

A NATURAL SYSTEMS GLOSSARY

A Glossary of Environmental, Biological, Zoological, Botanical, Ecological, Biogeographical, Evolutionary, Taxonomic, Hydrologic, Geographic, Geomorphologic, Geophysical, Meteorological and Climatological Terms

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INTRODUCTION

This glossary is the outgrowth of the InkaNatura guide training workshop held at Sandoval Lake Lodge and the Heath River Wildlife Center in southeastern Perú and adjacent Bolivia in January and February 2006. It began with the list of approximately 300 vocabulary words and terms generated during the workshop as well as many additional words and terms generated during the January and February 2008 guide training workshop held at Cock-of-the-Rock Lodge and Manu Wildlife Center in southeastern Peru. While originally intended for the use of the InkaNatura guides, it has expanded into a reasonably comprehensive glossary in excess of 2700 terms and useful throughout North and South America.

This version of the glossary should only be considered a draft. It has been compiled from many books and online sources. Some entries I wrote myself but the vast majority were cut and pasted from the many online and printed sources. In future versions the definitions will be edited down, but in this version, in the interest of time, for a large number of the entries several definitions from multiple sources have been included.

Throughout the glossary, words and terms in boldface type indicate other entries in the glossary.

GLOSSARY

abdomen - The part of the body that generally contains the intestines; also called the belly; in **organisms**, such as **insects** and spiders, is the last body section...In **entomology**, the part of an **insect's** body that contains the digestive system and the **organs of reproduction**.

aberrant - Departing from the normal or usual.

abiotic - Non-living components of the **environment**. ... Non-living, containing no living **organisms**. Abiotic influences on plants include **temperature** and rainfall. The opposite of **biotic**.

abiotic selection pressure - A **selection pressure** exerted by **climate** (seasonal stresses, **drought**, rainfall, **temperature**, etc.) or physical disturbance (fire, **hurricane**,

earthquake, flood, **erosion**, etc.) or soil (**nutrient** shortage or imbalance) (See: **selection pressure**)

ablation - Surface snow and ice loss from a **glacier** or covering of ice or snow.

abscisic acid - In **botany**, a growth-inhibiting **hormone**.

abscission zone - A layer of **cells** at the base of a **leaf petiole**, **flower**, or fruit stalk, the weakening of which causes the **organ** to separate from the plant.

abscission - The controlled separation of **leaves**, **flowers**, and fruit from plants.

absorption - The passage of water and **nutrients** through **cell membranes** instead of by direct ingestion. Also refers to how objects convert the solar radiation they receive into heat.

abundance - Number per unit area.

abyssal plain - The ocean floor beyond the **continental shelf**.

abyssal zone - The part of the oceanic zone that is found at depths greater than 2,000 meters (6,562 feet), where there is no sunlight, it is very cold, and the water pressure is high....The deep ocean zone that begins where light penetration ends....The **pelagic** zone that contains the very deep **benthic communities** near the bottom of oceans.....The deep sea (2000 meters or more) where there is no light.

accelerated erosion - **Erosion** that is much more rapid than natural **erosion**, or **geologic erosion**, and occurring primarily as a result of the influence of the activities of people or, in some cases, of animals or natural catastrophes that expose bare surfaces, for example, fires. (See: **erosion**)

accidental - In **biogeography**, used to describe a rare record of an animal outside its normal **geographic** distribution caused by unknown circumstances. (See: **vagrant**)

acclimation - Adjustment to **environmental** change by an individual. The **physiological** adjustment or increased tolerance shown by an individual **organism** to **environmental** change.... A reversible physical change in an adapting **organism** in response to **environmental** pressures. (See: **adaptation**)

acclimatization - Adaptation to a different climate.

accretion - The accumulation of **marine sediments** at the edges of a continent, building up in some cases into entire coastal mountain ranges.

achene - A dry and usually hard, one-seeded **fruit** that does not split open.

acid - A substance with a **pH** less than 7 due to prevalent hydrogen **ions**. Acids tend to be sour and corrosive. The human stomach contains hydrochloric acid with a **pH** of 1; battery acid is stronger, but not by much. Contrast with **basic**.

acid deposition - A comprehensive term for the various ways **acidic compounds** precipitate from the **atmosphere** and deposit onto surfaces... A complex chemical and **atmospheric** phenomenon that occurs when emissions of sulfur and nitrogen **compounds** and other substances are transformed by chemical processes in the **atmosphere**, often far from the original sources, and then deposited on Earth in either wet or dry form.... The transfer of acids or acid-forming substances from the **atmosphere** to the Earth's surface. Referred to as wet deposition when the transfer occurs through **precipitation** (rain, snow, fog); and dry deposition when the transfer occurs through other processes such as absorption and impaction.

acid rain - Rain containing **acids** that form when **sulfur dioxide**, **nitrogen oxides**, or similar industrial gas emissions combine with water... **Cloud** or rain droplets combine with gaseous **pollutants**, such as oxides of sulfur and nitrogen, to make falling rain or snow **acidic**... Rain that has become more **acidic** than normal (a **pH** below 5.0) as certain oxides present as airborne **pollutants** are absorbed by the water droplets... Rain that has become **acidic** after contact with certain **atmospheric** gases (primarily sulfur dioxide, **carbon dioxide**, and **nitrogen oxides**).... **Cloud** or rain droplets combine with gaseous **pollutants**, such as oxides of sulfur and nitrogen, to make falling rain or snow **acidic**.... **Precipitation** containing harmful amounts of nitric and sulfuric acids formed primarily by **nitrogen oxides** and sulfur oxides released into the **atmosphere** when **fossil fuels** are burned. .. Rainfall with a **pH** level of 7.0 or less. Long-term effects of acid rain are linked to adverse effects on **aquatic organisms** and plant life in areas with poor neutralizing (buffering) capacity, which can eventually lead to the "death" of a **lake** or similar body of water. Acid rain is also implicated in the death of many **species** of trees, *e.g.* Red Spruce, Sugar Maples, Paper Birch, Green Ash and other **species** in the northeastern United States. ... **Precipitation** with a **pH** less than 5.6 that forms in the **atmosphere** when certain **pollutants** mix with **water vapor**.... Water that falls to or condenses on the Earth's surface as rain, drizzle, snow, sleet, hail, dew, frost, or fog with a **pH** of less than 5.6. ... **Precipitation** heavy with nitric and sulfuric acid. Most of it is generated by sulfur dioxide and nitrogen dioxide (air **pollution**). Its pH is less than 5.6. Results include fish and plant deaths, corrosion, groundwater pollution, and soil **erosion**. Its long-term effects are unknown.... Acids form when certain **atmospheric** gases (primarily **carbon dioxide**, **sulfur dioxide**, and **nitrogen oxides**) come in contact with water in the **atmosphere** or on the ground and are chemically converted to **acidic** substances. Oxidants play a major role in several of these acid-forming processes. **Carbon dioxide** dissolved in rain is converted to a weak acid (carbonic acid). Other gases, primarily oxides of sulfur and nitrogen, are converted to strong acids (sulfuric and nitric acids).

Although rain is naturally slightly **acidic** because of **carbon dioxide**, natural emissions of sulfur and **nitrogen oxides**, and certain **organic** acids, human activities can make it much more **acidic**. Occasional **pH** readings of well below 2.4 (the acidity of vinegar) have been reported in industrialized areas. The principal natural phenomena that contribute **acid**-producing gases to the **atmosphere**

are emissions from volcanoes and from **biological** processes that occur on the land, in **wetlands**, and in the oceans. The effects of **acidic** deposits have been detected in **glacial** ice thousands of years old in remote parts of the globe. Principal human sources are industrial and power-generating plants and transportation vehicles. The gases may be carried hundreds of miles in the **atmosphere** before they are converted to acids and deposited.

Since the industrial revolution, emissions of sulfur and **nitrogen oxides** to the **atmosphere** have increased. Industrial and energy-generating facilities that burn **fossil fuels**, primarily coal, are the principal sources of increased sulfur oxides. These sources, plus the transportation sector, are the major originators of increased **nitrogen oxides**. The problem of acid rain not only has increased with population and industrial growth, it has become more widespread. The use of tall smokestacks to reduce local **pollution** has contributed to the spread of acid rain by releasing gases into regional **atmospheric** circulation. The same remote **glaciers** that provide evidence of natural variability in **acid deposition** show, in their more recently formed layers, the increased deposition caused by human activity during the past half century. (See: **acid deposition**)

acidic - Having a **pH** under 7....Of or referring to **acid**.

acidity - The property of being **acidic**.

acorn - A hard, one-seeded nut whose base is enclosed by a scaly cup.

acre - A measure of area equivalent to 43,560 square feet. One acre equals 4047 square meters or 0.4047 **hectares**. (See: **hectare**)

acre-foot - The amount of water it would take to cover an **acre** of land to a depth of one foot: 325,851 gallons of water. The standard measure of agricultural irrigation.

actinomorphic flower - A **flower** possessing **radial symmetry**; any cut through the center divides the **flower** into two equal parts.

Actinomycetales - Formerly classified as **fungi** because of their filaments, the Actinomycetales include many types of soil **bacteria**. They produce antibiotics, **enzymes**, and vitamins, although a few are harmful to humans.

active pursuit - A method of hunting practiced by birds such as Bat Falcons, *Falco ruficularis* that actively chase their **prey**.

acuminate - In **botany**, tapering gradually to a protracted point.

acute - In **botany**, terminating in a distinct but not protracted point, the converging edges separated by an angle less than 90 degrees.

adapt - To change, or change something, to suit different conditions or a different purpose; to make or become used to a new **environment** or different conditions. In nature, animals and plants often adapt through **evolution**.

adaptability - The ability to alter structure or function in response to changes in the **environment** in such a way that fundamental life processes can continue to cope with (or continue to function in) an uncertain **environment**.... The ability to adjust with changes in the **environment**.

adaptable - Capable of undergoing inheritable (and/or non-heritable) structural or functional changes in response to **environmental** changes that could otherwise impair life processes.

adaptation - The process of adapting....A **genetically** determined characteristic that enhances the ability of an individual to cope with its **environment**....The process(es) whereby **populations, species**, or individuals (or parts of individuals), change in structure, form, and/or function in such a way as to better survive under given **environmental** conditions....**Evolutionary** process by which an **organism** becomes fitted to its **environment**.... Changes in an **organism's** structure or habits that help it adjust to its surroundings. ... A condition or character which affords fitness to a species in a particular **environment**.... The result of the process of long-term **evolutionary** adjustment of a **population** to **environmental** changes, or short-term **physiological/behavioral** responses compensating for **environmental** changes. Frequently a short-term behavioral or **physiological** response, if it is generally adaptive, will be reinforced by **genetic adaptation** that ensures the longevity of the short-term response.... Biological adaptation is the process of changing or adjusting to altered **environmental** conditions. Adaptation can occur over the life of the **organism** (as in the responsive adjustment of a sense **organ**) or as used here, it can occur within a **species** due to **evolution** by **natural selection**.... In **evolutionary biology** a particular structure, physiological process or behavior that provides an **organism** with an advantage to better survive and reproduce....The **evolutionary** process which leads to the development or modification of an existing structure or function in response to a changed **environment**....The **physiological** response of sensory receptor **organs** (vision, touch, **temperature**, olfaction, audition and pain) to stimuli from the continually changing **environment**.... How living things change what they do or what they are to survive in a particular environment. In this the organism is not a passive recipient of external circumstances; the relationship is interactive.

adaptive radiation - The **evolutionary** divergence of a single ancestor **species** into several new **species** with different **ecological niches**. The **evolution** of a single ancestor **species** into several new **species** within a relatively short period of time and in a certain **geographic** area. The plants and animals of the Galápagos Islands are a result of adaptive radiation, where one plant or one animal **species** diversified into many **species** that fill a variety of **ecological** roles. For example, more than a dozen **species** of finches evolved from a single founding **species** that **colonized** the islands from the mainland of South America.... The relatively recent **evolution** of many **species** from a common ancestor,

with each **species** occupying a unique **ecological niche**.... **Evolutionary** divergence of members of a single **phyletic** line into many different **niches**.... The **evolutionary** divergence of a lineage of **organisms** into different **phenotypes**.... The **evolution** of many new **species** from a relative handful of ancestor **species**. It often happens after some kind of catastrophe empties a range of **ecological niches** simultaneously.

adiabatic cooling - When air masses expand and cool as they push up the side of a mountain.

advection - The horizontal movement of heat energy. A warm breeze through a relatively cool orchard, for instance....A horizontal movement of air or liquid.

adventitious - In botany, plant organs produced in an unusual or irregular position, or at an unusual time of development.

adventitious roots - A root that grows from somewhere other than the primary root, for example, roots that arise from **stems** or **leaves**. In the **tropics** trees will send adventitious roots into the mats or carpets of **mosses** and other **epiphytes** on their branches for the purpose of obtaining **nutrients** from these **epiphyte** mats..... A root arising in an unexpected position, such as from a stem or **leaf**.

adventitious shoot - A **shoot** arising in an unusual position, such as from the side of a root.

adult - Sexually mature; an animal that has contributed new individuals to a **population**.

aeolian landform - A landform sculpted by wind through deposition or **erosion**. Examples include dunes, **deflation** hollows, and sand-blasted outcroppings.

aerate - To add oxygen to water or soil.

aeration zone - The zone immediately below the land surface where the pores contain both water and air, but are not totally saturated with water. Plant roots can capture the moisture passing through this zone, but it cannot provide water for wells. Also known as the unsaturated zone or vadose zone.

aerial hawking - A method of hunting for **insects** practiced by many **species** of flycatchers as well as a number of other birds such as jacamars and Swallow-wing Puffbirds. Birds that hunt in this manner usually sit on an exposed perch from which they watch for passing insects, then fly up from their perch in aerial pursuit of insect prey. Often referred to as “true flycatching”, this encompasses all sallies in which aerial **prey** is pursued and captured in flight. Aerial **prey** is located while the bird searches from an exposed perch. Prey is snapped from the air after a rapid, direct flight off the perch. Especially after long sallies the bird may hover, glide, or float briefly at the point of capture. Escaping prey often are pursued with quick turns or a tumbling series of acrobatic maneuvers. Large **prey** items are carried to the perch for handling. No

flycatcher (**family** Tyrannidae) is known to habitually make multiple prey captures while searching on the wing, although this does occur occasionally in certain **genera** (e.g., *Contopus*, *Tyrannus*). This distinguishes aerial hawking from true aerial foraging that characterizes swallows (**family** Hirundinidae) and swifts (**family** Apodidae).

aerial root - A root emerging above soil level. Examples are the aerial roots of Red Mangrove, *Rhizophora mangle* and Black Mangrove, *Avicennia nitida*.

aerial sally (aerial sallying) - A method of hunting for **insects** practiced by many **species** of flycatchers as well as a number of other birds such as jacamars and Swallow-wing Puffbirds. Birds that hunt in this manner usually sit on an exposed perch from which they watch for passing insects, then fly up from their perch in aerial pursuit of insect prey. Same as **aerial hawking**. (See: **aerial hawking**)

aerie - Nest or dwelling made by some birds, such as an eagle or hawk, usually elevated in a tree or on a cliff; also called **eyrie**.

aerobe - Any **microorganism** that lives and grows on free oxygen. (See: **anaerobe**)

aerobic - In **biology**, living or occurring only in the presence of oxygen.... Capable of living only in the presence of free oxygen....Chemical reactions involving oxygen. (See: **anaerobic**)

aeroplankton - Tiny **organisms** living in the **atmosphere**. Certain small seeds, bacteria, and spores are examples.

aerosol - Particles of liquid or solid dispersed as a suspension in gas.

aerosolized - In a form capable of being dispersed through the air, for example, dry **virus** particles can be aerosolized because they are very small and light in weight.

aestivate (or estivate) - In zoology, to pass the summer in a **dormant** or **torpid** state. This is done by some species of **amphibians**, reptiles and **insects**. ...To spend the summer in a sleeplike condition of partial or total inactivity...To become **dormant** during the summer or dry season....To pass the summer in a certain manner or condition, often in a **dormant** or **torpid** state. It is when animals, especially **desert** animals, go into a state of **torpor** or **hibernation** in response to very dry conditions or hot temperatures (See: **aestivation, dormant, dormancy, hibernate, hibernation, torpid, torpor**)

aestivation (or estivation) - A period of inactivity during the summer months....A period of **dormancy** in cold-blooded animals during dry conditions; the metabolic rate is not decreased, but **metabolism** may become **anaerobic**, creating an oxygen debt. (See: **aestivate, dormant, dormancy, hibernate, hibernation, torpid, torpor**)

aflatoxin - Any of a family of **mycotoxins**, produced by **molds** of the *Aspergillus* **genus**, that can be **toxic, carcinogenic, mutagenic** or **teratogenic**; typically found as

contaminants of animal food or peanuts...Aflatoxins are naturally occurring **mycotoxins** that are produced by many species of *Aspergillus*, a **fungus**, most notably *Aspergillus flavus* and *Aspergillus parasiticus*. Aflatoxins are **toxic** and among the most **carcinogenic** substances known.

after-ripening - A maturation process in **seeds** of particular **species** after **dispersal**, required for **germination**.

age class - A general term applied to **organisms** which are born, hatched, etc. within a specified time period; also a life stage. Age class time frame varies with generation time of **organisms**. For example, the young, juvenile, and adult age classes of many small **mammals** occur within a single year, whereas for trees, the young age class encompasses several years, typically 10.

age distribution - The **demography** of the comparative ages of individuals in a **population**, commonly graphed as a '**population pyramid**'.

aggradation - The build-up or raising of a river or sea bed due to **sediment deposition**...The process by which a **stream's** gradient steepens due to increased **deposition** of **sediment**... Accumulation of **sediment** in a **stream** channel on an **alluvial fan** or on a **floodplain**. Also applied to **sediment** accumulation on slopes.... To raise the channel of a **river** by depositing **sediment** and similar materials.... Aggradation in **geology** is the accumulation of **sediment** in **ivers** and nearby landforms. Aggradation occurs when **sediment** supply exceeds the ability of a **river** to transport the **sediment**. As an example, the quantity of **sediment** entering a **river** channel may increase when climate becomes drier. ... A downward accumulation of **stream-carried inorganic** matter. Often has the effect of making the bed of a **stream** or **floodplain** rise. Also, a phase of forest **biomass** accumulation in the years that follow a harvest.

aggregate fruit - In **botany**, a group of small fruits derived from several **ovaries** within a single **flower**.

agroforestry - A farming practice which integrates timber plantation with agricultural production on the same area of land. The combination of trees with crops not only provides a diversification of produce, but also provides habitat and protection from soil erosion and salinity.... Planting crops among trees.

aguajal (plural: *aguajales*) - Local name in Amazonian Peru for a **swamp** dominated by *Mauritia flexuosa* palms. Roughly 10% of the Amazon basin is estimated to be covered by *aguajales*.

air bladder - An air-filled sac that helps keep certain **organisms**, such as fish, afloat in water; also known as a swim or gas bladder.

air mass - A large body of air that has similar horizontal **temperature** and moisture properties.... Large body of air, often hundreds or thousands of miles across, containing

air of a similar temperature and humidity. Sometimes the differences between air masses are hardly noticeable, but if colliding air masses have very different temperatures and humidity values, storms can erupt. (See: **front**)

air plant - See **epiphyte**.

air pollution - Gases, liquids and solids which, when added to the normal composition of the **atmosphere**, may be hazardous to **biology**, **ecology** or human health. Processes leading to **pollution** of the **atmosphere** include attrition, vaporization and combustion. Types and sources of air pollution include **photochemical smog**, transportation exhausts, incinerator emissions, forest fire smoke, industrial discharges, **greenhouse gases** (**carbon dioxide**, **nitrous oxides**, **methane**, **CFCs**, etc.), suspended particulates, oxides of carbon and sulfur, **inorganic** and **organic** acids, **toxic** chemicals, trace elements, irritants and odors.... The existence in the air of substances in concentrations that are determined unacceptable. Contaminants in the air we breathe come mainly from manufacturing industries, electric power plants, automobiles, buses, and trucks.... Most air pollution derives in one form or another from the use of petroleum products, oil in particular.

air pressure - The pressure exerted by the weight of air above a given point, usually expressed in millibars (mb) or inches of mercury (in. Hg). ... The weight of the **atmosphere** over a particular point, also called **barometric pressure**. Average air exerts approximately 14.7 pounds (6.8 kg) of force on every square inch (or 101,325 Newtons on every square meter) at sea level. Also known as **atmospheric pressure**. (See: **atmospheric pressure**, **barometric pressure**)

airshed - An area characterized by air with common qualities. Compare to **watershed**.

albedo - The percentage of incoming radiation reflected off a surface...The luminosity shining from a reflective surface. Earthshine is one type. About 1/3 of the sun's radiation is reflected back into space, with the remaining 42% warming the land and air and 23% moving water through the hydrologic cycle. (See: **albedo effect**)

albedo effect - An index of the "reflectiveness" - a way of quantifying how much radiation is reflected back, as opposed to that absorbed. low albedo ~0 absorb most of the radiation and high ~1 reflect itThe fraction of incident electromagnetic radiation reflected by a surface, especially of a celestial body.... A term referring to the reflecting properties of surfaces. White surfaces have albedos close to 1; black surfaces have albedos close to 0.

Several types of albedos are in common use. The Bond albedo (AB) determines the energy balance of a planet or satellite and is defined as the fraction of the total incident solar energy that the planet or satellite reflects to space. The "normal albedo" of a surface, more properly called the normal reflectance (rn), is a measure of the relative brightness of the surface when viewed and illuminated vertically. Such measurements are referred to as a perfectly white Lambert surface—a surface which absorbs no light and scatters the incident energy isotropically—usually approximated by magnesium oxide (MgO), magnesium carbonate (MgCO₃), or some other bright material.

Bond albedos for solar system objects range from 0.9 for Saturn's icy satellite Enceladus and Neptune's Triton to values as low as 0.01–0.02 for dark objects such as the satellites of Mars. Cloud-shrouded Venus has the highest Bond albedo of any planet (0.76). The value for Earth is 0.35. The Bond albedo is defined over all wavelengths, and its value therefore depends on the spectrum of the incident radiation.... The ratio of the outgoing solar radiation reflected by an object to the incoming solar radiation incident upon it. (See: **planetary albedo, cloud albedo**)

albinism - Albinism is an inherited condition present at birth, characterized by a lack of **pigment** that normally gives color to the skin, hair, and eyes. Many types of albinism exist, all of which involve lack of **pigment** in varying degrees.... The **congenital** absence of pigmentation in the eyes and skin and hair. ...A condition related to the production of **melanin** in the body, which controls coloring in areas such as the skin, eyes and hair. a lack of **melanin** usually results in characteristics such as pale skin, white hair and red eyes, a **phenotype** which is inherited as a result of a **genotype** that possesses an inborn error of **metabolism** where tyrosine (an **amino acid**) cannot be broken down within a biochemical pathway involved with **melanin**. (See: **leucism, albino**)

albino - An **organism** exhibiting **albinism**... A person or animal lacking normal pigmentation, with the result being that the skin and hair are abnormally white or milky and the eyes have a pink or blue iris and a deep-red pupil. (See: **albinism, leucism**)

alder swamp - Wet, **nutrient** rich site, often with mucky soils and the **vegetation** dominated by alders, *Alnus* spp.. The **nutrient**-poorer alder **swamps** with abundant Black Spruce, *Picea mariana*, and poorly growing alder **shrubs** have been separated as **mesotrophic** alder swamps. Alder swamps often occur at **bog** borders influenced by seepage water.

algae (singular: **alga**) - A wide diversity of chiefly **aquatic organisms** comprising the **seaweeds** and various **freshwater** forms varying in appearance and size from single-celled **phytoplankton** to multicellular **macroalgae** such as kelps. They are the Earth's dominant **autotrophs** supplying 50-60% of all **photosynthesis** on Earth. ...A group of chiefly **aquatic** plants (*e.g.*, **seaweed**, pond scum, stonewort, **phytoplankton**) that contain **chlorophyll** and may passively drift, weakly swim, grown on the substrate, or take root in a water body.... A group of plant-like **organisms**, mainly **aquatic**, that lack roots, stems and **leaves**, and are capable of producing food using light energy.... Simple rootless plants that grow in sunlit waters in relative proportion to the amounts of **nutrients** available. They are food for fish and small **aquatic** animals, and a factor in **eutrophication**.

algal - Of or referring to **algae**.

algal bloom - A readily visible, concentrated, distinctively colored growth or aggregation of **plankton** (plant and/or animal) in water.... A suffocating build-up of rapidly multiplying **algae** and **bacteria**, occurring in phosphorus-enriched waterways caused by run-off sewage, fertilizers and the processes of **eutrophication**. The resulting increased

biological activity transforms the water-mass green or red with large-scale **decomposition** rendering the **habitat** malodorous and **toxic**. Since all available oxygen is utilized by the bloom, **anaerobic organisms** begin to dominate the sediments, killing most of the animals from the previously viable **aquatic habitat**.... Sudden spurts of **algal** growth due to greatly increased amounts of phosphorus entering the **aquatic ecosystem** from sewage systems and agricultural fertilizers. Excessive growth of the **algae** causes destruction of many of the higher links of the **food web**. **Algae** that die and sink to the bottom at the end of the growing season stimulate massive growth of **bacteria** the following year, resulting in depletion of oxygen in the deeper water layers. This may result in fish kills and replacement with less valuable **species** who may be more tolerant of increased phosphorus levels. Deoxygenation also may cause chemical changes in the mud on the bottom, producing increased quantities of chemicals and toxic gases. All these changes further accelerate the **eutrophication** (aging) of the **aquatic ecosystem**.... Explosion of a **phytoplankton population**, sometimes because of incoming **pollutants** that artificially enrich the waters with **nutrients**. (See: **eutrophication, red tide**)

algal film - A thin layer of **microscopic algae** on the surface of rocks, etc.

algal mat - A layer of **algae** usually filamentous on **marine** soft bottoms.

alien species - See **exotic species, invasive species**.

alkaline - Substance capable of neutralizing acid, with a pH greater than 7.0.... Having a **pH** over 7; emits hydroxyl **ions**. Also called “**basic**.” It neutralizes the **acids** it combines with chemically. (See: **pH, acidic**)

alkalinity - The capacity of water for neutralizing an acid solution.

alkaloids - A nitrogen-containing **compound**, frequently used as a chemical defense by plants. (See **secondary compounds**)

allele - One of two or more alternative forms of a **gene**, occupying the same position (locus) on paired **chromosomes** and controlling the same inherited characteristic.... One of two or more different chemical codes possible for a given **gene**. Offer variation in a given trait.... Alternative form of a **genetic** locus; alleles are inherited separately from each parent (*e.g.* at a locus for eye color there might be alleles resulting in blue or brown eyes). Alleles arise through **mutations** in a given **DNA** sequence. If the locus codes for a **protein**, alleles can result in different **phenotypes**. Alleles can be dominant (a single dose is sufficient for expression of the **phenotype**) or recessive (both **genes** must carry a **mutant** allele in order to express the trait). At the **genotype** level, the alleles at a given locus are co-dominant. Different alleles can also be found in silent regions of the **genome** (the non-coding part of the genome). Some loci are bi-allelic, having only two alternative forms, but the most useful loci for gene mapping, **population** studies and human identification analyses are those which are multiallelic, resulting in a high polymorphism content of the locus at the **population** level.... Alternate versions of a given gene: for eye color, for example, the blue allele vs. the brown allele.

allelochemic - A type of chemical synthesized by plants that confers some protection against **herbivores** or **predators**. Common examples are terpenoids and **phenolics**. See defense **compound**.

allelochemicals - Biochemicals which an organism produces that influence the growth, survival, and reproduction of other organisms. They can have beneficial (positive allelopathy) or detrimental (negative allelopathy) effects on the target organisms. (See: **allelopathy**)

allelopathic - Used to describe a plant that releases **allelochemicals** to influence the growth, survival, and reproduction of other organisms. (See: *allelochemicals*, **allelopathy**)

allelopathy - Release of chemicals by a plant to discourage the growth of other plants near it.... The metabolic impact of one plant on another, whether beneficial or harmful. Example: *Eucalyptus* tree toxins that inhibit the growth of certain plants.... A biological phenomenon by which an organism produces one or more biochemicals that influence the growth, survival, and reproduction of other organisms. Allelopathy is characteristic of certain plants, algae, bacteria, coral, and fungi. (See: *allelochemicals*)

Allen's Rule - The warmer the climate the longer the appendages (ears, legs, wings) of **warm-blooded** animals in comparison with closely related **taxa** from colder climates.... Originally proposed by Joel Asaph Allen (1877), this rule states that certain extremities of animals are relatively shorter in the cooler parts of a **species'** range than in the warmer parts....An animal's extremities are shorter in colder parts of its range than in warmer parts. (The term "extremities" mainly refers to arms, legs, ears and snout/nose).

allochthonous - Something **organic** imported into an **ecosystem** from outside of it, e.g., **nutrients** brought by **streams** or blown in on the wind. Contrast with **autochthonous**.

allogenic - Originating outside a system.

allogenic succession - The kind of **succession** in which one kind of plant **community** replaces another because of a change in the **environment** which was external to and independent of that produced by the plants themselves. *e.g.*, decrease in soil moisture by improved drainage. (See: **ecological succession, autogenic succession, community succession, primary succession, secondary succession, sere, seral stage, seral, ecesis**)

allomothering - Caretaking of infants by individuals other than the infant's mother. This does not necessarily include suckling the infant.

allopatric - Referring to a situation where the **geographical** distributions of two **taxa** do not overlap (*e.g.* they do not breed in the same place at the same time)... Term describing two **populations** (or **species**) that are **geographically** separated and thus cannot potentially **interbreed**.... Relating to or involving two **populations** of the same **species**

which cannot **interbreed** because they are separated by a **geographic** barrier, such as a mountain range or wide river ... Literally, "other country"; refers to distribution areas of different **taxa** that do not overlap. (See: **allopatry, allopatric speciation, geographic isolation, sympatry, sympatric, parapatry, parapatric, parapatric speciation**)

allopatric speciation - Evolutionary divergence of **populations** which forms different **species** due to **geographic** separation, which do not interbreed.....Allopatric speciation, also known as **geographic speciation**, is the phenomenon whereby biological **populations** are physically isolated from one another by an extrinsic barrier (mountain range, large river, etc.) and evolve intrinsic (genetic) **reproductive isolation**, such that if the barrier breaks down, individuals of the **populations** can no longer interbreed. **Evolutionary** biologists agree that **allopatry** is a common method by which new **species** arise. By contrast, the frequency of other types of **speciation**, such as **sympatric speciation, parapatric speciation, and heteropatric speciation**, is debated. (See: **allopatric, sympatry, sympatric, parapatry, parapatric** and for more information on the formation of **species** see: **speciation, species, geographic speciation, allopatric speciation, parapatric speciation, sympatric speciation, heteropatric speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

allopatry - The occurrence of related organisms in separate geographical areas with no overlap....The condition of two organisms or groups of organisms inhabiting different places. Contrast with **parapatry**. In allopatry there is a hiatus between the **ranges** whereas in **parapatry** the **ranges** abut. (See: **allopatric, allopatric speciation, geographic isolation, sympatry, sympatric, parapatry, parapatric**)

allopolyploid - A **hybrid** arising from the combination of **chromosomes** from two different **species**.

allotype - A term, not regulated by the **International Code of Zoological Nomenclature**, for a designated specimen of opposite sex to the **holotype**. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

alluvial - Of or relating to **alluvium**, mud and/or sand deposited by flowing water.... Referring to layers of **sediment** deposited by flowing water..... A type of azonal soil which is highly variable and is classified by texture from fine clay and silt soils through gravel and boulder deposits.

alluvial deposit - A fan-shaped deposit of sediment at the mouth of a **stream** or **river**. (See: **alluvial fan**)

alluvial fan - A triangular deposit of **sediment** left by a **stream** that has lost velocity upon entering a broad, relatively flat valley. ... A fan-shaped deposit of **sediment** that forms where a **stream's** velocity decreases abruptly or where a **stream** coming off a

sloped incline encounters a less steep surface (like a valley floor) and slows down. ... A low, outspread, relatively flat to gently sloping mass of loose rock material deposited by a **stream** where it flows from a narrow mountain valley... A large, fan-shaped pile of **sediment** forming at the base of narrow canyons onto a flat plain at the foot of a mountain range.... An outspread, gently sloping mass of **alluvium** deposited by a **stream**, especially in an arid or semiarid region where a **stream** issues from a narrow canyon onto a plain or valley floor. Viewed from above, it has the shape of an open fan, the apex being at the valley mouth.... An outspread, gently-sloping mass of detritus deposited by moving water where there is an abrupt change in gradient from steep to gentle, as from mountain gorge to valley floor.... A fan-shaped area of sediment caused by a fast-flowing stream slowing down as it flows into flatter land. (See: **alluvial deposit, delta**)

alluvial plain - A plain bordering a river, formed by the **deposition** of material eroded from areas of higher elevation.

alluvial soil - A general term for those soils developed on a fairly recent **alluvium**.

alluvium - A general term for all **sediment** deposits resulting directly or indirectly from **sediment** transport within **streams** deposited in riverbeds, **floodplains**, lakes, fans and **estuaries**.... A **sediment** deposited by **streams** and varying widely in particle size. The stones and boulders when present are round or sub-rounded. Some of the most fertile soils are derived from **alluvium** of medium or fine texture.... Material such as earth, sand, gravel, or other rock or mineral materials transported and laid down by flowing water. ... A general term for all detrital material deposited or in transit by streams, including gravel, sand, silt, clay, and all variations and mixtures of these. ... Sediment transported by water, usually **river** or **stream** water.... Soil, usually rich in minerals, deposited by water, as in a floodplain. (See: **colluvium, sediment, silt**)

alongshore - Parallel and close to the coastline.

alpha diversity - Local diversity, the variety of **organisms** in a given **habitat** or location.

alpha predator - See **apex predator**.

alpine - Living or growing above **treeline**.... Pertaining to the region above the **treeline**.... The zone on mountain tops between permanent snow and the cold limits of trees.... Habitats at very high elevations, usually rocky and characterized by a lack of trees and a short growing season.... Found above the timber line at high **altitudes**.... By botanical definition, a plant found in pastures between the tree line and snow line of mountainous districts.

alpine glacier - A mountain **glacier**, a small **glacier** sitting in a U-shaped mountain valley.

alternate leaves - One leaf at each node, alternating from one side to the other of the

stem. Whether a plant has alternate or opposite leaves can be important in its identification.... Leaves that are spaced at different points along each side of a stem, alternating right and left sides and not opposite each other. (See: **opposite leaves**)

alternate plumage - In ornithology, the plumage worn by an adult bird during the breeding season, produced by a partial molt before breeding. Breeding plumage and nuptial plumage are synonyms. (See: **breeding plumage**)

alternation of generations - Term referring to a plant life cycle in which there is more than one free-living stage, typically a **spore**-producing **sporophyte** generation and a **gamete**-producing **gametophyte** generation.... The alternation between **diploid** and **haploid** cells or **organisms**.... A life cycle in which a multicellular **diploid** stage is followed by a **haploid** stage and so on; found in land plants such as **ferns**, and many **algae** and **fungi**.... In **botany**, the sequence of a **haploid gametophyte** and a **diploid sporophyte** during the course of a life cycle.

alternative fuels - Fuels from sources cleaner than **fossil fuels**: ethanol, **methanol**, solar, wind, geothermal, biodiesel from vegetable oil, etc.

alterne - In **ecology**, a **community** exhibiting alternating dominance with other **communities** in the same area....Plant **communities** that alternately occupy a territory.

altimeter - An used to measure the **altitude** of an object above a fixed level. For example, a laser altimeter can measure height from a spacecraft to an ice-sheet. That measurement, coupled with radial orbit knowledge, will enable determination of the **topography**.

altiplano - High-elevation, relatively flat plain between the eastern and western Andean ridges.

altitude - A measure of height or **elevation** above sea level. Often used interchangeably with **elevation**.

altitudinal - Referring to **altitude**.

altitudinal gradient - See **elevational gradient**.

altitudinal migrant - See **migrant**.

altitudinal replacement - See **elevational replacement**.

altitudinal zonation - The sorting of plant and animal species according to elevation in response to differences in temperature and **precipitation** patterns.

altocumulus cloud - A middle **altitude** cloud, usually white or gray. Often occurs in layers of patches with wavy, rounded masses or rolls.

altricial - Incapable of independent living at birth...Altricial birds are either naked or have very sparse down at hatching. Usually they have their eyes closed at hatching, are fed by their parents for some period of time, and may stay in the nest for an extended period after hatching. The opposite of **precocial**... (in birds) born with eyes closed, without feathers or down, unable to walk or fly, and dependent upon parent for food; the American Robin, *Turdus migratorius* is an example of an altricial bird. (See: **precocial**, **semi-precocial**)

altruism : A social interaction or type of behavior where an **organism** does good to another **organism** at the expense of its own welfare. Disinterested altruism is a disadvantage from an **evolutionary** viewpoint. There are however interested forms of altruism, which may favor survival of the individual or the **species**, by being cooperative. A gene can be **altruistic** if promotes the welfare of another entity.

altruistic - Of or referring to **altruism**.

ambush predator - An animal that attacks its prey from a motionless or concealed position. Also known as a **sit-and-wait predator**.

Amazonia - The lowland portion of the Amazon River basin, encompassing portions of nine countries (Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname and French Guiana) and covering about 4,355,200 square kilometers (about 2,722,000 square miles).

Amazonian - Of or referring to **Amazonia**.

amensalism - An interaction in which one **organism** or **population** adversely affects a second **organism** or **population**, but the second has no effect on the first.... A **symbiotic** relationship in which members of one **population** inhibit the growth of another **population** without being affected.... A one-sidedly harmful relationship between dissimilar **organisms**. (See: **commensalism**, **mutualism**, **parasitism**, **symbiosis**)

amino acid - Any of a class of **organic compounds** that contains at least one amino group, $-NH_2$, and one carboxyl group, $-COOH$. The alpha-amino acids, $RCH(NH_2)COOH$, are the building blocks from which **proteins** are constructed.... An **organic compound** containing an amino group (NH_2), a carboxylic acid group ($COOH$), and any of various side groups, especially any of the 20 **compounds** that have the basic formula $NH_2CHRCOOH$, and that link together by peptide bonds to form **proteins** or that function as chemical messengers and as intermediates in **metabolism**.... Any of a group of 20 **molecules** that combine to form **proteins** in living things. Chemically they contain an amino group, $-NH_2$, and a carboxyl group, $-COOH$. The sequence of amino acids in a protein is determined by the genetic code. There are actually 21 in number, with the 21st, Selenocysteine, being seldom used. They are the building blocks to form **proteins**, e.g. Glycine.... Ammonia-carbon **acids** that when strung together in long double-bonded

chains (peptides) build **proteins**. The **genetic** code inscribed in **DNA** employs twenty of them.

ammonia - A gaseous compound of nitrogen and hydrogen (NH₃) formed as a byproduct when **bacteria** decompose substances high in nitrogen. Compost piles thick with manure often emit ammonia when hot. Synthetic ammonia is a key component of artificial fertilizers.

amnion - A fluid-filled sac that safely enfolds a growing **mammal**, **reptile**, or bird embryo. The amnion is thought to have allowed animals to come out of the sea onto land.

amoebiasis - See **amoebic dysentery**.

amoebic dysentery - **Amoebic dysentery** or amoebiasis is an inflammation of the intestines caused by the **protozoan** *Endamoeba histolytica*; usually acquired by ingesting food or water contaminated with feces; characterized by severe diarrhea. (See: **dysentery**)

amphibian - Belonging to a group of **vertebrates**, or animals having a backbone, that begin life in the water or a very moist **environment** and generally transform to land-dwelling adults; frogs, toads, and salamanders are examples of amphibians. ...A member of the **class** Amphibia.

amphidromous - Refers to fishes that regularly migrate between freshwater and the sea (in both directions), but not for the purpose of breeding, as in anadromous and catadromous species. (See: **anadromous**, **catadromous**, **diadromous**)

amphipod - A small **crustacean** which has a laterally compressed body with no **carapace** and belongs to the **order** Amphipoda; a scud, or sideswimmer, is an example of an amphipod.

amplexus - The mating of **amphibians**, male grasps female tightly while sitting on her.... The mating position of frogs and toads. The male "hugs" the female and waits for her to lay eggs so that he can fertilize them.... The sexual embrace of male **amphibians**. There are two types, pectoral, where the male clasps the female from behind with his forelimbs in the chest and pelvic in which the male clasps the female from behind with his forelimbs around her waist.... Reproductive behavior in which the male grasps the female with his limbs before mating; fertilization is external.

amplitude - The distance from the midpoint to the crest or trough of a wave.

anabolic - **Metabolic** processes that build **tissues** and **organs**. The opposite of **catabolic**.

anadromous - In fish, migrating from the sea to freshwater rivers and streams in order to reproduce; American Shad and many species of salmon are examples of anadromous fish. Opposite of **catadromous**. (See: **amphidromous**, **catadromous**, **diadromous**)

anaerobe - Any microorganism which lives and grows in the absence, or almost absence, of oxygen. They are widely distributed in nature with just a few being infectious occurring, typically, in deep puncture wounds that exclude air or in tissue that has diminished oxygen....Any species which generally lives in the absence of oxygen.

anaerobic - Living or active in the absence of **atmospheric** oxygen....Without free oxygen.... Chemical reactions in the absence of oxygen and often initiated by **bacteria** or archaeans (**bacteria**-like **organisms** that live in extreme conditions).... Capable of living in the absence of, or not requiring, molecular oxygen. (See: **aerobic**)

anaeroby - Of or referring to an **anaerobic** condition.

anagensis - **Evolutionary** change, but without spilling over into **speciation**.

anamorph - The asexual form (also called the imperfect state) in the life cycle of a fungus, when asexual spores (such as conidia) or no spores are produced.

Anapsid - A **vertebrate** whose skull contains no side openings behind the eyes. The only living examples are turtles.

anastomose - To join together, as in the **aerial roots** of a **strangler** fig.

ancient forest - see **old-growth forest**.

anemometer - Instrument used to measure wind speed, usually measured either from the rotation of wind-driven cups or from wind pressure through a tube pointed into the wind.

anemophilous - Referring to seed plants pollinated by the wind.... Normally wind-pollinated.

aneuploidy - A condition in which **chromosome** numbers are not in exact multiples of the **haploid** set; having extra or missing **chromosomes** within a **nucleus**.

Angiosperm / Angiospermae - The botanical name for the group of **vascular flowering plants** that produce seeds enclosed in an **ovary**; includes **trees**, **bamboos**, other **grasses** and palms, but not **fungi**, **lichens**, **mosses**, **liverworts**, **hornworts**, or **ferns**, A group of plants that produce **seeds** enclosed within an **ovary**, which may mature into a fruit; **flowering plants**....Any class of **flowering plants** characterized by **seeds** that are fully enclosed by **fruits**. ... Literally, "angion" is Greek for container or vessel and "sperma" means **seed**. Thus an angiosperm is a plant that produces seeds enclosed in a container. The container holding the **seeds** is known as an **ovary**. Compare with **gymnosperms**. The angiosperms are the most successful seed producing plants in terms of sheer numbers with over 250,000 species.... A member of a **class** of plants characterized by the formation of **flowers** and **seeds** in **fruits**.... The flowering **vascular plants** which dominate many **terrestrial habitats** such as **deciduous forest**, **sclerophyll forest** and

rainforest. Class Angiospermae is primarily differentiated from the Gymnospermae by its mode of reproduction, which is via the seed, the fruit and the **flower** with its **pistil** and **stamen**. Angiosperms are divided into monocotyledonous and dicotyledonous plants.

angle of incidence - The angle at which the sun's rays hit the Earth.

angle of repose - The maximum slope at which soils and loose materials on the banks of canals, rivers or embankments stay stable.

anion - A negatively charged **ion**. (See: **ion, cation**)

anisotropic - Having properties that change with changing directions.

annelid - Elongated, segmented **invertebrate** including earthworms and leeches of the **phylum** Annelida.

Antarctic Circle - The Antarctic Circle is one of the five major circles of latitude that mark maps of the Earth. It is the parallel of latitude that runs approximately 66° 34_03_ (or 66.56756°) south of the Equator. The region south of this circle is known as the Antarctic, and the zone just to the north is called the Southern Temperate Zone. The equivalent Polar circle in the Northern Hemisphere is called the **Arctic Circle**.

The Antarctic Circle marks the northern extremity of the polar day (24-hour sunlit day, often referred to as the "midnight sun") and polar night (24-hour sunless night). South of the Antarctic Circle, the sun is above the horizon for 24 continuous hours at least once per year and below the horizon for 24 continuous hours at least once per year. On the Antarctic Circle those events occur, in principle, exactly once per year, at the June and December solstices, respectively.

annual - In **botany**, a plant with a lifespan of one year... Plants that grow and reproduce sexually during one year.... A plant completing its life cycle within a single growing season.... Pioneer plants which grow, flourish, and die in one season. Their seeds often germinate during the following wet season. (See: **perennial, biennial**)

annual ring - In **botany**, a cylinder of secondary **xylem** added to the **wood** in a single growing season. Also known as a growth ring. (See: **growth rings**)

annulate - With ring-like segments or divisions.

anoxic event - A period when the Earth's oceans are free of oxygen below the surface layer. (See: **oxygen depletion, hypoxia**)

anoxic waters - Areas of sea water, freshwater or groundwater that are depleted of dissolved oxygen. (See: **hypoxia**)

ant plant - See **myrmecophyte**.

Antarctic oscillation (AAO) - A low-frequency mode of **atmospheric** variability of the Southern Hemisphere.

antennae - Delicate sense organs on an **insect's** head, which it uses to smell, touch, taste, or hear the world.

anterior - Front, foremost, head.

anther - The **pollen**-bearing part of a **stamen**....The male portion of a **flower**, found on the tip of the **filament**; numerous anthers surround the female part, or **stigma** and **ovary**, of the flower.... The **pollen**-producing tip of a flower's **stamen**....The sac or sacs in which a **stamen** produces **pollen**.

antheridium - The male sex organ of plants other than **gymnosperms** and **angiosperms**.... The organ that produces antherozoids - male **gametes** or sperm **cells** - in **algae**, **bryophytes** (**mosses**, **liverworts** and hornworts), and pteridophytes (**club mosses**, **ferns**, horsetails). (See: **archegonium**)

anthesis - The time of pollination or bloom.... The time at which a flower comes into full bloom.

anthocyanin - Anthocyanins are water soluble **pigments** that reflect the red to blue range of the visible spectrum. They are responsible for the red, purple, and blue colors of many fruits, vegetables, cereal grains, and flowers. They belong to a class of **compounds** called flavonoids. They have long been the subject of investigation by botanists and plant physiologists because of their roles as **pollination** attractants and **phytoprotective agents**. A major function of anthocyanins is to provide color to most flowers and fruits. The colors can help attract pollinating animals to flowers and animals that will help disperse seeds. Anthocyanins act as powerful antioxidants. They are thought to help protect leaves from **ultraviolet radiation** by absorbing certain wavelengths. However, some botanists think that may not be true for all plant **species**. Anthocyanins are also thought to deter **herbivores** in some **species**. ... A water-soluble **pigment**, varying from red to blue.... Blue, purple, red, or pink water-soluble flavanoid pigment in cell sap. (See: **xanthophyll**, **secondary compounds**)

anthracnose - Plant disease caused by acervuli-forming fungi (order Melanconiales) and characterised by sunken lesions and necrosis. (See: **canker**)

Anthropocene - The term used by some scientists to describe the most recent period in the Earth's history, following the **Holocene**.... The current **geological** period, wherein human activities have a powerful effect on the global **environment**.

anthropocentric - Of or referring to **anthropocentrism**.

anthropocentrism - A belief, doctrine or attitude in which the Universe is regarded as centered around humankind and organized in terms of human values). Anthropocentrism

has been fostered by religious beliefs, placing human beings at the center of Creation, until scientific theories laid down by Darwin, Wallace and other naturalists in the mid-19th century have demonstrated that all living beings have common evolutionary roots and share mutual interdependence relationships, including our species. Bioethics based on anthropocentric views overlooks the many issues in which other species are involved, centering its attention only on human beings. ... The belief that the Earth is merely a stage for human salvation or self-development without any intrinsic importance of its own. ... Regarding the natural world only for what it does for humans. Contrast with **biocentrism**.

anthropogenic - Of human origin or influence, as in the anthropogenic maintenance, through burning, of many of the savannas of South America.... Made by people or resulting from human activities. Usually used in the context of emissions that are produced as a result of human activities.

anthropomorphic - Of or referring to **anthropomorphism**.

anthropomorphism - The attribution of human qualities to animals, inventions and other non-human objects or organisms. Although animals may not display properties related to human intelligence, they may have variations on other human qualities such as emotions and feelings like sadness or pain.

anthroposphere - The realm of human activity and infrastructure, a rapidly growing component of the **biosphere**. The anthroposphere has an input of materials and **natural resources**, and outputs a flow of waste materials. (See: **biosphere**)

anticline - An arch-shaped fold in layers of rock.

anticyclone - An area of high **atmospheric pressure** which has a closed circulation that is anticyclonic (clockwise in the northern hemisphere and counterclockwise in the southern hemisphere)...High pressure area with counterclockwise winds in the Southern Hemisphere and clockwise winds in the Northern Hemisphere.... A high pressure area where winds blow clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere. ... A high-pressure system that spirals outward clockwise in the Northern Hemisphere and counterclockwise in the Southern. (See: **anticyclonic rotation**)

anticyclonic rotation - Rotation in the opposite sense as the Earth's rotation, *i.e.*, clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere as would be seen from above. The opposite of **cyclonic rotation**.

antinutrients - Chemicals produced by plants as a defense mechanism; inhibit the action of digestive **enzymes** in **insects** that attack and attempt to eat the plants. (See: **secondary compounds**)

antiphonal singing - In music, when two or more voices sing against each other in a question-answer style, singing alternately or when two or more choirs of singers alternate

from different parts of a concert hall. In birds, this type of singing is found commonly in the wrens, **family** Troglodytidae, especially in the **genera** *Thryothorus*, *Campylorhynchus* and *Henicorhina* (See: **duet**, **duetting**, **chorusing**, **counter-singing**)

antler - One of a pair of hornlike, bony, growths, usually elongated and branched, on the head of a deer, moose, elk, caribou, or other member of the deer family. In most **species**, only males bear antlers. In contrast with the horns of cattle, antlers are shed after the mating season and are re-grown each year. Antlers are made of bone whereas the horns of cattle are made of **keratin** and other **proteins**. (See: **horn**)

anuran - Refers of a member of the **order** Anura, the frogs and **toads**.

apex - The end, tip, or outermost part.

apex predator - **Apex predators** are **predators** that, as adults, are not normally preyed upon in the wild in significant parts of their **ranges**.... A **species** that kills and eats other animals, but has virtually no **predators** of its own, Also known as **alpha predators**, **superpredators**, or **top-level predators**.

aphelion - The point in its orbit when a planet is farthest from the sun.... The annual point where the Earth is farthest from the sun (152.5 million kilometers). It falls on the 3rd or 4th of July. The opposite of **perihelion**.

aphytal - The plantless zone at the bottom of a lake.

apical - At the end, tip, or outermost part.

apical bud - In **botany**, a bud at the tip of a **stem**.

apical dominance - In **botany**, the inhibition of **axillary bud** growth by the **apical bud**.

apical meristem - In **botany**, a region of actively dividing **cells** at the tip of a growing root or **stem**....Group of **cells** at the growing tip of a branch or root. Its **cells** divide to create new tissues.... **Meristem (embryonic tissue)** at the tip of a shoot or root that is responsible for increasing the plant's length or height.... The tissue-creating **cells** at the growing tip of a branch or root.

apomixis - In **botany**, apomixis is **asexual reproduction**, without fertilization.... development of a viable **seed** without fusion of **gametes**.

aposematic coloration - Conspicuous, usually bright animal coloration that typically signals that the animal is aggressive or toxic...Many species of insects and other animals that sting, bite or otherwise defend themselves from predators often have warning (=aposematic) coloration, such as bright colors or bold patterns....Obviousness of appearance associated with **unpalatability** or **toxicity**. ... Aposematic refers to an animal that is brightly colored or otherwise obvious to a prospective **predator**, as a warning of

danger. An aposematic butterfly, for example, may be loaded with cyanide **compounds**, such as the *Heliconius* butterflies. Likewise, a poison arrow frog's distinctive colors warn that it contains **toxins** that will poison a careless **predator**. Aposematism is the functional opposite of **camouflage**. Also called **warning coloration**. (See **Batesian mimicry**, **Müllerian mimicry**, **mimicry**, **mimicry complex**, **warning coloration**)

aquaculture - A form of agriculture where plants and animals are cultured in farms in bodies of water. In fish farming areas fishes like Tilapia and other commercially valuable fishes can be cultured. In a **marine ecosystem**, salmon and shellfish are often cultivated. When done in seawater it is sometimes then called **mariculture**.... The commercial growing of **marine** (mariculture) or freshwater animals and plants in water.

aquatic - Living in water.

aquiclude - Rock formations impermeable to **groundwater**.

aquifer - An underground **geological** formation, or group of formations, containing usable amounts of **groundwater** that can supply wells and springs.... Porous, water-saturated layers of sand, gravel or bed rock through which **groundwater flows**. A large concentration of underground water. ...A subterranean **geologic** basin, composed of unconsolidated materials such as sand and gravel, or consolidated rock such as sandstone and fractured limestone. Aquifers are permeable enough to store, transmit, and yield groundwater in usable quantities.... A **geologic** formation that is water-bearing. ...A **geological** formation or structure that stores and/or transmits water, such as to wells and springs. Use of the term is usually restricted to those water-bearing formations capable of yielding water in sufficient quantity to constitute a usable supply for people's uses.... Layer of water-bearing permeable rock, sand, or gravel capable of providing significant amounts of water.... An underground geological formation able to store and yield water.... An underground layer of sand or rock that contains usable water. Can be unconfined (down to the first impervious rock layer) or confined (between the first and the second layers).

arachnid - An **arthropod** with four pairs of legs, a body divided into two parts, **chelicerae**, and simple eyes.

arboreal- Living predominantly or entirely in **trees**... Inhabitant of the **canopy** and **subcanopy**...Living in **trees** and **shrubs**.... Living in or frequent visitor to **trees**; **squirrels** and **monkeys** are arboreal **mammals**.

arbovirus - An abbreviation of “**arthropod**-borne virus”....A group of diverse animal **viruses** that are transmitted to humans by blood-feeding **arthropod vectors**, such as mosquitos, ticks, sandflies and **midges**.

arbuscula - A small or low shrub having the form of a tree.

Archaea - Unicellular **microorganisms** that constitute one of the three domains of life: **bacteria**, archaea, and **eukaryotes**. Like **bacteria**, archaea have no true **nucleus**; however, archaea are considered to be more closely related than **bacteria** to **eukaryotes**, **organisms** with a true **nucleus**. ...Archaea is one of three major **divisions** (along with **Bacteria** and Eukarya) in the **classification** of living **organisms**. Once thought to be **bacteria**, archaea are single-celled **organisms** without **nuclei** and with **membranes** different from all other **organisms**. ... A **prokaryotic** form of life that forms a domain in the tree of life. There are three domains: **Bacteria**, Archaea, and Eukarya. **Bacteria** are also **prokaryotic organisms** ... Proposed, but not widely accepted, sixth **taxonomic kingdom** that would include the archaeobacteria.... **Organisms** that resemble **bacteria** but also display characteristics found in multicellular **organisms**.

archegonium - The female **reproductive** organ of **mosses**, **ferns**, **liverworts**, and most **gymnosperms**. It contains a single **egg cell**.... The female sex organ of plants, other than **angiosperms**.... A multicellular female reproductive organ in **mosses**, **ferns**, and the majority of **gymnosperms**. Normally flask-shaped, it corresponds to the **pistil** in flowering plants. (See: **antheridium**)

archipelago - A group of islands.... Volcanically raised islands that arc near **subduction** zones where one continental plate rides over another. (See: **plate tectonics**)

Arctic - The region within the Arctic Circle, or, loosely, northern regions in general, characterized by very low temperatures.... The area lying above 66 degrees north **latitude** that includes the northern lands and Arctic Ocean.... The northern polar region of the Earth which includes almost the whole area of the Arctic Ocean and adjacent areas of Eurasian and North American continents... The region around the Earth's North Pole, opposite the Antarctic region around the South Pole.

Arctic amplification - The effect of sea ice melting, replacing high **albedo** ice with low **albedo** sea that absorbs more radiation from the sun, warming the **atmosphere**, which melts more ice, and so on. (See: **positive feedback loop**, **feedback mechanism**)

Arctic Circle - The parallel of **latitude** that is approximately 66° 34 03' (or 66.56756°) north of the Equator and that circumscribes the northern frigid zone.... The Arctic Circle is one of the five major circles of **latitude** that mark maps of the Earth. It is the parallel of **latitude** that (as of 2000) runs 66° 33' 39" (or 66.56083°) north of the Equator. The region north of this circle is known as the Arctic, and the zone just to the south is called the Northern Temperate Zone. The equivalent **latitude** in the Southern Hemisphere is called the Antarctic Circle.

The Arctic Circle marks the southern extremity of the polar day (24 hour sunlit day, often referred to as the "midnight sun") and polar night (24 hour sunless night). North of the Arctic Circle, the sun is above the horizon for 24 continuous hours at least once per year, and below the horizon for 24 continuous hours at least once per year. On the Arctic Circle these events occur, in principle, exactly once per year, at the June and December solstices respectively.

Arctic shrinkage - The marked decrease in Arctic sea ice and the observed melting of the Greenland Ice Sheet in recent years.

arête - A sharp ridge that divides cirques on a **glaciated** mountain.

aragonite - A form of **calcium carbonate** and the main component of **limestone**.

arid - Used to describe a region in which annual rainfall is less than 25 cms. (10 inches). (See: **xeric**)

aril - A fleshy, often brightly colored seed covering in some plants.

arrested litter - Litter that becomes trapped in **epiphytes** and the crowns of trees such as understory palms, and thus does not fall to the forest floor.

arthropod - A member of the phylum Arthropoda which is the largest **phylum** in the animal kingdom. It includes the **classes** Crustacea (crabs, shrimp, etc.), Myriapoda (centipedes and millipedes), Chelicerata (also known as Arachnida - spiders, scorpions, etc.), and Insecta (insects),.... An animal with jointed legs and a body divided into segments covered by an **exoskeleton**.... Any of a group of animals having no backbone, a segmented body, jointed appendages that exist in pairs, and a body covering called an **exoskeleton** that is made of **chitin**; insects, crayfish, and spiders are some examples of arthropods.... Having a segmented body, jointed appendages and a **chitinous exoskeleton** including crabs, insects, spiders etc of the **phylum** Arthropoda.

Arums - Refers to the plant family Araceae, to which the genus *Philodendron* belongs. The **florescence** is organized in an arrangement where a leafy petal called a spathe surrounds a central spike of flowers called a spadix.

ascocarp - Sexual fruiting body (ascus-bearing organ) of an ascomycete.

asexual reproduction - A type of **reproduction** involving only one parent that usually produces genetically identical offspring. Asexual **reproduction** occurs without **meiosis** or syngamy, and may happen through budding, by the division of a single **cell**, or the breakup of an entire **organism** into two or more parts.

aspect - In physical geography, aspect generally refers to the horizontal direction to which a mountain slope faces. For example, a slope on the eastern edge of the Rockies toward the Great Plains is described as having an easterly aspect. A slope which falls down to a deep valley on its western side and a shallower one on its eastern side has a westerly aspect or is a west-facing slope. The term can also be used to describe the shape or alignment of a coastline. Here, the aspect is the direction which the coastline is facing towards the sea. For example, a coastline with sea to the northeast (as in most of Queensland) has a northeasterly aspect. (See: **slope effect**)

aspect ratio - Term used in referring to the shape of a wing, as in a bird - the ratio of the span (=length) of the wing to its mean chord (=width). A gliding bird such as an albatross has a high aspect ratio whereas a soaring bird such as a vulture has a low aspect ratio.

asthenosphere - The layer of semi-molten **mantle** rock that lies directly below the **lithosphere**.

asynchronous - Not occurring at the same time

asynchronous hatching - Hatching that does not occur at the same time but that may take place over two to three calendar days.

atavism - The reappearance in an individual of characteristics of some remote ancestor that have been absent in intervening generations or an individual embodying such a reversion....Reversion to an earlier type; throwback.

atmosphere - The gaseous envelope surrounding the Earth; the air.... The gaseous mass or envelope surrounding a celestial body, especially the one surrounding the Earth, and retained by the celestial body's **gravitational** field....The air or climate in a specific place.... The envelope of gases that surrounds the Earth; consists largely of nitrogen (78%) and oxygen (21%).... A gaseous covering to a planet that is bound by **gravity**. Planets have very different atmospheres and each has very different properties.... The air surrounding the Earth, described as a series of shells or layers of different characteristics. The atmosphere, composed mainly of nitrogen and oxygen with traces of **carbon dioxide, water vapor**, and other gases, acts as a buffer between Earth and the sun. The layers, **troposphere, stratosphere, mesosphere, thermosphere**, and the **exosphere**, vary around the globe and in response to seasonal changes. (See: **atmosphere, planetary boundary layer, troposphere, tropopause, stratosphere, stratopause, mesosphere, mesopause, thermosphere, ionosphere, exosphere**)

The **troposphere** stems from the Greek word tropos, which means turning or mixing. The **troposphere** is the lowest layer of the Earth's atmosphere, extending to a height of 8-15 km, depending on **latitude**. This region, constantly in motion, is the most dense layer of the atmosphere and the region that essentially contains all of Earth's weather. **Molecules** of nitrogen and oxygen compose the bulk of the **troposphere**.

The **tropopause** marks the limit of the **troposphere** and the beginning of the **stratosphere**. The **temperature** above the **tropopause** increases slowly with height up to about 50 km. The **stratosphere** and **stratopause** stretch above the **troposphere** to a height of 50 km. It is a region of intense interactions among radiative, dynamical, and chemical processes, in which horizontal mixing of gaseous components proceeds much more rapidly than vertical mixing. The **stratosphere** is warmer than the upper **troposphere**, primarily because of a **stratospheric ozone layer** that absorbs solar ultraviolet energy.

The **mesosphere**, 50 to 80 km above the Earth, has diminished **ozone** concentration and radiative cooling becomes relatively more important. The **temperature** begins to decline again (as it does in the **troposphere**) with altitude.

Temperatures in the upper **mesosphere** fall to -70 degrees to -140 degrees Celsius, depending upon **latitude** and season. Millions of meteors burn up daily in the **mesosphere** as a result of collisions with some of the billions of gas particles contained in that layer. The collisions create enough heat to burn the falling objects long before they reach the ground.

The **stratosphere** and **mesosphere** are referred to as the middle atmosphere. The **mesopause**, at an altitude of about 80 km, separates the **mesosphere** from the **thermosphere** - the outermost layer of the Earth's atmosphere.

The **thermosphere**, from the Greek thermo for heat, begins about 80 km above the Earth. At these high altitudes, the residual **atmospheric** gases sort into strata according to **molecular** mass. **Thermospheric temperatures** increase with altitude due to absorption of highly energetic **solar radiation** by the small amount of residual oxygen still present. **Temperatures** can rise to 2,000 degrees C. Radiation causes the scattered air particles in this layer to become charged electrically, enabling radio waves to bounce off and be received beyond the horizon. At the **exosphere**, beginning at 500 to 1,000 km above the Earth's surface, the atmosphere blends into space. The few particles of gas here can reach 4,500 degrees F (2,500 degrees C) during the day.

The layers of the atmosphere, in order, are...

- 1) **planetary boundary layer** - Occupying the lowest few hundred meters of the atmosphere.
- 2) **troposphere** - The lower atmosphere, to a height of 7 or 8 to 15 or 17 km above Earth.
- 3) **tropopause** - The boundary between the troposphere and the stratosphere, about 8 km in polar regions and about 15 km in tropical regions.
- 4) **stratosphere** - Having a lower boundary of approximately 8 km at the poles to 15 km at the equator and an upper boundary of approximately 50 km. Includes the **ozone layer**.
- 5) **stratopause** - The boundary between the stratosphere and the mesosphere.
- 6) **mesosphere** - From about 50 to 85 kilometers altitude above the Earth. Meteorites break up here.
- 7) **mesopause** - The upper boundary of the mesosphere.
- 8) **thermosphere** - The outermost layer of the Earth's atmosphere (but see exosphere), between the mesosphere and outer space, beginning approximately 80 km above the Earth's surface.... Extends to 640 kilometers up. Auroras appear here. Includes the ionosphere, the layer of molecules broken up - ionized - by particles from the sun.
- 9) **ionosphere** - The region of the upper atmosphere from 70 or 80 km. to 500-900 km. above the Earth... The ionosphere makes radio work by bouncing radio waves back to the Earth. Part of the thermosphere.
- 10) **exosphere** - The uppermost layer of the atmosphere (but see thermosphere) with the lower boundary estimated at 500 km to 1000 km above the Earth's surface and its upper boundary at about 10,000 km. Merges with outer space.

atmospheric - Of or relating to the **atmosphere**.

atmospheric deposition - Contamination of land or water by **atmospheric pollutants**.

atmospheric pressure – The pressure exerted by the **atmosphere** at a given point. Its measurement can be expressed in several ways, including millibars and inches of mercury (Hg). Average sea level pressure is 1013.25 millibars or 29.92 inches of mercury. A drop in atmospheric pressure usually indicates the approach of a storm, such as a **hurricane**. Also known as **air pressure**. (See: **air pressure, barometric pressure**)

atoll - A ring of **coral** islands and **coral reefs** surrounding a central **lagoon**.... A **coral** island consisting of a ring of **coral** surrounding a central **lagoon**. Atolls are common in the Indian and Pacific Oceans.... an island formed from a **coral reef**, sometimes circular or horseshoe-shaped, with a **lagoon** in the center. ... A ring-shaped reef made mostly of coral. (See: **coral, coral reef**)

attenuation - Reduction in light intensity due to a filtering medium, *e.g.*, particles in water, or a **forest canopy**.

aurora - Auroras, or aurorae, sometimes called the northern and southern (polar) lights, are natural light displays in the sky, usually observed at night, particularly in the polar regions. They are produced by the collision of charged particles from Earth's **magnetosphere**, mostly electrons but also protons and heavier particles, with atoms and molecules of Earth's upper atmosphere, typically in the **ionosphere**, at altitudes above 80 km (50 miles). (See: **aurora australis, aurora borealis**)

aurora australis - The **aurora** of the Southern Hemisphere, also known as the southern lights. (See: **aurora**)

aurora borealis - The **aurora** of the Northern Hemisphere, also known as the northern lights. (See: **aurora**)

austral - Relating to, belonging to or coming from the south. The opposite of **boreal**.

austral migrant - A bird species that migrates from areas to the south towards the **equatorial** regions for the non-breeding season. Also known as a **southern migrant**. (See: **migrant, boreal migrant**)

autecology - The **ecology** of an **organism** or **taxonomic** group; also, the study of how **organisms** affect plants.

autochthonous - Indigenous. Contrast with **allochthonous**.

autogenic - Originating from within a system.

autogenic succession - A **sere** in which the replacement of one plant **community** by another results chiefly from the transformation of the site by the plants themselves. Antonym of **allogenic succession**. (See: **ecological succession, allogenic succession**,

community succession, primary succession, secondary succession, sere, seral stage, seral, ecesis)

autotroph - Same as a **producer**. An **organism** that produces its own food. Autotrophs may be photoautotrophic (fed by using light) or chemoautotrophic (by using chemical energy). (See: **producer, heterotroph**)

autotrophic nutrition - A form of nutrition in which complex food **molecules** are produced by **photosynthesis** from **carbon dioxide**, water, and minerals.

autotrophic organism - See **producer**.

auxin - A plant **hormone** that principally controls **cell** elongation.

avalanche - A slide of large masses of snow and ice and mud down a mountain...A landslide that typically occurs in a mountain area with a thick cover of snow... A mass of snow, rock, and/or ice falling down a mountain or incline. In practice, it usually refers to the snow avalanche. In the United States, the term snow slide is commonly used to mean a snow avalanche.

avian - Of or referring to a bird or birds.

avulsion - Sudden **erosion** by storm waves or rapid currents of water.

axial - Along, or parallel to, the main axis; lengthwise, longitudinal.

axil - In **botany**, the angle between the upper surface of a **leaf** and the **stem** to which it is attached... The angle that lies between a **leaf** stalk and its stem. Site of bud formation in **flowering plants**.

axillary bud - In **botany**, a bud located in an **axil** at the base of a **leaf**.

axillary bud primordium - In **botany**, an immature **axillary bud**.

azimuth - The angular distance clockwise along the horizon between north and the position of a celestial object. A star hanging exactly over the northern point on the horizon has an azimuth of 0°, for example, and one located exactly east an azimuth of 90°. Azimuth is combined with altitude (the distance of an object above the horizon) to calculate the direction of an object as seen from a specific earthly location.

background concentration - A concentration of a substance in a particular **environment** that is indicative of minimal influence by human (**anthropogenic**) sources.

background extinction rate - The natural rate of **extinction** for a **species**. Contrasts sharply with **mass extinction**. (See: **extinction, mass extinction**)

backrush - The seaward return of water following the **uprush** of a wave.

backscattering - Solar radiation reflected back into space by particles in the **atmosphere**.

backshore - The strip of beach above the daily **tides** but within reach of storm waves.... The upper part of the active beach above the normal reach of the tides (high water), but affected by large waves occurring during a high tide.

backwater - Slow-moving or stagnant water formed by a dam or some other obstruction to the flow. (See: **slough**)

backwater curve - Longitudinal profile of the water surface in an open channel where the depth of flow has been increased by an obstruction such as a weir or a dam across the channel, or by increase in channel roughness, or by decrease in channel width or by a decrease of the bed gradient.

bacteria (singular: **bacterium**) - One-celled **organisms** that differ from most other **cellular organisms** by lacking internal **membranes** that enclose **cell** parts, such as the **nucleus**.... Single-celled **microorganisms** that lack **chlorophyll**.... Small single-celled **organisms** from the Moneran **kingdom**. They are known as **prokaryotes**, which are classified together because they lack **nuclear membranes**. They are the most primitive living beings, but help in the **nitrogen cycle**.... **Microorganisms** with **prokaryotic cell** organization (lacking membrane-bounded **nucleus** and other specialized features); **bacteria** are also typically much smaller than **fungi** (molds).... Single-celled **prokaryotic organisms** (**prokaryotic** means the **DNA** is not enclosed in a **cell nucleus**), many microscopic. Early in Earth's history, bacteria gradually altered the **environment** to support more complex forms of life (producing oxygen, for instance, in the **atmosphere**) even while moving into **cells** as **organelles** and decomposing **organic** matter into soil nutrients. Hydrothermophile bacteria discovered in samples drilled from deep in the Earth give new support to the idea that life originated in hot, high-pressure crevices underground.

bacterial - Of or referring to **bacteria**.

bacteriophage - A virus that infects and eventually kills its bacterial host.

bacterium - The singular of **bacteria**.

badlands - Rough land eroded into arid barrenness. Also, a part of South Dakota.

bajada - Lower mountain slope covered with loose sediment, possibly from runoff. Example: overlapping **alluvial fans** rolling along the base of arid peaks.

balance of nature - The apparent stability of the **population** density relationships between the many species of **organisms** that make up a **biotic community**. The concept

of such a balance has been severely criticized. **Population density** of each of the **species** in a **biotic community** may fluctuate more or less widely from time to time (*e.g.*, existence of **population** explosions, die-offs, epidemics, irregular **migrations**, **succession** etc.) and that the density of no species remains at a fixed value. The fluctuations in the numbers of each **species**, however, usually have fairly definite limits. Using 'balance' includes the recognition that the **population densities** of every **species** making up a **community** fluctuate from season to season and from year to year.... An **ecological** system may be said to be stable during that period of time when no **species** becomes **extinct** (thereby creating a vacant **niche**) and none reaches plague proportions for long enough to destroy the **niches** of other **species** and cause them to become **extinct**. A stable **organic** is one in which all **niches** are fully occupied by appropriate **species**. Whatever stability there is in the **ecological** world it is not a static equilibrium, but a fluctuating or **dynamic** one - one that is normally highly fluctuating. Stability lies in the ability to bounce back, not in the ability to hold tenaciously to ground once taken or numbers once achieved.... The fluctuating equilibrium of natural **ecological** systems, in which proportions of different **species** are kept in balance by **competition**, **adaptation**, **predator/prey** relationships and **symbiosis**. It refers to natural **ecosystems**, **communities** and the **biosphere** in general where **populations** of all appear to be held roughly in equilibrium, and that disturbance of this harmony between **organisms** and the physical **environment** will have inevitable and generally unfavorable consequences for humankind. The phrase emphasizes the natural state as being one of balance which should be considered a critical bioethical concept.

Baldwin Effect - The hypothesized passing on of something learned, but not through the discredited Lamarckian theory of evolution (the inheritance of what previous generations experienced). Walking upright could be an example, as a band of our ancestors imitated some forgotten hominid who preferred that style of locomotion and then gave rise to descendants whose genes favored the behavior. The Baldwin Effect fills in a gap in how natural selection is thought to work by explaining how learnings normally invisible to it become innate.

ballooning - A method used by spiders to travel long distances. They are carried on the wind as they dangle from a long strand of **silk**.

bamboo - A group of woody **perennial evergreen** plants in the true **grass family** Poaceae, subfamily Bambusoideae, tribe Bambuseae. Some of its members are giant bamboo, forming by far the largest members of the **grass family**. Bamboo is the fastest growing **woody plant** in the world. There are 91 **genera** and about 1,000, **species** of bamboo. They are found in diverse **climates**, from cold mountains to hot **tropical** regions.

bank - The rising ground that borders a **river** or **stream**.

barchan - A crescent-shaped dune whose tips point to leeward. Different from a Seif.

bark - In **botany**, all the **tissues**, collectively, formed outside the **vascular cambium** of a woody **stem** or root.

barometer - An instrument that measures **atmospheric pressure or air pressure**. ... An instrument used to measure atmospheric pressure. A standard mercury barometer has a glass column about 30 inches long, closed at one end, with a mercury-filled reservoir. Mercury in the tube adjusts until the weight of the mercury column balances the atmospheric force exerted on the reservoir. High atmospheric pressure forces the mercury higher in the column. Low pressure allows the mercury to drop to a lower level in the column. An aneroid barometer uses a small, flexible metal box called an aneroid cell. The box is tightly sealed after some of the air is removed, so that small changes in external air pressure cause the cell to expand or contract. (See: **altimeter**)

barometric pressure – The pressure exerted by the atmosphere at a given point (as measured by a barometer). It can be measured in millibars or inches of mercury, among others. Watching a barometer for a drop in **atmospheric pressure** helps forecasters determine when a hurricane is approaching. (See: **atmospheric pressure, air pressure**)

barrier beach - A long strip formed by sand deposited across the mouth of a harbor or inlet. They are often duned, and many separate an area of marshland from the sea.... Sand or shingle bar above high tide, parallel to the coastline and separated from it by a lagoon.

barrier island - A long, relatively narrow island running parallel to the mainland, built up by the action of waves and currents and serving to protect the coast from erosion by surf and **tidal** surges.... A narrow sand island that parallels a shoreline....A sandbar that is more than 100 meters (328 feet) wide.

barrier reef - A **coral reef** parallel to a shore and separated from it by water too deep for **coral** growth.

barrens - A flat, open plains area dominated by **grasses**, sometimes supporting a growth of **shrubs** and small **trees**, and lacking a closed-**canopy** forest. Examples of barrens communities in North America are pine barrens and oak barrens.

basal - At the base; near the point of attachment (of an appendage).

basal area - A measurement of the size of a tree or the area taken up by trees in a stand - the area of the cross-section (measured outside bark at **d.b.h.**) of a single tree, or of all trees in a stand, expressed in square meters/**hectare** or square feet/**acre**....A forest's tree density expressed in square feet.

basal rosette - A plant structure in which all of the **leaves** of the plant originate from a central location at the very base of the major **stem** and unfurl outwards and away from the plant.

basal sliding - The downhill sliding of a **glacier** propelled by its weight.

base - A substance that forms a salt when it reacts with acid. A base is a substance that removes hydrogen ions (protons) from an acid and combines with them in a chemical reaction.

base flow / baseflow - Streamflow coming from **groundwater** seepage into a **stream** or **river**. **Groundwater** flows underground until the water table intersects the land surface and the flowing water becomes surface water in the form of **springs, streams/rivers, lakes and wetlands**. Baseflow is the continual contribution of **groundwater** to **rivers** and is an important source of flow between rainstorms. Also known as **groundwater flow....** A **stream** or **river's** normal flow volume.

base level - The altitude below which a **stream** cannot perform vertical **erosion**. Usually, sea level.

baseline - A measurement, calculation, or location used as a basis for comparison...The data used as a reference with which to compare future observations or results...A standard or value to which other similar things are compared.

baseline monitoring - An **environmental** or **community** study which provides **baseline** information on its condition at a point in time, for example a **biodiversity** inventory, against which future changes or developmental impacts can be measured.

basement rock - The ancient **granitic** and **metamorphic rock** that constitutes continental crust and the continental shield.

basic - In chemistry, **alkaline**.

basic plumage - In **ornithology**, for most birds, the plumage worn for the longest time each year and produced by a complete **molt**. Non-breeding plumage and winter plumage are synonyms.

basin area - Areas that do not receive adequate **precipitation** for **groundwater** recharge and streamflow. These areas can receive recharge and streamflow from upstream **headwater areas**.

basin and range physiography - A region characterized by a series of generally north-trending mountain ranges separated by **alluvial** valleys.

basiphile - A plant that favors **basic** or **alkaline** soils (those low in **acid**).

bask (basking) - To lie in or expose oneself to warmth, especially from the sun....To warm the body by exposing it to a heat source; turtles bask in the sun to raise their body **temperature....**A behavior of **exothermic** animals to help control their body **temperature**.

Batesian mimicry - A situation in which a palatable animal **species** comes to resemble an **unpalatable species**, thus gaining some protection from **predation**. (See: **Müllerian mimicry, mimicry, mimicry complex, warning coloration, aposematic coloration**)

batholith - A huge mass of **igneous** rock, usually **granitic**, that formed deep underground and only surfaced through erosion of the overlying mountainous material. Often found near plate edges. The Sierra Nevada mountains of California are a well-known batholithic formation. (See: **plate tectonics**)

bathyal zone - Also called the **continental slope** or **sublittoral zone**, the area extending from the edge of the continental shelf and dipping steeply to the abyssal plain (ocean bottom), typically ending at a depth of about 1,100 meters.... The part of the oceanic zone that is between 200 meters (656 feet) and about 2,000 meters (6,562 feet) deep.

bathymetric - Scientific-sounding term for measuring something in deep water.

bathymetry - Spatial variability in the bottom of a body of water.

bayou - A **swampy** arm or slow-moving outlet of a lake...A term used mainly in Mississippi and Louisiana in the United States... A bayou is a small, slow-moving **stream** or creek. Bayous are usually located in low-lying areas, for example in the Mississippi River **delta** region of the southern United States.... A relatively small, sluggish waterway through lowlands or **swamps**, generally with a slow, almost imperceptible current flow. Often also defined simply as slow-moving **streams** crisscrossing Louisiana.... An inlet or outlet, often **marshy**. A **slough**.

beach crest - The point representing the limit of high tide storm wave run-up.

beach cusp - One of a series of low mounds of beach material separated by crescent-shaped troughs spaced at more or less regular intervals along the **beach face**.

beach drift - The sideways movement of beach **sediment**.... The pulling of sand particles sideways along a beach.

beach erosion - The process by which waves pick up sand particles and move them along the shore.

beach face - The part of the beach from the **beach crest** to the limit of **sediment** movement.

beach head - Cliff, dune or sea wall looming the landward limit of the active beach.

beach material - Granular sediments, usually sand or shingle moved by the sea.

beach nourishment - The process of replenishing or enlarging a beach, which may be

brought about naturally by longshore transport or artificially by the deposition of dredged materials. Also known as **beach replenishment** or **beach recharge**.

beach profile - Cross-section taken perpendicular to a given beach contour; the profile may include the face of a dune or sea wall, extend over the backshore, across the foreshore, and seaward underwater into the nearshore zone.

beach recharge - The process of replenishing or enlarging a beach, which may be brought about naturally by longshore transport or artificially by the deposition of dredged materials. Also known as **beach replenishment** or **beach nourishment**.

beach replenishment - The process of supplementing the natural supply of beach material to a beach, using imported material. Also known as **beach recharge** or **beach nourishment**.

Beaufort Wind Scale - Wind speed scale developed in 1806 by Admiral Sir Francis Beaufort of the Royal Navy. Reaches from 0 (calm) to 12 (hurricane).

bed forms - Features on a seabed resulting from the movement of **sediment** over it.

bed load - Stream load material carried along the **stream** bed without falling into suspension.

bedding plane - A layer that indicates a change in the type of **sediment**, *e.g.*, where sand gives way to shale.

bedrock - The solid rock beneath the soil and superficial rock. A general term for solid (consolidated) rock that lies beneath soil, loose **sediments**, or other unconsolidated material....The solid layer of rock beneath loose rock and soil.... More or less unweathered rock near the surface.

behavioral ecology - The branch of **evolutionary ecology** concerned with tracing the link between **ecological** factors and adaptive behavior in animals.

Beltian bodies - Small orange globules growing from the tips of the leaflets of the **compound leaves** of some **species** of trees in the **genus** *Acacia*. These small **protein**-rich structures are provided for the *Pseudomyrmex* ants living in a **mutualistic** relationship with the tree, and supplement the sugars provided by the tree's nectaries. The ants bite off the Beltian bodies and eat them. (See: **myrmecophyte**, **nectary**, **extrafloral nectary**, **Müllerian bodies**, **domatium**)

benthic - Living at the bottom of a body of water.... Living on or near the sea bottom.

benthic organisms - **Organisms** living in or on the bottom of aquatic **environments**.... Organisms living on the sea floor. Littoral benthos occupy the space from the high-water spring tide mark to 200 meters down. Deep sea benthos live below that.... Animals

dwelling on the bottom of a water body. These organisms inhabit the sediment on lake, river, or ocean bottoms, as well as the sediment in marshes, tidal flats, and other wetlands.

benthopelagic - Lives in the water column but is associated with the sea floor.

benthos - Bottom-dwelling **aquatic biota**. . . . **Organisms** that live on or near the ocean floor, such as seaweed, kelp, and tube worms.

Bergmann's Rule - The colder the climate (thus, usually, the higher the latitude) the larger the body size of a **warm-blooded** animal when compared to close relatives in warmer regions. . . . Originally proposed by Christian Bergmann (1847). There have been many formulations of Bergmann's Rule. One widely accepted formulation is: within a given **species** (or **species cluster**), individuals from higher **latitudes** will tend to be larger than their lower-latitude counterparts. Several mechanisms have been proposed to explain this rule. Bergmann's favored proposal was that this was a result of heat conservation related to cooler **temperatures** at higher **latitudes**. . . . Warm-blooded animals in cold climates tend to be larger than animals of the same **species** living in warm climates. . . . An animal's body size is smaller in warmer parts of its range than in colder parts.

bergschrand - A deep crevasse, usually opened by ice, at the head of a moving **alpine glacier**.

berm - Nearly horizontal portion of ocean beach resulting from wave action at high tide. . . . A platform of wave-deposited sediment that is flat or slopes slightly landward. . . . A level, narrow ledge or bench that divides a **stream** or separates water from land, as in a canal path.

beta-diversity - The change in species composition between places.

biennial - In **botany**, a plant with a lifespan of two years. It often only flowers and sets seed during the second year. . . . A plant **species** that lives for two growing seasons. . . . A plant completing its life cycle within two growing periods. . . . Plants that live two growing seasons; they fruit during the second. (See: **annual**, **perennial**)

bifurcate - Forked.

bight - A small coastal indentation open to the sea.

bilateral symmetry - Body divisibility into mirror-image halves (right and left arms and legs, for example). Animals with bilateral symmetry display dorsal (top), ventral (bottom), anterior (front), and posterior (rear) orientations, whereas radial animals like starfish have only the dorsal and ventral. (Arms, legs, and wings evolved from the fins of lungfish swimming around over 400 million years ago.)

bilaterally symmetrical - Of or referring to **bilateral symmetry**.

binocular vision - Vision in which the fields of view for both eyes overlap and produce a single image in the brain, as opposed to monocular vision in which each eye sees a different field of view and the images are processed separately; binocular vision allows depth perception and more precise location of objects whereas monocular vision allows wider visibility; animals that have binocular vision have eyes that face forward whereas animals with monocular vision have side-facing eyes; humans have binocular vision.

binomial - The two-parted scientific name of an **organism**, consisting of the organism's **genus** and **species**. (See: **binomial nomenclature**, **Linnaean system**, **trinomial**)

binomial nomenclature - The system in which the scientific name of an **organism** consists of two parts indicating the **genus** and **species**.... The method of scientifically naming plants and animals in descriptive Latin terms. The first term identifies the **genus**, the second the **species** to which an **organism** belongs. The first letter of the generic name is capitalized and both names are italicized... System of naming **organisms** developed by the 18th century Swedish naturalist Carl von Linné. Every organism has a generic name (written with a capital) and a **species** name (always in low case, and following the **generic** name)... The practice of using **genus** and **species** names to refer to an **organism**.The system developed in the mid-18th century by Carolus Linnaeus for naming **biological** organisms whereby each **species** is given a scientific name comprised of its **genus** and **species** names. The **genus** name is capitalized and the **species** name is not capitalized. This naming system is also known as the **Linnaean system**.

bioaccumulation - The process by which substances increase in concentration in living **organisms** as they take in contaminated air, water, or food because the substances are very slowly metabolized or excreted.... The uptake and retention of **environmental** substances by an **organism** by means other than the ingestion of food. Bioaccumulation is a phenomenon which occurs due to the inability of the body to excrete certain chemicals. If the body is unable to excrete chemicals which alter the **endocrine system**, an accumulation will occur; the amount of accumulation is equal to the amount intake minus the amount excreted. Also known as **biomagnification** or **biological magnification** or **bioconcentration**....The buildup of a chemical, such as a pesticide or heavy metal, in living tissue over time; bioaccumulation may occur by such a substance being passed through the food chain due to the inability of tissues to excrete it fast enough. (See: **biomagnification**)

bioassay - A measurement of the effects of a substance on living **organisms**.... A laboratory test that uses **organisms** to evaluate whether a sample is **toxic**.... Any quantitative procedure in which a given **organism** is used for assay purposes.

biocapacity - A measure of the biological productivity of an area.... The capacity of an area or ecosystem to generate an ongoing supply of resources and to absorb its wastes. Unsustainability occurs if the **ecological footprint** (demand on the system) exceeds biocapacity.

biocenose - The relation of diverse organisms that live in association.... A group of interacting organisms that live in a particular habitat and form an ecological community.... The interacting organisms living together in a habitat. A **biotic community**.

biocenosis - See **biocenose**.

biocentric - Of or referring to **biocentrism**.

biocentrism - A belief in the equality of all forms of life. It considers the view from the individual organism, and may ascribe equal rights to all forms of life. ... Putting the natural world, rather than the human world, into the perceived center of the cosmos. The land is not made for us: we are a part of it. Contrast with **anthropocentrism**.

Biochemical (Biological) Oxygen Demand (BOD) - The amount of oxygen required to dissolve and decompose **organic** matter. A water quality measurement often applied to treated sewage.

bioconcentration - See **biomagnification**.

biocontrol - Using natural means like **predators** to control pests, like growing ginger to repel snails and slugs and nasturtiums to ward off aphids, which are also food for ladybugs and lacewing moths. Goldfish placed in water storage containers eat incoming mosquitos.

biodegradable - Noun: A substance that can be broken down by **microorganisms** into simple, stable **compounds** such as **carbon dioxide** and water.... Substance which can be broken into its component parts by **bacteria** and **fungi**.

Adjective: Capable of decomposing rapidly under natural conditions.... Reducible by **bacteria** and **fungi** as opposed to something that remains in the **environment** (plastic, certain industrial wastes).... The ability of a substance to be broken down physically and/or chemically by **microorganisms**. For example, many chemicals, food scraps, cotton, wool, and paper are biodegradable; plastics and polyester generally are not....Capable of being broken down into non-harmful products by the action of living things.... The ability of a substance or material to break down into harmless substances by the action of living **organisms**.... Capable of being decomposed (broken down) by natural biological processes.... Capable of being broken down by **microorganisms**. Breakdown products can often be re-used by other **organisms** as food and energy sources.

biodegradation - **Decomposition** of material by **microorganisms**. (See: **biodegradable**)

biodiesel - A fuel made from vegetable oils in crops such as soybean, or from animal fats.

biodiversity - Shortened term for **biological diversity**. Can be measured in a variety of ways, including the number of **species**, the **genetic** variation within a **species**, or the variety of **ecosystems**. ...The biological richness of an area or **geographic** region, usually defined as the number of **species** present. ...The variety of life....An index of richness in a **community**, **ecosystem**, landscape and the relative abundance of these **species**. NOTE: There are commonly five levels of biodiversity: a) **genetic diversity** referring to the **genetic** variation within a **species**; b) **species diversity** referring to the variety of **species** in an area; c) **community** or **ecosystem diversity** referring to the variety of **communities** or **ecosystems** in an area; d) **landscape** diversity referring to the variety of **ecosystems** across a landscape; and e) regional diversity referring to the variety of **species**, **communities**, **ecosystems**, or **landscapes** with a specific geographic region. Each level of biodiversity has three different components: 1) compositional **diversity** or the number of parts or elements within a system and is indicated by measures such as the number of **species**, **genes**, **communities**, or **ecosystems**; 2) structural diversity or the variety of patterns or organizations within a system, such as **habitat** structure, **population** structure, or **species morphology**; and 3) functional diversity or the number of **ecological** processes within a system, such as disturbance regimes, roles played by **species** within a **community**, and **nutrient** cycling within a forest. ...The variety of life on Earth and the interconnections among living things.... Variability of living **organisms** and the **ecosystems** and biological **communities** of which they are part. This includes **genetic** and **morphological diversity** within **species**, between **species** and of **ecosystems**. Biodiversity has increased over **geological** time and is essential to the survival life on Earth. **Diversity** supplies variation needed for **adaptation** and survival and continued **evolution** of **species**. ...Refers to the variety and variability among living **organisms** and the **ecological** complexes in which they occur. Diversity can be defined as the number of different items and their relative frequencies. For **biological diversity**, these items are organized at many levels, ranging from complete **ecosystems** to the biochemical structures that are the molecular basis of **heredity**. Thus, the term encompasses different **ecosystem**, **species**, and **genes**.... The total variation in life, including the number of **species**, the degree of **genetic variation** within **species**, the different types of **ecosystems**, and the all **ecosystem** functions.... Usually equivalent to **species** richness, *i.e.*, the number of different **species** occurring in some location or under some condition. Biological **diversity** may also be used in a more general sense to refer to the number of higher **taxonomic** levels or types and amounts of organismal relationships in some location or under some condition, *e.g.*, the number of **genera**, **families**, **orders** or **phyla** present; or **genetic** pathways; or the number of **biotic communities** present; or the number of energy, **nutrient**, or **food chain** pathways present. There are many measures and indices. Frequently used relationships are those for proportions of plants, animals, or areas present. Also known as **biological diversity** or **biotic diversity**.... Biological variety of the kind that preserves species and their DNA. R. H. Whittaker categorized it (1972) as alpha, the number of **species** in an **ecosystem**; beta, the diversity between **ecosystems**; and gamma, the diversity of entire regions. Depleted biodiversity leads to **population** crashes, declines in **genetic** variability, and **extinctions**. (See: **diversity**, **biological diversity**, **hyperdiversity**)

biodiversity hotspot - A region of very high **endemism** where threats to **habitat** integrity or of **extinction** are also high. As human activities are drastically accelerating **extinction** worldwide and only limited resources are available to conserve many **endangered organisms**, this concept was proposed to focus effort and funding on areas where there might be the best possible **conservation** results.

bioelectricity - The production of electric discharges by living **organisms**. The mechanism has evolved independently in many kinds of organisms, includes the electric eel, which is capable of generating up to 550 volts which it uses for offense and defense, and fishes who use electric **organs** and electro-receptors for navigation purposes. (See: **bioluminescence**)

biofuels - Renewable fuels made from **biomass** that can be used to supplement or replace the **fossil fuels**, including petroleum and diesel, used in transport. The two main biofuels currently used are ethanol and biodiesel. Ethanol is produced from the **fermentation** of sugar or starch in crops such as corn and sugar cane. **Biodiesel** is made from vegetable oils in crops such as soybean, or from animal fats.

biogas - A **methane** and **carbon dioxide** emission due to the breakdown of **organic** matter by **anaerobic bacteria**. Some trap it for use as an alternative fuel source.

biogenic - Material originating in **organisms**... Produced by natural processes. Usually used in the context of emissions that are produced by plants and animals.

biogeocoenosis - A seamless partnership between living **organisms** and their physical **environment**. Frequently used in Russian literature, equivalent to the word **ecosystem**.

biogeochemical - Relating to the chemical relationships between the **geology** of an area and its plant and animal life. In land use planning, the term is more often used for all of the naturally occurring objects, processes, and relationships in an area. Biogeochemical is approximately equivalent to the natural **ecosystem** and **ecosystem functions** of a planning area. This composite term is based on the assumption that all naturally occurring things can be classified as being biological, **geological**, or chemical.

biogeochemical cycles - Movements through the Earth system of key chemical constituents essential to life, such as carbon, nitrogen, oxygen, and phosphorus..... The great loopings and returns of life-giving substances through the **environment**. The three most important are the gaseous (*e.g.*, the **carbon cycle**, oxygen cycle, and **nitrogen cycles**), the sedimentary (including the phosphorus, sulfur, calcium, magnesium, and potassium cycles), and the **hydrologic cycle** (**water vapor** to rain to **streams** to oceans to **water vapor**). When not interfered with, these cycles tend to be self-organizing and self-renewing.... The chemical interactions that take place among the **atmosphere, biosphere, hydrosphere, and geosphere**.

biogeographic - Of or referring to **biogeography**.

biogeographical - Referring to **biogeography**.

biogeographically - Referring to **biogeography**.

biogeography - The study of living systems and their distribution. Biogeography is important to the study of the Earth's **biodiversity** because it helps with understanding where animals and plants live, where they don't, and why.... The branch of science that studies the distribution of life, past and present.... The branch of biology which studies the **geographical** range and distribution of animals and plants across the Earth. (See: **zoogeography**)

biogeochemical cycle - The movement of chemical **elements** between **organisms** and non-living compartments of **atmosphere**, **aquatic** systems and soils...Refers to the reciprocal interactions between living **organisms** and their elemental bio-cycles. Earth is essentially a closed system with respect to carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur the elements **organisms** need in large quantities; thus, these elements cycle from the **environment** through **organisms** back to the **environment** in sustainable harmony. There are two major types of biogeochemical cycles - gaseous and sedimentary, where each element has its distinct cycle with the specifics depending on its physical and chemical properties and how it is utilized by **organisms**.

biogeophysical - A composite term often used to encompass all of the naturally occurring materials, processes, and relationships operating in an area. The term is approximately equivalent to the natural **ecosystem** and **ecosystem functions**. The word was constructed so that all the natural objects and processes operating in an area can be classified as being either biological (*i.e.*, plant and animal species, **ecological** interactions, **biotic productivity**, etc.) or **geological** (*i.e.*, rock types, soil types, geomorphic history, sedimentation, **erosion**, etc.), or physical (*i.e.*, heat, light, electrical, gravitational, etc.).

bioindicator - A biological indicator of the well-being or abundance of an **organism**, which is then used to describe the quality of the **ecosystem**; also, an **organism** used as such an indicator (See: **ecological indicator**, **environmental indicator**, **indicator species**, **indicator plant**)

biological - Of or relating to **biology**.

biological diversity - The variety and complexity of **species** that are present and that interact in an **ecosystem**, plus the relative abundance of each. Also known as **biodiversity** or **biotic diversity**. (See: **diversity**, **biodiversity**)

biological indicator - See **indicator species**.

biological integrity - Commonly defined as the ability to support and maintain a balanced, integrated, and adaptive **community** of **organisms** having a species

composition, **diversity** and functional organization comparable to those of natural habitats within a region.

biological magnification - See **biomagnification**.

biological productivity - A measure of growth in living systems. ...A measurement of **biological** production of a given area over a given time period. A typical indicator of **biological** productivity is the annual **biomass** accumulation of an **ecosystem**....The intensity of life form production in an **ecosystem** or part of an **ecosystem**.

biological soil crust - Biological soil crusts are also known as cryptogamic, microbiotic, microphytic, and cryptobiotic, leading to some confusion. The names are all meant to indicate common features of the organisms that compose the crusts. The most inclusive term is probably biological soil crust, as this distinguishes them from physical crusts while not limiting crust components to plants. Whatever name used, there remains an important distinction between these formations and physical or chemical crusts. (See: **cryptogamic soil, cryptogams, cryptobiotic soil**)

Biological Species Concept - See **species**.

biological weathering - Weathering helped along by living things, like plants that break up layers of rock.

biology - The study of life.

bioluminescence - Emission of visible light by living **organisms** such as fireflies, **dinoflagellates**, various fish, **fungi**, and bacteria...Light produced by a living organism; examples of **organisms** that are bioluminescent are lightning bugs (fireflies), and some types of **dinoflagellates, bacteria, fish, and fungi**.... The production of light discharges by living **organisms**. The mechanism has evolved independently in many kinds of **organisms**; for example fireflies who produce flashes of light used to attract mates, and a variety of deep-sea creatures who are luminescent by means of either light-producing body cells or by specialized **organs** containing luminous **bacteria**. ... Light emitted by chemical reactions within living things (fireflies, glow worms, jellyfish, etc.). Uses: to communicate, escape **predators**, attract prey. (See: **bioelectricity**)

bioluminescent - Of or referring to **bioluminescence**.

biomagnification - The increasing concentration of a **compound** in the tissues of **organisms** as the **compound** moves from lower to higher **trophic levels**. Also known as **bioaccumulation, biological magnification, or bioconcentration**. Refers to the process whereby certain substances such as pesticides or heavy metals move up the **food chain**, work their way into **rivers** or lakes, and are eaten by **aquatic organisms** such as fish, which in turn are eaten by large birds, animals or humans. The substances become concentrated in **tissues** or internal **organs** as they move up the **food chain** ... The accumulation of a chemical in **tissues** of an **organism** to levels greater than in the

surrounding medium in which the **organism** lives. ... The increase in toxicity of chemically stable synthetic human-made **compounds** which resist the natural detoxifying processes of excretion and decay, so the poison accumulates exponentially in the animal body as it progress up the **food chain**. Through the process of magnification, the concentrations of any single **pollutant** can be millions of times greater in the body of a top **predator** (**carnivores** like eagles, Giant Otters, Jaguars or humans) compared with the surrounding **environment**. For example, the biomagnification of **PCBs** in fish can be concentrated to reach an accumulation factor exceeding 250,000 times that in the water. Also known as **biological magnification, bioconcentration** or **bioaccumulation**. ... The strengthening of a harmful and usually toxic substance as it moves up the **food chain**, as with DDT growing 400 times deadlier in gulls and other **carnivores** than when first ingested by marsh animals. (See: **bioaccumulation**)

biomass - The total weight of living material, plants and animals, in an **ecosystem**. ... Quantity of **organic** matter: total dry weight of all plants and animals in an **ecosystem**. Used as a measure of productivity....The total mass, at a given time, of living **organisms** of one or more **species** per unit of area (**species biomass**) or of all the **species** in the **community** (**community biomass**). ...The living or dead weight of **organic** matter in material units such as living or dead weight, wet or dry weight, ash-free weight, etc.....The weight of **organisms** in a given area or volume.... The total weight (at a given time) of living **organisms** of one or more **species** per unit of space (**species biomass**), or of all the **species** in a **community** (**community biomass**). **Phytomass** expresses the weight of plants only.....The total weight of matter incorporated into all **organisms** (living and dead)..... The total **biological** mass, quantity of living matter, or dry weight of a particular **species**, within a **habitat** or **geographical** area. Since **species** differ in size, the use of the mass rather than the number of **organisms** per unit of area helps to indicate the importance of a **population** in relation to productivity and the flow of energy and **nutrients** through an **ecosystem**. The global biomass consists of all of the **organisms** in the world.... **Organic non-fossil** material of **biological** origin. For example, **trees** and plants are biomass.... The total weight of living matter in a given area or **ecosystem**.

biomass conversion - A method for changing plant and animal materials into high-quality fuels.

biomass energy - Energy produced by combusting renewable **biomass** materials such as wood. The **carbon dioxide** emitted from burning **biomass** will not increase total **atmospheric carbon dioxide** if this consumption is done on a sustainable basis (*i.e.*, if in a given period of time, regrowth of **biomass** takes up as much carbon dioxide as is released from **biomass** combustion). **Biomass** energy is often suggested as a replacement for **fossil fuel** combustion which has large **greenhouse gas** emissions.

biome - A large **geographic** region characterized by a particular climate and dominant **organisms**....Entire **community** of living **organisms** in a single major **ecological** area.... One of the largest recognizably distinct **ecosystems** on earth; the plant and animal **communities** and associated soils that are characteristic of a given regional climate type. ... A major **biotic community** composed of all the plants and animals and smaller **biotic**

communities, including the **successional** stages of an area. The smaller **communities** in a biome possess certain similarities in gross external **vegetation** appearances (*e.g.*, **deciduous** trees, **coniferous** trees, **grasslands**, and **savanna/woodlands**) and **environmental** conditions present (especially gross **climatic** conditions - *e.g.*, **desert**, **tropical**, **temperate**, **tundra**). The North American **Grassland** is an example of a named biome.... A major **ecological community** or category of **habitat**, and having a characteristic **ecology**, **climate** or **geographical** region.... Well-defined **terrestrial environment** (*e.g.*, **desert**, **tundra**, or **tropical forest**). The complex of living **organisms** found in an **ecological** region. A region with a particular **climate** that contains certain types of plants and **ecosystems**. (See: **biotic community**, **ecosystem**, **ecoregion**, **biomes**)

biomes - Plural of **biome**. The world's major **communities**, classified according to the predominant **vegetation** and characterized by adaptations of **organisms** to that particular **environment**. Similar in meaning to **ecoregion**. ... The largest **ecological** regions distinguishable by characteristic plants and animals. There are six: **tundra**, **conifer**, **deciduous forest**, **grassland**, **tropical**, and **desert**. Biomes are subdivided into associations made up of societies. (See: **biome**)

biomimetic - Engineering which mimics designs from nature to produce new functional or technological innovations.

biomonitoring - The evaluation of **environmental** conditions through the use of living **organisms**.

biophilia - Word coined by biologist E. O. Wilson to describe the emotional affiliation of human beings for other living things, the innate tendency to focus on life and life-like processes ... Love of nature. The opposite of necrophilia, the love of dead things. (See: **ecologism**, **deep ecology**, **ecocentrism**, **environmentalism**, **Gaia hypothesis**).

biophysical - All the naturally occurring objects and processes of an area on the assumption that all naturally occurring things can be classified as being either living (*i.e.*, **biotic**) or non-living (physical or **abiotic**).

biopiracy - The business practice of patenting seeds and other indigenously grown agricultural products.

bioprospecting - Investigative collection of living **organisms** with the aim of uncovering potentially useful applications, for example **biomimetic** design features, unique **genetic** information, food and crop varieties, indigenous medicines, and especially with reference to the potential presence of pharmaceutically-active **alkaloids**. Conservationists and developers today find agreement over the value of **biodiversity** protection, at least on practical if not ideological grounds. Less than one or two percent of Earth's **organisms** have been examined, with the investigation and **conservation** of global **biodiversity** remaining one of the last great unexplored and undervalued realms of scientific discovery.

bioregion - A territory defined by a combination of **biological**, social and **geographical** criteria rather than by geopolitical considerations; generally, a system of related, interconnected **ecosystems**... An integrated and continuous natural area which contains an interconnected **biophysical** system, for example a **river catchment**, mountain range or other discrete **ecosystem**... A naturally bounded, **ecologically** distinct **geography**: a **watershed** is one example. Term coined by Peter Berg and Raymond Dasmann. The largest bioregion is an ecoregion (example: the Ozark Plateau in the United States), the next largest is a georegion (river basins, mountains, **watersheds**), and the next a local morphoregion. As Berg described it: *“A bioregion refers both to geographical terrain and a terrain of consciousness--to a place and the ideas that have developed about how to live in that place... A bioregion can be determined initially by use of climatology, physiography, animal and plant geography, natural history and other descriptive natural sciences. The final boundaries of a bioregion, however, are best described by the people who have lived within it, through human recognition of the realities of living-in-place....”*

bioregionalism - The defining and management of regions according to their biophysical and **ecological** characteristics, without restriction by political borders or other arbitrary human boundaries. This recognizes the integrity and continuity of large **biological** systems such as **habitats** and **ecosystems**, and is the appropriate large-scale unit for integrated management and monitoring of **environmental** impacts and change. (See: **bioregion**)

bioresources - **Genetic** resources, **organisms** or part thereof, **populations** or any other **biotic** component of the **ecosystem** with actual or potential use or value for humanity.

biorhythm - An innate, cyclical biological process or function... An innate periodicity in an **organism's physiological** processes, as sleep and wake cycles... A recurring biological process, such as sleep, that is controlled by the **circadian rhythms** of an **organism**.

biosolids - A euphemism for sewage sludge. The term was adopted in 1991, chosen in a renaming contest held by the Water Environment Federation, (the sewage industry's main trade, lobby and public relations organization) in a public relations campaign designed to counter the negative reaction of the public to the term “sewage sludge”. They are dangerous because is even after treatment, this toxic waste contains hundreds of pathogens, heavy metals and other harmful elements. It would be bad enough if these toxic wastes were stored in lined landfills, but the policy of the EPA is to promote the spreading of sewage sludge on agricultural lands and forest lands, from where they can easily make their way into our water supplies and food.

biosphere - All parts of Earth, including water, land, and atmosphere, that can sustain life... The portion of Earth and its **atmosphere** that can support life... the part of the Earth and its **atmosphere** in which living things exist... That part of the Earth's envelope, comprising the lower **atmosphere** (-aeroplankton), the seas and the land surface (-mantle rock) in which living **organisms** exist in their natural state... That part

of the Earth's crust, waters, and surrounding air-layer which is inhabited by living **organisms**. . . . It is a combination of two words - bios (life) and sphere (globe), meaning a globe that can sustain life, *e.g.* Earth. Refers to the regions of the Earth's **atmosphere** and crust occupied by living matterLargest self-sustaining and self-maintaining biological system. Also known as the **ecosphere**. . . . Taken together, the **troposphere**, oceans, and land surfaces where things live. (See: **ecosphere**, **hydrosphere**, **lithosphere**, **atmosphere**)

biosystem - Resultant of interaction between **abiotic** factors and **biotic factors** *e.g.* **gene** system, **cell** system, **organ** system, organismal system, **population** system and **ecosystem**.

biota - The animal and plant life of a given region. . . .All living animals and plants. . . The plants and animals of an area, taken collectively. . . . The combined living **organisms** of a given **ecological habitat**, **biome** or **geographical** region, comprising all of the plants, animals and **microorganisms**. The collection of all **organisms** living in a place.

biotic - Refers to the living components of the **environment** (such as plants, animals, and **fungi**) that affect **ecological** functions. . . . All of the natural living **organisms** in an area and their life processes. . . .Of living **organisms** and their **ecological** and **physiological** relations. The opposite of **abiotic**.

biotic community - A naturally occurring assemblage of plants and animals that live in the same **environment** and are mutually sustaining and interdependent. . . . An assemblage of related **populations** of plants and animals constituting a relatively self-sufficient **ecological** unit. Any assemblage of **populations** living in a prescribed area; it is a unit to the extent that it has characteristics additional to its individual **species** and **populations** components. . . . The **community** consisting of all of Earth's living **organisms**. . . . A self-sustaining **community** of living things. An **ecosystem**. (See: **community**, **biome**.)

biotic diversity - See **biodiversity**.

biotic factor - The **environmental** influence exerted naturally by living **organisms**: *e.g.* worms that aerate soil, animals that enrich it with manure, trees that throw shade, etc. . . . Any living thing that is part of an **ecosystem**.

biotic potential - A **population's** maximum production rate given ideal surroundings and resources.

biotic selection pressure - A **selection pressure** exerted by competing individuals of the same **species** or other **species**, or from **predators**, **parasites**, disease **organisms**, **mutualistic** partners, or food **species**. (See: **selection pressure**)

biotic zone - Life zone or **ecological** zone.

biotroph - An **organism** that derives **nutrients** from the living tissues of another **organism** (its host).

biotype - A **genetically homogeneous population** composed only of closely similar individuals; a **genotypic race** or group of **organisms**... An **environmentally** uniform area. The physical aspect of an **ecosystem**.

bioturbation - When **organisms** disturb **sediments**, as with worms on the ocean floor that eat food stuck between sand particles.

birth rate - Quantification of the potential rate of increase of a **population** due to the production (birth) of new individuals. Normally expressed as number of young produced per adult female per unit time.

bivalve - A **mollusk** having two shell halves that are held together with a hinge; clams and mussels are some types of bivalves.

bivouac - Temporary living quarters. The term is used especially for the encampments of soldiers and armies, and is used to describe the nightly shelter of *Eciton burchelli* army ants during their **nomadic** phase.

black zone - A band of blackish or brownish-black staining on rocks or other hard surfaces in intertidal areas or just above the **high tide line**. This zone is hardly ever submerged by water, but may get wet from spray of crashing waves. Occasionally, the black zone may extend into the **intertidal zone**. While appearing to be a bare rock surface, the black zone is really a **biological community** composed of very tiny and slow-growing black **lichens** (*Verrucaria* spp.) and blue-green algae (*Calothrix* spp.) (See: **cyanobacteria**)

blackwater river - A clear river that carries little or no **sediment** but is typically stained dark by **phenolics**, **tannins**, and other plant **compounds**...Blackwater rivers have a dark color due to **tannins** and other plant decay products. They tend to not carry much sediment. This is the origin of the name for the Rio Negro. In the Amazon **drainage** the major blackwater **tributaries** originate in the well-weathered sandy soils of the **Guianan Shield** north of the main trunk of the Amazon River. (See: **blackwater stream**, **igapó**, **whitewater river**, **white-sand forest**)

blackwater stream - Streams that drain white-sand areas (**white-sand forest**) carry heavy **tannin** loads and the water is often the color of dark tea or coca-cola. These are referred to as blackwater streams. Blackwater streams also form downstream from forested **swamps**, including palm **swamps** and *Ficus* **swamps**. (See: **blackwater river**, **igapó**, **whitewater river**, **white-sand forest**)

blade - In **botany**, the flattened part of a **leaf**.

blight - Blight refers to a specific symptom affecting plants in response to infection by a pathogenic organism. It is simply a rapid and complete chlorosis, browning, then death of plant tissues such as leaves, branches, twigs, or floral organs... Any plant disease resulting in withering without rotting... Any of many plant diseases causing damage to, or the death of, leaves, fruit or other parts... Any sudden, severe, and extensive spotting, discoloration, wilting, or destruction of leaves, flowers, stems, or entire plants, usually attacking young, growing tissues (in disease names, often coupled with the name of the affected part of the host, *e.g.*, leaf blight, blossom blight, shoot blight)... A disease characterized by rapid and extensive death of plant foliage. A general term applied to any of a wide range of unrelated plant diseases. (*e.g.*, chestnut blight, fireblight, late blight, halo blight). (See: **canker, gall, rust, smut**)

blowdown - See **windthrow**.

blowout - A depression caused by erosive wind.

blue-green algae - The old term for **Cyanobacteria**.

bluff - A high steep bank (usually formed by river erosion)... A high, steep bank, as by a river or the sea, or beside a ravine or plain; a cliff with a broad face.

board foot (MBF) - A measure for lumber equivalent to a one-inch thick board one foot long and one foot wide. Often used to determine the amount of wood cut from a **forest**.

bog - A bog is a **wetland** type that accumulates acidic **peat**, a deposit of dead plant material. Moisture is provided entirely by **precipitation**, and for this reason bog waters are acidic and termed **ombrotrophic** (or cloud-fed), which accounts for their low plant **nutrient** status. Excess rainfall outflows, with dissolved **tannins** from the plant matter giving a distinctive tan color to bog waters. Bogs are widely distributed in cold, **temperate** climates, mostly in the Northern Hemisphere, but also in mountainous areas such as the Andes. ... **Marshy** land covered by **shrubs** and **mosses**. Their **acidic** soils accumulate **peat**, the thick, carbonized vegetable tissue decomposed in water. ... A **mire** (**peat-forming ecosystem**) influenced solely by water which falls directly on to it as rain or snow and generally dominated by **Sphagnum mosses**. . . . That stage in the **physiographic succession** of an area during which its surface is entirely composed of living **Sphagnum**, immediately under which is a fibrous brown **peat** composed mainly or entirely of partially disintegrated **Sphagnum**, the habitat exercising a distinctly selective influence on its **flora**. ... A **peat-covered** or **peat-filled** area, generally with a high **water table** dominated by **mosses**, especially **Sphagnum**; although the **water table** is near the surface there is little standing water except in **ponds**. ... In Alaska, bog **vegetation** may be dominantly **herbs, shrubs, or trees**. **Sphagnum** spp. are usually present, and often dominate the **moss** layer. Substrate is composed of very wet **sedge peat** or **Sphagnum peat**. Depth of **peat** may range from 30 cm to several meters. Compare **fen**. (See: **fen, peat, ombrotrophic**)

- **basin bog** - A bog which has built up to the water level in a lake or an old river channel and the upper surface of the peat is either horizontal or gently sloping.

- **blanket bog** - Term used in the British Isles for a bog covering undulating semi-uplands. ...Bogs of cool **temperate** regions formed under a **maritime** rainfall at lower elevations.Bogs on hills developed under high rainfall and low **temperatures** as in Southeastern Alaska.
- **dwarf shrub bog** - A **nutrient**-poor, relatively dry bog covered with **ericaceous** dwarf **shrubs** and *Sphagnum* species.
- **ericaceous shrub bog** - Sites on wet peaty soils on which **ericaceous shrubs** are co-dominant with **sedges**, **mosses**, other **shrubs**, and/or **trees**. **Trees**, when present, provide less than 25% cover. **Peats** may be either sedge or *Sphagnum*, and accumulations range from 15 cm to 12 m. The lowest **peat** accumulations are in Interior and Arctic Alaska (although some substantial peat deposits are also present in these areas); the deepest are in Southeast Alaska. *Sphagnum* spp. are usually present, whether or not they are the primary **peat** formers. These types are usually acid. The surface is usually hummocky and standing water may be present in the depressions, especially in early summer. In general, the surface is drier than wet **meadows** and the **water table** may fall several centimeters below the surface during dry spells. **Peat**-flooded ponds one to several meters across are common in some bogs in Prince William Sound and Southeast Alaska. **Mosses** are present, if not co-dominant; **lichens** are frequently present, although usually not important. Erect **shrubs**, such as willows, *Salix* sp. and alders, *Alnus* sp., may be absent or common (but less than 25% cover). **Aquatic** plants are absent or non-dominant.
- **flat raised bog** - A bog which has a tendency for **peat** growth to extend up the sloping valley sides, leaving the boundary between bog and valley side poorly marked. There is a very weak rand and poorly developed lagg.
- **floating bog** - See **quaking bog**.
- **lacustrine bog** - The transitional stage in which some mineral water is still a major influence in the development of the bog.
- **mesotrophic bog** - A wet bog with a moderately poor to poor **nutrient** level. *Sphagnum* species are abundant but higher plants help to determine the **physiognomy** of the **vegetation**. Parts of the bog are influenced by somewhat richer water. Characteristic sites for **mesotrophic** bogs are bog borders, surroundings of drainage channels in bogs, and shallow bogs.
- **oligotropic bog** - Wet, extremely **nutrient**-poor bog often **ombrotrophic** and dominated by *Sphagnum* species.
- **paludification bog** - Refers to a bog formed over previously dry land where a rise in the water table saturates the soil without forming a lake. (See: **paludification**)
- **quaking bog** - Bog which has developed upon a mat of *Carex* or *Sphagnum* growing over a water surface.A carpet of bog **vegetation** that is floating and sinks and quivers when walked on. Often called a **floating bog**.
- **raised bog** - **Ombrophilous mire** in which **peat** accumulation at the center of the bog is greater than at its edges, giving rise to a cross-section resembling an inverted saucer. The central portion thus raised above the natural **groundwater** level, becomes solely dependent upon **precipitation** (**ombrotrophic**) and is therefore exceedingly low in plant **nutrients**.A bog which has grown above its site of origin, whose center is higher than the margins and whose surface is convex. Growth is by *Sphagnum* proliferation and deposition of **peat**, water being supplied by airfall or

capillary action in the **peat**. There is usually one or several very acid ponds near the center and around the rim is a sedgy channel (lagg) where water collects and flows away.Bog with an elevated central area caused by **peat** accumulation. This central zone is generally isolated from the local **water table** and chiefly dependent on **precipitation** for water and minerals.A bog with *Sphagnum* and associated plants that is typically convex and gently sloping from the center towards the steep margins and bordered by a ditch or a water course (lagg). Synonyms of Highmore, Hochmoor (German), hogmoose (Swedish), and red bog (Irish).

- **spruce bog** - A loosely applied term describing confined areas of **organic** terrain where **coniferous** trees (not always spruce) are a prominent feature of the **vegetation** cover. (See: **muskeg**)
- **string bog** - A common **taiga** landscape consisting of alternating low bog ridges (German-Strange) and wet sedgy hollows (Swedish-flarke, English-flarks). The ridges and hollows are orientated across the major slope of the **peatland** at right angles to water movement. Synonym of Strangmoor (German) and more properly termed a **fen** since it is usually fed by waters from outside the mire.
- **transition bog** - A bog with a **nutrient** supply and **vegetation** type intermediate between the **raised bog** and **low bog** types.
- **treed bog** - A type of **ericaceous shrub** bog with a 10 to 25% cover of **trees** at least 135 cm tall. (See: **muskeg**)

boggy - Of or referring to **bogs**.

bole - The main trunk of a **tree**.

bolson - A mountain-ringed desert basin lacking any outlet for drainage.

bolting - In **botany**, the rapid growth of a **stem** prior to flowering.

boreal - Relating to, belonging to or coming from the north....Describes the northern **biotic** area that is dominated by **tundra**, **taiga**, and **coniferous** forests....pertaining to the north or northern latitudes. The opposite of **austral**....Referring to a far northern region; a boreal forest is one that can withstand extreme climatic conditions typical of those bordering the Arctic; boreal forests are dominated by cone-bearing trees and typically found between the **temperate deciduous** forests to the south and the tree-less **tundra** to the north.... Cool temperature regions of the Northern Hemisphere.... Northern, or having to do with northern regions.... Of the northern latitudes.

boreal forest - The high to mid-latitude **biome** characterized by **coniferous forests** inhabited by fir, pine, spruce, larch, and cedar standing on previously **glaciated** land. Stretches across North America, Europe, and Asia. Also known as the **taiga**.

boreal migrant - A bird species that migrates from the Northern Hemisphere towards the **equatorial** regions for the non-breeding season. Also known as a **northern migrant**. (See: **migrant**, **austral migrant**)

borehole - Any exploratory hole drilled into the Earth or ice to gather geophysical data. Climate researchers often take ice core samples, a type of borehole, to predict **atmospheric** composition in earlier years.

botany - The scientific study of plants.... The branch of **biological** science dealing with plant life, for example the **classification**, structure or **ecology** of plants, or the **flora** characteristics of a particular time or region.

botfly - A member of the fly **family** Oestridae, hairy flies whose **larvae** live as **parasites** within the bodies of **mammals**. There are approximately 150 known **species** worldwide. One **species** of botfly, *Dermatobia hominis*, attacks humans. *Dermatobia hominis* eggs are vectored by mosquitoes and **muscoïd** flies. The female *Dermatobia* captures the mosquito and attaches its eggs to the body of it, then releases it. Either the eggs hatch while the mosquito is feeding and the **larvae** use the mosquito bite area as the entry point, or the eggs simply drop off the **muscoïd** fly when it lands on the skin. The **larvae** develop inside the **subcutaneous** layers, and after approximately eight weeks, they drop out to **pupate** for at least a week, typically in the soil. The adults are small gray flies resembling a blowfly. *Dermatobia hominis* is native to Mexico, Central America and South America.

bottom feeder - An animal, such as a fish, that typically feeds on the bottom of a body of water.

bottomland - A low-lying area near a **river**, the soil of which consists of sand, **silt**, and mud deposited by flowing water.

bottomset bed - A fine, horizontal **delta** deposit of **alluvial** clay and **silt**.

boulder - A rounded rock, dislodged from its place of origin and larger than 256mm (approximately 10 inches) in diameter.

boundary - In **ecology**, the line or zone formed by the edges of two adjacent **ecosystems**.

bounded coast - A stretch of coast along which wave currents, tidal currents and **sediment** transport is interrupted by either natural or man-made features, causing a rapid change in coastline orientation.

brachiate - To move by swinging with the arms from one hold to another, as certain **primates**, e.g. Spider Monkeys and gibbons, do.

Brachiopods - A small **phylum** of **benthic invertebrates**. Also known as lamp shells (or lampshells), "brachs" or Brachiopoda, they are **sessile**, two-valved, **marine** animals with an external **morphology** superficially resembling **bivalves** to which they are not closely related. Approximately 99 percent of all brachiopod species are documented solely from the fossil record.

brackish - This term is used to describe water which is intermediate in salinity (salt content) between freshwater and seawater. ...Mixed fresh and salt water. ...Describes water that is less salty than the ocean but more salty than **freshwater**. Typically occurs in **estuaries**.... Brackish water is water that is saltier than fresh water, but not as salty as sea water. It may result from mixing of seawater with **fresh water**, as in **estuaries**, or it may occur naturally, as in brackish fossil **aquifers**.... Mixed fresh and salt water. ... Water contaminated by salt, but with a salinity lower than 35 parts per thousand. (See: **brine**)

bract - A modified **leaf** arising below a **flower** or **inflorescence**.

bradyspory - The gradual release of seed from a cone or fruit over a long period of time, as opposed to **tachyspory**, the more-or-less immediate release of seed as soon as they have matured.

braided river - A river type with multiple channels separated by shoals, bars and islands...A braided **river** is one of a number of channel types. It has a channel that consists of a network of small channels separated by small and often temporary islands called braid bars or, in British usage, aits or eyots. Braided streams are common wherever a drastic reduction in **stream gradient** causes the rapid deposition of the stream's **sediment load**. Braided channels are also typical of **river deltas**, **alluvial fans** and **peniplains**. The Rio Alto Madre de Dios in the Department of Madre de Dios, Peru is an example of a braided **river**.

The channels and braid bars are usually highly mobile, with the **river** layout often changing significantly during flood events. Channels move sideways via differential velocity: On the outside of a curve, deeper, swift water picks up **sediment** (usually gravel or larger stones), which is re-deposited in slow-moving water on the inside of a bend. The braided channels may flow within an area defined by relatively stable banks or may occupy an entire valley floor. The dynamic nature and uneven terrain of braided **river**s present particular challenges to bridge construction.

Conditions which promote braided channel formation are:

- an abundant supply of **sediment**
- drastic reduction in **stream gradient** causes the rapid deposition of **sediment**
- rapid and frequent variations in water discharge
- erodible banks

breaker - A wave that collapses forward near the shoreline as the shoaling sea bottom makes it top-heavy. It collapses when the ratio of its height to its wavelength passes 1:7. A wave that breaks into foam against the shore and washes back into the ocean at another angle.... A wave breaking on a shore or over a structure. (See: **collapsing breaker**)

breaker depth - The depth of water, relative to still water level at which waves break; also known as breaking depth or limiting depth.

breaker index - The maximum ratio of wave height to water depth in the surf zone.

breaker zone - The zone within which waves approaching the coastline commence breaking, typically in water depths of between 5 and 10 meter.

breccia - Coarse sedimentary rock composed of sharp, angular rock fragments cemented together. Contrast with **conglomerate**.

breeding cycle - The time period beginning at nest building through egg-laying and raising young to the point of independence.

breeding plumage - The term usually referring to the colorful **plumage** which the males of many **species** of birds acquire for the breeding season, usually for the purposes of attracting a female mate. In a few **species**, it is the females which may be more colorful during the breeding season. (See: **alternate plumage**)

breeding rate - Natural inherent capacity to reproduce; numbers per unit of time, usually expressed as a theoretical or attained rate.

brine - Seawater with a salinity greater than 35 parts per thousand. Brine is often made salty by evaporation. (See: **brackish**)

broadleaf - A conventional term applied to **trees** and **shrubs** of the **Angiospermae**, in loose contrast with the generally needle-leaved **Gymnospermae**.

broadleaf evergreen forest - A kind of forest where the trees are **evergreen** but with broad leaves, not needle-like leaves (such as in pines). **Tropical moist forests** are examples.

broadleaf tree or **broad-leaved tree** - A tree in the **Angiospermae** having relatively broad leaves, in contrast to the rather needle-like or scale-like leaves of pines, spruce and other **coniferous** trees in the **Gymnospermae**.

bromeliad - A member of the plant **family** Bromeliaceae. Some bromeliads are **terrestrial**, but most are **epiphytic**. Most species are characterized by a basal cluster of spike-like leaves and an elongated flower stalk.

brood - (noun) - The young of a bird that are hatched or cared for at one time... A group of chicks or eggs in a nest ...(verb) - to sit on and keep warm (chicks).... To incubate eggs or care for hatchlings.

brood parasites - Birds or insects that lay their eggs in the nests of others to be raised by the **host**... A bird that lays its eggs in the nest of another species of bird in order to have that bird take on the parenting responsibilities of the hatchlings; sometimes called nest parasite; cowbirds and some cuckoos are an examples of birds that practice (interspecific) brood parasitism. (See: **interspecific brood parasitism**, **intraspecific brood parasitism**)

brood parasitism - The practice of some birds or insects to lay their eggs in the nests of others to be raised by the **host** (See: **interspecific brood parasitism, intraspecific brood parasitism**).

browse - In biology, (noun) young twigs, shoots, and leaves suitable to be used as food by some animals, such as deer, elk, and cattle; (verb) to feed on young twigs, shoots, and leaves.

