conservation programme.

→ Mineral Resources + Impact of mining

Unit IV Biodiversity and Conservation

Biodiversity can be defined as variety and variability among living organisms, ranging from microbes, plants animals to human beings. It could be of three types i) Genetic 2) Species 3) Ecological

Recently Species → 14 lakhs known species
One fish species from Mizoram / in cave water bodies
→ 3 Lakhs are found in fossils / extinct species.

Protozoa → Porifera → Coelentrata → Mollusca
(Eurocytic unicellular) (Hydra) ↓
Annelida
Scorpion
Spiders
Insecta ← Arthropoda (Largest / most diverse group of animals) ← Echinoderm mata ← Nematoda
Insecta ⇄ Arthropoda (Species)

Aquatic → Terrestrial → Aerial → Mammals.

Vertebrates → Fish
→ Amphibians
→ Reptiles → Snakes, Crocodiles
→ Apes, Birds

⇒ Mammals are least diverse because they have most specialised food & habitat

species ⇒ Generalised species & Specialised species

i) Genetic :- A biodiversity due to variation at gentic level for eg → biodiv within same species Eg - Homosapiens.

Eg → Rice plant → 60,000 varieties of rice are found.

ii) Species biod. →

iii) Ecological biod → Biodiversity due to various types of habitats/ecosystem
Eg → aquatic, desert, forest ecosystem.

Acc to Geographical area, classification of biodiversity (α, β, γ)

[Biodiversity within a community is called α biodiversity. Eg → grassland, forest.]

Beta Biodiversity
[Biodiversity of more than two communities
Eg → forest and lake biodiversity]
Gamma Biodiversity

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Biodiversity of whole regions which includes all kinds of communities and ecosystem.

Classification of plants [3 lakhs species of plants]

(Non-flowering) Gymnosperm, Angiosperm (Flowering)

→ Algae → (No proper organ system Loosely organised mass of cells)
→ Bryophytes
→ Teridophytes
→ Gymnosperms
→ Angiosperms.

Most Imp - Imp of biodiversity / value of Biodiversity.

Ecological value
→ for various cycles (hydrological, Population regulation, Nitrogen)

Commercial value / Productive value
for manufacturing of various products food, fodder, dyes, drugs

Moral value / Ethical → We are no one ethical/it is unethical to threaten the existence of other species.

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Aesthetic value → To maintain the beauty of nature and flora and fauna and inspiration for many people.

Social value → To maintain various values, rituals and rights

Optional / Alternate value

Not discovered yet. Before we realise the value of species (not discovered). They will become extinct bifore identification.

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Threats to Biodiversity

i) H I PP CO

→ Habitat destruction, damaged and fragmentation (primary most potential threat)

→ Invasive specis - These species outnumber local species.

→ Population growth of human ÷ major threat to other species.

→ Pollution - all kinds of pollution disrupt biodiversity

→ climate change

→ over-exploitation of resources.

Conservation Methods

In situ (within the habitat protection of species)

- National Parks
- Wildlife Sanctuaries
- Biosphere Reserve
- Sacred groves

Ex-situ (pro. of species outside their habitats especially through artificial means

All insitu are grouped under PAN
→ Protected Area Network

NP → 112
WS → 515
BS → 18
SG → 5000+

National Parks	Wildlife Sanctuary
• National Parks are declared under wild-life Protection Act 1972 by State or Union Govt. by Section 35	• WS are declared (WLPA) 1972 by Sec 18 by State & section 38 by Union
• In NP, anthropogenic activities such as grazing of cattles, collection MFP (Minor forest produce) etc is not allowed	• Such activities are being permitted for forest dewellers or local tribals.
• NP are being created or declared for the protection of all type of flora & fauna	• WS are declared for protection of specific group of animals and plants or even for a single

