Threats to Biodiversity

The diversity in India i.e .forests, grass lands, wetlands, mountains, deserts and marine ecosystems face many pressures. One of the major causes for the loss of biological diversity in India has been the depletion of vegetative cover in order to expand agriculture. Since most of the biodiversity rich forests also contain the maximum mineral wealth and also the best sites for water impoundment, mining and development projects in such areas have often led to destruction of habitats. Poaching and illegal trade of wildlife products too have adversely affected biological diversity.

Causal factors of threat

Causal factors of threat may be natural or man made. They are

1. **Development pressure**
    - Construction
    - Forest based industries
    - Hydel/ Irrigation projects
    - Mining
    - Oil drilling
    - Pollution
    - Resource extraction
    - Road & Transport
2. **Encroachment**
    a. Agriculture
    b. Expansion of forest villages

c. Fishery
d. Grazing / increased domestic animals
e. Habitat depletion / change
f. New settlements
g. Shifting cultivation

3. **Exploitation**
   a. Collection made by scientific/educational institutions
   b. Exploitation by local authorities as revenue resources
   c. Firewood collection
   d. Food gathering and hunting
   e. Poaching
4. **Human induced disasters**
   a. Floods
   b. Major oil spills/leakage
   c. Epidemics
   d. Forest fires
5. **Management of Natural resources**
   a. Genetic uniformity
   b. Inadequate water/ food for wildlife
   c. Increased competition
   d. Introduction of exotic species
   e. Predation
6. **Management of Human Resource**
   a. Change in people's lifestyle
   b. Increasing demands
   c. Dilution of traditional values
   d. Human harassment
   e. Inadequate trained human resources
   f. Lack of effective management
   g. In appropriate land use
7. **Political and policy issues**
   a. Change in use / legal status
   b. Civil unrest
   c. Intercommunity conflict
   d. Military activities

Categories of threat

The following categories of threat have been recognized by IUCN (International Union for Conservation of Nature and Natural Resources)

1. Endangered

The taxa in danger of extinction and whose survival is unlikely, the causal factors continue operation. The taxa whose number have been reduced to a critical level or whose habitats have been so drastically reduced that they are seemed to be in immediate danger of extinction (eg) *Nepenthes sp.*, *Vanda*, *Cycas beddomii*.

2. Vulnerable

Taxa likely to move into endangered category in near future, if the causal factors continue operating included taxa of which most or all the population are decreasing because of over exploitation, extensive destruction of habitats or other environmental disturbances. Eg. *Dioscoria deltoidea*

3. Rare

Taxa with small world population that are not at present endangered or vulnerable but are at risk. These taxa are usually localized within restricted geographical areas or habitat or are thinly scattered over more extensive range (eg) *Rauvolfia serpentina*

4. Threatened

The term threatened is used in the conservation for species which fall in one of the above three categories

Endangered plant and animal species

- 427 – endangered plant species (BSI) in **Red Data Book**
- Contributes to about 20% of India's floristic wealth of higher plants

Endangered plants

- *Acer laevigatum*
- *Phoenix rupicola*
- *Lactuca cooperi*
- *Carum villosum*
- *Amorphophalius bulbifeer*
- *Dioscorea laurifolia*

Endangered animals

Andaman wild pig, Bison, Black buck, Blue whale, Cheetah, crab eating macaque, two horned antelope, giant squirrels, Hyaena, Lion tailed Macaque, musk deer, Nilgiri tahr, Sambar, rhinoceros, Siberian White crane

Conservation of Biodiversity

The very existence of human being is threatened due to continuous loss of biodiversity. Tropical rain forests have been the focal point of the debates on biodiversity conservation. In fact, the rain forest covers only 7% of the earth's geographical area but supports more than half of the world's identified

species. Of these, 15 rain forests have been identified as hot spots. Tropical deforestation will be the single greatest cause of species extinction in the next century.

Strategies of Conservation

Future strategy for Conservation has 4 goals

1. Maintenance of adequate resources
2. Conservation of resources through reduction in demand and achievement of greater end use
3. Maximum use of renewable resources
4. Reduction in dependency of non-renewable resources

***In situ* strategy**

This strategy emphasizes on the conservation work at original site of biodiversity i.e. in wild. Conservation of overall diversity of genes, populations, species, communities and the ecological processes comes under this strategy. There are 37,000 protected area in the world (World Conservation Monitoring Centre , WCMC). India has 17 biosphere reserves, and 19 Ramsar wetlands. Amongst the protected areas, India has 102 national parks and 490 sanctuaries covering an area of 1.53 lakh sq. km.