Bryophyte - Embryophyte plants (land plants) that are nevertheless **non-vascular plants**: they have tissues and enclosed **reproductive** systems, but they lack **vascular tissue** that circulates liquids. They neither flower nor produce seeds, reproducing via **spores**. There are three groups of Bryophytes, the Marchantiophyta (**liverworts**), Anthocerotophyta (**hornworts**), and Bryophyta (**mosses**).... The **non-vascular plants**, characterized by life cycles dominated by the **gametophyte** phase. This group includes the **mosses, liverworts, and hornworts**, which lack lignified conducting tissues.... A member of the plant **order** Bryophyta, including the **mosses, liverworts, and hornworts**.

Bryozoan - A tiny, moss-like **organism** with primitive animal characteristics, lacking a backbone and living in gelatinous colonies attached to stones, wood, or **vegetation** under water.

bud scale - A modified **leaf** protecting a bud.

bud scale scar - See **terminal bud scale scar**.

budbreak - Stage of plant bud development when green tissue becomes visible.

buffer prey - A **species** targeted by a **predator** that usually eats a different **species**. This happens when the preferred **species** is depleted or the buffer species is unusually numerous.

buffer zone - A designated land or water area, along the perimeter of a protected area, designed to resist, absorb, or otherwise preclude unwanted development or other intrusions into the protected area. ... Intervening areas of natural vegetation which provide national parks and other protected areas additional protection from **edge effects** and the encroachment of other impacts. Buffer zones are important to reduce **habitat fragmentation** and demonstrate good environmental management policy outside parks and preserves. They also provide **wildlife corridors**.

bulb - A short, usually round, underground stem having thick, fleshy scales (modified leaves) that store food; lilies, onions, and tulips grow from bulbs.... A short, flattened **stem** bearing fleshy, food-storage **leaves**.

buoyancy - An upward force on an object or a substance that is in a liquid or a gas.

bur - A dry **fruit** covered with spines, scales or hooks.

burrow - A hole in the ground used by an animal that provides shelter and/or a place to raise young.

butte - A steep, craggy, isolated hill with a top less flat than that of a **mesa**. (See: **mesa**)

buttress root - A tree root that extends out from the trunk as a flange-like structure.... An enlarged, above ground root giving support to a **tree** trunk.

Buys-Ballot's Law - Standing somewhere in the Northern Hemisphere with your back to the wind locates the low pressure area driving it on your left. The reverse is true in the Southern Hemisphere. (See: **Coriolis Effect**)

byssal thread - One or more fibers secreted from a **gland** in juvenile mussels. Allows attachment to a **substrate** such as large sand grains, rocks, or even other mussels, thereby anchoring the mussel and preventing it from being swept away by current. ...**Protein** "ropes" secreted from mussels that attach them to **substrates**.

by-catch - Fish and other animals killed in fishing gear that was intended to catch other seafood; by-catch is usually thrown away at sea.... Accidental harvest of one **organism** instead of another, like the **crustaceans** caught in shrimp trawls and the dolphins trapped instead of tuna. Same as **incidental catch**.

caatinga - A Brazilian term for highly seasonal (with prolonged dry season) **deciduous** forest dominated by spiny trees and **shrubs**. Found extensively in eastern Brazil.

cache - A place where food is hidden.

caespitose - Plants with short stems and branches usually covered with **leaves** and forming dense tufts or cushions, *e.g.* *Silene acaulis*. (See: **cushion plant**)

calcareous - Containing **limestone** (**calcium carbonate**).

calcareous soil - Soil rich in **calcium carbonate** (calcite) deposited by weathering of **calcareous** rocks and shells. Chalk, **limestone**, **marl**, magnesium, and phosphates are often found in it, making it fertile, if dry or thin. Often seen in **deserts**.

calcicole - A plant that likes high-calcium soil.

calcification - Accumulation of **calcium carbonate** in upper soil layers. Frequent in semi-arid areas and in **grasslands**.

calcifuge - A plant that avoids **calcareous soils**.

calciphile - A plant confined to **calcareous soils**.

calcium carbonate - A salt found in nature as chalk or calcite or aragonite or **limestone**. It is a common substance found as rock in all parts of the world, and is the main component of shells of **marine organisms**, snails, and eggshells.

caliche - Surface soil particles cemented together by lime (**calcium carbonate**). Lumps of it can block water, curtail root growth, and cause iron deficiency in nearby plants.

California Current - An **ocean current** that carries cold water toward the equator along the western coast of the United States, keeping the **climate** of the northwest cool.

call notes - Bird sounds that are generally shorter than songs and seem to convey a specific message, such as food begging calls, alarm calls, and contact calls (or *chip* notes); these are generally innate rather than learned.

Callenbach's Four Laws of Ecology - 1. All things are interconnected. 2. Everything goes somewhere. 3. There is no such thing as a free lunch. 4. Nature bats last (nature doesn't compromise). (Barry Commoner, biologist, 1971. See: **ecology, Commoner's Four Laws of Ecology**)

callose - A plant substance created and deposited in the pores of **phloem sieve plates**, especially in response to injury.

callus - In **botany**, a **corky tissue** developed by woody **species** to cover wounds.

calorie - The amount of heat needed to raise the temperature of one gram of water at 15 degrees centigrade one degree centigrade.... A quantity of energy equal to the amount of heat required to raise one gram of pure water from 14.5 to 15.5° Celsius under standard atmospheric pressure.... The amount of energy needed to raise the temperature of 1 gram of water by 1°C

calving - Breaking off of sheaths of ice from icebergs or **glaciers**; a form of **ablation**.

calyx - Collectively, all of the **sepals** in a **flower**.... The **sepals** (outer leaves covering the bud) of a **flower**....Outermost short of organs of a flower.

canker - Canker and **anthracnose** are general terms for a large number of different plant diseases, characterised by broadly similar symptoms including the appearance of small areas of dead tissue, which grow slowly, often over a period of years. Some are of only minor consequence, but others are ultimately lethal, and of major economic importance in agriculture and horticulture. Different cankers and anthracnoses are caused by a wide range of organisms, including fungi, bacteria, mycoplasmas and viruses. The majority of canker-causing organisms are tied obligately to a single host species or genus, but a few will attack a wider range of plants. Canker can be spread by weather and animals, making an area that even has a slight amount of canker hazardous. A fungal disease of woody plants that causes localized damage to the bark...Necrotic, localized diseased area of a plant. (See: **anthracnose, gall, rust, blight, smut**)

capillary water - In **botany**, water held in the tiny spaces between soil particles or between plant **cells**.

cambium - The layer of **cells** between the inner bark and wood of a tree. This is where growth takes place.... The innermost part of bark; cambium is a living part of a plant stem. ... The **cell**-generating **tissue** between the bark and the stem. Usually absent in **monocotyledonous** plants. ... A layer of plant **cells** that sometimes separates the **xylem** and the **phloem**.Sheath of meristematic cells in stem and root, which divide primarily tangentially, producing secondary xylem toward the inside and secondary phloem toward the outside. (See: **vascular cambium, cork cambium, monocotyledonous, monocot**)

Cambrian explosion - Supposed huge diversification of multicellular life forms in the Earth's oceans during the Cambrian Period 570 million years ago. All that's certain is that **organisms** living before the "explosion" did not leave behind many fossils.

camouflage - Concealment by disguise or protective coloring.... The colors or patterns that help hide an animal so that it blends in with its **environment**.... Form of protection in which the color and the pattern of coloration makes an **organism** blend with its surroundings. (See: **cryptic coloration, disruptive coloration, mimicry**)

campanulate - Bell-shaped.

campos - A Brazilian term (meaning fields) for any of several types of low and mid-elevation **grasslands** that are usually seasonally wet. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

candle - In **botany**, new shoots on needled **evergreens**.

canebrakes - A general term for a dense growth of cane or bamboo, in North America, especially canebrake bamboo (*Arundinaria gigantea*)...A dense growth of cane, such as *Gynerium sagittatum*.

canid - A member of the dog **family**, Canidae, which includes dogs, wolves, and foxes.

canine - An animal of the dog family Canidae or referring to or resembling an animal of that family....One of the pointed, conical teeth located between the incisors and the first bicuspid. (See: **canid**)

cannibalism - The act of an animal feeding on its own kind.

cannibalistic - Of or referring to **cannibalism**.

cannibalize - To consume members of the same species as food.

canopy - The more or less continuous cover of branches and foliage formed collectively by the crown of a tree and the **crowns** of adjacent trees and other woody growth. ... A tree's uppermost layer - branches and leaves....The forest cover of leaves, branches, and foliage formed by tree **crowns**. There may be several canopy layers. ... Layer of **vegetation** elevated above the ground, usually of tree branches and **epiphytes**. In **tropical** forests, the canopy may be more than 100 feet above the ground. In many forests the canopy is considered the uppermost layer of foliage, but in **tropical rainforests** the uppermost level is often referred to as the **emergent layer**.... The above ground plant organs within a **community**. This term is generally applied to a collection of plants (trees) rather than individual plants (trees)..... More or less continuous cover of branches and foliage formed collectively by crowns of adjacent **trees, shrubs, or herbs** depending upon the type of **vegetation**.The cover of **leaves** and branches formed by the tops or crowns of plants as viewed from above....The uppermost layers of foliage and branches of the **trees** in a **forest community**, especially in the **tropical rainforest** where they join to form a continuous **habitat** with a large specialized **biodiversity**.... The overhead or dominant trees in a forest. ...The overhead branches and leaves of **streamside vegetation**.

canopy closure - In a stand of trees, the progressive reduction of space between **crowns** as they grow and spread laterally. A forest **canopy** in which the individual tree **crowns** are nearing general contact is termed a close canopy; and having achieved contact, a closed canopy. In general, closure indicates a process, while cover indicates a condition. (See: **canopy closure, canopy cover, crown cover, crown density, crown closure**)

canopy cover - The proportion of the ground area covered by the vertical projection of the **canopy**. Expressed as a percent of area....Sometimes used to mean a combination of canopy closure and **crown density**. Expressed as a degree of opacity. (See: **canopy closure, canopy cover, crown cover, crown closure, crown density, shade density**)

cap and trade - A specific type of **greenhouse gas** emissions trading system where total **greenhouse gas** emissions are limited or 'capped'. Permits are allocated or auctioned up to the set cap, and a market allows those participants emitting less than their quota to sell their excess permits to emitters needing to buy extra to meet their cap.

capillary action - Water movement through tiny absorbent channels, often against the force of **gravity**, made possible by water's firm hydrogen-oxygen bondings. Capillary action plays a major role in water diffusion through soils and **organisms**.... One force that pulls water up into plants by water **molecules** sticking to one another and to other substances.

capillary water - Just above the **water table**, in the aeration zone, is capillary water that moves upward from the **water table** by capillary action. This water can move slowly and in any direction. While most plants rely upon moisture from **precipitation** that is present in the unsaturated zone, their roots may also tap into capillary water or into the underlying saturated zone.

carapace - The upper shell of a turtle; also, the hard covering of the head and mid-section of a crustacean (shrimp, crab, etc.)... **Exoskeleton** of **crustaceans** covering the head and **thorax** on **dorsal** side.

carbohydrate - Any of a group of **organic compounds** that includes sugars, starches, **celluloses**, and gums and serves as a major energy source in the diet of animals. These **compounds** are produced by **photosynthetic** plants and contain only carbon, hydrogen, and oxygen, usually in the ratio 1:2:1.... An **organic compound** present in the **cells** of all living **organisms** and a major **organic nutrient** for human beings; consists of carbon, hydrogen, and oxygen, and makes up sugar, starch, and **cellulose**.... **Compounds** of oxygen, hydrogen, and **carbon** formed into the sugars, starches, and **cellulose** formed by plant **photosynthesis** of water and **carbon dioxide**. They provide energy and facilitate fat production.... Any of various chemical compounds of carbon, hydrogen, and oxygen, such as sugars, starches, and cellulose.

carbon - An **element** whose atoms have six protons and six electrons. Because its outer electron shell holds only four of the eight electrons it could support, carbon bonds easily with other **elements** and with itself to fashion the complex **molecules** on which life as we know it depends. It makes up almost half of the human body's dry mass.

carbon credit - A generic term to assign a value to a reduction or offset of **greenhouse gas** emissions. A carbon credit is usually equivalent to one ton of **carbon dioxide equivalent** (CO₂-e). A carbon credit can be used by a business or individual to reduce their **carbon footprint** by investing in an activity that has reduced or sequestered **greenhouse gases** at another site.

carbon cycle - The global scale exchange of carbon among its reservoirs, namely the **atmosphere**, oceans, vegetation, soils, and **geologic** deposits and minerals. This involves components in **food chains**, in the **atmosphere** as carbon dioxide, in the **hydrosphere** and in the **geosphere**.... The **biogeochemical** cycle undergone by carbon that is utilized by **organisms**, later liberated upon the death and **decomposition** of the **organisms**, and returned to its original state to be reused by another **organism**. It includes the **photosynthesis** of **carbohydrates** by plant **chlorophyll** from **atmospheric** carbon dioxide and water. Plants and animals transform **carbohydrates** into the structures and energy for growth and life processes. Carbon dioxide is returned (aided by the action of bacteria and other **microorganisms** and by combustion) to the atmosphere by excreta and decay.... All parts (reservoirs) and fluxes of carbon. The cycle is usually thought of as four main reservoirs of carbon interconnected by pathways of exchange. The reservoirs are the atmosphere, terrestrial biosphere (usually includes freshwater systems), oceans, and sediments (includes fossil fuels). The annual movements of carbon, the carbon exchanges between reservoirs, occur because of various chemical, physical, geological, and biological processes. The ocean contains the largest pool of carbon near the surface of the Earth, but most of that pool is not involved with rapid exchange with the atmosphere. ... The passage and recycling of **carbon** through the planetary **biosphere**, **lithosphere**, **hydrosphere**, and **atmosphere**. ... The process in which carbon is recycled between the atmosphere and living things. (See: **carbon dioxide**, **carbon sink**, **carbon**

flux)

carbon dioxide (CO₂) - A minor but very important component of the **atmosphere**, carbon dioxide traps **infrared radiation**. **Atmospheric** CO₂ has increased about 25 percent since the early 1800s, with an estimated increase of 10 percent since 1958. Burning **fossil fuels** is the leading cause of increased CO₂, **deforestation** the second major cause. The increased amounts of CO₂ in the **atmosphere** enhance the **greenhouse effect**, blocking heat from escaping into space and contributing to the warming of Earth's lower **atmosphere**.... A colorless **atmospheric** waste-product gas (one carbon atom joined to two oxygen atoms) produced by combustion, **fermentation**, and **respiration**. **Fossil fuel** consumption and **deforestation** have almost doubled the quantity of it in the **atmosphere**. (See: **greenhouse effect, carbon cycle, carbon footprint, photosynthesis**)

Carbon Dioxide Equivalent (CDE) - A metric measure used to compare the emissions from various **greenhouse gases** based upon their **global warming potential (GWP)**. **Carbon dioxide** equivalents are commonly expressed as "million metric tons of **carbon dioxide** equivalents (MMTCDE)" or "million short tons of **carbon dioxide** equivalents (MSTCDE)" The **carbon dioxide** equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. (See: **Carbon Equivalent, carbon dioxide, greenhouse gas**)

Carbon Equivalent (CE) - A metric measure used to compare the emissions of the different **greenhouse gases** based upon their **global warming potential (GWP)**. **Greenhouse gas** emissions in the U.S. are most commonly expressed as "million metric tons of carbon equivalents" (MMTCE). **Global warming potentials** are used to convert **greenhouse gases** to **carbon dioxide equivalents**. **Carbon dioxide equivalents** can then be converted to carbon equivalents by multiplying the **carbon dioxide equivalents** by 12/44 (the ratio of the molecular weight of carbon to **carbon dioxide**). (See: **Carbon Dioxide Equivalent, carbon dioxide, greenhouse gas**)

carbon flux - **Carbon** movement; movement of **organic compounds** through an **ecosystem**. Specifically, the relationship between **carbon dioxide** absorbed by green plants and **carbon dioxide** respired by various **organisms**. (See: **carbon cycle**)

carbon footprint - The amount of CO₂ emissions for which a single individual or discrete group is responsible....A measure of the impact human activities have on the **environment** in terms of the amount of **greenhouse gases** produced, measured in units of **carbon dioxide**. It is meant to be useful for individuals and organizations to conceptualize their personal (or organizational) impact in contributing to **global warming**. A conceptual tool in response to carbon footprints are **carbon** offsets, or the mitigation of **carbon** emissions through the development of alternative projects such as solar or wind energy or reforestation. A carbon footprint can be seen as a subset of earlier uses of the concept of **ecological** footprints.

The carbon footprint can be seen as the total amount of **carbon dioxide** (CO₂) and other **greenhouse gases** emitted over the full life cycle of a product or service. Normally

a carbon footprint is usually expressed as a CO₂ equivalent (usually in kilograms or tons), which accounts for the same **global warming** effects of different **greenhouse gases**. Carbon footprints can be calculated using a **Life Cycle Assessment (LCA)** method, or can be restricted to the immediately attributable emissions from energy use of **fossil fuels**.

An alternative definition of carbon footprint is the total amount of **carbon dioxide** attributable to the actions of an individual (mainly through their energy use) over a period of one year. This definition underlies the personal **carbon** calculators. The term owes its origins to the idea that a footprint is what has been left behind as a result of the individual's activities. Carbon footprints can either consider only direct emissions (typically from energy used in the home and in transport, including travel by cars, airplanes, rail and other public transport), or can also include indirect emissions (including CO₂ emissions as a result of goods and services consumed). Bottom-up calculations sum attributable CO₂ emissions from individual actions; top-down calculations take total emissions from a country (or other high-level entity) and divide these emissions among the residents (or other participants in that entity). (See: **greenhouse effect, carbon cycle, ecological footprint**)

carbon intensity - A measure of the amount of carbon contained in various energy forms. It is commonly expressed as units of carbon emitted per unit of energy.

carbon neutral - A voluntary mechanism where an activity, event, household, business or organization is responsible for no net emissions of **greenhouse gases** and can therefore be declared carbon neutral in that specific area. Carbon neutrality can be achieved reducing emissions as far as possible (*e.g.* energy efficiency, purchasing **renewable energy**) and then purchasing **carbon offsets** for any residual emissions in order to achieve zero net emissions.

carbon offset - A monetary investment in a project or activity elsewhere that abates **greenhouse gas** (GHG) emissions or sequesters carbon from the **atmosphere** that is used to compensate for GHG emissions from your own activities. Offsets can be bought by a business or individual in the voluntary market (or within a trading scheme), a carbon offset usually represents one ton of **carbon dioxide equivalent** (CO₂-e).Opportunity for individuals and businesses to neutralize their contribution to **climate change**.

carbon sequestration - The uptake and storage of carbon. Trees and plants, for example, absorb **carbon dioxide**, release the oxygen and store the carbon. **Fossil fuels** were at one time **biomass** and continue to store the carbon until burned.... The uptake and storage of carbon. Trees and plants, for example, absorb **carbon dioxide**, release the oxygen and store the carbon. **Fossil fuels** were at one time **biomass** and continue to store the carbon until burned..... The capture and long-term storage of carbon in forests and soils or in the oceans. For example trees and other plants sequester **carbon dioxide** from the **atmosphere** as they grow, through the process of **photosynthesis**. ...The process of (permanently) storing carbon someplace other than the atmosphere. Biologic sequestration includes absorption of **carbon dioxide** by **trees**. Physical approaches include separation of **carbon dioxide** from smokestacks and storage in underground

empty oil reservoirs or coal seams. (See: **carbon sink, carbon dioxide, geosequestration**)

carbon sink - Carbon sinks are areas that absorb and hold onto lots of **carbon dioxide** – oceans, soil and **forests**. A carbon “sink” can become a carbon “source.” For example, a growing **forest** is a carbon sink as it absorbs more carbon than it releases, but when that **forest** is cut, it becomes a **carbon** source....A system with the capacity to accumulate or release **carbon**, that has more **carbon** flowing in than out during a given period of time. ... A reservoir that absorbs or takes up released carbon from other parts of the **carbon cycle**. ... Opposite of a carbon source. A carbon pool can be a sink for **atmospheric** carbon if, during a given time interval, more carbon is flowing into it than out of it.... A sink is a component of the carbon cycle that stores more carbon than it emits to the **atmosphere**. A sink can be likened to a water well. **Forests** and soils can be carbon sinks. ... A carbon sink is a **reservoir** that can absorb or "sequester" **carbon dioxide** from the **atmosphere**. Forests are the most common form of sink, as well as soils, peat, **permafrost**, ocean water and carbonate deposits in the deep ocean. ... A **carbon reservoir** that is increasing in size. The main natural sinks are the oceans, soil, plants and other **organisms** that use **photosynthesis** to remove **carbon** from the **atmosphere** by incorporating it into **biomass**. CO₂ sinks are a form of **carbon** offset. ... Sites, such as **forests**, that soak up **carbon**.... Carbon **reservoirs** and conditions that take in and store more carbon (**carbon sequestration**) than they release. Carbon sinks can serve to partially offset **greenhouse gas** emissions. Forests and oceans are common carbon sinks. (See: **carbon dioxide, global warming, carbon sequestration, global carbon budget**)

carbon tax - A tax on energy sources which emit **carbon dioxide**.... A form of carbon price on **greenhouse gas** emissions where a fixed price is set by the government for carbon emissions for certain sectors.

carbonaceous - A material made of or containing carbon.

carbonate rocks - Rocks such as limestone or dolostone that are composed primarily of minerals, such as calcite and dolomite, containing the carbonate ion (CO₃²⁻).

carbonation - A type of **chemical weathering** in which carbonic acid (**carbon dioxide** dissolved in rainwater) reacts with the magnesium, potassium, sodium, or calcium in rocks like limestone and **feldspar** and thereby dissolves them, sometimes forming caves.

carbonic acid - A weak acid formed when **carbon dioxide** combines with water.... An acid formed when water mixes with carbon dioxide gas. It can dissolve limestone.

carcass - The dead remains of an animal.

carcinogen - A substance that fosters cancer.

carcinogenic - Causing or tending to cause cancer.

carnivore - An **organism** that eats meat. ... An **organism** that feeds primarily on meat...Most carnivores are animals, but a few **fungi**, plants, and **protists** are as well. Carnivores often feed on **herbivores** but can feed on other carnivores.... A flesh-eating animal...Any of various **predatory**, flesh-eating **mammals** of the **order** Carnivora, including the dogs, cats, bears, weasels, and raccoons.

carnivorous - Feeding mainly on the flesh or tissue of animals.... Relying primarily on animals for food.

carnivorous plant - See **insectivorous plant**.

carotene - In **botany**, an orange-yellow **pigment** located in the **chloroplasts**.

carotenoids - Yellow or orange **pigments** found in many marine algae and **invertebrates**.

carr - A **fen** (**minerotrophic mire**) supporting a **scrub** or **woodland vegetation**....A **mire** (permanently wet peat-forming organic soil) supporting a **scrub vegetation** and little or no *Sphagnum moss*.... A wet area of **deciduous scrub** or woods grown from **swampy** soil.... A deciduous woodland on a permanently wet, organic soil.

carrion - The rotting meat of a dead animal, in reference to the food of a **scavenger**.

carrying capacity - Maximum population of organisms that a given geographic area can support without being degraded or destroyed in the long run....The maximum number of animals an area can support during a given period. The steady-state density of a given **species** that a particular **habitat** can support....The maximum number of individuals of a particular species that an ecosystem can sustain without showing adverse effects ...The maximum number or **biomass** of **organisms** of a given **species** that can be sustained or survive on a long term basis within an **ecosystem**, during a specific time period.... The maximum **population** size that can be regularly sustained by an **environment**; the point where the **population** size levels off in the logistic growth model. ...The number (or weight) of **organisms** of a given **species** and quality that can survive in a given **ecosystem**, without causing deterioration, through the least favorable **environmental** conditions that occur within a stated interval of time. ...The maximum **population density** of a given species in an area beyond which no significant increase can occur without damage occurring to the **resources** upon which the **population** depends....The quantity of **biomass** an **environment** is capable of carrying over a 12-month period... or throughout the most critical period of the year ...or maintained indefinitely. NOTE: The concept now has so many meanings and interpretations that it is meaningless..... The maximum **population** an **ecosystem** can support of a given **species**. An ongoing debate focuses on whether the Earth's carrying capacity for humans has already been exceeded or shortly will be.

cartilage - A flexible, gristle-like tissue that forms part or all of a skeleton; the tip of the nose is supported by cartilage.

cartography - The science of mapmaking.

caruncle - A fleshy growth; in birds such as Wild Turkey, caruncles on the neck are bare and more noticeable in the male.

casual - In **ornithology**, used as a term of abundance to indicate a bird **species** that is not recorded on an annual basis, but whose records indicate a pattern of occurrence.

caste - In **zoology**, a specialized level in a **colony** of **social insects**, such as ants, in which the members, such as workers or soldiers, carry out a specific function.

casual agent - Organism or agent that produces a given disease.

catabolic - Metabolic processes that break down **tissues** and organs - turning protein into energy during a fast, for example. The opposite of **anabolic**.

catadromous - Refers to fish such as the American Eel, that spawn in sea water and then migrate to fresh water.... An **organism** which lives in **freshwater** and goes to the sea to spawn, such as some eels.... A fish that is born in **saltwater** but migrates to **freshwater** where it grows to adulthood. Opposite of **anadromous**. The American Eel is one of the few examples.... Catadromous fish are **species** that spawn (breed and lay eggs) in a seawater **environment** but spend at least part of their adult lives in a **freshwater environment**. An example is the American Eel.... In fish, migrating from **freshwater rivers** and **streams** to the sea in order to reproduce; the American Eel is an example of a catadromous fish. (See: **anadromous, amphidromous, diadromous**)

catalyst - In chemistry, a substance that alters the speed of a chemical reaction and does not appear in the final product and undergoes no permanent changes.... A substance which promotes a chemical reaction, but does not itself enter into the reaction.... A substance that changes the speed or yield of a chemical reaction without being consumed or chemically changed by the chemical reaction.... A substance, usually present in small amounts, that increases the rate of a chemical reaction without being consumed in the process.

catchment - See **catchment basin, watershed**.

catchment area - See **catchment basin, watershed**.

catchment basin - The area of land drained by a creek or **river** system, or a place set aside for collecting water which runs off the surface of the land... The land area drained by a **river** and its **tributaries**... The area of land from which rainwater or snow melt drains into a **reservoir, pond, lake, river** or **stream**.... An area of land, the boundaries of which are defined by relative elevation. The area from which a surface watercourse or **groundwater** system derives its water. Catchments are separated by divides... Describes the area of land which contributes runoff to a particular creek, **river lake** or ocean.... An

area within which all **precipitation** remains owing to **topographic** boundaries, such that this water is all ultimately channeled to one outlet. May also be called **watershed** or **drainage basin**.... The area of land that contributes surface water to a **river**.... An area in which all surface water drains to a common point. Ridges form the boundaries of catchments. Subsurface water may move between catchments. Many catchments or subcatchments are used to collect water for domestic supplies. (See: **watershed**)

caterpillar - The **larval** stage of a butterfly or moth.

cation - An **ion** carrying a positive atomic charge. Many key soil **nutrients** employ cations.

cation exchange capacity (CEC) - How well a soil hosts exchanges of **cations** between its minerals and its plant roots. In general, soils high in clay and **organic** matter carry a negative charge that retains plant **nutrient cations** against leaching away. High CEC usually correlates with high fertility.

catkin - A cylindrical, drooping, stalk-less cluster of flowers found on plants such as birches (*Betula* species), oaks (*Quercus* species), and willows (*Salix* species).... A drooping elongated cluster of bracted unisexual flowers found only in woody plants.

cattail - A **wetland** plant in the genus *Typha*, a **genus** of about eleven **species** of **monocotyledonous flowering plants** in the monogeneric **family**, Typhaceae. The **genus** has a largely Northern Hemisphere distribution, but is essentially cosmopolitan, being found in a variety of **wetland habitats**.... Any of various **perennial herbs** of the genus *Typha*, widespread in marshy places and having long strap-like **leaves** and a dense cylindrical cluster of minute flowers and fruits.... Tall erect **wetland herb** with sword-shaped **leaves**.

caudal - Referring to the tail region; a caudal fin is the tail fin of a fish.

cauliflorous - Referring to **cauliflory**.

cauliflory - The characteristic of having flowers (and thus fruits) grow directly from the branches or main trunk of a tree.

cavitation - Fast or even explosive **erosion** forced by air bubbles carried by a rapidly flowing liquid.

cavity - In **ecology**, a hole or opening in a **tree** trunk or limb.

ccolpa - A term used in western Amazonia for a **clay lick** or area of salty **clay**. Also spelled "colppa". (See: **clay lick**)

ceiling - In **meteorology**, the height of the lowest layer of clouds when the **weather** reports describe the sky as broken or overcast.

cell - The basic structural unit of all **organisms**... A usually microscopic structure containing **nuclear** and **cytoplasmic** material enclosed by a semipermeable **membrane** and, in plants, a **cell wall**.... The smallest structural units of living matter capable of functioning independently... The smallest, independently alive unit from which plants and animals are constructed.... Makers and maintainers of **protoplasm**; the basic living unit of all **organisms** except **viruses**. The cells of **organisms** other than **bacteria** are **eukaryotes** - those containing a defined **nucleus** in which **chromosomes** contain the **DNA** recipes from which cells synthesize **protein**. Cells know what to do and which **genes** to turn on because of what surrounding cells do in reference to a chemical-directional gradient. In **organisms** of greater complexity cells specialize into a variety of **tissues**.

cell wall - The outer covering of a plant **cell**.

cellular - Of or referring to **cells**.

cellular respiration - The chemical breakdown of food substances, resulting in the liberation of energy.

cellulose - The main constituent of the **cell walls** of all plants.... An inert and complex **carbohydrate**, $(C_6H_{10}O_5)_n$, the chief constituent of the **cell walls** of plants and of wood, cotton, hemp, paper, etc.... A plant substance forming a part of the structure of **cell walls**.... An insoluble, fibrous **carbohydrate** that reinforces the **cell walls** of plants, green **algae**, and **dinoflagellates**.

Celsius scale - A temperature scale where zero is assigned to the temperature where water freezes and 100 to the temperature where water boils (at sea level). ... Temperature scale in which water freezes at 0° and boils at 100°. Same as **centigrade**. To convert Fahrenheit to Celsius (Centigrade), subtract 32 and divide by 1.8. To convert Celsius (Centigrade) to Fahrenheit, multiply by 1.8 and add 32.... A change of 1 degree Fahrenheit equals a change of $5/9 = 0.56$ degrees Celsius.... A change of 1 degree Celsius equals a change of $9/5 = 1.8$ degrees Fahrenheit. (See: **Fahrenheit scale**)

center of endemism - Area with a proportionally large number of **endemic species**.

centigrade - See **Celsius scale**.

cephalothorax - The head and thorax of **arachnids** are combined in this body region. The **chelicerae**, **pedipalps**, and the eight legs are attached to it, and it also holds a spider's brain and sucking stomach.

cerrado - A Brazilian term (meaning closed) for a dense, dry **woodland** of small-stature trees and **shrubs** amidst **savanna**. (See: **grassland**, **savanna**, **Pampas**, **pampas**, **Pantanal**, **Llanos**, **prairie**, **steppe**, **veldt**, **meadow**, **campos**, **paramo**, **puna**, **savanna woodland**)

cervid - One of a group of hoofed **mammals** having long, slender legs, spotted offspring, **deciduous** antlers, and a four-chambered stomach; some examples of cervids are deer, caribou and elk.

Cetaceans - The **order** of mammals that includes dolphins and whales. (Closest living land relative to the whale is the hippo.) Like the **order** Sirenia (manatees and dugongs), the Cetaceans were never land animals.

CFCs - See **chlorofluorocarbons**.

Chaco - An extensive flatland of dry **shrubby woodlands**, **marshes**, **gallery forest** and palm **savanna** found mostly in Bolivia, Paraguay and Argentina.

Chagas disease - A **tropical parasitic** disease caused by the flagellate **protozoan** *Trypanosoma cruzi*. *T. cruzi* is commonly transmitted to humans and other **mammals** by an insect **vector**, the blood-sucking assassin bugs or kissing bugs of the subfamily Triatominae (**family** Reduviidae), most commonly species belonging to the *Triatoma*, *Rhodnius*, and *Panstrongylus* **genera**. The disease may also be spread through blood transfusion and organ transplantation, ingestion of food contaminated with **parasites**, and from a mother to her fetus.

The symptoms of Chagas disease vary over the course of an infection. In the early, acute stage, symptoms are mild and usually produce no more than local swelling at the site of infection. As the disease progresses, over the course of many years, serious chronic symptoms can appear, such as heart disease and malformation of the intestines. If untreated, the chronic disease is often fatal. Current drug treatments are generally unsatisfactory; available medications are highly toxic and often ineffective, particularly those used to treat the chronic stage of the disease.

Chagas disease occurs exclusively in the Americas, particularly in poor, rural areas of Mexico, Central America, and South America; very rarely, the disease has originated in the Southern United States. It is estimated that as many as 8 to 11 million people in Mexico, Central America, and South America have Chagas disease, most of whom do not know they are infected.

chalk - A type of limestone sedimented together from the skeletons and shells of marine **microorganisms**; it resists **erosion** but is porous, often gathering a lot of water beneath its formations.

channelization - Altering a **stream** by straightening, diverting, or dredging, usually to make it run faster.

chaos theory - The notion in the natural sciences that a very small change in a system may have massive, unpredictable consequences. Memorably summed up by the 'butterfly effect' in which it is possible, though of course, not certain, that the beating of a butterfly's wings in one part of the world may lead, a few weeks later, to a storm thousands of miles away. The indeterminacy of Heisenberg's Uncertainty Principle and

chaos theory effectively ended belief in a Newtonian, determinate world-view in which an accurate description of a system allows its future to be predicted absolutely. Nowadays, for example, scientists predict that however accurate our measuring instruments and powerful our computers we will never be able to predict local weather variations more than a couple of weeks ahead.

chamizal - A local name in northern Amazonian Peru for the most stunted **white-sand forests**, located on sites with poor drainage or occasional natural fires. (See: **white-sand forest, varillal, irapayal**)

Chapare - An area along the eastern slopes of the Andes of Bolivia, generally in the region between Santa Cruz and Cochabamba.

chaparral - a **shrubland** or **heathland** plant **community** found primarily in California, USA, that is shaped by a Mediterranean climate (mild, wet winters and hot dry summers) and wildfire. Similar plant **communities** are found in the five other Mediterranean climate regions around the world, including the Mediterranean Basin (where it is known as maquis), central Chile (where it is called matorral), South African Cape Region (known there as fynbos), and in Western and Southern Australia.

A typical chaparral plant **community** consists of densely-growing **evergreen, drought-resistant shrubs**. It often grows so densely that it is all but impenetrable to large animals and humans. This, and its generally arid condition, makes it notoriously prone to wildfires. Although many chaparral plant species require some fire cue (heat, smoke, or charred wood) for **germination**, chaparral plants are not "adapted" to fire *per se*. Rather, these species are adapted to particular fire regimes involving season, frequency, intensity and severity of the burn.... An **evergreen shrub community** adapted to dry seasons.... A dry region with a thick growth of brush and small trees found in the foothills of California's southern mountain ranges, in the Sierra Nevada, and along the California coast.

character displacement - Given two **species** that might need to compete for a resource, the members least like each other in what they require tend to survive and reproduce long enough to evolve into **species** whose niches do not involve competition.

chelate - An **organic** substance to which metals, such as iron, are bound and from which they are released.... A ring-shaped **compound** consisting of metals chemically bonded to **organic** residues. Metalloproteins, for example, that work in the body with **enzymes** and iron storage.

chelation - **Chemical weathering** in which **chelates** draw metallic **cations** (positively charged **ions**) out of rocks and rocky minerals. Ultimately, all forms of weathering have a hand in forming soils.

chela - The claw of an **arthropod**.

chelicera (plural **chelicerae**) - A spider's fang used for injecting **venom** into prey. In other **arachnids** they are pincer-like for shredding prey.

chemical autotroph - An **organism** that feeds itself chemically (**chemosynthesis**), as some **bacteria** do. Same as a **chemolithoautotroph**.

chemical weathering - Chemical **decomposition** of minerals and rocks. Types of chemical weathering are: oxidation (substances dissolved in oxygen - iron oxidation, for instance), hydrolysis (in acidic water), carbonation (limestone dissolved in water), hydration (weathering through water absorption), **chelation**.... The process that changes the composition of rock, forming new minerals that have properties different from those of the original rock.

chemigation - Dispensing a **pesticide** through an irrigation system. Sprinklers are often used for this.

chemolithoautotroph - See **chemical autotroph**.

chemosterilant - A chemical that stops pests from reproducing.

chemosynthesis - Process of using chemicals to form **organic nutrients** from **inorganic** matter. An alternative form of **primary production** used by **bacteria** and **archaea**. ... The formation or synthesis of **organic** nutritive substances in plants or animals by the use of energy derived from simple chemical reactions. For example, **anaerobic bacteria** such as the methanogens which live within the decaying sediments of **bogs** and **marshes** and produce **methane** gas.... The chemical conversion of **inorganic compounds** found in an **autotrophic organism's** surroundings into food for it. ... A chemical reaction that **bacteria** living near hydrothermal vents use to produce food. ... The process by which bacteria use energy from chemicals, such as hydrogen sulfide, to combine water and carbon dioxide to produce carbohydrates. ... The production of carbohydrates and other compounds from simple compounds such as carbon dioxide, using the oxidation of chemical nutrients as a source of energy rather than sunlight; it is limited to certain bacteria and fungi. Compare with **photosynthesis**.

chemosynthetic - Of or referring to **chemosynthesis**. (See: **chemotroph**, **chemosynthesis**)

chemotroph - An organism, usually a bacteria, that derives energy from **inorganic** reactions; also known as **chemosynthetic**. (See: **chemosynthesis**)

chernozem soils - Soils rich in **humus** and calcium, like the soils often seen in **meadows** and **prairies**.

chert - Hard and dense **sedimentary rock**, light gray to dark gray (flint), composed of quartz crystals and silica derived from **marine** fossils. Usually found in limestone nodules.

chigger - The six-legged red **larva** of a **mite** of the family Trombiculidae. These relatives of **ticks** are nearly microscopic, measuring 0.4 millimeters (1/100 of an inch) Chiggers infest many **vertebrates**, especially **mammals**, including humans. They attach to the skin of their **hosts** and their bites produce a wheal, usually with severe itching and dermatitis. Their **habitat** is tall grass and underbrush. The larval mites feed on the skin **cells**, but not blood, of animals, including humans. The six-legged **parasitic larva** feeds on a large variety of creatures including humans, rabbits, toads, box turtles, quail, and even some **insects**. After crawling onto their **host**, they inject digestive **enzymes** into the skin that break down skin **cells**. They do not actually "bite," but instead form a hole in the skin and chew up tiny parts of the inner skin, thus causing severe irritation and swelling. The body's allergic reaction to chigger saliva causes the formation of a hardened tube called a **stylostome** in the skin, through which the chigger feeds. The severe itching that often accompanies chigger bites is the body's reaction to the **protein** in the chigger's saliva and usually occurs after the **larvae** detach from the skin and drop to the ground. This itching sensation can last for several days....Also known as Harvest Mites. Chiggers are to be distinguished from **chigoes**. (See: **mite, stylostome, chigoe**)

chigoe - Small tropical flea; the fertile female burrows under the skin of the **host** including humans. Chigoes are to be distinguished from **chiggers** (See: **chigger**)

chinook - A warm, dry wind that blows on the lee sides of mountains in North America.

chiropterophily - **Pollination** by bats.

chiropterophilous - Of or relating to **chiropterophily, pollination** by bats. Chiropterophilous plants have characteristics adapted to attract bats and to aid bats in accessing **nectar**.

chitin - The dense substance forming the indigestible outer skeleton of insects, and the material from which the walls of the mycelia are made. ...A nitrogenous polysaccharide occurring as skeletal material in many invertebrates and fungi.... Complex polysaccharide (sugar) used by arthropods to construct their external skeletons.... A tough, horny polysaccharide that forms part of the hard outer integument in insects.... An aminosugar and polysaccharide (an insoluble **carbohydrate** spun from interwoven simple sugars) found in some **fungi cell walls** and in insect **exoskeletons**.

chitinous – Horny, usually somewhat **translucent**.

chlorinated hydrocarbons - A **hydrocarbon** compound containing chlorine. Includes many pesticides and industrial chemicals...Persistent **organic pollutants** including **DDT**, Dieldrin, Aldrin, Endrin and Chlordane used as **pesticides** but today maligned and phased out across much of the world because of their medical/**ecological** impacts such as toxicity and **bioaccumulation**. (See: **persistent pesticides**)

chlorofluorocarbons (CFCs) - Non-burning chemicals made of **carbon**, chlorine, and

fluorine and used in aerosol sprays, solvents, foams, refrigerants, and packing materials. When released into the air and exposed to **ultraviolet radiation** in the upper **atmosphere**, they form a gas that opens holes in the **ozone layer**.... Volatile **compounds** commonly known as "freons". The chemicals have been used in association with refrigerant fluids, solvents, aerosol propellants and blowing agents in the fabrication of foam plastics. Their extraordinarily high stability enables them to persist in the **atmosphere** and to enter the **stratosphere** where they are the major culprit in **ozone layer depletion**. Lag times before the effects of human-driven change emerge can often be long; for example, CFCs released into the **atmosphere** now will damage the **ozone layer** in thirty to eighty years time, risking a false sense of safety.... A family of **compounds** of chlorine, fluorine, and **carbon**, entirely of industrial origin. CFCs include refrigerants, propellants for spray cans (this usage is banned in the U.S., although some other countries permit it) and for blowing plastic-foam insulation, styrofoam packaging, and solvents for cleaning electronic circuit boards. The compounds' lifetimes vary over a wide range, exceeding 100 years in some cases.

CFCs' ability to destroy **stratospheric ozone** through catalytic cycles is contributing to the depletion of ozone worldwide. Because CFCs are such stable **molecules**, they do not react easily with other chemicals in the lower atmosphere. One of the few forces that can break up CFC **molecules** is **ultraviolet radiation**, however the **ozone layer** protects the CFCs from ultraviolet radiation in the lower **atmosphere**. CFC molecules are then able to migrate intact into the stratosphere, where the molecules are bombarded by ultraviolet rays, causing the CFCs to break up and release their chlorine atoms. The released chlorine atoms participate in **ozone** destruction, with a single atom of chlorine able to destroy **ozone** molecules over and over again.

International attention to CFCs resulted in a meeting of diplomats from around the world in Montreal in 1987. They forged a treaty that called for drastic reductions in the production of CFCs. In 1990, diplomats met in London and voted to significantly strengthen the Montreal Protocol by calling for a complete elimination of CFCs by the year 2000. (See: **ozone hole, ozone layer, greenhouse gases**)

chlorophyll - The **pigment** in green plants that absorbs solar energy... The green **photosynthetic pigment** common to all **photosynthetic organisms** ... Any of a group of related green **pigments** found in **photosynthetic cells** that converts light energy into ATP and other forms of energy needed for biochemical processes; it is found in green plants, brown and red **algae**, and certain **aerobic** and **anaerobic** bacteria. ... A green plant **pigment** located in the **chloroplasts**.... Chlorophyll is a green **compound** found in **leaves** and green **stems** of plants. The intense green color of chlorophyll is due to its strong absorbencies in the red and blue regions of the spectrum, and because of these absorbencies the light it reflects and transmits appears green. It is capable of channeling the energy of sunlight into chemical energy through the process of **photosynthesis**. In this process the energy absorbed by chlorophyll transforms **carbon dioxide** and water into **carbohydrates** and oxygen. ... A green, sunlight-capturing **pigment** in plants and some **bacteria**. ... Green pigment of plants that absorbs light energy and makes it effective in **photosynthesis**. (See: **photosynthesis**)

chloroplast - In **botany**, a **cellular** body in which **photosynthesis** occurs.... A **cell organelle**, once a free **bacterium**, that holds **chlorophyll**.... A structure that contains **chlorophyll** and is found in the **cells** of leaves and stems of green plants.... Those structures within plant cells where photosynthesis occurs. They contain small circular DNA molecules that replicate independently of the nucleus.

chlorosis - In **botany**, an abnormal yellowing of **leaves** due to a reduced **chlorophyll** content.... Abnormal plant color of light green or yellow due to incomplete formation or destruction of **chlorophyll**.

Cholera - Cholera is an infectious gastroenteritis caused by **enterotoxin**-producing strains of the **bacterium** *Vibrio cholerae*. Transmission to humans occurs through ingesting food or water that is contaminated with the **bacterium**. The major **reservoir** for Cholera was long assumed to be humans themselves, but considerable evidence exists that **aquatic environments** can serve as **reservoirs** of the bacteria.

The Cholera toxin, an **enterotoxin**, acts on the mucosal epithelium lining of the small intestine, causing the disease's infamous characteristic, exhaustive diarrhea. In its most severe forms, Cholera is one of the most rapidly fatal illnesses known, and a healthy person's blood pressure may drop to hypotensive levels within an hour of the onset of symptoms; infected patients may die within three hours if medical treatment is not provided. In a common scenario, the disease progresses from the first liquid stool to shock in 4 to 12 hours, with death following in 18 hours to several days, unless oral rehydration therapy is provided.

cholinesterase inhibitor - Chemical that inhibits the **enzyme** that manages neural activity. Found in many **insecticides** (carbamates, Parathion, Mestion).

chondrite - A stony meteorite, composed of finely crystallized material... A specific type of stony meteorite that is thought to be well-representative of the initial composition of the Solar System.... A rock of meteoric origin containing chondrules... Meteorite that contains tiny, round silicate granules referred to as chondrules.

Chordates - animals of the **phylum** Chordata with a notochord - a long, cartilaginous support column running most of the body's length - located between the stomach and a fluid-filled dorsal nerve cord.

chorusing - A group (more than two) of birds singing in unison, as with Black-fronted and White-fronted Nunbirds, *Monasa nigrifrons* and *M. morphoeus*. (See: **duet**, **duetting**, **antiphonal singing**, **counter-singing**)

chromosome - Chromosomes are packets of **genetic** material. The number of chromosomes varies from **species** to **species**. Humans have 46 pairs of chromosomes, fruit flies have four pairs. Each member of a pair is identical, one chromosome comes from the father, the other from the mother. Therefore sex **cells** have only have the number of chromosomes of all the other **cells**. When sex **cells** join during **fertilization**, the chromosomes pair up to make the full suite for the **species**. Chromosomes are an

effective way to package **DNA**. All the chromosomes together comprise the **genome**. If the **genome** is the library, and **genes** are the books, chromosomes are like the shelves. ...A rod-shaped structure in a **cell nucleus** carrying the **genes** that determine sex and the characteristics an **organism** inherits from its parents... Rod-shaped bodies in the **nuclei** of **cells** that consist of a string of **genes** and maintain the structure or arrangement of the **genetic code (DNA)**.... A thread-like structure bearing **genes** in a **cell nucleus**; each **chromosome** consists of two **chromatids** formed by the **chromosome's** longitudinal division.... A long, thread-like structure that carries the bearer's **genetic code (DNA)**, among other things. Humans have 23 pairs of chromosomes, 46 in all - 44 autosomes and two sex chromosomes, the X (female) and less complex Y (male). Offspring acquire half their chromosomes from the biological mother and half from the biological father. Each chromosome is shaped like an X, with a dot in the center (the centromere) and arms reaching out to the ends (the irreplaceable telomeres that keep chromosomes from sticking together accidentally; their gradual shortening from replication after replication during cell division sets the biological limit to a life). (See: **gene, DNA**)

chrysalis - The **pupa** of a moth or butterfly enclosed in a **cocoon**.... The **pupa** of a butterfly or a moth.... The **pupal** stage of a butterfly or moth; the casing of the chrysalis looks similar to a **cocoon** but often has metallic markings. (See: **cocoon**)

cilia (singular: cilium) - Short, fine, hair-like projections from the surface of some **cells**; cilia constantly beat in one direction and aid in the movement of a **cell** or in the movement of substances over the surface of **cells**.... Short hair-like structures on a cell or **microorganism**, the movement of which aids mobility of the **cell** and transfer of materials across its surface.... Small, hair-like projections extending from the outsides of some **protists' cells**; used for movement and for capturing food. (See: **flagellum**)

ciliate - Any **protist** that has small, hair-like projections, or **cilia**, extending from the outside of its **cell**.... A **protozoan** with a **microscopic** appendage extending from the surface of the **cell**.... The ciliates are one of the most important groups of **protists**, common almost everywhere there is water — lakes, ponds, oceans, **rivers**, and soils, with many **ectosymbiotic** and **endosymbiotic** members, as well as some obligate and opportunistic **parasites** included.

cinder cone - A **volcanic** landform made up of small rock particles, or cinders, which pile up around the vent of a **volcano** to form a small cone with steep sides.

circadian - Pertaining to a period of about 24 hours; applied especially to rhythmic biological repetition like the sleep-wake cycle..... A biological rhythm that happens about once a day.

circadian rhythms - **Biorhythms** that occur on a daily cycle.... The innate biological clock that regulates sleep and waking and controls the daily ups and downs of physiologic processes, including body temperature, blood pressure, and the release of **hormones**.... The rhythmic repetition of certain phenomena in living **organisms** at about the same time each day. Without cues provided by light, the human circadian cycle lasts

25.9 hours.... An innate, daily fluctuation of physiologic or behavioral functions, including sleep-wake states generally tied to the 24-hour clock... The cyclical changes in physiological processes and functions that are related to the 24-hour diurnal cycle.

Circum-Pacific Belt - A zone of **volcanoes** and volcanic islands circling an edge of the Pacific Basin where one continental plate grinds under another (**subduction**). Often known as the **Ring of Fire**. (See: **plate tectonics**)

circumboreal - Found throughout the high **latitudes** of the northern hemisphere; that is, in North America and Eurasia.

circumpolar - Refers to a **distribution** area that circles either the north pole or south pole.

cirque - Semicircular basin in an **alpine landscape** resulting from mountain **glaciation**. Progressive expansion of neighboring cirques results in the reduction of the unglaciated slopes between them to sharp, knife-edged ridges or **arêtes**.... A large, glacially eroded bowl on rocky mountains. **Alpine glaciers** generally start out from a cirque.... A deep, steep-walled basin shaped like a half bowl, on a mountain.

cirrocumulus cloud - A high cloud that appears as a white patch of cloud without shadows. It consists of very small elements in the form of grains or ripples.

cirrostratus cloud - A high cloud appearing as a whitish veil that may totally cover the sky. Often produces halo phenomena.

cirrus cloud - A high cloud composed of ice crystals in the form of thin, white, featherlike clouds in patches, filaments, or narrow bands.... A type of cloud composed of ice crystals and shaped in the form of hair-like filaments. It is formed at an altitude of approximately 29,000 feet.

clade - In **cladistics**, a group with a common set of shared derived characteristics presumed to be inherited from a common ancestor.... A group of **organisms** that includes their most recent common ancestor and all of their descendants.

cladistics - A methodology for reconstructing **evolutionary** relationships of **taxa**, both living and **extinct**, by using the distribution of shared **derived characters**.

cladode - In **botany**, a flattened **stem** performing the function of a **leaf** (such as a cactus pad).

class - A category of **taxonomic classification** below **phylum** and above **order**.... A **taxonomic** category between **phylum** and **order**. A class contains one or more **orders**, and belongs to a particular **phylum**. (Example: Phylum Vertebrata, Class Aves, Order Passeriformes) (See: **taxon, taxonomy, classification**)

classification - The placing of known plants and animals into groups or categories to show some relationship...The grouping of similar types of animals and plants according to criteria which are considered significant for this purpose... Forming, sorting, apportioning, grouping, or dividing objects into classes to form an ordered arrangement of items having a defined range of characteristics, relationships, and distinctive differences. Classification systems may be **taxonomic**, mathematical, observed, or inferred, depending upon the purpose to be served. The purpose of classification is to describe the structure and relationships of objects to each other and to similar objects, and to simplify these relationships in such a way that general statements can be made about classes of objects, thereby achieving economy of memory and ease of manipulation.... Identifying, describing and naming things, *i.e.* assigning them to particular groups is **taxonomy**, while arranging those groups in a coherent order which reflects their evolution and relatedness is classification. (See: **taxonomy**, **systematics**)

clast - A single constituent of a rock, *e.g.*, a grain.

clastic - Composed mostly of former rocks (like shale and sandstone) whose fragments have been carried a long distance from where they originated.

claw - A sharp, curved, horny structure at the end of a toe of a **mammal**, **reptile**, or bird.

clay - An **inorganic** soil component having particles less than 0.002 mm diameter.... Fine grained, plastic, **sediment** with a typical grain size less than 0.004 mm; clay possesses electromagnetic properties which bind the grains together to give a bulk strength or cohesion.

clay lick - Deposit of salty clay that attracts **herbivores**, such as Brazilian Tapirs (*Tapirus terrestris*) and Red Brocket Deer (*Mazama americana*) and **seed predators**, such as various species of parrots and macaws. These animals come for minerals in the clay that help to detoxify plant **toxins**. The clays can bond to certain types of toxic chemicals, such as **alkaloids** and **tannins**, and prevent their uptake. The clay licks also provide needed sodium, which can otherwise occur in very low concentration in the diets of these animals. (See: **geophagy**, **secondary compounds**, **clay**, *ccolpa*)

clear water river - A river with a low **sediment load** and moderate amounts of **phenolics** and related **compounds**. Intermediate between a **blackwater river** and a **whitewater river**.

clearcut - A tree-harvesting operation removing an entire stand (regardless of size) in one cut... The area after such a cut.... The cutting method that describes the silvicultural system in which the old crop is cleared over a considerable area at one time. Regeneration then occurs from (a) natural seeding from adjacent stands, (b) seed contained in the slash or logging debris, (c) advance growth, or (d) planting or direct seeding. An even-aged forest usually results.

clearcutting - Removing all the trees from a given area; a destruction of entire **forests** at

a time.

cleavage - Natural plane of breakage along which consecutive breaks produce smooth, parallel splits.

cleistogamy - In **botany**, the development of viable **seed** from unopened, self-pollinated **flowers**.

cleptobiosis - When one **species** steals food from another. (See **kleptoparasitism**)

cleptoparasitism - See **kleptoparasitism**.

cliff - A steep high face of rock... A significant vertical, or near vertical, rock exposure. Cliffs are categorized as **erosion** landforms due to the processes of **erosion** and weathering that produce them. Cliffs are common on coasts, in mountainous areas, escarpments and along **rivers**.

climate - The average course or condition of the weather at a particular place over a period of many years as exhibited in absolute extremes, means, ranges and seasonal distribution of air **temperature**, wind velocity and direction, **precipitation** type, duration and amount, **humidity** and other weather elements. It is not synonymous with weather. ...**Weather** averaged over a period of years. Compare with **weather**.... Average **atmospheric** conditions over a long time interval. Energy from the sun drives climate, which sets limits on a **biome's** plant life and therefore on the animals that live there. The Koppen-Geiger classification sorts major climates into five types - humid **tropical**, dry, humid warm, humid cold, and cold polar.

climate change - A broader term that refers to long-term changes in climate, including average temperature and precipitation....The term 'climate change' is sometimes used to refer to all forms of **climatic** inconsistency, but because the Earth's **climate** is never static, the term is more properly used to imply a significant change from one climatic condition to another. In some cases, 'climate change' has been used synonymously with the term, '**global warming**'; scientists however, tend to use the term in the wider sense to also include natural changes in climate.... The long-term fluctuations in **temperature**, precipitation, wind, and all other aspects of the Earth's **climate**. External processes, such as solar-irradiance variations, variations of the Earth's orbital parameters (eccentricity, precession, and inclination), lithosphere motions, and volcanic activity, are factors in **climatic** variation. Internal variations of the climate system also produce fluctuations of sufficient magnitude and variability to explain observed climate change through the feedback processes interrelating the components of the **climate system**. (See: **global warming, enhanced greenhouse effect, greenhouse effect**)

climate commitment - The amount of future **global warming** that is "committed", even if **greenhouse gas** levels do not rise....The tendency of the **climate** to continue changing as a result of past **greenhouse gas** emissions even if gases in the **atmosphere** are held fixed at already established levels.

climate feedback - An **atmospheric, oceanic, terrestrial**, or other process that is activated by the direct **climate change** induced by changes in radiative forcing. Climate feedbacks may increase (positive feedback) or diminish (negative feedback) the magnitude of the direct climate change. (See: **positive feedback loop, feedback mechanism, tipping point**)

climate lag - The delay that occurs in **climate change** as a result of some factor that changes only very slowly. For example, the effects of releasing more **carbon dioxide** into the **atmosphere** may not be known for some time because a large fraction is dissolved in the ocean and only released to the **atmosphere** many years later.

climate model - A quantitative way of representing the interactions of the **atmosphere**, oceans, land surface, and ice. Models can range from relatively simple to quite comprehensive.

climate modeling - The simulation of the **climate** using computer-based models.

climate sensitivity - The equilibrium response of the **climate** to a change in radiative forcing; for example, a doubling of the **carbon dioxide** concentration.

climate system - The five physical components (**atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere**) that are responsible for the **climate** and its variations..... The **atmosphere**, the oceans, the **biosphere**, the **cryosphere**, and the **geosphere**, together make up the climate system.

climate variability - **Climate change**, with no presumption of cause.

climatic - Of or referring to **climate**.

climatically - Of or referring to **climate**.

climatology - The science that deals with **climates** and investigates their phenomena and causes. ... The study of **climate** and its controls and variability.... The description and scientific study of **climate**. Descriptive climatology deals with the observed **geographic** or temporal distribution of **meteorological** observations over a specified period of time Climatology is the study of **climate**, scientifically defined as **weather** conditions averaged over a period of time, and is a branch of the **atmospheric** sciences. ...Compare with **meteorology**.

climax - Greek term meaning "ladder" and originally implying **succession**. It is interpreted to mean "the final step of the ladder."...In **monoclimax** theory, that state of a **biotic community** that is attained when **population** structures of all its **species** fluctuate rather than exhibit unidirectional change. Such a **community** will remain in a self-perpetuating state so long as present climatic, **edaphic**, and **biotic** conditions continue. ... The culminating stage of plant **succession** in a given **ecosystem**. Climax **communities**

tend toward maturity because of having attained harmony with their surroundings through years of experimentation and **adaptation**. (See: **climax, climax community, climax ecosystem, ecological succession, primary succession, secondary succession, polyclimax, seral**)

- **Climatic climax** - In **polyclimax** theory, the ultimate phase of **ecological** development of plant **communities** that the climate of a region will permit....The apparently stable **vegetation** that terminates **succession** on zonal soils. (See: **seral**)
- **Edaphic climax** - In **polyclimax** theory, any distinctive type of stable **community** that develops on soils different from those supporting a **climatic climax**.
- **Fire climax** - In **polyclimax** theory, any type of apparently stable **vegetation** whose distinctiveness depends on being burned at rather regular intervals...In **monoclimax** theory, a disclimax maintained by burning at repeated intervals.
- **Zootic climax** - In **polyclimax** theory, any type of stable **vegetation** whose continued existence depends upon continuous stress from heavy use by animals. The animal components of all **ecosystems** play important roles as subordinates, but only in a zootic climax is an animal so influential as to be clearly a dominant....In **monoclimax** theory, a disclimax maintained by heavy grazing.

climax community - The final or relatively stable, **biotic community** in a developmental series. It is self-perpetuating and in equilibrium with the physical, climatic, and **edaphic** conditions. ... The stage in community succession where the **community** has become relatively stable through successful adjustment to its **environment**. ...The **physiographic** climax is a climax determined in large measure by the nature of the **topography** or soil, *e.g.*, a particular type of forest may be the "climax" on a north-facing slope while a **grassland** may be the "climax" on the south-facing slope of the same ridge. The **edaphic** climax is a climax determined largely by the nature of the soil conditions, *e.g.*, a salt grass marsh in a poorly drained **alkaline** depression in **grassland**. A **biotic climax** is a climax caused by a permanent influence or combination of influences caused by one or more kinds of **organisms**, including people. The main **biotic** components are not overthrown by **invaders**. No new **species** become dominant in the **community**. Climax is frequently used in the sense of **species** usually present (or at least common) only as members of a climax community. Also known as **climax ecosystem**.

climax ecosystem - In the absence of any disturbance, the relatively stable, diverse, and productive state of an ecosystem reached after a succession sequence. Also known as **climax community**.

climax forest - A forest **community** that represents the final or culminating stage of natural forest **succession** for its locality, *i.e.* for its **environment**. (See **climax community**)

climax vegetation - A fully developed plant **community** that is in equilibrium with its **environment**... The culminating stage in plant **succession** for a given **environment**...The **vegetation** being conceived as having reached over time a highly stable condition.

climber - A soft or non-woody-stemmed vine that clasps the stems or branches of trees and **shrubs** to raise its foliage and flowers above the ground; a type of **growth form**.

clinal - Referring to a **cline**.

cline - A gradual change in certain characteristics of individuals of the same species, which is evident in a geographic progression from one population to the next... In **population genetics**, a **cline** is a gradual change of a character or feature (**phenotype**) in a **species** over a **geographical** area, often as a result of **environmental heterogeneity**. The change in **phenotype** does not result in different **species** as long as the geographically spread **populations** can **interbreed** with one another and **gene flow** is maintained... how the frequency of a trait changes along a **geographic gradient**... A series of **contiguous populations** that exhibit gradual and continuous change of character in response to some **environmental gradient**... A gradual and continual change in a structural or functional character exhibited by a series of **populations** or throughout the **range** of a **species**, usually along a line of **geographic** or **environmental gradient**, in which individuals at the two extremes differ markedly... A gradient of variations in a **species** that stretches across a **geographical** location. Example - different types of *Eucalyptus* trees running across a series of slopes.

clique - A group of **organisms** in a **food web** in which any pair of **species** shares at least one prey **species**; **species** groups that have similar diets but are different from other such groups.

cloaca - A chamber through which wastes and reproductive products exit the body; fish, **amphibians**, reptiles, birds and some lower mammals have a cloaca; some **invertebrates**, such as nematodes, also have a cloaca.

cloacal - Of or referring to the **cloaca**.

clone(s) - A plant group derived from a single individual through **vegetative reproduction**... **Genetically** identical **organisms** produced vegetatively from a single parent... In biology and agriculture, any organism whose genetic information is identical to that of a parent organism from which it was created.

closed canopy - A forest **canopy** in which the individual **tree** crowns are in contact with one another.

closed system - One that exchanges energy, but not matter, between itself and its **environment**. The Earth is a closed system of finite room and resource.

cloud albedo - Reflectivity that varies from less than 10% to more than 90% of the insolation and depends on drop sizes, liquid water content, water vapor content, thickness of the cloud, and the sun's zenith angle. The smaller the drops and the greater the liquid water content, the greater the cloud albedo, if all other factors are the same. (See: **albedo effect**, **planetary albedo**)

cloud feedback - The coupling between cloudiness and surface air **temperature** in which a change in surface **temperature** could lead to a change in clouds, which could then amplify or diminish the initial **temperature** perturbation. For example, an increase in surface air **temperature** could increase the evaporation; this in turn might increase the extent of cloud cover. Increased cloud cover would reduce the solar radiation reaching the Earth's surface, thereby lowering the surface **temperature**. This is an example of negative feedback and does not include the effects of longwave radiation or the advection in the oceans and the atmosphere, which must also be considered in the overall relationship of the climate system.

cloud forcing - The difference between the radiation budget components for average cloud conditions and cloud-free conditions. Roughly speaking, clouds increase the albedo from 15 to 30%, which results in a reduction of absorbed solar radiation of about 50 W/m². This cooling is offset somewhat by the greenhouse effect of clouds which reduces the OLR by about 30 W/m², so the net cloud forcing of the radiation budget is a loss of about 20 W/m². Were the clouds to be removed with all else remaining the same, the Earth would gain this last amount in net radiation and begin to warm up.

cloud types - See **clouds**.

- Cumulonimbus (thunderheads) - near ground level to above 50,000 feet.
- Cirrostratus - above 18,000 feet.
- Cirrus - above 18,000 feet.
- Cirrocumulus - above 18,000 feet.
- Altostratus - 6,000-20,000 feet.
- Altocumulus - 6,000-20,000 feet.
- Nimbostratus (rain) - below 6,500 feet.
- Stratocumulus - below 6,000 feet.
- Cumulus (fair weather) - below 6,000 feet.
- Stratus - below 6,000 feet.

cloudburst - Any sudden and heavy rain shower.

cloudforest / cloud forest - A mountain forest that exists in perpetual mist, characterized by stunted trees with an abundance of **epiphytic** growth..... A **cloud forest**, also called a fog forest, is a generally **tropical** or **subtropical evergreen montane moist forest** characterized by a high incidence of low-level cloud cover, usually at the **canopy** level. Cloud forests often exhibit an abundance of **mosses** covering the ground and **vegetation**, in which case they are also referred to as mossy **forests**. Mossy **forests** usually develop on the saddles of mountains, where moisture introduced by settling clouds is more effectively retained. Typically, there is a relatively small band of altitude in which the **atmospheric environment** is suitable for cloud forest development. This is characterized by persistent mist or clouds at the **vegetation** level, resulting in the reduction of direct sunlight and thus of **evapotranspiration**. Trees in these regions are generally shorter and more heavily stemmed than in lower altitude **forests** in the same regions, and the moisture promotes the development of an abundance of vascular **epiphytes**. This results

in abundant **moss** and **fern** covering, and frequently flowers such as orchids may be found. Soils are rich but **boggy**, with a preponderance of **peats** and **humus**. Within cloud forests, much of the **precipitation** is in the form of fog drip, where fog condenses on **tree leaves** and then drips onto the ground below.

The definition of cloud forest can be ambiguous, with many countries not using the term (preferring such terms as Afromontane forest and upper montane rain forest, or more localized terms such as the Peruvian **yungas**, and the laurisilva of the Atlantic Islands), and occasionally subtropical and even temperate forests in which similar meteorological conditions occur are considered to be cloud forests. (See: **humid montane forest**)

clouds - A visible mass of liquid water droplets suspended in the **atmosphere** above Earth's surface. Clouds form in areas where air rises and cools. The condensing **water vapor** forms small droplets of water (0.012 mm) that, when combined with billions of other droplets, form clouds. Clouds can form along warm and cold fronts, where air flows up the side of the mountain and cools as it rises higher into the **atmosphere**, and when warm air blows over a colder surface, such as a cool body of water.

Clouds fall into two general categories: sheet-like or layer-looking stratus clouds (stratus means layer) and cumulus clouds (cumulus means piled up). These two cloud types are divided into four more groups that describe the cloud's altitude.

High clouds form above 20,000 feet in the cold region of the **troposphere**, and are denoted by the prefix "cirro" or "cirrus". At this altitude water almost always freezes so clouds are composed of ice crystals. The clouds tend to be wispy, are often transparent, and include cirrus, cirrocumulus, and cirrostratus.

Middle clouds form between 6,500 and 20,000 feet and are denoted by the prefix "alto". They are made of water droplets and include altostratus and altocumulus.

Low clouds are found up to 6,500 feet and include the stratocumulus and nimbostratus clouds. When stratus clouds contact the ground they are called fog.

Vertical clouds, such as cumulus, rise far above their bases and can form at many heights. Cumulonimbus clouds, or thunderheads, can start near the ground and soar up to 75,000 feet. (See: **cloud types**)

club mosses - Any of various mostly small **vascular plants** of the **class** Lycopodiopsida, **order** Lycopodiales, **family** Lycopodiaceae and **genera** *Lycopodium* and *Lycopodiella*, often resembling **mosses** and reproducing by **spores**....Any of the **order** Lycopodiales of primitive **vascular plants** (as ground pine) often with the sporangia borne in club-shaped strobili.....Lycopodiopsida is a **class** of plants often loosely grouped as the **fern** allies, and includes the club mosses. Lycopodiopsida traditionally included all the club mosses, including *Selaginella* and *Isoetes*. However, subdivisions within the **division** Lycopodiophyta are now considered ancient enough to warrant higher-level separation in accordance with **cladistics**....Club mosses are thought to be structurally similar to the earliest **vascular plants**, with small, scale-like leaves, homosporous spores borne in sporangia at the bases of the leaves, branching stems (usually **dichotomous**), and generally simple form.....The class Lycopodiopsida as interpreted here contains a single living **order**, the Lycopodiales, and a single **extinct order**, the Drepanophycales.....The **classification** of the **order** Lycopodiales has been unsettled in recent years and a consensus is yet to emerge. Older **classifications** took a very broad definition of the

genus *Lycopodium* that included virtually all the species of Lycopodiales. The trend in recent years has been to define *Lycopodium* more narrowly and to classify the other **species** into several **genera**, an arrangement that has been supported by both **morphological** and **molecular** data and adopted in numerous revisions and **flora** treatments. These **genera** fall into two distinct groups but there is as yet no consensus as to whether to recognize them in a single **family**, Lycopodiaceae, or to separate them into two **families**: a more narrowly defined Lycopodiaceae and Huperziaceae...Lycopodiaceae, as narrowly defined, comprises the extant **genera** *Lycopodium* and *Lycopodiella*. Most of the *Lycopodium* favor **acidic**, sandy, upland sites, whereas most of the *Lycopodiella* favor **acidic**, **boggy** sites.

clutch - Total number of eggs laid by a female bird in one nesting attempt.... A group of eggs laid by one female during one nesting or spawning season; a group of chicks that hatch from one nest of eggs.

coal - **Hydrocarbon** and **sedimentary rock** composed of compacted plant remains, mostly ancient **club moss** trees sitting above **tropical swamps**. Mined coal provides most of the world's electrical energy.... A hard, black substance formed from plants that lived about 300 million years ago.

coarse - Rough, especially to the touch... Consisting of large particles; not fine in texture: *coarse sand*.

coarse particulate organic matter (CPOM) - Unprocessed **carbon compounds** added to an aquatic **environment**. Example - straw or leaves blown into a pond. **Microorganisms** eventually break it down into fine particulate organic matter (FPOM).

cobble - Rounded rock with diameter ranging from about 75 to 250 mm...A piece of rock that measures between 6.4 – 25.6 centimeters (2.52 and 10.08 inches) in diameter; a cobble is larger than a pebble and smaller than a boulder and has rounded edges due to natural forces.... Pebbles rounded by being bounced around in water.

cocoon - A protective case of silk or similar fibrous material spun by the **larvae** of moths and other **insects** that serves as a covering for their **pupal** stage.... A protective case, usually made of **silk**. **Insects** make cocoons to keep themselves safe while they are **pupae**, before emerging as adults....A covering, or case, made by the **larva** of certain **insects** in order to protect the **pupa** or by spiders to protect the eggs; a cocoon is often made of silk but can also be made of small stones, soil particles, leaves and other bits of **vegetation**. (See: **chrysalis**)

codominant - In ecology, two tree species (*e.g.* hickory and oak) with roughly equal **populations** and **ecological** impact in the forest they grow in....In genetics, the blended expression of two alleles (genetic variations), as when white carnations crossed with red carnations produce pink ones. (See: **allele**)

coevolution - **Evolution** in which two or more **species** adapt to each other...The interdependent **evolution** of two or more **species** having an obvious **ecological** relationship... The **evolution** of complimentary adaptations in two **species** caused by the **selection pressures** that each exerts on the other. ... **Evolution** of **species** in close association. Examples are **prey** and **predators**, plants and **pollinators** ... The **evolution** of two or more interdependent **species**, each adapting to changes in the other...The **evolutionary** interaction of two or more **species** acting as **selection pressures** upon each other. Examples of coevolution abound in the **tropical rainforest** - specific species of hummingbirds, such as *Eutoxeres*, evolving to feed upon and pollinate the flowers of specific species of plants, such as *Centropogon*...*Pseudomyrmex* ants and *Triplaris* trees...the **secondary compounds** of plants and **herbivores**.... Strictly, the joint **evolution** of two (or more) **ecologically** interacting **species**, each of which evolves in response to selection imposed by the other. Sometimes used loosely to refer to **evolution** of one **species** caused by its interaction with another... Interactions between **species** that impact how both evolve. Examples: bees and plants needing **pollination**; the cleaner fish and the whale shark.

Cohesion Species Concept - See **species**.

cohesive sediment - **Sediment** containing significant proportion of **clays**, the electromagnetic properties of which cause the **sediment** to bind together.

cohort - A group of plants or animals in the same age class. This is frequently discussed as the equivalent of 1,000 or 10,000 animals starting life together and being subject to different mortality factors, reducing the number over time.

col - Saddle-shaped depression between mountain peaks. Formed by opposing **cirque glaciers**.

cold-blooded - Having a body **temperature** not internally regulated but approximating that of the **environment**. A synonym for **exotherm**. The opposite of **warm-blooded**....Having an internal body **temperature** that varies with the **temperature** of the external **environment**; more correctly termed **poikilothermous**. ... Cold-blooded **organisms** (called "poikilotherms" - "of varying **temperature**") maintain their body **temperatures** in ways different from **mammals** and birds. The term is now outdated in scientific contexts. Cold-blooded creatures were, initially, presumed to be incapable of maintaining their body **temperatures** at all. They were presumed to be "slaves" to their environments. Whatever the **environmental temperature** was, so too was their body **temperature**. Cold-blooded animals are now called **ectotherms**, a term which signifies that their heat (therm) comes from outside (ecto) of them; the term cold-blooded is misleading. (See: **thermoregulation, homeothermic, endothermy, endotherm, ectotherm, exotherm, poikilotherm, warm-blooded**)

cold front - A transition zone where a cold air mass advances and replaces a warm air mass....A front that moves in such a way that cold air replaces warm air. (See: **front, warm front, frontal system**)

cold hardening - The process whereby some **species** prepare for seasonal periods of low temperatures.

collapsing breaker - A **breaker** in which breaking occurs over lower half of the wave, with minimal air pocket and usually no splash-up; bubbles and foam are also present.

collection - A process in which water soaks into the ground and is stored as **groundwater**.

colluvial - In soils, material that has been transported downhill and accumulated on lower slopes and/or at the bottom of the hill...In **geology**, material consisting of **alluvium** in part and also containing angular fragments of the original rock; also **talus** and cliff debris; material of avalanches...Pertaining to material transported and deposited by mass-wasting and local unconcentrated runoff on and at the base of steep slopes. (See: **colluvium, sediment, silt, alluvium**)

colluvium - Mixed deposits of soil material and rock fragments accumulated near the base of steep slopes through **gravity**, *i.e.*, soil creep, landslides, and local surface runoff (but not **stream** flow... Rock detritus and soil accumulated at the foot of a slope. (See: **colluvial, sediment, silt, alluvium**)

colonial nesting - The habit of certain birds - egrets, swallows, herons - to build concentrated **colonies**.

colonization - The process of colonizing (See: **colonize**)... The establishment of a **population** in a place formerly unoccupied by that species. Colonization implies successful **reproduction** in the new area, not simply the presence of a **species** there.

colonize - To form or establish a **colony** or **colonies**...To **migrate** to and settle in; occupy as a colony. ...to become established in a new **ecosystem**. *Cecropia* trees will colonize open areas...*Azteca* ants will colonize a new *Cecropia* tree.

colonizer or **colonizer species** - A **species**, plant or animal with rapid **dispersal** capability, high **reproductive** output, and general physiological hardiness; effective at establishing in newly created habitats and gaps. Colonizer **species** are typical of early stages of **ecological succession**.

colonizer plant species - **Species** with rapid **dispersal** capability, rapid growth rate, high **reproductive** output, and general physiological hardiness; effective at establishing in newly created gaps. **Species** typical of early **ecological succession**.

colony (plural: **colonies**)- A group of animals of the same kind that are living together and are dependent on each other, or a group of plants growing in the same place.... a group of birds nesting together in close association, such as a cacique or tern colony.... A group of animals of the same **species** that live and work together to survive.... a group of

organisms of the same type that live in close association and may function as a unit, for example, some bats winter in large groups called a colony. (See: **communal**, **communal nester**)

color phase - See: **discrete polymorphism**.

color morph - See: **discrete polymorphism**.

column - A formation, as of troops or vehicles, in which all elements follow one behind the other. Example: a column of army ants.

commensal - An **organism** in a relationship involving **commensalism**.

commensalism - A **symbiotic** relationship in which one **species** benefits and the other is not affected....A type of **symbiosis** (symbiotic relationship) in which one member (the commensal) benefits while the other does not benefit, but is not harmed. An **organism** in this type of relationship is known as a **commensal**. As an example, **epiphytes** depend on trees for support. The **host** tree does not receive any real benefit from the **epiphyte** and the **epiphyte** does not obtain its **nutrients** from the tree.An **ecological** relationship in which one **species** benefits from association with another but the other is neither harmed nor aided by the association....A relationship between two kinds of living **organisms** whereby one (the commensal) benefits and the other (the **host**) remains relatively or absolutely unaffected, and which is obligatory for the **commensal**.... A coevolutionary relationship between species (usually animal species) that benefits one without significantly impacting the other. (See: **symbiosis**, **parasitism**, **mutualism**, **amensalism**)

common name - Name other than the **scientific name** by which an organism is called.

Commoner's Four Laws of Ecology - 1. Everything is connected to everything else. 2. Everything must go somewhere. 3. Nature knows best. 4. There is no such thing as a free lunch. (Barry Commoner, biologist, 1971. See: **ecology**, **Callenbach's Four Laws of Ecology**)

communal - Relating to **communities** or to living in **communities**. Example: Yellow-rumped Caciques nest in **colonies** and are therefore communal nesters. (See: **colony**, **communal nester**)

communal nester - Birds, such as Yellow-rumped Caciques, that live in **colonies**. (See: **colony**, **communal**)

community (plural: **communities**) - In **ecology**, a group of interacting **populations** in time and space. ...A number of **populations** in a given area represent a community. ... Sometimes, a particular subgrouping may be specified, such as the fish community in a lake or the soil **arthropod** community in a forest... The total assemblage of plants, animals, and microbial **organisms** that interact within a given **ecosystem**.. All species living and interacting in a particular habitat....An assemblage of plants and animals

living together and occupying a given area. NOTE: With plants, a closed community (antonym: open community) is considered one whose components are so completely utilizing the site as to "exclude" (or give the appearance of excluding) further entrants. It is also important to note that classifying a community as "closed" is subjective and usually based on one-time measurements or observations.... a characteristic group of plants and animals living and interacting with one another in a specific region under similar **environmental** conditions... All **organisms** in a particular **habitat** that are bound together by **food chains** and other interrelationships.... . A group of different types of organisms that share a habitat and interact with each other ... A group of **populations** of different **species** occupying a given place at a given time that are viewed as interdependent. An aggregation of interacting **species**. Sometimes used to refer to only the assemblage of **populations** of a particular class of **organisms**, such as the bird community, the **herb** community, and so forth.... A community is an assemblage of **populations** living in a stated area. It is a loosely organized unit to the extent that it has characteristics additional to its individual **species** and **populations** components. Communities have perceived functional unity, characteristic **trophic** structures, and patterns of **energy flow**. They also have **taxonomic** unity (in that there is a certain probability that certain **species** will occur together) and a relatively uniform appearance. Communities may be sharply defined. Very frequently, however, communities blend gradually into one another but they have the characteristic of being distinctively (statistically) different from adjacent units. The word is used with the simplest (*e.g.*, an unrooted mat of **algae**) to the most complex **ecosystem** (*e.g.*, a multistoried **rainforest**). Community units may be very large, like the continent-wide **coniferous** forest, or very small, like the community of **invertebrates** and **fungi** in a decaying log. The extent of a community is limited only by the requirement of a more or less uniform **species** composition. The composition and character of a community is an indicator of the type of **environment** that is present. Since "plant communities" and "animal communities" occur together in the same **habitat** and have many interrelations, the one can scarcely be considered independently of the other. Together they make up the "**biotic community**", a part of the general concept of community that also includes **abiotic** subsystems and factors. (See: **biotic community**)

community coefficient - A measure of similarity between the plants and animals of two different **ecological communities**.

community simplification - The reduction of overall species diversity in a community; generally caused by human activity.

community succession The sequential replacement of **species** in a **community** by immigration of new **species** and by local **extinction** of old ones. (See: **ecological succession**)

companion cell - In **botany**, a **phloem cell** containing a **nucleus**, adjacent to a **sieve tube**.

competition (ecological competition) - Two or more organisms, populations, or species trying to live on the same resources in the same ecosystem...The effort of each **organism** to maximize fitness by both appropriating contested **resources** from a pool not sufficient for all, and adapting to the **environment** altered by all participants... The general struggle for existence (and dominance) in which **organisms** compete for a limited supply of the necessities of life. It is the condition of rivalry between different **organisms**, usually closely related **species** (or within a **species**) which use the same **resources** and live in the same places, that exists when **organisms** are in short supply. If the resources are not in short supply, the condition that occurs when the **organisms** seeking and using that **resource** nevertheless harm one another in the process. Competition may be **interspecific (interspecific competition, i.e., between two or more different species)**, or **intraspecific (intraspecific competition, i.e., between members of the same species)**. (See: **competitive exclusion, competitive exclusion principle, competitive release, diffuse competition, selection pressure, niche expansion**)

competitive exclusion - The elimination from a **habitat** of one **species** by another **species** through **interspecific competition**...The concept that no two **species** with exactly the same **ecological** requirements can co-exist in the same **habitat**, at least not indefinitely... Competition between **species** that is so intense that one **species** completely eliminates the second **species** from the area. Where one species competes another out of existence in an area. (See: **competition or ecological competition, competitive exclusion principle, competitive release, resource partitioning, habitat partitioning, niche, ecological niche, niche differentiation, niche expansion**)

competitive exclusion principle - In **community ecology**, the **competitive exclusion principle**, sometimes referred to as **Gause's Law of competitive exclusion** or just **Gause's Law**, is a theory which states that two **species** competing for the same **resources** cannot stably coexist, if the **ecological** factors are constant. Either of the two competitors will always have an advantage over the other that leads to either the **extinction** of the inferior competitor or its **evolutionary** shift towards a different **ecological niche**. (See: **competition or ecological competition, competitive exclusion, competitive release, resource partitioning, habitat partitioning, niche, ecological niche, niche differentiation, niche expansion**)

competitive release - The expansion of the **habitat**, **range** and/or food preferences of a **species** due to a reduction in the intensity of **interspecific competition**.... Occurs when one of two competing **species** is removed from an area, thereby releasing the remaining **species** from one of the factors that limited its **population** size. (See: **competition or ecological competition, competitive exclusion, competitive exclusion principle, resource partitioning, habitat partitioning, niche, ecological niche, niche differentiation, niche expansion**)

complete flower - A **flower** having all of the normal **flower** parts.

complete metamorphosis - A process of development in which the immature form looks and acts differently from the adult; the stages of development are egg, **larva**, **pupa**, and

adult. (See: **incomplete metamorphosis**)

complex - In plants or animals, a group of closely related species that may be difficult to distinguish from each other; for instance, the Slimy Salamander complex consist of 13 species of slimy salamanders that have very similar characteristics.

composite head - In **botany**, an **inflorescence** composed of many tightly packed, small, **ray flowers** and **disk flowers**.

composite volcano - A landform made up of layers of lava flows alternating with layers of ash, cinders, and rocks.

composting - The process in which **decomposers** break down **organic** matter so it can be used as a natural fertilizer for gardening or farming.

compound - In chemistry, a pure, macroscopically **homogeneous** substance consisting of atoms or ions of two or more different elements in definite proportions that cannot be separated by physical means. A compound usually has properties unlike those of its constituent elements.

compound eye - An insect's main pair of eyes, made up of many small eyes, each of which forms part of the image in the insect's brain.... An eye containing many lenses, each of which sees only a small portion of the whole image; arthropods such as insects and crayfish have compound eyes.

compound leaf - A leaf whose blade is divided into two more distinct leaflets... A leaf having more than one leaflet on a stalk, such as a hickory or clover leaf.... A **leaf** in which the **blade** is divided into separate **leaflets**.

condensation - Change of a substance to a denser form, such as gas to a liquid. The opposite of **evaporation**.... The process in the **hydrologic cycle** by which a vapor becomes a liquid; the opposite of **evaporation**.... The transformation, triggered by falling **temperatures**, of (water) vapor into liquid. ... The process in which a gas changes into a liquid.

condensation nuclei - Microscopic particle of dust, ash, etc. around which a raindrop forms. Drops also form around silver iodide particles seeded into clouds to increase local rainfall. (See: **condensation**)

conduction - The transfer of heat from one substance to another by direct contact. Denser substances are better conductors; the transfer is always from warmer to colder substances.... The movement of energy through direct contact.

cone - The fruit of a **conifer** composed of a woody central **stem** hard overlapping seed-bearing scales.... A fruit with overlapping scales in which seeds are formed... A dense and conical mass of flowers or fruits, or of seed-bearing scales, on a central axis. Found

on **conifers** and alders.... The reproductive structure of **coniferous trees**, which have bare seeds *i.e.* not enclosed in an **ovary**.

confining layer - A layer of **sediment** or **lithologic** unit of low permeability that bounds an **aquifer**.

confluence - Confluence, in **geography**, describes the meeting of two or more bodies of water. It usually refers to the point where a **tributary** joins a more major river.... The junction of two **rivers** or forks of a **river**.... The place at which two **streams** flow together to form one larger **stream**.... Where a branch of a watercourse joins the main channel.

congelifraction - The process of splitting rock by frost action. Also called frost-splitting, frost riving, frost-shattering and mechanical frost weathering. Synonym of gelifraction.

congelifracts - Individual fragments (spalls) produced by congelifraction (frost-splitting).

congeliturbation - The process of stirring, thrusting and heaving of the Earth's mantle by frost action...Frost patterning by a freeze-thaw cycle including frost heaving and differential mass movements like solifluction. Synonym of **cryoturbation**.

congenital - Present at birth but not necessarily **hereditary**; acquired during fetal development.... Describes a condition present from birth. Congenital malformations include all disorders present from birth whether they are inherited or caused by **environmental** factors.

congeneric - Belonging to the same **genus**.

congener - Belonging to the same **genus**; a close relative.

conglomerate - Coarse **sedimentary** rock composed of weather-rounded rock fragments cemented with **silt** and clay. Contrast with **breccia**.

conifer - A pine, spruce, cedar, fir, redwood, or other **coniferous** tree in the **Gymnospermae**. .. Any of predominantly **evergreen**, cone-bearing trees with needle, awn, or scale-like leaves, *e.g.*, pine, spruce, hemlock, cypress, larch, or fir (often called **softwoods**).... A **woody plant** that has seeds contained in **cones**.... A plant belonging to the order Coniferales bearing **cones** and needle-like or scale-like leaves. Sometimes misleadingly referred to as a **softwood**. (See **coniferous**, **softwood**)

coniferous - Cone-bearing seed plants with **vascular tissue**; all known living **conifers** are **woody plants**, the great majority being **trees** with just a few being **shrubs**.... In reference to a tree or shrub that bears cones and has leaves that are needle-like and **evergreen**....Bearing **cones**.

conjunctive symbiosis - A mutually beneficial relationship in which the two participants join into a single organ or body. Example: **lichens**. (See: **symbiosis**)

connectance - The actual **food web** interactions between **species** compared with the total possible number; usually expressed as a fraction.

conservation - The protection of plant and animal **habitat**....The management of a renewable natural resource with the objective of sustaining its **productivity** in perpetuity while providing for human use, compatible with sustainability of the **resource**. For a forest this may include periodic cutting and removal of trees, followed by management for regrowth of some form of the forest.... The **sustainable** use of forest **resources** in a manner that does not degrade the collective resource values of a region over the long term... Preserving and renewing, when possible, human and **natural resources**. The use, protection, and improvement of **natural resources**.... The protection, improvement, and use of **natural resources** according to principles that will assure their highest economic and social service. A general word suggesting practices and customs of people that perpetuate **resources** and yields from some that are sustained. It usually includes preventing waste of **non-renewable resources** and recycling..... Measures designed to achieve preservation, maintenance, or restoration goals for **species** without impairing the **sustainable** flow of uses, values, benefits, products, services, and visitor opportunities for current and future generations.... Includes both preservation and protection, preservation for long term use by the future generation and protection of what we have in the **biosphere** (on Earth). There are two types - *in situ* and *ex situ* depending on the region of conservation.

- *In situ* conservation: - conservation of naturally found **ecosystems** includes the care and maintenance of living **populations** of **species** in their natural **habitats** - domesticated and cultivated species.
- *Ex situ* conservation: - When an exotic **species** is removed from its original **habitat** and placed in an artificial **habitat** such as a zoo/zoological park, botanical garden, or seed bank. Currently there are about 500,000 species of living creatures in zoos and 35,000 species of plants in 1,500 botanical gardens which is 15 per cent of world's plant resources. Some estimates indicate the number of plant species in botanical gardens as high as 70,000 to 80,000 species.

conservation biology - The branch of **biology** that deals with the effects of humans on the **environment** and with the **conservation** of **biological diversity**.

conservation dependent species - A species which is the focus of a continuing program of **taxon** or **habitat conservation**, such that it would qualify for threatened species status if the **conservation** efforts were to cease.

consolidated rock - **Metamorphic**, **sedimentary**, or **igneous** (**granitic** or **volcanic**) rock that typically form mountainous uplands and underlie unconsolidated deposits in valleys.

conspecific - Belonging to the same **species** (as **congeneric** refers to belonging to the same **genus**).... refers to individuals or **populations** of the same **species**.

constancy - The dispersion of a **species** throughout a **community**. A constant is a **species** that shows up in almost every sample taken (indicating an occupation of roughly 80%).

constrictor - A snake that feeds by coiling around its prey and squeezing so that the prey cannot breathe, usually taking only seconds.

consumer - **Organism** that cannot make its own food. The same as a **heterotrophic organism**. **Heterotrophic organisms** are the animals, which must take in energy (food) from an outside source. **Heterotrophic organisms** are the consumers of an **ecosystem**, consuming (= feeding upon) other **organisms** to sustain life.... Any **organism** which must consume other **organisms** (living or dead) to satisfy its energy needs. **Heterotrophic organisms** or consumers are divided into four **ecological** groups based on what they consume. **Herbivores** feed directly on green plants and are called **primary consumers**. **Carnivores** often feed on **herbivores** but can feed on other **carnivores**. **Omnivores** feed on both plants and other animals. **Detritivores** feed on the dead remains of plants and animals. This last group is represented by **bacteria** and **fungi** and play a very important **ecological** role in the recycling of **nutrients**.... A primary **consumer**, as an **herbivore**, obtains its nutrition directly from plants; a secondary **consumer**, as a **carnivore**, obtains its energy indirectly by feeding upon **herbivores**. ... An **organism** that gets nourishment by eating plants or animals. Contrast with **producer** or **autotroph**. ... A **primary consumer** (also known as an **herbivore**) is an **organism** that eats **autotrophs**, such as marine plants. **Secondary consumers** (also known as **carnivores**) eat **organisms** that eat other **organisms**. **Tertiary consumers** are **organisms** that feed on **carnivores**.... An **organism** that consumes other **organisms**, whether living or dead. (See: **primary consumer**, **secondary consumer**, **tertiary consumer**, **omnivore**, **detritivore**, **predator**, **herbivore**, **producer**)

contact zone - The **geographical** area where the ranges of two **species** or **subspecies** meet. (See: **secondary contact zone**, **secondary contact**)

contiguous - Connected, as in a large stretch of unbroken forest or the lower forty-eight states of the United States.

continental crust - The predominantly granitic rock that comprises the stony foundations of the continents. (Ocean floors are composed primarily of basalt.) The crust's thickness varies from 20 to 75 kilometers. ... Crust that makes up Earth's land; made up mostly of a relatively lightweight rock called granite.

continental divide - The elevation that divides a continent's largest drainage basins. In the United States this divide occurs in the Rocky Mountain.

continental drift - The theory that continents are mobile rather than fixed. (See: **plate tectonics**)

continental effect - The seasonal temperature differences that land surface heating and

cooling have on local climate. The differences tend to be greater than in places closer to an ocean (maritime effect).

continental plate - A rigid, primarily granitic slab floating on the asthenosphere, a layer of semi-molten upper mantle. The plates average 125 kilometers of thickness and are pushed rather than pulled by currents in the mantle. The continents riding atop the plates occupy 29% of the planet surface. (See: **plate tectonics**)

continental shelf - The submerged and generally flat part of a continent typically extending seaward from the shore to a distance of 70 km and dipping gently to an average depth of about 200 m. Also called the **sublittoral zone** or **bathyal zone**.... The more or less level sedimentary interval from the shore to the continental slope that leads deeply downward to the ocean floor.

continental slope - The steep descent of the seabed from the **continental shelf** to the **abyssal zone**... The steep, narrow fringe separating the coastal zone from the deep ocean... The slope that extends from a **continental shelf** down to the ocean deep. In some areas, such as off eastern North America, the continental slope grades into the more gently sloping continental rise.... Steeply sloped underwater land that lies at the seaward border of the **continental shelf** and runs from a depth of about 200 meters to 3200 meters.

continuum - In **ecology**, subtle gradations in plant or animal **communities** within an **ecosystem**.

contractile root - In **botany**, a thickened root serving to pull a **corm**, **bulb**, or **rhizome** deeper into the soil.

convection - Warm air rising or cold air sinking or both....In weather processes, there is circulation of fluid (air) that serves to equalize temperatures. An example is air flow between ocean and land during day and during night. **Hurricanes** use warm ocean waters for convection, often allowing for an increase in strength. Warmer water allows for an increase in storm strength.... The rising of warm air and the sinking of cool air. Heat mixes and moves air. When a layer of air receives enough heat from the Earth's surface, it expands and moves upward. Colder, heavier air flows under it which is then warmed, expands, and rises. The warm rising air cools as it reaches higher, cooler regions of the **atmosphere** and begins to sink. Convection causes local breezes, winds, and **thunderstorms**.... Vertical heat transfer, as in a **convection current**.... The transfer of energy by the flow of a liquid or a gas.

convection current - The circulation of hot and cold fluids due to differences in temperature and resultant changes in density.

convective precipitation - When heat from the ground rises, cools, saturates the air, and falls, most often as rain from a highly localized storm. Common along the equator and deep inside continents.

convective flow - The continuous circular pattern of fluids as they are heated and cooled.

convergence - In biology, **phenotypic** similarity in distantly related or unrelated forms, presumably in response to similar **selective pressures**. . . . In **geography**, the zone where surface waters meet and sink. similarities that appear independently in more than one type of **organism**. Animals that live in similar surroundings often resemble each other, for instance. Contrast with **homology**. (See: **convergent evolution**)

convergence precipitation - Formed when air masses collide, resulting in warm, moist air rising until it cools. Also known as frontal precipitation.

convergent boundary - A boundary between **tectonic plates** that are moving toward each other, or colliding.

convergent evolution - The independent **evolution** of structural or functional similarity among unrelated groups of organisms. . . The evolving of similar body plans or body parts by distantly related **organisms** because they share similar modes of life or are designed to do the same jobs - example: Heliconiaceae and Marantaceae. . . . The evolution of similar characteristics in widely separated populations. The opposite of **divergent evolution**. (See: **convergence**)

coordinates - The exact **latitude** and **longitude** for a specific site. Coordinates are typically expressed as degrees and minutes and, occasionally, seconds. For example, the coordinates for the confluence of the Rio Madre de Dios and Rio Manu in southeastern Perú are 12° 15' 55" South **latitude**, 70° 55' 17" West **longitude**. (See: **latitude, longitude, GPS**)

copepod - A major class of small, often free-swimming, **crustaceans** of the subclass Copepoda. . . . A group of minute **crustaceans** found in water and belonging to the Subclass Copepoda; copepods have a forked tail and elongated body; an example of a copepod is *Cyclops*.

coprophagy - The eating of feces or dung. See: **refection**

copse - A very small, broad-leaved woodland originally derived from coppicing but now the term is used more widely. . . . A thicket of small trees or shrubs. . . . Brush; a dense growth of bushes

coral - A **colonial** animal which is formed from the **symbiotic** relationship of single-celled dinoflagellate **algae** (**zooxanthellae**) with coral polyps (**phylum** Cnidaria, **class** Anthozoa). The polyps exchange phosphates and nitrates for **carbohydrates** in the process of skeleton building. . . . **Marine invertebrates** that secrete a **calcium carbonate exoskeleton** and live symbiotically with **algae**, with the **algae** providing **nutrients** like **carbon** and the coral providing nitrogen, phosphorous, and an abode. Corals are perforate (porous skeleton) or imperforate (solid skeleton). **Colonial** corals live in deep water, and

reef-building corals in warm, shallow water where their **zooxanthellae algae** can receive sunlight. When corals die, their outer skeletons remain, growing the reefs layer upon layer. As of the second millennium, two fifths of the world's coral had disappeared due to industrial **pollution**, and all of the remainder is under threat. (See: **coral reef, atoll, coral bleaching, zooxanthellae, ocean acidification**).

coral bleaching - The release or eviction by the **coral** animal of the **symbiotic**, colored, **photosynthetic algae**, or **zooxanthellae**, normally living within the **coral** polyps. This occurs when the **coral** animals are stressed, by high **temperatures** or **pollution**, for example, making the **coral** appear white....Coral bleaching occurs when the **zooxanthellae** evacuate the coral skeleton, leaving the coral appearing white and bleached. **Global warming** and **pollution** are possible causes of this problem... Coral bleaching is a process which destroys the very **habitat** upon which the whole **coral reef ecosystem** depends. This is a devastating condition which has spread alarmingly in recent years and now affects large regions of Earth's **coral reef** systems..... The loss of color of corals due to stress-induced expulsion of symbiotic unicellular algae or **zooxanthellae**. Coral bleaching is a vivid sign of **corals** responding to stress which can be induced by any of the following: increased or reduced water temperatures (often attributed to **global warming**), increased solar irradiance (**photosynthetically** active radiation and **ultraviolet** band light), changes in water chemistry (in particular **ocean acidification**), increased sedimentation (can be contributed to silt runoff), **pollution, pathogen** infections or changes in salinity. (See: **coral, coral reef, zooxanthellae, ocean acidification, global warming**)

coral reef - One of the most biologically diverse **ecosystems** on the planet, coral reefs are perhaps the underwater equivalent of **tropical rainforests**. They are found mostly in the **tropical** and **subtropical** zones. Coral reefs tend to form in less than 100m depth and at a temperature of greater than 18° C. An atoll is a **coral** island, often a ring of reef with a lagoon. Coral reefs are dynamic systems with high **biodiversity**, productivity and complexity, even in a **nutrient-poor environment**. They are giant living platforms of interlaced **corals** and the complex **ecological community** that comes along with them. Coral reefs are fragile, and currently threatened by **coral bleaching**, sediment/fertilizer runoff, commercial fishing trawlers, overfishing, oil exploration, **pest** species like the Crown-of-Thorns starfish, anchor damage, development and mass tourism. ... A large underwater formation created from the **calcium carbonate** skeletons of **coral** animals; can also refer to the animals living on and near the **coral** reef. (See: **coral, atoll**)

cordgrass - Several plant **species** living in **brackish** or **saline estuarine marshes**; below them are tidal mud flats, and above them salt marshes. Cordgrass produces five to ten times as much nutriment and oxygen as a comparable acreage of wheat. Very useful for tidal marsh restoration because its roots hold the mud in place as the plants bracket incoming waves while filtering them for **nutrients**.

core - The central part of Earth that lies beneath the **mantle** and is made up of an outer, liquid part and an inner, solid part.

Coriolis Effect – The deflecting force of the Earth’s rotation that causes a body of moving water or air to be deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. A force per unit mass that arises solely from the earth’s rotation, acting to deflect fluid parcels that are in motion. The Coriolis Effect is dependent on the latitude and the speed of the moving object. The Coriolis Effect is stronger at higher latitudes and is equal to zero at the equator. Hurricanes can’t cross the equator because a steadily decreasing Coriolis Effect will stop the storm from spinning. In the Northern Hemisphere, Coriolis’ deflecting force causes air and water to deflect to the right of its path, while in the Southern Hemisphere they are deflected to the left of their path. This is the effect that causes a hurricane to rotate counter-clockwise (or have cyclonic motion.) **Ocean currents** in the Northern Hemisphere such as the **Gulf Stream** are deflected to the right as well.... The apparent tendency of a freely moving particle to swing to one side when its motion is referred to a set of axes that is itself rotating in space, such as Earth. The acceleration is perpendicular to the direction of the speed of the article relative to the Earth's surface and is directed to the right in the northern hemisphere. Winds are affected by rotation of the Earth so that instead of a wind blowing in the direction it starts, it turns to the right of that direction in the northern hemisphere; left in the Southern Hemisphere.... The apparent deflection of an object in motion because of the Earth's rotation. Low pressure systems in the Northern Hemisphere turn counterclockwise (clockwise in the Southern Hemisphere). Think of the apparent curve caused by a child trying to walk a straight line from the center of a carrousel to the edge as it spins.

Coriolis Force - See **Coriolis Effect**.

cork - The protective, outer **tissue** of the bark.

cork cambium - A layer of **cells** in the **bark** giving rise to the **cork**; a **lateral meristem**. (See: **cambium**)

corky - Of or referring to **cork**.

corm - A short, swollen, underground stem in which food is stored.... A short, thick stem that stores **nutrients** underground. Usually a **monocot**, it does this through hot summers or cold winters.

cormel - A small, undeveloped **corm**.

corolla - Collectively, all the **petals** in a **flower**.

corona - In **botany**, a trumpet-like outgrowth of **petals**.

corridor - A linear strip of **habitat** type that differs from that on either side of it. ...A thin strip of **vegetation** used by wildlife and potentially allowing movement of **biotic** factors between two areas.... An area of **vegetation** connecting two similar **habitats**; corridors are important in providing wildlife safe passage from one patch of **habitat** to

another that is otherwise disconnected from the first.

cortex - In botany, an outer covering; peridium.... The region in roots and **stems** immediately inside the **epidermis**.

corticulous - An **organism** inhabiting or growing on the bark of trees.

cosmopolitan - In biology, worldwide, or nearly so, in distribution.... Widely diffused over the globe, found in many locations. The Peregrine Falcon (*Falco peregrinus*) is an example of a species that is said to be cosmopolitan.

cotyledon - In **botany**, a **seed leaf**; a food-storage structure in seeds....A leaf of the embryo of a seed plant, which upon germination either remains in the seed or emerges, enlarges, and becomes green. Also called seed leaf. ... Embryo or seed leaves. They store nutrients for the seed until it grows its own photosynthetic leaves. (See: **dicot**, **monocot**)

coulee - A deep, dry ravine or streambed. Also, a steep flow of hardened lava.

counter-radiation - Greenhouse deflection of incoming longwave radiation back to the planet surface. (See: **greenhouse effect**)

counter-singing - In birds, singing contests between two or more males to establish territory or secure a mate. Also known as **vocal dueling**. (See: **antiphonal singing**, **chorusing**, **duet**, **duetting**)

counteract - To make ineffective or restrain or neutralize the usually ill effects of an opposite force.

countershading - Counter shading is a common color pattern in animals in which the dorsal side (upper side) of the animal is darker than the ventral (lower) side. Such a color pattern provides camouflage for the animal when viewed from above, below, and even from the side. Sunlight shines down from the sky and illuminates the top of an animal's body, casting its belly in shadow. The counter shading pattern balances the light from above and the shadow beneath the animal so as to blend the animal's side profile with its surroundings. Counter shading also helps animals blend into their surroundings when viewed from above and below, which is the case for many tree-dwelling and aquatic species. When viewed from below, a counter-shaded animal with a light belly blends into the light coming from the sky above. Likewise, when viewed from above, a counter-shaded animal with a dark back blends into the ground or seabed below. Examples of counter-shaded animals include: many species of shorebirds, some species of dolphins, and numerous species of fish....A type of protective coloration (camouflage) in which an animal is light on the underside and dark on top....Protective coloring of some species in which animals are darker on the upper (**dorsal**) surface than on their lower (**ventral**) surface so that whether viewed from above or below, they appear evenly colored and inconspicuous.... Countershading, or **Thayer's Law**, is a form of **camouflage**. Countershading, in which an animal's pigmentation is darker dorsally, is often thought to

have an adaptive effect of reducing conspicuous shadows cast on the **ventral** region of an animal's body.

courtship - Specialized behavior in animals that leads to or initiates mating.... The behavior of animals that ultimately results in mating... Behavior in animals for the purpose of attracting a mate.

courtship dancing - Usually elaborate displays of birds, most often performed by the males of certain **species**, in an attempt to attract a female mate. Andean Cock-of-the-Rock and some manakins are examples of birds that engage in courtship dancing.

cove - A small, sheltered recess in a coast, often inside a larger embayment....A recessed area sheltered by hills. This term is commonly used throughout the southern Appalachian Mountains.

cover - Any **vegetation** producing a protecting mat on or just above the soil surface....The plant parts, living or dead, on the surface of the ground. Vegetal cover is composed of living plants, litter cover of dead parts of plants. Also the percentage of a named area that has such plants....The area of ground covered by the vertical projection of the aerial parts of plants of one or more **species**.The entire **canopy** of all plants of all sizes and **species** found in an area.Plants or **vegetation** used by animals for nesting, resting, escape, or protection from adverse **environmental** conditions.

- **basal cover** - See **basal area**.
- **canopy cover** - The proportion of the ground area covered by the vertical projection of the **canopy**. Expressed as a percent of area....Sometimes used to mean a combination of canopy closure and **crown density**. Expressed as a degree of opacity. See shade density.
- **crown cover** - The ground area covered by the **crown** of a **tree** or a **shrub**, as delimited by the vertical projection of its outermost perimeter....The canopy of green leaves and branches formed by the **crowns** of all **trees** in a stand or **forest**. (See: **canopy cover**)
- **thermal cover** - Plant cover used by animals to ameliorate the effects of weather.

coverts - In birds, small feathers that cover the base of larger flight or tail feathers.

covey - A small group of birds, such as grouse or quail, that tend to stay together for protection.

crash - A sudden **population** drop off caused by resource depletion. (See: **dieback**)

crater - A bowl-shaped depression.

creek - A small **stream**...A natural **stream** of water, normally smaller than, and often **tributary** to a **river**.

creep - Slow mass movement of soil and soil material down relatively steep slopes,

primarily under the influence of **gravity** but facilitated by saturation with water and by alternate freezing and thawing. Under dry conditions creep constitutes a particular form of displacement brought about by thermal expansion and contraction....The slow and imperceptible movement of finely broken-up rock-matter from higher to lower levels.... Slow downslope soil movement.

crepuscular - Becoming active at twilight or before sunrise, as do bats and certain insects and birds.... Active at twilight, dawn, and dusk.

crest - A tuft of elongated feathers on the head of some species of birds, such as the Hoatzin, Ringed Kingfisher, and Lineated Woodpecker. The feathers are either held erect by the bird most of the time or are capable of being erected.... In birds, elongated feathers on top and toward the rear of the head; the cardinal has a red crest on its head.

critical photoperiod - In **botany**, the maximum day length a short-day plant and the minimum day length a long-day plant require to initiate flowering.

critically endangered - A **species** or other **taxon** which is at extreme risk of becoming **extinct** in the wild in the immediate future. This may be indicated by any of the following measures: a) a previous or projected **population** reduction of at least 80% over whichever is longer of a period of 10 years or three generations, b) extent of occurrence less than 100 km² or area of occupancy less than 10 km², along with **population** decline, fragmentation or extreme fluctuations, c) **population** less than 250 mature individuals with continuing decline, d) **population** less than 50 mature individuals, or e) probability of **extinction** in the wild estimated at 50% over the longer of 10 years or three generations. (See: **endangered species, vulnerable species, ghost species, extinction, conservation dependent species**)

cross-bedding - **Sedimentary** beds tilted when deposited in the direction the water or wind that built them was moving.

cross-pollination - The transfer of **pollen** to a **flower** on another plant.

cross-shore - Perpendicular to the shoreline.

crown - In **zoology**, the top of the head of a bird or mammal....The topmost part of the head, behind the forehead...The front of the crown is called the **forecrown**, and the back of the crown is called the **hindcrown**.... In **botany**, the branches and foliage of a tree; the upper portion of a tree.... The above ground parts of a tree or shrub, sometimes more particularly applied to the topmost leaves and limbs.... The upper part of a tree, including the branches and leaves.... The upper portion of a tree or shrub, including the branches and foliage.

crown closure - The closing together of the crowns of trees in a forest as they age and grow....By extension of the term, the proportion of the ground area covered by the

aggregate vertical projection of all the tree crowns in a crown cover. Expressed as a percent of area. (See: **canopy closure, canopy cover, crown cover, crown density**)

crown cover - The ground area covered by the crown of a tree or a shrub, as delimited by the vertical projection of its outermost perimeter....The canopy of green leaves and branches formed by the crowns of all trees in a stand or forest.... The percentage of forest floor overgrown with tree crown. A major component of forest productivity. Lack of light and room to grow limits it (called **crown shyness**). (See: **canopy closure, canopy cover, crown closure, crown density**)

crown density - The thickness or compactness of an individual **tree crown**, *i.e.* its opacity, as measured by its shade density. Collectively, crown density of all plants in a stand is termed **canopy density**. (See: canopy closure, canopy cover, crown cover, crown closure)

crown shyness - The presence of channel-like gaps among the **crowns** of **canopy** trees.

crust - In **geology**, the outer layer of the Earth.... The outermost layer of the Earth, consisting of relatively low-density rocks. (See: **continental crust**)

crustacean - A group of animals in the **class** Crustacea (**phylum** Arthropoda), usually **aquatic**, that lacks a backbone, has a tough shell, a segmented body and jointed appendages; crabs, shrimp and crayfish are examples.

cryoplanation - Molding of the landscape by frost action...Land erosion or reduction by the processes of intensive frost action, *i.e.* congeliturbation including solifluction and accompanying processes of translation of congelifraacts. Includes the work of rivers and streams in transporting materials delivered by the above processes....The process of mass-wasting related to frost action and solifluction.

cryosphere - The frozen part of the Earth's surface. The cryosphere includes the polar ice caps, continental ice sheets, mountain **glaciers**, sea ice, snow cover, lake and river ice, and **permafrost**....One of the interrelated components of the Earth's system, the cryosphere is frozen water in the form of snow, permanently frozen ground (**permafrost**), floating ice, and **glaciers**. Fluctuations in the volume of the cryosphere cause changes in ocean sea-level, which directly impact the **atmosphere** and **biosphere**.... The part of the Earth that remains below the freezing point, *e.g.*, the poles.

cryostatic pressure - Ice pressure of the kind often seen inside **glaciers**.

cryoturbation - Process of stirring, heaving, and thrusting of the Earth's mantle by frost action including frost heaving and differential mass movements like solifluciton. Frost churning of soils. Synonym of **congeliturbation**.

crypsis - 1) In **ecology**, crypsis is the ability of an **organism** to avoid observation or detection by other **organisms**. A form of antipredator **adaptation**, methods range from

camouflage, nocturnality, lifestyle, transparency, or **mimicry**. The word can also be used in the context of eggs and **pheromone** production.... The ability for a **organism** to blend in with its **environment**. (See: **cryptic coloration, camouflage, disruptive coloration, mimicry**)

cryptic coloration - **Camouflaged** appearance rendering the animal less visible. ... The cryptic appearance of an animal, the chameleon, for example, so that in some fashion it resembles some part of its environment in a way which helps it to escape detection by predators. (See: **cryptic coloration, camouflage, disruptive coloration, mimicry**)

cryptobiotic soil - Living soil crust, found in **drylands** and **deserts**, dominated by **cyanobacteria** and including **lichen**, green **algae**, **moss**, **microfungi**, and **bacteria**. (See: **cryptogamic soil, cryptogams, biological soil crust**)

cryptogamic soil - In more arid regions, vegetative cover is generally sparse. Open spaces are usually covered by a biological soil crust or biocrust, a highly specialized community of cyanobacteria, mosses, and lichen. Biological soil crusts are commonly found in semiarid and arid environments throughout the world. (See: **cryptobiotic soil, cryptogams, biological soil crust**)

cryptogams - **Non-vascular plants** such as **lichens** and **mosses** that make up the ground or surface layer of **vegetation**.... Collective term for the Thallophytes, **Bryophytes**, or **Pteridophytes**.... Any plant reproducing sexually without forming seeds.... Plants and **fungi** that do not reproduce by seeds.... A plant that has no true **flowers** or seeds. (See: **cryptogamic soil, cryptobiotic soil, biological soil crust**)

cryptophyte - A plant in which the buds are covered with soil or water; includes **geophytes**, **helophytes**, and **hydrophytes**.... A plant whose reproductive organs (*e.g.*, **bulbs**, **corms**) are underground or underwater.

cud - A wad of food that has been chewed briefly and stored in the first stomach of a **ruminant** until it can be brought back to the mouth for more thorough chewing later.

cultivar - A cultivated variety of plant, produced by horticultural techniques.... An organism with desirable breeding qualities.... A cultivated plant variety, or cultural selection.... A contraction of "cultivated variety." It refers to a plant type within a particular cultivated species that is distinguished by one or more characters.

culture - In biology, an artificial growth and propagation of organisms on nutrient media or living plants.

cumulative causation - See **positive feedback**.

cumulative impact - The collective impact of many small actions which by themselves have a small impact, but when considered together, have a considerably larger impact. An example would be the pesticide use of homeowners within their homes and around their

yards. The pesticide use of any individual homeowner is relatively insignificant, but when the pesticide use of all homeowners is considered, the impact on the environment is tremendous.

cumulonimbus cloud - A dark cloud of great vertical extent, often anvil-shaped, and charged with electricity; associated with **thunderstorms**.... A cloud type that is dense and vertically developed and is associated with rain (particularly of a convective nature). It is heavy and dense with a flat base and a high, fluffy outline, and can be tall enough to occupy middle as well as low latitudes. This type of cloud is formed from about 10,000 to 12,000 feet of altitude. Also known as a **thunderhead**.

cumulus cloud - A cloud in the form of individual, detached domes or towers that are usually dense and well defined.... Clouds forming in the **troposphere** which are vertically formed with flat bases and fluffy, rounded tops. They have often been described as cauliflower-like in structure. They occur at heights of 500-6000 meters in elevation above the Earth and most often occur scattered or in dense heaped packs. They are formed due to buoyant upward convection during warm, anti-cyclonic summer weather.

current refraction - Process by which wave velocity is affected by a current.

cushion krummholz - Alpine trees exposed to severe wind conditions are wind-pruned to a cushion-like mat. (See: **krummholz, flagged krummholz**)

cushion plant - Low-growing mat formed by tightly massed individuals of the same **species** of plant. Generally associated with **tundra** or high **alpine communities**..(See: **caespitose**)

cuticle - A waxy layer on the outside of **leaves, herbaceous stems** and fruits.... A waxy layer of cutin that protects the surfaces of leaves. A waxy coating secreted by **cells** of a plant's epidermis to prevent water from leaving the plant.Water-repellent waxy covering (cutin) of epidermal cells of plant parts such as leaves, stems, and fruits; The outer sheath or membrane of nematodes. (See: **cutin**)

cutin - In **botany**, the waxy substance forming a **cuticle** layer. (See: **cuticle**)

cyanobacteria - Cyanobacteria, also known as Cyanophyta, is a **phylum** (or **division**) of **bacteria** that obtain their energy through **photosynthesis**. They are often still referred to as blue-green **algae**, although they are in fact **prokaryotes** like **bacteria**.... **Prokaryotic**, single-celled **microorganisms** in the domain **Bacteria**. Formerly called blue-green **algae**, though not **algae**. Among the earliest life forms to colonize land.... **Photosynthetic bacteria** formerly referred to as blue-green algae, belonging to the **kingdom** Eubacteria and potentially the **symbiotic** progenitor to the **chloroplasts** of plants.... Bacteria that photosynthesize. They were among the first living things on Earth. The food-making chloroplast of plants is actually a cyanobacterium imported long ago..... **Prokaryotic**

producers that produced the oxygen that first made Earth inhabitable for other living things.

cyanophyte - A species of **Cyanobacteria**, also known as blue-green algae or blue-green **bacteria**. A member of the Cyanophyta, a **phylum** of **bacteria** that obtain their energy through **photosynthesis**. (See: **cyanobacteria**, **black zone**)

cycad - A group of trees from the order Cycadales. These are **tropical trees** and **shrubs** with thick stems, crowns of **fern-like** leaves, and fleshy seeds enclosed in large cones.....A seed-bearing plant similar in appearance to modern palm trees. They first appeared in the Permian, and were common in the Mesozoic, but are rare today, having been displaced by flowering, fruit-bearing plants which appeared in the Cretaceous.... Cycads are a group of seed plants characterized by a large crown of **compound leaves** and a stout trunk. They are **evergreen**, **gymnospermous**, **dioecious** plants having large **pinnately compound leaves**. They are frequently confused with and mistaken for palms or **ferns**, but are related to neither, belonging to the **division** (= **phylum**) Cycadophyta. Cycads are found across much of the **subtropical** and **tropical** parts of the world..... A **subtropical** and **tropical** group of plants with a large crown of **compound leaves** and a stout trunk.

cycle - A circular and continuous flow. Life on Earth is made possible by energy, water, and **nutrient** cycles...Fairly regular fluctuations in density of a **species** over many years, *e.g.* greater than 30 years. Cycles need to be evaluated in terms of the regularity of their period (the time between peaks or lows) and also their amplitude (the difference from the average density).

cyclone - A rotating mass of air with minimum pressure in its center. In the Northern Hemisphere, such winds move counterclockwise, and in the Southern Hemisphere, clockwise....An area of low pressure around which winds blow counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.... An area of low pressure around which winds blow counterclockwise in the Northern Hemisphere. Also the term used for a hurricane in the Indian Ocean and in the Western Pacific Ocean.... An area of low atmospheric pressure which has a circulation that is cyclonic (counterclockwise) in the Northern Hemisphere..... A low-pressure center wrapped in rotating movements of air. (See: **anticyclone**, **cyclonic rotation**)

cyclonic - Of or referring to a **cyclone**.

cyclonic rotation - Rotation in the same sense as the Earth's rotation, *i.e.*, counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere as would be seen from above. The opposite of **anticyclonic rotation**.

evaporation fog - Fog produced when sufficient water vapor is added to the air by evaporation.

cyst - A small, protective sac enclosing certain **organisms** during their dormant or **larval** stage; a saclike growth containing fluid or matter produced by inflammation.... Resistant

wall or shell secreted around an **organism**. . . . A capsule-like sac that encloses a **spore**, **parasite**, or abnormal growth.

cytokinesis - Cell division.

cytokinin - A plant **hormone** primarily stimulating **cell** division.

cytological - Of or relating to the study of **cells**.

cytoplasm - The living **protoplasm** of a **cell**, excluding the **nucleus**. . . . The portion of a **cell's protoplasm** (living matter) outside the **nucleus**.

cytoplasmic - In **biology**, of or referring to **cytoplasm**.

cytoplasmic membrane - The membrane enclosing the **cytoplasm**.

cytotoxic - **Toxic** to **cells**, killing or damaging them or preventing their reproduction or growth.

dawn - The time each morning at which daylight first begins.

dawn chorus - The chorus of many **species** of birds singing at dawn each day.

dawn song - A special type of song given by many flycatchers **species** at for a very short period of time at first light. The dawn song then gives way to the more typical song heard throughout the remainder of the day.

day-neutral plant - A plant in which **flower** formation is not controlled by **photoperiod**.

DDT - The first **chlorinated hydrocarbon insecticide** chemical name: Dichloro-Diphenyl-Trichloroethane. It has a half-life of 15 years and can collect in fatty tissues of certain animals. The US Environmental Protection Agency (EPA) banned registration and interstate sale of DDT for virtually all but emergency uses in the United States in 1972 because of its persistence in the **environment** and accumulation in the **food chain**. . . . A **pesticide** commonly used in the mid-1900s to control insect outbreaks. Breakdown elements from DDT and other **pesticides** called **chlorinated hydrocarbons** accumulated in the upper levels of the **food chain**. . . . A potent, slowly degradable **insecticide** still widely used in many parts of the world. . . . A **chlorinated hydrocarbon insecticide** whose accumulation and persistence in aquatic and terrestrial **ecosystems** led to its ban in the United States in 1971 for virtually all but emergency uses. DDT metabolites include DDE and DDD.

dead-leaf specialist - A bird, such as a White-eyed Antwren (*Myrmotherula leucophthalma*) that specializes in foraging around large dead leaves or clumps of dead leaves hanging in the vegetation of the forest undergrowth and understory.

dead reckoning - The technique of determining position by computing distance traveled on a given course. Distance traveled is determined by multiplying speed by elapsed time. ...A way of figuring your position based upon the influence of such things as currents and wind upon your projected course and anticipated speed.... Dead reckoning is a method of navigation that involves calculating one's position by noting one's speed, the speed and direction of the wind, **ocean currents**, and compass directions. Dead reckoning was used by sailors like Columbus.... A method of determining position by making an educated guess based on last known position, speed and currents.... To plot a future position based on travel from a known position using speed, time and course.

dbh - See **diameter at breast height**.

debris - The remains of something that has broken down or is decomposing, such as brush collected at the bottom of a stream; **organic** particles large enough to serve as food for **scavengers**.

decapod - **Crustaceans** including shrimp, lobster and crayfish of the order Decapoda.

decarbonization - A trend referring to a persistent long-term decline in carbon intensity, resulting from cleaner and more modern fuels being used on primary and final energy levels.....The decline in the carbon intensity of primary energy use is generally referred to as “decarbonization.”

deciduous - In **botany**, shedding all of the **leaves** in one season.....Shedding at periodic intervals, as with seasonal shedding of leaves or the falling off of antlers....The characteristic of dropping leaves during periods of stress due to dryness...Term applied to trees (commonly **broadleaf trees**), that usually shed their leaves annually. It is an **adaptation** to prevent excessive water loss by **transpiration** when water is scarce. ... Has leaves that fall off or shed either seasonally or at a certain stage of development in the life cycle. ... Annual or seasonal shedding of foliage from trees and shrubs. Conserves water by cutting down on transpiration and nutrients by reducing what the leaves required. (See: **deciduous forest, broadleaf trees, evergreen, coniferous**)

deciduous forest - A forest composed of trees that shed their leaves at some season of the year. In **tropical** areas the trees lose their leaves during the dry season in order to conserve moisture. **Deciduous** trees of the cool areas shed their leaves during the autumn to protect themselves against the cold and frost of winter. ... **Vegetation community** in which **trees** lose their leaves once a year, to help them survive a more difficult season, either winter or a distinct dry season. (See: **deciduous, coniferous, evergreen, dry forest, tropical dry forest**)

declination - In geography, the difference in degrees between magnetic north (the direction the magnetic needle on a compass points) and true or geographic north (the direction maps are printed towards)....The difference, expressed in degrees, between magnetic north and geographic (true) north.... The horizontal angle in any given location between true north and magnetic north.

decomposer - An **organism** that digests dead **organisms** to sustain life.... An **organism** that breaks down the tissue and/or structures of dead **organisms**.... An **organism**, usually a **bacterium** or a **fungus**, that breaks down the bodies of dead plants and animals into simpler substances usable by green plants. These **organisms mineralize organic matter**.... An organism that gets nourishment by breaking down tissue of dead organisms; various **fungi** and **bacteria** are examples.... An **organism** that eats dead **organic matter**. Most are **bacteria, algae, and fungi**. They fuel the nitrogen and oxygen cycles that support all life on Earth.

decomposer food web - The diverse **community** of mostly **microorganisms (fungi, bacteria, protozoans, and tiny animals)** that rely on dead material as their principal energy source; also the minute animals that prey upon them.

decompose - To breakdown **organic matter** from a complex to a simpler form, mainly through the action of **fungi** and **bacteria**, or to undergo this process.

decomposition - Conversion of **organic matter** as a result of microbial and/or enzymatic interactions; initial stage in the degradation of an **organic substrate**, characterized by processes of destabilization of the pre-existing structure.... The breakdown of dead **organic material** by **detritivores** or **saprophytes**.... A large number of interrelated processes by which **organic matter** is broken down to smaller particles and soluble forms available for plant uptake.... The breakdown of matter by **bacteria** and **fungi**, changing the chemical makeup and physical appearance of materials.... The breaking down of dead **organic matter** into its constituent minerals and **elements** by decomposers' such as **fungi** and **bacteria**. Decomposition is key in the recycling of **nutrients** in the **environment**.

decoy - Something used to lure victims into danger.

deep ecology- A value system which assigns an intrinsic value to natural systems and places nature within a system of morality or ethics, and which recognizes the **ecocentric** nature of our existence and the synthesis and interrelatedness of human cultures with ecological environments. Deep ecology is one of the most **ecocentric** of the preservationist green ideologies, and may also be referred to as 'ecologism', 'deep green' or 'Gaian' view. (See: **ecologism, deep ecology, ecocentrism, biophilia, environmentalism, Gaia hypothesis**)

defend - To make or keep safe from danger, attack, or harm.

defense compound - A type of chemical synthesized by plants or, in some cases, by animals that confers some protection against **herbivores** or **predators**. Common examples are terpenoids and **phenolics** in plants, and batrachotoxins in frogs.

deflation - The removal of soil by wind **erosion** in hollows and depressions.... The erosion of dunes by wind action.

defoliant - A synthetic chemical causing **leaves** to be prematurely shed.

deforestation - The large-scale removal of trees from a **habitat** dominated by **forest**....Those practices or processes that result in the change of forested lands to non-forest uses. This is often cited as one of the major causes of the enhanced **greenhouse effect** for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide; and 2) trees that once removed **carbon dioxide** from the **atmosphere** in the process of **photosynthesis** are no longer present and contributing to carbon storage.

degradation products - **Compounds** resulting from transformation of an **organic** substance through chemical, photochemical, and/or biochemical reactions.

degree - A unit of angular measure represented by the symbol °. The circumference of a circle contains 360 degrees. When applied to the roughly spherical shape of the Earth for **geographic** and cartographic purposes, degrees are each divided into 60 minutes.

dehiscence - To split open when ripe, usually along definite lines or sutures to release seeds.

delayed implantation - The process of a fertilized egg remaining unattached in the uterus for a period of time, sometimes up to five months, after which the egg implants, or becomes attached to the wall of the uterus, and continues development into a fetus; delayed implantation allows the birth to occur when a better food supply is available for the young or when the mother might be more nutritionally fit.

delta - An **alluvial** deposit, usually triangular shape at the mouth of a **river**.... The fan-shaped area at the mouth or lower end of a river, formed by eroded material that has been carried downstream and dropped in quantities larger than can be carried off by tides or currents. ...The mouth of a **river** that flows into an ocean or lake. (See: **alluvial fan**)

deme - A local **interbreeding** group; any local group of individuals of a given **species**....An **interbreeding** subpopulation....A locally distinct **population**....A subdivision of a population consisting of closely related plants, animals, or people, typically breeding mainly within the group....A local population of organisms of one species that actively interbreed with one another and share a distinct gene pool.

demersal - A bottom-feeding animal.

demography - The statistical science dealing with the birth and death processes of a **population**.

den - (noun) A place used as shelter by an animal... A rain proof, weather-tight cavity in a tree or a space dug by animals among rocks or in soil. ...(verb) To stay in a sheltered area, as in bears denning for the winter months.

dendrochronology - The process of determining the age of a tree or wood used in

structures by counting the number of annual **growth rings**.... A study of the annual ring patterns in **trees** to date past events and past **climatic** conditions.... Dating a tree by counting its rings.

dendrology - The study of the identification, habits, and **distribution** of trees.

