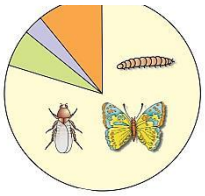
CHAPTER 13



BIODIVERSITY AND CONSERVATION

(A) NCERT QUESTIONS & SOLUTIONS

1. Name the three important components of biodiversity.

Ans. The three important components of biodiversity are :

(i) Genetic Diversity

(ii) Species Diversity

(iii) Ecological diversity

2. How do ecologists estimate the total number of species present in the world?

Ans. There are two methods to estimate the number of species in the world :

(i) By estimating the rate of discovery of new species.

(ii) By statistical comparison of the temperate-tropical species richness of an exhaustively studied group of insects and extrapolate this ratio to other groups of animals and plants to come up with a gross estimate of the number of species on earth.

3. Give three hypotheses for explaining why tropics show greatest levels of species richness.

[IMP.]

Ans. The three hypothesis to explain species richness in tropics are:

(a) The constant environment in tropics promotes niche specialization and increased species diversity.

(b) There is longer exposure to solar radiation in the tropical regions that contributes directly to higher productivity and indirectly to greater species diversity.

(c) There occurred no glaciation in tropical region and it remained undisturbed. Thus organisms living in tropics continued to flourish and evolved more species diversity.

4. What is the significance of the slope of regression in a species-area relationship?

Ans. Slope of regression in a species-area relationship indicates that species richness decreases with the decrease in area. Regression coefficient (Z) is 0.1 - 0.2 regardless of the taxonomic group or the region e.g. plants in Britain or birds in California. However, when very large areas like the entire continent is analysed, it was found that slope of the line is much steeper with Z values in the range of 0.6 to 1.2.

5. What are the major causes of species losses in a geographical region?

Ans. There are four major causes (The Evil Quartet) :

(a) Habitat loss and fragmentation.

(b) Alien species invasions.

(c) Over-exploitation.

(d) Co-extinctions.

6. How is biodiversity important for ecosystem functioning?]

Ans. Importance of biodiversity for ecosystem functioning -

(a) Stability: Biodiversity is an important aspect for stability of an ecosystem. Ecologists believe that communities with more species tend to be more stable than those with less species.

(b) Productivity: Ecosystem with higher biodiversity show more productivity than ecosystems with lower biodiversity. David Tilman's long-term ecosystem experiments using outdoor plots provide confirmation.

(c) Ecosystem health: Rich biodiversity is not only essential for ecosystem health but imperative for the survival of the human race on earth. Species are interlinked and so, killing or disappearance of one would effect the others also.

(d) Resilience: Increased biodiversity provides resilience of the ecosystem against natural or man-made disturbances.

7. What are sacred groves? What is their role in conservation?

Ans. Sacred groves are forest patches for worship in several parts of India. All the trees and wildlife in them are venerated and given total protection. They are found in Khasi and Jaintia Hills in Meghalaya, Western Ghat regions of Karnataka and Maharashtra etc. Tribe do not allow anyone to cut even a single branch of tree in these sacred groves thus sacred groves have been free from all types of exploitations.

8. Among the ecosystem services are control of floods and soil erosion. How is this achieved by the biotic components of the ecosystem?

Ans. Control of soil erosion: Plant roots hold the soil particles tightly and do not allow the top soil to be drifted away by winds or moving water. Plants increase the porosity and fertility of the soil. **Control of floods:** It is carried out by retaining water and preventing run off of rain water. Litter and humus of plants function as sponges thus retaining the water which percolates down and get stored as underground water. Hence, the flood is controlled.

9. The species diversity of plants (22%) is much less than that of animals (72%). What could be the explanations to how animals achieved greater diversification? [IMP.]

Ans. Animals have achieved greater diversification than plants due to following reasons:

(a) They are mobile and thus can move away from their predators or unfavorable environments. On the other hand plants are fixed and have fewer adaptation to obtain optimum amount of raw materials and sunlight therefore they show lesser diversity.

(b) Animals have well-developed nervous system to receive stimuli against external factors and thus can respond to them. On the other hand plants do not exhibit any such mechanism thus they show lesser diversity than animals.

10. Can you think of a situation where we deliberately want to make a species extinct? How would you justify it?

Ans. Species which are harmful to human beings can be made extinct e.g. HIV, polio virus, etc. Such micro-organisms are not part of any food chain and thus, their extinction would not affect the ecosystem.

