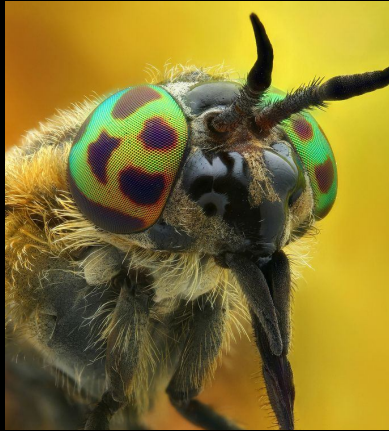# BIOLOGY

for NEET & BOARD

BIODIVERSITY & ITS CONSERVATION

Key Features

❶ All-In One Study Material (For Boards/Medical/Olympiads).

❷ Concise, Conceptual & Trick – Based Theory.

❸ NTA Based Solved Multiple Choice Questions With Answers.

Biodiversity & Its Conservation

1 INTRODUCTION

? **NATURAL RESOURCES:**
The materials or any component, that can be utilised by man and are necessary for welfare of life, which is available in the natural environment in Atmosphere, Hydrosphere, Lithosphere is called natural resources. e.g. O_2, Land, Soil, Water, Forest, Animals, Soil, microorganism.

? **Classification of natural resources :**

1. Inexhaustible resources (Non-conventional resources) : Available in unlimited quantities, and the earth quantity may remain unchanged by human impact. e.g. Solar Energy, Wind Power, Tidal power, Air, Geothermal Energy. Its quality can be affected due to continuous increase in human population. e.g. Air pollution.

2. Exhaustible resources (Conventional resources) : These are likely to be finished by human use or unsustainable uses. It is further divided in two groups.

(i) *Renewable resources :* Those which are being continuously consumed by man butrenewed continuously by nature, always available if managed in a proper way, otherwise they may even get totally exhausted. e.g. Biotic resources, forest, grazing animals, Rangeland, wild life, Agriculture crop system and fresh water yield, soil etc.

(ii) *Non renewable resources :* They are not renewable after use and are not replaced by nature, can not be regained. e.g. Fossil fuel (Coal, Petroleum), Natural Gas, Nuclear energy, Biotic species, Minerals etc.

Note : Nuclear energy is non renewable and unlimited resources.

HYDROSPHERE OR WATER RESOURCES

➢ The total volume of water in the hydrosphere is 1.4 billion cubic kilometers[Km3], about 97.5% is the ocean water, unsuitable for human use. Only 2.5% is available as fresh water. About 1.97% is stored in ice-caps (Polar ice) and glaciers and 0.5% is ground water and soil moisture (0.01%). The rest [about 0.36 percent] is distributed in lakes swamps, rivers and streams.

> **Land Resources**
  At the beginning of 20th century, about 30% of land in India was covered with forest but the end of the 20th century, the forest cover reduced to 19.4%. Out of 19.4 %, only 12 % area covered by dense forest.
> Percapita forest area available in India is = 0.06 hec.
> Percapita forest area available in world is = 0.64 hec.
> National Forest Policy (1988) of India has recommended 33 per cent forest cover for the plains and 67 per cent for the hills.

FOREST CONSERVATION
> It is conducted by two methods.
  1. Protection or conservation forestry *:* By Making national park and Bio-sphere Reserve.
  2. Production or commercial forestry *:*

- • It is of two types:
    a) Social forestry : To grow the trees and shrubs on unused farmland, road sides, Rail sides, community land etc.
    b) Agro forestry : Woody species are grown in combination with herbaceous crops either at the same time or in time sequence.
    c) Taungya system : Growing agricultural crops between rows of planted trees.

2 LEVELS OF BIODIVERSITY

- • Immense diversity (heterogenity) occurs at all levels of biological organisation. Three most important of them are *:*

(i) Genetic Diversity :

- • Genetic diversity refers to the variation of genes within species.

- • The differences could be in alleles (different variants of same genes), in entire genes or in chromosomal structures.

- • The genetic diversity enables a population to adapt to its environment and to respond to natural selection.

- • If a species has more genetic diversity, it can adapt better to the changed environmental conditions.

- • Lower diversity in a species leads to uniformity, as in the case with large monocultures of genetically similar crop plants.

- • This has advantage when increased crop production is a consideration, but can be a problem when an insect or a fungal disease attacks the field and possess a threat to the whole crop.

- • The total genetic diversity of a community will be greater if there are many species, as compared to a situation where there are only a few species.

- • Genetic diversity within a species often increases with environmental variability.

(a) It is measure of variety in genetic information contained in the organism *e.g.,* virus =

10-150 genes, *Mycoplasma* = 450-700 genes, *Oryza sativa* = 32,000-50000 genes etc. India has >50,000 genetically different strains of rice and 1000 varieties of mango. The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine).

(b)   It enables a population to adopt to its environment.

(c)   It helps in formation of ecotype.

(d)   It plays a key role in process of speciation.

(e)   It maintains diversity at community level.

(ii) Species Diversity

It is the variety of species within a region e.g., Western ghats are more diverse than eastern ghats, w.r.t. amphibians.

(a)   Species diversity is product of species richness and species evenness.

