Biodiversity and its Conservation

Introduction

- Bio means "life" and diversity means "variety". Hence biodiversity refers wide variety of life on the earth.
- The term **biological diversity** was used first by wildlife scientist and conservationist **Raymond F. Dasmann** in 1968, where he advocated **conservation**. It was widely adopted only in the 1980s.
- Diversification in the species is influenced by various physical and chemical, climatic factors, resulting in the production of new species, the new species which are unable to adjust with the new environment gradually become extinct.

"Biodiversity is defined as the variety and variability among all groups of living organisms and the ecosystem in which they live".

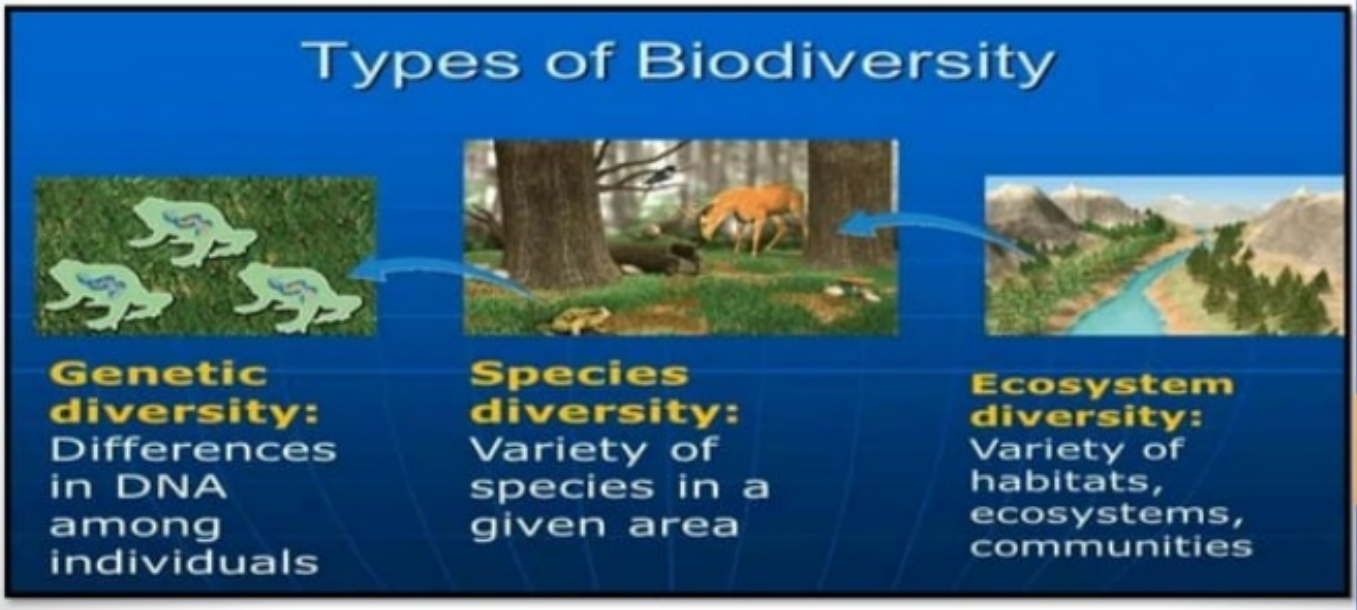
Biodiversity in Nature

Significance Of Biodiversity

- Biodiversity protects the fresh air, clean water and productive land.
- It is also important for forestry, fisheries and agriculture which depend on rich water variety of various biological resources available in nature.
- Loss of biodiversity has series economic and social costs for any country.
- It is very important for human life, we depend on plants, microorganisms, earth's animals for our food, medicine and industrial products.

Biodiversity is usually considered as 3 different levels

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



- **Genetic diversity:-** Within individual species there are number of varieties which are slightly different from one another. These differences are due to difference in the combination of genes.

Genes are the basic unit of hereditary information, transmitted from one generation to the other.

