

## Biological diversity

### What is biodiversity?

The Earth is populated by an incredible number of different living creatures. The term that is used to define this “crowd” of organisms that populate every corner of the Planet, and that have adapted even to the most extreme environments, is biodiversity or biological diversity. Biodiversity measures the variety of animal and vegetable species in the biosphere and is the result of long evolutive processes.

The elements that make up biodiversity can be subdivided into three different levels:

- **Genetic level**
- **Species level**
- **Ecosystem level**

#### ***Genetic biodiversity***

Genetic diversity refers to the differences in the genetic heritage of a species. The morphological characteristics, i.e. the visible characteristics of living organisms, such as for example the colour of the eyes and fur of a cat, which are examples of variety, from a genes level, in each single species.

#### ***Species biodiversity***

However when we speak of biodiversity, we generally refer to the species biodiversity, i.e. the diversity of the different species in a determined environment, where by species we mean a group of organisms that can be crossed with one another giving life to prolific offspring. Species biodiversity can be measured through the number of species in a particular area (richness of species), the number of units in each species in a place (abundance of a species) and through the evolutive relationship of the different species (taxonomic diversity). For example, a man and a chimpanzee have 98% of common genes, but as we all well know, their characteristics make them very discernible one from the other. Some areas of the Planet have greater richness of species than others: at the equator, for example there is the largest number of species, that decreases nearer to the Poles. In the ocean there are many more different species near the coastlines than in the abysses.

#### ***Ecosystem biodiversity***

The variety of environments in a determined natural area is the expression of biodiversity in the ecosystem, in other words, consider the differences there are, for example, between a temperate forest in South America and a mangrove forest at the Equator.

### Why do we need biodiversity?

Each and every species has a particular function in an ecosystem. Some species can capture energy in various forms: for example they can produce organic material, contribute to the nutritive system of the ecosystem, control soil erosion, act as a protection from pollution of the atmosphere and regulate the climate. Ecosystems contribute to improving the production of resources, as for example, soil fertility, pollination of plants and decomposition of vegetables and animals. They also carry out real services such as: purifying the air and water, moderating the climate and controlling the rain or drought, and other environmental disasters. Obviously all these important functions are fundamental for human survival. The more varied the ecosystem is, i.e. the greater the biodiversity, the greater its resistance to environmental stress will be. The loss of even only one species often can provoke a decrease in the capacity of the system to remain preserved in case of degradation.

Biodiversity is like a large tank, from which humans can draw food, pharmaceutical products and even cosmetics. This helps to better understand the importance of maintaining biodiversity, especially in the case of agrobiodiversity, i.e.

diversity in agricultural productions. This regards the innumerable quantity of plants that help to feed and heal human beings. It can be found in the immense variety of cultures and animal species with specific nutritional characteristics, in animal breeds that have adapted to hostile environments, in insects that guarantee pollination and microorganisms that regenerate the soil used in agriculture.

Biodiversity is an “assurance ” for life on our Planet, and therefore must be protected at all costs, because it is a universal heritage that can offer immediate advantages to human beings.

The economic importance of biodiversity for humans can be summarized as follows:

- Biodiversity offers food: harvests, silviculture, livestock and fish
- Biodiversity is fundamentally important in medicine. A very large number of species of plants is used for medicinal purposes since very ancient times. An example is quinine, extracted from the cinchona tree (*Cinchona calisaya* and *C. officinalis*) that is used to fight malaria. Furthermore some scholars believe that 70% of anticancer drugs are derived from tropical forest plants. It seems that out of 250,000 species of known plants, only 5,000 have been studied for their possible medical applications.
- Biodiversity has a remarkable role also in the textile fibres manufacturing industry, wood for building and for the production of energy. Many industrial products are obtained thanks to biodiversity: lubricants, perfumes, paper, waxes and rubber, are all obtained from plants; and there are also products of animal origin such as wool, silk, leather, hides, etc.
- Biodiversity is a source of richness also in the sector of tourism and recreational activities: wild natural environments and the presence of animals in fact attract thousands of tourists from all over the world every year.