NCERT Class 12 Biology Exercise Solutions

Chapter 13 – Biodiversity and Its Conservation

1. Name the three important components of biodiversity.

Ans: Biodiversity is the term used to describe the different types of living things found in various ecosystems. It encompasses the range of life forms that come from sources like air, water, and land. The three main components of biodiversity are species diversity, genetic diversity, and ecosystem diversity.

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

Ans: There is a wide variety of living things on Earth, with researchers estimating the number to be around seven million. Ecologists can determine the total number of species by comparing the diversity of well-studied insect groups in different regions. This information is then used to estimate the total number of species of plants and animals on Earth.

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

Ans: Scientists have three hypotheses to explain why there are so many different species in the tropics.

First, because tropical areas receive more sunlight, they have more diverse species and are more productive.

Second, the tropics have a stable environment with less seasonal changes, which allows for specialization and leads to a higher number of species.

Lastly, during the ice age, temperate regions experienced glaciations while the tropics remained unchanged, resulting in an increase in species diversity in the tropical regions.

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

Ans: The incline is useful for determining the species-area connection. When examining this connection in smaller regions, the regression slopes are consistent regardless of the taxonomic group or area. However, in larger areas, the regression slope is much steeper.

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

Ans: Biodiversity refers to the wide range of living organisms found in various ecosystems, including the different forms of life in the air, water, and land. Unfortunately, biodiversity all over the world is rapidly decreasing. There are several main reasons for this decline:

1. Habitat loss and fragmentation: Human activities like slash-and-burn agriculture, deforestation, mining, and urbanization are causing the destruction and alteration of habitats. This leads to habitats being broken up into smaller pieces, which affects the migration of animals and reduces genetic exchange between populations. As a result, species are declining.

2. Co-extinction: In nature, species are interconnected in complex networks within their native habitats. When one species becomes extinct, it can cause the extinction of another species that relies on it for survival. This obligatory connection between species can lead to a chain reaction of extinctions.
3. Over-exploitation: Humans have driven certain species to extinction or endangered them through excessive exploitation and over-hunting of plants and animals. For example, the passenger pigeon and tiger are two species that have become extinct due to human activities.
4. Alien species invasions: When non-native species are intentionally introduced into a specific habitat, they can outcompete and displace indigenous species, leading to their extinction. An example of this is the Nile perch, which caused the extinction of over two hundred native fish species in Lake Victoria, Kenya, when it was introduced.
These factors contribute to the decline of biodiversity worldwide, highlighting the urgent need for conservation efforts to protect our planet's rich variety of life.

6. How is biodiversity important for ecosystem functioning?

Ans: Biodiversity is crucial for several reasons. Firstly, ecosystems with a wide range of species are more stable compared to those with fewer species. Secondly, higher biodiversity leads to increased stability in productivity, making ecosystems more resistant to disturbances like floods or invasions by alien species. Thirdly, ecosystems rich in biodiversity maintain their ecological balance. Lastly, if one organism in a food chain becomes ill, it can disrupt the entire chain, causing imbalances and potentially leading to the extinction of other species. Therefore, having a diverse range of species in an ecosystem provides alternative food sources and increases the overall life expectancy of organisms. In conclusion, biodiversity plays a significant role in preserving the health and ecological balance of ecosystems.

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

Ans: Sacred groves are forests near places of worship. They can be found in the Western Ghats of Karnataka, Rajasthan, Maharashtra, Madhya Pradesh, and Meghalaya. These groves protect endangered species of animals and plants. Deforestation is strictly prohibited in tribal areas, so sacred groves are safe there.

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

Ans: The ecosystem consists of abiotic and biotic components. Abiotic components include air, light, water, temperature, and soil. Biotic components consist of animals, plants, and humans. Plants play a vital role in preventing soil erosion and floods by securing soil particles with their roots. This helps in maintaining soil structure and preventing erosion by water or wind. Additionally, plant roots create pores in the soil, allowing groundwater infiltration and reducing the risk of floods. Plants contribute to biodiversity, enhance soil fertility, and help in averting natural disasters like droughts and floods.

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

Ans: There is a significant gap between the species diversity of plants (22%) and animals (72%) due to various factors. Animals have adapted to changing environments for survival, developing complex nervous systems for coordinated movements. Insects, for example, have become versatile, surviving in various habitats with repeated body segments and paired appendages. On the other hand, plants are stationary, limiting their diversity compared to animals who can move and adapt to different environments.

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

Ans: Yes, there was a scenario in which various parasites and disease-causing micro-organisms needed to be eliminated from the world. Scientists were dedicatedly working to combat and eradicate them entirely because these microbes pose a threat to human life. They have managed to eradicate smallpox from the planet by utilizing vaccinations effectively. This demonstrates the intentional effort of humans to drive these species to extinction. Other initiatives, such as Hepatitis B and polio vaccinations, are also in place to eradicate disease-causing microbes.