(b)   Species richness is the number of species present within a unit area.
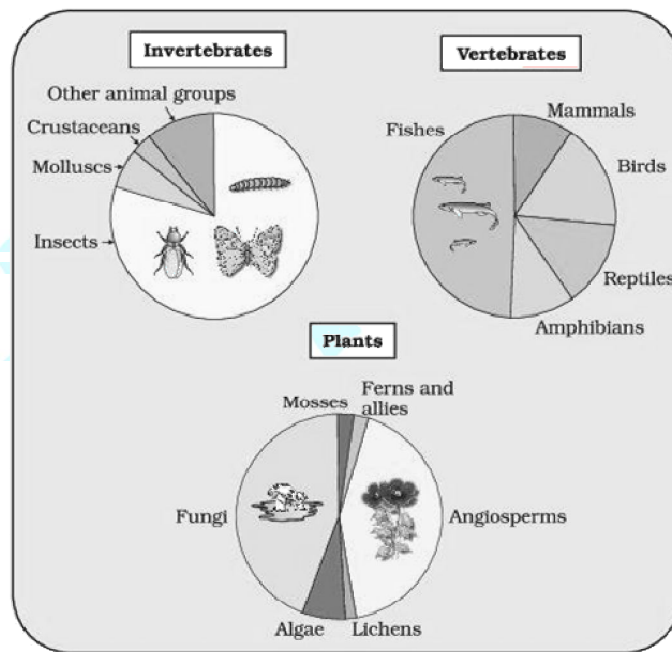
Fig. : Representing global biodiversity : proportionate number of species of major taxa of plants, invertebrates and vertebrates

(c)   Species evenness or species equitability is the proportionate number of individuals of different species (taxonomic groups). Communities where species are represented by more or less equal number of individuals exhibit evenness. Others where one or more species have more individuals than others show dominance or uneveness

(d)   Maximum / taxonomic diversity occurs where species of taxonomically different

groups occur in almost equal abundance.

(iii) Community or Ecosystem Diversity

• Diversity at the level of community and ecosystem has three perspectives.

• **Alpha diversity** : refers to the diversity of organisms sharing the same community or habitat.

• It is also called local diversity and is diversity within a community.

• The rate of replacement of species along a gradient of habitats or communities is called **beta diversity**.

• Diversity of the habitats over the total landscape or geographical area is called **gamma diversity**, also called regional diversity.

• It represents the total richness of species in all the habitats found within a region, geographical area or landscape. *e.g.,* India is more diverse than Norway.
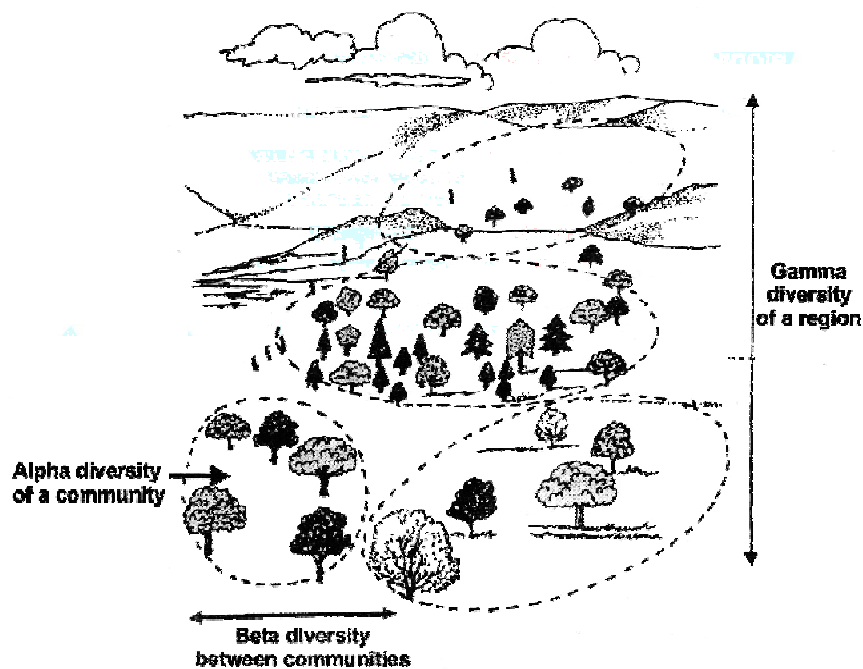

Fig. : Types of community diversity

• India, is endowed with a rich diversity of the **biogeographical regions** due to varying physical conditions and species groupings.

• Wild life institute of india has divided the country into ten biogeographical regions.

• Among the 10 biogeographical regions, **Deccan peninsula** has the most extensive coverage of the Indian landmass (42%).

• The most biodiversity-rich zones, **Western Ghats** and **north-east,** account for 4 and 5.2% of the geographical area, respectively.

- Each biogeographical zone has several habitats, biotic communities and ecosystems.

- A large number of species found in these zones are endemic or exclusive to India.

- About 33% of the flowering plants recorded in India are endemic to our country.

- Indian region is also notable for endemic fauna.

- The endemics are concentrated mainly in North-East, Western Ghats, North-West Himalayas and Andaman and Nicobar Islands.

- A very high number of **amphibian species are endemic to Western Ghats**

3 PATTERNS OF BIODIVERSITY

- Degree of biodiversity shows two master gradients, **latitudinal** and **altitudinal.**

(i) Diversity decreases from lower to higher altitudes on a mountain *i.e.* it is maximum at the base.

(ii) Biodiversity increases from high to low latitudes *i.e.* from the poles to the equator.

(iii) Biodiversity is minimum in arctic, moderate in temperate and maximum in tropical regions. With very few exceptions, tropics (latitudinal range of 23.5° N to 23.5° S) harbour more species than temperate or polar areas. Colombia located near the equator has nearly 1,400 species of birds while New York at 41° N has 105 species and Greenland at 71° N only 56 species. **India with much of its land area in the tropical latitudes, has more than 1,200 species of birds.** A forest in a tropical region like Equador has up to 10 times as many species of vascular plants as a forest of equal area in a temperate region like the Midwest of the USA. The largely tropical **Amazonian rain forest in South America has the greatest biodiversity on earth** -it is home to more than 40,000 species of plants, 3,000 of fishes, 1,300 of birds, 427 of mammals, 427 of amphibians, 378 of reptiles and of more than 1,25,000 invertebrates. Scientists estimate that in these rain forests there might be at least two million insect species waiting to be discovered and named.

(iv) Tropics show greater diversity because :

(a) Speciation is generally a function of time, unlike temperate regions subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years and thus, had a long evolutionary time for species diversification

(b) Tropical environment is less seasonal, relatively more constant and predictable, and can promote niche specialisation and lead to a greater species diversity.

(c) There is more solar energy available in the tropics, which contributes higher productivity; this in turn might contribute indirectly to greater diversity.

