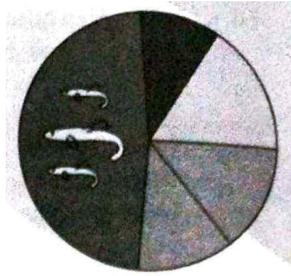


# 13 Biodiversity and Conservation



## 13.1 Biodiversity

1. These are regarded as major causes of biodiversity loss:

- Over-exploitation
- Co-extinction
- Mutation
- Habitat loss and fragmentation
- Migration

Choose the correct option:

- (I), (II), (III) and (IV) only
- (I), (II) and (V) only
- (I), (II) and (IV) only
- (I), (III) and (IV) only

[NEET 2024]

2. List of endangered species was released by:

(A) WWF	(B) FOAM
(C) IUCN	(D) GEAC

[NEET 2024]

3. Match List I with List II:

List I	List II
(a) Robert May	(i) Species-Area relationship
(b) Alexander von Humboldt	(ii) Long term ecosystem experiment using outdoor plots
(c) Paul Ehrlich	(iii) Global species diversity at about 7 million
(d) David Tilman	(iv) Rivet popper hypothesis

Choose the correct answer from the options given below:

(a)	(b)	(c)	(d)
-----	-----	-----	-----

- (iii) (i) (iv) (ii)
- (i) (iii) (ii) (iv)
- (iii) (iv) (ii) (i)
- (ii) (iii) (i) (iv)

[NEET 2024]

4. Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?

- Alien species invasions
- Co-extinctions
- Habitat loss and fragmentation
- Over-exploitation for economic gain

[NEET 2023]

5. Habitat loss and fragmentation, over-exploitation, alien species invasion and co-extinction are causes for:

(A) Competition	(B) Biodiversity loss
(C) Natality	(D) Population explosion.

[NEET 2022]

6. According to Alexander von Humboldt:

- species richness goes on increasing with increasing area of exploration
- species richness decreases with increasing area of exploration
- species richness increases with increasing area, but only up to limit
- there is no relationship between species richness and area explored.

[NEET Phase-II 2020]

7. Which of the following regions of the globe exhibits highest species diversity?

- Madagascar
- Himalayas
- Amazon forests
- Western Ghats of India

[NEET 2020]

8. According to Robert May, the global species diversity is about:

(A) 20 million	(B) 50 million
(C) 7 million	(D) 1.5 million.

[NEET Sept. 2020]

9. Decline in the population of Indian native fishes due to introduction of *Clarias gariepinus* in river Yamuna can be categorised as:

- Alien species invasion
- Co-extinction
- Habitat fragmentation
- Over-exploitation.

[NEET Odisha 2019]

10. Alexander Von Humboldt described for the first time:

- Laws of limiting factor
- Species-area relationships
- Population growth equation
- Ecological biodiversity.

[NEET 2017]

11. Red List contains data or information on:

- all economically important plants
- plants whose products are in international trade
- threatened species
- marine vertebrates only. **[NEET Phase-II 2016]**

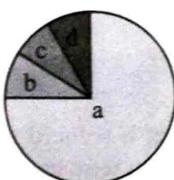
12. Which is the National Aquatic Animal of India?

- River dolphin
- Blue whale
- Sea-horse
- Gangetic shark **[NEET Phase-I 2016]**

13. Which of the following is the most important cause of animals and plants being driven to extinction?

- Alien species invasion
- Habitat loss and fragmentation
- Co-extinctions
- Over-exploitation **[NEET Phase-I 2016]**

14. Given below is the representation of the extent of global diversity of invertebrates. What groups the four portions (a-d) represent respectively?



	a	b	c	d
(A)	Insects	Crustaceans	Other animal groups	Molluscs
(B)	Crustacean	Insects	Molluscs	Other animal groups
(C)	Molluscs	Other animal Groups	Crustacean	Litter fall
(D)	Insects	Molluscs	Crustacean	Other animal groups

**[AIPMT 2014]**

15. The organisation which publishes the Red List of species is:

- ICFRE
- IUCN
- UNEP
- WWF. **[AIPMT 2014, NEET 2013]**

16. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold Northern regions move to:

- Western Ghat
- Meghalaya

(C) Corbett National Park

(D) Keoladeo National Park **[AIPMT 2014]**

17. The largest tiger reserve in India is:

- Valmiki
- Nagarjunasagar-Srisailam
- Periyar
- Nagarhole. **[NEET Karnataka 2013]**

18. Which organisation publishes the 'Red Data Book'?

- IUCN
- UNEP
- WWF
- GEF **[NEET Karnataka 2013]**

19. Which of the following represent maximum number of species among global biodiversity?

- Algae
- Lichens
- Fungi
- Mosses and ferns **[NEET 2013, AIPMT 2012]**

20. Which of the following has maximum genetic diversity in India?

- Mango
- Wheat
- Groundnut
- Rice **[NEET Karnataka 2013, AIPMT Screening 2011, 2000]**

21. Maximum nutritional diversity is found in the group:

- Fungi
- Animalia
- Monera
- Plantae. **[AIPMT Screening 2012]**

22. Which one of the following have the highest number of species in nature?

- Insects
- Birds
- Angiosperms
- Fungi **[AIPMT Screening 2011]**

23. Biodiversity of a geographical region represents:

- endangered species found in the region.
- the diversity in the organism living in the region.
- genetic diversity present in the dominant species of the region.
- species endemic to the region. **[AIPMT Mains 2011]**

24. Which one of the following has maximum genetic diversity in India?

- Teak
- Mango
- Wheat
- Tea **[AIPMT Screening 2009]**

25. The table gives the populations (in thousands) of ten species (I-X) in four areas (a-d) consisting of the number of habitats given within brackets against each. Study the table and answer the question which follows:

Area and number of habitats	Species and their populations (in thousands) in the areas									
	I	II	III	IV	V	VI	VII	VIII	IX	X
a (11)	23	1.2	0.52	6.0	—	3.1	1.1	9.0	—	10.3
b (11)	10.2	—	0.62	—	1.5	3.0	—	8.2	1.1	11.2
c (13)	11.3	0.9	0.48	2.4	1.4	4.2	0.8	8.4	2.2	4.1
d (12)	3.2	10.2	11.1	4.8	0.4	3.3	0.8	7.3	11.3	2.1

Which area out of a to d shows maximum species diversity?

