

Exercise**Question 1:**

Name the three important components of biodiversity.

Solution 1:

Biodiversity includes variability among life forms from all sources including land, air, and water. Three important components of biodiversity are:

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

Question 2:

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

Solution 2:

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 and these ratios are extrapolated with other groups of plants and animals to calculate the total species richness present on the Earth.

According to an estimate by researchers, it is about seven million which indicates that the variety of living organisms present on the earth is very vast.

Question 3:

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

Solution 3:

There are three different hypotheses proposed by scientists for explaining species richness in the tropics.

- (i) Tropical latitudes receive more solar energy than temperate regions, which leads to high productivity and high species diversity.
- (ii) Tropical regions have less seasonal variations and have a more or less constant environment. This promotes the niche specialization and thus, high species richness.
- (iii) 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.

Question 4:

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

Solution 4:

The slope of regression (z) has a great significance in order to find a species-area relationship. 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 slope 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.

Question 5:

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

Solution 5:

The major causes of species losses in geographical region are majorily due to human activities. They are as:

- (i) Habitat loss and fragmentation.
- (ii) Over-exploitation
- (iii) Alien species Invasions
- (iv) Co-extinction

Question 6:

How is biodiversity important for ecosystem functioning?

Solution 6:

An ecosystem with high species diversity is much more stable than an ecosystem with low species diversity. Also, high biodiversity makes the ecosystem more stable in productivity and more resistant towards disturbances such as alien species invasions and flood. If an ecosystem is rich in biodiversity, then the ecological balance would not get affected. 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 disturb 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. Thus, 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.

Question 7:

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

Solution 7:

Sacred groves are tracts of forest which are regenerated around places of worship. Sacred groves are found in Rajasthan, Western Ghats of Karnataka and Maharashtra, Meghalaya, and Madhya Pradesh.

Sacred groves help in the 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.

Question 8:

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

Solution 8:

The biotic components of an ecosystem include the living organisms such as plants and animals. Plants play a very important role in controlling floods and soil erosion. The root of plants hold the soil particles together, thereby preventing the top layer of the soil to get eroded by wind or running water. The roots also make the soil porous, thereby allowing ground water infiltration and preventing floods.

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.

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?

Solution 9:

More than 70 percent of species recorded on the Earth are animals and only 22 percent species are plants. There is quite a large difference in their percentage. This is because animals have adapted themselves to ensure their survival in changing environments in comparison to plants. For example, insects and other animals have developed a complex nervous system to control and coordinate their body structure. Also, repeated body segments with paired appendages and external cuticles have made insects versatile and have given them the ability to survive in

various habitats as compared to other life forms.

Question 10:

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

Solution 10:

Yes, there are various kinds of parasites and disease-causing microbes that we deliberately want to eradicate from the Earth. Since these micro-organisms are harmful to human beings, scientists are working hard to fight against them.

Scientists have been able to eliminate small pox virus from the world through the use of vaccinations. This shows that humans deliberately want to make these species extinct. Several other eradication programmes such as polio and Hepatitis B vaccinations are aimed to eliminate these disease-causing microbes.