- **Species diversity:-** A discrete group of organisms of the same kinds is known as species. 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 of diversity.
- **Ecosystem diversity:-** It is set of biotic components [plants, animals and micro organisms inter acting with one another and with one a biotic components like soil, air, water etc.,]

Values Of Biodiversity

- The value of biodiversity provides a variety of environmental services from its species and ecosystem that are essential at the global, regional and locally maintaining the water cycle and protecting soil are some of important services.
- Biodiversity is also essential for preserving ecological processes, such as fixing and recycling of nutrients, soil formation, maintaining the water balance with in ecosystem.
- Food, clothes, housing, energy, medicines are all resources that are directly (or) indirectly linked to the biological variety present in the biosphere. An agricultural community, biodiversity is used to grow their crops to suit the environment.

1- Environmental Value: The environmental value of biodiversity can be found by examining each ecosystem process and identifying the ecosystem services that result. For instance, in wetlands the vegetation captures water- carried sediment and the soil organisms break down a range of nutrients and pollutants washed into the area.

2- Social Value: The social value of biodiversity includes aesthetic, recreational, cultural and spiritual values. To this can be added health benefits resulting from recreational and other activities. While traditional societies which had a small population and required less resources had preserved their biodiversity as a life supporting resource, modern man has rapidly depleted it even to the extent of leading to the irrecoverable loss due to extinction of several species.

3- Ecosystem Services: These services also support human needs and activities such as intensely managed production ecosystems.

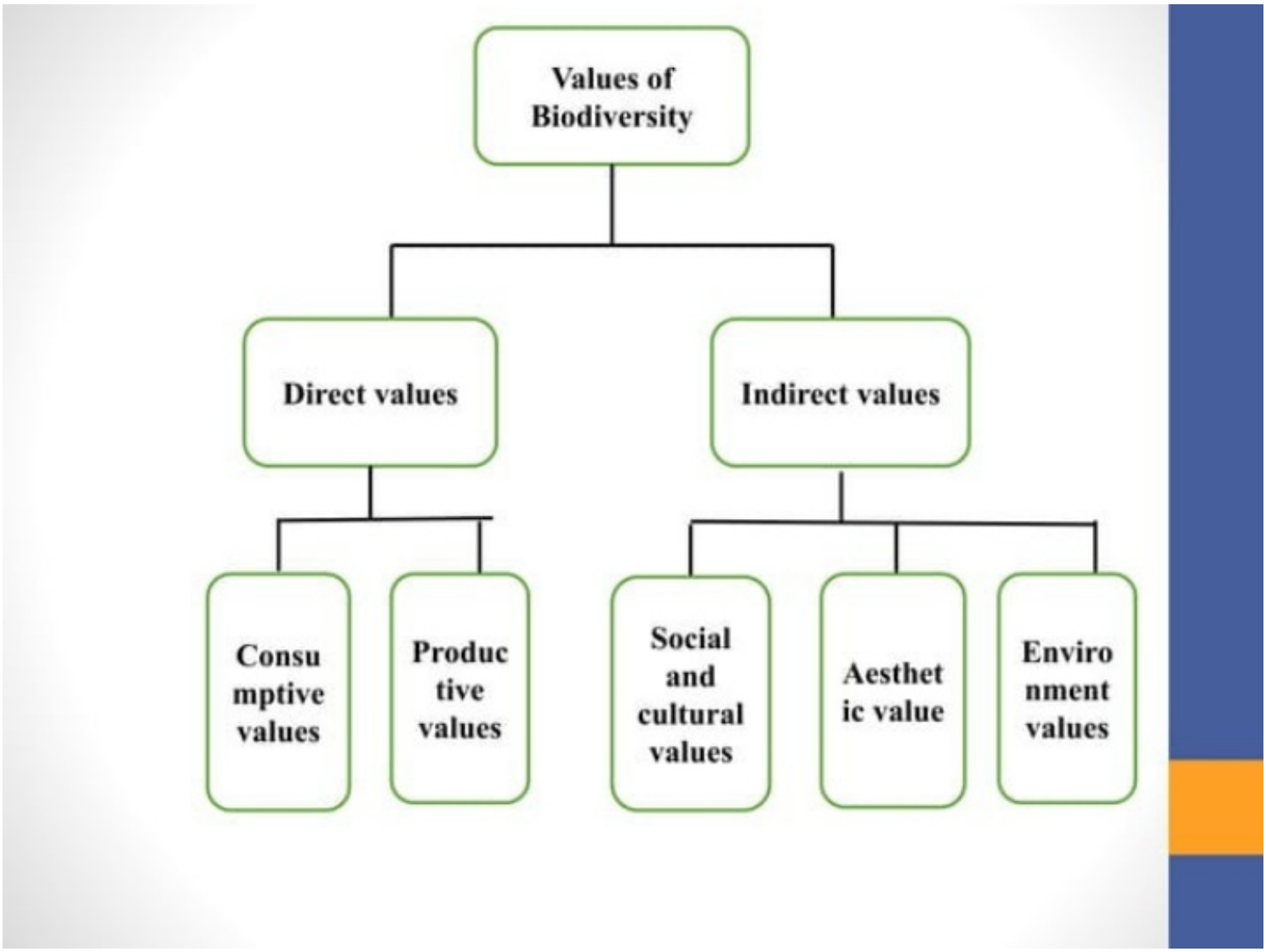
4- Economic Value: The economic potential of biodiversity is immense in terms of food, fodder, medicinal, ethical and social values. Biodiversity forms the major resource for different industries, which govern the world economy.

