

Biodiversity is our life!

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Abstract—Biodiversity or Biological diversity is that part of nature which includes the differences in genes among the individuals of a species, the variety and richness of all the plant and animal species at different scales in space, locally, in a region, in the country and the world, and various types of ecosystems, both terrestrial and aquatic, within a defined area. Biodiversity depends on climate, Altitude, soil variety and also the presence of other species. Biodiversity has contributed in many ways to the development of human culture, and, in turn, human communities have played a major role in shaping the diversity of nature at the genetic, species, and ecological levels. Biodiversity has both anthropocentric and intrinsic (ethical) value. Biodiversity we see today is a result of 3.5 billion years of evolution. But due to human activities biodiversity is under serious threat. The major dangers include heavy resource consumption due to population growth, habitat conversion and urbanization, climate change and global warming, over-exploitation of natural resources and environmental degradation. Biodiversity is necessary for human existence hence it should be conserved. Biodiversity conservation relies on number of disciplines working together, including biological sciences, environmental sciences, physical sciences, mathematics, psychology, law, public policy and economics. The period 2011–2020 has been declared as “The United Nations Decade on Biodiversity”. The Decade is intended to be a vehicle to support and promote implementation of the objectives of Strategic Plan for Biodiversity conservation and sustainable development as Biodiversity is our life!

Keywords: Biodiversity, Natural resources, Biodiversity hotspot, Conservation, Traditional Knowledge, Sustainable development.

1. INTRODUCTION

The word Biodiversity originates from Greek word Bios means Life and Latin word Diversitas means Variety or Difference. Biodiversity, as defined by E.O. Wilson, "is meant to be all inclusive- it's the genetic based variation of living organisms at all levels, from the variety of genes in populations of single species, through species, on up to the array of natural ecosystems." Biodiversity can relate locally or globally. Biodiversity generally means variety of life and includes the full range of species that live in an area.

Around the world there are around 35 biodiversity hotspots. A biodiversity hotspot is a region with maximum endemic species. A region must meet two criteria to qualify as a

biodiversity hotspot on Myers 2000 edition of the hotspot-map. The criteria are i) It must contain 1,500 species of vascular plants as endemics. ii) It should have lost at least 70% of its primary vegetation.^[1] Biodiversity hotspots in India includes east Himalayan region, North Eastern region and Western ghats.

Paleontologists after conducting the studies on fossil records recommend that around 99% of all species yet exist are now extinct and most of them vanished even before humans came into existence. However the impact of the people on their environment can be devastating because when humans interferes with ecosystem for its own benefit it tears biodiversity apart piece by piece.

Biodiversity is invaluable to human existence for various reasons. It is the primary source for natural resources that shape the economics of a region. It provides food, water, fuel, wood etc. Other than providing aesthetic value to human life it also provides the scientific community with what seems to be an ever growing source of information/data that can be used for making new medicines etc.

Conservation of biodiversity is a major concern at both national and international level. Laws and policies are being made to conserve biodiversity. For example the endangered species laws were created to protect earth's biological diversity. We have to manage and preserve biodiversity before it is lost and exhausted.

The situation for fresh water biodiversity is so grave that an additional plea for fresh water research is warranted. Freshwater fish alone comprise one-fourth of all living vertebrate species and recent assessments suggest that over 50% of them are threatened (World Conservation Union 2000).^[4]

Keeping in view the challenges of biodiversity conservation the United Nations has declared the 2010-2020 as the “Decade on Biodiversity”, and also proclaimed May 22nd as “The International Day for Biological Diversity” (IDB) to increase understanding and awareness of biodiversity issues.

2. TYPES OF BIODIVERSITY

On the basis of variation and distribution there are four types of biodiversity. They are Species biodiversity, Genetic biodiversity, Ecological biodiversity and Functional biodiversity.

i) Species Biodiversity: The change occurring in the variety of different types of flora and fauna present in different places in the same geographical area is called as species biodiversity.

ii) Genetic Biodiversity: It deals with the genetic make up of species and the variation in the genes of the species.

iii) Ecological Biodiversity: The variation in the ecological area or environment such as forests, deserts, grasslands, streams and coral reefs etc., is referred as ecological or ecosystem biodiversity

iv) Functional Biodiversity: It refers to study of various types of chemical processes of species like cycling of matter, energy flow etc.

