

PUC 1st Year-Semester-2

Unit No VIII: Biodiversities

Module No 43. Conservation of Biodiversity

Biodiversity conservation involves the management of not only the living organisms but also the abiotic factors of the environment so as to maintain the life supporting systems of the wild life.

Aims of Biodiversity Conservation:

1. To maintain the balance of ecosystem
2. To protect, preserve and help in rapid reproduction of the rare species to save them from extinction.
3. To preserve the breeding stock
4. To prevent deforestation and encourage afforestation
5. To study the ecological relations of the plants and animals in natural habitat.
6. Conservation of wildlife is essential because they carry many useful genes which are lost in domesticated animals.

Methods for the Conservation of Biodiversity:

There are basically two main types of conservation options 1) *In situ* Conservation and 2) *Ex situ* Conservation. *In situ* is usually seen as the ideal conservation strategy. *Ex situ* conservation can provide a backup solution to *In situ* Conservation projects.

I. *In situ* Conservation (On – site conservation):

It means “On – site conservation”. It is the process of protecting an endangered species in its natural habitat. *In situ* approach includes protection of a group of ecosystems through a network of protected areas like natural parks, and Sanctuaries, biosphere reserves and sacred forests.

National Parks and Sanctuaries:

In India at present there are 75 National parks and 247 wildlife sanctuaries covering nearly 4.2 percent of the country’s geographical area.

A National park is an area which is strictly reserved for the betterment of the wild life and where activities like forestry, grazing or cultivation are not permitted. In these parks, even private ownership rights are not allowed.

A sanctuary is a protected forest area which is reserved for the conservation of only animals and human activities like harvesting of timber, collection of minor forest products and private ownership rights are allowed so long as they do not interfere with the well being of animals. In sanctuaries killing and capturing of any animal is prohibited except under orders of the authorities concerned.

Names of some important National parks and sanctuaries are given below.

Some National Parks of India:

1. Kaziranga National Park (Assam)
2. Sundarbans (West Bengal)
3. Hazaribagh National Park (Bihar)
4. Corbett National Park (Uttarkhand)
5. Gir National Park (Gujrat)
6. Kanha National Park (Madhya Pradesh)
7. Tandoba National Park (Maharashtra)
8. Bandipur National Park (Karnataka)
9. Desert National Park (Rajasthan)
10. Guindy National Park (Tamil Nadu)

Some Important Sanctuaries of India:

1. Annamalai Sanctuary (Tamil Nadu)
2. Jaldapara Sanctuary (West Bengal)
3. Keoladeo Ghana Bird Sanctuary (Rajasthan)
4. Sultanpur Lake Bird Sanctuary (Haryana)
5. Bir Moti Bagh Wild life Sanctuary (Punjab)
6. Shikari Devi Sanctuary (Himachal Pradesh)
7. Dachigam Sanctuary (Jammu and Kashmir)
8. Mudumalai Wild life Sanctuary (Tamil Nadu)
9. Nagarjuna Sagar Sanctuary (Andhra Pradesh)
10. Periyar Sanctuary (Kerala)
11. Chilka Lake Bird Sanctuary (Orissa)

2. Biosphere Reserves:-

A biosphere reserve is a specified area in which multiple use of the land is permitted by dividing it into certain zones, each zone being specified for a particular activity.

A biosphere reserve is divided into three zones

- a) **Core Zone**:- It lies at centre where no human activity is allowed. It is legally protected.
- b) **Buffer zone**:- It surrounds core area. In this zone limited human activities are allowed.
- c) **Transition Zone**:- It is the outermost part of biosphere reserve. In this zone multiple human activities are allowed but ecology is not permitted to be disturbed.

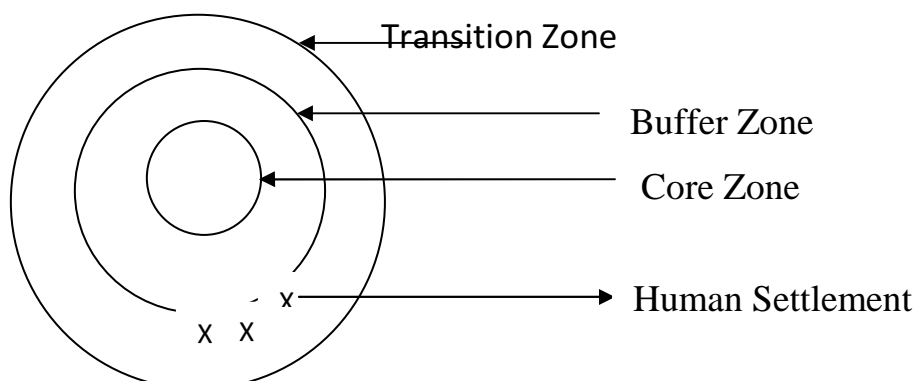


Fig: Zones of Biosphere Reserve

In India there are 14 biosphere reserves. The purpose of declaration of biosphere reserve is to conserve biodiversity *in situ* along with its supporting system.

