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Class: 12
Subject: Biology
Topic: Biodiversity and conservation
No. of Questions: 25

Q1. How do ecologists estimate the total number of species present in the world?

Sol. Ecologists make a statistical comparison of the species richness of exhaustively studied groups of insects of the temperate and tropical regions and extrapolate this ratio to other groups of animals and plants to calculate gross estimate of the total number of species existing on the earth.

Q2. What is the significance of the slope of regression in a species-area relationship?

Sol. When analysis of species-area relationships is done among small areas, the values of slopes of regression are remarkably similar regardless of the taxonomic group or the region. However, when such analysis is done among very large areas, i.e., continents, then the slope of regression would be much steeper.

Q3. How is biodiversity important for ecosystem functioning?

Sol. Rich biodiversity provides alternatives available at each trophic level. All organisms are linked in food chains and interact with their abiotic environment in such a way so as to keep the natural cycles going and make the ecosystems self – sustaining units. Disappearance of any link in a food chain will not affect the ecosystem as other alternatives are there.

Q4. What are sacred grooves? What is their role in conservation?

Sol. Sacred grooves are the sacred forest patches around places of worship. These are held in high esteem by tribal communities/state or Central government. Tribals do not allow to cut even a single branch of tree in these sacred grooves. This is the reason why many endemic species flourish in these regions.

Q5. Among the ecosystem services are control of floods and soil erosion. How is this achieved by the biotic components of the ecosystem?

Sol. Plants play a vital role in the control of floods and soil erosion. Their roots bind the soil particles firmly and in this way they do not allow the top soil to be drifted away by winds or moving water. Roots of plants also make the soil porous and allow the top go into the soil.

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Q6. 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?

Sol. Most animals possess simple or complex nervous system to control and coordinate various activities. They possess receptors to receive environmental stimuli and show response against them. Most of their responses are adaptive and ensure their survival in changing environmental conditions. They, therefore, have evolved to reveal much higher species diversity than plants who do not possess nervous system and respond differently against environmental stimuli.

Q7. Can you think of a situation where we deliberately want to make a species extinct? How would you justify it?

Sol. We are trying to eradicate disease causing organisms (e.g., polio virus) from this world to make this world disease free. Since, such microorganisms are harmful to the human society, such attempt is justified. Further, such microorganisms are not essential components (produces or decomposers) of any ecosystem and losing one or few such organisms would not affect the functioning of ecosystems.

Q8. Define cryopreservation.

Sol. It is a technique of preserving seeds of plants, vegetatively propagating plants, cells, sperms, ova, embryonic tissues of animals usually at – 196^{o}C, a temperature of liquid nitrogen.

Q9. What are endangered species? How many animals plants are endangered in India?

Sol. A taxon is endangered when its populations have decreased or habitats have been reduced to the levels that pose immediate danger of extinction. They are not likely to survive if the factors threatening their extinction continue. 54 animals and 113 plants are endangered in India.

Q10. What is in situ conservation?

Sol. It is the most appropriate method to maintain species of wild animals and plants in their natural habitats. This approach includes protection of total ecosystems through a network of protected area-national parks, wildlife sanctuaries, biosphere reserves, sacred grooves and lakes, several wetlands, mangroves and coral reefs.

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Q11. "Stability of a community depends on its species richness." Write how did David Tilman show this experimentally.

Sol. Ecologists believe that communities with more species tend to be more stable than those with less species. This was confirmed by David Tilman experimentally who showed that:

(i) Productivity should not vary too much from year to year.
(ii) It should be resistant to occasional natural and man-made disturbances.
(iii) It should be resistant to invasions by alien species.

Q12. What is meant by "alien species" invasion? Name one plant and one animal alien species that are a threat to our India native species.

Sol. Plants, animals and other living things have been introduced to a place where they have not lived before are known as invasive species. Cactus plant and hungry are a threat to our Indian native species.

Q13. What are the specific objectives of conservation of wild life?

