Chapter - 19
Biodiversity and Its Conservation

Biodiversity is composed of two words: Bio - which means life and diversity- which means variation. Accordingly the meaning of biodiversity is - the diversity found among the living beings found on the earth.

Biodiversity is a comprehensive term because the word living organisms includes the entire flora and fauna present on the earth. Its expanse ranges from microscopic plant algae to giant Banyan tree and Redwood, from microscopic water plankton to Mammoth, Whales and from bacteria to voluminous Elephants.

According to the "Technology Assessment Report" published by the United States of America in 1987, biodiversity has been defined as follows:

"The diversity, asymmetry and ecological complexity found among the biological organisms is called biodiversity."

Presently, the biodiversity found on our planet is the result of the continuous evolutionary and developmental process of life continuing from billions of years. In fact, biodiversity is very essential to maintain the balance our ecosystem.

19.1 Levels of biodiversity

(1) Species diversity

Species: - A group of organisms whose members are identical in appearance and have the ability to produce their offspring's by reproduction in natural conditions is called a species.

The total number of different species of organisms (plants and animals) found in any specified area is called species diversity of that region.

The general meaning of biodiversity is better understood by species diversity. It acts as a scale to measure the balance of an ecosystem. The microbial density and diversity is many folds higher than the other organisms found on earth. It is noteworthy here that only one gram of soil contains about more than 10 million bacteria and 50 thousand fungi.

(2) Genetic Diversity

The variation found in different members of the same species due to the genes (hereditary unit) is called genetic diversity. This diversity is found between different population groups of one species or between different members of a population. The different characters found in the members of same species (like varieties of Rice, Deer or Frog) inhabiting in different ecosystems of the world are example of genetic diversity. The higher the genetic variation in the members of a species, the lesser will be the risk of its extinction, because it will have greater ability to adapt as per the environment. This variation is also responsible for the genesis of new members (varieties) of a species.

(3) Ecosystem Diversity

The system established by mutual interactions among all the living organisms and the prevailing abiotic components in a specified area is called **Ecosystem**. Many types of ecosystem such as grasslands, mountains, desert, moist land, sea, river-valley, tropical forest etc are found on the earth. These ecological systems have their own geographical and environmental characteristics due to which they differ in the flora and fauna. Such variation is called as the diversity of the ecosystem.

19.2 Global biodiversity

There is lack of complete information about the biodiversity present throughout the World. According to the Millennium Ecosystem Assessment, about 50 to 300 million species of organisms are found on our planet out of which scientists could identify 17 to 20

million species only. Biodiversity distribution on Earth is uneven. The equator has the richest biodiversity but as we go away from the equator biodiversity decreases. The middle and south-east America and south-east Asia, where the maximum tropical forests on the Earth are found, has very rich floral biodiversity.These regions accounts for only 7 percent of the total area of the Earth, but hosts two-thirds of the world's floral diversity, 30 percent of invertebrates and 90 percent of pests.

According to the report of Ministry of Environment and Forests, Government of India (year 1999) the world wide distribution of different species of plants and animals found at different levels can be understood from the following illustrations:

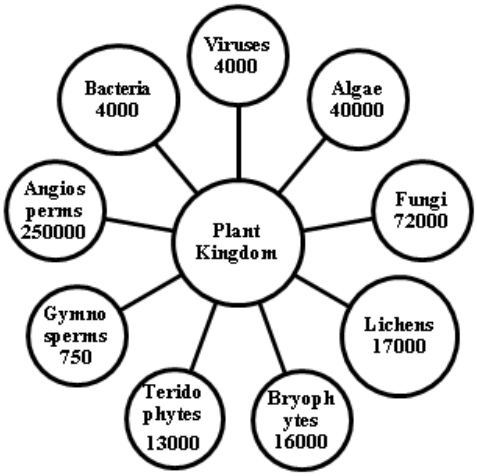

Figure 19.1 The Floral Diversity of the World

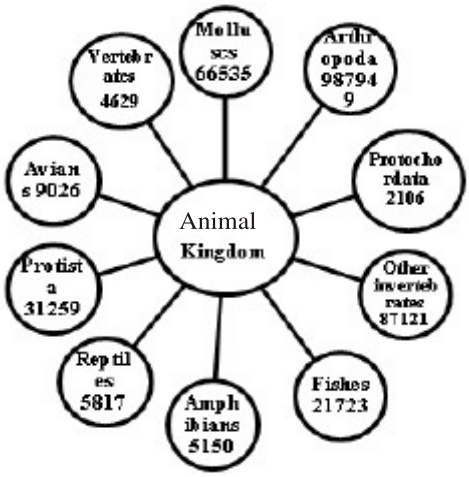

Figure 19.2 The Animal Diversity of the World

19.3 Biodiversity of India

India, due to its geographical location, has very rich biodiversity. India occupies only 2.4 percent of the total land of the world but it accounts for 7 to 8 percent of the total biodiversity found throughout the world. Almost all types of ecosystems that exist in the world such as grasslands, tropical rain forests, mangroves, coral reefs, river-valleys, islands, marshes etc. are found in India. Because of this reason, India has been included in 17 Mega biodiversity rich countries.

According to the report of the Ministry of Environment and Forest (2009) Government of India, 45968 plant species and 91364 animal species have been identified in India. The plant species comprises of 16,000 Fruit-Flowering plants, 12,500 Fungi, 2,500 Bryophytes, 2,300 Algae, 1,600 Lichens and 1,000 Ferns species. Similarly, 397 species of Mammals, 1232 of Birds, 460 of Reptiles, 240 of Amphibians, 2546 of Fish and 59300 Pests and Insect species are found here.

On account of its agricultural diversity, India has a prominent place in the world. In terms of its agriculture input, India has been placed on seventh place in the world. About 167 species of food crops are grown in India. About 50,000 varieties of rice and 1,000 varieties of mango are found in our country.

19.4 Biodiversity Hotspots

A place where a huge biodiversity is found is called as "**Biodiversity Hotspot**". This concept was first proposed by the British ecologist Norman Mayer in 1988. On this basis, 25 regions of the world were declared as biodiversity hotspot in 1999. At present, there are 34 biodiversity hotspots in the world. They accounts for 2.3% of the Earth's area.These hotspots host more than 50 percent of the world's endemic plant species.

There are two prerequisite conditions for declaring an area as a biodiversity hotspot -

(1) More than 0.5 percent of the total endemic species of the world should be present in that region. In terms

of number, at least 1500 endemic species should be present at that place.

(2) 70 percent habitation of that area must be redundant, that is, human activities have menaced the existence of that area. Such areas have an urgent need for protection, so they are declared as biodiversity hotspots.A large number of comprehensive conservative programs are organized at these places.

In the declared 34 biodiversity hotspots of the world, 42 endemic species of vertebrates, 55 species of fresh water fishes and 50 percent of plant endemic species are found. Some of the major biodiversity hotspots in the world are Atlantic Forest, East Malaysian Islands, Mountains of Southwest China, Islands of Madagascar, Central America, Colombia, Choco, Central Chile, Eastern Himalayas, Western Ghats, Sri Lanka, Indo- Burma etc.

19.4.1 Biodiversity hotspots of India

Among the biodiversity hotspots found globally, two - the Eastern Himalayas and Western Ghats are present in India while only a small portion of Indo-Burma Biodiversity Hotspot lies in India.

(1) The Eastern Himalaya Biodiversity Hotspot

The states of the east Himalayan regions like Assam, Arunachal Pradesh, Sikkim and West Bengal are part of this hotspot. The Himalayan mountain range is endowed with infinite biodiversity. The Himalayan biodiversity hotspot is spread in 7,50,000 sq km area and houses about 10,000 plant species, out of which 3,160 species are endemic. Apart from this, 300 species of mammals (12 are endemic), 997 species of birds (15 are endemic), 176 species of reptiles (15 are endemic), 105 species of amphibians (40 are endemic), 269 species of fish (33 are endemic) are also found here. Some of the key animals found in this area are - Himalayan Tahr, Golden Langur, Hoolock Gibbon, Pygmy Hog, Flying squirrel, Snow Leopard, Takin, Gangetic Dolphin etc.

