

BIODIVERSITY LOSS AND ITS CONSERVATION AND MANAGEMENT EFFORTS

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ABSTRACT-The variety and variability among living organisms & ecological complexes in which they occur is called biodiversity. Biodiversity is divided into three levels- genetic, species, and community or ecosystem. It is highest in the tropical region (0°-20° Latitude) of the earth. Habitat destruction, habitat fragmentation, habitat degradation, invasion of exotic/alien species, pollination, over-exploitation of natural resources, co-extinction, infectious disease, hunting & poaching, domestication, jhum cultivation, and many natural disasters are responsible for biodiversity loss. Biodiversity is conserved by In-situ/on-site (hot spots, wildlife sanctuaries, national parks, biosphere reserves, tiger reserves, eco-tourism sites, biodiversity heritage sites, Ramsar sites, and leopard reserves) and Ex-situ/off-site (zoo, botanical garden, cryo-preservation, gene bank, seed bank, semen bank, biological park, and deer/bird/peacock/cow/fish parks) conservational methods. Along with this, several projects like- Project Tiger, Gir-Lion Project and Crocodile Breeding Project etc. have also been run by the government to conserve the particular species. Living organisms are listed in different conservation categories (Not Evaluated, Data Deficient, Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, Extinct in the wild, and Extinct) that are made by IUCN. To prevent biodiversity loss, we all need to make efforts to conserve it.

Keywords-biodiversity, biodiversity loss, conservation, IUCN

I. INTRODUCTION

Variety and variability among living organisms and ecological complexes in which they occur is called Biodiversity. Biodiversity is divided into three levels- genetic, species, and community or ecosystem. Variety in nitrogenous base sequences of genetic

material among individuals of a particular species is called genetic diversity, variety in species is called species diversity and variations among communities & ecosystems is called community or ecosystem diversity (Figure: 1).

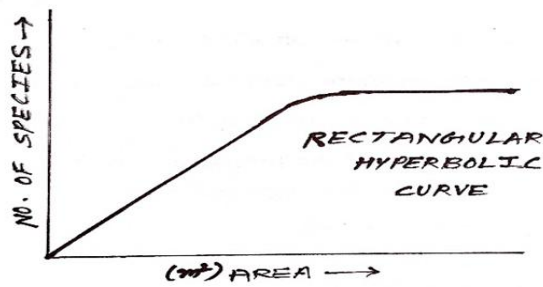


Figure 1. Species-area relationship curve

Biodiversity is rich in the tropical region due to stability of temperature, contamination of pests/parasites/diseases, falling of maximum solar light, high temperature,

and high humidity are factors that increase the productivity of plants so animals are prolonged stable in the region (Figure: 2).

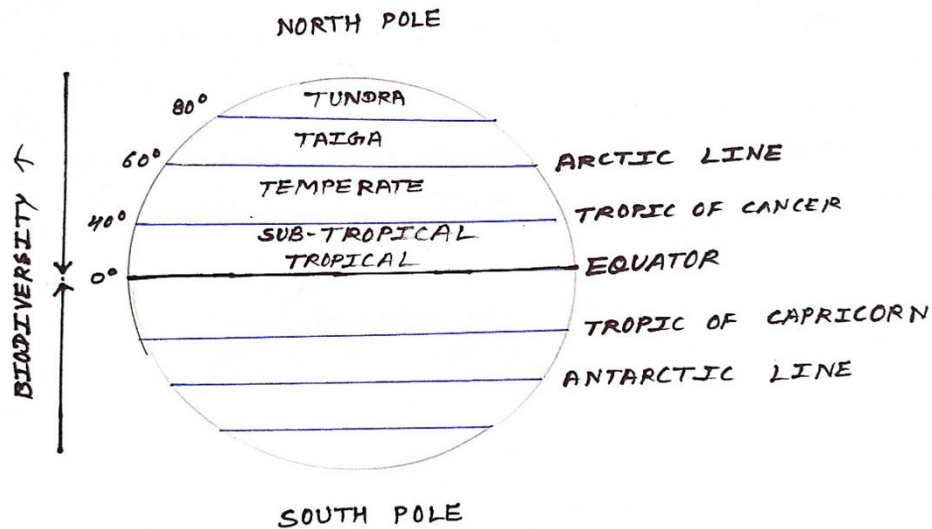


Figure 2. Major biomes of Earth

II. METHODOLOGY

For the study of avifauna, the direct observation method was applied. Regular visits were made in the

morning hours (6 to 8 am) and evening hours (4 to 8 pm).

