

BIODIVERSITY & ITS IMPORTANCE

Topic:2.3.1.1.5



Source: https://commons.wikimedia.org/wiki/File:Kingdom_of_animals.png

Table of Contents:

1. Learning Outcomes
2. Definition of Biodiversity
3. Importance of Biodiversity
 - 3.1 Ecological Importance of Biodiversity
 - 3.2 Economic Importance of Biodiversity
 - 3.3 Ethical Importance of Biodiversity
 - 3.4 Social Importance of Biodiversity
4. Values of Biodiversity
 - 4.1 Ecological Value
 - 4.2 Consumptive Use Value
 - 4.3 Productive Use Value
 - 4.4 Social Value
 - 4.5 Ethical and Moral Value
 - 4.6 Aesthetic Value
 - 4.7 Option Value

1. Learning Outcomes: On completion of this topic the students will be able to.

- Understand what is biodiversity and its value.
- Gain Knowledge on the importance of biodiversity.
- Explain how variety of plants and animals support each other in food chain and food web.
- Analyse the importance of complexity of biodiversity.
- Assess the necessity of sustainability of biodiversity and ecosystem services.

2. Definition of Biodiversity:

The term biodiversity was coined by Walter G. Rosen in 1985. It is defined as the variability among living organisms from all sources, including inter alia, terrestrial, marine and other aquatic ecosystems (An ecosystem or ecological system consists of all the organisms and the physical environment with which they interact ⁽¹⁾) and the ecological complexes of which they are the part. This includes diversity within the species, between species and of ecosystem ⁽²⁾.

Biodiversity means the richness and variety of life (of genes, species and ecosystems). It helps to maintain the health of the earth and its life forms. The greater the variety of species on earth the healthier the biosphere. The term '*biodiversity*' is a short form of 'biological diversity' in which the word 'bio' means life and 'diversity' means variety.



Source: <https://rb.gy/9werhy>



Source: <https://rb.gy/fnztnc>

*Web reference(s): (1) <https://rb.gy/jcrvh4>

(2) <https://rb.gy/qdmz1i>

[Click here](#) or Scan the QR code for an animated video on Biodiversity



3. Importance of Biodiversity:

Biodiversity is extremely important for the wellbeing of our planet. It maintains the health of earth and its people. It provides us with food and medicine. It contributes to the economic development of our country. Biodiversity of an ecosystem contributes to the sustainability of that ecosystem.

Note: Sustainability is the ability of an ecosystem to maintain its structure and function over time. The more sustainable an ecosystem is, the better it can handle the environmental stress.

Higher biodiversity = More sustainability

Lower biodiversity = Less sustainability

High biodiversity in an ecosystem means that there is an availability of great variety of genes and species in that ecosystem

The Helix of Sustainability



Plants grow, making sugars, starches, oils, cellulose and other complex molecules from simple raw materials, mostly water, CO₂ and sunshine.

In addition to harvesting food, people extract fuel and base materials for industry and commerce.

Manufacturers make wares, measuring profitability in environmental and social terms as well as financial.

The end-user reuses and repairs, only recycling after as long a useful life as possible.

At the end of its life the article decays, reducing large complex molecules to simple raw materials by the action of bacteria and fungi - composting

Plants grow, making sugars, starches, oils, cellulose and other complex molecules from simple raw materials, mostly water, CO₂ and sunshine.

