



CHAPTER 15

Biodiversity and Conservation

1. Define biodiversity.
Ans. The occurrence of different types of genes, gene pools, species, habitats and ecosystems in a particular place and various parts of earth is called biodiversity.
2. What is genetic diversity?
Ans. It is the measure of variation in genetic information contained in the organisms.
3. India has more than 50,000 strains of rice. Mention the level of biodiversity it represents.
Ans. 50,000 strains of rice represent genetic biodiversity.
4. 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
5. According to David Tilman, greater the diversity greater is the primary productivity. Can you think of a very low diversity man-made ecosystem that has high productivity.
Ans. Agricultural fields like wheat field or paddy field which are also examples of monoculture practices.
6. What is the difference between endemic and exotic species?
Ans. Endemic species are native species restricted to a particular geographical region. Exotic species are species which are introduced from other geographical regions into an area.
7. What is the ecological importance of biodiversity?
Ans. The ecological importance of biodiversity: (i) Biodiversity is required for maintaining and sustainable use of goods and services from ecosystem. (ii) Various insects help in pollination. (iii) Various micro-organisms help in the decomposition of organic matter thereby increasing the soil fertility and cleaning the environment. (iv) Various drugs and medicines are extracted from plants.
8. What does the term genetic diversity refer to? What is the significance of large genetic diversity in a population?
Ans. Genetic diversity is the measure of variety in genetic information contained in the organisms. Significance of large genetic diversity are as follows: (i) Larger genetic diversity provides adaptability at the time of environmental changes and helps the species in surviving. (ii) Larger genetic diversity is also useful in the evolution of species.
9. State the use of biodiversity in modern agriculture.
Ans. Biodiversity is a source of hybrids, GM plants, biopesticides, organic farming, biofertiliser, improved varieties of plants, disease resistant plants.
10. Where would you expect more species biodiversity— in tropics or in polar regions? Give reasons in support of your answer.
Ans. More biodiversity is found in the tropics. This is because tropical regions remain undisturbed from frequent glaciations as in polar regions. Also, the tropics are less seasonal/more constant.
11. "Stability of a community depends on its species richness." Write how did David Tilman show this experimentally.

Ans. David Tilman 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.

12. Why are certain regions on the Earth called hot-spots? Name any two hot-spots in India.

Ans. Certain regions have been declared as "hot spots" for maximum protection of these regions which have high levels of species richness and high degree of endemism. Western Ghats and Sri Lanka and Himalayas are two example of hot-spots.

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

Ans. When Nile perch, a large predator fish, was introduced in Lake Victoria, it started feeding on the native fish, Cichlid fish. As a result, Cichlid fish became extinct and Nile perch, not finding any food for itself, died too.

14. 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 purify air, mitigate droughts and floods. (ii) The cycling nutrients generate fertile soil and maintains biodiversity.

15. How is the presently occurring species extinction different from the earlier mass extinctions?

Ans. Species extinction occurring at present is due to anthropogenic or man-made causes whereas the earlier extinction was due to natural causes. Present extinction is occurring at 100 – 1000 times fast rate.

16. In an experiment, the slope of regression (Z) is 0.2 and in another experiment the value obtained is 1.2. Explain the two situations in respect of species area relationships.

17. Ans. 0.2 is obtained in studies regardless of the taxonomic group and the region 1.2 is obtained if species area relationship is analysed among very large areas like the entire continents.

18. Assess the effects of loss of biodiversity in a region. Mention any four such effects.

19. Ans. (i) Decline in plant production and animal species. (ii) Lowered resistance to environmental perturbations such as drought. (iii) Increased variability in certain ecosystem processes such as plant productivity/water use/ pest and disease cycles. (iv) Increased rate of species extinction

20. Explain, giving one example, how co-extinction is one of the causes of loss of biodiversity. List the three other causes also (without description).

21. Ans. When a species becomes extinct, the plant and animal species associated with it in an obligatory may also become extinct. This is called co-extinction. For example, when a host fish species becomes extinct, its unique assemblage of parasites also becomes extinct. The three other causes are: (i) Habitat loss and fragmentation, (ii) Over-exploitation, (iii) Alien species invasion.

