

Environmental Terms

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A

- **Abiotic**, adj: Nonliving or not containing any living organisms.
- **Abiotic factors**, n: Environmental influences produced other than by living organisms; for example, temperature, wind patterns, humidity, pH, substrate rock type, and other physical and chemical influences.
- **Absolute poverty**, n: The lack of sufficient income in cash or exchange items for meeting the most basic needs of food, clothing, and shelter.
- **Acid fallout**, n: Molecules of acid formed from reactions high in the atmosphere involving nitrogen, sulfur oxides, and water vapor that settle out of the atmosphere without any additional water.
- **Acid precipitation**, n: Includes acid rain, acid fog, acid snow, and any other form of precipitation that is more acidic than normal (i.e., less than pH 5.6). Excess acidity is derived from certain air pollutants, namely sulfur dioxide and oxides of nitrogen. The effects can include: fish kills and *eutrophication* of lakes; tree kills, leading to soil erosion; and physical corrosive damage to vehicles and buildings. Many historic buildings in Europe and the NE United States are suffering damage from severe corrosion due to acid precipitation.
- **Aerobe**, n: An organism that utilizes atmospheric oxygen (O_2) in its metabolic pathways. An organism that must have oxygen in order to survive is an *obligate aerobe*.
- **Aerobic**, adj: Living or occurring only in the presence of oxygen: aerobic bacteria. 2. Of or relating to aerobes, organisms that require and utilize oxygen. 3. Involving or improving oxygen consumption by the body: aerobic exercise.
- **Agroforestry**, n: Production of tree crops in a manner similar to agriculture. Also, production of trees along with regular crops.
- **Anaerobe**, n.: 1: An organism capable of living in the absence of free oxygen (O_2). 2: *Obligate anaerobe*: An organism that **must** live without oxygen, for whom oxygen (O_2) is toxic.
- **Anaerobic**, adj.: 1: Lacking or seriously depleted of oxygen. Opposite of aerobic. 2: Of or relating to organisms, such as certain bacteria, that can live in the absence of atmospheric oxygen (indeed, for most anaerobic bacteria, oxygen is toxic).
- **Autotroph**, n: Literally, "self eater." Organisms capable of producing their own food. See *primary producers*. Contrast with *heterotroph*.

B

- **Background extinction rate**, n: Normal rate of extinction -- as a natural part of the evolutionary process -- of various species as a result of changes in local environmental conditions and the actions of natural evolutionary forces. Extinctions not caused or contributed to by the actions of humans.
- **Bioaccumulation**, n: An increase in the concentration of a chemical in specific organs or tissues at a level higher than would normally be expected.
- **Biodegradable**, adj: Able to be broken down into simpler substances (elements and compounds) by naturally occurring decomposers. Essentially, anything that can be ingested by an organism without causing that organism harm. 2. Nontoxic and able to be decomposed in relatively short period even on a *human time scale* .
- **Biodiversity**, n: The variety of biotic factors found within a specified geographic region. 2. The combined differences of living things, generally classified in four broad categories:
- **Genetic Diversity**: Variety among individuals within a species -- or, more specifically, the variety in the DNA of a species. See also "alleles."
- **Species Diversity**: Variety of different organisms at the species taxonomic level. See also *species* and *taxonomy* .
- **Cultural Diversity**: Variety of learned behaviors among individuals of a species.
- **Ecosystem Diversity**: Variety of biomes and habitats occurring in the biosphere.
- **Binomial nomenclature**, n: The two-name system, developed by Carolus Linnaeus (the founder of modern taxonomy), used to assign scientific names to all living things. *Homo sapiens*, for example, is the scientific name for humans. The first name is the genus name and is always capitalized. This is sort of like your last name... it belongs to several of your close relatives, too, and it shows that you are all closely related. The second name is the species name is always lower case. This is like your first name, which no one else in your circle of relatives possesses and so it uniquely identifies you. Memory tool: you probably know the meanings of the terms generic (i.e. general, broad) and specific (i.e. precise, exact). These terms come from the same origins as genus and species, so recalling their meaning will help you recall the relationship between the two portions of a scientific name.
- **Biome**, n: A specific type of terrestrial region inhabited by well-defined types of life, especially zones of vegetation, that generally cannot live outside that specific region. Examples include types of deserts ("high desert" like the Mojave or "low desert" like the Chihuahuan), grasslands (prairies, coastal dunes), and forests (lodgepole pine vs. taiga; temperate rain forest; bamboo forest, tropical rain forest, cloud forest, etc.).
- **Bionomics**, n: See *ecology* .
- **Biosphere**, n: The portion of the earth and its atmosphere in which living organisms exist or that is capable of supporting life. 2. All of earth's ecosystems combined into one inclusive unit. Also called the "ecosphere." 3. The living organisms and their environment composing the biosphere. "...all life on earth and the realms that support it, from the outermost reaches of the atmosphere to the deepest trenches of the seas." National Geographic Atlas of the World, 6th Edition.