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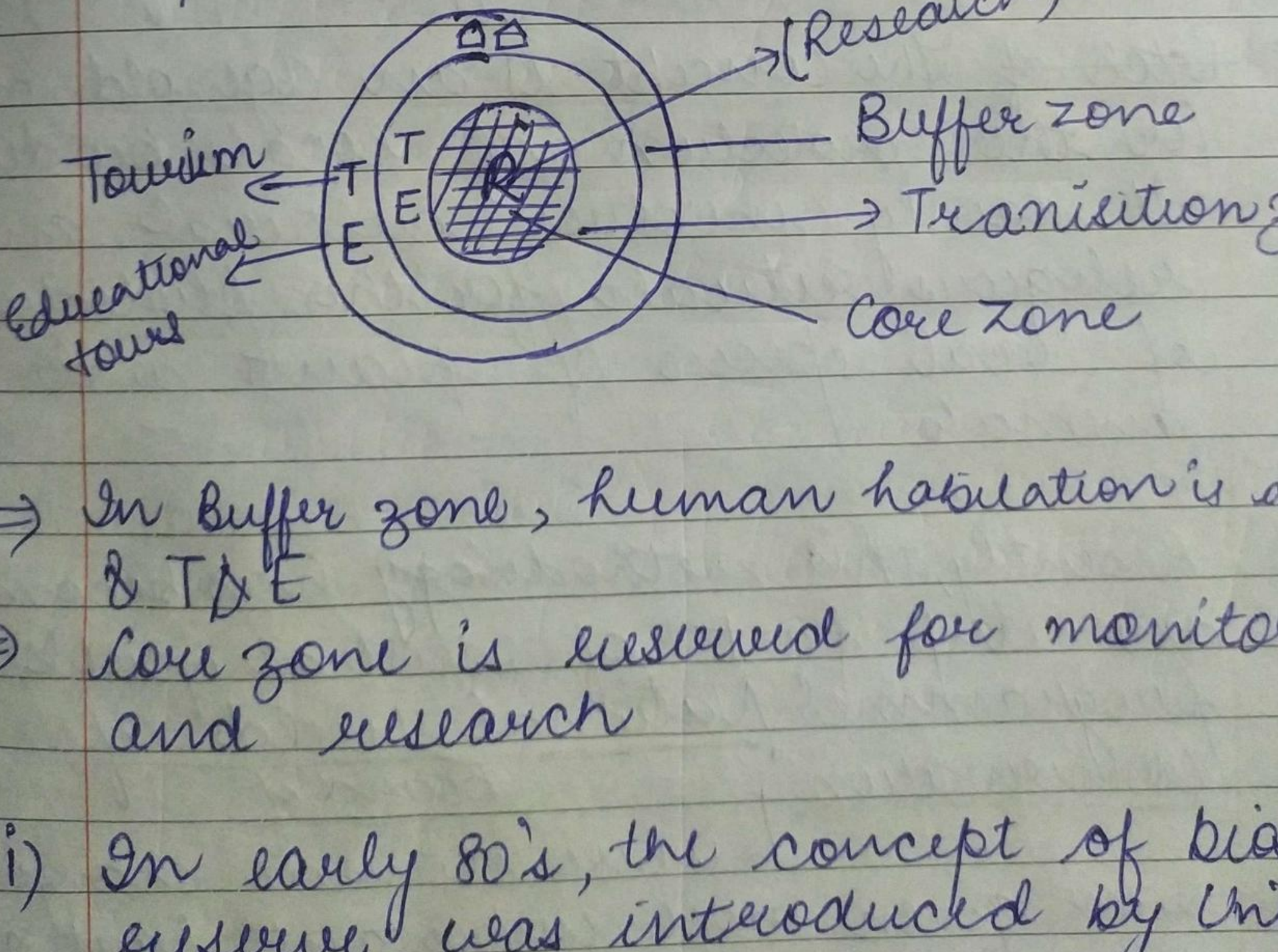
WF → Species or plant or animal

Eg → Kaziranga NP,
Jim Corbett NP

Eg → Danchi Gam
Wildlife Sanctuary
in Kashmir which
has been declared
for protection of
Hangul (Kashmir Stag)
→ Okhla Bird Sanctuary.

⇒ Biosphere Reserves.



⇒ In Buffer zone, human habitation is allowed & T & E

⇒ Core zone is reserved for monitoring and research

i) In early 80's, the concept of biosphere reserve was introduced by United

Nations under a programme called MAB (Man & Biosphere)

Objective → protect and conserve biodiversity along with protection of forest rights of tribal peoples of forest dwellers. (management wrts, IPR wrts)

⇒ Not considered in NP, WS.

Eg → Nokrak in TN, Nilgiri BR, Nanda Devi Bio Reserve.

Sacred Grooves :- (North East States) [more popular in Partic in Meghalaya]

⇒ ~~Patch of~~ The concept is an age old method for the protection of local biodiversity. It mainly involves cultural and religious rituals. for the protection of local species of plants and animals.

⇒ Recently, this methodology has become an imp part of central Govt's programme 'National wild life conservation' [Board of] where climate change has been given most important part of the policy.

