15. Biodiversity and Conservation

Question 1. Name the three important components of biodiversity.

Answer: Biodiversity is the various types of organisms in the ecosystem. Genetic diversity, species diversity and ecosystem diversity are three important components of biodiversity. Genetic diversity takes into account the genetic variations present in a species whereas ecosystem diversity refers to types of ecosystem present on earth. Species diversity refers to species richness.

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

Answer: The diversity of living organisms present on the Earth is very vast. According to an estimate by researchers, it is about seven millions.
The total number of species present in the world is calculated by ecologists by statistical comparison between a species richness of a well-studied group of insects of temperate and tropical regions. Then, these ratios are extrapolated with other groups of plants and animals to calculate the total species richness present on the Earth.

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

Answer: In tropics:-
No Catastrophes – In tropics, there has been no catastrophes but is temperate areas glaciations and other catastrophes have caused large scale of destruction.
Non-seasonal Environment – In tropics, seasons are nearly uniform. It promotes rich and increases species diversity.
Solar Energy – Tropics get lots of sunlight which enhances productivity.

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

Answer: The slope of regression has a major role in determining the species-area relationship. In smaller areas slope of regression is similar regardless of the taxonomic group or region. On the other hands, in case of larger areas, curve us steeper. Biodiversity also increases from higher to lower altitudes.

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

Answer: There are four major causes that can lead to species loss in an area.

• Habitat loss and fragmentation: Changes caused in a habitat due to uncontrolled and unsustainable human activities such as deforestation, slash and burn agriculture, mining, and urbanization can result into breaking up of the habitat into small pieces, which effects various species and the movement of migratory animals. This leads to decrease in the genetic exchange between populations leading to decreased population of species. It is the most important cause leading to species extinction.

• Over-exploitation: Human greed has led to over-exploitation of various natural resources which has led to endangering and extinction of various species over years.

• Alien species Invasions: Alien species that the introduced unintentionally or deliberately can become invasive and can cause declination or extinction of indigenous species.

• Co-extinctions: Various species can be connected to each other in an obligatory way. When one species gets extinct, other plants or animal species associated with it also gets extinct.

Question 6. How is biodiversity important for ecosystem functioning?

Answer: Ecosystems consist of groups of organisms interacting with their abiotic environment, and they perform many functions that are critical for maintaining the conditions that allow for life to occur. Plants and other autotrophs (such as algae in the oceans) are responsible for transforming carbon dioxide from the atmosphere into the usable forms of carbon that serve as the building blocks for life using energy from sunlight. In addition to sitting at the bottom of the food chain that supplies energy to all other organisms on the planet, plants have the potential to act as a "carbon sink," sucking up and storing excess carbon dioxide produced by human activities and moderating climate change. Animals consume the plants, and in turn provide numerous services to humans including as food, pollination, pest control, and transportation. Millions of species of bacteria and fungi play a critical role in breaking down dead material and reprocessing the nutrients to make them available for plants to continue growing.

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

Answer: Sacred grooves are communally protected forest fragments that usually have a religious importance attached to it.

• In India sacred groves are found in certain regions of Rajasthan, Western Ghats of Karnataka, Maharashtra, Meghalaya, and Madhya Pradesh.
• Sacred grooves help in protection of various rare and threatened species as deforestation is strictly restricted in such areas.

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

Answer: Ecosystem services refer to good or benefits that we get from the ecosystem. Prevention of soil erosion and floods comes under benefits provided by the ecosystem to us. The ecosystem includes both abiotic and biotic components. The biotic components are the living organisms present in an ecosystem. Biotic components play a role in providing ecosystem services. some of these roles are as follows:

1. The roots of plants hold the soil particles very tightly. This prevents the erosion or degradation of the top layer of soil

2. Plants increase soil fertility and biodiversity.

3. Presence of plants also help in controlling the flow of floods and lead to minimal destructions.

4. roots of plants make the soil porous thus allowing water to seep in the soil.

5. The carbon dioxide and oxygen balance are maintained in the ecosystem via plants and animals.

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

Answer: Species diversity refers to the variety of species within a region which is less in plants as compared to animals. It is due to greater dispersal/more number of surviving individuals. Most animals possess simple or complex nervous system to control and coordinate various activities. They possess receptors to receive 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 environment stimuli.

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

Answer: Humans can cause extinction of species through various means. We are trying to eradicate disease causing organisms (e.g., poliovirus) from this world to make this world disease free. Since such micro-organisms are harmful to the human society, such attempt is justified. Further, such micro-organisms are not essential components (producers or decomposers) of any ecosystem, and losing one or few such organisms would not affect the functioning of ecosystem.