Sol. Conservation of wildlife has tree specific objectives:

(i) To main essential ecological processes and life-supporting systems (air, water and soil).
(ii) To preserve the diversity of species or the range of genetic material of world's organisms.
(iii) To ensure a continuous use of species, in fact ecosystems, that support rural communities and urban industries.

Q14. A. Expand the abbreviations IUCN, CBD and CITES.
B. In which year and where Earth Summit was held?
C. When did India sign CBD?
D. List three goals of CBD.

Sol.

a. IUCN-International Union of Conservation of Nature and Natural Resources. CBD-Convention on Biological Diversity.
CITES-Convention on International Trade in Endangered Species.
b. In June, 1992 at Rio-de-Jeniero, Brazil.
c. India signed CBD in May, 1994.
Three goals of CBD are-

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(i) Conservation of Nature and Natural Resources.
(ii) Sustainable use of biodiversity, and
(iii) Equal and fair sharing of benefits by utilizing genetic resources.

Q15. Discuss on example, based on your day to day observations, showing how loss of one species may lead to the extinction of another?

Sol. If a given species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct. Such an extinction is called co-extinction.

Q16. Why are the conventional methods not suitable for the assessment of biodiversity bacteria?

Sol. Bacteria have the simplest body organization. Most of them are not culturable and hence it is difficult to study their morphological and biochemical characteristics in laboratory to identify them.

Q17. How is the 'sixth episode of extinction' of species on earth, now currently in progress, different from the five earlier episodes? What is it due to? Explain the various causes that have brought about this difference.

Sol. Sixth episode of extinction will be due to the climatic changes that would kill the biodiversity. Five earlier episodes that became extinct today are: (i) early reptiles, (ii) pelycosaurs (iii) thecodonts, (iv) therapsids, (v) dinosaurs.

The sixth episode contains turtles, lizards, snakes, tuataras, crocodiles, birds and mammals. Some are facing danger and are very near to extinction. For instance, population of white Bengal tiger due to unlimited hunting; The land reptiles.

Q18. A. Mention those red list categories which together are referred to as 'threatened species'.

B. What are rare species? Are these endangered or vulnerable at present? Give any one example of rare species in India.

Sol.

a. Species belonging to critically endangered, endangered, vulnerable and lower risk categories are referred to as 'threatened species'.
b. Rare species normally have small populations in the world. They are confined to limited areas or are thinly distributed over a more wide area.

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They are not endangered or vulnerable at present but have risk of becoming so because of their small numbers. Example of rare species: Great India bustard in some parts of Gujarat and Rajasthan.

Q19. A

a. What are hot spots of biodiversity?
b. List four main criteria for determining a particular place as a hot spot.
c. Among the hot spots of the world, list two which are located in India.

Sol.

a. Hot spots are the regions of rich biodiversity which have been declared sensitive due to direct or indirect interference of human activities.
b. Four main criteria are–
   (i) Rich species diversity
   (ii) Number of endemic species
   (iii) Degree of threat in terms of habitat loss, and
   (iv) Degree of exploitation.
c. Western ghats and Eastern Himalayas.

Q20. From among plants, invertebrates and vertebrates, list respectively those taxa which occur maximum in numbers at present.

Sol. Plants – Angiosperms

Invertebrates – Insects

Vertebrates – Fishes

Q21. How many bio-geographical regions are present in India?

a) 3

b) 4

c) 7

d) 10

Sol. (d)

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Q22. Lime is added to the soil which is too

a) Sandy

b) Salty

c) Alkaline

d) Acidic

Sol. (d)

Q23. Which one of the following areas in India, is a hotspot of biodiversity?

a) Sunderbans

b) Western Ghats

c) Eastern Ghats

d) Gangetic Plain

Sol. (b)

Q24. Darwin's finches are a good example of

a) Convergent evolution

b) Industrial melanism

c) Connecting link

d) Adaptive radiation

Sol. (d)

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Q25. Which one of the following is an example ex-situ conservation?

a) National park

b) Wildlife sanctuary

c) Seed bank

d) Sacred groves

Sol. (c)

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