(v) **Species-area relationships:** Alexander von Humboldt observed that within a region

species richness increases with increasing explored area, but only up to a limit. In fact, the relation between species richness and area for a wide variety of taxa (angiosperm plants, birds, bats, freshwater fishes) turns out to be a rectangular hyperbola. The relationship is a straight line described by the equation $\log S = \log C + Z \log A$ where S = Species richness, A = Area, Z = Slope of the line (regression coefficient), C = Y-intercept.
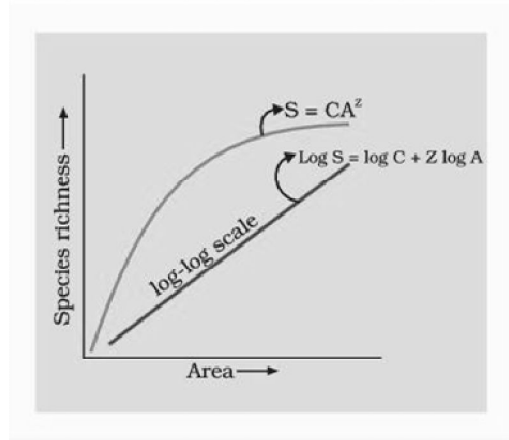
Fig. : Graph showing species area relationship.

Note that on log scale the relationship becomes linear

Ecologists have discovered that the value of Z lies in the range of 0.1 to 0.2, regardless of the taxonomic group or the region. If we analyse the species-area relationships among very large areas like the entire continents, the slope of the line will be much steeper (Z values in the range of 0.6 to 1.2). For frugivorous (fruit-eating) birds and mammals in the tropical forests of different continents, the slope is found to be 1.15.

(vi) Conditions favouring growth do not induce biodiversity or speciation, it is called **Paradox of enrichment.**

IMPORTANCE OF SPECIES DIVERSITY TO THE ECOSYSTEM

1. Community with more species is more stable. Stable community should not show too much variation in productivity from year to year; it must be resistant or resilient to occassional disturbances by natural or anthropogenic agencies and alien species. Ecosystem health/balance will be severly affected if species extinction (particularly key stone) occurs.

2. Results of David Tilman's long term ecosystem experiments using outdoor plots.

    (a) Plots with more species showed less year to year variation in total biomass.

    (b) Increased diversity contributed to higher productivity

    (c) Rivet popper hypothesis (by Paul Ehrlich)

Airplane	Ecosystem

Rivets	Species
Rivets on the wings	Key species

4 LOSS OF BIODIVERSITY

1. The biological wealth of our planet has been declining rapidly and the accusing finger is clearly pointing to human activities. The colonisation of tropical Pacific Islands by humans is said to have led to the extinction of more than 2,000 species of native birds.
2. The *IUCN Red List (2004)* documents the extinction of 784 species (including 338 vertebrates, 359 invertebrates and 87 plants) in the last 500 years.
3. Some examples of recent extinctions include the Dodo (Mauritius), Quagga (Africa), Thylacine (Australia), Steller.s Sea Cow (Russia) and three subspecies (Bali, Javan, Caspian) of tiger.
4. The last twenty years alone have witnessed the disappearance of 27 species. Careful analysis of records shows that extinctions across taxa are not random; some groups like amphibians appear to be more vulnerable to extinction. This is the fact that more than 15,500 species world-wide are facing the threat of extinction.
5. Presently, 12 per cent of all bird species, 23 per cent of all mammal species, 32 per cent of all amphibian species and 31per cent of all gymnosperm species in the world face the threat of extinction.
6. In general, loss of biodiversity in a region may lead to (a) decline in plant production, (b) lowered resistance to environmental perturbations such as drought and (c) increased variability in certain ecosystem processes such as plant productivity, water use, and pest and disease cycles.

5 CAUSES OF BIODIVERSITY LOSSES

? The accelerated rates of species extinctions that the world is facing now are largely due to human activities.

? There are four major causes (.The Evil Quartet. is the sobriquet used to describe them).

1. Habitat loss and fragmentation:
This is the most important cause driving animals and plants to extinction. The most dramatic example of habitat loss come from tropical rain forests. Once covering more than 14 per cent of the earth.s land surface, these rain forests now cover no more than 6 per cent. They are being destroyed fast. The Amazon rain forest (it is so huge that it is called the .lungs of the planet.) harbouring probably millions of species is being cut and cleared for cultivating soya beans or for conversion to grasslands for raising beef cattle.
Besides total loss, the degradation of many habitats by pollution also threatens the survival of many species.
When large habitats are broken up into small fragments due to various human activities, mammals and birds requiring large territories and certain animals with migratory habits are badly affected, leading to population declines.

2. Over-exploitation :
Humans have always depended on nature for food and shelter, but when .need. turns to .greed., it leads to over-exploitation of natural resources. Many species extinctions in the last 500 years (Steller.s sea cow passenger pigeon) were due to overexploitation by humans. Presently many marine fish populations around the world are over

harvested, endangering the continued existence of some commercially important species.

3. **Alien species invasions :**
When alien species are introduced unintentionally or deliberately for whatever purpose, some of them turn invasive, and cause decline or extinction of indigenous species. The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake.

You must be familiar with the environmental damage caused and threat posed to our native species by invasive weed species like carrot grass (Parthenium), Lantana and water hyacinth (Eicchornia). The recent illegal introduction of the African catfish Clarias gariepinus for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.

4. **Co-extinctions :**
When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct. When a host fish species becomes extinct, its unique assemblage of parasites also meets the same fate. Another example is the case of a coevolved plant-pollinator mutualism where extinction of one invariably leads to the extinction of the other.

Type of Extinction of species :

(i) Natural extinction : Due to change in environmental condition.
(ii) Mass extinction : Due to catastrophs.
(iii) Anthropogenic extinction : Due to human activities like hunting.

The characteristics of species particularly susceptible to extinction are :-

- Large body size, small population size, low reproductive rate, feeding at high trophic levels in the food chain;
- Fixed migratory routes and habitat and localized and narrow range of distribution.