(B) PREVIOUS YEAR QUESTIONS

1. The sixth extinction in progress currently is different from all previous extinctions on earth as it is : **[CBSE 2023]**

(a) 10-100 times faster (b) 100-1000 times faster

(c) 100-10000 times faster (d) 1000-10000 times faster

Ans. (b) 100-1000 times faster

2. The IUCN Red Data List (2004) in the last 500 years documents the extinction of nearly 784 species including : **[CBSE 2023]**

(a) 330 invertebrates (b) 338 invertebrates

(c) 359 invertebrates (d) 362 invertebrates

Ans. (c) 359 invertebrates

3. Which one of the following groups faces maximum threat of extinction? **[CBSE 2023]**

(a) Gymnosperms (b) Birds (c) Amphibian (d) Mammals

Ans. (c) Amphibian

4. "Cattle and goats do not browse the Calotropis plant." Justify the statement giving reasons. **[CBSE 2023]**

Ans. Organisms to survive in the complex food web have evolved characters to support their living and prevent them from predators. One of such example is Calotropis. Calotropis plant also known as milkweed produce a chemical compound cardiac glycoside that affect the mammalian heart. It is the defence mechanism in Calotropis plant to keep cattle stay away from it. This is the reason cattle and goats do no feed/browse on this plant.

5. "Biodiversity plays a major role in many ecosystem services that nature provides."

(a) Describe any two broadly utilatarian arguments to justify the given statement.

(b) State one ethical reason of conserving biodiversity. **[CBSE 2023]**

Ans. (a) The broadly utilitarian argument says that biodiversity plays a major role in many ecosystem services that nature provides.

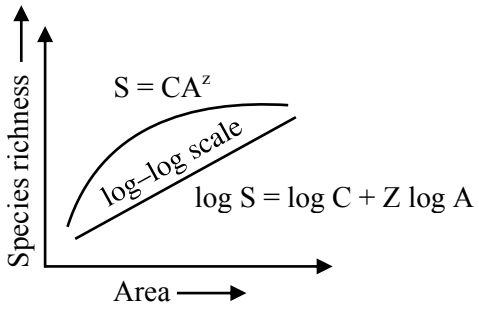
- The fast- dwindling Amazon forest is estimated to produce, through photosynthesis, 20 per cent of the total oxygen in the earth's atmosphere. Pollination (without which plants cannot give us fruits or seeds) is another service, ecosystems provide through pollinators layer – bees, bumblebees, birds and bats.

(b) The ethical argument for conserving biodiversity relates to what we owe to millions of plant, animal and microbe species with whom we share this planet.

- Philosophically or spiritually, we need to realise that every species has an intrinsic value, even if it may not be of current or any economic value to us.

6. (a) Write the inference drawn by Alexander von Humboldt after his ext n of South Americal jungle.

(b) Study the graph given below :



As per Alexander von Humboldt, what do the symbols S, A, Z and C in the graph stand for, in respect of a species and area relationship ? [CBSE Term-II 2022]

Ans. (a) German naturalist and geographer Alexander von Humboldt observed that within a region species richness increased with increasing explored area, but only up to a limit.

(b) On a logarithmic scale, 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

7. (a) Explain the concept of co–extinction by taking two examples.

OR

(b) "Forests provide intangible benefits to us." Explain by taking three different areas, how. [CBSE Term-II 2022]

Ans. (a) When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct.

Example:

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.

OR

(b) Intangible benefits from forests derived from forests, in other words influences of forests on environment are described below:

Improvement of climate : Forests ameliorate climate influencing temperature, rainfall, humidity, wind etc. Forests regulate temperature range balance in the atmosphere and water cycle.

8. Which of the three forests- Temperate, Mangroves and Tropical E e vulnerable to invasion by outside animals and plants? [CBSE IMP Questions]

Ans. Tropical Evergreen Forests

9. Assertion: A community with more species is more stable than that with less species.
Reason: More the number of species, lesser the variation in the total biomass production year after year. **[CBSE IMP Questions]**

(A) Both assertion and reason are true, and the reason is the correct explanation of the assertion.
(B) Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
(C) Assertion is true but reason is false.
(D) Both assertion and reason are false

Ans. (A) Both assertion and reason are true, and the reason is the correct explanation of the assertion.

