

# Biodiversity: The Network of Life and Conservation

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## **ABSTRACT:**

The term biodiversity refers to the range of living forms that may be found on Earth, including all plant, animal, microbial, and ecological species. The term conservation refers to the actions and plans taken to save and maintain biodiversity. This summary gives a general review of biodiversity and conservation, emphasizing their importance and major research discoveries. The health of ecosystems and the welfare of people depend on biodiversity. It offers crucial ecosystem services, such as the production of food, the supply of clean air and water, the management of the climate, and the preservation of cultural values. However, a considerable loss of biodiversity has been seen worldwide as a consequence of human activities such as habitat destruction, pollution, climate change, and overexploitation of resources. The issues facing biodiversity are greatly aided by conservation. It entails the preservation, administration, and wise use of ecosystems and natural resources. The main goals of conservation efforts are to protect species and their habitats, repair damaged ecosystems, and encourage sustainable behaviours that have the least amount of detrimental effects on biodiversity.

## **KEYWORDS:**

Animals, Biodiversity, Conservation, Forests, Species, Wild.

## **I. INTRODUCTION**

The majority of us now live in a technologically and socially advanced world where our ability to exploit the environment and our scholarly understanding of it have both grown. The issue is that our moral connection to it has deteriorated. It could have become so bad that it's now harmful to both ourselves and the natural world. The variety of all plant, animal, insect, and microbial species that live on earth, whether they are found in aquatic or terrestrial settings, is known as biodiversity [1], [2]. The most fundamental necessities of human civilization—food, fodder, fuel, fertilizer, lumber, alcohol, rubber, leather, pharmaceuticals, and a variety of raw materials depend directly or indirectly on this biodiversity. The need for the environment's long-term stability, the continuation of life on Earth, and the preservation of its integrity is variety. There is little question that the number and variety of living things provide many advantages and make our planet a beautiful and intriguing place to live, even if our knowledge of the earth's organisms its biological resources is still incomplete. The three basic and hierarchically connected layers of biological creatures are often used to characterize biodiversity [3].

### **Biological Diversity**

It encompasses the genetic variability within species, both within and between populations that are geographically distinct.

### **Species Diversity**

It covers a wide spectrum of species, such as single-celled viruses, bacteria, and other microorganisms, as well as multicellular plants, animals, and fungus, as well as huge and mammoth types of plants and animals.

### **Ecosystems Diversity**

It investigates the diversity of the biological communities where the species Jive coexist and communicate. The idea of biodiversity displays an interaction among its three components since genes are components of species, and species make up ecosystems [3]. The world's biodiversity is dispersed equally. It is noticeably higher in certain places than in others. In general, species diversity rises as one moves from the poles to the tropics; for example, among terrestrial systems, the tropical wet forests, which occupy only 57% of the planet's surface, are home to more than 50% of the world's species [4].

## II. DISCUSSION

### Loss of Biodiversity

There are several ways that human interference or natural processes may reduce or eliminate biodiversity. Each form of life is a natural repository for priceless elements, the genetic materials, hence the extinction of even one species is seen as tragic. The delicate balance of nature is greatly upset when species become extinct. Even the extinction of a single species has the power to destabilize an ecosystem, change a food chain or food web, and break the delicate balance between species that feed on one another [5], [6].

### Natural Causes

Natural selection, isolation, and mutation processes lead to the emergence of new species. Evolution may happen slowly over millions of years or it can happen suddenly when new animals move into a region or when the environment changes quickly. In a way, species that are replaced by their offspring are not quite extinct. For instance, the little Hip-hops has been supplanted by the much bigger contemporary horse, yet most of its genes are likely still present in its distant descendants.

### Human-Caused Extinction

Because of man's long-standing reliance on biological resources, resource depletion is clear. Humanity has never sought to entirely eradicate other species, but in a number of ways, due to our ignorance or negligence, we have decreased biological diversity and exterminated species. The Mega fauna of both America and Eurasia during the Pleistocene age may have been wiped off as a result of man acting as a hunter during the Stone Age. Climate change might have been the main or primary factor. The widespread use of bones in Europe and Siberia is sufficient proof that our predecessors killed animals ruthlessly, and the loss of species and ecosystems exacts a heavy price. Healthy biological systems are the source of all of our shared resources, including the water, air, rich soils, and prolific oceans. The extent of human influence on the world's biodiversity is enormous [7], [8].