The concept of Biosphere Reserve is of immense value for conserving the gene – pool resources of flora and fauna in the country and to serve as bench – marks for future studies.

Some important Biospheres reserves found in India are

1. Nilgiri
2. Nanda Devi
3. Nokrek
4. Manas
5. Sunderbans
6. Gulf of Mannar

7. Great Nicobar
8. Similpal
9. Panchmarhi
10. Kanchanjanga etc.,

3. Sacred forests and sacred lakes:

Some forest regions are being protected by tribals due to religious sanctity are called sacred forests. Such forests have been found to be most undisturbed. Such sacred forests in India are present in states like Karnataka, Maharashtra, Kerala and Meghalaya. In Sikkim, Khecheopalri lake is declared sacred lake by people, thus protecting the aquatic flora and fauna.

II. Ex – situ Conservation (Off – site Conservation)

It involves the conservation of genetic resources of species away from their area of origin or development. This includes off site collection and gene banks.

1. Off – site Collection:

Collection of wild and domesticated organisms in botanical gardens and zoos etc. Many botanical gardens have the facilities of seed banks, tissue culture and other latest *ex – situ* technologies.

2. Gene Banks:

Ex – situ Conservation occurs mainly in gene banks, which are mainly four types: a) Seed gene banks b) Field gene banks c) In vitro Preservation d) Cryo preservation.

Gene Banks are maintained by institutes. Seed banks are orthodox seed banks and recalcitrant seed banks. In orthodox seed banks orthodox seeds (eg, Cereals and legumes) are preserved. In recalcitrant seed banks recalcitrant seeds (hard to preserve) are stored (eg. Coconut, cocoa seeds, tee, jackfruit etc.,). Recalcitrant plants are maintained in field gene banks. In invitro preservation (in labs) tissue culture is used to develop embryoids, pollen grains, shoot tips for

plants without visible seeds. Cryo preservation is the technique in which embryos, animal cells, spermatozoa etc. are preserved at -196⁰ C.

Hot Spots of Biodiversity

Biodiversity is not distributed uniformly over the earth. Some areas, particularly along the tropics, are rich in species. Many species in these areas are threatened with extinction. However, the fund for conservation is rather limited and hence it is important to fix priority areas for conservation. In 1988 British ecologist, Norman Myers forwarded a concept called hot spots. He identified them priority areas for *In situ* conservation. Certain areas in various parts of world are known with mega biodiversity of species.

“Hot spots are areas that are extremely rich in species have high endemism and are under constant threat”

“A biodiversity Hot spot is a biogeographic region with a significant reservoir of biodiversity that is under threat from human”

According to the classification of Norman Myers, there are 25 hot spots scattered in different parts of the world. Even though the 25 biodiversity hot spots together represent 1.4 percent of the earth's land area, they contain 44 percent of all plant species and 35 percent of all terrestrial vertebrate species in the world.

India contributes about 8 percent of global biodiversity, although it bears only 2.4 percent of land areas of world. These areas are particularly rich in floral wealth and endemism, not only in flowering plants but also in reptiles, amphibians, butterflies and some mammals.

Out of 25 hot spots two are found in India. They are

1. Indo –Burma (earlier Eastern Himalayas) and
2. Western Ghats.

1. Eastern Himalayan Hot spot: Its boundry extends from North Eastern India to Bhutan. It is specially rich in some endemic plants. Many primitive families like

Magnoliaceae and winteraceae are represented here. Some plants of interest found here are Magnolia and Betula. Here temperate forests are found at height of 1780-3500 meters. Many deep valleys are also present here

2. **Western Ghat hot spot** Western Ghats is a mountain chain running from the north to south and is isolated by the Arabian sea to the west, the arid Deccan Plateau to the East and the Vindhya-Satpura ranges to the North. They have different vegetation types: Scrub jungles and grass lands at low altitudes, dry and moist deciduous forests, montane grass lands and shoals, and the precious tropical ever green and semi evergreen forests. Complex topography, high rainfall and relative inaccessibility have helped the region retain its biodiversity. Of the 15000 flowering plant species in India, there are an estimated 4780 species in Western Ghats region. There is also great diversity of traditional crop plants and an equal diversion of animal life. A large number of amphibians, fresh water fishes and invertebrate groups are endemic to western Ghats.

Red Data Book

The IUCN (International Union for the conservation of Nature and Natural resources) maintains an international list, published as the Red Data Book, which contains a record of animals which are known to be in danger. They are now being published in many different countries.

Definition: “A catalogue formerly published by the IUCN, listing species which are rare or in danger of becoming extinct.” The information is now available in a searchable data base.