III. RESULTS AND DISCUSSION

(1) NATURAL CAUSES OF BIODIVERSITY LOSS-Disturbance of animals by natural disasters (Earthquakes, floods, tsunamis,

wildfires, drought, landslides, volcanic eruptions, cyclones, avalanches).

(2) MAN-MADE CAUSES OF BIODIVERSITY LOSS-

1. HABITAT DESTRUCTION:Ex. Cutting of forests (Figure: 3)



Figure 3. Local news regarding habitat destruction

2. HABITAT FRAGMENTATION:
Fragmentation of habitat via Electric

power lines, Railway lines, and Water canals (Figure: 4).



Figure 4. Local news regarding habitat fragmentation

3. HABITAT DEGRADATION: Ex. Forest fire

3. Extinction of cichlid fishes in Victoria Lake due to the invasion of predator Nile perch (*Lates niloticus*)

4. INVASION OF EXOTIC / ALIEN / FOREIGN SPECIES: They are responsible for the extinction of native species.

4. Invasion of predator Catfishes (*Clarias*) in Florida

- Ex. 1. Water Hyacinth (*Eichhornia crassipes*)
- 2. Congress-grass (*Parthenium hystosporium*)

5. POLLUTION:

Biomagnification of heavy metals in animals and vultures (birds) is affected by acid rain (Figure: 5).



Figure 5. News regarding biomagnification

6. OVER-EXPLOITATION:

Population \uparrow α Needs \uparrow α
 Exploitation of Natural resources \uparrow
 α Biodiversity \downarrow

7. CO-EXTINCTION :

Extinction of two or more co-existing species
 Ex. (1) Extinction of parasites (Bird lice *Columbicola*) with their host (Passenger Pigeon)
 (2) Extinction of pollinators with their host plants

8. DISEASES:

Ex. (1) Rinderpest diseases in Rhino/ Cattles
 (2) Lumpy viral diseases in cow

9. HUNTING: Regulated by the government and hunters must obtain

permits authorizing them to kill certain animals.

10. POACHING: For meat, the horns of Rhinos and tusks of Elephants. Poaching is hunting without legal permission from whoever controls the land.

11. DOMESTICATION: Ex. Horse, Buffalos

12. JHUM CULTIVATION/SHIFTING CULTIVATION: Cutting of forests for agriculture in hilly areas (Tripura, Meghalaya, Nagaland, Arunachal Pradesh, etc.).

(3) IUCN CONSERVATION CATEGORIES (IUCN STATUS)- (Figure: 6)