C

- **Carrying capacity**, n: The amount of animal or plant life (or industry) that can be supported indefinitely on available resources; the number of individuals that the resources of a habitat can support. Also called biological carrying capacity.
- **Conservation biology**, n: Multidisciplinary science created to deal with the crisis of maintaining the genes, species, communities, and ecosystems that make up earth's biological diversity. Its goals are to investigate human impacts on biodiversity and to develop practical approaches to preserving biodiversity and ecological integrity.
- **Conservation-tillage farming**, n: Crop cultivation in which the soil is disturbed little (minimum-tillage farming) or not at all (no-till farming) to reduce soil erosion, lower labor costs, and save energy.
- **Coral bleaching**, n: The loss of color from a coral as it expels its zooxanthellae-usually a stress response.
- **Cost-benefit analysis**, n: Estimates and comparison of short-term and long-term costs (losses) and benefits (gains) from an economic decision. If the estimated benefits exceed the estimated costs, the decision to buy an economic good or provide a public good is considered worthwhile.

D

- **Debt-for-nature swap**, n: Agreement in which a certain amount of foreign debt is canceled in exchange for local currency investments that will improve natural resource management or protect certain areas in the debtor country from harmful development.
- **Deforestation**, n: Removal of trees from a forested area without adequate replanting.
- **Demographic transition**, n: Hypothesis that countries, as they become industrialized, have declines in death rates followed by declines in birth rates.
- **Desertification**, n: Conversion of rangeland, rain-fed cropland to desert-like land, with a drop in agricultural productivity of 10% or more. It is usually caused by a combination of overgrazing, soil erosion, prolonged drought, and climate change.
- **Dioxin**, n: A synthetic, organic chemical of the chlorinated hydrocarbon class. It is one of the most toxic compounds known to humans, having many harmful effects, including induction of cancer and birth defects, even in extremely minute concentrations. It has become a widespread environmental pollutant because of the use of certain herbicides that contain dioxin as a contaminant.

