What Is Biodiversity?

The word "Biodiversity" is a contraction of biological diversity. Biodiversity is the variety of life on earth. There are three levels of biodiversity: species diversity; ecosystem diversity; and genetic diversity. *Species diversity* includes all living things from the tiniest bacterium to the largest mammal and tree.

Biodiversity also includes ecosystem diversity, the habitats that house all life forms and the interconnections that tie living things together. Ecosystem diversity includes the prairies, marshes, swamps, forests and all other environments where species live. Ecosystems not only provide habitat for species but also perform functions such as flood control and water purification. Biodiversity includes the variety within species, which is determined by the genes. Genetic diversity makes every living thing unique. Each species is like a book of genetic information, containing billions of genetic letters that give it a particular code of life. Its traits are the result of coded messages in the genes that are passed on from one generation to the next. When a species becomes extinct, all the information is lost. Genetic diversity is a safeguard against future problems, such as disease or natural disasters.

Why Is Biodiversity Important?

Critical processes at the ecosystem level influence plant productivity, soil fertility, water quality, atmospheric chemistry, and many other local and global environmental conditions that ultimately affect human welfare. These ecosystem processes are controlled by both the diversity and identify of the plant, animal, and microbial species living within a community. Human modifications to the living community in an ecosystem – as well as to the collective biodiversity of the Earth – can therefore alter ecological functions and life support services that are vital to the well-being of human societies. Substantial changes have already occurred, especially local and global losses of biodiversity. The primary cause has been widespread human transformation of once highly diverse natural ecosystems into relatively species-poor managed ecosystems. Recent studies suggest that such reductions in biodiversity can alter both the magnitude and the stability of ecosystem processes, especially when biodiversity is reduced to the low levels typical of many managed systems. (Naeem, et.al. 1999)

Naeem, S., F.S. Chapin III, R. Costanza, P.R. Erlich, F.B. Golley, D.U. Hooper, J.H. Lawton, R.V. O'Neill, H.A. Mooney, O.E. Sala, A.J. Symstad, D. Tilman, 1999, Biodiversity and Ecosystem Functioning: Maintaining Natural Life Support Processes, Issues in Ecology, Ecological Society of America, Vol. 4, 1999.

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How Do You Measure Biodiversity?

Biodiversity is difficult to quantify precisely even with the tools and data sources that are available. But precise answers are seldom needed to sufficiently understand biodiversity, how it is changing, and the causes and consequences of such change.

Various ecological indicators, such as the number of species in a given area, are used to measure different aspects of biodiversity. They form a critical component of monitoring, assessment, and decision-making and are designed to communicate information quickly and easily to policy makers. However, no single indicator captures all the dimensions of biodiversity.

What Is The Status of Biodiversity?

According to the world's leading scientific and environmental experts, loss of biodiversity is one of the most urgent environmental problems facing the planet. As human populations grow, they exert increasing pressure on natural resources – pressure that is endangering species and ecosystems around the world. Habitat loss, introduced species, pollution, population growth and over-consumption are the main threats to biodiversity. The extinction of any species brings the irreversible loss of unique genetic codes and the potential loss of medicines, foods, products, and jobs. At the same time, degradation of natural systems threatens the very services, such as water purification and nutrient recycling, that support all life on earth.

Relevant journal articles:

Naeem, S., F.S. Chapin III, R. Costanza, P.R. Ehrlich, R.B. Golley, D.U. Hooper, J.H. Lawton, R.V. O'Neill, H.A. Mooney, O.E. Sala, A.J. Symstad, D. Tilman, *Biodiversity and Ecosystem Functioning: Maintaining Natural Life Support Processes,* Issues in Ecology, No.4, Fall 1999.

Ecosystems With Many Plant Species Produce More and Survive Threats Better, Science Daily, June 3, 2006. Web address: http://www.sciencedaily.com/releases/2006/06/060601214628.htm

Species Extinction Could Reduce Productivity of Plants on Earth by Half, Science Daily, November 6, 2007. Web address: http://www.sciencedaily.com/releases/2007/11/071105171952.htm.

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Fossil Fuels and Nitrogen Fertilizers May be Slowly Reducing the Number of Plant Species Globally, Science Daily, February 12, 2008. Web address: http://www.sciencedaily.com/releases/2008/02/080207171703.htm

People and Biodiversity

People make a significant impact on the landscape and its diversity. Clearing forests, draining wetlands, developing urban areas, building roads and conducting other human activities have drastically reduced the diversity of habitats in the Delta and the overall biodiversity of the state. When people alter habitats they kill and/or force out the organisms that live in them, upset ecological relationships and reduce the ecosystem's ability to perform services like flood control, water purification and nutrient recycling. Some of the habitats that originally occurred in our state can only be found in nature preserves, state parks, conservation areas and other protected sites that shelter the state's biological diversity. However, we can help protect biodiversity, a task that involves all of us. All species are significant, many in unknown but, perhaps, vitally important ways. We must value biodiversity and try to preserve it.

How Can We Protect Biodiversity?

One of the greatest challenges we face in protecting biodiversity is how to balance the needs of the present without jeopardizing those of the future. There is no one way to address this challenge, partially because there is no single reason why we are losing biodiversity. There are several goals, however, which can be attained by people working together. One proposal is to maintain a state of relative equilibrium with our environment, called *sustainability*. A society that reaches sustainability is one that is able to persist for many generations without producing significant amounts of pollution, depleting natural resources and causing a decline in biodiversity. Many different points of view need to be taken into consideration before sustainability can be achieved. Land-use planning is needed so that space may continue to exist for species and ecosystems. Restoration of habitats is an important goal. Research must be done rapidly to find out as much as possible about what species exist, how they depend on their habitats and how habitats can be managed to ensure healthy populations. Legal protection is necessary for some species. Stewardship of natural resources should be considered when corporations make business decisions. Captive breeding can be used to increase the population of some species. Gene banks are being developed to store seeds and plant parts to preserve biodiversity for future generations. Citizens can take action in their own communities to solve biodiversity problems. Educating people about the problem will lead to better understanding and solutions. Ensuring the survival of species, genes

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and ecosystems will require a combination of approaches, and the collective thinking of people from all disciplines and backgrounds. It will mean fostering compassion for other species, educating ourselves about the connections among all elements of biodiversity and coming to terms with the consequences of our behavior for other people and other species.

What is the Endangered Species Act?

Through federal action and by encouraging the establishment of state programs, the 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. The Act:

- authorizes the determination and listing of species as endangered and threatened;
- prohibits unauthorized taking, possession, sale, and transport of endangered species;
- provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants;
- authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and
- authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act or any regulation issued thereunder.

Source: http://www.fws.gov/laws/lawsdigest/ESACT.HTML

More information can be found at:

http://www.fws.gov/endangered/wildlife.html

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Internet Resources:

How many species are there?

Of all the tens of millions of species that have existed on Earth, only a small percentage have been studied in detail. Find out more at:

http://www.enviroliteracy.org/article.php/58.html - Environmental Literacy Council

http://www.worldwildlife.org/wildfinder/

Wildfinder is an online tool that helps find where wildlife live. Created by the World Wildlife Fund

http://www.iucnredlist.org/

Red list of endangered species. International Union for Conservation of Nature and Natural Resources

http://www.natureserve.org/explorer/

Information on plants, animals and ecosystems in the United States and Canada

Biodiversity Hotspots: California Floristic Province

http://www.biodiversityhotspots.org/xp/hotspots/california_floristic/Pages/default.aspx

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