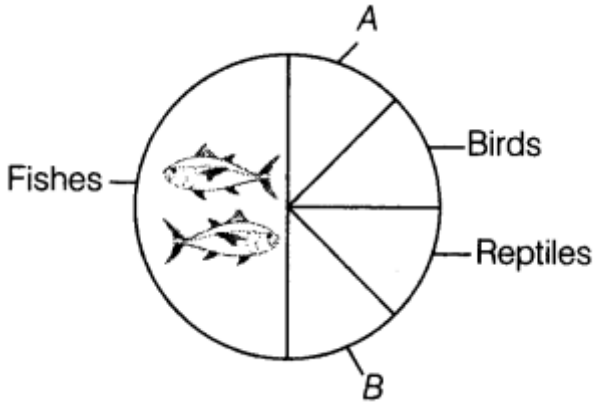
Chapter 14. Biodiversity and Conservation

Biodiversity

1 Mark Questions

1.Identify A and B in the figure given below representing proportionate number of major vertebrate taxa. [Delhi 2014]



Ans. In the above mentioned figure, among the major vertebrate taxa

A represent mammals

B represents ambhibians (1)

2.Write the level of biodiversity represented by a mangrove. Give another example falling in the same level. [Delhi 2014C]

Ans.The mangroves represents biodiversity at ecological level. Other examples of ecological diversity are deserts, rainforests, coral reefs, etc.

3.Name the type of biodiversity represented by the followings

- **1,000 varieties of mangoes in India.**
- **Variations in terms of potency and concentration of reserpine in Rauwolfia vomitoria growing in different regions of Himalayas. [All India 2013]**

Ans. (i) Genetic diversity

(ii) Genetic diversity

4. Why is tropical environment able to support greater species diversity? [Delhi 2011C]

Ans. Tropical latitudes have remained undisturbed for millions of years and had a long evolutionary time for species diversification. Thus, it supports greater species diversity.

5. Eichhornia crassipes is an alien hydrophyte introduced in India. Mention the problem posed by this plant.[All India 2010C]

Ans. Water hyacinth (Eichhornia) introduced in India is threatening the existing aquatic life in ponds and lakes, etc., as it clogs the stagnant water bodies very fast, thus, the native species are endangered.

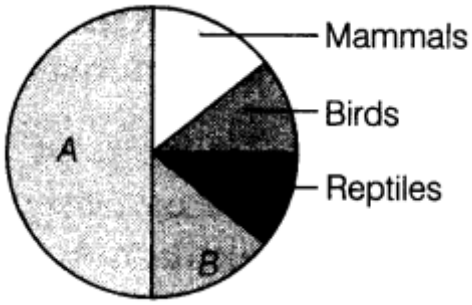
6. The Amazon rainforest is referred to as the lungs of planet. Mention any one human activity which causes loss of biodiversity in this region. [All India 2010C]

Ans. Human activity causing loss of biodiversity are:

(i) Many plants are cut in Amazon rainforest

(ii) Forests are converted to grasslands for raising beef cattle.

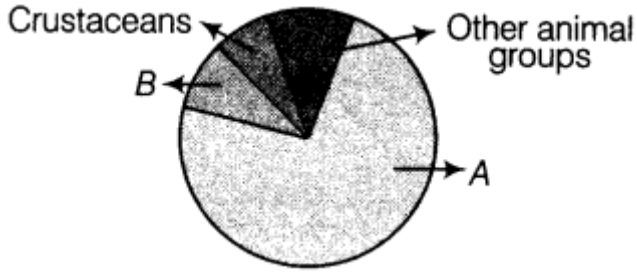
7. Name the unlabelled areas A and B of the pie chart representing biodiversity of vertebrates showing the proportionate number of species of major taxa. [Foreign 2009]



Ans. A- Fishes

B**–** Amphibians

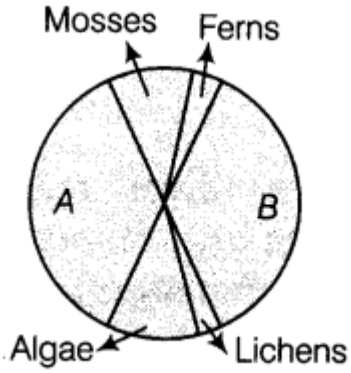
8.Name the unlabelled areas A and B of the pie chart representing the global biodiversity of invertebrates showing their proportionate number of species of major taxa. [Delhi 2009]



Ans. A- Insects

B**–** Molluscs

9.Name the unlabelled areas A and B of the pie chart representing the biodiversity of plants showing their proportionate number of species of major taxa. [All India 2009]



Ans. A- Fungi

B**–** Angiosperms

10.About 200 species of cichlid fish became extinct when a particular fish was introduced in Lake Victoria of Africa. Name the invasive fish. [Foreign 2008]

Ans. Nile perch is the invasive fish introduced in Lake Victoria.