(A) b (B) c  
(C) d (D) a

[AIPMT Screening 2008]

26. Identify the odd combination of the habitat and the particular animal concerned.

(A) Sunderbans — Bengal Tiger  
(B) Periyar — Elephant  
(C) Rann of Kutch — Wild Ass  
(D) Dachigam — Snow Leopard

National Park

[AIPMT 2007]

27. Which of the following pairs of an animal and a plant represents endangered organisms in India?

(A) Banyan and black duck  
(B) *Bentinckia nicobarica* and red panda  
(C) *Tamarind* and *Rhesus monkey*  
(D) *Cinchona* and leopard

[AIPMT 2006]

28. According to IUCN Red List, what is the status of Red Panda (*Ailurus fulgens*)?

(A) Critically endangered species  
(B) Vulnerable species  
(C) Extinct species  
(D) Endangered species

[AIPMT 2005]

29. Which endangered animal is the source of the world's finest, lightest, warmest and most expensive wool—the shahtoosh?

(A) Nilgai (B) Cheetah  
(C) Kashmiri goat (D) Chiru

[AIPMT 2003]

30. Number of wildlife is continuously decreasing. What is the main reason of this?

(A) Predation  
(B) Cutting down of forest  
(C) Destruction of habitat  
(D) Hunting

[AIPMT 2002]

31. Which group of vertebrates comprises the high number of endangered species?

(A) Mammals (B) Fishes  
(C) Reptiles (D) Birds

[AIPMT 2003]

32. Wildlife is destroyed most when:

(A) there is lack of proper care  
(B) mass scale hunting for foreign trade

(C) its natural habitat is destroyed

(D) natural calamity. [AIPMT 2002, 1998, 94]

33. The endangered largest living lemur *Indri indri* is found in:

(A) Sri Lanka (B) Madagascar  
(C) Mauritius (D) India. [AIPMT 2000]

34. Which animal has gone extinct in recent times in India?

(A) *Panthera leo* (B) *Acinonyx jubatus*  
(C) *Antilope cervicapra* (D) *Rhinoceros unicornis*

[AIPMT 1999]

35. Flamingos breed in:

(A) Rann of Kutch (B) Chilka lake  
(C) Sambhar lake (D) Mansarover Lake

[AIPMT 1996]

36. If the forest cover is reduced to half, what is most likely to happen on a long term basis?

(A) Tribals living in these areas will starve to death.  
(B) Cattle in these and adjoining area will die due to lack of fodder.  
(C) Large areas will become deserts.  
(D) Crop breeding programmes will suffer due to a reduced availability of variety of germplasm.

[AIPMT 1996]

37. The breeding place of Flamingo (Hansawar) in India is most likely:

(A) Rann of Kutch (B) Ghana Vihar  
(C) Sambhar lake (D) Chilka lake.

[AIPMT 1996]

38. Which animal has become extinct from India?

(A) Snow leopard (B) *Hippopotamus*  
(C) Wolf (D) Cheetah [AIPMT 1994]

39. Species diversity increases as one proceeds from:

(A) high altitude to low altitude and high latitude to low latitude  
(B) low altitude to high altitude and high latitude to low latitude  
(C) low altitude to high altitude and low latitude to high latitude  
(D) high altitude to low altitude and low latitude to high latitude [AIPMT 1994]

40. American water plant that has become a troublesome water weed in India is:

(A) *Cyperus rotundus* (B) *Eichhornia crassipes*  
(C) *Trapa latifolia* (D) *Trapa bispinosa*.

[AIPMT 1993]

### 13.2. Biodiversity Conservation

41. The regions with high level of species richness, high degree of endemism and a loss of 70% of the species and habitat are identified as:

(A) Natural Reserves  
(B) Sacred Groves  
(C) Biodiversity Hotspots  
(D) Biogeographical Regions

[Re-NEET 2024]

42. Which one of the following is not included under *in-situ* conservation?

(A) Wild-life sanctuary (B) Botanical garden  
(C) Biosphere reserve (D) National park

[Re-NEET 2024]

43. Cryopreservation technique is used for

(A) Protection of environment  
(B) Protection of Biodiversity hotspots.  
(C) Preservation of gametes in viable and fertile condition for a long period.  
(D) *In-situ* conservation.

[Re-NEET 2024]

44. Match List-I with List-II:

List-I	List-II
(a) Biodiversity hotspot	(i) Khasi and Jantia hills in Meghalaya
(b) Sacred groves	(ii) World Summit on Sustainable Development 2002
(c) Johannesburg, South Africa	(iii) <i>Parthenium</i>
(d) Alien species invasion	(iv) Western Ghats

Choose the correct answer from the options given below:

(a) (b) (c) (d)  
(A) (iv) (i) (ii) (iii)  
(B) (ii) (iii) (iv) (i)  
(C) (i) (iv) (iii) (ii)  
(D) (iii) (i) (ii) (iv)

[Re-NEET 2024]

45. The type of conservation in which the threatened species are taken out from their natural habitat and placed in special setting where they can be protected and given special care is called:

(A) Biodiversity conservation  
(B) Semi-conservative method  
(C) Sustainable development  
(D) *In-situ* conservation

[NEET 2024]

46. The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year:

(A) 1986 (B) 2002  
(C) 1985 (D) 1992

[NEET 2023]

47. Which of the following is not a method of *ex-situ* conservation?

(A) National Parks (B) Micropropagation  
(C) Cryopreservation (D) *In-vitro* fertilisation

[NEET 2022]

48. *In-situ* conservation refers to:

(A) conserve only high risk species  
(B) conserve only endangered species  
(C) conserve only extinct species  
(D) protect and conserve the whole ecosystem.