5- Consumptive use value: This is related to natural products that are used directly for food, fodder, timber, fuel wood etc. Humans use at least 40,000 species of plants and animals on a daily basis. Many people around the world still depend on wild species for most of their needs like food, shelter and clothing. The tribal people are completely dependent on the forests for their daily needs.

6- Productive Use Value: This is assigned to products that are commercially harvested and marketed. Almost all the present date agricultural crops have originated from wild varieties. The biotechnologists continuously use the wild species of plants for developing new, better yielding and disease resistant varieties. Biodiversity represents the original stock from which new varieties are being developed.

7- Ethical and Moral Value: It is based on the principle of 'live and let others live'. Ethical values related to biodiversity conservation are based on the importance of protecting all forms of life. All forms of life have the right to exist on earth. Man is only a small part of the Earth's great family of species.

8- Aesthetic Value: The beauty of our planet is because of biodiversity, which otherwise would have resembled other barren planets dotted around the universe. Biological diversity adds to the quality of life and provides some of the most beautiful aspects of our existence. Biodiversity is responsible for the beauty of a landscape.


Values of Biodiversity
Direct values
Indirect values
Consu mptive values
Produc tive values
Social and cultural values
Aesthet ic value
Enviro nment values

Biological Diversity to National level

- Every country is characterized by its own biodiversity depending mainly on its climate.
- India has a rich biological diversity of flora and fauna overall 6% of the global are found in India.
- India ranks 10th among the plant rich countries of the world, 11th in term of number of endemic species of high vertebrates and 6th among the centers of diversity and origin of agricultural crops.

India as a Mega diversity nation

- India has a rich and varied heritage of biodiversity, encompassing a wide spectrum of habitats from tropical rain forests to alpine vegetation and from temperature to coastal wetlands.
- India is one of the 12 mega diversity countries in the world. Government of India 2000 records 47000 species of plants and 81000 species of animals which is about 7% and 6.5% respectively of global flora and fauna.
- **Centre of origin:-** A large number of species are known to have originated in India. India has been the Centre of origin of 166 species of crop plants and 320 species of wild species of wild relative of cultivated crops. Nearly 5000 species of flowering plants had their origin in India.

MARINE BIODIVERSITY

- Along 7500km long coastline of our country in mangroves, estuaries, coral reefs, back water etc., there exist a rich biodiversity.
- The marine diversity is rich in moleskin, crustaceans [crabs], polychquetus and corals several species of mangroves plants and sea grasses[marine algae] are also found in our country.
- India's forest cover of 64.01 million hectares having a rich biodiversity of plants in the trans-Himalayan, north-west, central and eastern Himalayan forest, coasts, deserts, Gang tic plain, Nicobar and Lakshadweep island.

HOT SPOTS OF BIODIVERSITY

- Areas which exhibit high species richness as well as high species endemism are termed as "**hot spots of bio diversity**". The term was introduced by **MYERS.**
- **Characteristic features of hot spots:-**

a. They are of global importance and are the hosts of priceless gift of nature.

b. Very rich in biodiversity, genetic diversity, species diversity (or) combination of all.