E

- **Ecological efficiency**, n: The percentage of energy in biomass produced by one trophic level that is incorporated into biomass by the next highest trophic level.
- **Ecological fitness**, n: The number of a parent's young that live to reproduce; divided by two if sexual reproduction is involved.
- **Ecological succession**, n: Process in which communities of plant and animal species in a particular area are replaced over time by a series of different and often more complex communities.
- **Ecologically sustainable development**, n: Development in which the total human population size and resource use in the world (or in a region) are limited to a level that does not exceed the carrying capacity or the existing natural capital and is therefore sustainable.
- **Ecologist**, n: A scientist who studies *ecology* .
- **Ecology**, n: The study of the relationships between organisms and their environments, including: the interactions of living organisms with one another and with their non-living surroundings, the flow of matter and energy in an environment, and the structure and functions of nature. Also called *bionomics* .
2. The relationship between organisms and their environment. 3. The branch of sociology that is concerned with studying the relationships between human groups and their physical and social environments. Also called *human ecology* . 4. The study of the detrimental effects of modern civilization on the environment, with a view toward prevention or reversal through conservation. A component of the field of *human ecology* .
- **Ecosystem**, n: An ecological community of various plants, animals, and other organisms, interacting with each other and with the nonliving resources in their environment, all functioning as a unit.
- **Ecosystem services** , n: Services, vital to the support of human life, provided by intact natural ecosystems. These include the purification of air and water, detoxification and decomposition of wastes, regulation of climate, regeneration of soil fertility, and production and maintenance of biodiversity, from which key ingredients of our agricultural, pharmaceutical, and industrial enterprises are derived. Historically, the nature and value of Earth's life support systems have largely been ignored until their disruption or loss highlighted their importance
- **Ecotourism**, n: The enterprises involved in promoting tourism of unusual or interesting ecological sites. Environmentally, culturally, and scientifically responsible tourism that takes great efforts to ensure tourism revenues benefit the local communities where tourism occurs, the local inhabitants benefit the most economically (revenues are not returned to the traveler's country of origin) and native culture is not diluted with imported tourist cultures. Ecotourism safeguards the nature of the attraction that instigated the tourism and serves to strengthen conservation and scientific research efforts in the area. Very few large corporations who claim to engage in ecotourism actually do so. The most notorious and damaging of tourism industries -- the cruise line industry -- is an excellent example of a branch of travel that claims to be environmentally-friendly but is in fact extremely damaging, both culturally and ecologically.
- **El Nino Southern Oscillation (ENSO)**, n: Flip-flopping pressure systems in the South Pacific that trigger short-lived global changes in climate. Warm waters from the western Pacific move across the ocean, just below the equator, and significantly warm the eastern tropical Pacific.
- **Emergent**, n: A tree with a canopy that forms about the general upper most continuous canopy.
- **Emerging disease**, n: The Institute for Medicine defines emerging and re-emerging diseases as: "New, re-emerging, or drug-resistant infections whose incidence in humans has increased in the last two decades or whose incidence threatens to increase in the near future."
- **Endangered species**, n: Wild species with so few individual survivors that the species could soon become extinct in all or most of its natural range.

- **Endangered Species Act**, n: The United States federal legislation that mandates protection of species and their habitats that are determined by scientific consensus to be in danger of extinction.
- **Environment**, n: All external conditions and factors, living and nonliving (chemicals and energy), that affect an organism or other specified system during its lifetime; the earth's life-support systems for us and for all other forms of life - in effect another term for describing solar capital and earth capital.
- **Environmental degradation**, n: A reduction of an ecosystem's or habitat's ability to support its natural biota. 2. Depletion or destruction of a potentially renewable resource such as soil, grassland, forest, or wildlife by using it at a faster rate than it is naturally replenished. If such use is continued, the resource can become nonrenewable (on a human timescale) or nonexistent. 3. Pollution, toxification, or other alteration of an environment that makes it less productive, hospitable, usable, or enjoyable.
- **Environmental worldview**, n: How individuals think the world works, what they think their role in the world should be, and what they believe is right and wrong environmental behavior (i.e. ethics).
- **Epidemiology**, n: Study of the patterns of disease or other harmful effects from toxic exposure within defined groups of people to find out why some people get sick and some do not.
- **ERID**, acronym: Emerging and Re-emerging Infectious Diseases. See *emerging disease* .
- **Ethnobotany**, n: The study of indigenous knowledge bases regarding plants and their uses.
- **Ethnopharmacology**, n: The study of indigenous knowledge bases regarding medicines and how they are produced, as well as the medical practices, treatment protocols, etc. that utilize these medicines.
- **Exponential growth**, n: Growth in which some quantity, such as population size or economic output, increases by a fixed percentage of the whole in a given time; when the increase in quantity over a long enough time is plotted, this type of growth typically yields a curve shaped like the letter J.
- **Extant**, adj: A species that is still alive and reproducing. All species that currently live on earth are extant.
- **Extinct**, adj: A species that is no longer living on earth. All representatives of the species are dead. All the species that once occupied the earth but are no longer living are extinct. We know of their existence through studying the *fossil record* . Compare to *extant* .
- **Extinction**, n: Complete disappearance of a species from the earth. This happens when a species cannot adapt and successfully reproduce under new environmental conditions, when it evolves (through a process called *radiation*) into one or more new species, or when every member of the species is killed by overpredation, pollution, or other man-made causes.