Figure 19.3 Gangetic Dolphin

Do you know?

What is our national aquatic animal? In the year 2009, the Gangetic Dolphin was declared as India's National Aquatic Animal. The dolphin has the same significance in the river ecological system, which the tiger has in the forest.

(2) The Western Ghat Biodiversity Hotspot

The Western Ghats which are lined along the western coast of India is a major biodiversity hotspot of the world. This area is spread over 1,60,000 sq.km area, and includes the state of Kerala, Gujarat, Maharashtra, Goa, Karnataka and Tamilnadu. This hotspot hosts 5916 plant species out of which about 50 percent are endemic. Moreover 140 species of mammals (out of which 18 are endemic), 458 species of birds (out of which 174 are endemic), 267 species of reptiles (out of which 174 are endemic), 178 species of amphibians (out of which 130 are endemic), 191 species of fish (out of which 139 species are endemic) are found in this hotspot. The key animals found here include - Malabar Civet, Asian Elephant, Malabar Gray Hornbill, Nilgiri Tahr and lion tailed Macaque Monkey.

(3) Indo-Burma Biodiversity Hotspot

This hotspot spans about 23,73,000 sq Km area and extends in tropical East Asia covering parts of China, India, Myanmar, Vietnam, Thailand, Cambodia and Malaysia. This extensively large hotspot houses 13500 plant species, 433 types of mammalian species, 1266 types of amphibians and 1262 fish species.

Endemic Species-

Species which are found in a particular area, i.e., whose distribution or extension is limited to a specific area, are called **Endemic Species**. For example, the Lemur is limited to Madagascar Island only. Similarly,

Lion tailed Macaque Monkey

Metasequoia plant is found only in a specific valley of China. The Nilgiri Tahr and Lion tailed Macaque Monkey are found only in the Western Ghats of India.

Lemur

Therefore, endemic species of a place means that the said species could not be found anywhere else in the world.

Nilgiri Tahr

The main reasons for the endemic nature of a species are - the interaction between the region's climatic and geographical conditions and mutual interaction with other species. Due to the limited expansion of the endemic species, they are likely to get extinct or threatened. Therefore, there is a need to give special attention to their protection. The "Dodo" bird, which was firstly discovered in the year 1658, was an endemic species of an island of Mauritius. Due to the increased human activities and hunting on that island, this bird became extinct in just 23 years. It

Dodo

was last seen in the year 1681.

India is a nation which is rich in endemic species. Most endemic species of India are found in the Western Ghats, the north-eastern Himalayas and Andaman and Nicobar islands. In India, 17612 species of the wild animals, 44 species of the mammals, 57 species of the birds, 187 species of the reptiles and 110 species of amphibians are endemic. In addition, 5150 endemic species of plants are also found in India.

19.5 Importance of biodiversity

Biodiversity is a natural resource which can fulfill the natural and organic requirements needed for the life of organisms. This fulfills the basic necessities of human beings. The importance or value of biodiversity can be understood as per the following:

(1) Economic significance

Biodiversity directly provides us food, fuel, animal feed, building wood, industrial raw materials

etc. Due to biodiversity, we get diversified food, paddy, cereals, fruits and vegetables.

To meet the requirements of increasing population, biodiversity is being used to increase the agricultural yields as well as in the development of varieties of disease resistant and insect resistant crops. For example, the development of the dwarf varieties of wheat, which were responsible for the green revolution, was done from the Naren-10 variety of wheat found in Japan and the development of dwarf species of paddy was done from the **Dee-Geo-woo-gen** variety found in Taiwan.

In Asia, in the decade of year 1970, paddy crop in 1,60,000 hectare area was destroyed by the Grassy Stunt Virus. At that time, paddy species resistant to the above disease was developed by using the wild paddy species "*Oryzanivara*" which was collected in Eastern Uttar Pradesh in 1963. If this paddy species would not be preserved at that time, we could imagine the situation of Asia where majority of population is dependent on paddy.Today 20 genes of wild paddy are being used in Paddy Improvement Programs.

