

## **BIODIVERSITY (UNIT5-BIOLOGICAL RESOURCE)**

### **MODEL QUESTIONS AND ANSWERS**

**1. Define biodiversity.**

The totality of all living organisms OR A collection of variety of all life forms.

**2. Who coined the term biodiversity?**

Walter Rosen.

**3. Who developed the concept of biodiversity?**

Edward O. Wilson

**4. Name the different levels of biodiversity.**

Habitat diversity, species diversity and genetic diversity.

**5. What is genetic diversity ?**

It is the variation at the level of individual genes.

**6. What is species diversity?**

Variety of different species in a given geographical area.

**7. Define a species.**

A group of closely related organisms which can interbreed to produce viable and fertile offsprings.

**8. Define habitat diversity.**

It is the various habitats available for organisms in the ecosystem.

**9. What is alpha diversity?**

Diversity of living organisms within the community or different communities sharing the same habitat.

**10. Define beta diversity.**

Diversity of organisms between the communities in the given geographic area.

**11. What is gamma diversity?**

It is the diversity of organisms / habitats over a large geographical area.

**12. What are biodiversity hotspots?**

Habitats with rich endemism and the species are prone to endanger.

**13. Name the biodiversity hotspots in India.**

Western Ghats and Eastern Himalayas.

**14. What are invasive species?**

Foreign species that grow and reproduce rapidly causing major disturbance in the habitats.

**15. What are key stone species?**

Organism that helps to maintain species diversity within an ecosystem by keeping the number of other species in a ecosystem constant.

**16. Expand RDB.**

Red Data Book.

**17. Why should we conserve biodiversity?**

Biodiversity provides economical, ecological and ethical benefits to the mankind.

**18. What is mass extinction?**

Extinction of large scale species due to environmental catastrophe.

**19. What are threatened species?**

The species which are either endangered or vulnerable

**20. What are vulnerable species?**

Species which are likely to become endangered if environmental degradation continue to persist.

**21. What are rare species?**

A small population which are neither endangered nor vulnerable but are at the risk.

**22. What are endangered species?**

Species which are in the dangers of extinction due to the loss of natural habitats.

**23. What are critically endangered species?**

Species which is at extremely high risk of extinction.

**24. Expand IUCN.**

International Union for Conservation of Nature and natural resources.

**25. What is in-situ conservation of wild life?**

It is the conservation of wild species in their natural habitats.

**26. Name any two in-situ conservation methods.**

National parks, Sanctuaries, Biosphere reserve, hotspots etc.

**27. What are sacred species?**

The species which is traditionally conserved and dedicated to the local deities and are of

cultural /religious values.

**28. What are sacred groves?**

They are the small patches of natural forests dedicated to the local deities so that no one harms them.

**29. What is ex-situ conservation?**

Conservation of species out of their natural habitats.

**30. What are endemic species?**

A species which is found only in a particular area because of isolation and climatic condition.

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**31. What is the importance of species diversity to the ecosystem ?**

Any community with more species generally tends to be more stable than those with less species. The stable community must be resilient to the occasional disturbances. The stable community should not show any variation in less period of time. Increased diversity contributes to higher productivity of any ecosystem.

**32. Explain briefly the evil quartet of biodiversity losses.**

The four major causes of biodiversity loss are; i) Habitat loss – degradation of natural habitats are threatening the species. ii) Over-exploitation – Need turned greed has led to over exploitation of natural resources. iii) Alien species – Invasion of alien species in the natural habitats cause decline in the native species. iv) Co-extinction – when one organism becomes extinct , the other associated obligatory species also tend to extinct.

**33. What is the importance of biodiversity. Explain the causes of loss of biodiversity.**

**Biodiversity** is important for maintaining the balance in the ecosystem. The continuous flow of energy is maintained in the ecosystem.

The loss of biodiversity is the cause of great concern. It includes habitat loss, over exploitation, intensive farming, mining, desertification, erosion, over grazing, deforestation, pollution, acidification of soil and water, urbanization etc. have accelerated the process of biodiversity depletion.

**Habitat loss** is the destruction of ecosystem by unwanted human activities such as urbanization, intensive farming, deforestation, mining activities and so on. When the vegetation is cleared for human activities the continuous habitats become fragmented.