F

- **First law of human ecology**, n: We can never do merely one thing. Any intrusion into nature has numerous effects, many of which are unpredictable. For example, one classic dilemma is the case of behavioral biologists who observe their study subjects at close range: Are the observed behaviors truly natural or are they influenced by the researcher's presence?
- **Food chain**, n: Figure of speech describing the dependence of *heterotrophs* on other organisms for food, progressing in a series beginning with *primary producers* (plants) and ending with the largest carnivores. The food chain is used as a figurative image for educational purposes only... real trophic systems resemble webs rather than chains. See *food web* .
- **Food web**, n: The combination of all the feeding relationships that exist in an ecosystem. Most prey species are eaten by many different predators, and most predators eat more than one prey item. As a result, a picture of a trophic system with lines (representing ecological relationships) drawn between predators and prey soon resembles an intricate web.
- **Fossil**, n: A remnant, impression, mineralized mold, amber encasement, or other trace of a once-living organism. Technically, anything that once lived and has been permanently preserved is a fossil, but the most common usage implies great age. This common usage of fossil generally refers to the mineralized remains or impressions, preserved in stone (almost always sedimentary rock), of extinct organisms from past geologic ages.
- **Fossil fuel**, n: Products of partial or complete decomposition of plants and animals that occur as crude oil, coal, natural gas, or heavy oils as a result of exposure to heat and pressure in earth's crust over millions of years.
- **Fossil record**, n: The cumulative taxonomic information and historical perspective provided by the wealth and diversity of fossils and related geologic data stored in the earth's crust.

G

- **Gene pool**, n: The sum total of all the genes that exist among all the individuals of a species.
- **Genetic engineering**, n: The artificial transfer of specific genes from one organism to another.
- **Geologic time scale**, n: Occurring at such a slow pace, or at such infrequent intervals, as to be imperceptible to humans. 2. Occurring in a pre-human era. 3. The whole of earth's history, as opposed to the very recent period when humans have walked the earth. One common and effective means of conceptualizing the disparity between the geologic time scale and the *human time scale* is the "calendar year history model," wherein the entire history of the planet is condensed into a single calendar year. In this model, human ancestors do not appear until late December and *Homo sapiens* does not arise until the last second before midnight on December 31st.
- **Geology**, n: The branch of science that deals with the earth's history, particularly its physical history, as recorded in the substrate and the *fossil record*.
- **Geopolitics**, n: The study of the influence of such factors as geography, natural resources, economics, and demography on the politics (especially the foreign policy) of nations.
- **Global warming**, n: The term given to the possibility that Earth's atmosphere is gradually warming because of the greenhouse effect of carbon dioxide and other gases. Global warming is thought by many to be the most serious global environmental issue facing our society.
- **Greenhouse effect**, n: A natural effect that traps heat in the atmosphere (troposphere) near the earth's surface. Some of the heat flowing back toward space from the earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the lower atmosphere (troposphere) and then radiated back toward the earth's surface. If the atmospheric concentrations of these greenhouse gases rise and are not removed by other natural processes, the average temperature of the lower atmosphere will gradually increase.
- **Greenhouse gases**, n: Gases in the earth's lower atmosphere (troposphere) that cause the greenhouse effect. Examples are carbon dioxide, chlorofluorocarbons, ozone, methane, water vapor, and nitrous oxide.
- **Green Revolution**, n: Refers to the development and introduction of new varieties of wheat and rice (mainly) that increased yields per acre dramatically in some countries.
- **Gross primary productivity**, n: The rate at which an ecosystem's producers capture and store a given amount of chemical energy as biomass in a given length of time.

H

- **Habitat**, n: Place or type of place where an organism, population, or community lives.
- **Hazardous waste**, n: Any solid, liquid, or containerized gas that can catch fire easily, is corrosive to skin tissue or metals, is unstable and can explode or release toxic fumes, or has harmful concentrations of one or more toxic materials that can leach out.
- **Heterotroph**, n: Literally, "eats others." An organism that must consume other organisms to fuel its metabolism. Animals, including humans, are heterotrophs. Heterotrophic, adj.
- **Human capital**, n: Physical and mental talents of people used to produce, distribute, and sell an economic good.
- **Human ecology**, n: See *ecology* .
- **Human time scale**, n: Occurring within a short enough time frame that the event can be perceived, remembered, and recounted by humans through oral traditions, written histories, or other mechanisms of human memory. Compare to *geologic time scale* .
- **Hybrid**, n: The offspring of two parents from separate (though closely related) species. Usually sterile, though occasionally able to breed back into one of the parent lines. A hybrid can almost never produce viable offspring when mated with another hybrid. A common example is a mule, which is produced by breeding a horse with a donkey (note that the horse must be the mother, due to the large size of the foal). Hybridization is fairly common among wind-pollinated plants, while hybridization is quite uncommon among higher animals.
- **Hydrologic cycle**, n: Biogeochemical cycle that collects, purifies, and distributes the earth's fixed supply of water, from the environment to living organisms and then back to the environment.
- **Hydrosphere**, n: The earth's liquid water (oceans, lakes other bodies of surface water, and underground water), the earth's frozen water (polar ice caps, floating ice caps, and ice in soil known as permafrost), and small amounts of water vapor in the atmosphere.