The compatible season provides favorable conditions for the production of different crops which could resist diseases. In this way, biodiversity of food grains acts as a boon for the humans.

Today, the entire world is worried for limited resources of petroleum and its uncontrolled exploitation. In such a condition, plants such as Jatropa and Karanja have shown a ray of new hope because the seeds of these plants can be used to develop organic fuels. These plants are also known as **biodiesel trees**.

(2) Medicinal value

Since ancient times, many herbaceous plants are being used for the treatment of many types of diseases. According to an estimate, approximately 40 percent of the medicines available today are obtained from the plants.

Treatment of many incurable diseases, which were reported from time to time on earth, has always been sought through the biodiversity. The treatment of incurable malaria fever was found in the bark of **Cinchona** plant. Similarly **Vincristine** and **Vinblastine** are used in the treatment of incurable blood cancer (Leukemia).

Bark of tree *Taxus baccata* is used in the treatment of cancer and *Rauvolfia serpentina* is used in the treatment of hypertension. Treatment of AIDS which has become an epidemic disease in today's world, is also possible with biodiversity. AIDS resistant properties have been found in plants like Tulsi, Brahmi, Ashvagandha, Shatavari, Gilgo, Giloya etc.

(3) Environmental value

(a) Protection of food chain

We know that in a food chain one organism consumes another, that is, one species depends on another species. Therefore, the extinction of any one species may result in a danger of the termination of the food chain. A rich biodiversity ensures multiple food chains (the food web) operating in an ecosystem. On extinction of any species in a food chain, another species operating in the food web can conserve the food chain by compensating its deficiency.

(b) Regulation of Nutrient cycle

Biodiversity is helpful in maintaining the nutrient cycle. The micro-organisms of soil break down the dead parts of plants and animals resulting in the replenishment of the nutrients back to the plants. This is how this cycle continues.

(c) Disposal of environmental pollutants

Biodiversity also plays an important role in the disposal of environmental pollutants. Some plants have the property of degrading and absorption of the pollutants. For example, a plant called *Catharanthus roseus* has the ability to disintegrate the deadly explosive chemicals like trinitrotoluene. Micro-organisms like *Pseudomonas putida*, *Arthobacter viscosus* and *Citrobacter spp*. have the ability to remove heavy metals from the industrial effluents. In the same way fungi *Rhizopus oryzae* has the ability to remove Uranium and Thorium and *Penicillium chrysogenium* has the ability to eliminate harmful

elements such as Radium.

(d) Social, cultural and spiritual significance

The human culture and environment has developed simultaneously. Before the today's modern and consumerist approach, a harmony existed between the humans and nature. Even today, some tribal societies are completely dependent on the nature to fulfill their needs. Some plants like Peepal, Banyan tree, Mango, Basil (Tulsi), Amla, Banana etc. still have very special place in our society and we worship them on some festivals. Similarly, some animals like cow, peacock, goose, rat, elephant etc. are also very special in our culture. Our country still has some reserve forest areas called Dev vans and people voluntarily conserve these places.

Considering the economic, environmental, social and cultural significance of biodiversity on a global scale, the year 2010 was celebrated as **International Biodiversity Year** by the United Nations, so that the world community should try to maintain and understand the importance of biodiversity. 22 May has been declared as the **International Biodiversity Day** by the United Nations.

In fact, biodiversity is an outstanding gift of nature which plays an important role in maintaining life on the Earth. Therefore, we all have the duty to protect the biodiversity so that life on earth could smile in its various forms.