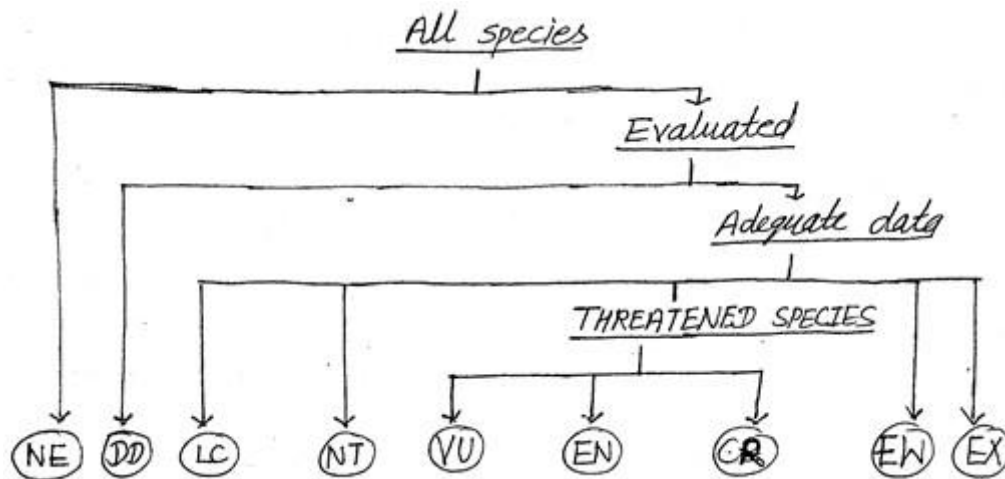


Figure 6. IUCN conservation categories

(4)BIODIVERSITY CONSERVATION:There are two types of biodiversity conservation (Table 1)

Table 1. Comparison of in-situ and ex-situ conservation

IN-SITU CONSERVATION/ ON-SITE PRESERVATION	EX-SITU CONSERVATION/ OFF SITE PRESERVATION
Conservation of animals/plants in their natural habitat	Conservation of animals/plants in man-made protected areas
Ex- HOT-SPOTS WILDLIFE SANCTUARIES NATIONAL PARKS BIOSPHERE RESERVES TIGER RESERVES ECO-TOURISM SITES BIODIVERSITY HERITAGE SITES RAMSAR SITES LEOPARD RESERVES	Ex- ZOO BOTANICAL GARDEN CRYO PRESERVATION GENE BANK SEED BANK SEMEN BANK BIOLOGICAL PARKS DEER/BIRD/PEACOCK/COW/FISH PARKS

HOTSPOT:

- Biodiversity hotspots are places on earth that are both biologically richest (SPECIES RICHNESS) and deeply threatened (HIGH ENDEMISM)(Table 2).
- The idea was first developed by British ecologist “Norman Myers” in 1988.

- The first hotspot was established in 1989.
- 44% plant species
- 35% land vertebrates species
- 0.5% endemic plant species in each hotspotAll hotspots cover 2.4% area of the Earth
- Total number of hotspots in the World- 36

Table 2. Endemic species of Hotspots

IN INDIA (4)	ENDEMIC SPECIES	OUTSIDE INDIA
1. Western Ghat 2. Eastern Himalaya	Lion-tailed macaque, Grey Hornbill, Nilgiri Tahr	1. Atlantic forest 2. Japan

3. Sundaland (Include Nicobar)	Giant flying Squirrel	3. Madagascar
4. Indo-Burma (North-East India except Assam & Andaman)	Pangolin, Orangutans Pygmy Loris, Giant Ibis	4. New Zealand 5. Philippines

Table 3. Comparison of wildlife sanctuary, national park and biosphere reserve

S.R.	WILDLIFE SANCTUARY	NATIONAL PARK	BIOSPHERE RESERVE
1.	NUMBER IN INDIA - 543	103	18
2.	Small sized	Middle-sized	Large sized
3.	Dependent on state government	Dependent on the central government	Dependent on the central government
4.	To conserve a particular species	To conserve a particular species	To conserve the whole ecosystem
5.	Tourism allowed	Tourism allowed	Tourism not allowed
6.	Man-made activities allowed	Limited man-made activities allowed	Man-made activities are not allowed
7.	Scientific research and management: NOT	Scientific research and management: NOT	Scientific research and management: YES
8.	Gene pool conservation: NOT	Gene pool conservation: NOT	Gene pool conservation: YES
9.	A sanctuary can be upgraded to a national park	A national park cannot be downgraded to a sanctuary but upgraded to a biosphere reserve	A biosphere reserve cannot be downgraded to a national park
Ex. 1. Gim Corbett National Park, Uttarakhand (FIRST NATIONAL PARK OF INDIA) 2. Hemis National Park, Jammu-Kashmir (LARGEST NATIONAL PARK OF INDIA) 3. South Button Island National Park, Andaman (SMALLEST NATIONAL PARK OF INDIA)			

BIOSPHERE RESERVE:A large area thatconservea completely large ecosystem (Figure: 7).

