

Standard IX

Action Research Project

Topic for 2016–2017

Biodiversity: Application and Conservation

Introduction

In our life all producers such as plants; consumers such as animals and decomposers like bacteria and fungi are important. If this was not the case, there would not have been recycling of nutrients and hence, no life on the Earth either. Each link of the food chain is important for survival of all organisms which makes the species' diversity important.

We can't eat only lentils (*dal*), only rice or only chocolate every day. We require variety of food coming from a variety of crops. Thus we require the biodiversity in the food stuff coming from the agricultural biodiversity.

When we utilize the biodiversity, we have to preserve it for all the organisms and also for the next generation. Nature provides us with everything in abundance and at no cost, provided we protect it.

What is biodiversity?

Biodiversity may be defined as the variety and variability of living organisms and the ecological systems in which they exist. In other words, biodiversity is the occurrence of different types of ecosystems, different species of organisms with their different types of genes and their variants adapted to different environments along with their interactions and processes.

Biodiversity found on Earth today, is the result of 4 billion years of evolution. It is not distributed evenly on Earth. It is consistently richer in the tropics.

When a species is confined entirely to a particular area, it is termed as endemic species. A biodiversity hotspot is a region with a high level of endemic species.

India is one of the twelve mega diversity nations of the world as it has 7.3 % of the global fauna and 10.88 % of global flora.

Types of biodiversity

1. Genetic diversity

Genetic diversity refers to the genetic variability within species. E. g. Different traits in human beings, such as skin and eye colour, height, type of hair, etc.

2. Species diversity

Species diversity is the number of different species that are present in a given community. E. g. In a pond ecosystem, variety of species are present such as fish, amphibians, algae, microorganisms, etc.

3. Ecosystem diversity

Ecosystem or Ecological diversity is the variation in the ecosystems found in a region or over the whole planet. E. g. Terrestrial, aquatic ecosystems. It relates varieties of habitats, biotic communities, ecological processes etc. For example, terrestrial ecosystems like the grass lands, deserts, mountains etc.

Biodiversity can also be Molecular, Functional, Morphological, Agricultural, Intraspecific, Interspecific, Community etc

Why should we conserve biodiversity?

1. Biological resources

Any product that is harvested from nature is the part of biological resources. These resources come under several categories such as:

- **Food:** More than 7,000 species of plants are involved, although we are mainly dependent on only 12 major crops for food.
- **Medicines:** Drugs, animal cures, antitoxins, antioxidants etc. Original formulae of many medicines come from plants. E. g. Quinine is produced by the Cinchona tree.
- **Fibres:** Used for ropes, clothing, webbing, netting, sacking etc.. E. g. Cotton plants, coconut plants.
- **Wood:** Used for paper, construction, fuel, furniture, boats, etc.
- **Other products:** Oils, essences, resins, gums, lac, pearls etc.

2. Ecosystem Services

These are processes provided by the nature to support life. For example, natural pest control, maintenance of population of various species, pollination, seed dispersal, nutrient cycling, conservation and purification of water, formation of soil, fixation of solar energy and carbon dioxide, moderation of floods, equalization of climate, etc. Greater species diversity ensures natural sustainability even in the time of disturbances like floods, temperature fluctuations, erosion etc.

3. Social value

Loss or change in biodiversity affects tourism, job opportunities, domestication of animals, research etc. E. g. Effects of global warming and acid rain cause an unfavourable alteration in social life.

4. Aesthetic value

Such as fragrance of the flowers, taste of berries, softness of mosses, melodious songs of birds, the Earth's natural beauty, thick forests etc. This also includes botanical and zoological gardens

5. Legal values

Since the Earth is homeland of all living organisms, all living organisms have an equal right to coexist on the surface of earth with all benefits.

6. Ethical value

Man has not created anything from scratch, so has no right to destroy it. It is the prime responsibility and moral obligation of man to preserve and conserve other organisms which will favour the existence of the human species.

7. Economic value

Biodiversity has great economic value because economic development depends upon efficient and economic management of biotic resources.

Threats to biodiversity

- **Habitat destruction:** This can be caused due to the industrial and commercial activities, inappropriate fire regimes, agriculture, irrigation, construction of dams, mining, fishing, etc.
- **Changes within aquatic environment and water flows:** This happens due to industrial waste release, pollutants and water transportation.
- **Habitat fragmentation:** Takes place because of roads, fields, canals, power lines, towns, etc.
- **Pollution:** This includes air, water, industrial, chemical, genetic pollution, etc.
- **Over exploitation or unsustainable use of natural resources:** This happens due to poverty, intensive technological growth and globalization of economy.