6   BIODIVERSITY CONSERVATION
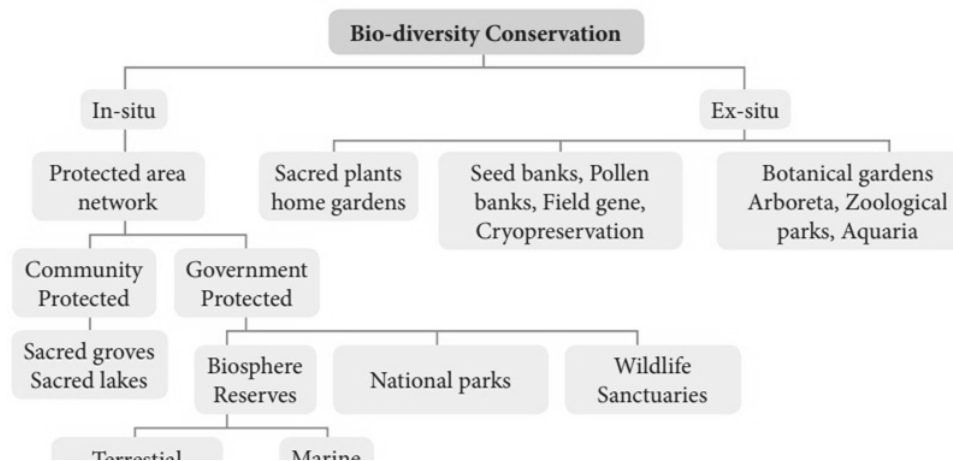
Why should we conserve biodiversity?

➢ There are many reasons (all equally important) to conserve biodiversity.

These reasons can be grouped into three categories :

➢ **The narrowly utilitarian aspect** : Economic importance

➢ *Pinus, Abies* and *Boswellia* are major source of paper.

➢ Pine resin is obtained from *Pinus* while damar from *Shorea robusta*.

➢ **Gums:** Kuteera gum *(Stericulia urens)*, Bengal Kino gum *(Butea monosperma),* salar *(Boswellia serrata)*, safed dhaora *(Anogeissus latifolia)* , gum arabic *(Acacia senegal)* etc.

➢ **Tannin sources:** *Uncaria* (leaves and young branches), *Acacia* (bark), *Juglans* (bark), *Caesalpinia* (woodand fruits).

➢ **Important dyes are:** Cutch / Kattha (heartwood of *Acacia catechu),* henna (leaves of *Lawsonia inermis)*, haematoxylon (heartwood of *Haematoxylon campechianum).*

➢ Plants can also be used to manufacture innumerable synthetic products, called botanochemicals

Some Important Drugs

Drug	Source	Application
Morphine	Dried latex from unripe capsules of *Papaver somniferum*	Analgesic
Quinine	Bark of *Cinchona ledgeriana* and *C.officinalis*	Antimalarial
Artemesin	*Artemesia annua*	Antimalarial
Taxol	Bark of Yew *(Taxus baccata, T. brevifolia)*	Anticancerous
Vincristin and vinblastin	Rosy Periwinkle *(Vinca rosea* or *Catharanthus roseus)*	Anticancerous
Reserpine	Roots of *Rauwolfia serpentina* (medicine of mads)	Against high blood pressure, Schizophrenia, painful bowels
Vasaca	Leaves of *Adhatoda vesica*	Bronchitis
Liquorice	Roots of *Glycyrrhiza glabra*	Bronchitis

• More than 25% of the drugs currently sold in the market worldwide are derived from plants and 25,000 species of plants, contribute to the traditional medicines used by the natives.

(i) **Bio-prospecting:** Exploring molecular, genetic and species level diversity for products of economic importance.

(a) **Broadly utilitarian aspect:** Ecosystem services are important, that nature provides
   (i) Amazon forest is estimated to produce 20% of the total 02 in the earth's atmosphere through - photosynthesis.
   (ii) Pollination -essential for seeds, fruits.
   (iii) Flood and erosion control
   (iv) Aesthetic pleasures

(b) **Ethical aspect:** Every species has an intrinsic value, so we have a moral duty to care for their well being.

How do we conserve biodiversity?

1. **Concept of Threatened Species** The **International Union of Conservation of Nature and Natural Resources (IUCN)** has classified the rare species of plants and animals into different categories for the purpose of conservation. The classification is based on :
   (i) The distribution of species in past and present.
   (ii) The decline in number of populations in course of time.
   (iii) The abundance and quality of natural habitat.
   (iv) The biology and potential value of the species.

THE IUCN RED LIST CATEGORIES

• The IUCN Red List is a catalogue of taxa that are facing the risk of extinction.

• It is important to understand that the Red List aims to impart information about the **urgency and scale of conservation problems** to the public and policy makers.
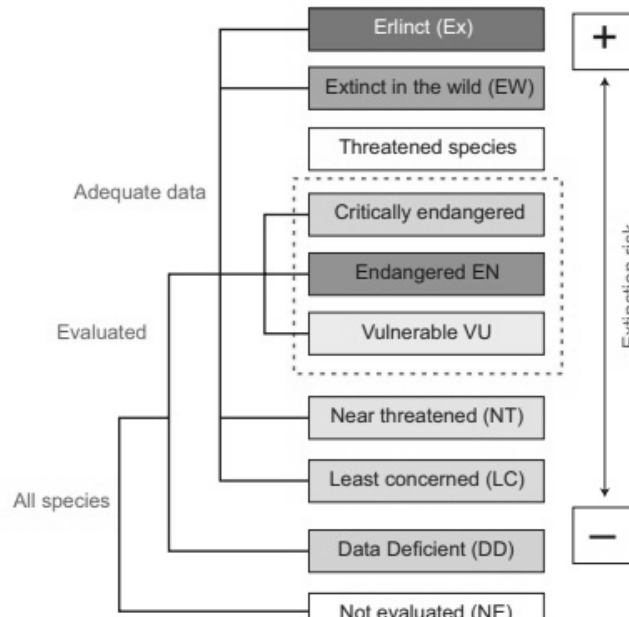
Fig: IUCN red list categories

• The uses of the Red List are :

   (i) Developing awareness about the importance of threatened biodiversity.