The Red Data Book is the state document established for documenting rare and endangered species of animals, plants and fungi as well as some local sub species that exist within the territory of the state or country. This book provides central information for studies and monitoring programmes on rare and endangered species and their habits. Each Red Data Book deals with a specific group of animals or plants (ex. Reptiles, insects, mosses etc).

The IUCN Red list of threatened species is the best known world wide conservation status listing and ranking system. The system divides threatened species into three categories.

1. Critically endangered (CR)
2. Endangered (EN) and
3. Vulnerable (Vu) (These are those species whose populations are still abundant but their home range has been adversely affected, so these may become endangered if these factors continued). Also listed are the documented extinction that have occurred since AD1500 and taxa that are extinct in the wild.

They usually deal with specific groups of organisms and /or geographical areas, and provide information on the populations of the species concerned with an indication of the level of threat (as threatened, critically endangered etc). Information on the legal protection given to the species, and anything that is being done to help protect them may also be included.

Endangered species: An endangered species is a population of organisms which is at risk of becoming extinct because it is either few in number or threatened by changing environmental or predation parameters

These are those species whose number have been reduced to a critical level or whose natural habitats have been adversely affected. So these are near extinction and may become extinct if these causal factors continue operating. There are many species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Under IUCN categories and criteria, endangered species is between critically endangered and vulnerable. The IUCN has calculated the percentage of endangered species as 40 percent of all organisms based on the sample of species that have been evaluated through 2006. It is estimated that about 25,000 species

of plants and 1000 vertebrate species and sub species are threatened with extinction.

Data regarding all endangered plant and animal species of our country are also not complete. In India, the wild life (Protection) Act, 1972 provides four schedules categorising the fauna of India based on their conservation status. Schedule 1 lists the rare and endangered species which are provided legal protection. It is considered that about 81 species of mammals; 38 species of birds and 18 species of amphibians and reptiles are endangered in India.

Some endangered species:

Mammals – Tiger, Muskdeer, Leopard, Dolphins, Panda, Hoolock gibbon, Indian Pangolin, Indian wolf, Jackal, Indian fox, Himalayan brown bear, sloth bear, Indian lion, rhinoceros etc

Birds--- Whooping crane, Bustard, geese, swans, Whitewinged wood duck etc

Reptiles -- Python, Turtle, Sphenodon, Tortoise, terrapin, crocodile, Alligator Gavialis etc

Amphibia-- The viviparous toad, Indian salamander

Crustacea-- robber crab (a large hermit crab)

Insects -- Some dragon flies, butterflies, moths and beetles.

The basic reasons for extinction of wild life as follows:

1. Destruction of their natural habitats due to expanding agriculture, urbanization and Industrialisation
2. Over grazing by domestic animals that convert the area into deserts
3. Poaching for meat, skin, fur, ivory, rhino horns etc
4. Export of some species

Due to continuous increase in the number of endangered species of flora and fauna of wild life, steps have been taken to protect and manage the wild life of the country. Non-governmental voluntary organizations as well as governmental organizations at state and central levels have been set up to protect the wild life.

Check Points

1. The main aim of conservation of biodiversity is to maintain the balance of ecosystem and to protect and preserve the rare species from extinction.
2. Protecting an endangered species in its natural habitat is called *In – situ* conservation.
3. The conservation of components of biological diversity outside their natural habitats is called *Ex – situ* conservation.
4. National parks are protected areas aimed at betterment of wildlife but where human activities are not permitted.
5. Sanctuaries are protected areas aimed at conservation of only animals and where certain human activities are also permitted.
6. Biosphere reserves are protected areas where multiple use of the land is permitted by dividing into certain zones.
7. Endangered species are the species which are in danger of extinction and whose survival is unlikely, if casual factors continue operating
8. Book containing a record of the threatened animal species is called Red Data Book.

Short Answer Questions

1. List out the aims of biodiversity conservation
2. Explain conservation strategies
3. Explain Biosphere reserves
4. Write short notes on Endangered Species
5. Write short notes on Gene Banks

Long Answer Questions

1. Write an essay on conservation of Biodiversity.

Multiple Choice Questions

1. Animals and plants are best protected in
 - A) Zoos
 - B) Botanical gardens
 - C) Sanctuaries
 - D) **National Parks**
2. Red Data Book deals with

- A) Endemic Plants
 - B) Plants that are extinct
 - C) **Animals on verge of extinction**
 - D) Plants showing Photoperiodism
3. Red Data Books are produced by
- A) **IUCN**
 - B) WWF
 - C) IBWL
 - D) None of these
4. Kaziranga National Park is located in
- A) **Assam**
 - B) West Bengal
 - C) Bihar
 - D) Gujrat
5. Number of National Parks present in India are _____ (Ans:- 75)