Project Tiger

i) It is world's / Indian Govt's most successful conservation project.

(ii) Govt of India launched 'Project Tiger' in 1973 with an objective to protect habitats of tiger including buffer zone and core zone, and in turn, to increase the population of tigers.

(iii) Another objective of Project Tiger was to involve forest dwellers in the management of forest resources mainly in those areas where tiger is a dominating species.

⇒ In 2006, two major events occured in the habitats of tiger

a) Sariska Reserve
b) Panna Reserve.

⇒ In both these tiger reserves, during the ~~tiger~~ census of tiger population no tiger was found.

⇒ In this backdrop, Govt of India constituted NTCA

⇒ (National Tiger Conservation Authori

under the PM of India saved 1400 tigers

Current Tiger Pop. in India = 2967

⇒ Currently, 50 tigers reserve have been declared.

⇒ Recent Ones are — Kamlang (Arunachal), Orang (Assam)

Ex-Situ Conservation :- Methods of Biodiversity

Botanical garden | Zoological Park | Seed Bank | Gene Bank | Germplasm Conservation | Tissue culture

1.) BOTANICAL GARDENS —

— These are artificially maintained plant conservatories - especially of endangered and rare species of plants.

— Globally, there are 1600 Botanical Garden

— In India — 8 Gargens
Largest one — J.C. Bose (Kolkata)

.) ZOOLOGICAL PARK :-

— These parks are similar to Botanical gardens, which include critically endangered and endangered species of animals & mainly mammals, reptiles,

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birds are protected and reared through captive breeding programs.
⇒ In India, we have 159 Zoological park
⇒ These are maintained by Zoological Parks Authority of India
⇒ Largest in Mysore.

3.) Seed Bank — In these, seeds are preserved in liquid N_2 at −196°C.
⇒ All physiological process are at rest
⇒ used to preserve seed for 100 years.
⇒ World's largest Bank → SVALBARD (Norway) where around 2 lakhs species of seeds have been preserved for next 1000 years with an objective to protect & conserve plants bio-diversity in case of any natural crisis such as epidemics, pendemics or extreme weather situations
⇒ India's largest is in Delhi → 'NBPGR' (National Bureau of Plants Genetic Resources, established in IARI (India's largest Agricultural University), PUSA

4.) Gene Bank → In these Banks, desired genes and complete genome of rare species are being preserved by a transfusion method.

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(ii) – The most common bacteria, which is used for this process is E. coli & Agrobacterium (Plant gene)

5) Germplasm conservation

i) It is the conservation of germinating bodies in lower plants (like in Algae) & spores. While in higher plants & animal, germinating bodies are sperms (in animals) and pollens (in plants) while ovum (female animals) and eggs in plants are preserved through cryopreservation method in liquid nitrogen.

(iii) Later these germplasm can be used for artificial insemination fertilisation.

6) Tissue Culture

(i) It is a plant conservation and proliferation whereby in artificial conditions or laboratories, with the help of tissue, number of plants can be produced in a short period of time employing combination of different plant hormones.

International Conservation Programmes and Treaties :-

I Agenda-21

a) This programme was proposed in 1992 during 'Earth Summit' at Rio-De Janeiro.

b) It is a plan of action on a number of issues including bio-diversity conservation.

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CITES (Convention on International Trade of Endangered Species of Wild Flora and Fauna)
+ CITES have been enforced since 1973 with currently 152 member countries
+ The objective is to cooperate and coordinate among the member countries for conservation & protection of endangered species of plants & animals

International Union for conservation of Nature
IUCN :- IUCN was founded in 1984 with primary objective to access all new sites of biodiversity rich region and to publish an annual 'Red Data Book', containing list of threatened species in various categories.
⇒ Another important objective is to launch specific programs for most fragile natural habitats of wild species. Eg :- Mangrove protection programme.

:- CBD → Convention on Biological Diversity. It was launched in 1992 during Earth Summit. In this programme, an extensive road map has been formed for the

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protection of global biodiversity by employing modern tools and techniques for such as camera tap Technique for census of Tigers.

nals.

On the similar lines, Govt. of India enacted Biodiversity Conservation Act in the year 2002.
2nd May :- World Biodiversity Day.

Categories of species acc. to threaten

→ Endangered :- Those species which are on the verge of extinction due to illegal trade practices and shrinking wild habitats. Eg → Royal Bengal Tiger, Single horn Rhino Asiatic Lion

→ These species are being kept under schedule 1 or 2 in wild life protection Act 1972.