(ii)   Identification and documentation of endangered species.

(iii) Providing a global index of the decline of biodiversity.

(iv)   Defining conservation priorities at the local level and guiding conservation action.

- The World Conservation Union (formerly known as IUCN) has recognised eight Red List Categories of species: **Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Lower Risk, Data Deficient, and Not Evaluated.**

- List of endangered plants in India include orchids (especially Blue *Vanda*) , most of tree ferns, pitcher plant *(Nepenthes khasiana), Podophyllum,* etc.

The IUCN Red list Categories

Red List Category	Definition
Extinct	A taxon is Extinct when there is no reasonable doubt that the last individual has died.
Extinct in the wild	A taxon is Extinct in the wild when exhaustive surveys, in known and/or expected habitats, have failed to record an individual.
Critically Endangered	A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the **immediate future.**
Endangered	A taxon is Endangered when it is facing a very high risk of extinction in the wild in the near future .
Vulnerable	A taxon is Vulnerable when it is not Critically Endangered or Endangered, but is facing a high risk of extinction in the wild in the medium-term future.
Lower Risk	A taxon is at Lower Risk when it has been evaluated and does not satisfy the criteria of Critically Endangered, Endangered or Vulnerable.
Data D efici ent	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction.
Not Evaluated	A taxon is Not Evaluated when it has not yet been assessed against the above criteria.

Examples of threatened species in India

Category	Plant	Animal
Critically endangered	*Berberis nilghiriensis*	*Sus salvanius* (Pigmy hog)
Endangered	*Bentinckia nicobarica*	*Ailurus fulgens* (Red Panda)
Vulnerable	*Cupressus cashmeriana*	*Antelope cervicapra* (Black Buck)

2. Conservation Strategies

- Some of the steps proposed to protect the existing species of the wild life are discussed below:

(i)   The threatened species should be given preference over others in conservation.

(ii)   The national protection programmes in different countries should be coordinated with the international programmes, particularly the biosphere reserve programme of the UNESCO's Man and the Biosphere Programme (MAB). The international network of biosphere reserve programme aims to conserve and use the diversity of living organisms for the present and the future within natural ecosystems.

(iii)   Every country should set up national parks and sanctuaries to protect wild life and to ensure its multiplication.

(iv)   Hunting should be regulated. It should be banned during breeding season of the animals. Killing of young animals should be prohibited.

3. **There are two basic strategies of biodiversity conservation,** *in-situ* (on-site) and *ex-situ* (off-site).

(A) In-situ (on site) Conservation Strategies

- The *in-situ* strategies emphasise protection of total ecosystems. The *in situ* approach includes protection of a group of typical ecosystems through a network of protected areas.

- **Protected Areas:** These are areas on land and/or sea, especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources. These are managed through legal or other effective means. Examples of protected areas are **National Parks** and **Wildlife Sanctuaries**. The earliest national parks, the Yellowstone in USA and the Royal near Sydney, Australia, were chosen because of their scenic beauty and recreational values. India has (**90 National Parks** and **448 Wildlife Sanctuaries**), covering 4.7% of the land surface, as against 10% internationally suggested norm. The **Jim Corbett National Park** was the first National Park established in India.

- Some of the main benefits of protected areas are :

    (i)   Maintaining viable populations of all native species and subspecies;

    (ii)   Maintaining the number and distribution of communities and habitats, and conserving the genetic diversity of all the present species;

    (iii)   Preventing man-made introductions of alien species; and

    (iv)   Making it possible for species to shift in response to environmental changes.

- **Biosphere Reserves:** Biosphere reserves are a special category of protected areas of land and/or coastal environments, wherein tribal people are an integral component of the system. These are representative examples of natural biomes and contain unique biological communities. The concept of Biosphere Reserves was launched in 1975 as a part of UNESCO's Man and Biosphere Programme, dealing with the conservation of ecosystems and the genetic resources contained therein. **There are 14 biosphere**

reserves in India. A Biosphere Reserve consists of core, buffer and transition zones. The natural or core zone comprises an undisturbed and legally protected ecosystem. The buffer zone surrounds the core area, and is managed to accommodate a greater research and educational activities. The transition zone, the outermost part of the Biosphere Reserve, is an area of active cooperation between reserve management and the local people, wherein activities like settlements <u>cropping, forestry, recreation and other economic uses continues in harmony with conservation</u> goals.
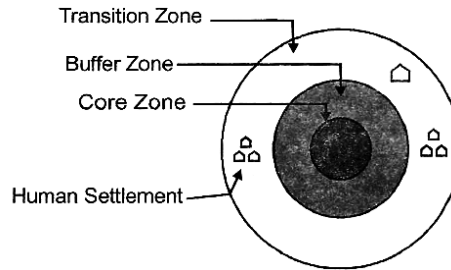
Fig. : The zonation in a terrestrial Biosphere Reserve

- The main functions of biosphere reserves are :

  (i)   Conservation

  (ii) Development

  (iii) Scientific research, monitoring and education

- A traditional strategy for the protection of biodiversity has been in practice in India and some other Asian countries in the form of **sacred forests**. In India, sacred forests are located in several parts *e.g.,* Karnataka, Maharashtra, Kerala, Meghalaya etc. and are serving as refuge for a number of rare, endangered and endemic taxa. Similarly, several water bodies *(e.g.,* Khecheopalri lake in Sikkim) have been declared sacred by the people, leading to protection of aquatic flora and fauna.

SACRED GROOVES

(i)   Sacred forests: also called **Islands of Pristine forests** *e.g.,* forests of Jaintia &Khasi (Meghalaya), Aravalli (Rajasthan), Westem ghats (Maharashtra and Kamataka), Surguja, Chanda and Bastar area (M.P.).

(ii) Sacred lakes: *e.g.,* Pushkar lake in Rajasthan, Khecheopalri lake in Sikkim.

