

The Effects of Declining Biological Diversity on the Environment

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ABSTRACT

India is home to three of the world's ten most biodiverse hotspots on land, a vast variety of forest types, and a temperate to tropical climatic range. The majority of terrestrial species are now only found in forests because their former habitats have been destroyed. 514 natural sanctuaries, 99 national parks (including 18 biosphere reserves), and several holy groves are all part of the extensive network of protected places. Forest degradation and biodiversity loss persist due to increasing human population needs, shifting land uses, and the introduction of invasive alien species, despite a supportive forest policy and a robust regulatory framework. Individuals should be encouraged to take part in large-scale biodiversity conservation restoration efforts, and the degree and rate of biodiversity loss should be monitored continuously.

Keywords: *biodiversity, environment, forest, climate, conservation*

I. INTRODUCTION

The term "biodiversity" is commonly used to describe the wide variety of life forms found on Earth. The term can also be used to describe every kind of living thing in a particular area. Biodiversity encompasses not just plants and bacteria but also animals and humans. Researchers estimate that there are 8.7 million unique kinds of plants and animals on Earth. To yet, scientists have only identified and named roughly 1.2 million species—most of which are insects. What this means is that the existence of potentially billions of additional forms of life is a mystery.

All of the currently-existing species have, over time, developed unique characteristics that differentiate them apart from other members of their genus. The distinctions between species are used by scientists. Distinct species are groups of creatures that have diverged so much through time that they can no longer mate with one another successfully. All members of the same species are considered to be of the same species.

There is a great deal of undiscovered biodiversity, thus scientists are curious about the global biodiversity total. Researchers count how many unique species inhabit a given ecosystem, whether it is a forest, grassland, tundra, or lake. Grasslands are home to a wide variety of creatures, from insects and snakes to antelopes. For example, tropical regions have the highest biodiversity because their warm and humid atmosphere is ideal for plant growth. Species too small for human eyes to see can also thrive in ecosystems. When examined under a microscope, samples of soil or water reveal a vast microbial world.

Mexico, South Africa, Brazil, the southwestern United States, and Madagascar are only few of the places on Earth where biodiversity is especially great. Biodiversity hotspots are places where the number of different species present is incredibly high. As a result of their isolation, endemic species can only be found in hotspots.

All life on Earth relies on cooperation to ensure its survival and the protection of its ecosystems. Grass is a staple diet for livestock such as cattle. Afterwards, the manure the cattle produce helps replenish soil nutrients and promotes grass growth. As a fertiliser, this manure can be spread over fields. Food, clothing, and medicine are just some of the ways that humans benefit from other animals.

Much of Earth's biodiversity is at danger due to human consumption and other activities that destabilise and even destroy ecosystems. Pollution, global warming, and a rising human population all pose serious risks to biodiversity. The rate at which species are dying off as a result of these threats is unprecedented. It has been predicted by some experts that half of all species on Earth would go extinct in the next century. It is imperative that we take conservation measures in order to save the planet's biodiversity and ensure the survival of endangered species and the ecosystems they rely on.

Although all of these insects share a similar structure and may even be genetic cousins, the incredible variety of colours, camouflage, shapes, and sizes exemplifies the wide range of variation that may exist even among closely related species. The photographer was Frans Lanting.

Several researchers have documented and described biodiversity over the years. These researchers include Subba Rao (2001), Kaushik et al. (2008), Verma (2015, 2016a, 2016b, 2016c, 2016d, 2017a, 2017b, 2017c, and 2017d), and Prakash et al. (2016, 2017, 2018). The purpose of this discussion is to investigate the ecological effects of biodiversity loss in India.

III. RANGES OF BIODIVERSITY

There are three tiers of biodiversity: genetic diversity, species diversity, and environmental diversity.

3.1 Genetic Variability

- Species are collections of unique organisms that share a set of defining physical traits.
- "Genetic biodiversity" refers to the variation in genes within a given species.
- For a species' population to thrive, it needs a wide range of genetic variations to reproduce.
- However, there is a great deal of variation in height, skin tone, and general appearance among members of the homo sapiens group, to which all humans belong genetically. This is due to the inherent variability in human genes.

3.2 Species Diversity

- This is a reference to the plethora of species that can be found there.
- A species' diversity can be measured by its abundance, variety, and degree of richness. There are places where you can find a wider variety of animals and plants than others. Places where a wide variety of species can be found are called "hotspots of diversity."
- It's related to the variety of life forms present there.

3.3. Ecosystem Diversity

- Ecosystem variety is characterized by a large range of variation between ecosystem types as well as between habitats and ecological processes found within each ecosystem type.
- Ecosystem boundary definition is therefore difficult and complex.
- We can be quite flexible in how we define the limits of communities (relationships among species) and ecosystems.
- The Indian plain's dense forests are home to such a wide variety of plant and animal life.