2 Marks Questions

11.List four causes of biodiversity loss. [Delhi 2014C]

Ans. (i) Habitat loss and fragmentation **(ii)** Over-exploitation **(iii)** Alien species invasions

12.What is meant by alien species invasion? Name one plant and one animal alien species that are a threat to our Indian native species. [All India 2013]

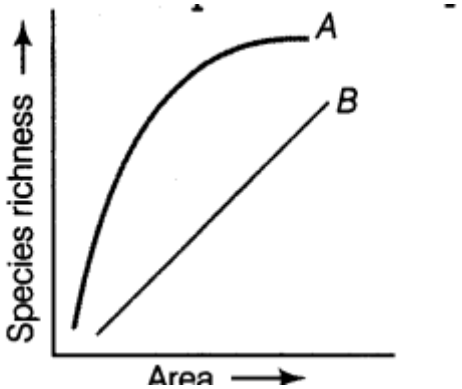
Ans. Intentional or chance introduction of exotic species into new islands or countries by man is called alien species invasion. For example, Nile perch introduced into Lake Victoria in East Africa caused loss of more than 200 species of cichlid fish. Plant alien species-Lantana **camara** and animal alien species – **Clarius gariepinus** are a threat to our Indian native species.

13. Justify with the help of an example where a deliberate attempt by humans has led to the extinction of a particular species. [Delhi 2011]

Ans. Over-exploitation of natural resources or over hunting of animals has led to extinction of particular species,

e.g. Steller's sea cow and passenger pigeon.

14. The given graph shows species-area relationship. Write the equation of the Curve A and Explain. [All India 2011]



Ans. The equation for the curve A is

$S - CA^Z$

where, S-Species richness,

A- Area C-Y-interecept,

Z- Slope of line

(regression coefficient)

(i) Alexander Von Humboldt observed that within a region, species richness increased with increasing explored area, but only up to a limit.

(ii) The relation between species richness and area for a wide variety of taxa like angiosperms, birds, fishes, etc., turns out to be a rectangular hyperbola.

15.With the help of an example, explain how alien species invasion causes biodiversity loss? [Delhi 2011]

or

Alien species are a threat to native species. Justify taking examples of an animal and a plant alien species. [All India 2010]

or

Sometimes alien species affect the indigenous organisms leading to their extinction. Substantiate this statement with the help of any two examples. [Delhi 2010 C]

Ans. Alien species become invasive, compete with the native species and cause extinction of indigenous species.

(i) Introduction of Nile perch into Lake Victoria lead to extinction of more than 200 species of cichlid fish in that lake.

(ii) Carrot grass (Parthenium and Lantana) introduced in our country have become invasive and cause environmental damage. They pose a threat to the native species of plants in our forests.

16.Giving two reasons explain why there is more species biodiversity in tropical latitudes than in temperate ones. [All India 2010]

Ans. Biodiversity is more in tropical latitudes than in temperate ones. The reasons are:

(i) Speciation is a function of time. The temperate regions were subjected to frequent glaciation in the past, while the tropics have remained undisturbed and so had longer time to evolve more species diversity.

(ii) More solar radiation is available in tropical region. This leads directly to more productivity and indirectly to greater species diversity.

(iii) The environment of tropics is less seasonal and relatively more constant and predictable, which encourages niche specialisation and species diversity.

17.In the biosphere, immense biological diversity exists at all levels of biological organisation. Explain any two levels of biodiversity. [All India 2010]

Ans. Levels of biodiversity in biosphere

(i) Genetic diversity It refers to the diversity of genes within a species.

For example, there are more than 50,000 genetically different strains of rice in India.

(ii) Species diversity It refers to the number of different species within a given region. For example, Western Ghats have a greater amphibian species diversity than Eastern Ghats.