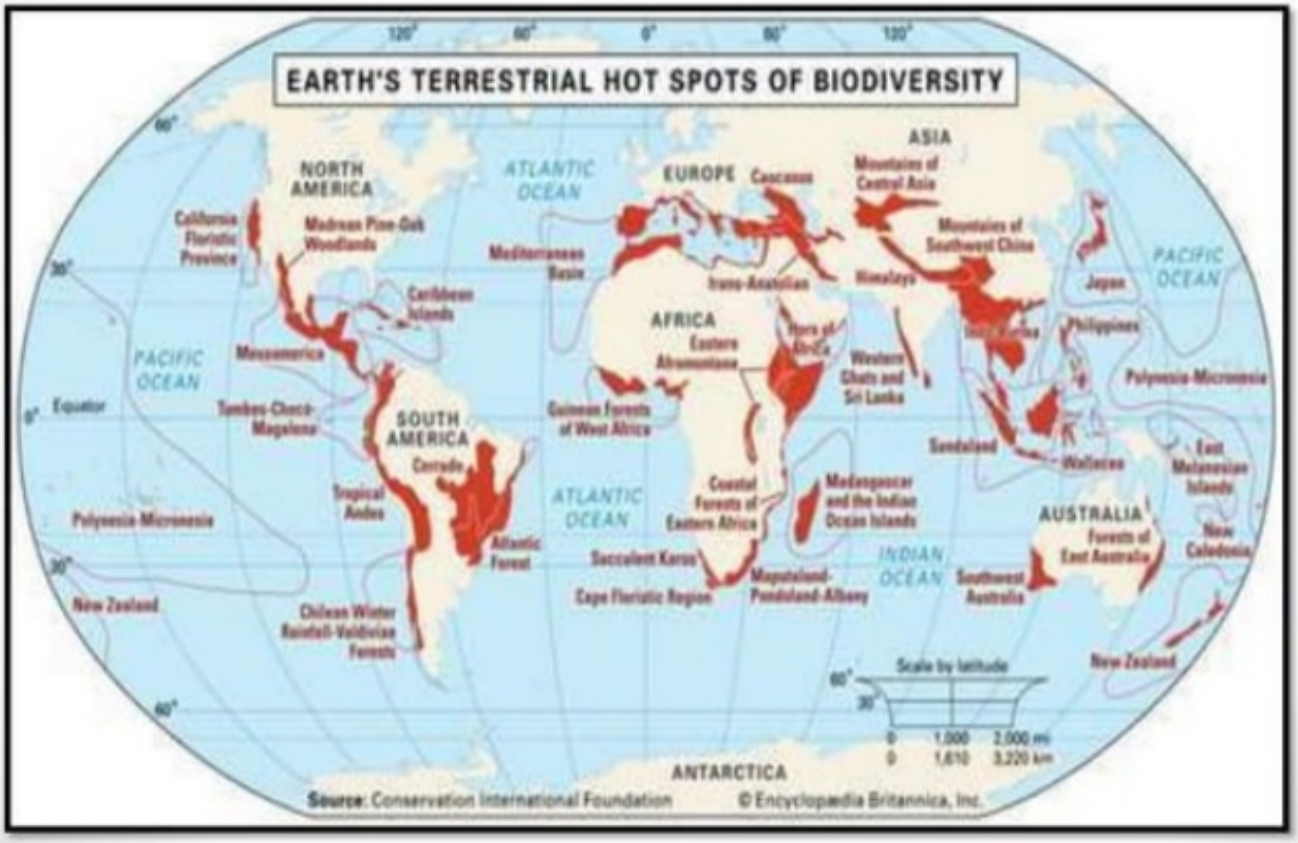
c. Being the habitats of endemic and endangered species. They are having a high level of endemic and are under threat of habitual destruction that again leads to extinction of species.