I

- **Indicator species**, n: Species that serve as early warnings that a community or an ecosystem is being degraded. Fish and amphibians make particularly excellent indicator species. Large predators (those generally at the apex of the food pyramid) are also good indicators in many habitats.
- **Integrated pest management (IPM)**, n: Combined use of biological, chemical, and cultivation methods in proper sequence and timing to keep the size of a pest population below the size that causes economically unacceptable loss of a crop or livestock animal.
- **Interspecific competition**, n: Members of two or more species trying to use the same limited resources in an ecosystem.
- **Intraspecific competition**, n: Two or individual organisms of a single species trying to use the same limited resources in an ecosystem.

K

- **Keystone species**, n: Species that play roles affecting many other organisms in an ecosystem.
- **Kwashiorkor**, n: Type of malnutrition that occurs in infants and very young children when they are weaned from mother's milk to a starchy diet low in protein.

L

- **Land-use planning**, n: Process for deciding the best present and future use of each parcel of land in an area.
- **Late successional plant species**, n: Mostly trees that can tolerate shade and that form a relatively stable complex forest community.
- **Laterite**: n. Product of rock decomposition with high iron and aluminum hydroxide content. Generally bright red to deep orange in color. 2. Land, usually in the tropics, baked by the sun after deforestation removes the protective and restorative forest layer above the soil. Abiotic hardpack ground, red in color. Normal soil microbiotic community, as well as macrobiotic flora and fauna, are absent. Prone to extensive erosion due to lack of plant cover. Lateritized hillsides have contributed to several devastating and deadly landslides in tropical countries.
- **Laterization**, n: The process of turning formerly healthy soils into laterite. What becomes of tropical forest lands when deforested and left exposed to the elements. The ground becomes extremely hard and cannot be penetrated by germinating forest seeds, so recolonization is slow or absent.
- **Lichen**, n: A *symbiotic* relationship between a fungus and a moss. The moss does most of the work, producing sugars for the lichen's collective metabolic pathways. Lichen are generally low-growing, vary in color from bright orange or yellow to gray or black, and are often found growing on rocks and tree bark. An easy mnemonic to assist recall of the nature of a lichen's symbiosis is: "A fungus took a **likin'** to a moss, and now they live together."

M

- **Marasmus**, n: Nutritional-deficiency disease caused by a diet that does not have enough calories and protein to maintain good health.
- **Mass extinction**, n: A catastrophic, widespread -- often global -- event in which major groups of species are wiped out over a relatively short period when compared to normal (*background*) extinction rates. There have been five major mass extinctions, of natural causes (in at least one case due to an asteroid impacting the earth), in the earth's history. We are now entering a sixth great mass extinction, this time of unnatural causes... human activities.
- **Median lethal dose (LD50)**, n: Amount of a toxic material per unit body weight of test animals that kills half the test population in a certain time.
- **Monocropping**, v: The act of planting and maintaining a *monoculture* .
- **Monoculture**, n: Cultivation of a single crop, usually on a large area of land. This unnatural agricultural system generally requires the use of large quantities of artificial fertilizers, herbicides, pesticides, nematocides, and other pest control efforts. Even with these chemical aids, monocultures are prone to disease outbreaks and pest infestations, largely due to the genetic homogeneity of such systems.
- **Mutualism**, n: One category of *symbiosis* in which both participating species generally benefit.