10. Explain how advanced *ex-situ* conservation techniques assist in preserving threatened species of plants and animals. [CBSE IMP Questions]

Ans.
- Advanced techniques are being used now for ex situ conservation. Gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques. Eggs can, thus, be fertilized invitro.
- In plants, the explants can be propagated using tissue culture methods and can be kept for long periods in seed banks.

11. The Tropical regions are likely to have more biological diversity than the Temperate ones. Give two reasons to justify the statement. [CBSE IMP Questions]

Ans. Some possible reasons are:
- 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.
- Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialisation and lead to a greater species diversity.
- There is more solar energy available in the tropics, which contributes to higher productivity; this in turn might contribute indirectly to greater diversity.

12. Alien species invasion has been a threat to biodiversity. Justify with the help of a suitable example. List any other causes responsible for such a loss. [CBSE 2020]

Ans. When alien species are introduced unintentionally or deliberately, some of them turn invasive and cause decline or extinction of indigenous species.

For example the Nile perch introduced into lake Victoria in East Africa led to the extinction of more than 200 species of cichlid fish. Other alien species examples includes African cat fish, *Parthenium* and water hyacinth. Introduction of these species have caused loss of biodiversity.

Apart from Alien species invasion; the other causes of loss of biodiversity are -

(i) Co-extinction
(ii) Habitat loss & Fragmentation
(iii) Over exploitation

13. List six advantages of *"ex-situ"* approach to conservation of biodiversity.]

Ans. 1. An endangered or threatened species can be conserved.
2. Genetic strains of commercially important plants can be preserved for a long time (seed banks). Biodiversity loss is reduced.
3. Gametes of threatened species can be preserved in a viable and fertile condition for long periods (using cryopreservation).
4. In zoological parks it enables us to learn about their food habits and behaviour.
5. Plants can be propagated using tissue culture for economically beneficial.
6. Conserve large number of species for aesthetic value.

14. State 'two' observations made by German naturalist, Alexander von Humboldt during his extensive explorations in South American jungles. [CBSE 2019]

Ans. (i) Within a region species richness increases with increasing explored area but only up to a limit.
(ii) The relation for a wide variety of taxa (angiosperm, birds, plants, fresh water fishes) turns out to be a rectangular hyperbola.

15. Analyze the effects of 'Alien species invasion' on the biodiversity of a given area. Provide two examples. [CBSE 2019]

Ans. Introduction of alien species causes decline or extinction of indigenous species due to tough competition for utilization of resources.

Examples :

(a) Introduction of Nile perch in lake Victoria led to extinction of more than 200 species of Cichlid fish.

(b) Introduction of African catfish *Clarias gariepinus* for aquaculture purposes threat to indigenous catfishes.

16. What is cryopreservation? Mention how it is used in conservation of biodiversity. [CBSE 2019]

Ans. It is a technique to preserve gametes for long period in viable and fertile condition at very low temperature / - 196°C in liquid nitrogen.
Preserving gametes of threatened species.

17. How did David Tillman show that "stability of a community depends on its species richness"? Explain. [CBSE 2019]

Ans. David Tilman (long term ecosystem experiments, using outdoor plots) found that presence of more species showed less year-to-year variation in total biomass, and increased diversity contributed to higher productivity.

18. Give the answer of following questions.]

(a) List any two ways the biodiversity loss affects any region.

(b) Explain any four causes of biodiversity loss, with the help of suitable examples.

Ans. (a)

- Decline in plant production.
- Lowered resistance to environmental perturbations such as drought.
- Increased variability in certain ecosystem processes such as plant productivity, water use, and pest and disease cycles.

(b)

(i) Habitat loss and fragmentation: This is the most important cause driving animals and plants to extinction.

Examples - Tropical rain forests. Once covering more than 14 % of the earth's land surface, these rain forests now cover no more than 6 %. The Amazon rain forest (it is so huge that it is called the 'lungs of the planet') harboring probably millions of species is being cut and cleared for cultivating soya beans or for conversion to grasslands for raising beef cattle. The degradation of many habitats by pollution also threatens the survival of many species.

(ii) 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.

Example - many marine fish populations around the world are over harvested, endangering the continued existence of some commercially important species.

(iii) 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.

Example - The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of more than 200 species of Cichlid fish in the lake. Threat posed to native species by invasive weed species like carrot grass (*Parthenium*).