According to estimates based on the fossil record, a species has an average lifespan of roughly 4 million years. In the next decades, it is predicted that we will lose around 50,000 species year if there are about 10 million new species discovered each year at a reasonable estimate. The seeds of biodiversity loss were sown throughout the colonial period in many southern nations. For example, during the British colonial era, large-scale commercial forestry in India accelerated the pace of forest exploitation for fodder, meat, milk, and other agricultural products like coffee. Our more recent predecessors' loss of biodiversity and deforestation in order to maintain life after independence adds fuel to the fire. Our cognitive powers prevent us from accepting the shifting and escalating demands of time. We continue to rely heavily on forest resources, particularly for fuel wood. However, the government has supplied alternatives in the form of solar-powered kitchen and lighting gadgets. However, it has not been able to lessen the demand on wood supplies.

### Measuring Biodiversity

The quantity of species present in a community may be seen as a measure of diversity. Therefore, biodiversity refers to a region's variety of species. The following species diversity algorithms have been devised to denote species diversity at various geographic scales:

#### Alpha Diversity

It shows how many species are found in a specific community. The index may be used to compare the variety of ecosystem types' species counts.

#### Beta Diversity

It shows how much a species' composition varies over an environmental gradient.

#### Gamma Diversity

It shows the pace at which new species are discovered as geographical replacements for existing species within a given habitat type in various locations.

## The Value of Biodiversity

The vast array of products and other services that ecosystems and species provide, both short-term and long-term, material and spiritual and psychological, are essential to human wellbeing. The worth of biological resources on earth may be broadly categorized. Directly into Values both constructive and consuming purposes.

**Food Resources:** From plant sources, there are grains, vegetables, fruits, nuts, condiments, tea, coffee, tobacco, alcohol, oil; from animal sources, there are meat, fish, eggs, milk and milk products, honey, etc. Medicine, fuel, wood, furnishings, feed, Fibre, fertilizer, wool, leather, paint, resin, wax, and thatch are examples of additional resources. plants for decoration, rubber, cosmetics, silk, feathers, etc.

### Relative Values

1. Future possibilities and non-consumptive applications.
2. Carbon is fixed by photosynthesis, which gives creatures their support network.
3. Gene flow, pollination, etc.
4. Keeping water cycles in check, replenishing groundwater, and safeguarding watersheds.
5. Protecting against severe weather conditions including floods and drought;
6. Promoting soil fertility and preventing soil erosion;
7. Maintaining vital nutrient cycles, including those for carbon, nitrogen, and oxygen, among others.
8. Absorbing and decomposing pollutants, organic wastes, pesticides, air, and water pollutants.
9. Preserving the recreational, artistic, sociocultural, scientific, educational, ethical, and historical qualities of natural settings.

**(i) Consumptive Use.** For his nutritional needs, man is mostly reliant on plant and animal resources. Our food is mostly derived from domesticated plants and animals. Still, a large portion of our food comes from wild animals. A significant portion of the population depends on food that is gathered from free-ranging wild species in the seas and oceans. Up to 60% of the protein is found in seafood, which is also high in vitamins, minerals, and other nutrients. Unfortunately, the removal of potentially useful food species and the wild relatives of our domestic crops occurs as a result of deforestation, hunting, clearance of forests, grazing, and the extension of agricultural fields.

**(ii) Productive Use.** The trade and commerce sector are heavily reliant on forests. Forests provide us with a variety of useful economic items in addition to timber, firewood, paper pulp, and other wood products. herbs with therapeutic potential. Products harvested in the wild from forested regions include rattan, cane, sisal, rubber, pectins, resins, gums, tannins, vegetable oils, waxes, and essential oils. Similar to how medicinal plants are stored in the woods of the Himalayas and are now utilised to treat a wide range of illnesses. The potential for many wild species to serve as sources of rubber, alkaloids, and other important organic substances is also being explored.

**(iii) Medicine.** Many fragrant and medicinal plants are being harvested from the wild to make drugs, such as Ephedra Kerardiana and Hippophae rhamnoides, which have the potential to treat a variety of illnesses. Dactylorhiza hatageria and others. Additionally, in order to promote in-situ and ex-situ conservation, they are being raised in plantations and preserved in the wild, namely in the Valley of Flowers, Rohtang in Kullu, Lahu, and Spiti Valley. treatments, analgesic medicines, antibiotics, heart regulators, anticancer and antiparasitic treatments, blood pressure regulators, anticoagulants, enzymes, and hormones are all derived from animal products.