- They are 25 such hot spots of biodiversity on a global level out of which two are present in India, namely the eastern Himalayas and Western Ghats.
- **HOT SPOTS:-**

1) Tropical Andes
2) Mesoamerican forest
3) Caribbean
4) Brazil's Antarctic forests
5) Ensco Darien of panama
6) Western Ecuador
7) Brazil's corrode
8) Central Chile
9) California floristic province
10) Madagascar
11) Eastern arc and coastal
12) Western African forest

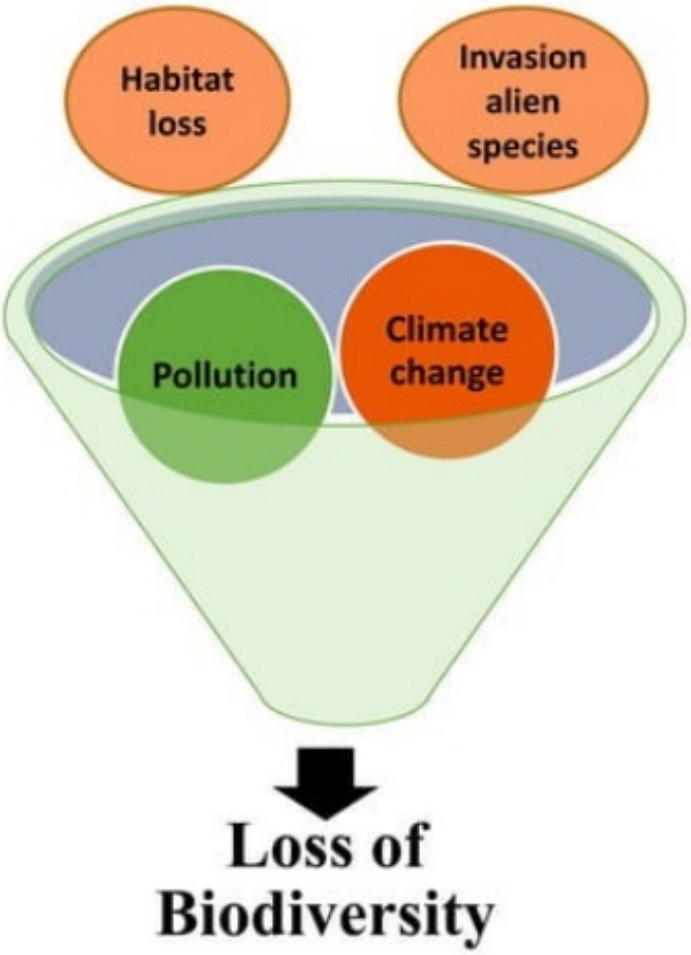
13) Cape holistic province
14) Succulent kaloc
15) Mediterranean basin
16) Caucused
17) Sunderland
18) Wallace
19) Philippians
20) Indo Burma eastern Himalayas
21) South central china
22) South Western Australia
23) Western Ghats Sri Lanka
24) New Zealand
25) New Caledonia

HOT SPOTS OF BIODIVERSITY



Loss of Biodiversity

- Today's threats to species and ecosystems are the greatest recorded in recent history and virtually all of them are caused by human mismanagement of biological resources often stimulated by misguided economic policies and faulty institutions.
- **Habitat alteration / destruction**
- **Overharvesting / over-exploitation of biological resources**
- **Pollution**
- **Introduced species / biological invasions**
- **Climatic changes**
- **Population**
- **Institutional / policy failure**