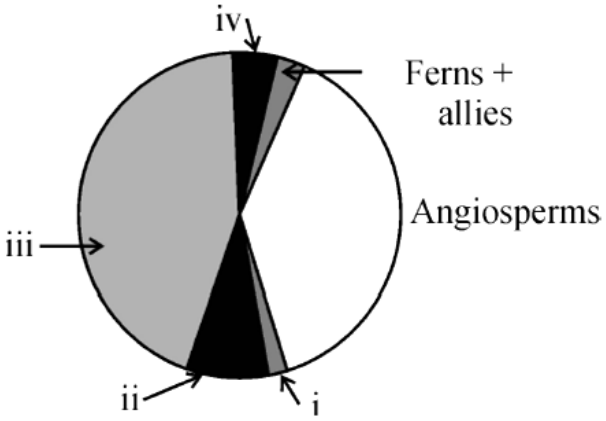
The African catfish for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.

(iv) Co-extinctions : When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct.

Example-When a host fish species becomes extinct, its unique assemblage of parasites also meets the same fate. Covelved plant-pollinator mutualism where extinction of one invariably leads to the extinction of the other.

19. Identify the areas labeled i, ii, iii and iv in the pie chart given below e biodiversity of plants showing their proportionate number of species of major taxa.

[CBSE 2018]



Ans. (i) Lichen, (ii) Algae, (iii) Fungi, (iv) Mosses

20. Suggest two practices giving one example of each, that help protect rare or threatened species. **[CBSE 2017]**

Ans. (1) In situ conservation, biodiversity hotspot, biosphere reserve, national parks, wildlife sanctuaries and sacred groves.

(2) Ex situ conservation, Zoological parks, botanical gardens, wildlife safari parks, cryopreservation techniques, seed bank.

21. *'In-situ'* conservation can help endangered/ threatened species. Justify the statement.

[CBSE 2017]

Ans. Threatened organisms are conserved in their natural habitat or ecosystem, and such regions are legally protected.

As hotspots, biosphere reserves, national parks, sanctuaries or sacred groves sites.

(C) MULTIPLE CHOICE QUESTIONS

1. Biodiversity term was popularized by –

(1) Edward Wilson (2) Paul Ehrlich

(3) Alexander von Humboldt (4) David Tilman

Ans. (1) Edward Wilson

2. log S = log C + Z log A

In the given equation of species-area relationship, the value of regression coefficient for a whole continent, would be

(1) 0.1-0.2 (2) 0.5-0.0 (3) 0.6-1.2 (4) 0.3-0.5

Ans. (3) 0.6-1.2

3. Which of the following organisation is responsible for maintaining the Red Data Book?

(1) IDRI (2) IUCN (3) UNESCO (4) USDA

Ans. (2) IUCN

4. Alexander Von Humboldt described for the first time-

(1) Ecological Biodiversity (2) Laws of limiting factor

(3) Species area relationships (4) Population Growth equation

Ans. (3) Species area relationships

5. India has more than _____ genetically different strains of rice.

(1) 1,000 (2) 20,000 (3) 50,000 (4) 85,000

Ans. (3) 50,000

6. IUCN stands for -

(1) International Union For Conservation of Nature and Natural Resources.

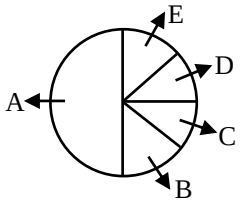
(2) Indian Union For Conservation of Nature and Natural Resources.

(3) Indian Union For Conservation of Nature

(4) International Union of Conservation of names

Ans. (1) International Union For Conservation of Nature and Natural Resources.

7. Given below is the representation of the extent of global diversity of vertebrates. What groups the four portions (A-D) represent



	A	**B**	**C**	**D**	**E**
(1)	Mammals	Reptiles	Birds	Fishes	Amphibian
(2)	Amphibian	Fishes	Birds	Reptiles	Mammals
(3)	Fishes	Mammals	Birds	Reptiles	Amphibian
(4)	Fishes	Amphibian	Reptiles	Birds	Mammals