Dengue - Dengue, also known as breakbone fever, is transmitted to humans by the bite of an *Aedes* mosquito (*Aedes aegypti* or more rarely the *Aedes albopictus* mosquito, which feed during the day) infected with any one of the four Dengue **viruses** of the **genus** *Flavivirus*, family Flaviviridae.

It occurs in **tropical** and **subtropical** areas of the world. Symptoms appear 3 to 14 days after the infective bite. Dengue fever is a febrile illness that affects infants, young children and adults. Symptoms range from a mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash. There are no specific antiviral medicines for Dengue. Dengue haemorrhagic fever (fever, abdominal pain, vomiting, bleeding) is a potentially lethal complication, affecting mainly children.

denitrification - Nitrogen transformations in water and soil that make nitrogen **nutrients** effectively unavailable for plant uptake, usually returning it to the **atmosphere** as nitrogen gas.... Chemical conversion of dissolved nitrogen (nitrite) into gaseous nitrogen. Fires on particular soils do this.

density - Number of **organisms** per unit of space.... The actual number of individuals of a defined group occurring in a specified unit of space and time...same as **population density**.... The mass per unit of volume of a substance.

density current - When a denser current sinks down under a less dense current and flows along the bottom.... Phenomenon of relative flow within water due to difference in density; the salt-water wedge is a density current when stratification occurs between identifiable flow masses.

density-dependence - Widely observed phenomenon in which **populations** of **cells** or **organisms** are naturally regulated. One or more factors act as (a) increasing brakes on **population** increase with increase **population density**, and/or (b) decreasing brakes on **population** increase with decreased **population** density. Bioethical concern point out how humans actively seek to avoid the natural controls of their own population size, whilst interfering with the life cycles of other organisms on an ongoing basis. ... The tendency of a **population's** growth rate to depend on its size, with an increase in **population density** corresponding to a decrease in growth. This self-regulating dynamic helps prevent **extinction**. (See: **balance of nature**)

density-dependent - Of or referring to **density-dependence**.

deposit - Material placed in a new position by the activity of humans or natural processes such as wind, water ice or gravity.

deposit feeder - A bottom-feeder that eats sedimentary material and by doing so stirs up the mud.

deposition - Deposition, also known as **sedimentation**, is the **geological** process whereby material is added to a landform. Deposition occurs when the forces responsible for **sediment** transportation are no longer sufficient to overcome the forces of particle weight and friction, which resist motion. Deposition can also refer to the build up of a **sediment** from **organically** derived matter or chemical processes. For example, chalk is made up partly of the **microscopic calcium carbonate** skeletons of **marine plankton**, the deposition of which has induced chemical processes (diagenesis) to deposit further **calcium carbonate**....Process by which water changes phase directly from vapor into a solid without first becoming a liquid.... The dropping of transported particles out of moving water onto a resting place. Also, a transformation from gas to solid as a result of cooling.... The process by which eroded soil and rock are put down in new places, reshaping the landscape (See: **sedimentation**)

depredate - To prey upon for food.

depression - In **meteorology**, a low pressure system.

derived character - In **cladistics**, a feature shared among members of smaller groups or **clades** that is believed to have **evolved** at a later date than **primitive characters**. Also called an advanced character.

desert - An area which averages less than 10 inches of precipitation per year. Temperature ranges from very hot in the summer to below freezing at night during the winter.... A land area so dry that little or no plant or animal life can survive.

desert scrub - A **shrubland** found in the Colorado, Sonoran, Mojave, and Great Basin **Deserts**, **taxa** are adapted to low rainfall and high summer temperatures.

desertification - The change of arable land into a **desert** either from natural causes or human activity.... The man-made or natural formation of desert from usable land... The degradation of moist land into a **desert**. Some desertification is natural, but most is from **erosion**, **climate change (global warming)**, or **overgrazing**.... The progressive destruction or degradation of existing vegetative cover to form **desert**. This can occur due to **overgrazing**, **deforestation**, **drought**, and the burning of extensive areas. Once formed, **deserts** can only support a sparse range of vegetation. **Climatic** effects associated with this phenomenon include increased **albedo**, reduced **atmospheric humidity**, and greater **atmospheric** dust (aerosol) loading.

desiccate - To lose water or dry out.

desiccation - Dehydrating or drying up.... Mummification.

determinate growth - Growth to a **genetically** predetermined size.

detoxify - To counteract or destroy the **toxic** properties of a substance....To remove the effects of poison from something, such as the blood.

detritivore - Any **organism** which obtains most of its **nutrients** from the **detritus** in an **ecosystem**. Detritivores feed on the dead remains of plants and animals. This group is represented by **bacteria** and **fungi** and plays a very important **ecological** role in the recycling of **nutrients**.... An **organism** (plant or animal) that feeds on **organic** remains or **organic** (mostly plant) debris. ... An **organism** that feeds on **detritus**, or dead matter and waste from other living things. Same as a **detrivore**.

detrivore - Same as a **detritivore**. (See: **detritivore**)

detritus - Small pieces of dead and **decomposing** plants and animals. ...Detached and broken-down **organic** fragments of structure....Pertains to small **organic** particles like leaves, twigs, etc.... Accumulated **organic** debris from dead **organisms**, often an important source of **nutrients** in a **food web**.... Loose particles or grains formed by disintegration; **organic** debris from dead **organisms**; **organic** detritus is an important source of **nutrients** for some **food webs**.... Decomposing **organic** matter (leaves, bugs, etc.).

dew - Water that has condensed onto objects near the ground when their temperatures have fallen below the dew point of the surface air.... Atmospheric moisture that condenses after a warm day and appears during the night on cool surfaces as small drops. The cool surfaces cause the water vapor in the air to cool to the point where the water vapor condenses.

dew point - The temperature at which condensation occurs....The **temperature** to which air with a given quantity of **water vapor** must be cooled to cause condensation of the vapor in the air.... The **temperature** and pressure at which a liquid begins to condense out of a gas.... The **temperature** of which air must be cooled for it to be saturated.... The certain **temperature** at which dew begins to form and **water vapor** changes to liquid form.... The **temperature** to which the air must be cooled to condense. For example, if the air **temperature** was 65 degrees F. and the dew point was 65 degrees F. the humidity would be 100% and the air would be totally saturated. The larger the spread of **temperature** and dew point, the drier the air.... The **temperature** to which air must be cooled for saturation to occur, exclusive of air pressure or moisture content change. At that **temperature** dew begins to form, and **water vapor** condenses into liquid.... The **temperature** that the air must reach to hold the maximum amount of moisture. When the **temperature** cools to the dew point, the air becomes saturated, and the result is fog, dew, or frost.... The temperature at which **water vapor** from a saturated air mass turns into liquid. Below freezing, called a frost point.

dewlap - A fold of loose skin hanging from the neck of certain animals....A pendulous part similar to this, such as the **wattle** of a bird. (See: **gular sac**)

diadromous - In **zoology**, **species** that divide their lives between freshwater and ocean environments..... Regularly migrating between freshwater and seawater. This includes **anadromous**, **catadromous** and **amphidromous** fishes.. In botany, with leaf veins radiating in a fanlike arrangement. (See: **anadromous**, **catadromous**, **amphidromous**)

diageotropic - Horizontal growth of a plant part.

diagnostic character - A trait used for identifying a **taxon**.

diagnostic species - A species with high constancy or abundance that differentiates one vegetation type from another.

diameter at breast height (dbh) - The diameter of a tree measured four feet, six inches from the ground level. "Ground level" can follow a convention; either the highest point off the ground touching the stem, or the mean of the highest and low points.

diaspore - In **botany**, the physical structure of a seed dispersal device. An example would be the soft fluff on the seeds of kapok trees (*Ceiba pentandra*), helping to catch the breeze and enabling the seed to travel on wind currents.

diatom - A type of **algae** consisting of one **cell** or a **colonial** group of **cells**; the **cells** of diatoms have a symmetrical covering that contains silica, or silicon dioxide.... Microscopic **algae** with **cell walls** made of silicon and have two separating halves.... A class of **unicellular algae** more formally known as Bacillariophyceae that live in cold waters of relatively low **salinity**.... A major group of **phytoplankton** whose **cells** are enclosed in shells.... A **photosynthetic** single-celled **organism** enclosed by a shell of silica.... A **microscopic** plant, which secretes a silica-rich shell, which nest inside each other like two Petri dishes.....The common name for the Bacillariophyceae, a **class** of **unicellular** microscopic **algae** with a symmetrical siliceous **exoskeleton**.... **Planktonic unicellular** or **colonial algae** with skeletons made of silica.

diatomaceous earth - See **diatomite**.

diatomite - A sediment formed from **diatoms** (unicellular algae with yellow chloroplasts). Also known as **diatomaceous earth**.

dichogamy - In a perfect flower, maturation of stamens and pistils occurs at different times, thus preventing self-pollination.

dichotomous - Branching by equal pairs.... Dividing into two equal branches.

dichotomous key - A key to the identification of animals and plants based on a series of decisions, each involving a choice between two alternate identification characteristics.... A classification key that usually has two choices or divisions at each step. Dichotomous keys are based on an "either-or" classification.... A method for determining the identity of an organism by going through a series of choices that leads the user to the correct

name of the organism.

dicot (= dicotyledon) - Flowering plants whose embryos have two **cotyledons** (seed leaves)....A member of a subclass of **angiosperms** characterized by having two **cotyledons** in their seeds....A flowering plant with two embryonic seed leaves or **cotyledons** that usually appear at germination.... An **angiosperm** that is not a **monocot** or monocotyledon, having two cotyledons in the seed. (See: **monocot, cotyledon**)

dicotyledonous - Referring to a **dicot** or **dicotyledon**.

dieback - The deep **population crash** when an **environment** can no longer support a **population's** demands. Usually leads to die-off (**extinction**). ...Progressive death of shoots, leaves, or roots of plants, beginning at the tips. (See: **crash**)

differentiation - In **botany**, the process whereby **parenchyma cells** undergo **morphological** and **physiological** change to become specialized in function.

diffuse competition - The cumulative effect of slight **competition** by many **species** on a single **species**.... The cumulative effect of competitive **selection pressures** imposed by other **species**. Many different **species** can each exert a small but not insignificant competitive **selection pressure** on any given **species**. (See: **selection pressure, competition**)

diffuse root system - See **fibrous root system**.

dimorphic - Of or relating to **dimorphism**. Having two forms, as when the male and female of a species have different plumages or sizes.... Producing two morphologically different forms.

dimorphism - Existing in two forms, two color forms, two sexes, and the like.... Having two forms within an individual (such as a summer and winter coat color) or individuals of the same species (such as male plumage and female plumage); **sexual dimorphism** refers to differences in the male and female while at the same stage of development. The different plumages of male and female Andean Cock-of-the-Rock (*Rupicola peruviana*) is an example of sexual dimorphism. The Short-tailed Hawk (*Buteo brachyurus*) is an example of a species exhibiting two color forms. Both plants and animals can exhibit dimorphism. (See: **dimorphic, discrete polymorphism, sexual dimorphism, polymorphic, morph**)

dinoflagellate - Any of numerous minute, chiefly **marine protozoans** of the order Dinoflagellata, characteristically having two **flagella** and a **cellulose** covering and forming one of the chief constituents of **plankton**. They include **bioluminescent** forms and forms that produce **red tide**.... Since dinoflagellates have characteristics of both plants and animals, their **classification** is controversial...**Photosynthetic organisms** of the order Dinoflagellida (for botanists Dinophyceae). They are **aquatic** and have two **flagella** lying in grooves in an often elaborately sculptured shell or pellicle that is formed

from plates of **cellulose** deposited in **membrane** vesicles. The pellicle gives some dinoflagellates very bizarre shapes. Their **chromosomes** lack centromeres and may have little or no **protein** and may perhaps be intermediate between **prokaryote** and **eukaryote** types, hence the group has been termed mesokaryotic. The **nuclear membrane** persists during **mitosis**. They are very abundant in **marine plankton**. *Gymnodinium* and *Gonyaulax*, that causes **red tide**, produce toxins that if accumulated by filter feeding **mollusks** can be fatal. Another common genus is *Peridinium*. Food reserve is stored in the form of starch like **carbohydrates** and oils. A non-contractile vacuole called a pustule is present near the flagellar base. It may have one or more vesicles. The pustule may take part in floatation and osmoregulation. Contractile vacuoles are absent. ... A **protist** that has characteristics of both plants and animals (See: **red tide**)

dioecious - **Species** in which sexes are always separate. The opposite of **hermaphroditic** and **monoecious**..... **Organisms** which have separate sexes where some of the individuals can produce only female **gametes** and others only male **gametes** ... Term applied to plant **species** having separate male and female plants. In **botany**, having male and female sex organs on separate individuals. ... Plants with either male or female flowers, but not both. ... Having staminate (male) flowers and pistillate (female) flowers on different plants of the same **species**... The opposite of **monoecious**.

diploid - In **biology**, a **cell** containing two sets of **chromosomes**... Having two similar complements of **chromosomes**... An **organism** or **cell** having double the basic **haploid** number of **chromosomes**..... Having two sets of **chromosomes**. (See: **haploid**, **chromosome**)

directional selection - A process of natural selection that tends to favor **phenotypes** at one extreme of the phenotypic range. (See: **natural selection**, **disruptive selection**)

disbudder - A synthetic chemical causing the shedding of immature **flower** buds.

discharge - In its simplest concept discharge means outflow; therefore, the use of this term is not restricted as to course or location, and it can be applied to describe the flow of water from a **drainage basin** or a pipe. If the discharge occurs in some course or channel, it is correct to speak of the discharge of a canal or of a river. It is also correct to speak of the discharge of a canal or **stream** into a lake, a **stream**, or an ocean. Most simply, it is the volume of water that passes a given location within a given period of time. It can be expressed in cubic feet per second or cubic meters per second.

disclimax - In monoclinal theory, a distinctive type of **climax community** which retains its character only under continuous or intermittent disturbance such as heavy grazing or periodic burning.... A relatively stable ecological community often including kinds of organisms foreign to the region and replacing the climax because of disturbance.

discontinuous variation - Occurs when the **phenotypes** of traits controlled by a single **gene** can be sorted into two distinct **phenotypic** classes.

discrete polymorphism - The situation where individuals of a **species** (of same age and sex) can occur in two or more different forms in the same place at the same time, with no intermediates between them (examples: Crested Eagle, Short-tailed Hawk, Hook-billed Kite, Collared Forest-Falcon). These differently colored forms are called **color morphs**. (See: **dimorphism, sexual dimorphism, polymorphic, morph**)

disguise - The method an animal uses to imitate a part of its **environment**.

disjunct distribution - The distribution of a **species** whose **populations** have been **geographically** divided...Refers to a fragmented **distribution** area with two or more **geographically** separated **ranges**.

disk flower - A small, five-petaled flower found in the center, or disk, of a larger, composite flower such as the sunflower or other members of the **family** Compositae. A small, tubular **flower** at the center of a composite **flower** head. (See: **ray flower**)

dispersal - The movement of individuals to new locations, such as when offspring make a home away from their parents....The spread, on any time scale, of plants or animals from any point of origin or from one place to another (**migration**)...The scattering of **organisms** of a **species**, often following a major reproductive event. **Spores** and **larvae** are commonly dispersed into the **environment**. **Pollen** or **gametes** may also be dispersed, but in this case the intent is to target another individual so that **reproduction** may occur. **Organisms** may disperse as **spores**, seeds, eggs, **larvae**, or adults.... the movement of a young bird from the site where it hatches to the site where it breeds (juvenile dispersal); the year-to-year movement of an adult bird from one nest site to another (breeding dispersal).... The transport of **propagules** beyond the limits of a **species'** **distribution** area... The transport of **propagules** away from the parent.

dispersion - The pattern or **distribution** of **organisms** in space...The movement of **organisms** in space from a point...The movement of **organisms** in time...A condition following such acts. (See: **dispersal**)

disruptive coloration - Coloration designed to disrupt the outline of an animal so as to protect it from **predators**....A type of **camouflage**....An example of a bird exhibiting disruptive coloration would be Collared Plover, *Charadrius collaris*. (See: **cryptic coloration, camouflage, mimicry**)

disruptive selection - A process of **natural selection** that favors individuals at both extremes of a **phenotypic** range. (See: **natural selection, directional selection**)

dissection - In **geology**, the cutting down of valleys by **river erosion**. Thus, a dissected plateau is a level surface which has been deeply cut into by **rivers**, leaving a close network of valleys with hills in between.

dissemination - In botany, the spread of infectious material (inoculum) from diseased to healthy plants.

dissolve - To pass into **solution**. (See: **solution**)

dissolved organic matter (DOM) - Decomposing carbon **compounds** in water. Can be natural or artificial.

dissolved solids - In **hydrology**, the amount of minerals, such as **salt**, that are **dissolved** in water; amount of **dissolved** solids is an indicator of **salinity**.

distal - Furthest from point of attachment.

tributary - A branching **stream** channel that flows away from a main **stream** channel. (See: **tributary**)

distribution - The **geographic** range of a **taxon**... The complex of factors (those of the **atmosphere**, **hydrosphere**, **lithosphere**, and **biosphere**) that act upon an **organism** or **population** and ultimately determine its form and survival. ... The spatial **range** of a species in an **ecosystem**. (See: **allopatric**, **circumboreal**, **circumpolar**, **cosmopolitan**, **disjunct**, **pantropical**, **relict**, and **sympatric**)

disturbance - Any relatively discrete event in time that disrupts **ecosystem**, **community**, or **population** structure and changes resources, **substrate** availability, or the physical **environment**.

diurnal - Occurring or active during the daytime rather than at night. The opposite of **nocturnal**....Active during the day.... Performed in twenty-four hours, such as the diurnal rotation of the Earth.

diurnal tide - A tide that comes in once a day.

divergence - Where deep water surfaces and spreads out.

divergent boundary - A boundary between **tectonic plates** that are moving away from each other, or pulling apart.

divergent evolution The divergence of a single **interbreeding population** or **species** into two or more descendant **species**.... When two **populations** become more and more dissimilar, usually as a result of different **environmental** pressures. The opposite of **convergent evolution**.

diversity - The variety of plant and animal **taxa**, including **genes**, **amino acids**, flowers, **species**, or **populations**....The variety of plant and animal **communities**, forest types, stand conditions, age classes, and **landscape** components. ... The total number of **species** present...Some index which incorporates both the number of **species** and the relative abundance of each. ... The **distribution** and abundance of different plant and animal **population** and **species** within the area covered by a land and **resource** management

plan. ...The relative degree of abundance of wildlife **species**, plant **species**, **population**, **populations**, or **population** features per unit of area. ...The total **range** in kinds and numbers of **species** potentially related in a defined area. ...A numerical index which incorporates the total number of **species** in a **biotic population** and some rating of the relative importance (numbers, **biomass**, **productivity**, etc.) of individual **species**. (See: **biodiversity**, **biological diversity**).

division - In **botany**, a **taxonomic** unit of plants corresponding to a **phylum**. (See: **phylum**, **taxon**, **taxonomy**, **classification**),

DNA (Deoxyribonucleic Acid) - The substance of which **genes** are made; the carrier of **genetic** information in **cells**...A nucleic acid **molecule** in the form of a twisted double strand (double helix) that is the major component of **chromosomes** and carries **genetic** information...Deoxyribonucleic acid, the primary component of **chromosomes**. It is shaped like a ladder. The side rails are a chain of sugar and phosphate **molecules** and the rungs are pairs of four nitrogenous bases: guanine, adenine, thymine, and cytosine. Twist the opposite ends of the ladder so that you get a full twist every 10 rungs and you have the double helix. It's double because of the two strands of sugar phosphate. A sequence of "rungs" forms a functional group called a **gene**... A form of nucleic acid organized into pairs of double-helix **molecules** packaged into **chromosomes** carrying the **genetic** code. The **molecules** are made of linked nucleotides: units with a sugar, a phosphate, and one of four base chemicals: adenine, thymine, guanine, and cytosine. These bases join like ladder rungs--always an A to a T and a C to a G--with the sugar-phosphate forming the outside "backbone" of the strand. The sequence of these nucleotides, with each group of three spelling one amino acid "codon," determines the kind of **protein** manufactured when translated by strands of RNA. (James Watson and Francis Crick discovered this structure in 1953.) RNA also aids in DNA's replication. Everything living carries the same gene code, one reason scientists are so confident we are all related biologically. Some DNA sequences are identical in humans and bacteria, a fact that underlines our common biological origins. (See: **gene**, **chromosome**)

doldrums - Region near the equator characterized by low pressure and light shifting winds. (See: **wind**)

Dollo's Law - **Evolution** never reverses itself.

domatium (plural: domatia) A part of a plant that has been modified to provide protection for insects or mites or fungi. This can be a part of a leaf, a hollow stem (as for *Pseudomyrmex* ants in trees of the genus *Triplaris*), or a specialized pouch or thorn (as for *Pseudomyrmex* ants in some trees of the genus *Acacia*)....Small structure on the lower surface of a leaf in some woody **dicotyledons**, located in the axils of the primary veins and usually consisting of depressions partly enclosed by leaf tissue or hairs. (See: **myrmecophyte**, **Beltian bodies**, **Müllerian bodies**, **extrafloral nectary**, **nectary**)

dominant - In **ecology**, of, relating to, or being a species that is most characteristic of an **ecological community** and usually determines the presence, abundance, and type of

other **species**... Referring to a **species** that has the greatest effect within its **ecological community**, especially by determining the presence, abundance, or type of other **species**. As a plant **community** progresses through stages of succession, different species may become dominant for a period until the **climax community** is reached, at which point the dominant **species** remains stable until a major disruption occurs. Among animals, the dominant **species** in a **community** is generally the top **predator** or the most abundant or widespread **species**....That component of a **community**, typically a **species**, which exerts the greatest influence on its character because of its life-form and/or great abundance. ...In **botany**, generally, an individual or **species** of the upper layer of the **canopy**. ... A dominant plant typically receives the greatest amount of sunlight in a **population**. It is usually the most visually conspicuous plant but other characteristics or traits may make "greatest influence" the meaning.... The most numerous or weighty **species** in a **community**.

In **genetics**, relating to the form of a **gene** that expresses a trait, such as hair color, in an individual **organism**. The dominant form of a **gene** overpowers the counterpart, or recessive, form located on the other of a pair of **chromosomes**....A single **gene** whose characteristics are expressed in an individual in whom that gene is present.... Any trait that is expressed in the heterozygous condition.... An **allele/gene** that determines the characteristics in the **organism** (dominant over the recessive **allele**).

In **ethology**, the individual in any association that is highest in rank and exercises the most influence or control. (See: **dominant species, dominant gene, dominant trait, subordinate**)

dominant species - The most abundant **species** in a plant **community** and the one most impacted by the **environment**. (See: **dominant**)

dominant gene - Genes are either dominant or recessive. A dominant gene's characteristics will predominate when paired with a **recessive gene**. For a **recessive gene** to show, it must be paired with another recessive gene. (See: **dominant trait**)

dominant trait - A characteristic determined by a **gene** masking the expression of a comparable, but **recessive gene**....A trait or condition that is expressed in individuals who have a single version of a particular **gene**. (See: **dominant gene**)

dormancy - A state of reduced **cellular** activity....A period of suspended growth and metabolic activity. Many plants, seeds, **spores**, and some **invertebrates** become dormant during unfavorable conditions.... A period of summer or winter **metabolic** slowdown in animals, plants, or seeds that need to conserve energy in inhospitable seasons....Non-growing condition of a plant, caused by internal factors (as in endodormancy) or environmental factors (as in ectodormancy). (See: **aestivation, aestivate, dormant, hibernate, hibernation, torpid, torpor**)

dormant - In biology, in a state of minimal metabolic activity with cessation of growth, either as a reaction to adverse conditions or as part of an **organism's** normal annual rhythm....temporarily inactive.... A period of inactivity or biological rest; in living **organisms**, little or no growth occurs during this time and some biological functions be

suspended.... In a state of reduced **cellular** activity.... In a condition of biological rest or suspended animation. (See: **aestivation, aestivate, dormancy, hibernate, hibernation, torpid, torpor**)

dormant seedling - Seedlings that have ceased visible growth due to high or low **temperature**, moisture, or other causes.

dorsal - Upper.

dorsolateral - Extending from the back to the side of an **organism**.

dorsum - The upper side of an **organism**, or the side that contains the spine if a **vertebrate**.

down - In birds, soft feathers found close to the skin; some hatchlings are born with down feathers and some birds, such as waterbirds, may keep down feathers throughout their life...In plants, the soft fuzz covering the skin of some fruits.

downburst - A severe localized downward gust of air that can be experienced beneath a severe thunderstorm.

downdraft - A strong downward current of air. **Cumulonimbus** clouds or **thunderheads** produce cool downdrafts that can be felt as a thunderstorm approaches.

downslope winds- typically warm and dry, occur in many parts of the world where mountains stand in the path of strong air currents. Dry air descending in elevation warms to a higher temperature than air at the surface. In the European Alps they are known as the *foehn*. The *foehn* has other names in other places: *zonda* in Argentina, *halny wiatr* in Poland, *koembang* in Java, and Santa Ana in California. In the Rocky Mountains, where warm, dry downslope winds can melt a foot of snow in less than a hour, they are called the Chinook - after Native Americans of the Pacific northwest, where the winds originate.

downwelling - The process of accumulation and sinking of warm surface waters along a coastline. A change of air flow of the atmosphere can result in the sinking or downwelling of warm surface water. The resulting reduced nutrient supply near the surface affects the ocean productivity and meteorological conditions of the coastal regions in the downwelling area.

downy plumage - Refers to the **plumage** of a chick upon hatching. May be thick and soft as in ducklings, or very sparse or absent as in the **nestlings** of many **passerine species**. Downy **plumage** is followed by the development of feathers.

dragline - A thread of **silk** attached to an object that a spider will trail behind it as it moves around.

drainage basin - A region of land where water from rain or snowmelt drains downhill into a body of water, such as a river, lake, **estuary**, or ocean. It includes both the **streams** and rivers that convey the water as well as the land surfaces that feed those channels. The combined **streams** and rivers that drain the area are collectively the drainage system. Drainage basins are separated from one another by peaks, ridges, or other **topographically** high points on the landscape. ...The **topographic** region from which a **stream** receives runoff, throughflow, and groundwater flow. The area of land that drains water, sediment, and dissolved materials to a common outlet at some point along a **stream** channel... The area from which water is carried off by a drainage system, a **watershed**, or a **catchment basin** or **catchment area**...land area where precipitation runs off into **streams**, rivers, lakes, and reservoirs. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. Large drainage basins, like the area that drains into the Amazon River contain thousands of smaller drainage basins....Also known as a **watershed** or **river basin**.

drawdown - Dropping water levels in a dam or **reservoir**. Also, the overuse of resources faster than they can be replaced.

dri-ki - Dri-ki is short for dry kindling, a term loggers coined to refer to the scraps of wood left behind after harvesting a forest. It is sometimes also used for the standing dead trees in a flooded area.

driftwood - Wood that is floating or that has been washed ashore... Wood that has been washed onto a shore or beach of a sea or river by the action of winds, tides, waves.

drip tip - A pointed **leaf** tip helping to drain water from the **leaf** surface....The sharply pointed tip of a typical **tropical** leaf, named for its tendency to drip rainwater.

drip zone - The area of soil around a **tree** occupied by root tips and into which water drips from the **leaf canopy**.

drone - A male bee, resulting from an unfertilized egg; a drone's role in the **colony** is to mate with the queen.

drop - In botany, the dropping of unpollinated flowers and young fruits.

drought - An extended period with little or no **precipitation**.

drought-resistant - Able to withstand prolonged periods of dryness. **Deserts** are typically populated with drought-resistant plants.

drumlin - Small, oval, hummocky hill formed from the detritus of a retreating glacier.... A smooth, glacially streamlined hill that is elongate in the direction of ice movement. Drumlins are generally composed of till.... A smooth hill formed from deposits of glacial till; the long axis parallels the direction of flow of the former glacier.... A streamlined

hill or mound formed by a moving **glacier**, with the "tail" in the direction of ice-flow.... A long, spoon-shaped hill that develops when pressure from an overriding **glacier** reshapes a **moraine**. Drumlins range in height from 5 to 50 meters and in length from 400 to 2000 meters. They slope down in the direction of the ice flow.... An elongated hill of **glacial till** or drift whose narrow end points toward the retreating **glacier**.

drupe - A simple, usually one seeded, fleshy fruit with the outer pericarp fleshy and the endocarp bony, a stone fruit..... A type of fruit with a fleshy outer layer and a hard, nutlike core, such as peaches or cherries...A fleshy fruit with a stone-like pit.... A pulpy or fleshy fruit containing a single stone or pit.... A fleshy fruit with a single seed. Cherries, peaches, and plums are all drupes.

dry forest - A forest of short-stature trees that tend to drop their leaves during the dry season. (See: **tropical deciduous forest, tropical dry forest, sclerophyll forest, thorn forest**)

drylands - Drylands, or dryland **ecosystems**, are characterized by a lack of water. They include cultivated lands, **dry forest, scrublands, shrublands, grasslands, savannas**, semi-deserts and true deserts. They are more specifically defined as land areas where the mean annual **precipitation** is less than two thirds of potential **evapotranspiration**, excluding polar regions and some high mountain areas which meet this criterion but have completely different **ecological** characteristics. Four dryland subtypes are widely recognized: dry sub-humid, semiarid, arid, and hyper-arid, showing an increasing level of aridity or moisture deficit. Drylands cover about 41% of Earth's land surface.

duet - A musical composition of or for two performers....Two performers or singers who perform together. Many **tropical** birds, especially in the wren family, duet, such as Moustached, Buff-breasted and Thrush-like Wrens, and Black-capped Donacobius. (See: duetting, **antiphonal singing, chorusing, counter-singing, vocal dueling**)

duetting - Two performers or singers performing together. (See: **duet, antiphonal singing, chorusing, counter-singing, vocal dueling**)

duff - **Forest litter** and other **organic** debris in various stages of **decomposition** on top of the mineral soil, typical of **conifer** forests in cool climates where rate of **decomposition** is slow and **forest litter** accumulation exceeds decay... . **Decomposition** products of litter lying on mineral soil, in which the identity of the original **tissue** can no longer be discerned. A product of litter decay.A general term for vegetal matter including fresh litter and well decomposed **organic** material and **humus** lying on mineral soil in a forest.

dune - A ridge of sand created by the wind; found in **deserts** or near lakes and oceans. Along with **estuaries** they prevent coastal flooding and **erosion**.

dusk - The time of day immediately following sunset.

dust devil - A small **atmospheric** vortex not associated with a **thunderstorm**, which is made visible by a rotating cloud of dust or debris (dust whirl). Dust devils form in response to surface heating during fair, hot weather; they are most frequent in arid or semi-arid regions.

dust dome - Brown or gray dome of air particles and **pollutants** trapped by an urban heat island above a city.

dweller - An **organism** that exists in a given place. Example: Red Howler Monkey is a forest **canopy** dweller.

dyke - Vertical vein of **igneous** rock formed by magma cooling in breaks and fractures.

dynamic - Characterized by continuous change, activity, or progress.

dynamic metamorphism - Metamorphism that changes a rock's shape without changing it chemically. Sometimes associated with mountain-building.

dysentery - An infection of the intestines marked by severe diarrhea... A disease characterized by inflammation of the intestines, especially the colon, accompanied by pain in the abdomen, severe diarrhea and often with blood in the feces.

dystrophic - Pertaining to lakes with brown water, high **humic** material and **organic** matter content, low **nutrient** availability, poor bottom **fauna**, and high oxygen demand; oxygen is continually depleted and **pH** is low. In lake aging, the "age" between a **eutrophic** lake and a **swamp**. ... Refers to **habitats** which are both low in basic **nutrients** and toxic... Term used to denote high concentrations of **humic** acid in water. It generally refers to **bog** ponds with **peat**-filled margins which eventually develop into **peat bogs**. ... **Toxic habitats** deficient in **nutrients**. (See: **oligotrophic**, **eutrophic**, **mesotrophic**)

Earth capital - The **natural resources** and processes that sustain life on Earth.

earthquake - The shaking of the ground that occurs when **tectonic plates** shift and change positions... Shaking and vibration at the surface of the Earth resulting from underground movement along a **fault** plane or from **volcanic** activity. It is the result of a sudden release of energy in the Earth's **crust** that creates **seismic waves**. At the Earth's surface, earthquakes manifest themselves by shaking and sometimes displacing the ground. When a large earthquake **epicenter** is located offshore, the seabed sometimes suffers sufficient displacement to cause a **tsunami**. (See: **fault**, **fault line**, **fault zone**, **tectonic plate**, **seismic wave**)

Earthshine - Sunlight reflected from Earth and illuminating the dark side of the Moon.

Easterly wave - A migratory wave-like **atmospheric** disturbance in the **tropical** easterlies. Easterly waves occasionally intensify into **tropical cyclones**. They are also

called **tropical** waves.

ecesis - The process whereby a plant establishes itself in a new area, from **germination** or its equivalent (*e.g.*, the rooting of some detached portion) to reproduction, whether sexual or vegetative. Synonym of **colonization**. (See: **ecological succession, primary succession**)

echinulated - In botany, having spines or other sharp projections.

echolocation - The sonar-like ability used by bats, dolphins, and other animals to detect objects. Using echolocation, the animal emits high-pitched sounds that reflect off of an object and return to the ears or other sensory receptors.... The process of finding an object by emitting high frequency sound vibrations and analyzing the reflected vibrations that bounce off the object..... The detection of an object by means of reflected sound. The animal emits a sound, usually at a very high frequency, which bounces off an object and returns as an echo. Interpreting the echo and the time taken for it to return allows the animal to determine the position, distance, and size of the object, and so helps it to orientate, navigate, and find food.

eclipse - The partial or total apparent darkening of the sun when the moon comes between the sun and the Earth (solar eclipse), or the darkening of the moon when the full moon is in the Earth's shadow (lunar eclipse).

eclipse plumage - Eclipse **plumage**, typical of ducks but found in other birds as well, is dull, female-like **plumage** worn by the male for a month or more in summer after breeding. It “eclipses” his usual more colorful **plumage**.....Eclipse **plumage** is found most notably amongst ducks. It replaces the breeding plumage after the breeding season and appears at a time when the main flight feathers are molting.

ecobalance - See **ecological balance**.

ecocentric - Of or referring to **ecocentrism**.

ecocentrism - A viewpoint giving importance to **ecological** processes, living in tune with nature, an accent on **ecological balance**, recycling, and **conservation** of **natural resources**. (See: **ecologism, deep ecology, biophilia, environmentalism, Gaia hypothesis**).

ecocide - **Ecological** genocide; the total destruction of the natural **ecology** and **environment** to make way for humans and their desires. Typically, ecocide tends not to have legal recognition as an atrocity or crime.

ecojustice - See **ecological justice**.

ecoliteracy - See **ecological literacy**.

ecological - Referring to the study of interrelationships between individual **organisms**, and between **organisms** and their **environments**.

ecological balance - Interaction between the **environment** and the living beings to bring about a steady-state. In this sense, balance is not a point but a condition.

ecological community - The assemblage of **species** that makes up the **biota** of a **habitat** ...A human settlement that tries to minimize its adverse **environmental** impacts. (See: **community**)

ecological composition - The biological components of an **ecological** system, which are the foundation of **diversity** at the **genetic**, **species**, and **landscape** scales. **Genetic diversity** is the variation in inheritable characteristics within and among individual **organisms** and **species**. **Species diversity** is the number and different kinds of **species** present in a given area. Landscape **diversity** is the variety of plant **communities** (including their identity, **distribution**, juxtaposition, and seral stage) and **habitats** evaluated at the **landscape** scale.

ecological footprint - A measure of consumption, our ecological footprint is an amount of land area which represents our resource use. Ecological footprint analysis converts our use of materials and energy into **hectares** of land per person required to provide these resources. It is an illustrative indicator of individual or collective human impact which highlights concepts such as natural capital, carrying capacity and ecological limits..... The total area of productive land and water required on a continuous basis to produce the resources consumed, and to assimilate the wastes produced, by that **population**, wherever on Earth the land and water is located.... The amount of biologically productive space (land and sea) required to produce the **natural resources** consumed, measure in **hectares** (acres) often on per capita basis..... A resource accounting tool that can measure how much land and water area a person or a specific group, for example, an event, a business, a city or a country, requires to produce the resources it consumes and to absorb its waste. The footprint is measured in global **hectares** (gha). (See: **carbon footprint**)

ecological impact - The effect that a man-made or natural activity has on living **organisms** and their non-living (**abiotic**) **environment**.

ecological indicator - Also known as an **environmental indicator** - a characteristic of the **environment** that, when measured, quantifies magnitude of stress, **habitat** characteristics, degree of exposure to a **stressor**, or **ecological** response to exposure. The term is a collective term for response, exposure, **habitat**, and **stressor** indicators. A measurement, statistic or value that provides a proximate gauge or evidence of the state or condition of the **environment**. (See: **environmental indicator**, **habitat indicator**, **indicator species**, **bioindicator**, **indicator plant**).

ecological integrity - The cohesion and intactness of the **web of life** comprising the **ecological** system - unpredictable consequences may arise from human disturbance of the **ecological** integrity...An innate awareness of the total interdependence of living things

functioning as both a scientific and philosophical moderator as expressed in the phrases ‘thinking ecologically’ and an ‘**ecological** point of view’.

ecological justice - A principle that links social justice with **environmental** quality, that which is due to the **ecosystem**. The right of each component of an ecosystem to be free from human exploitation and to be free from destruction, discrimination, bias and **extinction**. A principle that deals with solidarity of creation that ensures sufficiency and **sustainability** avoiding disposal of poisonous, **toxic** or hazardous wastes like nuclear wastes that threaten the fundamental right to clean air, land, water and food.

ecological literacy - The ability to understand the natural systems that make life on earth possible. To be ecoliterate means understanding the principles of organization of ecological communities. Also known as ecoliteracy.

ecological niche - The **ecological** role of a **species** in a **community**; includes consideration of physiological tolerances as well as interactions, both positive and negative, with other **species**. Often referred to as simply “**niche**”. (See: **niche, competition or ecological competition, competitive exclusion, competitive exclusion principle, competitive release, resource partitioning, habitat partitioning, niche differentiation, niche expansion**)

ecological pyramid - A graphic representation of the **food chain** which indicates the large numbers of **producer organisms** (*i.e.*, green plants) at the base of the food chain, and the progressively decreasing numbers of **herbivores** (plant eaters) and **carnivores** (meat eaters) higher up in the **food chain**. The concept is that in most **food chains** the number of individuals decreases in each succeeding stage, with large numbers of animals occurring at the base and a few large ones at the top. ...Groups of **organisms** in nature often consist of many small **organisms** associated with a few larger **organisms**. This **distribution** of number and size has been compared to a pyramid with a broad base representative of numerous small **organisms** and the point of the pyramid representing a few largest **organisms**. (See: **food pyramid, food web, food chain, trophic level**)

ecological or ecosystem services - Valuable services provided for free by natural systems. Examples are water filtration, flood control, crop **pollination** and irrigation, climate control, air purification and oxygen to breathe. (See: **ecosystem services**)

ecological release - Ecological release occurs when a species expands its niche within its own habitat or into a new habitat where there is little competition for resources, often as the result of the removal of a predator or another competing species. It also occurs when a species is introduced to an environment other than its native habitat. In this new habitat it often lacks competitors or predators that kept it in check in its native habitat.

ecological resilience - See **resilience**

ecological stability - See **balance of nature**.

ecological succession - The gradual and orderly change in an ecosystem or community until stability is reached; usually follows a catastrophic change, such as abandonment of farmland, forest fire, or flood....The changes, over time, in the structure and function of an **ecosystem**. When no previous **vegetation** exists on a site, the process is called primary succession. When a site supported **vegetation** previously but was disturbed, the process is called secondary succession. ... The orderly sequence of **communities** that eventually lead to a **climax community**... The development of an **ecosystem** through a predictable series of **communities** until a final, stable **community** (the **climax community**) in balance with the regional climate is attained. In its original form, the theory implied that each **community** altered the **habitat** and prepared it for invasion by the next, succeeding **community**....An **ecological** process in which groups of fast growing **species** **colonize** a disturbed area, eventually to be replaced by groups of slower-growing **species** that are good competitors and that occupy the site indefinitely.... The replacement of one plant and/or animal **species** over time by another in progressive development toward **climax vegetation** ... The gradual supplanting of one **community** of plants by another, the sequence of **communities** being termed a **sere** and each **community** a **seral stage**. Succession is considered primary (by **pioneers**) on sites that have not previously borne **vegetation**, and is considered secondary after the whole or part of the original **vegetation** has been supplanted. Succession is considered allogenic when the causes of succession are external to and independent of the **community** (*e.g.* accretion of soil by wind or water, or a change of climate) and is considered autogenic when the developing **vegetation** is itself the cause of the succession. In autogenic succession, each stage or step forms the foundation for the next...Each wave of plants creates the right conditions for the next wave.... The orderly, likely sequential transition of an area through distinctively different stages of development.... The gradual process of change in an **ecosystem** brought about by the progressive replacement of one **community** by another in a definite order until a stable **community** *i.e.* **climax community** is established over a period of time.... The gradual replacement of one **community** of plants by another, the sequence of **communities** being termed a **sere** and each **community** a **seral (successional)** stage. A **sere** whose first stage is open water is termed a **hydrosere**, one whose first stage is dry ground is a **xerosere**....Any series of vegetational **communities** following one another in an area, repeating themselves under similar conditions (**habitat** or **environment**) and clearly due in each case to the same or a similar set of causes....The process of replacement of one plant **species** by another. (See: **community succession, primary succession, secondary succession, sere, seral stage, seral, ecesis**)

allogenic succession - The kind of **succession** in which one kind of plant **community** replaces another because of a change in the **environment** which was external to and independent of that produced by the plants themselves. *e.g.*, decrease in soil moisture by improved drainage. See **autogenic succession**.

autogenic succession - A **sere** in which the replacement of one plant **community** by another results chiefly from the transformation of the site by the plants themselves. Antonym of **allogenic succession**.

primary succession - Succession beginning from newly formed soils or upon surfaces exposed for the first time (as by land slides or lava) which have as a consequence never borne **vegetation** or animals.... The sequential process of change from one type of plant **community** to another, often more complex **community** in a place that has never before been occupied by living **organisms**.... Plant **succession** on newly formed soils or upon surfaces exposed for the first time, which have never borne **vegetation**. Primary succession is autogenic, or internally controlled by the developing **vegetation**. ...The **community** formation process that begins on **substrates** that had never before supported any **vegetation**. Colonization is by pioneers. (See: **ecesis**)

secondary succession - Any succession caused by a human agency following the destruction of part or all of the **vegetation** in an area. ... The change over time of a sequence of **communities** reclaiming land after natural **vegetation** has been disrupted, such as by fire, farming, or development.... Plant **succession** which is subsequent to the destruction of part or all of the original **vegetation** on a site. An **allogenic succession**....All non-phenomenological **vegetation** changes that occur in already established **ecosystems**; originates only from a partial disturbance of an **ecosystem**.

ecologically sustainable development - A variant of the term **sustainable development**, emphasizing the underlying importance of **ecological** integrity to human life. The **ecological** component cannot however be separated from the economic and social components. Ecologically sustainable development means using, conserving and enhancing the community's resources so that the ecological processes on which life depends, are maintained, and the total quality of life, now and in the future, can be increased. (See: **sustainable development**)

ecologism - A green philosophy which emphasizes the need for deep social, economic, political and **environmental** reform in preparation for a post-industrial **sustainable** future - in comparison to **environmentalism**, which involves reform within the boundaries of the current sociopolitical system. Ecologism has similar viewpoints to **deep ecology**, including recognitions of an **ecocentric** perspective, **biophilia**, limits to growth, and the radical restructuring of existing institutions and ideologies. (See: **deep ecology**, **ecocentrism**, **biophilia**, **environmentalism**, **Gaia hypothesis**).

ecologist - One who studies **ecology**.

ecology - The study of **ecosystems**. ... The study of **organisms** and how they interact in an **ecosystem**...The study of the interrelationships between plants and animals and their physical **environment**, and how these **organisms** adapt to their **environment**. ...The relationship of living things to one another and their **environment**, or the study of such relationships....The study of interrelationships between individual **organisms**, and between **organisms** and their **environments**.... The science that studies the relationships between **organisms** and their **environment**...The study of the structure and function of nature.... The study of the interactions and interrelationships between **organisms** and

their **environments**. . . . A branch of science dealing with the relationships of **organisms** and their cycles and rhythms, **community** development, and **environments** -- especially as manifested by natural structure, interaction between different kinds of **organisms**, **geographic**, **environmental**, and **population** alterations. . . . The study of the relation of **organisms** or groups of **organisms** to their **distribution**. . . . The study of the relations among living **organisms** and their **distribution**. . . . The scientific discipline that is concerned with the relationships between **organisms** and their past, present, and future **environmental**. These relationships include **physiological** responses of individuals, structure and dynamics of **species**, interactions among **species**, organization of biological **communities**, and processing of energy and matter in **organisms**. . . . The scientific study of the distribution and abundance of living **organisms** and how the distribution and abundance are affected by interactions between the organisms and their environment. . . . The study of how living things interact with each other and their non-living **environment**; from the Greek "oiko," meaning "home," and "logos, meaning "knowledge." . . . The three basic laws of ecology are:

- 1) The Law of Diversity. The strength and health of an ecosystem depends on the diversity within it. Weaken the diversity, as we are doing now with the steady loss of species, and the entire system will be weakened and will eventually collapse.
- 2) The Law of Interdependence. All of the species within an ecosystem are interdependent and interconnected. We need each other to survive.
- 3) The Law of Finite Resources. There is a limit to growth because there is a limit to carrying capacity. In the long run, you cannot have a society and economic system designed for infinite growth on a planet with finite resources. It is a plan designed to fail. Human populations and human resource use are currently exceeding ecological carrying capacity or sustainable limits by a considerable degree, diminishing both resources and diversity of species, and this cannot and will not continue indefinitely. (See: **Commoner's Four Laws of Ecology**, **Callenbach's Four Laws of Ecology**)

Another wording of the laws of ecology. . . .

- Everything is connected to everything else.
- Everything has to go somewhere or there is no such place as away.
- Everything is always changing.
- There is no such thing as a free lunch.
- Everything has limits.

ecomigration - **Migration** forced by **environmental** conditions, often applied to the movement of human **populations**.

ecoregion - A **geographically** distinct area of land that is characterized by a distinctive climate, **ecological** features, and plant and animal **communities**. . . . A relatively large area of land or water that contains a **geographically** distinct assemblage of natural communities. . . . A restricted **geographic** area (scale usually in hundreds of kilometers) with particular weather patterns, **ocean currents** and depths, drainage, and **population** of plants and animals. . . . A relatively large area of land or water with a distinct climate, **environment**, and assemblage of natural **communities**. Similar to **biome**.

ecosphere - The **biosphere** is an ecosphere, meaning the existence of various types of **habitats** and **biomes**. Indicates the living relationship between all of Earth's living beings with the physical **environment**. Ecosphere = **biosphere**. (See **biosphere**)

ecosystem - A community of living things and the environment in which they live... The complex of a community of **organisms** and its environment functioning as an ecological unit....An area that contains the biological (both living and non-living) and physical factors (such as soil, water, and sunlight) that it needs in order to be self-sustaining; an ecosystem may not have a definite boundary or size, that is, it can be as large as an ocean or as small as a rotting log, and may overlap another ecosystem; some examples of natural ecosystems are wetlands, streams, rivers, lakes, forest, woodlands, savannas, barrens, and glades... A functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow... A complex system of interaction between living **organisms** and their non-living environment... The interacting system of a biological **community** and its non-living environment... The interacting synergism of all living **organisms** in a particular environment; every plant, insect, aquatic animal, bird, or land **species** that forms a complex web of interdependency. ... A complex set of relationships of living **organisms** functioning as a unit and interacting with their physical environment... An **ecological community** together with its environment, functioning as a unit... A localized system made up of living **organisms** interacting with each other and their non-living **environment**... Any natural unit or entity including living and non-living parts that interact to produce a stable system through cyclic exchange of materials.

ecosystem engineer- **Organism** that significantly transforms its **environment**, a prototypical example being the dam-building beaver of North America.

ecosystem fragmentation - **Biodiversity** impacts of **ecosystem** fragmentation include disruption of **migration** and foraging routes, reduced **genetic** exchange, isolation of **ecological communities** and exposure to edge effects, weed invasions etc. Experimental studies reviewed by E. O. Wilson suggest that a tenfold decrease in land area will approximately halve the number of species present, although the specific area-species curve is dependent on the ease of dispersal of given **organisms**. As with **conservation of endangered species**, focus has been on the effects of small size on **population** persistence, and must address the causes of such reductions in size and connectivity. These causes include expansion of human-dominated **ecosystems**, creation of edges (*e.g.* roads), creation of barriers (*e.g.* dams), land clearing, **monoculture**, hunting/harvesting, removal of **food web** species, separation of **mutualistic organisms**, **habitat competition** from **introduced species**, introduced **predators**, and other **ecosystem** disruption and destruction. (See: **habitat fragmentation, edge effect, buffer zone, wildlife corridor**)

ecosystem functions - Refers to actions and, how things work in the **ecosystem**. In the case of ecosystem functions we look at **photosynthesis**, **nutrient** cycling, **population** control, **dispersal** mechanisms, temporal patterns of flowering (**phenology**), breeding,

dormancy, and so forth.

ecosystem services - Ecosystem services are valuable services provided for free by natural systems. Examples are water filtration, **flood** control, crop **pollination** and irrigation, climate control, air purification and oxygen to breathe.

....Services provided for free by the Earth's natural systems, such as water filtration, crop **pollination** and irrigation, and oxygen to breathe....Contributions of the **ecosystems**, generally taken for granted and assumed to be free, for instance clean air and water, natural filtering provided by wetlands etc. ...The quantifiable services that an **ecosystem** provides to humans, including consumables and non-consumables. Resource economists assign monetary values to these services to estimate the economic value of a healthy **ecosystem**.... Processes and functions provided by natural **ecosystems** that sustain life and are critical to human welfare.... Humankind benefits from a multitude of resources and processes that are supplied by natural **ecosystems**. Collectively, these benefits are known as **ecosystem** services and include products like clean drinking water and processes like the decomposition of wastes....Humans are ultimately dependent upon the functions and services of **ecological** systems. **Ecosystem** services are the supply and restoration processes essential to the functioning of the life. They may break down wastes (*e.g.* **biogeochemical cycles**), provide shelter, energy and oxygen (*e.g.* **forests**) or protect us in other ways (*e.g.* the **ozone layer**). Although usually taken for granted, these services are provided free by **ecosystems**, but end up costing heavily if damaged or destroyed. Essential **ecosystem** services are 'critical natural capital' which must be conserved to provide our global life-support system. (See: **ecological or ecosystem services**)

ecotonal - Referring to an **ecotone**.

ecotone - The boundary or transition zone between adjacent **ecological communities**...The transition zone between two adjoining **communities**.An edge **habitat**.....A **habitat** created by the juxtaposition of distinctly different **habitats**. 4) an **ecological** zone or boundary where two or more **ecosystems** meet.... A transition between two **population** or **vegetation** types. It is a junction zone narrower than the adjoining **population** areas themselves. The **ecotonal population** commonly contains many of the **organisms** of each of the overlapping **population** and, in addition, **organisms** that are characteristic of and often restricted to the ecotone. Often, both the number of **species** and the **population density** of some of the **species** are greater in the ecotone than in the **population** flanking it. **Organisms** which occur primarily or most abundantly or spend the greatest amount of time in contiguous **population** are often called "edge **species**," while the tendency for increased **species** richness and density at **population** junctions is known as the "**edge effect**."

ecotype - A **genetically** distinct **race** or subdivision of **species** adapted to local **population** and climate. These significantly different **genetic** groups are broader than a **biotype** and narrower than a **species**. Ecotypic variation must be considered before transferring information on impacts to a **species** in one region to the same **species** in another region because different ecotypes may respond differently to the same level of effect. A group of similar populations within one and the same plant species that are

adapted to certain climatic, edaphic, or cenotic conditions and that have developed, under these conditions, hereditary morphological, physiological, biochemical, and other features. A climatic ecotype is adapted to certain climatic conditions, an edaphic ecotype is adapted to certain soil conditions, *etc.* Thus, an ecotype is isolated with respect to distribution; genotypically it is an intraspecific subdivision, which distinguishes it from a biotype. (See: **edge zone**)

ecotourism - Environmentally responsible travel to natural areas, in order to enjoy and appreciate nature (and accompanying cultural features, both past and present) that promote **conservation**, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples.... Travel that focuses on avoiding harm to wilderness areas and wildlife and wherever possible, actively contributes to their preservation.... Travel to fragile, pristine, and usually protected areas that strives to be low impact and (usually) small scale. It **SHOULD** help educate the traveler; provide funds for **conservation**; directly benefit the economic development and political empowerment of local communities, and foster respect for different cultures and for human rights.

ecozone - A broad **geographic** area (scale usually in thousands of kilometers) in which there are distinctive climate patterns, ocean conditions, types of landscapes and **species** of plants and animals.

eco-terrorism - The use of fear and violence in the cause of **environmentalism** or to save **environments** facing destruction. Or more broadly, use of violence in either the activist protection or the commercial extraction of **ecological** resources. So-called eco-terrorist groups may conduct illegal activities, usually against property, but lives are also confronted and lost as a result of **ecocide**, inappropriate technologies, **habitat** destruction, threats to **biodiversity**.

ectoparasite - A **parasite** that lives on the exterior of its **host**. ... An organism that lives on the outside of its host, deriving nourishment at the host's expense; a tick is an example of an ectoparasite....A parasite living outside its host. (See: **endoparasite**)

ectosymbiont - Any **organism** that lives on the body surface of another **organism**, *i.e.* forming an **ectosymbiosis**.

ectosymbiosis - **Symbiosis** in which the **symbiont** lives on the body surface of the **host**, including internal surfaces such as the lining of the digestive tube and the ducts of glands.

ectosymbiotic - Of or referring to **ectosymbiosis**.

ectotherm - A **cold-blooded** animal. Sometimes referred to as an **exotherm** or **poikilotherm**. (See: **thermoregulation**, **homeothermic**, **endothermy**, **endotherm**, **exotherm**, **poikilotherm**, **warm-blooded**, **cold-blooded**)

ectothermic homeothermy - Sometimes called **gigantothermy**, ectothermic homeothermy is a phenomenon with significance in biology and paleontology, whereby large, bulky ectothermic animals are more easily able to maintain a constant, relatively high body temperature than smaller animals by virtue of their smaller surface area to volume ratio

ectothermy - This refers to creatures that control body temperature through external means such as the sun, or flowing air/water. Examples of temperature control include: Snakes and lizards sunning themselves on rocks, fish changing depths in the water column to find a suitable temperature, and desert animals burrowing beneath the sand during the day. (See: **thermoregulation, homeothermic, endotherm, ectotherm, exotherm, poikilotherm, warm-blooded, cold-blooded**)

edaphic - Of or pertaining to the soil.... Related to particular soil conditions...An adjective suggesting the soil complex or soil as a system. ...Influenced by soil factors..... Pertaining to the soil and particularly the influence of soil on **organisms**.

edaphic factor - A permanent or nearly permanent condition of the **substrate** that influences the types of plants that grow in an area. For example, **substrates** may be permanently or seasonally waterlogged, droughty, deficient in essential **nutrients**, extremely thin, and so forth.

eddy - A small, spinning air current that often develops when wind flows over buildings, mountains, or other obstructions

edge - That part of an **ecosystem** near the perimeter that is influenced by the **environment** of the adjacent **ecosystem** so that it differs in some characteristics from the center of the **ecosystem**.

edge effect - An effect exerted by adjoining communities on the population structure within the marginal zone. Generally used to suggest an increase in species richness....Refers to changes in **species** composition, **distribution** and/or abundance found in the edge relative to the interior....An edge effect is the effect of the juxtaposition of contrasting **environments** on an **ecosystem**. This term is commonly used in conjunction with the **boundary** between natural **habitats**, especially forests, and disturbed or developed land. Edge effects are especially pronounced in small **habitat fragments** where they may extend throughout the patch.

When an edge is created to any natural **ecosystem**, and the area outside the boundary is a disturbed or unnatural system, the natural **ecosystem** is seriously affected for some distance in from the edge. In the case of a forest where the adjacent land has been cut, creating an openland/forest boundary, sunlight and wind penetrate to a much greater extent, drying out the interior of the forest close to the edge and encouraging rampant growth of opportunistic **species** at the edge. Air **temperature**, vapor pressure deficit, soil moisture, light intensity and levels of **photosynthetically** active radiation all change at edges....**Ecological** impacts typically initiated along edges or by the boundaries between natural and interrupted systems. For example, a road through a **rainforest** will create an

edge which introduces light, **pests, weeds, pollution, erosion**, danger to **wildlife**, human access, and ultimately **habitat fragmentation** due to the altered **ecosystem** along that strip. (See: **habitat fragmentation, ecosystem fragmentation, buffer zones, wildlife corridors**)

edge species - **Species** that occur primarily, most abundantly or most of the time in the transition zones between two or more **habitats**, *i.e.*, in the **ecotone**.

edge zone - A transition area between forest and prairie, where any two or more habitat types meet. Between a forest and open grassland, for example, small trees, **shrubs**, and dense undergrowth characterize the edge zone. (See: **ecotone**)

efficiency - The amount of usable energy given off by an energy conversion compared to the total amount of energy used in the conversion.

eft - The terrestrial stage of a **newt's** life cycle. A **newt** is a type of salamander belonging to the **family** Salamandridae. Some **newts** begin life in the water, go through a **terrestrial** (eft) stage, then return to water as **aquatic** adults.

egg - A female sex **cell**.

egg sac - A **silk** covering woven by a female spider to wrap up her eggs, to protect them, and keep them from drying out.

El Niño - See **El Niño-Southern Oscillation Phenomenon (ENSOP)**.

El Niño-Southern Oscillation Phenomenon (ENSOP) - An extensive ocean warming that begins along the coast of Peru and Ecuador...A periodic (range of 2-7 year intervals), short-term **climate change** due to warmer currents (as high as 14° C. warmer) in the Pacific Ocean creating significant changes or reversals in **barometric pressures** in the Pacific and Indian Oceans (Southern Oscillation). Together these warmer currents and changed **barometric pressures** are referred to as ENSO (El Niño-Southern Oscillation). The effects of ENSO are global, producing heavy rainfall or snowfall in some areas while **drought** in other areas and therefore significantly affecting plant and animal life.... Refers to the warm **ocean current** that blows along the northern tropical coast of South America in its changing phase causing unseasonable changing weather patterns in the Americas and Pacific Region, including Australia. El Nino refers to "the child" of change as opposed to La Nina "the Child" of constancy. Great interest has been expressed in the phenomenon and whether its current greater frequency is linked to global warming and human increases in **atmospheric carbon dioxide**. One model postulates such a relationship in which trapped heat in the CO₂-rich **atmosphere** increases the temperature of the oceans, triggering cycles of **drought** and rain. The local effects of the El Nino current were known to the ancient people of Peru long before the arrival of the Spanish conquistadores... A warming of the surface waters of the eastern **equatorial** Pacific that occurs at irregular intervals of 2-7 years, usually lasting 1-2 years. Along the west coast of South America, southerly winds promote the upwelling of cold, nutrient-

rich water that sustains large fish **populations**, that sustain abundant sea birds, whose droppings support the fertilizer industry. Near the end of each calendar year, a warm current of **nutrient-pool tropical** water replaces the cold, **nutrient**-rich surface water. Because this condition often occurs around Christmas, it was named El Niño (Spanish for boy child, referring to the Christ child). In most years the warming lasts only a few weeks or a month, after which the weather patterns return to normal and fishing improves. However, when El Niño conditions last for many months, more extensive ocean warming occurs and economic results can be disastrous. El Niño has been linked to wetter, colder winters in the United States; drier, hotter summers in South America and Europe; and **drought** in Africa. ... Interacting parts of a single global system of **climate** fluctuations. ENSO is the most prominent known source of interannual variability in weather and **climate** around the world, though not all areas are affected. The Southern Oscillation (SO) is a global-scale seesaw in atmospheric pressure between Indonesia/North Australia, and the southeast Pacific. In major warm events El Niño warming extends over much of the tropical Pacific and becomes clearly linked to the SO pattern. Many of the countries most affected by ENSO events are developing countries with economies that are largely dependent upon their agricultural and fishery sectors as a major source of food supply, employment, and foreign exchange. New capabilities to predict the onset of ENSO event can have a global impact. While ENSO is a natural part of the Earth's climate, whether its intensity or frequency may change as a result of global warming is an important concern. (See: **Southern Oscillation Index, La Niña -Southern Oscillation Phenomenon, southern oscillation**).

electrolytes - Salts in bodily fluids; needed for the body to function....When salts are dissolved in water, they are called electrolytes, and are able to conduct electricity.

element - Elements are the building blocks of chemistry. Elements are the simplest components of **molecules** that can be produced by normal chemical means. The **nucleus** of every atom in an element has the same number of protons. Each chemical element contains different atoms to the other elements, and gives off an individual line spectrum. The Periodic Table arranges all of the elements according to their properties. The hundred or so elements combine to create thousands of **compounds** with the different physical properties that make up the world. ...An element more generally refers to any single component or constituent part of a group, object, system or procedure.

elevation - Distance or height of something above a reference point, such as sea level. Often used interchangeably with **altitude**.

elevational - Referring to **elevation**.

elevational gradient - As **altitude** increases, a gradient of cooler **temperatures** and drier conditions occurs. Going up in elevation on a mountain is **climatically** similar to moving upwards in **latitude** towards either the North or South Poles, The climate becomes colder as you go higher in elevation. This occurs because as you climb in elevation the air pressure diminishes. As the air pressure diminishes, the air expands, and as it expands, it cools. (According to Boyle's Law, a gas, like air, cools when it expands and heats up

when it is compressed.) The rate of change is approximately 10°C per km of elevation or altitude or 1° C. per 100 meters of elevation gain. Some sources give this rate as 3.08° C. per 305 meters (5.4 to 5.5° F. per 1000 feet) or as only 0.5° C temperature change for each 100 m change in elevation....Other sources give the rate as dropping 3° F. for every 1000 feet in elevation gain). Therefore, moving up 100 meters on a mountain is roughly equivalent to moving 80 kilometers (45 miles or 0.75° of **latitude**) towards the pole. This relationship is only approximate, however, since local factors such as proximity to oceans can drastically modify the **climate**. Also known as an **altitudinal gradient**. (See: **latitude, altitudinal zonation, elevational replacement**)

elevational replacement - Closely related species that replace one another at different elevations on a mountain slope. With birds, a good example is with Spectacled and Slate-throated Redstarts, *Myioborus melanocephalus* and *M. miniatus*, of the humid montane forests on the east slope of the Andes. Spectacled Redstart occurs at higher elevations, and replaced by Slate-throated Redstart at lower elevations. Also known as **altitudinal replacement**. (See: **elevational gradient, altitudinal zonation, geographic replacement**)

elfin forest - Low, dense, twisted forests near **treeline** or along ridgetops in **tropical** mountains are sometimes referred to as 'elfin forests'.

Eltonian Pyramid - See **food pyramid** and **ecological pyramid**.

elytra - A beetle's forewings. These two wings provide a protective covering for the beetle's delicate pair of flying wings underneath.

embryo - An **organism** in its early stages of development, especially before it has reached a distinctively recognizable form....An **organism** at any time before full development, birth, or hatching.....The fertilized **egg** of a **vertebrate** animal following cleavage....In **botany**, the minute, rudimentary plant contained within a seed or an **archegonium**....In general, a group of living **cells** resulting from an **egg** being fertilized; the early stages of fetal growth..... In **botany**, an immature plant within a seed.

embryology - The study of the origin, growth, development and function of an **organism** from fertilization to birth.

embryonic - In **biology**, of or referring to an **embryo**.

embryophyte - The embryophytes are the most familiar group of plants, including trees, flowers, **ferns**, **mosses**, and various others. All are complex multicellular **organisms** with specialized reproductive organs and, with very few exceptions, they obtain their energy through **photosynthesis**, *i.e.* by absorbing light, and synthesize food from **carbon dioxide**. They may be distinguished from multicellular **algae** by having sterile tissue within the reproductive organs. Further, embryophytes are primarily adapted for life on land, although some are secondarily **aquatic**. Accordingly they are often called land plants.

emergent - A **tree** whose height well exceeds that of the average **canopy** tree, and thus whose crown is conspicuous above the **canopy**.... An individual **tree** growing higher than all (or virtually all, if in a clump) others in its vicinity within a forest, so that its **crown** rises markedly above the adjacent **overstory** or **canopy**.... In **aquatic** plants, one whose upper stems and leaves extend above the water's surface.

emergent layer - The uppermost level in a **tropical rainforest**. The emergent layer contains a small number of very large **trees** which grow above the general **canopy**. On occasion a few **species** will grow to be 70 m or 80 m tall. Exposed as they tend to be, they need to be able to withstand the hot **temperatures** and dry wind.... The uppermost **rainforest** layer, made up of very tall trees that emerge from the forest below into the sunlight above.

empirical - Derived from observation, experience or experiment rather than from conjecture, hypothesis or theory. Empirical information is based on perception with the five senses rather than thinking and rationalism.

encyst - To enclose in a sac-like structure that is a part of the body; a cyst may be a resting or dormant stage in the life cycle of an **organism**, or a way to survive unfavorable conditions, or an abnormal structure containing fluids, gases, semisolids, or **parasites**.

endangered species - **Species** in danger of becoming **extinct** due to diminished **population**, impoverished **genetic diversity**, or limited **habitat**....A **species** threatened with **extinction**. The Giant Otter is an example of an endangered species. **Species** that are likely to become **extinct**. Animals, birds, fish, plants, or other living **organisms** threatened with **extinction** by man-made or natural changes in their **environment**. ... A legal classification given to a plant or animal in danger of **extinction** within the foreseeable future throughout all or a significant portion of its **range**.... A species which is at very high risk of becoming extinct in the wild in the near future. This may be indicated by any of the following measures: a) a previous or projected population reduction of at least 50% over whichever is longer of a period of 10 years or three generations, b) extent of occurrence less than 5000 km² or area of occupancy less than 500 km², along with population decline, fragmentation or extreme fluctuations, c) population less than 2500 mature individuals with continuing decline, d) population less than 250 mature individuals, or e) probability of extinction in the wild estimated at 20% over the longer of 20 years or five generations (See: **critically endangered, vulnerable species, threatened species, ghost species, extinction**)

endemic - A type or form that is unique, or restricted, to a place or region....Naturally occurring in only one area or region. ... Native to a particular region...Native to or peculiar to a locality or region. ..Restricted to a certain region or part of a region or locality...Native to and found exclusively in one region or **habitat** type. For example, the Black-faced Cotinga is endemic to the Department of Madre de Dios and immediately adjoining Brazil and Bolivia, the Andean Condor is endemic to the Andes, the Giant

Otter is endemic to northern South America, and the Mountain Lion is endemic to the Western Hemisphere.

endemic species - A **species** that is specific in its occurrence in a particular **geographical area**.

endemism - The percentage of **endemic species** that occur in a given **habitat type**.

endosymbiont - Any **organism** that lives within the body or **cells** of another **organism**, *i.e.* forming an **endosymbiosis**. Examples are nitrogen-fixing **bacteria** (called rhizobia) which live in root nodules on legume roots, single-celled **algae** inside reef-building **corals**, and bacterial endosymbionts that provide essential nutrients to about 10%–15% of insects.

endosymbiosis - The symbiotic relationship formed when an **organism** that lives within the body or **cells** of another **organism**. (See: **endosymbiont**)

endocrine system - The bodily system that consists of the endocrine glands and functions to regulate body activities.... The endocrine system comprises the glands (and certain **tissues**) that secrete **hormones**. **Glands** that manufacture and secrete **hormones** are called endocrine glands. The **hormones** they secrete are like ‘messengers’ that, when released into the blood, travel to distant **tissues** and organs to elicit specific functions necessary for the **organism**.

endodermis - In **botany**, a layer of **cells** in roots between the **cortex** and **vascular tissues**.

endogenous - Developing or originating within the organism, or arising from causes within the organism.

endoparasite - A **parasite** that lives within its **host**. ...A parasite living within its **host**. (See: **ectoparasite**)

endoskeleton - A skeleton produced within the flesh of an animal and typically remaining embedded there.

endosperm - Food-storage **tissue** in **seeds**.

endosymbiont - Any **organism** that lives within the body or **cells** of another **organism**, *i.e.* forming an **endosymbiosis**.

endosymbiosis - **Symbiosis** in which one partner lives within the other.

endosymbiotic - Of or referring to **endosymbiosis**.

endotherm - An animal that is able to maintain a constant body temperature despite changes in the temperature of its **environment**. ...A synonym for **warm-blooded**. (See: **thermoregulation, homeothermic, endothermy, ectotherm, exotherm, poikilotherm, warm-blooded, cold-blooded**)

endothermic - In biology, of or relating to an **endotherm** or **warm-blooded** animal.

endotoxin - A substance found in the **cell** walls of certain **bacteria** that can be extremely **toxic** to people, producing fever, shock, and even death.... A **bacterial toxin** composed of **protein, lipid**, and polysaccharides...Poison produced by some gram-negative **bacteria**, present in the **cellular membrane**, and released only upon **cell** rupture; composed of complex lipopolysaccharide (fat-like **molecule** and sugar **molecule**) and more heat-stable than **protein exotoxins**.

energy budget - A quantitative description of the energy exchange for a physical or **ecological system**. The budget includes terms for radiation, conduction, convection, latent heat, and for sources and **sinks** of energy.

energy conversion - The process in which energy changes from one form into another.

energy flow - The movement of energy around an **ecosystem** by **biotic** and **abiotic** means. **Ecological pyramids (food chains or food webs)** are where a sizable percentage of energy is held, where **organisms** in the chain supply an energy source to other **organisms** and so forth, to the top of the chain which then decomposes after death.

energy pyramid - A model that shows how energy moves through a **food chain**.

energy source - The origin of the light, heat, or electrical energy **organisms** use.

enhanced greenhouse effect - The natural **greenhouse effect** has been enhanced by **anthropogenic** emissions of **greenhouse gases**. Increased concentrations of **carbon dioxide, methane**, and **nitrous oxide, CFCs, HFCs, PFCs, SF6, NF3**, and other photochemically important gases caused by human activities such as **fossil fuel** consumption and adding waste to landfills, trap more **infra-red radiation**, thereby exerting a warming influence on the **climate**. (See: **greenhouse effect, climate change, global warming**)

enteric fermentation - **Fermentation** that takes place in the digestive systems of **ruminant** animals.

enterotoxin - An enterotoxin (not to be confused with **endotoxin**) is a **bacterial protein toxin** released in the intestine. Enterotoxins are frequently **cytotoxic** and kill **cells** by altering the permeability of the epithelial **cells** of the intestinal wall....A **bacterial protein** that, following release into the intestine, causes cramps, diarrhea and nausea. (See: **toxin**)

entire leaf - Having a smooth edge without being toothed or divided into lobes.

entomology - The scientific study of insects.

entomophilous - **Seed plants** which are pollinated by insects are said to be entomophilous.

entropy - The degree of disorder in a system. As energy is transferred from one form to another, some is lost as heat; as the energy decreases, the disorder in the system and thus the entropy increases. ... A measure of the disorder or randomness in a system.... A measure of the dispersal or degradation of energy. The **Second Law of Thermodynamics** states that entropy of a closed system always increases over time. This means that energy is being transformed by the mechanics of the universe into uniformly distributed heat energy. However, this is true only for large closed systems, and order can be maintained in an open system containing life. Living **organisms** preserve their internal order by taking from their surroundings free energy, in the form of **nutrients** or sunlight, and returning to their surroundings an equal amount of energy as heat and entropy. It is obvious that the entropy of the **biosphere** is decreasing continuously, at least it was before the industrial revolution and **deforestation**. This means that the matter involved in the formation of the **biosphere** is getting more and more organized or less random. (See: **Laws of Thermodynamics**)

environment - The place in which an **organism** lives, and the circumstances under which it lives. The environment includes measures like moisture and temperature, as much as it refers to the actual physical place where an **organism** is found...The sum of all external conditions and influences, living and non-living, that effect the development and, ultimately, the survival of an **organism** or group of **organisms**.....All the **biotic** and **abiotic** factors of a site (together termed locality factors = **environmental** factors, site factors)....The sum of all external conditions affecting the life, development and survival of an **organism** or group of **organisms**..... All the natural features of Earth, such as landforms and climate, that affect living things.... The totality of physical, chemical, and **biotic** conditions surrounding an **organism**.... An organism's surroundings; the environment includes such factors as temperature, amount of moisture, slope or gradient, sunlight, chemicals, and sounds; **organisms** have an internal environment too that includes such factors as **nutrients** and body temperature.... The complex of physical, chemical, and **biological** factors in which a living **organism** or **community** exists.

environmental - Of or referring to the **environment**.

environmental economics - The study of how economic activity impacts the **environment**, and of how economic mechanisms can be created that minimize harm to the **environment** while allowing maximum economic benefit.

environmental flows - Movements through compartments of the environment, a model or process. Environmental flows include abiotic solids (*e.g.* minerals, topsoil), biotic flows (*e.g.* harvest biomass), **ecological** flows (*e.g.* **migration**), **genetic** exchange (*e.g.*

crop **genetics**), water (surface water, **ocean currents**), air (**atmospheric** gases), biogeochemical cycles (*e.g.* carbon, **nitrogen cycles**), product cycles (extraction, production, transport) and **pollution** (waste, heat, radioactive materials etc).

environmental gradient - A gradual change in certain **environmental** conditions. Examples include **geographical** gradients of **climate**, soil or vegetation, or abundance/productivity gradients graphed against **climate** or soil type. Environmental gradients determine the optimal **range** and distribution of **species** with different requirements.

environmental health - Describes circumstances that ensure that living **organisms** (plants, animals and **microorganisms**) are provided with the best chance to reach and maintain their full **genetic** potential. For example, it is well known that children exposed to harmful agents; such as lead or alcohol, during critical periods in their development, are deprived from reaching their full **genetic** potential. Obviously the maintenance of overall environmental health is a balancing act between conflicting needs; however, since humans are now in charge of planetary health, we have an ethical duty to do or best in maintaining as fully as possible the **genetic** potential of all living things.

environmental impact - An **environmental** impact may be adverse, beneficial or a combination of these, although use of the term often connotes a negative impact. It may be sudden (*e.g.* land clearing), gradual (*e.g.* water utilization) or have delayed action (*e.g.* climate change). Impacts may create secondary or flow-on impacts, and may add or multiply in combination with other impacts. It may be an environmental impact on humans (*e.g.* natural hazards) or a human impact on the environment (mining, dams, **pollution**, etc). Usually refers to adverse impacts of human activities and developments on natural systems and **ecology**, or also on the broader **environment** including human society. Attempts have been made to estimate the total environmental impact of human activity on the Earth; for example,

- a) Total impact = PF (Population x impact per capita)
- b) Ecological impact = PCT (Population x Consumption/affluence x Technological efficiency)
- c) Impact damage = population x economic intensity x resource intensity x environmental pressure on the resource x susceptibility of the environment
- d) Impact = PLOT (Population x Lifestyle x Organization x Technology).

Risk evaluation and prevention of **environmental** impacts is essential to avoid further breakdown of the Earth's **ecosystem** support processes, critical natural capital and quality of life.

environmental indicator - Measure of physical, chemical, **biological**, social, cultural or economic factors which best represent the key elements of complex **ecosystems** or **environmental** issues...Physical, chemical, biological, social and economic characteristic of the environment which is monitored as an indicator of broader **environmental health** and integrity. **Environmental** indicators provide comparisons with standard references, between regions, and of course across time. **Environmental** indicators create meaning, simplify data and streamline management by reducing the

number of measures needed for exact representation of the environmental situation. As examples, indicators of pressures may include **vegetation** clearance/**fragmentation**; indicators of **environmental** state may include distributions/abundances of **species**; and indicators of response might include the proportions of protected area by **ecosystem** type. **Environmental** indicators may include pre-existing managerial, commercial or census data. Implicit in the choice of a key set of indicators are simplifications, assumptions and value judgments. Care must be taken that they cover all fundamental issues and are appropriately scaled, broadly representative, robust, comparable, credible, and easily monitored. (See: **ecological indicator**, **habitat indicator**)

environmental monitoring - A process of repeated collection of data from a number of **environmental indicators** according to schedules across time and space. These are essential for awareness of **environmental** change and the impacts of policy and development. Measurement is the authority of science, and neither adaptive management nor credible **sustainable development** can occur without monitoring. Regularly-used environmental indicators include water quality, **species** abundance and **habitat** distribution, but standardized data is also collected by remote sensing.

environmental overshoot - From a planetary perspective, the condition of putting more stress on our ecosystems than they are able to repair or recover from. Resource use is one factor subject to overshoot, although substitutability allows humans to recover from this state. Overshoot can also remain hidden until a resource runs out or an ecosystem suffers sudden decline, at which time the consequences become suddenly obvious...Exceeding environmental or **ecological niche** and consuming Earth's life support systems faster than they can regenerate.

environmental processes - Environmental processes are the functions, forces and dynamics which drive change in **environmental systems**. Examples of environmental processes include the following: chemical transformation and precipitation (*e.g.* pollution chemistry), biochemical transformation (*e.g.* metabolic pathways), ion exchange (cellular transfer), genetic exchange (modified crops/ecosystems), adsorption, absorption (biochemical oxygen demand), acid/base reactions (acid rain), sterilization (disinfection), filtration (water quality), coagulation, membrane separations, oxidization/reduction, volatilization (air quality), thermal transformations, phase transfer and mass transfer processes among other transport and transformation processes.

environmental systems - Environmental systems may be biological, **ecological**, chemical, physical, socio-economic or managerial. Systems may be natural (*e.g.* ecosystems), engineered (*e.g.* urban environment) or artificial (*e.g.* cyberspace).

environmentalism - A broad philosophy and social movement regarding concerns for environmental conservation and improvement of the state of the environment...The movement concerned with slowing or reversing environmental degradation caused by human activities. (See: **ecologism**, **deep ecology**, **ecocentrism**, **biophilia**, **Gaia hypothesis**).

enzymes - A **protein molecule** functioning as a chemical **catalyst** in a biochemical reaction...Any of numerous **proteins** or conjugated **proteins** produced by living **organisms** and functioning as specialized catalysts for biochemical reactions.... A **protein** that catalyses a specific biochemical reaction. ...A **protein** that acts as a catalyst, speeding the rate at which a biochemical reaction proceeds by not altering its direction or nature. Also some RNA can act as an enzyme, a ribozyme. Enzymes regulate chemical reactions in **cells** of an organism. Most names of enzymes usually end with "ase" *e.g.* Protease. Amylase. There are exceptions to that, such as Trypsin.

ephemeral - Lasting for a very short time... Short-lived or transitory...In **botany**, an **annual** plant with an extremely short lifespan measured in a few weeks or very few months. This is the characteristic **growth form** of desert **forbs**...In **geography**, an example would be a watercourse that does not flow all the time. (See: **ephemeral stream**)

ephemeral pool - See **vernal pool**.

ephemeral stream - An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. **Groundwater** is not a source of water for the **stream**. Runoff from rainfall is the primary source of water for **stream** flow. (See: **intermittent stream, perennial stream**)

epicenter - The point on Earth's surface directly above the focus of an **earthquake** and the place where the strongest shocks are felt.

epidemic - general and serious outbreak of disease.

epidemiology - The study of the distribution and causes of disease occurrence in a **population**.... The scientific study of epidemics and epidemic diseases, especially the factors that influence the incidence, distribution, and control of infectious diseases....The study of factors influencing the initiation, development, and spread of infectious disease.

epidermal - Of, relating to, or arising from the **epidermis**.

epidermal hair - A filament of **cells** arising from an **epidermal cell**.

epidermis - The outer, protective, non-vascular layer of the skin of **vertebrates**, covering the dermis....An integument or outer layer of various **invertebrates**....The outermost layer of cells covering the leaves and young parts of a plant.... Thin **membranous** outer layer or covering.... The outer layer of **cells** on an **herbaceous** plant organ....The outermost layer of cells on plant parts.

epifauna - Creatures living on the surface.....Animals living on the surface of the bottom of the sea.

epifaunal - Of or referring to the **epifauna**.

epigeal- The part of the seedling above the cotyledon(s). (See: **hypogeal**)

epigenesis - In **biology**, the unfolding development in an **organism**, and in particular the development of a plant or animal from an egg or **spore** through a sequence of steps in which **cells** differentiate and organs form....In **geology**, a **geological** change in the mineral content of rock after the rock has formed.

epigenetic - In **biology**, the term epigenetics refers to changes in gene expression that are stable between **cell** divisions, and sometimes between generations ... Of or relating to **epigenesis**; of or relating to **epigenetics**... Something that affects a cell, organ or individual without directly affecting its DNA. An epigenetic change may indirectly influence the expression of the genome..... A factor that changes the phenotype without changing the genotype. (See: **epigenetics**).

epigenetics - The influence of the environment on genetics...The study of the processes involved in the **genetic** development of an **organism**, especially the activation and deactivation of **genes**.... The study of heritable changes caused by the activation and deactivation of **genes** without any change in sequence.... In biology, the study of changes in phenotype (appearance) or gene expression caused by mechanisms other than changes in the underlying DNA sequence... The study of the processes involved in the genetic development of an organism, especially the activation and deactivation of genes; The study of heritable changes caused by the activation and deactivation of genes without any change in DNA sequence... Making heritable changes in the way that a gene works or functions, without altering the sequence of the genetic code, or DNA.....The 'study of mitotically and/or meiotically heritable changes in gene function that cannot be explained by changes in DNA sequence. (See: **epigenetic**)

epigeous germination - **seed germination** in which the **cotyledons** are raised above the soil surface.

epilimnion - The uppermost layer of water in a lake, characterized by an essentially uniform **temperature** that is generally warmer than elsewhere in the lake and by a relatively uniform mixing caused by wind and wave action; specifically the light (less dense), oxygen-rich layer of water that overlies the metalimnion in a thermally stratified lake.

epinasty - The downward curvature of a leaf, leaf part, or stem.

epiphyll - A type of **epiphyte** that grows on living leaves. These **epiphytes** are represented by some **mosses**, **liverworts**, **fungi**, and **lichens**. Once well established on a leaf, they may impede the **vascular plant's photosynthetic** process, which may result in the early death of the leaf.

epiphyllous - Of an **organism** growing on living leaves.

epiphyllous community - The small to minute **flora** and **fauna** that **colonize tropical** leaves: **lichens**, **mosses**, **liverworts**, bacteria, **fungi**, **protozoans**, slime molds, others.

epiphyte - A plant growing on another plant for physical support....A plant that lives on another plant but does not **parasitize** it. Examples are **lichens**, **bromeliads**, and orchids. Same as air plant...A plant growing on, but not nourished by, another plant. A plant, **fungus**, or **microbe** sustained entirely by **nutrients** and water received non-parasitically from within the **canopy** in which it resides....A plant which uses a rock or host plant merely as a place of residence and obtains its moisture and **nutrients** directly from the air; an **air plant**....A plant which grows upon another plant. The epiphyte does not get nourishment from the plant on which it grows, but merely uses the plant for structural support, or as a way to get off the ground and into the **canopy environment**. A plant that begins life as an epiphyte but later sends roots into the soil, is termed a **hemi-epiphyte**. An example of a **hemi-epiphyte** is the **strangler fig**. (See: **parasite**)

epiphyte mat - A carpet-like aggregation of **canopy** plants along with associated suspended soils and debris. Also called a **moss mat** when **mosses** dominate.

epiphytic - Of or referring to **epiphytes**.

epithelial - **Cells** that cover surfaces of the body and its **organs** and line the cavities of the body.

epizoan - Animal attached to another **organism**.

equatorial - Of or referring to the Equator or the zone near the Equator.

equilibrium plant species - **Species** characterized by moderate to poor **dispersal** abilities, and relatively slow growth, but generally shade tolerant and a good competitor. **Species** typical of late **ecological succession**.

equinox - The time when the sun crosses the Earth's equator, making night and day of approximately equal length all over the earth and occurring about March 21 (the spring or vernal equinox in the Northern Hemisphere) and September 22 (the autumnal equinox in the Northern Hemisphere).... The time of year when the Sun crosses the celestial equator. This occurs around March 21st and September 23rd producing the vernal equinox and autumnal equinox respectively in the Northern Hemisphere. (See: **solstice**)

ericaceous - Of or referring to the Heath family, Ericaceae, *e.g.*, blueberry, *Vaccinium* spp.

erosion - The wearing away of Earth's surface by the breakdown and transportation of rock and soil....The wearing away of soil by wind or water...The wearing away of land surface by wind or water, intensified by land-clearing practices related to farming, residential or industrial development, road building, or logging..... The wearing down or

washing away of the soil and land surface by the action of water, wind, or ice...The removal of material from the surface of the land by weathering, running water, moving ice, wind and mass movement... the process in which a material is worn away by a **stream** of liquid (water) or air, often due to the presence of abrasive particles in the **stream**...The group of processes whereby earth or rock material is worn away, loosened, or dissolved and removed from any part of the Earth's surface by wind, water, ice, or gravity. It includes the processes of weathering, solution, corrosion, and transportation. It is often classified by the eroding agent (wind, water, wave, or raindrop erosion) and/or by the appearance of the erosion (sheet, rill, or gully erosion) and/or by the location of the erosion activity (surface, or shoreline) or by the material being eroded (soil erosion or beach erosion). "Raindrop erosion" always takes the form of "sheet erosion" though wind action or the movement of thin sheets of water can also cause "sheet erosion" over the ground surface. "Sheet", "gully" and "rill erosion" are all forms of "soil erosion." "Sheet" and "rill erosion" are the two forms of surface erosion. "Beach erosion" is always "shoreline erosion", *e.g.*, because not all shorelines are beaches; "shore line erosion" is not always "beach erosion". The term **accelerated erosion** is used in comparing erosion caused by human activities with that occurring at natural rates (*i.e.*, **geologic** erosion). (See: **weathering**)

gully erosion - Removal of soil and formation of relatively large channels or gullies cut into the soil by concentrated surface runoff. Gullies are too deep to be obliterated by ordinary tillage practices.

rill erosion - Removal of soil by the cutting of numerous small (several inches deep), but conspicuous, water channels or tiny rivulets by concentrated surface runoff usually from cultivated or exposed soils. It is intermediate between sheet erosion and gully erosion.

sheet erosion - The removal of a fairly uniform layer of soil from the land surface by runoff water or wind without the development of conspicuous water channels.

splash erosion or raindrop erosion - The spattering of small soil particles caused by the impact of raindrops on wet soils. The loosened and spattered particles may or may not be subsequently removed by runoff.

erratic - A rock transported by **glacier** action from a distant source. Also known as a **glacial erratic**..... A rock transported by **glacier** action from a distant source.

erythrism - Birds with erythrism have an excess of red pigmentation.

esker - A narrow, winding ridge of stratified gravelly and sandy drift deposited between ice walls by meltwater channels flowing on, in, or under the glacial ice. (See: **kame**)

estivate - See **aestivate**.

estivation - See **aestivation**.

estrous - A stage in the female reproductive cycle during which the **egg** is susceptible to fertilization.

estuarine - Relating to, found in or formed in an **estuary**.

estuary - The part of a river where fresh water meets the sea and is affected by tides....Place where fresh and sea waters mix....The portion of a coastal **stream** influenced by the **tide** of the body of water into which it flows. ...A bay, at the mouth of a **river**, where the **tide** meets the **river** current. ...An area where fresh and **marine** waters mix..... Regions of interaction between **rivers** and near-shore ocean waters, where **tidal** action and **river** flow mix fresh and salt water. Such areas include bays, mouths of **rivers**, **saltmarshes**, and **lagoons**. These **brackish** water **ecosystems** shelter and feed **marine** life, birds, and wildlife.... A coastal body of water that has a connection with salt and **freshwater** sources.... a place where fresh and salt water mix, such as a bay, **saltmarsh**, or where a **river** enters an ocean.... The area where **freshwater** from a **river** and saltwater from the ocean meet; an estuary is a very productive and complex **ecosystem** that is influenced by **tides** and currents and is easily damaged by human activities; some examples of estuary **ecosystems** are bay, coastal **wetland**, **lagoon**, and **saltmarsh**.... Semi-enclosed coastal waters at the junctions of **rivers** with ocean **habitats**, for example **littoral** basins, bays, inlets and harbors. Estuaries have a high **biological productivity** due to **nutrient** delivery and mixing processes. The **salinity** gradient between the fresh and salt water typically takes the form of a heavier saline wedge, mixed by flood and **tidal** flows. Major **communities** in the **estuarine habitat** may include juvenile fish, **benthos**, **seagrass**, **mangrove**, **saltmarsh** and **wetland ecosystems**. Estuaries are essential breeding grounds for many fish **species** and must be protected from **habitat**-damaging fishing practices such as trawling. Activities upstream can also adversely impact the **estuarine environment**, for example, water **pollution**, and agricultural runoff, which may cause **sedimentation** and **eutrophication**.... A bay that formed when a broad **river** valley was submerged by rising sea level or a sinking coast.... Part of a **river** or **stream** or other body of water that has an unimpaired connection with the open sea and where the sea water is measurably diluted with fresh water from land drainage.

ethnocentric - Of or referring to **ethnocentrism**.

ethnocentrism - The tendency to look at the world primarily from the perspective of one's own culture.....Centered on a specific ethnic group, usually one's own.

ethology - The science of behavior and behavioral patterns of individuals and **communities**.

ethylene - A gaseous plant **hormone** produced in abundance by ripening fruits and damaged **tissues**.

etiolation - The condition of a plant when grown in darkness; its **stem** is pale and

elongated, the **leaves** are undeveloped.

eukaryote - Any **organism** having as its fundamental structural unit a **cell** type that contains specialized **organelles** in the **cytoplasm**, a **membrane**-bound **nucleus** enclosing **genetic** material organized into **chromosomes**, and an elaborate system of division by **mitosis** or **meiosis**, characteristic of all life forms except **bacteria**, **blue-green algae**, and other primitive **microorganisms**.... A single-celled or multicellular **organism** whose cells contain a distinct **membrane**-bound **nucleus**.... An **organism** whose **cells** contain a **nucleus** surrounded by a **membrane** and whose **DNA** is bound together by **proteins** (histones) into **chromosomes**. The cells of **eukaryotes** also contain an endoplasmic reticulum and numerous specialized **organelles** not present in **prokaryotes**, especially **mitochondria**, Golgi bodies, and lysosomes. The **organelles** are enclosed in a three-part **membrane** (called a unit **membrane**) consisting of a lipid layer sandwiched between two **protein** layers. All **organisms** except for **bacteria** and **archaea** are **eukaryotes**.... literally a "true **nucleus**". A **cell** with a well defined **nucleus** surrounded by a **nuclear membrane** and with **membrane**-bound **organelles** (such as **mitochondria** or **chloroplasts**). All **fungi**, plants, animals, and **protists** are composed of **eukaryotic cells**. In contrast, **bacteria** are called **prokaryotic cells** and have a **nuclear** area not bounded by a **membrane**. **Prokaryotic cells** are the earliest forms of **cellular** life and originated a few hundred million years after the earth's crust solidified. **Prokaryotic cells** first appear in the fossil record about 3.5 billion years ago. The oldest eukaryotic **cell** fossils are about 1.7 billion years old. (See: **eukaryotic cell, prokaryote, prokaryotic cells**)

eukaryotic - Referring to a **eukaryote**.

eukaryotic cell - **Cell** whose **genetic** material is contained in a **membrane**-bound compartment called a **nucleus**. Compare with **prokaryotic cell**. (See: **eukaryote prokaryote, prokaryotic cells**)

euphotic zone - Upper layer of ocean where **photosynthesis** takes place. (See: **photic zone**)

euplankton - **Organisms** that spend most or all of their lives as **plankton**.

eurythermal - Tolerating a wide range of **temperature**.

eurytypic species - A **species** which has a large tolerance to **environmental** change, typically with a wide **geographical** distribution. (See: **stenotypic species, environmental gradient**)

eusocial - Living in a cooperative group in which usually one female and several males are reproductively active and the non-breeding individuals care for the young or protect and provide for the group. Honeybees are an example of this type of system.

eutrophic - Literally, "well fed." Refers to **habitats**, particularly soils and water, that are rich in **nutrients**....**Aquatic habitats** of high productivity.....Characteristic of waters

rich in dissolved **organic** or mineral **nutrient** materials and exhibiting a paucity or complete lack of oxygen in the bottom waters as a consequence of high primary production and the high **nutrient** content. ...Applied to **fens** composed of plants growing in "hard waters" which are rich in **nutrients**. Compare **mesotrophic**, **oligotrophic**, and **dystrophic**. (See: **dystrophic**, **oligotrophic**, **mesotrophic**)

eutrophication - The natural process of maturing or aging of a lake..... The slow aging process during which a lake, estuary, or bay evolves into a **bog** or **marsh** and eventually disappears. During the later stages of eutrophication the water body is choked by abundant plant life due to higher levels of nutritive **compounds** such as nitrogen and phosphorus. Human activities can accelerate the process. ... Processes by which bodies of water, such as lakes, receive extra **nutrients** that stimulate excessive plant growth and otherwise put the **ecosystem** out of its normal balance....The process of enrichment with **nutrients**, especially nitrogen and phosphorus, leading to increased production of **organic** matter... the process that occurs when water becomes high in **nutrients**, which can cause **algal blooms** and wide swings in dissolved oxygen concentrations.... The process of over-fertilizing (over-enrichment) of a body of water by **nutrients** (or pollutants) that produces more **organic** matter (*e.g.*, **algal** growth) than the self-purification processes can overcome. A low oxygen content results.... The addition of **nutrient** material, mostly from domestic sewage, some industrial wastes and the leaching of fertilizers from agricultural lands, into rivers and lakes with the subsequent flourishing of **algae** and **microorganisms**. This results in the depletion of dissolved oxygen and the potential suffocation of other **aquatic organisms**.... The process whereby a body of water becomes rich in dissolved **nutrients** through natural or man-made processes. This often results in a deficiency of dissolved oxygen, producing an **environment** that favors plant over animal life.

evaporation - The process by which water is changed from the liquid into the vapor state. In **hydrology**, evaporation is **vaporization** that takes place at a **temperature** below the boiling point. It is usually measured with evaporation pans....The process of liquid water becoming **water vapor**, including vaporization from water surfaces, land surfaces, and snow fields, but not from **leaf** surfaces.... Change from a liquid (more dense) to a vapor or gas (less dense) form. When water is heated it becomes a vapor that increases **humidity**. Evaporation is the opposite of **condensation**...The conversion of a liquid (water) into a vapor (a gaseous state) usually through the application of heat energy during the **hydrologic cycle**; the opposite of **condensation**. (See: **evapotranspiration**, **transpiration**, **hydrologic cycle**)

evapotranspiration - The total loss of water by **evaporation** from soil and from water bodies and **transpiration** from **vegetation** The combined processes of **evaporation** and **transpiration**.... The loss of water from the soil both by **evaporation** and by **transpiration** from the plants growing in the soil. ... Loss of water from a land area through **transpiration** of plants and **evaporation** from the plant and other surfaces.... The sum of **evaporation** and **transpiration**.... The loss water from the soil through both **evaporation** and **transpiration** from plants. (See: **evaporation**, **transpiration**, **hydrologic cycle**)

Everglades - A large and biologically diverse **wetland ecosystem** in South Florida. ... The Florida Everglades are **subtropical** marshlands located in the southern portion of the U.S. state of Florida, specifically in parts of Monroe, Collier, Palm Beach, Miami-Dade, and Broward counties. .. The Everglades is a **swamp** located in southwestern Florida.... A large **subtropical swamp** in southern Florida that is noted for its **wildlife**.

evergreen - Having green leaves or needles throughout the year; evergreen plants do not shed all their leaves at one time as **deciduous** plants do...Retaining green foliage for more than one season.... Trees which retain green foliage throughout the year. Not all **conifers** are evergreens.... A woody **perennial** plant bearing **leaves** throughout the year. (e.g., Tamarack, *Larix laricina*. See: **deciduous, coniferous**)

evolution - The changes in plants and animals over many years as they **adapt** to new conditions....The process of change in the traits of **organisms** or **populations** over time. .. The process of gradual change in the attributes of **organisms** through successive generations...Evolution, through the process of **natural selection**, can lead to the formation of new **species**. (For information on the formation of **species** see: **speciation, species, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)... Generally, evolution refers to development but also to degeneration. **Genetic** theory seeks to explain evolution in terms of changes in the **gene** frequencies of **populations** brought about by variation in **reproductive** habits, **mutation**, recombination, **natural selection, migration**, and **genetic drift**.... A change in the **allele** frequencies within a **population**.

evolutionary - Of or referring to the process of **evolution**.

evolutionary psychology - Evolutionary psychology attempts to explain psychological traits—such as memory, perception, or language—as **adaptations**, that is, as the functional products of **natural selection** or sexual selection.

Evolutionary Species Concept - See **species**.

evolve - To change through the process of **evolution**.

exoskeleton - An external, often hard, covering or integument that provides support and protection to the body, as in **Arthropods**.... The hard, outer skeleton of an **arthropod**, which supports the muscles and soft internal organs.... A hard, jointed, external covering that encloses the muscles and organs of an organism; typical of many **arthropods** including insects.... An external covering that protects the body and gives support to underlying muscles; crayfish, mussels, and insects are examples of animals having an exoskeleton.... In **arthropods**, the hardened cuticular covering of the body serving for protection of soft parts and as sites for muscle attachments.

exosphere - The exosphere is the uppermost layer of the **atmosphere** (but see **thermosphere**). On Earth, its lower boundary at the edge of the **thermosphere** is estimated to be 500 km to 1000 km above the Earth's surface, and its upper boundary at about 10,000 km....The outermost layer of the Earth's **atmosphere** (500 to 1000km above surface); the only part of the **atmosphere** where an appreciable amount of **atmospheric** gases escape the Earth.... The outermost, least dense portion of the **atmosphere**.... The outermost portion of the Earth's or Moon's **atmosphere** from which gases can escape into outer space.... The outermost **atmospheric** layer....The uppermost layer of the **atmosphere**, its lower boundary is estimated at 500 km to 1000 km above the Earth's surface. It is only from the exosphere that **atmospheric** gases can, to any appreciable extent, escape into outer space.... Merges with space. (See: **atmosphere, planetary boundary layer, troposphere, tropopause, stratosphere, stratopause, mesosphere, mesopause, thermosphere, ionosphere**)

exotic species - A **species** that is not native to the **ecosystem**; also known as **invasive species, invader species, introduced species** or **alien species**.... A **species** that is not indigenous to a region.... All **species** of plants and animals not native to an area or naturally occurring historically in any **ecosystem**. ... a **species** that does not naturally occur in an area. These invaders can cause major problems for native plants and animals....Established plants and animals not native to the **ecosystem**, region, or country. ... Any **organism** (plant or animal) that is not native in the area where it now occurs (introduced). "**Invasive**" may include "weedy" natives as well as invasive exotics. " A rose in a cornfield is a weed." Exotics may (or not) be **invasives** as can "native" plants. (See: **introduced species, naturalized, invasive**)

exotherm - Having a body temperature not internally regulated but approximating that of the **environment**. A synonym for **cold-blooded, ectotherm, or poikilotherm**. The opposite of **warm-blooded**. (See: **thermoregulation, homeothermic, endothermy, endotherm, ectotherm, poikilotherm, warm-blooded, cold-blooded**)

exothermic - In biology, of or relating to an **exotherm** or **cold-blooded** animal....In chemistry, a reaction where the product is at a higher energy level than the reactants. (See: **thermoregulation, homeothermic, endothermy, endotherm, ectotherm, exotherm, poikilotherm, warm-blooded, cold-blooded**)

exploitation - Utilization of a **resource** for expected profits or benefits...The number or proportion of animals removed by hunting, fishing or other means.

exponential growth - The **population** growth pattern expected when no forces are holding back the **population**. When graphed, it looks like a J-shaped curve.

extant - Still in existence, not lost, exiled, **extirpated** or **extinct**.

exterminate - To completely destroy a **population** or **community** of living **organisms**, for example **pests** or vermin. (See: **extinction, extirpate**)

extermination - The complete destruction of a **population** or **community** of living **organisms**, for example **pests** or vermin. (See: **extinction**, **extirpate**)

external fertilization - A method of reproduction most common in **aquatic organisms** during which the **gametes** (egg and sperm) unite outside the body; for instance, a male frog releases sperm into the water as the female is releasing eggs and union of the two types of **gametes** occurs in the water.

external forcing - Influence on the Earth system (or one of its components) by an external agent such as solar radiation or the impact of extraterrestrial bodies such as meteorites.

extinct - In **biology**, refers to a **species** that no longer exists. ... No longer existing in living form as a **species**, having died out as a result of the normal dynamic of **evolution** or commonly also due to human disturbances such as **habitat destruction**. ... In **geology**, describes a volcano that has not erupted within recorded history. (See: **extinction**, **extirpate**, **mass extinction**)

extinction - The death of the last surviving individual of a **species**, group, or **gene**, globally or locally.... Local **extinction** or **extirpation** occurs when every member of a particular **population** has died. Global **extinction** occurs when every member of a **species** has died. The Passenger Pigeon and the Dodo are examples of globally **extinct** birds.

Just as new **species** form through **natural selection**, **species** also die off - or become **extinct**. What causes extinction? For a **species** to continue to exist, some members must have traits that allow them to survive and pass their **genes** onto the next generation. If the **environment** changes, for instance, the **species** will become **extinct** unless some members have adaptations that allow them to survive and reproduce successfully under the new **environmental** conditions. Changes in climate and competition among **species** are examples of **environmental** changes to which **species** must adapt in order to survive. **Environmental** changes caused by human beings have led to the extinction of hundreds of **organisms** in the past few centuries. Most of these changes involve the destruction of **habitats**. For example, the conversion of the **prairies** of central North America into farmland and grazing ranges caused a decline in the large **population** of **prairie** dogs in the region. In turn the Black-footed Ferret, which preys solely on the **prairie** dog, has also greatly declined in numbers. This weasel-like animal may soon become **extinct**, because members of the **species** do not have variations that result in reproductive success in this changing **environment**. The example of the ferret shows how **species** depend on others for survival.

The decline in **population** of one **species** has led to the near extinction of another. Extinction is a natural process. However, the rapid rate at which **species** are becoming extinct as a result of the destruction of **habitats** by human beings may endanger the survival of many life forms. Over the billions of years of **evolution**, **species** of **organisms** have evolved with unique **adaptations** to problems presented by a diverse and changing **environment**. Once a **species** has become **extinct**, the unique solution to life we call a **species** will be lost forever. ...Extinction is the termination or

extinguishing from the Earth of an **evolutionary** lineage such that they no longer exist in living form. Anything which ceases to exist can also be said to undergo extinction, such as outmoded technology, information, beliefs or behaviors. In psychology and physiology, extinction is a decline in a learned or stimulus response in the absence of reinforcement. Extinction however most often refers to the loss of a group of **organisms**, usually a species but ranging from a local **population** to a **phylum**. We are currently experiencing a human-driven **mass extinction**, and extrapolations from current trends predict the rapid extinction of approximately half of the **species** on Earth. This **mass extinction** is the result of rapidly expanding human populations and our excessive focus on economic growth, with the associated development, pollution, hunting, pest introductions, land degradation, habitat destruction and ecosystem fragmentation. This massive loss of life will have serious global repercussions for the future of natural **biodiversity**, **ecosystem** processes, **habitat** stability and other essential **ecological** functions. Even from a purely **anthropocentric** point of view which ignores the intrinsic value of nature, this mass extinction is resulting in rapid loss of information and ideas, new patterns and processes, chemical and food products, and other economic, aesthetic and spiritual opportunity costs. Perhaps the greatest danger from this extinction of **biodiversity** is the risk of undermining the stability and **homeostasis** of the Earth's self-sustaining feedback mechanisms, possibly resulting in a world uninhabitable to humans. (See: **extirpate, extinct, mass extinction, background extinction rate**)

extinct in the wild - A **taxon** which has not been recorded in expected **habitat** over an appropriate time frame throughout its past range. Such species may survive only in captivity, cultivation or as a naturalized **population** away from its original wild **habitat**.

extirpate - To remove or eliminate a **species** from a landscape. Example: The Giant Otter has been extirpated over much of its former **range**. (See: **extirpated, extirpation, extinction**)

extirpated - Removed or eliminated from an area or region. Differs from **extinction** in that a **species** (or **population**) may still exist in other regions, but has been eliminated from former parts of its **range**. (See: **extirpate, extinction**)

extirpation - The **extinction** or elimination of a **species** from a local area. (See: **extirpate, extinction**)

exotoxin - A poison excreted by some gram-negative or gram-positive **organisms**. It is composed of **protein**.

extrafloral nectary - Nectar-rich bodies, present on many **tropical** plants, that are fed upon by ants and wasps but are not flowers. (See: **nectary, Müllerian bodies, Beltian bodies, myrmecophyte, domatium**)

extralimital - Not found within a given **geographical** area. In biology, the term is usually used to describe an **organism**, especially a bird, found outside its normal range, *e.g.*, an extralimital occurrence. (See: **vagrant**)

exudate - A material that has oozed out of something. For example, gum that has oozed out of a tree through a wound in the bark. ...Material that oozes out of a plant including gum, sap, resin, and latex... fluid which has seeped out of tissues or vessels due to injury, increased permeability of cells, or inflammation.

exuviae - The cast skin of an **arthropod**, including **insects**.

eyas - A young bird still in the nest and unable to find food for itself; usually refers to a bird of prey.

eyeshine - The glow reflected from the eyes of some animals when struck by light in dark surroundings.

eyrie - Nest or dwelling made by some birds, such as an eagle or hawk, usually elevated in a tree or on a cliff; also called **erie**.

eye-ring - A ring of color around the eye of a bird. Also called an orbital ring.

facial disk - In birds such as owls, a circle of feathers that surround the eyes and ears and function to focus sound toward the ears.

facultative - In botany, capable of changing life-style, e.g., from saprophytic to parasitic or the reverse.

Fahrenheit scale - A temperature scale where 32 is assigned to the temperature where water freezes and 212 to the temperature where water boils at sea level. To convert Fahrenheit to Celsius (Centigrade), subtract 32 and divide by 1.8. To convert Celsius (Centigrade) to Fahrenheit, multiply by 1.8 and add 32.... A change of 1 degree Fahrenheit equals a change of $5/9 = 0.56$ degrees Celsius.... A change of 1 degree Celsius equals a change of $9/5 = 1.8$ degrees Fahrenheit. (See: **Celsius scale**)

false end bud - Bud at the end of a twig or branch that does not ever open into a leaf, shoot, or flower. (See: **true end bud**)

family - A category of **taxonomic classification** below **order** and above **genus**....A **taxonomic** category between **order** and **genus** and comprised of one or more **genera**. The names of bird families all have the ending *-idae*. (See: **taxon, taxonomy, classification**)

famine - Famine is widespread risk of death by starvation and malnutrition; a devastating condition of insufficient food supply.

fang - Hollow or grooved tooth of a **venomous** snake with which it injects its poison...**Canine** tooth of a **carnivorous** animal, such as a dog or wolf, with which it

seizes and tears its **prey**.... A hollow tooth designed to carry **venom**, as in some **reptiles**; a canine tooth used to pierce and tear flesh, as in **carnivorous** animals.

fasciated - In biology, marked by broad bands of color, as in certain birds (*e.g.* Fasciated Antshrike, *Cymbilaimus lineatus*) and insects.

fault - In **geology**, a fracture in the Earth's **crust** accompanied by a displacement of one side of the fracture....A crack in the Earth's **crust** resulting from the displacement of one side with respect to the other.... A planar rock fracture which shows evidence of relative movement. Large faults within the Earth's **crust** are the result of differential or shear motion and active **fault zones** are the causal locations of most **earthquakes**.... A break, or crack, in the rocks of the **lithosphere** along which movements take place; usually located along the boundaries between **tectonic plates** (See: **fault line, fault zone, tectonic plates**)

fault line - A fracture in rock along which one side has moved with respect to the other. (See: **fault, fault zone, tectonic plates**)

fault mechanics - A field of study that investigates the behavior of geologic faults.

fault scarp - The topographic expression of faulting attributed to the displacement of the land surface by movement along faults. They are exhibited either by differential movement and subsequent erosion along an old inactive geologic fault (a sort of old rupture), or by a movement on a recent active fault. Fault scarps often contain highly fractured rock of both hard and weak consistency. In many cases, bluffs form from the upthrown block and can be very steep. The height of the scarp formation is equal to the vertical displacement along the fault. Active scarps are usually formed by tectonic displacement, *e.g.* when an earthquake changes the elevation of the ground, and can be caused by any type of fault, including strike-slip faults, whose motion is primarily horizontal. This movement is usually episodic, with the height of the bluffs being the result of multiple movements over time. Displacement of around 5 to 10 meters per tectonic event is common.

fault zone - An area where there are many interconnected **faults**; usually located along the boundaries between **tectonic plates**. (See: **fault, fault line, tectonic plates**)

fauna - The animals that live in a particular area... The animal life of an area, at a time, used in the broad sense to include birds, mammals, fish, reptiles, amphibians, insects, mollusks, and crustaceans. Life, other than plants.

faunal - Of or referring to **fauna**.

fecundity - The number of eggs, or seeds, or generally offspring in the first stage of the life cycle, produced by an individual.... Production of young by animals within an age class (typically a rate). Precisely, the conception rate; also the ability to produce offspring.

feedback - Feedback is the flow of changes through a system which come back in a circle to again affect the initial cause of the change. This 'feedback loop' is a continuous re-iterative cause-and-effect relationship between interactive elements and adjusting subsystems. 'Positive feedback' reinforces the original process and 'negative feedback' suppresses the original process. 'Reinforcing feedback' increasingly alters the system away from its initial point as each change amplifies the next (*e.g.* **population** growth, epidemics). (See: **feedback loop, positive feedback loop, positive feedback, negative feedback loop, negative feedback, feedback mechanisms**)

feedback loop - A circular pathway of cause and effect. Also known as a "causal loop". ...Circular cause and effect relationships dominating some interaction of particular sets of system's key variables...A loop that feeds back some of the output to the input of a system. (See: **feedback, feedback mechanisms, positive feedback loop, positive feedback, negative feedback loop, negative feedback, climate feedback**)

feedback mechanisms - Factors which increase or amplify (**positive feedback**) or decrease (**negative feedback**) the rate of a process. An example of positive climatic feedback is the ice-albedo feedback. ... A mechanism that connects one aspect of a system to another. The connection can be either amplifying (positive feedback) or moderating (negative feedback). (See: **feedback, feedback loop, positive feedback loop, positive feedback, negative feedback loop, negative feedback**)

feldspar - A group of minerals that makes up almost 60% of Earth's **crust**.

felid - A member of the cat family, Felidae, which includes Jaguars, Ocelots, Pumas, Jaguarondis, and house cats.

feline - An animal of the cat family Felidae or referring to or resembling an animal of that family. (See: **felid**)

fellfield - From the Danish "fjoeld-mark," or rock desert. A type of **tundra ecosystem** characterized by rather flat relief, very stony soil, and low, widely spaced **vascular plants**....Rocky **habitats** with a cover of low plants on exposed **alpine** summits and ridges, characterized by low mat and **cushion plants** and an abundance of surface rocks.Those stony, sparsely vegetated **alpine habitats** which are intermediate between a boulder field and an **alpine meadow**. Compare **felsenmeer**.

felsenmeer - German term ("sea of rocks") for extensive areas, usually fairly level or with only moderate slope, characterized by a chaotic assemblage of moderate to large size blocks of rock. Generally applied to **polar** regions where well-jointed bedrock is shattered by intensive frost action (frost riving) into jagged boulders and rock fragments, but may also refer to areas above **timberline** with similar characteristics. Synonym of blockfield. Compare **fellfield**.

fen - A bog with springs as a water source other than precipitation...Low land overflowed, or covered wholly or partially with water, but producing **sedges**, coarse **grasses**, or other **aquatic** plants...a moor or **marsh** plant **community** on **alkaline**, neutral or slightly acid **peat**... A type of **wetland** that accumulates **peat** deposits. Fens are less acidic than **bogs**, deriving most of their water from **groundwater** rich in calcium and magnesium... A general term for a mire (**peat-forming ecosystem**) with little or no *Sphagnum* **moss** and with a source of water and minerals outside the limits of the **mire**. Fens are, in comparison with **bogs**, less acid or even **alkaline** and mineral rich. Fens generally support a more varied **vegetation** composed of **grasses**, **sedges**, or **reeds**. Those supporting a **scrub** or **woodland vegetation** are termed a **carr**. ...A class of eutrophic mires lacking *Sphagnum*, with graminoids dominant. ...A European term applied to **grass**, **sedge**, or **reed** covered **peatlands**. The water table is at the surface most of the time. The water and **peat** are not as acid as a **bog** and richer in **nutrients**....A tract of low, wet ground containing **sedge peat**, relatively rich in mineral salts, alkaline in reaction, and characterized by slowly flowing water. **Vegetation** is generally **sedges** and **grasses**, often with low **shrubs** and sometimes a sparse cover of **trees**. *Sphagnum* **mosses** are absent or of low cover. (See: **bog**, **carr**, **fen**, **heath**, **heathland**, **marsh**, **mire**, **moor**, **muskeg**, **peat**, **peatland**, *Sphagnum*, **swamp**)

- **eutrophic fen** - Nutrient-rich fen (**minerotrophic mire**) where green **sedges** predominate and *Sphagnum* is absent. Usually on sites with **nutrient**-rich telluric **groundwater**.
- **forested fen** - See **alder swamp** and **swamp**.
- **mesotrophic fen** - A moderately **nutrient**-poor fen (**minerotrophic mire**) where greyish-green **sedges** predominate and *Sphagnum* species occur. With an increase in *Sphagnum* it would become a **bog**.
- **patterned fen** - A **mire** (**peat-forming ecosystem**) characterized by low **peat** ridges alternating with parallel wet hollows, the pattern developing parallel to the contour (at right angles to water movement) on gentle slopes.
- **string fen** - A patterned fen with long strings and flarks. (See: **laniere**)
- **shrub fen** - A type of **mire** (**peat-forming ecosystem**) usually flooded with slowly flowing water. Vegetated with low (less than 1.5 m) erect **shrubs** and generally open **canopy**. **Trees** may be present or absent. **sedge peat** is often present. (See: **carr**)

feral - Describes a **species** that was once tamed or domesticated and has since reverted to a free-roaming life in the wild... Living in the wild; not domesticated.

fermentation - The partial breakdown of food **molecules** to yield ethyl alcohol, carbon dioxide, and energy; occurs in the absence of oxygen.

fern - A plant that has roots, stems, and fronds, but no flowers, and reproduces by means of **spores**. Order Filicales... Any of numerous flowerless and seedless **vascular plants** having true roots from a **rhizome** and **fronds** that uncurl upward; reproduce by **spores**... A fern is any one of a group of about 20,000 species of plants classified in the **phylum** or **division** Pteridophyta, also known as Filicophyta. The group is also referred to as polypodiophyta, or polypodiopsida when treated as a subdivision of tracheophyta (**vascular plants**).

fertilization - In **biology**, the union of male and female **gametes**, such as an **egg** and a sperm or a **pollen** and an **ovule**....In agriculture, a term used to denote efforts to enhance plant growth by increased application of nitrogen-based fertilizer or increased deposition of nitrates in **precipitation**.

fetch – The area over which the wind blows steadily. With bodies of water, the greater the fetch, the greater the wave height. In a **hurricane**, fetch, wind speed, and wind direction associated with the storm will determine the **storm surge** as the storm moves landward.

fiber - In **botany**, a long, thick-walled **cell** that dies at maturity.

fibric soil material - The least decomposed of all **organic** soil material. Synonymous with **peat**. (See: **hemic soil material**, **sapric soil material**)

fibrous roots - A root system found in **monocots** in which branches develop from the **adventitious roots**, forming a system in which all roots are about the same size and length.... Roots that do not grow deep but branch out into a network of thin, hairy roots; can form thick mats.

fibrous root system - A highly branched, spreading root system.

field capacity - See **water-holding capacity**.

field mark - A prominent characteristic useful in identifying an **organism**. Usually the confirmation of a combination of field marks is needed to positively identify an **organism** to **species**.

filament - In **botany**, the stalk of a **stamen** bearing an **anther**.

filoplume - A hair-like feather having few or no barbs, usually located between contour feathers.... A feather with a slender scape and with but few barbs.

filter feeder - An **organism** such as a **mollusk** or sponge that feeds by removing food from water that filters through its body.... An **organism**, such as a clam or mussel, which feeds by filtering **organic** particles from water as it passes through the body.

fire regime - The pattern of fires at a location; includes the frequency, intensity and seasonality of the fires.

First Law of Thermodynamics - See **Law of Thermodynamics**.

Fisher's Fundamental Theorem - R.A. Fisher, one of the founders of what has come to be known as the Modern Synthesis of **evolutionary** biology, showed that **natural selection** always ensures that a generation is more adapted to the parent generation's

environment than the parent generation was. Note: this does not mean that each generation is more “advanced” than the previous one, nor does it mean that each successive generation would perform better in the former **environment**. It just means that, of all the factors affecting **fitness** (**genetic drift**, for instance), **natural selection** will *always* favor increased **fitness**. Many biologists have been rather blasé about this theorem, while others have enthusiastically embraced it as a “law” of **adaptation**.

fitness - In an **evolutionary** sense, the relative number of offspring produced by an individual relative to others belonging to the same **species**. . . . The measure of a **species** ability to survive and reproduce.

flagellate - A **protozoan** that has **flagella**, or long, hair-like structures that whip and lash to help it swim.

flagellum (plural: **flagella**) - A whip-like appendage which is the organ of locomotion of a motile **cell**. . . . long, hair-like structure that whips and lashes to help **flagellates** swim. (See: **cilia**)

flagged krummholz - The tallest trees protrude from the protective snow pack and become wind-battered "flags." (See: **krummholz**, **cushion krummholz**)

flagship species - A **flagship species** is a **species** chosen to represent an **environmental** cause, such as an **ecosystem** in need of conservation. These **species** are chosen for their vulnerability, attractiveness or distinctiveness in order to best engender support and acknowledgement from the public at large. Thus, the concept of a **flagship species** holds that by giving publicity to a few key **species**, the support given to those **species** will successfully leverage conservation of entire **ecosystems** and all **species** contained therein. Examples of **flagship species** in Amazonia are Jaguar, Harpy Eagle, Giant Otter and large macaws.

flark - A Swedish term referring to limited, usually elongated, wet areas of exposed **peat** having an **algal** film and sometimes a sparse cover of **sedges**. The flark may be several hundred meters in length. On sloping sites flarks are narrow, being only a few meters wide but on horizontal peatland they may be a hundred or more meters wide. The flark axis is always perpendicular to direction of the contours. Synonym of mare (French-Canadian), rimpi (Finnish), and kulju.

flash colors - Bright areas of coloration, normally concealed, on certain tree frogs, Lepidopterans (butterflies and moths), and other animals that, when suddenly revealed, may act temporarily to confuse a potential **predator**.

flash flood - A flood which is caused by heavy or excessive rainfall in a short period of time, generally less than six hours.

flashet - Term used commonly in Newfoundland to denote any small pond found in **bogs** and **fens**. On raised bogs flashets usually form concentric circles outward from the center. Called seepages and rullen in other countries.

fledge - To grow the **plumage** (feathers) necessary for flight.... The act of leaving the nest or nest cavity after reaching a certain stage of maturity.... To grow the first coat of feathers necessary for flight in order to leave the nest and develop independent activity.

fledging - Growing the first coat of feathers, particularly those needed for flight.

fledgling - A young bird that has recently acquired its **flight feathers**.

flight feathers - The large wing feathers of a bird. They are comprised of the **primaries**, **secondaries** and tertials.

flight note - **Call notes** usually given by a bird in flight, whether during its **nocturnal migration** or when flying from perch to perch.

flood - An overflow of water onto lands that are not normally covered by water. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river, **stream**, lake, or ocean. ... The filling with water of a normally dry area of land caused by an increased water level in a stream, river or drainage ditch or by the ponding of rainwater.

flood basin - The flat land area actually covered by water during the highest known **floods**. It is between the valley sides and the river banks and commonly contains heavy soils and limited or swampy **vegetation** A strip of relatively flat and normally dry land alongside a **stream**, river, or lake that is covered by water during a **flood**. (See: **flood plain**)

flood stage - The elevation at which overflow of the natural banks of a **stream** or body of water begins in the reach or area in which the elevation is measured.

flooded tropical evergreen forest - See **várzea** and **igapó**.

floodplain / flood plain - Area adjoining a body of water that may become inundated during periods of maximum water levels....That land outside a **stream** channel described by the perimeter of the maximum probability **flood**.....A strip of relatively smooth land bordering a **stream**, built of **sediment** carried by the **stream** and dropped in the slack water beyond the influence of the swiftest current..... The land adjacent to a **stream**, built of **alluvium** and subject to repeated flooding.... The flat or nearly flat land along a river or **stream** or in a tidal area that is covered by water during a **flood**.... That portion of a **stream** valley, adjacent to the channel, which is built of sediments during the present regimen (*i.e.*, the state of equilibrium between a **stream** and its ability to transport sediments) of the **stream** and which is covered with water when the **stream** overflows its banks at flood stages. No simple, absolute floodplain commonly exists. As a

consequence, floodplains are delineated in terms of some specified **flood** size (*e.g.*, the 50-year floodplain -- the area that would be flooded by the largest **stream** flow that will, on the average, occur once within a 50-year period). The largest, absolute floodplain that is ever likely to occur is sometimes referred to as the flood basin. The minimum area included is that subject to a one- percent (100-year recurrence) or greater chance of flooding in any given year.... A broad, level area of land bordering a **river** and frequently flooded. ... The nearly flat portion of a **river (stream)** valley adjacent to the **river (stream)** channel; it is built by **sediment** deposited during **floods** and is covered by water during a **flood**. (See: **flood basin**)

flora - The plants that live in a particular area.... The total plant life of an area at a time. "**Vegetation** " is frequently used in a more limited sense, often meaning just the large **vascular plants**.

floral - Of or referring to **flora** or **flower**.

florescence - The time and process of budding and unfolding of a blossom....A **flower**.

flow rate - The time required for a volume of **groundwater** to move between points. Typically **groundwater** moves very slowly - sometimes as little as inches per year.

flowage - A body of water that has been created by deliberately flooding an area, as by beavers (*Castor canadensis*)...A water system developed by the use of a dam for flood control. Low-lying area's existing lakes and rivers are generally used to develop a flowage.... An overflowing onto adjacent land....A body of water formed by overflowing or damming....Floodwater especially of a stream.

flower - The reproductive branch of an **Angiosperm** plant.... The reproductive structure of **Angiosperm** plants, comprised of protective **sepals**, often colorfully attractive **petals**, the female **pistil** with **stigma**, **style** and **ovary**, and the male **stamen** with filament and **anther**.

flowering plant - See **Angiosperm**.

fluorocarbons - Carbon-fluorine **compounds** that often contain other **elements** such as hydrogen, chlorine, or bromine. Common fluorocarbons include chlorofluorocarbons and related **compounds** (also know as ozone depleting substances), **hydrofluorocarbons** (HFCs), and **perfluorocarbons** (PFCs).

fluvial - Pertaining to **streams** or produced by **stream** action.... Pertaining to **rivers**.... Produced by stream action.

flux - The measure of the flow of some quantity per unit area per unit time.

flycatching - Same as **aerial sallying**.

foam - A mass of bubbles of air or gas in a matrix of liquid film, especially an accumulation of fine, frothy bubbles formed in or on the surface of a liquid, as from agitation or fermentation. The term can be used to describe the masses of brownish bubbles seen floating down **whitewater rivers**.

focus - In **geology**, the point below the surface of the Earth where an **earthquake** begins.

fog - A cloud with its base at the Earth's surface.... A cloud on the ground.

foliage - The leaves of a plant or of many plants.

folivore - In **zoology**, a folivore is an animal that specializes in eating leaves. Examples are Red Howler Monkey (*Alouatta seniculus*) and Hoatzin (*Opisthocomus hoazin*)

folivorous - Leaf-eating.

food - An **organic** substance providing energy and body-building materials; especially **carbohydrates**, fats, and **proteins**.

food chain - A sequence of **organisms**, each of which uses the next lower member of the sequence as a food source. (See: **food web**, **food pyramid**, **trophic level**, **ecological pyramid**)

food pyramid - A graphic representation showing the comparative numbers of **organisms** involved in specific food energy transfers as you change **trophic levels** or move up the **food chain** (See: **ecological pyramid**, **food web**, **food chain**, **trophic level**)

food miles - A calculation of the distance and mode of transport foodstuffs have traveled throughout the complete production process and until they reach the consumer. These calculations enable simple comparisons to be drawn between the use of energy and the level of **greenhouse gas** emissions associated with different food products.

food vacuole - A structure inside certain **cells** where food is digested.

food web - The transfer of food energy from **organisms** in one nutritional level to those in another. Food webs stress the feeding relationships between species.... A sequence of **organisms**, each of which uses the next, lower member of the sequence as a food source. ...All the interactions of **predator** and **prey**, included along with the exchange of **nutrients** into and out of the soil. These interactions connect the various members of an **ecosystem**, and describe how energy passes from one **organism** to another... The interlocking pattern of feeding relationships in a **community**.... Sometimes known as the **food chain**.... The conceptual web of food connections between **organisms** in an **ecological community**. **Primary producers** create **organic** matter and are eaten by grazers (**herbivores**), which are in turn eaten by **carnivores**. Formerly, this was called a **food chain**, but recognition that such links are often nonlinear led ecologists to change this to food web. (See **ecological pyramid**, **food chain**, **food pyramid**, **trophic level**)

foothill - A hill near the base of a mountain or mountain range...Foothills are the lower slopes of a mountain range.

forage - (verb) to search for and gather food...(noun) food for animals.

forb (plural: forbes) - A small, upright soft-stemmed or non-**woody plant** with broadleaves; the **growth form** of many common wildflowers.... Any **herbaceous** plant other than the graminoids (those in the Gramineae, true grasses), Cyperaceae (**sedges**) and Juncaceae (**rushes**) families), *i.e.*, any non-**grass**-like plant having little or no woody material within it.... An **herbaceous** plant other than a **grass, sedge**, or other **grass** like plant....A **broadleaf herbaceous** plant... A broad-leafed, **herbaceous** plant typical of a **grassland** or **meadow**; some examples of forbes are clover, common ragweed, prairie coneflower, and smooth aster. **Grasses** are not included in the group of forbes.... A broad-leaved herbaceous plant.

force - Any external agent that causes a change in the motion of a free body, or that causes stress in a fixed body.

forecrown - See **crown**.

forcing mechanism - A process that alters the energy balance of the **climate system**, *i.e.* changes the relative balance between incoming solar radiation and outgoing infrared radiation from Earth. Such mechanisms include changes in solar irradiance, volcanic eruptions, and enhancement of the natural **greenhouse effect** by emission of **carbon dioxide**.

foreshortening - Foreshortening is when an object appears compressed when seen from a particular viewpoint, and the effect of perspective causes distortion. For example, when looking up at a perched bird with a reasonably long tail, it can still appear to have a short tail...Refers to the visual distortion of an object or person when viewed at an extreme angle...Refers to the visual effect of a three-dimensional object rendered on a two-dimensional surface. In order to give the illusion of depth an object is made shorter than it actually is because it is angled toward the viewer.

forest - A **community** dominated by dense, extensive **tree** cover.... Plant **community** predominately of **trees** and other woody plants, growing more or less closely together....**Ecosystem** characterized by more or less dense and extensive **tree** cover, *i.e.*, larger than what might be called a grove.