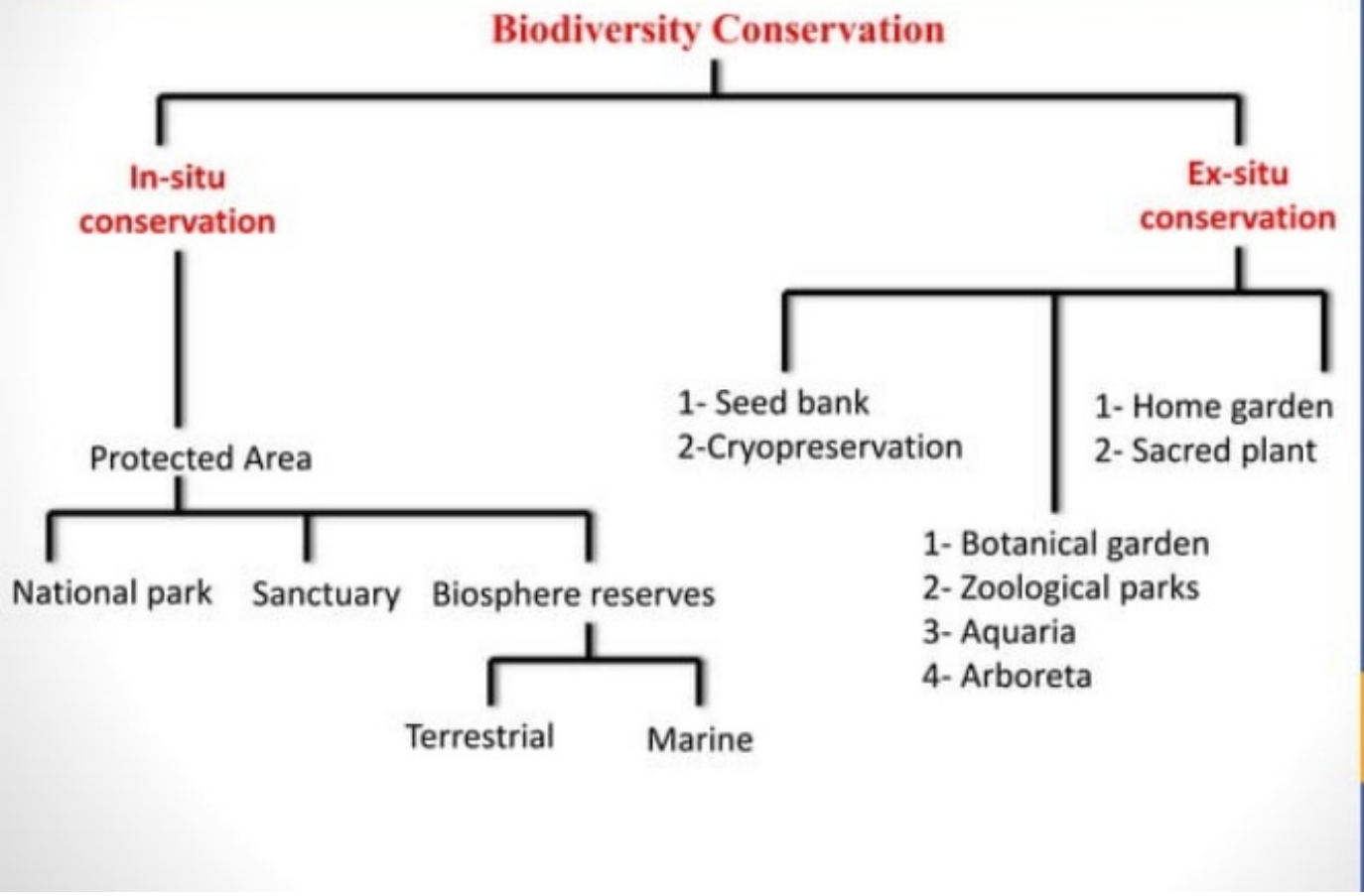

Habitat loss
Invasion alien species
Pollution
Climate change
Loss of Biodiversity

CONSERVATION OF BIODIVERSITY

Conservation refers to management of human activities in the environment. So, that it does not lead to habitual destruction and loss of biodiversity.

- To preserve and protect the species of their habitat.
- To maintain essential ecological process. So that there is no ecological imbalance created.
- To use the species and ecosystem sustainably without exploiting them.
- The creation of natural parks, sanctuaries biosphere reverses etc., to preserve flora and fauna.
- Conservation of genetic biodiversity by establishing zoo's botanical gardens, nurseries etc.,
- Proper planning of land use and other natural resources affecting the biodiversity.
- By prohibiting of hunting, poaching of animals, fishing etc., beyond the productive capacity of ecosystem.
- By regulation through acts, laws, legislative controls such as India forests act, endangered species act etc.

There are two approaches of Biodiversity Conservation



Conservation measures of biodiversity

1- **Ex-situ conservation:**

- Refers to conservation of components of biodiversity outside their natural habitats, e.g. zoos, museums, gene banks, botanic gardens/arboretums;
- Used for threatened and endangered species to avoid their extinction; also known as captive conservation.