A B-Amphibian C-Reptiles D-Birds E-Mammals

___

8. Robert May places the global species diversity at about ____

(1) 10 million (2) 15 million (3) 2 million (4) 7 million

Ans. (4) 7 million

9. The enormous number of varieties of mango in India represents

(1) Genetic diversity (2) Species diversity

(3) Ecological diversity (4) Hybridisation programmes

Ans. (1) Genetic diversity

10. How many species of ants on Earth?

(1) 20,000 (2) 10,000 (3) 15,000 (4) 25,000

Ans. (3) 15,000

11. In Rivet Popper hypothesis, what do you mean by rivets?

(1) Species (2) Ecosystem (3) Biodiversity (4) Biosphere

Ans. (1) Species

12. The current species extinction rates are estimated to be _____ times faster than in the pre-human times.

(1) 10-100 (2) 100-1000 (3) 200-2000 (4) 500-1000

Ans. (2) 100-1000

13. Which of the following is called the lungs of the planet?

(1) Tropical rain forest (2) Thar desert

(3) Amazon rain forest (4) Temperate deciduous forest

Ans. (3) Amazon rain forest

14. From his long-term ecosystem experiments, David Tilman showed that

(1) decreased diversity contributed to higher productivity

(2) decreased diversity contributed to decreased productivity

(3) increased diversity contributed to increased productivity

(4) increased diversity contributed to decreased productivity

Ans. (3) increased diversity contributed to increased productivity

15. Extinction of species like steller's sea cow and passenger pigeon were due to _____ by humans.

(1) Co-extinctions (2) Over-exploitation

(3) Habitat loss and fragmentation (4) Alien species invasions

Ans. (2) Over-exploitation

16. What do you mean by "The Evil Quartet"?

(1) Causes of biodiversity loss (2) Biodiversity conservation

(3) Species-Area relationship (4) Genetic diversity

Ans. (1) Causes of biodiversity loss

17. The most important cause of extinction of animals and plants, especially in tro is

(1) Habitat loss (2) Afforestation (3) Pollution (4) Soil erosion

Ans. (1) Habitat loss

18. Which of the following is not a cause for loss of biodiversity?

(1) Destruction of habitat (2) Invasion by alien species

(3) Keeping animals in zoological parks (4) Over-exploitation of natural resources

Ans. (3) Keeping animals in zoological parks

19. More than ____ percent of the drugs currently sold in the market worldwide are derived from plants.

(1) 50 (2) 25 (3) 75 (4) 60

Ans. (2) 25

20. Amazon forest is estimated to produce _____ percent of the total oxygen in the earth's atmosphere.

(1) 10 (2) 15 (3) 20 (4) 30

Ans. (3) 20

(D) ASSERTION & REASON QUESTIONS

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

(1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(3) If Assertion is true but Reason is false.
(4) If both Assertion and Reason are false.

1. **Assertion:** Steller's sea cow becomes extinct.
Reason: It is due to over exploitation by humans.
Ans. (1)

2. **Assertion:** Biodiversity hotspots are example of in *situ* conservation.
Reason: It is a conservation of biological wealth on site.
Ans. (1)

3. **Assertion:** *Ex situ* conservation is carried out in biosphere reserves, national parks and sanctuaries.
Reason: NGOs are involved in the maintenance of these protected areas.
Ans. (4)

4. **Assertion:** Insects are enormously diversified.
Reason: It is because of the presence of exoskeleton made up of chitin.
Ans. (1)

5. **Assertion:** Habitat loss and fragmentaion is the most important cause driving animals and plants to extinction.
Reason: Habitat loss and fragmentaion causes alien species invasion.
Ans. (3)

6. **Assertion:** India has more than 50,000 genetically different strains of rice.
Reason: India has approximately 1,000 varieties of mango.
Ans. (2)

7. **Assertion:** According to the IUCN (2004), the total number of plant and animal species described so far is lightly more than 1.5 million.
Reason: For many taxonomic groups, species inventories are more complete in temperate than in tropical areas.
Ans. (2)

8. **Assertion:** During the long Period since the origin and diversification of life on earth there were five episodes of mass extinction of species.
Reason: The six Extinctions is on progress different from the previous episodes.
Ans. (2)

9. **Assertion:** The diversity of microbes may run into millions.
Reason: If we use biochemical or molecular criteria to estimate microbial species.
Ans. (1)

10. **Assertion:** India is one of the 12 mega biodiversity economies of the world.
Reason: India has only 2.4% of the world's land area. It shares 8.1% if the global species diversity.
Ans. (1)

(E) VERY SHORT ANSWER QUESTIONS

1. Name the type of biodiversity represented by the following:

(i) 50,000 different strains of rice in India.

(ii) Estuaries and alpine meadows in India.

Ans. (i) Genetic diversity. **(ii)** Ecological diversity

2. Name the type of biodiversity represented by the following:

(i) 1000 varieties of mangoes in India.