19.6 Threats to biodiversity

Extinction of vegetation and animal species in nature or the emergence of new species is a natural phenomenon. Generally, one species of mammal extincts in 400 years and one ovian species lasts in 200 years. But at present, the human activities and the indiscriminate destruction of natural resources have increased this rate from 1000 to 10000 times. As a result the biodiversity is decreasing rapidly. According to an estimate, about 700 species have become extinct since the year 1600 AD. Today about 4000 species of animals and 60,000 species of plants are on the verge of extinction. At present one bird from every 8^{th} on Earth, one mammal from 4^{th}, one Coniferous tree out of 4, one amphibian in every 3, 6 of the 7 sea turtles are facing the risk of extinction. Not only this, today we have lost 75 percent of the genetic diversity of the agricultural crops. Due to excessive exploitation, about 75 percent of the world's fish are at the risk of extinction. In the last few years, Asian Cheetah, Javanese Rhinoceros, Himalayan Quail and Pink-headed Duck became completely extinct from India.

Following are some of the reasons for biodiversity loss seen today:

(1) Destruction of natural habitats

Nature has set aspecific habitat for every organism in which it dwells and increase its number as per the laws of nature . But in order to fulfill the needs of the growing population of the world, we are expanding the townships and agricultural land by destroying these natural habitats.

There are 50 million to 300 million species on our planet out of which over 50 percent species are found in the tropical forests. But today these forests are being cut at a rate of 1.7 crore hectare per year. If tropical forests were destroyed at this rate, then according to a scientific estimate, in the next 30 years, 5 to 10 percent of the plant and animal species inhabiting in these forests will become extinct. In the last 60 years due to deforestation in Europe, 50 percent of fungal species have become extinct. Similarly, the temperate rainforests are being destroyed at a rate of about 1 crore hectare per annum.Unfortunately, the majority of the extinct species could not be recognized by the scientists.

(2) Habitat Fragmentation

The natural habitats of wild creatures, which were earlier extensively and indiscreetly spread in the area, have now been disrupted by the construction of roads, railways, gas pipeline, canal, electricity lines, dams and farms. They have adversely affected the natural activities of the wild life and these creatures feel unsafe in such activities. When they encroach into

human habitats many wild animals are slayed by the vehicles or killed by local residents. Every year, about half a dozen tigers and many small animals meet with accidents on the railway track passing through the Dudhwa National Park.

(3) Climate change

Human activities have significantly enhanced the amount of greenhouse gases on earth. This has resulted in a continuous increase in the temperature of the earth. With the rise in the temperature, the ice on poles is melting rapidly and the water level of the sea is increasing.This has resulted in adverse impact on marine biological diversity. Because of the decrease in land availability, terrestrial biodiversity has been affected adversely. According to an estimate, if the temperature of the earth increases by 3.5 degrees centigrade, 70 percent of the species will face a danger of extinction.

(4) Environmental pollution

The environmental pollution badly affect the animals and plants. Many plants and animals are destroyed in the land and water, polluted by industrial effluents. Many micro-organisms and plants are destroyed by the acid rain caused due to the excessive air pollution. Similarly, the excessive use of chemical fertilizers and insecticides to increase agricultural yields, has resulted in extinction of micro-organisms found in the soil. This has an adverse impact on the fertility of the soil.

(5) Over Exploitation of the natural resources

The use of natural resources for the fulfillment of local needs is in no way harmful. But man has excessively exploited the trees and animals for his commercial benefits.This has resulted in a threat of extinction of many species. For example, frog legs in Europe and North America are used to increase flavor of food. Many Asian countries including India exported legs of frogs. In 1983, India exported 3650 Metric Tons of frog. This resulted in depletion of number of frogs in the forests and unexpected increase in pests which were otherwise would have been eaten by the frogs.Looking to the seriousness of the problem, on 1 April 1987, the Government of India has banned the business of the frogs.

(6) Commercial practices in Agriculture and Forestry

Prior to the Green Revolution, farmers used to grow various varieties of cereals, fruits, vegetables etc in their fields and kept many breeds of livestock. However, in the greed of getting more production in less time, today's farmer grows improved seeds varieties only and maintains the more productive hybrid species of livestock. These practices have resulted in steep decline in the genetic biodiversity. In Indonesia, from the last 15 years, 80 percent of the farmers are producing more productive hybrid varieties of rice. This has resulted in the extinction of 1500 local varieties of rice.This is a huge threat for the future because once a pandemic is spread; all the crops will be destroyed together and shall result in hunger problem.