1. The Trans-Himalayan region is split into three distinct provinces: Ladakh, the Tibetan Plateau, and Trans-Himalayan Sikkim.
2. The North-West Himalaya, West Himalaya, Central Himalaya, and East Himalaya are the four Himalayan regions.
3. Two regions make up the Indian Desert: Thar and Kutch.
4. The semi-arid region comprises the states of Punjab and Gujarat, in addition to Rajasthan.
5. The Western Ghats are a geographic region that consists of the Malabar Plains and the Western Ghats Mountain Range.
6. The Deccan Plateau is made up of the five provinces of Deccan South, Deccan Central, Deccan Central Plateau, Deccan Eastern Highlands, and Deccan Highlands.
7. Three provinces—West Coast, Lakshadweep, and East Coast—form the West Coast.
8. Two distinct regions, the upper and lower Gangetic plains, make up the Gangetic plains.
9. The Brahmaputra Valley and the North Eastern Hills are included in the ninth.
10. The provinces of Andaman and Nicobar make up this area. This biome has a wide range of ecosystems.

India is home to a wide variety of species, but many of them are in danger of going extinct. The Wildlife Act identifies 253 species of wildlife as vulnerable, while the Botanical Survey of India identifies 135 plant species as threatened with extinction.

IV. THE IMPORTANCE OF SPECIES DIVERSITY

Human societies have influenced biodiversity on the genetic, species, and ecological levels, and biodiversity has helped advance human culture in a number of ways.

The following are some of the roles that biodiversity plays:

4.1 Environmental Functions

There are several species that provide essential ecosystem services. In addition to satisfying its own requirements, every organism also provides something of value to other organisms. Capturing and storing energy, generating and decomposing organic materials, and contributing to the ecosystemic cycling of water and nutrients are all ways in which these species have a role in fixing atmospheric gases and regulating the climate. Thus, they contribute to the development of soil, the

mitigation of pollution, and the preservation of our precious land, water, and air resources. These roles are essential to ecosystem health and human survival.

4.2 Functions of Science

Biodiversity is important because it reveals patterns in the history and future of life. Learning about the interconnectedness of all living things and the role each species plays in maintaining the ecosystems of which we are a part is facilitated by biodiversity.

4.3 Economic Activities

Biodiversity serves as a precious commodity in regular life. Agro-biodiversity, or crop diversity, is a key part of the larger concept of biodiversity. Food, medicine, and personal care products are just a few examples of how people put biodiversity to use. That concept of biological resources is what's killing off our species' variety. Biodiversity provides many of humanity's most valuable economic resources, including food crops, animals, wood, fish, medicinal resources, and so on.

4.4 Cultural and Social Services

The variety of natural forms is a source of aesthetic pleasure. It gives us a chance to relax, and the region's rich biodiversity is a draw for sightseers. Numerous communities have been able to co-develop with their environments and the resources they offer thanks to the high degree of biological diversity present there. Therefore, it serves a crucial function in modern society. A few of the many useful functions it provides are as follows:

- Ecotourism in particular
- Theme: Recreation and Downtime
- Having meaningful spiritual experiences and a place to call home
- Creative Process, Art, and Planning

Recognizing the inherent right to existence of all species, including our own, is a moral obligation. Therefore, it is unethical to work toward the extinction of any species. The diversity of life on Earth is a barometer for the health of our interspecies connections.

V. DISADVANTAGE TO BIODIVERSITY

Loss of biodiversity refers to a decrease in the number of different kinds of organisms on Earth. Biodiversity is the variety of life on Earth, from the tiniest environment to the entire biosphere. It includes all of the genes, species, individuals within a species, and biological communities found there. (A group of creatures that share a habitat is called a biological community.) However, biodiversity loss is defined as a decline in the number of species, genetic diversity, and biological communities in a given region. Wherever there has been a drop in biodiversity, the functioning of the local ecosystem may suffer as a result.



Source: <https://earthjustice.org/blog/2017-april/saving-coral-reefs-from-death-by-fossil-fuels>

The Heron Island Sea view Survey XL Catlin in February 2016 featured a sea turtle swimming over a landscape of bleached coral.

Loss of biodiversity is often perceived as the eradication of species within an ecosystem or perhaps the entire biosphere due to the common association between biodiversity and species richness (the number of species within a specific

area) (see also extinction). Nonetheless, there are other, more subtle phenomena that threaten ecosystem health over time, and these are overlooked when discussing biodiversity loss in terms of species extinction alone. Species that experience sudden population losses may have their social structures disrupted, making it difficult for the few remaining males and females to mate and so preventing the species from recovering. It's possible that inbreeding (mating between closely related people) could increase after severe population decreases, leading to an even lower genetic diversity pool.

A species' niche (the role it plays in the environments it occupies) decreases when its numbers decrease, even if it does not disappear from the ecosystem or the biosphere. Significant shifts in the composition of ecosystems may result from a sudden drop in population. When trees are cut down in a forest, for instance, the ecosystem no longer provides the benefits of shade, regulation of temperature and moisture, animal habitat, and nutrient supply.

5.1 A Decline in Natural Biodiversity

Biodiversity rises and falls with the passing of time because of natural cycles. The coming of spring, for example, brings with it new opportunities for many species to feed and breed, leading to an overall increase in biodiversity as a result of the subsequent increase in the number of individuals of those species. Conversely, the onset of winter causes a temporary decline in biodiversity as warm-adapted insects perish and migratory animals depart the region. Plant and invertebrate populations (such as insects and plankton) grow and fall annually, affecting the food web and thus the biodiversity of an area.

