

BIODIVERSITY CONSERVATION

IMPORTANCE OF BIODIVERSITY

- Biodiversity is very crucial to the existence of man.
- Plants are central to the well-being of humans as a key component of our food, medicine, cultures and traditions.
- Along with plants, many animals, birds, mushrooms and several microorganisms also play a vital role in the existence of human beings.
- Without those organism, i.e., biodiversity, life would be very unbearable.
- The biodiversity values are broadly categorised into two types;
 1. Intrinsic values; and
 2. Anthropocentric values
 - a) Economic value; and
 - b) Aesthetic value



THREATS TO THE BIODIVERSITY

- All over the world, animals and plants that are surviving from the past are experiencing threat of extinction due to anthropogenic activities.
- Every day, we are losing species and even very fast.
- Biologists have estimated that all over the world, 36% of plant species are threatened with extinction.
- The main causes responsible for the loss of biological diversity are;
 1. **HABITAT LOSS AND HABITAT FRAGMENTATION**
 2. **OVEREXPLOITATION**
 3. **INTRODUCTION OF INVASIVE SPECIES**
 4. **POLLUTION**
 5. **CLIMATE CHANGE**

Table 11.4 Status of threatened categories of species in India

Category	Number of species
Extinct (Ex)	04
Extinct in the wild (EW)	02
Critically endangered (CR)	85
Endangered (E)	182
Vulnerable (VU)	147
Lower Risk/ Conservation dependent (Lr/cd)	01
Lower Risk/ Near threatened (LR/nt)	50
Data deficient (DD)	98
Least Concern	1524

Source www.iucnredlist.org accessed on 4 August, 2020

CONSERVATION OF THE BIODIVERSITY

- Conservation of Biodiversity is the **PROTECTION, PRESERVATION AND MANAGEMENT OF BIODIVERSITY** so as to maintain it at its optimum level and derive sustainable benefits for the present, and the future.
- Biodiversity conservation ensures the protection and preservation of species diversity and **SUSTAINABLE MANAGEMENT OF SPECIES AND ECOSYSTEMS.**
- The biodiversity conservation has three specific aims and objectives;
 1. To sustain important ecosystems
 2. To protect the variety of genetic materials and range of species
 3. To guarantee sustainable use of organisms and natural ecosystems
- Two major strategies are followed in the biodiversity conservation;
 1. ***IN-SITU* CONSERVATION** – Protection of species in their natural habitats.
 2. ***EX-SITU* CONSERVATION** – Protection of species under the control of humans.

IN-SITU CONSERVATION

- In-situ” conservation strategy involves the conservation of ecosystems, genetic resources or organisms in their **NATURAL SURROUNDINGS**.
- *In-situ* strategy is specifically applied to wild flora and fauna.
- This system of protection is **AN INCLUSIVE ARRANGEMENT OF PROTECTED AREAS** which comprises putting separately huge areas of land for wild animals with a notion to protect an endangered species or the entire area.
- **A PROTECTED AREA** is a designated land and/or sea area specifically dedicated to conserving and safeguarding biodiversity and natural and cultural resources, managed **through legal or other effective methods**.
- The protected areas have been designated with different names according to their character and the objectives of their formation.

1. BIOSPHERE RESERVES

- Biosphere reserves are sites established by countries and recognized under UNESCO's Man and the Biosphere (MAB) Programme.
- They extend over large areas of terrestrial or coastal/marine ecosystems or a combination thereof.
- The main objective of a biosphere reserve is to promote sustainable development through the conservation of biodiversity, cultural heritage, and sustainable use of natural resources.
- The biosphere reserve typically includes three zones:
 1. **CORE ZONE:** a strictly protected area where human activities are not allowed.
 2. **BUFFER ZONE:** an area where limited human activities are allowed, including research and eco-tourism.
 3. **TRANSITION ZONE:** an area where sustainable development is encouraged, such as farming, forestry, and other human activities.
- [India consists of a total of 18 biosphere reserves.](#)

Sl. No.	Name of the Biosphere Reserve	Year of Establishment
1	Nilgiri Biosphere Reserve	1986
2	Sundarbans Biosphere Reserve	1987
3	Manas Biosphere Reserve	1988
4	Western Ghats Biosphere Reserve	1991
5	Agasthyam Biosphere Reserve	1991
6	Arabian Rappah Biosphere Reserve	1991
7	Indira Gandhi Memorial Biosphere Reserve	1991
8	Debra Biosphere Reserve	1991
9	Marine Biosphere Reserve	1991
10	Nilgiri Biosphere Reserve	1991
11	Nilgiri Biosphere Reserve	1991
12	Nilgiri Biosphere Reserve	1991
13	Nilgiri Biosphere Reserve	1991
14	Nilgiri Biosphere Reserve	1991
15	Nilgiri Biosphere Reserve	1991
16	Nilgiri Biosphere Reserve	1991
17	Nilgiri Biosphere Reserve	1991
18	Nilgiri Biosphere Reserve	1991

2. NATIONAL PARKS

- A National park is an area protected for its ecological, faunal, floral, geomorphological, or zoological importance.
- A National park may be set up to conserve a particular species of wild animal like rhinoceros, tiger, and lion.
- The national parks are generally not inhabited by humans, and human activities are restricted.
- The areas are open to the public for recreational purposes, such as hiking, camping, and wildlife watching (safaris).
- [India consists of 106 National parks](#) and Karnataka consists of 5 national parks.