***Ex situ* Strategy**

This strategy says that conservation work should be done outside the natural habitat in form of botanical and zoological gardens, conservation stand, seed and seedling banks, pollen banks, germ plasm banks, tissue culture banks, gene and DNA banks etc. In India, conservation of genetic diversity of cultivated plants and their wild relatives is done by NBPGR (National Bureau of Plant Genetic Resources).

Reduction of Anthropogenic Pressure

Increasing population and it's demands pose remarkable threat to taxa important to human being. About 70% of identified medicinal plants of Indian Himalaya are exposed to destructive harvesting. Cultivation of such plants elsewhere would contribute to their conservation.

Restoration of endangered species

It is tough and difficult strategy. It requires specific knowledge about species and its surrounding. This strategy includes diagnosis of factors responsible for the decline of species, habitat conservation, captive breeding and restriction of harvesting etc. the strategy include:

- Reintroduction programmes in the original site of living
- Augmentation programmes to increase the existing population size and genetic diversity of a species
- Introduction programmes for a new area.

Endemic species

Endemic species are the plants, which are limited in their distribution i.e. they are restricted to a small area and are not found elsewhere in the world. Endemism of Indian biodiversity is significant. About 4,900 species of flowering plants and 33% of the recorded floras are endemic to the country. These are distributed over 141 genera belonging to 47 families. These are concentrated in the floristically rich areas of North East India, the western Ghats, North West Himalayas and the Andaman and Nicobar Islands. The Western Ghats and the Himalayas have two of the 18 hot spots identified in the world. It is estimated that 62% of the known amphibian species are endemic to India of which a majority occur in Western Ghats. Endemism may be due to:

- Poor adaptability of a species in a wide range of ecology
- Presence of some geographical barrier
- Failure of dispersal of reproductive organs
- The species might have comparatively been young and not have time to spread.

Biosphere Reserves

Biosphere reserve programme was launched by UNESCO in 1971 under its MAB (Man and Biosphere Programme). Biospheres are sites where protection is granted not only to the flora and fauna of the protected region, but also to the human communities who inhabit these regions, and their ways of life. Biosphere reserves are sites established by countries and recognized under UNESCO's Man and the Biosphere (MAB) Program to promote sustainable development based on local community efforts and sound science. Currently there are 580 sites across 114 countries. The Indian government has established 17 **Biosphere Reserves of India.** Seven of the seventeen biosphere reserves are a part of the World Network of Biosphere Reserves, based on the UNESCO Man and the Biosphere (MAB) Program list.

Biosphere reserves of India

S.No	Name of Biosphere Reserve	Location
1	Great Rann of Kutch	Gujarat
2	Nokrek	Meghalaya
3	Manas	Assam
4	Gulf of Mannar	Tamil Nadu
5	Sundarban	West Bengal
6	Nandadevi	Uttrakhand
7	Nilgiri	Tamil Nadu, Kerala and Karnataka
8	Dehang Debang	Assam
9	Panchmani	Madhya Pradesh
10	Amarkantak	Madhya Pradesh and Chattisgarh

11	Kanchenjunga	Sikkim
12	Agasthyamalai Biosphere Reserve	Kerala and Tamil Nadu
13	Great Nicobar Biosphere Reserve	Andaman and Nicobar
14	Dibru-Saikhowa	Assam
15	Cold Desert	Himachal Pradesh
16	Seshachalam Hills	Andhra Pradesh
17	Simplipal	Orissa

Important National parks and wild life sanctuaries in India

- Andra Pradash – Pakhal, Povharam, kawal, kollaeru, pelicanary wild life sanctuary
- Arunachal Pradesh – Namidapha Wild life sanctuaries
- Assam – Kaziranga National Park, Manas Wild life sanctuaries
- Bihar – Hazaribagh National park
- Gujarat – Gir National Park
- Karnataka – Bandipur National park, Silent Valley National park
- Kerala – Periyar Wild life sanctuarie, Wyanad Wild life sanctuarie
- Orissa – Chilka Lake Bird sanctuary
- Tamil Nadu – Mudumalai Wild life sanctuarie, Vedanthangal Bird Sanctuary
- Uttar Pradah – Corbett National park
- West Bengal – Jaldapara Wild life sanctuarie

Some of the policies, which can be taken into account for biodiversity conservation, are:

- Identifying and monitoring the important components of biological diversity that needs to be conserved and used sustainably.
- Establishing protected areas to conserve biological diversity while promoting environmentally sound development around these areas.
- Respecting, preserving and maintaining traditional knowledge of the sustainable use of biological diversity with the involvement of indigenous peoples and local communities.
- Educating people and raising awareness about the importance of biological diversity and the need to conserve it
- Promoting public participation, particularly when it comes to assessing the environmental impacts of development projects that threaten biological diversity and protecting the biodiversity hot spots from alien species.