[NEET 2022]

49. In the following in each set a conservation approach and an example of method of conservation are given.

(I) *In-situ* conservation- Biosphere reserve  
(II) *Ex-situ* conservation- Sacred groves  
(III) *In-situ* conservation- Seed bank  
(IV) *Ex-situ* conservation- Cryopreservation

Select the option with correct match of approach and method.

(A) (I) and (III) (B) (I) and (IV)  
(C) (II) and (IV) (D) (I) and (II)

[NEET Oct. 2020]

50. Western Ghats have a large number of plant and animal species that are not found anywhere else.

Which of the following terms will you use to notify such species?

(A) Keystone (B) Endemic  
(C) Vulnerable (D) Threatened

[NEET Odisha 2019]

51. All of the following are included in *ex-situ* conservation except:

(A) botanical gardens (B) sacred groves  
(C) wildlife safari parks (D) seed banks.

[NEET 2018]

52. The region of biosphere reserve, which is legally protected and where no human activity is allowed is known as:

(A) core zone (B) buffer zone  
(C) transition zone (D) restoration zone.

[NEET 2017]

53. Which one of the following is related to *ex-situ* conservation of threatened animals and plants?

(A) Wildlife Safari parks (B) Biodiversity hotspots  
(C) Amazon rainforest (D) Himalayan region

[NEET 2017]



70. A number of natural reserves have been created to conserve specific wildlife species. Identify the correct combination from the following:

(A) Gir forest	— Tiger
(B) Kaziranga	— Elephants
(C) Rann of Kutch	— Wild Ass
(D) Manas wild life Sanctuary	— Musk deer

[AIPMT 1996]

71. Which of the following is the correct matching pair of a sanctuary and its main protected wild animal?

(A) Gir	— Lion
(B) Sariska	— Tiger

(C) Sunderban — Rhino

(D) Kaziranga — Musk deer

[AIPMT 1995]

72. National Park associated with rhinoceros is:

(A) Kaziranga	(B) Ranthambore
(C) Corbett	(D) Valley of flower.

[AIPMT 1994]

73. Ranthambore National Park is situated in:

(A) Maharashtra	(B) Rajasthan
(C) Gujarat	(D) U.P.

[AIPMT 1994]

## SOLUTIONS

1. (C) The major causes of biodiversity loss are as follows:

- (1) **Over-exploitation:** This refers to the unsustainable use of natural resources, which can lead to the decline of species.
- (2) **Co-extinction:** When one species goes extinct, another species that depended on it may also perish.
- (3) **Habitat loss and fragmentation:** This is a primary cause of biodiversity loss, as it reduces the living space and resources available to species.

### Related Theory

- *Mutations are random genetic changes which can be beneficial, neutral, or harmful, but they do not typically drive biodiversity loss.*
- *Migration is a natural process by which species move from one location to another, often for survival purposes, and does not inherently lead to biodiversity loss.*

2. (C) The list of endangered species was released by the International Union for Conservation of Nature (IUCN), which maintains the IUCN Red List of threatened species.

### Related Theory

- *This list is widely recognised as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species.*

3. (A) Robert May made a more conservative and scientifically sound estimate and places the global species diversity at about 7 million.

Alexander von Humboldt during his pioneering and extensive explorations in the wilderness of South American jungles observed that within a region species richness increased with increasing explored area, but only up to a limit.

Paul Ehrlich proposed the "Rivet Popper Hypothesis" that suggests the importance of species richness in the maintenance of the ecosystem.

David Tilman's long-term ecosystem experiments using outdoor plots found that plots with more species showed less year-to-year variation in total biomass. He also showed that in his experiments, increased diversity contributed to higher productivity.

4. (C) 'The Evil Quartet' refers to the four major drivers of biodiversity loss and species extinction, which are habitat loss and fragmentation, overexploitation for economic gain, alien species invasions, and co-extinctions. Among all these causes habitat loss and fragmentation is considered the most important cause driving extinctions of species.

### Related Theory

- *Over-exploitation for economic gain refers to the unsustainable use of natural resources such as wildlife, fisheries, and forests, which can lead to the depletion of these resources and the extinction of species the most important cause driving extinction of species.*

5. (B) The Evil Quartet is related to four major causes of biodiversity loss i.e., habitat loss and fragmentation, over exploitation, alien species invasion, co-extinctions. Natality refers to the number of births during a given period in a population that are added to the initial density. When the population surpasses its carrying capacity, there is a dramatic surge in population. This is called population explosion. An ecosystem's biodiversity is lost when the available resources are overused, habitat is fragmented or an alien species invade the area.

6. (C) The German naturalist and geographer Alexander von Humboldt observed that species richness goes on increasing with discovered area of the habitat or part of habitat, but only up to a limit, called it species area relationship or species area curve.

7. (C) One in ten known species in the world lives in the Amazon rainforest. 40,000 plant species, 3,000 freshwater fish species, 1300 of birds, 427 of

mammals, 427 of amphibians, 378 of reptiles and more than 1,25,000 invertebrates. Such a huge flora and fauna found here is because of its tropical rain forest climatic conditions.

8. (C) Robert May estimated the global species diversity to be about 7 million. Other scientists estimated its range from 20-50 million. India has only 2.4% of the world's land area and its share of global species diversity counts to 8.1%.

### Related Theory

→ It is estimated that 15 million different species live on our planet, but only 2 million of them are currently known to science. Discovering new species is important as it helps to protect them. Furthermore, new species can also produce compounds that could lead to the development of new medicine.