18.List the features that make a stable biological community. [All India 2010]

Ans. Features of stable biological community

(i) It should not show much variation in productivity from year-to-year.

(ii) It should be resistant or resilient to occasional disturbances both natural and man-made.

(iii) It must be resistant to invasions of alien species.

19.Write any two hypothesis put forth by ecologists explaining the existence of greater biodiversity in tropical regions than in temperate regions. [Foreign 2010]

Ans. Hypothesis put forth by ecologists explaining the existence of greater biodiversity in tropical regions, than in temperates are:

(i) Speciation is a function of time, the temperate regions were subjected to frequent glaciation in the past, while the tropics have remained undisturbed and hence, had longer time to evolve more species diversity. (1)

(ii) The tropical environments are less seasonal and relatively more constant and predictable than temperate regions, niche specialisation has been promoted/favoured by such constant environments and hence, there is greater species diversity.

20.Name the sociobiologist who popularised the term biodiversity. Identify the levels of biodiversity in India represented by

- **Diversity among amphibian in Eastern and Western Ghats.**
- **50,000 strains of rice in India.**
- **Presence of deserts, mangroves and coral reefs of India. [All India 2009]**

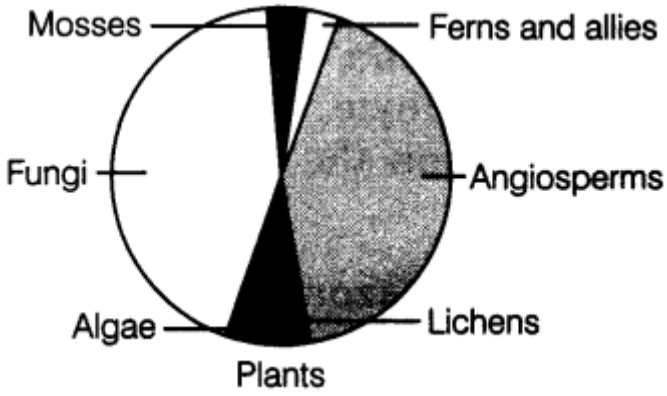
Ans. Edward Wilson, a sociobiologist popularised the term biodiversity. (1/2)

(i) Species diversity Western Ghats have a greater amphibian species diversity than the Eastern Ghats.

(ii) Genetic diversity India has more than 50,000 genetically different strains of rice.

(iii) Ecological diversity Presence of deserts, mangroves and coral reefs in India in greater than in Scandinavian country like Norway.

21.Observe the global biodiversity distribution of major plant taxa in the diagram and answer the questions that follow.



- **Which group of plants are the most endangered?**
- **Why are mosses/fems so few? Give reason.**
- **How do fungi that are heterotrophs sustain themselves as a large population?**
- **Which group of plants is most advanced and which one is most primitive? [Delhi 2009C]**

Ans. (i) Ferns and allies.

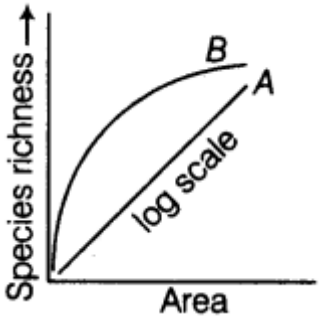
(ii) They grow in humid and shady places and need water for fertilisation. Due to the high temperature and dry condition, few of them survived.

(iii) Fungi has saprotrophic mode of nutrition, they depend only on organic matter for their survival and hence, survive in any environment.

(iv) Angiosperms are most advanced and algae are most primitive.

3 Marks Questions

22. The following graph shows the species-area relationship. Answer the following questions as directed.



(i) Name the naturalist who studied the kind of relationship shown in the graph. Write the observations made by him.

(ii) Write the situations as discovered by the ecologists when the value of Z (slope of the line) lies between

- **1 and 0.2**
- **6 and 1.2**

What does Z stand for?

(iii) When would the slope of the line 'b' become steeper? [All India 2014]

Ans. (i) Alexander Von Humboldt studied the relationship shown in above graph. He observed that the species richness in an area increased with an increase in exploring area, up to a certain limit only.

(ii) (a) Ecologists have observed that when the value of Z lies between 0.1 – 0.2 when the species are considered for a small or average area.

(b) When the value of Z lies between 0.6-1.2, the area considered is very large. Z represents the slope of the line, i.e. regression coefficient.