**(iv) Environmental Advantages.** In the wild, man is powerless over nature. It can only stress the environment and put pressure on resources. In terms of resource creation and self-cleanliness, what causes the environment to function as a self-replenishing system? To respond, consider the function of biotic communities. Man cannot regulate the processes involved in the creation of soil, waste disposal, air and water purification, nutrient cycling, solar energy absorption, and management of biogeochemical and hydrological systems. This benefit to humanity is provided free of charge by non-domestic plants, animals, and bacteria that sustain ecological processes. These also act as a gene pool library. Wild plant and animal species have the ability to manage pests and disease-carrying organisms. The food chain describes how nature maintains control over the population of organisms by having bigger and more numerous species devour smaller and more numerous organisms to reach the next higher trophic level. Therefore, it is important to promote and practise natural area preservation and the protection of wild species in order to replenish biological diversity.

**(v) Use of Aesthetics.** The psychology of man has always been drawn to wild kinds of flora and animals. The early home of the human species was in the woods, which are now teeming with vegetation and wildlife. His

innate desire to view wildlife in its natural habitat has drawn tourists from far and wide, many of whom come from societies with advanced social and cultural systems. Numerous visitors go to national parks, sanctuaries, and forests around the nation, but notably in mountainous regions. The most beautiful terrain in the world, temperate grasslands are pleasing and reassuring to the human eye. Although food collection is no longer necessary for man since all cultivated plants have descended from wild predecessors, many people still love hunting, fishing, and other daring outdoor activities that include wild species. After leading a frantic day in modern life, such an atmosphere and amusing activity allow man the chance to refresh his pioneering abilities and feel mentally at peace. Man makes the most of his surroundings by adorning it with pictures of untamed creatures and vegetation.

**vi) Cultural Advantages.** For a group of people who believe their identity is closely related to the natural elements of the environment that produced their culture, a specific species or community of organisms may have emotional worth. This might be a religious principle or a psychological desire for access to nature. In any case, we often give the preservation of certain wild species a high priority.

**(vii) Option Values.** This alludes to the eventual usage of numerous animals for the benefit of humanity. The search for numerous species covered by biotechnology is already under progress in an effort to discover answers to a number of environmental issues. The following environmental topics will be addressed: pollution as a significant issue, methods of combating different diseases like cancer, diabetes, etc., AIDS, and others.

## **Global, National, and Local Levels of Biodiversity**

### **1. Global Initiatives for Biodiversity Assessment**

The UNEP Biodiversity Country Studies Project, which consists of bilateral and Global Environmental Facility-funded studies in poor countries, was launched in collaboration with donor nations and UNDP in 1991, marking the beginning of the push for biodiversity assessment. It was first put together in 1987. There have been 19 studies completed, and many more are nearing completion. The research agenda for biodiversity, IUBS/SCOPE/UNESCO, Paris, launched the gene to ecosystem method (Sol Brig, 1991). The Convention on Biological Diversity's agreed-upon wording was ratified by 159 states, including the European Union, at the United Nations Conference on Environment and Development (UNCED), which was held in Rio de Janeiro in June 1992. It was endorsed by 101 governments in Nairobi in May 1992. 174 governments are now a member of this treaty. The milestones on the international biodiversity initiative include the Global Biodiversity Strategy (1992), the Status of the Earth's Living Resources (1992), Caring for the Earth: A Strategy for Sustainable Living (1991), the Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making (1993), the Norway/UNEP Expert Conference on Biodiversity (1993), and From Genes to Ecosystems: A Research Agenda for Biodiversity (1991).

More countries than ever before are working to create their own national biodiversity strategies. According to the Global Biodiversity Assessment (UNEP, 1995) there are between 13 and 14 million different types of animal and plant species worldwide. Additionally, it notes that only 1.75 million species have been investigated and documented too yet. Diversity of ecosystems hasn't even been logically investigated yet. As a result, there seems to be a sizable knowledge gap at the global, regional, and local levels. Prior until recently, it was believed that the conservation of biodiversity was only possible through preserving genes, species, and ecosystems. However, the adoption of ground-breaking legislation and increased awareness have resulted in the formation of a framework based on conserving biodiversity as well as understanding and, most importantly, utilising it sustainably. Reforms are necessary in the management of watersheds, forestry, agriculture, technology, and international trade agreements. Researchers, governmental organisations, non-governmental organisations, and the business sector are all affected by biodiversity, either directly or indirectly, depending on the degree of development. Since we rely on biodiversity, a number of our actions may be connected to the use and preservation of it. Therefore, biodiversity protection is influenced by commerce, economy, population, land tenure, intellectual property rights, resource use, and waste. Therefore, it is possible to encourage its sustainable usage via education, ethics, knowledge, and awareness.