9. (A) One of the four Evil Quartet is alien species invasion for e.g., *Clarias gariepinus*, in river Yamuna, *Eichhornia crassipes* found in Assam, *Lantana camara* found in Grah Himalayas, *Parthenium hysterophorus* found in North-western Himalayas. The recent illegal introduction of the African catfish *Clarias gariepinus* for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.

10. (B) Alexander von Humboldt observed that species richness goes on increasing with discovered area of the habitat or part of habitat, but only up to a limit, called it species area relationship. If S is the number of species, A is the habitat area and Z is the slope of species area relationship in log then, the power function species area relationship goes as:

$$\log S = \log C + Z \log A$$

11. (C) The IUCN Red List provides taxonomic data, conservation status, and distribution information on species that are facing a high risk of global extinction. It defines the extinction risk of species assessed.

### Related Theory

→ Currently, there are more than 134,400 species on The IUCN Red List, with more than 37,400 species threatened with extinction, including 41% of amphibians, 34% of conifers, 33% of reef building corals, 26% of mammals and 14% of birds.

12. (A) The ministry of environment and forests declared gangetic dolphin (*Platanista gangetica*) as National aquatic animal of India on 18<sup>th</sup> May 2010.

### Related Theory

→ The Ganges River Dolphin or also called 'Susu' is the National Aquatic Animal of India. It is one of the National Symbols of India. Gangetic Dolphins are found in the river systems of Ganga, Brahmaputra, Meghna, and Karnaphuli-Sangu in Nepal, India, and Bangladesh.

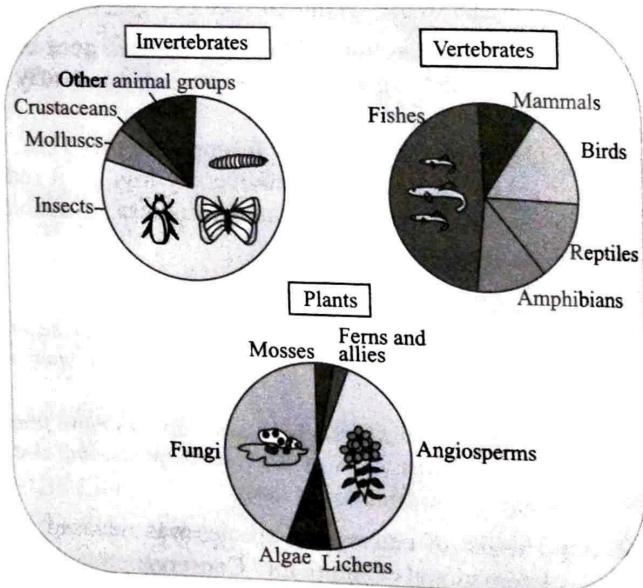
13. (B) Members of the endangered species cannot meet and breed as result of habitat loss, habitat fragmentation

or geographical distance leading to genetic erosion of animal species. Alien invasive species replace, and often result in the extinction of native species. Over-harvesting and over-hunting for food, fashion and medical purposes has caused significant reduction in species and endangers many more. Co-extinction occurs when two or more species are dependent on each other for their survival.

### Related Theory

→ Habitat loss and fragmentation is a very important cause of species extinction. The deforestation of tropical forests is expected to be the greatest cause of mass extinctions caused by human activity. Cutting down forests and hedge rows to provide agricultural land has increased. The loss of tropical forests, which holds 50% of the world's biodiversity proving to be the most significant threat to species in the modern age. This leads to fragmentation of habitats and species which require large habitats-such as bears cannot survive if the area is too small.

14. (D)



### Caution

→ Students should know that these pie charts are very important and are frequently asked in exams.

15. (B) The International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data List), founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species (Animal, fungus and plant species). ICFRE (Indian Council of Forestry Research and Education) conduct research and educates the people about forestry. UNEP (United Nations Environment Programme) coordinate its environmental activities, assisting developing countries in implementing environmentally sound policies and practices. WWF (World Wide Fund for nature) works on issues regarding the conservation, research and restoration of environment.

## Related Theory

→ The IUCN Red List shows us where and what actions need to be taken to save the building blocks of nature from extinction. It provides a straightforward way biodiversity needs into decision-making processes by providing a wealth of useful information on species. It is a critical indicator of the health of the world's biodiversity and a powerful tool to inform and catalyse action for biodiversity conservation and policy to survive. It provides information about range, population size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary decisions.

16. (D) Every year, during winters, Keoladeo National Park (Bharatpur Bird Sanctuary) host thousands of migratory birds from Siberia (Atlantic ocean) to escape extremely cold climate.

## Related Theory

→ Bird migration is important because they provide ecosystem benefits including pest control, pollination of plants and serve as food sources for other wildlife. However, birds suffer higher mortality on migration, because of increased risk of predation and starvation resulting from higher energetic requirements and unpredictable food supplies. Longer journey increase these risks, and may therefore lead to population declines.

17. (B) Nagarjunasagar-Srisailam tiger reserve is the largest tiger reserve in India, located in Andhra Pradesh. The reserve spreads over five districts, Nandyal District, Prakasam District, Palnadu District, Nalgonda District and Mahabub Nagar district. The total area of the tiger reserve is 3,728 km<sup>2</sup> (1,439 sq mi). The core area of this reserve is 1,200 km<sup>2</sup> (460 sq mi). The reservoirs and temples of Srisailam are major attraction for many tourists and pilgrims. It is the largest tiger reserve forest in India and is located inside Nallamala forest area.

18. (A) The International Union for Conservation of Nature (IUCN) maintains the Red Data Book. It is a public document which is created for recording endangered and rare species of plants, animals, fungi as well as some local subspecies which are present in a particular region. It helps us in providing complete information for research, studies and also for monitoring the programs on rare and endangered species and their habitats.

