

## **11. Sustainable Development through Conservation of Biodiversity**

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**Figure 11.1: Importance of Biodiversity**

**Abstract:**

*Biodiversity is “the variety of all living things and the systems which connect them. This includes all the planet's different plants, animals and microorganisms. Human society depend on biological diversity for almost all the food supply, half of its medicines, much of its clothing and in some region virtually all of its fuel and building material and as well as, of course, an important part of its mental and spiritual welfare. Biodiversity has great economic value because economic development depends upon efficient and economic management of biotic resources. Human beings are maintaining their lifestyle at the sacrifice of surrounding species which come from diversity of plants and animals struggling for their existence. So, it is highly essential for the human beings to take care of their surrounding species and make optimum use of their service, for better economic development. Thus, it is rightly told, survival of the man depends upon the survival of the biosphere.*

**Keywords:**

*Biodiversity, ecosystem, global issues, sustainable development, conservation.*

**11.1 Introduction:**

Bio means “life” and diversity means “variety”. Hence, biodiversity refers wide variety of life on the earth. The term biodiversity<sup>1-5</sup> (Figure 11.1) was coined by **E.O. Wilson** in 1985. Biodiversity may be defined as the variety and variability of living organisms and the ecological system in which they exist. In other words, biodiversity is the occurrence of different types of ecosystems, different species of organisms with the range of their variants and genes adapted to different climate.

It is the result of millions of years of evolution. Biodiversity, besides its ecological significance provides a socio economic and monetary asset to the nation. Human society depends on biological resources, their diversity and the ecosystems that sustain them to provide essential goods and services.

According to The International Union for Conservation<sup>6-9</sup> of Nature (**IUCN**) around 20 million species of plants and animals are known to science. The loss of biodiversity directly influences the social life of the country. Man has always been fascinated by the natural beauty and nature has inspired him resulting in development of his moral and ethical values.

**A. Uses of Biodiversity:**

- It provides food of all types.
- It provides fibers, clothes.
- It provides different types of oil seeds for the preparation of oils.
- It provides varieties of rice, potato etc.
- It provides different drugs and medicines.
- It is very essential for nutrient cycling, clean water, fresh air and fertile soil etc.

## **B. India as a Mega Diversity Nation:**

Among the biologically rich nations, India stands among the top 10 countries for its great variety of plants and animals, many of which are not found elsewhere. India has 45,000 plant species 87,950 animal species. We have two hot spots of biodiversity like Eastern Himalaya and Western Ghats. High endemism has also been recorded for various groups of insects, marine worms, centipedes and fresh water sponges. Apart from the high biodiversity of Indian wild plants and animals there is also a great diversity of cultivated crops and breeds of domestic livestock.

### **11.2 Importance of Biodiversity:**

The living organisms on earth are of great diversity providing food, shelter, clothing, medicines etc.

**A. Productive values:** Biodiversity produces a number of products harvested from nature and sold in commercial markets.

**B. Consumptive value:** These are directly used values where the biodiversity products are harvested and consumed directly. The consumptive value can be assigned to goods such as fuel woods, leaves, forest products etc. which may be consumed directly. The biological resources are consumed directly, without passing to the market. Many plants genetic resources are used from derivation of basic drugs.

Example: Food: - A large number of wild plants are consumed by human beings as food.

Drugs: Around 80% of modern medicines are derived for plant and plant extracts.

Fuel: Our forest has been used since ago for fuel wood. The forest fossil fuel like coal, petroleum and natural gas are also the products of the fossilized biodiversity.

**C. Social value:** These are the values associated with the social life customs, religion and spiritual aspects of the people. The consumptive and productive value of biodiversity is closely linked to social concerns and religious sentiments. Many of the plants are considered holy and sacred in our country.

Example: -

Holy plants: Tulsi, neem, lotus, etc.,

Holy animals and birds: cow, snake, rat, peacock, tiger, etc.,

**D. Aesthetic value:** Aesthetic values such as refreshing fragrance of the flowers, taste of berries, melodious songs of birds, etc. compel the human beings to preserve them. The earth's natural beauty with its color and thick forest and graceful beasts has inspired the human beings.

