Nature and biodiversity

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Characteristics of biological diversity

For thousands of years people have been exploring the natural environment. In the times when they were entirely dependent on nature, they knew it better. It applies in particular to hunter-gatherer societies. Despite the fact that we have been studying the natural environment over a number of centuries, our knowledge on this topic is unsatisfactory. Scientists have discovered and analysed fewer than 2 million currently living or extinct species, while it has been estimated that the world is inhabited by the total of approx. 10 million living species. Given the above, at least 80% of them have not been given a name so far. Such a large number of species gives the idea of biological diversity - multitude and variety of forms which the living matter can assume.

Variety of living organisms is a result of their adaptation to constantly changing environmental conditions. Owing to biodiversity, these changes do not affect the natural environment significantly. As a result of changing environmental factors, some individuals, species, and ecosystems has become extinct, part of them however have acquired features which allowed them to survive. A particular species can survive by passing down these features through generations. As a result of evolution the nature creates and sustains diversity - new kinds of species are constantly being formed while individuals with new and more complex features increase the chances of survival if the natural environment undergoes further modifications.

Biodiversity is thus of crucial importance to the whole animated nature. It can be defined as a diversity of living forms and their microscopic and macroscopic variations. According to the definition officially adopted by the Convention on Biological Diversity, biodiversity is variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part. This includes diversity within species, between species and of ecosystems.

Risks to biological diversity

Extinction of species is a natural process characteristic to all animals, which is caused by continual environmental changes. However, at present people are interfering with the environment to a degree and at a pace which leads to massive species extinction. At least 20 animal and plant species become extinct every day as a result of pollution and conversion of their natural habitats. It is estimated that in 30 years, this number will increase to over 100 species daily. Extinction is a natural process of dying out of weak species that cannot adapt to changing environmental conditions.

Why do species become extinct at such a fast pace?

The main reason why species become extinct is that they lose their natural habitats, most often as a result of human interference and the consequent destruction of natural living conditions. A lot of organisms find it difficult to adapt to living (i.e. hiding, breeding and finding food) in areas which have been occupied and transformed by people. Currently the loss of habitats is the most significant reason behind the species extinction (over 50% of all cases). The second reason is human interference in biological diversity by introducing in a certain area new species from other geographical regions (the so-called invasive species) which displace native species. Another type of risk is posed by genetically modified organisms. The third important reason for species extinction is the destruction caused by fishing, poaching, hunting and tree logging. Organisms such as birds which inhabit small areas (below 50,000 km^2) are at highest risk of extinction. This rule applies to all groups of animals and plants.

Protection of biological diversity

It took us a lot of time to understand how important it is to preserve biological diversity in all ecosystems. Biodiversity must be protected in order:

- to maintain the mechanisms of the functioning of animated nature,
- to preserve its ability to survive environmental changes,
- not to lose values which have not yet been discovered or used and might serve as ground for development and guarantee the survival of future generations.

Extinction of a particular species is an irretrievable loss since it is related to a loss of a unique mixture of genes. Due to the fact that it affects the ecosystem and is its inseparable element, extinction of every species has a negative effect on stability of the natural environment. People are trying to protect endangered species by taking two basic forms of measures: situ (inside of natural habitat) and ex situ (outside of natural habitat) protection. The in situ protection involves such following environmental measures as protection, restoration and extension of the habitat area of a particular species, reintroduction of a species into the area in which it became extinct, limitation of species exploitation, restrictions regarding destroying, killing, fishing etc. The ex situ protection consists in maintaining and breeding species outside their natural habitats, i.e. keeping species on special farms or in botanical or zoological gardens, selective breeding based on the lowest degree of correlation between particular individuals, preservation of seeds and embryos at low temperatures so that they could be used to recreate a particular species.

As regards the ecology, biodiversity refers to ecological systems, their species compositions and related biological balance. Different types of ecosystems were created as a result of adaptation of a given number of individuals of certain species to the ecosystem structure under particular environmental conditions. If a given type of ecosystem is destroyed, it can be restored over the long term due to nature's capacity for self-renewal, provided that new species are introduced into the ecosystem from the outside. It is however impossible to restore ecosystems which abound in various species and have been largely destroyed. The ecological landscape characteristic of a particular area should also be protected not only due to its unique natural but also aesthetic values.

Protection of biological diversity has been included in the International Convention for Environmental Protection, acts and programmes for development of international communities and particular countries. It is also one of priorities of the EU policy on natural environment protection.

Under law currently applicable in Poland, environmental protection is governed by the provisions of the Nature Conservation Act of 16 April 2004. In its meaning, nature protection consists in maintaining, sustainable use, and the restoration of environmental resources, creations and elements of nature, namely:

- wild plants, animals and fungi;
- plants, animals and fungi under species protection;
- animals leading a migratory life;
- natural habitats;
- the habitats of endangered, rare and protected plants, animals and fungi;
- creations of living and inanimate nature and the remains of fossil plants and animals;
- the landscape;
- green areas in cities and in the countryside;
- wooded areas.

Clearing House Mechanism on Biological Diversity (CHM)

The basic element of this system is a comprehensive website created by the Ministry of Environment and currently coordinated by the Division of Environmental Information in cooperation with the Division of Environmental Protection at the General Directorate for Environmental Protection. The Clearing House Mechanism (CHM) provides for access to various sources of information provided by individuals or institutions for interested users and for the purpose of including them in documentation, database and analytical studies which are made available to the public. The website is a part of a global system for the Exchange of information on biological diversity. It provides information on the its most important aspects for instance in the form of essays on gene banks (as regards both animals and plants), forest resources or generically modified organisms. The CHM website contains also links to conventions related to the Convention on Biological Diversity and references to the global CHM system coordinated by the European Environment Agency. The most important elements of the system include:

- invasive species database,
- database on projects related to biological diversity which allows for advanced search for projects and including new projects in the existing database automatically.

Service Exchange of Information on Biological Diversity