## Related Theory

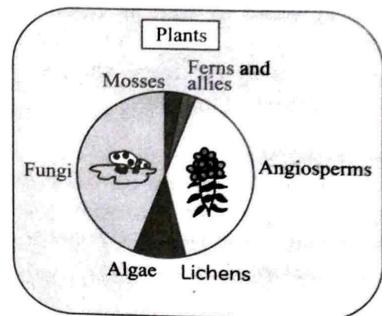
→ Red Data Book of India includes the conservation status of animals and plants which are endemic to the Indian subcontinent. The data for this book is provided through surveys which are conducted by the Zoological Survey of India and the Botanical Survey of India under the guidance of the Ministry of Environment, Forest and Climate Change.

## Caution

→ Students usually get confused between the red list and Red Data Book. They should understand that the red list contains only the names of the endangered species; however, the Red Data Book contains the information about the species that are on the verge of extinction.

19. (C) Global diversity in plant kingdom:

Angiosperms > fungi > algae > mosses > ferns > lichens



## Mnemonics

→ The order can be learned using the following mnemonic:

Acche Fool Aaye Mausi Foofi ke Liye

Acche — Angiosperms

Fool — Fungi

Aaye — Algae

Mausi — Mosses

Foofi — Ferns

Liye — Lichens

20. (D) Genetic diversity is the measure of variety in genetic information contained in the organism. *Oryza sativa* (rice) has 32,000 – 50,000 genes. There are 1000 varieties of mango, 448 varieties of wheat and 238 varieties of groundnut.

21. (C) Maximum nutritional diversity is shown by the members of kingdom – Monera. Some of them are autotrophic (e.g., photosynthetic autotrophic or chemosynthetic autotrophic) while the vast majority are heterotrophs (e.g., saprotrophic or parasitic). Organisms belonging to the group Plantae include all the autotrophic forms while Fungi and Animalia include all the heterotrophic forms only.

22. (A) More than 70% of all the species recorded are animals. Among animals, insects are the most species rich taxonomic group, making more than 70% of the total. It means out of every 10 animals on this planet, 7 are insects.

23. (B) The term biodiversity (or biological diversity) refers to the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life.



### Related Theory

→ We value biodiversity both for what it provides to humans, and for the value it has in its own right. Utilitarian values include the many basic needs humans obtain from biodiversity such as food, fuel, shelter, and medicine. Ecosystems provide crucial services such as pollination, seed dispersal, climate regulation, water purification, nutrient cycling and control of agricultural pests.

24. (B) Genetic diversity is the diversity in the number and types of genes as well as chromosomes present in different species and the variation in the genes and their alleles in the same species. India has about 1000 varieties of mango.



### Related Theory

→ Crop diversity enables farmers and plant breeders to develop higher yielding, more productive varieties that have the improved quality characteristics required by farmers and desired by consumers.



### Caution

→ Students should remember that India has more than 50,000 genetically diverse varieties of rice. Thus, if one of the options is rice, then it would be the correct option.

25. (C) Species diversity is defined as the number of different species present in an ecosystem and relative abundance of each of those species. Diversity is greatest when all the species present are equally abundant in the area.

In the given table:

$$\text{Area a - species diversity} = \frac{8}{11}$$

$$\text{Area b - species diversity} = \frac{7}{11}$$

$$\text{Area c - species diversity} = \frac{10}{13}$$

$$\text{Area d - species diversity} = \frac{10}{12}$$

Thus, area d has maximum species diversity.



### Related Theory

→ There are two constituents of species diversity:

- (1) **Species richness:** Number of different species present in an ecosystem.
- (2) **Species evenness:** Relative abundance of individuals of each of those species.

26. (D) Dachigam national park, in Jammu Kashmir is for conservation of Hangul which is one of India's most scenically beautiful wildlife reserves. Due to the vast variation, the park is very clearly demarcated into an upper and lower region. The best times to explore these two areas are summer and winter respectively.

27. (B) Endangered species is a plant or animal species defined by IUCN as being in immediate danger of extinction because its members have reached a critical level or their habitats have been drastically reduced. A plant, *Bentinckia condapanna dnicobarica* (member of family Arecaceae) and the animal, Red panda, both are declared as endangered in India. Tamarind, Banyan, etc., are not endangered in India.

28. (D) Red panda is listed as Endangered on the IUCN Red List. Endangered species are those species which are on verge of becoming extinct. Due to deforestation, poaching, red pandas are at very high risk of being extinct. Its population has declined below 50% in last three generation. A species is classified as critically endangered when its population has declined at least 90% and the cause of the decline is known. A species is vulnerable if its population has declined at least 50% and the cause of the decline is known. The animals that no longer exist on Earth are called extinct animals. Example: Dinosaurs, Dodo, etc.

29. (D) Shahtoosh comes from the short, warm fleece of the rare Tibetan antelope (*Pantholops hodgsonii* - Chiru), a species found almost exclusively in the Changtang area of Tibet, on the Tibetan Plateau. It takes four animals to provide enough wool for just one shahtoosh shawl or scarf.



### Related Theory

→ Despite legal protection of the highest order, the population of chiru is constantly on the decline and today the species is extremely endangered.

30. (C) Habitat loss and fragmentation is a very important cause of species extinction. The deforestation of tropical forests is expected to be the greatest cause of mass extinctions caused by human activity. Cutting down forests and hedgerows to provide agricultural land has increased. The loss of tropical forests, which holds 50% of the world's biodiversity proving to be the most significant threat to species in the modern age. This leads to fragmentation of habitats and species which require large habitats such as bears cannot survive if the area is too small.



### Related Theory

→ The accelerated rate of species extinction that the world is facing now is largely due to human activities. This is due to habitat loss and fragmentation, over-exploitation, introduction or invasion of alien species, pollution, climate change and co-extinction.