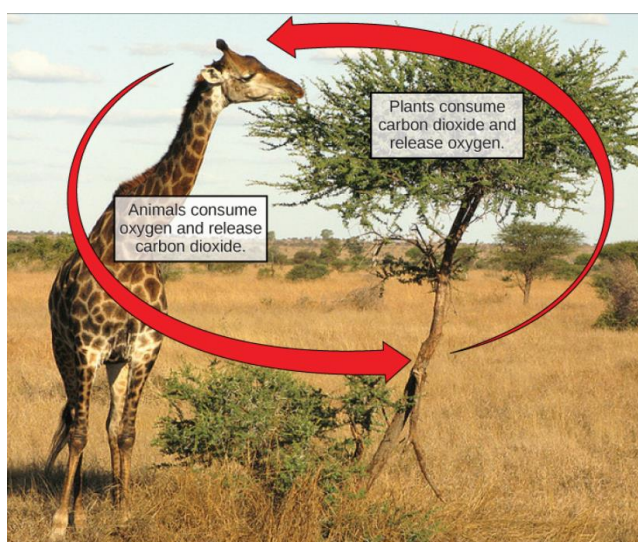
Source: <https://rb.gy/u8liv3>

Importance of Biodiversity can be classified as:

1. Ecological importance of biodiversity
2. Economic importance of biodiversity
3. Ethical importance of biodiversity
4. Scientific importance of biodiversity

3.1 Ecological Importance of Biodiversity:

- **Controlling Soil Erosion:** Soil organisms reduce the soil erosion by improving porosity and storage of water, which holds soil and roots.
- **Improvement of Soil Quality:** Healthy biodiversity increase the flexibility of the soil to environmental challenges. Better agricultural yields are possible with good quality soils.
- **Formation of a Healthy Ecosystem:** Biodiversity is important to sustain a healthy ecosystem that supplies oxygen, fresh air and water, pollination of plants, waste water treatment and many ecosystem services. For example, Plants produce oxygen through the process of photosynthesis. Animals breathe oxygen and release carbon dioxide, which is consumed by the tress. This forms a cycle that shows the connection between the species in the ecosystem.