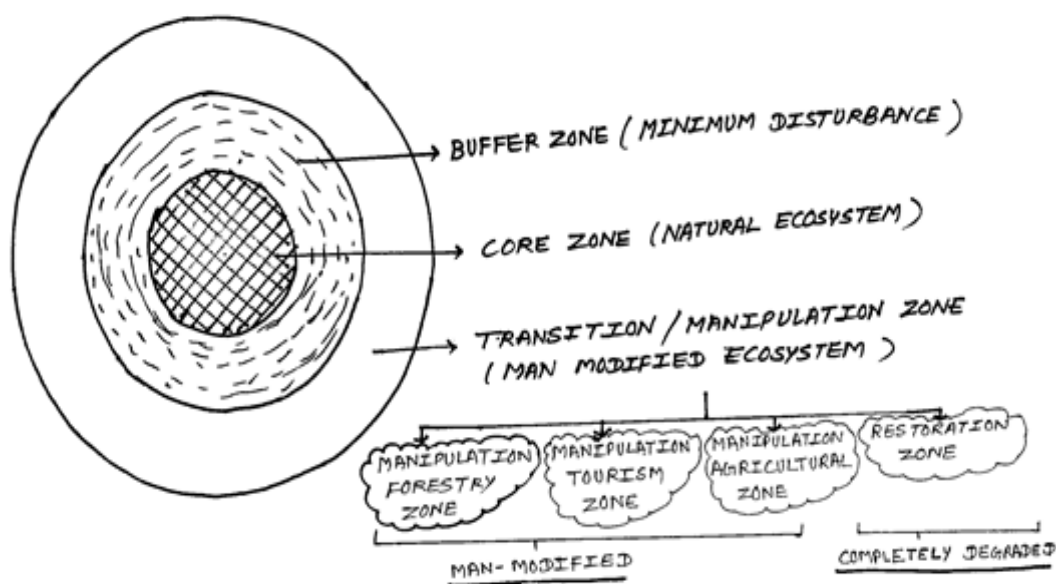


Figure 7. Zones of Biosphere reserve

Table 4. Biosphere reserves in India

S.R.	NAME	ESTABLISHED	LOCATION
1.	Nilgiri B.S.	1986	Karnataka-Kerala-Tamil Nadu
2.	Nandadevi B.S.	1987	Uttarakhand
3.	Nokrek B.S.	1988	Meghalaya
4.	Great Himalayan B.S.	1989	Andaman-Nicobar
5.	Rann of Kutch B.S.	-	Gujarat
6.	Thar desert B.S.	-	Rajasthan
7.	Sundar ban B.S.	-	West-Bengal

RAMSAR SITES:

- Favourable places for birds
 - Total number of Ramsar sites in India :- 75
(75thआजादीकाअमृतमहोत्सव)
 - Highest no. in Tamil Nadu (14)
 - Ex.- In Rajasthan –
- (1) Keoladeo National Park, Bharatpur
(2) Sambhar Lake, Jaipur

1. Jijamata Zoo/ Victoria Garden/Rani Bagh (Mumbai):- Elephants
2. Mysore Zoological Park (Karnataka):- Elephants
3. Nehru Zoological Park (Hyderabad):- Lions
4. Sakerbagh Zoological Park (Gujarat):- Lions
5. Sanjay Gandhi Zoological Park (Patna):- Fishes

ZOO / ZOOLOGICAL PARK / ZOOLOGICAL GARDEN:

Protecting animals by keeping them in cages.Ex.