31. (A) Mammals are the most complex animals that cannot easily adapt the environmental changes and some mammals are used as a source of industrial raw materials. Thus, due to climatic change and

hunting their population is getting down and become endangered. Mammalian species have the highest number of endangered species (177), accounting for 3.8% of all vertebrate species.

### Related Theory

→ Fish (including sharks) make up the largest group of vertebrates. Nearly half of all vertebrates are fish. The insect is the largest class of animals. It has over 7,00,000 species.

32. (C) When a habitat is destroyed, the carrying capacity for plants, animals, and other organisms is reduced so that populations decline, sometimes up to the level of extinction. Habitat loss is perhaps the greatest threat to organisms and biodiversity.

33. (B) Lemurs are a prominent animal in Madagascar. The Indri (*Indri indri*), which inhabits the montane forests of eastern Madagascar. All lemur species are currently in risk of extinction, primarily as a result of habitat loss (deforestation) and hunting.

34. (B) *Acinonyx jubatus* (Indian cheetahs) usually referred to as Asiatic cheetahs, have long been recognised as existing in India. The fastest land animal on Earth has gone extinct in India as a result of habitat degradation, deforestation, and access hunting. It was discovered in semi-desert regions of Rajasthan and Gujarat as well as other open habitats with accessible prey.

35. (A) Rann of Kutch, which is located in Gujarat, is often referred to as the Flamingo City. It is home to many stunning pink flamingos. After each monsoon, these birds migrate here from Central Asia to construct their nests. They breed throughout the winter in shifts, and then they vanish during the summer.

36. (C) A forest will eventually result in the construction of a desert or the process of desertification if it is cut in half, which indicates a drop in the vegetation cover. Formation of a desert or the process of desertification will take place. As we know that in an ecosystem there is the chain of balance and trees are an integral part of this system. As there will be a reduction in the number of trees the ecosystem will be disturbed and it might lead to the process of desertification.

37. (A) Flamingos are beautiful pink birds. Their breeding place in India is situated in Gujarat, Rann of Kutch. It is also known as the Flamingo city. It houses a great number of beautiful pink flamingos.

### Related Theory

→ Flamingo birds fly here from central Asia after each monsoon to build their nests, breeding in shifts through the winter and in summer they disappear. It is a major attraction for tourists. Every year thousands of greater and lesser flamingos migrate

to Mumbai. While the lesser flamingos take a journey south from Kutch, Gujarat, which is the creatures' main breeding ground in India.

38. (D) Indian cheetah also known as Asiatic cheetah have been known to exist in India for a very long time. Due to excess hunting, deforestation and habitat loss, cheetah, the fastest land animal in Earth become extinct in India.

### Related Theory

→ In India, many animal species are on the verge of extinction and they have been listed in the critically endangered species. Over the past years, more than 30% of the land area in our country has been damaged due to deforestation, over-cultivation, soil erosion, and similar reasons.

39. (A) Species diversity increases as one proceeds from high altitude to low altitude and high latitude to low latitude. The temperature and seasonal variability increases with increased altitude and decreased latitude. Hence, this results in higher species diversity in these areas.

40. (B) The plant known as the water hyacinth (*Eichhornia crassipes*) is indigenous to the Amazon basin in the America. It was brought to India and other countries since it was such a beautiful plant. However, it expanded quickly, generating thick mats that could cover water surfaces and eventually enclose the entire body of water.

41. (C) A biodiversity hotspot is a biogeographical region with uncommon engrossment of species, mostly are endemic which is marked by serious threatened to its biodiversity by human habitation. To be eligible as a hotspot, a biogeographical region must meet two exacting criteria first is endemism that must accommodate 1,500 species of vascular plants and secondly is the habitat loss which means it has to lost 70% of its native habitat.

### Related Theory

→ Natural reserves are the protected areas where the flora and fauna are conserved without disturbing inhabitants.

→ Sacred groves are the smaller natural areas of vegetation due to religious belief particular community conserved these forests in the name of god.

42. (B) *In-situ* conservation is defined as the provide protection of all the living organisms especially endangered species in their natural home. Wild-life sanctuary, Biosphere reserve, National parks are all come under is *ex-situ* conservation except Botanical garden as it is *ex-situ* conservation.

43. (C) Cryopreservation is used for preservation of gametes in viable and fertile condition for long period at very low temperature of liquid nitrogen of -196°C.

44. (A) Western ghat is a biodiversity hotspot.  
Khasi and Jantia hills in Meghalaya are sacred groves.  
World summit on Sustainable Development 2002 was held in Johannesburg, South Africa.  
*Parthenium* was an alien species invasion.

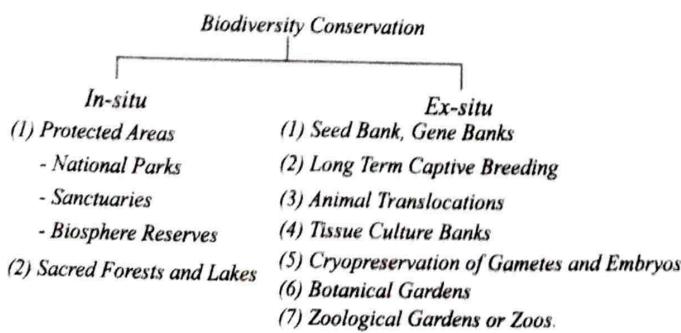
45. (A) In *ex-situ* conservation, threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care. Zoological parks, botanical gardens and wildlife safari parks serve this purpose. *Ex-situ* conservation is a type of biodiversity conservation.

46. (D) The historic Convention on Biological Diversity, also known as "The Earth Summit," was held in Rio de Janeiro in the year 1992. The Convention on Biological Diversity is an international treaty that aims to conserve biodiversity, ensure sustainable use of its components, and ensure the fair and equitable sharing of benefits arising from the utilization of genetic resources.  
The Rio Summit, held from 3 to 14 June 1992, was attended by representatives of 178 countries, as well as various non-governmental organizations and other stakeholders. The Convention on Biological Diversity was signed on 5 June 1992, and entered into force on 29 December 1993.