In the same way, forests of the same species are being planted for meeting today's needs of paper, matches, plywood and industrial raw materials, thereby decreasing the faunal biodiversity.

(7) Invasion of foreign species

Many times, the existence of local species is threatened by the desirable or undesirable influx of foreign species and they cause an imbalance in the whole ecosystem. Some plant species such as Lantana and Hyacinthus were imported for beautification. The British had brought Lantana to India in 1807 and planted it in the Botanical Garden of Calcutta, but it gradually spread throughout the subcontinent. Today, this plant has become a menace for the local biodiversity because it does not allow other plants to grow near it nor do animals eat it. Similarly Hyacinthus, which is also called waterlili, due to its beautiful purple flowers,was brought to India from Brazil but today it has spread to so many water bodies of India. The uncontrolled pervasion of hyacinth prevents the sunrays to reach beneath

the water, as a result the plants present in the water are destroyed and due to lack of oxygen the organisms begin to die.

Similarly, some exotic species came involuntarily with imported food grains. For Example,congress grass (Parthenium) came to India along with the wheat imported from the US in 1950s. Congress grass is one of the most dangerous weed species of the world, which is not consumed even by the animals. This plant contains many chemical substances that cause allergies. This grass has become a huge threat to our local biodiversity.

Consider this with another example - some deer's were introduced in Andaman and Nicobar Islands almost 50 years ago, without keeping it in mind that there was no natural consumer of the deers. The result was that the number of deers enhanced rapidly and they consumed the local plants with a high pace and then turned towards the fields for their feeds. Thus, interference in the system of the nature without a concrete thinking not only affects the local ecosystem, but also messes up the social and economical system of the concerned area.

(8) Superstition and Ignorance

Due to superstition and ignorance of the people, the threat on some specific species of living beings increases tremendously. For example, due to the misleading concept of understanding the dialect of humans, people started to catch the Gagroni parrots (*Psittacula eupatria*) in large numbers and this resulted in their loss.The bird Godavan (The Great Indian Bustard/ *Ardeotis nigriceps*), being considered to be a sex enhancer, are hunted in larger numbers and hence are facing a great danger. Similarly, in the rural areas of Rajasthan, it is a misconception that the breath of Monitor lizard is poisonous, so the villagers try to kill it on the very sight.

19.7 Conservation of biodiversity

For the balance and general functionality of our biosphere and ecosystems, there is a need for maintaining the diversity of organisms and vegetation. But with the influence of modern man's selfishness and the consumerist culture, uncontrolled and excessive exploitation of the natural resources has caused destruction of the earth's biodiversity. As a result, presently many species of animal and plants are rapidly becoming extinct or endangered.

A number of efforts are being made at International, National and Local level to protect the endangered species.

19.7.1 International efforts

In view of the worldwide constant loss of biodiversity, in the year 1968, under the auspices of United Nations, an international organization - "**International Union for Conservation of Nature" (IUCN)** was formed. After an extensive worldwide four years study on Plants and Animals, a book called "**Red Data Book**" was published by this Institution in 1972. This book enlists the disappearing species, their habitat and their present number.

With the intension of their conservation, IUCN has divided the organisms of the world into 5 categories -

(1) Extinct species

Species which are no longer found anywhere in the world are called extinct species. For example - Dodo bird, Dinosaur, Rhynia plant etc.

(2) Endangered species

Species which are on the verge of extinction and if not protected will extinct soon. For example - Cheetah, Tiger, Leopard, *Ginkgo biloba*, Sarpagandha (*Rauwolfia serpentine*), etc.

(3) Vulnerable species

The species whose population is decreasing rapidly and soon expected to become an endangered species. For example - Yak, Nilgiri tahr, Red Panda, Cobra, Black bug etc.

(4) Rare species

Species which are usually limited to a particular geographical area or whose number is very sparse. For example - Red Wolf, Hainan Gibbon etc.