(iii) Sacred plants are *Ocimum sanctum* (Tulsi), *Elaeocarpus floribundus, Ficus religiosa* etc

(B) Ex-situ (off site) Conservation Strategies

- The *ex-situ* conservation strategies include botanical gardens, zoos, gene, pollen, seed, seedling, tissue culture and DNA banks.

- **Seed gene banks are the easiest way to store germplasm of wild** and cultivated plants at low temperature in cold rooms.

- Preservation of genetic resources is carried out in field gene banks under normal growing conditions.

- *In vitro* conservation, especially by cryopreservation in liquid nitrogen at a temperature of -196°C, is particularly useful for conserving vegetatively propagated crops like potato.

- Cryopreservation is the storage of material at ultra-low temperature either by very rapid cooling (used for storing seeds), or by gradual cooling and simultaneous dehydration at low temperature (used for tissue culture).

- The material can be stored for a long period of time in compact, low maintenance refrigeration units.

- Botanical gardens and arboreta may also have seed banks, tissue culture facilities and other *ex-situ* technologies. Many of the zoos are conducting captive breeding programmes.

HOT SPOTS OF BIODIVERSITY

- Norman Myers developed the concept of hot spots in 1988 to designate **priority areas** for *in-situ* conservation.

- The hot spots are the richest and the most threatened reservoirs of plant and animal life on earth.

- The key criteria for determining a hot spot are:

    (i)   Number of endemic species *i.e.* the species which are found in a restricted area only.

    (ii) Degree of threat, which is measured in terms of habitat loss.

- Initially 25 terrestrial hot spots have been identified globally.

- But now the **number is raised to 34** with an area of less than 2%.

- The number of species they collectively harbour is extremely high and strict protection of these hot spots could reduce the ongoing mass extinctions by almost 30%.

- As many as 16 hot spots are in located the tropics.

- About 20% of the human population lives in the hotspot regions.

- **Western Ghats and Sri Lanka, Indo-Burma** and **Himalaya** cover our country's exceptionally high biodiversity regions *(i.e.* three hot spots).

- Eastern Himalaya is an active centre of evolution and has a rich diversity of flowering plants, their occur numerous primitive angiospermous families *e.g., Magnoliaceae, Winteraceae* and primitive genera of plants, like *Magnolia* and *Betula*.

- The Western Ghat region lies parallel to the western coast of Indian peninsula for

almost 1600 km, in Maharashtra, Karnataka, Tamil Nadu and Kerala.

• The forests at low elevation are mostly evergreen, while those found at 500-1500 meter height are generally semi-evergreen forests.

• *The Agasthyamalai hills, the Silent Valley and the new Amambalam Reserve, are the main centres of diversity.*

• The historic convention on Biological Diversity **(The Earth Summit) held in Rio de Janeiro in 1992,** called upon all nations to take appropriate measures for conservation of biodiversity and sustainable utilisation of its benefits.

• **In** a follow-up, **The World Summit** on sustainable development held **in 2002 in Johannesburg,** South Africa, where 190 countries pledged their commitment to achieve, a significant reduction in the current rate of biodiversity loss of global, regional and local levels by 2010.


DO YOU KNOW ?

- ✍ *NEERI : National Environment Engineering Research Institute.*
- ✍ *UNEP: United Nations Environment Programme.*
- ✍ *CAZRI : Central Arid Zone Research Institute (Jodhpur).*
- ✍ *BRP : Biosphere Reserve Programme.*
- ✍ *MAB : Man and Biosphere. IBWL : Indian Board of Wild Life.*
- ✍ *CITES : Convention on International Trade in Endangered Species.*
- ✍ *CBD : Convention on Biological Diversity (Promoted by The Earth Summit) 1992.*

IMPORTANT PRACTICE QUESTION SERIES FOR NEET EXAM – 1

1. Which group of vertebrates comprises the highest number of endangered species?
   a) Reptiles   b) Birds   c) Mammals   d) Fishes
2. The Indian wild ass is in the category of ...... by Wildlife Protection Act of government of India.
   a) Rare species   b) Endangered species   c) Endemic species   d) Vulnerable species
3. As estimated by Robert May, what is total number of species present on earth?
   a) 3 million   b) 5 million   c) 7 million   d) 9 million
4. The species area relationship is a straight line described by the equation

a) $\log S = \dfrac{\log C}{\log A}$ b) $Z\log A = \dfrac{\log C}{\log S}$

c) $\log S = \log C + Z \log A$ d) $\log S = \log C - Z \log A$

5. In India, hot spot area is found in
   a) Eastern Himalaya   b) Tropical Andes   c) Madagascar   d) Meso –America

6. Hangul Project was started by government to save hangul ($Cernus\ hanglu$) in 1970. The sanctuary where it is started is
   a) National Chambal sanctuary   b) Dachigam sanctuary
   c) Corbett national park   d) Bandipur national park

7. Rivet Popper hypothesis explains the importance of
   a) Species in an ecosystem   b) Birds in an ecosystem
   c) Fishes in a pond ecosystem   d) None of the above

8. The term 'Alpha diversity' refers to
   a) Genetic diversity   b) Community diversity
   c) Species diversity   d) Diversity among the plants

9. Which endangered animal is the source of the world's finest, lightest, warmest, and most expensive wool-the Shahtoosh?
   a) Kashmiri goat   b) Chiru   c) Nilgai   d) Cheetal

10. Which one is an endangered species?
    a) $Cuscuta$ b) $Acacia\ nilotica$ c) $Nepenthes$ d) Both (b) and (c)

11. Land mass occupied by forest is
    a) 40%   b) 22%   c) 30%   d) 17%

12. The greatest threat to genetic diversity in agricultural crops is
    a) Extensive use of insecticides and pesticides   b) Extensive mixed cropping
    c) Introduction of high yielding varieties   d) Extensive use of fertilizers

13. Which of the following species are restricted to an area?
    a) Sibling species   b) Endemic species   c) Allopatric species   d) Sympatric species