**E. Ethical value:** Biodiversity must be seen in the light of holding ethical value. Since earth is homeland of all living organisms, all have equal right to coexist on the surface of earth with all benefits. Unless some legal value is attached to biodiversity, it will not be possible to protect the rapid extinction of species.

Ethical values related to biodiversity conservation are based on the importance of protecting all forms of life. All forms of life have the right to exist on earth.

Our rich heritage teaches us to worship plant, animals, river and mountains. The ethical values mean that a speck may or may not be used, but its existence in nature gives us pleasure.

Example: -

- The river Gangs is considered as Holy River.
- Tulsa, veggie some of the trees worshipped by the people.

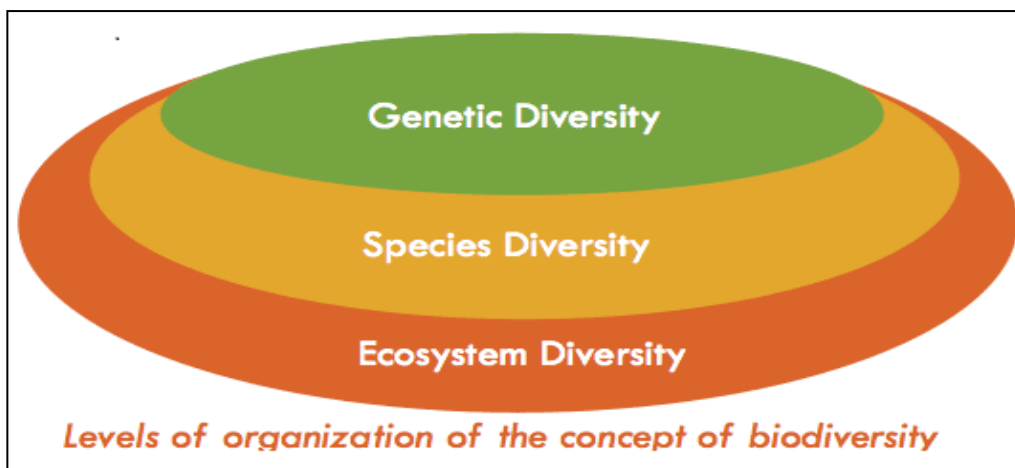
Thus, there is an ethical value (or) existence value attached to each species

**F. Ecological value:** Biodiversity holds great ecological value because it is indispensable to maintain the ecological balance.

**G. Option values:** Keeping future possibilities open for their use is called option value. It is impossible to predict which of our species or traditional varieties of crops and domestic animals will be of great use in the future.

### **11.3 Types of Biodiversity:**

There are three interrelated hierarchical levels of biodiversity (Fig.2) namely, genetic diversity, species diversity and community or ecosystem diversity.



**Figure 11.2: Types of Biodiversity**

**A. Species Diversity:** Species diversity refers to variety and abundance of different types of individuals of a species in a given area. It describes the variety in the number and richness of the species within a region.

**B. Genetic Diversity:** It describes the variation in the number and types of genes as well as chromosomes present in different species. Every individual member of a plant or animal species differs from other individuals in its genetic constitution. Each individual has specific characters.

**C. Ecological Diversity:** Each ecosystem consists of organisms from many different species, living together in a region connected by the flow of energy and nutrients. It describes the assemblage and interaction of species living together and the physical environment in a given area. It also talks about the diversity within the ecosystem.

#### **11.4 Threats to Biodiversity:**

A number of threats<sup>10-16</sup> affect biodiversity today. Biodiversity is considered as a reservoir of resources to be used for the manufacture of food, medicine, industrial products, etc. But with an increased demand of rapid population growth, biodiversity is gradually depleting. A number of plants and animal species have already become extinct and many are endangered. The different factors responsible for causing threat to biodiversity are Habitat loss is mainly due to human population growth, industrialization and changes in the land use patterns, poaching of wild life and man wildlife conflicts.



**Figure 11.3: Threats to Biodiversity**

**A. Habitat destruction:** The primary cause of loss of biodiversity is habitat loss which is resulted due to the large industrial and commercial activities associated with agriculture, construction of dams, mining, irrigation, fishing etc.

**B. Habitat fragmentation:** With increased population, the habitats are fragmented into pieces by roads, dam construction etc.