(ii) Variations in terms of potency and concentration of reserpine in *Rauwolfia vomitoria* growing in different regions of Himalayas.

Ans. (i) Genetic diversity. **(ii)** Genetic diversity.

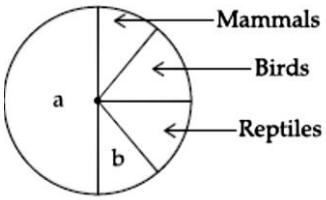
3. An exotic variety of prickly pear introduced in Australia turned out to be invasive. How was it brought under control?

Ans. It was controlled by introducing a cactus – feeding predator (a moth) from its natural habitat

4. Give an example of a plant which came into India as a contaminant and is a cause of pollen allergy.

Ans. *Parthenium* / Carrot grass.

5. Name the unlabelled areas 'a' & 'b' of the pie chart representing biodiversity of vertebrates showing the proportionate number of species of major taxa.



Ans. (i) Fishes **(ii)** Amphibians

6. Habitat loss and fragmentation has caused severe damage to a particular type of ecosystem. Name it.

Ans. Tropical Rain Forest.

7. What trend is observed in respect of species diversity when we move from equator to poles?

Ans. In general, species diversity decreases as we move away from the equator towards poles.

8. Which region is considered as the one with highest biodiversity on earth? What is the name given to such region.forests?

Ans. Amazonian rain forests. They are also called the 'Lungs of the planet'.

9. Write the importance of cryopreservation in conservation of biodiversity.

Ans. Gametes of threatened species can be preserved in viable and fertile conditions for long periods by cryopreservation.

10. What is the total number of species discovered and described presently on earth? What is the predicted number?

Ans. 1.7 million and 50 million, respectively.

(F) SHORT ANSWER QUESTIONS

1. List three levels of biodiversity.

Ans. Biodiversity can be studied at the following levels:

1. Genetic diversity **2.** Species diversity **3.** Ecological/Ecosystem diversity.

2. Biodiversity must be conserved as it plays an important role in many ecosystem services that nature provides. Explain any two services of the ecosystem.

Ans. The two ecosystem services are:

(i) Forest ecosystem, mitigates droughts and floods.

(ii) The wildlife help in pollination of crops.

3. Write what was the percentage of forest cover of India at the beginning and at the end of the twentieth century. How different is it from the one recommended by the National Forest Policy of our country ?

Ans. Beginning of 20th century - 30%

End of 20th century - 19.4%

Recommendations were 33% for the plains and 67% for the hills (thus forest cover shrunk substantially)

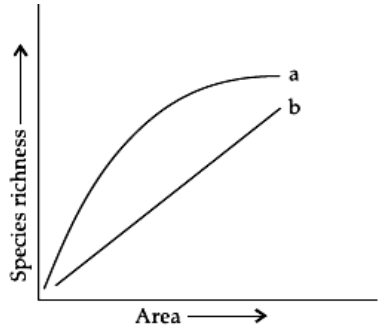
4. What is meant by 'alien species' invasion ? Name one plant and one animal alien species that are a threat to our Indian native species.

Ans. 'Alien species' invasion means introducing those that are, firstly, outside their natural distribution area, and, secondly, threatens biological diversity.

Plants : *Lantana camara*

Animals : *African catfish.*

5.



The above graph shows Species-Area relationship. Write the equation of the curve 'a' and explain.

Ans. **(i)** $S = CA^Z$

Within a region, species richness increases with increasing explored area but only up to a limit.

6. Alien species are highly invasive and are a threat to indigenous species. Substantiate this statement with any three examples.

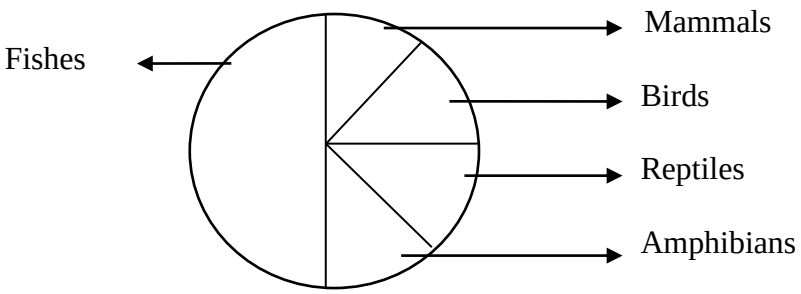
Ans. **(i)** Nile perch introduced into Lake Victoria in East Africa led to the extinction of Cichlids fish.