- **aguajal** (plural: aguajales) - Local name in Amazonian Peru for a **swamp** dominated by *Mauritia flexuosa* palms.
- **ancient forest** - see **old-growth forest**.

- **broadleaf evergreen forest** - A kind of forest where the trees are **evergreen** but with broad leaves, not needle-like leaves (such as in pines). **Tropical moist forests** are examples.
- **broadleaf forest** - Forest **vegetation** in which 75% or more of the forest **canopy** is made up of **broadleaf trees**.
- **caatinga** - A Brazilian term for highly seasonal (with prolonged dry season) **deciduous** forest dominated by spiny trees and **shrubs**. Found extensively in eastern Brazil.
- **cerrado** - A Brazilian term (meaning closed) for a dense, dry **woodland** of small-stature trees and **shrubs** amidst **savanna**.
- **Chaco** - An extensive flatland of dry **shrubby woodlands**, **marshes**, **gallery forest** and palm **savanna** found mostly in Bolivia, Paraguay and Argentina.
- **chamizal** - A local name in northern Amazonian Peru for the most stunted **white-sand forests**, located on sites with poor drainage or occasional natural fires. (See: **white-sand forest**, *varillal*, *irapayal*)
- **closed forest** - A **community** completely dominated by the **tree** stratum due to the closure of the **crowns**. (See: **canopy closure**)
- **cloudforest / cloud forest** - A mountain forest that exists in perpetual mist, characterized by stunted trees with an abundance of **epiphytic** growth..... A **cloud forest**, also called a fog forest, is a generally **tropical** or **subtropical evergreen montane moist forest** characterized by a high incidence of low-level cloud cover, usually at the **canopy** level. Cloud forests often exhibit an abundance of **mosses** covering the ground and **vegetation**, in which case they are also referred to as mossy **forests**. Mossy **forests** usually develop on the saddles of mountains, where moisture introduced by settling clouds is more effectively retained. Typically, there is a relatively small band of **altitude** in which the **atmospheric environment** is suitable for cloud forest development. This is characterized by persistent mist or clouds at the **vegetation** level, resulting in the reduction of direct sunlight and thus of **evapotranspiration**. Trees in these regions are generally shorter and more heavily stemmed than in lower **altitude forests** in the same regions, and the moisture promotes the development of an abundance of vascular **epiphytes**. This results in abundant **moss** and **fern** covering, and frequently flowers such as orchids may be found. Soils are rich but **boggy**, with a preponderance of **peats** and **humus**. Within cloud forests, much of the **precipitation** is in the form of fog drip, where fog condenses on **tree leaves** and then drips onto the ground below. The definition of cloud forest can be ambiguous, with many countries not using the term (preferring such terms as Afromontane forest and upper montane rain forest, or more localized terms such as the Peruvian **yungas**, and the laurisilva of the Atlantic Islands), and

occasionally subtropical and even temperate forests in which similar meteorological conditions occur are considered to be cloud forests. (See: **humid montane forest**)

- **conifer forest** - See **needleleaf forest**.
- **dry forest** - A forest of short-stature trees that tend to drop their leaves during the dry season. (See: **tropical deciduous forest, tropical dry forest, sclerophyll forest, thorn forest**)
- **floodplain forest** - Forest growing on terrain periodically flooded by the rising waters of a river. In Amazonia this forest type is known as *várzea*.
- **gallery forest** - A narrow fringe of forest closely confined to the margin of a **stream** running through otherwise unforested **terrain**. Synonym of galleria.... A generally lush forest that grows along a tropical riverbank and **floodplain**.
- **hardwood forest** - See **broadleaf forest**.
- **humid montane forest** - Tropical forests that cover wet mountain slopes from about 500 meters elevation up to **treeline**. It is lower in stature than **tropical evergreen forest**, rarely exceeding 30 meters in height. The stature of the forest also tends to decrease with increasing elevation or steepness of terrain. The **canopy** is often broken, and branches and trunks of many trees are covered in moss, **bromeliads**, orchids, ferns and other epiphytes. **Tree** species composition of humid montane forest usually changes significantly above 1500-1800 meters in elevation, above which point **epiphytes**, including **bryophytes**, and **lichens** also become more prevalent. Below this elevation the humid montane forest contains significant elements of the lowland **flora** and is transitional between lowland **terra firme** forest and true **montane forest**. Also known as **montane evergreen forest**, and includes forests covered by the term **cloud forest**. Example: the forests that cover the eastern slopes of the Andes and outlying ridges of Colombia, Ecuador, Peru and northern Bolivia.
- **igapó** - Seasonally flooded **gallery forest** along **blackwater rivers** such as the Rio Negro in Brazil.... Forested areas flooded by **blackwater rivers**. (See: **blackwater river, blackwater stream, rainforest, tropical lowland evergreen forest, terra firme, várzea, igapó, flooded tropical evergreen forest, white-sand forest, tropical deciduous forest**)
- **iripayal** - A local name in northern Amazonian Peru for an open-**canopy** forest on poor soils with a palm-dominated **understory**. It may occur on very weathered **clays** or on soils with a sandy mixture. (See: **white-sand forest, chamizal, varillal**)
- **jungle** - A colloquial term lacking a precise biological or **taxonomic** definition. It is often used to describe a tangled, dense **successional ecosystem** consisting of many fast-growing, light-loving species, but is also at times used to refer to **rainforest** or **tropical rainforest**.

- **krummholz** - This term, from the German for “bent wood”, refers to the stunted, **shrub**-like form characteristic of some **conifer tree** species when grown under extreme **environmental** stress, especially at high elevation. An example would be the Balsam Fir, *Abies balsamea* growing at **treeline** in the mountains of the northeastern United States.... A German term meaning "bent wood" for the twisted and distorted woody **vegetation** characteristic of mountain **timberlines**....**Scrubby**, stunted **trees**, often forming a characteristic zone at the limit of tree growth in mountains. ...The belt of discontinuous **scrub** or groveland at **alpine timberlines**, composed of **species** which have the **genetic** potential of the **tree** life-form, but in this belt are both strongly dwarfed and misshapen.
- **mangrove forest** - The mangrove forest habitat is located along **tropical** and **subtropical estuaries** and coastal **intertidal** zones, often fringed seaward by sea grass habitat and landward by **saltmarsh** habitat. There are many mangrove species, coming from 20 different plant **families**. Mangrove trees are salt-tolerant and many ‘breathe’ through **lenticels** on **aerial roots**. Mangrove forests play a key role as nurseries for many types of **marine fauna**.
- **mature floodplain forest** -
- **mature forest** - A wooded area in which the **dominant** trees have reached their maximum size....A forest which has reached the age of utilization specified in a silvicultural plan. The meaning differs with the object of management.
- **mixed forest** - A forest composed of two or more **species** of **trees**....Often refers to a forest composed of both needleleaf and **broadleaf trees**.
- **mixed mesophytic forest** -A forest, having well-drained, **acidic** soil consisting of a mix of sand and clay and supporting a rich diversity of trees, including tulip poplar, beech, white oak, sugar maple, yellow buckeye, white basswood, and hemlock.
- **montane evergreen forest** - See **humid montane forest**.
- **moist forest** - A seasonal **tropical** forest receiving not less than 100 mm. (approximately 4 inches) of rainfall in any month for two out of three years, frost-free, with an average temperature of 24°C (75°F) or more. (See: **rainforest, tropical rainforest**)
- **needleleaf forest** - Forest **vegetation** in which 75% or more of the forest **canopy** is made up of needleleaf trees.
- **old-growth** or **old-growth forest**- Forest **ecosystems** characterized by **vegetation** and associated animals requiring the oldest and most mature successional stages.... **old growth forest**, also called **primary forest, ancient forest, virgin forest**, or

primeval forest, is an area of forest that has attained great age and so exhibits unique biological features. Old-growth forests typically contain large live trees, large dead trees (sometimes called "snags"), and large logs. Old-growth forests usually have multiple vertical layers of **vegetation** representing a variety of tree species and age classes.... A natural, usually **mature forest** never harvested and virtually uninfluenced by human activity. These forests have the characteristic of little or no perceived human influence.... Forests that have persisted for centuries without stand-replacing disturbances. These typically have old trees, uneven-aged, multi-layered **overstories**, and abundant coarse woody debris. This term is defined more precisely in many different ways depending on the purpose; there is no universally agreed-upon definition.

- **open boreal forest** - Mosaic of **trees** (rarely *krummholz*) and a deep **lichen** mat (mostly *Cladonia* spp.) with **herbs** and **shrubs** derived from a **boreal-type vegetation**. The proportion of **trees** to **lichen** mat gradually changes southward till **trees** become dominant and there is a dense needleleaf forest with a **moss**, rather than a **lichen understory**....The widespread forest within the subarctic zone between the forest line and closed **boreal** forest. Synonym of subarctic woodland, open woodland, and lichen-woodland.
- **otsegoa** - In the upper Rio Urubamba Valley of southeastern Peru, a Machiguenga term for the dry **river** courses, side branches, and braids of narrow, high-gradient **rivers** that carve up the **river** margin forests into a patchwork of **successional habitats** of varying ages and structures. The structure and distribution of otsegoa **habitat** are spatially and temporally variable. Although these otsegoa often fill during the rainy season and retain pools of standing water during the dry season, many are partially or fully overgrown with **successional species** such as *Cecropia*, Balsa (*Ochroma* sp., Bombacaceae), and wild cane, *Gynerium sagittatum*. In some cases, established groves of **riverine** forest shade an open **understory** scraped clean by rainy-season **floods**, but the **understory** can also be overgrown with dense, viney, rank **vegetation**. ...In places, otsegoa forests are similar in structure to the well-known primary **successional habitats** described from the Manu Biosphere Reserve area in southeastern Peru. Nevertheless, they are more **heterogeneous** and patchily distributed than the *Gynerium* **canebrakes** and **transitional forest habitat** types familiar to observers along the wider Manu and Madre de Dios rivers. Otsegoa forests seem to predominate at slightly higher elevations closer to the Andes, where *Ficus* (Moraceae), *Cedrela* (Meliaceae), and *Erythrina* species are less prominent members of the **canopy tree community** than in the **transitional forests** along lowland, meandering rivers, such as the middle and lower Rio Manu. *Gynerium* cane is a common element in the **understory** of otsegoa forests, and often forms isolated patches between rocky river beds; it does not tend to occur in the broader, more **homogeneous** stands referred to as the *zabolo* **habitat** type. In some places, patches of *Guadua* (Graminae) **bamboo** are also found in the **understory** of otsegoa forests....These otsegoa forests form the preferred **habitat** for Selva Cacique, *Cacicus koepckeae*.

- **overmature forest** - A forest in which net growth has almost ceased due to decay and deterioration of older trees. (See: **old-growth forest**)
- **Polylepis forest** - *Polylepis* (family Rosaceae) is a **genus** of low **trees** with reddish, rugged, scaly bark. They grow in more or less open groves at high elevations in the Andes of Ecuador, Peru and Bolivia. Typically, they are found well above other **forest**, and so usually are surrounded by **scrub** or **grass**. A small set of bird species is restricted to these unique **woodlands** - e.g. Giant Conebill (*Oreomanes fraseri*), Tawny Tit-Spinetail (*Leptasthenura yanacensis*), White-browed Tit-Spinetail (*Leptasthenura xenothorax*), White-cheeked Cotinga (*Zaratornis stresemanni*), Ash-breasted Tit-Tyrant (*Anairetes alpinus*).
- **primary forest** - See **old-growth forest**.
- **primeval forest** - see **old-growth forest**.
- **rainforest / rain forest**- A very wet, essentially non-seasonal forest. (Definitions vary. This is the definition from *A Neotropical Companion*) ... **Evergreen** forest associated with a climate characterized by continual high humidity and abundant rainfall and a short or no dry season. NOTE: Commonly applied, in a restricted sense, to **tropical** forests with an annual rainfall 80 inches and abundant **epiphytes** and **climbers**. (See: **moist forest**, **tropical rainforest**, **temperate rainforest**)
- **restinga** - A restinga is a distinct type of coastal tropical and subtropical moist broadleaf forest found in Brazil. Restingas form on sandy, acidic, and nutrient-poor soils, and are characterized by medium sized trees and shrubs adapted to the drier and nutrient-poor conditions.vThe World Wildlife Fund distinguishes two restinga ecoregions, the Atlantic Coastal and the Northeastern.
 - The Atlantic Coast restingas are found in several enclaves along Brazil's east coast from Rio Grande do Norte state in northeastern Brazil to Rio Grande do Sul state in southern Brazil, covering an area of 7,900 square kilometers (3,100 square miles) that extends from the tropics to the subtropics. Its flora and fauna shares affinities with the humid Atlantic forest of eastern Brazil.
 - The Northeastern Brazil restingas are found along the northern coast of Brazil, in Maranhão, Piauí, and Ceará states. Its flora and fauna are distinct from that of the Atlantic Coast restingas, with greater affinities to the moist forests of Amazonia.
 -An area containing scrubby vegetation typical of sand marine barrier islands.
- **savanna woodland** - A more or less open, **tropical** or **subtropical** woodland having an **undergrowth** mainly of grasses, the trees being of moderate height and generally **deciduous** or, if **evergreen**, tending to have small **leaves**. (See: **savanna**, **Cerrado**)
- **sclerophyll forest**: A tall open forest dominated by plants which have **sclerophyll leaves**. These **leaves** are stiff and toughened with a reduced surface area to minimize

water loss in regions of low or irregular rainfall. Dry sclerophyll forests are typically up to 30 meters in height with medium **canopy** cover, adapted to low **nutrient** soils, and resistant to fire. Wet sclerophyll forests are typically taller, to 60 meters, and occur on more fertile soils in moister regions or sheltered valleys. (See: **tropical deciduous forest, tropical semi-deciduous forest, dry forest, thorn forest**)

- **second growth - Vegetation** that covers an area after the removal of the original **vegetation**, as by cutting or fire... Forest growth that has come up naturally after some drastic interference (*e.g.*, wholesale cutting, serious fire, or **insect** attack) with the previous forest crop...Refers to regenerating forest. Most second growth is the result of human disturbance, but second growth also is a feature of naturally disturbed **habitats**, such as landslides. Second growth forests differ in **species** composition from adjacent undisturbed forests and are dominated by a small number of rapidly growing **species** (including **pioneer species**). (See: **secondary succession, pioneer species**)
- **secondary forest - Second growth** forest...A **successional** forest regenerating after the removal of the original forest by cutting, fire, etc.... Forest growth that has come up naturally after some drastic interference (*e.g.*, wholesale cutting, serious fire, or **insect** attack) with the previous forest crop... Refers to regenerating forest. Most secondary forest is the result of human disturbance, but secondary forest also is a feature of naturally disturbed habitats, such as landslides. Second growth forests differ in **species** composition from adjacent undisturbed forests and are dominated by a small number of rapidly growing **species** (including **pioneer species**).
- **taiga** - The subarctic **coniferous** forests of North America and Eurasia, located south of the **tundra**.... Northern Hemisphere (Eurasia, North America) cold-temperate **coniferous** forest **environment, habitat** and **ecological communities** (**evergreen conifers** like pine, spruce, and fir trees, etc.).... A Russian term meaning "land of little sticks," and originally applied to the open **conifer lichen woodland** between the **boreal conifer forest** and the **tundra**.....**Ecosystems** adjacent to Arctic **tundra** in which Balsam Fir, *Abies balsamea*, Black Spruce, *Picea mariana*, Tamarack, *Larix laricina* or Paper Birch, *Betula papyrifera* are characteristic **trees** and **muskeg, fen,** and **bog** are prominent features of the **landscape**. Sometimes narrowly applied to just the Arctic **timberline** transition zone; sometimes extended to all subarctic and even subalpine **forests** of the north **temperate** zone.....The wooded **vegetation** of **boreal-subarctic latitudes** that occupies the subarctic climatic zone adjacent to the treeless **tundra**.... The open northern part of the **boreal forest**. It consists of open **woodland** of **coniferous trees** growing in a rich floor of **lichen**, and is generally cold and swampy.
- **temperate rainforest** - A type of forest found in only a few places around the world, such as the Pacific temperate rainforest on the West Coast of North America. These forests are often dominated by **coniferous** trees adapted to wet climates and cool **temperatures**. ... Moist closed-**canopy evergreen** forest in **temperate** climates. These mid-latitude **rainforests** usually have a simpler structure and composition than

tropical rainforests, often with only a single **canopy**, a lower diversity of species, smaller-leaved slender trees. **Ferns** are usually abundant but palms rare. Temperate rainforests may interface with subtropical, wet **sclerophyll forest**, broadleaf or evergreen mixed forests. (See: **rainforest**, **tropical rainforest**)

- **terra firme** - **Tropical rainforest** or **tropical lowland evergreen forest** on upland **terraces** that never **flood**...An area of **tropical rainforest** off the **floodplain** and thus not subject to flooding.... Forested areas of Amazonia that are too high to be flooded during seasonal inundation. Terra firme constitutes about 97% of the area of the Amazon **rainforest**, with flooded forests, *várzea* and *igapó*, comprising most of the remainder. (See: **tropical rainforest**, *várzea*, *igapó*, **transitional forest**)
- **thorn forest** - A **deciduous forest** of small thorny trees developed in a **tropical semi-arid** climate.
- **transitional forest** - A term used in Amazonia for low-lying, poorly-drained forest that is seasonally inundated by rainfall or by rain-swollen **streams**, but not by a nearby **river**. Structurally it is similar to *terra firme*. Palms are common in the **swampy** places and **bamboo** (especially *Guadua* spp.) is also conspicuous. This forest type differs from *várzea* in having a more developed undergrowth.
- **tropical deciduous forest** - A type of forest found near the Equator that experiences distinct rainy and dry seasons. Many tropical deciduous forest plants are adapted to withstand high temperatures and seasonal **droughts**.... Forest of variable stature, but rarely exceeding 20-25 meters in height. Most **species** of **trees** lose all of their leaves during the dry season, which is usually pronounced where tropical deciduous forests are found, but these forests may contain some **evergreen species**, especially along **river** courses or at higher **elevations**. Example: the forests of the west slope of the Andes in northwestern Peru, from Tumbes south to Cajamarca. Also known as **tropical dry forest**. (See: **tropical semi-deciduous forest**, **dry forest**, **sclerophyll forest**, **thorn forest**)
- **tropical dry forest** - See **tropical deciduous forest**.
- **tropical lowland evergreen forest** - A more technical term for **tropical rainforest**.
- **tropical rainforest** - Forest occurring in the **tropics** and receiving at least 2000 mm. of rain per year.... A type of wet forest found near the Equator that harbors the richest **diversity** of **terrestrial** plant and animal **species**.**Tropical** closed moist forests dominated by **broad-leaved evergreen trees**. The most diverse **terrestrial biome** on Earth, tropical rainforests cover only 6-7% of the surface of the Earth but are thought to contain more than half of all **species**. The treetops are layered into several **canopies** which form a dense **habitat** and prevent 90-99% of the sunlight from reaching the ground. Tropical rainforests typically receive some 2000 mm. of annual rainfall without distinct changes in **climate** between seasons. Tropical rainforest **biodiversity** is based on a very tight recycling of mineral **nutrients**, most of which

(80+%) are tied up in the **vegetation** and recycled by means of **symbiotic** relationships between **microorganisms** and **host** plants. Because of natural cycling and reuse of **nutrients**, luxuriant **rainforests** can grow on soils that an agriculturist would regard as infertile unless supplied with large amounts of fertilizers. ... An **evergreen woodland** of the **tropics** distinguished by a continuous **leaf canopy** and an average rainfall of about 100 inches per year. Rainforests play an important role in the **global environment**. The Earth sustains life because of critical balances and interactions among many factors. Were there not processes at work that limit the effects of other essential processes, Earth would become uninhabitable. Destruction of tropical rainforests reduces the amount of **leaf** area in the **tropics**, and consequently the amount of **carbon dioxide** absorbed, causing increases in levels of **carbon dioxide** and other **atmospheric** gases. It is estimated that cutting and burning of **tropical forests** contributes about 20 percent of the **carbon dioxide** added to the **atmosphere** each year. The World Resources Institute and the International Institute for Environment and Development have reported that the world's **tropical forests** are being destroyed at the rate of fifty-four acres per minute, or twenty-eight million acres lost annually. Rainforest destruction also means the loss of a wide spectrum of **biological** life, **erosion** of soil, and possible **desertification**. ((See: **tropical rainforest, tropical lowland evergreen forest, terra firme, várzea, igapó, flooded tropical evergreen forest, white-sand forest, tropical deciduous forest, tropical semi-deciduous forest, transitional forest**)

- **tropical semi-deciduous forest** - A type of forest found near the Equator in the transition zone between **tropical deciduous forest** and more humid forests. (See: **tropical deciduous forest**)
- *varillal* (plural: *varillales*) - A local name in northern Amazonian Peru for a lower stature forest that occurs on sandy soil. (See: **white-sand forest, chamizal, irapayal**)
- *várzea* - A Brazilian term referring to **riverine** forests along **whitewater rivers** such as much of the Amazon and some of its tributaries...Várzea is a Portuguese-Spanish term referring to areas of forested land regularly inundated by seasonal **river floods**. Typically, it refers to those areas flooded by **whitewater rivers**, contrasted with areas flooded by **blackwater rivers** which are called **igapó**. Várzea and **igapó** have distinctive **flora** and **fauna** adapted to the changing **environment**; a **biota** that is different from that inhabiting areas that are never flooded, called **terra firme**. The flooded forests constitute about three percent of the area of **Amazonian rainforest**, while **terra firme** comprises most of the rest. (See: **tropical rainforest, tropical lowland evergreen forest, terra firme, várzea, igapó, flooded tropical evergreen forest, white-sand forest, tropical deciduous forest, transitional forest**)
- **virgin forest** - See **old-growth forest**.
- **white-sand forest** - In South America, forests growing on pure white sands, or a white sand mixture. Forests growing on such substrates typically have reduced species richness (although they are rich in endemic or habitat-specific species) and

often are low in stature, as well. **Streams** that drain white-sand areas carry heavy **tannin** loads and the water is often the color of dark tea or coca-cola. These are referred to as blackwater streams. White-sand forests are most developed on the north bank of the Amazon River, particularly along the Rio Negro, but also further to the west in northern Peru. They are also prominent in the Guianas (Guyana, Suriname and French Guiana). (See: **blackwater river**, **blackwater stream**, *varillal*, *chamizal*, *irapayal*)

- **woodland** - Land that is covered with **trees** and **shrubs**. Woodland is often considered to be composed of trees of low stature than those found in forest.
- **zabolo** - A Machiguenga word referring to a **riparian successional habitat** or type of river-edge forest of western Amazonia characterized by *Cecropia peltata*, *Ochroma* sp., *Erythrina* sp., *Gynerium sagittatum*, *Heliconia* sp., and abundant vines.

forest floor - The bottom level of the forest, which receives little sunlight. ...A loose term for the deposit of dead plant matter on the mineral soil surface in a forest. Includes litter and unincorporated **humus**. (See: **duff**.)

forest gap - A gap in the forest caused by a treefall. Also known as a **treefall gap** or **treefall clearing**. ... An opening, large or small, natural or **anthropogenic**, in the **canopy** creating high light intensity.... A space in a **canopy** created by the partial or whole death of a plant.

forest limit - The upper elevational or **latitudinal** limit beyond which natural **tree** regeneration cannot develop into a closed forest stand....The general upper elevational or **latitudinal** limit of contiguous forest growth.... The limit of forest **vegetation** covering 50% or more of the landscape. Compare **treeline** and **tree limit**. Also known as **forest line**. (See: **treeline**, **tree limit**, **timberline**)

forest line - See **forest limit**.

forest litter - see **leaf litter**.

forestry - The art, science, and practice of managing forest landscapes to provide a sustained production of a variety of goods and services for society. ... The total system of managing and using for human benefit the **natural resources** that occur on and in association with land with trees.

form - In **biology**, a synonym of **subspecies** or **race**.

formation - A group of **communities** in a single region or continent with similar physiognomy (structure) and related climatic and **environmental** conditions. ...One of several regional or continental expressions of a given **biome**....A combination of **synusia**.

formic acid - A colorless pungent, vesicatory (blister-causing) liquid acid. CH_2O_2 , found naturally in ants and many plants.

fossil - Hardened remains or traces of plant or animal life from a previous geological period preserved in the Earth's crust.

fossil fuel - Fuel derived from ancient **organic** remains, *e.g.*, **peat**, coal, crude oil, and natural gas.... Any hydrocarbon deposit that can be burned for heat or power, such as petroleum, coal, and natural gas.... A fuel that comes from the remains of plants and animals and is formed beneath the surface of Earth over millions of years.

fossorial - Having an adaptation for digging or burrowing, such as the large front feet of a mole or the beak of a kingfisher.... An animal adapted for burrowing or digging.... A reference to an underground lifestyle such as that lead by moles... Pertaining to a subterranean (burrowing) to life style (Examples: moles, mole rats).... Adapted for digging or burrowing. It often refers to animals that live predominantly underground. Pocket gophers are good examples of fossorial **mammals**.

founder effect - The founder effect is an **evolutionary** phenomenon. Founder effects arise when an isolated **environment** is invaded by only a few members of a **species**, which then multiply rapidly. In the extreme case, a single fertilized female might arrive in a new **environment**. It is a type of **population** bottleneck.

The result of the small number of founders is that there is a sharp loss of **genetic variation** or **genetic diversity** compared with the parent **population**. As a result, the new **population** may be distinctively different, genetically and **phenotypically**, to the parent **population** it derived from. In addition, there is a raised probability of **inbreeding**, resulting in an unusual number of defects due to **recessive genes**.

Founder effects are common in island **ecology**, but the isolation need not be **geographical**. ... **Evolutionary adaptation** and **speciation** which results in rapid change (**punctuated equilibrium**) due to sudden mass mortality or **genetic** partitioning, for example **geographical separation**, natural disasters or other **evolutionary** bottlenecks. (See: **founder principle**)

founder principle - A few individuals starting a new **population** may represent an atypical sample of the parent species' **gene** pool. This "sampling error" leads to the **founder effect**: rapid changes in **allele** frequencies in the **colonizing population** and divergence from the parent **population**. (See: **founder effect**)

fragmentation - See **habitat fragmentation**.

frass - Solid fecal material produced by **insects**.... Excrement of an **insect**, usually mixed with plant debris.... **Insect** excrement or castings, including chewed wood and other debris.... Solid insect excrement of **insects**, particularly **larvae**; that of wood-eating **insects** such as bark beetles can be called boring dust.... During large-scale attacks of a tree by caterpillars, their frass can sometimes be heard and seen as it falls from the **forest canopy**.

free-living - Able to live on its own, not **parasitic** or **symbiotic** on another **organism**....
Non-**parasitic**.....Capable of moving about, not fixed to a **substrate**.

freezing rain / drizzle - Occurs when super cooled rain or drizzle freezes upon contact with surfaces such as the ground, trees, power lines, etc. (See: **hail**, **sleet**, **graupel**)

frequency index - Any measure of the likelihood of encounter of a particular **species** during a specified sampling procedure.

freshwater - Water that is not salty; this term also refers to organisms that live in water resulting from precipitation, such as a river, stream, lake, or pond....Water that contains less than 1,000 milligrams per liter (mg/L) of dissolved solids; generally, more than 500 mg/L of dissolved solids is undesirable for drinking.... Water that is not salty. As an adjective, of, relating to, or living in water that is not salty.... Water with less than 0.5 parts per thousand dissolved salts.

froglet - Newly transformed frog (without tail) from a **tadpole**.

frond - The **leaf** of a **fern**....A large **compound leaf** of a palm.

front - In **meteorology**, the transition zone between two different air masses..... a boundary between two different air masses. The difference between two air masses sometimes is unnoticeable. But when the colliding air masses have very different temperatures and amounts of water in them, turbulent weather can erupt. A cold front occurs when a cold air mass moves into an area occupied by a warmer air mass. Moving at an average speed of about 20 mph, the heavier cold air moves in a wedge shape along the ground. Cold fronts bring lower temperatures and can create narrow bands of violent thunderstorms. In North America, cold fronts form on the eastern edges of high pressure systems.

A warm front occurs when a warm air mass moves into an area occupied by a colder air mass. The warm air is lighter, so it flows up the slope of the cold air below it. Warm fronts usually form on the eastern sides of low pressure systems, create wide areas of clouds and rain, and move at an average speed of 15 mph.

When a cold front follows and then overtakes a warm front (warm fronts move more slowly than cold fronts) lifting the warm air off the ground, an *occluded front* forms. (See: **warm front**, **cold front**, **frontal system**)

Classification of fronts - Four of the six types of air masses that surround the Earth influence the weather in North America. Depending on the season, then, meteorologists daily deal with up to four types of baroclinic zones, with strong thermal and moisture gradients. Generally speaking, each of these zones is identified according to the colder air mass, which is almost always on the north side.

Arctic, Arctic 2 or A2 Front - An arctic front separates a continental arctic air mass from a maritime arctic air mass, to the south. It is a clear separation between dry and very cold air and less cold, less dry air. This main front is found on all

analysis charts, and is more common in winter, because of the invasion of continental arctic air. In summer, on the other hand, this air remains over the pole, not even reaching as far south as the far north of Canada. In Canada we make a slight distinction, however: whenever continental polar air reaches south of maritime arctic air, it is called arctic 2 air, or A2 air. This distinction is necessary because of the presence of the arctic front that divides maritime arctic and continental polar air.

Maritime Front - Since there is no continental polar air mass, this front actually divides the maritime arctic and maritime polar air masses, the main difference between the two being in their temperature and moisture content. In winter, the transition zone from snow to rain or from freezing rain to rain is often near this front, a fact that simplifies meteorologists' work, in particular when it comes to pinpointing icing zones associated with freezing rain.

Polar Front - In three-dimensional terms, the combination of cold air masses forms an enormous dome of cold air, with the outer part made up of maritime polar air, covering the top of the globe. This dome is surrounded on all sides by warmer tropical air; in the far northern latitudes, the tropical air is much colder than in the lower latitudes. The polar front, which sits north of the maritime tropical air, thus essentially separates the polar and tropical air masses. Given the strong temperature and moisture contrasts in winter between these masses, the polar front generates heavy precipitation and sometimes violent storms.

Stationary Front - A stationary front occurs when the cold and warm air are moving parallel to one another. Only an upper-air disturbance, caused by a short wave, vortex effect or a trough can initiate movement. The cold air that descends southward will push beneath the warm air and lift it, creating a low with its own cold and warm fronts. The resulting rising movement generates clouds and precipitation. Synoptic-scale (large-scale) systems are in fact the product of stationary fronts.

Cold Front - A cold front is that section of a frontal system where the cold air is moving more quickly than the warm air. It is represented on charts by a blue line or a line of small triangles pointing in the direction of movement. A frontal zone is not a perfectly straight wall. When cold air pushes horizontally against warm air, the warm air is automatically lifted. This phenomenon creates a "scraper" effect, as the cold air pushes under the warm air. The wedge of cold air becomes progressively thicker as the cold front pushes into the warm air mass. Because of the frictional drag on the lower levels of the advancing cold air, the cold air dome tends to be relatively steep in this region, with a slope generally of about 1:50. Since the resistance of the warm air near the ground depends directly on surface friction, the weaker the friction the steeper the slope. As the cold front advances, it systematically initiates condensation, and clouds and precipitation can be seen along its length. The greater the moisture and instability, the greater the risk of storms, even violent ones... but clouds are not always signs of frontal activity.

Both the entire transition zone and the sloping frontal surface are referred to as the "front."

Warm Front - A warm front is that part of a frontal system that moves so that the warmer air mass pushes against the colder air mass. In this situation, as the warm air climbs over the cold air, the slope of the frontal surface is inverted. Since the surface friction is much stronger, the slope is considerably shallower, about 1 in 200 km. Warm fronts are always indicated by a red line, or by half-circles indicating the direction of movement.

Occluded Front and Trowal - The cold front of an intensifying weather system picks up speed and catches up with the warm front. When the cold front reaches the warm front, the warm air is caught and squeezed more and more between the two fronts. It will be lifted and the system becomes occluded, producing what is known as a trowal ("trough of warm air aloft"). In the cold air underlying the trowal, a weak front may form, stretching from its base to the surface. This is called an occluded front. This front is a narrow transition zone between the two cold air masses that have created the occlusion.

There are two kinds of occluded fronts. If the advancing part of the cold air is colder than the retreating part and lifts the warm front, this is called a cold-front type occlusion. In the reverse situation, when the cold front climbs all along the warm frontal surface, the term warm-front type is used. Note that in a cold-front type occlusion, the base of the upper-air warm air trough is located behind the surface occlusion, while in a warm-front type occlusion, the base is ahead of the surface front.... An occluded front is a composite of two fronts formed as a cold front overtakes a warm front. A cold occlusion results when the coldest air is behind the cold front. The cold front undercuts the warm front and, at the Earth's surface, coldest air replaces less-cold air....A warm occlusion occurs when the coldest air lies ahead of the warm front. Because the cold front can not lift the colder air mass, it rides piggyback up on the warm front over the coldest air.

Upper Cold Front - As cold air moves it may encounter pools of cold air trapped in hollows or ride over a shallow layer of colder air on the surface. The leading edge of the advancing cold air is called an upper cold front. There is another type of upper cold front, when cold air advances much more rapidly in the lower levels than it does aloft and causes a shallow layer of cold air to spread out along the ground for some distance ahead of the main dome of cold air. The line along which the surface of the cold air abruptly steepens is called an upper cold front.

Upper Warm Front - The basic concept of the upper warm front is similar to that of the upper cold front, except that a station located in the colder air does not experience a change of air mass, since the cold air retreats and the warm air advances overhead. There are cases in which the frontal surface of the retreating cold air is almost flat for some distance ahead of the surface front and then abruptly steepens. The line along which the surface of the retreating cold air abruptly steepens is also called an upper warm front.

frontal shield - In birds, an area above the bill which is featherless; seen in several species of the Family Rallidae.

frontal system - The transition zones between two separate **air masses**, called frontal or baroclinic zones, are divided into **fronts**. **Fronts** are as large as real weather systems, and can be several thousand kilometers long and wide. They move at different speeds, since each **air mass** pushes them along at its own rate....By definition, a frontal system includes its own low, bringing foul weather: low cloud, **precipitation**, icing, turbulence, storms and tornadoes. (See: **warm front, cold front, front**)

frost - A covering of ice produced by **water vapor** freezing on exposed surfaces when the air temperature falls below the frost point....Ice crystals formed by deposition of **water vapor** on a relatively cold surface.

frost action - The weathering process caused by repeated cycles of freezing and thawing the ground in the presence of water....Freezing and thawing of soil moisture.

frost heaving - The lifting of a surface by the internal action of freezing moisture. It generally occurs after a thaw when the soil is filled with water droplets and when a sudden drop of temperature below freezing changes the water to ice crystals with consequent expansion and upward movement of the soil. (See: **congeliturbation, cryoturbation**)

frost line - The depth at which water contained in soil will not freeze.

frost ring- A zone of injured **cambium** tissue caused by frost.

fructification - Fruiting body.

fructivore - An animal that eats primarily **fruit**. Also known as a **frugivore**.

frugivore - An animal that eats primarily fruit. Also known as a **fructivore**.

frugivorous - Feeding mainly on **fruit**.

fruit - Noun - In **botany**, a mature **ovary**.... The ripened reproductive body of a **seed** plant (**Angiosperm**).... The **seed**-bearing part of a plant, often edible, colorful and fragrant, produced from a **floral ovary** after **fertilization**.... The mature, ripened **ovary** containing the **seeds** of an **Angiosperm**. Verb - To bear fruit.

fry - Recently hatched fish.

fumarole - A hole in the ground through which gases and hot vapors pass; located in a **volcanic** region.

fundamental niche - The fundamental **niche** of a **species** includes the total range of **environmental** conditions that are suitable for existence without the influence of **interspecific competition** or **predation** from other **species**. (See: **niche**, **realized niche**)

fungal - Of or referring to a **fungus** or **fungi**.

fungi (singular: **fungus**) - **Molds, mildews, yeasts**, mushrooms, and puffballs, a group of **organisms** lacking in **chlorophyll** (*i.e.*, are not **photosynthetic**) and which are usually non-mobile, filamentous, and multicellular. Some grow in soil, others attach themselves to decaying trees and other plants whence they obtain **nutrients**. Some are **pathogens**, others stabilize sewage and digest composted waste. ... Simple plant-like **organisms** that lack **chlorophyll**. They obtain their nutrition from living on or in other **organisms** (parasitically), from living with other **organisms** symbiotically (as in **lichens**, or the **microscopic mycorrhizae** which live off the tree, while fixing nitrogen for the tree), or by breaking down dead **organic** materials (saprophytically). Simple plants that lack **chlorophyll** and are composed of **cellular** filamentous growth known as **hyphae**. ... Plants that lack **chlorophyll** and derive their nourishment directly from other **organisms** (**parasitic fungi**) or from dead **organic** matter (**saprophytic fungi**). They include **molds, yeasts, mildews, rusts**, and mushrooms.... The group of plantlike organisms that do not flower and do not have **chlorophyll**, therefore requiring a **host** from which to receive nourishment; mushrooms, puffballs, and **mildew** are some examples of fungi.

fungicide - A **pesticide** used to control or destroy **fungi** on food or grain crops.... Chemical or physical agent that kills or inhibits the growth of **fungi**.... A chemical **compound** capable of inhibiting or destroying the growth of **fungi**.

fungivory - Feeding on fungus or mushrooms.

furrowed - Having grooves that run lengthwise, as in the bark of some trees.

Gaia - A hypothetical super-**organism** composed of the Earth's four spheres: the **biosphere**, **hydrosphere**, **lithosphere**, and **atmosphere**. The Greek goddess of the Earth. (See: **Gaia hypothesis**, **ecologism**, **deep ecology**, **ecocentrism**, **biophilia**, **environmentalism**)

Gaia hypothesis - The hypothesis that the Earth's *atmosphere*, *biosphere*, and its living organisms behave as a single system striving to maintain a stability that is conducive to the existence of life....An hypothesis that posits the Earth behaves as a super-**organism** with multiple **feedbacks** among **organisms** and physical processes regulating climate and Earth surface conditions to within a relatively narrow range conducive to life.... The Gaia theory of the Earth is a post-Darwinian **evolutionary** theory, which posits a set of homeostatic mechanisms as devices for self-maintenance of the Earth's **environment**. In other words, instead of passively riding the planet, living things became fully-fledged **symbiotic** partners in the shaping of the Earth. It challenges the reductionist view of the world by proposing that the world is one living system where living things transform each other in ways that actively maintain life. The essence of this proposition is that the

physical and chemical conditions of the surface of the earth, the **atmosphere** and the oceans, are conditioned by the presence of life itself. Colloquially, the sum of a series of complex systems (**biodiversity**) is more than the sum of its parts. What becomes immediately evident is that the **Gaia** hypothesis is a powerful challenge to our **ethnocentric** view of the world. We have to reassess our **environmental** responsibilities in this context. We have to take care not to violate the principles of sustainability which a global commons of air, water and soil; we have to become fully participating partners within **ecosystems** where **diversity**, not unity, is the basis of health. (See: **Gaia, ecologism, deep ecology, ecocentrism, biophilia, environmentalism**)

gaining stream - A stream in which **groundwater** discharges contribute significantly to the streamflow volume. The same **stream** could be both a gaining stream and a **losing stream**, depending on the conditions. (See: **losing stream**)

gale – On the Beaufort Wind Scale, defined as winds with speeds from 28 to 55 knots (32-63 mph). Gale force winds are often associated with the outer portion of **hurricanes**.

gall - An abnormal swelling of plant **tissue** caused by **insects, microorganisms**, or external injury.... Pronounced swelling or outgrowth on a plant, usually **insect** or disease caused.... Outgrowth or swelling of unorganized plant cells produced as a result of attack by bacteria, fungi, or other organisms.

gallery forest - A narrow fringe of **forest** closely confined to the margin of a **stream** running through otherwise unforested **terrain**. Synonym of galleria.... A generally lush forest that grows along a **tropical** riverbank and **floodplain**.

gamete - A mature sexual reproductive **cell**, as a **sperm** or **egg**, that unites with another **cell** to form a new **organism**.

game species - Any **species** of **wildlife** or fish which are normally harvested by hunters, trappers, **poachers**, and fishermen.

gamete - A sex **cell**; **sperm** or **egg**.

gametogenesis - The production of **sperm** and **egg cells**.

gametophyte - The phase of the plant life cycle that carries the **gamete** producing **organs**. In **flowering plants**, the **pollen** grain is the male gametophyte and the **embryo sac** is the female gametophyte. ...A plant or generation that bears **gametes** during the sexual life cycle... The phase of a plant's life cycle which has half the normal number of **chromosomes**.... The plant generation that produces the **gametes** and usually has a reduced **chromosome** number... In plants that undergo **alternation of generations**, a gametophyte is the structure, or phase of life, that contains only half of the total complement of **chromosomes**: The **sporophyte** produces **spores**, in a process called **meiosis**. These **spores** develop into a gametophyte....The **haploid** stage of a plant exhibiting **alternation of generations**, generates **gametes** by the process of **mitosis**.

In **botany**, a **haploid, gamete**-producing plant in the **alternation of generations**. (See: **sporophyte**)

ganglia - A cluster of nerve **cells**. In many **invertebrates**, ganglia control different parts of the body.

gap - See **forest gap**.

gap dynamics - The change in space and time in the pattern, frequency, size, and **successional** processes of forest **canopy** gaps caused by the fall or death of one or more **canopy** trees.

gap specialist - An animal or plant specially adapted to growing or living in **forest gaps** or **treefall clearings**.

gape - The area on a bird where the base of the bill joins the feathered face.

gastropod - Snails with spiral or simple shells of the **class** Gastropoda....Any of the large **class** Gastropoda, belonging to the **phylum** Mollusca, such as snails and slugs, usually with a univalve shell or no shell and a distinct head bearing sensory organs....**Organisms**, such as snails and slugs, that lack a backbone and have a stomach (gastro) that sits directly over a muscular foot (pod)...Gastropod means "stomach footed".

Gause's Law of competitive exclusion or **Gause's Law** - See **competitive exclusion principle**.

gelatinous - Having a jelly like texture.

gene - A unit of **genetic inheritance**....The basic unit capable of transmitting characteristics from one generation to the next. It consists of a specific sequence of **DNA** or **RNA** that occupies a fixed position (locus) on a **chromosome**.... The segment of **DNA** at a particular locus on a particular **chromosome** that controls production of **proteins** and **enzymes** and influences the development of a specific trait.

gene flow - The transfer or movement of **genes** from one **population** to another. There are a number of factors that affect the rate of **gene flow** between different **populations**. One of the most significant factors is mobility, and animals tend to be more mobile than plants. Physical barriers to **gene flow** are usually, but not always, natural. They may include impassable mountain ranges or vast deserts, or wide rivers....The consequence of cross-fertilization between members of a **species** which results in the spread **genes** across and between **populations**.... term for what happens when two different **taxa** **interbreed** such that their **genes** start to get mixed up.... The transfer of **genes** (actually, **alleles**) from one **population** to another.

gene pool - The collective **genetic** information contained within a **population** of sexually

reproducing **organisms**.... The totality of **genetic** information in a given **population** at a given time.... The sum total of all the different genes and forms of genes (**alleles**) found in a **population** or other collection of **organisms** within a **species**. So the gene pool contains all the **genetic variation** found among the **organisms** in question.

Genealogical Species Concept - See **species**.

genealogy - The study of the ancestry or descendants of a certain individual.

generalist - An **organism** which can survive under a wide variety of conditions, and does not specialize to live under any particular set of circumstances.... able to feed on a variety of food sources or survive under a variety of conditions.

generation - All of one type of organism living at the same time and of approximately the same age; one step in a line of descent, that is, the parents are one generation and the offspring are another.

generic - In **biology**, of or referring to **genus**.

genetic - Involving, resulting from, or relating to **genes** or **genetics**.... referring to heredity, or traits transmitted from parents to offspring.

genetic diversity - A characteristic of **ecosystems** and **gene pools** that describes an attribute which is commonly held to be advantageous for survival - that there are many different versions of otherwise similar **organisms**. The greater the genetic diversity of a **population** of **organisms**, the more easily the **population** can **adapt** to changes in the **environment**.... One of the three diversities in the biosphere (**habitat** diversity, **biodiversity**, genetic diversity) Indicates the enormous variety of genes - DNA sequence-found in **organisms**.

genetic drift - **Gene** frequency changes in a **population** over time due only to chance. Drift is observed most strongly in small **populations** and results in changes that need not be adaptive.... **Allele** frequency changes in **populations** caused by random events rather than by **natural selection**, especially the effects of sampling error on the **gene pool** of small **populations**.

genetic engineering - A process of inserting new **genetic** information into existing cells in order to modify any **organism** for the purpose of changing one of its characteristics. Sometimes called **genetic modification**. (See: **transgenic**)

genetic material - The genetic material contained in the **nucleus** of an **organism**, commonly referred to as the **genome** where the **DNA** contains the blue print for **genotypic** and **phenotypic** expression of an **organism**. The **chromosome** contains the **DNA** and the **DNA** the **genes**. ...The complex set up which is concerned with **heredity**.

genetic modification - See **genetic engineering**.

genetic mutation - An induced, inheritable change in the structure of a **gene**....A change of the **DNA** sequence within a gene or **chromosome** of an **organism** resulting in the creation of a new character or trait not found in the parental type. **Mutations** can be caused by copying errors in the **genetic** material during **cell** division and by exposure to radiation, chemicals, or **viruses**, or can occur deliberately under **cellular** control during processes such as **meiosis**. (See: **genetic drift**)

genetic variation - **Genetic diversity** in a **population**; natural differences between living things caused by **genetic** and **environmental** factors. (See: **genetic diversity**)

genetically - As a result of **genetics**.

genetics - A branch of **biology** dealing with **heredity** and **genetic** variations....The **genetic** makeup of an **organism** or group of **organisms**.... The study of the patterns of inheritance of specific traits. Study of **genetic** systems, *e.g.* **gene**, **chromosome**, **nucleus**.

genome - All the **genes** of a particular **organism** or **species**...Term used for the complete **DNA** of an **organism**.... The set of **genes** carried by an individual....The set of **genes** shared by members of a reproductive unit such as a **population** or **species**.... All the genetic material in the **chromosomes** of a particular **organism**; its size is generally given as its total number of base pairs.

genotype - The **genetic** constitution of an **organism**....The **genetic** makeup of an **organism**, as opposed to its physical characteristics ...All members of a **species** sharing the same **genetic** constitution. ... The **genes** (or **alleles**) present in an individual. (See: **phenotype**)

Genotypic Species Cluster Definition - See **species**.

genotypical - Of or referring to **genotype**.

genus (plural: **genera**) - A category of **taxonomic classification** below **family** and above **species**....A **taxonomic** category between family and **species**, and including one or more **species**. **Families** are divided into genera.... A **taxonomic** category ranking below a family and above a **species** and generally consisting of one or more **species**. If the genus has more than one **species**, they will exhibit similar characteristics and are likely to be morphologically more similar than **species** belonging to different genera. In **taxonomic** nomenclature the genus name is used, either alone or followed by a Latin adjective or epithet, to form the name of a **species**.... A **taxonomic** category containing related **species**. (See: **taxon**, **taxonomy**, **classification**)

geodynamics - The study of the Earth's motions, including rotation, tectonics, ocean **tides**, and structure (*i.e.*, core, mantle).

geographic - Of or referring to **geography**.

Geographic Information System (GIS) - A system for archiving, retrieving, and manipulating data that has been stored and indexed according to the geographic coordinates of its elements. The system generally can utilize a variety of data types, such as imagery, maps, table, etc...A computer system designed for storing, manipulating, analyzing, and displaying data in a geographic context... Computer technology for the storage, analysis, manipulation, synthesis and display of spatially referenced information. Overlay mapping allows the integration of multiple geographical or social data sets to find patterns, correlations and new information for strategic management. GIS has applications as a decision support tool for environmental impact assessment and sustainability monitoring.

geographic isolation - Geographic isolation is the physical separation of members of a **population**. **Populations** may be physically separated when their original **habitat** becomes divided, as, for example, when new land or water barriers form. Also, when part of a **population** colonizes anew, remote area such as an island, the **colonizers** geographically isolated from other **populations** of the **species**. For example, when a group of American finches colonized the Hawaiian islands, the group became geographically isolated from other **populations** of the **species**. these finches eventually gave rise to the 23 **species** of Hawaiian honeycreepers. Geographic isolation of a **population** may occur as a result of physical changes in an **environment**. When a river changes course or even when a highway is built across a field, **populations** may become geographically isolated. An example in which geographic isolation may have led to **speciation**. The desert of Death Valley, California, has a number of isolated ponds a formed by springs. Each pond contains a **species** of fish that lives only in that pond. Scientists suggest that these **species** arose through geographic isolation. **Geologic** evidence from a study of wave patterns in sedimentary rocks indicates that most of Death Valley in California was covered by a huge lake during the last Ice Age. When the Ice Age ended, the region became dry. Only small, spring fed ponds remained. Members of a fish **species** that previously formed a single **population** in the lake may have become isolated in different ponds. The **environments** of the isolated ponds differed enough that **natural selection** and perhaps **genetic drift** acted on the separate **populations**. Eventually the fish in the different ponds may have diverged so much **genetically** that they could no longer **interbreed** even if brought together. In this way geographic isolation of fishes in Death Valley probably led to the formation of new **species**. Geographic isolation, plus **reproductive isolation**, probably is the usual cause of the formation of new **species**. ... The separation of a **population** from the rest of its **species** due to some physical barrier, such as a mountain range, an ocean, or great distance. (For information on the formation of **species** see: **speciation, species, geographic speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

geographic replacement - Closely related **species** that replace one another at different locations. In North America, an example would be Black-headed Grosbeak (*Phaeucticus melanocephalus*) in the west and Rose-breasted Grosbeak (*P. ludoviciana*) in the east. In

South America an example would be Black-headed Parrot (*Pionites melanocephalus*) north of the Amazon River and White-bellied Parrot (*P. leucogaster*) south of the Amazon River. (See: **elevation replacement**)

geographic speciation - (from *Tropical Nature*, 1984, pp. 199-200) - Geographic **speciation**, also known as **allopatric speciation**, is a fairly straightforward mechanism. **Populations** become **geographically** separated from one another so that there is no longer any direct **genetic** connection among individuals in the isolated **populations**. Isolation can come about in many ways: a **species** may colonize a remote island; a large island may partially sink, creating an archipelago that strands **populations** on each island; mountain ranges may come up, separating lowland **species** on either side; or rivers may change course, separating **populations** on either bank. Through time these **geographically** isolated **populations** may change and diverge, perhaps in response to **natural selection** molding **adaptations** to local **environmental** changes, or perhaps simply as a result of random, non-adaptive **genetic drift**.

If these **isolated populations** should come back into contact, several things can take place.

- 1) If divergence among the **isolated populations** has been minimal, they will reestablish the common **breeding pool** that existed before isolation. They may retain some of their **adaptations** to local **ecological** conditions or some of their randomly evolved characteristics, but these characters will grade gradually into one another across a wide zone of contact.
- 2) If divergence in isolation has proceeded further when contact is re-established the **populations** may retain their separate **genetic** identities. There may be some mixing along a narrow zone where they come into contact, or they may come into direct contact with no signs of **interbreeding**.

When divergent **populations** reach the point where they can no longer **interbreed**, they are said to be **reproductively isolated** and are considered to be distinct **species**. When these **species** come into contact...

- 1) One may prove competitively superior to the other and gradually erode its range, perhaps to the point of **extinction**.
- 2) If the competitive abilities of each **species** depend on special **adaptations** they have made to certain **ecological** conditions, each may occupy exclusive **geographic** ranges with little or no overlap.
- 3) If the new species have diverged **ecologically** as well as **genetically**, they may be able to coexist, and the ranges may overlap broadly while the **species** maintain their **genetic** integrity.

There is no single moment when you can say isolated **populations** have become new **species**. **Speciation** is a process that can be studied at any point, and often it will not be possible to determine which **populations** are distinct **species** and which are not, particularly if they remain isolated from one another. There is no way you can make rigid definitions along a continuum; but this does not mean that **reproductively isolated**

species are hazy abstractions existing only in the minds of **evolutionary** biologists. **Species** exist as discrete, discontinuous units in the natural world if you are a naturalist studying a given place at a given time. The 500 **species** of birds that may inhabit a patch of Peruvian **rainforest** are each independent **evolutionary** lines, with their own histories, ecologies, and behaviors. With exceedingly rare exceptions, they breed only among themselves, and they are discrete natural units in any sense you care to examine them. The problem in any definition of a **species** arise when we examine **populations** spread out over time and space. (For information on the formation of **species** see: **speciation, species, geographic speciation, allopatric speciation, parapatric speciation, sympatric speciation, heteropatric speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

geographically - Of or referring to **geography**.

geography - The **topographical** features of a region... The study of the Earth and its features and of the distribution of life on the earth, including human life and the effects of human activity.... study of the Earth's surface; includes people's responses to **topography** and climate and soil and **vegetation** .

geologic - Of or referring to **geology**.

geologically - Of or referring to **geology**.

geology - The science that deals with the dynamics and physical history of the Earth, the rocks of which it is composed, and the physical, chemical, and **biological** changes that the Earth has undergone or is undergoing... The **geologic** features and processes occurring in a given region on the earth or on a celestial body.... The scientific study of the origin, history, and structure of the Earth.....The structure of a specific region of the Earth's crust.

geomorphic process - A physical and/or chemical mean which causes a modification of the Earth's **surficial** form, *e.g.*, volcanic activity, weathering, mass-wasting, **erosion**, **sedimentation**, **glacial** action, running water, etc.

geomorphologic - Of or related to **geomorphology**.

geomorphology - The study of present-day landforms, including their classification, description, nature, origin, development, and relationships to underlying structures. Also the history of **geologic** changes as recorded by these surface features. The term is sometimes restricted to features produced only by **erosion** and deposition.

geophagy - The practice of eating of soil, clay or chalk. (See: **ccolpa/ colppa, secondary compounds**)

geophysical - Relating to the study of the physical characteristics and properties of the solid Earth, its air and waters, and its relationship to space phenomena.

geophyte - **Perennial herb** with its perennating bud(s) located well below the soil surface....**Perennial** plant with an **annual** shoot and **perennial** underground parts.

geosequestration - Also known as carbon capture and storage (CCS), geosequestration is the process of capture, transport, injection and storage of CO₂ in underground **geological** formations for the primary purpose of mitigating **greenhouse gas** emissions.

(See: **carbon sequestration**)

geosphere - The physical elements of the Earth's surface crust and interior.... The soils, sediments, and rock layers of the Earth's crust, both continental and beneath the ocean floors.

geothermal - Relating to the Earth's internal heat; commonly applied to springs or vents discharging hot water or steam.

geothermal energy - Energy derived from the heat in the interior of the Earth.... Energy that is generated by converting hot water or steam from deep beneath the Earth's surface into electricity.... Energy derived from the natural heat and water resources within the Earth, such as volcanoes and hot springs.

geotropism - Growth of a plant organ in response to **gravity**....A plants' response to gravity: roots grow downward, showing positive geotropism, while shoots grow upward in a negative response....Growth in response to **gravity**. Also known as **gravitropism**.

germinate - To begin to grow or sprout from a **spore**, seed, or **bud**.

germination - The beginning of growth of a seed, **spore**, or **pollen** grain....The process by which a **seedling** emerges and develops from a seed, or by which a **sporeling** emerges and develops from a **spore**.... The breaking of the seed coat followed by the protrusion of the hypocotyl (that part of the axis of a plant **embryo** or seedling below the first leaf or pair or whorl of leaves developed by the **embryo** of a seed plant) forming a root system.

germination inhibitor - A chemical substance preventing **seed germination**.

gestation period - The gestation period refers to the length of time from conception to birth, being the length of pregnancy. The term is usually used in the context of mammals. For humans the gestation period is about nine months. Among Amazon **mammals** the Amazon River Dolphin or pink dolphin (*boto*) has a gestation period of about 11 months, whereas in the Brazilian Tapir it is about 13 months.... Period of time between **fertilization** and birth of an animal. Commonly called pregnancy.... The period of **embryonic** and fetal development from conception to birth; the length of time that an **organism** is pregnant.

geyser - A fountain of hot water and steam that shoots into the air at regular or irregular intervals.

ghost species - Once a **population** decreases to a certain threshold, the **species** may be virtually doomed. Lacking sufficient **genetic diversity**, **habitat** size or **ecological** support, the **species** may live for some time as a non-viable **population** or require human intervention for the prevention of **extinction**. Such "ghost species" may lead to an underestimation of **biodiversity** loss as measured by **extinction rate**. (See: **extinction**, **extinct**, **critically endangered species**, **endangered species**)

gibberellin - A plant **hormone** regulating several processes including internode elongation and **cell** enlargement.

gigantothermy - Sometimes called ectothermic homeothermy, gigantothermy is a phenomenon with significance in biology and paleontology, whereby large, bulky ectothermic animals are more easily able to maintain a constant, relatively high body temperature than smaller animals by virtue of their smaller surface area to volume ratio

gill - An organ that absorbs oxygen from water. Gills are found in many **aquatic** animals, including insects.... One of the thin, vane or bladelike structures on the underside of a mushroom cap or on a similar **fungus**; a breathing organ of some **aquatic organisms** such as fish and mussels.

girdle - To encircle the **bole** of a living tree with cuts that sever the bark and **cambium** and kill the tree.

GIS - GIS, or Geographic Information Systems, is a mapping system that uses computers to collect, store, manipulate, analyze, and display data....A system of computer hardware and software used for storage, retrieval, mapping, and analysis of geographic data....A system of computer hardware, software and data for collecting, storing, analyzing and disseminating information about areas of the Earth. (See: **GPS**)

glabrous - Smooth.

glacial - Of or referring to **glaciers**.

glacial drift - Rock debris transported by a **glacier** and then deposited either directly from the ice or from the melt water.

glacial erratic - A rock transported by **glacier** action from a distant source. Sometimes referred to as simply an **erratic**.

glacial outwash - Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from **glacial** ice.

glacial till - The mass of rocks and finely ground material carried by a **glacier**, then

deposited when the ice melted.... Non-stratified sediment carried or deposited by a **glacier**.... **Geological** deposit consisting of mixture of **clay**, sands and rocks of varying size and type picked up and dragged along by a **glacier** then dumped as the ice melted. As known as a diamicton....Unstratified **glacial** drift deposited directly by the ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.... A jumble of materials that has been deposited by **glaciers** as they advance or retreat across a landscape, including boulders, rocks and gravel in a matrix of sand, **clay** or silt.

glaciated - Having been affected by the action of **glaciers**.

glaciation - The condition of being covered with **glaciers** or masses of ice...The result of the action of **glaciers**.

glacier - A large mass of moving ice that forms over hundreds or thousands of years...A large mass of ice that moves slowly over the surface of the ground or down a valley. They originate in snowfields and terminate at lower elevations in a warmer **environment** where they melt.... A multi-year surplus accumulation of snowfall in excess of snowmelt on land and resulting in a mass of ice at least 0.1 km² in area that shows some evidence of movement in response to gravity. A glacier may terminate on land or in water. Glacier ice is the largest reservoir of fresh water on Earth, and second only to the oceans as the largest reservoir of total water. Glaciers are found on every continent except Australia. (See: **Pleistocene glaciations**)

glade - An open grassy area within a forest or wooded area... An open space surrounded by woods. Not really a **wetland**, but might surround a **fen** or **bog**....An open space in a **forest**.

gland - An **organ** that makes and releases substances to other parts of the body.... An organized mass of **cells** that functions as an organ to secrete or excrete substances... An **organ** that makes one or more substances, such as **hormones**, digestive juices, sweat, tears, saliva, or milk. Endocrine glands release the substances directly into the bloodstream. Exocrine glands release the substances into a duct or opening to the inside or outside of the body.... A group of **cells** that secrete substances. Endocrine glands secrete **hormones**. Exocrine glands secrete salt, enzymes, and water.... An **organ** or a specialized group of **cells** in the body that produces secretions, such as insulin or bile, or excretions, such as sweat.... a **gland** is a group of **cells**, or an **organ**, that makes and secretes substances for use elsewhere in the body or for elimination from the body; glands are found in both plants and animals; salivary and sweat glands are two examples.

glandular - Having characteristics of, or involving a **gland**.

glaucous - A very light shade of gray, often used to describe the color of a bird, *e.g.* Glaucous Gull, *Larus hyperboreus*....In **botany**, covered with a whitish bloom (a glaucous bloom), as with a plum or blueberry....Smooth and having a waxy bloom.

glean - As applied to birds, a foraging method of many **insectivorous species**. Several

categories or styles of gleaning are recognized....

sally-gleaning - This category encompasses several widespread capture techniques in which prey is picked off a **substrate** during a flight from the perch. Four types of sally-gleans are recognized here, although even finer subdivisions could be made.

- **outward hover-gleaning** - The bird searches from an exposed, usually well-lighted site, looking primarily outward or downward. The approach flight is rapid and direct, and **prey** is snatched from an exposed surface (upper side of a **leaf**, a twig, or **weed** top) during a short hover in which the bird may still be moving forward. Often, during the hover and capture, the bird crashes into the substrate, slowing down only slightly while snapping the **prey**. The follow-up flight is a continuation of the sally, carrying the bird well away from its former perch.
- **upward hover-gleaning** - The bird searches from an enclosed position within the **vegetation**. The approach flight is either horizontal or upward. While the approach may be rapid, the hovering bird does not move forward at the point of capture. The hover may begin well before the capture, and may last several seconds as the bird positions itself almost vertically under the **prey** item. Capture occurs with a quick snap, and repeated attempts may occur during a single hover. The follow-up flight may be a momentary return to the former perch, but active searching usually begins only after a move to a new perch.
- **outward striking** - The bird snaps stationary **prey** off an exposed surface during a direct, horizontal or downward approach flight. No hover is used during **prey** capture and the follow-up flight usually carries the bird away from the original perch.
- **upward striking** - Searching occurs among enclosed, often dense **vegetation**. The approach is explosively rapid, and **prey** is snapped or scraped off the under-surface of **leaves** without hovering. Only one capture attempt is made as the bird moves rapidly through to a new perch.
- **perch-gleaning** - This category includes foraging maneuvers in which stationary **prey** is taken from the **substrate** while the bird remains perched.
- **simple perch-gleaning** - Searching occurs between rapid movements through the **vegetation**, with perches chosen in a variety of exposed and enclosed situations. **Prey** is located only with visual searching, the bill rarely being used for probing. **Prey** is removed from the **substrate** with no approach flight. The bird may employ body movements during both search and capture. Usually this involves an upward or downward lean, but occasionally even results in a somersault around the perch to retrieve **prey** from below. Escaping prey are rarely pursued.
- **landing-and gleaning** - After spotting **prey** too far away for a **simple perch-glean**, the bird perches within reach of the **prey** and picks it off the substrate immediately after landing.
- **ground foraging** - **Prey** is found while the bird stands, walks, hops, or runs on the ground.

- **ground sally-gleaning** - Prey is picked from the **vegetation** during a short jump or flight.
- **standing or running ground gleaning** - Prey is picked from the ground or **vegetation**.

gleyed soil - A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

global carbon budget - The balance of the exchanges (incomes and losses) of carbon between the carbon reservoirs or between one specific loop (*e.g.*, **atmosphere** - **biosphere**) of the **carbon cycle**. An examination of the carbon budget of a pool or reservoir can provide information about whether the pool or reservoir is functioning as a source or sink for CO₂. (See: **carbon sink**)

global climate change - See **climate change, global warming**.

global cooling - Conjecture during the 1970s of imminent cooling of the Earth's surface and **atmosphere** along with a posited commencement of **glaciation**.

global dimming - A worldwide decline, during the last few decades, of the intensity of the sunlight reaching the Earth's surface, caused by particulate air **pollution**. Such dimming has a dampening effect on **global warming**.

global energy balance - A correspondence between the amount of radiant solar energy absorbed the Earth and the amount radiated back outwards, such that the temperature on Earth remains within a range able to support the presence of life.

global hectare - The global **hectare** (gha) is a measurement of **biocapacity** of the entire Earth - one global **hectare** is a measurement of the average **biocapacity** of all **hectare** measurements of any biologically productive areas on the planet. If you take the sum of the world's **biocapacity**, then divide it by the number **hectares** on the Earth's surface, you get the **biocapacity** of one average Earth **hectare**. When the term 'global **hectare** per person' is used, it refers to the amount of biologically productive land and water available per person on the planet....One **hectare** of biologically productive space adjusted to world average **biomass** productivity allowing meaningful comparisons across regions to be made.

global positioning system - See **GPS**.

global variables - Functions of space and time that describe the large scale state and evolution of the Earth system. The Earth system's **geosphere, hydrosphere, atmosphere, and biosphere** and their components are, or potentially are, global variables.

global warming - The increase of the Earth's average surface temperature due to a build-up of **greenhouse gases** in the **atmosphere**. . . . The process by which the Earth's **atmosphere** is warming because of the release of "**greenhouse gases**," such as carbon dioxide. These gases are released into the air from burning gas, oil, coal, wood, and other resources and trap heat in an action similar to that of the walls of a greenhouse. **Tropical deforestation** currently (2007) contributes approximately 2 billion tons of **carbon dioxide** to the **atmosphere** annually, compared to approximately 6 billion tons from burning **fossil fuels**. Also sometimes known as **climate change**, but global warming is a more accurate term. . . . An increase in the near surface temperature of the Earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases. Scientists generally agree that the Earth's surface has warmed by about 1 degree Fahrenheit in the past 140 years. The Intergovernmental Panel on Climate Change (IPCC) recently concluded that increased concentrations of greenhouse gases are causing an increase in the Earth's surface temperature and that increased concentrations of sulfate aerosols have led to relative cooling in some regions, generally over and downwind of heavily industrialized areas. (See: **greenhouse effect, enhanced greenhouse effect, greenhouse gases, carbon dioxide, carbon sink, sea level rise, carbon sequestration, climate change**)

Global Warming Potential (GWP) - A measure of how much a given mass of **greenhouse gas** is estimated to contribute to **global warming**. . . . The index used to translate the level of emissions of various gases into a common measure in order to compare the relative **radiative forcing** of different gases without directly calculating the changes in **atmospheric** concentrations. GWPs are calculated as the ratio of the **radiative forcing** that would result from the emissions of one kilogram of a **greenhouse gas** to that from emission of one kilogram of **carbon dioxide** over a period of time (usually 100 years). Gases involved in complex **atmospheric** chemical processes have not been assigned GWPs due to complications that arise. **Greenhouse gases** are expressed in terms of **Carbon Dioxide Equivalent**. The International Panel on Climate Change (IPCC) has presented these GWPs and regularly updates them in new assessments. . . . The GWP enables a comparison to be drawn between the six Kyoto Protocol **greenhouse gases**. The GWP is a relative scale, where $\text{CO}_2 = 1$. The other gases are given a number based on their effect on the **atmosphere** relative to CO_2 . The GWP changes relative to the time horizon, for example, **methane** has a GWP of 21 over 100 years, meaning it has 21 times the amount of heating capacity of CO_2 A measure of the impact a **greenhouse gas** has compared with **carbon dioxide**. It takes into account how long the gas remains in the **atmosphere** and how effective the gas is in absorbing **infrared radiation**.

global winds - Winds that blow from a specific direction and typically cover long distances.

globalization - The economic and social process whereby local markets and cultures are increasingly dominated by global markets and culture. . . . Globalization commonly refers to a tendency to transcend the boundaries of the nation state. This tendency can be

observed in almost every aspect of modern life: ideologies, economics, technical advances, transnational regulations, and **environmental** problems. Whereas in the course of the 20th century, nation states have been the main agents in the international community, they are increasingly being replaced by non-governmental and/or transnational actors. Environmentalist movements operate worldwide, international organizations address the problems of **global warming** or the problem of poverty, and transnational companies are important players on the world market. High technology advances (media, the internet) have enabled individuals to communicate with others in any part of the world, hereby enabled them to participate globalizing their lives. Nevertheless, globalization cannot only be viewed as a desirable process. Many critics have been addressing the problems that globalization poses: while it broadens the options for Westerners and highly educated elites all around the world, it increases discrimination of the poor even further. In this context, globalization can be defined as the spatial and temporal approximation of world regions that have access to high tech means for communication and information.

Gloger's Rule - Originally proposed by Constant Wilhelm Lambert Gloger (1883). This rule holds that dark **pigments** increase in **races** of animals living in warm and humid **habitats**. (This rule is sometimes used to explain the original **geographic distribution** of human races). Dark pigmentation helps protect against **ultraviolet radiation**, but also has several other effects, many of which have only begun to be investigated recently.... A **zoological** rule which states that within a **species** of **endotherms**, more heavily pigmented forms tend to be found in more humid **environments**, *e.g.* near the equator.... The drier the **climate**, the lighter the color of animals relative to closely related **taxa** of more humid regions. (Yellows and light browns predominate in arid regions; dark browns and blacks in humid regions.).... Dark pigments increase in warm and humid **habitats**.

glucose - A simple sugar made naturally by plant **cells**; glucose is a product of **photosynthesis**.

gnat - The term gnat is applied as a colloquial name to any of various small insects in the order Diptera and specifically within the suborder Nematocera....Any of various small biting flies: midges; biting midges; black flies; sand flies.

gnetophyte - A member of the plant division Gnetophyta, a **woody plant** in the genera *Gnetum*, *Welwitschia*, or *Ephedra*.... Gnetophytes comprise three related **families** of **woody plants** grouped in the **Gymnosperms**. The gnetophytes differ from other **Gymnosperms** in having vessel elements as in the **flowering plants** (**Angiosperms** or Magnoliophytes). The living Gnetophyta comprise three genera *Gnetum*, *Welwitschia*, and *Ephedra*.

Gondwana - The southern supercontinent that started to break up about 150 million years ago, consisting of what are now South America, Africa, Antarctica, Arabia, Australia, India, Madagascar and New Zealand....Name applied to the ancient (Paleozoic-early Mesozoic) Southern Hemisphere supercontinent that rifted apart to form present-day Antarctica, India, Africa, Australia, and South America. The southern part of

Pangaea... About 200 million years ago all major continents were locked together in a supercontinent named Pangea (meaning "all Earth"). Pangea began to break up about 190 million years ago. First, the northern group of continents (Laurasia) split apart from the southern group (Gondwana). Laurasia formed North America and Eurasia while Gondwana broke into three parts; Africa-South America, Australia-Antarctica and India. India drifted northwards and collided with Asia which collision initiated the uplift of the Himalayas. Subsequently, South America and Africa separated and Antarctica separated from Australia. From the outset, continental drift has been closely interwoven with that of evolution. Australia, which has been separated the longest from other continents (about 65 million years) has the most distinct **biota**, including its indigenous people. Interestingly, the first evidence of life on Earth comes from the north-west of Western Australia, where microbe-size fossils, some of which may have produced oxygen, have been dated at 3.465 billion years before present. South America has the next most distinct **biota**, having been isolated from other continents for nearly 60 million years. North America and Eurasia, which were joined together for much of Earth's history, have very similar **biotas**. (See: **Pangaea**)

gorge - A deep, narrow passage with steep, rocky walls and usually having a river or stream flowing through it.

gorget - A band or patch of distinctive color on the throat of a bird or other animal. The term is used in particular with hummingbirds...A contrasting, usually **iridescent**, patch of feathers on the throat of some hummingbirds.

GPS - GPS, which stands for **Global Positioning System**, is a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world...The Global Positioning System, usually called GPS, is the only fully functional satellite navigation system. A constellation of more than two dozen GPS satellites orbit at 10,600 miles above the earth. These satellites broadcast precise timing signals by radio to electronic GPS receivers which allow them to accurately determine their location (**longitude**, **latitude**, and **altitude**) in real time, day or night, in any weather, anywhere on Earth. ... A system consisting of 25 satellites in 6 orbital planes at 20,000 km **altitude** with 12 hr periods, used to provide highly precise position, velocity and time information to users anywhere on Earth or in its neighborhood at any time. (See: **latitude**, **longitude**, **coordinates**, **GIS**)

gradient - Slope, or change in elevation, of a **stream** or **river**.

graft - In **botany**, the union of a piece of one plant to another, established plant.

graminoid - An **herb** with grass-like **morphology**...A **growth form** typified by true grasses (Graminae) and by **sedges** (Cyperaceae)... **Grass-like** in appearance, with leaves mostly very narrow or linear in outline...An **herbaceous** grass or plant of similar growth form...Plants which are **grass-like** in appearance even though they are not **grasses** in a **taxonomical** sense, such as **sedges**, **reeds**, cattails, and others, *e.g.*,

cottongrass. Compare **forb**.... Grasses, and grass-like plants including sedges and rushes.... Any plant such as a grass, sedge or rush; resembling the grasses.

granite - A light-colored, coarse-grained **igneous** rock formed by cooling of silica-rich magma below the surface of the Earth. Granite is considered to be the average composition of the continental crust of the Earth.... A light colored, often coarse grained **igneous** rock of high silica composition.... A light-colored intrusive **igneous** rock made up of the minerals quartz and feldspar with biotite and/or muscovite mica. The crystals are big enough to be visible without magnification. Granite is formed from the melting of the continental crust rocks.... An **igneous** rock made up of mica, quartz, and feldspar.

granitic - Of or referring to **granite**.

granivorous - Feeding on seeds or grain.... Feeding primarily on grains.

granum - A stack of plate-like, **pigment**-containing structures in a **chloroplast**.

grass - A group of plants in the family Poaceae having narrow leaves with parallel veins, small **flowers**, and basically hollow stems with joints where the leaves are attached.

grasslands - Areas of abundant grasses and **shrubs** with very few trees, like **prairies** or meadows. Grasslands can be found in many places. Large **temperate** grasslands occur naturally in central North America (**prairies**), southern South America (**pampas**), central Asia (**steppes**), southern Africa (**savannas**), and Australia. Region in which the climate is dry for long periods of the summer, and freezes in the winter. Grasslands are characterized by **grasses** and other erect **herbs**, usually without trees or **shrubs**. Grasslands generally occur in the dry **temperate** interiors of continents, and first appeared in the Miocene.... An **ecosystem** that is dominated by **grasses**; some types of grasslands include campos, meadow, **pampas**, prairie, **savanna**, **steppe**, and **veldt**.... A **landscape** in which the existing plant cover is dominated by **grasses**.The continental scale **landscape** unit (**biome**) or **ecosystem** extending from Alberta, Canada to Texas, United States, and characterized by various species of **grasses**. (See: **savanna**, **Pampas**, **pampas**, **cerrado**, **Pantanal**, **Llanos**, **prairie**, **steppe**, **veldt**, **meadow**, **campos**, **paramo**, **puna**, **savanna woodland**)

graupel - Small pellets of ice created when super-cooled water droplets coat, or rime, a snowflake. The pellets are cloudy or white, not clear like sleet, and often are mistaken for hail. (See: **hail**, **sleet**, **freezing rain**)

gravel - A piece of rock that measures between 0.2 – 1.6 centimeters (0.078 and 0.629 inches) in diameter; gravel is larger than sand and smaller than a pebble.

gravelly riffle - A shallow area of a stream where there is broken water and the stream bed is pebbles or rock fragments that are larger than sand.

gravitropism - A plants' response to gravity: roots grow downward, showing positive geotropism, while shoots grow upward in a negative response....Growth in response to gravity. Also known as **geotropism**.

gravitational - Of or referring to **gravity**.

gravity - The natural force of attraction exerted by a celestial body, such as Earth, upon objects at or near its surface, tending to draw them toward the center of the body....The natural force of attraction between any two massive bodies, which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

green flash - An intense, brief flash visible under certain conditions following the moment the sun goes beyond the horizon. The phenomenon is due to refraction of light rays from the setting sun as they pass through the lower layers of the **atmosphere**.

greenhouse effect - The trapping of heat in the Earth's **atmosphere** by certain gases such as **carbon dioxide**, **methane**, and **nitrous oxide**. Some scientists predict that the **temperature** and **sea level rise** associated with **global warming** could adversely affect **biodiversity**. ...The warming of the Earth's **atmosphere** attributed to a build-up of **carbon dioxide**, **methane** and other gases; some scientists think that this build-up allows the sun's rays to heat the Earth, while **infra-red radiation** makes the **atmosphere** opaque to a counterbalancing loss of heat. ... The heating that occurs when gases such as **carbon dioxide** trap heat escaping from the Earth and radiate it back to the surface; so-called because the gases are transparent to sunlight but not to heat and thus act like the glass in a greenhouse. ... The warming of an **atmosphere** by its absorbing and reemitting **infrared radiation** while allowing shortwave radiation (=solar radiation) to pass on through. Certain gaseous components of the **atmosphere**, called **greenhouse gases**, transmit the visible portion of **solar radiation** but absorb specific spectral bands of thermal radiation emitted by the Earth. The theory is that terrain absorbs radiation, heats up, and emits longer wavelength thermal radiation that is prevented from escaping into space by the blanket of **carbon dioxide** and other **greenhouse gases** in the **atmosphere**. As a result, the climate warms. Because **atmospheric** and oceanic circulations play a central role in the climate of the Earth, improving our knowledge about their interaction becomes essential. ... Rise in temperature resulting from a buildup of gases which trap heat in Earth's **atmosphere** that leads to **global warming**. (See: **enhanced greenhouse effect**, **global warming**, **greenhouse gases**, **carbon dioxide**, **carbon sink**, **carbon sequestration**, **radiative forcing**)

greenhouse gases - Gaseous components of the **atmosphere** that contribute to the **greenhouse effect** and therefore to **global warming** or **climate change**. They absorb infrared light. The major natural greenhouse gases are water vapor, which causes about 36-70% of the **greenhouse effect** on Earth (not including clouds); carbon dioxide, which causes between 9-26%; and ozone, which causes between 3-7%. Other greenhouse gases include, but are not limited to: **methane**, nitrous oxide, sulfur hexafluoride, and **chlorofluorocarbons**. ... A gaseous component of the **atmosphere** contributing to the

greenhouse effect. Greenhouse gases are transparent to certain wavelengths of the sun's radiant energy, allowing them to penetrate deep into the **atmosphere** or all the way into the Earth's surface. Greenhouse gases and **clouds** prevent some of infrared radiation from escaping, trapping the heat near the Earth's surface where it warms the lower **atmosphere**. Alteration of this natural barrier of **atmospheric** gases can raise or lower the mean global **temperature** of the Earth.... Greenhouse gases are the gases present in the Earth's **atmosphere** which reduce the loss of heat into space and therefore contribute to global temperatures through the **greenhouse effect**.

Greenhouse gases include carbon dioxide, **methane**, nitrous oxide, **chlorofluorocarbons**, and **water vapor**. Carbon dioxide, **methane**, and nitrous oxide have significant natural and human sources while only industries produce **chlorofluorocarbons**. **Water vapor** has the largest **greenhouse effect**, but its concentration in the **troposphere** is determined within the climate system. **Water vapor** will increase in response to **global warming**, which in turn may further enhance **global warming**. (See: **global warming, greenhouse effect, carbon dioxide, carbon sink, carbon sequestration**)

greenwash - Disinformation disseminated by an organization, usually a polluting or resource extraction corporation, so as to present an environmentally responsible public image.

gregarious - social; living or moving in a group with others of its kind, as in a flock of birds.

grizzled - Hair is more than one color, usually dark hair mixed with some light gray hair.

gross productivity - Rate of total production including respiration and net production.

ground cover - **Herbaceous** plants (including grasses and ferns) and the lowest **shrubs** occupying an area.

ground layer - The lowest layer or level in an **ecosystem**. In a forest, the ground layer is found just below the **herb layer**.

ground water / groundwater - The supply of fresh water found beneath the Earth's surface, usually in **aquifers**, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from **leaching** agricultural or industrial pollutants or leaking underground storage tanks.... That portion of water beneath the surface of the earth that can be collected through wells, tunnels, or drainage galleries, or that flows naturally to the earth's surface via seeps and springs....**Precipitation** which infiltrates the ground and fills the pores in rocks and soil.... Water located in interstitial areas below the Earth's surface. Groundwater is recharged by **infiltration**, and enters **streams** through seepage and springs.... Water found underground as a result of rainfall, ice and snow melt, submerged rivers, lakes, and springs. This water often carries minerals. These minerals can accumulate in the remains of buried **organisms** and eventually cause fossilization.... Subsurface water occupying

the saturation zone (where all openings in soils and rocks are filled), from which wells and springs are fed. The upper surface of this zone of saturation forms the "water table." ... Water that flows or seeps downward and saturates soil or rock, supplying springs and wells. The upper surface of the saturate zone is called the **water table**. ... Water stored underground in rock crevices and in the pores of geologic materials that make up the Earth's crust. ... Sub-surface fresh water infiltrating the spaces between soil particles, contained in permeable rock or in voids between rock layers.... Water found in the spaces between soil particles and cracks in rocks underground (located in the saturation zone). Groundwater is a natural resource that is used for drinking, recreation, industry, and growing crops.

groundwater basin - The underground area from which groundwater drains. The basins could be separated by geologic or hydrologic boundaries.

groundwater divide - The boundary between two adjacent groundwater basins, which is represented by a high point in the water table.

groundwater flow - The part of the flow in a river or **stream** (or discharge from a drainage basin) that comes from ground water. Also known as **baseflow**.

growth form - The overall **morphology** of a plant **species**, including its stature, leaf type, and habit. The most basic growth forms are trees, **shrubs**, **forbs**, and **graminoids**; but there are many more specialized growth forms such as **epiphytes**, **lianas**, and stem succulents.

growth hormone (GH) - A peptide **hormone** produced by the anterior pituitary that is essential for growth.

growth retardant - A chemical substance slowing or inhibiting plant growth.

growth rings - The layers of wood laid down each growing season, also called annual rings. These rings frequently are visible when a tree is cut and may be used to estimate the age of the tree, as well as to determine the rate of its growth.... Features of woody stems produced by plants growing in areas with seasonal (as opposed to year-long) growth. The growth ring marks the position of the vascular cambium at the cessation of the previous year's grow. Also known as **annual rings**. (See: **annual ring**, **dendrochronology**)

grub - The thick worm-like **larva** of certain beetles and other **insects**.... The **larva**, or worm stage, of some **insects** such as beetles.

guano - The solid wastes of bats and some sea birds; guano is rich in **nutrients** and often used as fertilizer.... Dried bird and bat droppings; rich in phosphate and nitrogen.

guard cell - In **botany**, one of a pair of **cells** surrounding a **stoma**.... One of two **cells** surrounding the **stomata** of a leaf; regulates when the **stomata** open and close.

guard hair - In **mammals**, one of the long, coarse hairs that cover and protect the softer fur near the body.

Guianan Shield - The Guianan Shield underlies Guyana (previously British Guiana), Suriname (previously Dutch Guiana) and French Guiana (or Guyane), as well as parts of Colombia, Venezuela and Brazil. It is one of the three cratons of the South American Plate. It is a 1.7 billion year old Precambrian **geological** formation in northeast South America that forms a portion of the northern coast. The higher **elevations** on the shield are called the Guiana Highlands, which is where the impressive and mysterious table-like mountains called the Tepuis are found. The Guiana Highlands are also the source of some of the world's most spectacular waterfalls such as Angel Falls, Kaieteur Falls and Kuquenán Falls.

guild - A group of **species** having similar **ecological** resource requirements or foraging strategies.... A group of species found in the same place that share the same food resource (e.g. the fruit-eating birds in a **tropical rainforest**).... A group of species, all members of which use the same food, shelter, and other resources in a similar way.... A group of **organisms** that share a common food resource.

gular pouch - See **gular sac**.

gular sac - A skin pouch of the throat found in some **species** of birds, and most obvious in the pelicans. Pelicans and some other birds use it for panting, as a means of cooling or lowering their body **temperature**, as well as to hold partially digested fish while the young feed from the pouch. Less conspicuous gular sacs are found in cormorants, owls, pheasants, pigeons and some other groups of birds. Also known as a **gular pouch**.

Gulf Stream - A warm, swift **ocean current** that flows along the coast of the Eastern United States and makes Ireland, Great Britain, and the Scandinavian countries warmer than they would be otherwise.... An **ocean current** that carries warm water from the southern tip of Florida north along the eastern coast of the United States

gum - A sticky, water-soluble plant secretion that hardens on exposure to air.

guttation - Exudation of droplets of water, most often from **leaf** margins, as the result of water movement up a plant due to **root pressure**.

gymnosperm / Gymnospermae - A member of a **class** of plants forming **seeds** in an exposed condition, frequently in **cones**....The botanical name for a group of seed-bearing plants (and thus **vascular plants**). The term gymnosperm comes from the Greek word *gymnospermos*, literally meaning "naked seed". This is because the seeds of these plants are not formed in an ovule that is enclosed (and developing into a fruit, in the **angiosperms**), but naked on the scales of a cone or cone-like structure. **Conifers** and cycads are members of the Gymnospermae....A plant that produces seeds, which are not enclosed; includes any seed plant that does not produce flowers. Any class of seed plants,

mostly trees such as **conifers**, that produce naked seeds not enclosed in fruit....

Vascular plants that develop their seeds from exposed ovules hidden within cones rather than in an **ovary** as in **angiosperms**. Gymnosperms, such as pines and firs, do produce tiny "flowers" within their cones, but they are hard to see because they do not possess petals or **ovaries**. Gymnosperms do produce **pollen** and ovules, but are not generally referred to as flowering plants. The gymnosperms first appear in the fossil record about 360 million years ago, long before the evolution of the dinosaurs. Modern gymnosperms are composed primarily of the **Division** Coniferophyta, the Conifers, with 550 species. The other **Divisions** are the Cycads with 100 species, Gnetae with 70 species, and Ginkgo with one species. In contrast, **angiosperms**, the flowering plants, comprise over 250,000 species.... The cone-bearing trees, **evolutionarily** older than the **angiosperms**, for example conifers and **boreal** forest trees such as pine, spruce and fir.

gymnospermous - Of or referring to **gymnosperms**.

gynandromorph - An **organism** exhibiting both male and female characteristics.

gyre - A circular or spiral motion, especially a circular **ocean current**.

habitat - The place or **environment** where a plant or animal naturally or normally lives and grows ...The area that provides an **organism** with adequate food, water, shelter, and living space, and/or the conditions of that **environment** including the soil, **vegetation**, water, and food..... The home of an animal or plant. There can be many habitats within the one **environment**....The place and conditions in which an **organism** lives. ... The place where a plant and/or animal **population** lives and its surroundings, both living and nonliving; includes the provision of life requirements such as food and shelter. ...The **environment** where a plant or animal will naturally be found....The place where a **population** (*e.g.*, human, animal, plant, **microorganism**) lives and its surroundings, both living and non-living.... the area in which an animal, plant, or **microorganism** lives and finds the **nutrients**, water, sunlight, shelter, living space, and other essentials it needs to survive. Habitat loss, which includes the destruction, degradation, and **fragmentation** of habitats, is the primary cause of **biodiversity** loss.... The place where an organism lives; habitat includes space, food, water, and shelter.... The area or region where a particular type of plant or animal lives and grows.

habitat conservation - **Habitat**-level is an appropriate system level for **environmental** scientists and policy-makers to work at, because **ecological** systems and **endangered species** are subsystems also preserved by **habitat conservation**. **Habitat conservation** should place high priority on the **habitats** most vulnerable to **extinction**, *e.g.* the **biodiversity hotspots**.

habitat corridors - The impacts of habitat fragmentation can be somewhat alleviated by the provision of habitat corridors: wide connecting areas of appropriate habitat to link existing **ecosystems** and allow connectivity, biophysical regeneration, **migration**, genetic exchange, foraging routes, **ecosystem** services and **biodiversity conservation**. A corridor implies free movement, ranging from wildlife tunnels under large roads to large-scale

links between national parks. Habitat corridors also provide aesthetic values and hazard protection to intervening urban and suburban landscapes.... Wide strips of **vegetation** retained as linkages between isolated patches of natural **habitat**. **Habitat** corridors are essential to increase **migration** and foraging routes and allow **genetic** exchange, helping alleviate the **biodiversity** impacts of **habitat fragmentation**. **Habitat** corridors also provide aesthetic values to intervening urban or suburban landscapes.

habitat degradation - Habitat degradation is the gradual erosion of **environmental** integrity, quality, **biodiversity** and aesthetics, leading **ecosystems** into a state of **fragmentation** and several steps closer to destruction. Usually a result of human activity, habitat degradation includes industrial **pollution**, **climate change**, forestry and mining operations, dams, **desertification**, **salinization**, loss of land fertility, **erosion**, **edge effects**, ecological effects of **pesticides**, water diversion, **river turbidity**, **eutrophication**, trawling, coral bleaching, introduction of diseases, exotic predators, **invasive weeds** or vulnerable **genetic** stock etc. New generations may not bear witness to the true beauty and bounty of surroundings they inherit, and adjust to a lower standard of **environmental** quality and diversity. (See: **habitat destruction**)

habitat destruction - Widespread forms of habitat destruction, which lead to **fragmentation** of what remains, include deforestation, land clearing, slash and burn cultivation, cattle ranching, large-scale agriculture, large-scale mining, the effects of large dams, industrial warfare, industrial and suburban encroachment, urban sprawl and the **ecological footprint** of cities etc. Of human activities, agriculture and grazing occupy the most land-surface area, with corresponding opportunity cost for natural **ecosystems**. Habitat destruction is obviously one of the priority issues in **environmental** ethics, requiring political and community activism and economic restructuring. (See: **habitat degradation**)

habitat fragmentation - The breaking up of large **habitats** into smaller, isolated chunks. Fragmentation is one of the main forms of **habitat** destruction, which is the primary reason **biodiversity** is in decline.... The process of breaking apart or causing something to no longer be continuous, as in a forest with open areas or a patchy landscape. ... The creation of unconnected **biogeographic habitat islands**. (See: **ecosystem fragmentation, edge effect, buffer zone, wildlife corridor**)

habitat fragments - See **habitat fragmentation**.

habitat indicator - A physical attribute of the **environment** measured to characterize conditions necessary to support an **organism, population, or community** in the absence of **pollutants**, *e.g.*, salinity of **estuarine** waters or **substrate** type in **streams** or lakes. (See: **environmental indicator, ecological indicator**)

habitat island - A section of **habitat** isolated from other areas of the same **habitat** by the surrounding **environment** - for example a forest **glade**, an isolated mountaintop, an island in a **saltmarsh**, or a **habitat fragment** within an agricultural or suburban landscape. (See: **habitat fragmentation**)

habitat partitioning - The differentiation of **microhabitats** and **ecological niches** between closely related **organisms**. (See: **competition** or **ecological competition**, **competitive exclusion**, **competitive exclusion principle**, **competitive release**, **resource partitioning**, **ecological niche**, **niche differentiation**, **niche expansion**)

hail - Balls or chunks of ice larger than 1/4 inch in diameter which are produced due to strong updrafts in thunderstorms.... Precipitation composed of balls or irregular lumps of ice. Hail is produced when large frozen raindrops, or almost any particles, in cumulonimbus clouds act as embryos that grow by accumulating super-cooled liquid droplets. Violent updrafts in the cloud carry the particles in freezing air, allowing the frozen core to accumulate more ice. When the piece of hail becomes too heavy to be carried by upsurging air currents it falls to the ground. (See: **sleet**, **graupel**, **freezing rain**)

halocarbons - Chemical **compounds** consisting of carbon, sometimes hydrogen, and either chlorine, fluorine bromine or iodine.

halteres - The modified back wings of a fly. They help the fly to balance during flight.

haploid - In biology, pertaining to a single set of **chromosomes**....An **organism** or **cell** having only one complete set of **chromosomes**, ordinarily half the normal **diploid** number..... Having one set of unpaired **chromosomes**. (See: **diploid**, **chromosome**)

hard energy - Non-renewable fossil fuel energies like coal and oil, typical of current majority consumption, which produce air pollution, greenhouse gases and are ultimately non-sustainable. Nuclear power is sometimes also included as 'hard energy' because of its inherent danger and waste problems.

hard mast - see **mast**.

hardwood - A **deciduous** or **broadleaf tree**; also applies to the wood from such trees. ...A conventional term for the timber of **broad-leaved trees**, and the trees themselves, belonging to the botanical group **Angiospermae**.... A broad-leaved flowering tree, usually **deciduous**, as distinguished from a **conifer**. Trees belonging to the botanical group of **Angiosperms**; trees such as oaks, maples, ashes, elms. It does not necessarily refer to the hardness of the wood. In countries where **coniferous** species are of little commercial significance, the terms hardwood and **softwood** are commonly used in their literal significance, *i.e.* hard wood, soft wood. (See: **softwood**)

harem - A social structure whereby several females associate and breed with a single male (*i.e.* **polygyny**).... The mating and association of several adult females with one male. The term is usually used with **mammals**, such as sea lions. (See: **polygyny**, **polygamy**)

hatch - To emerge from or break out of an egg... To emerge from an egg, **pupa**, or **chrysalis**.

hatching - The moment an **organism** emerges from an egg, **pupa**, or **chrysalis**.

hatchling - A newly hatched animal.

haustorium - An organ produced by a **parasite** that penetrates and absorbs water and **nutrients** from the **host's tissues**.

haze - Fine dry or wet particles of dust, salt, or other impurities that can concentrate in a layer next to the Earth when air is stable.

hazards - Potential dangers, ranging from earthquakes and hurricanes to fires and floods, etc.

haze - Fine, dust, salt or pollution particles dispersed through a portion of the atmosphere. Individually these are not visible but cumulatively they will diminish visibility.

headwater area - Mountains and adjacent areas where **precipitation** is adequate to provide **groundwater** recharge and streamflow. (See: **headwaters**)

headwaters - The source and upper reaches of a **stream**; also the upper reaches of a **reservoir**....The water upstream from a structure or point on a **stream**. ...The small **streams** that come together to form a river. Also may be thought of as any and all parts of a river basin except the **mainstream** river and main **tributaries**. ...The upper **tributaries** of a **drainage basin**.... The source or upper part of a stream or river. (See: **headwater area**)

heartwood - The inner core of a woody stem, wholly composed of non-living cells and usually differentiated from the outer enveloping layer or **sapwood** by its darker color.... The central, dark-colored portion of **secondary xylem** in a **tree** trunk.

heat balance - The equilibrium existing between the radiation received and emitted by a planetary system.

heath - A member of the Ericaceae or heath family. Usually leathery-leaved **shrubs** preferring acidic or low-**nutrient substrates** and often tolerant of cold.... **Community** of **grass-like plants** and **shrubs** of one or more of the Heath families, Ericaceae, Empetraceae, or Diapensiaceae, found on infertile sites. Frequently found on **bogs** in the far north or high in the Andes and other mountain ranges.

heathland - **Community** of **grass-like plants** and **shrubs** of one or more of the Heath families, Ericaceae, Empetraceae, or Diapensiaceae, found on infertile sites. Frequently found on **bogs** in the far north or high in the Andes and other mountain ranges. (See:

heath, bog)

hectare - A measurement of area equivalent to 10,000 square meters (100 meters x 100 meters). One hectare equals 2.471 acres.

helical - Shaped like a spiral or a coil.

heliotactic - adjective -The ability of an **organism** to move in response to the light of the sun. (**heliotaxis** is the noun. See: **phototropism, heliotropism, tropism**)

heliotaxis - noun -The movement of an **organism** in response to the light of the sun. (**heliotactic** is the adjective. See: **phototropism, heliotropism, tropism**)

heliotropism - A botanical term for a **sessile organism's** response to light. This is also known as **phototropism**. Heliotropism is specifically response to the light from the sun. This is one of the many plant **tropisms** or movements in response to external stimuli. Growth toward a light source is a positive **phototropism**, while the reverse is called negative **phototropism** (if growth or orientation is toward darkness, as with some members of the Araceae when they first **germinate**). Leaves and other parts of the plant that require light for **photosynthesis** exhibit positive **phototropism**, while roots usually exhibit negative **phototropism**, although **gravitropism** (growth in response to gravity) may play a larger role in their behavior and growth. (See: **phototropism, heliotaxis, tropism**)

helophyte - A **perennial marsh** plant having its overwintering buds under water....A **cryptophyte** that mainly grows in soil saturated with water or in the water itself, and from which **leaf** and flower-bearing shoots emerge. Helophytes do not include all the plants ordinarily known as **marsh** plants. (See: **hydrophyte, cryptophyte**)

hematoxin - A **toxin**, found in many **pit vipers**, that attacks the blood.

hemic soil material - **Organic** soil material intermediate in degree of **decomposition** between the less decomposed fibric and the more decomposed sapric material. Synonym of mucky **peat**. (See: **fibric soil material, sapric soil material**)

hemisphere - Half of the Earth, usually conceived as resulting from the division of the globe into two equal parts, north and south or east and west.

hemi-epiphyte - These **epiphytes** develop long aerial roots that eventually reach the ground and become rooted. Once this occurs, hemi-epiphytes are able to more efficiently obtain water and **nutrients**. This group includes members of the **herbaceous** Araceae, **strangler** figs, and various **shrubby** plants....Epiphytes that send roots to the soil.

hemi-parasitic - Of or referring to a **hemiparasite**.

hemiparasite - A **parasite** that invades its **host** to obtain only water and mineral **nutrients**....A partial or facultative (optional rather than obligatory) **parasite** that can survive without its **host**. There are well over a 1000 **species** of hemiparasites that live in the **tropics**. In the Amazonian **rainforest**, hemiparasites typically live in the tree crowns, and produce tubular red, green, or yellow flowers that are pollinated by birds. They often develop specialized roots that penetrate the bark of its **host** to obtain **nutrients**. The family of plants most represented by hemiparasites is the Loranthaceae (Mistletoe family). Members of the Loranthaceae may also be **hyperepiphytes** - an **epiphyte** growing on another **epiphyte**.

herb - Generally any plant which does not produce wood, and is therefore not as large as a tree or **shrub**, is considered to be an herb.... Any flowering plant except those developing persistent woody stems above ground....Non-woody **vascular plants** such as grasses, grass-like plants, and **forbs**.... Any non-woody **vascular plant**; a category of plants including both **forbs** and **graminoids**. Hence the term "**herbaceous layer**".... a non-woody **plant** that dies down to the ground after flowering.... Flowering plant with no significant woody tissue above the ground, including both **forbs** and **grasses**.

herb layer - In an **ecosystem**, the layer or level between the **ground layer** and the **undergrowth layer** in which the predominant **vegetation** is composed of **herbs**.

herbaceous - Used to describe **flowering plants** or plant parts that are fleshy, as opposed to plants such as trees and **shrubs** that grow woody stems.... In reference to a plant, having soft, non-woody stems that die back at the end of the growing season.... A non-woody, soft-stemmed and leaved plant.... Soft, green, and containing little woody **tissue**..... **Vegetation** with 5% or more crown cover in vascular and non-vascular (**mosses** and **lichens**) plants and less than 10% crown cover of woody plants.

- **aquatic herbaceous** - **Vegetation** in which there is a predominance of **cover** in floating or submerged plants growing in water. It can include **mosses** and **algae** as well as **vascular plants**. In this classification scheme **emergent plants** are not included in **aquatic vegetation**, but are placed in the wet **forb herbaceous** and **graminoid herbaceous** units.
- **bryoid herbaceous** - **Vegetation** in which the predominance of **cover** is in **mosses** or **lichens**.
- **forb herbaceous** - Herbaceous **vegetation** in which the predominance of **cover** is in non-grass-like plants. This includes **forbs**, **ferns**, and **horsetails**.
- **graminoid herbaceous** - Herbaceous **vegetation** with the predominance of **cover** in **grasses** or **sedges**.

herbaceous vegetation - The low-growing, non-woody **plants** in a forest **understory**, including **grasses** (graminoids), wildflowers, and **ferns**.

herbicide - Any chemical that, when applied to a plant, inhibits growth or kills....A chemical used to prevent the growth of certain plants, such as weeds....

herbivore (herbivorous) - An animal that eats only plant material, such as a caterpillar or a fungus-garden ant. ... An animal that feeds primarily on living plant substances.Herbivores that feed directly on plants and are called **primary consumers**.... An **organism** that gets nourishment primarily from plants.

herbivory - The consumption of living plant material.

herd - A number of **mammals** of one **species** that remain together as a group. The term is generally used for hooved **mammals**, such as cattle, deer, and llamas.

hereditary - Transmitted **genetically** from one generation to the next...Transmitted from parents to their offspring; inherited.... Appearing in, or characteristic of, successive generations.

heredity - The passing on of **genetic** factors such as the color of hair or eyes from one generation to the next, resulting in similarities between members of one family or **strain**....The complete set of inherited characteristics of an **organism**.... Heredity is embedded within the **DNA** of each **chromosome** where the **genes** or **gene** combinations function as a 'unit of heredity' specifying particular traits such as eye color.

hermaphroditic - Having both male and female reproductive organs.

herpetology - The scientific study of **reptiles** and **amphibians**.... The study of **amphibians**, such as frogs, toads, and salamanders, and reptiles, such as snakes, turtles, and lizards.

herps - Reptiles and **amphibians**.

heterogeneity - The diverse nature of something.... The quality or state of being **heterogeneous**.

heterogeneous - Consisting of parts or individual elements that are unrelated or unlike each other.... Differing in kind; not uniform; having qualities which are significantly different throughout; possessed of different characteristics. ... Consisting of different parts; not of the same kind of nature. The opposite of **homogeneous**.

heteropatric speciation - A special case of **sympatric speciation** that occurs when different **ecotypes** or **races** of the same **species** **geographically** coexist but exploit different **niches** in the same patchy or heterogeneous **environment**. Thus heteropatric speciation is a refinement of our notion of **sympatric speciation** in that it represents a behavioral rather than **geographic** barrier to the flow of genes among diverging groups within a **population**. The importance of behavioral separation as a mechanism for promoting **sympatric speciation** in a heterogeneous or patchwork landscape is highlighted in John Maynard Smith's seminal paper on sympatric speciation(J. Maynard Smith, 1966. Sympatric speciation. *The American Naturalist* 110:637-650). Although some evolutionary biologist still regard **sympatric speciation** as a highly contentious

issue, both theoretical and empirical studies increasingly support **sympatric speciation** as a likely process in explaining the diversity of life in particular **ecosystems**. (For more information on the formation of **species** see: **speciation, species, geographic speciation, allopatric speciation, parapatric speciation, sympatric speciation, heteropatric speciation, heteropatry, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

heteropatry - A concept that refines our notion of **sympatry** in recognizing that though two variants (**genotypes, strains, races**) of a **population** coexist in the same **geographical** area, these variants are behaviorally separated in terms of exploiting **niches** that are interwoven to produce a heterogeneous or patchwork landscape. (See: **heteropatric speciation, sympatry**)

heterosis - The improved or increased function of any biological quality in a hybrid offspring. Also known as **hybrid vigor** and outbreeding enhancement.

heterotroph - An **organism** that cannot make food from light energy and, therefore, depends upon other **organisms** for its nourishment; deer, fish, and bats are examples of heterotrophs, whereas algae and plants are **autotrophs** and make food inside their cells. ... **Organism** that, unable to produce its own food, feeds on other organisms. (See: **heterotrophic, heterotrophic organisms, autotroph, autotrophic organism, consumer**)

heterotrophic - Obtaining nourishment by digesting plant or animal matter as opposed to photosynthesizing food. (See: **heterotroph, heterotrophic organism, autotroph, autotrophic organism, consumer**)

heterotrophic nutrition - A form of nutrition in which the **organism** depends on **organic** substances as a food source, as is the case with humans.

heterotrophic organism - The same as a **consumer**...An animal which must take in energy (food) from an outside source. Heterotrophic **organisms** are the **consumers** of an **ecosystem**, consuming (= feeding upon) other **organisms** to sustain life.... **Species** that are dependent on **organic** matter for food ...Any **organism** which must consume other **organisms** (living or dead) to satisfy its energy needs. Heterotrophic **organisms** or **consumers** are divided into four **taxonomic** groups based on what they consume. **Herbivores** feed directly on green plants and are called **primary consumers**. **Carnivores** often feed on **herbivores** but can feed on other **carnivores**. **Omnivores** feed on both plants and other animals. **Detritivores** feed on the dead remains of plants and animals. This last group is represented by **bacteria** and **fungi** and play a very important **taxonomic** role in the recycling of nutrients. Contrast with **autotroph or autotrophic organism**.. (See: **heterotroph, heterotrophic, consumer**)

heterozygous - Having both **dominant genes** and **recessive genes** for a particular characteristic on **homologous chromosomes**.

hibernaculum - The protective place where an animal hibernates, or spends the winter.

hibernate - To pass the winter in a **dormant** or **torpid** state....To be in an inactive or **dormant** state or period....To become inactive for an extended period of time during the winter months; there are several levels of inactivity, thus different forms of **hibernation**. (See: **aestivation, aestivate, dormant, dormancy, hibernation, torpid, torpor**)

hibernation - Winter dormancy in animals characterized by a great decrease in **metabolism**.... A condition in which an animal's **metabolism** is purposely slowed to endure prolonged periods of adverse **population** conditions. normally several months at a time. (See: **aestivation, aestivate, dormant, dormancy, hibernate, torpid, torpor**)

hierarchy - A form of social organization in animals in which different members of a group possess different levels of status, affecting their feeding and mating behavior.

high - See **high pressure system**.

high-lining - The underside of a **forest canopy** that is uniformly cropped by deer at the highest level they can browse. A browseline.

high pressure system - An area of high **barometric pressure** that rotates clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere and is generally associated with good weather.... An area of a pressure maximum relative to its surroundings. A high pressure system has diverging winds which rotate clockwise in the Northern Hemisphere. Also known as an **anticyclone**.

high tide line - The line of intersection of the land with the ocean's surface at the maximum height reached by a rising tide.

hillock - See **hummock**.

hindcrown - See **crown**.

histoplasmosis - A **fungal** disease that may result in flu-like symptoms. It can be found inside caves in the **guano** of bats.

holistic - An attempt to study and master the knowledge and control of entire systems. An emphasis on functional relations between parts and whole; a doctrine in which a whole cannot be expressed as the simple sum of its parts.

hollow - The lower wet areas between **bog hummocks**. The hollow may be characterized by a **flashet** or the remnants of a small pond with more **hygrophilic *Sphagnum* sp.** dominant. **Sedges** also make up a major component of the plant cover in the hollow.

Holocene - A geological period, which began approximately 11,550 calendar years BP

(before present, or about 9600 BC) and continued to the **Anthropocene**.

holoparasite - An **obligate parasite** that cannot survive without a **host**. These are represented by only a few plant families in the lowland **rainforest**. One plant family, the Balanophoraceae, is a common root **parasite** of the Amazonian **rainforest**, with some members mimicking a **fungi**. It is thought that these fungi **mimics** may be pollinated and have their seeds dispersed by small mammals such as rodents.

holophytic - **Photosynthetic**.

holoplankton - Organisms that are **planktonic** for their entire life cycle. Examples of holoplankton include **diatoms**, radiolarians, **dinoflagellates**, foraminifera, amphipods, **krill**, copepods, and salps. (See: **plankton**)

holoplanktonic - Of or referring to **holoplankton**.

holotype - An individual specimen used to define a **species**. Also known as a **type specimen**.... The specimen used for naming and describing a **species**... The specimen that is the legal bearer of the name of the **species**, according to the **International Code of Zoological Nomenclature**.... The single specimen designated or indicated as "the type" by the original author at the time of publication of the original description. ... A single specimen designated as the name-bearing type of a **species** or **subspecies** when it was established, or the single specimen on which such a **taxon** was based when no type was specified. (See: **type specimen**, **holotype**, **type series**, **type locality**, **allotype**, **topotype**, **paratype**, **syntype**, **lectotype**)

holozoic - **Heterotrophic** nutrition.

holt - The den or **lair** of an animal, especially an otter or fox, (suitably used for a Giant Otter den) in tree roots, banks, drains, or similar hideouts... A small piece of woodland or a woody hill; a **copse**.

home range - The area which an animal uses during its normal activities, not to be confused with **territory**....The area in which an animal carries out its daily activities; also called **home territory**. (See: **territory**)

home territory - See **home range**.

homeostasis - A state of equilibrium or a tendency to reach equilibrium...An important process or mechanisms of an **organism** (perhaps **biotic population**) for regulation (perhaps predisposed self-regulation) toward a constant or standard condition. All **populations**, except possibly the very simplest types, appear to contain regulatory mechanisms that enable them to adjust to the changing conditions of their physical **environmental**. ...The maintenance of a high degree of uniformity in functions of an **organism** or interactions of individuals in a **population** or **population** under changing **population** conditions. The constant function or status that results from the capabilities

of **organisms** to make compensatory adjustments. (Negative feedback is at work.)... A system that maintains a dynamically stable state by internal regulation similar to a thermostat governing the **temperature** of a room...The ability of the body to support life by keeping the internal chemical **environment** constant within a normal range of values. (See: **negative feedback loop**)

homeothermic - An **organism**, such as a mammal or bird, having a body **temperature** that is constant and largely independent of the **temperature** of its surroundings; an **endotherm**. (See: **thermoregulation, warm-blooded**)

homogeneity - The quality of having a uniform appearance or composition...The quality of being of the same or a similar nature...The quality or state of being **homogeneous**.

homogeneous - Having a uniform composition or structure. ... Of the same kind of nature, or consisting of the same parts. The opposite of **heterogeneous**.

homologous chromosomes - Matching **chromosome** pairs.

homology - A similarity shared by descendants of a common ancestor. We walk upright; so did early hominids. Contrast with **convergence**.

homozygous - Having identical **genes** on **homologous chromosomes**.

hormonal system - See **endocrine system**.

hormone - A product of living **cells** that circulates in body fluids or sap and produces a specific effect on the activity of **cells** remote from its point of origin... Any of various similar substances found in plants and animals that regulate development...A substance, usually a peptide or steroid, produced by one **tissue** and conveyed by the **bloodstream** to another to effect physiological activity, such as growth or **metabolism**....A non-**nutrient** substance synthesized by plants that regulates growth and development...A synthetic **compound** that acts like a hormone in the body... An **organic** substance produced in small amounts and transported to sites where it controls growth and development processes.

horn - A permanent projection on the head of an animal, as on a cow, a Rhinoceros, or a Rhinoceros Beetle. With **mammals**, the horn is hollow and consists mainly of **keratin** as well as other proteins. True horns are found only among the **ruminant** Artiodactyls, in the families Antilocapridae (pronghorn) and Bovidae (cows, buffaloes, yaks, goats, antelope etc.). The "horns" of the Rhinoceros are made of **keratin** but are actually compacted hair, not true horn. (See: **antler**)

hornwort - Any **aquatic** plant of the **genus** *Ceratophyllum*; forms submerged masses in ponds and slow-flowing **streams**... Hornworts are a group of **Bryophytes**, or **non-vascular plants**, comprising the **division** Anthocerotophyta. The common name refers to the elongated horn-like structure, which is the **sporophyte**. The flattened, green plant

body of a hornwort is the **gametophyte** plant.

horse latitudes - The **subtropical latitudes** (30-35 degrees), where winds are light and **weather** is hot and dry. According to legend, ships traveling to the New World often stagnated in this region and had to throw dead horses overboard or eat them to survive, hence the name horse **latitudes**.

horsetail - A member of the **genus** *Equisetum*, a **genus** of **vascular plants** that reproduce by **spores** rather than seeds. The **genus** includes 15 **species** commonly known as horsetails and scouring rushes. It is the only living **genus** in **class** Equisetopsida, formerly of the **division** Equisetophyta (Arthropphyta in older works), though recent **molecular** analyses place the **genus** within the **ferns** (Pteridophyta). Other **classes** and **orders** of Equisetopsida are known from the fossil record, where they were important members of the world **flora** during the Carboniferous period....The **genus** is near-**cosmopolitan**, being absent only from Australasia and Antarctica. They are **perennial** plants, either **herbaceous**, dying back in winter (most **temperate species**) or **evergreen** (some **tropical species**, and the **temperate species** *Equisetum hyemale*, *E. scirpoides*, *E. variegatum* and *E. ramosissimum*). They mostly grow 0.2-1.5 m tall, though *E. telmateia* can exceptionally reach 2.5 meters, and the tropical American species *E. giganteum* 5 meters, and *E. myriochaetum* 8 meters....A group of plants which first appeared in the Devonian. Horsetails have jointed stems with a ring of long, pointed leaves and branches at each joint. *Equisetum* is the only type of horsetail alive today... Perennial rush-like flowerless **herbs** with jointed hollow **stems** and narrow tooth-like **leaves** that spread by creeping **rhizomes**; tend to become weedy; common in Northern Hemisphere; some in Africa and South America.

host - An animal that is attacked by a **parasite**....**Organism** which serves as the **habitat** for a **parasite**, or possibly for a **ymbiont**. A **host** may provide nutrition to the **parasite** or **ymbiont**, or simply a place in which to live....A living **organism** on which another **organism** lives and is dependent.... A plant or animal harboring a **parasite**.... In medicine, an animal infected or parasitized by another **organism**.

hot spot - In geology, a region of **volcanic** activity in the middle of a **tectonic plate**.

hot spring - A stream of hot, bubbling water that flows out of the ground continuously.... A spring that is produced by the emergence of geothermally-heated **groundwater** from the Earth's crust. There are hot springs all over the Earth, on every continent and even under the oceans and seas.... A spring that emits water ranging in temperature from about 30° to 104°C.

hull - The outer coating of a seed or fruit; the persistent calyx.

Humboldt Current - A cold **ocean current** that flows north along the Pacific Coast of South America before turning west near the Equator.

humic - Of or referring to **humus**.

humid montane forest - Tropical forests that cover wet mountain slopes from about 500 meters **elevation** up to **treeline**. It is lower in stature than **tropical evergreen forest**, rarely exceeding 30 meters in height. The stature of the forest also tends to decrease with increasing **elevation** or steepness of terrain. The **canopy** is often broken, and branches and trunks of many trees are covered in **moss**, **bromeliads**, orchids, ferns and other epiphytes. **Tree** species composition of humid montane forest usually changes significantly above 1500-1800 meters in elevation, above which point **epiphytes**, including **bryophytes**, and **lichens** also become more prevalent. Below this elevation the humid montane forest contains significant elements of the lowland **flora** and is transitional between lowland **terra firme** forest and true **montane** forest. Also known as **montane evergreen forest**, and includes forests covered by the term **cloud forest**. Example: the forests that cover the eastern slopes of the Andes and outlying ridges of Colombia, Ecuador, Peru and northern Bolivia.

humidity - A general term that refers to the air's **water vapor** content. (See: **relative humidity**)

humification - The process of **decomposition** whereby **organic** material is humified and becomes **humus**. ...The degree of **decomposition** of **organic** matter. Three degrees of humification are recognized in **organic** soil materials: fibric, hemic and sapric.

hummock - A small hill or mound.

humus - The complex **organic** material resulting from the **decomposition** of forest leaf and branch litter.... Soil **organic** matter...The dark **organic** part of soil formed from decaying plant and animal matter, often called **topsoil**.... Black **organic** material of complex composition which is the end-product of **microbial** breakdown of plant and animal residues at the soil surface..... The well-decomposed, relatively stable part of the **organic** matter found in **aerobic** soils. A complex aggregate of amorphous substances, formed during the microbial **decomposition** or alteration of plant and animal residues and products synthesized by soil **organisms**; principal constituents are derivatives of **lignins**, **proteins** and **cellulose**....The dark **organic** material in soils, produced by the **decomposition** of vegetable or animal matter and essential to the fertility of the earth.... A brown or black **organic** substance consisting of partially or wholly decayed vegetable or animal matter that provides **nutrients** for plants and increases the ability of soil to retain water.... **Organic** matter in the soil derived from the **decomposition** of plant and animal remains.... The finely divided, amorphous **organic** matter that is diffused through mineral material in a soil profile. ...That more or less stable fraction of the soil **organic** matter remaining after the major portion of added plant and animal residues have decomposed. ...The well decomposed, more or less stable part of the **organic** matter in mineral soils. ...The plant and animal residues of the soil, litter excluded, which are undergoing **decomposition**.

humus layer - The top portion of the soil which owes its characteristic features to its content of humus. The **humus** (brown or black **organic molecules**, gelatinous, following

processing by **bacteria, fungi,** and soil **organisms**) may be incorporated or unincorporated in the mineral soil.

hunt - To pursue or search for prey for food.

hurricane – A tropical **cyclone** in which maximum sustained surface wind is 74 mph (64 knots or greater in the North Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and in the eastern North Pacific Ocean. (Tropical **cyclones** are known as typhoons in the western Pacific and cyclones in the Indian Ocean.)... Severe tropical storms whose winds exceed 74 mph. Hurricanes originate over the tropical and subtropical North Atlantic and North Pacific oceans, where there is high humidity and light wind. These conditions prevail mostly in the summer and early fall. Since hurricanes can take days or even weeks to form, time is usually available for preventive or protective measures.

From space, hurricanes look like giant pinwheels, their winds circulating around an eye that is between 5 and 25 miles in diameter. The eye remains calm with light winds and often a clear sky.