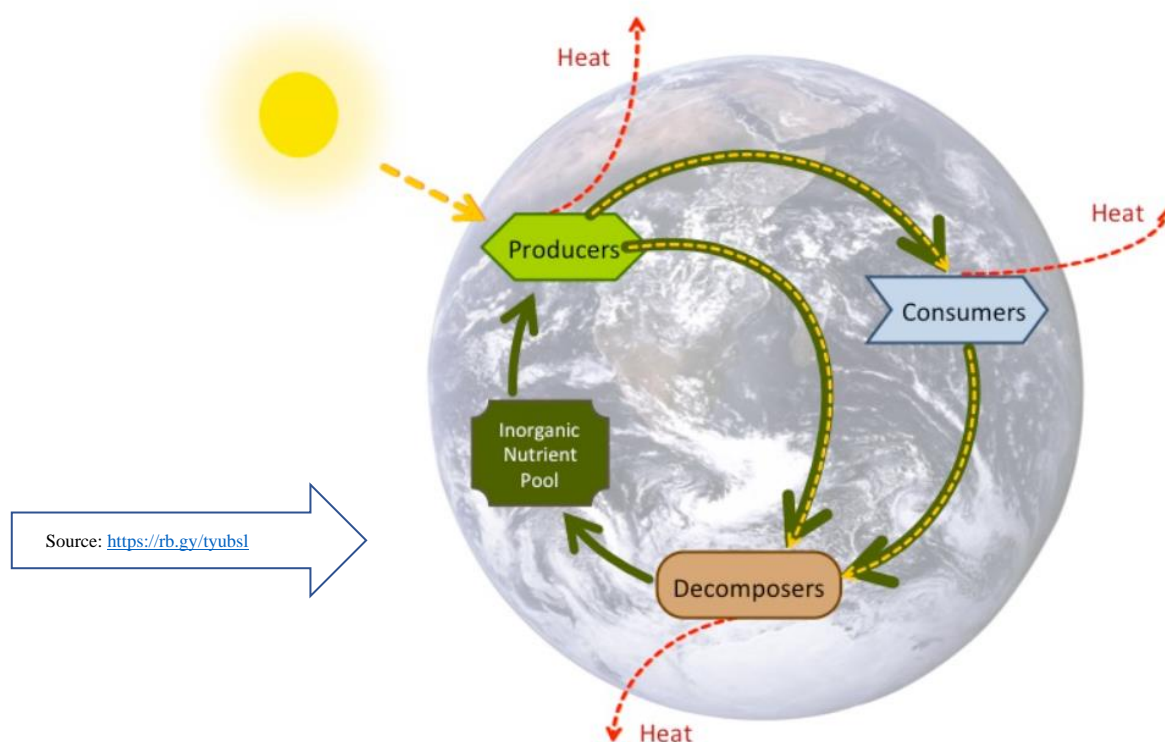


Source: <https://rb.gy/1hguew>

- **Protection of species and natural resources in the ecosystem:** Key indicator of health of an ecosystem is the biodiversity. Healthy ecosystems purify our air and water, maintain the quality of soil, recycle nutrients, regulate the climate and provide us with food, protects the species

diversity and their habitats. Even if certain species are affected by climate change, pollution or human activities, the healthy ecosystem as a whole adapt and survive.

- **Pollution management:** Control of pollution is one of the important roles of biodiversity. As the trees and other vegetation absorb harmful pollutants such as oxides of nitrogen, excessive carbon dioxide, ozone and particulate matter, it therefore improves air quality.
- **Study and Research:** Biodiversity is the major source of study and research. Scientific studies help to promote the development of human beings, animals, plants, social and economic development etc.
- **Nutrient Recycling:** Biodiversity plays a vital role in nutrient recycling. For example, plants take nutrients from the soil and the air, and these nutrients can then form the basis of food chains, which is utilized by variety of other life forms.



- **Reduction of risk from natural disasters:** Healthy biodiversity is very important in reducing the risks from natural disaster. By controlling soil erosion and preventing deforestation, we can reduce the risks from climate shocks and natural calamities.

3.2 Economic Importance of Biodiversity:

- **Source of Food:** Biodiversity provides food to all living organisms in this ecosystem.
- **Source of Fuel:** Biodiversity helps in providing fossil fuel, petrol and natural gas. It also helps in the sustainable growth of wood (which acts as fuel wood used in day-to-day life) by increasing forests.
- **Development of Medicine:** Scientists have developed several medicines for many incurable diseases from plants and other living organisms.
- **Economic Growth and Poverty reduction:** Rich biodiversity is essential for economic growth and poverty reduction. It extends up to the production of high yielding varieties of plants and animals. It is the chief source of raw materials for the industries. It provides economic support to the farmers, fishermen and also to the poor population in rural areas by creating career opportunities that results in the poverty reduction.
- **Source of Tourism:** Biodiversity plays an important role in the development of tourism. It creates natural tourism such as Wildlife watching, mountain trekking, bird watching, camping and scuba diving and attracts tourists thereby promoting the economic development of the country.

3.3 Ethical Importance of Biodiversity: Healthy biodiversity has the ethical importance of protecting all life forms on earth. All living organism have an equal right to live and exist on earth. Ethics and morality teach us to preserve all forms of life and not to harm any organism unnecessarily.

3.4 Scientific Importance of Biodiversity: Scientific importance of biodiversity is to perform research and experiments on species of plants and animals to make new developments in agriculture and medicine. It also helps scientists to find evidences about the evolution of life in certain species.

[Click here](#) to view animated video on importance of Biodiversity or

Scan the QR code



4. The Value of Biodiversity:

Biodiversity is the valuable natural resource for the survival of living organisms. It provides a variety of ecological services from its species and ecosystems that are essential at local, regional and global levels. The biodiversity can be categorised into different values based on its direct use and indirect use by the mankind. They include:

1. **Ecological Value**
2. **Consumptive Use Value**
3. **Productive Use Value**
4. **Social Value**
5. **Ethical and Moral Value**
6. **Aesthetic Value**
7. **Option Value**

4.1 Ecological Value: Each species plays a unique role in the ecosystem. Ecological balance is maintained through this role. This value is a life support service value. Services like supply of oxygen, maintenance of soil fertility, nutrient recycling, biogeochemical cycles, water cycle, stable climate, waste water treatment, prevention of soil erosion, pollutant absorption, reduction of the threat due to global warming and many more are provided by the healthy ecosystem to maintain the environmental (ecological) balance.

