

Biodiversity and Ecosystem Services



1. Ecosystem Services:

- **Ecosystem services** are defined as the benefits provided by ecosystems to humans.
- These services are many and varied benefits that humans freely gain from natural environment and from properly functioning ecosystems.
- Such ecosystems include: agro, forest, grassland and aquatic ecosystem.
- The ecosystems functioning properly provide agricultural produce, timber and aquatic organisms such as fishes and crabs.

- These services are provide clean drinking water, decomposition of wastes and the natural pollination of crops and other plants.
- **Ecosystem services** make human life possible by providing nutritious food and clean water, regulating disease and climate, supporting the pollination of crops, pest control and soil formation and providing recreational, cultural and spiritual benefits.
- Ecosystem functions are supported, sustained and the biodiversity protected by **ecosystem services**.

2. Biodiversity Services:

- **Biodiversity** is the most precious gift of nature mankind is blessed with.
- It is essential to ecosystems function and services delivery.
- Many key ecosystem services provided by biodiversity, such as nutrient cycling, carbon sequestration, pest regulation and pollination, sustain agricultural productivity.
- Changes in **biodiversity** can influence the supply of **ecosystem services**.

- Living elements which interact with each other and their non-living environments-provide benefits or services, to the world.
- **Biodiversity**, as with **ecosystem services**, must be protected and sustainably managed.
- **Biodiversity** has a fundamental value to humans because we are so dependent on it for our cultural, economic and environmental well being.
- It provides benefits to human beings that support the existence of biological life and other benefits which are difficult to quantify.

➤ Some of the major **services of biodiversity** are as follows: *Ecological, Economic, Social, Ethical, Aesthetic and Informational values.*

(i) Ecological Values or Ecological Diversity :

➤ **Ecological diversity** is the intricate network of different species present in different ecosystems and the dynamic interaction between them.

➤ All living creatures are supported by the interactions among organisms and ecosystems.

- Loss of biodiversity makes ecosystems less stable, more vulnerable to extreme events and weakens its natural cycles like: *Energy, Water, Carbon, Oxygen and Nitrogen cycles*.
- ***Energy Cycle:*** Plants and photosynthetic bacteria transform energy from the sun into stored chemical energy.
- ***Water Cycle:*** Forests moderate water flows by catching, holding and recycling rainwater.
- Plants release absorbed rainwater into the air through the loss of water through their leaves (transpiration).
- Wetlands and estuaries purify water and control flooding.

- ***Carbon and Oxygen Cycles:*** Carbon dioxide in the atmosphere is generated by animal respiration, plant decay and the burning of fossil fuels.
- ***Nitrogen Cycle:*** Nitrogen is needed by all living organisms and it makes up a large component of Earth's atmosphere.
- In its natural atmospheric form, nitrogen is not directly accessible to most organisms, so it needs to be converted, primarily by bacteria living on the roots of certain plants.

- Their daily activities help ecosystems functioning.
- In turn, these ecosystems support life.
- Healthy ecosystems are more stable and more adaptable to any change, such as extreme events like drought or floods which can alter entire ecosystems.

(ii) Economic Values:

- Nature provides the raw materials we need for survival and forms the basis for the global economy.
- Everything we buy and sell originates from the natural world.

- For economic growth of countries, many products are commercially sold in national and international market.
- For example: Textile, leather, silk, paper and pulp industry, *etc.*
- It is the source for many medicines such as aspirin, heart stimulants, antibiotics, anti-malarial and cancer fighting compounds.
- The economic potential of biodiversity is also immense in terms of food, fodder, ethical and social values.

- The salient features regarding the economical potential of biodiversity are given below:
- *The major fuel sources of the world including wood and fossil fuels have their origin due to biodiversity.*
- *It is the source of food for all animals and humans.*
- *Many important chemicals have their origin from the diverse flora and fauna, used in various industries.*
- *Diverse group of animals are used for medical research during the testing of new drugs.*

(iii) Social and Cultural Values:

- The biodiversity in different parts of the world has been largely preserved by the traditional societies.
- Many plants and animals are considered holy and sacred in India and are worshipped like Tulsi, Banyan, peepal, cow, snake, *etc.*
- In Indian society great cultural value is given to forest and as such tiger, peacock and lotus are named as the national animal, bird and flower, respectively.

- Thus apart from the local use or sale of products of biodiversity there is the social aspect in which more and more resources are used by affluent societies.
- **(iv) Ethical Values:**
- These values are related to conservation of biodiversity where ethical issue of 'all life forms must be preserved' is laid down.
- There is an existence value which is attached to each species because biodiversity is valuable for the survival of human race.

- Moreover all species have a moral right to exist independent of our need for them.

(v) Aesthetic Values:

- Natural landscapes at undisturbed places are a delight to watch and also provide opportunities for recreational activities like bird watching, photography, *etc.*
- It promotes eco-tourism which further generates revenue by designing of zoological, botanical gardens, national parks, wild life conservation, *etc.*

- **(vii) Informational Values:**

- **Biodiversity** holds potential insights for solutions to biological problems, both current and future.
- It holds the potential for applied knowledge through the discovery of how different species have adapted to their varied environments (Wilson 1992).
- We might discover bacteria that inhabit hot springs and have evolved enzymes that function at unusually high temperatures.

- **Biodiversity** has often served as an early-warning system that has foretold threats to human health before sufficient data had been collected to detect effects directly.
- Wildlife studies have shown evidence of effects of various chlorinated organic compounds on the immune systems of animals (reviewed in Repetto and Baliga 1995) and on their reproductive physiology (Colborn and others 1993).