N

- **Natural resources**, n: Nutrients and minerals in the soil and deeper layers of the earth's crust; water; wild and domestic plants and animals; air; and other resources produced by the earth's natural processes.
- **Natural selection**, n: One of several gradual mechanisms through which evolution occurs. Process by which a particular beneficial gene (or set of genes) is reproduced more than other genes in succeeding generations due to selective pressures in the environment that favor the beneficial gene. The result of natural selection is a population that contains a greater proportion of organisms better adapted to certain environmental conditions.
- **Negative feedback loop**, n: Situation in which a change in a certain direction provides information that causes a system to change less in that direction. This is a common regulatory mechanism and is widely used in animals to control hormone levels in the blood. For example, the hormones that control ovulation in humans are on a negative feedback loop.
- **Nitrogen cycle**, n: Cyclic movement of nitrogen in different chemical forms from the environment to organisms and then back to the environment.
- **Nitrogen fixation**, n: The process of chemically converting nitrogen gas (N_2) from the air into compounds, such as nitrates (NO_3^-), nitrites (NO_2^-), or ammonia (NH_3), that can be used by plants in building amino acids and other nitrogen-containing organic molecules.
- **Nonbiodegradable**, adj: Not able to be consumed and/or broken down by biological organisms. Nonbiodegradable substances include plastics, aluminum, and many chemicals used in industry and agriculture. Particularly dangerous are nonbiodegradable chemicals that are also toxic and tend to accumulate in organisms.
- **Nonrenewable resource**, n: Resource that exists in a fixed amount (stock) in various places in the earth's crust and has the potential for renewal only by geological, physical, and chemical processes taking place over hundreds of millions to billions of years. Examples are copper, aluminum, coal, and oil. We classify these resources as exhaustible because we are extracting and using them at a much faster rate than they were formed.
- **Nutrient**, n: Any food or element an organism must take in to live, grow, or reproduce. Plant: An essential element in a particular ion or molecule that can be absorbed and used by the plant. For example, carbon, hydrogen, nitrogen, and phosphorus are essential elements; carbon dioxide, water, nitrate (NO_3^-), and phosphate (PO_4^{3-}) are respective nutrients. Animal: Materials such as protein, vitamins, and minerals that are required for growth, maintenance, and repair of the body and also materials such as carbohydrates that are required for energy.

O

- **Obligate aerobe**, n: See [aerobe](#).
- **Obligate anaerobe**, n: See [anaerobe](#).
- **Old-growth forest**, n: Virgin and old, second growth forests containing trees that are often hundreds, sometimes thousands, of years old. These are the richest forest biomes with the widest arrays of niche microhabitats and the broadest biodiversity, especially in the tropics.
- **Open system**, n: A system, such as a living organism, in which both matter and energy are exchanged between the system and the environment.
- **Optimum sustainable population**, n: the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem.
- **Organic**, adj: All living things, and products that are uniquely produced by living things, such as wood, leather, and sugar. 2. All chemical compounds or molecules, natural or synthetic, that contain carbon atoms as an integral part of their structure.
- **Overburden**, n: Layer of soil and rock overlying a mineral deposit, removed during surface mining.
- **Overconsumption**, n: Situation in which some people consume much more than they need at the expense of those who can not meet their basic needs- and at the expense of earth's present and future life-support systems for humans and other forms of life.
- **Overfishing**, n: Harvesting so many fish of a species (especially immature fish) that there is not enough breeding stock left to replenish the species, such that it is not profitable to harvest them, leading to *commercial extinction* .
- **Overgrazing**, n: Destruction of vegetation when too many grazing animals feed too long and exceed the carrying capacity of a rangeland area.
- **Overnutrition**, n: Diet so high in calories, saturated (animal) fats, salt, sugar, and processed foods, and so low in vegetables and fruits that the consumer runs high risks of diabetes, hypertension, heart disease, and other health hazards.