Hurricanes may move as fast as 50 mph, and can become incredibly destructive when they hit land. Although hurricanes lose power rapidly as soon as they leave the ocean, they can cause high waves and tides up to 25 feet above normal. Waves and heavy flooding cause the most deaths during a hurricane. The strongest hurricanes can cause tornadoes.

husk - Material consisting of seed coverings and small pieces of stem or leaves that have been separated from the seeds... outer membranous covering of some fruits or seeds. Example: corn husks.

hyaline - Transparent, translucent, or colorless.

hybrid - The offspring of genetically dissimilar parents or stock, especially the offspring produced by the breeding plants or animals of different **varieties, species,** or races...Offspring of **organisms** of dissimilar **genotype**, often the offspring of a cross between different **species**...Any cross-bred animal or plant...An offspring produced by parents of two different species... The offspring of two plants of the same or closely related **species** differing in one or more **genes**.

hybrid swarm - An extremely variable **population** derived from the **hybridization** of two different **taxa** and consisting of the products of subsequent segregation and recombination, backcrossing, and crossing between the **hybrids** themselves. It occurs where the range of inter-fertile species overlap.

hybrid vigor - The increased vigor, size, and **fertility** of a **hybrid** compared with its parents. ... Increased vigor or other superior qualities arising from the crossbreeding of genetically different plants or animals. Also known as **heterosis** and outbreeding enhancement.

hybridization - The act of mixing, either naturally or by man, different **species** or **varieties** of animals or plants, and thus to produce **hybrids**. Also known as **interbreeding** or cross-breeding.

hybridization zone - A zone where the ranges of two **races** or two **species** meet and **hybridization** between them occurs.

hybridize - To breed plants or animals of different **varieties** or **species** in order to create offspring having characteristics of each.

hydrarch - Of **successions** or **seres** which originate in **aquatic habitats** such as lakes and ponds and progress toward more **terrestrial** conditions, as in **bogs** and **swamps**. (See: **hydrosere**)

hydric - Relating to or containing hydrogen. Sometimes used incorrectly in the sense of "wet" as a substitute for **hydrophyte**. (See: **hygric**)

hydrocarbon - An **organic molecule** containing hydrogen and carbon; the major components of petroleum... A chemical containing only carbon and hydrogen. Hydrocarbons are of prime economic importance because they encompass the constituents of the major fossil fuels, petroleum and natural gas, as well as plastics, waxes, and oils. In urban **pollution**, these components--along with NO_x and sunlight--contribute to the formation of **tropospheric ozone**.

hydrofluorocarbons (HFCs) - These chemical **compounds** (along with **perfluorocarbons**) were introduced as alternatives to **ozone** depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the **stratospheric ozone layer**, but they are powerful **greenhouse gases** with **global warming potentials** ranging from 140 (HFC-152a) to 12,100 (HFC-23).

hydrogeology - The study of the interrelationships of **geologic** materials and processes with water, especially **groundwater**.

hydrologic cycle - Movement or exchange of water between the atmosphere and the earth.... Ongoing, continual set of processes by which Earth's water passes through the land, sea, and atmosphere.... Disposal of precipitation from the time it reaches the soil surface until it re-enters the atmosphere by **evapotranspiration** to serve again as a source of **precipitation**.... The circuit of water movement from the atmosphere through various stages or processes on the ground (such as **precipitation**, interception, runoff, infiltration, percolation, storage) and then back to the atmosphere again by **evaporation**, and **transpiration**.... the circuit of water movement from the oceans to the atmosphere and to the Earth and return to the atmosphere through various stages or processes such as precipitation, interception, runoff, infiltration, percolation, storage, **evaporation**, and transportation. ... The cyclic transfer of water vapor from the Earth's surface via

evapotranspiration into the atmosphere, from the atmosphere via **precipitation** back to earth, and through runoff into **streams**, rivers, and lakes, and ultimately into the oceans.... the circuit of water movement from the oceans to the atmosphere and to the Earth and return to the atmosphere through various stages or processes such as **precipitation**, interception, runoff, infiltration, percolation, storage, **evaporation**, and transportation. ... The movement of water from the oceans to the **atmosphere** by solar **evaporation**, to the soil by **precipitation**, and back to the oceans via runoff from **rivers** and **groundwater**. Some water is cycled many times within compartments of the system before completing one full circuit. **Terrestrial** ecologies including humans are dependent upon sustainable management of the **freshwater** phase of this cycle..... The process of **evaporation**, vertical and horizontal transport of **water vapor**, **condensation**, **precipitation**, and the flow of water from continents to oceans. It is a major factor in determining climate through its influence on surface **vegetation**, the **clouds**, snow and ice, and **soil moisture**. The hydrologic cycle is responsible for 25 to 30 percent of the mid-**latitudes'** heat transport from the **equatorial** to **polar** regions... The process by which water is transpired and evaporated from the land and water, condensed in the clouds, and precipitated out onto the earth once again to replenish the water in the bodies of water on the Earth.... The continuous movement of water between Earth's surface and the air. Also known as the **water cycle**.

hydrological - Of or referring to **hydrology**.

hydrology - The science encompassing the behavior of water as it occurs in the **atmosphere**, on the surface of the ground, and underground.... The study of the occurrence, distribution, and chemistry of all waters of the Earth. ... The science that deals with global water (both liquid and solid), its properties, circulation, and distribution, on and under the Earth's surface and in the **atmosphere** through **evapotranspiration** or is discharged into oceans.

hydrophilic - Describes a substance that absorbs, dissolves in or is attracted to water.

hydrophyte - A **vascular plant** growing wholly or partly in water, especially a **perennial** aquatic plant having its overwintering buds under water....A plant requiring an abundance of water for growth and growing in water or in soil too waterlogged for most other plants to survive....A plant usually found growing in water, or in soil containing water well in excess of field capacity most of the time. (See: **hygrophyte**, **helophyte**, **xerophyte**, **hygrophile**)

hydrophytic leaves - The leaves of plants that grow in water or under conditions of abundant moisture.

hydrosere - A time (not space) sequence of **seral communities** which starts with **hydrophytes** and eventually leads to a **mesic climax community**. (See: **hydrarch**)

hydrosphere - The part of the Earth composed of water including clouds, oceans, seas, ice caps, **glaciers**, **lakes**, **rivers**, underground water supplies, and **atmospheric water**

vapor....The part of the physical **environment** that consists of all the liquid and solid water at or near the Earth's surface.... The layer of water which nearly envelopes the Earth, in the form of oceans and inland seas. (See: **biosphere, lithosphere, atmosphere**)

hydrothermal vent - Deep-sea formation in which superheated, chemical-rich water gushes upward through cracks in the seafloor; creating chimney-shaped formations.... A jet of hot water rich in minerals that comes up through a crack in the ocean floor.

hygric - Referring to sites or **habitats** characterized by decidedly moist or wet conditions. Compare **hydric**.... Growing in or characterized by wet conditions, as opposed to **xeric** (dry) or **mesic** (moderate) moisture conditions. The nature of an **organism** adapted to conditions of wet conditions.

hygrometer - Instrument that measures **water vapor** content in the air and communicates changes in **humidity** visibly and immediately through a graph or a dial. (See: **psychrometer**)

hygrophile - Refers to **organisms** inhabiting moist sites.

hygrophyte - A plant that is more or less restricted to moist sites, *e.g.*, *Drosera rotundifolia*. (See: **hydrophyte**)

hyoid bone - A U-shaped bone or complex of bones situated at the base of the tongue and supporting the tongue and its muscles. In male Red Howler Monkeys the hyoid bone acts as a resonating chamber, allowing the monkeys to make their loud roar.

hyperdiversity - A term applied to **ecosystems** such as **tropical rainforest** that exhibit an extremely high degree of **biodiversity** in relation to most other kinds of **ecosystems**. (See: **biodiversity**)

hyperepiphyte - An **epiphyte** growing on another **epiphyte**.

hyperphagia - An abnormal appetite for food.

hypertrophy - Abnormal increase in the size of cells in a tissue or organ, resulting in formation of galls or tumours.

hypha (singular: **hyphae**) - Thread-like filaments that form the **mycelium** (body) of a **fungus**.... The multinucleate or multicellular filaments that make up the **mycelium** (body) of a **fungus**....The many thread-like filaments that together form the **mycelium** of a **fungus**.

hypocotyl - In **botany**, the part of a **seedling** between the roots and the place of attachment of the **cotyledons**.

hypogeal - Describes seed germination in which the **cotyledons** remain beneath the surface of the soil. (See: **epigeal**)

hypogeous - Growing or developing below the soil surface.

hypogeous germination - **Seed germination** in which the **cotyledons** remain below the soil surface.

hypoxia - low oxygen conditions (See: **anoxic event, anoxic waters, oxygen depletion**)

ice age - Any of the periods in the Earth's history when temperatures fell worldwide and large areas of the Earth's surface were covered with **glaciers**. During the last few million years, there have been many **glacial** periods, occurring initially at 40,000-year frequency but more recently at 100,000-year frequencies. Usually the term Ice Ages refers to the most recent periods of **glaciation** during the **Pleistocene Epoch**.... A **glacial** epoch or time of extensive **glacial** activity. (See: **Pleistocene glaciations, Pleistocene Epoch**)

ice core - A cylindrical section of ice removed from a **glacier** or an ice sheet in order to study climate patterns of the past. By performing chemical analyses on the air trapped in the ice, scientists can estimate the percentage of **carbon dioxide** and other trace gases in the **atmosphere** at that time.... A core sample from the accumulation of snow and ice over many years that have re-crystallized and have trapped air bubbles from previous time periods.

ice sheet (continental glacier) - A **glacier** of considerable thickness and more than 50,000 sq km in area. It forms a continuous cover of ice and snow over a land surface. An ice sheet is not confined by the underlying **topography** but spreads outward in all directions. During the Pleistocene Epoch, ice sheets covered large parts of North America and northern Europe but they are now confined to **polar** regions (*e.g.*, Greenland and Antarctica).

ice shelf - A thick mass of ice extending from a **polar** shore. The seaward edge is afloat and sometimes extends hundreds of miles into the sea.

ichthyologist - One who studies the physiology, ecology, behavior and classification of fish.

ichthyology - The scientific study of fish.

igapó - Seasonally flooded **gallery forest** along **blackwater rivers** such as the Rio Negro in Brazil.... Forested areas flooded by **blackwater rivers**. (See: **blackwater river, blackwater stream, rainforest, tropical lowland evergreen forest, terra firme, várzea, igapó, flooded tropical evergreen forest, white-sand forest, tropical deciduous forest**)

igneous - One of the three basic categories into which rocks can be classified, of which the other two are sedimentary and metamorphic. Igneous rocks are formed by the cooling of molten rock, called magma. ...Formed by solidification of magma.... Formed from the cooling and crystallization of a magma. Igneous rocks can be extrusive, meaning that they cooled on or very near the Earth's surface, or intrusive, meaning that they cooled below the Earth's surface... A term used for solidified magma. It is also a term used for describing the processes related to the formation of igneous rocks.... Produced under conditions involving intense heat, as rocks of volcanic origin or rocks crystallized from molten magma. (See: **sedimentary rock**)

igneous rock - Rock formed by the solidification of molten magma (See: **igneous, sedimentary rock, metamorphic rock**)

imbibition - The process of water absorption by a dry substance or structure, causing it to swell.

immigration - Movement into an area.

immunity- The state of being protected against contagious agents. Immunity may be acquired naturally or artificially and both forms may be active or passive. Active immunity means that the individual has responded to an antigen and produced suitable antibodies. In passive immunity the individual has been given antibodies produced by someone else. Passive naturally acquired immunity is acquired before birth by the passage of maternal antibodies across the placenta to the fetus.

imperfect flower - A flower which lacks either stamens or carpels.

impermeable layer - A layer of solid material, such as rock or clay, which does not allow water to pass through.... A layer of material (such as clay) in an aquifer through which water does not pass.

impermeability - The resistance of land to the infiltration of water from the surface to the subsurface. Different land uses often have different impermeabilities.

impoundment - A man-made body of water, such as a reservoir, that is confined usually by a dam.

imprint -

imprinting - A rapid learning process by which a newborn or very young animal establishes a behavior pattern of recognition and attraction to another animal of its own kind or to a substitute or an object identified as the parent.

in situ - Latin for 'in original place.' Refers to measurements made at the actual location of the object or material measured. Compare **remote sensing**.

inbred - See **inbreeding**.

inbreeding - The continued mating of closely related individuals....The mating of closely related individuals of a **species**, especially over many generations. A **population** that has inexperienced inbreeding over a long period is said to be **inbred**. Over time, inbreeding can have a severe negative impact on the health of a **population**.... In plants, a breeding system in which sexual reproduction involves the interbreeding of closely related plants by self-pollination or backcrossing.

incidental catch - Fish and other animals killed in fishing gear that was intended to catch other seafood; by-catch is usually thrown away at sea. Same as **by-catch**.

incisors - The front-most teeth, usually adapted for cutting or gnawing; humans have two incisors on the upper jaw and two on the lower jaw.

inclusive fitness - The ability of an individual organism to pass on its genes to the next generation, taking into account the shared genes passed on by the organism's close relatives.

incomplete flower - A **flower** lacking one or more of the normal **flower** parts.

incomplete metamorphosis - A life cycle of certain **insects**, such as crickets and grasshoppers, characterized by the absence of a **pupal** stage between the immature and adult stages.... Gradual growth of an **arthropod** that involves change in size, but not form.... A type of development wherein an insect hatches from an egg and acquires adult features and behaviors gradually through a series of molts; typically, there is no inactive, non-feeding pupa in insects with incomplete metamorphosis. (See: **complete metamorphosis**)

incubate - To maintain a certain **temperature** in order to promote hatching, as in birds sitting on their eggs; in diseases, to maintain favorable conditions for development during the early stages of the disease.

incubation - The act of rearing and hatching eggs by the warmth of the body.

incubation patch - In birds, a temporary patch of featherless skin that allows a more direct contact between the egg and the warmth emitted from the blood vessels of the belly; the incubation patch is also called a brood patch and is usually not found in male birds.

incubation period - Time between infection by a pathogen and appearance of symptoms.

indeterminate growth - Growth to an indefinite size...Refers to growth that is not terminated, in contrast to determinate growth that stops once a genetically pre-determined structure has completely formed. **Organisms** with indeterminate growth continue to grow

throughout their lives. Examples of **organisms** with indeterminate growth are trees, snakes, caimans, and turtles.

index species - See **indicator species**.

indicator - See **indicator species**.

indicator plant - Any plant that, by its presence, its frequency or its vigor, indicates any particular property of the site, particularly, but by no means exclusively, of the soil. (See: **indicator species, bioindicator, ecological indicator**)

indicator organism - See **indicator species**.

indicator species - Also known as a **biological indicator**... A **species** whose presence or absence is indicative of a particular **habitat, community** or set of **environmental** conditions...A **species** which plays a fundamental role in the **ecosystem** and is able to be monitored as a proxy indicator of broader **environmental health**. The **species** must be **ecologically** appropriate and representative, including its abundance, **distribution, taxonomy, habitat** specificity and life strategy. Appropriate choices of indicator **species** also include those with known sensitivity to particular pressures, those with pre-existing information and cross-regional comparability, and those which allow practical non-destructive sampling. Major examples include the defining **habitat vegetation** and any **keystone species**. Over-emphasis on **species**-level indicators is warned against however, as **biodiversity** concerns a range of biological scales from **genes**, through **species**, and on to the most important unit for **conservation** management, **ecosystems**...A **species** whose presence, absence, or relative well-being in a given **environment** is indicative of the health of its **ecosystem** as a whole. Indicator **species** are unique **environmental indicators** as they offer a signal of the biological condition in a **watershed** or **ecosystem**, and are a warning system that **pollution** has entered the **food web**. They can be abundant or **dominant** in the **community**, and occasionally can be a **keystone species**. The term indicator species is a bit misleading, as indicators are often whole groups of **flora/fauna** types which can be used to assess **environmental** condition. Indicator species are also used as a standard in identifying similar **communities**. Their decline may indicate a disturbance that alters the **ecosystem**... Plants and animals that, by their presence, abundance, or chemical composition, demonstrate some distinctive aspect of the character or quality of the **environment**. A plant or animal in a certain location or situation, the presence or absence of which, or its frequency or vigor, is a fairly certain sign that particular **environmental** conditions are also present, *e.g., Escherichia coli* **bacteria** in water indicates probable **pollution** by human fecal matter. A **biological indicator** can be used to refer to signs or symptoms associated with any level of **organic** organization while indicator **species** only refers to those associated with the **species** level. For example, a particular plant might indicate a soil type or the presence or absence of an air or water **pollutant**. ...A **species** used to locate another, less visible **species**... Plant or animal whose presence or absence in an area indicates certain **environmental** conditions, such as soil type, high levels of **pollution**, or, in rivers, low levels of dissolved oxygen. Many plants show a preference for either **alkaline** or acid soil conditions, while certain

trees require aluminum, and are found only in soils where it is present. Some **lichens** are sensitive to sulphur dioxide in the air, and absence of these **species** indicates **atmospheric pollution**. ... **Organism**—often a **microorganism** or a plant—that serves as a measure of the **environmental** conditions that exist in a given locale. For example, greasewood indicates **saline** soil; mosses often indicate acid soil. *Tubifex* worms indicate oxygen-poor and stagnant water unfit to drink. The presence of certain species of plants suggests how well other species might grow in the same place.... In **biology**, an **organism, species, or community** whose characteristics show the presence of specific **environmental** conditions... An **organism** or a class of **organisms**, such as a **species**, that is so strictly associated with particular **environmental** conditions that its presence is a fairly certain sign or symptom of the existence of these conditions. In select cases, an **organism** that exhibits identifiable responses to a **pollutant** at low levels. (See: **bioindicator, ecological indicator, indicator plant**)

indigenous - Pertaining to plants or animals that are **native** to a particular region or country. ...**Native** to a specified area or region, not introduced.... **Native**; naturally occurring.... Belonging naturally in an area; native, intrinsic, innate, not introduced.

indigenous species - **Species** historically native to an area, not introduced by people. ... **species** that is normally found as part of a particular **ecosystem**.... **species** that occurs naturally in an area or **habitat**. Also called **indigenous species**.... A **species** that occurs naturally within an area....A **species** which is a natural member of a **biotic community**. An indigenous species. The term implies that humans were not involved in the **dispersal** or **colonization** of the species.... Any **species** of wildlife native to a given land or water area....Those plants and animal **species** indigenous to an area.... Animals or plants that originated in the area in which they are found, *i.e.*, were not introduced and naturally occur in that area. Also known as a **native species**.

individual variation - **Phenotypic** diversity within a **population**.

infaunal - Burrowing creatures that live underground.

infertile - Not capable of producing offspring.

infiltration - Flow of water from the land surface into the subsurface. (See: **percolation**)

infiltration rate - The quantity of water that enters the soil surface in a specified time interval. Often expressed in volume of water per unit of soil surface area per unit of time.

inflorescence - A flowering structure that consists of more than one flower and usually comprises distinct individual flowers....A cluster of flowers.... A cluster of flowers originating from the same bud.... A shoot bearing clusters of **flowers**.... A cluster of flowers.

infrared (or infra-red) - Invisible light with wavelengths longer than red...Light that is so red humans cannot see it. A band of the electromagnetic spectrum between the visible

and the microwave. Photons of infrared light are less energetic than photons of visible light.... Electromagnetic waves whose frequency range is above that of microwaves, but below that of the visible spectrum.... Any electromagnetic wave whose wavelength is between 0.78 and 300 microns... Light waves with wavelengths between visible red light and radio waves. (See: **infrared radiation**)

infrared (or infra-red) **radiation (IR)** - The heat energy that is emitted from all solids, liquids, and gases. In the context of the greenhouse issue, the term refers to the heat energy emitted by the Earth's surface and its **atmosphere**. **Greenhouse gases** strongly absorb this radiation in the Earth's atmosphere, and reradiate some back towards the surface, creating the greenhouse effect.... Infrared is electromagnetic radiation whose wavelength spans the region from about 0.7 to 1000 micrometers (longer than visible radiation, shorter than microwave radiation). Remote sensing instruments work by sensing radiation that is naturally emitted or reflected by the Earth's surface or from the atmosphere, or by sensing signals transmitted from a satellite and reflected back to it. In the visible and near-infrared regions, surface chemical composition, vegetation cover, and biological properties of surface matter can be measured. In the mid-infrared region, geological formations can be detected due to the absorption properties related to the structure of silicates. In the far infrared, emissions from the Earth's **atmosphere** and surface offer information about **atmospheric** and surface **temperatures** and **water vapor** and other trace constituents in the **atmosphere**. Since IR data are based on **temperatures** rather than visible radiation, the data may be obtained day or night. (See: **infrared**)

infructescence - A cluster of fruits originating from the same **inflorescence**, and therefore, bud.

inheritance - Any attribute that is inherited from ancestors... Attributes acquired via biological heredity from the parents.

innate - Existing naturally rather than acquired. For example, an innate behavior is a behavior that is inherited rather than one that is learned.

inoculate - To insert or introduce a substance such as a **microorganism** into the body of another **organism**.

inoculum - **Pathogen** or **pathogen** part (*e.g.*, **spores**, **mycelium**) that infects plants.

inorganic - Composed of matter that is not animal or vegetable; not having the organized structure of living things.... A substance in which carbon-to-carbon bonds are absent; mineral matter.... Not containing carbon. Not from living things, *e.g.* minerals, water, oxygen, etc.

insect - A member of the **class** Insecta... An animal lacking a backbone, having three pairs of legs, and three distinct regions of the body; ants, butterflies, mosquitoes, beetles, grasshoppers, and flies are some examples of **insects**.

insecticide - A substance used to prevent, repel, or destroy **insects**.... A poison that kills insects. Includes inorganic salts arsenicals, DDT and other **organochlorines**, organophosphates, **hormones/pheromones** and biological controls, and Integrated Pest Management measures.

insectivore - An animal that eats primarily **insects**.

insectivorous - Eating primarily **insects**.

insectivorous plant - A plant that captures and digests **insects** as a source of nitrogen. Examples are sundews (*Drosera* spp.), Venus Flytrap, pitcher plants (*Sarracenia* spp.) and bladderworts (*Utricularia* spp.). In **boreal** regions, **insectivorous** plants are common in **peat bogs**.

insolation - The amount of **solar radiation** reaching the surface of the Earth.

instar - A stage in the development of an **insect** between two successive molts.... A stage between molts in the life cycle of certain **arthropods**, such as **insects** and crayfish.

insular - Of, or pertaining to, an island or islands..... Relating to or characteristic of, resembling, or situated on an island...Separate or isolated from its surroundings.

insular dwarfism - A form of phyletic dwarfism, insular dwarfism is the process and condition of the reduction in size of large animals over a number of generations when their population's range is limited to a small environment, primarily islands.

interbreed - To produce offspring by mating with a member of a different **species**, **subspecies**, or **population**.... To mate with an **organism** of a different **species** or variety; **organisms** must be closely related types to be able to interbreed. The resulting offspring is called a **hybrid**.

intercalary meristem - In **botany**, a **meristem** located between non-dividing **tissues** such as at the base of a **leaf**.

interception loss - The part of the **precipitation** falling on **vegetation** that does not reach the ground, including water evaporated from or absorbed within the **canopy**.

Interglacial Period - A relatively mild period occurring between two **glacial** periods. (See: **Pleistocene glaciations**, **Pleistocene Epoch**, **ice age**)

intergeneric - Existing or occurring between **genera**, such as an intergeneric **hybrid**.

intermittent stream - An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow. (See: **ephemeral stream**, **perennial stream**)

International Code of Zoological Nomenclature - A set of rules in **zoology** that have one fundamental aim: to provide the maximum universality and continuity in the naming of all animals according to **taxonomic** judgment. The Code is meant to guide only the nomenclature of animals, while leaving the zoologists some degree of freedom in classifying new **species** and higher-level **taxa**. In other words, whether a **species** itself is or is not a real entity is a subjective decision, but what name should be applied to it is not; the Code applies only to the latter, not to the former.

internode - In **botany**, the segment of a **stem** between two **nodes**...The portion of a stem between two adjacent nodes.

interspecific - Between different **species**. (See: **intraspecific**)

interspecific brood parasitism - The dumping of eggs by the female into an already established nest of an individual of another **species**. (See: **intraspecific brood parasitism, brood parasitism, brood parasite**)

interspecific competition - **Competition** between **species**. (See: **competition, competitive release**)

intertidal - Between the levels of low and high tide. (See: **intertidal zone**)

intertidal zone - The area along **marine** shores between low-**tide** and high-**tide** water levels. Same as **littoral zone**.

interveinal - In botanym between leaf veins.

intolerant species - Plant **species** that do not grow well in shade...Plant and animal **species** that are unable to endure significant **environmental** or **climate change**.

intraspecific - Within a single **species**... Refers to some relationship between the members of the same **population** or **species**, such as **competition**. (See: **interspecific**)

intraspecific brood parasitism - The dumping of eggs by the female into an already established nest of the same **species**. (See: **interspecific brood parasitism, brood parasitism, brood parasite**)

intraspecific competition - **Competition** within a **species**. (See: **competition**)

introduce - The verb used when humans release, either intentionally or not, an **invader species, exotic species, introduced species** or **alien species** into the **environment**.

introduced species - An **exotic species** which has arrived, often thrived, in a foreign **environment**. Introduced **species** may successfully compete with native **species** by invading **habitat** and **ecological niches**. Introduced species may not necessarily be **pest**

species, depending on their amenity or impact. Also known as an **exotic species** or **invasive species**. (See: **exotic species**, **invasive species**)

introgression - The entry or introduction of a **gene** from one **gene** complex to another.

invade - What an **invader species**, **exotic species**, **introduced species** or **alien species** does.

invader species - Same as **invasive species**.

invasive organism - See **invasive species**.

invasive species - A **species** that is not native to the **ecosystem**; also known as **exotic species**, **introduced species**, **invader species**, **non-native species** or **alien species**.... A **species** that is not **indigenous** to a region.... All **species** of plants and animals not native to an area or naturally occurring historically in any **ecosystem**. ... a **species** that does not naturally occur in an area. These invaders can cause major problems for native plants and animals....Established plants and animals not native to the **ecosystem**, region, or country.... **Species** capable of rapidly taking over a new area. Non-native invasive species are a major **conservation** concern. ...invasive species are **organisms**, usually transported by humans, which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native **ecosystems**. The consequences of such invasions - including alteration of **habitat** and disruption of natural **ecosystem** processes - are often catastrophic for native **species**. (See: **exotic species**, **naturalized**, **invasive**)

invasive - An **invader species** is said to be invasive, especially if it causes or is likely to cause **environmental** or economic harm. (See: **exotic species**, **naturalized**, **invasive species**)

inversion - In **meteorology**, an increase in air **temperature** with height, the reverse of the normal pattern.... In meteorology, an inversion is a deviation from the normal change of an atmospheric property with altitude. It almost always refers to a temperature inversion, *i.e.* an increase in temperature with height, or to the layer (**inversion layer**) within which such an increase occurs. (See: **inversion layer**)

inversion layer - In **meteorology**, the **atmospheric** layer in which the usual **temperature** gradient - warm air below cold air - is reversed, preventing the mixing of warm and cold air as the warmer air rises. This can trap dangerous concentrations of **pollutants** in the cool air below, sometimes causing dense smog over urban areas....A layer of warm air in the **atmosphere** that prevents the rise of cooling air and traps **pollutants** beneath it. (See: **inversion**)

invertebrate - **Organism** lacking a backbone.... An animal that has no backbone. Some invertebrates have soft bodies, but others, like **arthropods**, are protected and supported by their hard **exoskeletons**.... An animal which does not possess a backbone; all invertebrates also do not have internal skeletons made of bone or cartilage (including the

arthropods, mollusks, **protozoans**, sponges, annelid worms, and many more obscure animals).

invertivore - An **organism** whose primary diet consist of small animals lacking a backbone, such as **insects**, spiders, worms, and crayfish.

ion - Atom or **molecule** that has acquired an electric charge by the loss or gain of one or more electrons.

ionosphere - The region of the upper **atmosphere** from 80 to 900 km (50 to 600 miles) that contains a relatively high concentration of **ions** (electrically charged particles)... An electrified region of the upper **atmosphere** where fairly large concentrations of **ions** and free electrons exist.... The upper layer of the **atmosphere** above the **stratosphere**, from a distance of about 80 kilometers from the Earth's surface. Incoming solar radiation is sufficiently intense to cause the ionization of the sparse gas **molecules** present... That part of a planets **atmosphere** that is sufficiently ionized by solar **ultraviolet radiation** so that the concentration of free (*i.e.*, unattached) electrons affects the propagation of radio waves.... The ionosphere is a charged layer of the **atmosphere** that can reflect radio waves. Actually it is a series of layers from 30-275 miles in elevation. It enables communication beyond the horizon for a band of frequencies, and with multiple reflections can reach half way around the globe. ... Region of charged particles in a planet's upper **atmosphere**; the Earth's ionosphere is at an **altitude** of about 40-400 km.... That part of the **atmosphere**, extending from about 70 to 500 kilometers, in which ions and free electrons exist in sufficient quantities to reflect electromagnetic waves. (See: **atmosphere**, **planetary boundary layer**, **troposphere**, **tropopause**, **stratosphere**, **stratopause**, **mesosphere**, **mesopause**, **thermosphere**, **exosphere**)

iripayal - A local name in northern Amazonian Peru for an open-**canopy** forest on poor soils with a palm-dominated **understory**. It may occur on very weathered **clays** or on soils with a sandy mixture. (See: **white-sand forest**, **chamizal**, **varillal**)

iridescence - A lustrous, rainbow-like quality of a surface, such as that of an oil slick; the inner layer of some mollusk shells, the wings of some butterflies, and the **plumage** of some birds (hummingbirds, jacamars, tanagers, etc.) exhibit iridescence.

iridescent - Marked by or showing rainbow colors that appear to move and change as the angle at which they are seen changes....Having a lustrous or brilliant appearance or quality. Many hummingbirds have iridescent plumage. Other examples of birds with iridescent plumage are Greater Ani, *Crotophaga major* and Bluish-fronted Jacamar, *Galbula cyanescens*.

irradiance - The amount of electromagnetic radiation reaching a surface, measured in watts per square meter.

irritating hairs - Hairs, as on a caterpillar or **stinging nettle**, that when touched cause a burning or stinging sensation on the skin.

irrupt - To undergo a sudden upsurge in numbers, especially when natural **taxonomic** balances and checks are disturbed.

irruption - A sudden upsurge in numbers, especially when natural **taxonomic** balances and checks are disturbed....An irregular and rapid increase in **population**.

island biogeography - The study of theories relating to the rates of **colonization** and **extinction** on **taxonomic** "islands" and how the rates vary with island size and distance from the source of colonists.

isobars - Lines drawn on a weather map joining places of equal **barometric pressure**.

isolated populations - **Species** is defined as a group of **organisms** that look similar and have the ability to **interbreed** and produce fertile offspring in the natural **environment**. For a new **species** to arise, either **interbreeding** or the production of fertile offspring must somehow cease among members of a formerly successful breeding **population**. For this to occur, **populations** or segments of a **population** must somehow become isolated. Two forms of isolation prevent **interbreeding** or cause infertility among members of the same **species**. These forms of isolation are **geographic isolation** and **reproductive isolation**. (For information on the formation of **species** see: **speciation, species, geographic speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

isolating mechanism - See **reproductive isolating mechanism**.

isopod - Small **crustaceans** which have seven pairs of legs and belong to the **order** Isopoda; the aquatic sow bug is an example of an isopod.... A large order of **crustaceans** whose members are characterized by flat, segmented bodies.

isotherms - Lines connecting points of equal **temperature** on a weather map..... A line on a map or chart of the Earth's surface connecting points having the same temperature at a given time or the same mean temperature for a given period..... A line on a chart representing changes of volume or pressure under conditions of constant temperature

isostatic uplift - Isostatic uplift includes the gradual uplift of the earth following rapid erosional removal of material from a mountain range. The land rises as a result of the removal of the weight. (See: **orogenic uplift, tectonic uplift**)

isthmus - Narrow strip of land located between two bodies of water, connecting two larger land areas.

iteroparity - See **iteroparous**.

iteroparous - A reproductive strategy of an organism characterized by multiple reproductive cycles over the course of its lifetime. **Polycarpy** is a parallel term. (See: **polycarpy, monocarpy, semelparous**)

jet stream - Fast-flowing, relatively narrow current or tube of air found at heights ranging from 7 to 8 miles (11.3–12.9 km) above the surface of the Earth. They form at the boundaries of adjacent air masses with significant differences in **temperature**, such as of the polar region and the warmer air to the south. The jet stream is mainly found in the **tropopause**, at the transition between the **troposphere** (where **temperature** decreases with height) and the **stratosphere** (where **temperature** increases with height). There are four major jet streams, two in the Northern Hemisphere and two in the Southern Hemisphere. There are two main jet streams at polar latitudes, one in each hemisphere, and two minor subtropical streams closer to the equator. Although discontinuous at some points, they circle the globe at middle and polar latitudes. In the Northern Hemisphere the streams are most commonly found between latitudes 30°N and 70°N for the polar jet stream, (pilots remember that like birds they go north in the summer and south in the winter), and between latitudes 20°N and 50°N for the subtropical stream. Instead of moving along a straight line, the jet stream typically flows in a wavelike or meandering fashion and these meanders themselves propagate east, at lower speeds than that of the actual wind within the flow. ...A narrow air current flowing from west to east at about 20,000 feet in the **atmosphere**, traveling at about 50 **knots**, that influences storms and pressure systems at the surface. ...Relatively strong winds concentrated in a narrow stream in the **atmosphere**, normally referring to horizontal, high-**altitude** winds. The position and orientation of jet streams vary from day to day. General weather patterns (hot/cold, wet/dry) are related closely to the position, strength and orientation of the jet stream (or jet streams). A jet stream at low levels is known as a low-level jet.... River of high-speed air in the atmosphere. Jet streams form along the boundaries of global air masses where there is a significant difference in **atmospheric temperature**. The jet streams may be several hundred miles across and 1-2 miles deep at an **altitude** of 8-12 miles. They generally move west to east, and are strongest in the winter with core wind speeds as high as 250 mph. Changes in the jet stream indicate changes in the motion of the **atmosphere** and weather.... A current of fast-moving air in the upper **atmosphere** and one factor that determines **weather** in North America

juglone - A chemical that inhibits plants from growing.

jungle - A colloquial term lacking a precise **biological** or **taxonomic** definition. It is often used to describe a tangled, dense **successional ecosystem** consisting of many fast-growing, light-loving **species**, but is also at times used to refer to **rainforest** or **tropical rainforest**.

juvenile - A stage in the life span in which the **organism** has not yet achieved adult characteristics such as adult **plumage** or reproductive capabilities.

kame - An irregular short mound, hill, or ridge of poorly sorted sand and gravel deposited by melt water in contact with **glacial** ice. A long winding kame is termed an **esker**.

karst - A geologic formation of irregular limestone deposits that dissolve forming sink holes, underground streams, and caverns....Any limestone or dolomitic region showing the pits, sinks, and other features characteristic of subterranean solution and diversion of surface water....A limestone plateau marked by sinks, or karst holes, and solution channels interspersed with abrupt ridges. Not a single feature, but a **landscape**.

karyotype - The appearance and characteristics of the **chromosomes** of a **cell**, especially size, number and form....A photomicrograph in which a **cell's chromosomes** are arranged according to size and classification.... The character of the **chromosomes** as defined by their size, shape, and number.

keratin - A tough, fibrous, insoluble **protein** that is the main structural element in hair, nails, feathers horns and hooves.

kettle or **kettle hole** - A hollow, typically filled by a pond or lake, that results from the melting of a mass of ice trapped in **glacial** deposits...A depression in the surface of a ground **moraine**, caused by the melting of a block of subsurface ice after the **moraine** had formed....A bowl-shaped depression created when blocks of ice become lodged in **glacial** deposits and melt, leaving a depression....A circular depression in the ground made when a block of ice calves off the toe of a **glacier**, becomes buried by till, and later melts.... A depression in **glacial** drift formed by the melting of a detached block of stagnant ice that was buried in the drift. It often contains a lake or **swamp** (kettle lakes); Thoreau's Walden Pond is an example. ...A **pothole** in a **stream** bed.

kettle lake - A body of water occupying a **kettle** or **kettle hole**. Thoreau's Walden Pond is an example.

key species - See **keystone species**.

keystone complex - A web of animals and food, **predators** and **prey**, that is especially important in defining an **organic**.

keystone species - An important **species** which plays a key role in holding the **ecosystem** together, the absence of which would have catastrophic consequences for **community** composition and **ecological** structure across the **food web**. **Conservation** of these **organisms** is the key to the survival of many others irrevocably linked by natural systems and processes. Keystone **species** are often the **dominant habitat vegetation**, but may be harder to predict ranging from the charismatic Sea Otter of North America to otherwise inconspicuous soil or **planktonic organisms**. ...**Species** that have a large effect on their **ecosystem** relative to the number of individuals present, such as prairie dogs and starfish. **Species** that play roles affecting many other **organisms** in the **ecosystem**.... A **species** that increases or decreases the **diversity** of a system. Generally these **species** are

competitively superior **species**..... **Species** that significantly modify the physical **distribution** of other **organisms** or that have important influences on other **biota**; *e.g.*, removal of a keystone **species** may result in the loss of other **species** of animals and plants. ... A **species** which plays an important role in determining the overall structure and dynamic relationships within a **biotic community**. An **evolutionary**, component **species** of a **biotic community** whose presence is essential to the integrity and stability of the **community**. Keystone **species** may be unimportant as energy transformers in a **biotic community** (*i.e.*, they may be neither very abundant nor consume large portions of the **biotic productivity** of a **community**). However, slight variations in keystone **species'** abundance results in large changes in the abundance of other **species** and/or in **biotic community** relationships and structure....A **species** that increases the **diversity** of a system by selective **predation** is considered a **keystone predator**...A species that has a critical influence on the nature and functioning of the **ecosystem** in which it occurs.... A **population** that occupies a **niche** of such importance that many other **organisms** depend on it..... A **species** that has a disproportionate effect on the **environment** relative to its **biomass**.

keystone predator - A **species** that increases the **diversity** of a system by selective **predation**.

kilometer - A measure of length equal to 1000 meters or about 0.621 miles. ... Metric unit of distance equal to 3,280.8 feet or .621 statute miles. (See: **mile**)

kin selection - The exhibition of strategies that favor the reproductive success of an organism's relatives, even at a cost to its own survival and/or reproduction. The classic example is a **eusocial** insect colony, with sterile females acting as workers to assist their mother in the production of additional offspring.

kingdom - A category of **taxonomic classification** above **phylum**....One of the major subdivisions of life; based upon basic similarities in cell structure. Five kingdoms are recognized: Monera, **Protoctista**, Fungi, Animalia, and Plantae. (See: **taxon**, **taxonomy**, **classification**)

kinetic energy - The energy of any moving object.

kit - The young of certain fur-bearing **mammals**, such as foxes, beavers, cats, and rabbits.

kleptoparasitism - Literally, **parasitism** by theft, a form of feeding where one animal takes **prey** from another that has caught, killed, or otherwise prepared, including stored food (as in the case of cuckoo bees, which lay their eggs on the pollen masses made by other bees). Kleptoparasitism is also the 'stealing' of nest material or other inanimate objects from one animal by another. Also spelled **cleptoparasitism**. (See: **cleptobiosis**)

knee - In botany, an abrupt bend in a stem or tree trunk, or an outgrowth rising from the roots of some **swamp**-growing trees such as Baldcypress (*Taxodium distichum*).

knot - Short for nautical mile... Nautical measurement of speed equal to 1.15 miles per hour on land. ... Unit of speed equal to one nautical mile per hour (1.852 km/h). ...The unit of speed in the nautical system; one nautical mile per hour. It is equal to 1.1508 statute miles per hour or 0.5144 meters per second. Unit of speed of one nautical mile (6,076.1 feet) an hour...A knot is a unit of speed, abbreviated kt or kn. It is a non-SI unit accepted for use with the SI. It is used around the world for maritime and aviation purposes.... nautical mile: a unit of length used in navigation; equivalent to the distance spanned by one minute of arc in latitude; 1,852 meters....A nautical mile is a unit of distance equal to 1,852 meters. The length of the nautical mile is very close to the mean value of the length of 1 minute of latitude, which varies from approximately 1,843 meters at the equator to 1,861.6 meters at the pole...In **botany**, a hard mass of wood that forms where a branch grows out of the stem or trunk of a tree; the knot is usually visible in lumber as a darkened round mass.

kph - Abbreviation for “kilometers per hour”, a measurement of speed.

krill - Shrimp-like **planktonic crustaceans**; major source of food for *e.g.* baleen whales... Any of several small marine crustacean species of plankton in the order Euphausiacea in the class Malacostraca...Small, shrimp-like crustaceans, which form an important food source for filter-feeding marine mammals.... A shrimp-like marine invertebrate animal. These small crustaceans are important organisms of the zooplankton, particularly as food for baleen whales, manta rays, whale sharks, crabeater seals, other seals, and a few seabird species that feed almost exclusively on them. ... The common name given to the order Euphausiacea of shrimp-like marine crustaceans. Also known as euphausiids, these small invertebrates are found in all oceans of the world.... Krill are considered an important trophic connection - near the bottom of the food chain - because they feed on phytoplankton and to a lesser extent zooplankton, converting these into a form suitable for many larger animals for whom krill makes up the largest part of their diet.

krummholz - This term, from the German for “bent wood”, refers to the stunted, **shrub**-like form characteristic of some **conifer tree** species when grown under extreme **environmental** stress, especially at high elevation. An example would be the Balsam Fir, *Abies balsamea* growing at **treeline** in the mountains of the northeastern United States.... A German term meaning "bent wood" for the twisted and distorted woody **vegetation** characteristic of mountain **timberlines**....**Scrubby**, stunted **trees**, often forming a characteristic zone at the limit of tree growth in mountains. ...The belt of discontinuous **scrub** or groveland at **alpine timberlines**, composed of **species** which have the **genetic** potential of the **tree** life-form, but in this belt are both strongly dwarfed and misshapen.... The stunted growth habit, literally crooked wood, caused by wind and found in certain tree species at their upper limit of distribution. In cushion krummholz, alpine trees exposed to severe wind conditions are wind-pruned to a cushion-like mat. In flagged krummholz, the tallest trees protrude from the protective snow pack and become wind-battered "flags."

K-Strategist - Species that produce a few, often large offspring or seeds, but invest a great deal of time and energy to ensure that most of the offspring or seeds will reach **reproductive** age.... A K-strategist is characterized by: 1) large parental investment in the young or seeds. K-strategists reproduce slowly, with long **gestation periods**, to permit the young to develop more in the womb. After birth, the young are tended until they can be reasonably expected to care for themselves, and 2) the ability to exploit stable **environmental** situations. Once the **population** of a K-strategist has reached the **carrying capacity** of its **environment**, the **population** size stays relatively constant. (See: **R-Strategist**)

La Niña-Southern Oscillation Phenomenon - Refers to the warm **ocean current** that flows along the northern tropical coast of South America in its stabilizing phase. La Niña refers to "the child" of constancy as opposed to El Niño "the Child" of change..... A period of stronger-than-normal **trade winds** and unusually low sea-surface **temperatures** in the central and eastern tropical Pacific Ocean; the opposite of El Niño (See: **Southern Oscillation Index, El Niño -Southern Oscillation Phenomenon, southern oscillation**)

labium - In **entomology**, an **insect's** lower lip. It protects the piercing stylets of sucking **insects**.

lacustrine - Relating to lakes and standing bodies of water.... Pertaining to lakes.... Related to or growing in lakes.

lagg - Marginal zone outside the **rand** containing **fen** vegetation and representing the transition between **raised bog peat** and mineral soils....**Fen** belt which separates a **bog** from mineral soil....Natural ditch around the perimeter of a raised **bog** or confined **muskeg**.

lagoon - A shallow water body that is near or connected to a larger body of water....A pond or small **lake** connected with a larger body of water. The term is also used to describe shallow water separated from the sea by low sandbanks, or the body of water enclosed by an **atoll**....A lagoon is a body of comparatively shallow salt or **brackish** water separated from the deeper sea by a shallow or exposed sandbank, **coral reef**, or similar feature. Thus, the enclosed body of water behind a barrier reef or barrier islands or enclosed by an **atoll** reef is called a lagoon...A lagoon is a shallow body of water that is located alongside a coast.

lahar - A mudflow containing **volcanic** ash and rock.

lair - A den, refuge, or hiding place....A place inhabited by a wild animal, often a cave or a hole in the ground.

lake - A body of fresh or salt water entirely surrounded by land.

lamina - In botany, the broad, expanded portion, or blade, of a leaf.

lammas - The part of an annual shoot that is formed after a summer pause in growth.

lanceolated - In botany, rather narrow, tapering to a point at the apex, and sometimes at the base also; as, a lanceolate **leaf**...In birds, marked with narrow, pointed streaks, as in Lanceolated Monklet, *Micromonacha lanceolata*.

land breeze - A **nocturnal** coastal breeze that blows from land to sea. In the evening the water may be warmer than the land, causing pressure differences. The land breeze is the flow of air from land to sea equalizing these pressure differences. (See: **sea breeze, offshore winds, onshore winds**)

land bridge - In **biogeography**, an isthmus or other land connection between what at other times are two distinct land masses separated by water. During the Pleistocene a land bridge existed between eastern Russia and western Alaska. Today a land bridge connects North and South America whereas in the past these two continents were separated by water.

land cover - The physical state of the land surface, including vegetation, soil, rock and human-made structures.

land degradation - The decline in integrity, fertility and usefulness of the land, usually as a result of human mismanagement. This reduction in land quality has impacts on both human utility such as farm productivity, and **ecosystem** utility such as the ability to maintain **biodiversity**. Common forms of land degradation include water and wind **erosion, salinization** from over-irrigation or land clearing, soil acidification from overuse of fertilizers, **habitat** and vegetation destruction, chemical contamination and **pollution**, landslips and other soil loss or movement, decline in soil structure from stock trampling, soil compaction from heavy equipment, and loss of soil fertility due to excessive agriculture.

LANDSAT - Any of a series of land-observing satellites useful for civilian land-use mapping, **natural resource** assessment, and measuring **habitat destruction** and other **environmental** data. Land Remote-Sensing Satellite, operated by the U.S. Earth Observation Satellite Company (EOSAT). Commercialized under the Land Remote-Sensing Commercialization Act of 1984, Landsat is a series of satellites (formerly called ERTS) designed to gather data on the Earth's resources in a regular and systematic manner. Objectives of the mission are: land use inventory, geological/mineralogical exploration, crop and forestry assessment, and cartography.

landscape - A mosaic of repeated **ecosystems** in a given **geographic** area. The land is **heterogeneous**, but there are structural and functional relationships among the matrix and the various patches and corridors.... A total part of Earth, a composite of all of the characteristics that distinguish a certain area on the Earth's surface from other areas. An expanse of Earth typically seen within one viewing, but often a large designated area on a map somehow different than contiguous areas.

landscape ecology - The study of the **distribution** patterns of **communities** and **ecosystems**, the **taxonomic** processes that affect those patterns, and changes in pattern and process over time.... The study of patterns of **ecosystems** of a given area and the interactions among those various **ecosystems**.... The study of spatial and temporal variety (**heterogeneity**) in the structure, dynamics, and relations of plants, animals, (including people), and **landscape** elements at a large scale.

landslide - The rapid, downslope movement of a mass of rock, soil, and debris.

lanieres - In a **fen** or **bog**, the drier, low, winding **peat** ridges located between the flarks. They have a slight damming effect on the water drainage down the seepages. Synonym of strings, ribs, and banks.

larva (plural: **larvae**) - Among **invertebrates**, an immature stage in the life cycle which usually is much smaller than, and **morphologically** different from, the adult. In **insects** with **metamorphosis**, the larva must become a **pupa** before reaching adulthood.... The immature, wingless, and often wormlike stage of a **metamorphic insect** that hatches from the egg, alters chiefly in size while passing through several molts, and is finally transformed into a **pupa** or **chrysalis** from which the adult emerges.... The immature stage of some **insects** that looks completely different from their parents.... An immature form in some **organisms** that looks and acts differently from the adult, for example, the worm-like stage of an **insect** or the **tadpole** stage of a frog; **organisms**, such as butterflies, that undergo **complete metamorphosis** have four life stages: **egg**, **larva**, **pupa**, adult.

larval - Of or referring to a larva.

larval stage - The period in an insect's life as a **larva**.

latent heat - The energy released or absorbed during a change of state, for example, in changing from a liquid to a gas. In a **hurricane**, latent heat comes from warm ocean water that is turned to steam providing energy to the storm. This is one ingredient needed to form and strengthen a **hurricane**.... The heat that is either released or absorbed by a unit mass of a substance when it undergoes a change of state, such as during **evaporation**, **condensation**, or **sublimation**.

lateral bud - See **axillary bud**.

lateral meristem - A region where **cells** divide, located along the length of a **stem** or root (for example, **vascular cambium** and **cork cambium**).

laterite - A kind of **tropical** soil high in aluminum and iron **compounds**, often reddish in color.

lateritic - Of or referring to **laterite**.

lateritic soil - See **laterite**.

laterization - The process whereby **leaching** caused by heavy rains plus high **temperatures** converts **lateritic soils** into hardened, brick-like material.... Used by some to refer to the processes of formation of **laterite** or red and yellow **tropical** soils. This term is not specific and should not be used.

latex - A thick, white, fluid secretion of many plant **species**....A milky, usually white fluid of variable composition that is usually made up of various gum resins, fats, or waxes and often a complex mixture of other substances frequently including poisonous **compounds**. This is found in or produced by **cells** of plants especially of the *Asclepiadaceae* but also of the *Apocynaceae*, *Sapotaceae*, *Euphorbiaceae*, *Papaveraceae*, *Moraceae*, and *Compositae*. It yields rubber, gutta-percha, chicle, and balata as its chief commercial products.

laticifer - In **botany**, a **cell** producing **latex**.

latitude - South to north measurement of location on the planet. Moving upwards in latitude towards either the North or South Poles, is climatically similar to going up in elevation on a mountain. The climate becomes colder at high elevations - air will tend to get colder as it rises, since it expands. The rate of change is approximately 10°C per km of elevation or **altitude** or 1° C. per 100 meters of elevation gain (some sources give this rate as only 0.5° C **temperature** change for each 100 m change in elevation). Therefore, moving up 100 meters on a mountain is roughly equivalent to moving 80 kilometers (45 miles or 0.75° of latitude) towards the pole. This relationship is only approximate, however, since local factors such as proximity to oceans can drastically modify the climate.... One of many imaginary lines parallel to the Equator and measured in degrees; the Equator is 0°, a latitude and either pole is 90°, a latitude; the degree of latitude of an area indicates how far north or south it is and thus the climatic conditions as well as the types of plants and animals that might be expected there. Latitude (a.k.a. the geodetic latitude) is the angle between a perpendicular at a location, and the equatorial plane of the Earth. (See: **longitude**, **coordinates**, **GPS**, **altitudinal gradient**).

latitudinal - Of or referring to **latitude**.

latitudinal cline - Trend that increases or decreases with **latitude**. Example: **alkaloid** content in plant leaves tends to decrease with increasing **latitude**. (See: **latitudinal diversity gradient**)

latitudinal diversity gradient - The concept that **biological diversity** declines **latitudinally** as one travels north or south from the equator....The strong tendency for various **taxonomic** groups to have their maximum **species** richness in the equatorial **tropics**, with **species** richness diminishing with increasing **latitude** (*i.e.*, toward **polar** regions).

latitudinally - Of or referring to **latitude**.

lava - Molten rock that flows out onto the surface of Earth.

Law of Conservation of Energy - See **Laws of Thermodynamics (First Law of Thermodynamics)**.

Law of Priority - Part of the **International Code of Zoological Nomenclature** whereby the date of publication of a **scientific name** determines its validity, with the earliest publication having priority. The Law of Priority determines which name that prevails when **species** or **genera** are consolidated or “**lumped**”.

Law of the Minimum - See **Liebig’s Law**

Laws of Thermodynamics - The Laws of Thermodynamics dictate the specifics for the movement of heat and work. (See: **thermodynamics**) -

First Law of Thermodynamics - The universal **Law of Conservation of Energy** - **energy** can be neither created nor destroyed, but changes from one form to another....The total amount of energy and matter in the Universe remains constant, merely changing from one form to another.... The principle that the total energy of a system cannot change unless energy is taken from or given to the outside. Thus the law states that the total energy - resting mass energy + kinetic energy + potential energy - of a closed system remains constant; that is, the total value of a particular physical or living system is conserved. Earth is a closed system, therefore, the idea of perpetual growth, as in consumerism or human population growth, is a losing strategy overall. Therefore, excessive wealth generates excessive poverty, excessive land use generates excessive land degradation.

Second Law of Thermodynamics - “In all energy exchanges, if no energy enters or leaves the system, the potential energy of the state will always be less than that of the initial state.” This is also commonly referred to as **entropy**. A watchspring-driven watch will run until the potential energy in the spring is converted, and not again until energy is reapplied to the spring to rewind it. A car that has run out of gas will not run again until the car is refueled. Once the potential energy locked in **carbohydrates** is converted into kinetic energy (energy in use or motion), the **organism** will get no more until energy is input again. In the process of energy transfer, some energy will dissipate as heat. **Entropy** is a measure of disorder: **cells** are NOT disordered and so have low **entropy**. The flow of energy maintains order and life. **Entropy** wins when **organisms** cease to take in energy and die.... The **second law of thermodynamics** is an expression of the universal law of increasing **entropy**, stating that the **entropy** of an isolated system which is not in equilibrium will tend to increase over time, approaching a maximum value at equilibrium.

layering - In **botany**, a method of plant propagation in which **adventitious roots** are developed on an intact plant, before the rooted section is removed.

LD50 - Dosage of a chemical **compound** which will result in the death of 50% of test animals given the **compound**.

leachate - Liquids that have percolated through a **soil** and that carry substances in solution or suspension.... The liquid produced when water percolates through any permeable material... A soluble substance that is washed out of the soil.... A solution formed when soluble components have been removed from a material.... A solution produced by leaching. Example: water that has seeped through a waste disposal site and thus contains in solution various substances derived from the waste material. (See: **leaching**)

leaching - The process by which soluble materials in the soil, such as salts, **nutrients**, **pesticide** chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water....The removal of **nutrient** atoms from soils brought about by the effect of rainwater washing through the soils, interacting with the clay component of the soil.... The process by which **nutrient** chemicals or contaminants are dissolved and carried away by water, or are moved into a lower layer of soil.... The process by which soluble constituents are dissolved and filtered through the soil by a percolating fluid.... The washing out of material from the soil, both in solution and suspension. Leaching may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, **groundwater**, or soil.... The removal of materials in solution by the passage of water through a solid medium, *e.g.*, through soil or overburden. ... The process by which soluble materials in the soil, such as salts, **nutrients**, **pesticide** chemicals, or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water. (See: **leachate**)

leaf (plural: leaves) - An outgrowth of a **stem**; the principal organ of **photosynthesis**.

leaf area index - The area of foliage per unit area of ground. Conventionally this refers to the ratio of the area of the upper side of the leaves in a canopy projected onto a flat surface to the area of the surface under the canopy. Occasionally this has been used in reference to both sides of the leaves..... Leaf area index (LAI)- Leaf surface area per unit of land surface area. For broad-leaf forests, the index is calculated using only one side of the leaf blade; for needle-leaf stands the total leaf surface is used; and, for mixed broad- and needle-leaved stands, a combination of the two is used.

leaflet - One of the segments of a **compound leaf**.... A portion of the **blade** of a **compound leaf**.

leaf litter - **Leaf litter**, or **forest litter**, is the **detritus** of fallen leaves and bark which accumulate in forests.... The uppermost layer of **organic** debris on the ground under a **vegetation** cover, *i.e.*, essentially the freshly fallen or only slightly decomposed vegetable material, mainly from foliage but also bole, bark fragments, twigs, flowers,

fruits, etc. ... **Leaves** that have fallen from a plant because of seasonal changes or disease. (See: **duff**)

leaf margin - The outer margin or edge of a **leaf**.

leaf petiole - The stalk of the **leaf**.

leaf primordium - An immature **leaf**, located at a **stem** tip.

leaf rosette - A group of **leaves** radiating from a short **stem**.

leaf scar - A scar left on a **stem** after a **leaf** has fallen.

leaf tendril - A modified **leaf** or **leaf** part used as a grasping organ.

lectotype - A **syntype** designated as the single name-bearing **type specimen** subsequent to the establishment of a nominal **species** or **subspecies**. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

left bank (of a river) - The bank of a river that is to your left if you position yourself in the middle of the river and look downstream (See: **right bank**).

legume - A plant of the **family** Fabaceae (or Leguminosae).

leguminous - Of or referring to a **legume**.

Leishmaniasis - A group of **parasitic** diseases affecting the skin, mucous membranes, and internal organs caused by **protozoan parasites** that belong to the **genus** *Leishmania* and transmitted by the bite of certain species of sand fly, including flies in the **genus** *Lutzomyia* in the New World and *Phlebotomus* in the Old World.

lek - Traditional display grounds on which males of certain **promiscuous species**, such as some manakins, perform **courtship** displays to attract females. Displaying males defend small **territories** on the lek, with the more **dominant** males usually dancing towards the center of the court. Females visit the lek, and select a male for copulation....An area in which several, and sometimes several dozen, males court passing females. May be concentrated or dispersed, covering a larger area where males are not in direct view of one another. (examples: Band-tailed Manakin, *Pipra fasciicauda*, Screaming Piha, *Lipaugus vociferans*, and Andean Cock-of-the-Rock, *Rupicola peruviana*).

lentic - Pertaining to standing (non-flowing) waters such as lakes, **reservoirs**, ponds, and **swamps**. (See: **lotic**)

lentic water - Ponds or lakes (standing water. See: **lentic, lotic waters**)

lenticel - In **botany**, a small, gas-exchange opening in the **cork** of a woody **stem**. . . . A group of loosely arranged, corky cells (as on the epidermis of a mature grape berry, pedicel, or stem) permitting gas exchange.

leucism - An abnormal paleness occurring due to a dilution of pigmentation. . . . Leucistic or 'dilute' birds are abnormally pale or 'washed out' looking. This **plumage** aberration is perhaps more frequent than any except **albinism**, though still very unusual. (See: **albinism, albino, melanism**)

leucistic - See: **leucism, albino, albinism, melanistic**.

levee - A wall or a large mound of earth built along a river to prevent it from flooding. (See: **natural levee**)

liana - A long-stemmed, woody, climbing plant growing from the ground into the tree **canopy** of **tropical** forests. . . . A woody, climbing, **tropical** vine. . . . A woody-stemmed vine. Lianas are rooted in the **substrate** and use trees or **shrubs** as support; often their leaves and flowers reach the **canopy** of layer of the **vegetation** A type of woody vine that begins as a small **shrub** and entwines upward, entangling throughout the **canopy**.

lichen - A composite **organism** formed from the **symbiotic** association of a true **fungi** and an **alga**. . . . An obligate **mutualistic** association between a **fungus** and a **photosynthetic** partner (either green **algae, cyanobacteria**, or both). . . . An **organism** formed by a **symbiotic** association of a **fungus**, an **alga**, and sometimes a **cyanobacterium**. Lichens are classified according to the **fungal** partner, the **mycobiont**. The **algal** partner is called the **phycobiont** ("phyco" means **algae**) or sometimes the **photobiont** and it uses **photosynthesis** to supply **carbohydrates** to the **fungus**. "In nature not one of the 15,000 - 20,000 fully lichenized **fungi** (almost a fifth of all known **fungi**, and 40% of all ascomycetes) is ever found without its domesticated **alga**, though most of the **algae** can lead independent existences. . . . Lichens are **organisms** formed by the **symbiotic** association of a **fungus**, forming the vegetative body, and either **cyanobacteria** or unicellular **algae** undergoing **photosynthesis**. Lichens are often seen as green, gray or yellow crust-like forms growing flush on rocks or **tree** trunks. The **symbiotic** combination functions so effectively that lichens flourish in some of the harshest **environments** on earth such as the extreme cold and aridity of Antarctica. They are however very sensitive to **air pollution** since they cannot excrete **toxic** substances. Lichen die-back has been used as an effective **biological indicator** of rising **pollution** levels.

Liebig's Law - Also called the *Law of the Minimum*. . . . The **carrying capacity** for any given **species** is set by the necessity in least supply. Every **species** has a list of requirements for survival - water, **temperature** range, degree of salinity of water, degree of acidity or **alkalinity** of soil, food of a certain nature, so many hours of sunlight, and so on. Liebig's Law tells us that even if all other factors are optimal, the lack of one necessity can undermine an **organism's** ability to survive. . . . A principle developed in agricultural science by Carl Sprengel (1828) and later popularized by Justus von Liebig.

It states that growth is controlled not by the total of **resources** available, but by the scarcest **resource**. This concept was originally applied to plant or crop growth, where it was found that increasing the amount of plentiful **nutrients** did not increase plant growth. Only by increasing the amount of the limiting **nutrient** (the one most scarce in relation to "need") was the growth of a plant or crop improved... An early version of this law was formulated by Baron Justus von Liebig (1840). The modern version of the rule holds that, of all the **biotic** or **abiotic** factors that control a given **population**, one or two have to be limiting – that is to say, a change in these factors produces a change in the average or equilibrium density of the **population**. These factors could be **biotic** (e.g. **population density** of a particular **predator species**) or **abiotic** (e.g. amount of nitrogen in the soil). (See **limiting factor**.)

life cycle - The phases, changes, or stages through which an **organism** passes during its lifetime.... The successive stages through which an **organism** passes from the **spore** or fertilized egg of one generation to the **spore** or fertilized **egg** of the next generation. A continuous, descriptive account of a life cycle is called the life history of an **organism**.

Life Cycle Analysis (LCA) - See **Life Cycle Assessment**.

Life Cycle Assessment (LCA) - Life Cycle Assessment is the investigation and valuation of the **environmental**, economic and social impacts of a product or service. A product's life cycle starts when the raw materials are extracted from the Earth through to processing, transport, use, reuse, recycling or disposal. For each of these stages, the impact is measured in terms of the resources used and **environmental** impacts caused.... A detailed assessment of the environmental effects of a process, product or service "from the cradle to the grave".... A procedure which involves assessing the impacts of a product or material throughout its life cycle - *i.e.* from raw material extraction or production through manufacture and use, to disposal or recovery. Also called **Life Cycle Analysis**.

life zone - A recognizable band of **vegetation** within a certain **altitudinal** range along a mountain slope.... belts of **vegetation** that are similar in structure and species composition in both latitudinal and **elevational** expressions.... An **altitudinal**, **latitudinal**, or **climatic** region or belt with distinctive **faunal** and **floral** characteristics, type of animal and plant life found in them -- *e.g.*, in the Northern Hemisphere, the Upper Sonoran, Transition, Canadian, Hudsonian, and Alpine life zones., and in the **tropics**, the **Tropical**, **Subtropical**, **Temperate** and **Paramo** or **Puna** life zones. (See: **biome**, **ecoregion**)

lift - The upward force that helps flying animals to stay in the air.

lightning - A visible electrical discharge produced by **thunderstorms**.... A discharge of atmospheric electricity accompanied by a vivid flash of light. During thunderstorms, static electricity builds up within the clouds. A positive charge builds in the upper part of the cloud, while a large negative charge builds in the lower portion. When the difference between the positive and negative charges becomes great, the electrical charge jumps

from one area to another, creating a lightning bolt. Most lightning bolts strike from one cloud to another, but they also can strike the ground. These bolts occur when positive charges build up on the ground. A negative charge called the 'faintly luminous streamer' or 'leader' flows from the cloud toward the ground. Then a positively charged leader, called the return stroke, leaves the ground and runs into the cloud. What is seen as a lightning bolt is actually a series of downward-striking leaders and upward-striking return strokes, all taking place in less than a second.

Lightning bolts can heat the air to **temperatures** hotter than the surface of the sun. This burst of heat makes the air around the bolt expand explosively, producing the sound we hear as thunder. Since light travels a million times faster than sound, we see lightning bolts before we hear their thunderclaps. By counting the seconds between a flash of lightning and the thunderclap and dividing by five, we can determine the approximate number of miles to the lightning stroke.

lignify - Convert into wood or cause to become woody.... To develop woody tissue as a result of incrustation of **lignin** during secondary growth.... To harden by impregnation with **lignin**.

lignin - In **botany**, a tough, durable plant substance deposited in **cell walls**, especially in **wood**....A polymer that binds **cellulose** together to make wood. The stiffening material inside wood **cell** walls that gives strength and rigidity. Allows **trees** to grow tall and out-compete other plants for sunlight. Accounts for about 30% of the dry weight of wood.. ...The component of wood responsible for its rigidity.

limestone - Rock that is made mostly of **calcium carbonate**.

limiting factor - A condition whose absence or excessive concentration, is incompatible with the needs or tolerance of a **species** or **population** and which may have a negative influence on their ability to thrive or survive.... Any **environmental** factor whose presence, absence, or abundance is the main factor restricting the **distribution**, numbers, or condition of an **organism**. A factor to which the limit of tolerance of an **organism** is first reached and which, therefore, acts as the immediate restriction to one or more of its functions or activities, thus its abundance and **geographic distribution**.... An **environmental** condition which, when altered, causes a **population** of **organisms** to not thrive; space, sunlight, **temperature**, and water are some common examples of limiting factors. An element of a process which acts to restrict the rate, magnitude or quality of an outcome. In chemistry, the rate-limiting factor holds up the flow of a chemical reaction. In **ecology**, limiting factors which control **populations** may be **density-dependent** limits (*e.g.* **carrying capacity** limitations such as food, **predation** and shelter) or density-independent limits (factors unrelated to **population**, *e.g.* weather, hazards, **environmental** disruption). (See **Liebig's Law**)

limnobiotic - Occurring only in standing (non-flowing) waters.

limnology - The scientific study of **freshwaters**, especially of ponds and lakes. It deals with the physical, chemical, **meteorological**, and especially **biological** and **ecological**

conditions pertaining to such bodies of water. ... The scientific study of **freshwater**, such as the **geography** and **ecology** of lakes and **streams**.

limnophilous - Occurring mainly in standing waters, but also found in flowing waters.

Linnaean system - The system developed in the mid-18th century by Carolus Linnaeus for naming **biological** organisms whereby each **species** is given a scientific name comprised of its **genus** and **species** names. The **genus** name is capitalized and the **species** name is not capitalized. This naming system is also known as **binomial nomenclature**. (See: **binomial nomenclature, binomial**)

lipid - A type of fat **molecule**. Lipids are important components of **cellular** membranes.... Any of a group of fats and fat-like **compounds**, including sterols, fatty acids, and many other substances.... Fat or fat-like substance found in the blood, such as cholesterol.

lithology - The gross physical character of a rock or rock formation....The microscopic study, description, and classification of rock.

lithologic - Referring to the gross physical character of a rock or rock formation.

lithosphere - The solid outer layer of the Earth; includes both the land area and the land beneath the oceans and other water bodies.... Refers to areas of the surface of the Earth not covered by water.... The component of the Earth's surface comprising the rock, soil, and sediments. It is a relatively passive component of the climate system, and its physical characteristics are treated as fixed elements in the determination of climate.... The rigid outer part of Earth made up of rocks in the **crust** attached to the upper part of the **mantle**. (See: **biosphere, hydrosphere, atmosphere**)

lithospheric - Of or referring to the **lithosphere**.

lithospheric plate - plate of the **lithosphere** that moves slowly within Earth.

lithotroph - A lithotroph is an organism that uses an inorganic substrate (usually of mineral origin) to obtain reducing equivalents for use in biosynthesis (*e.g.*, carbon dioxide fixation) or energy conservation via aerobic or anaerobic respiration. Known lithotrophs are exclusively microbes; No known macrofauna possesses the ability to utilize inorganic compounds as energy sources. Macrofauna and lithotrophs can form symbiotic relationships, in which case the lithotrophs are called "prokaryotic symbionts." The term "Lithotroph" is created from the terms 'lithos' (rock) and 'troph' (consumer), meaning the "eaters of rock." ... An organism that obtains its energy from inorganic compounds (such as ammonia) via electron transfer.

litter - In **zoology**, multiple offspring born to one mother at one time, for example, dogs and cats give birth to a litter of young...In **ecology**, the topmost layer of **organic** material, such as fallen leaves, in a **forest**. ... A surface layer on the **forest floor** of loose

organic debris consisting of freshly fallen or slightly decomposed plant parts...Plant parts dropped on the soil surface so recently that the **organ** from which they originated can be discerned rather readily. (See: **duff, leaf litter**)

Little Ice Age - A cold period that lasted from about A.D. 1550 to about A.D. 1850 in Europe, North America, and Asia. This period was marked by rapid expansion of mountain glaciers, especially in the Alps, Norway, Ireland, and Alaska. There were three maxima, beginning about 1650, about 1770, and 1850, each separated by slight warming intervals.

littoral - Existing on or pertaining to a shore...The shoreline **environment** of a lake, river or sea.

littoral zone - The area between the high- and low-water marks on the seashore. Same as **intertidal zone**.

liverwort - A **bryophyte** belonging to the **class** Hepaticae. These are primitive **photosynthetic** plants. Liverworts have one of two forms: thalloid liverworts are strap-shaped while leafy liverworts have a "stem-and-leaf" form similar to **mosses**... The Division Hepatophyta. A primitive group of plants with no vascular system, simpler than **mosses**. They produce **spores** like **mosses** and live in similar habitats but have a simpler structure and probably had a common ancestor in the Ordovician period (approx 450 million years ago). They are cousins to the **mosses** and **hornworts**.

living stone - A **species** of succulent plants **camouflaged** to look like a small rock.

Llanos - A vast area of seasonal marshland mostly in central and southern Venezuela but also in Colombia and northeastern Brazil. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

load - In **hydrology**, a material or constituent in solution, in suspension, or in transport; usually expressed in terms of mass or volume. For example, one can talk about the **sediment** load of a **river**.

loam - A mixture of sand, silt, and clay...Soil having a mixture of **clay, silt**, and sand; loamy soil is typically loose, well-drained, and rich in **organic** matter...Soil material that is 7 to 27% clay particles, 28 to 50% silt particles, and less than 52% sand particles. ...A loose term for any non-sandy, non-sticky, friable soil.

lobe - A rounded projection, such as the lobe of an ear or a **leaf**.

lobed - With **leaves**, having deeply indented margins but with the lobes not entirely separate from each other.

local winds - Winds that tend to blow over a relatively small area.... Winds that can blow from any direction and cover short distances.

locus (plural: **loci**) - A specific place or location on a given **chromosome**. The **genetic** information encoded there is a **gene**.

loess - A uniform and unstratified fine sand or silt (rarely clay) deposit transported by wind (an aeolian soil). It is sometimes described as rock flour.

long distance migrant - See **migrant**.

long-day plant - A plant flowering in response to day lengths exceeding its **critical photoperiod**.

longitude - East to west measurement of location on the planet.... The angular distance from the Greenwich **meridian** (0 degree), along the equator. This can be measured either east or west to the 180th **meridian** (180 degrees) or 0 degree to 360 degrees W. (See: **latitude, coordinates, GPS, meridian, prime meridian**)

longliner - A commercial fishing boat that uses miles and miles of fishing lines and hooks to catch fish; can entangle **wildlife** not intended to be caught.

longwave radiation - The radiation emitted in the spectral wavelength greater than 4 micrometers corresponding to the radiation emitted from the Earth and atmosphere. It is sometimes referred to as 'terrestrial radiation' or 'infrared radiation,' although somewhat imprecisely.

lore - The area of the face between the eye and the upper bill of a bird, or the nostril of a snake, or a corresponding area on other animal **organisms**.

losing stream - A **stream** that is losing water to (or recharging) the **groundwater** system. The same **stream** could be both a **gaining stream** and a losing stream depending on the conditions. (See: **gaining stream**)

lotic waters - Flowing waters, as in **streams** and rivers. (See: **lentic waters**)

Lotka-Volterra's Law - Originally proposed, independently, by Alfred James Lotka (1925) and Vito Volterra (1926). This principle says that when **populations** are involved in negative feedback with other **species**, or even components of their **environments**, cyclical dynamics are likely to be seen. An example of a **negative feedback loop**: when **prey population density** increases, **predator population density** may also increase, which in turn feeds back to reduce the **prey population** through increased **predation**-related mortality. **Predation** then slows as **predators** starve, allowing the **prey** to recover, and the cycle continues *ad nauseum*.

low - See **low pressure system**.

low pressure system - A **cyclonic** storm that most often forms along a front in middle and high latitudes.... An area of a relative pressure minimum that has converging winds and rotates in the same direction as the Earth. This is counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere. Also known as a **cyclone**.... A horizontal area where the atmospheric pressure is less than it is in adjacent areas. Since air always moves from areas of high pressure to areas of low pressure, air from these adjacent areas of higher pressure will move toward the low pressure area to equalize the pressure. This inflow of air toward the low will be affected by the Earth's rotation (see Coriolis force) and will cause the air to spiral inward in a counterclockwise direction in the northern hemisphere. The air eventually rises near the center of the low, causing cloudiness and precipitation.

The air in a low rotates in a counterclockwise direction in the Northern Hemisphere, and in a clockwise direction in the Southern Hemisphere. Low-pressure cells are called cyclones.

low tide line - The line of intersection of the land with the ocean's surface at the minimum level reached by a falling tide.

lump - In **taxonomy**, to combine two or more **genera** into one **genus** or two or more **species** into one **species**. ...Lumping is the merging of two, or even several, species or subspecies into one.The opposite of **split**. (See: **split**, **Law of Priority**)

lush - Having or characterized by luxuriant **vegetation**.

lye - A strong alkaline solution of sodium hydroxide, potassium hydroxide, or the **leachate** of wood ashes that is rich in potassium carbonate.

Lyme disease - A disability disease caused by the **bacteria** *Borrelia burgdorferi* and carried by Deer Ticks, *Ixodes scapularis*. It is named for Lyme, Connecticut, USA, where the disease was first encountered. No vaccine has been developed, but research is ongoing.

macroalgae - **Algae** growing in large, **seaweed** form, such as kelp.

macroclimate - The general large-scale climate of a large area or country, as distinguished from the **mesoclimate** and **microclimate**.

macronutrient - A mineral required by plants and animals in relatively large quantities.... The nutritional elements, nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur, essential for normal plant growth, development, and reproduction. They are usually derived from the soil. (See: **micronutrient**)

macrophyte - Any plant that can be seen with the naked, unaided eye.

macroscopic - Large enough to be seen with the naked eye, as opposed to **microscopic**,

so small it cannot be seen without the aid of microscope.

maggot - The legless, soft-bodied, worm-like **larva** of any of various flies of the **order** Diptera, often found in decaying matter.... The **larval**, wormlike stage of a fly's life cycle.

magma - Molten, or melted, rock deep below the surface of Earth.

magma chamber - A reservoir from which volcanic materials erupt.

magnetosphere - The region around an astronomical object in which phenomena are dominated or organized by its magnetic field.

main stem - In **geography**, the principal course of a **river** or a **stream**.

malaria - A **vector**-borne infectious disease caused by **sporozoan** or **protozoan parasites** of the **genus** *Plasmodium* that are transmitted through the bite of an infected *Anopheles* mosquito. It is widespread in **tropical** and **subtropical** regions, including parts of the Americas, Asia, and Africa. Only four **species** of the *Plasmodium parasite* can infect humans. The most serious forms of the disease are caused by *Plasmodium falciparum* and *Plasmodium vivax*, but other related **species**, *Plasmodium ovale* and *Plasmodium malariae*, can also affect humans.

Malthusian Law - Originally proposed by Thomas Malthus (1798), whose *Essay on the Principle of Population* had some disturbing things to say about the future of humanity. This law holds that, when birth and death rates are constant, a **population** will grow (or decline) at an exponential rate. It describes the default situation for **populations** - how they behave in the absence of any disturbing factors (like **predation**, etc.). The Malthusian law is a fundamental principle of **ecology** and **evolution**, underlying the notion of **natural selection**. (In fact, Charles Darwin's conception of **natural selection** was avowedly fueled by his reading of Malthus.)

mammal - A member of the **class** Mammalia....An animal having a backbone and **mammary glands** for producing milk to nourish the young.... A **homeothermic (warm-blooded)**, hairy, milk-suckling **vertebrate** of the **class** Mammalia.

mammary gland - A **gland** in the breast of **mammals**; in females, the mammary **glands** produce milk to nourish the young.

mammology - The scientific study of **mammals**.

mandible - A mouth part, commonly referred to as a jaw, used for seizing and/or biting the food; in most **vertebrates**, the mandible is the lower jaw and the maxilla is the upper jaw; in birds, however, the mandible can refer to either the upper or lower bill.

mangrove forest - The mangrove forest **habitat** is located along **tropical** and

subtropical estuaries and coastal **intertidal** zones, often fringed seaward by **seagrass habitat** and landward by **saltmarsh** habitat. There are many mangrove species, coming from 20 different plant **families**. Mangrove trees are salt-tolerant and many 'breathe' through **lenticels** on **aerial roots**. Mangrove forests play a key role as nurseries for many types of **marine fauna**.

mantle - In **mollusks**, a protective, skin-like layer that secretes substances that harden to form shell; in birds, the upper part of the back forming a saddle between the wings...In **geology**, the thick layer of rock and molten rock that lies beneath Earth's **crust**... The layer of the Earth between the **crust** and the **core**.

mariculture - **Aquaculture** done in a **marine environment**. (See: **aquaculture**)

marine - Of or relating to the sea...Having to do with the ocean.

marine layer - An air mass which develops over the surface of a large body of water such as the ocean or large lake in the presence of a temperature inversion. The inversion itself is usually initiated by the cooling effect of the water on the surface layer of an otherwise warm air mass. As it cools, the surface air becomes denser than the warmer air above it, and thus becomes trapped below it. The layer may thicken through turbulence generated within the developing marine layer itself. It may also thicken if the warmer air above it is lifted by an approaching area of low pressure. The layer will also gradually increase its humidity by evaporation of the ocean or lake surface, as well as by the effect of cooling itself. Fog will form within a marine layer where the humidity is high enough and cooling sufficient to produce condensation. Stratus and stratocumulus will also form at the top of a marine layer in the presence of the same conditions there. A marine layer will disperse and break up in the presence of instability such as may be caused by the passage of frontal system or trough, or any upper air turbulence which reaches the surface. A marine layer can also be driven away by sufficiently strong winds. It is not unusual to hear media weather reporters discuss the marine layer as synonymous with the fog or stratus it may contain, but this is erroneous. In fact, a marine layer can exist with virtually no cloudiness of any kind, although it usually does contain some. The marine layer is a medium within which clouds may form under the right conditions, not the layers of clouds themselves.

marine terrace - A flat step of rock formed in an exposed, windy area where the waves pound hard against the shore.

maritime - Of or relating to seas or oceans.

maritime effect - The effect that large ocean bodies have on the **climate** of locations or regions. This effect results in a lower range in surface air **temperature** at both daily and annual scales.

marl - A **calcium carbonate** or lime-rich mud or mudstone which contains variable amounts of clays and aragonite...A loose and crumbling earthy deposit consisting mainly

of calcite or dolomite.... A mixed earthy substance, consisting of carbonate of lime, clay, and possibly sand, in very variable proportions.... A **calcareous** clay, or impure fine grained **limestone**.

marsh - A **wetland**, part of the **palustrine system**, dominated by **emergent**, submerged, or floating **aquatic vegetation**.... a type of wetland which is subject to frequent or continuous inundation. Typically a marsh features **grasses, rushes, reeds, *Typha*, sedges**, and other **herbaceous** plants (possibly with low-growing **woody plants**) in a context of shallow water...A low **wetland** characterized by **grasses** and **reeds** rather than **trees** and other **woody plants**.... A periodically wet or continually flooded but non-**peat**-forming **ecosystem** where the surface is not deeply submerged and supporting **sedges**, cattails, **rushes** or other **hygrophytic** plants. Subclasses include fresh and salt water marshes. Less acid and less continuously flooded than a **bog**, often only intermittently flooded.An **ecosystem** dominated by **herbaceous** plants, and with the soil saturated for long periods if not permanently, but without surface accumulations of **peat**.... A periodically wet or continually flooded but non-**peat**-forming **ecosystem** where the surface is not deeply submerged and supporting **sedges, cattails, rushes** or other **hygrophytic** plants. Subclasses include fresh and salt water marshes. Less acid and less continuously flooded than a **bog**, often only intermittently flooded....An **ecosystem** dominated by **herbaceous** plants, and with the soil saturated for long periods if not permanently, but without surface accumulations of **peat**. (See: **bog, fen, swamp, meadow**)

marshland - An area or region characterized by **marshes**...A **marshy** tract of land. (See: **marshy, marsh**)

marshy - Of or referring to a **marsh**.

mass balance - The term 'mass balance' is often used by glaciologists to describe the difference between all of the ice that is added to a **glacier**, and all of the ice the **glacier** loses over a period of time. **Ice sheets** and **glaciers** can lose mass due to melting, **calving, evaporation**, etc. They can gain mass from direct **precipitation**, avalanching, and windblown snow. The net result of all these outputs and inputs of ice are then the **glacier's** mass balance.

mass extinction - Mass extinction events are relatively brief periods during which a large proportion of the Earth's existing **species** are **extirpated**. They are characterized by numerous **extinctions** occurring simultaneously around the planet. The big five mass **extinctions** in Earth's history are:

1. **Cretaceous-Tertiary extinction**, about 65 million years ago, probably caused or aggravated by the impact of several-mile-wide asteroids that created the Chicxulub crater now hidden on the Yucatan Peninsula and beneath the Gulf of Mexico. Some argue for other causes, including gradual climate change or flood-like volcanic eruptions of basalt lava from India's Deccan Traps. The **extinction** killed 16 percent of **marine families**, 47 percent of **marine genera** (the **classification** above **species**) and 18 percent of land **vertebrate** families, including the dinosaurs.

2. **End Triassic extinction**, roughly 199 million to 214 million years ago, most likely caused by massive floods of lava erupting from the central Atlantic magmatic province -- an event that triggered the opening of the Atlantic Ocean. The volcanism may have led to deadly **global warming**. Rocks from the eruptions now are found in the eastern United States, eastern Brazil, North Africa and Spain. The death toll: 22 percent of **marine families**, 52 percent of **marine genera**. **Vertebrate** deaths are unclear.
3. **Permian-Triassic extinction**, about 251 million years ago. Many scientists suspect a comet or asteroid impact, although direct evidence has not been found. Others believe the cause was flood volcanism from the Siberian Traps and related loss of oxygen in the seas. Still others believe the impact triggered the volcanism and also may have done so during the Cretaceous-Tertiary extinction. The Permian-Triassic catastrophe was Earth's worst mass extinction, killing 95 percent of all species, 53 percent of **marine families**, 84 percent of **marine genera** and an estimated 70 percent of land species such as plants, **insects** and **vertebrate** animals.
4. **Late Devonian extinction**, about 364 million years ago, cause unknown. It killed 22 percent of **marine families** and 57 percent of **marine genera**. Erwin said little is known about land **organisms** at the time.
5. **Ordovician-Silurian extinction**, about 439 million years ago, caused by a drop in sea levels as glaciers formed, then by rising sea levels as **glaciers** melted. The toll: 25 percent of marine families and 60 percent of marine genera.

We are currently experiencing the sixth mass **extinction**. Regrettably, the current mass **extinction** event has been driven by human development and expansion, and *Homo sapiens* will not necessarily be excluded from its catastrophic effects. (See: **extinction**, **background extinction rate**)

mass-wasting - A general term for a variety of processes by which large masses of earth material are moved by **gravity** either slowly or quickly from one place to another. Includes mass movement....A set of geomorphic processes which does not require a suspending medium (air, water, or ice) to carry away its detritus....The slow downslope movement of rock and earth debris.

mast - Hard mast is the hard-shell fruits or nuts of forest **trees**. Soft mast includes the fruits and berries **trees** and **shrubs**. Mast connotes that animals consume these.... Fruits or nuts used as a source of food by **wildlife**; soft mast are fruits with soft coverings, such as blueberry, cherry, grape, persimmon, and dogwood seed; hard mast are nuts such as acorns, beech, hickory, and walnut.

mast fruiting - Phenomenon where virtually all the individuals of a **species** of plant in a forest fruit synchronously. It is a strategy to defeat **seed predators**. The plants generally fruit only every several years. There are not enough seeds available during non-mast years to support large populations of seed eaters, so when a mast year comes around these **seed predators** are not numerous enough to severely deplete the seed crop. Examples of

plants that engage in mast fruiting are kapok trees (*Ceiba pentandra*) and **bamboos** (*Chusquea* spp. and *Guadua* spp.) (See: **seed predator**)

mate guarding - In birds, while the female is producing eggs the male will guard her from other males, staying close to her and chasing off any other males that get too close.

matrix - The background land use or **vegetation** in a **landscape**... That **ecosystem**-type which is most extensive so that others appear as patches or **corridors** within it.

matorral - The Chilean Matorral is a **terrestrial ecoregion** dominated by **shrubland** in central Chile, located on the west coast of South America.

mature forest - A wooded area in which the dominant **trees** have reached their maximum size.

maxillary teeth - Teeth in the upper jaw.

meadow - A **grassland** area, usually low-lying and having moist soil... Closed **herbaceous vegetation**, commonly in stands of rather limited extent, the term not usually applied to extensive **grasslands**. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland, marsh, fen**)

- **brackish marsh meadow** - Coastal flats and lower beach **habitats** regularly inundated by tides. Soils are mineral (usually fine **silts** but sometimes sands or gravels), sometimes overlain by a tough sod of roots and **rhizomes** or by shallow (up to 20 cm) peat. Erect **shrubs** are absent or nearly so. **Mosses** and **lichens** are absent. See marsh.
- **fresh marsh meadow** - Fresh or essentially fresh **community** types, predominately on mineral soils or less than 30 cm of **peat**. Where **peat** is present it is usually **sedge peat**. The full range of wet meadow soil pH conditions (3.0-9.0) is represented in this type. All wet meadow types occurring predominantly in **tundra** settings are included here. Common non-**tundra** sites supporting fresh **marsh meadow vegetation** are wet **alluvium**, margins of **oxbow lakes**, and silted-in **sloughs**. Erect **shrubs** are absent or nearly so, but small quantities of prostrate willows, *Salix* sp. are present in some stands. **Mosses** may be common or absent, and **lichens** are absent or scarce. (See: **fen**)
- **sedge meadow** - A **vegetation** unit (usually in wet situations) consisting of low **grass-like** plants belonging to the **family** Cyperaceae; *e.g.* cottongrass.
- **wet meadow** - Sites characterized by saturated soils or by flooding to depths of less than 15 cm and **vegetation** dominated by **herbaceous species**, usually **graminoids**. **Moss** cover varies, but is generally low. Soils are mineral but may be overlain by a shallow **organic** layer. Compare **marsh** and **fen**.... Sites with soils characteristically saturated or flooded with less than 15 cm water. The **vegetation** is predominantly **herbaceous** in most types but scattered erect woody plants are present in some types and prostrate willows, *Salix* sp., are present in others. **Aquatic** plants may be absent, present or co-dominant. **Lichens** are usually absent or nearly so. This is the largest

and most diverse class of **wetlands**, with a great variety of **vegetation** types occurring under a wide range of **environmental** conditions. Soils range from entirely mineral to deep **peats**. Soils pH ranges from 3.0 to 9.0. (See: **fen**)

mean sea level - The average height of the sea surface, based upon hourly observation of the tide height on the open coast or in adjacent waters that have free access to the sea. In the United States, it is defined as the average height of the sea surface for all stages of the tide over a nineteen year period. Mean sea level, commonly abbreviated as MSL and referred to simply as 'sea level,' serves as the reference surface for all **altitudes** in upper **atmospheric** studies.... Mean sea level is the average of **high tide** and **low tide**. (See: **sea level**)

meander - A loop-like bend or curve in a stream or river that develops when a watercourse flows through level land and erodes its **floodplain**.

meander belt - The zone along the floor of a valley across which a meandering stream periodically shifts its channel. ... The zone along a valley floor that encloses a meandering river.... Area between lines drawn tangential to the extreme limits of fully developed **meanders**.

mechanical weathering - The process that breaks a rock apart into smaller and smaller pieces that retain the characteristics of the original rock and also known as physical weathering.

Mediterranean climate - Climatic characteristics first identified around the Mediterranean region but since discovered to exist in the Cape region of South Africa, central California, central Chile, and the parts of southern Australia having a west facing coastline. ... A climate characterized by moist, mild winters and hot, dry summers.... A climatic condition in which the summers are normally dry, warm to hot and sunny whereas winters are mild with the maximum rainfall taking place during this time of the year. ... A relatively mild weather pattern characterized by winter precipitation and long, hot, and dry summers.

megadiversity - A concept introduced to indicate the richness of species diversity in a given country by taking an inventory of species. Seventy percent of the worlds' species diversity is found in ten such "megadiversity" countries - Mexico, Colombia, Ecuador, Peru, Brazil, Zaire, Madagascar, China, India, Malaysia, Indonesia and Australia.

megafauna - Large or relatively large animals. Compare with **microbe**.

megaspore - A **spore** that develops into a female **gametophyte**.

meiosis - In **organisms** that reproduce sexually, a process of **cell** division during which the **nucleus** divides into four **nuclei**, each of which contains half the usual number of **chromosomes**.... The process of **cell** division in sexually reproducing **organisms** that reduces the number of **chromosomes** in **reproductive** cells from **diploid** to **haploid**,

leading to the production of **gametes** in animals and **spores** in plants.... A **cell** divisional process in which the **chromosome** number is reduced by half. (See: **mitosis**)

melanin - The **pigment** that naturally colors the hair and skin. The more melanin in the hair and skin the darker the hair and skin.... Dark **pigment** the body produces as a response to exposure to **ultraviolet radiation**.... **Pigment**, as typically produced by specialized **epidermal cells** called melanocytes.

melanism - The condition of an animal whose skin or **plumage** contains an excess of color pigment, **melanin**, compared to the general population. **Melanistic** individuals are usually much darker, and may be even completely black. Melanism may result from the over-expression or duplication of **genes** that are responsible for producing color **pigment**. A common **protein** that serves as a color **pigment** is melatonin. ...**Melanistic** animals have an abnormal amount of dark pigmentation. Several species of birds have dark phases, and others occasionally show signs of melanism. The opposite of melanism is **albinism**.

melanistic - An **organism** exhibiting **melanism**.... Showing an excess of dark pigmentation, such as a dark color phase in birds. (See: **melanism**)

membrane - A thin, sheet-like structure composed of **protein** and fats surrounding the **cytoplasm**, **organelles**, and other **cell** structures.

membranous - Of, referring to or similar to a **membrane**.

meridian - An imaginary great circle on the surface of the earth passing through the north and south poles at right angles to the equator. All points on the same meridian have the same **longitude**.... A line of constant **longitude**. Unlike lines of latitude, all meridians are of equal length on the globe.

meristem - In **botany**, a region where **cells** actively divide.... Tissue primarily associated with protoplasmic synthesis and formation of new **cells** by division.

mesa - A broad, flat-topped elevation with one or more cliff-like sides, common in the southwest United States. (See: **butte**)

mesic - Refers to sites or **habitats** characterized by intermediate moisture conditions, *i.e.* neither decidedly wet (**hygric**) nor decidedly dry (**xeric**).... **environmental** conditions that are medium in moisture supply....In **ecology**, a type of habitat with a moderate or well-balanced supply of moisture, *i.e.* a mesic **forest**....Growing in or characterized by moderate moisture... moderate moisture conditions, as opposed to **xeric** (dry) or **hygric** (wet) conditions. The nature of an **organism** adapted to conditions of moderate moisture.... Characterized by moderate amounts of moisture.

mesoclimate - The climate of small areas of the Earth's surface; it may not be representative of the general climate of the district; intermediate in scale between

macroclimate and **microclimate**. Places considered in mesoclimatology include small valleys.

mesocosm - In **ecology**, medium-sized **ecosystem** simulation (*e.g.*, terrarium, greenhouse) created to study **ecological** processes. (See: **microcosm**)

mesokaryote - Intermediate between a **prokaryote** and an **eukaryote**, *e.g.* a **dinoflagellate**. (See: **prokaryote**, **eukaryote**)

mesopause - The upper boundary of the **mesosphere** where the **temperature** of the **atmosphere** reaches its lowest point. (See: **atmosphere**, **planetary boundary layer**, **troposphere**, **tropopause**, **stratosphere**, **stratopause**, **mesosphere**, **thermosphere**, **ionosphere**, **exosphere**)

mesophyll - In **botany**, the **parenchyma tissue** of a **leaf** between the upper and lower **epidermis**, including **palisade cells** and **spongy cells**.

mesophyte - A plant that grows under medium conditions of moisture. ... A plant whose normal habitat is neither very wet nor very dry. (See: **hydrophyte**, **xerophyte**)

mesosphere - The **atmospheric** layer above the **stratosphere**, extending from about 50 to 85 kilometers **altitude**. The **temperature** generally decreases with **altitude**... 50-85 kilometers up to the **mesopause**. Meteorites break up here. (See: **atmosphere**, **planetary boundary layer**, **troposphere**, **tropopause**, **stratosphere**, **stratopause**, **mesopause**, **thermosphere**, **ionosphere**, **exosphere**)

mesotrophic - **Habitats** of moderate **nutrient** capacity. (See: **eutrophic**, **dystrophic**, and **oligotrophic**)

metabolic - Of or referring to **metabolism**.

metabolic rate - The rate at which the cells of the body use energy.

metabolism - The sum of the biochemical processes of a living **organism**... Sum of the chemical reactions within a cell or whole **organism**, including the energy-releasing breakdown of **molecules** (catabolism), and the synthesis of complex **molecules** and new **protoplasm** (anabolism)... **Biological** processes involving the breaking down of food to release energy and the restructuring of those simplified food **compounds** to make new **cell** parts or new, complex **molecules** to be used by **cells**; **metabolic rate** refers to the speed at which all this happens... The sum of all the chemical and physical processes within a living **organism**, including anabolism and catabolism

metamorphic - Referring to **metamorphosis**.

metamorphic rock - Rock that has been physically altered by heat and/or pressure... Preexisting rock that is restructured by high temperature and pressure... A rock that has

undergone chemical or structural changes. Heat, pressure, or a chemical reaction may cause such changes.... A rock that has been heated and compressed so that it re-crystallizes, but does not melt.... Rock formed from **igneous** or **sedimentary rocks** due to pressure, heat (though not melted), or chemical conditions below the Earth's surface. (See: **igneous rock**, **sedimentary rock**)

metamorphose - To undergo a change in appearance and body function in the course of developing into an adult; a **tadpole** metamorphoses into a frog. (See: **metamorphosis**)

metamorphosis - The transformation of a juvenile **insect** (a **nymph** or a **larva**) into an adult.... A process of developmental change whereby a **larva** reaches adulthood only after a drastic change in **morphology**; occurs in most **amphibians** and **insects**, for some **insects**, this change may include another stage (**pupa**) before the adult stage.... Distinct changes in form and sometimes behavior that occur during development of some animals; **tadpoles** undergo metamorphosis in becoming an adult frog. (verb is **metamorphose**)

metamorphose - To undergo the process of **metamorphosis**.

metapopulation - A group of two or more **populations** that regularly exchange **genes**.

meteorological - Of or referring to **meteorology**.

meteorology - The study of the **atmosphere** and **atmospheric** phenomena.... The study of weather.... The study of the physics, chemistry, and dynamics of the Earth's **atmosphere**, including the related effects at the air-earth boundary over both land and the oceans. Fundamental topics include the composition, structure, and motion of the **atmosphere**. The goals ascribed to meteorology are the complete understanding and accurate prediction of **atmospheric** phenomena.... In popular usage, the underlying science of weather and weather forecasting.... The science dealing with the **atmosphere** and its phenomena, including weather and climate... The **atmospheric** conditions and weather of an area.... Study of the **atmosphere** and its phenomena. Compare with **climatology**.

meter - The international standard unit of length, approximately equivalent to 39.37 inches or 3.2808399 feet.

methane - A gas made up of carbon and hydrogen and the main ingredient in natural gas.... A colorless, nonpoisonous, flammable gas created by **anaerobic decomposition** of **organic compounds**.... A colorless, odorless, tasteless gas composed of one **molecule** of carbon and four of hydrogen, which is highly flammable.... A gas generated by **microbial decomposition** of **organic** wastes.... A **hydrocarbon** that is a **greenhouse gas**. Methane is produced through **anaerobic** (without oxygen) **decomposition** of waste in landfills, animal digestion, **decomposition** of animal wastes, production and distribution of natural gas and oil, coal production, and incomplete **fossil fuel** combustion. The **atmospheric** concentration of methane has been shown to be increasing at a rate of about 0.6% per year and the concentration of about 1.7 parts per million by

volume (ppmv) is more than twice its pre-industrial value. However, the rate of increase of methane in the **atmosphere** may be stabilizing.

methane clathrate - A semi-frozen mix of **methane** gas and ice typically found in the Northern Hemisphere's **tundra permafrost** regions and in **sediment** layers on the ocean floor. Sudden release of large amounts of **methane** from methane clathrate deposits has been proposed as a cause of past and possibly future **climate changes**.

microalgae - microscopic algae, typically found in freshwater and marine systems. They are unicellular species which exist individually, or in chains or groups. Depending on the species, their sizes can range from a few micrometers (μm) to a few hundreds of micrometers. Also known as **microphytes**.

microbe - A microscopic **organism**...A general term for a **microorganism**... A minute living **organism** like **bacteria**, **protozoa**, and some **fungi**... An organism so small it can only be seen using a microscope; also known as **microorganism**. Compare with **megafauna**.

microbial - Of or referring to **microbes**.

microbial ecology - The study of the relationships among **microorganisms** and between **microorganisms** and their **environment**. Concerns of microbial ecologists include fluxes of biologically active substances (*e.g.*, **nutrients**, metals, water **pollution** and **toxic** chemicals in the **environment**).

microclimate - Generally, the **climate** of small areas, especially in so far as this differs significantly from the general climate of the region. More particularly, the **climate** under a plant or other cover, differing in extremes of **temperature** and moisture from the **climate** outside that cover...The climate of a very small region....The localized **climate** conditions with in an urban area or neighborhood.... The local climate of a site or **habitat** varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate over the site involved and relatively local as compared to its enveloping macroclimate from which it differs because of local **climatic** factors (such as elevation and exposure). ...A local **climatic** condition near the ground resulting from modification of relief, exposure, or cover.The fine climatic structure of air space which extends from the very surface of the Earth to a height where the effects of the immediate character of underlying surface no longer can be distinguished from the general local climate, (*i.e.*, **mesoclimate**). The microclimate varies with and in turn is superimposed upon the larger-scale conditions. While some rigid limits have been placed on the thickness of the layer concerned, it is realistic to consider variable thicknesses, *e.g.*, the microclimate of a putting-green versus that of a redwood forest. Generally, four times the height of surface growth or structures defines the level where microclimatic overtones disappear. The word has been used to describe the climate of a cave, a plant, and an **insect** inside of a log.

microcosm - In **ecology**, a small (less than the size of a **mesocosm**) simulation of an **ecosystem**, created to study **ecological** processes.

microfauna - Small animals only visible with a microscope, including **protozoa**, **nematodes**, etc....The small animals that can only be seen with a microscope; they include **protozoa**, **nematodes**, etc.

microfibril - In **botany**, a fine thread of **cellulose** in a **cell wall**.

microflora - Small plants that can only be seen with a microscope; they include **algae**, **fungi**, bacteria, etc.

microfungi - Microfungi are **eukaryotic organisms** such as mold and mildew as well as rust .The microfungi are an artificial, **paraphyletic** group, distinguished from macrofungi only by the absence of a large **multicellular** fruiting body. Microfungi are ubiquitous in all **terrestrial** and **freshwater** and marine **environments**. Microfungi grow in plants, soil, water, insects, cow rumen, hair, and skin.

microhabitat - Specific localized conditions in which an **organism** lives, such as a certain type of soil. Microhabitats reflect the non-uniform nature of the **environment** and the availability of many **ecological niches** within any **habitat**. A diversity of microhabitats may be required for the co-existence of **species** competing for overlapping **niches**. ...The specific combination of **habitat** elements in the locations selected by **organisms** for specific purposes and/or events. (See: **habitat**)

microlepidoptera - An artificial (*i.e.*, unranked and not monophyletic) grouping of moth families, commonly known as the 'smaller moths'.

micronutrient - A mineral required by plants and animals in relatively small quantities..... A nutrient required in small quantities (trace amounts) for normal growth and reproduction but toxic at high concentrations. (See: **macronutrient**)

microorganism - A microscopic **organism**The members of the **microflora** and **microfauna** that can only be seen with a microscope.... A minute living **organism** like **bacteria**, **protozoa**, and some **fungi**.... An **organism** so small it can be seen only by using a microscope. Also known as a **microbe**.... Minute, **microscopic**, or submicroscopic living **organism** (*e.g.* **bacteria**, mycoplasma, and **virus**).

microphagous - Feeding on small particles.

microphyllus - With very small leaves.... Describes a plant with small leaves; individual leaf surface areas are less than 500 square millimeters or one square inch.

microphyte - See **microalgae**.

microscopic - So small it cannot be seen without the aid of microscope, as opposed to **macroscopic**, large enough to be seen with the naked eye.

microspore - In **botany**, a **spore** that develops into a male **gametophyte**.

micron - A measure of length equivalent to one thousandth of a millimeter, or one millionth of a meter. It is abbreviated using the Greek letter μ .

mid-ocean ridge - A vast, underwater mountain chain that has been built up by the addition of new rock from below to **tectonic plates** moving apart under the oceans.

midden - A mound of discarded items, such as empty clam shells left by raccoons.

middle lamella - In **botany**, a layer of **pectin** binding two adjacent **cell walls**.

midge - Tiny **gnat**-like fly having two wings as an adult; non-biting midges belong to the **family** Chironomidae, biting midges belong to the family Ceratopogonidae and are commonly called **no-see-ums**; midge **larva** live in water and are eaten by many types of fish.

midgut - In insects, **nutrients** from food are absorbed here.

midstory or **mid-story** - The layer of young trees and **shrubs** that are shaded by taller trees in a forest.

migrant - An animal who **migrates**... An organism that regularly moves, or migrates, to and from an area for breeding, nesting, and wintering. (See: **migration**) Among birds, several categories of migrant are recognized.....

- **altitudinal migrant** - A bird that nests at higher elevations and migrates to lower elevations during the non-breeding season. An example would be Chilean Flamingo, *Phoenicopterus chilensis*, which nests high in the Andes and winters along the coast of Peru and Chile.
- **austral migrant** - A bird that nests in more southerly latitudes and migrates towards the equator during the non-breeding season. An example would be Large Elaenia, *Elaenia spectabilis*, which nests in southern Brazil, southern Bolivia, Paraguay and northern Argentina and winters in Amazonia.
- **boreal migrant** - A bird that nests in more northerly latitudes and migrates towards the equator during the non-breeding season. An example would be Eastern Wood Pewee, *Contopus virens*, which breeds in eastern North America and winters in northern South America.
- **neotropical migrant** - A bird that spends a portion of the year, usually the non-breeding season, in the New World **tropics** in South or Central America south of the Mexican Plateau.
- **long distance migrant** - A bird that travels a relatively long distance between nesting and wintering areas. An example would be Blackpoll Warbler, *Dendroica striata*, which nests in the boreal forest region of North America and winters in

Amazonia.

- **short distance migrant** - A bird that travels a relatively short distance between nesting and wintering areas. An example would be Greater Ani, *Crotophaga major*. While its movements are still poorly understood, it disappears from areas in southeastern Peru during the dry season/austral winter.

migrate - To move from one region, **habitat**, or **environment** to another in response to seasonal changes and variations in food supply or weather.... To move from one area to another, usually on a seasonal basis.

migration - The regular, extensive, seasonal movements of birds between their breeding regions and their wintering regions ... The movement of animals in response to seasonal changes or changes in the food supply. ... A group of animals traveling from one region to another, to breed or to find enough food to eat in winter or summer... Birds provide the best examples. In the Peruvian Amazon, at the proper season, you can find bird migrants from North America, southern South America, the **Pantanal**, and the Andes. (See: **dispersal, winter resident**)

migration corridor - See **habitat corridor**.

migratory - Referring to an animal that **migrates**.

mildew - A growth of minute powdery or webby **fungi**, whitish or of different colors, found on various diseased or decaying substances.... A white or grayish coating formed by **fungi** on plant leaves, cloth, paper, etc.... A **fungal** disease of plants in which the **mycelium** and **spores** of the **fungus** are seen as a whitish growth on the **host** surface.

mile - A measure of length equal to 5280 feet or about 1.6 kilometers. (See: **kilometer**)

mimic - An **organism** that engages in **mimicry**.

mimicry - A strategy by which an animal copies or imitates another animal, either to hunt or to avoid being hunted... A situation in which an **organism**, through either appearance, behavior, or both, comes to resemble closely another, unrelated **species** that shares the same **ecosystem**. (See **Batesian mimicry, Müllerian mimicry, mimicry complex, warning coloration, aposematic coloration**)

mimicry complex - A situation in which a group of **organisms**, including some from different **taxonomic families**, converge in appearance. A good example of a mimicry complex can be found among the butterflies of the **families** Ithomiidae and Heliconidae. (See **Batesian mimicry, Müllerian mimicry, mimicry, warning coloration, aposematic coloration**)

mineral - A naturally occurring solid material of Earth's **crust** that includes clay, sand, and **silt**.

mineral soil - A soil consisting predominantly (80% or more) of and having its properties determined predominantly by mineral matter. The soil may have an **organic** surface layer up to 30 centimeters thick.

minerotrophic - **Peatland** sites which receive **terrestrial** mineral nutrition in addition to **precipitation**, indicating that **nutrients** are brought to the **peat** by water that has previously extracted them from a mineral soil. (See: **soligenous**)

mineralization - The breakdown of **organic compounds** to their mineral forms, *e.g.*, **proteins** to **nitrates**, phosphates, etc.

minnow - Generally, any of various small fishes usually having a silver-colored body; specifically, various fishes belonging to the **family** Cyprinidae and characterized by having a single top fin with fewer than 10 rays and toothless jaws.

mirage - An optical illusion in which atmospheric refraction by a layer of hot air distorts or inverts reflections of distant objects.

mire - General term which embraces all those **peat**-forming **ecosystems** described in English by such other terms as **bog**, **fen**, **carr**, **muskeg**, **moor**, and **peatland**. Does not include **marshes** since they are, by definition, non-**peat**-forming and are seasonally flooded. Mires are subdivided into **fens** and **bogs** on the basis of the origin and chemistry of their respective water supplies. Terms for conditions similar to mire in other languages are: myr (Swedish and Norwegian), moor (German), myri (Icelandic), and suo (Finnish)...An **ecosystem** in which the rooting medium consists of wet **peat**.

mistletoe - A member of the plant **family** Loranthaceae. Mistletoes are **hemiparasites**.

mites - Tiny **arthropods**, usually less than 1 millimeter (1/16 inch) in size. Mites, together with **ticks**, belong to the subclass Acarina (also known as Acari) and the class Arachnida. Mites are among the most diverse and successful of all the **invertebrate** groups. Most mites are minute and have transparent or semitransparent bodies; they may be parasitic on humans and domestic animals, producing various irritations of the skin. **Chiggers** are the **larval** form of mites of the family Trombiculidae. (See: **chigger**, **stylostome**)

mitochondria - **Cellular** bodies in which **cellular respiration** occurs.

mitosis - A **cell** divisional process in which the **chromosomes** are duplicated...The process by which a **cell** divides into two daughter **cells**, each of which has the same number of **chromosomes** as the original **cell**. (See: **meiosis**)

mixed flock (= **mixed-species flock**) - A foraging flock of birds comprised of several, and sometimes many, **species**.

mixed mesophytic forest - A forest, having well-drained, **acidic** soil consisting of a mix

of sand and clay and supporting a rich diversity of trees, including tulip poplar, beech, white oak, sugar maple, yellow buckeye, white basswood, and hemlock.

mob (mobbing) - Among animals that are preyed upon, to surround and harass a potential **predator**.... In bird behavior, the use of several or a large number of individuals to show aggression or for protection; for instance, smaller birds such as cardinals and sparrows will dive aggressively toward a predator, such as a hawk, in order to defend a nest or a life.

modal - Term used to describe the “home” tree where a sloth spends most of its time.

moderate - verb- To lessen the violence, severity, or extremeness of.

moist forest - A seasonal **tropical** forest receiving not less than 100 mm. (approximately 4 inches) of rainfall in any month for two out of three years, frost-free, with an average temperature of 24°C (75°F) or more. (See: **rainforest, tropical rainforest**)

mold - Molds (or moulds) include all species of **microscopic fungi** that grow in the form of multicellular filaments, called **hyphae**. In contrast, **microscopic fungi** that grow as single cells are called **yeasts**.... A **fungus** that produces a superficial growth on various kinds of damp or decaying **organic matter**.

molecular - Of or referring to **molecules**.

molecule - The smallest physical unit of an **element** or **compound**, consisting of one or more like atoms in an **element** and two or more different atoms in a **compound**.... A chemically bonded group of atoms.

mollusk - A member of the **phylum** Mollusca...An animal having a soft, unsegmented body with a muscular foot, but lacking a backbone and usually protected by a hard shell; snails, slugs, clams, and mussels are examples of mollusks.... One of the oldest **phyla** of complex **invertebrates**; all major lines were already established during the Cambrian period. This **phylum** is characterized by a thick, muscular body wall; a muscular foot, generally used for locomotion; and several other characteristics that are usually, but not always present: non-segmented, the body secretes a shell that encloses a mantle cavity, a regionalized digestive tract, and a well developed circulatory system. **Extant classes** include the Polyplacophora, Gastropoda (snails), Bivalvia (bivalves), Cephalopoda (squids and octopuses).

molt (or moult) - To shed periodically part or all of a coat or an outer covering, such as feathers, cuticle, or skin, which is then replaced by a new growth.... The process in insects and spiders of shedding the **exoskeleton** to grow or to change into adults.... To shed, as in feathers, shell, or skin, periodically and before new growth.

monocious - In **botany**, bearing separate male and female **flowers** on the same plant....Term applied to plant **species** having male and female reproductive **organs** on

the same individual plant. ... Having staminate and pistillate flowers in separate places on the same plant. The opposite of **dioecious**.

monocarpy - A reproductive strategy of an organism characterized by a single reproductive episode before death. (See: **polycarpy**, **semelparous**, **iteroparous**)

monoclimax - Theory which suggests that there can be only a single stable **vegetation** type as the result of **succession** within a climatic region. (See: **climax**, **polyclimax**)

monocot (= **monocotyledon**) - A **monocotyledonous flowering plant**; the stem grows by deposits on its inside. **Grasses**, palms, lilies, irises, and orchids are monocotyledons.... Any of a **class** of **angiosperm** plants having a single **cotyledon** in the seed. Monocotyledons have leaves with parallel veins, flower parts in multiples of three, and fibrous root systems.... A member of a subclass of **angiosperms** characterized by the presence of one **cotyledon** in the seeds. (See: **dicot**, **cotyledon**)

monocotyledonous - Referring to a **monocot** or **monocotyledon**.

monoculture - Form of agriculture in which only one crop is grown on a field at a time: from the Latin "monos, meaning "single," and "cultura." meaning "cultivation."

monogamous - Refers to an animal practicing **monogamy**.... having only one mate during a breeding season or during a lifetime. (See: **monogamy**)

monogamy - Monogamy is a reproductive system in which males and females form single pairs. Each male is paired with a single female (or vice versa). Monogamy is widespread among some groups such as birds, but is generally the exception rather than the rule in the animal **kingdom**. ...The practice of having only one mate at a time or during a lifetime...the opposite of **polygamy**. (See: **polygamy**, **polyandry**, **polygyny**, **monogamous**, **seasonally monogamous**)

monogenic - Of or relating to an inheritable character that is controlled by a single pair of **genes**.... Controlled by a single **gene**.

monogenesis - Asexual reproduction by the production and release of **spores**.

monomorphic - Having a single form. The opposite of **polymorphic**....Both sexes have essentially the same plumage or size.

monotremes - Egg-laying **mammals** of the order Monotremata, such as the Echidna or Spiny Anteater and the Duck-billed Platypus.

monotypic - A term applied to the **families**, **genera**, and **species** of living **organisms**. The opposite of **polytypic**. A **family** containing only one **species** is a monotypic **family**. Examples of monotypic bird **families** are the Eurypygidae (Sunbitterns) and Opisthocomidae (Hoatzins). A **genus** containing only one **species** is a monotypic **genus**.

A species without any **subspecies** or **races** is a monotypic **species**. (See: **subspecies**, **monotypic species**)

monotypic species - A **species** with no recognized **subspecies**. (See **monotypic**, **polytypic species**)

monsoon - Monsoon is traditionally defined as a seasonal reversing wind accompanied by seasonal changes in precipitation, but is now used to describe seasonal changes in atmospheric circulation and precipitation associated with the asymmetric heating of land and sea. Usually, the term monsoon is used to refer to the rainy phase of a seasonally-changing pattern, although technically there is also a dry phase. The major monsoon systems of the world consist of the West African and Asia-Australian monsoons. The inclusion of the North and South American monsoons with incomplete wind reversal may be debated....A name for seasonal winds, first applied to the winds over the Arabian Sea that blow for six months from the northeast and for six months from the southwest. The term has been extended to similar winds in other parts of the world (*i.e.*, the prevailing west to northwest winds of summer in Europe have been called the European monsoon). The primary cause for these seasonal winds is the much greater annual variation of temperature over large land areas compared with neighboring ocean surfaces, causing an excess of pressure over the continents in winter and a deficit in summer, but other factors, such as topography of the land, also have an effect. The monsoons are strongest in the southern and eastern sides of Asia, but also occur along the coasts of tropical regions wherever the planetary circulation is not strong enough to inhibit them. The monsoon climate can be described as a long winter-spring dry season, which includes a cold season followed by a short hot season just preceding the rains; a summer and early autumn rainy season, which is generally very wet but may vary greatly from year to year; and a secondary warming immediately after the rainy season..... Rainy season in southern Asia when the southwestern monsoon winds blow, bringing heavy rains.

montane - Mountainous... pertaining to a mountainous region.... Existing on or pertaining to mountains or the mountain **environment**, especially the **communities** below the **treeline**, above which are snow-covered **alpine altitudes**. Many montane **environments** may qualify as **ecological hot-spots** because mountains act to isolate **ecosystems** into **biogeographically** distinct **evolutionary habitat islands**.

montane evergreen forest - See **humid montane forest**.

moor - A Germanic term applied to any area of deep **peat** whether acid or **alkaline** (**bog** or **fen**)....In English, the term is applied to high-lying country covered with heather and other **ericaceous** dwarf **shrubs**, mainly *Vaccinium*. It is often used to refer to land having any of the **oxyphyllous communities**.

- **low moor** (lowmoore) - Type of **fen** (**eutrophic mire**) composed of **peat** or muck soil, formed in **eutrophic** or **mesotrophic** waters (commonly a former lake) and, therefore, relatively rich in minerals, and supporting a rich **vegetation**. Compare to **high moor** which is poor in **nutrients**....A common European term for **fen peatland** occupying basins or depressions and not elevated above their perimeter. ...**Peatland**

in which the **peat** is made up of **sedges, reeds**, and certain **trees** and **shrubs**. *Sphagnum* species are absent or rare. Occurs chiefly in river valleys and is fed by ground waters rich in mineral salts. Synonym of Flachmoor (German), niedermoor, and niederungs. (See: **bog**)

- **high moor** - Type of **bog** in which both the **vegetation** and the **peat** have low **nutrient** status, the **vegetation** having developed either on basin sites receiving run-off water poor in minerals and nitrogen or on sites in a cool humid climate where heavy **precipitation** has leached most of the **nutrients** from the soil and caused waterlogging for much of the year creating a **blanket bog**. *Sphagnum*, *Eriophorum*, and **ericaceous shrubs** typically dominate high moor **vegetation**. Compare low moor which is rich in **nutrients**. Synonym of Hochmoor (German). (See: **raised bog**)

mor - A type of **forest** humus layer of unincorporated **organic** material, usually matted or compacted or both, distinctly delimited from the mineral soil and generally overlain by **litter**. Formed in the absence of earthworms. Compare mull. (See: **duff**.)

moraine - An accumulation of boulders, stones, or other debris carried and deposited by a glacier.... Stones, boulders, and other debris deposited by a glacier.... Ridges or deposits of rock debris transported by a glacier. Moraines are left after a **glacier** has receded, providing evidence of its former extent... A mound or ridge of till deposited directly by **glacial** ice.... A single, large mass of **glacial** till that accumulates, typically at the edge of a **glacier**.... A landform created when material was pushed up by a glacier into distinct landforms.... A moraine is a form of **glacial** till, a soil sediment deposited at the terminus of a melting **glacier**. The moraine is a single, large mound deposited, typically at the edge of a **glacier**, being a jumble of rocks and finely ground material carried by the **glacier** and deposited when the ice melted.... An accumulation of **glacial drift** built within a **glaciated** region by the direct action of **glacial** ice. Examples are lateral, terminal, and recessional moraines.

morph - Usually describes a fixed color variation within a **population** or entire **species**...A distinct genetic form of a particular **species**; a distinct color phase of a **species** that exhibits more than one color at different times of the year; one of several colors exhibited by a **species**. (See: **discrete polymorphism**, **polymorphic**, **dimorphism**)

morphogenesis - The key process or steps at the level of the **organism** by which **cells** change their shape and chemistry and move *en masse* to build the **organism**. (See: **sociogenesis**)

morphological - Of or referring to **morphology**...Relating to body shape; also taken to include body size and color patterns.

morphologically - Relating to body shape; also taken to include body size and color patterns.

morphology - The form and structure of anything, usually applied to the shapes, parts, and arrangement of features in living and fossil **organisms**.... Physical shape and structure of an **organism**.

morphometrics - A field concerned with studying variation and change in the form (size and shape) of **organisms** or objects.... The measurement of shape; The study of the relationships between the form and function of **organisms**.... The physical features of **organisms**, for example, coloration. Morphometric differences are sometimes used to identify separate **populations** of a **species** of **organism**.

mosquito - A two-winged biting, blood-sucking fly of the **insect order** Diptera, **family** Culicidae.... Any of various two-winged **insects** of the **family** Culicidae, in which the female of most **species** is distinguished by a long proboscis for sucking blood. Some **species** are **vectors** of diseases such as **Malaria**, **Yellow Fever**, and **Dengue**.

moss - A **bryophyte** belonging to the **class** Musci. These are primitive **photosynthetic** plants. Mosses have a "stem-and-leaf" form when viewed closely.

moss mat - An **epiphyte** mat dominated by **mosses**.

motile - Able to move oneself about, capable of self-locomotion.

mottled - Having a blotched or spotted appearance where the spots are poorly defined; a mottled appearance may consist of several colors or several shades of a color.

mould - See **mold**.

moult - See **molt**.

mountain and valley breezes - System of winds that blow downhill during the night (mountain breeze) and uphill during the day (valley breeze).

mountain belt - Several mountain ranges that lie parallel to one another.

mountain breeze - A breeze that occurs when cool air circulates from mountain peaks into surrounding valleys.

mph - Abbreviation for "miles per hour", a measurement of speed.

mucilaginous - Viscous, slimy.

muck - Highly decomposed **organic** wet soil.... Highly decomposed wet **organic** matter in which the original plant parts are not recognizable.

mucous membrane - Thin layer of tissue associated with mucous secreting glands that lines body passages and communicates with the exterior, e.g., inside of nose.

mucus - A sticky secretion of mucous glands and used for locomotion, lubrication, or protection.

mudflat - An area usually covered by shallow water, with a bottom surface of mud and is able to support growth of aquatic plant life. Mudflats can be tidal or can occur in non-tidal freshwater.... Coastal wetlands that form when mud is deposited by tides or rivers. They are found in sheltered areas such as bays, bayous, lagoons, and estuaries. (See: **tidal flat**)

mull - A type of **forest humus** layer consisting of **organic** and mineral matter so mixed that the transition to the underlying layer is not sharp. Mixed mainly through the activities of earthworms. Compare **mor**.

Müllerian bodies - **Nectaries on *Cecropia* trees, located at the base of the leaf petioles.** (See: **myrmecophyte, nectary, extrafloral nectary, Beltian bodies, domatium**)

Müllerian mimicry - A situation in which two or more unpalatable **species** converge in appearance. ... A similarity in appearance between two or more unrelated poisonous species in which both species benefit from this similarity. (See: (See **Batesian mimicry, mimicry, mimicry complex, warning coloration, aposematic coloration**))

multicellular - Composed of more than one cell...Multicellular organisms are organisms consisting of more than one cell, and having differentiated cells that perform specialized functions.

multiple fruit - A cluster of mature **ovaries** from several **flowers** on a single **stem**.

multivoltine - Producing more than one brood of offspring during one breeding season.

muscid - Belonging to the fly **family** Muscidae.

musk - A strong-smelling odor released from **glands** beneath the skin of some animals and used as a form of communication, such as a sexual attractant or a warning signal. (See: **scent gland, musk gland, musky**)

musk gland - A large preputial scent gland of the musk deer, musk ox and various other animals, including skunk and other members of the weasel **family**. Also known as musk bag. (See: **scent gland, musk, musky**)

muskeg - A **swamp** or **bog** occurring in depressions in poorly drained **alluvial** or **glacial** terrain in northern Canada or the United States... Thick water-saturated accumulations of **peat** produced by **bog succession** in **glaciated** regions.... A *Sphagnum* **bog** of northern North America often with tussocks.... Muskeg is a soil type (also a **peatland** or **wetland** type called a **bog**) common in Arctic and **boreal** areas. Muskeg consists of dead plants in various states of **decomposition** (*i.e.*, **peat**), ranging from fairly intact *Sphagnum* **moss**,

to **sedge peat**, to highly decomposed **muck**. . . . An old Algonquin Indian term applied to a large expanse of **Sphagnum peatland** bearing stunted Black Spruce, *Picea mariana* and Tamarack, *Larix laricina* with **ericaceous shrubs** prominent. . . . A wet area usually **moss**-floored, characterized chiefly by an **organic** soil. Muskeg most often refers to a Black Spruce, *Picea mariana* **woodland** with a thick mat of **mosses** (*Hypnaeae* and *Sphagnum*) underlain by **peat**. It can be used loosely to refer to a willow-grown **sedge** low place, and in loosest terms is any wet lowland such as a **slough** or **bog**. . . . A **bog** in northern North America characterized by an abundance of *Sphagnum* and a sparse cover of **shrubs** and small **trees** such as Black Spruce, *Picea mariana*.

- **flat muskeg** - The surface of these muskegs is flat or concave and their development cannot go beyond a certain height nor can it spread laterally. Limited to lowlands, valley **streams**, and edges of **lakes** and ponds of which the water is more or less acid in reaction and relatively poor in soluble mineral salts.
- **raised muskeg** - Muskeg having a convex surface and **hummocks** of *Sphagnum* **mosses** which by their continual upward growth lead to accumulation of **moss peat** reaching several feet in thickness. *Ledum*, *Kalmia*, and *Andromeda* are the dominant **shrubs**. Raised muskegs develop in less extremely wet climatic conditions than those necessary for the formation of slope muskegs. Synonym of **raised bog**.
- **slope muskeg** - Muskegs which have a sloping surface and which usually develop in coastal regions where the **peat-forming vegetation** is dependent upon cool summers, high **precipitation**, and high **humidity**. Usually support mixed **communities** of **sedge** and **moss vegetation** with *Scirpus*, *Eriophorum angustifolium*, *E. vaginatum*, *Rhynchospora alba*, and several species of *Sphagnum*.
- **smallpox muskeg** - Areas of former **lake** and pond beds now free of water and characteristically saucer-like in shape. The former rims have a good growth of small **trees** and **shrubs** which produce a pock-marked effect.

musky - Of, relating to, or having the odor of **musk**. . . with a pungent smell similar to that of musk. (Musk is a greasy secretion with a powerful odor, produced in a glandular sac beneath the skin of the abdomen of the male musk deer and used in the manufacture of perfumes. A similar secretion is produced by certain other animals, such as members of the weasel family, Mustelidae. (See: **scent gland, musk, musk gland**)

mutagen - A chemical or physical agent that causes a permanent **genetic** change in a **cell** other than that which occurs during normal **genetic** recombination.

mutagenic - Causing or tending to cause mutations or permanent **genetic** change in a **cell**. (See: **genetic mutation**)

mutagenicity - The capacity of a chemical or physical agent to cause permanent **genetic** change in a **cell**. (See: **genetic mutation**)

mutant - An individual, **organism**, or new **genetic** character arising or resulting from **genetic mutation**. (See: **genetic mutation**)

mutation - See **genetic mutation**. (Also see: **genetic drift**)

mutual exclusion - When two different, but usually closely related, species exclude one another from their territories.

mutualism - Mutualism is a type of **symbiosis**. Mutualism is when two **species** or dissimilar **organisms** living together benefit each other, *i.e.*, the relationship is advantageous to both. For example, in the Amazon **rainforest**, leafcutter ants are mutualistic with a species of **fungus**. The **fungus** grows on the leaves harvested by the ants. The two species are so interdependent that neither can survive without the other. ...A type of **symbiosis** in which both members of the relationship benefit. As an example, **mycorrhizae (fungi)** form **symbiotic** associations with the roots of some plants. **Mycorrhizae** aid the plant in the uptake of **nutrients**, while the plant provides the **fungi** with **carbohydrates** (food)....A situation in which two or more **species** become evolutionarily interdependent in such a way that each benefits the other(s). ... Relationship between two **organisms** in which each benefits from the others presence, such as flowers and bees. (See: **symbiosis, commensalism, parasitism, amensalism**)

mutualist - An **organism** in a relationship involving **mutualism**.

mutualistic organism - An **organism** in a relationship involving **mutualism**.

mutualistic - Of or referring to **mutualism**.

muzzle - The snout of certain **mammals**, such as a fox or wolf, consisting of the nose and forward portions of the upper and lower jaws.

mycelium - The vegetative body of a **fungus**, consisting of **hyphae**.... The mass of thread-like filaments constituting the vegetative body of a **fungus**.... mass of **hyphae** constituting the body (thallus) of a **fungus**.... The **hypha** or mass of **hyphae** that make up the body of a fungus... Thread-like filament making up the vegetative portion of thallus **fungi**.... The aggregate of long, single-cell-wide, filaments (**hyphae**) of **fungi**.... The non-reproductive part of a **fungus**; much of the mycelium may be underground or concealed beneath the **substrate** on which the **fungus** grows.... Mass of **hyphae** constituting the body (thallus) of a **fungus**.

mycobiont - The **fungal** component of a **lichen**, commonly an ascomycete, a member of the Ascomycota, one of the major classes of **fungal organisms**. (See: **lichen, phycobiont photobiont**)

mycologist - One who studies **fungi**.

mycology - The scientific study of **fungi**...The branch of **botany** that deals with **fungi**.

mycoparasite - Fungal parasite on another fungus.

mycorrhizae (singular: **mycorrhiza**) - A group of **fungal species** that are **mutualists** with trees...**Fungi**, which grow into the roots, aid in taking up minerals from the soil. Trees supply **fungi** with **carbohydrates** from **photosynthesis**... **Symbiotic** association between a **fungus** and the roots or **rhizoids** of a plant... The probably **symbiotic** and maybe sometimes **parasitic**, association between the root or **rhizome** of a green plant and a **fungus**... The **symbiotic** association of the **mycelium** of a **fungus** (as various basidiomycetes and ascomycetes) with the roots of a seed plant (as various **conifers**, beeches, **heaths**, and orchids) in which the **hyphae** form an interwoven mass investing the root tips or penetrate the parenchyma of the root... Associations between **fungi** and the roots of a higher plant.

mycorrhizal - Of or referring to **mycorrhizae**.

mycotoxins - A **toxin** produced by a **fungus**... **Toxic** substance of **fungal** origin, such as **aflatoxin**... A diverse class of poisonous **compounds** produced by certain mushrooms and other **fungi**; mycotoxins are produced on the surface of **mold spores** and remain **toxic** even after the **spore** is dead.

myrmecophile - An **organism**, such as a beetle, that habitually shares the nest of an ant colony.

myrmecophilous - Living symbiotically with ants... Associated with, or benefiting from ants through sharing their nest.

myrmecophyte - An “ant plant”...Plants that possess nectar-secreting glands as well as other structures that collectively act to attract ants...Plants that offer specialized shelter or food for ants. ...A diversity of plant species ranging through nineteen families (and including ferns, epiphytes, vines and trees) have been classified as “ant plants” because of their ant-attractant properties. Examples are *Cecropia* spp., *Cordia* spp., *Tocoa* spp. *Inga* spp., *Triplaris* spp., *Tachigali* spp., *Clidemia* spp. *Durola* spp., and some *Acacia* spp. *Cecropia*, a pioneer species, puts most of its energy into rapid growth, leaving little for the production of chemical **compounds** or **secondary compounds** to protect the trees from **herbivores**. In the place of these chemical **compounds**, the ants protect the tree from **herbivores**.A plant **pollinated** by ants. (See: **extrafloral nectary**, **nectary**, **Müllerian bodies**, **Beltian bodies**, **domatium**, **myrmecophile**, **myrmecophilous**)

mysid - A shrimp-like **crustacean**, usually **marine**, that often occurs in large swarms and is an important part of the oceanic food web.

naiad - Another name for nymph. Naiad is used to refer to the nymph stage of aquatic insects, such as dragonflies... The aquatic growing stage of insects with an incomplete metamorphosis...The aquatic immature stage of any hemimetabolous insect...The immature, or **nymph**, stage of some **aquatic insects**, such as dragonflies, that undergo **incomplete metamorphosis**; these **organisms** have three life stages: egg, naiad, adult; the naiad looks entirely different from the adult. (See: **nymph**)

nanoplankton (nannoplankton) - The smallest **planktonic organisms**...Minute **planktonic organisms** with a body diameter between 0.2 and 20 micrometers. ...Generally any **plankton**, usually plants, smaller than 80 μm ; many important nanoplankton are only 0.2-2.0 μm long. ...**Phytoplankton** 5-60 microns long. (See: **phytoplankton**)

nape - The back of the neck.

nastic movement - A movement of a plant part (such as a **leaf**) not caused by an external stimulus.

natal - Relating to the time or place of one's birth.

natality - The birthrate, which is the ratio of total live births to total **population** in a particular area over a specified period of time...**Population** increase factor *i.e.* birth rate.... Another word for **fertility**, the number of individuals born during a given time period.

native - Originating or occurring naturally in a certain area without human intervention.

native organism - See **indigenous species**.

native species - See **indigenous species**.

native vegetation - Any local **indigenous** plant **community** containing throughout its growth the complement of native **species** and **habitats** normally associated with that vegetation type or having the potential to develop these characteristics. It includes vegetation with these characteristics that has been regenerated with human assistance following disturbance. It excludes plantations and vegetation that has been established for commercial purposes.

natural capital - The stock of **environmental** assets and **natural resources** existing in the physical **environment**. Components of natural capital range from currently monitored factors such as mineral, forest or energy resources, through to other important factors such as clean water and **atmosphere**, **biodiversity** and **ecological** support systems. Natural capital requires a broader set of measures and indicators to monitor development and encourage the sustainable use of **renewable resources**.

natural environment - An **environment** that is not the result of human activity or intervention.

natural gas - A mixture of gaseous **hydrocarbons** formed from **marine organisms**.

natural heritage - Natural heritage sites are physical or biological features, formations or groups which have outstanding universal value from the point of view of aesthetics, science or **conservation**. They include landscapes, **geological** structures, **ecological**

assemblies, rare habitats and **habitats** containing **threatened species**. **Conservation** of natural heritage may be achieved using networks of national parks or reserves and international guidelines such as the 1972 UNESCO Convention concerning the Protection of World Cultural and Natural Heritage.

natural levee - A natural embankment that parallels the course of a **river** or **bayou**. A natural levee is built up over time by seasonal flooding of uncontained **rivers** and **bayous**. A natural levee is generally shorter and broader than an artificial levee. (See: **levee**)

natural pruning - The freeing of the stem of a standing tree of its branches by natural death, disintegration, and/or fall, from such causes as decay, or deficiency of light or water, or snow, ice, and wind breakage. Also known as **self-pruning**.

natural resource - Any property of the physical **environment**, such as minerals, or natural **vegetation**, which humans can use to satisfy their needs. Technically speaking, a property only becomes a resource when it is exploited by humans; by this definition, climate may be considered as a natural resource, especially for countries dependent on tourism. Natural resources may be classified as renewable and non-renewable.A source of supply from the **natural environment** for some human necessity, deficiency or desire. Excessive demands on natural resources are currently placing global **ecosystems** under threat, particularly as a result of **habitat destruction** and **habitat degradation** with its associated loss of **biodiversity**. Consumption of natural resources can only endure over the long term if current non-renewable resources are able to be replaced with the sustainable management of alternative renewable resources. (See: **renewable resource, non-renewable resource**)

natural selection - The mechanism of **evolutionary** change first formally described by Charles Darwin and Alfred Russell Wallace. Argues that **genetic** characteristics best suited to a particular **environment** will be disproportionately passed to offspring because these characteristics confer greater survival value, and thus their possessors reproduce in greater numbers.... The process by which **populations** adapt to their **environment** as **genes** that increase an **organisms** probable reproductive success are preferentially passed on to future generationsThe process by which **genetic** traits are passed on to each successive generation. Over time, natural selection helps **species** become better adapted to their **environment**. Also known as “survival of the fittest,” natural selection is the driving force behind the process of **evolution**.... the process by which the **genetic** makeup of a **population** changes allowing for a better adapted **phenotype** to be produced. ... The action of the **environment** on **organisms** such that those individuals better able to survive **environmental stress** are more likely to reproduce and perpetuate their **species**. ... The process of differential reproductive success by which **genes** in a **population** increase or decrease in frequency with the passage of generations, depending on their contribution to the survival of offspring in which they are carried; arguably the most important of the several mechanisms by which **evolution** takes place, discovered by Darwin and first described in 1858-59. (See: **disruptive selection, directional selection**. For information on the formation of **species** see: **speciation, species, evolution**,

population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Epoch, fitness)

natural vegetation - The **vegetation** condition and/or **species** composition native to an area prior to it being modified by people. Little existing **vegetation** is unmodified by people's activities either directly (*i.e.*, burning or cutting) or indirectly (*i.e.*, introducing grazing animals or exotic plants). The current tendency is to call all **vegetation** not deliberately managed or controlled by farming activities "natural **vegetation** " or to use the term "semi-natural." The phrase rarely includes the mosses, **lichen**, **algae**, etc.

naturalize - To introduce and establish in another area; a naturalized plant is one that is non-native and persists in the wild without cultivation, such as Queen Anne's Lace, Chicory, and dandelion.

naturalized - **Alien** or **exotic species** that have become successfully established....When a **species** that is not native to a certain area grows, reproduces and maintains itself.

naturalized species - A (non-native) **species** established as if it were a native **species**, *e.g.*, the **annual** grasses of California's Central Valley and foothills. (See: **exotic species**, **invasive species**, **indigenous species**)

nautical mile - See **knot**.

neap tide - **Tide** of lowest amplitude in the lunar cycle.

necropsy - An autopsy or examination of a dead body to determine the cause of death or the changes caused by a disease.

necrosis - (adjective: necrotic) - Localized tissue death that occurs in groups of **cells** in response to disease or injury...Pathologic death of one or more **cells**, or of a portion of tissue or organ, resulting from irreversible damage.... Pertaining to the death of tissue.... When tissue in an organ dies due to lack of blood supply.... Death of tissue, usually accompanied by black or brown darkening.

nectar - A sugary fluid secreted in some **flowers**....A sweet liquid secreted by flowers of various plants, consumed by **pollinators**, such as hummingbirds and insects, and gathered by bees for making honey.... A liquid secreted by flowers that is typically sweet and attracts pollinators such as insects and birds.

nectar guide - A contrasting color pattern in a **flower** that guides a **pollinator** to the **nectar**.

nectary - In **botany**, a **gland** secreting **nectar**....Nectar-secreting organ in flowering plants that serves as an **insect** feeding station and thus attracts **insects**, which then assist

in the transfer of **pollen**. (See: **extrafloral nectary, Müllerian bodies, Beltian bodies, myrmecophyte, domatium**)

nectarivore / nectivore - An animal that feeds primarily on **nectar**, for example an adult butterfly or a hummingbird.

nectivorous - Feeding primarily on **nectar**.

needleleaf - Plant bearing stiff, linear, needle-like leaves, or vegetation composed of needleleaf plants, *e.g.* **conifers**.

negative feedback - An interaction that reduces or dampens the response of the system in which it is incorporated. (See: **homeostasis, negative feedback loop, feedback, feedback loop, feedback mechanisms, positive feedback loop, cloud feedback**)

negative feedback loop - A negative feedback loop is a process that creates conditions that tend to reduce output and make that process slow or diminish. The general result is that fluctuations are attenuated. In **biology**, this process (generally biochemical) is often referred to as **homeostasis**. (See: **homeostasis, negative feedback, feedback, feedback loop, feedback mechanisms, positive, feedback loop, cloud feedback**)

negentropy - The negentropy, also negative **entropy** or syntropy, of a living system is the **entropy** that it exports to keep its own **entropy** low; it lies at the intersection of **entropy** and life. (See: **entropy**)

nekton - Active **pelagic** swimming animals.... Animals such as flounder, tuna, and squid that swim through the water; can be found in any ocean zone.

nematode - A type of roundworm; members of this phylum are often parasiticAny of a group of worms having a smooth, unsegmented, cylindrical body with pointed ends; some nematodes such as hookworm, pinworm, and *Ascaris* are **parasitic**.... A member of the class Nematoda which includes 12,000+ species of worm-like **organisms** that are unsegmented and which have a round body and are pointed at both ends.

neontology - The branch of zoology dealing with living forms as distinct from fossils.

neoteny - The retention of juvenile characters into adulthood.