22. Why are sacred groves highly protected?

Ans. Sacred groves are highly protected because of religious and cultural traditions. These are refuges for large number of rare and threatened plants. They are ecologically unique and biodiversity rich regions.

23. List any four techniques where the principle of ex situ conservation of biodiversity has been employed.

Ans. Cryopreservation, in vitro fertilisation, micropropagation/tissue culture, sperm bank/seed bank/gene bank.

24. What is cryopreservation? Give its one use.

Ans. Cryopreservation is a preservation technique in which sperms, eggs, cells, tissues, etc., are stored at ultra-low temperature of -196°C under nitrogen. Cells and gametes of threatened species can also be preserved by this method.

25. Why should biodiversity be conserved? List any two ethical arguments in its support.

Ans. The biodiversity should be conserved because of the following reasons: (Any two) (i) Narrowly utilitarian arguments for deriving direct economic benefit from nature. (ii) Broadly utilitarian arguments as biodiversity plays a major role in many ecosystem services. (iii) Ethical reasons: There is a need to realise that every species has an intrinsic value and we need to pass on our biological legacy to future generations.

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

Ans. Exotic species are defined as species that have been introduced from another geographic region to an area outside its natural range. For example, (i) Parthenium, Lantana and Eichhornia are the exotic species of plants that have invaded the native species of India and caused environmental damage. (ii) Introduction of African catfish *Clarias gariepinus* for aquaculture purpose is posing threat to many indigenous catfish. (iii) Nile perch introduced into lake Victoria in East Africa led to the extinction of cichlid fish.

27. Explain 'rivet popper' hypothesis. Name the ecologist who proposed it.

Ans. Paul Ehrlich proposed the rivet popper hypothesis. This hypothesis states that in an airplane (ecosystem) all parts are joined together using thousands of rivet (species). If every passenger travelling in it starts popping a rivet to take home (causing a species to become extinct), it may not affect flight safety (proper functioning of the ecosystem) initially but as more and more rivets are removed, the plane becomes dangerously weak over a period of time. Also, which rivet is removed may also be critical like loss of rivets on the wings (key species) is more serious threat to flight safety than loss of few rivets on the seats or windows inside the plane.

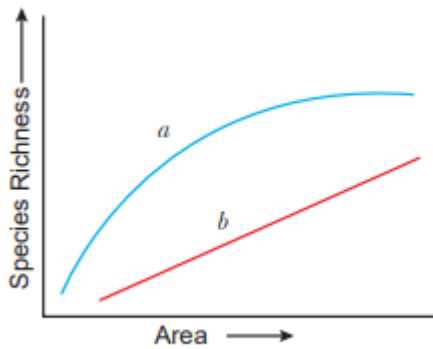
28. There are many animals that have become extinct in the wild but continue to be maintained in Zoological parks. (i) What type of biodiversity conservation is observed in this case? (ii) Explain any two other ways which help in this type of conservation.

Ans. (i) Ex-situ conservation (ii) (a) In-vitro fertilisation: Gametes of threatened species can be fertilised for their propagation. (b) Cryopreservation techniques: Gametes of threatened species can be preserved in viable and fertile condition for long periods.

29. Explain, giving three reasons, why tropics show greatest levels of species diversity.

Ans. (i) Tropical latitude have remained relatively undisturbed and had a long evolutionary time for species diversification. (ii) Tropical environments have less seasonal variations, more constant and predictable environmental conditions. This promotes niche specialisation for greater species diversity. (iii) There is more availability of solar energy which contributes to higher productivity.

30. The graph shows species-area relationship:



If *b* denotes the relationship on log scale- (i) Describe *a* and *b*. (ii) How is slope represented? Give the normal range of slope. (iii) What kind of slope will be observed for frugivorous birds and mammals in a tropical forest? (b) Species diversity of plants (22%) is much less than that of animals (72%). Analyze the reasons for greater diversity of animals as compared to plants.

Ans.

(a) (i) *a* is $S = CA^2$

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

(ii) Slope is *Z* (regression coefficient). Its normal value ranges from 0.6 to 1.2. (iii) In frugivorous birds and mammals, value of $Z=1.15$ (b) Reasons for greater diversity of animals are: (i) Animals are mobile and can avoid predator or unfavourable event. (ii) Well developed nervous system to receive stimuli against external factors and respond to them.