47. (A) *In-situ* conservation is the production and management of important components of biological diversity through a network of protected areas. *Ex-situ* conservation is the conservation of selected rare plants or animals in places outside the natural forms. National parks are type of *in-situ* conservation.  
Micropropagation, cryopreservation, *in-vitro* fertilisation are methods of *ex-situ* conservation.

48. (D) *In-situ* conservation, the conservation of species in their natural habitats, is considered the most appropriate way of conserving biodiversity. Conserving the areas where populations of species exist naturally is an underlying condition for the conservation of biodiversity. That's why, *in-situ* conservation includes the protection and conservation of the whole ecosystem.

### Related Theory

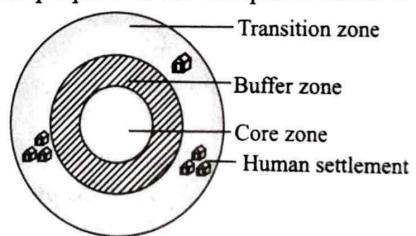


49. (B) In *in-situ* conservation, important components of biological diversity are protected and managed through protected areas, biosphere reserves and sacred forests or lakes. While, *ex-situ* conservation includes off site collection and gene banks, where germplasm, tissue or embryos are stored in preserved condition using various technologies like orchards, tissue culture and cryopreservation.

50. (B) Endemism is the condition in which a species is only found in a single, clearly defined geographic area, such as an island, state, country, or other geographically defined region. Such as the lion-tailed macaque (*Macaca silenus*) found in the Western Ghats and the Nilgiri tahr (*Hemitragus hylocrius*).

51. (B) Sacred groves is a mode of *in-situ* conservation, in which forest fragments are protected by religious communities. It helps to protect the biota of that area. Botanical gardens, seed banks and wildlife safari parks are modes of *ex-situ* conservation.

52. (A) Biosphere reserve consist of three zones *i.e.*, core, buffer and transition zone. Core zone comprises an undisturbed and legally protected ecosystem, where no human activity is allowed. Buffer zone surrounds the core area and transition zone is the outermost area of biosphere reserve where active cooperation between reserve management and local people occur with the purpose of the biosphere reserve.



Zonation in Terrestrial Biosphere

### Mnemonics

→ The order of zones in terrestrial biosphere can be memorised using the following mnemonic:  
**Three Buffalo Came for Hunting**  
**T**hree — Transition zone  
**B**uffalos — Buffer zone  
**C**ame — Core zone  
**H**unting — Human settlement

53. (A) Wildlife safari parks are *ex-situ* conservation of threatened animals and plants, as they are taken out of their natural habitat and protected under special (artificial) conditions. Biodiversity hotspots, Amazon rainforests and Himalayan region are areas of *in-situ* conservation.

### Related Theory

→ *In-situ* conservation is the method of conserving all the living species, especially the wild and endangered species in their natural habitats and environment. It includes biosphere

reserves, national parks, wildlife sanctuaries, etc. Ex-situ conservation is the method of conserving all the living species in the artful habitats that reflect their natural living habitats. It comprises of aquariums, botanical gardens, cryopreservation, DNA banks, zoos, etc.

54. (C) There are total 34 biodiversity hotspots all over the world. Asia-pacific have the highest number of biodiversity hotspots continent wise. Biodiversity hotspots are regions with a significantly high level of flora and fauna that are threatened by human intervention and activities. A hotspot is a natural habitat that has at least more than 0.5% of total vascular plants as endemic species and is under threat due to human activities. The 34 hotspots identified till date cover only 2.3% of total earth's surface area but their habitat constitutes 77% of the world's species.

### Related Theory

- Biodiversity hotspots in India are Himalaya, Indo-Burma, Sundalands, Western Ghats and Sri Lanka.
- According to 2020 reports, there are 36 hotspots in total.

55. (C) Endemic species are plant and animal species that are found in a particular geographical region and nowhere else in the world. Some species are endemic to a continent while the others can be endemic to an island. A keystone species is an organism that helps define an entire ecosystem. Alien species are species that occur outside their natural range and dispersal potential. Rare species are those which are uncommon in nature and exist in a very low population.

### Caution

- Vulnerable species on the other hand are neither less populated nor uncommon. Rare species may move into vulnerable or endangered category but vulnerable species are already into danger of extinction.

56. (A) The process of protecting an endangered plant or animal species in its natural habitat is commonly known as *in-situ* conservation. It includes national parks, wildlife sanctuaries and sacred groves. On the other hand, *ex-situ* conservation involves the relocation of endangered or rare species from their natural habitats to protected areas. It includes botanical gardens, cryopreservation, seed banks and tissue cultures.

57. (B) Cryopreservation is the method of *ex-situ* preservation, in which the seeds and embryos are preserved outside their natural habitat at low temperatures.

### Related Theory

- Cryopreservation is a method of preserving biological tissue or cells at extremely low temperatures (-196°C). Although there are many applications of cryopreservation, the most common uses of the process are to preserve sperm, embryos, eggs and plant seeds.

58. (B) *Ex-situ* conservation involves the relocation of endangered or rare species from their natural habitats to protected areas. It includes botanical gardens, cryopreservation, seed banks and tissue cultures. On the other hand, the process of protecting an endangered plant or animal species in its natural habitat is commonly known as *in-situ* conservation. It includes national parks, wildlife sanctuaries and sacred groves.