Neotropical - Referring to the **Neotropics**.... Referring to a region that includes southern Mexico, Central America, and most of South America; a neotropical **migrant** species nests in North America and winters south of the continental United States.

Neotropical migrant - A bird that spends a portion of the year, usually the non-breeding season, in the New World **tropics** in South or Central America south of the Mexican Plateau.

Neotropics - The term for the American or New World **tropics**.... The Neotropics are a **geographical** region defined by the Tropic lines of **latitude** (Cancer and Capricorn) that run parallel to the equator. This region lies in the Americas, or New (= "Neo") World. Due to long isolation from the Old World **flora** and **fauna**, the Neotropics are characterized by a wide range of **biomes**, unique **ecology** and high **biodiversity**, including Amazonia.

neritic - Pertaining to the shallow waters overlaying the **continental shelf**.

neritic zone - The ocean zone from the low-tide line to the point where the ocean floor drops off.

nesting - The process in birds and other animals of building a nest, laying eggs, and raising young.... The behaviors of adult animals leading up to nest building and egg laying through departure of young from the nest.

nestling - A young bird that has not left, or abandoned, the nest...A young bird not yet **fledged**.... A young bird that is not yet able to leave the nest. (See: **fledge**, **fledging**)

net primary productivity (NPP) - The rate at which **producer** (usually plants) **biomass** is created in a community..... Plants both take in and emit carbon dioxide. NPP is the net amount of CO₂ taken in by vegetation in a particular area. It is an important element in the balance of carbon exchange between the Earth and the **atmosphere**. Two main processes are involved: **Photosynthesis** is the fundamental energy-gathering process of life: sunlight + **carbon dioxide** + water are transformed into organic carbon + oxygen. This occurs mainly in the leaves of **terrestrial** plants and in microscopic **blue green algae** in the ocean. Photorespiration (**autotrophic** respiration) takes place simultaneously, when plants are exposed to light; the plants take up oxygen from the air and release **carbon dioxide**. It takes place primarily when plants are exposed to light. In an unperturbed world, the balance between these two processes produces a net loss of **carbon dioxide** - approximately enough to balance the carbon which is formed into **soils** and **peat**, plus the amount consumed in **heterotrophic** respiration (respiration by **microbes**, converting **organic** matter back into atmospheric CO₂). The carbon balance can be changed considerably by human activities and land use changes, and by climate changes. Since the pools and fluxes are large (NPP 50-60 GtC per year), any perturbations that affect **photosynthesis** or photorespiration can have a significant effect on the atmospheric concentration of CO₂. (See: **primary productivity**, **secondary productivity**, **net secondary productivity**)

net production - Production going to **biomass** increase.

net secondary productivity (NSP) - The rate at which consumer and decomposer biomass is produced in a community. (See: **primary productivity**, **secondary productivity**, **net primary productivity**)

neurological - pertaining to the nervous system and its disorders.

neurotoxin - A poisonous protein substance that damages the nervous system.

neutralism - See **commensalism**.

neutralize - To counterbalance or counteract the effect of; render ineffective.... To make chemically neutral.

neurotoxin - A chemical that paralyzes nerves. Neurotoxins are produced by a variety of **organisms**, including some **pit-vipers** and **heterotrophic** dinoflagellates.... A poison that acts directly on the **tissues** of the central nervous system; such as the **toxin** secreted in the **venom** of certain snakes, or present in the spines of certain shellfish, or produced by certain **bacteria**.

newt - A type of salamander belonging to the family Salamandridae. Some newts begin life in the water, go through a **terrestrial (eft)** stage, then return to water as **aquatic** adults.... Small, usually brightly colored semi-**aquatic** salamanders of North America and Europe and northern Asia... Any of several small, slender, often brightly colored salamanders of the European genus *Triturus* or the North American genera *Notophthalmus* and *Taricha*, living chiefly on land but becoming **aquatic** during the breeding season.

niche - The role of an **organism** in an **ecosystem**... Both the role that an **organism** plays within its **ecosystem** and the particular area within its **habitat** that it occupies.... The ultimate unit of the **habitat**, *i.e.*, the specific spot occupied by an individual **organism**. ... By extension, the more or less specialized relationships existing between an **organism**, individual or **synusia**, and its **environment**. ... The place a particular **species** occupies within its **ecosystem**, especially regarding the **food chain**.... The specific set of **environmental/habitat** conditions that permits the full development and completion of the life cycle of an **organism**.... The place and function of a **species** in an **ecosystem**. NOTE: The **taxonomic** niche of a **species** is the functional role of the **species** in a **community**; the fundamental niche is the totality of **environmental** variables and functional roles to which a **species** is adapted; the **realized niche** is the niche which a **species** normally occupies.... The portion of the **environment** which a **species** occupies, defined in terms of the conditions under which an **organism** can survive, and may be affected by the presence of other competing **organisms**.... The term niche as applied to **ecology** was coined in 1917 and popularized by **ecologist** G. Evelyn Hutchinson. The view is that no two **species** could be identical in all aspects of their **ecology**, but should differ in some fundamental way related to their feeding behavior, breeding cycle or **geographical** location. This unique profile of each **species** is its niche. One way to think of a niche is as the **species** "profession" in the **ecosystem**. ... The total requirements and tolerances of a **species**; its way of life, including how it traps energy and otherwise uses its **habitat** or **microhabitat**.... A place or position of life suitable for the capabilities or merits of an **organism** or qualities of a thing. A site or **habitat** supplying the factors characteristically necessary for the successful existence of an **organism** or **species**. An "**ecological niche**" is the role of an **organism** in a **population**, involving especially its

way of life and its effect on the **distribution**, as through its relations to other **biotic** and **abiotic** factors. It also may mean where it lives, what it does (how it transforms energy, behaves, responds to and modifies its physical and **biotic distribution**), and how it is constrained by other **species**. By analogy, it may be said that the **population** is the **organism's** "address," and the **niche** is its "profession." The "**population niche**" can be subdivided into a "**trophic niche**" and a "**multidimensional niche** or hypervolume." "**Trophic niche**" is the feeding role or position of an **organism** in a **biotic population** - *e.g.*, producer, consumer, herbivore, carnivore, detritivore, etc. The "**Multidimensional niche** or hypervolume" is an **organism's** position within a volume described by **population** gradients, such as temperature, moisture, pH, and soil factors. (See: **competition** or **ecological competition**, **competitive exclusion**, **competitive exclusion principle**, **competitive release**, **resource partitioning**, **habitat partitioning**, **ecological niche**, **niche differentiation**, **niche expansion**)

niche differentiation - See **niche partitioning** and **resource partitioning**.

niche expansion - The concept that in the lack of interspecific competitors the niche of a species will expand beyond the limits otherwise imposed by those competitors. This can perhaps be most easily seen when a new species arrives on a small island where few interspecific competitors exist in comparison with its place of origin. (See: **competition** or **ecological competition**, **competitive exclusion**, **competitive exclusion principle**, **competitive release**, **resource partitioning**, **habitat partitioning**, **niche**, **ecological niche**, **niche differentiation**)

niche partitioning - See **niche differentiation** and **resource partitioning**. - The term **niche partitioning** (synonymous with **niche differentiation**, **niche separation** and **niche segregation**), as it applies to the field of **ecology**, refers to the process by which **natural selection** drives competing **species** into different patterns of **resource** use or different **niches**. This process allows two **species** to partition certain **resources** so that one **species** does not out-compete the other as dictated by the **competitive exclusion principle**; thus, coexistence is obtained through the differentiation of their realized **ecological niches**.... Co-existence within a species or between similar species who share fundamentally the same ecological niche, but are distributed with different sub-habitats, seasonal periods and/or habitat partitions as a result of resource competition. (See: **competition** or **ecological competition**, **competitive exclusion**, **competitive exclusion principle**, **competitive release**, **resource partitioning**, **habitat partitioning**, **niche**, **ecological niche**, **niche expansion**)

niche segregation - See **niche partitioning** and **resource partitioning**.

niche separation - See **niche partitioning** and **resource partitioning**.

nimbostratus cloud - A nimbostratus cloud is characterized by a formless cloud layer that is almost uniformly dark gray. It is a stratiform cloud that produces rain, developing cloud bases between the surface and 10000 ft (3000 m).

nitrate - One usable form of **nitrogen** absorbed by plants and used to make **proteins**...A **compound** containing **nitrogen** that can exist in the **atmosphere** or as a dissolved gas in water and which can have harmful effects on humans and animals. Nitrates in water can cause severe illness in infants and domestic animals. A plant **nutrient** and **inorganic** fertilizer, nitrate is found in septic systems, animal feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills, and garbage dumps...Formed when ammonia is degraded by **microorganisms** in soil or **groundwater**. This **compound** is usually associated with fertilizers....Any salt of nitric acid, having the molecular formula NO_3^-An oxidized ion of **nitrogen**. Nitrifying **bacteria** can convert nitrite (NO_2^-) to nitrate in the **nitrogen cycle**. Sodium nitrate (NaNO_3) and potassium nitrate (KNO_3) are used as fertilizer.The only form in which **nitrogen** can be used directly by plants; a component of chemical fertilizers....A **compound** (NO_3) that contains **nitrogen** and oxygen that comes from decomposing **organic** materials like manure, plants and human waste....A form of **nitrogen** which is readily available to both **aquatic** and **terrestrial** plants as a **nutrient**. (See: **nitrite**)

nitrite - Another usable form of **nitrogen** absorbed by plants and used to make **proteins**. (See: **nitrate**)

nitrogen - A chemical element essential for the growth of plants and animals. Our **atmosphere** is comprised of 79% of nitrogen.

nitrogen cycle - The circulation of **nitrogen** between the **environment** and living **organisms**....The sequence of biochemical changes undergone by nitrogen, wherein it is used by a living **organism**, liberated upon the death and **decomposition** of the **organism**, and converted to its original state of oxidation....The conversion of **organic molecules** containing **nitrogen** (a component of **amino acids**) into **inorganic molecules** (mostly in the form of **nitrates** or ammonia) in several stages by different **organisms**, followed by their uptake into plants and **organic molecules**. This movement of nitrogen among **organisms** accounts for about 95% of all nitrogen fluxes on Earth.... The continuous trapping of **nitrogen** gas in **compounds** in the soil and the returning of **nitrogen** gas to the air. (See: **nitrogen fixation**, **nitrogen-fixing bacteria**)

nitrogen fixation - The conversion of **atmospheric** nitrogen gas into **organic nitrogen compounds** by a limited number of **microorganisms**....The complex process by which **microorganisms**, often in association with root systems of certain **vascular plants** (such as legumes), acquire energy from the conversion of gaseous **nitrogen** to **inorganic nitrate** that is subsequently taken up by **vascular plants**.... The transformation of elemental nitrogen to an **organic** form by **microorganisms**.... The conversion of gaseous nitrogen into a form usable by plants.... The process of converting **atmospheric** nitrogen into a form that is usable to plants and other living things; **nitrogen** fixation is part of the **nitrogen cycle** and is typically carried out by **nitrogen-fixing bacteria** that live in nodules on the roots of certain plants such as locust trees, beans, peas, clover and other legumes.... The process of conversion or fixation of **inorganic nitrogen** gas from the **atmosphere** into substances such as ammonia, which makes **nitrogen** available to living **organisms**. Nitrogen fixation is essential in the synthesis of **amino acids**, **proteins** and

other **nitrogen**-containing **compounds**. The **organisms** responsible for nitrogen fixation are either **symbiotic bacteria** living in association with a plant, such as those living in the root nodules of **leguminous** plants or inside **lichens**, or free-living forms such as **blue-green algae**. (See: **nitrogen cycle**, **nitrogen-fixing bacteria**)

nitrogen-fixing bacteria - Certain **bacteria** that live in the roots of beans, peas, peanuts and other **legumes** and can extract **nitrogen** from the air. (See: **nitrogen fixation**, **nitrogen cycle**)

nitrogen oxides (NO_x) - Gases consisting of one **molecule** of nitrogen and varying numbers of oxygen **molecules**. Nitrogen oxides are produced in the emissions of vehicle exhausts and from power stations. In the **atmosphere**, nitrogen oxides can contribute to formation of photochemical ozone or **photochemical smog**, can impair visibility, and have health consequences; they are thus considered **pollutants**.

nitrous oxide (N₂O) - A powerful **greenhouse gas** with a **global warming potential** of 320. Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and **organic** fertilizers, **fossil fuel** combustion, nitric acid production, and **biomass** burning.

no-see-ums - See **midge**.

nocturnal - Active only at night.... For animals, active at night; for plants, blooming at night...Occurring or active during the night rather than during the day. The opposite of **diurnal**.

node - In **botany**, the segment of a **stem** to which **leaves** and **axillary buds** are attached...Enlarged portion of a shoot or cane at which leaves, clusters, tendrils, or buds are located.

nomadic - A roaming lifestyle, moving frequently...Having no permanent abode... Moving according to the seasons from place to place in search of food and water.

nomenclature - The system of naming things; for instance, certain rules apply to naming an **organism** with a two- or three-word scientific name or to naming a group of chemical compounds.

nominate subspecies - The first type of the **species** to be described for a **polytypic species**. In the **trinomial**, the **subspecies** name is the same as the **species** name. For example, the nominate subspecies of Roadside Hawk is *Buteo magnirostris magnirostris*.

nonpoint source (NPS) pollution - Pollution discharged over a wide land area, not from one specific location. These are forms of diffuse **pollution** caused by **sediment**, **nutrients**, **organic** and toxic substances originating from land use activities which are carried to lakes and **streams** by surface runoff. Nonpoint source **pollution** is contamination that occurs when rainwater, snowmelt, or irrigation washes off plowed

fields, city streets, or suburban backyards. As this runoff moves across the land surface, it picks up soil particles and **pollutants**, such as **nutrients** and **pesticides**. (See: **point source pollution**)

non-breeding plumage - See **basic plumage**.

non-monetary cost - The **environmental** consequences of human activity such as energy use; examples include the generation of **pollution** and long-term health problems caused for people.

non-native species - See **exotic species, alien species, introduced species, invasive species, naturalized species**.

non-passerine - A bird from any order other than Passeriformes or perching birds, including all the other birds in the world.

non-renewable resource - A material that people take from Earth and that cannot be replaced within a short period of time or at all like coal, oil, and **natural gas**...A **natural resource** that is in limited supply and doesn't have the capacity to be replaced through natural processes, at least not for many thousands of years. **Fossil fuels** are an example of a non-renewable resource... **Natural resources** the total quantity of which does not increase significantly with time. Thus, with the total initial supply being limited in quantity, each use must diminish the total stock. Long before a given resource is physically used up, it may be "exhausted" in the sense that further utilization is indefinitely discontinued because the costs of producing any possible quantity of this resource are larger than the revenue that could be obtained. The economic concept of resource exhaustibility typically only applies to commodity type resources because biological, location, and amenity type resources can be physically (by **extinction** or site occupancy) or conceptually (alteration of primeval wilderness conditions) exhausted... Source of energy or material from nature which is unable to be replaced or regenerated within a timescale similar to the human utilization of the resource. Examples include fossil fuels such as coal, oil and natural gas, or irreplaceable **ecological** resources such as **endangered species** or **habitats, old-growth forests** and wilderness areas. (See: **natural resource, renewable resource**)

non-vascular plants - Non-vascular plants include the **mosses, hornworts**, and **liverworts** and members of other **kingdoms** (the various **algae**). Because these plants lack water-conducting tissues or **vascular tissues**, they fail to achieve the structural complexity and size of **vascular plants**. (See **vascular plants**)

non-venomous - An animal that does not produce a toxin, or poison, in order to subdue its prey.

non-migratory - Referring to an animal that does not migrate, or move from one place to another on a seasonal basis.

northern migrant - See **boreal migrant**.

nuclear - In **biology**, of or referring to the **nucleus**.

nucleus (plural: **nuclei**) - A specialized, usually spherical mass of **protoplasm** encased in a double membrane, and found in most living **eukaryotic** cells, directing their growth, **metabolism**, and reproduction, and functioning in the transmission of **genetic** characters.... **nucleus** - The body within a **cell** controlling its activities, including **inheritance**.

nuptial - Relating to mating or breeding in animals.

nuptial plumage - The **plumage** of a bird worn during the breeding season.

nurse log - A large decomposing tree trunk that has fallen, usually in a forest; the decaying wood provides moisture and nutrients for a variety of insects and plants....A fallen tree trunk which acts as a sort of nursery for the establishment of new tree seedlings, providing them with needed nutrients as it decomposes.... A nurse log is a fallen tree which, as it decays, provides ecological facilitation to seedlings. Broader definitions include providing shade or support to other plants. ... A larger and decomposing fallen log which acts as a germination substrate for tree species establishing in the understorey. Such logs provide moisture, nutrients and often some degree of elevation above other potentially competing vegetation on the forest floor.

nutrient - Any **molecule** or substance needed by an **organism** to live and reproduce.... Substance required for growth and development. Plants, for example, need water and minerals to grow and reproduce.... elements or **compounds** essential to growth and development of living things; carbon, oxygen, nitrogen, potassium and phosphorus.... The elements C, H, O, P, K, N, S, Ca, Mg, K, B, Mn, Cu, Zn, Mo, Cl, Co, Si and F which are required for plant growth.... Any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements. ... Any element or simple **compound** necessary for the health and survival of an **organism**. This includes air and water, as well as food.

nutrient cycle - The exchange of elements between the living and non-living components of an **ecosystem**. (See **nutrient cycling**)

nutrient cycling - The transformation of chemical elements from **inorganic** form in the **environment** to **organic** form in living **organisms**, then back to **inorganic** form. This includes the exchange of elements between and among the **biotic** and **abiotic** components.... All the processes by which **nutrients** are transferred from one **organism** to another. For instance, the carbon cycle includes uptake of carbon dioxide by plants, ingestion by animals, and respiration and decay of the animal.... Recycling **nutrients**, such as carbon, nitrogen, and phosphorus, through an **ecosystem**.

nutrient recycling - See **nutrient cycling**.

nymph - In aquatic insects, the **larval** stage.... In terrestrial arthropods such as insects and some arachnids, an immature form that resembles the adult but is not fully developed; **organisms**, such as grasshoppers, that undergo **incomplete metamorphosis** have three live stages: egg, nymph, adult. (See: **naiad**)

nymphal stage - The period in an aquatic insect's life as a **nymph**.

obligate commensal - An **organism** that can only exist in a **commensal** relationship with another **species**. ((See: **mutualism, symbiosis, commensalism, obligate symbiont**)

obligate parasite - A **parasite** that cannot survive without a **host**.....An organism that can grow or reproduce only on or in living tissue.

obligate symbiont - Organism depending entirely upon another organism. (See: **mutualism, symbiosis, commensalism, obligate commensal**)

obliquity - The angle between the plane of the Earth's orbit and the plane of the Earth's equator; the "tilt" of the Earth.

occluded front - See **front**.

ocean acidification - The name given to the ongoing decrease in the **pH** (or increase in acidity) of the Earth's oceans, caused by their uptake of **anthropogenic carbon dioxide** from the **atmosphere**. The increased **atmospheric carbon dioxide** (CO_2) due to human activities increases the amount of CO_2 dissolved in the oceans. **Carbon dioxide** gas dissolved in the ocean reacts with water to form **carbonic acid** resulting in ocean acidification. Since biological **systems** are adapted to a narrow range of **pH**, this is a serious concern directly driven by increased **atmospheric carbon dioxide** and not **global warming**....In addition to **climate change**, another concern about increasing **atmospheric** CO_2 is its potential impact on the chemistry of the world's oceans. Normally, the sea is slightly **alkaline**, but higher **atmospheric** CO_2 concentrations cause more **carbon dioxide** to dissolve in the ocean waters, making the water slightly more **acidic**. In a more **acidic** ocean, it is more difficult for creatures such as mollusks and corals to build their **calcium carbonate** shells and skeletons. With increasing acidity, these **calcium carbonate** shells and skeletons can actually start to dissolve. At its worse, an **acidic** ocean will actually dissolve coral reefs, in the same way that tooth enamel dissolves in a glass of Coca-Cola.

ocean current - A continuous flow of ocean water along a definite path. (See: **Humboldt Current, California Current, Gulf Stream**)

ocean trench - A long, narrow, deep valley on the ocean floor.

oceanic - The **pelagic environment** beyond **continental shelves**.

oceanic crust - **Crust** that lies below the oceans and made up mostly of basalt.

oceanic zone - The zone that lies beneath the **neritic zone** and is divided into two areas based on depth: the **bathyal zone** and the **abyssal zone**.

ocellus (plural **ocelli**) - A small, light sensitive eye. Many insects have three ocelli on the top of their head, which help flying insects stay level in flight.... A small, simple eye or markings that look like an eye.

ochraceous - A brownish shade of yellow (ochre-colored), often used to describe the color of a bird, *e.g.* Ochraceous Attila, *Attila torridus*.

offshore winds (or breezes) - Winds moving off the land and out over the ocean.... A **nocturnal** coastal breeze that blows from land to sea. In the evening the water may be warmer than the land, causing pressure differences. The land breeze is the flow of air from land to sea equalizing these pressure differences. (See: **land breeze, onshore winds, sea breeze**)

oil - A thick, black substance that forms underground, over millions of years, from decaying sea creatures and plants. Also called **petroleum**.

old-growth or old-growth forest- Forest **ecosystems** characterized by **vegetation** and associated animals requiring the oldest and most mature successional stages.... **old growth forest**, also called **primary forest, ancient forest, virgin forest, or primeval forest**, is an area of forest that has attained great age and so exhibits unique **biological** features. Old-growth forests typically contain large live trees, large dead trees (sometimes called "snags"), and large logs. Old-growth forests usually have multiple vertical layers of **vegetation** representing a variety of tree species and age classes.... A natural, usually mature forest never harvested and virtually uninfluenced by human activity. These forests have the characteristic of little or no perceived human influence.... Forests that have persisted for centuries without stand-replacing disturbances. These typically have old trees, uneven-aged, multi-layered **overstories**, and abundant coarse woody debris. This term is defined more precisely in many different ways depending on the purpose; there is no universally agreed-upon definition....**Ecologically** mature vegetation that has been subject to negligible levels of disturbance such as logging, road construction and clearing.

old-growth associate - A species that is most frequent in old-growth forests.

old-growth stand - Not synonymous with old-aged forest and must be recognized on the basis of stand characteristics rather than age of **trees**. Old growth stands contain **trees** of a wide range of sizes and ages and have a deep, multilayered **canopy**. They contain large standing dead **snags** and large down dead trees and other coarse woody debris. **Nutrient** cycling is low and much energy accumulates on the **forest floor**. (See: **old-growth**)

oligotrophic - Literally, "poorly fed." Refers to **habitats**, particularly soils and water,

that are poor in **nutrients**...**Nutrient**-deprived...**Aquatic** areas of low productivity...A lake condition characterized by a low supply of **nutrients** and consequent support of very little **organic** production. Dissolved oxygen is present at or near saturation throughout such lakes during all seasons of the year. Characteristic of waters that are poor in dissolved **predator** or mineral **nutrient** materials. ...Describing **bog** formed of plants growing in "soft" waters which are poor in **nutrients** as in a raised **bog**.Pertaining to water that is poorly supplied with the basic **nutrients** needed by plants. Compare **eutrophic, dystrophic, and mesotrophic**. (See: **dystrophic, eutrophic, mesotrophic**)

oligoxyphilous - Characteristic of water having low dissolved oxygen concentrations.

olivaceous - Of an olive or olive-green color.

ombrotrophic - Term meaning "nourished by rain" and referring to areas exclusively dependent on **nutrients** from **precipitation**.

omnivore - **Organisms** that feed on both plants and other animals.... **Animal organisms** that can use plants and other animals as food sources. ... Literally, an **organism** that will eat anything. Refers to animals who do not restrict their diet to just plants or other animals... An **organism** that feeds on both animal and plant substances. (Whether the foods must be living is debated, *e.g.* for "**scavengers**" or "**detritivores**....) ... An **organism** that eats both plants and animals.

omnivorous - Of or referring to an **omnivore**, an **organism** that feed on both plants and other animals.... Able to feed on both plants and animals.

omnivory - The process of animals eating both plants and other animals...Feeding on **prey** from more than one **trophic level**.

onshore winds (or breezes) - coming from the sea toward the land; "an inshore breeze"; "an onshore gale". Onshore winds are caused by the rising of warm air over the land, creating a vacuum and drawing in colder air from over the ocean. Typically, onshore winds pick up around mid-day and last through the afternoon. (See: **offshore winds, land breeze, sea breeze**)

ontogeny - The development of an individual **organism** from its conception to its maturity; as compared, for example, with a **species'** development over time, or the history of animal **evolution** as a whole (**phylogeny**).... The sequence and course of development during the life of an individual **organism**....A statement often heard in biology is that "ontogeny recapitulates **phylogeny**".(See: **phylogeny**)

oocyst - The resting stage of a **protozoan**; the oocyst is encapsulated within a strong shell.

oophagous - Feeding or living on eggs. (See: **oophagy**)

oophagy - The practice of embryos feeding on eggs produced by the ovary while still inside the mother's uterus.,...Oophagy is also used to refer to more general egg-eating behaviours such as those practised by some snakes or the differential oophagy practiced by the *Polistes biglumis* species of wasp.

oothecae (singular: ootheca) - The egg cases of some **insects** and **mollusks**.

opalescent - Having a lustrous finish like the colors of an opal stone or the rainbow.

opportunistic - Term used to describe the hunting behavior of some types of **predators**. While all **predators** are opportunistic to some degree, other **predators**, such as Coatis, are more purely opportunistic in their hunting methods, taking insects, lizards, birds' eggs, small mammals, or whatever other **prey** they come upon.... Taking advantage of what is available; the red fox is an opportunistic feeder because eats what is available from a variety of sources.

opposite leaves - Two leaves at each **node**, always on opposite sides of the **stem**. (See: **alternate leaves**) Whether a plant has opposite or **alternate leaves** can be important in its identification.... **Leaves** that are arranged in pairs, directly opposite each other on the **stem**.

orbital ring - See **eye-ring**.

order - A category of **taxonomic classification** below **class** and above **family**....A **taxonomic** category between **class** and **family**. **Orders** are composed of one or more **families**. (See: **taxon, taxonomy, classification**)

ore - A mineral or an aggregate of minerals from which a valuable constituent, especially a metal, can be profitably mined or extracted.

organ - In **botany**, a part of a plant, composed of different **tissues**, that acts as a functional unit.

organelle - A **cell** structure performing a specific function.... A structure in the **cytoplasm** of a **cell** that is specialized in its ultrastructure and biochemical composition to serve a particular function (*e.g.* **mitochondria**, endoplasmic reticulum, **chloroplast**).

organic - In chemistry, of or relating to any covalently bonded compound containing carbon atoms. Pertaining to **compounds** containing carbon..... Any **compound** containing carbon.... Substance which includes carbon-to-carbon bonds.,...Carbon forms the backbone of all **organic compounds**, such as protein, cholesterol, and sugar.... Referring to substances containing both carbon and hydrogen.....In biology, relating to or involving an **organism** or **organisms**....Refers to living things or the materials made by living things.Referring to or derived from living **organisms**....Produced by or relating to a living or once-living thing.....The opposite is **inorganic**

organic compound - See **organic**.

organic matter - Plant and animal residues, or substances made by living **organisms**. All are based upon carbon **compounds**. ...Referring to or derived from living **organisms**. 2. In chemistry, any **compound** containing carbon. ...Carbonaceous waste contained in plant or animal matter and originating from domestic or industrial sources....Any form of animal or plant life.... Decomposed plant and animal residues.... portion of the soil that includes **microflora** and **microfauna** (living and dead) and residual **decomposition** products of plant and animal tissue; any carbon assembly (exclusive of carbonates), large or small, dead or alive, inside soil space; generally consists primarily of **humus**.

organic soil - A soil that contains a high percentage (greater than 25 percent) of **organic** matter in the upper layers (where living roots are primarily found).

organically - As a result of living things.

organism - Any form of animal or plant life.... A complete living thing; a mushroom, a tree, a fox, and a human are some examples of **organisms**.... A living plant or animal.

organochlorine - See **chlorinated hydrocarbon**.

ornamental - Serving the purpose of decoration or beauty rather than usefulness. The frontal crest on an Andean Cock-of-the-Rock or the long tail of a male Booted Rackettail hummingbird are examples of ornamental plumage in birds.

ornithologist - One who studies birds and bird life. Ornithologists study the **physiology**, **ecology**, behavior and **classification** of birds.

ornithology - The scientific study of birds and bird life.

ornithophilous - A botanical term for plants which are distributed (= dispersed), germinated, or fertilized by birds.

orogenesis - The process of **orogeny**.

orogenic - Of or referring to **orogeny**.

orogenic uplift - Orogenic uplift is the result of tectonic-plate collisions and results in mountain ranges or a more modest uplift over a large region. (See: **tectonic uplift**, **isostatic uplift**)

orogenic zone - An area undergoing **orogeny**.

orogeny - The process of natural mountain building. **Orogenic** events occur solely as a result of the processes of **plate tectonics**.... Orogeny refers to forces and events leading to a severe structural deformation of the Earth's crust due to the engagement of tectonic

plates. Response to such engagement results in the formation of long tracts of highly deformed rock called orogens or orogenic belts. ... The process of mountain formation, especially by the upward displacement of the Earth's crust... The process by which mountain ranges are formed, *i.e.* the process of rock thrusting, folding and faulting in association with deeper plastic deformation, metamorphism and plutonism.....The forces and events leading to a severe structural deformation of the Earth's lithosphere (crust and uppermost mantle) due to the engagement of tectonic plates.

orographic - Related to, or caused by, physical **geography** (such as mountains or sloping terrain).....Of or pertaining to **orography**.

orography - The study of the physical **geography** of mountains and mountain ranges.

oscine - Of, belonging to, or pertaining to the sub-**order** Oscines, of the **order** Passeriformes (perching birds), comprising the songbirds that have highly developed vocal organs. (See: **suboscine**, **passerine**)

osmosis - The diffusion of water across permeable **cell** membranes that select for or against specific substances.

otsegoa - In the upper Rio Urubamba Valley of southeastern Peru, a Machiguenga term for the dry **river** courses, side branches, and braids of narrow, high-gradient **rivers** that carve up the **river** margin forests into a patchwork of **successional habitats** of varying ages and structures. The structure and distribution of otsegoa **habitat** are spatially and temporally variable. Although these otsegoa often fill during the rainy season and retain pools of standing water during the dry season, many are partially or fully overgrown with **successional species** such as *Cecropia*, Balsa (*Ochroma* sp., Bombacaceae), and wild cane, *Gynerium sagittatum*. In some cases, established groves of **riverine** forest shade an open **understory** scraped clean by rainy-season **floods**, but the **understory** can also be overgrown with dense, viney, rank **vegetation**.

In places, otsegoa forests are similar in structure to the well-known primary **successional habitats** described from the Manu Biosphere Reserve area in southeastern Peru. Nevertheless, they are more **heterogeneous** and patchily distributed than the *Gynerium* **canebrakes** and **transitional forest habitat** types familiar to observers along the wider Manu and Madre de Dios rivers. Otsegoa forests seem to predominate at slightly higher **elevations** closer to the Andes, where *Ficus* (Moraceae), *Cedrela* (Meliaceae), and *Erythrina* **species** are less prominent members of the **canopy tree community** than in the **transitional forests** along lowland, meandering rivers, such as the middle and lower Rio Manu. *Gynerium* cane is a common element in the **understory** of otsegoa forests, and often forms isolated patches between rocky river beds; it does not tend to occur in the broader, more **homogeneous** stands referred to as the *zabolo* **habitat** type. In some places, patches of *Guadua* (Graminae) **bamboo** are also found in the **understory** of otsegoa forests.

These otsegoa forests form the preferred **habitat** for Selva Cacique, *Cacicus koepckeae*.

outcompete - To succeed, through competition, over another **species**.

ovary - Female **reproductive** organ where eggs are produced... In **botany**, the reproductive part of a **flower** that will eventually develop into a fruit... The basal portion of a **pistil** that becomes a fruit.

over-consumption - Over-consumption is a concept related to **overpopulation**, referring to situations where per capita consumption of resources is so high that even in spite of a moderate population density, sustainability is not achieved.... The use of resources at a rate that exceeds the ability of natural processes to replace them.

overdraft - See **overwithdrawal**.

overexploitation - Unsustainable use of a **natural resource** leading to the depletion or degradation of the resource and consequent loss of its availability or productivity.

overfishing - Fishing a population faster than it can replace itself; the population decreases in size as a result.

overgrazing - Excessive grazing by animals to an extent that the land is damaged....The excessive consumption of plants by grazing animals to the level that regeneration of the plants is inhibited...Excessive grazing, to the detriment of the land and its vegetation.

overpopulation - Growth of a **species' population** beyond its **carrying capacity**.... Overpopulation is the condition of any **organism's** numbers exceeding the **carrying capacity** of its **ecological niche**. In common parlance, the term usually refers to the relationship between the human **population** and its **environment**, the Earth. ...A depletion of resources that occurs when too many of at least one kind of living thing inhabits an **ecosystem**....The environmental impact of human **population** growth rate can better be appreciated by the time taken for the **population** to double in size. For example, growth rates of 2% - a doubling time of 35 years - is particularly relevant since large parts of the world have a growth rate close to 2% which is clearly unsustainable.

overripe - Too ripe....past its best flavor and texture...marked by decay or decline.

overshoot - In population dynamics and population ecology, overshoot occurs when a population exceeds the long term carrying capacity of its environment. The consequence of overshoot is called a crash or die-off...In ornithology, the term refers to migrating birds that lose their way and end up overshooting their intended destinations, and appear outside their normal ranges.

overstory - The roughly horizontal uppermost layer of mature trees which overtop other layers of foliage. The **canopy** in a stand of trees. In contrast to the **understory** which is low growing woody or **herbaceous vegetation** forming a layer beneath the overstory....The stratum of trees that have outgrown the other vegetation in a forest to have their uppermost **crown** foliage largely or fully in direct sunlight, usually as a

relatively continuous layer (excluding gaps)... The uppermost part of a forest, formed by the **crowns** of the **trees**; also referred to as **canopy** or upper **canopy** layer.... That portion of the trees in a forest of more than one story forming the upper or uppermost canopy layer.

overwinter - To survive over the winter period.

overwithdrawal - Withdrawal (removal) of groundwater over a period of time that exceeds the recharge rate of the supply aquifer. Also referred to as **overdraft** or mining the aquifer.

oviparous - Producing eggs that mature and hatch after being expelled from the body, as with birds, most reptiles and fish, and the monotremes.... Young hatch from eggs laid outside the mother's body.... reproduction in which young hatch from eggs.... Producing eggs that hatch sometime after leaving the body. ... Producing eggs that develop and hatch outside the female's body. Contrast with **viviparous** and **ovoviviparous**. (See: **ovoviviparous**, **viviparous**)

oviposit - To lay eggs, especially by animals, such as **insects**, that have an **ovipositor**.

oviposition - The depositing of eggs, especially by **organisms** that have an **ovipositor**, such as **insects**.

ovipositor - Egg-laying tubular structure at the end of the abdomen in many female insects and some fishes... A tube at the tip of a female insect's abdomen used for laying eggs... A tubular structure, usually concealed but sometimes extending outside the abdomen, with which many female insects deposit eggs... A similar organ of certain fishes.

ovoviviparous - "live-bearing" fish. Eggs are held within the body of the female where the development of the embryo takes place. Contrast with **oviparous** and **viviparous** (See: **oviparous**, **viviparous**)

ovulation - Release of the female reproductive **cell** from the **ovary**; in general, the few days surrounding ovulation is when a female can become pregnant.

ovule - An immature seed.

oxbow - A U-shaped bend in a **river**; an **oxbow lake** may form if enough **silt** is deposited, cutting off that area from the main current. (See: **oxbow lake**)

oxbow lake - Semi-circular lake located in an abandoned **meander river** channel (loop) on a **floodplain**... A lake formed in the channel of an abandoned **river meander**.... A crescent-shaped body of standing water formed from a single loop that was cut off from a meandering **stream** or **river**, typically by a **flood** that allowed the **stream** to flow through its **floodplain** and bypass the loop.... A portion of a **stream** channel that is cut

off from the rest of the **stream** by **erosion**... When a **meander** of a **river** is stranded to form a lake.... A portion of a stream channel that is cut off from the rest of the stream by **erosion**.

oxygen demand - The need for **molecular** oxygen to meet the needs of biological and chemical processes in water. Even though very little oxygen will dissolve in water, it is extremely important in biological and chemical processes.

oxygen depletion - A phenomenon that occurs in aquatic environments as dissolved oxygen becomes reduced in concentration to a point where it becomes detrimental to aquatic organisms living in the system. (See: **anoxic waters, hypoxia**)

oxyphilous - Referring to a **habitat** which is controlled by excessive **acidity** of the substratum.

ozone - A highly reactive form of oxygen consisting of three atoms, O₃. Ozone is formed naturally when oxygen is present in an electric discharge, as occurs in a lightning storm. Due to its high reactivity, ozone is also used in many industrial processes as an oxidizing agent in bleaching, cleaning and related processes. In the **troposphere**, ozone reacts with other **pollutants** to produce smog and free radicals that damage the health of humans and other **organisms**. In the **stratosphere**, an **ozone layer** shields the Earth's surface from **ultraviolet radiation (UV)** which would otherwise damage **DNA** in living things. An almost colorless, gaseous form of oxygen with an odor similar to weak chlorine. A relatively unstable compound of three atoms of oxygen, ozone constitutes--on the average - less than one part per million (ppm) of the gases in the **atmosphere** (peak ozone concentration in the **stratosphere** can get as high as 10 ppm). Yet ozone in the **stratosphere** absorbs nearly all of the biologically damaging solar **ultraviolet radiation** before it reaches the Earth's surface where it can cause skin cancer, cataracts, and immune deficiencies, and can harm crops and aquatic ecosystems.

Ozone is produced naturally in the middle and upper **stratosphere** through dissociation of molecular oxygen by sunlight. In the absence of chemical species produced by human activity, a number of competing chemical reactions among naturally occurring species--primarily atomic oxygen, molecular oxygen, and oxides of hydrogen and nitrogen--maintains the proper ozone balance. In the present-day **stratosphere**, this natural balance has been altered, particularly by the introduction of man-made **chlorofluorocarbons**. If the ozone decreases, the **ultraviolet radiation** at the Earth's surface will increase.

Tropospheric ozone is a by-product of the photochemical (light-induced) processes associated with **air pollution**. Ozone in the **troposphere** can damage plants and humans. (See: **photochemical smog, ozone layer, ozone hole, ozone depletion, ozone layer, greenhouse gases**)

ozone depletion (or **ozone layer** depletion) - Ozone depletion describes two distinct, but related observations: a slow, steady decline of about 4 percent per decade in the total amount of **ozone** in Earth's **stratosphere** since the late 1970s; and a much larger, but seasonal, decrease in **stratospheric ozone** over Earth's polar regions during the same

period. The latter phenomenon is commonly referred to as the **ozone hole**. (See: **ozone, ozone layer, ozone hole, stratosphere**)

ozone hole - In common idiom, describes human-driven stratospheric **ozone layer** depletion. The **stratospheric ozone** serves as a shield to absorb harmful **ultraviolet radiation** in the **stratosphere**, protecting living organisms on the Earth from the effects of excessive amounts of such radiation. Under normal equilibrium conditions, the quantity of ozone in the **stratosphere** is at steady-state levels resulting from balanced production and destruction. However, industrial activities have emitted a variety of **atmospheric pollutants**, especially **chlorofluorocarbons (CFCs)**, that have significantly accelerated the destruction of **stratospheric ozone** in **polar** regions with the consequent thinning of this protective shield. The most prominent instance of **ozone layer** destruction is the so-called Antarctic Ozone Hole, which refers to the region of the Antarctic **stratosphere** where **ozone** is depleted by 50 to 75% in winter and early spring. Increasing ground-level **ultraviolet radiation** seriously reduces **photosynthetic** production and causes other ill effects on organisms.... A large area of intense stratospheric ozone depletion over the Antarctic continent that typically occurs annually between late August and early October, and generally ends in mid-November. This severe ozone thinning has increased conspicuously since the late seventies and early eighties. This phenomenon is the result of chemical mechanisms initiated by man-made **chlorofluorocarbons** (see CFCs). Continued buildup of CFCs is expected to lead to additional ozone loss worldwide.

The thinning is focused in the Antarctic because of particular meteorological conditions there. During Austral spring (September and October in the Southern Hemisphere) a belt of stratospheric winds encircles Antarctica essentially isolating the cold **stratospheric** air there from the warmer air of the middle latitudes. The frigid air permits the formation of ice clouds that facilitate chemical interactions among nitrogen, hydrogen, and chlorine (elevated from CFCs) atoms, the end product of which is the destruction of ozone. (See: **ozone, ozone layer, ozone depletion, stratosphere**)

ozone layer - A very thin layer of **ozone** in the **stratosphere** that acts to shield the Earth from **ultraviolet radiation** (UV) which would otherwise damage **DNA** in living things. ... The layer of **ozone** that begins approximately 15 km above Earth and thins to an almost negligible amount at about 50 km, shields the Earth from harmful **ultraviolet radiation** from the sun. The highest natural concentration of **ozone** (approximately 10 parts per million by volume) occurs in the **stratosphere** at approximately 25 km above Earth. The **stratospheric ozone** concentration changes throughout the year as **stratospheric** circulation changes with the seasons. Natural events such as **volcanoes** and solar flares can produce changes in **ozone** concentration, but man-made changes are of the greatest concern. (See: **ozone, ozone hole, ozone depletion, stratosphere**)

pacal (plural: pacales) - A local name in southeastern Peru for a thicket of *Guadua* bamboo.

pack - A group of animals, such as dogs or wolves, that run and hunt together.

pair bond - The association between two birds or **mammals** who have come together for **reproduction**; can be short-term (lasting only through egg-laying or the rearing of young) or lifelong.

palaentologist - One who studies **palaentology**.

palæontology - See **paleontology**

palaentology - See **paleontology**

paleobiology - A branch of **paleontology** that deals with the origin and growth and structure of fossil animals and plants as living **organisms**... Paleobiology (sometimes spelled palaeobiology) is a growing and comparatively new discipline which combines the methods and findings of the natural science biology with the methods and findings of the earth science **paleontology**.

paleobiologist - One who studies **paleobiology**.

paleoclimate - **Climate** as it existed in the distant past, particularly before historical records.

paleoclimatology - The study of past **climates**, throughout **geological** history, and the causes of the variations among...The study of climate prior to the use of measuring instruments, including histories and geologic time.

paleoecology - The science of reconstructing past **ecological** conditions using fossils, isotopes, chemical signatures. and other indicators.

paleogeography - The study of ancient or prehistoric **geography**.

paleontological - Of or relating to paleontology

paleontology (British: palaentology) - The study of fossils.... Paleontology, palaeontology or palæontology is the study of prehistoric life forms on Earth through the examination of plant and animal fossils.

palisade cell - In **botany**, a **photosynthetic cell** directly beneath the upper **leaf epidermis**.

palmate - Shaped like an open palm or like a hand with the fingers extended, as a leaf or an antler... In **botany**, having three or more veins, leaflets, or lobes radiating from one point; digitate: *a palmate leaf. (e.g. Cecropia)*... In **zoology**, having webbed toes, as the feet of many water birds....Describes a bird's foot which is webbed between the three forward toes, characteristic of the majority of swimming birds. (See: **webbing**)

palmate venation - In **botany**, a **vein** pattern in which the major **veins** radiate from one point.

palmately compound leaf - A **leaf** in which the **leaflets** radiate from one point.

paludification - Literally, "swamping." Process of **mire** (**peat-forming ecosystem**) formation over previously forested land or **grassland** due to climatic or autogenic processes leading to waterlogging and **anaeroby**...Conversion of previously dry land to **swamp**. Compare **terrestrialization**.

palustrine - Of, pertaining to, or living in, a **marsh** or **swamp**; marshy.... Vegetated **wetlands** dominated by **trees**, **shrubs**, and persistent **emergents**. It typically includes areas traditionally called **marsh**, **swamp**, **bog**, **fen**, **prairie**, and also includes small shallow, permanent or intermittent water bodies called ponds less than 6.6 feet deep. These **wetlands**, except for ponds, are situated shoreward of lakes, **river** channels, and large **river** embayments.

palustrine system - The Palustrine System includes all non-tidal **wetlands** dominated by trees, **shrubs**, emergents, mosses or **lichens**, and all such **wetlands** that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. The Palustrine System was developed to group the vegetated **wetlands** traditionally called by such names as **marsh**, **swamp**, **bog**, **fen**, and **prairie**, which are found throughout the United States. It also includes the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine **wetlands** may be situated shoreward of lakes, **river** channels, or **estuaries**; on river **floodplains**; in isolated catchments; or on slopes. They may also occur as islands in lakes or **rivers**.

Pampas - Temperate **grasslands** in the central and southern parts of South America. (See: **grassland**, **savanna**, **pampas**, **cerrado**, **Pantanal**, **Llanos**, **prairie**, **steppe**, **veldt**, **meadow**, **campos**, **paramo**, **puna**, **savanna woodland**)

pampas - **Grasslands** across northern Bolivia and extending into extreme southeastern Peru. (See: **grassland**, **savanna**, **Pampas**, **cerrado**, **Pantanal**, **Llanos**, **prairie**, **steppe**, **veldt**, **meadow**, **campos**, **paramo**, **puna**, **savanna woodland**)

Pangaea - The supercontinent that broke apart 200 million years ago to form all present-day continents....The name proposed by German meteorologist Alfred Wegener for a supercontinent that existed at the end of the Paleozoic Era and consisted of all the Earth's landmasses. ... About 200 million years ago all major continents were locked together in a supercontinent named Pangea (meaning "all Earth"). Pangea began to break up about 190 million years ago. First, the northern group of continents (Laurasia) split apart from the southern group (Gondwana). Laurasia formed North America and Eurasia while Gondwana broke into three parts; Africa-South America, Australia-Antarctica and India. India drifted northwards and collided with Asia which collision initiated the uplift of the Himalayas. Subsequently, South America and Africa separated and Antarctica separated from Australia. From the outset, continental drift has been closely interwoven with that of

evolution. Australia, which has been separated the longest from other continents (about 65 million years) has the most distinct **biota**, including its indigenous people. Interestingly, the first evidence of life on Earth comes from the north-west of Western Australia, where microbe-size fossils, some of which may have produced oxygen, have been dated at 3.465 billion years before present. South America has the next most distinct **biota**, having been isolated from other continents for nearly 60 million years. North America and Eurasia, which were joined together for much of Earth's history, have very similar **biotas**. ... Earth's single landmass, or supercontinent, that is thought to have existed about 200 million years ago. (See: **Gondwana**)

panicle - In **botany**, a highly branched **inflorescence**.

panne - A **wetland** consisting of a small depression, with or without standing water, often in a **salt marsh** or other coastal **wetland**. (See: **salt panne**)

Pantanal - An extensive area of seasonal **grassland** and **marshland** in southwestern Brazil and extreme eastern Bolivia. The largest contiguous **wetland** in South America, the Western Hemisphere, and the world. The area is a stronghold for endangered species such as Giant Otter, Marsh Deer and Hyacinth Macaw. (See: **grassland, savanna, Pampas, pampas, cerrado, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

pantropical - Refers to a distribution area that extends through the **tropics** (that is generally between 23° 30' S and 23° 30' N **latitude**).

parallel venation - A **vein** pattern in which the **veins** are arranged parallel to each other. Monocots (Lily family, Orchid family, Grass family, etc.) exhibit parallel venation.

parallel-veined - Leaves in which the veins run parallel to each other. This condition is characteristic of the Monocotyledoneae (Poaceae, Orchidaceae, Lilaceae).

paramo - A humid, high-elevation **shrubby grasslands** found in the northern Andes, from northern Peru northward....Paramo often consists of a mosaic of **grasslands** with scattered **shrubs** and small patches of **trees**. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

parapatric - Pertaining to the ranges of species that are contiguous but not overlapping....Populations that have contiguous but non-overlapping geographic distributions.... Referring to **organisms** with adjoining but not overlapping **ranges**....When the **ranges** of two **populations** (or **species**) meet but do not extensively overlap.... Term used when the **geographical ranges** of two **taxa** meet, and overlap only slightly. (See: **parapatry, parapatric speciation, allopatry, allopatric, allopatric speciation, geographic isolation, sympatry, sympatric**)

parapatric speciation - A type of **speciation** where the **ranges** of two **species** abut but

do not overlap. The two **species** often have contact at the common boundary of their zones, and **speciation** occurs in partial, but not complete, isolation.... A form of **speciation** that occurs due to variations in mating frequency of a **population** within a continuous **geographical** area. In this model, the parent species lives in a continuous **habitat**, in contrast with **allopatric speciation** where subpopulations become **geographically** isolated. **Niches** in this **habitat** can differ along an **environmental gradient**, hampering **gene flow**, and thus creating a **cline**. (See: **parapatry, parapatric, allopatry, allopatric, allopatric speciation, geographic isolation, sympatry, sympatric, ring species**)

parapatry - Condition where the ranges of two species abut but do not overlap. The two species often have contact at the common boundary of their zones, and speciation occurs in partial, but not complete, isolation. Contrast with **allopatry**. In **allopatry** there is a hiatus between the **ranges** whereas in parapatry the **ranges** abut. (See: **parapatric, parapatric speciation, allopatry, allopatric, allopatric speciation, geographic isolation, sympatry, sympatric**)

paraphyletic - A group of **organisms** is said to be **paraphyletic** if the group contains its most recent common ancestor, but does not contain all the descendants of that ancestor.

parasite - An **organism** that lives on or in another **organism** (called the **host**) from which it derives its nourishment....An **organism** that derives its **nutrients** from living **organisms**. **Parasites** include both plants and animals. The plant **parasites** can be classified as **hemiparasites** or **holoparasites**.... An **organism** that lives on or within a **host** (another **organism**); it obtains **nutrients** from the **host** without benefiting or killing (although it may damage) the **host**; a type of **symbiotic** relationship in which one **organism** benefits and the other does not...An **organism** that lives on or in an **organism** of another **species** and derives **nutrients** from it.... An **organism** (plant or animal) that lives in or on another living **organism** of a different kind (**host**) and derives subsistence from it without returning any benefit. (adjective is **parasitic**; noun is **parasitism**)...In **botany**, A plant without **chlorophyll** that obtains its **nutrients** by tapping into the branches, **stems** or roots of living green plants.... A plant, **fungus**, or **microbe** that actively extracts **nutrients** or water from live **host** plant **tissues**, typically by means of intrusive **organs** or by living internally. Of course, animals may be both parasitized and parasites.... An **organism** that lives at the expense of another; a tapeworm is a parasite because it takes nourishment from the digestive tract of other **organisms**.... A plant or animal obtaining food from another living **organism**, frequently to the latter's detriment....An organism that lives with, in, or on another **organism** (**host**) to its own advantage and to the disadvantage of the **host**.

parasite load - The amount or quantity of **parasites** possessed by an individual that may affect the individual's capacity for survival.

parasitic - Referring to a **parasitism**. (See: **parasite, parasitism**)

parasitism - A type of **symbiosis** in which a **parasite** obtains its energy requirements (food) from the **host**. This could be considered a type of **predator/prey** relationship. **Parasites** may live within their **host** (**endoparasites**) or on the body of their **host** (**ectoparasites**). Typically, an efficient **parasite** does not kill its **host**, but in some cases this does occur. Many kinds of worms and **fungi** are **parasitic**, living in (worms) or on (**fungi**) their **host**. For example, ringworms (a **fungi**) are **parasitic** on human skin and hookworms are internal **parasites** that attach themselves to the intestine and obtain food in the form of blood and **tissue** liquids....The mode of life of a **parasite**, *i.e.* as between it and its **host**. (See: **symbiosis, commensalism, mutualism, amensalism**)

parasitize - To engage in **parasitism**.

parasitized - To be harmed in some fashion by another **organism** acting as a **parasite**; for example, nests of some songbirds may be parasitized by cowbirds who lay eggs in the nest and leave them for the songbird to raise, often displacing the eggs of the songbird.

paratype - Each specimen of a **type series** other than the **holotype**. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

parenchyma - A thin-walled, undifferentiated **cell**.

parent rock - The rock from which soil is formed.

parotid gland - One of a pair of salivary **glands** located near the ear; on toads, the parotid **glands** are often prominent and located behind the eyes.

parthenocarpy - Development of a fruit without **pollination, fertilization, or seed** development....The development of fruit without viable seed. It may be induced artificially, as by some foreign pollen, or with hormones.

parthenogenesis - A form of reproduction in which an **egg** develops in a normal fashion without being fertilized; parthenogenesis is common in some types of plants, **invertebrates** such as some types of aphids, bees, and wasps, as well as **vertebrates** such as some types of fish, lizards, salamanders, and turkeys.

particulates - Very small pieces of solid or liquid matter such as particles of soot, dust, fumes, mists or aerosols. The physical characteristics of particles, and how they combine with other particles, are part of the feedback mechanisms of the atmosphere.

passerine - A member of the bird order Passeriformes or perching birds.

patagium - An expandable skin-like **membrane** that connects the extremities of bats, flying squirrels, and some birds to form a flexible wing-like structure.

patch - A non-linear **habitat** type that differs from the surrounding **vegetation** .

pathogen - An **organism**, chiefly a **microorganism**, including **viruses, bacteria, fungi**, and all forms of animal **parasites** and protozoa, capable of producing an infection or disease in a susceptible **host**.... A disease-producing agent; usually applied to a living **organism**. Generally, any **viruses, bacteria, or fungi** that cause disease.

...**Microorganisms** that can cause disease in other **organisms** or in humans, animals and plants (*e.g.*, **bacteria, viruses, or parasites**) found in sewage, in runoff from farms or rural areas populated with domestic and wild animals, and in water used for swimming. Fish and shellfish contaminated by **pathogens**, or the contaminated water itself, can cause serious illness.... A living **organism** capable of causing disease in a particular **species** or range of **species**....An infectious, disease-causing agent that interrupts the physiology of **organisms** in which they grow and reproduce; some types of **bacteria, viruses, fungi, and parasites** are examples of pathogens....Any disease-producing **organism**.

pathogenic - Of or referring to a **pathogen**.

patagium - A thin membrane extending between the body and a limb to form a wing or wing-like extension, as in bats and flying squirrels....An expandable membranous fold of skin between the wing and body of a bird.

PCBs - See **polychlorinated biphenyls**.

peak flow - The maximum instantaneous discharge of a **stream** or **river** at a given location.

peak oil - The point at which half of global oil reserves have been used, at which point scarcity will gradually increase and prices rise. When this will happen is not known. In 1956 geologist M. King Hubbert came up with the principle of peak oil, and predicted, accurately, that the United States would hit peak oil in the 1970s.

peat - A compacted deposit of partially decomposed **organic** debris, usually saturated with water, and often **acidic**....A deposit of dead plant material....Partially decomposed plant remains including both **bog** and **swamp peat** (formed under waterlogged conditions) and **heath peat, mor**, or raw **humus** (formed under well-drained conditions)....Layer consisting largely of **organic** residues originating under more or less water-saturated conditions through the incomplete **decomposition** of plant and animal constituents, and being due to **anaerobic** conditions, low temperatures and other complex causes. ...Unconsolidated soil material, largely undecomposed **organic** matter, that has accumulated under conditions of excess moisture.... Peat becomes coal when it undergoes several changes as a result of bacterial decay, compaction, heat, and time.

peatland - A generic term including all types of **peat**-covered terrain. Many peatlands are a complex of **bogs** and **fens**, sometimes called a "**mire-complex**". A loose synonym of **muskeg** and **organic** terrain.

pebble - A piece of rock that measures between 1.6-6.4 centimeters (0.629 and 2.52

inches) in diameter; a pebble is larger than **gravel** and smaller than a **cobble** and typically is worn smooth from **erosion**.

pectin - In **botany**, a substance in **cell walls** binding **cells** together.

pedicel - The stalk of an individual **flower** in an **inflorescence**....The stalk of a **flower** or berry.

pedipalp - An appendage on the **cephalothorax** of **arachnids**, used to touch, taste, smell, and hold prey. Male spiders use these to deposit **sperm**.

peduncle - In botany, the portion of a rachis (cluster stem) from the point of attachment to the shoot to the first lateral branch of the cluster.

peel - noun - The skin or rind of certain fruits and vegetables. verb - To strip or cut away the skin, rind, or bark from...To strip away; pull off.

pelage - Hair, wool, or fur covering a **mammal's** body.

pelagic - Having to do with or living in the open seas or oceans; not associated with the seabed or coastal areas.

pellet - In birds, a regurgitated capsule containing undigested particles such as bones, feathers, and fur. Birds of prey and herons, as well as other species, commonly regurgitate pellets.

peneplain - A flat, featureless **landscape** formed by a long history of **erosion**.... A nearly flat erosional surface, usually near sea level, presumably produced by the long-continued processes of **mass-wasting**, sheetwash, and **stream erosion**.... A nearly flat surface that lies at an elevation close to sea level; thought to be the product of long-term **erosion**.... A formerly mountainous or hilly area reduced nearly to a plain by prolonged **erosion**... A region reduced almost to a plain by the long-continued normal **erosion** of a land surface. It should be distinguished from a plain produced by the attack of waves along a coast or the built-up **floodplain** of a **river**.

perch angle - The angle at which a bird perches on a branch. For example, the perch angle of a Tropical Kingbird, *Tyrannus melancholicus* is often close to 90°, whereas the perch angle of a Drab Water-Tyrant, *Ochthornis littoralis* is closer to 25°.

perched aquifer - Localized zone of saturation above the main water table created by an underlying layer of impermeable material.

percolation - The downward movement of water within a soil, especially the downward flow of water in saturated or nearly saturated soil. **Infiltration** connotes entrance and exit of a substance through a soil.... The movement of water through the openings in rock or soil. ...The entrance of a portion of the streamflow into the channel materials to

contribute to groundwater replenishment.

perennial - In **botany**, a plant that lasts for more than two growing seasons, either dying back after each season, as some **herbaceous** plants do, or growing continuously as some **shrubs** and **trees** do.... A plant that lives more than two years.... Plants that form annual above ground **vegetation** and seed structures from underground roots that persist for many years...Having roots or underground **stems** that live more than two years.... A plant living through several growing seasons. (See: **annual**, **biennial**)

perennial stream - **Streams** that flow throughout the year from source to mouth...A **perennial stream** has flowing water year-round during a typical year. The **water table** is located above the **stream** bed for most of the year. **Groundwater** is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for **stream** flow. (See: **intermittent stream**, **ephemeral stream**)

perfluorocarbons (PFCs) - A group of human-made chemical **compounds** composed of carbon and fluorine only: CF₄ and C₂F₆. These chemicals, specifically CF₄ and C₂F₆, (along with **hydrofluorocarbons**) were introduced as alternatives to the **ozone** depleting substances. In addition, they are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the **stratospheric ozone layer**, but they are powerful **greenhouse gases**: CF₄ has a **global warming potential** (GWP) of 6,300 and C₂F₆ has a GWP of 12,500.

perianth - All the **sepals** and **petals** in a **flower**.

pericarp - In **botany**, the fruit wall; derived from the **ovary** wall....The walls of a ripened ovary or fruit, sometimes consisting of three layers, the epicarp, mesocarp, and endocarp.

pericycle - In **botany**, a root **tissue** giving rise to branch roots.

peripheral - Near the margin or outer boundary.

periphyton - A complex mixture of algae, cyanobacteria, heterotrophic microbes, and detritus that is attached to submerged surfaces in most aquatic ecosystems. It serves as an important food source for invertebrates, tadpoles, and some fish.... A broad organismal assemblage composed of attached algae, bacteria, their secretions, associated detritus, and various species of microinvertebrates.... Sessile organisms, such as algae and small crustaceans, that live attached to surfaces projecting from the bottom of a freshwater aquatic environment....Algae attached to substrate like rocks.....Algae growing on surfaces in a stream, lake, or ocean...Organisms that grow on underwater surfaces; periphyton include algae, bacteria, fungi, protozoa, and other organisms...Microscopic underwater plants and animals that are firmly attached to solid surfaces such as rocks, logs, and pilings...An assemblage of organisms attached to and living on submerged solid surfaces in natural environments such as rivers.

periscope (periscoping) - A behavior of Giant Otters in which they crane their head and neck straight up out of the water while remaining stationary. They do this to check out a potential danger when they feel anxious or threatened.

permaculture - The design and maintenance of agriculturally productive **ecosystems** which have the diversity, stability and resilience of natural **ecosystems**. Permaculture is based on the observation of nature rather than its domination, and allows the co-existence of natural systems within the cultivated agricultural system. Instead of the conventional monocultural practice of "mining the land" of its fertility and **ecology** for the purpose of providing a single product, permaculture is a combination of **ecology**, agriculture, forestry, energy, architecture, animal husbandry, traditional wisdom and scientific technology. The term was coined in 1974 and is spreading to become a global grassroots initiative.

permafrost - A layer of soil beneath the earth's surface that remains frozen throughout the year. ...Perennially frozen ground that occurs wherever the temperature remains below 0 °C. for several years.... Perennially frozen ground, or ground in which a temperature below 0° C has existed continuously for two or more years. Permafrost is defined exclusively on the basis of **temperature** and no moisture or ice need be present. The upper surface of permafrost is known as the permafrost table. The layer of ground above the permafrost which freezes and thaws each year is called the active layer...Refers to both the phenomenon of permanently frozen ground and to the frozen material.... Perennially frozen ground that occurs wherever the temperature remains below 0°C for several years.... The permanently frozen soil layer in the **tundra biome**.... Permanently frozen ground; generally refers to a layer at some depth below the soil surface. Any layer above it, which thaws in summer, is termed the active layer.

permanent resident - An animal that lives in the same area year-round. (See: **resident**)

permeability - The readiness with which soil or rock allows water, air, or plant roots to penetrate or pass through. It is measured by the rate at which water can enter and move through soil in a given interval of time under standard conditions....The ability of a material to allow the passage of a liquid, such as water through rocks. Permeable materials, such as gravel and sand, allow water to move quickly through them, whereas impermeable material, such as clay, don't allow water to flow freely.... The capacity to transmit water (porous rock, **sediment**, or soil); the rate at which water moves through rocks or soil.

permeable layer - A layer of porous material (rock, soil, unconsolidated **sediment**); in an **aquifer**, the layer through which water freely passes as it moves through the ground.

persistent pesticides - **Pesticides** composed of compounds that retain their **toxicity** for long periods after application, *e.g.*, DDT and other **chlorinated hydrocarbons**. Such **pesticides** do not deteriorate quickly, work their way up the food chain through various animals, and may accumulate in the fatty tissues of animals, including people, and remain there. (See: **chlorinated hydrocarbons**)

pest - In general, an **organism**, plant or animal, that irritates or causes damage to plants, animals, or materials that humans

pesticide - A general term used to refer to chemicals used to destroy, prevent, or control plant or animal pests. There are several classes of pesticides, defined by the type of **pest** they will influence, *e.g.*, **herbicides**, **insecticides**, **rodenticides**, molluskicides, and **fungicides**. . . . A substance used to prevent, repel, or destroy **pests**; pesticides are classified by the type of pest they target, for instance, **insecticides** target **insects**, **herbicides** target **weeds**, and **rodenticides** target **rodents**, **fungicides** target **fungi**. . . . Any poison or chemical used for control of plant or animal **pests**. Pesticides include **insecticides**, **herbicides**, **fungicides**, nematocides, and **rodenticides**. . . . Any substance or mixture of substances (other than a device) intended for killing, controlling, or managing **insects**, **rodents**, **fungi**, **weeds**, and other forms of plant or animal life that are considered to be **pests**. . . . A general term for **insecticides**, **herbicides** and **fungicides**. **Insecticides** kill or prevent the growth of **insects**. **Herbicides** control or destroy plants. **Fungicides** control or destroy **fungi**. Some pesticides can accumulate in the **food chain** and contaminate the **environment**. (See: **persistent pesticides**, **insecticide**, **herbicide**, **fungicide**, **rodenticide**)

petal - An often flattened, conspicuously colored **flower** part.

petiolate leaf - A **leaf** in which the **blade** is attached to the **stem** by a **petiole**.

petiole - The slender stalk that attaches the **leaf blade** to the plant **stem**. . . . A **leaf** stalk.

petrochemical - A chemical that comes from **petroleum** or **natural gas**.

petroleum - A thick, black substance that forms underground, over millions of years, from decaying sea creatures and plants. Also called **oil**.

pH - A measure of relative **acidity** or **alkalinity**. . . . A measure of the relative **acidity** or **alkalinity** of water. Water with a pH of 7 is neutral; lower pH levels indicate increasing **acidity**, while pH levels higher than 7 indicate increasingly basic solutions. . . . Parts hydrogen ("pH") is the intensity of the acid condition of a solution. . . . One can measure the pH or acidity of water or soil. . . . It is the hydrogen ion activity expressed in moles per liter. The value is an exponent, 10 to the power of the measurement. A pH of 7.0 indicates that the water sample solution is neutral while readings lower than 7.0 denote increasing **acidity** and higher than 7.0 denote increasing **alkalinity**. . . . A symbol for the degree of acidity or alkalinity of a solution. Expressed as a negative logarithm of the hydrogen ion concentration in a solution, $\text{pH} = -\log_{10}[\text{H}^+]$. If the hydrogen ion concentration of a solution increases, the pH will decrease, and vice versa. The value for pure distilled water is regarded as neutral, pH values from 0 to 7 indicate acidity, and from 7 to 14 indicate alkalinity.

phenolics - Plants construct complex phenolic **compounds**, many called flavonoids, which may function to protect them from **insects**, diseases, and **environmental stress**. They include the flavonoids, **anthocyanins** and **tannins**... Plant **compounds** (structurally characterized by an alcohol group on an aromatic ring) that impart a variety of functions to plants, including defense mechanisms and interactions with other **organisms**. Phenolics can also determine plant properties such as flavor and palatability.... The structural 'backbone' for most of the antioxidants found in plants. These are molecules composed of at least two six-carbon rings (benzene rings) connected by a chain of three carbons. Various chemically active functional groups (oxygen, sulfur, nitrogen, alcohols, etc.) are attached to the carbons located along the chain or rings. The phenols are a varied group of plant constituents that range from sugar-containing phenolic glycosides (such as Cyanidin-3-O-Glucoside) to salicylic acid. (See: **secondary compounds**)

phenological - Of the relation of developmental stages of plants to seasonal changes. (See: **phenology**)

phenology - The scientific study of periodic **biological** phenomena, such as flowering, breeding, and **migration**, in relation to climatic conditions.... The relationship between a periodic **biological** phenomenon and climatic conditions.... The study of the periodic occurrence of animal and plant phenomena and their relations to the weather and climate, *e.g.*, the time of flowering in plants. (See: **phonological**)

phenotype - The physical appearance of an **organism**.... The observable physical or biochemical characteristics of an **organism**, as determined by both **genetic** makeup and **environmental** influences.... The totality of characteristics of an individual: the expression of the **genotype**. The characteristics of individuals that result from the interaction of their **genotypes** and their **environments**. The external appearance of an **organism**, controlled by **genes** and **environment**. ... The **organism** as observed; the product of the interaction of the **genes** of an **organism** (**genotype**) with the **environment**. (See: **genotype**)

phenotypic - Of or referring to **phenotype**.

phenotypical - Of or referring to **phenotype**.

phenotypically - Of or referring to **phenotype**.

pheromone - A chemical secreted by an individual that attracts, informs, or otherwise influences others of the same **species**.... Any chemical produced by a living **organism** that transmits a message to other members of the same **species**. There are alarm pheromones, food trail pheromones, sex pheromones, and many others. Their use among **insects** has been particularly well documented, although many **vertebrates** and plants also communicate using pheromones.... A substance produced by some types of animals as a form of communication to stimulate a response from other members of that **species**.

philopatry - Faithfulness to a region or an area.

phloem - The food-conducting **tissue** of **vascular plants**. ... In **vascular plants**, phloem is one of the two types of transport tissue in plants, **xylem** being the other one. Phloem is the living tissue that carries **organic nutrients**, particularly sucrose, to all parts of the plant where needed. In trees, the phloem is underneath and difficult to distinguish from bark, hence the name, derived from the Greek word for "bark".

Unlike **xylem** (which is composed primarily of dead **cells**), the phloem is composed of still-living **cells** that transport sap. The sap is a water-based solution, but rich in sugars made by the **photosynthetic** areas. These sugars are transported to non-**photosynthetic** parts of the plant, such as the roots, or into storage structures, such as tubers or bulbs. A layer of plant **tissue** just inside the bark that transports food (dissolved **nutrients**) from the leaves to the **stem** and roots. ... **Nutrient**-conducting tissue of **vascular plants**. Tubes within a plant stem that move food from the leaves to other parts of the plant. (See: **xylem**).

photic zone - The layer of the ocean that is penetrated by sunlight; extends to a depth of about 200 meters. Area of oceans (or lakes) near the surface with enough light to support **photosynthesis**. ... The area of the ocean where there is enough sunlight for plants to survive. The upper portion of the water column admitting sufficient light for **photosynthesis**. (See: **euphotic zone**)

photobiont - The **algal** partner in a **lichen**, sometimes called the **phycobiont**. (See: **lichen**, **mycobiont**)

photochemical smog - A type of smog that forms in large cities when chemical reactions take place in the presence of sunlight, its principal component is **ozone**. **Ozone** and other oxidants are not emitted into the air directly but form from reactions involving nitrogen oxides and hydrocarbons. Because of its smog-making ability, ozone in the lower **atmosphere** (**troposphere**) is often referred to as 'bad' ozone. (See: **tropospheric ozone**)

photodissociation - A chemical reaction involving sunlight in which molecules are split into their constituent atoms. Also known as **photolysis**.

photoinduce - To initiate a **physiological** process as a result of being subjected to a particular **photoperiod**.

photolysis - See **photodissociation**.

photoperiod - The length of time that light is present in a given time interval, such as a daily 24-hour time interval. ... The number of hours of light per 24-hour period. The duration of an organism's daily exposure to daylight, with seasonal changes affecting certain organisms in particular ways. ... The length of time an organism is daily exposed to light, especially with regard to how that exposure affects growth and development. ... Day length or duration of daily exposure to light and dark periods, either natural or artificially manipulated. Regular alternation of night and day, the length of which

varies in the course of the year.... Day length. Used to describe the relationship between phenology and episodes of light.... Duration of the daylight period including twilight during a given day; the number of hours between sunrise and sunset.... The relative hours of light and darkness in a 24-hour period. Some plants respond to a change in day length (photoperiod) in order to grow or flower.

photoperiodism - The physiological response of an organism to the periodicity and duration of light and darkness which affects many processes including growth, flowering, and germination.... In **botany**, the initiation of flowering in response to relative lengths of day and night.

photoreceptor - A sensor sensitive to light.

photosynthesis - The process in which light energy is used to form foods from carbon dioxide and water.... The complex biochemical process by which green plants capture a small amount of the sun's light energy and incorporate it, with water and carbon dioxide, into energy-rich sugar **compounds**.... Process by which the light energy of the sun is used to convert **inorganic** material into **organic nutrients** - compare with **chemosynthesis**.... The manufacture by plants of **carbohydrates** and oxygen from carbon dioxide mediated by **chlorophyll** in the presence of sunlight.... Complex process that takes place in **cells** of green plants. Radiant energy from the sun is used to combine carbon dioxide (CO₂) and water (H₂O) to produce oxygen (O) and **carbohydrates** (such as glucose) and other **nutrient molecules**.... The process of plants that contain **chlorophyll** converting solar energy into chemical energy in the form of a **carbohydrate molecule**; this process requires carbon dioxide and water, **glucose** is the **carbohydrate** and oxygen is a by-product. ... Literally "synthesis out of light" - **metabolic** processes carried out by green plants where water and carbon dioxide is synthesized to form oxygen and **organic compounds** such as ATP and **glucose**. The process is enabled by trapping the energy from sunlight.... The process by which green plants use light to synthesize organic compounds from carbon dioxide and water. In the process oxygen and water are released. Increased levels of carbon dioxide can increase net photosynthesis in some plants. Plants create a very important reservoir for carbon dioxide. (See: **chemosynthesis**)

photosynthetic - Of or referring to **photosynthesis**.

photosynthetically - Of or referring to **photosynthesis**.

photosynthetically active radiation - Electromagnetic radiation in the part of the spectrum used by plants for **photosynthesis**.

phototropism - A botanical term for a **sessile organism's** response to light (also known as **heliotropism**. In the case of **heliotropism**, specifically the light from the sun). This is one of the many plant **tropisms** or movements in response to external stimuli. Growth toward a light source is a positive phototropism, while the reverse is called negative phototropism (if growth or orientation is toward darkness, as with some members of the

Araceae when they first germinate). Leaves and other parts of the plant that require light for **photosynthesis** exhibit positive phototropism, while roots usually exhibit negative phototropism, although **gravitropism** (growth in response to gravity) may play a larger role in their behavior and growth.... Curvature of a plant **organ** in response to light. (See **heliotropism, heliotaxis**)

phreatophyte - A deep-rooted plant that obtains a significant portion of the water that it needs from the phreatic zone (zone of saturation) or the capillary fringe above the phreatic zone. These species are found in **riparian ecosystems** and areas characterized by shallow **groundwater**, such as bottomlands. They are also present in water limited **environments**; for example, oaks in Mediterranean climate regions.... Water tolerant plants frequently associated with wetlands, *i.e.* cottonwood trees, willows and cattails.....Any plant, typically living in deserts, that obtains its water from long taproots that reach the water table.... Phreatophytes are plants that have adapted to arid **environments** by growing extremely long roots, allowing them to acquire moisture at or near the water table.....A desert **shrub** with a long **tap root** that enables the plant to avoid reliance on rainwater by tapping into **groundwater**.

phycobiont - The **algal** partner in a **lichen** ("phyco" means algae), sometimes called the **photobiont**. (See: **lichen, mycobiont**)

phyletic - Of or pertaining to a **phylum** or to an **evolutionary** line of descent.

phyletic gradualism - The belief that **evolution** (and especially **speciation**) occurs over considerable time through a slow accumulation of new **alleles** and changing **allele** frequencies.

phylogenetic - Referring to **phylogeny**.

Phylogenetic Species Concept - See **species**.

phylogeny - The **evolutionary** history of an **organism** or a **taxonomic** group, *e.g.* a **species**.. The **evolutionary** history of a **species** or **subspecies**.... The **evolutionary** history of a **taxon**. The graphic representation of a phylogeny is called a **phylogenetic tree**.

phylum (plural: **phyla**) - A category of **taxonomic classification** below **kingdom** and above **class**. (See: **division, taxon, taxonomy, classification**)

physical climate system - The system of processes that regulate **climate**, including **atmospheric** and ocean circulation, **evaporation**, and **precipitation**.

physical weathering - The process that breaks a rock apart into smaller and smaller pieces that retain the characteristics of the original rock and also known as **mechanical weathering**.

physiognomy - The structure and life form of a plant **community**.... The form and structure of natural **communities**.... Structure of the dominant plants in an **environment**...The study of character analysis through physical features.

physiognomic - Of or relating to **physiognomy**.

physiographic - Of or referring to **physiography**.

physiography- **Geography** that deals with the exterior physical features and changes of the Earth... The physical features of the land, in particular its slope and elevation.

physiological - Of or pertaining to **physiology**....Consistent with the normal functioning of an **organism**.

physiology - The branch of biology dealing with the functions and activities of living **organisms** and their parts, including all physical and chemical processes.....the **organic** processes or functions in an **organism** or in any of its parts.

phytoalexin - A chemical produced by a plant to inhibit the growth of **pathogens**.... A substance that inhibits the growth of certain microorganisms and that is produced in higher plants in response to a number of chemical, physical, and biological stimuli.

phytoestrogen - A naturally occurring **compound** of plants, such as soybeans, or plant products, such as whole grain cereals, that acts like the **hormone** estrogen in the body.

phytomass - The mass of plants, including both live and dead, and above-ground and below-ground unless otherwise specified, usually measured per unit area. (See: **biomass**)

phytophage - Also known as an **herbivore**.

phytoplankton - Suspended or floating plant **organisms**, such as **diatoms** and blue-green **algae**, which drift passively with water currents.... **Microscopic** drifting **organisms** in **aquatic ecosystems**, such as the ocean, that are capable of **photosynthesis**.... **Microscopic marine organisms** (mostly **algae** and **diatoms**) which are responsible for most of the **photosynthetic** activity in the oceans..... **Microscopic organisms** that, like plants, use the Sun's energy to make food through **photosynthesis**.

phytoprotective - Serving to protect a plant from **herbivores**. A phytoprotective chemical is a **compound** such as **anthocyanin** that discourages **herbivores**.

phytoprotective agent - Something that protects a plant from **herbivores**.

phytotelm - A small body of water found on a plant. Examples include the contents of a pitcher plant or the small pool within a tree hole. Although often transitory, phytotelms may contain abundant life and represent well-demarcated animal communities that are very amenable to ecological study.

phytotoxic - Harmful to plants...Detrimental to plant growth; caused by the presence of a contaminant. (See: **phytotoxin**)

phytotoxin - Substance causing growth reduction or death in plants.... A toxin affecting plants....A plant product having **toxic** effects on **herbivores** and other **invasive organisms**.

piedmont - An area of shallow, rolling hills formed or lying at the foot of a mountain or mountain range....Foothills, the area between a mountain and a valley. ...Lying or formed at the base of a mountain range. ...Lying or formed at the base of mountains; in the United States, an area in the southern states at the base of the Blue Ridge Mountains...In the United States the piedmont is the plateau between the coastal plain and the Appalachian Mountains: parts of Virginia and North and South Carolina and Georgia and Alabama...The piedmont is a plateau region located in the eastern United States between the Atlantic Coastal Plain and the main Appalachian Mountains, stretching from New Jersey in the north to central Alabama in the south. The Piedmont province is a physiographic province of the larger Appalachian division. The province consists of the Piedmont Upland and Piedmont Lowlands sections.

pigmentation - Coloration of living **tissue**, such as skin and hair, due to the presence of **pigments**.

pilose - Having long, soft hairs.

pincer - A grasping claw, as in the pincers of a crayfish or crab.

pinnate - Having leaflets arranged along each side of a leaf **stem**, or veins along each side of the midrib of a leaf, similar to the vanes of a feather.

pinnate leaf - A feathery, **compound leaf** with leaflets branching off a main midrib.

pinnately compound - A **leaf** whose leaflets are arranged along each side of a **stem**, similar to the vanes of a feather; the leaf of an ash, hickory, or walnut tree is an example.

pinnately compound leaf - A **leaf** in which the **leaflets** are arranged on both sides of a common axis.

pinnate venation - A **vein** pattern in which the major **veins** are arranged in rows on each side of the midrib.

pioneer plant - A plant **species** that appears early in the cycle of **vegetation succession**. These pioneer plants have characteristics that particularly suit their role in the early stages of **succession**, such as a rapid growth rate and the ability to produce large amounts of small, easily dispersed seeds.... A plant capable of invading bare sites (*e.g.* a newly exposed soil surface) and persisting there or "colonizing" them, until supplanted, by

successional **species**.... any new arrival in the early stages of succession. In North America, the blackberry is a pioneer **shrub** in old field habitats, and the willows (*Salix* species) are pioneer trees along stream and river banks. In the Amazon Basin, some of the pioneer plants along river banks are *Tessaria*, willow (*Salix*) and *Cecropia*.

pioneer organisms - See **pioneer species**.

pioneer species - The first species of plant or animal life to begin living in a previously unoccupied site, for example, a moss beginning to grow on otherwise bare rock. ... First living things to colonize new **habitats**, such as a new lava flow, which at the onset contains no life....Pioneers often **invade** in large numbers and over considerable areas. A species that is an early occupant of newly created or disturbed areas. A member of the early stage **communities** in **taxonomic succession**....One of the first **species** to establish itself in a barren **environment**. (See: **pioneer plant**)

piscivore - An animal that habitually feeds on fish.... An animal that feeds primarily on fishes.

piscivorous - Habitually feeding on fish; fish-eating...Feeding on fishes.

pistil - The female part of a **flower**.... The female structure of a flower, composed of the stigma, on which pollen grains germinate, and the style, through which the pollen tube grows to the ovule in the ovary.

pistillate - In botany, having only female organs. May apply to individual flowers or inflorescences, or to plants of a dioecious species in angiosperms. (See: **staminate**)

pit - In **venomous** snakes (**pit vipers**), a heat-sensing organ on the sides of the head used to locate warm-blooded **prey**.... In **botany**, a small opening in a **cell wall**.

pit viper - **Venomous** snakes in the **family** Crotalidae, such as the Bushmaster and Fer-de-Lance.... one of a group of **venomous** snakes having a heat-sensing pit on each side of the head below the eye and used to locate **prey**; copperhead and rattlesnake are examples of pit vipers.

pith - In **botany**, the spongy center of some twigs, **stems**, or roots.... A region of **parenchyma cells** at the center of a **stem**.

plagioclimax - A plant **community** which is maintained by continuous human activity of a specific nature, such as burning or grazing.

plagiotropic - Growth of a branch at an angle.

planktivore - An animal which feeds primarily on **plankton**.

planktivorous - Feeding solely or primarily on **plankton**.

plankton - Tiny **aquatic organisms**, such as small plants and animals, that free-float on the surface of water and float as a mass....Small (usually less than two millimeters long) floating or drifting life forms in water bodies. Plankton includes both plants (**phytoplankton**) and animals (**zooplankton**) that are carried passively in the water currents. Those that can swim do so to change or adjust their depth in the water, not to move from place to place. Plankton is one of the three main divisions of **aquatic** life. The others being "nekton" (the animals that swim actively and may move long distances for feeding or breeding) and the "benthos" (**organisms** which crawl about on the bottom, or burrow into the bottom or grow attached to the bottom).... **plankton** is the collective group of tiny plants and animals that float or drift near the surface of a body of water. **Plankton** is very low on the **aquatic food chain** and therefore a vital element in that **ecosystem**.... **Microorganisms** that live near the surface of the ocean; the two types are **phytoplankton** and **zooplankton**. (See: **holoplankton**)

planktonic - Of or referring to **plankton**, **aquatic organisms** that float; **plankton** is generally composed of **algae** and **protozoans** and is an important base for **aquatic food chains**.

plant growth regulator - See **hormone**.

plant pathologist - One who studies, interprets, and diagnoses diseases and abnormalities of plants.

planetary albedo - The fraction of incident solar radiation that is reflected by a planet and returned to space. The planetary albedo of the Earth-atmosphere system is approximately 30 percent, most of which is due to backscatter from clouds in the atmosphere. (See: **albedo effect**, **cloud albedo**)

planetary boundary layer - The turbulent layer of **atmosphere** occupying the lowest few hundred meters of the **atmosphere**. (See: **atmosphere**, **troposphere**, **tropopause**, **stratosphere**, **stratopause**, **mesosphere**, **mesopause**, **thermosphere**, **ionosphere**, **exosphere**)

plantigrade - Walking flat on the sole of the foot; humans and bears are examples of plantigrades.

plasmodesmata - Fine strands of **cytoplasm** that pass through **cell walls**, connecting adjacent **cells**.

plasmolysis - Shrinkage of **cytoplasm** away from the **cell wall** as a result of excess water loss.

plastron - The bottom part of a turtle or tortoise shell... The lower hard shell-like structure which protects the abdomen of a turtle or tortoise.... The breastplate or "belly" of a turtle.... The lower part of a tortoise or turtle shell.... The lower portion of a shell,

such as a turtle shell.

plate tectonics - Concept that the Earth's crust is composed of rigid plates that move over a less rigid interior.... The theory that Earth's surface is made up of separate, rigid plates (**tectonic plates**) that move slowly across the **mantle**.

playa - A type of **marsh** found on the high plain of northern Texas and eastern New Mexico that is characterized by small, seasonally flooded basins with clay or fine sandy loam **hydric** soils and **emergent hydrophytic vegetation**.

Pleistocene Epoch - The Pleistocene Epoch (pronounced like "plys-tow-seen") is part of the geologic timescale. The name of the Pleistocene is derived from the Greek *pleistos* (most) and *geno* (new). The Pleistocene follows the Pliocene Epoch and is followed by the **Holocene** Epoch. The Pleistocene is the third epoch of the Neogene or Quaternary Period or 6th epoch of the Cenozoic Era. It lasted from 1.81 million to 11,550 years before the present. In Europe and North America, there is evidence of four or five periods of intense cold during this period, when large areas of the land surface were covered by ice - glacial periods. During the interglacial periods, the climate ameliorated and the glaciers retreated. (See: **ice ages**, **refugia**)

Pleistocene glaciations - The four or five periods of intense cold during the **Pleistocene Epoch** when **glaciers** covered much of North America and Eurasia. (See: **glacier**)

plumage - The collective term for all the feathers that cover a bird's body...The covering of feathers on a bird.... The feathers that cover a bird; often used in reference to the color phases of a bird's life.

plumose - Feather-like.

plumbeous - A shade of gray - lead gray - often used to describe the color of a bird, *e.g.* Plumbeous Antbird, *Myrmeciza hyperythra*.

pluvial - Relating to or characterized by rainfall.... A period marked by increased rainfall... In geology and climatology, a pluvial (Latin *pluvilis*, from *pluvia*, "rain") was an extended period of abundant rainfall lasting many thousands of years. Pluvial is also applied to the sediments of these periods (*e.g.* Lake Bonneville, Lake Lahontan, Lake Manly). The term is especially applied to such periods during the Pleistocene Epoch. A minor, short pluvial may be termed a "subpluvial".

pluvial lake - A landlocked basin (endorheic basin) which fills with rainwater during times of glaciation, when precipitation is higher.

pneumatophore - A specialized root of certain swamp plants, such as the mangrove, that branches upwards and undergoes gaseous exchange with the atmosphere....An air-filled root (submerged or exposed) that can function as a respiratory organ of a marsh or swamp plant..... A gas-filled sac serving as a float in some colonial marine hydrozoans,

poacher - Any person who illegally takes for personal or group benefits a wild animal or wild plant.... The act or acts related to purposefully attempting to take or actually taking a wild animal or plant of improper **species**, sex, time of year, excessive numbers, or area classify any person of any description as a poacher. (See: **poaching**)

poaching - Poaching is unauthorized hunting or capture of animals, for example illegal fishing, hunting outside the appropriate season, or taking wildlife from private property or national parks. Large amounts of illegal African ivory, skins and other animal products have been ceremoniously destroyed in the war against poaching. In some countries, poaching of charismatic and threatened species is crime enough for rangers to have a shoot-first policy for poachers. Regulatory and consumer action must be maintained against products containing animal parts, for example Asian tiger, rhino and seahorse aphrodisiacs. (See: **poacher**)

poikilothermous - Animals having a body temperature that varies with the **environment**
Same as **cold-blooded**.

point source pollution - **Pollutants** discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, and containers of various types. (See: **nonpoint source pollution**)

pointed - Having a sharp or tapered end.

polar - Of or referring to the North and South Poles....Regions with temperatures below 0° C. or 32° F. most of the time, with little or no **precipitation**.

polar stratospheric clouds (PSCs) - High **altitude** clouds that form in the stratosphere above Antarctica during the Southern Hemisphere winter. Their presence seems to initiate the **ozone** loss experienced during the ensuing Southern Hemisphere spring.

polar vortex - A circumpolar wind circulation which isolates the Antarctic continent during the cold Southern Hemisphere winter, heightening **ozone depletion**.

pollen - A structure that develops from a **microspore** in **angiosperms** and **gymnosperms** to become a male **gametophyte**....The fertilizing element of flowering plants.... Tiny grains produced by the male part of a flower that will fertilize the **eggs** in the female part of a flower.... Male reproductive **cells** produced by the anther of a flower; pollen grains often look like fine powder and may be carried by the wind, while other types are carried by birds, **insects**, or water.

pollen tube - An outgrowth from a **pollen** grain conveying the **sperm** to the female **gametophyte**.

pollinate - To transfer **pollen** from the male **reproductive organs** of a plant to the female **organs** of a same plant.

pollination - Pollen transfer from an **anther** to a **stigma** or, in **gymnosperms**, from a male **cone** to a female **cone**....Process of transferring the **pollen** from its place of production to the place where the **egg cell** is produced. This may be accomplished by the use of wind, water, **insects**, birds, bats, or other means. Pollination is usually followed by fertilization, in which **sperm** are released from the **pollen** grain to unite with the **egg cell**....The transfer of **pollen** from one reproductive part of a flower to another for the purpose of fertilization.

pollinator - Animal which carries **pollen** from one seed plant to another, unwittingly aiding the plant in its **reproduction**. Common pollinators include **insects**, especially bees, butterflies, and moths, birds, and bats.... An **organism**, such an **insect** or a bird, that carries **pollen** from one flower to another.

polliwog - A larval frog or toad. Same as a **tadpole**. (See: **tadpole**)

pollutant - A waste material that contaminates air, soil, or water and makes it unfit for use.... Strictly, too much of any substance in the wrong place or at the wrong time is a pollutant. More specifically, **atmospheric pollution** may be defined as the presence of substances in the **atmosphere**, resulting from man-made activities or from natural processes that cause adverse effects to human health, property, and the **environment**.

pollution - Anything that degrades the quality of an **environment**; excessive amounts of noise, light, chemicals, sewage, heat, and trash are examples of pollution.... Any undesirable change in the physical, chemical or **biological** characteristics of air, land and water with a possibility to harm **organisms**/human beings/cultural assets/industrial process/living conditions. ...Introduction by humans, directly or indirectly, of substances or energy into the **environment** (including air, water, soil etc.). Often resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to activities including agriculture, fishing, impairment of quality for use of water and reduction of amenities.... An alteration in the character or quality of the **environment**, or any of its components, that renders it less suited for certain uses. The alteration of the physical, chemical, or **biological** properties of water by the introduction of any substance that renders the water harmful to use.

polyandrous - Refers to an animal practicing **polyandry**.

polyandry - Animal mating system in which a female mates with more than one male during any single breeding season... Polyandry is a social system of reproduction in which one female mates with several males. It is the reverse of **polygyny** and tends to be less common among animals. In the Amazon, the Wattled Jacana, *Jacana jacana* is a bird that has a polyandrous mating system. The female controls a territory within which males build nests. She lays eggs in all the nests, and the males take most of the responsibility for care of the young. (See: **polygamy**, **polygyny**, **monogamy**, **seasonally monogamous**, **promiscuous**)

polycarpy - A reproductive strategy of an organism characterized by multiple reproductive cycles over the course of its lifetime. (See: **monocarpy**, **semelparous**, **iteroparous**)

polychlorinated biphenyls (PCBs) - A group of chlorinated **organic compounds** that are non-corroding and resistant to heat and **biological** degradation; used as insulation in electrical equipment; can accumulate in some species and disrupt reproduction...Synthetic, chemically stable industrial **compounds** used as hydraulic fluids, flame retardants, dielectric fluids for capacitors and transformers. PCBs are in a class collectively known as **hormone disruptors** because they mimic naturally-occurring steroid hormones such as estrogens and testosterone, and interfere with thyroid and adrenal **gland metabolism**. They resist the body's natural detoxification processes, so accumulate in the body's fat deposits and have been documented to be an important factor in rising infertility rates in humans. (See: **biomagnification**)

polyclimax - Theory which permits two or more simultaneously existing, stable, self-maintaining plant **communities** controlled by local **environmental** conditions in a larger climatic region. (See: **climax**, **monoclimax**)

polygamous - Refers to an animal practicing **polygamy**.

polygamy - Animal mating system in which an individual of a **species** mates with more than one other individual during any single breeding season...the opposite of **monogamy**. (Includes both **polyandry** and **polygyny**...See: **polyandry**, **polygyny**, **monogamy**, **seasonally monogamous**, **promiscuous**)

polygynous - Refers to an animal practicing **polygyny**.

polygyny - Animal mating system in which a male mates with more than one female during any single breeding season. ... Polygyny is a social system of reproduction in which a single male mates with several females. The female group is commonly called a harem. Males usually compete for control of the females and retain control only as long as they are able to fend off rival challengers. Polygyny is common among primates and among some groups such as birds, but is generally the exception rather than the rule in the animal **kingdom**. Polygamy is a similar situation except that both sexes mate with more than one mate. In the Amazon, polygyny occurs among birds in caciques and oropendolas, and among mammals some in bats. It has been well-studied in the Sac-winged Bat. (See: **polygamy**, **polyandry**, **monogamy**, **seasonally monogamous**, **promiscuous**)

Polylepis forest - *Polylepis* (**family** Rosaceae) is a **genus** of low **trees** with reddish, rugged, scaly bark. They grow in more or less open groves at high elevations in the Andes of Ecuador, Peru and Bolivia. Typically, they are found well above other **forest**, and so usually are surrounded by **scrub** or **grass**. A small set of bird species is restricted to these unique **woodlands** - e.g. Giant Conebill (*Oreomanes fraseri*), Tawny Tit-Spinetail (*Leptasthenura yanacensis*), White-browed Tit-Spinetail (*Leptasthenura*

xenothorax), White-cheeked Cotinga (*Zaratornis stresemanni*), Ash-breasted Tit-Tyrant (*Anairetes alpinus*).

polymorph - One of several forms of an **organism**.

polymorphic - The occurrence of different forms, stages, or types in individual **organisms** or in **organisms** of the same **species**, independent of sexual variations. The opposite of **monomorphic**. (See: **discrete polymorphism, dimorphism, morph**)

polyna - An area of open sea surrounded by ice.... stretch of open water surrounded by sea ice.

polyploid - Having three or more sets of **chromosomes** per **cell**.

polyphyletic - Of or referring to **polyphyly**. A polyphyletic group is an artificial rather than natural group, because a natural group would derive from a single common ancestor. A polyphyletic group comprises more than one common ancestor. For example, the group of warm-blooded animals is polyphyletic. It includes birds and mammals, which evolved from two separate branches on the evolutionary tree. (See: **polyphyly**)

polyphyly - A **taxonomic** term that refers to a grouping of **organisms** based on common traits or characters that have evolved independently. (See: **polyphyletic**)

polypore - A type of fungus which is usually shelf-like and often grows on the trunks of tree.... Polypores are a group of tough, leathery poroid mushrooms similar to boletes, but typically lacking a distinct stalk. The technical distinction between the two types of mushrooms is that polypores do not have the **spore** bearing tissue continuous along the entire underside of the mushroom.... woody pore **fungi**; any **fungus** of the family Polyporaceae or family Boletaceae having the **spore**-bearing surface within tubes or pores; the fruiting bodies are usually woody at maturity and persistent.

polytypic - A **taxonomic** category (**subspecies, species, species, genus**, etc.) containing two or more representatives. For example, a **polytypic species** contains two or more **subspecies**...A term applied to the **families, genera, and species** of living **organisms**. The opposite of **monotypic**. A polytypic **family** or **genus** contains more than one **species**. A **polytypic species** has two or more **races** or **subspecies**. This **classification** reflects separate groups that are clearly distinct from one another and do not generally **interbreed** (although there may be a relatively narrow **hybridization zone**), but which would **interbreed** freely if given the chance to do so. Although different **species** can sometimes **interbreed** to a limited extent, the converse is not true. Groups incapable of producing fertile offspring with each other are universally considered distinct **species**, and not merely different **races** or **subspecies** of the same **species**. (See: **species, subspecies**)

polytypic species - A variable **species** that has multiple named **subspecies**. (See: **polytypic, monotypic species**)

population - A group of individuals all of which are the same **species**. The structure of any **taxonomic** system consists of **populations**, which are the members of the same **species** that inhabit a particular area.... A group of **interbreeding organisms** occupying a particular space; the number of humans or other living creatures in a designated area. ... Number of individual **organisms** of a single **species** living in a given area....The individuals of a given **species** that occupy the same locality and form the **interbreeding** group in that location. A group of two or more populations that regularly exchange **genes** is known as a **metapopulation**. ... A group of organisms of one species, or type, that live in an area and interact with each other through competition for food, space, and mating right. (See: **speciation, species, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

population density - In **ecology**, the number of individuals of a **population** per unit of living space.... Number of **organisms** per unit of space.... The actual number of individuals of a defined group occurring in a specified unit of space and time....The number of individuals of a **species** per unit of land area occupied by that **species**, for example people per square **kilometer**. The measure should exclude land unsuitable for habitation, such as rugged mountains, **deserts** or other inappropriate **habitats**.

population dominance - The condition in **populations** or in **vegetation** strata in which one or more **species**, by means of their numbers, coverage, or size, have considerable influence or control upon the conditions of existence of associated **species**.

population explosion - In most **species**, the number of individuals in a **population** can increase rapidly, *i.e.* undergo a **population** explosion, at times when there is an excess of food and other factors necessary for successful reproduction.

population genetics - The study of the **allele** frequency distribution and change under the influence of the four **evolutionary** forces: **natural selection, genetic drift, mutation** and **gene flow**. It also takes account of **population** subdivision and **population** structure in space. As such, it attempts to explain such phenomena as **adaptation** and **speciation**.

population impact - The observable or suspected effects of one or more perturbations on a factor (usually **biological**) of a **population** system. There are no value judgments, *e.g.*, positive or negative impacts. An impact is simply an effect or a change of condition.

population dynamics - Description of the change in abundance and structure of plant or animal **species** resulting from births, deaths, migrations, and related rate phenomena.... The totality of changes that take place during the life of a **population**....A study of changes, and the reasons for those changes, in the numbers of individuals in **species**.

pore space - Openings between geologic material found underground. Also referred to as void space or interstices. (See: **porosity**)

porosity - A measure of the water-bearing capacity of subsurface rock. With respect to water movement, it is not just the total magnitude of porosity that is important, but the size of the voids and the extent to which they are interconnected, as the pores in a formation may be open, or interconnected, or closed and isolated. For example, clay may have a very high porosity with respect to potential water content, but it constitutes a poor medium as an **aquifer** because the pores are usually so small.... The ratio of the volume of void or air spaces in a rock or sediment to the total volume of the rock or sediment. The capacity of rock or soil to hold water varies with the material. For example, saturated small grain sand contains less water than coarse gravel. (See: **pore space**)

positive feedback - **Feedback** in which the system responds to perturbation in the same direction as the perturbation... Sometimes referred to as "cumulative causation". (See: **homeostasis, negative feedback, negative feedback loop, feedback, feedback loop, feedback mechanisms, positive feedback loop**)

positive feedback loop - A self-reinforcing system, a process that creates conditions that make that process quicken or intensify and that tends to increase the output of a system....A **feedback loop** that, acting alone, will tend to enhance or augment any small change in any of the quantities in the **feedback loop**. Common expressions referring to a positive feedback loop include: vicious cycle, snowballing, or run-away situation. **Global warming** provides several examples of positive feedback loops. In one of these, higher **temperatures** in the Arctic cause the **permafrost** to begin melting. This melting causes the **decomposition** of **organic** material that has been frozen in the soil. This **decomposition** releases into the **atmosphere** both **methane** and **carbon dioxide**, two **greenhouse gases**. The increase in the **atmosphere** of these **greenhouse gases** causes the **atmospheric temperature** to rise further, which causes increased melting of the **permafrost**, and so on. (See: **feedback, feedback loop, feedback mechanisms, negative feedback, negative feedback loop**)

posterior - Rear; hinder.

potamodromous - An aquatic organism that migrates from lakes into rivers or streams to spawn.

potential evapotranspiration - The amount of **evaporation/transpiration** that will occur if there is no deficiency of water in the soil.

pothole - A bowl-shaped depression in a rock surface that has been carved by the whirling action of stones in a stream bed.... A bowl-shaped depression carved into the floor of a stream by a long-lived whirlpool carrying sand or gravel.... A smooth-sided deep hole in bedrock formed by the abrasion of pebbles and boulders caught in eddies in streams.

powder down - A special kind of modified feathers which sometimes form patches on certain parts of some birds. These down feathers differ from the usual down as they are

exceptionally fine and produce a dust between the frons, the bird takes this dust from its powder down feathers and coats all its external feathers with the dust. This dust mainly provides the bird with some waterproofing for the main **flight feathers** so it can still fly in the rain. It also conditions the feathers.... A specialized type of down found only in a few groups of birds.

prairie - A broad, flat plain usually dominated by tall, native **grasses**....A tree-less, grass-covered plain (**grassland**) in the United States and Canada, especially in the Midwest and West. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

prairie pothole - A **wetland ecosystem** that is characterized by shallow depressions in the Earth's surface which were created by **glaciers**. Prairie potholes are found in the **prairies** of the northern Great Plains region of the United States and Canada.... A type of marsh found on **glacial** till in Minnesota, Iowa, North Dakota, South Dakota, and Montana that is characterized by small seasonally or permanently flooded depressions and **emergent hydrophytic vegetation**.

precautionary principle - An important modern concept for **ecological**, political and corporate management, the precautionary principle effectively states that "Where there are threats of serious or irreversible **environmental** damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent **environmental** degradation". Lack of full scientific knowledge of impacts should not be used as an excuse for development, with the onus of responsibility on the developer. Threats of irreversible **environmental** damage should be considered guilty until proven innocent. The principle of caution involves leaving **ecological** space as room for ignorance. All efforts should be taken to prevent non-sustainable development, **habitat destruction** or **habitat degradation**, release of chemicals into the **environment**, global **climate change**, and loss of **biodiversity**. It is a useful tool to flag ignorance and uncertainty about eventualities such as undesirable **ecological**, social or corporate impacts, and to hold policy until increased scientific understanding of a problem has been achieved. The precautionary principle should be especially considered in **environmental** impact assessment, risk analysis, hazard management, political diplomacy and the scientific development of dangerous knowledge or technology. Many believe that the principle should become an established guideline for all policy-makers.... Where there are threats of serious or irreversible **environmental** damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent **environmental** degradation.

precession - The tendency of the Earth's axis to wobble in space over a period of 23,000 years. The Earth's precession is one of the factors that results in the planet receiving different amounts of solar energy over extended periods of time.

precipitation - Any form of water - rain, snow, sleet, or hail - that falls to Earth...Any form or all forms of liquid or solid water particles that fall from the **atmosphere** and reach the Earth's surface; includes drizzle, rain, snow, snow pellets, ice crystals, ice

pellets and hail....Water that is deposited upon the land from the **atmosphere**, and it can be in the form of rain, snow, hail, sleet, dew, and frost.... Any form of water particles - liquid or solid-that falls from the **atmosphere** and reaches the ground.... The part of the hydrologic cycle when water falls, in a liquid or solid state, from the **atmosphere** to Earth (rain, snow, sleet).... Moisture that falls from clouds. Although clouds appear to float in the sky, they are always falling, their water droplets slowly being pulled down by gravity. Because their water droplets are so small and light, it can take 21 days to fall 1,000 feet and wind currents can easily interrupt their descent. Liquid water falls as rain or drizzle. All raindrops form around particles of salt or dust. (Some of this dust comes from tiny meteorites and even the tails of comets.) Water or ice droplets stick to these particles, then the drops attract more water and continue getting bigger until they are large enough to fall out of the cloud. Drizzle drops are smaller than raindrops. In many clouds, raindrops actually begin as tiny ice crystals that form when part or all of a cloud is below freezing. As the ice crystals fall inside the cloud, they may collide with water droplets that freeze onto them. The ice crystals continue to grow larger, until large enough to fall from the cloud. They pass through warm air, melt, and fall as raindrops. When ice crystals move within a very cold cloud (10 degrees F and -40 degrees F) and enough water droplets freeze onto the ice crystals, snow will fall from the cloud. If the surface temperature is colder than 32 degrees F, the flakes will land as snow.

Precipitation Weights:

one raindrop .000008 lbs

one snowflake .0000003 lbs

one cumulus cloud 10,000,000 lbs

one thunderstorm 10,000,000,000 lbs

one hurricane 10,000,000,000,000 lbs

precocial - Capable of independent living at birth....Precocial birds have their eyes open at hatching, are covered with down, and leave the nest almost immediately after hatching to find food for themselves. The opposite of **altricial**....Capable of a high degree of independent activity from birth. Many ground-nesting birds such as tinamous and wood-quail have precocial young.... Birds hatched with eyes open, covered with down feathers, and capable of moving about on their own. (See: **altricial**, **semi-precocial**)

predaceous - Getting food by seizing and devouring another animal.

predation - The act of preying...One **organism** feeding on another - a natural way in which **population** size is kept in check. A **predator** is typically well adapted to capturing its food, the prey. Predation includes animals feeding on plants or animals feeding on other animals. A **predator** typically will be the **prey** and the **prey** will always be the **predator** of another **organism**. Although natural **population** sizes are usually maintained within an undisturbed **ecosystem** due to **predator/prey** interactions, there are occasions when **predators** may seriously reduce their **prey populations**. This results not only in the reduction of the **prey population**, but eventually a reduction in the **predator population**. Once the predator **population** is reduced to a certain size, the prey **population** may begin to increase. This in turn will be followed by an increase in the **predator population**...The act of hunting and capturing another animal for food.

predator - An animal that hunts or preys on other animals for its food....**Organism** which hunts and eats other **organisms**. This includes both **carnivores**, which eat animals, and **herbivores**, which eat plants.... An **organism** that lives by preying on other **organisms**.... **Organism** that feeds by killing other **organisms**....Generally, an animal that seizes and kills another animal for food.

predatory - Adjective to describe an animal that is a **predator**.

preen - To smooth or clean feathers with the beak or bill, as birds do, or to trim or clean (fur) with the tongue, as mammals do.... In birds, to clean and realign parts of a feather using the beak.

prehensile - Adapted for grasping or holding, especially by wrapping around an object.

prehensile tail - A type of tail found on certain **Neotropical** monkeys, anteaters, kinkajous, opossums, and some snakes that functions as a fingerlike limb. The sensitive and dextrous tail is capable of being curled around a branch, holding the animal securely.

prescribed burn - A planned fire used to dispose of fuels, control unwanted **vegetation**, restore or stimulate growth of desired **vegetation**, change successional stages, maintain fire dependent **population**, reduce **arthropod** disease vector abundance, increase grazing wild faunal or livestock forage, and improve viewscapes in order to meet wildlife, recreation, wilderness, **watershed**, or timber management objectives....Any wildland or rural fire ignited by management actions and burning under certain predetermined conditions to meet specific objectives such as those related to hazardous fuels, forest or range regeneration, or **watershed** or **faunal** space management.... intentional controlled application of fire to wildland fuels in either their natural or modified state, under such conditions of weather, fuel moisture, soil moisture, etc. as to allow the fire to be confined to a predetermined area and to produce the intensity of heat and rate of spread required to further certain planned objectives of **silviculture**, wildlife management, grazing, fire-hazard reduction, etc. It seeks to employ fire so as to realize maximum net benefits with minimum damage and at acceptable cost. The fire may result from either planned or unplanned ignitions.

prescribed fire - See **prescribed burn**.

prevailing westerlies - Winds in the middle latitudes (approximately 30 degrees to 60 degrees) that generally blow from west to east. The subtropical high pressure regions at the horse latitudes (30 degrees) forces surface air poleward, and the rotation of the Earth causes these winds to bear to the right (east) in the Northern Hemisphere and to the left (east) in the Southern Hemisphere (see Coriolis force). This is, to some extent, an idealized picture of the atmospheric circulation. The actual circulation on individual days includes modifications and variations due to the migratory cyclones and anticyclones of middle latitudes, causing rapid and often violent weather changes, as warm semi-tropical air from the horse latitudes meets cold polar air from the high latitudes.

prevailing wind - A wind that consistently blows from one direction more than from any other.... The wind direction most frequently observed during a given period.... Wind and wind direction that is strongest and most frequent.... Wind most frequently occurring at a place.

prey - (noun) An animal that is hunted for food by a **predator**... **Organism** hunted and eaten by a **predator**.... An animal that is hunted by **predators**....(verb) to hunt another animal for food.

prickle - In **botany**, a hard, pointed **epidermal** outgrowth on some **species' stems** and **leaves**.

primaries (singular: **primary**) - In birds, the longest flight feathers in the wings, attached to the manus, or the "hand" part of the wing. The number of primary feathers varies from 9 to 11, and are numbered from the innermost primary to the outermost. (See: **secondaries**)

primary consumer - **Herbivores** feed directly on green plants and are called **primary consumers**. ... A primary **consumer**, as an **herbivore**, obtains its nutrition directly from plants ...A **primary consumer** (also known as an **herbivore**) is an **organism** that eats **autotrophs**, such as plants. (See: **consumer**, **secondary consumer**, **tertiary consumer**, **herbivore**)

primary forest - See **old-growth forest**.

primary growth - In **botany**, growth arising from **cellular** activities in **apical meristems**.

primary phloem - In **botany**, food-conducting **tissue** formed by growth activities originating in **apical meristems**.

primary producer - See **producer**.

primary production - The **photosynthetic** production of **biomass** or, alternately, **chemosynthesis**, the process of using chemicals to form **organic nutrients** from **inorganic** matter.

primary productivity - The rate at which **organic** matter is produced by the photosynthetic and chemosynthetic activity of **autotrophic organisms**, chiefly green plants.... The rate at which new plant **biomass** is formed by **photosynthesis**. Gross primary productivity is the total rate of **photosynthetic** production of **biomass**; net primary productivity is gross primary productivity minus the **respiration** rate. (See: **net primary productivity**, **net secondary productivity**, **secondary productivity**)

primary succession - **Succession** beginning from newly formed soils or upon surfaces exposed for the first time (as by land slides or lava) which have as a consequence never borne **vegetation** or animals.... The sequential process of change from one type of plant **community** to another, often more complex **community** in a place that has never before been occupied by living **organisms**. (See: **ecological succession, secondary succession, community succession**)

primary tissue- In **botany**, a **tissue** formed during **primary growth**.

primary wall - In **botany**, the first layer of **cellulose** laid down during development of a new **cell wall**.

primary xylem - In **botany**, water-conducting **tissue** formed by growth activities originating in **apical meristems**.

primate - Any member of the biological order Primates, the group that contains all the **species** commonly related to the lemurs, monkeys, and apes, with the last category including humans.

prime meridian - The **meridian** or line of **longitude** at which **longitude** is defined to be 0°.... Zero degrees **longitude**.

primeval forest - see **old-growth forest**.

primitive character - In **cladistics**, a character shared among and defining members of a large group or **clade** and believed to have arisen early in the group's **evolution**. (See: **derived character**)

proboscis - In invertebrates, a hollow, straw-like mouthpart; some butterflies and moths have a long proboscis for drinking flower **nectar**.

process - An association of phenomena governed by physical, chemical, or **biological** laws. An example of a process is the vertical mixing of ocean waters in the so-called surface-mixed layer; the state variables for this process include **temperature, salinity** in the water on a vertical scale of tens of meters, and heat flow and wind stress at the sea surface. Other examples include the volcanic deposition of dust and gases into the **atmosphere**, eddy formation in the **atmosphere** and oceans, and **soil** development.

producer or producer organism - Same as a **primary producer, autotroph** or **autotrophic organism** - An **organism** that uses solar (green plants) or chemical energy (some bacteria) to sustain life.... Any **organism** which brings energy into an **ecosystem** from **inorganic** sources. Most plants and many **protists** are producers.... Organism able to produce its own food.... **Organism** able to create food energy from light or chemicals ...Producers can manufacture their own food using sunlight. These **organisms** are the green plants that, through a process of **photosynthesis**, convert light energy to chemical energy (food). The **autotrophic organisms** are the **primary producers** of an **ecosystem**.

Any **organism** that is able to manufacture its own food. Most plants are **autotrophs**, as are many **protists** and bacteria. **Autotrophs** may be photoautotrophic, using light energy to manufacture food, or chemoautotrophic, using chemical energy.... An **organism** generally a plant or an algae, that can produce **organic** food **molecules** using the sun's energy (**photosynthesis**) or certain chemical **compounds** (**chemosynthesis**); producers are usually a source of food for other **organisms**. (See: **autotroph, consumer, heterotrophic organism, consumer**).

production - The process of producing **organic** material....The increase in **biomass**, by individuals, **species** or **species** groupings, over time, such as the total amount of wood or fish tissue elaborated by a **population** of trees or fish within a specified period of time.

productivity or **biotic productivity** - In **ecology**, the total amount of **photosynthesis** that occurs in a given **ecosystem**....The rate at which **biomass** is produced per unit area by any class of **organisms**....Rate of new tissue formation or energy utilization by one or more **organisms**....Capacity or ability of an **environmental** unit to produce **organic** material....The ability of a **population** to recruit new members by **reproduction**.... The rate of production of **organic** matter produced by biological activity in an area or volume (*e.g.*, grams per square meter per day, or other units of weight or energy per area or volume and time).The innate capacity of an **environment** to produce plant and animal life.....The capacity of a soil to produce a certain kind of crops under a defined set of management conditions.....The rate at which energy is stored by **organisms** in the form of **organic** substances which can be used as food materials.....The rate of storage of **organic** matter in tissue by **organisms** including that used by the **organisms** in maintaining themselves.... Growth products and by-products of living **organisms** (*e.g.*, wood, meat, other plant fibers).

progeny - An offspring of an animal or plant.

prokaryote - **Cell** or **organism** lacking **membrane**-bound, structurally discrete **nucleus** and subcellular compartments. **Bacteria** are examples...**Prokaryotic cells** have a nuclear area not bounded by a membrane. **Prokaryotic cells** are the earliest forms of **cellular** life and originated a few hundred million years after the Earth's crust solidified. Prokaryotic cells first appear in the fossil record about 3.5 billion years ago. Contrast with **eukaryote**. (See: **eukaryote**)

prokaryotic - Of or referring to **prokaryotes**.

prokaryotic cell - **Cell** with **genetic** material not contained in a membrane-bound compartment. Compare with **eukaryotic cell**. (See: **prokaryote, eukaryote, eukaryotic cell**)

promiscuous - Not forming pair bonds during the mating season, but rather, having indiscriminate, casual sexual relationships of brief duration. Most often involves the male mating with more than one female.... Both males and females mate with more than one member of the opposite sex. Same as **polygamous**. (See: **polygamy, polygyny**,

polyandry, monogamy)

prop root - A supportive root growing from an above ground **stem**. . . . A root that leaves the trunk or a branch well above ground and helps anchor the tree. Same as **stilt root**.

propagule - Any part of an **organism** capable of independent growth. . . . Any **spore**, seed, fruit or other part of a plant or **microorganism** capable of producing a new plant and used as a means of **dispersal**. . . . In animals, the minimum number of individuals of a species capable of **colonizing** a new area. This may be fertilized eggs, a mated female, a single male and a single female, or a whole group of **organisms** depending upon the biological and behavioral requirements of the species. In plants, a propagule is whatever structure functions to reproduce the species: a seed, **spore**, stem or root cutting, etc.

prostrate - Growing flat along the ground.

protected area - A type of eco-protection of a particular geographically defined area which is designed or regulated and managed to achieve specific **conservation** objectives which covers all kinds of situations. Examples are national, regional and local parks and reserves. There are about 30,000 protected areas worldwide covering 8.83 % of the surface of the earth.

protein - A complex natural substance that has a molecular weight and a globular or fibrous structure composed of **amino acids** linked by peptide bonds. . . . Any of a group of complex **organic macromolecules** that contain carbon, hydrogen, oxygen, nitrogen, and usually sulfur and are composed of one or more chains of **amino acids**. Proteins are fundamental components of all living **cells** and include many substances, such as **enzymes, hormones**, and antibodies, that are necessary for the proper functioning of an **organism**. They are essential in the diet of animals for the growth and repair of tissue Any of a large group of nitrogenous **organic compounds** that are essential constituents of living **cells**; consist of polymers of **amino acids**. . . . A large **molecule** composed of chains of smaller **molecules (amino acids)** in a specific sequence; the sequence is determined by the sequence of nucleotides in the **gene** coding for the protein. Built by two or more **amino acids** linked by polypeptide chain, CONH bonding, can be hydrolyzed. They are a major constituent of all living **organisms**. Proteins are required for the structure, function (*e.g.* neurotransmitters) and regulation of the body's **cells, tissues** and **organs**, and each protein has a unique function. Examples are **hormones, enzymes** and antibodies.

proteinaceous - Composed of, or resembling, **protein**.

proteranthous - Having flowers appearing before the leaves.

Protist - A member of the former Kingdom Protista. The protists now belong to the Kingdom Protoctista, a new classification in most modern **taxonomic** systems. . . . A single-celled, **eukaryotic organism** that cannot be clearly classified as animal or plant. (See: **Protoctist**)

Protoctist - A member of the **Kingdom** Protoctista, regarded as distinct from plants and animals. In most modern classifications, Kingdom Protoctista is a replacement for the Kingdom Protista. It includes Protozoa, Euglenophyta, Chlorophyta, Cryptophyta, Heterokontophyta, and Rhodophyta...unicellular protists and their descendant multicellular **organisms**...Some members of the Protoctista **kingdom** are unicellular, others are colonial, and yet others are multicellular. In the **colonial** forms, all the cells are similar with similar, generalized functions, whereas in the truly multicellular **species**, the “body” of the **organism** consists of a variety of types of cells, each type with its own specialized function. These **organisms** are all **eukaryotes**, meaning they have a true nucleus. They all need some kind of a water-based **environment**, which can be fresh or marine water, snow, or damp soil in which to live. All are **aerobic** and have mitochondria to do **cellular** respiration, and some have chloroplasts and can do **photosynthesis**. Most of them **reproduce** or grow by **mitosis**, and some reproduce by **meiosis** and fertilization. Many can form cysts in adverse conditions. **Protists** are a major component of **plankton**. **Protists** are grouped into three major, unofficial categories based on means by which they obtain nutrition. These are the Protozoa, the **Algae**, and the **Fungus-like Protists**. (See: **Protist**)

protoplasm - The living substance of **cells**, including **cytoplasm** and **nucleus**...The complex, semi-fluid, translucent substance that constitutes the living matter of plant and animal **cells** and manifests the essential life functions of a **cell**. Composed of **proteins**, fats, and other **molecules** suspended in water, it includes the **nucleus** and cytoplasm... The living portion of a **cell** as opposed to the non-living **cell** wall. ...Fluid living content of a **cell**, the cytoplasm and nucleoplasm... The mass of material which makes up the contents of a cell including enzymes and organized particles which carry out specific functions within the **cell**... Fundamental material composing all living things. Protoplasm, which exists in all plants and animals in the small units called **cells**, is mainly (85-90 percent) water and also contains **proteins**, fatty substances and **inorganic** salts.

protozoan - Any of a large group of single-celled, usually **microscopic**, **eukaryotic organisms**, such as amoebas, **ciliates**, **flagellates**, and **sporozoans**... Any of a diverse group of **eukaryotes**, of the **kingdom Protista**, that are primarily unicellular, existing singly or aggregating into **colonies**, are usually non-**photosynthetic**, and are often classified further into **phyla** according to their capacity for and means of motility, as by pseudopods, **flagella**, or cilia... One of a group of single-celled, **microscopic**, animal-like **organisms**... A **protist** that has no **cell walls** and can find and eat food; examples include **flagellates** and **ciliates**.

proximal - Toward the point of attachment.

pseudobulb - A thickened, bulblike, fleshy stem located above the ground, as in many orchids.

pseudopod - A **cell** extension used by **protists** to move about and capture food and it means false foot.

psychrometer - An instrument designed to measure **dew point** and relative **humidity**, consisting of two thermometers (one dry bulb and one wet bulb). The **dew point** and **humidity** levels are determined by drying the wet bulb (either by fanning or whirling the instrument) and comparing the difference between the wet and dry bulbs with preexisting calculations. (See: **hygrometer**)

pteridophyte - Literally a "fern-like plant". A **vascular plant** with well-developed roots, stems, and leaves that produces and releases **spores** but not seeds. Applied to the **horsetails**, lycopods (club mosses), and **ferns**, "pteridophyte" is a convenient descriptive word but is not often used as an exact **taxonomic** term.... The term "pteridophyte" has traditionally been used to describe all seedless vascular plants, making it synonymous with "ferns and fern allies". This can be confusing since members of the fern **phylum** Pteridophyta are also sometimes referred to as pteridophytes.

pterophyte - A true fern. A member of th Pterophyta, a **taxonomic** subdivision, within division Pteridophyta.

Pteropods - A group of tiny **marine** snails having the anterior lobes of the foot expanded into broad, line, wing-like swimming organs. They live like **plankton**.... Sea butterflies, also known as Thecosomata or flapping snails, are a **taxonomic** suborder of small **pelagic** swimming sea snails. These are holoplanktonic opisthobranch gastropod **mollusks** in the order Opisthobranchia.... Any of several small **marine** gastropod **mollusks**, of the suborder Thecosomata, that have wing-like lobes on the feet; the sea butterfly.

pubescent - In **botany**, having short hairs.

pulp - Inner portion of the fruit.

pulpwood - **Softwood**, such as pine, used for making paper.

pumice - A volcanic glass full of cavities and very light in weight.

puna - A dry or semi-dry high-elevation **grassland** found throughout the southern Andes, from Peru southward. Characteristic of many puna sites are cushion plants, which may form broad mats. Woody vegetation is scarce in puna, apart from (local) patches of *Polylepis* forest. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

punctuated equilibrium - The theory that **evolution** occurs in huge and sudden jumps.... The hypothesis that **evolution** takes place in fits and starts; **evolution** occurs very slowly for quite a while and then, during a relatively short period, takes place very rapidly.... The **evolutionary** process involving long periods without change (stasis)

punctuated by short periods of rapid **speciation**.... A model of **evolution** where new **species** appear suddenly (within a few hundred thousand years) in the fossil record and show little change for millions of years until their **extinction**. Gradualism is the term used where there is a gradual **evolution** of one **species** into another.... The pattern of **evolution** (very common in **invertebrates**) whereby **species** once in existence do not change radically over long periods of time (except perhaps in size) and then are suddenly replaced by other, quite different **species**.... A theory of **evolution** holding that **evolutionary** change in the **fossil** record came in fits and starts rather than in a steady process of slow change....The belief that **evolution** proceeds by spurts of change interspersed with long periods of stasis (**genetic** stability) where **natural selection** favors no change.

pupa - In **metamorphosing** insects, a stage between the **larva** and adult during which the **organism** undergoes major developmental changes.... an intermediate stage of a **metamorphic** insect (such as a bee, moth, or beetle), usually enclosed in a **cocoon** or protective covering.... A stage that many insects undergo during **metamorphosis**. Inside a **pupal** case, its juvenile body parts break down and adult features emerge.... A developmental stage of many insects, intermediate between the **larva** and the adult; this stage is generally inactive and encased in a case or **cocoon**.

pupal - Of or referring to a **pupa**.

pupate - To go through a **pupal** stage; that is, to change from a **larva** to an adult, as in many **insects**.

pycnocline - In the ocean, a region where the water density increases rapidly with depth....A zone of rapid vertical density change in water... The boundary between layers of water of different densities. ...In the ocean, a region where the water density increases rapidly with depth.... A vertical density gradient (as determined by the vertical **temperature** and **salinity** gradients and equation of state) in some layer of a body of water, which is appreciably greater than the gradients above and below it; also a layer in which such a gradient occurs... The region of the water column characterized by the strongest change in density with depth. **Temperature** falls and **salinity** rises in this zone.... A layer across which there is a rapid change in water density with depth. In **freshwater environments** such as **lakes** this density change is primarily caused by water **temperature**, while in seawater **environments** such as oceans the density change may be caused by changes in water **temperature** and/or **salinity**.