14. More than 25% of the drugs are derived from the plants. What benefits does this described?
    a) Aesthetic value   b) Ethical value
    c) Indirect economic value   d) Direct economic value

15. Which of the following is conserved by $exsitu$ conservation method?
    a) All animals   b) All plants
    c) Threatened animals and plants   d) None of the above

16. Soil erosion is prevented by
    a) Deforestation   b) Afforestation
    c) Reduction of CFCs production   d) Use of CNG in all transports

17. Many species like steller's sea cow passenger pigeon have been driven to the brink of extinction. Which of the following describes this situation?
    a) Over-exploitation by humans   b) Pollution
    c) Habitat loss   d) Competition from introduced species

18. The number of species facing the threat of extinction worldwide is
    a) 14,500   b) 14,000   c) 15,000   d) 15,500

19. In your opinion, which is the most effective way to conserve the plant diversity of an area?
    a) By tissue culture method   b) By creating biosphere reserve
    c) By creating botanical garden   d) By developing seed bank

20. Habitat loss and fragmentation, over exploitation, alien species invasion and co-extinction are causes for
    a) Population explosion b) Migration   c) Biodiversity loss   d) Pollution

21. The medicinal plant, $Rauwolf iavomitoria$, growing in Himalayan ranges shows variation in terms of the potency and concentration of the chemical (reserpine), that it produces. It is an

example of

a) Species diversity   b) Ecological diversity   c) Genetic diversity   d) None of them

22. Conservation in natural habitat is

a) *Insitu*   b) *exsitu*   c) Zoo   d) Botanic garden

23. The animal, extincted from India is

a) Lion   b) Cheetah   c) Deer   d) Peacock

24. For frugivorous birds and mammals in the tropical forests of different continents, the slope is found to have the value of

a) 1.15   b) 1.5   c) 1.05   d) 1.005

25. If $\log A = 4, Z = 0.3$ and $\log C = 0.8$, find the value of log 'S'?

a) 3.76   b) 100   c) 4.24   d) 2

26. Siberian cranes are regular visitors of

a) Bharatpur sanctuary, Rajasthan   b) Lalbagh, Bangaluru
c) Vedanthgol sanctuary, Tamil Nadu   d) Jim Corbett national park, Uttarakhand

27. *Exsitu* strategies includes

I. Zoos
II. Seed/pollen banks
III. Gene bank and tissue cultures
IV. Botanical garden
Choose the correct option

a) II, III and IV   b) I, II and III   c) I, II and IV   d) I, II, III and IV

28. The Periyar sanctuary is located in

a) Kerala   b) Tamil Nadu   c) Karnataka   d) Andhra Pradesh

29. Manas sanctuary is located at

a) Rajasthan   b) Asom   c) Bihar   d) Gujarat

30. Which of the following supports a dense population of plankton and littoral vegetation?

a) Oligotrophic   b) Eutrophic   c) Lithotrophic   d) Agroecotrophic

31. What is the main cause for the extinction of some species in tropical forest?

a) Deforestation   b) Afforestation   c) Pollution   d) Soil erosion

32. Given below are pie diagrams I, II and III related to the proportionate number of species of major taxa of invertebrates, vertebrates and plants respectively. Critically study and fill in the blanks A, B, C and D

I. Invertebrates
II. Vertebrates
III. Plants
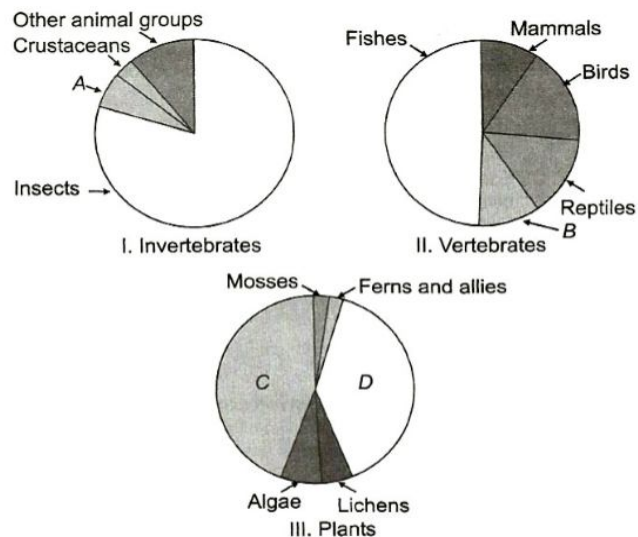
a) A-Molluscs, B-Amphibians, C-Angiosperms, D-Gymnosperms
b) A-Molluscs, B-Amphibians, C-Fungi, D-Angiosperms
c) A-Turtles, B-Amphibians, C-Fungi, D-Angiosperms
d) A-Hexapoda, B-Amphibians, C-Fungi, D-Angiosperms

33. The soil which is transported by wind is known as
a) Colluvial soil   b) Eolian soil   c) Alluvial soil   d) Glacial soil

34. Ranthambor national park is situated in
a) Asom   b) Jharkhand   c) Uttarakhand   d) Rajasthan

35. Which of the following pairs of an animal and a plant represents endangered organisms in India?
a) *Bentinckia nicobarica* and red panda   b) Tamarind and rhesus monkey
c) *Cinchona* and leopard   d) Banyan and black buck

36. In which year, convention on the biodiversity came into force?
a) 1993   b) 1992   c) 1994   d) 1995

37. The narrowly utilitarian arguments for conserving biodiversity includes the following from the given list
I. Ecosystem services like photosynthesis
II. Industrial products like dyes and lubricants
III. Watching spring flowers in full bloom
IV. The aesthetic pleasure of walking through thick
V. Fibre, firewood and construction material
VI. Products of medicinal importance
Choose the correct option
a) I, II, III   b) II, III, VI   c) IV, V, VI   d) I, III, VI

38. The measure of the variety of species and their relative abundance present within a region is referred to as
a) Biodiversity   b) Genetic diversity   c) Species diversity   d) Ecological diversity