2- **In-situ conservation:**

- Refers to conservation of ecosystems and natural habitats including maintenance and recovery of viable populations of species in their natural habitats.

Strategies

In-situ conservation:

NATIONAL PARKS-

- It is an area abdicated for the conservation of wild life along with its environment.
- It is also meant for enjoyment through tourism but without impairing the environment.
- Each national park usually aims at conservation specifically of some particular species of wildlife along with others.
- Overgrazing of domestic animals all private rights and forestry activities are prohibited with in national parks.

NATIONAL PARK	STATE	IMPORTANT WILD LIFE
Kaziranga	Assam	One horned rhino
Sandspur	Karnataka	Elephant
Gar national park	Gujarat	Indian lion
Primer	Kerala	Elephant, tigers
Saransk	Kagastharn	Tigers
Dudwa	Uttar Pradesh	Tigers

Wild life sanctuaries-

This also protected areas where killing, hunting, and sharing (or) capturing of wild life is prohibited except under the control of highest authority. Some important wild life sanctuaries of India


Wildlife Sanctuaries in India
Desu
Chhumanai
Dachigan
Saichu Tun Nai
Gamgul&Syla
Kugti
Shikari Devi
Govind
Abohar
Kedarnath
Nanda Devi
PAKISTAN
CHINA (TIBET)
NEPAL
BHUTAN
Gorumara
Jaldapara
Buxa
Sonai Rupa
Pabha
Garampani
Kazaranga
Laokhoa
Mahanadi
Bankatwa
Wild Ass Scantuary
Kumbhalgarh
Darah
Ramsagar
Mt Abu
Gandhi Sagar
Swarngiri
Gaunar
Rajgir
Nal Sarovar
Bhimbandh
Bori
Pachmarhi
Satmakhali
Halliday Islands
Lothian Islands
MYANMAR
Purna
Melghat
Nawegaon
Badrama
Ushakothi
Bhitar Kanika
Sitanadi
Kopilas
BANGLADESH
Satkosia Gorge
Kawai
Pocharam
Konark
Etuarnagaram
Pakhol
Papikondalu
BAY OF BENGAL
Hyderabad
Radhanagari
Satkosia
Tungabhadra
ARABIAN SEA
Srisailam
Kolleuru Lake
Cotigao
Ranibennur
Sharavathi
Pulicat
Melkote
Mukambika
LAKSHADWEEP
Wayanad
Madhumalai
Kalkad
Periyar
Apamalai
Neyyar
Wildlife Sanctuaries
Map not to Scale
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Biosphere Reserves-

- It is a special category of protected areas where human population also forms a part of the system. They are large protected area of usually more than 5000 sq.km. A biosphere reserves has 3 parts- **core, buffer and transition zone**.

1- Core zone is the inner zone; this is undisturbed and legally protected area.

2- Buffer zone lies between the core and transition zone. Some research and educational activities are permitted here.

3- Transition zone is the outermost part of biosphere reserves. Here cropping, forestry, recreation, fishery and other activities are allowed.

Ex-situ conservation:

1- Seed gene bank:

- These are cold storages where seeds are kept under controlled temperature and humidity for storage and this is easiest way to store the germ plasma of plants at low temperature. Seeds preserved under controlled conditions (minus temperature) remain viable for long durations of time.

2- Gene bank:

- Genetic variability also is preserved by gene bank under normal growing conditions. These are cold storages where germ plam are kept under controlled temperature and humidity for storage; this is an important way of preserving the genetic resources.

3- Cryopreservation:

- This is the newest application of technology for preservation of biotic parts. This type of conservation is done at very low temperature (196°C) in liquid nitrogen. The metabolic activities of the organisms are suspended under low temperature, which are later used for research purposes.