(5) Insufficiently known species

Those species about which sufficient information is not known and hence cannot be kept in a particular category.

In the year 1973, IUCN organized a convention called **Convention on International Trade in Endangered Species (CITES)**, in which various countries agreed to control the international trade of endangered species.

During the Earth Convention which was held in the City of Rio de Janeiro in Brazil in 1992, the **Biodiversity Treaty (CBD - Convention on Biodiversity)** came into existence. Till today it has been accepted by the 193 countries. Through this treaty, all the nations expressed their commitment to protect the biodiversity.

19.7.2 National Efforts

Keeping in mind the commitment of India towards the International Treaty on Biodiversity - CBD (Convention on Biodiversity), the Central Government in 2002 made the **Biodiversity Act 2002**, with the following three main objectives.

(1) Protection of biodiversity.

(2) Use of biodiversity in such a way that it can remain available for a long time (Sustainable use).

(3) Even distribution of the benefits obtained from utilization of biological resources of the country, so that it can reach to as many people as possible.

In order to achieve these objectives, there is a provision of a three-tier organization in the Biodiversity Act 2002 -**National Biodiversity Authority (NBA)** at the national level, **Biodiversity Board** at the state level and **Biodiversity Management Committees** at the local level.

In India, the **National Green Tribunal** has been formed on 2 June 2010 with an objective of bringing the environment, forest, water, air and biodiversity laws into the same lap. Now, the appeal under the said laws are filed in the National Green Tribunal but not in the High Court. This will resolve the disputes related to these matters faster. The National Green Tribunal has been headquartered in Bhopal.

19.7.3 Types of Biodiversity Conservation

The conservation of biodiversity refers to efforts made to protect the genes, species, habitats and ecosystems. Therefore, the best way to conserve biodiversity is to keep the whole ecosystem in its natural form. Biodiversity is currently preserved in two different ways.

(1) In-situ Conservation

The most suitable environment for the growth and development of an organism is provided by its natural habitat.The onsite conservation of the living organisms in their natural habitat which is maintained by the man is called **In situ conservation**.The endangered species which is to be protected is provided with its own natural habitat, favorable conditions and safety. For this, the Biosphere Reserves, the National Parks, the Wild Life sanctuaries and Conservation Reserves have been established. At present, 14 Biospheres Reserves, 99 National Parks and 523 Wildlife Sanctuaries and 47 protected reserves have been set up in India. A total of 1,58,745sq.km area of the country has been preserved in these reserves. This makes approximately 4.83 percentage of the total geographical area of the country.

(2) Ex- Situ Conservation

In this method of biodiversity conservation, the endangered plant and animal species are protected in artificial housing outside their natural habitat. For the protection of the plant species, Botanical Garden, Seed Bank, Tissue Culture Laboratories etc. have been established. Bird houses, aquarium etc. are established for the protection of the animals. The germplasm of the endangered plants and animals like seeds, fruits, pollens, spores, sperm and ovums are protected with the help of cryopreservation and slow culture technique. Moreover, the genes of the endangered plants and animals are preserved in their germination stage in the gene banks.