(ii) *Parthenium, Lantana, Eichhornia* are invasive plants and pose a threat to indigenous species.

(i) Introduction of African catfish (*Clarias gariepinus*) for aquaculture is a threat to indigenous catfishes.

(G) LONG ANSWER QUESTIONS

1. Observe the global biodiversity distribution of major vertebrate taxa in the given pie diagram along side and answer the questions that follow.



(i) Which group of vertebrates have maximum diversity.

(ii) Which group of vertebrates are have minimum diversity in the Amazon rain forest of South America.

(iii) Which group of vertebrates are completely regulators? Why?

Ans. (i) Fishes

(ii) Reptiles

(iii) All birds and mammals are regulators because they maintain homeostasis by thermoregulation and osmoregulation.

2. Describe the advantages for keeping the ecosystems healthy?

Ans. The advantages of keeping the ecosystem healthy are as follow.

- The products of ecosystem processes are named as ecosystem services, as they are of aesthetic goods and organism living within an ecosystem.
- Healthy ecosystem is the base for a wide range of economic, environmental and aesthetic goods and services.
- It also mitigates drought and floods and cycling nutrients.
- Healthy forests ecosystem purify air and water
- It also provide aesthetic, cultural and spiritual values.
- Maintenance of biodiversity is also an important aspect of healthy ecosystem.
- Healthy ecosystem generate fertile soil and provide wide life habitats.

3. Which one of the two "in-situ" or "ex-situ" biodiversity conservation measures help the larger number of species to survive? Explain.

Ans. In situ is onsite conservation which implies that species are conserved in their natural habitat, while ex situ conservation implies conservation of genetic resources and different organisms outside their natural habitat.

- To conserve species in their natural habitat the entire ecosystem has to be conserved including all other organisms, biotic and abiotic components of the ecosystem associated with the target species.
- In situ conservation helps in the restoration of degraded ecosystem and habitats that are means of conserving genetic resources species ecosystem and landscapes,without uprooting the local people.

4. Give the answer of following questions.

(a) List any two ways the biodiversity loss affects any region.

(b) Explain any four causes of biodiversity loss, with the help of suitable examples.

Ans. (a)

- Decline in plant production.
- Lowered resistance to environmental perturbations such as drought.
- Increased variability in certain ecosystem processes such as plant productivity, water use, and pest and disease cycles.

(b) (i) Habitat loss and fragmentation: This is the most important cause driving animals and plants to extinction.

Examples- Tropical rain forests: Once covering more than 14 % of the earth's land surface, these rain forests now cover no more than 6 %. The Amazon rain forest (it is so huge that it is called the 'lungs of the planet') harboring probably millions of species is being cut and cleared for cultivating Soya beans or for conversion to grasslands for raising beef cattle. The degradation of many habitats by pollution also threatens the survival of many species.

(ii) 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.

Example - many marine fish populations around the world are over harvested, endangering the continued existence of some commercially important species.

(iii) 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.

Example - The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of more than 200 species of Cichlid fish in the lake. Threat posed to native species by invasive weed species like carrot grass (*Parthenium*).

The African catfish for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.

(iv) Co-extinctions: When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct.

Example-When a host fish species becomes extinct, its unique assemblage of parasites also meets the same fate. Coevolved plant-pollinator mutualism where extinction of one invariably leads to the extinction of the other.

5. Give the answer of following questions.

(a) Why should we conserve biodiversity? How can we do it?

(b) Explain the importance of biodiversity hot-spots and sacred groves.

Ans. (a) (i) Narrowly Utilitarian:

- ☛ It is concerned with direct economic benefits from nature food, firewood, fibre, construction material, industrial products and products of medicinal importance.
- ☛ More than 25 % of the drugs currently sold in the market world wide are derived from plants.

(ii) Broadly Utilitarian:

- ☛ It is concentred with indirect benefits from nature, like, photosynthesis, pollination.
- ☛ A major role in many ecosystem services that nature provides Amazon forest is estimated to produce 20% of the total oxygen in the earth's atmosphere pollination is another Service, ecosystem provide through insects.

It can conserved by:

- In situ conservation by biosphere reserves, national parks, sanctuaries and sacred groves.
- Ex situ conservation by zoological parks, botanical gardens, wild life safari parks, cryopreservation, seed banks and tissue culture (eggs in vitro).

(b) Hot spots - Regions with high level of species richness, high degree of endemism.