P

- **Paleoecology**, n: The study of ancient ecosystems. Paleoecologists use data from such sources as tree rings, geologic deposits, fossils (pollen is a particularly popular tool), and coral bores to reconstruct the climate and ecology of ancient ecosystems.
- **Phosphorus cycle**, n: Cyclic movement of phosphorus, in varying chemical forms, from the environment to organisms and then back to the environment.
- **Pioneer species**, n: First hardy, often *xerophytic*, species (often microbes, mosses, and lichens) that begin colonizing a site as the first stage of ecological succession.
- **Pollutant**, n: A particular chemical or form of energy that can adversely affect the health, survival, or activities of humans or other living organisms.
- **Population**, n: A group within a single species, the individuals of which can and do freely interbreed. Breeding between populations of the same species is less common because of differences in location, culture, nationality, and so on.
- **Population change**, n: An increase or decrease in the size of a population. It is equal to (births + immigration) - (deaths + emigration).
- **Population density**, n: Number of organisms in a particular population found in a specified area.
- **Population dispersion**, n: General pattern in which the members of a population are arranged throughout its habitat.
- **Population distribution**, n: Variation of population density over a particular geographical area. For example, a country has a high population density in its urban areas and a much lower population density in rural areas.
- **Positive feedback loop**, n: Situation in which a change in a certain direction provides information that causes a system to change further in the same direction. This can lead to a runaway or vicious cycle.
- **Potentially renewable resource**, n: Resource that theoretically can last indefinitely without reducing the available supply, either because it is replaced more rapidly through natural processes than are nonrenewable resources or because it is potentially inexhaustible (solar energy). Examples are trees in forests, grasses in grasslands, wild animals, fresh surface water in lakes and streams, most groundwater, fresh air, and fertile soil. If such a resource is used faster than it is replenished, it can be depleted and converted into a nonrenewable resource.
- **Poverty**, n: Inability to meet basic needs for food, clothing, and shelter.
- **Primary producer**, n: An organism, such as a plant or microbe, that makes its own food and forms the bottom-most tier in a trophic system. Primary producers are the basis of the food web in most ecosystems (the exceptions are *open system* communities based entirely on scavenging nutrients flushed into the system from elsewhere, such as some deep sea communities -- though even in these cases, the food flushed into the system comes from another system where primary producers are the basis of the *trophic pyramid*). Primary producers are able to convert abiotic raw materials into biotic tissue, either by capturing the sun's energy through *photosynthesis* (plants) or by harnessing the energy in chemical bonds through *chemosynthesis* (some microbes).
- **Pyramid of biomass**, n: Diagram representing the biomass (total dry weight of living organisms) that can be supported at each trophic level in a food web. The bottom of the pyramid is comprised of *primary producers*, while the peak of the pyramid is topped by one (or at most a small handful) *apex predator*. Humans are abnormal in that we cross all ecosystems and biomass pyramids, and in almost every one (excepting the polar caps and deepest of oceanic environments) we are the dominant apex predator.
- **Pyramid of energy flow**, n: Also called a *trophic pyramid*. Diagram representing the flow of energy through each trophic level in a food chain or food web. With each energy transfer, only a small part

(typically 10%) of the usable energy entering one trophic level is transferred to the organisms at the next trophic level, with the remaining 90% lost as heat or expended in metabolic processes.

R

- **Resource economics**, n: The study of natural ecosystem services and the economic values, in terms real-world currencies and capital valuations, of those services. One of the goals of resource economics is to assist policy makers in performing the cost-benefit analysis of various plans of action or inaction with regard to the natural world. The value of an ecosystem service is determined by calculating what it would cost to perform the same service artificially if the naturally-occurring service were disrupted or destroyed.
- **Resource partitioning**, n: Process of dividing up resources in an ecosystem so that species with similar requirements (overlapping ecological niches) use the same scarce resources at different times, in different ways, or in different places.
- **Runoff**, n: Surface water effluent (usually from precipitation but may be from human activities such as irrigation) that moves too quickly to be absorbed into the ground. It flows down contour gradients to enter stream and river systems, carrying with it anything light enough to be borne in the volume of water, which may be light after a small rain or tremendous in the wake of a storm, when even large boulders and trees get swept up in the runoff. When runoff travels over *deforested* or unplanted agricultural lands, it carries away large quantities of *topsoil* . Runoff from agricultural areas often carries heavy doses of *biocides* , fertilizers, and other nutrients, which can lead to *eutrophication* when introduced into aquatic systems.