Important points

1. The diversity, asymmetry and ecological complexity found among the organism is called biodiversity.
2. Biodiversity is observed at three levels - species diversity, genetic diversity and ecological diversity.
3. A group of organisms whose members are identical in appearance and have the ability to produce their offspring's by reproduction in natural conditions is called a species.
4. The diversity found among the members of a species caused due to the genetic makeup of the individuals is called Genetic Diversity.
5. The diversity found among the members inhabiting in different ecosystems due the differences in geographical and environmental conditions is called ecological diversity.
6. As per an estimate, scientists have identified only 7 percent of the species found in the world.
7. On account of its biodiversity, India has been included in the list of 17 mega biodiversity rich countries.
8. The regions where enormous biodiversity is found are called biodiversity hotspots.
9. Total 34 biodiversity hotspots are found in the world.
10. Two biodiversity hotspots exclusively found in India are - East Himalaya biodiversity and Western Ghats. The Indo Burma Biodiversity hotspot is spread in many countries. Some part of India is also covered in it.
11. In 2009, the GangeticDolphin was declared as the National Aquatic Animal of India.
12. Species which are found in a particular area, i.e., whose distribution or extension is limited to a specific area, are called endemic species.
13. 22 May has been declared as the International Biodiversity Day by the United Nations.
14. Biodiversity is very important for the humans. It is not only important for the economy but also important for the environment, society, medical and other reasons.
15. Presently due to the human activities and exploitation of the natural resources, the extinction rate of many species has enhanced.
16. The climate change, habitat fragmentation, habitat loss, over exploitation of the natural resources, commercial agriculture and forestry practices, superstition and ignorance etc are the main reasons for the loss of biodiversity.
17. A number of efforts are being made at International, National and Local level to protect the Biodiversity.
18. An international organization called International Union for Conservation of Nature (IUCN) was formed in 1968. After an extensive study, this Union has published a book called Red Data Book.
19. For their conservation the IUCN has classified the organisms into five categories - Extinct species, Endangered species, Vulnerable species, Rare Species and Insufficiently known species.
20. India made a Biodiversity act in 2002 in which a three-tier organization (National Biodiversity Authority, State Biodiversity Authority and Biodiversity management committee) was proposed.

Practice questions

Objective type questions

1. Unit to measure the balance of an ecosystem is
   (a) Species (b) Biodiversity
   (c) Animal diversity (d) None of the Above
2. In terms of its agriculture input, India acquires ……..place
   (a) Eight (b) Ninth
   (c) Seventh (d) Tenth

3. The total number of Biodiversity hotspots in the world are
   (a) 25 (b) 20
   (c) 34 (d) 33
4. National Aquatic Animal of India is
   (a) Gangetic Dolphin (b) Whale
   (c) Star Fish (d) None of the above
5. Which among the following hotspot is present in India?
   (a) Madagascar Hotspot
   (b) East Malaysia Islands
   (c) Indo Burma Hotspot
   (d) None of the above
6. International biodiversity day is observed on
   (a) 21 May (b) 23 May
   (c) 22 May (d) 24 May
7. International biodiversity year was observed on
   (a) 2012 (b) 2010
   (c) 2011 (d) 2009
8. Presently how many animal species are on the verge of extinction?
   (a) 8000 (b) 2000
   (c) 2800 (d) 4000
9. Due to misconception, which of the following organism is killed by the villagers?
   (a) Monitor lizard
   (b) Godawan (Great Indian Bustard)
   (c) Frog (d) Dodo
10. At which of the following place does the earth summit in 1992 was held?
    (a) New Delhi (b) Paris
    (c) Perth (d) Rio-de-Janeiro

Very short type questions

11. Write three levels of biodiversity.
12. What percentage of the total species found in the world have been identified by the scientists?
13. What are Biodiversity hotspots?
14. Which is National Aquatic Animal of India?
15. Write names of Biodiversity hotspots of India.
16. Write names of two endemic species.
17. Write names of two endangered species.
18. Which position does India has in terms of its biodiversity?

Short type questions

19. What is Biodiversity? Explain.
20. Explain the biodiversity found in East Himalayan Biodiversity Hotspot.
21. Which countries are included in Indo- Burma Biodiversity Hotspot?
22. What is the impact of invasion of foreign species on the Biodiversity?
23. "Export of frof legs has adversily effected the biodiversity". Explain this statement.
24. Illustrate the National level efforts made for the conservation of biodiversity.
25. Write the types of biodiversity conservation.

Essay type questions

26. Explain the levels of biodiversity.
27. Explain the biodiversity hotspots.
28. Illustrate the importance of Biodiversity.
29. Explain the reasons responsible for the loss of biodiversity.
30. Write an essay on efforts made for the conservation of biodiversity.

Answer key

1. (a) 2. (c) 3. (c) 4. (a) 5. (c) 6. (c)
7. (b) 8. (d) 9. (a) 10. (d)