BIODIVERSITY

Definition:

Biodiversity refers to the variety and variability among all groups of living organism and the ecosystem complex in which they occur.

Classification of Biodiversity

Biodiversity is generally classified into three types

1) Genetic diversity
2) Species diversity
3) Ecosystem or Community diversity

1. Genetic Diversity

- A species with different genetic characteristics is known as **genetic diversity.**
- It is the basic source of biodiversity.
- The genes found in organisms can form enormous number of combinations each of which gives rise to some variability.
- Genes are the basic units of hereditary information transmitted from one generation to other. When the genes within the same species show different versions due to new combinations, it is called **genetic variability**.
- For example, all rice varieties belong to the species Oryza sativa, but there are thousands of wild and cultivated varieties of rice which show variations at the genetic level and differ in their color, size, shape, aroma and nutrient content of the grain. This is the genetic diversity of rice.

2. Species Diversity

- The variability found between different species of a community is called as species diversity.
- It represents broadly the species richness and their abundance in a community. There are two popular indices of measuring species diversity known as Shannon-Wiener index

- The total number of living species in a range of l0 million to 50 million. Till now only about l.5 million living and 300,000 fossil species have been actually described and given scientific names.

3. Ecosystem Diversity

- The diversity at the ecological or habitat level is known as ecosystem diversity
- The diversity of ecological complexity showing variations in ecological niches, trophic structure, food-webs, nutrient cycling etc.
- The ecosystems also show variations with respect to physical parameters like moisture, temperature, altitude, precipitation etc.
- We may consider diversity in forest ecosystem, which is supposed to have mainly a dominance of trees. But, while considering a tropical rainforest, a tropical deciduous forest, a temperate deciduous forest and a boreal forest, the variations observed are just too many and they are mainly due to variations in the above mentioned physical factors.

VALUE OF BIODIVERSITY

Introduction

The value of biodiversity in terms of its commercial utility, ecological services, social and aesthetic value is enormous. We get benefits from other organisms in innumerable ways. Sometimes we realize and appreciate the value of the organism only after it is lost from this earth. Very small, insignificant, useless looking organism may play a crucial role in the ecological balance of the ecosystem or may be a potential source of some invaluable drug for dreaded diseases like cancer or AIDS. The multiple uses of biodiversity or biodiversity value have been classified as follows:

1) **Consumptive use value**

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

Food: A large number of wild plants are consumed by human beings as food. About 80,000 edible plant species have been reported from wild. About 90% of present day food crops have been domesti- cated from wild tropical plants. Even now our agricultural scientists make use

of the existing wild species of plants that are closely related to our crop plants for developing new hardy strains. A large number of wild animals are also our sources of food.

Drugs and medicines: About 75% of the world³s population depends upon plants or plant extracts for medicines. The wonder drug Penicillin used as an antibiotic is derived from a fungus called 9eniciSSium. Likewise, we get Tetracyclin from a bacterium. Quinine, the cure for malaria is obtained from the bark of Cinchona tree, while DigitaSin is obtained from foxglove

(Digitalis) which is an effective cure for heart ailments. Recently vinblastin and vincristine, two anticancer drugs, have been obtained from Periwinkle (Catharanthus) plant, which possesses anticancer alkaloids. A large number of marine animals are supposed to possess anti-cancer properties which are yet to be explored systematically.

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. Firewood collected by individuals is not normally marketed, but are directly consumed by tribals and local villagers, hence falls under consumptive value.

2. **Productive use values**:

- These are the commercially usable values where the product is marketed and sold. It may include lumber or wild gene resources that can be traded for use by scientists for introducing desirable traits in the crops and domesticated animals. These may include the animal products like tusks of elephants, musk from musk deer, silk from silkworm, wool from sheep, fir of many animals, lac from lac insects etc, all of which are traded in the market
- Many industries are dependent upon the productive use values of biodiversity e.g.- the paper and pulp industry, Plywood industry, Railway sleeper industry, Silk industry, textile industry, ivory-works, leather industry, pearl industry etc.
- Despite international ban on trade in products from endangered species, smuggling of fur, hide, horns, tusks, live specimen etc. worth millions of dollars are being sold every year. Developing countries in Asia, Africa and Latin America are the richest biodiversity centers and wild life products are smuggled and marketed in large quantities to some rich western countries and also to China and Hong Kong where export of cat skins and snake skins fetches a booming business.