3. IMPORTANCE OF BIODIVERSITY

Biodiversity is the variety of life and the processes. It includes all the living beings with the genetic differences among them, and the ecosystems in which they occur. The habitat can be rainforest, desert, lake, mountain top, tidal pool or any other. There are a great variety of organisms interacting, competing and also supporting each other.

Biodiversity plays significant role in our daily life. The benefits supplied by natural surroundings, such as the purification of air and water, woodlands, fisheries, nutrient recycling etc. In the modern world for better development biodiversity is applicable in different fields like agriculture, industries etc.

i) Importance in Agriculture: Biodiversity plays an important role in producing new variety of crops by producing change in their genetic traits. It helps in developing disease resistant variety of crops.

ii) Importance in various industries: Biodiversity helps in producing different kinds of products like fibers, dyes, rubber, oil and medicines.

4. THREATS TO BIODIVERSITY

Scientists are estimating that for about 50,000 years man has been the major cause for the extinctions of other species. However over the past 500 years, ecologists have noticed a meteoric rise in species loss; this modern mass extinction crisis is an indicator that our mother Earth is out of harmony. As species extinction is irreversible it should be taken more seriously.

The size and growth of the human population are often cited as key factors in threats to Earth's biodiversity, yet the extent of their contribution to the endangerment and extinction of other species has remained unclear.^[5]

However, industrialization and rapid growth of human population has resulted in many environment altering effects which are detrimental for biodiversity.

Table 1: Types of threats on biodiversity

Human Activities (IUCN: Direct Threats)	Stresses (IUCN: Stresses)
1. Climate Change	1. Ecosystem conversion
2. Agriculture	2. Ecosystem degradation
3. Forestry	3. Alien species
4. Oil and gas	4. Environmental contamination
5. Mining and Industrial operations	5. Species disturbance
6. Urban and Rural development, transportation, recreation etc.	6. Species mortality

Climate change, rather than deforestation is likely to bring about high levels of extinction since the impacts of climate change are local to global and that climate change is acting synergistically with a range of other threats to biodiversity including deforestation.^[6]

In India, a significant part of land, forests and habitats of native/tribal people is being affected by human activities like deforestation, road construction, dam projects, mining, urbanization and conversion of forests to land for agricultural plantations.^[9]

These threats have adverse impact on biodiversity. It may result in loss of genetic diversity, population decline, species extinction, habitat fragmentation, impaired ecosystem function etc.

5. CONSERVATION OF BIODIVERSITY

Conservation and management of biodiversity in our ecosystem is a intimidating task, Action has to be taken at local, national and international level.

5.1 International level

At international level various treaties have been made to conserve biota. They are as follows:

i) The Convention on Biological Diversity (**CBD**) is an international agreement adopted at the Earth Summit, in Rio de Janeiro, in 1992. It has three main objectives:

- To conserve biological diversity
- To use its components in a sustainable way
- To share fairly and equitably the benefits arising from the use of genetic resources.

The CBD was negotiated under the guidance of the United Nations. It was signed by more than 150 government leaders at the Rio Earth Summit (which official denomination is the 'United Nations Conference on Environment and Development'). The Convention is now one of the most widely ratified international treaties on environmental issues, with

194 member countries. Unlike other international agreements that set compulsory targets and obligations, the CBD takes a flexible approach to implementation. It identifies general goals and policies, and countries are free to determine how they want to implement them.

One of the CBD's greatest achievements so far has been to generate an enormous amount of interest in biodiversity, both in developed and developing countries. Biodiversity is now seen as a critically important environment and development issue.

- ii) The first convention on biodiversity at Rio De Janerio from June 5 to 16, 1992 named as United Nation Conference On Environment and Development (UNCED), better known as Rio Summit.
- ii) CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, prepared in 1973.
- iv) World Summit On Sustainable Development (WSSD) at Johannesburg in 2002

5.2 National level

In India Organizations were made and Acts were devised to protect biodiversity and counter the problem of biopiracy.