- **Introduction of exotic species:** These are due to horticulture or agriculture. They may be predators, parasites or competitors.
 - **Diseases:** Incidence of diseases in wild species.
 - **Shifting cultivation:** Also known as slash and burn agriculture which involves clearing a section of land and using it for farming activities for a relatively short time before abandoning it.
 - **Genetic pollution:** This is mainly due to hybridization.
 - **Poaching and hunting:** Poaching of wild plants and animals is illegal while hunting can be legal. When done with due rules and regulations hunting can be helpful in maintaining the ecological balance
 - **Human overpopulation:** According to a 2014 study by the World Wildlife Fund (WWF), the global human population already exceeds the planet's bio capacity and has more impact on biodiversity than any other single factor.
- safeguarded.
 - Priority should be given to preserve unique ecosystems.
 - There should be sustainable utilisation of resources.
 - Trade in wild life should be highly regulated
 - Pollution should be controlled.
 - Public awareness should be created regarding biodiversity and its importance for the living organisms.
 - Priority should be given to wildlife conservation programmes to endangered species over vulnerable species and to vulnerable species over rare species.
 - The habitats of migratory birds should be protected.
 - The useful animals, plants and their wild relatives should be protected both in their natural habitat and in zoological botanical gardens
 - Environmental laws should be strictly followed.
 - Select products that have ecolabels i.e. products that are green, safe and environmentally sustainable.
- (See figure on next page)

What is the problem?

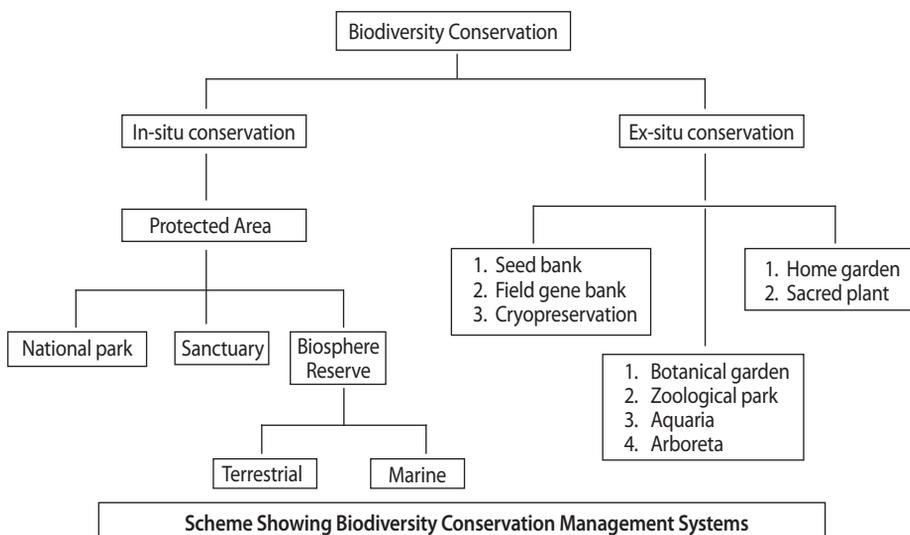
Today, biodiversity is disappearing at 1,000 times the normal rate due to human civilization. We, as individuals should follow the principles of conservation biology to slow down this loss.

Conservation biology is the scientific study of nature and of the Earth's biodiversity with the aim of protecting species, their habitats and ecosystems from rapid destruction and damage so that it provides maximum benefit to present and future generation.

Strategies for conservation of biodiversity

- Along with economically important, all varieties of organisms should be conserved
 - Critical habitats for each species should be
- Go through the study material and understand the content. Remember that whatever work is done has to be related to the main theme, that is, biodiversity. However, you can choose your own title.
 - Select an area in the neighbourhood of either your residential area, school or native place.
 - Take a survey of the surroundings with respect to the biodiversity.
 - Find out the research question/threats to the biodiversity/species diversity of the selected area.
 - Select ANY ONE aspect
 - Collect information/conduct experiments/ implement measures for biodiversity conservation as per the topic selected.

What students have to do?



- Analyse your data and draw conclusion
- Write the report

You may consider following points while selecting/planning the project

- How and where should we protect nature areas?
- Which kinds of conservation interventions work to slow the loss of wild nature?
- How will the conservation of biodiversity interact with other ecosystem services?
- What are the implications of climate and land use change on biodiversity conservation?

Remember, we have to be clear about why, what and how we are doing a particular activity. The methodology and remediation should be economically viable. For long term sustainable effects we have to be patient and wait for the results.

Some examples of projects on biodiversity

- Study of biodiversity of your locality. Suggest what biodiversity conservation means and try to implement.
- Preparing pedigree charts
- Study of flora and fauna of the locality with

respect to the classification chart, pictures, morphological characteristics, habit, habitat, food, feeding habit, whether it's a carnivore, herbivore or omnivore, its function in the food chain, the effect of human activity on the organisms' habitat and survival and the effect of the organism on the human, the conservation measures and their implementation, the evolutionary history with respect to its surrounding.

- Study of an invasive species and effects.
- Study of protected areas: Issues and analysis.
- Effect of pesticides or other chemicals on biodiversity.
- Biodiversity applications in local culture, ecosystems, landscapes.
- Conduct experiments on microbiology of decay.
- Study of plant adaptation biodiversity, and ecosystem stability.
- Interpret long-term data to investigate ecosystem change over time.
- Collect the evidence for the impact of conservation interventions in the fields nearby.

(Reference: www.google.com)