### Related Theory

Ex-situ conservation	In-situ conservation
<i>In this, the animals and plant are placed in a special care unit.</i>	<i>In this, the animals and plants are not placed in any special care unit.</i>
<i>The animals and plants are separated from their natural habitat.</i>	<i>The animals and plants are not separated from their natural habitat but are protected in their natural habitat only.</i>
<i>It helps in recovering populations or preventing their extinction under stimulated conditions closely resembles their natural habitats.</i>	<i>It helps in recovering populations in the surrounding where they have developed their distinct features.</i>
<i>Ex-situ conservation method includes protective maintenance of threatened species.</i>	<i>In-situ conservation method includes protection of endangered species.</i>
<i>Examples are zoological parks, botanical gardens, wildlife sanctuary, in vitro fertilization, etc.</i>	<i>Examples are biosphere reserves, national parks and many sacred groves.</i>

59. (C) Shifting cultivation results into deforestation. Botanical garden have collection of living plants for reference and study. Field gene banks are a type of biorepository which preserve genetic material. Seed banks store seeds as a source for planting.

### Related Theory

- Genetic conservation is the conservation of gene pool of a population with the objective to conserve and restore biodiversity. Conservation of genetic resources is crucial to sustain food and ecological security. It can be achieved by the following ways:
  - To maintain them in the wild places like forests and nature preserves;
  - To conserve them in protected areas, like national parks, biosphere reserves and botanical gardens;
  - To feed them into the agricultural and horticultural trade so that they are cultivated by people at large;
  - To preserve them in the form of seeds or some other suitable material.

60. (D) Sacred groves is the method of *in-situ* conservation of species of plants and animals. Sacred groves includes a piece of natural vegetation that is protected by a certain community due to religious reasons. The local communities tend to take responsibility to protect and

nurture the area. It could be only a few trees or an entire forest. 14,000 sacred groves have been reported from all over India.



### Related Theory

Fauna species like bees, lizards, snake, monkeys, etc. are also seen in sacred groves of Manipur. Monkeys (*Rhesus sp.*) and Flying fox found in Mongba Hanba sacred grove (popularly known as Mahabali) are largely conserved within the grove. Many of the birds are found nesting in the sacred groves. Conservation of these groves can conserve water and, prevent soil and nutrient loss. Sacred groves also help in preserving the religious and cultural heritage.

61. (C) Western Ghat occur along the Western Coast of India in Maharashtra, Karnataka, Tamil Nadu and Kerala. There is high degree of endemism as well as richness, of species of flowering plants, amphibians, reptiles, some mammals and butterflies.



### Related Theory

Biodiversity is important for several reasons. It provides economic benefits, protects human health and safety, and offers recreational or aesthetic enjoyment. Biodiversity varies with changing cardinals/gradients. Biodiversity is minimum in the arctic region, moderate in temperate areas and maximum in tropical regions. Biodiversity decreases with increasing altitude. The temperature drops with increasing altitude and low temperature is not favourable for the diversity.

62. (D) Nearly 85% of the global Indian Rhinoceros population is concentrated in Assam, where Kaziranga National park contains 70% of rhino population.

63. (C) Gir National Park (Gujarat) is not concerned with tiger. It is famous for Asiatic lion, panther, striped hyaena, sambar nilgai, chital, 4-horned antelope and chinkara. Ranthambhor National Park (Rajasthan), Sunderbans (West Bengal) and Jim Corbett National park (Uttarakhand) are tiger reserves.



### Related Theory

National Park is a protected territory that is formed by the governing bodies to preserve wildlife and evolve them. Wildlife sanctuary is natural habitat that is run by the governing bodies or private organizations that protects certain species of animals and birds.

There are 106 national parks and 567 wildlife sanctuaries in India (National Wildlife Database, December 2023).

64. (D) *Podophyllum* is one of the endangered species of Indian medicinal plants which is used to remove benign (not cancer) growths, such as certain kinds of warts. It works by destroying the tissue of the growth.

65. (C) Zoological/botanical garden is not included under *in-situ* conservation. *In-situ* conservation is the methods of conserving all the living species,

especially the wild and endangered species in their natural habitats and environment. *Ex-situ* is the methods of conserving all the living species in the artful habitats that reflect their natural living habitats.

66. (C) Rhinoceros (*Rhinoceros unicornis*) - Kaziranga National Park, Assam  
Siberian Crane - Keoladeo National Park, Rajasthan  
Tiger - Jim Corbett National Park, Uttarakhand  
Tiger - Dudhwa Tiger Reserve, UP  
Great Indian Bustard - Desert National Park, Jaisalmer, Rajasthan  
Lion - Gir National Park, Gujarat  
Wild Ass - Rann of Kutch, Gujarat



### Related Theory

National Parks are the areas that are set by the government to conserve the natural environment. Sanctuary is a place of refuge where injured, abandoned and abused wildlife is allowed to live in peace in their natural environment without any human intervention.

67. (C) A botanical garden helps in the preservation of species that face the threat of extinction. Some botanical gardens also have cryopreservation facilities wherein the seeds of certain species are stored for future use.

68. (A) Viable material of endangered species can be preserved by gene banks. Gene bank is an institute that maintains stocks of viable seeds, live growing plants and frozen germplasm with the whole range of genetic variability.

69. (B) The phrase "intraspecific competition" is used to describe competition between members of the same species. This occurs due to population growth and a lack of available resources.

70. (C) Rann of Kutch is situated in Gujarat and provides protection mainly to wild ass whereas musk deers are mainly protected in Kedarnath sanctuary. Gir is famous for Asiatic lions. Kaziranga is famous for one-horned rhinoceros.

71. (A,B) The tiger is the primary protected animal at Sariska, a wildlife sanctuary that is located in Alwar, Rajasthan, and was chosen as a tiger reserve as part of Project Tiger (1973). Gir National Park, Gujarat is associated with Asiatic Lion.

72. (A) Kaziranga National park in Assam is famous for conserving Rhinoceros.

73. (B) Ranthambore National Park is one of the biggest and most renowned national parks in Northern India. The park is located in the Sawai Madhopur district of Rajasthan.