- **Sacred groves** - In many cultures, tracts of forest were set aside, and all the trees and wildlife within were venerated and given total protection. Sacred groves are the last refuges for a large number of rare, and threatened plants.

(H) CASE-STUDY BASED QUESTIONS

(1) Read the following and answer the questions given below:

Non-native or alien species are often introduced in advertently for their economic and other uses. They often become invasive and drive away the local species. Exotic species have proved harmful to both aquatic and terrestrial ecosystems. For example, water hyacinth (*Eichhornia crassipes*) was introduced in Indian waters to reduce pollution. It was clogged water bodies including wetlands at many places resulting in death of several aquatic plants and animals.

(i) Name the alien fish species which is posing a threat to indigenous caltfishes in our rivers

Ans. *Clariass gariepinus (African catfish)*

(ii) What is meant by alien species?

Ans. Non native powerful species which invade a new area are known as alien species.

(iii) What is the second major cause for the species extinction.

Ans. Alien species invasion

(iv) *Eichhornia crassipes* is an alien hydrophyte introduced in india. Mention the problem posed by this plant.

Ans. When an alien hydrophyte Eichhornia were introduced unintentionally they turned invasive caused decline or extinction of indigenous species.

(v) Give an example of a plant which came into india as contaminant and is a cause of pollen allergy.

Ans. Parthenium/Carrotgrass.

(2) Read the following and answer the questions given below:

IUCN maintains a Red Data Book or Red List which is a catalogue of taxa facing risk of extinction. The IUCN Red List (2004) documents the extinction of 784 species in the last 500 years. Some examples of recent extinctions include the dodo, quagga, thylacine and Steller's sea cow. The last twenty years alone have witnessed the disappearance of 27 species. Red List has eight categories of species.

(i) Dodo, an extinct taxon, belongs to which country?

Ans. Mauritius

(ii) Why Steller's sea cow and passanger pigeon become extinct?

Ans. Over - exploitation

(iii) Bali, Javan and Caspian belong to which species?

Ans. Species of tiger.

(iv) Which organization publisher the Red list of species?

Ans. ICUN

(v) What is Red Data book?

Ans. The Red Data book is a compilation of data on species threatened with extinction and is maintained by IUCN.

(3) Read the following and answer the questions given below:

Wetlands are called Ramsar sites because the first international convention on their conservation was held in Ramsar in Iran in 1971. Wetlands or Ramsar sites are low lying marshy areas which get filled up during rains due to runoff and overflow from other water bodies. They are often considered to be waste lands which are used as dumping areas and filled up to recover land for various constructions activities. As a result, a large number of wetlands have disappeared.

(i) In which wetlands Migratory bird flamingo breeds in India?

Ans. Rann of Kutch

(ii) Which wetland in ecosystem is highly acidic and has a accumulation of decomposed plants known as peat?

Ans. Bog

(iii) Write down importance of wetlands?

Ans. **(1)** They are an important source of recharging groundwater

(2) They provide protection from floods.

(3) They are good source of siltation and purification of water.

(iv) What are Ramsar sites?

Ans. They are conserved wetlands which are of international importance.

(v) Which is the largest Ramser site in India?

Ans. Sundarban Wet land (WB) India**.**

(4) Read the following and answer the questions given below:

Excessive exploitation of species, whether a plant or animal reduces the size of its population so it becomes vulnerable to extinction. Such as Dodo and passenger pigeon have become extinct due to over exploitation by humans. Thus the world is facing accelerated rates of species extinctions, largely due to human interference.

(i) State how the current occurrence of species extinction is different from the earlier mass extinction.

Ans. Species extinction in earlier times occurred due to natural calamities such as volcanic eruptions, landslides, flood etc. while in the present times, the cause of species extinction is human activities.

(ii) State how does ex-situ conservation help in protecting biodiversity.

Ans. Cryopreservation, in vitro fertilisation, micropropagation / tissue culture, sperm bank / seed bank / gene bank, are help full for conservation of biodiversity.

(iii) What is endemic species?

Ans. Endemic species belong to a local area and are of limited distribution due to biotic and abiotic regulations, e.g. Lion Tailed Macaque

(iv) What is exotic species?

Ans. Exotic or Alien species are new species that enter a geographical regions.

(v) What do you understand by co-extinction?

Ans. When a species become extinct, the plant and animal species associated with it in the obligatory ay, also become extinct.