**C. Pollution:** The most dreaded factor inducing loss of biodiversity is environmental pollution which include air pollution, Water pollution, industrial pollution, pollution due to chemical pesticides, radioactive materials etc.

**D. Over exploitation:** The natural resources are over exploited to meet growing rural poverty, intensive technological growth and globalization of economy. All these factors together may be responsible for the extinction of a number of species.

**E. Poaching of wild life:** A number of wildlife species are becoming extinct due to poaching and hunting. A variety of wild plants with real or sometimes, dubious medicinal values are being overharvested.

**F. Man wild life conflicts:** Conflicting situations with wild life start causing immense damage and danger to man. For Ex: In Sambalpur, Orissa 195 humans are killed in last 5 years by elephants and in retaliation villagers killed 98 elephants and badly injured more than 30 elephants. Shrinking forest cover, human encroachment, lack of food for animals, protecting villagers by putting electric fence are the main reasons for such happenings. As the compensation paid by government. is not enough, conflicts occur between forest department and villagers.

**G. Climate Change due to over population:** Global warming is also considered to be a major potential threat to global biodiversity in the future. From 1950 to 2000, world population increased from 2.5 billion to 7 billion and is forecast to reach a plateau of more than 10 billion during the 21st century. The massive growth in the human population through the 20th century has had more impact on biodiversity as biodiversity depend on population growth.



**Figure 11.4: Conservation of Biodiversity**

### **11.5 Conservation of Biodiversity:**

The historic Convention<sup>15-18</sup> on Biological Diversity ('The Earth Summit') held in Rio de Janeiro in 1992, called upon all nations to take appropriate measures for conservation of biodiversity and sustainable utilization of its benefits. Conserving biological diversity (Figure 11.3) involves restoring, protecting, conserving the variety of life in an area. The abundance and distribution of species should be continued. Conservation of biodiversity is protection and scientific management of biodiversity so as to maintain it for a sustainable benefit for the present and future generation. In other words, conservation of biodiversity is the proper management of the biosphere by human beings so that it gives maximum benefits for the present generation and also to meet the needs of the future generations. There are two types of conservation methods namely in-situ and ex-situ conservations. Let us discuss the different conservation methods along with their importance.

**a. In Situ Conservation:** The conservation of species in their natural habitat or natural ecosystem is known as in situ conservation. In the process, the natural surrounding or ecosystem is protected and maintained so that all the constituent species are conserved and benefited. Conserving a species in its own environment by creating national parks and wildlife sanctuaries. India has 7 Biosphere reserves, 90 National parks and 500 wildlife sanctuaries. The great Himalayan national park is the largest sanctuaries in the ecosystem and is the home of snow leopard.

**b. Ex Situ Conservation:** Conserving the species outside the natural habitat in a carefully controlled situation, such as botanical garden for plants or zoological parks for animals. In this approach, threatened animals and plants are taken out from their natural habitat and placed in a carefully controlled situation where they can be protected and given special care. Zoological parks, botanical gardens and wildlife safari parks serve this purpose. In India following are the important gene bank / seed bank facilities:

- National Bureau of Plant Genetic Resources (**NBPGR**) in New Delhi.
- National Bureau of Animal Genetic Resources (**NBAGR**) at Karnal, Haryana.
- National Facility for Plant Tissue Culture Repository (**NFPTCR**) in New Delhi.

### **11.6 Conclusion:**

Any disturbance in a natural ecosystem tend to reduce its biodiversity. The enormous quantity of waste generated due to increasing in human population, urbanization and industrialization damage the environment and leads to loss of biodiversity. Biodiversity is generally disturbed by human activities especially any developmental activities in forest areas. The marine ecosystem is also disturbed due to oil spills and discharge of industrial effluents. Poaching of wild animals, over exploitation of natural resources, degradation of habitats also affects biodiversity. The climatic factors like global warming, acid rain and depletion of ozone layer are also affecting the biodiversity. Biodiversity is one of the important and powerful tools for sustainable development. Biodiversity protects the fresh air, clean water and productive soil. It also provides our food, medicine and industrial products. The loss of biodiversity has serious economic and social loss for any country. The enormous values of biodiversity due to their consumptive, commercial, medical, aesthetic, ethical and ecological importance emphasizes the need to conserve biodiversity.



**Figure 11.5: Biodiversity for sustainable development**

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