S

- **Salinization**, n: Accumulation of salts in soil that can eventually make the soil unable to support plant growth.
- **Second law of thermodynamics**, n: In any conversion of heat energy to useful work, some of the initial energy input is always degraded to lower quality, more dispersed, less useful energy -- usually low-temperature heat that flows into the environment; every energy system has "leaks" and loses energy or heat to attenuation.
- **Soil Erosion**, n: The loss of topsoil through silt-laden *runoff*, strong winds, or other forces that transport soil away from its natural location.
- **Specialist species**, n: Species with a narrow ecological niche. They may be able to live in only one type of habitat, tolerate only a narrow range of climatic or other environmental conditions, or they may use only one or a few types of food.
- **Speciation**, n: Formation of two species from one species as a result of divergent natural selection in response to changes in environmental conditions; usually takes thousands or tens of thousands of years.
- **Species**, n: The boundaries of this taxonomic level (the most precise in the hierarchical system of *binomial nomenclature*) are hotly debated among scientists and there is little real consensus about where to draw the lines between species, subspecies, morphs, races, variants, etc. In general, a species is a group of organisms that resemble one another in appearance, general behavior, ecological niche, chemical makeup and processes, and genetic structure. Organisms that reproduce sexually are classified as members of the same species only if they can actually or potentially interbreed with one another and produce fertile offspring. It should be noted that some (though quite few) taxonomists believe the species level of classification is frequently invalid and these scientists only recognize classifications down to the level of genus (again, these taxonomists represent a very small minority view).
- **Sulfur cycle**, n: Cyclic movement of sulfur in different chemical forms, from the environment to organisms and then back to the environment.
- **Sustainability**, n: Ability of a system to survive for some specified (finite) time.
- **Sustainable agriculture**, n: Method of growing crops and raising livestock based on organic fertilizers, soil conservation, water conservation, biological control of pests, and minimal use of non-renewable fossil-fuel energy.
- **Sustainable development**, n: Forms of economic development and activities that do not deplete or degrade the natural resources upon which present and future economic growth and life depend.
- **Sustainable living**, n: Taking no more potentially renewable resources from the natural world than can be replenished naturally and not overloading the capacity of the environment to cleanse and renew itself by natural processes.
- **Sustainable society**, n: A society that manages its economy and population size without doing irreparable environmental harm by overloading the planet's ability to absorb environmental insults, replenish its resources, and sustain human and other forms of life over a specified period-usually hundreds to thousands of years. During this period it satisfies the needs of its people without depleting earth capital and thereby jeopardizing the prospects of current and future generations of humans and other species.
- **Sustainable system**, n: A system that survives and functions over some specified (finite) time; a system that attains its full expected lifetime.
- **Sustainable yield (sustained yield)**, n: Highest rate at which a potentially renewable resource can be used without reducing its available supply throughout the world or in a particular area.
- **Symbiont**, n: See *symbiosis*.

- **Symbiosis**, n: Literally means "living together" in Latin. Any intimate relationship or association between members of two or more species. The members of the relationship are symbionts. Obligate symbionts rely so heavily on the relationship that they cannot feed, reproduce, or perform some other crucial life function in the absence of their symbiotic partner(s). There are three main categories of symbiosis: *commensalism* , *mutualism* , and *parasitism* , with some degree of blending at the edges of these definitions in many cases.
- **Symbiotic**, adj: Refers to a component or member of a system of symbiosis. "These organisms have a symbiotic relationship."

T

- **Taxonomy**, n: The classification of living organisms according to the hierarchy of relationships.
- **Threatened species**, n: Wild species that is still abundant in its natural range but is likely to become endangered because of a decline in numbers.
- **Total fertility rate (TFR)**, n: Estimate of the average number of children that will be born alive to a woman during her lifetime if she passes through all her childbearing years (ages 15-44) conforming to age-specific fertility rates of a given year. In simpler terms, it is an estimate of the average number of children a woman will have during her childbearing years.
- **Transmissible disease**, n: A disease that is caused by living organisms (such as bacteria, viruses, and parasitic worms) and that can spread from one person to another by air, water, food, body fluids (or in some cases by insects or other organisms).

U

- **Urban heat island**, n: Buildup of heat in the atmosphere above an urban area. This is produced by the large concentration of cars, buildings, factories, and other heat-producing activities.

Z

- **Zero population growth (ZPG)**, n: State in which the birth rate (plus immigration) equals the death rate (plus emigration) so that the population of a geographical area is no longer increasing.
- **Zoonosis**, n: A disease of animals, such as rabies or psittacosis, that can be transmitted to humans.
Zoonotic, adj.