### **2. Levels of Action**

All countries in the globe are aware of the need for conservation of biodiversity on many levels since it is in everyone's best interests. Most of the resources are not the property of any one person, country, or continent. They are just worldwide. Every single person on earth has an equal right to it. At the national, regional, and local levels, four key actions have been realized to reduce the loss of biodiversity worldwide. Global Environment Facility (GEF), to start the GEF was formed in 1990 as a three-year experimental programme by the World Bank, United Nations Development Programme (UNDP), and United Nations Environment Programme (UNEP). The

GEF is anticipated to contribute \$400 million towards the problem of biodiversity protection. The framework to significantly decrease biodiversity loss has been developed by the International Biodiversity Strategy Programme (IBSP), which includes the World Resources Institute (WRI), World Conservation Union (WCU), UNEP, and more than 40 Governmental and non-Governmental organisations. This would benefit humanity in a more long-term way.

### **The COBD, or Convention on Biological Diversity**

More than 100 countries convened in Brazil for the Earth Summit under the auspices of UNEP. This was done in order to provide a legal basis for:

- i. Identifying global conservation objectives,
- ii. Regulating international financial assistance for biodiversity conservation
- iii. Transferring technology for biodiversity use and protection.
- iv. AGENDA 21 offers a course of action on several problems, including biodiversity. It was developed via a series of intergovernmental preparation meetings with input from a range of non-governmental organisations, including the Biodiversity Strategy Programme.

### **India as a Mega-Diversity Nation**

India is a nation with a wide biodiversity in the world and an important one throughout the world. It is located at the intersection of the Agro-tropical, Euro-Asian, and Indo-Malayan biogeography domains. In fact, it is one of the world's 12 Mega diversity nations. In addition, India is a Vavilov center of high crop genetic diversity, so called in honor of the Russian geobotanist N.I. Vavilov who, in the 1950s, found roughly eight such locations worldwide. India, a nation with a massive amount of biodiversity, has been attentive to the requirements of conservation while yet moving forward with its growth. In the past, India's efforts for biodiversity conservation and sustainable use focused on giving regions rich in biodiversity special status and protection by designating them as national parks. Biosphere reserves, sensitive and environmentally vulnerable places, and wildlife sanctuaries. It has aided in lessening strain on reserve forests by finding other ways to satisfy demand for fire wood and feed. through reforestation squatter zones and wastelands, building ex-situ conservation institutions like gene banks, and engaging in eco-development. India has problems in not only maintaining previous efforts but also adding to them by enlisting people in the mission.

### **Biodiversity Assessment: Initiatives in India**

Rodgers and Pan War (1988) made an effort to characterise the biogeographic areas of India in their most current mapping of biogeographic zones. The Trans-Himalayan, Himalayan, Indian desert, Semi-Arid, Western Ghats, Deccan Peninsula, Gangetic Plains, North East India, Islands and Coasts are the 10 biogeographic zones of the subcontinent. Undefined zones for aquatic ecosystems have also been identified. These areas have been transferred to the digitised Survey of India database by the Wildlife Institute of India. India has a variety of unique plants and animals. An estimate (Anon., 1983) states that roughly 30% of plant species are unique to India. North Eastern India, the Western Ghats, and the North Western Himalayas are regions with high endemism. From the Eastern Ghats, a small area of local endemism has also been documented (MacKinnon & MacKinnon, 1986). About 3000–4000 plant species are thought to be threatened in varying degrees, according to the Project on Study, Survey, and Conservation of Endangered Plants (POSSCEF) (Nayar & Shastri, 1987). The National Biodiversity Strategy and Action Plan (NBSAP), a project recently launched by the Ministry of Environment and Forests of the Government of India, calls for the assessment and inventory taking of biodiversity-related information at various levels, including the distribution of endemic and endangered species and site-specific threats. Decentralised planning and the utilization of multidisciplinary working groups to encompass all sectors involved with biodiversity protection are two of this project's standout characteristics.