Pyramid of Numbers - See **food pyramid**

pyric - Resulting from, induced by, or associated with burning.

pyrogenic - Resulting from fire activities. Usually used in the context of emissions that are produced by fires, *e.g.*, smoke from fires.

pyrophyte - A general term for any **species** or group of plants that is clearly **adapted** to an **environment** in which fire is frequent.... A **species** that is **adapted** to survive severe fires.

quartz - The second most common **mineral** found in Earth's **crust**.

quicksand - Wet sand in which things readily sink in, often found near rivers or coasts.....A colloid hydrogel consisting of fine granular matter (such as sand or silt), clay, and salt water. In the name, as in that of quicksilver (mercury), "quick" does not mean "fast," but "living" (*cf.* the expression the quick and the dead). Water circulation underground can focus in an area with the optimal mixture of fine sands and other materials such as clay. The water moves up and then down slowly in a convection-like manner throughout a column of sand, and the sand remains a generally solid mass. This lubricates the sand particles and renders them unable to support significant weight, since they move with little friction, behaving more like a liquid when exposed to stress. Since water does not usually go up to the surface of the sand, the sand on top appears solid, and can support leaves and other small debris, making quicksand difficult to distinguish from the surrounding environment.

race - A synonym of **subspecies** or **form**. A race or **subspecies** is a **genetically** distinct **population** within a **species**, not reproductively isolated from other **populations** within the **species**.... A **taxonomic** category intermediate in rank between **species** and **variety**, based on a smaller number of correlated characters than are used to differentiate **species** and generally conditioned by geographical and/or **taxonomic** occurrence. ... A recognizable group forming all or part of a **species**. (See: **subspecies**)

A **monotypic species** has no races, or rather one race comprising the whole species.

Monotypic species can occur in several ways:

- All members of the **species** are very similar and cannot be sensibly divided into biologically significant subcategories.
- The individuals vary considerably but the variation is essentially random and largely meaningless so far as **genetic** transmission of these variations is concerned (many plant **species** fit into this category, which is why horticulturists interested in preserving, say, a particular flower color avoid propagation from seed, and instead use vegetative methods like propagation from cuttings).
- The variation between individuals is noticeable and follows a pattern, but there are no clear dividing lines between separate groups: they fade imperceptibly into one another. Such **clinal** variation always indicates substantial **gene flow** between the apparently separate groups that make up the **population(s)**. **Populations** that have a steady, substantial **gene flow** between them are likely to represent a **monotypic species** even when a fair degree of **genetic variation** is obvious.

raceme - An **inflorescence** where the flowers are borne along the main stem.... An **inflorescence** in which **flowers** are borne on short stalks on an elongated **stem**....A stalk that continues to grow and on which flowers are borne on individual stems... A simple type of flower **inflorescence** that looks like a long stem with flowers arising along it.... A

cluster of many flowers packed tightly in a long, skinny column.... An unbranched **inflorescence** of stalked flowers.

radial - Radiating from the apex or umbone to the outer margin.

radial symmetry - In animals, refers to a body design in which the body parts of an **organism** are arranged around a central axis. Such animals tend to be circular or cylindrical in shape, *e.g.* starfish and sand dollars.

radiant energy - The energy given off by the Sun,

radiation - In **biology**, the increase in numbers of a new **species** and its spread into new **habitats**....In physics, energy transfer in the form of electromagnetic waves or particles that release energy when absorbed by an object.... Energy emitted in the form of electromagnetic waves. Radiation has differing characteristics depending upon the wavelength. Because the radiation from the Sun is relatively energetic, it has a short wavelength (ultra-violet, visible, and near infra-red) while energy re-radiated from the Earth's surface and the atmosphere has a longer wavelength (infra-red radiation) because the Earth is cooler than the Sun....The transfer of energy by electromagnetic waves.

radiational cooling - In **meteorology**, the result of radiative cooling of the Earth's surface and adjacent air. ... The process in which the Earth's surface loses heat into outer space by emitting infrared radiation. This process is maximized on clear nights with little or no wind and a fresh snow cover. ... Radiational cooling is the cooling of the earth's surface through thermal radiation, also known as infrared radiation...Accomplished mainly at night, the cooling of the Earth's surface and adjacent air or whenever the Earth's surface suffers a net loss of heat due to the emission of infrared radiation. ...Radiational cooling occurs, as is typical on calm, clear nights, whenever the longwave emission from the surface is not balanced by significant amounts of absorbed shortwave radiation or downwelling longwave from the **atmosphere** above the surface, and there are no non-radiative sources of sufficient energy to make up the difference. Same as **radiative cooling**. (See: **radiative cooling**)

radiative cooling - Cooling process of the Earth's surface and adjacent air, which occurs when infrared (heat) energy radiates from the surface of the Earth upward through the **atmosphere** into space. Air near the surface transfers its thermal energy to the nearby ground through conduction, so that radiative cooling lowers the **temperature** of both the surface and the lowest part of the **atmosphere**. Same as **radiational cooling**. (See: **radiational cooling**)

radiative forcing - A change in the balance between incoming **solar radiation** and outgoing **infra-red radiation**. Without any radiative forcing, **solar radiation** coming to the Earth would continue to be approximately equal to the **infra-red radiation** emitted from the Earth. The addition of **greenhouse gases** traps an increased fraction of the infra-red radiation, reradiating it back toward the surface and creating a warming influence (*i.e.*, positive radiative forcing because incoming **solar radiation** will exceed outgoing

infra-red radiation)...A change in the **environment** that directly affects the amount of energy being absorbed by the Earth. A positive forcing tends to warm the surface of the Earth, and a negative forcing tends to cool the surface. (See: **greenhouse effect**)

radicle - In **botany**, an **embryonic** root.

rain gauge - Calibrated container that measures the amount of rainfall during a specific period of time.

rain shadow - The dry region on the leeward side of a mountain range, where rainfall is noticeably less than on the windward side. For example, the coast of Peru is in the rain shadow of the Andes, and in North America, the Great Basin is in the rain shadow of the Sierra Nevada and Cascades....An area to the leeward of a high land mass, particularly a mountain range, which receives less rain than would be expected had the high land mass not been upwind of it.

rainbow - Rainbows are produced by refraction and reflection of the sun's rays by millions of falling raindrops.

rainforest / rain forest- A very wet, essentially non-seasonal forest. (Definitions vary. This is the definition from *A Neotropical Companion*) ... **Evergreen** forest associated with a climate characterized by continual high humidity and abundant rainfall and a short or no dry season. NOTE: Commonly applied, in a restricted sense, to **tropical** forests with an annual rainfall 80 inches and abundant **epiphytes** and **climbers**. (See: **moist forest, tropical rainforest, temperate rainforest**)

range - In **ecology**, the area in which a plant naturally lives and **reproduces**....The known geographical **distribution** of a plant or animal during a defined period of time.....The area in which an animal seeks food and water..... the area in which an **organism** may travel in its lifetime. Range also refers to the geographic **distribution** of a particular **species**..... Species distribution, often excluding vagrant individuals and some proportion of territory within the outer range. (See: **distribution**)

raphide - In **botany**, a needle-shaped crystal of calcium oxalate in certain **species' cells** that deter **herbivores**.

Rapport's rule - Rapport's rule states that **latitudinal ranges** of plants and animals are generally smaller at low than at high **latitudes**. Support for the generality of the rule is at best equivocal. Some studies have found support for the rule, others, probably even more numerous, have found exceptions to it. For most groups that have been shown to follow the rule, it is restricted to or at least most distinct above **latitudes** of about 40-50 degrees. The rule may be restricted to very high **latitudes** due to the effects of **glaciations** which have wiped out **species** with narrow **ranges**. Another explanation of Rapport's rule is the "climatic variability" or "seasonal variability hypothesis". According to this hypothesis, seasonal variability selects for greater climatic tolerances and therefore wider **latitudinal** ranges.

raptor - A bird of prey.... A **predatory** bird; a **carnivorous** bird.... A bird that hunts and kills other animals for food; eagles, falcons, hawks, and owls are examples of raptors.

raptorial - Adapted for seizing prey, as in the front legs of a praying mantid or the claws of an eagle.

ravine - A narrow, deep valley usually formed by running water.

raw materials - The building blocks of products.

ray flower - One of several small **flowers** often forming a ring around the **disk flowers** in a composite flower head....A small flower with a single ray of three, fused petals that is part of a larger, composite flower; outlines a central, compact disk full of tubular disk flowers; typical of the **family** Compositae. (See: **disk flower**)

reactant - An original substance in a chemical reaction.

realized niche - The realized niche describes that part of the **fundamental niche** actually occupied by the **species**. (See: **niche, fundamental niche**)

realm - A region of the Earth that harbors similar groups of **species** based on a shared **biogeographical** history. For example, while primates are found in many parts of the world, all monkeys found with **prehensile tails** are only found in the **Neotropic** realm. The Earth is made up of eight realms.

receptacle - In **botany**, the enlarged end of a **flower** stalk to which the **flower** parts are attached.

recessive gene - A **gene** which must be present on both **chromosomes** in a pair to show outward signs of a certain characteristic.... A **gene** that is **phenotypically** expressed in the homozygous state but has its expression masked in the presence of a **dominant gene**.... A **gene** whose trait will not be expressed in the heterozygous state but will only be expressed in the homozygous state... **Genes** are either dominant or recessive. A **dominant gene's** characteristics will predominate when paired with a recessive gene. For a recessive gene to show, it must be paired with another recessive gene.... A **gene** that produces its characteristic **phenotype** only when its **allele** is identical, *e.g.* the recessive gene for blue eyes in humans.... A type of **gene** that is not expressed as a trait unless inherited by both parents. (See: **recessive trait**)

recessive trait - A **genetic** characteristic, the expression of which is masked by a comparable but **dominant gene**....A characteristic determined by a **recessive gene**. If a **genetic** trait is recessive, a person needs to inherit two copies of the **gene** for the trait to be expressed. Thus, both parents have to be carriers of a recessive trait in order for a child to express that trait. If both parents are carriers, there is a 25% chance with each child to show the recessive trait. (See: **recessive gene**)

recharge - Water added to an **aquifer**. For example, when rainwater seeps into the ground.

recharge rate - The quantity of water per unit of time that replenishes or refills an **aquifer**. (See: **recharge**)

recharge zone or area - An area where permeable soil or rock allows water to seep into the ground to replenish an **aquifer**.

Recognition Species Concept - See **species**.

recovery - In reference to a plant or animal population that has been removed from the **endangered** or threatened species list due to its now being large enough to sustain itself in the wild.

recycled water - Water that is used more than one time before it passes back into the natural hydrologic system.

red tide - The term applied to toxic **algal** blooms caused by several **genera** of **dinoflagellates** (*Gymnodinium* and *Gonyaulax*) that turn the sea red and are frequently associated with a deterioration in water quality. The color occurs as a result of the reaction of a red **pigment**, peridinin, to light during **photosynthesis**. These toxic **algal** blooms pose a serious threat to **marine** life and are potentially harmful to humans. The term has no connection with astronomical **tides**. However, its association with the word "**tide**" is from popular observations of its movements with **tidal** currents in **estuaries**....A proliferation of a **marine plankton** toxic and often fatal to fish, perhaps stimulated by the addition of **nutrients**. A **tide** can be red, green, or brown, depending on the coloration of the **plankton**.... Seawater discolored by the presence of toxic **dinoflagellates**, especially *Gymnodinium breve* (= *Karenia brevis*).... **Algal** bloom involving **dinoflagellate phytoplankton** species which naturally manufacture biotoxins. Depending upon species, red tides can cause fish kills and several types of shellfish poisoning in human consumers.... A common name for a phenomenon known as an **algal** bloom, an event in which **estuarine, marine, or freshwater algae** accumulate rapidly in the **water column**, or "bloom". These **algae**, more specifically **phytoplankton**, are microscopic, single-celled **protists**, plant-like **organisms** that can form dense, visible patches near the water's surface. Certain species of **phytoplankton** contain **photosynthetic pigments** that vary in color from green to brown to red, and when the **algae** are present in high concentrations, the water appears to be discolored or murky, varying in color from white to almost black, normally being red or brown. Not all **algal** blooms are dense enough to cause water discoloration, and not all discolored waters associated with **algal** blooms are red. Additionally, red tides are not typically associated with **tidal** movement of water, hence the preference among scientists to use the term **algal** bloom....The most conspicuous effects of red tides are the associated **wildlife** mortalities among **marine** and coastal species of fish, birds, **marine mammals** and other **organisms**. In the case of Florida red tides, these mortalities are caused by exposure to a

potent neurotoxin called brevetoxin which is produced naturally by the **marine algae** *Karenia brevis*. (See: **dinoflagellate**)

reed - A tall, stiff, hollow, grass-like plant... A generic botanical term used to describe numerous plants of similar appearance, including plants in the Poaceae (grass) family and Sparganiaceae (Bur-reed) family.... Tall woody perennial grasses with hollow slender stems especially of the genera *Arundo* and *Phragmites*.... Any of various types of tall stiff perennial grass-like plants growing together in groups near water.

refection - The eating of partly digested fecal pellets, as practiced by rabbits. See: **coprophagy**.

reforestation - Natural or artificial restocking or reestablishing an area with forest trees (natural regeneration as well as tree planting and seeding); renewing forest cover by planting seedlings, transplants, tree seeds, or, (for certain **species**) cuttings.

refugia - Hypothesized shrunken areas of **rainforest** that were scattered in Central and South America during the **Pleistocene Ice Ages**. They are so named because **rainforest species** found "refuge" in these **rainforests**, which were otherwise surrounded by **savanna**. (For information on the formation of **species** see: **speciation, species, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

regenerate - To replace or grow back, as in body tissue that has been damaged or destroyed.

regeneration - The renewal of **vegetation** by natural or artificial means....A parent tree's establishment of progeny.

regurgitant - Partially digested stomach contents; in some animals, such as birds, the regurgitant is brought up in portion sizes small enough to feed the young.

regurgitate - To cause to pour back, especially to cast up partially digested food. Many birds feed their young by regurgitating food they have eaten.

reintroduce - To return members of a **species** to their historical range. This strategy is sometimes used when a **species** has become locally **extinct** or if its **population** is threatened.

reintroduction - The process of breeding, releasing, or planting a plant or animal species back into its natural **habitat** and historic **range**; also referred to as **restoration**.

relative humidity - The ratio of the amount of **water vapor** actually in the air compared to the amount of **water vapor** the air can hold at that particular **temperature** and pressure. ... The ratio of the amount of **water vapor** in the air compared to the amount

required for saturation (at a particular **temperature** and pressure). ... A measurement of the amount of **water vapor** in the air compared to the amount that would saturate the air. (See: **humidity**)

relict distribution - A **distribution** area that is a mere remnant of a formerly wider **range**.

relict species - A **species** that has survived while other related ones have become **extinct**. A relict **species** may be one that had a wider **range** but is now found only in particular areas, or it may have survived relatively unchanged from an older period when other kinds of **species** went **extinct** (such as Horseshoe Crabs)... A **species** that remains from an earlier geologic time when **environmental** conditions were different than at present.

remediation - Also known as clean up, remediation is taking action to reduce, isolate, or remove contamination from an **environment** with the goal of preventing exposure to people or animals. Examples include dredging to remove contaminated **sediment**, or capping to prevent contaminated **sediment** from contacting **benthic organisms**.

remote sensing - An explicitly spatial method of using satellite imagery to conduct **taxonomic** research and decision-making....Acquisition of information about objects using photographic or electromagnetic sensors on airplane or satellite platforms....The collection and interpretation of information about an object without physical contact with the object; *e.g.*, satellite imaging and aerial photograph.... The technology of acquiring data and information about an object or phenomena by a device that is not in physical contact with it. In other words, remote sensing refers to gathering information about the Earth and its environment from a distance. Some remote-sensing systems encountered in everyday life include the human eye and brain, and photographic and video cameras.

renewable energy - Energy produced from **renewable resources**, such as wind, solar, geothermal energy and **biofuels**.

renewable resource - A resource that has the capacity to be replaced through natural processes. **Trees** are a renewable resource. ... A resource that can replenish itself faster than it is destroyed, such as forests that are harvested sustainably...Resources, the supply of which becomes available for use at different intervals in time. The use of present supply flows does not diminish future flows and it is possible to maintain use indefinitely provided the use rate does not exceed flow rate. Many renewable resources can be stored -- such as water in a reservoir or mature timber in a stand and such stores can be treated as a stock (*i.e.*, exhaustible) resource. The availability of a flow for replenishing the stock, however, differentiates such stores from truly "nonrenewable resources." There are two broad classes of "renewable resources" one in which human resource use activities do not significantly alter future flows (*e.g.*, wind, tidal and solar energy) and a second class where human activities may increase or decrease future flows (*e.g.*, timber, wildlife, and soil **productivity**).... Natural resources which are able to replenish or regenerate themselves within a similar time frame to their utilization by humans, thereby enabling sustainable long-term consumption. Examples include sustainably managed fisheries and

the cultivation of plantation timbers. . . . A **natural resource** qualifies as a renewable resource if it is replenished by natural processes at a rate comparable to its rate of consumption. Wind, solar, oxygen, fresh water, timber, and **biomass** can all be considered renewable resources. However they can become non-renewable resources if used at a rate greater than the **environment's** capacity to replenish them. Renewable resources are used in the production of renewable energy. . . . A resource that can be replaced in a relatively short time; examples are wood, water, wind, and solar energy. (See: **natural resource, non-renewable resource**)

replacement clutch - The eggs laid by a bird to replace a clutch in which none of the eggs hatched.

reproduce - To produce offspring or new individuals through a sexual or asexual process.

reproduction - The process by which plants and animals make new life. . . . The manufacture of offspring as part of an **organism's** life cycle. Reproduction may be sexual, involving the fusion of **gametes**, or asexual.

reproductive - Referring to **reproduction**.

reproductive isolating mechanism - Biological or behavioral characteristics that reduce or prevent **interbreeding** with other **populations**. Examples of these isolating mechanisms are courtship behavior, vocalizations, timing of migration, habitat preference, and the production of sterile **hybrids**. Establishment of **reproductive isolation** is considered essential for development of a new **species**.

reproductive isolation - A condition in which **interbreeding** between **populations** is prevented by intrinsic factors of the species themselves. Sometimes groups of **organisms** within a **population** become isolated genetically without prior **geographic isolation**. When barriers to successful breeding arise among **population** groups in the same area, the result is reproductive isolation. Reproductive isolation is the inability of formerly interbreeding **organisms** to produce offspring. Reproductive isolation can arise through disruptive selection. Remember that in disruptive selection the two extremes of a specific trait in a given **population** are selected for. The Wood Frog and the Leopard Frog have become reproductively isolated, possibly as a result of disruptive selection. Though the Wood Frog and the Leopard Frog sometimes interbreed in captivity, they do not interbreed where the ranges overlap in the wild. The Wood Frog usually breeds in early April, and the Leopard Frog usually breeds in mid-April. This reproductive isolation may have resulted from disruptive selection. In the ancestral frog **species** frogs that bred earlier and frogs that bred later may have both been selected for, while frogs that bred between these times may have been selected against, perhaps because some **predator** was especially active during that time. The two groups of frogs may have become reproductively isolated because of differences in breeding times. Probably it was in part through such reproductive isolation that **speciation** occurred in these frogs. Eventually different **selection pressures** led to the type of morphological variations. (For

information on the formation of **species** see: **speciation, species, geographic speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

reptile - Any **cold-blooded vertebrate** of the class Reptilia including tortoises turtles snakes lizards alligators crocodiles and **extinct** forms... **Cold-blooded**, scaly animals from the **phylum** Chordata, **class** Reptilia. This **class** of animals breathes air and lives mostly on land. It includes turtles, snakes, lizards and crocodilians.

reservoir - A supply of a substance, especially a reserve or extra supply. For example, the soil acts as a reservoir of carbon...In **geography**, a pond, lake, or basin, either natural or artificial, for the storage, regulation, and control of water. ... An artificial lake created by damming a **stream** or **river**...In **epidemiology**, anything (a person or animal or plant or substance) in which an infectious agent normally lives and multiplies; an infectious agent depends on a reservoir for its survival.

residence time - The average time spent in a **reservoir** by an individual atom or **molecule**. Also, the age of a **molecule** when it leaves the **reservoir**. With respect to **greenhouse gases**, residence time usually refers to how long a particular **molecule** remains in the **atmosphere**.

resident - An animals that lives in a particular area. One can talk about the resident **species** of an area in contrast to the **migrant species**. One can also differentiate between **permanent residents** and **winter residents**. (See: **permanent resident**)

resident species - A species common to an area without distinction as to being native (*i.e.*, **indigenous species**) or introduced (*i.e.*, **exotic species, naturalized species** or feral **species**). With migratory animals, like birds, this usually refers to a species that is present year round.

resilience - in ecology - The ability of a **community** to returns to its former state after disturbance.... The capacity of an ecosystem to respond to a perturbation or disturbance by resisting damage and recovering quickly.... The amount of disturbance that an ecosystem can withstand without changing self-organized processes and structures... Measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables... The magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behavior...The capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and therefore identity.... the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes. A resilient ecosystem can withstand shocks and rebuild itself when necessary.

resin - A viscous, protective secretion of many **conifers** that is insoluble in water and

hardens on contact with air...A sticky yellow or brown substance that oozes from the bark of certain **trees**, such as pine and fir.

resin canal - A **resin**-containing tube.

resistant - Able to protect the body against a disease or harmful agent.

resource - See **natural resource**.

resource allocation - Societal or institutional decisions about the distribution of available resources, for example water allocation between the needs of irrigation farmers and **riverine ecosystems**.

resource partitioning - Division of some **resource** or **resources** among two or more co-occurring **species**; for example, eating slightly different foods... The division of **resources** such that a few dominant **species** exploit most of the available **resources** while other **species** divide the remainder; helps explain why a few **species** are abundant in a **community** while others are represented by only a few individuals. Also known as **niche segregation**, **niche separation**, **niche partitioning** and **niche differentiation**. (See: **competition** or **ecological competition**, **competitive exclusion**, **competitive exclusion principle**, **competitive release**, **habitat partitioning**, **ecological niche**, **niche differentiation**, **niche expansion**)

resource-based pricing - Pricing of goods and services which reflects the true **environmental** and social costs of the associated extraction of **natural resources** and production of the product. This provides a monetary disincentive to production processes which are **environmentally** damaging.

respiration - The process of exchanging oxygen and carbon dioxide with the environment and using oxygen to release energy for the **cell's** use; some **organisms** obtain energy without the presence of oxygen...The act or process of inhaling and exhaling; breathing...The act or process by which an **organism** without lungs, such as a fish or plant, exchanges gases with its **environment**...The oxidative process occurring within living **cells** by which the chemical energy of **organic molecules** is released in a series of **metabolic** steps involving the consumption of oxygen and the liberation of carbon dioxide and water...Any of various analogous **metabolic** processes by which certain **organisms**, such as **fungi** and **anaerobic bacteria**, obtain energy from **organic molecules**. ... The process by which animals use up stored foods (by combustion with oxygen) to produce energy. ... The process through which energy is released in plants and animals and occurs when sugars and oxygen join to produce water, **carbon dioxide**, and energy. (See: **cellular respiration**, **photosynthesis**)

restinga - A restinga is a distinct type of coastal tropical and subtropical moist broadleaf forest found in Brazil. Restingas form on sandy, acidic, and nutrient-poor soils, and are characterized by medium sized trees and shrubs adapted to the drier and nutrient-poor conditions.vThe World Wildlife Fund distinguishes two restinga ecoregions, the Atlantic

Coastal and the Northeastern.

The Atlantic Coast restingas are found in several enclaves along Brazil's east coast from Rio Grande do Norte state in northeastern Brazil to Rio Grande do Sul state in southern Brazil, covering an area of 7,900 square kilometers (3,100 square miles) that extends from the tropics to the subtropics. Its flora and fauna shares affinities with the humid Atlantic forest of eastern Brazil.

The Northeastern Brazil restingas are found along the northern coast of Brazil, in Maranhão, Piauí, and Ceará states. Its flora and fauna are distinct from that of the Atlantic Coast restingas, with greater affinities to the moist forests of Amazonia.

.....An area containing scrubby vegetation typical of sand marine barrier islands.

restoration - The repair of **taxonomic** damage to an **ecosystem** so that it is close to the natural condition prior to a disturbance and it can function as a normal self-regulating system. This is done through processes such as chemical cleanups, **revegetation**, and the reintroduction of native **species**.

restoration ecology - Rehabilitation of **ecological** components of land previously degraded by humans. Reconstruction of a damaged site involves **environmental** reclamation including the removal of infrastructure, clearing of potential **pollutants**, and contouring of the land surface and topsoil. **Ecological** rehabilitation then includes local **ecosystem** research, bioremediation, nursery, planting and maintenance of appropriate **trees**, reforestation, **habitat** restoration, **fauna** management and **ecosystem monitoring**. Restoration ecology is an important final component of any extractive development process such as mining or forestry. Restored **ecological** systems are usually less natural and diverse than originals, and should be considered an adjunct to **habitat** preservation. Many **ecologists** are philosophically predisposed to **conservation** rather than restoration.

reticulate venation - A net-like **vein** pattern in some **leaves**.

revolution - In astronomy, process of the Earth circling the sun in its orbit. Revolution determines the seasons, and the length of the year. In addition, differences in seasons occur because of Earth's inclination (tilt on its axis) of about 23.5 degrees as it revolves around the sun. Compare with **rotation**.

rheobiontic - Occurring only in flowing water.

rheophilous - Occurring mainly in flowing water, but may also be found in standing water.

rhizoid - Rhizoids are a structure (as a hypha of a **fungus**) that functions like a root in support or absorption. Rhizoids, in fungi, are small branching **hyphae** that grow downwards from the **stolons** that anchor the fungus. They release digestive enzymes and absorb digested organic material. Rhizoids, in bryophytes, are root-like structures that anchors the plant to the ground. Rhizoids are related primarily to **heterotrophic** nutrition... A stem, generally modified (particularly for storing food), that grows along but below the surface of the ground and produces **adventitious roots**, scale leaves, and

suckers irregularly along its length, not just at node...Filamentous structures in the plants group known as **bryophytes** that attach to a substrate and absorb moisture. The term is also applied to similar structures found outside the **bryophytes**.

rhizominous - A plant that spreads via rhizomes.

rhizomorph - **Fungus mycelium** arranged in strands, rootlike in appearance.

rhizome - A horizontal underground **stem**, such as found in many **ferns**, where only the leaves may stick up into the air; sphenophytes (horsetails and their relatives) spread via rhizomes, but also produce erect stems. ... An underground portion of a stem, producing shoots on top and roots beneath; different from a root in that it has buds, nodes, and scaly leaves; rootstock...In **ferns**, a horizontal stem with upright leaves containing **vascular tissue**.... An underground **stem** which stores food for the following year's growth.... A **stem**, generally modified (particularly for storing food), that grows along but below the surface of the ground and produces **adventitious roots**, scale leaves, and suckers irregularly along its length, not just at **nodes**, *e.g.* *Equisetum* and *Pteridium* spp. Compare **runner** and **stolon**.

ribonucleoprotein - A nucleoprotein that contains RNA, or ribonucleic acid; a nucleoprotein is the combination of a **protein molecule** and a nucleic acid **compound**; nucleic acids are complex chemical **compounds** found in all living **cells** and **viruses** and are important in the transfer of hereditary information as well as controlling **cellular** functions.

ribosome - A **cellular** particle; the site of **protein** synthesis.

Richter scale - A set of numbers used to describe the magnitude of an **earthquake**.

riatal bristles - Outwardly directed, bristly feathers near the base of a bird's bill. (See: **vibrissa**)

ridge lines - Points of higher ground that separate two adjacent **streams** or **watersheds**; also known as divides.

riffle - A shallow area of a **stream**, causing the water to be broken as it flows over rocks.

right bank (of a river) - The bank of a river that is to your right if you position yourself in the middle of the river and look downstream (See: **left bank**)

Ring of Fire - A zone of frequent **earthquakes** and **volcanic** eruptions encircling the Pacific Basin. (See: **Circum-Pacific Belt**)

ring species - In **biology**, a ring species is a connected series of neighboring **populations** that can interbreed with relatively closely related **populations**, but for which there exist at least two "end" **populations** in the series that are too distantly related to interbreed.

Often such non-breeding-though-**genetically**-connected **populations** co-exist in the same region thus creating a "ring". Ring species provide important evidence of **evolution** in that they illustrate what happens over time as **populations genetically** diverge, and are special because they represent in living **populations** what normally happens over time between long deceased ancestor **populations** and living **populations**.

Ring species also present an interesting problem for those who seek to divide the living world into discrete **species**, as well as for those who believe that **evolution** does not create new species. After all, all that distinguishes a ring species from two separate **species** is the existence of the connecting **populations** - if enough of the connecting **populations** within the ring perish to sever the breeding connection, the ring species becomes two distinct **species**...In ring **species**, members of adjacent **populations** interbreed successfully but members of widely separated **populations** do not. (See: **sympatry, parapatry, allopatry**. And for more information on the formation of species see: **speciation, species, geographic speciation, allopatric speciation, parapatric speciation, sympatric speciation, heteropatric speciation, heteropatry, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**)

ring spot - In botany, disease symptom characterised by yellowish or necrotic rings enclosing green tissue, as in some plant diseases caused by viruses.

riparian - The area bordering a body of water, such as the banks of a river or stream. ...Along banks of rivers and **streams**...The land adjacent to and pertaining to the banks of **streams**, rivers, or other water bodies.... Pertaining to the banks of a river or other body of freshwater ...Having to do with the edges of **streams** or rivers.... The physical and biological **environment** adjacent to a river or **stream** that significantly influences, and/or is significantly influenced by, the **stream** or river. NOTE: The zone which contributes organic matter to the river or **stream**; the zone that is wetted by periodic surface or subsurface water from the river or **stream**. Trees forming a strip along a watercourse may be termed **gallery forest**..... Land adjacent to perennial **streams**, lakes, and reservoirs and including other well developed riparian **vegetation** (primarily intermediate **streams**). This land is specifically delineated by the transition between the aquatic **organic** and the adjacent terrestrial **organic** and defined by soil characteristics and distinctive **vegetation population** that require free and unbound water. Areas include **stream** channels, lakes, wetlands, and adjacent **floodplains** and riparian **organics**. They include all areas within a horizontal distance of 100 feet from the edge of perennial **streams** or other water bodies.... The strip of **habitat** along **streams** or lakes, and presumably influenced by those bodies of water. Various more precise definitions have been used, but not agreed upon.... Pertaining to streamside **environment**...**Vegetation** growing in close proximity to a watercourse, lake, or spring and often dependent on its roots reaching the **water table**. (See: **riverine, riparian, riparian or riverine succession, riparian buffer, riparian habitat, riparian zone, gallery forest**)

riparian buffer - A vegetated area near a **stream**, usually forested, which helps shade and partially protect a **stream** from the impact of adjacent land uses. (See: **riverine, riparian, riparian or riverine succession, riparian buffer, riparian habitat, riparian zone**)

riparian habitat - Areas adjacent to rivers and **streams** with a high density, **diversity**, and productivity of plant and animal **species** relative to nearby uplands. (See: **riverine, riparian, riparian or riverine succession, riparian buffer, riparian habitat, riparian zone**)

riparian or riverine succession - **Vegetation** al succession in the **riparian** zone. Along lowland **whitewater** rivers in Amazonia riparian succession follows a predictable pattern, beginning with grasses, and then proceeding through a *Tessaria-Salix* phase, a *Cecropia-Gynerium* phase, then a *Ficus insipida-Cedrela* phase. (See: **riverine, riparian, riparian or riverine succession, riparian buffer, riparian habitat, riparian zone**)

riparian zone - **Terrestrial** areas adjacent to perennial or intermittent **streams** and rivers Also called riparian area or riparian **habitat**.... The **ecosystems** surrounding streams; very important for wildlife. ... A **woodland community** located along a **river** or **stream**, including the bank. It is dominated by trees and differs from a **wetland** in that the **water table** does not normally reach the soil surface. Floods may occur occasionally, but the habitat remains unsaturated for most of the year. (See: **riverine, riparian, riparian or riverine succession, riparian buffer, riparian habitat, riparian zone**)

ripe - Fully developed; mature...Sufficiently advanced in preparation or aging to be used or eaten, as in *ripe fruit*.

ripeness-to-flower - The minimal vegetative size a plant must achieve before it is capable of flowering.

risk - Chance or probability that a **hazard** will actually cause harm.

river - A body of flowing water, either above or below the ground, that is generally larger than a **stream** and empties into a **lake**, another river, or the ocean....A natural **stream** of water of considerable volume, larger than a brook or creek.

river basin - The land area drained by a **river** and its **tributaries**. Also known as a **drainage basin** or **watershed**. (See: **drainage basin** or **watershed**)

river delta - See **delta**.

river terrace - An accumulation of **river** deposits along the sides of a **river** valley which were deposited when **river** levels were higher..... A bench-like feature running along a valley side, roughly parallel with the valley walls. Most terraces form when a **river's** erosional capacity increases so that it cuts down through its **floodplain**. Many **river** valleys have been subject to alternating phases of **aggradation** and **dissection** such that a

series of terraces has developed. These are cut and fill terraces, formed as **erosion** alternates with **deposition**. Two similar terraces on each side of a **river** are paired terraces. These occur at times of elevation of the land surface or when down-cutting is greater than lateral **erosion**. Unpaired terraces usually form when lateral **erosion** dominates.... A bench or step that extends along the side of a valley and represents a former level of the valley floor. A terrace results from any **hydrological** or climatic shift that causes renewed down-cutting. It generally has a flat top made up of sedimentary deposits and a steep fore edge, and it may be the remains of an old **floodplain**, cut through by the **river** and left standing above the present floodplain level. Another type of terrace is cut into **bedrock** and may have a thin veneer of alluvium, or sedimentary deposits. In paired terraces, the terrace features on each side of a valley correspond....Terraces are flat surfaces preserved in valleys that represent **floodplains** developed when the **river** flowed at a higher elevation than its present channel. A terrace consists of two distinct **topographic** components: (1) a tread, which is the flat surface of the former **floodplain**, and (2) a scarp, which is the steep slope that connects the tread to any surface standing lower in the valley. Terraces are commonly used to reconstruct the history of a **river** valley. Because the presence of a terrace scarp requires **river** down-cutting, some significant change in controlling factors must have occurred between the time that the tread formed and the time that the scarp was produced. Usually the phase of trenching begins as a response to climatic change, **tectonics** (movement and deformation of the crust), or base level lowering. Like most **floodplains**, abandoned or active, the surface of the tread is normally underlain by **alluvium** deposited by the **river**.

riverine - Relating to rivers and **streams**... Includes all wetlands and deepwater **populations** contained within a channel. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water. It is bounded on the landward side by upland, by the channel bank, or by **wetland** dominated by trees, **shrubs**, persistent and emergents. It terminates at the upstream end where tributary **streams** originate and at the **downstream** end where the channel enters a lake. (See: **riparian**)

rock cycle - A continuous cycle in which rocks are continually changed from one type to another.

rodent - A member of the **order** Rodentia...A type of warm-blooded mammal having fur or hair on the body, mammary glands associated with feeding the offspring, and large incisor teeth that grow continually; rats, mice, squirrels, capybaras, agoutis and beavers are examples of rodents.

rodenticide - A **pesticide** that is used to kill rats, mice and other **rodents**. ...A poison or chemical or agent used to destroy rats or other **rodent pests**, or to prevent them from damaging food, crops, etc.

roost (noun) - A support on which birds rest; a place where birds customarily rest; also a group of birds resting together... A place where a bird or a group of birds settle down to rest...(verb) - To settle down for rest or sleep: perch.

root - Generally the underground portion of a plant; an organ anchoring the plant to the soil and absorbing water and minerals. ...Structures of plant, usually occurring underground, that absorb **nutrients** and water and anchors the plant; one of the three major plant organ systems.

root cap - A protective cover over a root tip.

root hair - Extension of the root epidermis that increases the root's ability to absorb water.... A hair-like projection of a root's **epidermal cell**.

root nodule - A small swelling on a root resulting from invasion by nitrogen-fixing **bacteria**.

root pressure - The pressure developed by living **cells** in a root forcing water up the **xylem**.... Force that moves water upward into the stem and in small plants it can move water through the plant.

root sucker - A shoot that arises from a plant's root; suckers can give rise to new plants.

root system - Plant organ system that anchors the plant in place, stores excess sugars, and absorbs water and mineral **nutrients**. That part of the plant below ground level.

root tuber - An enlarged, food-storage root bearing **adventitious shoots**.

rosette - A **growth form** in which the leaves are arranged in concentric circles or whorls around a central bud.

rosulate - A plant with leaves arranged in rosettes (circular clusters).

rotation - In astronomy, process of the Earth turning on its axis. Rotation determines day and night, and the length of the day. Compare with **revolution**.

rotten - Affected by rot or decay...being in a state of putrefaction or decay; decomposed.

rudimentary - Not fully developed and not functional; organs in the early stage of development may be rudimentary.

rufescent - Of or referring to the color **rufous**.

rufous - A reddish brown color - often used to describe the color of a bird, *e.g.* Rufous Hornero, *Furnarius rufus*....the color of the tails of most **species** of woodcreepers and foliage-gleaners.

rugose - Wrinkled.

Rule of Twelfths - The Rule of Twelfths is a rule of thumb for estimating the height of the **tide** at any time, given only the time and height of high and low water. This is important when navigating a boat or a ship in shallow water and when launching and retrieving boats on slipways on a **tidal** shore.

The rule assumes that the rate of flow of a tide increases smoothly to a maximum halfway between high and low **tide** before smoothly decreasing to zero again and that the interval between low and high **tides** is approximately six hours. The rule states that in the first hour after low **tide** the water level will rise by one twelfth of the range, in the second hour two twelfths, and so on according to the sequence - 1:2:3:3:2:1.

ruminant - A hoofed **mammal** having four compartments to the stomach so that a **cud** is regurgitated and chewed; two examples of ruminants are deer and cattle....Any mammal that chews its **cud**, including cattle, sheep, and antelope....Physiologically, a ruminant is a **mammal** of the order Artiodactyla that digests plant-based food by initially softening it within the animal's first stomach, known as the rumen, then regurgitating the semi-digested mass, now known as **cud**, and chewing it again.

run - An area of fast-flowing water in a **stream**; a transitional area between a **riffle** and a pool.

runner - A horizontal **stem** growing above ground that may form **roots** at its tip or at **nodes**.... An above-ground, more or less horizontal **stem** that forms roots and shoots at some of the **nodes** under favorable conditions, *e.g.*, strawberry and *Saxifraga flagellaris*....A slender aerial branch rooting at the tip and forming a new plant which eventually becomes detached from the parent. (See: **rhizome**, **stolon**)

runoff (direct runoff) - The flow of water which enters **stream** or river channels promptly after rainfall or snowmelt. Runoff can pick up pollutants from the land and carry them into **streams**....Water from rain that cannot soak into the soil; water that runs off a paved parking lot is an example of runoff.

runways - The covered pathways constructed by termites to protect themselves from weather and the sun.

rush - A round-stemmed, grass-like plant of the family Juncaceae.

russet - In botany, a yellowish brown or reddish brown scar tissue on the surface of fruit.

rust - In **botany**, **fungi** of the **order** Uredinales. Many of these **species** are plant **parasites**. Some are superficially similar to the **smuts**, although their relation to each other is not clear. The **taxonomy** of Urediniomycota, as a whole, is in a state of flux.... A plant disease that produces a reddish-brown discoloration of leaves and stems; caused by various rust fungi....Rusts are fungi of the order Uredinales. Many of these species are plant parasites. Some are superficially similar to the **smuts**, although their relation to each other is not clear.... Any of various fungi causing rust disease in plants.... Destructive diseases of plants (especially cereal grasses) caused by fungi that produce

black powdery masses of spores. (See: **canker, gall, blight, smut**)

R-Strategist - An R-Strategist is characterized by: 1) small parental investment in the young or seeds. The prenatal period is short and postnatal care is minimal. To compensate, an r-strategist produces a large number of offspring or seeds, most of which will not survive long enough to reproduce, and 2) the ability to rapidly exploit unpredictable **environment** opportunities. An example of this is the *Cecropia*. (See: **K-Strategist**)

saddle - In geography, a ridge connecting two higher elevations.

sahel - The transition zone in Africa between the Sahara Desert to the north and **tropical forests** to the south. This dryland belt stretches across Africa and is under stress from land use and climate variability.

Salmonella - a group of rod-shaped **bacteria**, some of which cause food poisoning, typhoid fever, and other infectious diseases in humans and domestic animals.

salinity - The amount of dissolved salt in the water. Salinity is important because it controls what type of plants can grow, or what types of animals can exist, in a given area. For example, around the Gulf of Mexico, **saltmarsh** grows in water closest to the gulf waters with a high salinity, **brackish marsh** in the next landward zone followed by fresh **marsh** and **swamps**.... The degree of salt in water. The rise in sea level due to **global warming** would result in increased salinity of **rivers**, bays and **aquifers**. This would affect drinking water, agriculture and **wildlife**.

salinization - See **soil salinization**.

salt - A salt, in chemistry, is defined as the product formed from the neutralization reaction of acids and bases. Salts are ionic compounds composed of cations (positively charged ions) and anions (negative ions) so that the product is electrically neutral (without a net charge). These component ions can be inorganic such as chloride, as well as organic such as acetate and monoatomic ions such as fluoride, as well as polyatomic ions such as sulfate. ... The substance formed when the hydrogen of an **acid** is replaced by a metal...Sodium chloride, or table salt, is the salt commonly used for the flavoring and preservation of food, but there are also many other salts, *e.g.* magnesium chloride, potassium chloride, cobalt chloride, sodium bromide, sodium chromate, magnesium sulfate, mercury sulfide.

salt panne - An undrained natural depression, as a crater or tectonic basin, in which water accumulates, then evaporates, leaving a deposit of salt... A small lake of brackish water occupying such a depression.... A basin in a semi-arid region where chemical precipitates (evaporites) are deposited due to the concentration by evaporation of natural solutions of salts. The least soluble salts (calcium and magnesium carbonates) precipitate first, on the outside of the pan, followed by sodium and potassium sulphates. Finally, in the centre, sodium and potassium chlorides and magnesium sulphate are deposited.... A

natural or artificial basin used to obtain salt by evaporating brine. also referred to as hardpan. (See: **panne**)

saltmarsh / salt marsh - An **intertidal habitat** comprising salt tolerant **vegetation**. Frequency and duration of **tidal** inundation determines which plants and animal species are present. Saltmarshes are bisected by meandering **creek** systems, which allow **tidal** waters to drain in and out. The creeks slow down **tidal** energy and the **marsh** plants slow down wave energy.... A low coastal **grassland** frequently inundated by the **tide**. (See: **tidal wetland**)

saltwater / salt water - Water that contains a relatively high percentage (over 0.5 parts per thousand) of salt minerals.

saltwater intrusion - Process by which an **aquifer** is **overdrafted** creating a flow imbalance within an area that results in **saltwater** encroaching into **freshwater** supply.

samara - A dry, indehiscent, winged fruit, one-seeded as in *Fraxinus* and *Ulmus* or two-seeded as in *Acer*.

sand - An **inorganic** soil component, the particles of which range between 0.02 and 2 mm diameter.

sand dune - Mound formed in the desert or on beaches from particles of sand that have been deposited by the wind.

sandbar - A ridge of sand caused by the action of waves along a shore... A submerged (at least at high tide) ridge of alluvial sand in shallow water. ...A formation that is formed when waves deposit sand and cause shallow water to be collected.... An offshore ridge or mound which is caused by wave action and submerged (at least at high tide) near the shoreline; typically they are very mobile.

sand flat - See **tidal flat**.

sap - The fluid part of a plant; specifically, a watery solution of gases (as carbon dioxide), salts and other materials from the soil, and **organic** products of metabolism that circulate through the vascular system, carries raw materials to the peripheral **chlorophyll**-bearing cells, translocates the products of **metabolism** to other parts of the plant for use or storage and is a major commercial source of sugar in Sugar Cane, various palms, and the Sugar Maple.

sapling - A young **tree** with a slender trunk.... A loose term for a young **tree** greater than a few feet tall and an inch or so in diameter at breast height and typically growing vigorously and without dead bark or more than an occasional dead branch.

sapric soil material - Muck...The most highly decomposed of all **organic** soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water

content at saturation of all **organic** soil material. (See: **fibric soil material, hemic soil material**)

saprophobic - Restricted to waters that have not been polluted organically.

saprophyte - An **organism** that obtains food from dead **organic** matter....**Organism** living on dead or decaying organic matter that helps natural **decomposition** of **organic** matter in water. ...**Organism** which feeds on dead and decaying **organisms**, allowing the **nutrients** to be recycled into the **ecosystem**. **Fungi** and bacteria are two groups with many important **saprophytes**.... A plant lacking **chlorophyll** that obtains its **nutrients** from dead **organic** matter. The bacteria and **fungi** of decay are examples, but there are also **flowering plants** like the white Indian pipes of eastern US Temperate **Broadleaf Deciduous** Forests or the giant *Rafflesia* of the Indo-Malaysian formation of the **Tropical Broadleaf Evergreen** Forest that are saprophytes. Same as a **saprotroph**.... Non-pathogenic **organism** that obtains nourishment from the products of organic breakdown and decay.

saprophytic - Of or referring to a **saprophyte**.

saprotroph - A **microbe** or other **organism** that feeds on dead plants. Same as a **saprophyte**.

saproxenous - Occurring mainly in clean water **habitats** but also tolerant of some **organic** enrichment if the dissolved oxygen concentration remains above 5.0 mb/l and pH and **temperature** are not adversely altered.

sapwood - In **botany**, the outer, light-colored, water-conducting region of **secondary xylem**....The younger wood nearer to the surface of the **tree**, which does not have the natural extractives (chemicals) to prevent decay.

sartenjales - A local name for forests on raised clay flats in southeastern Peru. They are not seasonally flooded by the rivers, but are so poorly drained as to create a shallowly inundated forest from the rains of the wet season.

saturated thickness - Total water-bearing thickness of an **aquifer**.

saturation zone - The portion below the Earth's surface that is saturated with water is called the saturation zone. The upper surface of this zone, open to **atmospheric pressure**, is known as the **water table**.

savanna / savannah - An **ecosystem** that is primarily **grassland** but with scattered trees and shrubs.... A type of **grassland** with widely spaced trees and a blanket of **grasses** that require a lot of light. Rainfall usually occurs in the warmer, summer months with a dry period of between two to eight months. Fires are typical across savannas during drier months and occur at intervals from one to 50 years..... Essentially lowland, **tropical** and **subtropical grassland**, generally with a scattering of **trees** and/or **shrubs**..... **Tropical**

grassland habitat and community, characterized by **grasses** and scattered **trees** and **shrubs**, and, in South America, groves of *Mauritia* palms. ... A **physiognomic** type of **vegetation** in which tall, widely spaced plants, especially **trees**, are scattered individually over a **landscape** otherwise covered with low-growing plants, especially **graminoids**.
.....Closed **grass** or other predominantly **herbaceous vegetation** with scattered or widely spaced woody plants. The term implies not only a **vegetation**, but also a characteristic **landscape**, climate, and soils. ... One of the Earth's **biomes** characterized by an extensive cover of grasses with scattered trees. The savanna biome is a transitional **biome** between those dominated by **forests** and those dominated by **grasses** and is associated with climates having seasonal **precipitation** accompanied with a seasonal **drought**. Also spelled savana. (See: **grassland, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

savanna woodland - A more or less open, **tropical** or **subtropical woodland** having an **undergrowth** mainly of **grasses**, the **trees** being of moderate height and generally **deciduous** or, if **evergreen**, tending to have small **leaves**. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

scansorial - Pertaining to **arboreal mammals** that climb by means of sharp recurving claws. *e.g.* tree squirrels.... An animal which commonly climbs.... Adapted predominantly for living in **trees**... Climbing by use of claws. Lives predominately in **trees**.

scapulars - In birds, the inner most feathers covering the wings.

scat - Solid waste, or droppings, of **carnivorous** animals.

scavenger - An **organism** that feeds upon dead and dying **organisms**.... An animal that feeds on rotting **organic** matter, like food scraps, dung, and dead animals.... An animal that feeds on dead animals that it did not kill.... An animal that seeks out and feeds off of the remains of dead animals.

scent gland - Scent **glands** are found in the genital area of most **mammals** and in various other parts of the body, such as the underarms of humans and the pre-orbital **glands** of deer. They produce a semi-viscous fluid which contains **pheromones**. These odor-messengers indicate information such as status, mood, and sexual power. The odor may be subliminal, not consciously detectable. ((See: **musk gland, musk, musky**)

school - A large group of **aquatic** animals, especially fish, swimming together.... A large group of fish that swim as a unit.

scientific name - See **Linnaean system**.

scientific law - A scientific law is a regularity which applies to all members of a broad class of phenomena, or a generalized description of how things behave in nature under a

variety of circumstances. Laws are NOT, as is commonly supposed, theories which have reached a high degree of experimental confirmation. Laws are simply statements of a pattern, with no real explanation – that's where *theory* comes in. (Newton's Laws of Gravitation, for example, express mathematically the attractive relationship between bodies, but do not explain them; Einstein's Theory of Gravitation provides an explanation for the relationship observed.)

scion - A plant part inserted into a root stock during grafting.

sclereid - See **stone cell**.

sclerophyll forest: A tall open forest dominated by plants which have **sclerophyll leaves**. These **leaves** are stiff and toughened with a reduced surface area to minimize water loss in regions of low or irregular rainfall. Dry sclerophyll forests are typically up to 30 meters in height with medium **canopy** cover, adapted to low **nutrient** soils, and resistant to fire. Wet sclerophyll forests are typically taller, to 60 meters, and occur on more fertile soils in moister regions or sheltered valleys. (See: **tropical deciduous forest**, **tropical semi-deciduous forest**, **dry forest**, **thorn forest**)

sclerophyll leaves - **Leaves** that are stiff and toughened with a reduced surface area to minimize water loss in regions of low or irregular rainfall.

sclerophyllous - Having tough, leathery leaves... Describes a plant with usually evergreen leaves that are stiff and firm and retain their stiffness even when wilted; they are common in, but not restricted to, regions with a long summer drought and predictable yet limited winter rain.... Describes a plant with usually evergreen leaves that are stiff and firm and retain their stiffness even when wilted; they are common in, but not restricted to, regions with a long summer drought and predictable yet limited winter rain.

sclerotized - Hardened.

scree - Small unconsolidated rocks or gravel, fist-size or smaller, located mostly below rock ridges and cliffs.... a mass of loose boulders, smaller pieces of rock and sediment at the bottom of a cliff or steep slope.... A sheet of coarse rock debris covering a mountain slope without an adjacent cliff.... Small, loose rocks that gather on a slope and often at the bases of cliffs.... Loose rock or gravel on a steep slope.... Scree, also called talus and detritic cone, is a term given to broken rock that appears at the bottom of crags, mountain cliffs or valley shoulders, forming scree slopes. The maximum inclination of such deposits corresponds to the angle of repose of the mean debris size. (See: **talus slope**, **scree slope**)

scree slope - A slope with an angle of at least 30 degrees and covered with small rocks and gravel that have broken away from the cliffs above. (See: **scree**, **talus slope**)

scrub - **Vegetation** consisting of small or stunted **trees** and/or **shrubs**....A variety of plant **communities** that are dominated by **shrubs**, scattered low **trees**, and, in some

areas, cactus or **terrestrial bromeliads**. Scrub can be defined more narrowly as ‘arid lowland scrub’, ‘arid montane scrub’, semi-humid montane scrub’, ‘humid montane scrub, etc....**Vegetation** dominated by **shrubs**....Woody **vegetation** predominantly of **shrubs**, ranging between 0.2 and 3 m in height. ...Treeless **vegetation** (or with less than 10% tree crown cover) and with **shrubs** comprising 25% or more of the absolute **crown cover**.

- **dwarf shrub scrub** - **Scrub vegetation** that is less than 20 cm tall and with 25% or more **crown cover** in dwarf **shrubs**. If tall and/or low **shrubs** are present their combined cover should be less than 25%.
- **dwarf tree scrub** - **Vegetation** with 10% or more **crown cover** in dwarf **trees** which will not achieve heights of 3 m at maturity on those sites.
- **low shrub scrub** - **Scrub vegetation** between 20 cm and 1.5 m in height and with 25% or more **crown cover** in **shrubs**.
- **tall shrub scrub** - **Scrub vegetation** more than 1.5 m in height and with 25% or more **crown cover** in **shrubs**.

scrubby - Of, referring to, or having the characteristics of **scrub**.

scrublands - An area of land that is covered with sparse, stunted, **scrubby** vegetation.

scurf - In **botany**, a covering resembling scales or bran that covers some plant parts...Woolly hairs, usually found on the scape of an **inflorescence**.

scurfy - Covered with scales or **scurf** ...Covered with scale-like or bran-like particles. (See: **scurf**)

scute - A hardened and sometimes enlarged scale or plate; the sections of a turtle shell or the scales on the belly of a snake, or the scales on the legs and feet of birds are called scutes.

sea breeze - A coastal local wind that blows from the ocean onto the land and often begins during some time during the day at many coastal locations. The leading edge of the breeze is termed a sea breeze front. ...Local coastal wind that blows from the ocean to land. Sea breezes usually occur during the day, because the heating differences of land and sea cause pressure differences. Cooler, heavier air from the sea moves in to replace rising warm air on the coastline. ... A breeze that develops when cooler, high-pressure air over the water moves in to replace the rising warm air above the land. (See: **land breeze**, **offshore winds**, **onshore winds**)

sea ice- During the winter, large sections of the Arctic Ocean and adjacent seas freeze into patches of ice. These patches of sea ice may be carried by currents and winds as far south as Newfoundland, Canada.

sea level - The datum against which land elevation and sea depth are measured. **Mean sea level** is the average of **high tide** and **low tide**. (See: **mean sea level**)

sea level rise - Long-term increases in mean sea level. The expression is popularly applied to the anticipated sea level changes due to global warming. (See: **global warming, sea level, mean sea level**)

sea stack - A geological landform consisting of a steep and often vertical column or columns of rock in the sea near a coast, isolated by erosion... An isolated column of rock, the eroded remnant of a sea arch, located in the ocean a short distance from the shoreline.... Usually steep-sided, eroded remnant of coastal cliff... A pillar-shaped bedrock pinnacle resulting from wave erosion along the ocean shore..... An isolated tower of land just offshore, disconnected from the mainland by the collapse of a sea arch.... A column of resistant rock left behind after a sea cliff has eroded.

sea surface temperature - The **temperature** of the layer of seawater (approximately 0.5 m deep) nearest the atmosphere.

seafloor spreading - The addition of new rock to **tectonic plates** moving apart under the oceans.

seagrass - Seagrasses (*e.g. Zostera, Posidonia*) are **rhizome angiosperm grasses** adapted to live underwater in shallow **estuaries** and sheltered **lagoons**. **Conservation** of seagrass beds is important for **nutrient** productivity and to provide **habitat** for juvenile fish. Seagrass **communities** are in serious decline due to human-induced processes like **sedimentation** and **eutrophication**, and activities such as trawling.

search image - A pattern recognized by **predators** to aid in quickly identifying potential **prey**.

seasonally monogamous - Having only one mate for a particular breeding season. (See: **monogamous**)

seaweed - Seaweeds are any of a large number of **marine benthic algae**. They are macroscopic, multicellular, and macrothallic, in contrast with most other **algae**. Seaweed is often found in the seashore **biome**. ... Any large **alga** growing in the sea or on rocks below the high water mark; such plants collectively.... A macroscopic **marine algae** easily observed with the unaided eye... Plant growing in the sea, especially **marine algae**.

second growth - Vegetation that covers an area after the removal of the original **vegetation**, as by cutting or fire... Forest growth that has come up naturally after some drastic interference (*e.g.*, wholesale cutting, serious fire, or insect attack) with the previous forest crop... Refers to regenerating forest. Most second growth is the result of human disturbance, but second growth also is a feature of naturally disturbed **habitats**, such as landslides. Second growth forests differ in **species** composition from adjacent undisturbed forests and are dominated by a small number of rapidly growing **species** (including **pioneer species**). (See: **secondary succession, pioneer species**)

Second Law of Thermodynamics - See **Laws of Thermodynamics**. (See:

thermodynamics)

secondaries - In birds, the flight feathers of the wing arising from the ulna, or "forearm" region of the wing. Secondary feathers are nearer the bird's body than the **primaries** or primary feathers, and are numbered from the outermost feather to the innermost. (See: **primaries**)

secondary compounds - Chemical **compounds** produced by plants as a defense mechanism to help protect them from **herbivores**. A few of these **compounds** include...

- **alkaloids**: prevent **enzymes** to work effectively as biological catalyst; Well-known examples are cocaine, morphine, cannabidiol, caffeine, and nicotine.... They contain nitrogen, and usually oxygen. **Alkaloids** are commonly colorless and bitter-tasting. Chemically, they are usually alkaline, with nitrogen as the base. They react with acids, forming soluble salts in reaction. Many **alkaloids** have physiological toxic effects on humans. ... Nitrogen-containing **compounds**, frequently used as a chemical defense by plants. (See: **alkaloid**)
- **cardiac glycosides**: act on the heart; example - digitalis.
- **cyanogenic glycosides**: affect the respiratory process; found in cassava roots.
- **tannins**: make **vegetation** indigestible; characteristic of temperate oaks. (See: tannin)
- saponins: are soap-like **compounds** and destroy part of the cell membrane.
- **terpenoids**: are fat-soluble **compounds** that are highly **toxic** to some **fungi** and the leaf-cutting ant.
- **toxic amino acids**: tend to replace the amino acids of an **organism** and interfere with the normal synthesis of **proteins**.
- **calcium oxalates**: crystals of calcium oxalate that, when eaten, severely burn the mouth tissues; a common **compound** found in the plant family Araceae.

(See: **phenolics, tannin, xanthophyll, anthocyanin, terpenoids**)

secondary consumer - **Organism** that feeds on **herbivores** ... **Secondary consumers** (also known as **carnivores**) eat **organisms** that eat other **organisms**.... **Carnivores** often feed on **herbivores** but can feed on other **carnivores**. ... A **secondary consumer**, as a **carnivore**, obtains its energy indirectly by feeding upon **herbivores**.... An **organism** that gets its energy by eating **primary consumers** (See: **primary consumer, tertiary consumer, consumer, predator, carnivore**)

secondary contact - The rejoining of two **populations** whose range was divided in two. In Amazonia, this happened several times during the **Pleistocene glaciations** as the areas of forest and **savanna** expanded and contracted in response to the changing climatic conditions. When two **populations** of a **species** are separated (See: **geographic isolation**), they begin to evolve differently in response to differences in the two different regions they now occupy. If in the future their **ranges** are again joined and the **populations** come into secondary contact, one of three things will happen...

- 1) If the two **populations** have not diverged or **evolved** greatly, then they will **interbreed** freely and again behave as a single **species**.

- 2) If the two **populations** have diverged or **evolved** only slightly, there will be limited **hybridization** in the **zone of contact**, but the two **populations** will generally remain separate.
- 3) If the two **populations** have diverged or **evolved** significantly, then they will behave as two separate **species**.

If the two **populations** have diverged or **evolved** to the level of two separate **species**, then one of three things will happen...

- 1) one **species** will outcompete the other and occupy the **ranges** of both.
- 2) the two **species** will coexist side-by-side, occupying different **niches**.
- 3) the two **species** will remain **parapatric**, occupying different areas.

(For information on the formation of **species** see: **speciation, species, geographic speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period, contact zone, secondary contact zone**)

secondary contact zone - The **contact zone** where two historically separated populations have come back into contact once again. (See: **secondary contact, contact zone**)

secondary forest - **Second growth** forest...A **successional** forest regenerating after the removal of the original forest by cutting, fire, etc.... Forest growth that has come up naturally after some drastic interference (*e.g.*, wholesale cutting, serious fire, or **insect** attack) with the previous forest crop... Refers to regenerating forest. Most secondary forest is the result of human disturbance, but secondary forest also is a feature of naturally disturbed habitats, such as landslides. Second growth forests differ in **species** composition from adjacent undisturbed forests and are dominated by a small number of rapidly growing **species** (including **pioneer species**).

secondary growth - Growth resulting from the activities of **lateral meristems** (**vascular cambium** and **cork cambium**).

secondary organism - An **organism** that multiplies in already diseased tissue but is not the primary **pathogen**.

secondary phloem - In **botany**, food-conducting **tissue** formed by the **vascular cambium**.

secondary product - A biochemical product other than substances used in major **metabolic** pathways such as **photosynthesis** and **respiration**.

secondary productivity - See **net secondary productivity**. (Also see: **primary productivity, net primary productivity**)

secondary succession - The change over time of a sequence of **communities** reclaiming land after natural vegetation has been disrupted, such as by fire, farming, or development. ... Nature is constantly undergoing and recovering from disturbances both small and

large. While **primary succession**, the development of life in a lifeless **landscape**, may take thousands or millions of years, secondary succession takes place all the time, over the course of decades, years, or even months. Secondary succession defines the recovery of life after a natural or man-made disturbance to an **ecosystem**. Secondary succession occurs after a variety of disturbances: after a **flood** washes away **trees** and deposits **silt**, or a fire burns through a swath of forest, or after agricultural land is abandoned. In each case, the land will recover relatively quickly and in stages....Any **succession** caused by a human agency following the destruction of part or all of the **vegetation** in an area. (See: **ecological succession, primary succession, community succession, second growth**)

secondary wall - In **botany**, the portion of a **cell wall** laid down inside the **primary wall**.

secondary xylem - Water-conducting **tissue** formed by the **vascular cambium**.

secure - The status given to a **population** of **organisms** that is common, widespread, and abundant.

sedentary - Living in a fixed location, as with most plants, tunicates, sponges, etc. Contrast with **motile**.... Remaining in one area; not active.

sedge - A **grass**-like plant of the **family** Cyperaceae, growing in wet places and having solid stems, **grass**-like leaves, and spikelets of flow...Any member of the Cyperaceae, a family of **flowering plants** that in their **growth form** resemble **grasses**.... A **grass**-like plant of the **family** Cyperaceae.... A plant in the **family** Cyperaceae, **grass**-like in appearance, but with solid stems that are triangular in cross-section.

sediment - Material, such as dirt and stones, that is deposited by wind, water, **glaciers**, or that settles to the bottom of a body of water ...Suspended or deposited soil and **organic** matter in **streams** that originates from **erosion** processes.... Soil, sand, and minerals washed from land into water, usually after rain. They pile up in **reservoirs, rivers** and harbors, destroying fish and **wildlife habitat**, and clouding the water so that sunlight cannot reach **aquatic** plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to wash off the land after rainfall.... Usually applied to material in suspension in water or recently deposited from suspension. In the plural the word is applied to all kinds of deposits from the waters of **streams**, lakes, or seas. ... Weathered rock particles. (See: **colluvium, silt, alluvium**)

sediment load - The **sediment** carried by a **stream** or **river**.... The soil particles transported through a channel by streamflow... The total volume of sediment carried by a stream.... Total sediment in a sample of water. There are three categories of sediment: suspended load, dissolved load, and bed load.

sedimentary - Of or referring to **sediment**.

sedimentary rock - Any rock formed from sediment.... Rock formed by the hardening of material deposited in some process; most commonly sandstone, shale, and

limestone.... Any rock composed of sediment, *i.e.* solid particles and dissolved minerals. Examples include rocks that form from sand or mud in riverbeds or on the sea bottom.... Rock that is formed by the consolidation of sediment particles or of the remains of plants and animals.... Rock formed when particles of eroded rock, called sediment, are pressed or cemented together... Rock formed from the consolidation of sediments transported by water, wind or ice, or deposited by organisms...,, A rock type that has been created by the deposit and compression of sediment. This type of rock is created over millions of years while **igneous** rock can be created overnight. Sandstone is a good example of a sedimentary rock. (See: **igneous**)

sedimentation - The **deposition** or accumulation of **sediment**.... The phenomenon of **sediment** or gravel accumulating....The act or process of depositing **sediment**.... The depositing especially by mechanical means of matter suspended in a liquid.... In flowing **streams** or standing water, an accumulation of dirt or debris deposited by gravity at the bottom of the body of water; sedimentation can also be deposited by air or ice. (See: **deposition**)

seed - A reproductive structure formed from the maturation of an **ovule** and containing an **embryo** and stored food....A structure produced by seed plants which encapsulates the **embryo**. The seed often provides nourishment during **germination**, but may lie **dormant** for many years first.

seed capsule - A seed case which, when dry, splits to release the seeds.

seed coat - The protective outer layer of a **seed**.

seed disperser - An **organism** or an **environmental** factor, such as wind or water, that carries a seed from one area and deposits it in another, for example, a fruit-eating bird may carry whole seeds in its digestive system, a fox may carry seeds on its fur, or the wind may carry the feathery seeds of a Sycamore tree.

seed germination - See **germination**.

seed leaf - See **cotyledon**.

seed plant - A plant that reproduces by means of **seeds** not **spores**....A **spermatophyte**.

seed predator - Animals that eat seeds. Examples of seed predators are rodents, and, among birds, pigeons, macaws, parrots, and seedeaters. (See: **mast fruiting**)

seedling - A young plant that is grown from a seed.... A young plant, shortly after **seed germination**.

seep - A spot where water that is flowing below the Earth's surface slowly oozes out to form a small pool or a spring above the surface.

seepage - An area where water emerges from the soil over an expanded surface, as opposed to a spring; an area where water slowly flows into soil from a body of water such as a canal or ditch.... The slow movement of water into or out of a body of surface or subsurface water. ...The loss of water by infiltration into the soil from a canal, ditch, lateral, watercourse, **reservoir**, storage facility, or other body of water, or from a field.

segment - A clearly defined section of an **organism's** body; an earthworm's body has many segments.

seismic wave - A vibration that travels through Earth and is produced by **earthquakes** and **volcanic** eruptions.

seismograph - An instrument that detects, measures, and records the energy of **earthquake** vibrations at a given location.

selection pressure - A characteristic of the **environment** of an **organism**, either **abiotic** or **biotic**, that influences the probable survival of the **organism**.... The influence of factors extrinsic to an organism (*i.e.* **environmental** factors) on its ability to compete with other **organisms** for reproductive success. (See: **abiotic selection pressure**, **biotic selection pressure**....For information on the formation of **species** see: **speciation**, **species**, **evolution**, **population**, **reproductive isolation**, **reproductive isolating mechanism**, **geographic isolation**, **isolated populations**, **genetic drift**, **founder effect**, **secondary contact**, **refugia**, **natural selection**, **selection pressure**, **Pleistocene Period**)

selective advantage - An **organism's** increased probability of reproduction and producing offspring, conferred by its **genetic** characteristics.

selective pressure - See **selection pressure**.

selection cut - see **selective cutting**.

selective cutting - The periodic removal of mature **trees**, individually or in small groups from an uneven-aged forest.... A system that removes trees individually in a scattered pattern... Removal of mature timber, usually the oldest or largest **trees**, either as single scattered **trees** or small groups.

self-pollination - In **botany**, the transfer of **pollen** from an **anther** to the **stigma** of the same **flower**.

self-pruning - See **natural pruning**.

semelparity - See **semelparous**.

semelparous - Reproducing or breeding only once in a lifetime, such as many species of salmon that die after spawning. (See: **polycarpy**, **monocarpy**, **iteroparous**)

semi-concealed back patch - A partially hidden white patch on the backs of some members of the antbird **family**, Formicariidae, especially in the **genera** *Myrmeciza* and *Cercomacra*. This patch is often displayed in confrontations with rivals.

semi-molten - Almost melted or molten; used to describe **mantle** rocks below the **lithosphere**.

semi-permeable - Partially able to allow substances through, that is, some substances can pass through while others cannot; **cell membranes** are semi-permeable.

semi-precocial - In birds, young that are down-covered when born and can leave the nest under their own power almost immediately after hatching, but are less independent and stay near or in the nest and are fed by the adults until fledging. (See: **precocial**, **altricial**)

senesce - To decline with maturity or age, often hastened by stress from environment or disease.

senescence - The aging process; a breakdown of **cellular** structures leading to death....Also sometimes used to describe lakes or other bodies of water in advanced stages of **eutrophication**.

sensitive species - Plant and animal **species** or **subspecies** for which there is a concern for **population** viability.... **species** that warrant continued monitoring or special management to assure harm is not occurring and will not occur in the future.

sepals - A **flower** part that usually encloses and protects the **flower** bud....Modified leaf that surrounds the base of a **flower** to protect the developing seed or fruit.

sepia - A brownish gray to dark olive brown.... A dark brown color... Reddish brown: a shade of brown with a tinge of red... Term used to describe items that have an overall brown-tone.

seral - Of or about the series of stages in **community** or plant **succession**...Refers to sere. ...Non-**climax**, *i.e.*, a **species** or a **community** demonstrably susceptible to replacement by another **species** or **community**, usually within a few decades or a few centuries at most. (See: **sere**, **seral stage**, **ecological succession**)

seral stage - A stage in the series of changes occurring in the **taxonomic succession** of a plant **community**, e.g. **pioneer** stage or climax stage.... A temporal and intermediate stage in the process of **taxonomic succession**.... A recognizable step or stage in the development of plant **community**. (See: **ecological succession**, **seral**, **sere**)

sere - A sequence of plant **communities** that successively follow one another in the same **habitat** from the **pioneer** stage to a climax stage.... A sequence of events by which the **vegetation** of an area develops and becomes more complex. A sere whose first stage is open water is termed a hydrosere, one whose first stage is dry ground, a xerosere.... A

sequence of plant **communities** that follow one another in an **ecological succession** on the same **habitat** from a pioneer stage to, and terminate in, a particular kind of stable (**climax**) association. (See: **seral, seral stage, ecological succession**)

serotinous - Late in developing; particularly applied to plants that flower or fruit late in the season and to fruit and cones that remain closed for a year or more after the seeds mature, but also to bud opening, leaf shedding, etc.

serotiny - An **ecological** adaptation exhibited by some seed plants, in which seed release occurs in response to an environmental trigger, rather than spontaneously at seed maturation. The most common and best studied trigger is fire, and the term serotiny is often used to refer to this specific case. The term has also been used in the more general sense of plants that release their seed over a long period of time, irrespective of whether release is spontaneous; in this sense the term is synonymous with **bradyspory**.

Serpentine - A hydrous magnesium silicate mineral that is a major rock forming mineral and is found as a constituent in many **metamorphic** and weathered **igneous** rocks. It is found only in areas where oceanic crust is **subducted** and then pushed up again along **fault zones**. Serpentine is commonly found in stony **carbonaceous chondrites**....Consists to a large extent of magnesium silicate. Typically somewhat shiny and greenish, although after being weathered for a long time it becomes reddish brown, and the soil into which it eventually breaks down is usually reddish.... An unusual rock, found in parts of California's soil layer, containing minerals that are harmful to many plants.... A rock consisting almost wholly of serpentine minerals derived from the alteration of previously existing olivine and pyroxene.

serrated - Having or forming a row of small sharp projections resembling the teeth of a saw...Having a saw-toothed edge or margin notched with tooth-like projections.... Having a toothed edge, like the blade of a saw; leaf margins are sometimes serrated with the teeth pointing toward the tip of the leaf.

sessile - Permanently attached or fixed; not free-moving, as with most plants.... In reference to animals, stationary or not able to move about freely, may be attached or anchored to a surface; in reference to plants, any part that is attached directly at the base and has no intervening stalk; some plant leaves and flowers are sessile.... Without a stalk; sitting directly on its base.

sessile leaf - A **leaf** in which the **blade** is directly attached to the **stem**.

set - The burrow or den of a badger.

setae - Bristle or stiff hair-like structures.

sexual dimorphism - A trait in **organisms** in which the male and female differ in one or more characteristics, such as size, color, shape, or structure. **Organisms** exhibiting sexual dimorphism are said to be **sexually dimorphic**....A difference in color or size between

male and female individuals of a species.... differences in the male and female while at the same stage of development. The different **plumages** of male and female Andean Cock-of-the-Rock (*Rupicola peruviana*) is an example of sexual dimorphism.... Differences in appearance between males and females of a species. (See: **dimorphism**)

sexual reproduction - A type of reproduction in which two parents give rise to offspring that have unique combinations of **genes** inherited through the **gametes** of the two parents.

sexual selection - The process first described by Charles Darwin in which females mate preferentially with the most "attractive" males and/or in which males compete among themselves for females. The result of female choice and male/male competition is to select for colorful and/or large males.

sexually dimorphic - See **sexual dimorphism**.

shade density - The percent of light passing through **crowns**, assuming uninterrupted light to have a value of 100%....An expression of opacity. (See: **crown density**)

shade intolerant - Those plant **species** that need full or near full sunlight to regenerate and grow...the opposite of **shade tolerant**.

shade tolerant - Having the ability to live in low light intensities....A plant that is a better competitor under shaded conditions.The capacity of a plant **species** to develop and grow in the shade of, and in competition with, other trees or plants. .. Relative ability of a plant **species** to reproduce and grow under shade. Plant **species** are usually classified in descending order of shade tolerance as: very tolerant, tolerant, intermediate, intolerant, and very intolerant. ...the opposite of **shade intolerant**.

shale - A type of **sedimentary** rock formed in layers that separate easily.

shallows - A stretch of water that is shallow, or lacks depth.

shebonales - In the Peruvian Amazon, this refers to areas dominated by the *shebon* palm, *Attalea butyracea*. See *sartenjales*.

shed - To lose by natural process, example: a snake shedding its skin.... To lose a natural growth or covering by natural process, example: a *Capirona* tree shedding its bark.

sheen - Glistening brightness; luster.

sheet flow - In hydrology, an overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rock surfaces and not concentrated into channels larger than rills.

shield volcano - A volcano with broad, gently sloping sides formed by the buildup of layers of **lava** rocks.

shoal - In **geography**, a place in a body of water where the water is particularly shallow... An area of the sea that is shallow, especially at low tide...A sandbank, visible at low tide, in a stretch of water... A shallow area, often an underwater **sandbar**; sometimes also refers to an island or group of islands (See: **sandbar**)...In **biology**, a large number of fish of the same species swimming together.

shoot - In **botany**, a **stem** bearing **leaves**....Young, immature **stem**.

short distance migrant - See **migrant**.

short-day plant - A plant flowering in response to days shorter than its **critical photoperiod**.

shortwave radiation - The radiation received from the sun and emitted in the spectral wavelengths less than 4 microns. It is also called 'solar radiation'.

shrub - A woody, **perennial** plant differing from a **perennial herb** in its persistent and woody stem, and less definitely from a tree in its lower stature and the general absence of a well-defined main stem.... A **woody plant** that produces no trunk but branches from the base.... A low-growing **perennial** plant with a persistent woody **stem** and low branching habit.... A small, woody plant which grows no more than 4 meters (15 feet) in height; made up of more than one strong, main stem.... A **woody plant** with little or no trunk and having branches near its base.... A woody **perennial** plant differing from a **tree** by its low stature and by generally producing several basal stems instead of a single bole, and from a **perennial herb** by its persistent and woody **stem(s)**.

- **dwarf shrub** - A shrub less than 20 cm tall.
- **low shrub** - A shrub between 20 cm and 1.5 m in height.
- **tall shrub** - A shrub more than 1.5 m in height.

shrubland - A **habitat** type dominated by woody **shrubs**.... An area dominated by short, multi-stemmed plants (**shrubs**)....An area (or vegetation type) in which **shrubs** dominate, including **chaparral**, coastal scrub, and **desert scrub**.

shrubby - An area covered with **shrubs**....Of, referring to, or having the characteristics of **shrubs**.

Sialic - Light rock rich in silica and alumina, and typical of the outer layer of the earth.

siblicide - A type of behavior in which a young bird kills its sibling in the nest. The victim is most often the younger, smaller sibling of a **clutch**, and parents often do nothing to prevent its death. This behavior is common in some **species** of **raptors**, for example.

sieve plate - In **botany**, the perforated end-wall of a **sieve tube** member.

sieve tube - In **botany**, a food-conducting **cell**.... A series of **phloem cells** forming a long **cellular** tube through which food materials are transported.

silk - A strong but elastic substance produced by many insects and spiders. Silk is liquid until it leaves the animal's body.

silt - An **inorganic** soil component, the particles of which range between 0.002 and 0.02 mm diameter....Fine particles, smaller than sand but larger than clay particles, which settle to the bottom of a body of water...**Substrate** particles smaller than sand and larger than clay.... **Sedimentary** materials composed of fine or intermediate-sized mineral particles.... Loose **sedimentary** material composed of rock articles usually 1/20-millimeter or less in diameter. May also be used to refer to soil containing 80 percent or more of such material and less than 12 percent of clay.... Particles of dirt in ponds, lakes, rivers, **streams**, and **marshes**. Silt moves around a lot when it is disturbed. Too much silt in the water is a problem, since it can cover and destroy eggs of fish, amphibians, and other **organisms**.... Soil that runs off the land and accumulates where water slows down. (See: **colluvium**, **sediment**, **alluvium**)

siltation - The process of fine soil particles being deposited from flowing water and accumulating on the bottom, covering other habitats; siltation often kills bottom dwelling **stream organisms** such as immature insects, crayfish, mussels, darters, and suckers. The runoff from logging operations is a serious source of siltation. (See: **silt**)

silvics - The life history and general characteristics of **forest trees** and stands, with particular reference to **environmental** factors.

silviculture - Management of forest land for timber. ...The care and cultivation of forest trees; forestry.... The science and practice of controlling the establishment, composition, and growth of the vegetation of forest stands...The theory and practice of managing forest establishment, composition and growth, to achieve specified objectives..... The theory and practice of controlling the establishment, species composition, growth and quality of forest stands in order to achieve the objectives of management.

simple fruit - A fruit formed from one **ovary**.

simple leaf - Leaf with a single blade and main midrib.... A **leaf** in which the **blade** is not divided into smaller units (**leaflets**).... A leaf with only one blade.

single-celled organism - An **organism** comprised of a single **cell**; **unicellular organism**.

sink - Processes or places that remove or store gases, solutes or solids in accumulating parts of the **environment**....The process of providing storage for a substance. For example, plants, through **photosynthesis**, act as sinks for carbon dioxide, transforming **carbon dioxide** in the air into **organic** matter, which either stays in the plants or is stored in the soils. The plants are a sink for **carbon dioxide**.... A **reservoir** that uptakes a

pollutant from another part of its cycle. Soil and trees tend to act as natural sinks for carbon. (See: **carbon sink**)

sinkhole - A depression in the ground that leads to a passage or to an underground body of water; sinkholes occur naturally and particularly in limestone regions.

sinuate - Wavy; S-shaped.

siphon - A tube-like organ in some animals, such as clams and mussels, used to take in and expel water; water often contains food as it enters and wastes as it is expelled; some **organisms**, such as waterscorpions, use a siphon as a breathing tube while under water.

sister species - The species or other group of organisms that is the most closely related in developmental terms to a given species or group. (See: **sister taxa**)

sister taxa - A related developmental **taxa** or **species**. . . . The **species** or other group of **organisms** that is the most closely related in developmental terms to a given **species** or group. . . . **Taxa** or **species** derived from a common ancestral **taxa** or **species** shared by no other **taxa** or **species**.

sit-and-wait - A method of hunting practiced by some **predators**, such as Roadside Hawk, that sit quietly watching and waiting for a prey animal to come within easy range.

sit-and-wait predator - An animal that attacks its prey from a motionless or concealed position. Also known as an **ambush predator**.

slash-and burn-agriculture - A farming technique in which **vegetation** is cut and then burned on small plots, thus opening the plots for planting crops as well as fertilizing the soil. . . . An agricultural system in which farmers periodically clear land for farming by cutting and burning patches of forest. Traditionally, patches used for agriculture were allowed to revert to forests for a number of years before being replanted, causing minimal impact. Today, however, intensive slash and burn agriculture damages many **tropical forest ecosystems** and is a leading cause of **deforestation**.

sleet - Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate like snow and cause a hazard to motorists. Heavy sleet occurs when a half of an inch of sleet accumulates. . . . A type of precipitation consisting of transparent pellets of ice 5 millimeters or less in diameter. Sleet is rainfall that freezes before it hits the ground. (See: **hail, graupel, freezing rain**)

slime mold - A member of a category of **eukaryotic organisms** that typically have some **fungal**-like attributes and some animal-like attributes. . . . A life form which looks and acts like a single animal, but is in fact a **colony** of amoebas. . . . A naked mass of **protoplasm** having characteristics of both plants and animals; sometimes classified as **protocists**.

slope effect - A vegetational result of **aspect**. It is in evidence in the coastal sage scrub community of southern California's Santa Monica Mtns. North-facing slopes are moister and dominated by *Ceanothus* sp., while south-facing slopes are much drier (receiving more direct sun), and are more sparsely vegetated with the more drought tolerant *Artemisia californica* and *Yucca whipplei*. (See: **aspect**)

slough - Wet or marshy area....A former **stream** channel now containing standing water....**Backwater** or inlet of a **river**, usually having deep layer of mud. (See: **oxbow lake**)

smart growth - Development in or near cities intended to lessen or reverse suburban sprawl, decrease the use of automobiles, and shorten daily travel. Smart Growth occurs in or near existing transportation centers, such as subway stations. It clusters together residential, shopping, and work areas and encourages walking and public transportation.

smog - This is a term used to describe a mixture of smoke and fog. Smog occurs when high concentrations of moisture is combined with smoke (often containing oxides of sulfur and nitrogen) in the presence of high **temperatures** or thermal inversions and the absence of wind. These conditions cause polluted air to stagnate over industrial areas and can create a respiratory health hazard. Large coastal industrial centers with surrounding high ground are more prone to smog. There is often a **diurnal** (over a day) variation in the process of smog formation because one of the necessary components for its formation is sunlight....Thick clouds of smoke and fog that result from **pollutants** in the **atmosphere**.

smut - In **botany**, any **fungus** of the **order** Ustilaginales..... **fungi**, mostly Ustilaginomycetes (of the class Teliomycetae, subphylum Basidiomycota), that cause plant disease.... The smuts are fungi, mostly Ustilaginomycetes (of the class Teliomycetae, subphylum Basidiomycota), that cause plant disease.... Any of a number of plant diseases caused by the smut fungi (Ustilaginales); characterized by masses of dark, powdery, and sometimes odorous spores (*e.g.*, stinking smut of wheat, common smut of maize). (See: **canker, gall, rust, blight**)

snag - A standing dead **tree**. ... A standing dead **tree** trunk and any attached branches.... Snags frequently provide homes for **wildlife**... A standing dead **tree** potentially or actually used by birds and other animals for nesting, roosting, perching, breeding and/or foraging for food.... The standing portion of a dead **tree**, often in reference to one that extends above the surface of water...In deer, an imperfect branch of the antler.

snout - An elongated nose or beak-like projection on the front of the head.

soar - The act of rising upward into the air...To fly or rise high in the air, often with the aid of **thermals**.

sociability - The tendency of **organisms** to live or grow together with others of the same kind.

social dominance - The determination of the behavior of one or more animals by the aggressive behavior or otherwise of other individuals, resulting in establishing a social hierarchy.

social insects - **Insects** that live in **colonies**, such as ants, wasps, bees (order Hymenoptera) and termites (order Isoptera).

social parasitism - When one **species** takes advantage of another **species**. Some **species** of birds will lay their eggs in the nest of other bird **species**, leaving the process of protecting and feeding of their young to the parasitized bird. There are some **species** of ants that will enslave other **species** to care for their eggs, **larvae**, and **pupae**.

sociobiology - The study of the **biological** basis of social behavior in animals, including human beings. Viewing social behavior from a biological standpoint offers insights into behaviors such as sexism, nepotism, **altruism**, parenting and conflict. The contribution of E. O. Wilson was crucial to the development of the science as previously sociobiology was a loose amalgam of **evolutionary** theory, **ecology** and animal behavior.... A synthesis of scientific disciplines which attempts to explain social behavior in animal **species** by considering the Darwinian advantages specific behaviors may have. It is often considered a branch of **biology** and sociology, but also draws from **ethology**, anthropology, **evolution**, **zoology**, archaeology, **population genetics** and other disciplines. Within the study of human societies, sociobiology is closely related to the fields of human behavioral **ecology** and **evolutionary** psychology. Sociobiology investigates social behaviors, such as mating patterns, territorial fights, pack hunting, and the hive society of social insects. Just as **selection pressure** led to animals evolving useful ways of interacting with the natural environment, it led to the **genetic evolution** of advantageous social behavior.

sociogenesis - The key process or steps at the level of a society by which individual **organisms** undergo changes in caste and behavior to build a society, as with **social insects**. (See: **morphogenesis**)

soft mast - see **mast**.

soft parts - A general term for the bill, legs, feet, and bare facial skin of birds.

softwood - A **coniferous** tree or the wood of a **coniferous** tree. In countries where **coniferous** species are of little commercial significance, the terms **softwood** and **hardwood** are commonly used in their literal significance, *i.e.* hard wood, soft wood.... A **coniferous** tree, one belonging to the botanical group Gymnospermae....trees that in most cases have needle or scale-like leaves; also, the wood produced by such trees. (See: **hardwood**)

soil - The accumulation of mineral particles and **organic** matter that forms a superficial layer over large parts of Earth's surface. It provides support and **nutrients** for plants and

is inhabited by numerous and various **microorganisms** and animals....A dynamic natural body composed of mineral and **organic** materials and living forms in which plants grow.....The collection of natural bodies occupying parts of the Earth's surface that support plants and that have properties due to the integrated effect of climate and living matter acting upon parent material, as conditioned by relief, over periods of time... The top layer of the Earth's surface, containing unconsolidated rock and mineral particles mixed with organic material.

soil compaction - Reduction of soil pore space volume (porosity) which results in alteration of the soil chemical and physical properties.

soil fertility - The quality of a soil that enables it to provide **nutrients** in adequate amounts and in proper balance for the growth of specified plants.

soil horizon - Layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil forming processes. The major horizons of mineral soil are as follows:

- **O horizon** - An **organic** layer of debris and decaying plant residue at the surface of a mineral soil.
- **A horizon** - The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified **organic** matter is mixed with the mineral material.
- **A₂ horizon** - A mineral horizon, mainly a residual concentration of sand and **silt** high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.
- **B horizon** - The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.
- **C horizon** - The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon.

soil moisture - Water contained in the **aeration zone** or **unsaturated zone**.

soil salinization - The condition in which the salt content of soil accumulates over time to above normal levels; occurs in some parts of the world where water containing high salt concentration evaporates from fields irrigated with standing water..... A type of environmental degradation that is particularly common in naturally dry areas that undergo irrigation and do not allow for any fallow periods for the land to recover.

solar constant - Total solar **irradiance**. The constant expressing the amount of solar radiation reaching the Earth from the sun, approximately 1370 watts per square meter. It is not, in fact, truly constant and variations are detectable.

solar cycle - Eleven-year cycle of sunspots and solar flares that affects other solar indexes such as the solar output of **ultraviolet radiation** and the solar wind. The Earth's

magnetic field, temperature, and **ozone** levels are affected by this cycle.

solar energy - Any form of energy radiated by the Sun.

solar maximum - The point in the 11-year solar cycle at which sunspot activity is highest.

solar minimum - The point in the 11-year solar cycle at which sunspot activity is lowest.

solar radiation - Energy from the Sun. Also referred to as short-wave radiation. Of importance to the climate system, solar radiation includes ultra-violet radiation, visible radiation, and **infra-red radiation**. ...Energy received from the sun is solar radiation. The energy comes in many forms, such as visible light (that which we can see with our eyes). Other forms of radiation include radio waves, heat (infrared), ultraviolet waves, and x-rays. These forms are categorized within the electromagnetic spectrum... The electromagnetic energy emitted by the Sun, that shines on Earth's surface. (See: **shortwave radiation**)

solar variation - Changes in the amount of radiant energy emitted by the Sun.

soligenous - Referring to **peatlands** with water percolating through them that carries minerals into the **peatland** from outside sources...Pertaining to **muskeg** formed on sloping ground where formation and development are controlled by the movement of surface water and by climate. (See: **minerotrophic**)

solitary - In animals, living alone rather than in groups or **colonies**; in plants, found as a single structure rather than in a cluster.

solstice - Either of the two times of the year when the sun is at its greatest distance from the celestial equator... Solstices occur twice a year, (generally 20-21 June and 21-22 December) when the tilt of the Earth's axis is oriented directly towards or away from the sun, causing the sun to appear to reach its northernmost and southernmost extremes....A solstice occurs twice a year, whenever Earth's axis tilts the most toward or away from the sun, causing the sun to be farthest north or south at noon. On approximately 20-21 June the sun is directly over the Tropic of Cancer at 23° 26' 22" north **latitude** and on approximately 21-22 December the sun is directly over 23° 26' 22" south **latitude**, the **Tropic of Capricorn**. (See: **Summer Solstice, Winter Solstice, equinox**)

solum - The upper and most weathered part of the soil profile, *i.e.*, the A and B horizons.

solution - In chemistry, a **homogeneous** mixture of two or more substances, which may be solids, liquids, gases, or a combination of these... A mixture of a solvent and a solute. In some solutions, such as sugar water, the substances mix so thoroughly that the solute cannot be seen. But in other solutions, such as water mixed with dye, the solution is visibly changed.

solvent - A substance that dissolves other substances, thus forming a solution. Water dissolves more substances than any other, and is known as the "universal solvent".

somatolysis - On an animal, markings that have no relation to body contours, creating a good **camouflage**.

song perch - A favored perch from which a bird sings. The same song perch will be used day after day.

sorus (plural: sori) - An area of **spore** production on the underside of a **fern leaf**.

soupy mud - Wet, slushy, deep mud.

source - In **geography**, the point of origin of a **river** or a **stream**; often occurs in the mountains.

southern migrant - See **austral migrant**.

southern oscillation - A large-scale atmospheric and hydrospheric fluctuation centered in the equatorial Pacific Ocean. It exhibits a nearly annual pressure anomaly, alternatively high over the Indian Ocean and high over the South Pacific. Its period is slightly variable, averaging 2.33 years. The variation in pressure is accompanied by variations in wind strengths, ocean currents, sea-surface **temperatures**, and **precipitation** in the surrounding areas. El Niño and La Niña occurrences are associated with the phenomenon. (See: **El Niño-Southern Oscillation Phenomenon, La Niña-Southern Oscillation Phenomenon, Southern Oscillation Index**).

Southern Oscillation Index - Refers to high and low fluctuations in ocean currents, **atmospheric pressure**, wind and rainfall in the **equatorial** Southern Pacific regions and are caused by differences in ocean temperatures between the east and west tropical Southern Pacific. Fluctuations in the current's intensity are called Southern Oscillation or **El Niño -Southern Oscillation (ENSO)** events. Researchers have yet to discover the causes of abrupt climatic shifts, and until they do the situation leaves us in limbo with regard to climatic predictions. It is possible that large-scale reorganizations of the ocean's circulation following **atmospheric** triggers may be involved and that this can change the weather patterns that depend on it (See: **El Niño-Southern Oscillation Phenomenon, La Niña-Southern Oscillation Phenomenon, southern oscillation**).

spadix - In **botany**, a spike of **flowers** enclosed in a **spathe**.

spathe - In **botany**, a large **bract** enclosing a **spadix**.

spawn - (verb) in fish, to release eggs by the female and sperm by the male as part of the reproductive process.

specialist / specialist species - **Organism** which has adopted a lifestyle specific to a particular set of conditions.A **species** that has a narrow **taxonomic** niche. For example, they may be able to live in only one type of **habitat**, tolerate only specific **environmental** conditions, or eat only a few types of food. The Giant Panda is a **specialist species** because over 95 percent of its diet consists only of **bamboo**. ... **Organism** which has very particular **habitat** needs as opposed to a **generalist** which can live on a variety of different foods or cover types ...Contrast with **generalist**.

specialization - The act or process of becoming specialized...The **adaptation** of an **organism** or part of an **organism** to a particular function or condition in response to **environmental** conditions....An **organism** or part of an **organism** that has been adapted to a particular function or condition.

specialize - To engage in **specialization**.

speciation - The process by which a **species** evolves into two or more other **species**.... Evolutionary process involving the formation of a new species....The process by which one or more **populations** of a **species** become genetically different enough to form a new **species**. The process often requires **populations** to be isolated for a long period of time... The formation of a new **species** by **evolution**.

How fast do new **species** form? Because their generation times are short, new **species** of unicellular **organisms** may **evolve** in years, months, or even days. For plants and animals Darwin theorized that new **species** formed gradually over millions of years. Today scientists know of examples in which **species** arose in only thousands rather than millions of years.

For example, archaeological evidence indicates that settlers from Polynesia introduced banana trees to the Hawaiian islands about a thousand years ago. Today several **species** of moths, unique to the Hawaiian islands, feed on Bananas. These moth **species** are closely related to other plant eating moths in Hawaii. Thus scientists suggest that the banana eating moths arose from other plant eating moths, undergoing **adaptive radiation** in less than the thousand years that banana trees have existed in Hawaii. Evidence from the fossil record has led some scientists to propose that speciation need not occur gradually but can occur in spurts. According to the theory of punctuated equilibrium, all **populations** of a **species** may exist for a relatively long time at or close to genetic equilibrium. Then the equilibrium may be interrupted by a brief period of rapid **genetic** change in which speciation occurs. Some scientists argue that if new **species** evolved gradually, the fossil record should show many examples of transitional forms- **species** with characteristics intermediate between those of ancestral **species** and new **species**. However, for most **organisms** such transitional forms are absent from the fossil record. Instead the fossil record shows that most **species** remained the same for hundreds of thousands or millions of years. Then new, related **species** suddenly appeared. Whether new **species** form gradually or rapidly is still a point of debate among scientist. However, scientists agree that **natural selection**, whether gradual or rapid, is the most important factor in speciation....The process by which new **species** arise. The process by which discontinuities between **populations** occur due to the development of mechanisms creating the **reproductive isolation** of one **population** from the other.

- **Allopatric** speciation: **species** formation that occurs during **geographic isolation** of **populations**. Generally believed to be the most common way in which new **species** arise, especially among the higher animals (See: **geographic speciation**).
- **Sympatric** speciation: the formation of new **species** without **geographic isolation**; the acquisition of reproductively isolating mechanism among individuals coexisting in the same area...The **genetic** divergence of multiple **populations** (from a single parent species) inhabiting the same **geographic** region such that those **populations** become different species.

A number of models have been proposed to account for this mode of speciation. In the most popular, disruptive speciation, homozygous individuals may, under particular **environmental** conditions, have a greater fitness than those with alleles heterozygous for a certain trait. Under the mechanism of **natural selection**, therefore, homozygosity would be favored over heterozygosity, eventually leading to speciation.

Disruption may also occur in multiple-gene traits. The Medium Ground Finch (*Geospiza fortis*) is showing gene pool divergence in a population on Santa Cruz Island. Beak **morphology** conforms to two different size ideals, while intermediate individuals are selected against. Some characteristics (termed “magic traits”), such as beak **morphology**, may drive speciation because they also affect mating signals. In this case, different beak **phenotypes** may result in different bird calls, providing a barrier to exchange between the **gene pools**.

Sympatric speciation events are vastly most common in plants when they double or triple their number of **chromosomes**, resulting in a condition called polyploidy.

A rare example of **sympatric** speciation in animals is the divergence of "resident" and "transient" Orca forms in the northeast Pacific. Resident and transient Orcas inhabit the same waters, but avoid each other and do not **interbreed**. The two forms hunt different **prey** species and have different diets, vocal behavior, and social structures.

(For information on the formation of **species** see: **speciation, species, ring species, geographic speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period.**)

species - 1) a group of **organisms** that have a unique set of characteristics (like body shape and behavior) that distinguishes them from other **organisms**. It is usually defined as an **interbreeding** group of **organisms** that is reproductively isolated from other such groups. If members of a **species** reproduce, individuals within the same **species** can produce fertile offspring. (2) the basic unit of biological **classification**. Scientists refer to **species** using both their **genus** and **species** name. ... A reproductively isolated aggregate of **interbreeding organisms**.... Plants and animals that display features in common. When they breed, they produce offspring that can also breed.... A unit of classification of plants and animals, consisting of the largest and most inclusive array of sexually reproducing and cross-fertilizing individuals which share a common gene pool....The smallest natural **population** regarded as sufficiently different from all other **species** to

deserve a name, and assumed or proved to remain different despite **interbreeding** with related **species**. . . . Any native taxon of the plant or animal kingdom, including **subspecies**, distinct **population** segments, or designated evolutionarily significant units. . . . Related **organisms** or **populations** having common attributes and potentially capable of **interbreeding**. . . . A group of individuals sharing many characteristics and **interbreeding** freely. . . . **Taxonomic** category subordinate to a **genus** composed of individuals with common characteristics that distinguish them from other groups of the same **taxonomic** level; in sexually reproducing **organisms**, a group of interbreeding natural **populations** that are **genetically** distinct from other such groups. The most objective level in the classification of **organisms**. For extant, sexual species, a species is defined as the collection of individuals capable of breeding among themselves and producing viable offspring. This definition has problems. For example, in captivity it produces a wider definition, *i.e.* smaller number of 'species', because of successful breeding between different 'wild species', *e.g.* successful breeding between closely related species of wild duck. For organisms that reproduce asexually, *e.g.* many species of dandelions (*Taraxacum* spp.) and brambles (*Rubus* spp.), and for fossils, a more subjective criterion of **morphological** similarity is used.

Speciation is a process that can be looked at from many points of view, whether it be by Behaviorists, Phylogeneticists, Systematists or Evolutionary biologists. So, when trying to decide on a single definition, many conflicting ideas come into play depending on the angle you are examining it from. Most often, the definition for a species, depends on the specific criteria you have set for boundaries.

As you can see, this is not as easy to define as it initially seemed. So, how do we begin to understand speciation? First and foremost, it is best to understand the current definitions that are accepted for a species. Then, tackle the problem of understanding the difference between concepts to finally be able to choose a definition that works best for you.

Species Concepts for Speciation:

1. Biological Species Concept (Isolation Concept) - This species concept defines a species as a **genetically** cohesive group of **populations** that are reproductively isolated from other such groups. With the Biological Species Concept, **geographic isolation** leads to **genetic** change; if and when these different groups later come back into contact, reproductive **isolating mechanisms** such as vocalizations, timing of **migration**, and so on will serve to maintain the essential integrity of the separate groups of **populations** as distinct species. This species concept allows for some interbreeding, sometimes extensive **interbreeding**, and these **hybrids** can indeed be fertile; but within a **contact zone**, there are enough pure individuals of either species to indicate that **isolating mechanisms** are taking place. . . . species are groups of interbreeding natural populations that are reproductively isolated from other such groups. . . . "Groups of actually or potentially interbreeding natural populations which are reproductively isolated from other such groups" (Mayr 1963). "Systems of populations, the gene

exchange between these systems is limited or prevented in nature by a reproduction **isolating mechanism** or by a combination of such mechanisms" (Dobzhansky 1970)

2. **Recognition Species Concept** - "The most inclusive **population** of individual biparental **organisms** which share a common fertilization system [specific mate recognition system]" (Paterson 1985)

3. **Cohesion Species Concept** - "The most inclusive **population** of individuals having the potential for phenotypic cohesion through intrinsic cohesion mechanisms [**genetic** and/or demographic exchangeability]" (Templeton 1989)

4. **Phylogenetic Species Concept** - The Phylogenetic Species Concept, as compared to the **Biological Species Concept**, offers a more narrow definition of species as "the smallest diagnosable cluster of individual organisms within which there is a parental pattern of ancestry and descent." Suffice it to say, this species concept would recognize many currently recognized subspecies as full species."An irreducible (basal) cluster of **organisms**, diagnosable distinct from other such clusters, and within which there is a parental pattern of ancestry and descent" (Cracraft 1989)

5. **Genealogical Species Concept** - "exclusive' groups of **organisms**, where and exclusive group is one whose members are all more closely related to each other than to any **organisms** outside the group..." (Baum and Shaw 1995)

6. **Evolutionary Species Concept** - "A single lineage of ancestor-descendant **populations** which maintains its identity from other such lineages and which has its own **evolutionary** tendencies and historical fate" (Wiley 1978).

7. **Genotypic Species Cluster Definition** - "Distinguishable groups of individuals that have few or no intermediates when in contact..."
"...clusters are recognized by a deficit of intermediates, both at a single loci (heterozygote deficits) and at multiple loci (strong correlations or disequilibria between loci that are divergent between clusters)" (Mallet 1995).

From this list, 1-3 are process based, while 4-7 are pattern based. Many researchers are adamant that pattern not process should form the basis of any species definition while the others are just as adamant for the opposite.

Ecological Species Concept - The ecological species concept is a concept of species in which a species is a set of organisms adapted to a particular set of resources, called a niche, in the environment. According to this concept, populations form the discrete phenetic clusters that we recognize as species because the ecological and evolutionary processes controlling how resources are divided up tend to produce those clusters.

Ecological research, particularly with closely related species living in the same area, has abundantly demonstrated that the differences between species in form and

behavior are often related to differences in the ecological resources the species exploit.

The ecological species concept should be contrasted with the biological, recognition and cladistic species concepts.

A generally defined and consistently applied definition of species is vital for the study of **diversity**, as well as, **phylogenetic** investigations of diversification...which ultimately gives valuable insights into the study of speciation.

However, what previously seemed easy to define, is in fact a hot issue being debated to this day... with the science community still not using a single, general concept of what exactly defines a species.

from Wikipedia's entry for **species**...

The question of how best to define "species" is one that has occupied biologists for centuries, and the debate itself has become known as the species problem. One definition that is widely used is that a species is a group of actually or potentially **interbreeding populations** that are reproductively isolated from other such groups.

The definition of a species given above is derived from the behavioral biologist Ernst Mayr, and is somewhat idealistic . Since it assumes **sexual reproduction**, it leaves the term undefined for a large class of **organisms** that reproduce asexually. Biologists frequently do not know whether two morphologically similar groups of **organisms** are "potentially" capable of interbreeding. Further, there is considerable variation in the degree to which **hybridization** may succeed under natural and experimental conditions, or even in the degree to which some **organisms** use **sexual reproduction** between individuals to breed. Consequently, several lines of thought in the definition of species exist:

Typological species - A group of **organisms** in which individuals are members of the species if they sufficiently conform to certain fixed properties. The clusters of variations or **phenotypes** within specimens (*i.e.* longer and shorter tails) would differentiate the species. This method was used as a "classical" method of determining species, such as with Linnaeus early in evolutionary theory. However, we now know that different **phenotypes** do not always constitute different species (*e.g.*: a 4-winged *Drosophila* born to a 2-winged mother is not a different species). Species named in this manner are called morphospecies.

Morphological species - A **population** or group of **populations** that differs morphologically from other populations. For example, we can distinguish between a chicken and a duck because they have different shaped bills and the duck has webbed feet. Species have been defined in this way since well before the beginning of recorded history. This species concept is much criticized because more recent **genetic** data reveal that **genetically** distinct **populations** may look very similar and, contrarily, large **morphological** differences sometimes exist between very closely related **populations**. Nonetheless, most species known have been described solely from **morphology**.

Biological / Isolation species - A set of actually or potentially interbreeding **populations**. This is generally a useful formulation for scientists working with living examples of the higher **taxa** like mammals, fish, and birds, but meaningless for **organisms** that do not reproduce sexually. It does not distinguish between the theoretical possibility of **interbreeding** and the actual likelihood of **gene flow** between **populations** and is thus impractical in instances of **allopatric** (geographically isolated) **populations**. The results of breeding experiments done in artificial conditions may or may not reflect what would happen if the same **organisms** encountered each other in the wild, making it difficult to gauge whether or not the results of such experiments are meaningful in reference to natural **populations**.

Biological / reproductive species - Two **organisms** that are able to reproduce naturally to produce fertile offspring. **Organisms** that can reproduce to almost always make infertile **hybrids**, such as a mule or hinny, are not considered to be the same species.

Mate-recognition species - A group of **organisms** that are known to recognize one another as potential mates. Like the isolation species concept above, it applies only to **organisms** that reproduce sexually. Unlike the isolation species concept, it focuses specifically on pre-mating **reproductive isolation**.

Phylogenetic (Cladistic)/ Evolutionary / Darwinian species - A group of **organisms** that shares an ancestor; a lineage that maintains its integrity with respect to other lineages through both time and space. At some point in the progress of such a group, members may diverge from one another: when such a divergence becomes sufficiently clear, the two **populations** are regarded as separate species. **Subspecies** as such are not recognized under this approach; either a **population** is a **phylogenetic** species or it is not taxonomically distinguishable.

Ecological species - A set of **organisms** adapted to a particular set of **resources**, called a **niche**, in the **environment**. According to this concept, **populations** form the discrete phenetic clusters that we recognize as species because the **ecological** and **evolutionary** processes controlling how **resources** are divided up tend to produce those clusters.

Genetic species - Based on similarity of **DNA** of individuals or **populations**. Techniques to compare similarity of **DNA** include **DNA-DNA hybridization**, and **genetic** fingerprinting (or **DNA** bar-coding).

Phenetic species - Based on **phenotypes**.

Recognition species - Based on behavioral interactions.

Microspecies - Species that reproduce without **meiosis** or fertilization so that each generation is genetically identical to the previous generation. (See: **apomixis**)

Cohesion species - Most inclusive population of individuals having the potential for phenotypic cohesion through intrinsic cohesion mechanisms. This is an expansion of the mate-recognition species concept to allow for post-mating isolation mechanisms; no matter whether populations can hybridize successfully, they are still distinct cohesion species if the amount of **hybridization** is insufficient to completely mix their respective gene pools.

Evolutionarily Significant Unit (ESU) - An evolutionarily significant unit is a population of **organisms** that is considered distinct for purposes of conservation. Often referred to as a species or a wildlife species, an ESU also has several possible definitions, which coincide with definitions of species.

In practice, these definitions often coincide, and the differences between them are more a matter of emphasis than of outright contradiction. Nevertheless, no species concept yet proposed is entirely objective, or can be applied in all cases without resorting to judgment. Given the complexity of life, some have argued that such an objective definition is in all likelihood impossible, and biologists should settle for the most practical definition. For most **vertebrates**, this is the biological species concept (BSC), and to a lesser extent (or for different purposes) the phylogenetic species concept (PSC). Many BSC subspecies are considered species under the PSC; the difference between the BSC and the PSC can be summed up insofar as that the BSC defines a species as a consequence of manifest **evolutionary** history, while the PSC defines a species as a consequence of manifest **evolutionary** potential. Thus, a PSC species is "made" as soon as an **evolutionary** lineage has started to separate, while a BSC species starts to exist only when the lineage separation is complete.

(For information on the formation of **species** see: **speciation, species, ring species, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period**. Also see **ring species, classification, taxon, taxonomy**)

species barrier - The idea that there is a natural barrier between species that preserves their integrity or identity. This idea has no known foundation in biology. The parameters that limit the ranges and variations of species are fluid and variable, and species exist as reproductive **communities** rather than as separate creatures.

species cluster - See **Genotypic Species Cluster Definition** under **species**.

species composition - The kinds and numbers of **species** occupying a specified area.

species diversity - The number of different **species** occurring in some location or under some condition. Of the total number of **species** in a **biotic population** only a few are usually abundant while most are relatively uncommon. Because the large number of uncommon, relatively unimportant **species** largely determine the amount of "**species diversity**", this property is often expressed as a **species diversity index** which is calculated so as to better reflect the importance of those few **species** whose numbers, **biomass, productivity**, etc., so greatly dominate these attributes of the entire biological **population**. Diversity tends to be high in older **communities** and low in newly established ones. Diversity is directly correlated with **population stability**, but it is not certain to what extent this relationship is a cause-and-effect one.

species integrity - The idea that a **species** has integrity as a biological unit. This would have to be based on the identity of the **genetic** material carried by the **species**. However, it is not clear how a species might be defined **genetically**, and this issue is the subject of debate among those seeking to understand the nature of **species**.

species inventory - A sample survey to estimate the number of **flora** and/or **fauna** inhabiting a defined area. The level of resolution of such a listing varies with objectives and may range from only a few conspicuous or predominant **species** to a complete list for the area. A **species** inventory does not necessarily constitute an **environmental** baseline study and the two phrases should not be used interchangeably.

species of concern - An informal term for a plant or animal with declining **populations** and believed in need of concentrated **conservation** actions such as research, monitoring, or removal of threats, and given legal classification as threatened or **endangered**.

species richness - The number of **species** of a given **taxon** within a given **ecosystem**.

specific epithet - **Taxonomic classification**; the second part of a **species'** scientific, **binomial** name.

speculum - A patch located on the wings of certain birds, butterflies, and moths; on ducks, the speculum is usually a bright or metallic color, while on butterflies and moths it may be transparent; the speculum, if present, can be used as an identification mark in the field.

sperm - Male **reproductive cell** that fertilizes the egg.... A male sex **cell**.

spermatophore - A capsule containing many **sperm**; a mass of **sperm** resting on top of a jelly-like base deposited by the male during breeding; some male **organisms**, such as salamanders, release a spermatophore that is transferred to or picked up by the reproductive parts of the female.

spermatophyte - The spermatophytes (also known as phanerogams) comprise those plants that produce **seeds**. They are a subset of the **embryophytes** or land plants. The living spermatophytes form five groups:

- cycads, a **subtropical** and **tropical** group of plants with a large crown of **compound leaves** and a stout trunk.
- Ginkgo, a single living **species** of **tree**.
- **conifers**, cone-bearing **trees** and **shrubs**.
- **gnetophytes**, **woody plants** in the genera *Gnetum*, *Welwitschia*, and *Ephedra*.
- **Angiosperms**, the **flowering plants**, a large group including many familiar plants in a wide variety of **habitats**.

Sphagnum - Predominant **moss genus** found in **bogs**, sometimes called **peat moss**.... Any of a **genus** of **mosses** that grow in wet **acidic** areas, where there remains become compacted with other plant debris to form **peat**.... Any of various pale or ashy **mosses** of the **genus** *Sphagnum* whose decomposed remains form **peat**...A **genus** of between 150-350 species of **mosses** commonly called **peat moss**, due to its prevalence in **peat bogs** and **mires**. **Bogs** are dependent on **precipitation** as their main source of water and **nutrients**, thus making them a favorable **habitat** for *Sphagnum* as it can retain water quite well. Members of this **genus** can hold large quantities of water inside their **cells**; some **species** can hold up to 20 times their dry weight in water, which is why **peat moss** is commonly sold as a soil amendment. *Sphagnum* and the **peat** formed from it do not decay readily because of the **phenolic compounds** embedded in the **moss's cell walls**. **Peat moss** can also acidify its surroundings by taking up cations such as calcium and magnesium and releasing hydrogen ions. (See: **bog, carr, fen, heath, heathland, mire, moor, muskeg, peat, peat bog, peatland**)

spigots - Tubes that spin spider **silk** into strands.

spike - In **botany**, an **inflorescence** in which the **flowers** are attached to the main **stem** without stalks.

spine - A modified **leaf** part that is hard and sharply pointed.

spinnerets - Two to six finger-like organs at the tip of a spider's **abdomen**. Different types of silk made by the spider emerge from the spinnerets.

spiracle - A breathing hole in the side of an insect that takes oxygen into the body and expels waste gases, such as carbon dioxide.

split - In **taxonomy**, to divide one **genus** or one **species** into two or more **genera** or **species**....Splitting is the division of what was thought to be a single species into usually two, or possibly more, species....The opposite of **lump**.

spongy cell - One of a group of loosely packed **photosynthetic cells** in a **leaf**.

sporangium (plural **sporangia**) - A plant or **fungal** structure producing and containing **spores**. Sporangia occur on **Angiosperms**, **Gymnosperms**, **ferns**, fern allies, **mosses**, **algae**, and **fungi**.... Fungal structure producing asexual **spores**, usually zoospores.

spore - A small, usually one-celled **reproductive** structure produced by seedless plants, **algae**, **fungi**, and some **protozoans** that is capable of developing into a new individual.... A reproductive **cell** that grows directly into a new plant.... Reproductive body of fungi and other lower plants, containing one or more cells; a bacterial cell modified to survive an adverse environment.

sporeling - A young plant produced by a **germinated** spore.

sporophyte - A **diploid**, **spore**-producing plant in an **alternation of generations**.... A plant or phase of a plant that bears the **spores** formed during the sexual reproductive cycle... the plant which bears not sexual organs but asexual **spores**; in lycopods and **ferns**, the ordinary plant; in seed plants the whole plant except the embryo sac and **pollen** grain.... The **spore** producing plant that alternates with the **gamete** producing plant in the reproductive cycle of plants. Sporophytes are **diploid** organisms that produce **spores** in **sporangia**. The **spores** then germinate and produce the **gametophyte** form of the **species**. ... The **diploid** generation in the life cycle of a plant, and that produces **haploid** spores by **meiosis**.... All land plants, and some **algae**, have life cycles in which a **haploid gametophyte** generation alternates with a **diploid** sporophyte, the generation of a plant or **alga** that has a double set of **chromosomes**. (See: **gametophyte**)

sporozoan - A **parasitic spore**-forming **protozoan**.... Any of many **parasitic protozoans**, of the **class** Sporozoa, that reproduce alternately sexually and asexually via **spores**; they are responsible for diseases such as **malaria**.

sporulate - To produce spores.

spring - The emergence of **groundwater** at the land surface, usually at a clearly defined point; it may flow strongly or just ooze or seep out.

spring high tide - The exceptionally high tide that occurs at the time of the new moon or the full moon when the sun, moon, and Earth are approximately aligned.

spring tide - The exceptionally high and low tides that occur at the time of the new moon or the full moon when the sun, moon, and Earth are approximately aligned.

springtail - A hexapod that lives in **leaf litter** and soil; hexapods have six feet, such as insects and close relatives.... A primitive **insect** belonging to the apterygotes (wingless forms), subclass Apterygota, **order** Collembola.

springwood - In **botany**, **xylem** laid down by the **vascular cambium** in spring and early summer in the north.

spur - A tubular projection from a **flower**.

squall line - A solid or nearly solid line or band of active **thunderstorms**.

stamen - The male part of a **flower**, consisting of an **anther** and **filament**.... The male structure of a flower, composed of an anther, bearing pollen, and a filament, or stalk. (See: **pollen**)

staminate - Having pollen-bearing organs (**stamens**) only. May apply to individual male plants of a **dioecious** species or to flowers, inflorescences, or strobili. (See: **pistillate**)

stand - A **community** of trees sufficiently uniform in **species**, age, arrangement or condition to be distinguishable as a group from the forest or other growth on the area.

standard of living - In many ways, a measure of the quantity of **natural resources** utilized to maintain one's lifestyle.

startle display - A type of display employed by a wide variety of **insects** to startle potential **predators**. Examples are the large, brightly colored eyespots on the hind wings of many moths, expose when disturbed, or certain sphinx moth caterpillars that can transform their body into an excellent duplicate of the head of a small viper.... A response by an animal to discovery by a predator in which the potential victim exposes some previously hidden markings, for example an eyespot, in order to surprise its attacker. This may enable the victim to escape or divert the attentions of the predator elsewhere. Some camouflaged insects use this as a second line of defense, flicking their forewings forwards when disturbed to reveal a pair of vividly colored eyespots on the hindwings.

starch - The principal food-storage substance of higher plants; a **carbohydrate** consisting of numerous **glucose** units.

stem - The part of a plant that supports leaves and flowers and also transports water and other substances between the roots and leaves....The **leaf**- and **flower** bearing part of a plant.

stem tuber - An enlarged tip of a **rhizome** containing stored food.

stenotypic species - A **species** with a low tolerance to **environmental** change, typically with only localized distribution covering a small **environmental gradient**. Stenotypic **species** may be more vulnerable and subject to **conservation** requirements. (See: **eurytypic species, environmental gradient**)

steppe - A **landscape** term referring to the broad, undulating, treeless and grassy plains of Central Asia, especially eastern Russia and Siberia. It implies a characteristic **landscape**, soils, climate, and **vegetation** similar to **prairie** in North America....**Temperate** zone **vegetation** dominated by **grasses** and occurring in **climates** where **zonal soils** are too dry to support **trees**. Open **grass** or other **herbaceous vegetation**, the plants or tufts discrete but averaging less than their diameters apart. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, veldt, meadow, campos, paramo, puna, savanna woodland**)

steppes - The grasslands of central Russia.

stewardship - Responsible care-taking, based on the premise that we do not own but are managers of resources and are responsible to future generations for their condition.... The belief that it is humanity's duty and responsibility to conserve and protect our planetary life-support systems prudently and conscientiously. In the words of the World Conservation Strategy (IUCN, 1980): "We have not inherited the Earth from our parents, we have borrowed it from our children".

stigma - In biology, the female organ of a flower which receives the pollen, or the respiratory spiracle of an **insect**... In **botany**, The part of a **pistil** that receives **pollen**... The tip of the female part of the flower, which receives the male **pollen** grains ... The sticky part of the female portion of a flower onto which **pollen** will stick... The structure on which **pollen** grains germinate in a **pistil**.

stilt root - A root that leaves the trunk or a branch well above ground and helps anchor the tree. Same as **prop root**.

stinger - A hollow structure on the tail of **insects** and scorpions that pierces flesh and injects **venom**.

stinging hair - A **multicellular** hair containing an irritant fluid. (See: **urticating hairs**)

stinging nettle - An **herbaceous flowering plants** of the genus *Urtica*, native to Europe, Asia, northern Africa, North America, and South America. Both the leaves and the stems are covered with brittle, hollow, silky hairs which cause a burning sensation when they come in contact with bare skin. Recent research has revealed the cause of the sting to be from three chemicals - a histamine to irritate the skin, acetylcholine to bring on a burning sensation and hydroxytryptamine to encourage the other two chemicals. Bare skin brushing up against a stinging nettle plant will break the delicate defensive hairs and release the trio of chemicals, usually resulting in a temporary and painful skin rash. (See: **stinging hair, urticating hairs**)

stipe - A supporting stalk, such as the stalk of a **pistil**, a gill **fungus**, or the **petiole** of a fern leaf.

stipule - A small, leaf-like structure at the base of the leaf's stalk where it attaches to the stem; not all plants have stipules, the rose is an example of one that does.... Small leaf-like structures found at the bottoms of certain leafstalks... An outgrowth from the base of a **leaf** stalk; sometimes functioning as a protective structure.... A small structure or appendage found at the base of some leaf petioles, usually present in pairs. They are morphologically variable and appear as scales, spines, glands, or leaflike structures.

stock - A rooted plant into which a **scion** is inserted during **grafting**.

stolon - An aerial shoot from a plant with the ability to produce **adventitious roots** and new offshoots of the same plant. A horizontal stem which grows along the surface of the soil and which propagates vegetatively by forming new shoots and roots at its **nodes**. Compare rhizome and runner. (See: **rhizome**, **runner**)

stoma (plural: **stomata**) - A pore in the **epidermis** of **leaves** and **herbaceous stems**....A small opening found in the **epidermal** layer of plants, allowing access for carbon dioxide and the release of water. Stomata are surrounded by guard **cells** that control the opening size.... Openings in the **epidermis** of a stem or leaf of a plant which permit gas exchange with the air. In general, all plants except **liverworts** have stomata in their **sporophyte** stage.... Minute openings on the surfaces of leaves and stems through which gases (*e.g.*, oxygen, **carbon dioxide**, **water vapor**) and some dissolved **minerals** pass into and out of plants.... Tiny pore of the lower **epidermis** of a leaf through which gases and water pass.... A pore in the epidermis and the two guard cells surrounding it. Sometimes applied only to the pore.

stone cell - A hard, thick-walled plant **cell**.

stoop - The action of a bird of prey swooping downward.

storm surge - An abnormal rise of the sea along a shore as the result, primarily, of the winds of a storm....A rise above the normal water level along a shore caused by strong onshore winds and/or reduced atmospheric pressure. The surge height is the difference of the observed water level minus the predicted tide. Hurricanes often produce a high storm surge.

strain - In biology, the collective descendants of a common ancestor; a **race**, stock, line, or breed....Any of the various lines of ancestry united in an individual or a family; ancestry or lineage.A group of **organisms** of the same **species**, having distinctive characteristics but not usually considered a separate breed or **variety**. Example: *a superior strain of wheat; a smooth strain of bacteria*....An artificial **variety** of a domestic animal or cultivated plant.

strangler - A plant that begins life as an **epiphyte** in the **canopy** of a forest and sends its roots down the trunk of a **host** tree and into the **substrate**. The roots may form a thick woody net around the host's trunk, and as the roots continue to grow (**anastomose**), the put pressure on the **host** tree's transport tissues (**xylem** and **phloem**), restricting the movement of water and **nutrients**. The foliage of the strangler contributes to the eventual killing of the host tree by blocking sunlight from reaching the latter's leaves. This is a type of **growth form** found in **tropical** forests.

stratification - The organization of trees in a forest in different horizontal layers such as **emergent**, **canopy**, **subcanopy**, **understory**, **undergrowth**, **shrub**, **herb** and **ground** layers.... Separating into layers...In **botany**, a cold treatment given to the **seed** of some **species** to improve the likelihood of **germination**.

stratigraphy - the branch of geology concerned with the order and relative position of strata and their relationship to the geological time scale.... the analysis of the order and position of layers of archaeological remains.... the analysis of the order and position of layers of archaeological remains.

stratocumulus cloud - A low cloud, predominantly, stratiform with low, lumpy, rounded masses, often with blue sky between them.... Low **altitude** gray colored clouds composed of water droplets that have a patchy appearance. Each cloud patch consists of a rounded mass. This cloud has a somewhat uniform base and normally covers the entire sky. Between the patches blue sky can be seen.

stratosphere - The region of the upper **atmosphere** extending upward from the **tropopause** to about 30 miles (50 km) above the Earth, characterized by little vertical change in **temperature**. ... The region of the **atmosphere** above the **troposphere** that extends upwards between approximately 10 and 50 km **altitude**. This zone contains very little water.... Region of the **atmosphere** between the **troposphere** and **mesosphere**, having a lower boundary of approximately 8 km at the poles to 15 km at the equator and an upper boundary of approximately 50 km. Depending upon **latitude** and season, the **temperature** in the lower stratosphere can increase, be isothermal, or even decrease with **altitude**, but the **temperature** in the upper **stratosphere** generally increases with height due to absorption of **solar radiation** by **ozone**. ... Reaches up to about 50 kilometers, where the **stratopause** is. Includes the **ozone layer**. (See: **atmosphere, planetary boundary layer, troposphere, tropopause, stratopause, mesosphere, mesopause, thermosphere, ionosphere, exosphere**)

stratospheric - Of or referring to the **stratosphere**.

stratospheric ozone layer - See **ozone layer**.

stratopause - The upper boundary of the **stratosphere**, between the **stratosphere** and the **mesosphere**. (See: **atmosphere, planetary boundary layer, troposphere, tropopause, stratosphere, mesosphere, mesopause, thermosphere, ionosphere, exosphere**)

stratum (plural: **strata**) - In **geomorphology**, a layer within the Earth's crust that generally consists of the same kinds of **soils** or rock material.

stratus clouds - A low, gray cloud layer with a rather uniform base whose **precipitation** is most commonly drizzle.

stream - A body of flowing water, usually forked, and two or more of which combine to form a **river**; streams often are of a size that can be waded across; sometimes called a creek....A general term for a body of flowing water; natural water course containing water at least part of the year. In **hydrology**, it is generally applied to the water flowing in a natural channel as distinct from a canal.

stream bed - The substrate of the **stream** channel between the ordinary high water marks. The **substrate** may be **bedrock** or **inorganic** particles that range in size from clay to **boulders**. **Wetlands contiguous** to the **stream** bed, but outside of the ordinary high water marks, are not considered part of the **stream** bed.

stream channelization - The altering of the flow of a **wetland** or waterway so that the flow is more direct.

stream gradient - The general slope, or rate of vertical drop per unit of length of a flowing **stream**.... The slope of a **stream's** channel in the downstream direction.... Stream gradient is the ratio of drop in a **stream** per unit distance, usually expressed as feet per mile or meters per kilometer. A high gradient indicates a steep slope and rapid flow of water (*i.e.*, more ability to erode); whereas a low gradient indicates a more nearly level stream bed and sluggishly moving water, that may be able to carry only small amounts of very fine **sediment**. High gradient **streams** tend to have steep, narrow V-shaped valleys, and are referred to as young **streams**. Low gradient **streams** have wider and less rugged valleys, with a tendency for the **stream** to meander.

stream order - A method of numbering **streams** as part of a **drainage basin** network. The smallest unbranched mapped **tributary** is called first order, the **stream** receiving the **tributary** is called second order, and so on. **Tributaries** which have no branches are designated as of the first order, **streams** which receive only first-order **tributaries** are of the second order, larger branches which receive only first-order and second-order **tributaries** are designated third order, and so on, the main **stream** being always of the highest order.

streamflow - The water discharge that occurs in a natural channel. A more general term than runoff, **streamflow** may be applied to discharge whether or not it is affected by diversion or regulation.

stress - Anything that disturbs the normal functioning of an organism or ecosystem to the extent that its chances for survival are reduced.

stressor - An agent, condition, or other stimulus that causes stress to an **organism**.

stridulation - The shrill sound made by rubbing two body parts together, as in the sound a cricket makes by rubbing the fore wings together.

strip mining - A process in which layers of **topsoil** are peeled away, exposing the **coal** underneath.

strobilus - The male or female fruiting body of the **gymnosperms**.

structure - In regard to **ecosystems**, the physical arrangement or spatial patterns of the components, especially the plant life. Includes **growth forms**, number of **canopy** layers, degree of cover, **distribution** patterns of **species** within the **ecosystem** (patches, for

example). Structure may also refer to the organization of the **ecosystem** in terms of **trophic levels**.

stump sprout - A tree that grows from the stump or sucker root of a parent tree: it is not of seed origin. ...Regeneration of shoot growth from either adventitious or dormant buds from a cut tree stump.

style - One of the three parts of the female reproductive **organ (pistil)** connecting the **ovary** and the **stigma**.... The narrow part of a **pistil** bearing the **stigma**.

stylet - A sharp mouthpart of an insect used for piercing food.

stylostome - A channel-like structure which is formed by **mites** and **chiggers (larval mites)** of the family Trombiculidae during sucking at the host's surface. The body's allergic reaction to **chigger** saliva causes the formation of a hardened tube called a **stylostome** in the skin, through which the **mite** or **chigger** feeds. (See: **mite**, **chigger**)

subarctic - Of or relating to **latitudes** just south of the **Arctic Circle**.... A region in the Northern Hemisphere immediately south of the true Arctic and covering much of Alaska, Canada and Siberia, the north of Scandinavia, northern Mongolia and the Chinese province of Heilongjiang. Generally, subarctic regions fall between 50°N and 70°N **latitude**, depending on local **climates**.

subalpine - Refers to the **biotic zone** immediately below **treeline** around the world. Trees in the subalpine zone often become *krummholz* (crooked wood, stunted and twisted)..... Area on a mountain below **timberline**.... A general term for the **ecological** zone that lies below **timberline** in mountain areas.

subcanopy - The layer of **vegetation** in a forest comprising the lower section of the **canopy**...The **vegetation** al layer in a forest between the **understory** and the **canopy**.

subcutaneous - Below the skin. ...Located or placed just beneath the skin... Layer of fatty tissue between skin and muscle.

subducted - Of or referring to **subduction**.

subduction - In **geology**, a process in which one **lithospheric** plate descends beneath another, often as a result of folding or faulting.....A **geological** process in which one edge of a crustal plate is forced sideways and downward into the **mantle** below another plate... A process that occurs when **tectonic plates** converge and one plate sinks or slides under the other. (See: **subduction zone**)

subduction zone - In **geology**, an area on Earth where two **tectonic plates** meet and move towards one another, with one sliding underneath the other and moving down into the mantle, at rates typically measured in centimeters per year. This often involves an oceanic plate sliding beneath a continental plate (though subduction zones can occur at

the boundary of oceanic plates) and typically creates an **orogenic zone** or **volcanic arc** subject to many **earthquakes**. In a sense, subduction zones are the opposite of divergent boundaries, areas where material rises up from the **mantle** and **tectonic plates** are moving apart. (See: **subduction**)

subepidermal - Beneath the **epidermis**.

suberin - A fatty plant substance present in the walls of **cork cells**.

sublimation - The transition of a substance from the solid phase directly to the vapor phase, or vice versa, without passing through an intermediate liquid phase.

sublittoral zone - Also called **continental shelf**, the area extending from immediately below the **littoral zone** to the edge of the **continental slope**.

subordinate - In **ethology**, an individual in any association that is lower in rank and exercises less influence or control than the **dominant** individual. (See: **dominant**)

suboscine - Of or pertaining to birds of the sub-**order** Suboscines, of the **order** Passeriformes (perching birds), comprising the supposedly more primitive members of the **order**, with less well-developed vocal organs than the **oscine** birds. (See: **oscine**, **passerine**)

subpopulation - **Geographically** distinct groups within the **population** of a **species**, between which there is little or no **migration** or reproductive exchange. (See: **population**, **subspecies**)

subsidence - In **geomorphology**, the process of sinking or settling of a land surface because of natural or artificial causes.... A depression of the land surface as a result of **groundwater** being pumped. Cracks and fissures can appear in the land. Subsidence is virtually an irreversible process.... Compression of soft **aquifer** materials in a confined **aquifer** due to pumping of water from the **aquifer**....In weather forecasting terminology, this term refers to sinking motions of air masses. It could also refer to sinking motions within fluids or bodies of water.

subsoil - The layer of soil below the **topsoil**.

subspecies - A synonym of **race** or **form**. A subspecies or **race** is a **genetically** distinct **population** within a **species** that is not reproductively isolated from other **populations** within the **species**.... A **taxonomic** category intermediate in rank between **species** and **variety**, based on a smaller number of correlated characters than are used to differentiate **species** and generally conditioned by **geographical** and/or **taxonomic** occurrence....The **taxonomic** level below **species**, containing individuals from a particular **geographic** region where the large majority of individuals are **morphologically** distinct from other individuals of the same **species** from a different area....A **race**, or **subspecies**, is a recognizable group forming all or part of a **species**.... A variety of **organisms** within a

species, typically isolated from other members of their **species**; for example, the Eastern Worm Snake and the Midwest Worm Snake are subspecies that occupy two **geographical** areas of Kentucky and intergrade, or **interbreed**, where the two ranges meet.... The subdivision of a **species**, in which **subpopulations** have been reproductively isolated from one another long enough to differ **genetically**, forming distinct **rac**es (=subspecies) of the same **species**. (See: **taxon, taxonomy, classification**)

A **monotypic species** has no **rac**es, or rather one **race** comprising the whole **species**. **Monotypic species** can occur in several ways:

- All members of the **species** are very similar and cannot be sensibly divided into biologically significant subcategories.
- The individuals vary considerably but the variation is essentially random and largely meaningless so far as **genetic** transmission of these variations is concerned (many plant **species** fit into this category, which is why horticulturists interested in preserving, say, a particular flower color avoid propagation from seed, and instead use vegetative methods like propagation from cuttings).
- The variation between individuals is noticeable and follows a pattern, but there are no clear dividing lines between separate groups: they fade imperceptibly into one another. Such **clinal** variation always indicates substantial **gene flow** between the apparently separate groups that make up the **population(s)**. **Populations** that have a steady, substantial **gene** flow between them are likely to represent a **monotypic species** even when a fair degree of **genetic** variation is obvious.

substrate - Supporting surface on which an **organism** grows. The substrate may simply provide structural support, or may provide water and **nutrients**. A substrate may be **inorganic**, such as rock or soil, or it may be **organic**, such as wood.... A surface on which an **organism** can attach and grow.... A surface on which the **organism** feeds.... A layer of material beneath the surface soil.... The substance on which an **organism** lives or from which it obtains **nutrients**; chemical substances acted upon, often by an **enzyme**.

substratum - A surface of seabed, lakebed or riverbed.

subsume - To classify, include, or incorporate in a more comprehensive category or under a general principle: "*The evolutionarily later always subsumes and includes the evolutionarily earlier*" (Frederick Turner)....To contain or include; "This new system subsumes the old one".... To take up into or under, as individual under **species, species** under **genus**, or particular under universal; to place(any one cognition) under another as belonging to it; to include under something else.

subterranean - Situated or operating beneath the Earth's surface; underground.... Beneath the Earth's surface.

subtropical - **Geographically**, regions that have an average **temperature** of 50 degrees Fahrenheit or 10 degrees **Celsius** or above for 5 to 8 months of the year. Subtropical areas can be found to the north and south of the **tropics** as well as on mountain slopes within the **tropical** regions..... Area between 30° and 40° **latitude** with **temperatures** always above 32°F and **precipitation** most of the year.... Generally the part of the

Earth's surface between the **tropics** and the **temperate** regions, or between about 40 degrees N. and S. (See: **subtropics**)

subtropics - Subtropical areas... The indefinite belts in each **hemisphere** between the regions of **tropical** and **temperate** climates. The boundaries are considered to be roughly 35°N and 35°S **latitudes**, but vary greatly according to continental influence, being farther pole-ward on the west coasts of continents and farther Equator-ward on the east coasts. (See: **subtropical**)

succession - See **ecological succession**.

successional - Of or relating to **succession** or **ecological succession**.

succulent - A plant that is able to store water in its **tissues** and then withdraw it during times of **drought**. Water storage **tissue** may be found in the stem, leaves, or roots depending on the species. Stem succulents, leaf succulents, and root succulents are types of growth forms.... A plant with thick, fleshy **stems** or leaves that store water.... Succulent plants have **leaves** and/or **stems** which are thick and fleshy. They often have waxy outer layers that allow the plants to retain water well.... A plant that has a specialized fleshy **tissue** in roots, **stems**, or **leaves** for the conservation of water.... A fleshy plant that holds water in its **stems** or **leaves**.... A plant that has fleshy and juicy **tissues**, like cacti, sedums, aloes, and yuccas.... A plant with fleshy stems or leaves with specialized tissue for the conservation of water; a xeromorphic strategy for tolerating long periods of drought.

sucker - An **adventitious shoot** arising from a root.

sulfur dioxide (SO₂) - A **compound** composed of one sulfur and two oxygen **molecules**. Sulfur dioxide emitted into the **atmosphere** through natural and **anthropogenic** processes is changed in a complex series of chemical reactions in the **atmosphere** to sulfate aerosols. These aerosols result in negative radiative forcing (*i.e.*, tending to cool the Earth's surface).

sulfur hexafluoride (SF₆) - A very powerful **greenhouse gas** used primarily in electrical transmission and distribution systems. SF₆ has a **global warming potential** of 24,900.