(iii) The slope of the line 'b' will become steeper when very large areas such as continents are considered for species area relationship.

23. Explain giving three reasons, why tropics show greatest levels of species diversity? [All India 2014]

or

List the reasons that account for the greater biological diversity in tropics. [Foreign 2012]

Ans. Levels of biodiversity in biosphere

(i) Genetic diversity It refers to the diversity of genes within a species.

For example, there are more than 50,000 genetically different strains of rice in India.

(ii) Species diversity It refers to the number of different species within a given region. For example, Western Ghats have a greater amphibian species diversity than Eastern Ghats.

24. Alien species are highly invasive and are a threat to indigenous species. Substantiate this statement with any three examples. [All India 2012]

Ans. Alien species become invasive, compete with the native species and cause extinction of indigenous species.

(i) Introduction of Nile perch into Lake Victoria lead to extinction of more than 200 species of cichlid fish in that lake.

(ii) Carrot grass (Parthenium and Lantana) introduced in our country have become invasive and cause environmental damage. They pose a threat to the native species of plants in our forests.

(iii) Introduction of African cat fish Clarius gariepinus for aquaculture posses a threat to indigenous cat fishes in Indian rivers.

25. Explain by giving example, how co-extinction is one of the causes of loss of biodiversity? List the three causes also (without description). [Foreign 2011]

Ans. Co-extinction is one of the cause of loss of biodiversity as when a species become extinct, the plant and animal species associated with it in an obligatory manner, also become extinct.

For example,

(i) In plant pollinator mutualism, extinction of one results in the extinction of other. `

(ii) If a host fish become extinct, the unique , parasites depending on it would also become extinct.

The other causes of loss of biodiversity are:

- Habitat loss fragmentation
- Over-exploitation
- Invasion of alien species.

26. Explain rivet popper hypothesis. Name the ecologist who proposed it. [Foreign 2011]

Ans. Rivet popper hypothesis

(1) The hypothesis was proposed by Paul Ehrlich.

(ii) In an airplane (ecosystem), all parts are joined together using thousands of rivets (species).

(iii) If every passenger travelling in it, starts popping a rivet to take home (causing a species to become extinct), it may not affect the flight safety (proper functioning of ecosystem) initially, but as more and more rivets are removed, the plane becomes dangerously weak after some time.

(iv) Further, which rivet is removed may also be critical loss of rivets on the wings. (Key species that drive major ecosystem function) is obviously a more serious threat to flight safety than loss of a few rivets on the seats or windows inside the plane.

27. Why are

- **alien species invasion and**
- **loss of habitat and fragmentation considered to be the major cause of loss of biodiversity? Explain with the help of one example each. [Foreign 2009]**

Ans. (i) The alien species become invasive and cause extinction or decline 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 in the lake.

(ii) Loss of habitat and fragmentation drive animals and plants to extinction.

For example, as the Amazon forest is cut and cleared for cultivating soybeans or for conversion to grasslands for raising beef cattle, many species are affected and leads to decline in their population.

Conservation of Biodiversity

1 Mark Questions

1.Write the importance of cryopreservation in conservation of biodiversity. [Delhi 2011]

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

2.Mention one application of pollen bank. How are pollen stored in a bank? [Delhi 2008C]

Ans. Pollen banks can be used to store pollen grains like seed banks. Stored pollen grains can be used in pollen breeding programmes. Pollen grains can be stored in liquid nitrogen -196°C for many years.

2 Marks Questions

3. State the uses of biodiversity in modern agriculture. [All India 2011]

Ans. Uses of biodiversity in modern agriculture are:

(i) Humans obtain food, fibres, medicines and many industrial products from plants.

(ii) Wild varieties of plants are used for breeding to obtain disease and pest resistant crops with many desirable traits.

(iii) By exploring molecular, genetic and species level diversity for economically important products, rich biodiversity can be obtained.

4. Differentiate between insitu and exsitu approaches of conservation of biodiversity. [All India 2011]

Ans. Differences between in situ and ex situ approaches of conservation of biodiversity are:___

In situ conservation	*Ex situ* conservation
This method involves protection of endangered species in their natural habitat.	It involves placing of threatened animals and plants in special care unit for their protection.
It helps in recovering populations in the surroundings where they have developed their distinct features.	It helps in recovering populations or preventing their extinction under stimulated conditions that closely resemble their natural habitats.
e.g. national parks, biosphere reserves, wildlife sanctuaries, etc.	e.g. botanical garden, zoological parks.