4- Long term captive breeding:

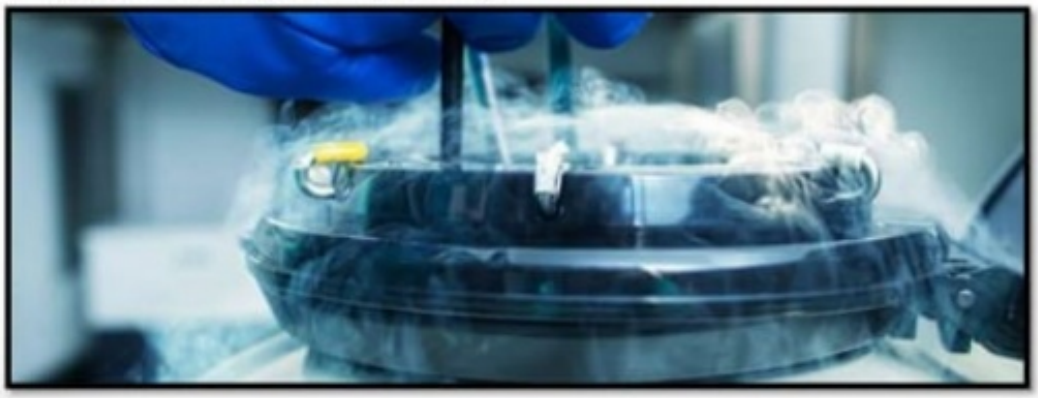
- The method involves capture, maintenance and captive breeding on long term basis of individuals of the endangered species which have lost their habitat permanently or certain highly unfavorable conditions are present in their habitat.

5- Botanical gardens:

- A botanical garden is a place where flowers, fruits and vegetables are grown. The botanical gardens provide beauty and calm environment. Most of them have started keeping exotic plants for educational and research purposes.

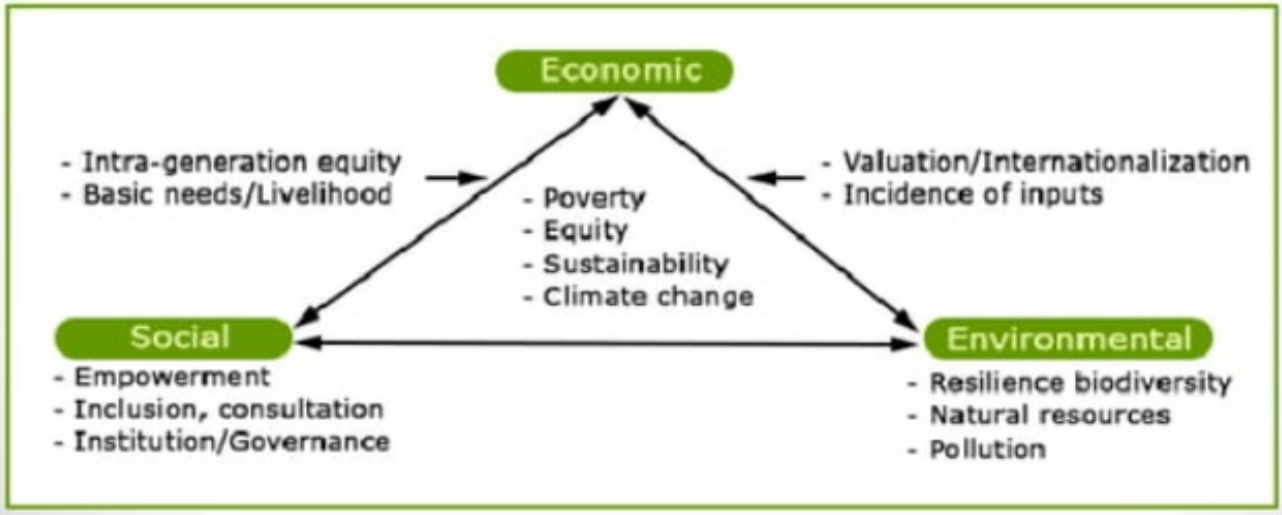
6- Zoological Gardens:

- In zoos wild animals are maintained in captivity and conservation of wild animals (rare, endangered species).



Sustainable development

- This refers to development that meets the needs of the current generation without compromising the ability of future generations to meet their needs; it simply refers to intra and intergenerational equity. A balance between the environment, development and society results to sustainable development which ensures **biodiversity conservation**. This is only possible in the presence of good enforced and implemented policies/ conventions, environmental institutions




THANK YOU !