Summer Solstice - Approximately June 20-21 in the Northern Hemisphere, when the sun is highest in the sky and directly overhead at **latitude** 23° 26' 22" north, the **Tropic of Cancer**. (See: **solstice**, **Winter Solstice**)

summerwood - In **botany**, **xylem** laid down by the **vascular cambium** in late summer in the north.

sunspot - Relatively cooler area on the sun's surfaces. Sunspots represent regions of extremely high magnetic field.... A region on the surface (photosphere) of the sun that is temporarily cool and dark compared to surrounding areas..... A region on the Sun's

surface (photosphere) that is marked by a lower temperature than its surroundings and has intense magnetic activity, which inhibits convection, forming areas of low surface temperature. Sunspot activity is subject to research on climate change.

superpredator - See **apex predator**.

superspecies - A group of **species** that are **morphologically** similar and are considered to have **evolved** quite recently from a common ancestor. There are many examples among Amazonian and Andean birds and **mammals**.

surface roots - Roots that radiate out on, rather than in, the soil. Most common on **nutrient** poor soils.

surface tension - The attraction of **molecules** to each other on a liquid's surface. Thus, a barrier is created between the air and the liquid....A property of liquids in which the exposed surface tends to contract to the smallest possible area, as in the formation of a meniscus. It is caused by unequal molecular cohesive forces near the surface.... Surface tension is a property of the surface of a liquid. It is what causes the surface portion of liquid to be attracted to another surface, such as that of another portion of liquid (as in connecting bits of water or as in a drop of mercury that forms a cohesive ball).... The force that acts on the surfaces of liquids causing them to "bead up" minimizing contact with solid surfaces.... A property of liquid surfaces that causes the surface layer to behave like a thin elastic 'skin'. Molecules in a liquid have attractive forces that hold them together. Molecules on the surface are attracted to molecules from all sides and below, but not from above. This results in a downward and sideways pull on molecules on the surface layer.

surface water - Water that is on the Earth's surface, such as in a **stream, river, lake, or reservoir**. ... Water above the surface of the land, including **lakes, rivers, streams, ponds, floodwater, and runoff**.

surficial - Of or pertaining to a surface, especially the land surface of the Earth: *a surficial geologic deposit*.

survival of the fittest - A popular descriptive term for **evolution** by the process of **natural selection**. (See: **natural selection**)

suspended loads - **Sediment** particles maintained in the water column by turbulence and carried with the flow of water. (See: **sediment, sediment load**)

suspended sediment - Very fine soil particles that remain in suspension in water for a considerable period of time without contact with the bottom. Such material remains in suspension due to the upward components of turbulence and currents and/or by suspension.... **Sediment** that remains suspended in the water for a long period of time without coming in contact with the bottom.

suspended-sediment discharge - The quantity of **suspended sediment** passing a point in a **stream** over a specified period of time.

sustainability - The ability to consume resources without using them up. Economic development that takes full account of the environmental consequences of economic activity and is based on the use of replaceable or renewable resources that do not get depleted.... The idea that people should fulfill present needs without endangering the ability of future generations to fulfill their needs as well. (See: **sustainable, sustainable development**)

sustainable - Meeting the needs of the present without diminishing the ability of people, other **species**, or future generations to survive.... Able to maintain or stay in existence over a period of time; a sustainable population is one that is able to maintain a healthy number of individuals year after year. For a practice or use to be sustainable it must meet the needs of the present without diminishing the ability of people, other species, or future generations to survive. It is a practice or use that can continue indefinitely. (See: **sustainability, sustainable development**)

sustainable development - The term refers to achieving economic and social development in ways that do not exhaust a country's **natural resources** - a broad concept referring to the need to balance the satisfaction of near-term human interests with the protection of the interests of future generations, including their interests in a safe and healthy **environment**. In short, sustainable development is a bad oxymoron. Development, which by its very nature consumes resources, can never be truly sustainable. (See: **sustainable, sustainability**)

swale - An elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water.... A moist or **marshy** depression, particularly in a **grassland** or **prairie**.... A slight depression, sometimes **swampy**, in the midst of generally level land.... A low tract of land, especially when moist or **marshy**.... A linear hollow or depression found between dunes or beach ridges. Generally marshy or **swampy**, or may contain small lakes.... A shallow depression in the land's surface which may be filled with water.

swamp - A low wet area, dominated by **trees** and **shrubs**....A tract generally characterized by a soil that is slightly acid, neutral, or slightly **alkaline**, and a **water table** at or above the soil surface (the water often moving perceptibly), supporting not only low **vegetation** , e.g. **sedges**, but also reeds and woody **vegetation** , including trees....Tree or tall **shrub** dominated **wetlands** that are characterized by periodic flooding and nearly permanent subsurface water flow through mixtures of mineral **sediments** and **organic** materials, essentially without **peat** accumulation....A type of **wetland** dominated by woody **vegetation** but without appreciable **peat** deposits. ... An area saturated with water throughout much of the year, but with the surface of the soil usually not deeply submerged....A loose term for a **wetland** area characterized by **tree** or **shrub vegetation** and saturated with water throughout much of the year, but with the surface of the soil not deeply submerged. **Peat-forming ecosystems (mires)** supporting a **tree** or **shrub**

vegetation are properly termed **fen** or **carr**....An **ecosystem** dominated by woody plants and with soils saturated for long periods if not permanently, but without a surface accumulation of **peat**....A flat, wet area usually or periodically covered by standing water and supporting a growth of **trees, shrubs** and **grasses**; in contrast to a **bog**, the **organic** soil is thin and readily permeated by roots and **nutrients**....Swamp is forested **wetland**, usually with little or no **peat** and waters having a slightly acid reaction. It is chemically allied with **fens**....Sites dominated by tall **shrubs** and occasional **trees**. Standing or flowing water is usually present. Although **peat** is generally absent, soils may be high in **organic** matter content. ...A wooded **fen** whose mucky substratum is intermittently flooded; **peat** accumulation is not characteristic.

swampy - Of, similar to or referring to a **swamp**.

swarm - noun - A mass of insects, such as bees or flies, that collect or move around together for eating, mating, or finding a new nest site....A large number of insects or other small **organisms**, especially when in motion...A group of bees with a queen bee in **migration** to establish a new **colony**....verb - To move or emerge in a swarm....To leave a hive as a swarm, as with bees....To move or gather in large numbers.

swash zone - The zone of wave action on a beach. This zone moves vertically up and down the beach as the tide rises and falls.

swidden agriculture - See slash-and-burn agriculture.

swimmeret - Small appendage on the underside of the abdomen of crustaceans, such as crayfish, used for swimming, carrying eggs in the female, and in respiration.

sylvan - Forest-dwelling.... Relating to or characteristic of forests or wooded regions.

sylvatic - From the forest or present in the forest... A scientific term referring to diseases or **pathogens** affecting only wild (sylvan means forest-dwelling) animals.

symbiont - An **organism** in a **symbiotic** relationship. Also called **symbiote**.

symbiosis - A relationship between two types of organisms in which at least one benefits; mutualism, commensalism, and parasitism are types of symbiotic relationships....The intimate relationship between two or more dissimilar **organisms**. The individual **organisms** are called **symbionts**. There are three kinds of symbiotic relationships. ..

1. **mutualism**: in which both members of the relationship benefit. **Mycorrhizae** (fungi) form symbiotic associations with the roots of some plants. **Mycorrhizae** aid the plant in the uptake of **nutrients**, while the plant provides the fungi with **carbohydrates** (food).
2. **commensalism**: one member benefits while the other does not benefit, but is not harmed. **Epiphytes** depend on trees for support. The **host** tree does not receive any real benefit from the **epiphyte** and the **epiphyte** does not obtain its **nutrients** from the tree. Also known as **neutralism**.

3. **parasitism**: a **parasite** obtains its energy requirements (food) from the **host**. This could be considered a type of **predator/prey** relationship. **Parasites** may live within their **host** (**endoparasites**) or on the body of their **host** (**ectoparasites**). Typically, an efficient **parasite** does not kill its **host**, but in some cases this does occur. Many kinds of worms and **fungi** are **parasitic**, living in (worms) or on (fungi) their **host**. For example, ringworms (a **fungi**) are **parasitic** on human skin and hookworms are internal **parasites** that attach themselves to the intestine and obtain food in the form of blood and tissue liquids.

.....A relationship between two **organisms** that live in intimate contact with each other; includes **mutualism** (both **organisms** benefit, they rely on each other for survival), **parasitism** (one **organism** benefits at its **host's** expense) and **commensalism** (one partner benefits and the other is neither benefited nor harmed). The relationship may sometimes be obligatory for all. A non-obligatory relationship may be termed proto-cooperation.... A close and prolonged relationship between two or more different kinds of **organisms** in which both may or may not benefit.... Relationship between **organisms** living together in intimate contact. May benefit both or only one partner; in the latter case, it may be neutral or harmful to the second partner, as **parasite** and **host**. (See: **amensalism, conjunctive symbiosis**)

symbiote - An **organism** in a **symbiotic** relationship. Also called **symbiont**.

symbiotic - Of or referring to **symbiosis**, the intimate relationship between two or more dissimilar **organisms**. (See: **symbiosis**)

sympatric - Occupying the same **geographic distribution** or **range**.... Term used when two **taxa** live in the same area at the same time. refers to **distribution** areas of different **species** that overlap.... With overlapping **geographical distributions**.. (See: **sympatry, parapatry, parapatric, parapatric speciation, allopatry, allopatric, allopatric speciation, geographic isolation**)

sympatric speciation - The **genetic** divergence of various **populations** (from a single parent **species**) inhabiting the same **geographic** region, such that those **populations** become different **species**. Sympatry is one of four theoretical models for the phenomenon of **speciation**. In contrast to **allopatry**, **populations** undergoing sympatric speciation are not **geographically** isolated by, for example, by a mountain or a river. Although some **evolutionary** biologist still regard sympatric speciation as a highly contentious issue, both theoretical and empirical studies increasingly support sympatric speciation as a likely process in explaining the diversity of life in particular **ecosystems**. (See: **sympatry, sympatric**. For more information on the formation of **species** see: **speciation, species, geographic speciation, allopatric speciation, parapatric speciation, sympatric speciation, heteropatric speciation, evolution, population, reproductive isolation, reproductive isolating mechanism, geographic isolation, isolated populations, genetic drift, founder effect, secondary contact, refugia, natural selection, selection pressure, Pleistocene Period, ring species**)

sympatry - When the ranges of two **populations** (or **species**) extensively overlap....
.Literally, "same country". Contrast with **allopatry** and **parapatry**. (See: **sympatric**,
parapatry, **parapatric**, **parapatric speciation**, **allopatry**, **allopatric**, **allopatric speciation**, **geographic isolation**)

synchronous - Happening at the same time.

synchronous hatching - Hatching that occurs at the same time or nearly the same time, usually within one calendar day.

synchronous nesting - Nesting by a local **population** in which breeding pairs initiate egg laying within a relatively short period of time (a few days to a few weeks).

synconium - A very particular **inflorescence**, typical of all fig trees. It consists of a flat and wide floral receptacle with tens to hundreds of tiny, **sessile** flowers. This receptacle closes itself in a fruit-like structure, with an orifice on the top. Inside lay the flowers, and, after fertilization, the fruits.

synergism - The simultaneous action of separate agencies which, together, create a greater total effect than the sum of their individual effects....An interaction of two or more chemicals which results in an effect that is greater than the sum of their effects taken independently... The combined action of two or more agents the result of which is greater than the sum of the actions of each of the agents acting alone.... When the combined effects of two substances/**pollutants**/chemicals are greater than the sum total of their individual effect, or the ability of two **organisms** to bring about changes (usually chemical) that neither can accomplish alone.

synthetic - A material that is artificial, or man-made.

syntype - Each specimen of a **type series** from which neither a **holotype** nor a **lectotype** has been designated. (See: **type specimen**, **holotype**, **type series**, **type locality**, **allotype**, **topotype**, **paratype**, **syntype**, **lectotype**)

synusia - Vegetational units based on life-form.

system - A group of things that work together as a unified whole.

systematics - The study of **biological diversity** and **evolutionary** relationships among **organisms**. NOTE: The term is sometimes used interchangeably with **taxonomy**.... The field of science dealing with the **diversity** of life and the relationships of life's component **organisms**. (See: **taxonomy**, **classification**)

systemic - Pertaining to a disease in which the pathogen (or a single infection) spreads generally throughout an organism; pertaining to chemicals that spread internally through an organism.

tachyspory - The more-or-less immediate release of seed as soon as they have matured, as opposed to **bradyspory**, the gradual release of seed from a cone or fruit over a long period of time,

tadpole - The limbless **aquatic larva** of a frog or toad, having **gills** and a long flat tail. As the tadpole approaches the adult stage, legs and lungs develop, and the tail gradually disappears.... The **larval** stage of a frog or toad; tadpoles differ from the adult in both internal and external appearance, for instance, tadpoles hatch without limbs, breathe with gills, have a flattened tail, and have a round mouth to scrape food particles from **algae** and **aquatic** plant material. Also known as a **polliwog**.

taiga - The subarctic **coniferous** forests of North America and Eurasia, located south of the **tundra**.... Northern Hemisphere (Eurasia, North America) cold-temperate **coniferous** forest **environment, habitat** and **ecological communities** (**evergreen conifers** like pine, spruce, and fir trees, etc.).... A Russian term meaning "land of little sticks," and originally applied to the open **conifer lichen woodland** between the **boreal conifer forest** and the **tundra**.....**Ecosystems** adjacent to Arctic **tundra** in which Balsam Fir, *Abies balsamea*, Black Spruce, *Picea mariana*, Tamarack, *Larix laricina* or Paper Birch, *Betula papyrifera* are characteristic **trees** and **muskeg, fen**, and **bog** are prominent features of the **landscape**. Sometimes narrowly applied to just the Arctic **timberline** transition zone; sometimes extended to all subarctic and even **subalpine forests** of the north **temperate** zone.....The wooded **vegetation** of **boreal**-subarctic **latitudes** that occupies the subarctic climatic zone adjacent to the treeless **tundra**.... The open northern part of the **boreal forest**. It consists of open **woodland** of **coniferous trees** growing in a rich floor of **lichen**, and is generally cold and **swampy**. (See: **boreal forest**)

tail-pumping - A behavior exhibited by some members of the Antbird family, particularly in the genera *Myrmeciza* and *Percnostola*, when agitated (*e.g.* when disturbed and on the alert or because of playback of territorial song). Repeatedly, the tail is rapidly pumped downward then raised more slowly.

tailings - Rock that remains after processing ore to remove the valuable minerals.

talon - A claw, especially of a bird of prey.

talus - A sloping accumulation of coarse rock fragments at the base of a cliff.

talus slope - The large pile of rocky boulders that accumulates at the foot of a cliff, typically by the mechanical-weathering process of frost-wedging....Talus slopes are more angled, sloping at 45 degrees or more, than a scree slope. Talus is also larger than scree and the rocks have sharper edges. (See: **scree, scree slope**)

tank bromeliad - **Bromeliads** with long stiff leaves that form a rosette of overlapping leaf bases. The result is the formation of a **reservoir** that usually permanently holds water. Falling into this water there will be an accumulation of dead leaf and wood material, and dead and living animals, mostly insects.

tannin - A substance occurring in the **bark** or **leaves** of some **species**, functioning to protect against **herbivores**.... An **acidic** substance, soluble in water, with a bitter taste, that is present in a number of plants.... A group of **organic compounds** found in the bark, roots, **stems** and seeds of many plants. (See: **secondary compounds**)

tap root / taproot - A thick, deep central root.... The main root of a tree which strikes downward with or without heavy branching until it either reaches an impenetrable layer or one so lacking in oxygen or moisture that further downward growth is impossible.... A primary root that grows vertically downward and gives off small lateral roots; occurs in **dicots**. Root system in plants characterized by one root longer than the other roots, *e.g.* a carrot.... A prominent root with few branches, sometimes swollen to store food... Thick, straight root with a few root hairs along the sides.

taxis - The ability of a wide variety of **microorganisms**, simple animals and plants to respond to light, magnetic fields and chemical substances in the surrounding **environment**. (See: **tropism, phototropism, heliotropism, heliotaxis, geotropism, gravitropism**)

taxon (plural: **taxa**) - A group of **organisms** that are members of the same **evolutionary** group. For example, birds represent a taxon, as do **mammals**, insects, and **flowering plants**.... literally an 'arrangement', a group of **organisms** bunched together for **taxonomic** purposes; it is generally used in place of the more clumsy, **species** or **subspecies**.... In scientific classification, any taxonomic division, such as species, genus, family, and so on; the plural form of taxon is taxa....Any one of the levels in the **taxonomic** hierarchy:

- **Kingdom** - One of the major subdivisions of life; based upon basic similarities in cell structure. Five **kingdoms** are recognized: Monera, **Protoctista**, **Fungi**, Animalia, and Plantae.
- **Phylum** - A subdivision of a **kingdom** encompassing all forms of life with the same distinctive body plan. [plural = **phyla**]. In **botany** the term **division** is sometimes used as an equivalent to phylum.
- **Class** - A higher taxon consisting of one or more **orders** and distinct from other taxa of similar rank
- **Order** - A higher taxon consisting of one or more **families** and distinct from other taxa of similar rank.
- **Family** - A **taxonomic** level including one or more **genera** of common phylogenetic origin and distinct from taxa of the same rank. (The Latin names of animal families end in "-idae".)
- **Genus** - A **taxonomic** category including one or more **species** with a presumed recent common ancestor.
- **Species** - Groups of actually or potentially **interbreeding populations** that are reproductively isolated from other such groups. By some considered the lowest **taxonomic** rank and presumably the only real **taxonomic** unit in nature.
- **Subspecies (= race)** - A **geographically** defined aggregate of local **populations** which differ **phenotypically** from other such subdivisions of a **species** in other

geographic areas.

taxonomic - Of or referring to **taxonomy**.

taxonomy - The science of natural relationships among and within types of living things...The science of classifying all living things by arranging them in groups according to the relationship of each to the others....The scientific naming of **organisms** and their **classification** with reference to their precise position in the animal or plant **kingdom** ...The science of the **classification** of **organisms**.... The field of science that classifies life. The term is sometimes used interchangeably with **systematics**.... Taxonomy is the science of **classification**. It is usually meant in terms of classifying life but may be applied to other phenomena, such as a taxonomy of minerals. Formal biological **classification** was first attempted by the Greeks and Romans, but it was not until the 16th century that Swedish scientist Carolus Linnaeus formalized the system of modern taxonomy. The basis of the system is **binomial** (two name), in which every **species** is identified by a **genus** name and a **species** name. (Think of your last name and first name.) A **genus** (plural: **genera**) may contain several **species** and **genera** in turn belong in **families**, which belong in **orders**, then **classes** and **kingdoms**. Taxonomy is partly subjective although modern **genetics** enables scientists to establish relationships between species. This has led to calls for changes in the naming system established by Linnaeus. ...The science of classifying and identifying **organisms**. The modern **classification** of **organisms** reflects their presumed **phylogeny**.... The science of classifying **organisms**; the arrangement of **organisms** into systematic groups such as **species**, **population**, family, and order. It is the theoretical study of **classification** including its bases, principles, procedures, and rules...Identifying, describing and naming things, i.e. assigning them to particular groups is taxonomy, while arranging those groups in a coherent order which reflects their evolution and relatedness is **classification**. The classification of an **organism** based on an accepted, scientific system. Each **organism** is classified with a taxonomy including names in the 7 major classification groups: **kingdom**, **phylum**, **class**, **order**, **family**, **genus**, and **species**. (See: **classification**, **systematics**)

taxonomist - One who studies the science of the classification of **organisms**.

tectonic - Corresponding with the broad architecture of the outer part of the Earth.

tectonic plates - Segment of the **lithosphere** that comprise the surface of the Earth much the way a turtle shell is composed of its plates..... Large sheets of rocky **crust** floating on top of the Earth's semi-fluid **mantle**... Rigid plates that are part of Earth's surface and move slowly across the **mantle**.

tectonic uplift - A geological process most often caused by **plate tectonics** which increases elevation. The opposite of uplift is subsidence, which results in a decrease in elevation. Uplift may be orogenic or isostatic. (See: **orogenic uplift**, **isostatic uplift**)

tectonics - The process that forms planetary features such as continents, mountains, and **faults**. ... Processes that deform the Earth's **crust**. ... The process by which the Earth's surface has attained its present structure....A branch of **geology** dealing with the broad architecture of the outer part of the Earth, that is, the major structural or deformational features.

teleomorph - The sexual form (also called the perfect state, or sexual stage) in the life cycle of a **fungus**, in which sexual spores (ascospores or basidiospores) are formed after nuclear fission.

temperate - **Geographically**, regions that have an average **temperature** of 50 degrees Fahrenheit or 10 degrees Celsius or above for only 2 to 4 months of the year.... Region in which the climate undergoes seasonal change in temperature and moisture. Temperate regions of the Earth lie primarily between 30 and 60 degrees **latitude** in both **hemispheres**..... A region which undergoes seasonal changes in **temperature** and moisture; in general, **climate** in a **temperate** region is mild and without extremes.... Areas with distinct summer and winter seasons and moderate **precipitation** with **temperatures** will fall below 32° F in winter and above 72° F in summer.... Region in which the **climate** undergoes seasonal change in **temperature** and moisture. Temperate regions of the Earth lie primarily between 30 and 60 degrees **latitude** in both **hemispheres**.

temperate rainforest - A type of forest found in only a few places around the world, such as the Pacific temperate rainforest on the West Coast of North America. These forests are often dominated by **coniferous** trees adapted to wet climates and cool **temperatures**. ... Moist closed-**canopy evergreen** forest in **temperate** climates. These mid-**latitude rainforests** usually have a simpler structure and composition than **tropical rainforests**, often with only a single **canopy**, a lower diversity of **species**, smaller-leaved slender trees. **Ferns** are usually abundant but palms rare. Temperate rainforests may interface with **subtropical**, wet **sclerophyll forest**, broadleaf or evergreen mixed forests. (See: **rainforest**, **tropical rainforest**)

temperature - Temperature is a measure of the heat content of a body (the **atmosphere** in the case of weather). The **molecular** motion of a substance creates energy, which can be measured in terms of the heat it generates. Air, water, and soil can all be measured for temperature. ... Temperature is a property of matter which measures the kinetic energy of particles resulting from the application of heat. All objects emit and absorb radiation, and are at a constant temperature when these are balanced. Temperature is measured by observing gas pressure or liquid expansion in a thermometer. The Celsius scale has the reference points of 0°C for freezing and 100°C for boiling point of water. The Fahrenheit scale has 32°F for freezing and 212°F for boiling. The Kelvin scale is widely used in science, beginning at absolute zero (0K = -273°C) with the same change per degree as the Celsius scale (thus 0°C = 273K). (See: **Celsius scale**, **Fahrenheit scale**)

temporary wetland - A type of **wetland** in which water is present for only part of the year, usually during wet or rainy seasons; also known as a **vernal pool**.

tendrill - In **botany**, a modified **stem** or **leaf** for climbing...A twisting, threadlike structure by which a twining plant, such as a vine, grasps an object or a plant for support.... A slender, threadlike organ which serves to attach some climbing plants to a support.

tepal - In **botany**, a **perianth** part in **flowers** having no distinct **petals** or **sepals**.

Tepuis - A group of unique, flat-topped, **geologically** ancient table mountains in southeastern Venezuela that remain from the **erosion** of the **Guianan Shield**. Most have **endemic** plant **species**. Not part of the Andes.

teratogen - Any substance capable of causing malformations or defects in a developing embryo or fetus.

teratogenic - Of or relating to substances or agents that can interfere with normal embryonic development... Of, relating to, or causing malformations or defects to an embryo of fetus... Possessing the ability to disrupt normal fetal development and causing fetal abnormalities.... Refers to any substance capable of causing malformations in a developing embryo.

terminal bud - See **apical bud**.

terminal bud scale scar - In **botany**, a scar left on a **stem** after the **bud scales** have fallen.

terminus - In glaciology, the end, or foot, of a **glacier**.

termitarium - A nest built by a **colony** of termites. Also called a **termitary**.

termitary - A nest built by a **colony** of termites. Also called a **termitarium**.

terpene- Any of various isometric hydrocarbons found especially in essential oils (as from conifers), resins, and balsams. (See: **terpenoids**)

terpenoids - Volatile unsaturated **hydrocarbons** produced by plants (*e.g.* Ponderosa Pine and other dry forest and **shrubland ecosystems**) that may chemically inhibit both mineralization and nitrification; may be destroyed by fire....The terpenoids, sometimes referred to as isoprenoids, are a large and diverse class of naturally-occurring organic chemicals similar to terpenes, derived from five-carbon isoprene units assembled and modified in thousands of ways. Most are multicyclic structures that differ from one another not only in functional groups but also in their basic carbon skeletons. These lipids can be found in all classes of living things, and are the largest group of natural products. (See: **terpene**, **secondary compounds**)

terra firme - **Tropical rainforest** or **tropical lowland evergreen forest** on upland **terraces** that never **flood**...An area of **tropical rainforest** off the **floodplain** and thus not subject to flooding.... Forested areas of Amazonia that are too high to be flooded during seasonal inundation. Terra firme constitutes about 97% of the area of the Amazon **rainforest**, with flooded forests, **várzea** and **igapó**, comprising most of the remainder. (See: **tropical rainforest, várzea, igapó**)

terrace - A broad surface running along the contour. It can be a natural phenomenon or specially constructed to intercept runoff, thereby preventing **erosion** and conserving moisture. (See: **river terrace**)

terrestrialization - Formation of a **mire** (**peat-forming ecosystem**) system by filling a water body with **organic** material. Usually occurs by gradual extension of **peat-forming plant communities** outward from the shore of a pond or lake. A common high school text example of **succession**. Compare **paludification**.

terrestrial - Living or growing on land, as opposed to marine or **aquatic organisms**.

territoriality - The behavior by which an **organism** claims an area and displays, threatens, and defends it against members of its own **species**.

territory (plural: **territories**) - In biology, an area occupied by a single animal, mating pair, or group and often vigorously defended against intruders, especially those of the same species.... The area which an animal defends, usually during breeding season, against intruders of its own **species**. ... An area that is guarded or defended by an animal; some animals have breeding territories that may be different from their nesting territory...Territories are smaller than and are normally located within an animal's **home range**.

tertiary consumer - **Organism that feeds on carnivores**. ... An animal that eats **secondary consumers**; usually the top **predator** in a **food chain**. (See: **primary consumer, secondary consumer, consumer, predator, carnivore**)

thanatosis - A state that in some respects resembles shock, is characterized by cessation of all voluntary activity and usually by assumption of a posture suggestive of death, and occurs in various insects (as beetles) when disturbed.

thaw depressions - Depressions which result from subsidence following the thawing of perennially frozen ground...Hollow formed by the melting of ice in perennially frozen ground. (See: **thermokarst**)

thaw lakes or ponds - Lakes which occupy **thaw depressions**. ...Lake or pond in **permafrost** region whose basin is formed by thawing of ground ice. ...A pool of water on the surface of sea ice or large **glaciers** formed by accumulation of melt water. (See: **thermokarst**)

Thayer's Law - See **countershading**.

theory - An explanation for some phenomenon that is based on observation, experimentation, and reasoning.

thermal - In **weather**, a column of warm air rising through cooler surrounding air. Birds such as vultures, hawks and storks often use thermals to **soar**.

thermal conductivity - The rate at which a material warms up when absorbing heat.

thermal energy - The movement of energy from one substance to another; also called heat.

thermal pollution - The release of excess heat from nuclear power plants; can destroy **habitats** and kill the animals that live in them.

thermal spring - Heated **groundwater** that naturally flows to the land surface.

thermocline - Zone of rapid vertical **temperature** change in water.... A transition layer of water in the ocean, with a steeper vertical temperature gradient than that found in the layers of ocean above and below. The permanent thermocline separates the warm mixed surface layer of the ocean from the cold deep ocean water, and is found between 100- and 1000-m depths. The thermocline first appears at the 55-60° N and S **latitudes**, where it forms a horizontal separation between **temperate** and **polar** waters. The thermocline reaches its maximum depth at mid-**latitudes** and is shallowest at the equator and at its northern and southern limits. The thermocline is stably stratified, and transfer of water and **carbon dioxide** across this zone occurs very slowly. Thus, the thermocline acts as a barrier to the downward mixing of **carbon dioxide**.... A layer within a body of water or air where the temperature changes rapidly with depth.

thermodynamics - The science of heat and temperature and of the laws governing the conversion of heat into mechanical, electrical, or chemical energy...In general, the relationships between heat and other properties (such as **temperature**, pressure, density, etc.) In forecast discussions, thermodynamics usually refers to the distribution of **temperature** and moisture (both vertical and horizontal) as related to the diagnosis of **atmospheric** instability.... The branch of physics dealing with heat energy. A wide interpretation identifies four laws of thermodynamics: zero - no exchange of heat in contact is thermal equilibrium; first law - energy can change form but is conserved; second law - **entropy** always increases in a closed system; third law - absolute zero Kelvin is the minimum possible **temperature**.

thermokarst - A **permafrost** related **landscape** characterized by a peculiar **topography** of pits, **hummocks**, depressions, and small ponds caused by the melting of ground ice and the settling or caving of the ground surface. Considered to be a misuse of the work **karst** by most geomorphologists. . "Cryokarst" has been suggested as an alternate term. (See: **karst**)

thermoregulation - The act of maintaining a constant body temperature....The regulation of body temperature...Maintenance of a constant internal body temperature independent from the **environmental** temperature. Other examples of temperature control include: Snakes and lizards sunning themselves on rocks, fish changing depths in the water column to find a suitable temperature, and desert animals burrowing beneath the sand during the day. Insects that warm their flight muscles by vibrating them in place. Dilating or constricting peripheral blood vessels to adapt more or less quickly to the ambient temperature. (See: **warm-blooded, homeothermic, endotherm, cold-blooded, exotherm, ectothermy**)

thermosphere - The outer layer of the Earth's **atmosphere** beginning approximately 80 km above the Earth's surface (but see **exosphere**).The outermost layer of the **atmosphere**, where gas **molecules** split apart into **ions**.... The **atmospheric** shell extending from the top of the **mesosphere** to outer space. It is a region of more or less steadily increasing **temperature** with height, starting at 70 or 80 km.... The highest layer in the **atmosphere**, where atoms absorb solar energy resulting in warming of the air to as high as 3,600 F.....The extreme outer edge of the earth's atmosphere, within which temperature increases steadily with **altitude**....The outermost shell of the **atmosphere**, between the **mesosphere** and outer space; where **temperatures** increase steadily with **altitude**. ... Extends to 640 kilometers up. Auroras appear here. The layer of **molecules** broken up - ionized - by particles from the sun is the **ionosphere** that makes radio work by bouncing radio waves back to the Earth. (See: **atmosphere, planetary boundary layer, troposphere, tropopause, stratosphere, stratopause, mesosphere, mesopause, thermosphere, ionosphere, exosphere**)

thermospheric - Of or relating to the **thermosphere**.

thicket - A dense growth of small **trees, shrubs, bamboo, cane, etc.**

thigmotropism - A growth response to touch.

thorax - The middle section of an **insect's** body, between its head and **abdomen**. It is full of muscles that drive the **insect's** wings and three pairs of legs, all of which are attached to the thorax.... The part of the body between the neck and stomach; in **insects**, the middle body section bearing the legs and wings.

thorn - A modified **stem** that is hard and sharply pointed.

thorn forest - A **deciduous forest** of small thorny trees developed in a **tropical** semi-arid climate.

threatened species - **Species** that could possibly or are likely to become **endangered** in the near future..... A legal classification given to a plant or animal likely to become **endangered** within the foreseeable future throughout all or a significant portion of its **range**.

thunder - The sound due to rapidly expanding gases along the channel of a lightning discharge.,,, The sound that results from lightning. Lightning bolts (static electricity) produce intense heat. This burst of heat makes the air around the bolt expand explosively, producing the sound we hear as thunder. Since light travels faster than sound, we see the lightning before we hear the thunder.

thunderhead - See **cumulonimbus cloud**.

thunderstorm - A local storm produced by cumulonimbus clouds. Always accompanied by lightning and thunder.... Produced by a cumulonimbus cloud, it is a microscale event of relatively short duration characterized by thunder, lightning, gusty surface winds, turbulence, precipitation (including hail in larger systems), moderate to extreme up and downdrafts, and under the most severe conditions, tornadoes.... Local storm resulting from warm humid air rising in an unstable environment. Air may start moving upward because of unequal surface heating, the lifting of warm air along a frontal zone, or diverging upper-level winds (these diverging winds draw air up beneath them). The scattered thunderstorms that develop in the summer are called air-mass thunderstorms because they form in warm, maritime tropical **air masses** away from other weather fronts. More violent severe thunderstorms form in areas with a strong vertical wind shear that forces the updraft into the mature stage, the most intense stage of the thunderstorm. Severe thunderstorms can produce large hail, forceful winds, flash floods, and tornadoes.

tick - Any of numerous small bloodsucking **parasitic** arachnids of the **family** Ixodidae, many of which transmit febrile diseases, such as Rocky Mountain spotted fever and **Lyme disease**.

tidal - Influenced by the **tides** of the ocean.

tidal flat - A sandy, silty or muddy substrate in the form of a broad, nearly horizontal plain, exposed or nearly exposed at low tide but totally submerged at high tide. (See: **mudflat**)

tidal inlet - Natural inlet between two barrier islands (or spits), maintained by tidal flow reversals and connecting the open sea with the tidal flats or lagoons lying between the barrier islands or spits and the mainland.

tidal waters - Those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

tide - Cyclic rising and falling of the ocean due to **gravitational** pulls of the moon, sun and Earth....A periodic rise or fall in sea level caused by the **gravitational** pull of the moon.

tidal bore - High, breaking wave that advances up an **estuary** as the **tide** rises.... A tidal bore (or just bore, or aegir) is a tidal phenomenon in which the leading edge of the incoming tide forms a wave (or waves) of water that travel up a river or narrow bay against the direction of the current..... A wave, in the form of a wall of water, formed by an incoming tide funneling into an estuary.

tidal wetland - A **tidal wetland** is a **wetland** that is inundated by **tidal** waters. **Tidal** waters rise and fall in a predictable and measurable rhythm or cycle due to the **gravitational** pulls of the moon and sun. **Tidal** waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. **Tidal** wetlands are located channel-ward of the **high tide line** (*i.e.*, **spring high tide** line) and are inundated by **tidal** waters two times per lunar month, during **spring high tides**. (See: **saltmarsh**)

timberline - The upper altitude or **latitude** at which erect, marketable **trees** grow; not synonymous with **tree limit**.....Any altitudinal or **latitudinal** limit of forest growth.....Some consider the upper edge of continuous forest to be timberline, while others recognize it as the altitude of the highest **tree**, and still others accept a midpoint between these extremes. (See: **treeline, tree limit, forest limit**)

time lag - A period of time after causal agents have been active but before which repercussive effects have begun to have noticeable impact. Examples include biological or chemical effects on the body, or the impacts of **pollution** or **climate change** on aspects of the **environment**. The time lag may induce a false sense of security, increasing the likelihood of the passage of critical thresholds or **tipping points**.

tipping point - A critical threshold...The point at which a slow, reversible change becomes irreversible, often with dramatic consequences. In the context of **climate change**, the time threshold when **global warming** would continue to occur even if **anthropogenic greenhouse gas** emissions were completely halted immediately worldwide...In climatology, the point at which climate change due to human activity brings about sufficient new processes in nature to make any human reversal of the change impossible. (See: **positive feedback loop, climate feedback, feedback mechanism**)

tissue - A group of **cells** of the same type having a common function.

toad - Any of numerous tail-less **amphibians** chiefly of the **family** Bufonidae, related to and resembling the frogs but characteristically more **terrestrial** and having a broader body and rougher, drier skin..... A toad can refer to a number of species of **amphibians** in the **order** Anura. A distinction is often made between frogs and toads by their appearance, prompted by the **convergent adaptation** among so-called "toads" to dry **habitats**. Many "toads" have leathery skin for better water retention, and brown coloration for camouflage. They also tend to burrow. However, these **adaptations** are not reliable indicators of its ancestry. Because **taxonomy** reflects only **evolutionary** relationships, any distinction between frogs and toads is irrelevant to their **classification**.... Any of several families of tail-less, leaping **anuran amphibians**,

especially of the family Bufonidae, with a rough, warty skin: normally they eat insects and live on moist land but when breeding they live in water.

tolerance - The ability of an **organism** or biological process to subsist under a given set of **environmental** conditions. NOTE: 1) The range of these under which it can subsist, representing its limits of tolerance, is termed its **taxonomic** amplitude. 2) For trees, the tolerance of most practical importance is their ability to grow satisfactorily in the shade of, and in competition with, other trees; if intolerant of shade, they are termed light demanders, if tolerant, shade bearers. (See: **shade tolerant**). 3) For wildlife, it is its ability to adjust to different or disturbed **habitats**.

tolerant species - A **species** that is adaptable to (tolerant of) human effects on the **environment**.

tombolo - A spit of sand linking an island to the mainland (or to another island), formed by longshore drift... A coastal formation of beach material developed by refraction, diffraction and longshore drift to form a 'neck' connecting a coast to an offshore island or breakwater.

Top Down Cascade - A **trophic cascade** where the food chain or food web is disrupted by the removal of a top predator, or a third or fourth level consumer. On the other hand, a bottom up cascade occurs when a primary producer, or primary consumer is removed, and there is a diminishment of population size through the community. An example could include Paine's study from the University of Washington, where he removed several species in different plots along the northwestern United States coastline, and realized that *Pisaster*, a common starfish, when removed, created a top-down cascade which involved a surge in barnacle and mussel population, but a decrease in the populations of chitons, limpets, and whelks. This led to the conclusion that *Pisaster* was a keystone species in that food web.

top-level predator - See **apex predator**.

topographic map - A map depicting the natural and human-made features of a place or region, especially in a way to show their relative positions and **elevations**.

topographic - Of or relating to **topography**.

topographical - Of or relating to **topography**.

topography - The physical features of a surface area including relative elevations and the position of natural and man-made features... The configuration and relations of a surface including its relief, elevation and the position of its natural and human-made features. The physical or natural features of an object or entity and their structural relationships.... The physical features of a place or region.

topotype - One or more specimens collected at the same location as the **type series** regardless of whether they are part of the type series.... A term, not regulated by the **International Code of Zoological Nomenclature**, for a specimen originating from the type locality of the species or subspecies to which it is thought to belong, whether or not the specimen is part of the type series. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

topsoil - Soil consisting of various mixtures of sand, silt, clay and **organic** matter; considered to be the **nutrient**-rich top layer of soil that supports plant growth... The upper layer of soil; composed mostly of **humus, minerals, water, and air**. (See: **humus**)

tornado - An intense, rotating column of air that protrudes from a **cumulonimbus** cloud in the shape of a funnel or a rope whose circulation is present on the ground.... A violently rotating column of air in contact with and extending between a convective cloud and the surface of the Earth. It is the most destructive of all storm-scale **atmospheric** phenomena. They can occur anywhere in the world given the right conditions, but are most frequent in the United States in an area bounded by the Rockies on the west and the Appalachians in the east. **Waterspouts** are tornadoes that form over water. A twisting, spinning funnel of low pressure air. The most unpredictable **weather** event, tornadoes are created during powerful **thunderstorms**. As a column of warm air rises, air rushes in at ground level and begins to spin. If the storm gathers energy, a twisting, spinning funnel develops. Because of the funnel's cloud and rain composition and the dust, soil, and debris it draws up, the funnel appears blackish in color. The most energetic storms result in the funnel touching the ground. In these tornadoes, the roaring winds in the funnel can reach 300 mph, the strongest winds on Earth. Funnels usually travel at 20 to 40 mph, moving toward the northeast. When tornadoes form over **lakes** or oceans they suck water into the funnel cloud and are called **waterspouts**.

torpid - Inactive, **dormant**, or **hibernating**. A ground squirrel is torpid when it is **hibernating**, or a hummingbird can become torpid at night and during periods of cold, rainy weather. (See: **aestivation, aestivate, dormant, dormancy, hibernate, hibernation, torpor**)

torpor - The **dormant**, inactive state of a hibernating or aestivating animal. To conserve energy, hummingbirds will go into a state of torpor at night and during periods of cold, rainy weather. (See: **aestivation, aestivate, dormant, dormancy, hibernate, hibernation, torpid**)

total solar irradiance - The amount of solar energy hitting the top of the Earth's **atmosphere**, currently accepted to be about 1,368 watts per square meter.

Totora - Totora (*Schoenoplectus californicus tatora*) is a **subspecies** of the giant bulrush **sedge**. It is found in South America, around the shores of high Andean lakes, and on Easter island in the Pacific Ocean. The **genus** *Schoenoplectus* is closely related to *Scirpus* and sometimes included therein...*Schoenoplectus californicus* is a species of **sedge** known by the common names California bulrush and giant bulrush. It is also sometimes

called "**tule**", but the closely related *Schoenoplectus acutus* is the more correct owner of that name. It is a rhizomed water plant found in marshy areas from southern and western North America to South America and on Pacific islands including some of those in the Hawaiian and Cook chains. It has tall, thin, dark green **stems** which are usually triangular in cross-section and woolly, bristly tan or brown flowers in panicle **inflorescences**. A notable **subspecies** is the Totoro, *Schoenoplectus californicus tatora*. This is famous for making up the floating islands on which the Uros people of Lake Titicaca dwell, as well as occurring on isolated Easter Island in the Pacific. (See: **tule**)

toxic - Relating to or containing a poison or **toxin**...Capable of causing serious harm or death. ..Characteristics of things called poisons or **toxins**.

toxicant - A **toxic** substance....A harmful substance or agent that may injure an exposed **organism**.... Poisonous. (See: **toxin**)

toxicity - Adverse biological effect due to **toxins** and other **compounds**.

toxin - A toxic substance...An unstable poison-like **compound** of biological origin which may cause a reduction of viability or functionality in living **organisms**. ... A substance or the excessive amount of a substance that may cause death, stress, or impairment. ... A poison produced by the cells of certain plants and animals....Most often, a toxic peptide or **protein** capable of eliciting antibody production. A natural biological agent (from plants, animals, **bacteria** or **fungus**) that causes **toxicity**. A toxin is a substance that has been shown to present some significant degree of possible risk when consumed above safe limits by animals.. A harmful substance, poisonous. (See: **toxicant, endotoxin, exotoxin**)

trace - A visible path created by repeated passage of animals or people.

trace element - A chemical element appearing in minute quantities in natural systems. Trace elements may occasionally be concentrated by specific **organisms**.... An element found in only minor amounts (concentrations less than 1.0 microgram per liter) in water or sediment; includes arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc. (See: **micronutrient**)

trace gas - Any one of the less common gases found in the Earth's **atmosphere**. Nitrogen, oxygen, and argon make up more than 99 percent of the Earth's **atmosphere**. Other gases, such as carbon dioxide, water vapor, **methane**, oxides of nitrogen, ozone, and ammonia, are considered trace gases. Although relatively unimportant in terms of their absolute volume, they have significant effects on the Earth's **weather** and **climate**.

trachea (plural: **tracheae**) - A breathing tube. **Insects** and most spiders have a whole network of tracheae that carry oxygen to every organ and **cell**.

tracheid - A water-conducting **cell** in **gymnosperms** and other lower **vascular plants**.

trade winds - The winds that occupy most of the **tropics** and blow from the **subtropical** highs to the equatorial low. North of the Equator the winds blow from the northeast, and south of the Equator they blow from the southeast.... Surface air from the **horse latitudes** that moves back toward the equator and is deflected by the Coriolis Force, causing the winds to blow from the Northeast in the Northern Hemisphere and from the Southeast in the Southern Hemisphere. These steady winds are called trade winds because they provided trade ships with an ocean route to the New World... Winds that blow almost continually toward the equator from the northeast to the southwest.

tragedy of the commons - The Tragedy of the Commons is a famous essay authored by Garrett Hardin. It is an argument for private ownership as a means of conserving resources. Hardin envisages an area of common land on which animals are kept for grazing by a number of herders. It is to the advantage (*sensu* self interest) of any one herder to increase the number of animals he keeps on the commons. So all do. But this leads to **overgrazing** and irreversible damage to the commons. The tragedy of the commons has been repeated a thousand times. We overfish, we cut down too many trees, we extract too much **freshwater** from **aquifers** and so, through human selfishness, we ruin much of what is held in common ownership.

trait - **Phenotypical** and **genotypical** characters in plants and animals, vary in degree they are expressed.

transect - A narrow sample strip or a measured line laid out through **vegetation** specifically chosen for study, *i.e.* for analysis, profiling and charting.... A narrow strip along which researchers count **organisms** within **communities** to determine **species populations** and variability.

transform boundary - A boundary between **tectonic plates** that are sliding past each other.

transgenic - An **organism**, plant or animal, in which a foreign **gene** (a transgene) or **DNA** sequence, is incorporated into its **genome** early in development. The transgene is present in both somatic and germ **cells**, is expressed in one or more **tissues**, and is inherited by the offspring....A variety containing a foreign **gene** with the process of **genetic engineering** - from one species to another. Commonly refers to movement of **genes** between unrelated **species**, plants, animals, **bacteria**, humans. This is unknown in nature and is mediated by humans through **genetic** manipulation. (See: **genetic engineering**)

transient - An **organism** that crosses or stops in an area on its way to its usual breeding and wintering habitat; a transient is also called a visitor or a **vagrant**.

transitional forest - A term used in Amazonia for low-lying, poorly-drained forest that is seasonally inundated by rainfall or by rain-swollen **streams**, but not by a nearby **river**. Structurally it is similar to *terra firme*. Palms are common in the swampy places and **bamboo** (especially *Guadua* spp.) is also conspicuous. This forest type differs from

várzea in having a more developed undergrowth.

translocation - In botany, the movement of water, nutrients, chemicals, or elaborated food materials within a plant.

translucent - Allowing light to pass through but not allowing clear distinction of shape or color.

transparent - Allowing light to pass through; able to be seen through.

transpiration - The process by which water evaporates from vegetation through small holes called **stomata** in its leaves or needles. Transpiration is one way water is cycled back into the **atmosphere**. ...A **metabolic** process whereby plants take up water and minerals from the soil, evaporating the water via the leaves. The process by which plants absorb water from their roots, move it up through the plant (via the **xylem**), pass it through pores (**stomata**) in the leaves and other plant parts, and then evaporate it into the **atmosphere** as **water vapor**. The process by which **water vapor** is lost to the **atmosphere** from living plants. The term can also be applied to the quantity of water thus dissipated. ... process by which water that is absorbed by plants, usually through the roots, is evaporated into the **atmosphere** from the plant surface, such as **leaf** pores. ... The process in plants by which water is taken up by the roots and released as **water vapor** by the **leaves**. The term can also be applied to the quantity of water thus dissipated. The loss of **water vapor** from a plant, mostly from the **stomata** of **leaves**. The process by which water absorbed by plants (usually through the roots) is evaporated into the **atmosphere** from the plant surface (principally from the leaves)... Water loss by evaporation from leaf surfaces and through stomata. (See: **evaporation, evapotranspiration, hydrologic cycle**)

transpirational pull - The force exerted by **transpiration** from the **leaves** that draws water up through a plant.

transpire - To carry on **transpiration**.

transverse - Across; crosswise.

tree - A large, woody, **perennial** plant having a definite trunk.

tree cavity - A hollow cavity in a **tree** that provide resting or nesting places for **wildlife**.

tree limit - The point in **latitude** beyond which **trees** can no longer grow due to the interaction of their **biological** requirements with the complex of environmental factors. Compare **forest limit** and **treeline**. (See: **treeline, forest limit, timberline**)

treefall clearing - See **forest gap**.

treefall gap - See **forest gap**.

treeline / tree line- A loose term for the limit beyond which trees cannot or do not occur. Treeline is more generally used for the **altitudinal** boundary and tree limit for the **latitudinal** boundary.... The **limiting factor** is most commonly **altitude** or **geographical latitude**, and hence wind and cold, but may also be *e.g.* aridity, flooding, **air pollution**. Note: A distinction may be drawn between treeline and timber line, the latter being roughly the limit of timber rather than isolated **trees**. (See: **tree limit, forest limit, timberline**)

tremor - A small **earthquake**.

triangulation - Using two known points of reference to locate a third unknown point.

tributary (plural: **tributaries**) - A **stream** that flows into a larger **stream** or other body of water.... A smaller river or **stream** that flows into a larger river or **stream**. Usually, a number of smaller tributaries merge to form a river.... A stream that flows into a larger body of water.

trihalomethanes (THM) - A group of **compounds** formed during the disinfection process by the reaction between chlorine and naturally occurring **organic** substances present in water.... A group of **volatile organic compounds** containing one carbon atom, one hydrogen atom, and three halide (fluorine, chlorine, bromine, and iodine) atoms. Common THMs include chloroform, bromoform, and dichlorofluoromethane. These **compounds** can be a result of chlorination processes in water-supply wells.

trill - A rapid series of two vibrating tones.

trinomial - The three-parted scientific name of an **organism**, consisting of the organism's **genus, species** and **subspecies**. (See: **binomial nomenclature, binomial, Linnaean system**)

trochophore - A small, free-swimming, **larval** stage of some **aquatic invertebrates** such as mussels and clams. Trochophores swim using **cilia**, rather than **flagella** or some other method.

troop - A group or company of people, animals, or things. The term used for a group of monkeys.

trophic - Pertaining to food and nutrition.

trophic cascade - Trophic cascades occur when predators in a food web suppress the abundance and/or alter traits (*e.g.*, behavior) of their prey, thereby releasing the next lower **trophic level** from **predation** (or herbivory if the intermediate trophic level is an herbivore). For example, if the abundance of large **piscivorous** fish is increased in a lake, the abundance of their prey, zooplanktivorous fish, should decrease, large zooplankton abundance should increase, and phytoplankton biomass should decrease. This theory has

stimulated new research in many areas of ecology. Trophic cascades may also be important for understanding the effects of removing top predators from food webs, as humans have done in many places through hunting and fishing activities.

A **Top Down Cascade** is a trophic cascade where the food chain or food web is disrupted by the removal of a top predator, or a third or fourth level consumer. On the other hand, a bottom up cascade occurs when a primary producer, or primary consumer is removed, and there is a diminishment of population size through the community. An example could include Paine's study from the University of Washington, where he removed several species in different plots along the northwestern United States coastline, and realized that *Pisaster*, a common starfish, when removed, created a top-down cascade which involved a surge in barnacle and mussel population, but a decrease in the populations of chitons, limpets, and whelks. This led to the conclusion that *Pisaster* was a keystone species in that food web.

trophic level - Position in the **food chain** assessed by the number of energy transfer steps to reach that level. Producers (green plants) occupy the first trophic level, **herbivores** (plant-eaters) the second level, the **carnivores** (meat eaters) which eat the **herbivores** the third level, and secondary **carnivores** (*i.e.*, **carnivores** which eat other **carnivores**) the fourth level.... Feeding level. Link in **food chain**. (See: **food chain, food web, food pyramid, ecological pyramid**)

trophozoite - The feeding stage in the life cycle of a **protozoan**.

tropical - Of or referring to the **tropics**.... Often between 20°N and 20°S, very hot and humid with **temperatures** always greater than 65°F and rain most of the year.... The area between 23.5 degrees north and south of the equator. This region has small daily and seasonal changes in temperature, but great seasonal changes in **precipitation**.

tropical cyclone - A warm-core low pressure system which develops over **tropical**, and sometimes **subtropical**, waters and has an organized circulation. Depending on sustained surface winds, the system is classified as a (1) tropical disturbance, (2) a tropical depression, (3) a tropical storm, or (4) a hurricane or typhoon.

tropical deciduous forest - A type of forest found near the Equator that experiences distinct rainy and dry seasons. Many tropical deciduous forest plants are adapted to withstand high temperatures and seasonal **droughts**.... Forest of variable stature, but rarely exceeding 20-25 meters in height. Most **species** of **trees** lose all of their leaves during the dry season, which is usually pronounced where tropical deciduous forests are found, but these forests may contain some **evergreen species**, especially along **river** courses or at higher elevations. Example: the forests of the west slope of the Andes in northwestern Peru, from Tumbes south to Cajamarca. Also known as **tropical dry forest**. (See: **tropical semi-deciduous forest, dry forest, sclerophyll forest, thorn forest**)

tropical storm - Tropical storms generally form in the eastern portion of tropical oceans and track westward. **Hurricanes**, typhoons, and willy-willies all start out as weak low pressure areas that form over warm tropical waters (e.g., surface water temperature of at

least 80 degrees F). Initially, winds and cloud formations over the warm tropical waters are minimal. Both intensify with time. Formation of tropical storms also requires a significant **Coriolis effect** to induce proper spin in the wind formation. As the storm begins to organize itself into a coherent pattern, it will experience increased activity and intensity.

When a storm develops a clearly recognizable pattern, it is referred to as a tropical depression. When wind speeds reach 35 knots (40.3 mph), it is called a tropical storm and is given a name. When wind speed equals or exceeds 74 mph, the storm is called a hurricane. In the western Pacific, a hurricane is referred to as a typhoon. In waters around Australia it is called a cyclone or willy-willy.

Hurricanes intensify when moving over areas of increased water temperatures, and weaken over colder water surfaces. Upper atmosphere wind shear (different wind direction and speeds at different elevations) will frequently prevent or slow intensification of tropical storms by 'spreading out' the storm horizontally and preventing the formation of strong updrafts of warm, humid air. Movement over a land-mass will weaken hurricane winds but will result in large-scale rain that can result in large-scale flooding. When encountering a strong frontal system (such as a polar front) the hurricane will curve and track along the leading edge of the front or become implanted in it.

Satellite infrared imagery can identify surface water temperatures that will foster tropical storm development. (See: **hurricane, cyclone**)

Tropic of Cancer - A line 23° 26' 22" **latitude** north of the Equator. On June 21 (or thereabouts) the sun is directly above the Tropic of Cancer, at all other times the sun is farther south. (See: **tropics**)

Tropic of Capricorn - A line 23° 26' 22" **latitude** south of the Equator. On December 21 (or thereabouts) the sun is directly above the Tropic of Capricorn. At all other times the sun is farther north. (See: **tropics**)

tropical depression - A tropical cyclone in which the maximum one-minute sustained surface wind is 38 mph or less. They form from a tropical wave or tropical disturbance.... A tropical cyclone in which the maximum sustained surface winds are 38 miles per hour (33 knots) or less. Characteristically having one or more closed isobars, it may form slowly from a tropical disturbance or an easterly wave which has continued to organize.

tropical dry forest - See **tropical deciduous forest**.

tropical lowland evergreen forest - A more technical term for **tropical rainforest**.

tropical rainforest - Forest occurring in the **tropics** and receiving at least 2000 mm. of rain per year.... A type of wet forest found near the Equator that harbors the richest **diversity of terrestrial** plant and animal **species**.**Tropical** closed moist forests dominated by **broad-leaved evergreen trees**. The most diverse **terrestrial biome** on Earth, tropical rainforests cover only 6-7% of the surface of the Earth but are thought to contain more than half of all **species**. The treetops are layered into several **canopies** which form a dense habitat and prevent 90-99% of the sunlight from reaching the ground.

Tropical rainforests typically receive some 2000 mm. of annual rainfall without distinct changes in climate between seasons. Tropical rainforest **biodiversity** is based on a very tight recycling of mineral **nutrients**, most of which (80+%) are tied up in the **vegetation** and recycled by means of **symbiotic** relationships between **microorganisms** and **host** plants. Because of natural cycling and reuse of **nutrients**, luxuriant **rainforests** can grow on soils that an agriculturist would regard as infertile unless supplied with large amounts of fertilizers.... An **evergreen woodland** of the **tropics** distinguished by a continuous **leaf canopy** and an average rainfall of about 100 inches per year. Rain forests play an important role in the **global environment**. The Earth sustains life because of critical balances and interactions among many factors. Were there not processes at work that limit the effects of other essential processes, Earth would become uninhabitable. Destruction of tropical rain forests reduces the amount of **leaf** area in the tropics, and consequently the amount of **carbon dioxide** absorbed, causing increases in levels of **carbon dioxide** and other **atmospheric** gases. It is estimated that cutting and burning of **tropical forests** contributes about 20 percent of the carbon dioxide added to the **atmosphere** each year. The World Resources Institute and the International Institute for Environment and Development have reported that the world's **tropical forests** are being destroyed at the rate of fifty-four acres per minute, or twenty-eight million acres lost annually. Rain forest destruction also means the loss of a wide spectrum of **biological** life, **erosion** of soil, and possible **desertification**. (See: **tropical rainforest, tropical lowland evergreen forest, terra firme, várzea, igapó, flooded tropical evergreen forest, white-sand forest, tropical deciduous forest, tropical semi-deciduous forest**)

tropical semi-deciduous forest - A type of forest found near the Equator in the transition zone between **tropical deciduous forest** and more humid forests. (See: **tropical deciduous forest**)

tropical storm - A tropical **cyclone** in which the 1-minute sustained surface wind ranges 39-73 mph. Tropical storms pose a threat to life and/or property in coastal areas.

tropical waters - Ocean waters within 23 degrees **latitude** of the equator. In the western Atlantic, these waters are warm year-round. When a **hurricane** is moving through these waters, it is considered a tropical **cyclone**.

tropics - The region of the world between the Tropic of Cancer (23° 26' 22" north of the Equator) and the Tropic of Capricorn (23° 26' 22" south of the Equator)... Region in which the climate undergoes little seasonal change in either **temperature** or rainfall. **Geographically**, regions characterized by a climate with high **temperature**, humidity and rainfall, and having very rare light frosts at night (an average temperature of 65 degrees Fahrenheit or 18° Celsius for the coolest month).

tropism - The movement of plant parts toward or away from a stimulus in the plant's **environment**. Plant movement in response to an **environmental** stimulus such as **gravity** or light.... A growth curvature of a plant part caused by some external stimulus such as light or **gravity**. (See: **phototropism, heliotropism, heliotaxis, geotropism, gravitropism, taxis**)

tropopause - The boundary, or transitional layer, between the **troposphere** and the **stratosphere**.... The upper boundary of the **troposphere**, usually characterized by an abrupt change in lapse rate from positive (decreasing **temperature** with height) to neutral or negative (**temperature** constant or increasing with height).... The boundary between the troposphere and the stratosphere (about 8 km in polar regions and about 15 km in tropical regions), usually characterized by an abrupt change of lapse rate. The regions above the troposphere have increased atmospheric stability than those below. The tropopause marks the vertical limit of most clouds and storms. (See: **atmosphere, planetary boundary layer, troposphere, stratosphere, stratopause, mesosphere, mesopause, thermosphere, ionosphere, exosphere**)

tropophyte - A plant that markedly changes its character, particularly its water requirements, with seasonal changes of climate, *e.g.* a **deciduous tree**.

troposphere - The layer of the **atmosphere** closest to the Earth's surface. ..The lowest layer of the **atmosphere**, 6 mi. (10 km) high in some areas and as much as 12 mi. (20 km) high in others, within which there is a steady drop in **temperature** with increasing **altitude** and within which nearly all **cloud** formations occur and weather conditions manifest themselves.... The layer of the **atmosphere** from the Earth's surface up to the **tropopause**, characterized by decreasing **temperature** with height, vertical wind motion, appreciable **water vapor** content, and sensible weather (**clouds**, rain, etc.)....The lowest region of the **atmosphere** between the Earth's surface and the **tropopause**, characterized by decreasing **temperature** with increasing **altitude**.... The lowest and densest region of the Earth's **atmosphere**, extending from the Earth's surface to the **tropopause**. The troposphere is characterized by **temperatures** that decrease with increasing **altitude**. At the top of this region, **temperatures** are close to -55°C. (-67°F.). The weather, major wind systems, and cloud formations occur mostly in the troposphere.... The region of the **atmosphere** between the Earth surface and the **stratosphere**, which begins at approximately 17 km **altitude** in the **tropics** and **subtropics** but only at about 10 km altitude at higher **latitudes**. The troposphere is characterized by dropping **temperature** with increasing altitude and is the zone in which virtually all the **water vapor** in the **atmosphere** is located.... The lower **atmosphere**, to a height of 8-15 km above Earth, where temperature generally decreases with altitude, clouds form, **precipitation** occurs, and convection currents are active.... From the planet surface to roughly 7-17 kilometers up. It makes up about 75% of the atmosphere. Weather occurs here, through exchanges of heat. The outer boundary is called the **tropopause**. (See: **atmosphere, planetary boundary layer, tropopause, stratosphere, stratopause, mesosphere, mesopause, thermosphere, ionosphere, exosphere**)

tropospheric - Of or relating to the **troposphere**.

tropospheric ozone - A by-product of the photochemical (light-induced) processes associated with **air pollution**. **Ozone** in the **troposphere** can damage plants and humans.... Ozone that is located in the **troposphere** and plays a significant role in the **greenhouse effect** and urban **smog**. (See: **troposphere, ozone, photochemical smog**)

trough - In **meteorology**, an elongated area of relatively low **atmospheric pressure**, usually not associated with a closed circulation, and thus used to distinguish from a closed low. The opposite of ridge.... Elongated area of low **atmospheric pressure**, either at the surface or in the upper **atmosphere**.

truncate - Square-ended; opposite to rounded.

true end bud - A **bud** located at the very tip of the twig... An end **bud** from which sprouts an actual **leaf, stem**, or twig. (See: **false end bud**)

truncate - Cut off squarely at tip.

tsunami - A series of huge waves caused by an **earthquake** or **volcanic** eruption beneath or near the ocean.... A series of waves of extremely long wave length and long period generated in a body of water by an impulsive disturbance that vertically displaces the water.

tuber - A portion of an underground **stem** from which new plants may form. (See **root tuber, stem tuber**)

tubercle - A small, rounded knob or projection.

tuberous - Resembling a **tuber**.

tuberous root - See **root tuber**.

tuft - In animals, an extension of hair or feathers from the head, tail, or ears.

tule - The tule (*Schoenoplectus acutus*, also known as *Scirpus acutus*, *Schoenoplectus lacustris*, and *Scirpus lacustris acutus*), also known as the common tule, hardstem tule, tule rush, hardstem bulrush, or viscid bulrush, is a giant species of **sedge** in the plant **family** Cyperaceae, native to **freshwater marshes** all over North America. It is generally pronounced "too-lee". The **species** has a thick, rounded green stem growing to 1-3 m tall, with long, **grass**-like leaves, and radially symmetrical, clustered pale brownish flowers. Tules at shorelines play an important **ecological** role, helping to buffer against wind and water forces, thereby allowing the establishment of other types of plants and reducing **erosion**. ...*Schoenoplectus californicus* is a species of **sedge** known by the common names California bulrush and giant bulrush. It is also sometimes called "tule", but the closely related *Schoenoplectus acutus* is the more correct owner of that name (See: **Totora**)

tundra - The zone of low, Arctic **vegetation** between the **treeline** of the **taiga** to the south and the region of perpetual ice and snow. The corresponding zone on high mountains may be termed alpine or mountain tundra.A vast, mostly flat, treeless Arctic region of Europe, Asia, and North America in which the subsoil is permanently

frozen. The dominant **vegetation** is low-growing **lichens**, **mosses**, and stunted **shrubs**. . . . A type of **ecosystem** dominated by **lichens**, **mosses**, **grasses**, and **woody plants**. Tundra is found at high **latitudes** (Arctic tundra) and high **altitudes** (alpine tundra). Arctic tundra is underlain by permafrost and is usually saturated. . . . A treeless area in the Arctic with permanently frozen subsoil that supports **vegetation** such as **lichens**, **mosses**, and stunted **shrubs**. . . . Northern Hemisphere circumpolar **environment** (very cold, low rainfall) and its **ecological communities**. . . . From the Finnish "tunturi," meaning a treeless plain and describing the **landscape** beyond the cold limits of **tree** growth. . . . A cold **climate landscape** having a **vegetation** without **trees**. The absence of **trees** is caused by a complex of conditions that is ultimately related to regional climate. This regional aspect distinguishes tundra from treeless **bogs** and similar local areas without **trees** due to **edaphic** extremes in areas that otherwise support a **forest cover**. . . . The **landscape** beyond the **temperature** limits of **tree** growth, both in the far north and at elevations above **treeline** on mountains. . . . The so-called "barren ground" north of the **circumpolar coniferous forests**. . . . Treeless areas where dwarf **shrubs** and low **herbaceous** plants predominate, often with many **lichens** and **mosses**, on a permanently frozen subsoil.

- **alpine tundra** - That portion of the **landscape** above the upper limit of tree growth in the higher mountain regions which supports a plant cover of dwarf **shrubs** and **herbs**.
- **dwarf shrub scrub tundra** - A tundra **landscape** (beyond the limits of **tree** growth) with a dwarf shrub **scrub vegetation**.
- **herbaceous tundra** - A tundra **landscape** (beyond the limits of **tree** growth) with an **herbaceous vegetation**.
- **mat and cushion tundra** - A tundra **landscape** (beyond the limits of **tree** growth) with a **vegetation** composed of mat and **cushion plants**. (See: **fellfield**)
- **sedge-grass tundra** - A tundra **landscape** (beyond the limits of **tree** growth) with a **herbaceous vegetation** of non-**tussock** forming **sedges** and **grasses**.
- **shrub tundra** - A tundra **landscape** (beyond the limits of **tree** growth) with a **scrub vegetation**.
- **tussock tundra** - A tundra **landscape** (beyond the limits of **tree** growth) with a **herbaceous vegetation** of **tussock** forming plants, particularly *Eriophorum* spp.

turbid - Thick or opaque with suspended materials; roiled; muddy.

turbidity - Cloudiness of water due to suspension of particles or stirring up of sediment from the bottom of the stream or river bed. . . . The amount of solid particles that are suspended in water and that cause light rays shining through the water to scatter. Thus, turbidity makes the water cloudy or even opaque in extreme cases. . . . An indicator of the cloudiness or suspended solid particulate matter in smog or muddy water; a commonly measured component of water quality. . . . A cloudy condition in water due to suspended **silt** or **organic** matter.

turbulence - Irregular, disturbed or apparently chaotic movement of water or air.

turgid - In botany, swollen and firm due to internal water pressure.

turgor pressure - In **botany**, the pressure developed in a **cell** as it becomes filled with water.

turnover - Mixing of water due to lack of a **pycnocline**.

turret - A small tower that extends above a surface; in the case of cicadas, the turret is made of mud and extends above the surface of the ground.

tusk - An elongated pointed tooth, usually one of a pair, extending outside of the mouth in certain animals such as the walrus, elephant, wild boar, or peccary.

tussock - A **hummock** of grasses or **sedges** bound together by their roots. Tussocks are found commonly in the **pampas** and in the **puna**.... A plant-form that is tufted, bearing many stems arising as a large dense cluster from the **crown**.... **Graminoid** life form consisting of bunch-like tufts, sometimes more than 1 meter or 3 feet tall, in which the hard, old, withered leaves are intermingled with the fresh, young, green leaves.

twiner - In **botany**, a **stem** growing in a spiral fashion around a supportive object.

tymbal - A vibrating membrane of the sound-making organ of a cicada; a kettledrum is a timbal.

tympanic membrane - A thin membrane that detects vibrations made by sound; also called eardrum and **tympanum**.

tympanum - A membrane that acts like an ear. It receives sounds as vibrations in the air. This information is carried to the brain, so the insect can hear. Also known as a **tympanic membrane**.

type locality - The **geographic** location where the first specimen of a **species** of plant or animal was collected.... The geographical place of capture or collection of the name-bearing type of a nominal species or subspecies. If the name-bearing type was captured or collected after being transported by boat, vehicle, aircraft, or other human or mechanical means, the type locality is the place from which it, or its wild progenitor, began its unnatural journey. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

type series - The series of specimens that either constitutes the name-bearing type of a nominal species or subspecies or from which the name-bearing type has been or may be designated. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

type specimen - In **taxonomy**, the original individual plant or animal specimen from which the first scientific description of the species was drawn up. Also known as the **holotype**. (See: **type specimen, holotype, type series, type locality, allotype, topotype, paratype, syntype, lectotype**)

typhoon - A **hurricane** that forms in the western Pacific Ocean.

ultrasonic - Having frequencies above those that humans are able to hear. Sounds with higher frequencies travel less distance than those having lower frequencies.

ultraviolet (UV) radiation - The energy range just beyond the violet end of the visible spectrum. Although ultraviolet radiation constitutes only about 5 percent of the total energy emitted from the sun, it is the major energy source for the stratosphere and mesosphere, playing a dominant role in both energy balance and chemical composition.

Most ultraviolet radiation is blocked by Earth's **atmosphere**, but some solar ultraviolet penetrates and aids in plant photosynthesis and helps produce vitamin D in humans. Too much ultraviolet radiation can burn the skin, cause skin cancer and cataracts, and damage vegetation... Electromagnetic radiation at shorter wavelengths and higher energies than the violet part of visible light... Light that is so blue humans cannot see it. A band of the electromagnetic spectrum between the visible and the X-ray. Photons of ultraviolet light are more energetic than photons of visible light... Light from the region of the spectrum with wavelengths between 1nm (X-ray) and 400nm (the blue end of the visible spectrum), approximately... Invisible electromagnetic radiation (light) with wavelengths shorter than violet light and longer than X-rays. Ultraviolet light occupies the spectral band extending from 300 nanometers down to about 10 nanometers... Light in the wavelength range roughly from 100 to 400 nm, which is invisible to the human eye. Ultraviolet radiation (UV) has higher energy than visible light and is strongly absorbed by DNA, which is damaged by exposure. In recent decades, UV irradiance has been increasing as **chlorofluorocarbons** released by industrial activities have depleted the Earth's **stratospheric ozone layer**, which acts as a UV shield.

umbel - In **botany**, an **inflorescence** in which the **flower** stalks arise from one point at the tip of a **stem**.

umbrella species - Biologists sometimes name certain **species** as **umbrella species** in the hopes of saving a whole range of animals and plants in a given area. The idea is that by protecting the important **umbrella species** and preserving its **habitat**, you will also protect a number of other **species** that depend on the same **habitat**.

However, it doesn't always work out that way. For example, in California, a certain insect's **umbrella species** was doing okay, but the insect itself had gone down in numbers. What happened was that some development was allowed in the **umbrella species'** **habitat**, keeping in mind to protect the **umbrella species**. However, the insect required a specific plant in order to live that the **umbrella species** did not necessarily need. Many of the insect's plants were lost to development. With fewer plants to live on, fewer insects were able to survive. So it is often better all around to preserve land rather than a specific **species**.

unconfined aquifer - An **aquifer** in which the **water table** is at or near **atmospheric pressure** and is the upper boundary of the **aquifer**.

unconsolidated deposit - Deposit of loosely bound **sediment** that typically fills topographically low areas. These deposits are common in valleys and typically form principal **aquifers** when saturated.

unconsolidated rock - Loosely bound geologic formation composed of sands and gravel.

undergrowth or **undergrowth layer** - Low-growing plants, **saplings**, and **shrubs** beneath trees in a forest....The **vegetation** al layer in a forest below the **understory layer** and above the **herb layer**.

understory or **understory layer** - An underlying layer of **vegetation** , especially the plants that grow beneath a forest's **canopy**. This layer is found above the **undergrowth** layer and below the **subcanopy** layer.... The lesser **vegetation** (**shrubs**, seedlings, **saplings**, small **trees**) within a **forest** stand which forms a layer between the **overstory**, the upper portions of adjacent trees and other woody growth, and the **herbaceous** plants of the **forest floor**... The stratum of **trees** that (barring **gaps**) lies in the shade immediately below the **overstory**. Also loosely applied to all woody strata below the **overstory**.... An underlying layer of plant growth beneath larger **trees** of a wooded area of **forest**.... The forest layer that is beneath the canopy and is made up of the trunks of the canopy trees as well as shrubs, vines, and small plants.

undertow - The subsurface return of the water of waves breaking on shore.

undulated - Wavy.

ungulate - A **mammal** having hooves; deer, elk, and bison are some examples of ungulates.

unicellular organism - An **organism** composed of a single **cell**, a **single-celled organism**.

unifying theory - A theory that ties other theories together to give a more complete picture of natural occurrences, such as **plate tectonics**.

unpalatability - Referring to something that is **unpalatable**.

unpalatable - Not pleasing to the taste.

unsaturated zone - The zone immediately below the land surface where the pores contain both water and air, but are not totally saturated with water. These zones differ from an **aquifer**, where the pores are saturated with water. Also known as the **aeration zone**. (See: **aeration zone**)

unstable - Tending strongly to change; not constant; fluctuating.

unsustainability - Unfortunately, perhaps the majority of current human activities are not **sustainable**, so it may be easier or more appropriate to measure unsustainability. (See: **sustainability**)

updraft - A small-scale current of rising air.... A relatively small-scale current of air with marked upward vertical motion.

upland - An area that is far enough from a **wetland** or other fresh water body to make the vegetation dependent upon rain or other forms of precipitation for its water source.

upper level system - In **meteorology**, a general term for any large-scale or mesoscale disturbance capable of producing upward motion (lift) in the middle or upper parts of the **atmosphere**.

uprush - The landward return of water following the **backrush** of a wave.

upslope flow - Air that flows toward higher terrain, and hence is forced to rise. The added lift often results in widespread low cloudiness and stratiform **precipitation** if the air is stable, or an increased chance of **thunderstorm** development if the air is unstable.

upwelling - An area of nutrient rich water brought to the surface from the ocean depths by a combination of winds and currents.... The upward movement to the ocean surface of deeper, cold and usually **nutrient**-rich waters, especially along some shores, due to the offshore movement of surface waters.... The vertical motion of water in the ocean by which subsurface water of lower temperature and greater density moves toward the surface of the ocean. Upwelling occurs most commonly among the western coastlines of continents, but may occur anywhere in the ocean. Upwelling results when winds blowing nearly parallel to a continental coastline transport the light surface water away from the coast. Subsurface water of greater density and lower temperature replaces the surface water, and exerts a considerable influence on the weather of coastal regions. Carbon dioxide is transferred to the atmosphere in regions of upwelling. This is especially important in the Pacific equatorial regions, where 1-2 GtC/year may be released to the atmosphere. Upwelling also results in increased ocean productivity by transporting nutrient-rich waters to the surface layer of the ocean.

urban - Referring to a city environment.

urogenital opening - The terminal opening of the reproductive and urinary systems.

uropygial gland - A large **gland** at the base of a bird's tail that secretes an oil used in **preening**. Also called the oil **gland**.

urticating hairs - Hairs that contain skin irritants, as with many caterpillars and **stinging nettle**, plants in the **genus** *Urticaria*. (See: **stinging hair**)

vacuole - A fluid-filled sac within a **cell**.

vagrant - In a biological context, an **organism**, especially a bird, which has wandered or been blown or otherwise transported to a locality beyond its normal **range**. When used as a term of abundance (or lack thereof), as in an annotated checklist, it is essentially synonymous with “**accidental**”. (See: **extralimital, accidental**)

valley breeze - A breeze that occurs when cool air moves out of the valleys to replace warm air that rises off the slopes of mountains.

vaporization - The conversion of a solid or liquid into a vapor.

variegated - In **botany**, irregular pattern of color in a **leaf** or **petal**.

variegation - An inherited, irregular pattern of color in a **leaf** or **petal**.

variety (plural **varieties**) - Refers to a distinct group of plant or animal within the same **species** that share a number of characteristics which are passed on from one generation to the next and which distinguishes the plant/animal of one variety from those of another. ...In **botany**, variety is a **taxonomic** rank below that of **species** and **subspecies**.

varillal (plural: **varillales**) - A local name in northern Amazonian Peru for a lower stature **forest** that occurs on sandy soil. (See: **white-sand forest, chamizal, irapayal**)

várzea - A Brazilian term referring to **riverine** forests along **whitewater rivers** such as much of the Amazon and some of its tributaries....Várzea is a Portuguese-Spanish term referring to areas of forested land regularly inundated by seasonal **river floods**. Typically, it refers to those areas flooded by **whitewater rivers**, contrasted with areas flooded by **blackwater rivers** which are called **igapó**. Várzea and **igapó** have distinctive **flora** and **fauna** adapted to the changing **environment**; a **biota** that is different from that inhabiting areas that are never flooded, called **terra firme**. The flooded **forests** constitute about three percent of the area of **Amazonian rainforest**, while **terra firme** comprises most of the rest. (See: **tropical rainforest, tropical lowland evergreen forest, terra firme, várzea, igapó, flooded tropical evergreen forest, white-sand forest, tropical deciduous forest**)

vascular - In **botany**, pertaining to conductive tissues (**xylem** and **phloem**).

vascular bundle - A strand of conducting **tissue** containing **xylem** and **phloem**.... Strand of conductive tissue, usually composed of **xylem** and **phloem** (in leaves, small bundles are called veins).

vascular cambium - A narrow cylinder of **cells** that gives rise to **secondary xylem** and **phloem**; a **lateral meristem**. (See: **cambium**)

vascular plant - Plant that has specialized **tissues** for conducting water. Vascular plants include the **ferns, club mosses, horsetails, flowering plants, conifers** and other

Gymnosperms. ... Any plant containing water and food-conducting **tissues**. (See **nonvascular plants**)

vascular ray - In **botany**, a narrow sheet of **cells** running radially across the secondary **vascular tissues** of a **stem** or root.

vascular tissue - In **botany**, a group of food- or water-conducting **cells**....Specialized **tissue** in plants for conducting water.

vector - An **organism** or an agent that transmits a disease-causing **microorganism**.... An agent that transmits **inoculum** and is capable of disseminating disease. (See: **vector-borne disease**)

vector-borne disease - A vector-borne disease is one in which the **pathogenic microorganism** is transmitted from an infected individual to another individual by an **arthropod** or other agent, sometimes with other animals serving as intermediary **hosts**. The transmission depends upon the attributes and requirements of at least three different living **organisms**: the pathologic agent, either a **virus**, **protozoa**, **bacteria**, or helminth (worm); the **vector**, which are commonly **arthropods** such as **ticks** or **mosquitoes**; and the human **host**. In addition, intermediary **hosts** such as domesticated and/or wild animals often serve as a reservoir for the **pathogen** until susceptible human **populations** are exposed. (See: **vector**)

vegetated shallows - Areas that are permanently inundated and under normal circumstances have rooted **aquatic vegetation**, such as sea grasses in **marine** and **estuarine** systems and a variety of **vascular** rooted plants in **freshwater** systems.

vegetation - All the plants or plant life of a place, taken as a whole, *e.g. the vegetation of the Amazon Basin*. ... The plant life of a particular area. (See: **flora**)

vegetative - Referring to somatic or asexual parts of a plant, which are not involved in sexual reproduction.

vegetative reproduction - Production of a new plant from a portion of another plant, such as a stem, branch, or root.... the ability of plants to reproduce without sexual reproduction, by producing new plants from existing vegetative structures. Some plants, such as most **bamboos**, send out long underground stems that produce new plants, often at considerable distances from the original plant. Such plants can form enormous **colonies** of new plants within a relatively few years. Many trees, such as the beech and aspen, send up root sprouts, and large colonies of new trees thus arise. In other trees, the lower branches may produce roots where they rest upon the ground, and new trees are produced. The leaves of some plants produce buds at their edges, which develop in turn into miniature plants that fall off and take root.

vein - In **botany**, a strand of **xylem** and **phloem** in a **leaf blade**.... A narrow channel that runs through a leaf blade, bringing the leaf water and **minerals**.... Small vascular bundle in a leaf.

velamen - In **botany**, a water-absorbing **tissue** on the outside of orchids' **aerial roots**.

veldt / veld) - Elevated open **grassland** in southern Africa...Southern African term for natural **vegetation**, usually **grassland** or wooded **grassland**, typically containing scattered **shrubs** or **trees**...The term veld, or veldt, refers primarily (but not exclusively) to the wide open rural spaces of South Africa or southern Africa and in particular to certain flatter areas or districts covered in **grass** or low **scrub**. The word comes from the Afrikaans (ultimately from Dutch), literally meaning 'field'. However, this simple translation does not convey the subtleties of the many idiomatic nuances of the term. Veld can be compared to the Australian terms "outback" or "bush," to "the **prairie**" of North America, or to the "**pampas**" of South America but the comparisons are not exact. (See: **grassland, savanna, Pampas, pampas, cerrado, Pantanal, Llanos, prairie, steppe, meadow, campos, paramo, puna, savanna woodland**)

velvet - In zoology, the soft covering of an antler of a member of the deer **family** during the spring and summer season. The velvet nourishes the antler externally through its rich blood supply carrying calcium and other minerals necessary for bone growth. The velvet is shed annually.

venation - Distribution or arrangement of a system of veins, as in a **leaf blade** or the wing of an **insect**.

venom - A poisonous secretion of an animal, such as a snake, spider, or scorpion, usually transmitted by a bite or sting.... A chemical that is injected into another animal to kill, paralyze, or deter it from attacking. Venom can also help liquefy the **prey** so it can be sucked up.

venomous - Producing a **venom**, or poison. The copperhead, rattlesnake, Bushmaster and Fer-de-Lance are venomous snakes.

vent - The **cloacal** opening.

venter - The under or belly side of an **organism**.

ventral - The underneath or lower side; in higher animals, the side containing the belly.... Lower; bottom; under.

ventriloquism - The art of projecting one's voice so that it seems to come from another source, or from a different direction.

ventriloquous - Of or pertaining to a ventriloquist or **ventriloquism**. Many **rainforest** birds can be said to be ventriloquous.

vermiculated - Wormlike; often used to describe fine, wavy lines of color on bird feathers.

vermiculations - Fine, wavy lines of color on bird feathers.

vernal equinox - The beginning of spring in the Northern Hemisphere. The time/day that the sun crosses the equatorial plane going from south to north.

vernal pool - A temporary body of freshwater that usually fills and dries up on a seasonal cycle.... A seasonal body of standing water that, in the north, typically forms in the spring from melting snow and other runoff, dries out completely in the hotter months of summer, and often refills in the autumn. Vernal pools range from broad, heavily vegetated lowland bodies to smaller, isolated upland bodies with little permanent **vegetation**. They are free of fish and provide important breeding **habitat** for many **terrestrial** or semi-**aquatic** species such as frogs, salamanders, and turtles. Also known as an **ephemeral pool** or **temporary wetland**.

vernalization - In **botany**, a low-temperature treatment promoting flowering.

vertebrate - An animal with an internal skeleton... Animals with backbones or spinal columns, such as fish, amphibians, reptiles, birds, and mammals.... The group or individual animals of the phylum Chordata, subphylum Vertebrata. Vertebrates are characterized by the presence of a spine.

vessel - In **botany**, a water-conducting **cell** in **angiosperms**.

vestigial - Much reduced; showing only a trace.

viable - In botany, able to germinate, as seeds, fungus spores, sclerotia, etc.; capable of growth.

viable species - A **wildlife** or fish **population** of sufficient size and reproductive potential to maintain its existence over time in spite of normal fluctuations in **population** levels.

viability - A **population** of sufficient numbers and reproductive potential to maintain its existence over time in spite of normal fluctuations in **population** levels.

viable - In **botany**, capable of **germination**.

vibrissa (plural: **vibrissae**) - Any of the long stiff hairs growing around the mouth or elsewhere on the face of many mammals, used as organs of touch; whiskers.... Any of the long stiff hairs that project from the snout or brow of most mammals, as the whiskers of a cat....One of several long modified feathers that grow along the gape of the mouth of insect-eating birds (also known as **rectal bristles**)

vicariance - A situation in which **populations** are physically separated by some sort of natural barrier, such as a mountain range, unsuitable **habitat**, or river. (See: **vicariant**, **geographic isolation**)

vicariant - Refers to **species** that occupy similar **taxonomic niches** but in **geographic isolation** from each other. Implies a **phylogenetic** relationship existing between the two **species**. (See: **vicariance**, **geographic isolation**)

vine - A plant that creeps along a surface or requires support to grow upward.... An **herbaceous** or woody plant with **tendrils** and the ability to climb and grow over other plants or objects easily.

vine tangle - A dense tangle of **vines**, often in the **understory** or **subcanopy** of the forest. Some **species** of birds, such as Gray Antbird, *Cercomacra cinerascens*, are **vine tangle specialists**.

viral - Of or referring to a virus.

virga - A mass of streaks of rain appearing to hang under a cloud and evaporating before reaching the ground....Streaks of water drops or ice particles falling out of a cloud and evaporating before reaching the ground...In meteorology, virga is an observable streak or shaft of precipitation that falls from a cloud but evaporates before reaching the ground. At high altitudes the precipitation falls mainly as ice crystals before melting and finally evaporating; this is usually due to compressional heating, because the air pressure increases closer to the ground. It is very common in the desert and in temperate climates. In North America, it is commonly seen in the Western United States and the Canadian Prairies....

virgin forest - See **old-growth forest**.

virus (plural: viruses) - Any of a large group of sub-microscopic **organisms** comprised of a **protein** coat with **genetic** material in the form of a nucleic acid **molecule** (DNA or RNA, double or single strand, linear or circular). A virus is however unable to reproduce outside the host cell of another plant or animal, and for this reason is often not included within the definition of life. Viruses nevertheless live at the borderlines, providing insight into the nature and processes of life and **evolution**. Some viruses are **pathogenic** to plants and animals, for example causing human diseases including the common cold, herpes, measles, smallpox and HIV/AIDS....A **microorganism** that can infect cells and cause disease..... A **microorganism** composed of a piece of **genetic** material : RNA or DNA : surrounded by a **protein** coat. To replicate, a virus must infect a **cell** and direct its **cellular** machinery to produce new viruses.... A **microscopic organism** that relies on the **genetic** machinery of living **cells** to grow and reproduce.

visibility - In **meteorology**, the greatest distance an observer can see and identify prominent objects.

visible spectrum - That part of the electromagnetic spectrum to which the human eye is sensitive, between about 0.4 and 0.7 micrometers.

vitamin - Any one of several unrelated **organic compounds** that an **organism** cannot synthesize itself so they must be obtained from the diet, or from dietary supplements. They are essential, in small quantity, for normal growth and **metabolism** and when deficient produce specific-deficiency illnesses.

viviparous - Bringing forth living young rather than eggs, as with most **mammals** and some **reptiles** and fishes.... Producing free-swimming young, rather than laying eggs....In animals, giving birth to young that develop inside the mother's body without a shell ever being present; some **reptile** and most **mammals**, (with the exception of **monotremes**, such as the Duck-billed Platypus) are viviparous. Contrast with **oviparous** and **ovoviviparous**. (See: **ovoviviparous**, **oviparous**)

VOC - See **volatile organic compound**.

vocal dueling - In birds, singing contests between two or more males to establish territory or secure a mate. Also known as **counter-singing**. (See: **counter-singing**, **duet**, **duetting**, **antiphonal singing**, **chorusing**)

vocal pouch - A sac in the throat area of a male toad or frog that acts as a resonating chamber as air is forced from the lungs, past the vocal cords and into the pouch.

vocalization - The process of making a sound using vibrations of the vocal organs; the bellow of a frog, the song of a bird, and the howl of a coyote are examples of vocalizations.

volatile organic compound (VOC) - Any **organic compound** which evaporates readily to the **atmosphere**. VOCs contribute significantly to **photochemical smog** production and certain health problems.

volcanic - Of or referring to **volcanoes** or the action of **volcanoes**.

volcanic island arc - A long, curved chain of **volcanic** islands.

volcano - A place where molten rock, hot gases, and solid rocks erupt through an opening in Earth's **crust**, also a mountain that formed from these materials...A naturally occurring vent or fissure at the Earth's surface through which erupt molten, solid, and gaseous materials. **Volcanic** eruptions inject large quantities of dust, gas, and aerosols into the atmosphere. A major component of **volcanic** clouds is sulfur dioxide, a strong absorber of **ultraviolet radiation**. Chemical interactions between sulfur dioxide and water cause sulfuric acid aerosols which can scatter some of the incident solar radiation back to space, thus causing a global cooling effect. For example, Mt. Pinatubo in the Philippines erupted in June 1991, and in the following year the global surface

temperature was observed to decrease by about 0.3 degrees C.

volunteer - In **botany**, growing from self-sown or accidentally dropped seed. Often used in reference to a cultivated plant or crop.

voracious - Consuming food in great quantities.

vortex - A mass of fluid rotating about an axis, *i.e.*, whirlpool or whirlwind.

voucher specimen - Those specimens retained in a collection as representatives of a study, and that are presumed to be accurately identified by competent authorities. Such collections are often erroneously referred to as "type collections."

vulnerable species - A species which may soon move into the 'endangered' category if causal factors affecting their numbers continue. Included are **species** of which all, or most, **populations** are decreasing because of **overexploitation**, extensive destruction of **habitat**; **species** which are seriously depleted; under threat from severe adverse factors throughout their **range**; and **species** with low or localized **populations** and dependent upon a limited **habitat** which would be vulnerable to further threats. (See: **endangered species, critically endangered, threatened species, ghost species, extinction**)

wallow - A depression formed by an animal or a group of animals repeatedly bedding down or rolling about on the ground; wallows often collect standing water and provide **habitat** for other **species** as well as allowing water to slowly seep through the soil.

warm-blooded - Maintaining a relatively constant and warm body **temperature** independent of **environmental temperature**. An animal that is able to maintain a constant body **temperature** despite changes in the **temperature** of its **environment**. ...**Mammals** and birds are the only animals that are warm-blooded. Opposite of **cold-blooded**. A synonym for **endotherm**. ... Able to maintain the internal body **temperature** independently of the surrounding **temperature**; also called **endothermic**; birds, raccoons, and humans are examples of warm-blooded animals. (See: **thermoregulation, homeothermic, endothermy, endotherm, ectotherm, exotherm, poikilotherm, cold-blooded**)

warm front - A transition zone where a warm air mass advances and replaces a cold air mass.... A front that moves in such a way that warm air replaces cold air. (See: **front, cold front, frontal system**)

warning coloration - Conspicuous, usually bright animal coloration that typically signals that the animal is aggressive or toxic...Obviousness of appearance associated with **unpalatability** or **toxicity**. Also called **aposematic coloration**. (See **Batesian mimicry, Müllerian mimicry, mimicry, mimicry complex, aposematic coloration**)

water column - The volume of water extending from the surface down to, but not including, the substrate....Volume of water between the surface of the ocean and the

ocean bottom. A creature swimming either on the surface or along the bottom is not in the water column.

water crisis - A state of emergency in which **populations** are at risk of death, disease and panic due to an interruption/contamination of the **freshwater** supply. Many communities of the world endure an unclean, unpredictable and remote water source on a daily basis. The term also refers to times of **drought** and insufficient water supply to agricultural and **ecological** systems.

water cycle - See **hydrologic cycle**.

water quality - A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose. ... The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

water table - The level below which the ground is completely saturated with water... the top of the water surface in the saturated part of an **aquifer**.... That surface in a **groundwater** body at which the water pressure is **atmospheric**. The highest point in a soil profile where water saturates the soil on a seasonal or permanent basis. It is defined by the levels at which water stands in wells that penetrate the water body just far enough to hold standing water. In wells that penetrate to greater depths, the water level will stand above the confining upper bed of the **aquifer**....The upper limit of the soil or underlying rock material that is wholly saturated with water....The upper surface of ground water or that level below which the soil is saturated with water..... The top of an unconfined aquifer; indicates the level below which soil and rock are saturated with water. The upper surface of the **saturation zone**.... The point below the land surface where ground water is first found and below which the earth is saturated. Depth to the water table varies widely around the world.

water vapor - Water in a vapor (gaseous) form; also referred to as **atmospheric** moisture. Water vapor is one of the most important parts of the **atmosphere**.... The state of water in the **hydrologic cycle** in which individual **molecules** are highly energized and move about freely; also known as gas/gaseous.... The most abundant **greenhouse gas**, it is the water present in the **atmosphere** in gaseous form. Water vapor is an important part of the natural **greenhouse effect**. While humans are not significantly increasing its concentration, it contributes to the enhanced **greenhouse effect** because the warming influence of **greenhouse gases** leads to a positive **water vapor** feedback. In addition to its role as a natural **greenhouse gas**, **water vapor** plays an important role in regulating the **temperature** of the planet because **clouds** form when excess water vapor in the **atmosphere** condenses to form ice and water droplets and **precipitation**.

water-bearing rocks - Several types of rocks can hold water, including: sedimentary deposits (sand and gravel), channels in carbonate rocks (limestone), lava tubes or cooling fractures in **igneous** rocks, and fractures in hard rocks.

water-holding capacity - The amount of water held in a soil after **gravitational** run-off.

waterbird - A type of bird that utilizes **aquatic** habitats.

waterlogging - The saturation of soils with water; often associated with insufficient oxygen for good plant growth.

watershed - A region of land where water from rain or snowmelt drains downhill into a body of water, such as a **river**, lake, **estuary**, or ocean. It includes both the **streams** and rivers that convey the water as well as the land surfaces that feed those channels. The combined **streams** and **rivers** that drain the area are collectively the watershed or **drainage system**. Watersheds are separated from one another by peaks, ridges, or other **topographically** high points on the **landscape**. ...The **topographic** region from which a **stream** receives runoff, throughflow, and **groundwater flow**....The area of land that drains water, **sediment**, and dissolved materials to a common outlet at some point along a **stream** channel... The land area that drains water to a particular **stream**, river, or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. Large watersheds, like the Amazon River basin contain thousands of smaller watersheds.... The total region or area above a given point on a **stream** or lake that contributes water to the flow at that point. It is designated by the dividing line of area from which surface **streams** flow in two different directions; the line separating two contiguous drainage areas. ...The entire region drained by a waterway or which drains into a lake or **reservoir**. ...The **topographic** dividing line from which surface **streams** flow in two different directions; the line separating two contiguous drainage areas or basins. ... The area of land from which water drains into a stream or river ...The area drained by a **stream** and its **tributaries**. The land area from which surface runoff drains into a stream, channel, lake, reservoir, or other body of water; also called a drainage basin....Also known as a **drainage basin**, **river basin**, **catchment area**, or **catchment basin**. (See: **catchment basin**)

waterspout - A column of rotating wind over water that has characteristics of a **dust devil** and **tornado**.

wattle - A flap of bare skin that hangs under the chin area of some birds such as turkeys; the wattle of males becomes more red during courtship.

wavelength - The distance between corresponding points on two successive waves, generally measured from crest to crest.... The distance between crests of a waveform.... The distance between similar points on successive waves.... The distance from crest to crest or trough to trough of an electromagnetic wave or other wave.... The length of light wave, which determines it's color. Common units of measurement are; angstroms, nanometers or **microns**... The distance from the top of one crest to the top of the next or from the bottom of one trough to the bottom of the next.

waxy - Consisting of, abounding in, covered with, or feeling like wax.

wean - To train an offspring to take nourishment from a source other than the mother's breast milk.

weather - **Atmospheric** condition at any given time or place. ...What is happening in the air at any given time and place. Compare with **climate**.

weathering - The natural processes by which the actions of **atmospheric** and other **environmental** agents, such as wind, rain, and **temperature** changes, result in the physical disintegration and chemical decomposition of rocks and earth materials in place, with little or no transport of the loosened or altered material.... The gradual breakdown of rock into smaller pieces by natural processes such as **precipitation**, wind, plant growth, and temperature change. (See: **erosion**)

web of life - See **food web, food chain**.

webbing - A membrane or fold of skin connecting the toes, as of certain amphibians (frogs), birds (ducks, Anhingas), and mammals (Giant Otter). It is generally found on aquatic animals and aids the animal in swimming. (See: **palmate**)

weed - A plant species growing where it is not wanted by humans...A species that **volunteers** in artificially modified habitats and is considered undesirable by people. The same species may occur elsewhere in a wild state, or even in cultivation. *Weedy habit* refers to the propensity of certain species to **disperse** easily and widely and to **colonize** disturbed habitats.... Any plant that grows where it is not wanted by humans.

wetlands - An area that, at least periodically, has waterlogged soils or is covered with a relatively shallow layer of water. **Bogs, freshwater** and saltwater **marshes**, and **freshwater** and saltwater **swamps** are examples of wetlands. ...Land where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal **communities** living in the soil and on its surface. ...Soil or **substrate** that are at least periodically saturated with or covered by water, and differ from adjoining non-inundated areas....An area that is saturated by surface or ground water with **vegetation** adapted for life under those soil conditions, as **swamps, bogs, fens, marshes**, and **estuaries**... An area that is saturated with water for a portion of the year and characterized by a particular type of soil and plants that it can support; **swamp, marsh, bog**, and **oxbow lake** are examples of wetlands....Areas that are permanently wet, or intermittently water-covered, such as **swamps, marshes, bogs, muskegs**, potholes, **swales, glades**, and overflow land of river valleys. **Salt marshes**, and **brackish marshes** subject to saline and/or **tidal** influences are usually included. Large, open lakes are commonly excluded, but many kinds of ponds, pools, **sloughs**, holes, and **bayous** may be included. These may also be any areas that are more or less regularly wet or flooded. Where the water table stands at or above the land surface for at least part of the year. Shallow lakes and ponds, usually with **emergent aquatic vegetation** (such as **reeds** or cattails) as a conspicuous feature, are included in the definition, but the permanent waters of **streams, reservoirs** and deep lakes are not included. Neither are water areas that are so temporary as to have little or no effect on the development of

moist-soil dependent **vegetation**. . . . Lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal **communities** living in the soil and on its surface. . . . A general term for sites which are permanently, seasonally, rarely, or never flooded, but which support plants characteristic of saturated soils. Dominant plants, or at least one co-dominant plant, are **terrestrial** or **emergent**, with subaerial **stems** and leaves. . . . Lands where water saturation is the dominant factor in determining the nature of soil development and the types of plant and animal communities. Other common names for wetlands are **sloughs**, ponds, and **marshes**. . . . Areas that are inundated or saturated by surface or **ground water** at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include **swamps, marshes, bogs**, and similar areas. (See: **bog, carr, fen, marsh, marshland, swamp, Everglades, Llanos, Pantanal**)

whiskers - The long, stiff, tactile bristles or hairs that grow near the mouth and elsewhere on the head of most mammals.

whitewater river - A **sediment**-rich river that is part of the Andes drainage pattern. (See: **blackwater river, várzea**)

white-sand forest - In South America, forests growing on pure white sands, or a white sand mixture. Forests growing on such substrates typically have reduced species richness (although they are rich in endemic or habitat-specific species) and often are low in stature, as well. **Streams** that drain white-sand areas carry heavy **tannin** loads and the water is often the color of dark tea or coca-cola. These are referred to as blackwater streams. White-sand forests are most developed on the north bank of the Amazon River, particularly along the Rio Negro, but also further to the west in northern Peru. They are also prominent in the Guianas (Guyana, Suriname and French Guiana). (See: **blackwater river, blackwater stream, varillal, chamizal, irapayal**)

whorl - Complete spiral twist, turn, or volution. . . . In plants, having leaves arranged in a circle around a single point of a stem; in animals, a pattern of hair growth often referred to as a "cow lick".

whorled - Arranged in a ring.

wilderness - A large remote area such as **old-growth forest** in which **genetic diversity** and natural cycles remain essentially intact and uninterrupted. More than national parks, wilderness areas should have public access restricted to help preserve these designated examples of undisturbed **ecological** systems.

wildlife - Often interpreted colloquially to mean natural animals. Wildlife more correctly means the collective non-domesticated animals and plants of any **habitat**.

wildlife corridor - See **habitat corridor**.

wilt - In **botany**, the loss of freshness or drooping of plants due to inadequate water supply or excessive transpiration; a vascular disease interfering with water utilisation.

wind - A natural motion of the air, especially a noticeable current of air moving in the atmosphere parallel to the Earth's surface. Winds are caused by unequal heating and cooling of the Earth and atmosphere due to absorbed, incoming solar radiation and infrared radiation lost to space--as modified by such effects as the Coriolis force, the condensation of water vapor, the formation of clouds, the interaction of air masses and frontal systems, friction over land and water, etc... Air that moves horizontally near Earth's surface.

wind chill - The perceived cooling that a person feels due to loss of body heat as wind passes over exposed skin. The loss of heat is greater the faster the wind blows.... The portion of the cooling of the human body caused by air motion. Wind chill becomes important for human health as air motion accelerates the rate of heat loss from a human body, especially when **temperatures** are below 45° F.... The **temperature** it feels like to people and animals. The wind chill is a combination of **temperature** and wind.... The human body produces heat. This heat radiates out of our skin and into the surrounding air. When there is no wind, this thin layer of heat partially insulates us from the full effect of the cold surrounding us. When conditions are windy, this layer of heat is swept away from the body and thus the full impact of the cold air is felt on our skin. Thus, even though the actual air **temperature** is the same when windy, it "feels" colder. The wind chill **temperature** gives a comparison to what it would feel like at a lower **temperature** if there were no wind. Wind chill only applies humans and other living things; it has no effect on objects such as vehicles. ... The wind can reduce significantly the amount of heat your body retains. The following wind chill chart does not take into account such variables as type of clothing worn, amount of exposed flesh, and physical condition, all of which would alter body heat. (See: **wind chill temperature**)

wind chill temperature - An "apparent **temperature**" that results from the combination of low **temperature** and high winds. A wind chill **temperature** is thought to feel the same as an air **temperature** equal to the wind chill **temperature** but with no wind. The higher the wind, the lower the wind chill **temperature**. (See: **wind chill**)

wind velocity - Vector term that includes both wind speed and wind direction.

windthrow - The uprooting and felling of **trees** by the wind....The tendency to be uprooted by the wind. Also, a **tree** or **trees** uprooted. **Trees** tend to develop root systems to support themselves against the forces they face. When either logging creates a new **forest** edge or selected **trees** from a group are removed the remaining **trees** may face a significant increase in the force of the wind. The **trees** growing on the edge of a **forest** tend to shelter the interior **trees**, and trees in a group protect each other from the full force of the wind. If the remaining **trees** do not have root systems capable of absorbing this additional stress, they will be blown down....A **tree** blown over. (See: **forest gap**)

wing bars - In birds, these are the lighter-colored tips of the upper wing coverts which appear as narrow bars in the folded wings. They are most common in some **passerine** bird species.

wing-flashing - A habit in some **passerine** birds of repeatedly flicking the wings half open. An example is White-flanked Antwren, *Myrmotherula axillaris* which flicks its wings half open to expose its white flank patches.

wing-lifting - A habit in some **passerine** birds of raising a single wing up over the back, either alternately or the same one repeatedly, especially during display, but also at other times. The behavior is also known as wing-flashing. Members of the flycatcher genera *Leptopogon* and *Mionectes* are known for this behavior, and this wing-lifting behavior can be used as a field mark to identify a small flycatcher as a member of one of these genera.

winged petiole - A leaf petiole with a leaf-like or membrane-like extension along its length, as in *Inga*...A petiole having narrow extensions of the leaf blade that continue along each side of the petiole, from the base of the blade to the stem.

wingspread - The distance from tip to tip of the longest **primary** feathers of the outstretched wings of a bird.

winter plumage - See **basic plumage**.

winter-rain - A climatic regime characterized by precipitation that occurs mostly as rain during cool winters that alternate with dry, hot summers; often associated with **sclerophyllous** vegetation.

winter resident - Term used for a **migratory** bird that spends either the **boreal** or **austral** winter in a different region from where it breeds. In Amazonia, Eastern Wood Pewee, *Contopus virens* is an example of a winter resident from the north, and Vermillion Flycatcher, *Pyrocephalus rubinus* is an example of a winter resident from the south.

Winter Solstice - Approximately December 21-22 in the Northern Hemisphere, when the sun is lowest in the sky and directly overhead at **latitude** 23° 26' 22" south, the **Tropic of Capricorn**. (See: **solstice**, **Summer Solstice**)

witch's broom - In **botany**, a disease symptom characterised by an abnormal, massed, brush-like development of many weak shoots arising at or close to the same point.

withdrawal - In hydrology, water removed from a surface or **groundwater** source for use.

wolf tree - A tree with large living lower branches, resulting from growing in the open (without close competitors) or growing adjacent to **canopy gaps** or permanent openings in the forest.

wood - The dense **tissue** composed of **secondary xylem** in **stems** and roots.

woodland - Land that is covered with **trees** and **shrubs**. Woodland is often considered to be composed of **trees** of low stature than those found in **forest**....**Vegetation** in which **trees**, often small and characteristically short-boled in relation to their **crown** depth, are present but form only on open or sparse **canopy**, the intervening areas being occupied by **shrubs** or **herbs**...Forest vegetation with 10 to 25% **crown cover** of the **tree crowns**.

woody plant - Any **vascular plant** that has a perennial stem that is above ground and covered by a layer of thickened bark. Woody plants are adapted to survive from one year to the next; the stem supports continued vegetative growth above ground from one year to next....A plant with persistent woody parts that do not die back in adverse conditions. Most woody plants are **trees** or **shrubs**....A plant having hard **lignified** tissues or woody parts especially stems.

wrack - Dried seaweed especially that cast ashore.... A tangle of seaweeds on the seashore; often used as a common name for fuclean seaweeds.

wrack line - A line that runs the length a beach and marks the place where the tide reaches its highest point. It is composed of seaweeds, shells and bits of shells, pebbles, or anything else that is washed ashore.

xanthism - See **xanthochroism**.

xanthochroism - See **xanthochroism**.

xanthochroism - Involves the loss of darker pigments and the abnormal retention of yellow pigment.... A term that may be applied to birds, fish and other animals whose coloration is unusually yellow through an excess of yellow pigment, or possibly a loss of darker pigments that allows yellow pigment to be unusually dominant. It is often associated with the lack of usual red pigmentation and its replacement with yellow. The cause is usually genetic but may also be caused by diet. Also sometimes called **xanthism** or **xanthochroism**.

xanthophyll - Xanthophylls (originally phylloxanthins) are yellow to orange pigments of oxycarotenoid type, from the carotenoid group. They are found in the leaves of most plants and are synthesized within the plastids. They are involved in **photosynthesis** along with green **chlorophyll**, which typically covers up the yellow except in autumn (in the north), when the **chlorophyll** decomposes. In plants, xanthophylls are considered accessory pigments, along with **anthocyanins**, carotenes, and sometimes phycobilins. Animals cannot produce xanthophylls, and thus xanthophylls found in animals (*e.g.* in the yolks of chicken eggs) come from their food intake. ... Yellow pigment in plants that, like **chlorophyll**, is responsible for the production of **carbohydrates** by **photosynthesis**.... Yellow pigment in plants that, like **chlorophyll**, is responsible for the production of **carbohydrates** by **photosynthesis**.....carotenoids serve as accessory

pigments in **photosynthesis**, trapping solar energy and passing it to **chlorophyll**, the primary **photosynthetic** pigment..... Xanthophylls are carotenoids. The main xanthophyll in leaves is lutein. ...Xanthophylls are structural components of the light harvesting **antenna** in chloroplasts. They function as accessory pigments for harvesting light at wavelengths that **chlorophyll** cannot, and transfer the light energy to **chlorophyll**. They also absorb excess light energy and dissipate it in order to avoid damage in what is termed the Xanthophyll Cycle. The xanthophyll, zeaxanthin, appears to have a role in sensing blue light which is involved in stomatal opening and in **phototropism**. ... A yellow or almost colorless **photosynthetic pigment**. (See: **anthocyanin, secondary compounds**)

xenotransplantation - The transfer of **cells, tissues**, and/or an **organ** from an individual of one **species** to an individual of another **species**....A transplant of **tissue** from an animal of one **species** to an animal of another **species**. ... Transplanting a foreign **tissue** into another **species**.

xerarch - Refers to a **successional** sequence which begins in a dry **habitat**. (See: **xerosere, hydrarch**)

xeric - Dry conditions, as opposed to **mesic** (moderate) or **hydric** (wet) conditions. The nature of an **organism** adapted to dry conditions.....Refers to a dry **habitat** or site. (See: **arid**)

xeromorphic - Describes plants with morphological and physiological characters that tolerate persistently low water availability, such as succulence, specialized leaf surfaces for light reflectance or water retention, opportunistic leaf growth, leaf-size reduction with increased thickness and sunken stomata, revolute margins, or stem and leaf modification to form thorns or spines.

xerophyte - A plant that is adapted to dry or arid habitats....A plant well adapted to withstand prolonged **drought**. The typical xerophyte is a **deciduous shrub** with tiny **leaves** and a shallow root system that extends well beyond the **crown** of the **shrub**.... A plant structurally adapted for life and growth with a limited water supply, especially by means of mechanisms (as **epidermal** thickening, waxy or resinous coats, or dense pubescence) that limit **transpiration** or that provide for the storage of water. The term is used both of **desert** plants and of those occupying **environments** (as **saltmarshes** or acid **bogs**) where water absorption is impeded by excess salts or acids in solution. (See: **hydrophyte, mesophyte**)

xerosere - A series of **successional** stages beginning on a dry **habitat**. ...**Primary succession** emerging from geomorphological exposure of rock material, either solid bedrock, coarsely broken rocks, or fine rock and sand particles. (See: **xerarch**)

xylem - The water-conducting **tissue** of plants....The **tissue** in higher plants which transports water, dissolved salts, and other materials (*e.g.*, **pesticides**) from the roots to aerial portions of the plant....In **vascular plants**, xylem is one of the two types of

transport tissue in plants, **phloem** being the other one. The word “xylem” is derived from classical Greek *xýlon*, "wood", and indeed the best known xylem **tissue** is wood. The xylem transports sap from the root up the plant: xylem sap consists mainly of water and **inorganic** ions, although it can contain a number of **organic** chemicals as well. ...

Vascular tissue of **angiosperm** plants, involved in the transport of water with its dissolved minerals and **nutrients**. (See: **phloem**)

yeast - Yeasts include all species of **microscopic fungi** that grow as single **cells**. In contrast, **microscopic fungi** that grow in the form of multicellular filaments, called **hyphae**, are called **molds** (or moulds).

Yellow Fever - An acute **viral** disease caused by an **arbovirus** of the family Flaviviridae. Human infection begins after deposition of **viral** particles through the skin in infected **arthropod** saliva. Several different species of *Aedes* and *Haemogogus* (South America only) mosquitoes transmit the yellow fever **virus**. These mosquitoes are either domestic (*i.e.* they breed around houses), wild (they breed in the **jungle**) or semi-domestic types (they display a mixture of habits). Any region populated with these mosquitoes can potentially harbor the disease. Control programs successfully eradicated mosquito **habitats** in the past, especially in South America. However, these programs have lapsed over the last 30 years and mosquito **populations** have increased. This favors epidemics of Yellow Fever.

Humans and monkeys are the principal animals to be infected. The **virus** is carried from one animal to another (horizontal transmission) by a biting mosquito (the **vector**). The mosquito can also pass the **virus** via infected eggs to its offspring (vertical transmission). The eggs produced are resistant to drying and lie dormant through dry conditions, hatching when the rainy season begins. Therefore, the mosquito is the true **reservoir** of the **virus**, ensuring transmission from one year to the next.

Yellow Fever begins suddenly after an incubation period of three to five days in the human body. In mild cases only fever and headache may be present. The severe form of the disease commences with fever, chills, bleeding into the skin, rapid heartbeat, headache, back pains, and extreme prostration. Nausea, vomiting, and constipation are common. Jaundice usually appears on the second or third day. After the third day the symptoms recede, only to return with increased severity in the final stage, during which there is a marked tendency to hemorrhage internally; the characteristic “coffee ground” vomitus contains blood. The patient then lapses into delirium and coma, often followed by death. During epidemics the fatality rate was often as high as 85%. Although the disease still occurs, it is usually confined to sporadic outbreaks.

South America has two different types of Yellow Fever.

- Sylvatic (or jungle) Yellow Fever: In **tropical rainforests**, yellow fever occurs in monkeys that are infected by wild mosquitoes. The infected monkeys can then pass the **virus** onto other mosquitoes that feed on them. These infected wild mosquitoes bite humans entering the forest resulting in sporadic cases of yellow fever. The majority of cases are young men working in the forest (logging, etc). On occasion, the **virus** spreads beyond the affected individual.
- Urban Yellow Fever: Large epidemics can occur when migrants introduce the **virus** into areas with high human **population** density. Domestic mosquitoes (of

one species, *Aedes aegypti*) carry the **virus** from person to person; no monkeys are involved in transmission. These outbreaks tend to spread outwards from one source to cover a wide area.

Thirty-three countries, with a combined population of 508 million, are at risk in Africa. These lie within a band from 15°N to 10°S of the equator. In the Americas, yellow fever is **endemic** in nine South American countries and in several Caribbean islands. Bolivia, Brazil, Colombia, Ecuador and Peru are considered at greatest risk. There are 200,000 estimated cases of yellow fever (with 30,000 deaths) per year. However, due to underreporting, only a small percentage of these cases are identified.

yolk sac - A **membranous** sack that holds the yolk, or stored food, for a developing **embryo**.

Yungas - The Yungas is an area in the eastern **piedmont** of the Andes Mountains, from Peru and Bolivia to Argentina. Like the surrounding areas, it has characteristics of the Neotropic **ecozone**. It is rainy, humid, and warm. The World Wide Fund for Nature has delineated three Yungas **ecoregions** along the eastern side of the Andes. The northernmost is called the Peruvian Yungas, located entirely within Peru and stretching nearly the whole length of the country. The Bolivian Yungas lies to the south, mostly in Bolivia but including part of southern Peru. The Inambari River marks the boundary between the Peruvian Yungas and Bolivian Yungas since the Yungas north and south of the river have distinct **ecological** differences. The Southern Andean Yungas begins in southern Bolivia and continues south into Argentina. The Southern Andean Yungas is a humid forest region between the drier Gran **Chaco** region to the east and the dry, high **altitude Puna** region to the west.

All three Yungas **ecoregions** are transitional zones between the Andean highlands and the eastern forests. The Yungas **forests** are extremely diverse, ranging from moist lowland forest to **evergreen montane forest** and **cloud forests**. The terrain is extremely rugged and varied, contributing to the **ecological** diversity and richness. A complex mosaic of **habitats** occur with changing **latitude** as well as elevation. There are high levels of **biodiversity** and **species endemism** throughout the Yungas regions. Many of the **forests** are **evergreen**, and the South Andean Yungas contains what may be the last **evergreen forests** resulting from Quaternary **glaciations**.

zabolo - A Machiguenga word referring to a **riparian successional habitat** or type of river-edge forest of western Amazonia characterized by *Cecropia peltata*, *Ochroma*, *Erythrina* sp., *Gynerium sagittatum*, *Heliconia* sp., and abundant vines.

zero population growth - A situation of equilibrium in which there is no **population** increase during a given year, or other defined period of time because the total live birth rate (+ immigration) is equal to the total death rate (+ emigration).

zonal soil - A soil having well developed characteristics reflecting the full influence of the prevailing climate, **flora**, and **fauna**, and, therefore, characteristic of that climatic zone....Moderately deep to deep soil profile developed from loamy parent materials, having moderate internal and surface drainage, and, except in extreme **environments**,

with evident horizon differentiation. Soils in this category show the maximum correlation with climatic types.

zonation - Horizontal banding of **communities of organisms** in response to a vertical **environmental gradient**.

zone of contact - See **contact zone**.

zone of intolerance - The area outside the **geographic range** where a **population** is absent; grades into the zone of **physiological stress**.

zone of physiological stress - The area in a **population's geographic range** where members of the **population** are rare due to physical and biological **limiting factors**.

zoogeography - Scientific study of the **geographical range** and distribution of animals across the Earth. Of particular importance is the monitoring of **endangered species** and the spread of exotic **pests**. (See: **biogeography**)

zoology - The study and **classification** of animals and animal life.... The branch of biological science dealing with animal life, for example the **classification, evolution** or **physiology** of animals, or the characteristics or diversity of **fauna** in a group or region.

zoonose - Same as **zoonosis** (See below).

zoonosis - Any infectious disease that can be transmitted (in some instances, by a vector) from non-human animals, both wild and domestic, to humans or from humans to non-human animals (the latter is sometimes called reverse zoonosis). Many serious diseases fall under this category....The simplest definition of a zoonosis is a disease that can be transmitted from other vertebrate animals to humans. A slightly more technical definition is a disease that normally infects other animals, but can also infect humans....An animal disease that can be passed to humans.... Diseases which are specific to animals in the normal course of life and are contracted by human beings due to/after **xenotransplantation**.

zoonotic disease - Refers to diseases that can be passed from animals, whether wild or domesticated, to humans.

zooplankton - Small or **microscopic**, drifting animals in **aquatic ecosystems** such as the ocean. May be **larval** stages of larger animals....Suspended or floating animal **organisms** usually drifting passively with water currents, *e.g.*, **protozoans**, entomostracans, and various **larvae**....The animal portion of the **plankton**.... Animal plankton. Small **herbivores** that float or drift near the surface of **aquatic** systems and that feed on plant **plankton (phytoplankton and nanoplankton)**.... **Microscopic** animals that feed on **phytoplankton**.

zoospore - A reproductive **cell** that is asexual (neither male nor female) and capable of

free movement; zoospores have a tiny hair-like filament that enables them to swim in water.

zooxanthellae - The **photosynthetic algae** that grows inside **coral** polyps in a **symbiotic** relationship, providing the **coral's** color. The zooxanthellae provide **carbohydrates** to the coral animal in exchange for phosphates and nitrates. Golden-brown intracellular **endosymbionts** of various **marine** animals and **protozoa**, especially anthozoans (a class within the phylum Cnidaria that contains the sea anemones and corals) such as the scleractinian **corals** (stony corals) and the tropical sea anemone, *Aiptasia*. Zooxanthellae can provide up to 90% of a **coral's** energy requirements. In return, the **coral** provides the zooxanthellae with protection, shelter, **nutrients** (mostly waste material containing nitrogen and phosphorus) and a constant supply of carbon dioxide required for **photosynthesis**. Their **population** in the host tissue is limited by available **nutrients** and incident light, and by expulsion of excess cells. (See: **coral, coral bleaching**)

Zugunruhe - A German compound word consisting of Zug (move, migration) and Unruhe (anxiety, restlessness). In ethology it describes anxious behavior in migratory animals, especially in birds during the normal migration period.

zygodactylic - The type of toe structure found in some groups of birds (*e.g.* members of the parrot family), with two toes pointing forward and two pointing backward.

zygomorphic flower - An irregular shaped **flower** divisible into two similar halves along one plane only.

zygote - The product of the union of a sperm and **egg**; a fertilized **egg**.