

Biodiversity and its conservation

- Bio means 'life' and diversity means 'variety'
- **Definition :**
Biodiversity is defined as , the variety and variability among all groups of living organism and the ecosystem in which they occur.

Classification:

- **Genetic diversity**
Genetic diversity is the diversity within species ie., variation of genes within the species.eg.,rice varieties.
teak wood trees : Indian teak,burma teak,malasian teak.

GENETIC DIVERSITY

- It refers to the total genetic information contained in the genes of individuals of plants, animals and microorganisms.
- The genes found in organisms can form enormous number of combinations each of which gives rise to some variability.
- when the genes within the same species show different versions due to new combinations, it is called genetic variability.

SPECIES DIVERSITY

- Species diversity is the diversity between different species. The sum of varieties of all the living organisms at the species level is known as species diversity.
- Species richness is the simplest measure of biodiversity and is simply a count of the number of different species in a given area.
- Plant species : Apple,mango,graphs,wheat
- Animal species : lion,tiger,elephant
- ,deer.

Community or ecosysytem diversity :

- The diversity at the ecological or habitat level is known as **ecosysytem diversity**. A large region with different ecosysytem can be considered as ecosysytem diversity.
- Eg., River ecosystem.



Value of Bio-Diversity

Consumptive value:

- These are direct use values where the biodiversity product can be harvested and consumed directly e.g. **fuel, food, drugs, fibre** etc.

Drugs and medicines:

- About 75% of the world's population Depends upon plants or plant extracts for medicines. The wonder drug **Penicillin** used as an antibiotic is derived from a fungus called "**Penicillium**".
- Quinine, the cure for malaria is obtained from the bark of **Cinchona tree**,
- **Digitalin** is obtained from **foxglove (Digitalis)** which is an effective cure for **heart disease**.
- **Vinblastin** and **vincristine**, two anticancer drugs, have been obtained from Periwinkle (**Catharanthus**) plant, which possesses anticancer alkaloids.

Fuel:

- Our forests have been used since ages for fuel wood. The fossil fuels coal, petroleum and natural gas are also products of fossilized biodiversity.

Productive Values:

- These are the commercially usable values where the product is marketed and sold. These may include the animal products like tusks of elephants, musk from musk deer, silk from silk-worm, wool from sheep, leather from all animals.

Social Values/Ethical values:

- These are the values associated with the **social life, customs, religion** and aspects of the people.
- Holy plants: Many of the plants are considered holy plants in our country like **Tulsi, Mango, Lotus, Neem** etc.
- Holy animals : Many of the plants are considered holy animals in our country like **cow, snake, peacock** etc.,

Aesthetic value:

- People from far and wide spend a lot of time and money to **visit beautiful areas** where they can enjoy the aesthetic value of biodiversity and this type of tourism is now known as **ecotourism**.
- The pleasant music of world birds, colour of flowers, peacock, butterfly are important aesthetic value.

Ethical value:

- It involves ethical value like ‘’ all life must be preserved.
- The ethical value means that a species may or may not be used, but its existence in nature gives us pleasure.
- Eg., The river ganga, neem, tulsi etc.,

Optional values:

The optional values of biodiversity suggests that any species may be proved to be a valuable after someday.

Eg., growing technology field is searching a species for causing the diseases of **cancer** and **AIDS**.

Levels of Bio-Diversity

BIODIVERSITY AT GLOBAL LEVEL

- The huge number of species which are still unknown on this earth. About **2.1 million species** have been **identified** till date.
- About **70%** of all known species are **invertebrates** (animals without backbones such as insects, sponges, worms, etc.); while, about **15% are plants**.
- The tropical rainforests have species of plants, insects, animals. They are the earth's largest store house of biodiversity.