Ecosystems, landscapes, and the global biosphere all undergo more long-lasting ecological changes as a result of biodiversity loss. Ecosystems undergo dramatic change when natural ecological disturbances like wildfires, floods, and volcanic eruptions wipe out local populations of certain species and change entire biological communities. Ecosystems have adapted to the frequent occurrence of natural disturbances. As a result, these setbacks won't last forever.

5.2 Human-Induced Decline in Biodiversity

Human-caused disturbances, on the other hand, typically result in more severe and protracted biodiversity losses. More and more of the planet's land is being used by humans (*Homo sapiens*), their crops, and the animals they raise for food. About 51 million square kilometres (19.7 million square miles) of the earth's arable land has been converted to agriculture, with cattle, sheep, goats, and other livestock using another 40 million square kilometres (15.4 million square miles) for grazing. Vertebrate populations have dropped by an estimated 60% worldwide since 1970 due to the widespread alteration of terrestrial ecosystems like forests, marshes, and grasslands. The decline has been especially severe in freshwater settings (83%), as well as in South and Central America (89%). Between 1970 and 2014, the world's population grew from 3.7 billion to 7.3 billion. In 2018, the biomass of humans and livestock (0.16 gigatonne) greatly outweighed that of wild mammals (0.007 gigatonne) and birds (0.04 gigatonne). (two billionth of a gigaton. Scientists estimate that the current rate of species extinction is one hundred to ten thousand times higher than the average extinction rate (which is roughly one to five species per year when the entire fossil record is considered).

Clearing forests, filling in wetlands, redirecting streams, and constructing new roads and buildings are all examples of systematic endeavours that have a significant impact on the ecological trajectory of their respective landscapes or regions. As human populations grow, the terrestrial and aquatic ecosystems they rely on may suffer as a result of human activities such as food production, land modification, and the development of trade networks. The loss of biodiversity is an inevitable consequence of these actions.

VI. CONSERVATION OF BIODIVERSITY

Humanity relies on biodiversity to ensure its continued existence. All forms of life are intricately connected, so when one is disturbed, it throws the others off kilter. Threats to the survival of humans may result from the degradation of ecosystems caused by the extinction of plant and animal species. In order to protect biodiversity, you can do one of two things:

6.1 In-situ Conservation

This strategy involves defending a threatened species in its natural habitat, which may involve cleaning up the area or removing potential threats. Some of the techniques that fit under that umbrella are as follows:

- Biosphere Reserves
- The National Park Service
- Safe havens for rescued animals

6.2 Ex-situ Conservation

In order to protect endangered species, it is necessary to remove them from their natural habitats and relocate them to a special facility.

- This is achieved by visiting a botanical garden, safari park, or zoo.
- Ex situ conservation has expanded in recent years beyond the protection of endangered species.
- Cryopreservation techniques have made it possible to store gametes in a viable and fertile state for extended periods of time, to fertilise eggs in vitro, and to grow plants using tissue culture procedures, all of which are vital for saving endangered species.
- Seeds of many varieties of economically important plants can be safely stored in banks for years at a time.

The importance of local community and individual involvement in conservation and sustainable use is becoming increasingly recognized. This can only be achieved through the establishment of locally-based institutions. The continuity of the conservation effort is as important as the preservation of species or habitat.

The global conservation strategy proposes the following measures to protect biodiversity:

1. Food crops, fodder plants, lumber trees, cattle, animals, and wild related variations all need to be safeguarded.
2. Planning and management are essential for avoiding extinction.
3. Animals need secure areas to forage, mate, rest, and care for their young.
4. It is important to work to protect endangered and vulnerable species.
5. International guidelines are needed to control the trade of endangered species.
6. The natural homes of our wild kin should be catalogued and safeguarded in every nation.

VII. CONCLUSION

The loss of biodiversity has a wide range of negative effects on humankind. Culture is deeply rooted in our biological surroundings. Flags, sculptures, and other representations of plants and animals serve as symbols of our identities and the communities we live in. The sheer magnitude and power of nature are awe-inspiring, and this serves as a constant source of motivation for us. In addition to including pressures and responses in the study design of ecological studies, there is a need for thorough reporting and documentation of conservation projects. However, without sufficient documentation and controlled settings, this evaluation cannot be conducted. The final arbiter in matters of biodiversity rests with the individual citizen. Because individual consumption drives development, which in turn uses and pollutes nature, choices made by individuals have far-reaching consequences. Biodiversity is critical to the health of ecosystems, which in turn are essential to human life and prosperity. Assessing and conserving biodiversity at both the regional and global levels is essential in light of the growing recognition of the importance of biodiversity and the high rates of loss. Involving people in the effort to protect biodiversity is crucial, but there are few proven methods for doing so. India should be at the forefront of developing respectable methodologies and policies for assessing and protecting biodiversity, with help from the government, scientists, and NGOs.

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