5. Biodiversity must be conserved as it plays an important role in many ecosystem services that nature provides. Explain any two services of the ecosystem. [Delhi 2010]

Ans. The two ecosystem services are:

(i) Forest ecosystem, mitigates droughts and floods.

(ii) The wildlife help in pollination of crops.

6. Why certain region have been declared as biodiversity hot spots by environmentalists of the world? Name any two hot spot regions of India. [Delhi 2010]

Ans. Certain regions are declared hot spots by the environmentalists because these regions have very high levels of species richness and high degree of endemism. Hot spots of India are Western Ghats and Sri Lanka, Himalayas and Indo-Burma

3 Marks Questions

7. There are many animals that have become extinct in the wild but continue to be maintained in zoological parks. `

- **What type of biodiversity conservation is observed in this case?**
- **Explain any other two ways which help this type of conservation. [Delhi 2014]**

Ans. (i) The animals maintained in zoological parks is an example of ex situ conservation, as it involves threatened animals in special conditions, away from natural habitat, in order to protect them.

(ii) The other ways of maintaining the endangered animals or species by ex situ conservation are botanical gardens and wildlife safari parks.

8. White Bengal tigers are protected in special settings in zoological parks. Tiger reserves are maintained in Western Ghats.

- **How do these two approaches differ from each other? Mention the advantages of each one.**
- **What is the significance of cryopreservation technique? [All India 2010C]**

Ans. White Bengal tigers are protected in special settings in zoological parks. This is called ex situ conservation, while tiger reserves are maintained in Western Ghats. This is called in situ

(i) For differences between two approaches, i.e. in situ conservation and ex situ conservation and their advantages.

In situ conservation	*Ex situ* conservation
This method involves protection of endangered species in their natural habitat.	It involves placing of threatened animals and plants in special care unit for their protection.
It helps in recovering populations in the surroundings where they have developed their distinct features.	It helps in recovering populations or preventing their extinction under stimulated conditions that closely resemble their natural habitats.
e.g. national parks, biosphere reserves, wildlife sanctuaries, etc.	e.g. botanical garden, zoological parks.

(ii) Using cryopreservation technique:

- Gametes of threatened species can be preserved in viable and fertile conditions for long.
- Plants are propagated by tissue culture method.
- Eggs can be fertilised in vitro.

5 Marks Questions

9. (i) Why is there a need to conserve biodiversity?

(ii) Name and explain any two ways that are responsible for the loss of biodiversity. [All India 2014]

Ans.(i) The biodiversity needs to be conserved because of three categories: .

- **Narrow utilarian** includes most of the resources required for our day-io-day life, e.g. food, oil, clothes, firewood, drugs and medicines, industrial products all are derived from nature, thus needs to be conserved to reap more benefits.
- **Broadly utilarian** includes most of the ecosystem services provided to us by nature. Such as release of oxygen and fixation of $C0_2$ by photosynthesis in plants, pollination and dispersal of seeds, etc. Therefore, for the continuation of these services biodiversity needs to be conserved.

- **Ethical reasons** as it becomes our moral duty to take care of all living species in our surroundings irrespective of their economic importance and pass this biological legacy to our future generations.

(ii) The two ways that are responsible for the loss of biodiversity are:

- Habitat loss and fragmentation of natural habitats due to the natural reasons or human activities and pollution results in degradation of habitats, thereby threatening the survival of many species concerned.

- **Co-extinction** also leads to loss of biodiversity as when a species becomes extinct, the plant and animal species associated with it in obligatory way also become extinct, e.g. when a host organism (fish) becomes extinct, the parasites exclusive to it also becomes extinct

10. (i) Why is there a need to conserve biodiversity?

(ii) Name and explain any two ways that are responsible for the loss of biodiversity. [All India 2014]

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- **Ethical reasons** as it becomes our moral duty to take care of all living species in our surroundings irrespective of their economic importance and pass this biological legacy to our future generations.

(ii) Hot spots are regions exhibiting high degree of endemism and great species richness, therefore designating these areas as 'biodiversity hot spots' allows their maximum protection and reduce the ongoing extinction by about 30%.

Such hot spot regions in India are Western Ghats and Himalayas.