- Tropical deforestation alone is reducing the biodiversity by half a percent every year. Many of these species are more vulnerable to extinction when their natural home is destroyed.
 - About 50 to 80% of global biodiversity lies in these rainforests.
 - More than one-fourth of the world's prescription drugs are extracted from plants growing in tropical forests.
 - Temperate forests have much less biodiversity.
- Globally, we have roughly
- 1, 70,000 = flowering plants
 - 30,000 = vertebrates
 - 2, 50,000 = other groups of species

DIVERSITY AT NATIONAL LEVEL :

Indian Biodiversity:

- Every country is characterized by its own biodiversity depending mainly on its climate.
- India has a rich biological diversity of flora and fauna.
- Overall **six percent of the global species are found in India.**
- It is estimated that India ranks **10th** among the plant rich countries of the world.
- India ranks **11th** in terms of number of **endemic species** of higher vertebrates.
- India ranks **6th** place among the centers of diversity and origin of agricultural crops.
- The total number of living species identified in our country is **1,50,000.**
- Indian is also one of the **12 mega-biodiversity countries in the world.**
- Out of a total of **25 biodiversity hot-spots** in the world, India possesses 2, one in the **northeast region** and second one in the **western ghats.**

India as a mega-diversity nation

- India occupies 2.4% of the total land area of the world, but India contributes 8.22% of the known global biodiversity.
- India is one of the 12 mega-diversity nations of the world.
- India is in the 10th position in the world and 4th in the Asia in terms of plant diversity.
- India ranks 10th in the world in terms of number of mammalian species.
- India ranks 11th in the world in terms of endemic species of higher vertebrates
- In terms of number of species contributed to agriculture and animal husbandry, it ranks 7th in the world.

- India has three biomes, namely the tropical humid forests, the tropical dry deciduous forests and the warm desert/semi-deserts.
- India can be divided into ten **biogeographic zones** and **26** biotic provinces which represent the major ecosystems of the world.
- Out of 25 hotspots in the world, India has two 'hotspots'. the Western Ghats and the Eastern Himalayas.
- **Endemism: Species which are restricted only to a particular area are known as endemic.**
- About **62% of amphibians and 50% of lizards** are endemic to India. Western ghats are the site of maximum endemism. India has **26** recognized endemic centers.
- Biosphere reserves : which protect larger areas of natural habitat ,it includes National Parks, preserves, along buffer zones that are open to some economic uses. The World has **482 biosphere reserves in 102 countries.**

Hot spots of Bio-Diversity

The hotspots are the geographic areas which possess high endemic species.

- There are 25 hot spots at global level. Out of 25, two are present in India, namely the **Eastern Himalayas and Western Ghats**.
- Nearly 70% of the bird species in this hotspot are **endemic**. These are the areas of high diversity, endemism and are also threatened by human activities.

- About 40% of terrestrial plants and 25% of vertebrate species are endemic and found in these hotspots.
- It has been estimated that 50,000 endemic plants, which comprise 20% of global plant life, probably occur in only 18 hotspots in the world.
- Countries which have a relatively large proportion of these biodiversity hotspots are referred to as mega-diversity nations.

Threats to Bio-Diversity

- Any disturbance in an natural ecosystem tent to reduce its biodiversity.
- **Causes of threats :**
 - a.Habitat loss :**
 - The lose of population is caused by habitat loss. Habitat loss threatened a wide range of animals and plants.

1.Deforestation :

Forest and grasslands have been cleared for **conversion into agricultural lands** or settlement areas or development project. So thousands of species loss their habitat.

2.Destruction of wetlands :

The wetlands and mangroves are destroyed due to **the draining,filling and pollution** which cause huge biodiversity loss.

3.Habitat fragmentation :

The habitat is divided into **small and scattered patches**.This is called as Habitat fragmentation .due to this wild animals and song birds are vanishing.

4.Raw material :

for the production of hybrid seeds the wild plants are used as raw materials.

5.Production of drugs :

many pharmaceutical companies collect wild plant for the production of drugs.

6.Illegal trade:

Illegal trade on wild life also reduces the biodiversity .

