

Chapter-15
Biodiversity and conservation
Class –XII
Subject –Biology

1. Name the three components of biodiversity

Answer 1.

Diversity exists at all level of biological organization ranging from the macromolecules with in cells to biom

Three important components of biodiversity are:

- (a) Genetic diversity
- (b) Species diversity
- (c) Ecosystem diversity

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

Answer 2.

Living organisms have very vast diversity on the Earth. An estimation by researchers says that it is about seven millions. The total number of species present in the world is calculated by ecologists. An ecologist uses the data of the species richness of a well studied group of insects of temperate and

tropical regions to make statistical comparison between species richness. Then, these ratios are extrapolated with other groups of plants and animals to calculate the total species richness present on the Earth.

- 3. Give three hypotheses for explaining why tropics show greatest levels or species richness.**

Answer 3.

Scientists had proposed three different hypotheses to explain the species richness in the tropics.

1. The flow of solar energy in tropical latitudes is more than temperate regions, which leads to high productivity and high species diversity.
 2. Seasonal variations in tropical regions are less and have a more or less constant environment. This condition promotes the niche specialization and thus, high species richness.
 3. Temperate regions were subjected to glaciations during the ice age, while tropical regions remained undisturbed which led to an increase in the species diversity in this region.
- 4. What is the significance of the slope of regression in a species — area relationship?**

Answer 4.

An species-area relationship can be fined by the slope of the line or regression coefficient. It gives an estimate of species richness of area. It is independent of taxonomical category or type of area studied. It has been found that in smaller areas (where the species-area relationship is analyzed), the value of slopes of regression is similar regardless of the taxonomic group or the region. However, when a similar analysis is done in larger areas, then the slope of regression is much steeper.

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

Answer 5.

Biodiversity can be defined as the totality of genes, species and ecosystems of a given region.

The following are the major causes for the loss of biodiversity around the world.

(a) **Habitat loss and fragmentation:**

It is the most important or primary cause for extinction. The tropical rain forest initially covered 14% of the land surface of the earth but now they cover only 6% of the land area. Habitats of various organisms are altered or destroyed by uncontrolled and unsustainable human activities such as deforestation, slash and burn agriculture, mining, and urbanization. This results in the breaking up or the habitat into small pieces, which effects the movement of migratory animals and also, decreases the genetic exchange between populations leading to a declination of species.

(b) **Over-exploitation:** When nature is over exploited by man for the natural resources, many species become extinct (such as the tiger, the passenger pigeon and Stellar's sea cow).

- (c) **Invasion of Alien species:** The alien species become invasive, compete with native species and cause extinction of the indigenous species. For example, the Nile perch introduced in Lake Victoria in Kenya led to the extinction of more than two hundred species of native fish in the lake and introduction of African catfish (*Clarias gariepinus*) for aquaculture purpose, is posing threat to our indigenous catfish, (*Clarias bacterachus*)
- (d) **Co-extinction:** Co-extinction is a phenomenon in which, when a species becomes extinct, the plant and animal species associated with it in an obligatory manner, also become extinct. For example, the extinction of the host will cause the extinction of its parasites.

6. How is biodiversity important for ecosystem functioning?

Answer 6.

High species diversity ecosystem has more stability than a low species diversity ecosystem. Also; high biodiversity makes the ecosystem more stable in productivity and more resistant towards disturbances such as alien species invasions and floods.

The ecological balance will be unaffected when an ecosystem is rich in biodiversity, then. As we all know, various trophic levels are connected through food chains. If any one organism or all organisms of any one trophic level is killed, then it will disrupt the entire food chain. For example, in a food chain, if all plants are killed, then all deer's will die due to the lack of food. If all deer's are dead, soon the tigers will also die. Therefore, it can be concluded that if an ecosystem is rich in species, then there will be other food alternatives at each trophic level which would not allow any organism to die due to the absence of their food resource. Hence, biodiversity plays an important role in maintaining the health and ecological balance of an

ecosystem. Now it is clear that species richness and biodiversity both are essential for ecosystem functioning.

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

Answer 7.

Sacred groves are undistributed forest without any human intervention and they are surrounded by highly degraded landscape. Such forests include a number of rare, endangered and endemic species. Such scared groves are found in

- Khasi and jantia hills in Meghalaya
- Western Ghat region of Karnataka and Maharashtra
- Aravalli Hills of Rajasthan and
- Sarguja, Chanda and Bostar areas of Madhya Pradesh

Scared groves help in protection of many rare, threatened, and endemic species of plants and animals found in an area. The process of deforestation is strictly prohibited in this region by tribals. Hence, the sacred grove biodiversity is a rich area.

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

Answer 8.

Living organisms such as plants and animals come under the biotic components of an ecosystem. The role of plants in controlling floods and soil erosion is very much important by holding the soil particles together through root, thereby preventing the top layer of the soil to get eroded by

wind or running water. Ground water infiltration and prevention of floods is done because of soil porosity which is done by the plants root. Hence, plants are able to prevent soil erosion and natural calamities such as floods and droughts. They also increase the fertility of soil and biodiversity.

9. What measures, as an individual, you would take to reduce environmental pollution?

Answer 9.

The following initiatives can be taken to prevent environmental pollution:

Measures for preventing water pollution:

- i. Optimizing the use of water
- ii. Using kitchen waste water in gardening and other household purposes

Measures for decreasing solid waste generation:

- i. Segregation of waste
- ii. Recycling and reuse of plastic and paper
- iii. Composting of biodegradable kitchen waste
- iv. Reducing the use of plastics

Measures for controlling Noise pollution:

- i. Avoid burning crackers on Diwali
- ii. Plantation of more trees

Measures for preventing Air pollution

- i. Planting more trees
- ii. Use of clean and renewable energy sources such as CNG and bio-fuels
- iii. Reducing the use of fossil fuels

iv. Use of catalytic converters in automobiles

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

Answer 10.

There are different types of parasites and disease-causing microorganisms that we deliberately want to eradicate from the Earth. Since these microorganisms are harmful to human beings, scientists are working hard to develop the vaccines against them and elimination of small pox virus from the world through the use of vaccinations is the great achievement. This shows that humans deliberately want to make these species extinct. Several other eradication programs such as polio and Hepatitis S vaccinations are aimed to eliminate these disease-causing microbes.