Biodiversity: Its Different Levels and Values

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Review Article

Biodiversity: Its Different Levels and Values

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ABSTRACT

Biodiversity or biological diversity refers to the variety of life on Earth, comprising millions of plants, animals, microorganisms and the genes they contain. It simply means the existence of a wide variety of plant and animal species in their natural environments or the diversity of plant and animal life in a particular habitat. The biodiversity is usually described at three levels and it has a large number of values. In present discussion, author is trying to discuss different levels and values of biodiversity in modern context.

Key words: Biodiversity, genetic diversity, species diversity, ecosystem diversity, values, conservation.

INTRODUCTION

There are varied definitions of the term 'biodiversity'. According to Gaston and Spicer (2004), it is 'variation of life at all levels of biological organization'. Biodiversity is also viewed as a measure of the relative diversity among organisms present in different ecosystems. In this definition, diversity includes variation within species and among species, and comparative diversity among ecosystems. Biodiversity may also be defined as the 'totality of genes, species, and ecosystems of a region.

The Convention on Biological Diversity (Glowka *et al*, 1994) defines biodiversity as the variability among living organisms from all sources including, among other things, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

A review of literature revealed that huge efforts have been taken and a number of scientists have worked a lot on biodiversity. Some of them are Kaushik *et al*, (2008), Odum (1971), Wilson (1988), Nair (1992), Bhatt (1997), Subba Rao (2001), Verma *et al*, (2015, 2016a, 2016b), Prakash *et al*, (2015, 2016a, 2016b), Verma (2016a, 2016b) etc.

LEVELS OF BIODIVERSITY

The biodiversity is explored at following three levels and all these three work together to create the complexity of life on Earth:

1. genetic diversity
2. species diversity
3. ecosystem diversity

The **genetic diversity** is the diversity of the basic units of hereditary information (genes) within a species, which are passed from one generation to next. The genetic diversity results in variations hence the basic source of biodiversity and the amount of genetic variation is therefore the basis of speciation. The genetic diversity enables a population to adapt according to its environment hence important for natural selection Genetic diversity within a species often increases with environmental variability but not all groups of animals have the same degree of genetic diversity. To conserve genetic diversity, different populations of a species must be conserved.

The **species diversity** refers to the variety of species within a region. It is the variability found within the population of a species or between different species of a community. The species is the real basic

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unit used to classify the organisms and its diversity is the most commonly used level for describing the biodiversity. It represents broadly the species richness and their abundance in a community. Species are therefore distinct units of diversity, each playing a specific role in the ecosystem. In nature, the number and kind of species, as well as the number of individuals per species vary, leading to greater diversity. The species are grouped together into families according to shared characteristics.

An ecosystem is a set of life forms (biotic components) interacting with one another and with the non-living elements (abiotic components) of their environment. It means, the ecosystem is a community of organisms and their physical environment interacting together. An ecosystem may be as large as the Great Barrier Reef or as small as the back of a spider crab's shell, which provides a home for plants and other animals, such as sponges, algae and worms. **Ecosystem diversity** is therefore the diversity of habitats (place where an organism or a population of organisms naturally occurs), which include the different life forms within. Diversity at the level of community and ecosystem exists along 3 levels. First is alpha diversity (within community diversity), second is beta diversity (between communities diversity) and the third is gamma diversity (diversity of the habitats over the total landscape or geographical area).

VALUES OF BIODIVERSITY

Biodiversity has its enormous value almost in all aspects of life. The multiple uses of biodiversity include:

1. **Consumptive use**, in which biodiversity products are harvested and consumed directly e.g. fuels, food, drugs, medicines, fibres etc. A large number of wild plants and animals are sources of food for human beings. About 75% of the world's population depends upon plants or plant extracts for medicines. For examples, the wonder drug penicillin used as an antibiotic is derived from a fungus called *Penicillium*, tetracycline from a bacterium. Quinine, the cure for malaria is obtained from the bark of *Cinchona* tree, two anti-cancer drugs namely vinblastin and vincristin are obtained from *Catharanthus* plant and so on. Our forests have been used since ages for fuel wood. The fossil fuels coal, petroleum and natural gas are also products of fossilized biodiversity.
2. **Productive use**, in which animal products like musk from musk deer, silk from silkworm, wool from sheep, fur from many animals, lac from lac insects etc. are trades in market. Besides, many industries are dependent upon productive use of values of biodiversity e.g. paper and pulp industry, plywood industry, railway sleeper industry, textile industry, leather industry and pearl industry.
3. **Social value**, in which social life, customs, religion and psycho-spiritual aspects of people are associated i.e. biodiversity has distinct social value, attached with different societies. Many of the plants are considered holy and sacred in our country like Tulsi, Peepal, Mango, Lotus etc. The leaves, fruits or flowers of these plants are used in worship or the plant itself is worshipped. The social life of tribals, songs, dances and customs are closely linked around the wildlife. Many animals like cow, bull, peacock, owl, snake etc. also have significant place in our psycho-spiritual arena and thus hold special social importance.
4. **Ethical value** or existence value, which is based on the concept of 'Live and Let Live'. It means biodiversity is valuable because if we want our human race to survive and continue then we must protect all biodiversity i.e. 'all life must be preserved'.
5. **Aesthetic value**, in which eco-tourism is entertained. People from far and wide spend a lot of time and money to visit wilderness areas where they can enjoy the aesthetic value of biodiversity hence biodiversity has great aesthetic value.
6. **Ecosystem service value**, in which non-consumptive use of self maintenance of the ecosystem and various ecosystems have been recognized. It refers to the services provided by ecosystems like prevention of soil erosion, prevention of floods, maintenance of soil fertility, cycling of nutrients, fixation of nitrogen, cycling of water, pollutant absorption and reduction of the threat of global warming etc.
7. **Scientific and evolutionary value**, in which each species provides some clues to scientists as to how life evolved and will continue to evolve on earth. Moreover, biodiversity helps scientists to understand how life functions and the role of each species in sustaining ecosystems. In addition, biodiversity has other many values too.

Thus, different levels of biodiversity: ecosystem, species and genetic, all have huge potential and a

decline in biodiversity will lead to serious economic, ecological and socio-cultural losses. If we want our human race to survive then we must protect all biodiversity because biodiversity has existence value.

CONSERVING BIODIVERSITY

The living world has rich diversity of animals, plants and microbial life that appear to be well adapted according to the environment. This varied diversity must have to be maintained in order to mutual survival and existence of living beings.

The biodiversity is being depleted by the loss and deterioration of habitats, over exploitation of resources, unprecedented climatic changes, pollution, diseases, cultivation shifting, poaching of wild life etc. Since the human beings are deriving all the benefits from biodiversity hence they should take proper care for the preservation of biodiversity in all its forms and good health as well as safety for the future generation.

Conserving biodiversity does mean the proper management of the biosphere by human beings in such a way that it gives maximum benefits for the present generation and also develops its potential so as to meet the needs of the future generations.

The best way to conserve biodiversity is to save habitats and ecosystems rather than trying to save a single species. The conservation of biological diversity has now become a global concern. There are basically two main approaches of biodiversity conservation namely, *in-situ* conservation (within habitat) and *ex-situ* conservation (outside habitat).

The former is achieved by conservation of flora and fauna in nature itself e.g. Biosphere reserves, National parks, Sanctuaries, Reserve forests etc. The later is achieved by establishment of gene banks, seed banks, zoos, botanical gardens etc.

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