7. Development activities :

construction of massive dams in the forest area and discharge of industrial effluents which kills the birds and other aquatic organism.

b. Poaching of wildlife :

Poaching means killing of animals or commercial hunting. It leads to loss of animal biodiversity.

1.Subsistence poaching:

killing animals to provide enough food for their survival .

2.Commercial poaching :

hunting and killing animals to sell their products .

Man-wildlife conflicts :

when wildlife starts causing immense damage.

Eg.,

- 1.In orissa, 199 humans were killed in the last 5 years by elephants.
2. In mysore several elephants were killed becoz of massive damage done by the elephants to the sugarcane crops.

Endangered Species of India

- **IUCN-INTERNATIONAL UNION OF CONSERVATION OF NATURAL RESOURCES**, the species classified into various types,

1. Extinct species :

A species is said to be extinct, when it is no longer found in the world.

2. Endangered species :

When its number has been reduced to a critical level. Unless it is protected and conserved, it is in immediate danger of extinction.

3.Vulnerable species :

A species is said to be vulnerable, when its population is facing continuous decline due to habitat destruction.

4. Rare species:

A species is said to be rare, when it is localised within restricted area or they are scattered over a more extensive area. Such species are not endangered or vulnerable.

Endangered Species of India

- When its number has been reduced to a critical level. Unless it is protected and conserved, it is in immediate danger of extinction.
- Eg., Reptiles – python, tortoise.
- Birds : peacock
- Mammals : tiger, lion, golden cat, desert cat
- Primates : golden monkey, capped monkey.
- Plants : sandal wood tree.

- RED DATA BOOK :Red data book contains the list of endangered species of plants and animals.

Endangered Species of India

The species which are found only in a particular region are known as endemic species.

Eg., fauna and flora.

- Out of about 47,000 species of plants in our country 7000 are endemic.
- Thus, Indian subcontinent has about 62% endemic flora, restricted mainly to Himalayas, Khasi Hills and Western Ghats.
- A large number out of a total of 81,000 species of animals in our country is endemic.
- The Western Ghats are particularly rich in amphibians (frogs, toads etc.) and reptiles (lizards, crocodiles etc.). About 62% amphibians and 50% lizards are endemic to Western Ghats.

Conservation of Bio-Diversity

- The act or process of conserving. The protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water.

Conservation of our natural resources has the following three specific objectives:

- (i) to maintain essential ecological processes and life-supporting systems .
- (ii) to preserve the diversity of species or the range of genetic material found in the organisms on the planet .
- (iii) to ensure sustainable utilization of species and ecosystems which support millions of rural communities as well as the major industries all over the world.

There are two approaches of biodiversity conservation:

(a) In situ conservation (within habitat): This is achieved by protection of wild flora and fauna in nature itself, e.g. Biosphere Reserves, National Parks, Sanctuaries, Reserve Forests etc.

- **(b) Ex situ conservation** (outside habitats) This is done by establishment of gene banks, seed banks, zoo, botanical gardens, culture collections etc.

(a) In situ conservation:

In-situ conservation involves protection of fauna and flora within its habitat, where the species normally occurs is called In-situ conservation.

1. Biosphere reserves: nilgiri – kerala, TN
2. national park: gir national park-gujarat
3. wildlife sanctuaries: ghana bird sanctuary
4. gene sanctuary: one gene sanctuary for citrus(lemon family).

Exsitu conservation :

In-situ conservation involves protection of fauna and flora outside the natural habitat.

Methods of exsitu conservation:

1.National Bureau of plant Genetic Resources:
(NBPGR):Its located in new delhi.

Cryo preservation technique:

Perseveration of seeds of crops by using liquid nitrogen at temp -196°C . Variety of rice, tomato, onion, carrot, chilli preserved in liq. nitrogen

**ii) National bureau of animal genetic resources :
(NBAGR):It is located at haryana.**

It preserves the semen of bovine animals.

**iii)National facility of plant tissue culture
repository:(NFPTCR)**

It develops the facility for conservation of varieties of crop plants and trees by tissue culture.