39. Chipko movement was launched for the protection of
a) Grasslands   b) Forests   c) Livestock   d) Wet lands

40. Chipko movement is related to
a) Swaminathan   b) Bahuhuna   c) Odum   d) Misra

41. The shifting cultivation method called jhum belongs to the category of
a) Industrial forestry   b) Agroforestry   c) Commercial forestry d) Social forestry

42. Which of the following is exhaustible but limited source of energy?
a) Nuclear fuel   b) Water energy   c) Fossil fuel   d) Solar energy

43. Sanjay Gandhi Biological Park is situated in
    a) Patna   b) Kanpur   c) Delhi   d) Bangaluru
44. The country whose tropical rain forests possess the greatest biodiversity on earth is
    a) New York   b) South America   c) India   d) England
45. The number of species per unit area is called
    a) Species richness   b) Species evenness   c) Species equitability   d) Species diversity
46. Which of the following is correctly matched?
    I. Alpha diversity – Number of species in a given habitat
    II. Genetic diversity – Variation of the genes within species
    III. Beta diversity – Diversity of the habitat in the whole region
    IV. Species diversity – Product of the species richness and evenness
    a) I, II and III   b) I and II   c) I, II, III and IV   d) I, II and IV
47. According to IUCN red list, what is the status of red Panda (*Athurus fulgens*)?
    a) Vulnerable species   b) Critically endangered species
    c) Extinct species   d) Endangered species
48. Most of the endangered species are the victims of
    a) Competition with introduced species   b) Habitat destruction
    c) Over-hunting   d) Acid rain
49. The part of earth in which life exists, is known as
    a) Lithosphere   b) Biosphere   c) Atmosphere   d) Hydrosphere
50. According to the IUCN 2004, the total number of plant and animal species described so far is
    over
    a) 2.5 million   b) 2 million   c) 1.5 million   d) 1 million
51. Which of these is an *in situ* method of conservation?
    a) National park   b) Botanical garden   c) Tissue culture   d) Genetic engineering
52. Identify the correct matched pair.
    a) Gir forest – Rhino   b) Kaziranga – Elephant
    c) Corbett park – Aves   d) Rann of Kutch- Wild ass
53. Biosphere reserves are different from national park as
    a) Plants and animals are protected in   b) Human are integral part of biosphere
       biosphere reserves   reserves
    c) Humans are not involved in biosphere   d) None of above
       reserves
54. Biosphere reserve programme started in India in
    a) 1986   b) 1984   c) 1982   d) 1988
55. Deforestation causes
    a) Thermal pollution   b) Noise pollution   c) Soil erosion   d) None of these
56. Lime is added to the soil which is too
    a) Sandy   b) Salty   c) Alkaline   d) Acidic
57. Rivet popper hypothesis assumes the …A… to be an aeroplane and the …B… to be the rivets,
    joining all parts together. Here *A* and *B* refers to
    a) A-species; B-ecosystem   b) A-ecosystem; B-species
    c) A-species; B-community   d) A-community; B-species
58. The total number of hot spots present in the world are
    a) 29   b) 25   c) 39   d) 34

59. Which of the following statements are correct about Amazon rainforest?
    I. They called lungs of the planet
    II. They harbours probably millions of the species
    III. They are largest trophical rainforest in south America and has highest biodiversity on earth
    IV. They are beings cut and cleared for cultivating soya-beans or for the conversion to grasslands
    for raising beef cattle

Choose the correct option
a) II, III and IV   b) I, II and III   c) I and II   d) I, II, III and IV
60. Disappearance of dionosaurs and a number of other organism is called
    a) Natural extinction   b) Anthropogenic extinction
    c) K-T boundary   d) Extinction vertex
61. Nehru Zoological Park is situated in
    a) Vishakhapattnam   b) Hyderabad   c) Chennai   d) Mysore
62. Which of the following is not done in a wildlife sanctuary?
    a) Fauna is conserved   b) Flora is conserved
    c) Soil and flora is utilized   d) Hunting is prohibited
63. A keystone species is the one that
    a) Causes other species to become extinct
    b) Exerts a strong influence on an ecosystem
    c) Has a weak influence on an ecosystem
    d) Has a higher likelihood of extinction than a non-keystone species
64. The reasons behind conserving biodiversity can be grouped into categories, which includes?
    I. Broadly utilitarian II. Narrowly utilitarian
    III. No utilitarian IV. Ethical utilitarian
    Choose the correct option
    a) I, II, III and IV   b) II, III and IV   c) I, II and IV   d) I, III and IV
65. Which one is not the renewable energy of natural resources?
    a) Tidal energy   b) Wind energy   c) Fossil fuel   d) Solar energy
66. Hoolock gibbon (India's only ape) is found in
    a) Kaziranga bird sanctuary   b) Hazaribagh national park
    c) Corbett national park   d) Gir national park
67. The government of India in 1980s has introduced a concept to work closely with the local
    communities for protecting and managing forests. The concept is
    a) Forest research institutes   b) Panel of local communities for forest
                                                  management
    c) Joint forest management   d) Jhum cultivation
68. If we remove half of the forest cover of earth, the crisis that will occur
    a) Many species would become extinct
    b) Population, pollution and ecological imbalance will rise
    c) Energy crisis will commence
    d) The remaining forest will correct the imbalance
69. Sacred grooves in India are related with
    a) Cultural tradition
    b) It is the place where threatened species are protected
    c) It is the place where only artificial animal breeding is allowed
    d) Forest patches around the places of worship

70. Which of the following shows maximum, greater and minimum diversity?
    A

Animals	Species	Members
Bird	I	1
Bird	II	1
Bird	III	4

B

Animals	Species	Members
Bird	I	2
Bird	II	2
Mammal	III	2

C

Animals	Species	Members
Bird	I	2
Mammal	II	2
Insect	III	2

a) A-Minimum diversity, B-Greater diversity, C-Maximum diversity
b) A-Maximum diversity, B-Greater diversity, C-Minimum diversity
c) A-Maximum diversity, B-Maximum diversity, C-Greater diversity
d) A-Minimum diversity, B-Maximum diversity, C-Greater diversity