Biodiversity conservation is an important step towards a successful disaster management and if policies are implemented to protect it, then we can get one step closer in making a Disaster Free World.

Lecture 6. Bio-diversity: Definition, classification, threats to biodiversity and its conservation.

1.	The levels of biological organization include	
	a) Genetic diversity	b) Species diversity
	c) Ecosystem diversity	**d) All the above**
2.	The location of Salim Ali College of Ecology	
	a) New Delhi	b) Kolkotta
	c)Mumbai	d) Pondicherry.
3.	Which of the following is not an estimate of species diversity?	
	a) Abundance	b) Turn over
	c) Chromosome banding	**d) Richness**
4.	Variation of genes within the species is	
	a)Species diversity	b)ecological diversity
	c)Genetic diversity	d)Population diversity
5.	The species richness and evenness is ----------	
	a) ά Diversity	b)β- diversity
	c) Ɣ-Diversity	d) all the above
6.	India has ----------	
	a) 10 recognised endemic centre	**b) 26 recognised endemic centre**
	c) 12 recognised endemic centre	d) 40 recognised endemic centre
7.	The richest, rarest and most distinctive natural areas in the earth"s biodiversity is ----------	
	a) universe 200	**b) global 200**
	c) planet 200	d) Biome 200
8.	The world's heritage sites located in West Bengal is	
	a) Kazirangal National part	b) Manos Wildlife sanctuary
	c) Sunderban National park	d) Sunderban Mangrooves
9.	In India conservation of genetic diversity of cultivated plant and their wild relative is done by	
	a) WCMC	**b)NBPGR**
	c) IUCW	d)WCED
10	Plant species which are restricted to a small area and are not found elsewhere in the world is	
	a) Ecotone	b) Biome
	c) Endemism	d) Microcosm
11	Vanda is a ------	
	a) Rare species	**b) Endangered species**
	c) Extinct species	d) Threatened species
12	An undisturbed natural areas for scientific study as well as conditions of disturbance are under perfect control of	
	a) Wild life sanctuary	**b) Biosphere reserve**
	c) National park	d) Botanical garden
13.	Carbett National park is at	
	a) Uttar Pradesh	b) Tamil Nadu
	c) West Bengal	d) Gujarat
13.	Kaziranga national park and Manas wild life Sanctuaries are at	
	a) Assam	b) Bihar
	c) Uttar Pradesh	d) West Bengal

14.	Zoological Gardens are----------method of conserving the resources	
	a)Exsitu	b) insitu
	c) Traditional	d) all the above
15.	A net work of different species present in a local ecosystem and interact between them is called	
	a)Ecological Diversity	b) Ecotone
	c) ecosystem	d) None of the above
16.	Endemism is due to	
	a)Poor adoptability	b)Geographical barrier
	c)Failure of reproductive organs	**d)All the above**
17.	A species deliberately introduced into an environment that does not historically belongs to its range is known as	
	a)Endemic	**b) Exotic**
	c)Wild species	d)none of the above
18.	Biodiversity is rich in	
	a)Temperate forest,	b)Grasslands,
	c)Tropical forest.	d)dessert
19.	Species in danger of extinction whose survival is unlikely	
	a)Extinct	**b)Endangered**
	c)Rare	d)Threatened
20.	Nilgiri biosphere reserves covers	
	a)Tamil Nadu and Kerala	b)Tamil Nadu and Andhra Pradesh
	c)Karnataka and Tamil Nadu	**d) Kerala, Karnataka and Tamil Nadu**
21.	The animal which is fast becoming an endangered species in India	
	a) Lion	b) Tiger
	c) Wolf	d) Deer
22.	The first national park established in the World	
	a) Royal National park in Australia	**b). Yellowstone National Park in North America**
	c) Kruger national park	d) June Corbett national park.
23.	The shrub brought from Australia to decorate garden hedges in India that has become a weed	
	a)*Parthenium*	**b). *Lantana***
	c) Elder	d) Bilberry
24.	The project tiger was launched in the year	
	a) 1980	b) 1985
	c) 1973	d) 1970
25.	Expand CITES----------**(Convention on International trade on Endangered Species)**	
26.	The location of Salim Ali Centre for Ornithology is located at----------**(Coimbatore**)	