3. WILDLIFE SANCTUARIES

- A Wildlife Sanctuary is a protected area of importance for **FLORA, FAUNA, OR FEATURES OF GEOLOGICAL OR OTHER INTEREST**, which is reserved and managed for conservation and to provide opportunities for study or research.
- The sanctuary is usually a small area, and human activities are restricted to prevent animal disturbance.
- Wildlife sanctuaries are generally open to the public for educational purposes, but recreational activities are restricted.
- There are 567 wildlife sanctuaries are there in India. Whereas in Karnataka, it is 35.

4. CONSERVATION RESERVES

- Conservation reserves are the areas of government land declared by the state governments to protect the habitat of plants and animals and protect landscapes and seascapes.
- In conservation reserves, special status is given to the rights of the population residing there, and their rights are unaffected.
- In India, there are 105 conservation reserves are established and in [Karnataka it is 14](#).

5. COMMUNITY RESERVES

- Community reserves are the areas of community or private land declared by the state governments for the purpose of protection of wildlife, its habitat, and values of cultural and traditional practices.
- There are 220 community reserves are there in India, and in Karnataka one community reserve, i.e., [Kokkare Belluru Community Reserve](#) in Maddur Talluk of Mandya District.

Type of PA	India	Area (km ²)	Karnataka	Area (km ²)
Biosphere reserves	18	-	1	-
National parks	106	44,402.95 (1.35%)	5	2,794.05 (1.46%)
Wildlife sanctuaries	567	122564.86 (3.73%)	35	7923.23 (4.13%)
Community reserves	220	1455.16 (0.043%)	1	3.12 (0.002%)
Conservation reserves	105	5206.55 (0.160%)	14	171.92 (0.09%)

EX-SITU CONSERVATION

- Ex-situ strategy is conserving wildlife in confinement under controlled human attention.
- Due to various threats to biodiversity, ex-situ conservation play a significant role in preventing a species from going extinct.
- This approach is used when the natural habitats of certain species are severely degraded and making it difficult to ensure their survival in the wild.
- The major objectives of this method is to maintain and increase the genetic diversity of species, prevent extinction, and eventually reintroduce them back into the wild if possible.
- It is important to note that ex-situ conservation is not a substitute for in-situ conservation (conserving species in their natural habitats).
- Instead, it should complement and support in-situ efforts to ensure the long-term survival of species and ecosystems.

1. BOTANICAL GARDENS

- Botanical gardens are living collections of plants, including rare and endangered species.
- They serve as repositories for diverse plant species, providing them with a safe environment to grow and reproduce.
- They are useful in research, to promote conservation and raise awareness.
- Ex; Acharya Jagadish Chandra Bose Indian Botanic Garden, Kolkata; Kew Botanical Garden.

2. ZOOLOGICAL PARKS AND CAPTIVE BREEDING PROGRAMS

- Zoos are helpful in ex-situ conservation by housing and caring for endangered animals.
- Some species are bred in captivity through managed breeding programs to ensure the maintenance of their genetic diversity.
- These captive-bred individuals prevent a species from extinction and, in some cases, be candidates for future reintroduction into the wild.
- Ex; Gharial rehabilitation centre; Rushikulya Sea Turtle Protection Committee.

3. SEED BANKS AND GENE BANKS

- Seed banks store seeds of various plant species, ensuring the preservation of genetic diversity.
- They are very useful in research and have the potential to reintroduce the stored seed into their natural habitats in the future.
- Similarly, gene banks store samples of genetic material, including DNA, tissue, or semen, from a range of animal species.
- Both these seed and gene banks act as repositories for future research and breeding efforts.

4. AQUARIUMS

- Similar to zoos, aquariums focus on conserving aquatic species, especially endangered fish, marine mammals, and invertebrates.
- They provide a controlled environment for these species and contribute to public education and awareness about marine conservation.

5. IN VITRO CONSERVATION

- In vitro conservation involves growing plant tissues or cells in laboratory conditions, such as tissue culture, to preserve genetic diversity and rare plant species.

6. POLLEN BANKS

- A pollen bank is a facility designed to store and preserve pollen grains from various plant species.
- This ex-situ conservation method is essential for protecting the genetic diversity of plants and is particularly valuable for species that face threats of extinction.
- Pollen banks are vital in supporting research, breeding programs, and conservation efforts.
- **PRESERVATION METHODS:**
 - ✓ **DRIED POLLEN:** The collected pollen is dehydrated to remove moisture and then stored at low temperatures. This method is widely used and maintains the pollen's viability for several years.

- ✓ **CRYOPRESERVATION:** The pollen is preserved at extremely low temperatures using cryopreservation techniques.
- ✓ Cryopreservation involves freezing the pollen in liquid nitrogen at -196°C .
- ✓ This method allows for long-term storage of pollen and can maintain viability for decades or even centuries.

7. CRYOPRESERVATION

- Cryopreservation is a specialized technique used to preserve living organisms, such as plant seeds, animal embryos, tissues, or cells, at extremely low temperatures.
- The process involves cooling the biological material to temperatures below freezing (typically at or near the temperature of liquid nitrogen, around -196°C or -321°F).
- By doing so, the metabolic processes of the organisms are essentially halted, allowing them to remain in a suspended state until thawed and used for future applications.
- Cryopreservation is a valuable tool for conserving the genetic diversity of species, supporting research, and enabling assisted reproductive technologies.