4.2 Consumptive Use Value: It is a direct use value, where the products of biodiversity are harvested and consumed directly. E.g., food, fuel and medicine. A large number of wild plants and animals are sources of food for human beings. Many tribal societies completely depend on forests (biodiversity) for their livelihood and habitation. Since ages our forests have been used for fuel wood. Around the world, more than 1500 million people still cook their food by burning wood. The fossilized biodiversity products include coal, petroleum and natural gas. About 75% of the world's population depends upon the plants and plant extracts for medicines. Some examples include penicillin from a fungus called *Penicillium*, Quinine from the bark of Cinchona tree and vinblastine from *Catharanthus* plant and so on.

4.3 Productive Use Value: This is also a direct use value assigned to the products of biodiversity that are harvested and marketed commercially. Many forest products are valuable, expensive and have the productive use. For example, products like silk from silkworm, wool

from sheep, rubber from plants, lac from lac insects etc. Besides, many industries commercially depend on the products of biodiversity. E.g., textile industry, paper and pulp industry, leather industry, plywood industry and pearl industry.

4.4 Social Value: Social value of biodiversity is related to the social life, religion and spiritual aspects of the people. In our country, many plants (or trees) like tulsi, neem, mango, peepal and Lotus etc. are considered holy and sacred. Many animals like cow, snake, monkey, bull, peacock etc. also have special importance. Thus, biodiversity has distinct social value attached with different societies.

4.5 Ethical and Moral Value: “Live and let others live” is the basic principle of ethical value of biodiversity. Every lifeform on this earth has the right to exist. Man is only a minor part of the earth’s vast family of species (biodiversity). For the continuous survival of the human race, we must protect all diversity that means ‘all life must be preserved’.

4.6 Aesthetic Value: Biodiversity enhances the beauty of our planet. Without plants, animals and other life forms, earth would be like any other barren planets revolving in the universe. Quality of life on earth is mainly because of the existence of variety of species. Hence biodiversity is the direct cause of pleasure and provides inspiration for all kinds of art work (aesthetic satisfaction).

4.7 Option Value: Keeping future possibilities open for their use is called ‘option value’. It suggests that any species of the present day may be proved as the species of greatest use after some day. The search for various species is already under process for finding answers to several environmental issues. The environmental problems being addressed to be: pollution, ways to fight diseases like cancer, diabetes etc., AIDS, COVID-19 and others. If we destroy biodiversity then we lose the opportunity of finding solutions for these. Hence Preservation of biodiversity for future generations is our responsibility.

References:

1. An advanced textbook on biodiversity, K.V. Krishnamurthy
2. Biodiversity, Christian Leveque, Jean-Claude Monolou
3. A Guide to the convention on biological diversity, Lyke Glowka, Francoise Burhenne-Guilmin and High Synge in Collaboration with Jeffrey A. McNeely and Lothar Gundling

Web References:

1. <https://www.ck12.org/book/ck-12-understanding-biodiversity/section/4.1/>
2. https://youtu.be/nUo_LL-2PoU
3. [https://www.researchgate.net/publication/342638063 Biodiversity Its Different Levels and Values](https://www.researchgate.net/publication/342638063_Biodiversity_Its_Different_Levels_and_Values)
4. <https://www.mrgscience.com/ess-topic-34-conservation-of-biodiversity.html>
5. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=119670>
6. https://www.google.co.in/books/edition/An_Advanced_Textbook_on_Biodiversity/2Vczdr9ysZYC?hl=en&gbpv=1&dq=biodiversity&printsec=frontcover
7. <https://www.worldwildlife.org/pages/what-is-biodiversity#:~:text=Biodiversity%20is%20all%20the%20different,maintain%20balance%20and%20support%20life.>
8. <https://education.nationalgeographic.org/resource/biodiversity>