### **Hotspots of Biodiversity**

The term hot spots refer to regions with high levels of endemism and rich biodiversity that are prioritized globally for conservation practises due to the urgent danger of species extinction and habitat loss. In just 0.2% of the world's total land area, the 12 hot spots that have been found constitute 14% of the plant species. 60–70% of the world's biodiversity is found in the 12 mega-diversity countries of Mexico, Colombia, Brazil, Peru, Ecuador, Madagascar, Indonesia, Malaysia, India, China, and Australia. Two of the global hotspots are located in India. These are symbolized by the Western Ghats region in the south and the North-Eastern Himalayas (Khasi Jaintia Hills and Lower Himalayan Slopes including Areas of Arunachal Pradesh, Assam, Meghalaya, Nagaland and Tripura). These are located in areas with high rainfall. The thick, high trees that make up the rain forests of the

Western Ghats and the eastern Himalayas are made up of several species that coexist in the same region. A hectare of land has hundreds of different tree species in addition to mosses, ferns, epiphytes, orchids, lianas and vines, herbs, shrubs, and fungus. Habitat with the most diversity. Huge trees reach up in the direction of the sun. The smooth, straight trunks, which climb 30 meters or more before branching out, are supported by buttress roots that are fixed in the earth. Most of the light coming from the ground underneath is effectively blocked by the spreading crowns. These woodlands are known as Dipterocarpus forests because Dipterocarpus sp. predominates there.

### 1. North-east Himalayas

From the thick, Eastern foothills' evergreen and semi-evergreen flora. Himalaya, the vegetation's characteristics alter between 1525 and 1830 metres above sea level. The sal, silk-cotton trees, and enormous bamboos of the foothills are replaced by qaks, magnolias, laurels, and birches clothed in moss and ferns. One reaches the coniferous forest of pine, fir, yew, and junipers between 2745 and 3660 metres. Dwarf bamboos and scrubby Rhododendrons flourish as undergrowth. The tree trunks are covered with lichens, mosses, orchids, and other epiphytes as a result of the high humidity and abundant rainfall. The presence of Indo Chinese fauna distinguishes the animal life in the temperate zone from that in the western Himalaya. This region is home to characteristic animals including the red panda, hog badgers, ferret badgers, and crestless porcupines. The eastern Himalaya is also home to three different goat antelope species that are related to chamois in Europe. Smaller goat antelopes called goral may be found all throughout the tract on rocky outcrops next to coniferous woods and on craggy grassy slopes.

### 2. Western Ghats

With its evergreen vegetation and copious rainfall, the Western Ghats and the central belt to the west of them are similar in flora and fauna to the evergreen rain forest of north-eastern India. The lion-tailed macaque (*Macaca silenus*), which only exists in the evergreen forests of the Western Ghats in south India, is one of the most endangered primates in the world. Its population is only thought to number approximately 800 individuals. The nilgiri 'langur' (*Presbytis johni*), a member of the langur group, is a multihabitat species that lives in temperate evergreen forests over 1700 m height in the Western Ghats in addition to shoals. Many climbing creatures, many of which are unique to these woods, have developed gliding systems. The flying squirrels are one such species. The Nilgiri mongoose, strip necked mongoose, Malabar civet, and spiny mouse are some of the other species that are distinctive to the Western Ghats. These evergreen areas' flora and wildlife haven't been well studied. These woods are one of the greatest gene pools of flora and fauna in the nation because they are a repository for a wide diversity of plants and animals. Even though many of these forests haven't been lost to plantations growing rubber, cocoa, coffee, etc., any virgin forests that do exist must be carefully protected, as in Kerala's Silent Valley or the region's abundant orchid belt in the north-eastern Himalayas in Arunachal Pradesh and Sikkim.

## III. CONCLUSION

Biodiversity refers to the natural world and the variety of species that dwell on our planet, including plants, animals, insects, and microbes. Every one of them exists in delicate balance and lives and works together in ecosystems to sustain and support life on Earth. For ecosystems to operate and be resilient, as well as for human well-being, biodiversity is crucial. The protection and preservation of biodiversity, the reduction of species extinction, and the maintenance of ecosystem services all depend on conservation efforts. For successful biodiversity protection, sustainable practices, legislative backing, and public awareness are essential. We can assure a more sustainable future for both human cultures and the other animals that coexist on our planet by appreciating biodiversity and putting conservation measures in place.

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