- i) The patents Amendment Act, 2005
- ii) National Biodiversity Authority of India (Section 8 of the Biological Diversity Act, 2002)
- iii) The Protection of Plant Varieties and Farmer's Right Act, 2001
- iv) Forest (Conservation) Act, 1980
- v) Wildlife (Protection) Act, 1972
- vi) Indian Forest Act, 1927

The organizations like Centre for Environment Education (CEE) and Conservation Education Centre (CEC) have been set up to spread awareness about the environment to various stakeholders. Eco clubs have been set up in schools and colleges to sensitize the students about the challenges and opportunities in biodiversity conservation.

5.2.1. Salient features of Biodiversity Act of 2002:

- a) Regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources, and knowledge relating to biological resources.
- b) Conserve and sustainable use of the biological diversity.
- c) Respect and protect knowledge of local communities related to biodiversity.
- d) Secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources.

- e) Conserve and develop areas of importance from the standpoint of biological diversity by declaring them as biological diversity heritage sites.
- f) Protect and rehabile threatened species.
- g) Involve institutions of state governments in the broad scheme of the implementation of the Act through constitution of committees.^[10]

5.3 Communities/Local level

Community-based conservation makes efforts more complex, but will probably be more successful in the long run. Conservation of biodiversity is possible by afforestation of right type of species of plants by natives as it can help in restoring the native and degraded biodiversity.^[3]

5.4 In situ and Ex situ conservation of Biodiversity

Because of the progress in both the scientific and political arenas advanced environmental legislation are in place to protect biodiversity. Protection of biodiversity is not only at the ecosystem level, but for specific species and genetic material also. Research has shown the important of every living being and its role in the global ecosystem. Hence both the endangered species and the habitat they need to survive have to be protected.

Table 2: In situ and Ex situ conservation of biodiversity

In situ conservation	Ex situ conservation
Conservation of biodiversity in its natural habitat. It helps not only in recovering populations but also helping them to develop their distinctive features.	Conservation of biodiversity outside their habitat. It helps in recovering population in order to prevent their extinction.
Eg.–Biosphere reserves, Wildlife sanctuaries, National parks etc.	Eg.–Zoological parks, Safaris, Botanical gardens, Home gardens, Seed banks, gene banks etc.

6. BIODIVERSITY RELATED TRADITIONAL KNOWLEDGE AND IPRS

Due to the growing demand for the bio-products in recent decades, commercialization of the traditional knowledge associated with the bioresources has been on pace all over the world. This has adversely affected the livelihoods of TK holding societies and also caused serious threat to the biodiversity. Hence, a need for the protection of TK and bioresources has been raised and has become a topic of international debate.^[7]

Traditional knowledge is widely known as a valuable attribute of biodiversity and it plays a key role in sustainable development.

According to All India Coordinated Research Project on Ethnobotany, the indigenous communities are acquainted with the use of over 7500 species of plants for the purpose of healing. By 2020 the global market for herbal products is estimated to touch US\$ 5 trillion.^[8]

7. SUSTAINABLE DEVELOPMENT

According to Miller and Spoolman the three principles of sustainability are solar energy, biodiversity, and chemical cycling.

Biodiversity actually controls ecosystem around us. If we have a healthy biodiversity there will be more chances to prosper and move towards sustainable development as at least 80% of the human needs and 40% of the world's economy are derived from biological sources.

Cultural diversity is closely linked to biodiversity. There exists a symbolic relationship between habitats and cultures, between ecosystems and cultural identity, and this relationship constitutes a determining factor in ensuring sustainable human development.^[2]

8. CONCLUSIONS AND RECOMMENDATIONS

"If we pollute the air, water and soil that keep us alive and well, and destroy the biodiversity that allows natural systems to function, no amount of money will save us." -- David Suzuki.

Biodiversity also means a ray of hope for various options ranging from medicine to technology that are inspired by animals and plants. Every time a species is wiped out or whenever genetic diversity is lost, we lose the chance that might have been cure for cancer or AIDS. Biodiversity should be conserved by one and all as it is the foundation for sustainable development.

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