

National Wildlife Federation

What is Biodiversity?

Biodiversity is the variety of life. It can be studied on many levels. At the highest level, you can look at all the different species on the entire Earth. On a much smaller scale, you can study biodiversity within a pond ecosystem or a neighborhood park. Identifying and understanding the relationships between all the life on Earth are some of the greatest challenges in science.

Most people recognize biodiversity by species. **A species is a group of living organisms that can interbreed.** Examples of species include, blue whales, white-tailed deer, white pine trees, sunflowers and microscopic bacteria that you cannot even see with your eye. Biodiversity includes the full range of species that live in an area.

Biodiversity at a Glance

Let's look at the species biodiversity within a local pond. At first glance, we can identify different plants, including cattails and water lilies. If we wait a while, we might be able to spot a garter snake, a bullfrog or maybe a red-winged blackbird. With a closer look, you can see invertebrates and worms under leaves, on grasses and in the pond water.

Think you're done? - You have not even scratched the surface of the biodiversity within the pond! Using a microscope, you would be able to see hundreds or even thousands of different bacteria that inhabit the pond water. They are all part of the species biodiversity of this small ecosystem!



Biodiversity is More than Just Species

Species diversity is only one part of biodiversity. To properly catalogue all the life on Earth, we also have to recognize the genetic diversity that exists within species as well as the diversity of entire habitats and ecosystems.

Genetic Biodiversity is the variation in genes that exists within a species. A helpful way to understand genetic diversity is to think about dogs. All dogs are part of the same species, but their genes can dictate whether they are Chihuahua or a Great Dane. There can be a lot of variation in genes – just think about all the colors, sizes, and shapes that make up the genetic diversity of dogs.

Ecological Biodiversity is the diversity of ecosystems, natural communities and habitats. In essence, it's the variety of ways that species interact with each other and their environment. The forests of Maine differ from the forests of Colorado by the types of species found in both ecosystems, as well as the temperature and rainfall. These two seemingly similar ecosystems have a lot of differences that make them both special.

Some Biodiversity Facts

Researchers have estimated that there are between 3 - 30 million species on Earth, with a few studies predicting that there may be over 100 million species on Earth! Currently, **we have identified only 1.7 million species**, so we have a long way to go before we can come close to figuring out how many species are on Earth!

- There is more biodiversity within tropical ecosystems than temperate or boreal ecosystems. Tropical rainforests have the most diversity.
- The most diverse group of animals are **invertebrates**. Invertebrates are animals without backbones, including insects, crustaceans, sponges, scorpions and many other kinds of organisms. Over half of all the animals already identified are invertebrates. Beetles are some of the most numerous species.
- Science has so much more to learn about the biodiversity of microscopic organisms like bacteria and protozoa.

The Importance of Biodiversity

Biodiversity is extremely important to people and the health of ecosystems. A few of the reasons are:

- Biodiversity allows us to live healthy and happy lives. It provides us with an array of foods and materials and it contributes to the economy. Without a diversity of pollinators, plants, and soils, our supermarkets would have a lot less produce.
- Most medical discoveries to cure diseases and lengthen life spans were made because of research into plant and animal biology and genetics. Every time a species goes extinct or genetic diversity is lost, we will never know whether research would have given us a new vaccine or drug.
- Biodiversity is an important part of [ecological services](#) that make life livable on Earth. They include everything from cleaning water and absorbing chemicals, which wetlands do, to providing oxygen for us to breathe—one of the many things that plants do for people.
- Biodiversity allows for ecosystems to adjust to [disturbances](#) like extreme fires and floods. If a reptile species goes extinct, a forest with 20 other reptiles is likely to adapt better than another forest with only one reptile.
- Genetic diversity prevents [diseases](#) and helps species adjust to changes in their environment.
- Simply for the wonder of it all. There are few things as beautiful and inspiring as the diversity of life that exists on Earth.

Threats to Biodiversity

Extinction is a natural part of life on Earth. Over the history of the planet most of the species that ever existed, evolved and then gradually went extinct. Species go extinct because of natural shifts in the environment that take place over long periods of time, such as ice ages.

Today, **species are going extinct at an accelerated and dangerous rate**, because of non-natural environmental changes caused by human activities. Some of the activities have direct effects on species and ecosystems, such as:

- Habitat loss/ degradation
- Over exploitation (such as overfishing)
- Spread of Non-native Species/ Diseases

Some human activities have indirect but wide-reaching effects on biodiversity, including:

- Climate change
- Pollution

All of these threats have put a serious strain on the diversity of species on Earth. According to the International Union for Conservation of Nature (IUCN), globally about one third of all known species are threatened with extinction. That includes 29% of all amphibians, 21% of all mammals and 12% of all birds. If we do not stop the threats to biodiversity, we could be facing another mass extinction with dire consequences to the environment and human health and livelihood.

Helping Biodiversity in your Own Backyard

You can play a part in protecting the biodiversity of your local community by creating a Certified Wildlife Habitat®. One of the greatest threats to biodiversity is habitat loss. A Certified Wildlife Habitat® provides food, shelter, water and a place to raise young for native wildlife—the essential elements of habitat that wildlife need to survive. A Certified Wildlife Habitat® can provide food and homes for a range of local species that need your help.

Questions

Answer the following questions:

1. What are the two types of biodiversity?
2. Which area of the Earth has the most biodiversity?
3. Which group of organisms has the most biodiversity?
4. Why is biodiversity important to your everyday life?
5. What is one thing you can do in your daily life to help reduce the local threats to biodiversity in your area?

Sources:

International Union for Conservation of Nature

Comparing and Graphing Nine Environmental Threats, Researchers Find Unexpected Evils

Encyclopedia of Earth: Biodiversity

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Precious Heritage: The Status of Biodiversity in the United States. Stein, Bruce A., Lynn S. Kutner and Jonathan S. Adams. Oxford University Press, New York: 2000.