(5)WILDLIFE PROTECTION ACT (WPA-1972)

- Formation of protected areas

- Limited exploitation of natural resources
- Prevention of hunting & poaching
- Conservation of threatened species
- Conservation of species

(6) WILDLIFE MANAGEMENT EFFORTS:

Table 5. Governmental and non-governmental organizations for wildlife management

S.R.	NAME	HEADQUARTER	ROLE
1.	BIRD AREAS	-	Conservation of birds
2.	ZOOLOGICAL SURVEY OF INDIA (ZSI)	Sibpur (Kolkata)	Prepare a red list of threatened animal species in the country
3.	BOTANICAL SURVEY OF INDIA (BSI)	Sibpur (Kolkata)	Prepare a red list of threatened plant species in the country
4.	WILDLIFE INSTITUTE OF INDIA (WII)	Dehradun (Uttarakhand)	Wildlife conservation
5.	SACON (SALIM ALI FOR ORNITHOLOGY & NATURAL HISTORY)	Koyamutthoor (Tamil Nadu)	Conservation of birds
6.	BOMBAY NATURAL HISTORY SOCIETY (BNHS)	Mumbai (MH)	Wildlife conservation
7.	TRADE RECORD ANALYSIS OF FLORA & FAUNA IN COMMERCE (TRAFFIC)	Cambridge (UK)	Banning the transport of animals
8.	ROYAL SOCIETY FOR PROTECTION OF BIRDS (RSPB)	-	Wildlife conservation
9.	CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FLORA & FAUNA (CITES)	Switzerland	Banning the transport of animals (28000 plants & 28000 animals)
10.	WORLD WIDE FUND OF NATURE (WWF)	Switzerland	Wildlife conservation

(7) SINGLE HABITAT-BASED CONSERVATION PROGRAMMES:

Table 6. Wildlife conservation projects in India

GIR LION PROJECT	PROJECT TIGER	CROCODILE BREEDING PROJECT
1972	1973	1974
Conservation of	Conservation of	Habitat conservation and rearing of

habitat for ASIAN LION (<i>Panthera leo persica</i>)	habitat for TIGER (<i>Panthera tigris</i>)	Fresh-water crocodile (<i>Crocodylus palustris</i>), Salt-water crocodile (<i>Crocodylus porosus</i>), and Gharial (<i>Gavialis gangeticus</i>)
Ex- Gir National Park (Junagarh, Gujarat)	Ex- Tiger Reserves	Ex- (1) National Chambal Sanctuary (Kota, Rajasthan) (2) Krishna Sanctuary (Andhra Pradesh)

OTHER:-

1. BARAHSINGHA PROJECT (1969, By MP Govt) – *Cervus duvaceli*
2. OPERATION RHINO

3. ELEPHANT PROJECT – Asian elephant (*Elephas maximus*)

IV. CONCLUSION AND FUTURE SCOPE

- We should not cut unnecessary trees.
- Electric power lines, railway-lines, water canals, and road-highways pass through such places where there is minimum forest cover.
- Do not allow fire to start in your surrounding area.
- Plantation of different types of plants in pots in your homes and develop a botanical garden at the college level.
- At the college level, we can reduce invasive species by running campaigns in our surrounding areas. Like congress grass eradication campaigns (Figure: 8).

स्वयंसेवकों ने गाजर घास उन्मूलन अभियान शुरू किया

भूपालसागर | राजकीय उच्च माध्यमिक विद्यालय में गाजर घास उन्मूलन अभियान शुरू किया। विद्यालय के कृषि प्राध्यापक डॉ. मदन लाल मेघवाल ने विद्यालय परिसर में गाजर घास के नुकसान बताए। इस दौरान स्थानीय विद्यालय के प्रधानाचार्य चेतना कुमारी सारंगदेवोत, उप प्रधानाचार्य किशन लाल गाडरी, शंकर लाल तेली, सत्यनारायण मीणा प्राध्यापक, गणपत लाल अग्रवाल प्राध्यापक, हुकम सिंह चौहान प्राध्यापक, बाबूलाल गाडरी प्राध्यापक, हीरामणि मोगरा, दिनेश नागर, ममता मीणा आदि ने श्रमदान किया।

Figure 7. Institutional effort regarding biodiversity conservation

- Get vaccination of pets and other animals completed.
- Do not hunt animals.
- Do not cut the trees present on the edge of the field.
- Maintain cleanliness in your surrounding area.
- Do not harm any wildlife.
- Help any injured or helpless animal.
- Explain the importance of biodiversity to people and make them aware of its conservation.

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