Critically Endangered :- These are those species which may become extinct

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Sarus Crane → tallest bird

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within five years due to sharp decline their population. The main cause is mostly either a disease (endemic / Penaumic) or illegal poaching (largest flying bird)
Eg- Great Indian Bustard, Bengal Florican

* Vulnerable → very few chances of the specis to be endangered.
Eg- Leopard, Elephant, Sparrows.

* Rare → those species which are having irregular citings.
Eg → Bird Species (Nicobarian Crane)
Owl Species

* Extinct → Species which have not been reported since last 50 years.
Eg → Indian Cheetah, Dodo, Passenger Pigeon

* Endemic → Specific Species restricted to a particular geographic regeon.
Eg → Red Panda (North East)
Lion tailed (Macaque)

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Describe 2/3 Indian Hotspots
→ Western Ghats (Amphibians)
→ Eastern Himalayas (Fish, Lizard)

Biodiversity Hot spots

Myer :- The concept of biodiversity hotspot was introduced by myer, ecologist 1990.

⇒ These are those natural habitats which are very rich in biodiversity on the one hand. On the other site, they are also most threatened from conservation pt. of view.

⇒ These are consisting of those species which are endemic in nature.

⇒ There are two criterias proposed by Meyer for a region to be in the list of biodiversity hotspots

300 ~ 1600 Species

a) It must have 0.1% of plants as endemic in nature

aa) Place must have lost 50% of its total vegetation.

Globally, 34 biodiversity hotspots have been identified so far. Out of 34, 4 are in India

o) Eastern Himalayas ooo) Western Ghats
oo) Indo Burma Region oo) Sundaland
(Andaman & Nicobar, Indonesia, Java)
found in tropical & sub-tropics region of world (South East Asia, India)

India as Megabiodiversity Nation
:- 12th position

India is a Megadiverse Nation because of large biodiversity of plants (16%) of global biodi. While 7%. of the total animal Species of globle around 82,000 animal Species. Most of the Species of ambhibians and reptiles are endemic in nature. There are three cuteria by which a country or nation is catbeized under the list of Megabiodiversity nation

(i) Origin of plants :- Plant origin country. Around 5,000 flowering plants species including 300 crop plants are being originated in India. For eg- Turmeric, Bdsmati Rice, Neem, Rose. In crop plants, no of pulses have originated in India Eg- Lentil, Pulses

Restricted to India

(ii) Endemism :- phenomena of endemic species. No of endemic specits are found in India, part; Western & Eastern Ghats. Most of the orchards species are seen in nature. Single-horned Rhino, Asiatic Lion, Great Indian Bustard.

(iii) Coastal/Marine Biodiversity :- India is a country with longest coastline, which is directly associated with marine biodiversity, including Coral Reefs.

Imp

Man and Wildlife Conflict

dispute over share of Resources

⇒ Acc. to WWF, any interaction b/w humans and wildlife that results in negative impacts on human, social, economic and cultural lives and on the conservation of wildlife or on the environment is called Man and wildlife conflict.

Causes of Conflict

(1) Decline in Natural habitat of wild animal.

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territory :- where you carry out daily activities
habitat :- where you reside

(ii) Decline in prey population in forest area.
(iii) Injured & Old wild animals have tendency to hunt easy prey
(iv) Inadequate or no compensation to the farmers in case of crop damage by wild animal lead to killing of wild animals by humans.
(v) Lack of natural corridors in case of large wild animals like Elephant, Tiger.

Corridor — pathway to territory.
(vi) Religious practices such as feeding wild animals in name of cultural practices

~~Remedies~~ Impact of Conflict

(i) Loss of life on both sides
(ii) Injuries to wild animals and humans.
(iii) Crop-damage, Killing of Livestock (Livestock depredation)
~~(iv)~~

Measures:
(1) Proper ~~conse~~ compensation mechanism

should be provided for farmers
(2) Land-Use Planning (EIA) should be made mandatory before big Projects → highway, Road
(3) More forest cover should be brought
(4) To protect natural corridor, flyover, elevated roads in forest area.
(5) Educate local and tribal people about the behaviour of wild animals
(6) Never feed wild animal on name of Culture
Wild Boar, Elephants.
⇒ Last year, 300 elephants have been killed in this conflict
⇒ In last 5 year, 200 tigers have been killed
= " , 800 Leopards have been killed

Biogeographic zones.

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