This is called habitat fragmentation. When fragments are formed it restricts the movement of organism across the fragments thereby reducing the gene flow and there will be decline the species composition. Thick forests receive large amount of water thereby evaporation and transpiration maintains water cycle. Disappearance of large habitats makes it vulnerable to draught and desertification.

**Over exploitation** is the harvesting of renewable resources to the extent of diminishing returns. Such act would lead to complete destruction and extinction of the natural resources.

**Alien species** invasion into the natural grounds has resulted in thinning the indigenous species. There will be no predation to such alien species and there number keeps increasing causing a problem.

**Co extinction** is the simultaneous extinction of multiple species when one is directly associated with other. When hosts become extinct the parasites also become extinct.

### **34. Explain the benefits of biodiversity.**

**Biodiversity** is known for the multiple benefits such as economical (narrowly utilitarian), ecological (Broadly utilitarian) and ethical benefits.

**Narrow utilitarian** includes economical benefits such as food, medicine, industrial and bioprospecting.

**Foods** include cereals, pulses, fruits, vegetables, wheat, rice, millets, rice etc are obtained from plants. From over 10000 varieties of cereals wheat, rice and corn fulfills 1/3<sup>rd</sup> of the total food demand. IARI identified lesser known plants and animal having food value. Medicines such as morphine form poppy seeds, taxol from bark of yew tree. Indian system of medicine uses over 25000 different plant based formulations as drugs. Majority of cancerous drugs are obtained from the plants itself.

**Industrial products** such as tannins, dyes, resins are also obtained from the plants.

**Bioprospecting** is the exploration of molecular, genetic and species level diversity for the products of economic importance.

**Broadly utilitarian** deals with unlimited ecological services rendered by biodiversity to the mankind. Viz., pollination, release of oxygen, esthetic value related to the integrity of ecosystems.

**Pollination by insects**, birds, bats and animals is the supreme ecological service which is crucial to the plants. Plants by way of photo-ionization of water during photosynthesis produce elemental oxygen as one of the end products. This oxygen gas is responsible for keeping all the aerobic organisms alive. Modern man has been utilizing habitats for recreational and aesthetic values. The economical upliftment and awareness about the biodiversity conservation comes from activities like hiking, camping, gardening, cliff hanging, mountaineering, bird watching, sport fishing etc.

**Peter Raven** said biodiversity keeps the planet habitable and the ecosystems functional. These natural services if calculated in terms of money it would be around 3 trillion US \$ per year.

**Ethical aspects** put certain moral principles to the conservation of biodiversity. These are propagated through cultural, religious and spiritual beliefs.

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**Genetic diversity:** A single species might show high diversity at the genetic level over its distributional range. The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces. India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango.

**Species diversity:** The diversity at the species level. For example, the Western Ghats have a greater amphibian species diversity than the Eastern Ghats.

**Ecological diversity:** At the ecosystem level, India, for instance, with its deserts, rain forests, mangroves, coral reefs, wetlands, estuaries, and alpine meadows has a greater ecosystem diversity than a Scandinavian country like Norway.

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**Causes of biodiversity losses:** The accelerated rates of species extinctions that the world is facing now are largely due to human activities. There are four major causes

**(i) Habitat loss and fragmentation:** This is the most important cause driving animals and plants to extinction. The most dramatic examples of habitat loss come from tropical rain forests. Once covering more than 14 per cent of the earth's land surface, these rain forests now cover no more than 6 per cent. They are being destroyed fast. By the time you finish reading this chapter, 1000 more hectares of rain forest would have been lost.

The Amazon rain forest (it is so huge that it is called the ‘lungs of the planet’) harbouring probably millions of species is being cut and cleared for cultivating soya beans or for conversion to grasslands for raising beef cattle. Besides total loss, the degradation of many habitats by pollution also threatens the survival of many species. When large habitats are broken up into small fragments due to various human activities, mammals and birds requiring large territories and certain animals with migratory habits are badly affected, leading to population declines.

**(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. Many species extinctions in the last 500 years (Steller’s sea cow, passenger pigeon) were due to overexploitation by humans. Presently 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. The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake. You must be familiar with the environmental damage caused and threat posed to our native species by invasive weed species like carrot grass (*Parthenium*), *Lantana* and water hyacinth (*Eicchornia*).

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

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