3. **Social Value**

- These are the values associated with the social life, customs, religion and psychospiritual aspects of the people. Many of the plants are considered holy and sacred in our country like Tulsi (holy basil), Peepal, Mango, Lotus, Bael etc.
- The leaves, fruits or flowers of these plants are used in worship or the plant itself is worshipped.
- The tribal people are very closely linked with the wild life in the forests. Their social life, songs, dances and customs are closely woven around the wildlife. Many animals like Cow, Snake, Bull, Peacock, Owl etc. also have significant place in our psychospiritual arena and thus hold special social importance.
- Thus biodiversity has distinct social value, attached with different societies.

4. **Ethical value:**

- It is also sometimes known as existence value.
- It is based on the concept of "Live and Let Live". If we want our human race to survive, then we must protect all biodiversity, because biodiversity is valuable.
- The ethical value means that we may or may not use a species, but knowing the very fact that this species exists in nature gives us pleasure.

5. **Aesthetic value:**

Great aesthetic value is attached to biodiversity. No one of us would like to visit vast stretches of barren lands with no signs of visible life. People from far and wide spend a lot of time and money to visit wilderness areas where they can enjoy the aesthetic value of biodiversity and this type of tourism is now known as **eco-tourism**. The "Willingness to pay" concept on such eco-tourism gives us even a monetary estimate for aesthetic value of biodiversity.

6. **Optional Value**

These values include the potentials of biodiversity that are presently unknown and need to be explored. There is a possibility that we may have some potential cure for AIDS or cancer existing within the depth of a marine ecosystem.

7. **Ecosystem service value:**

Recently, a non-consumptive use value related to self maintenance of the ecosystem and various important ecosystem services has been recognized. It refers to the services provided by ecosystems like prevention of soil erosion, prevention of floods, maintenance of

soil fertility, cycling of nutrients, fixation of nitrogen, cycling of water, their role as carbon sinks, pollutant absorption and reduction of the threat of global warming etc.

INDIA AS A MEGA-DIVERSITY NATION

Nearly 170 countries are present in the world and 12 of them contain 70% of our plant diversity. Among this India have 12 mega diversity countries in the world. It has 47000 species of plant and 81000 animal species which about 7% and 6.5% respectively of global flora and fauna.

Endemism:

The species which are restricted only to a particular area are called as **endemic species.** Our country has a rich endemic flora and fauna. About 62% amphians, 50% lizards, 33% of flowering plant, 53% of fresh water fishes and 10% mammalian are endemic species.

Centre of origin

A large no of species are known to have originated in India.

- **Plant diversity:** Nearly 5000 flowering plant and 166 crop plant species have their origin in India.
- **Agro-biodiversity**: There are crops species and wild relatives. India is considered to be the centre of origin of 30000 to 50000 varieties of rice, mango, turmeric, ginger etc.
- **Marine Biodiversity:** Along 7500KM long coastline of our country in the mangroves, estuaries, coral reefs, back water etc. There exists a rich biodiversity. More than 340 coral species of the world are found there. Several species of mangrove plants and sea grass are also found in our country.
- **Animal biodiversity:** There are 75000 animal species including 5000 insects. India is home to about nearly 200000 living organism.

A large proportion of the India biodiversity is still unexplored. There are about 93 major wetland, coral reefs and mangroves. Indian forest covers 64.01 million hectares having a rich biodiversity of plants such as Trans Himalayan, North east central, eastern Himalaya forest, Western Ghats, coast deserts etc. Due to vary diverse climate conditions there is a complete rainbow spectrum of biodiversity in our country.