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Biodiversity: Its Threats and Conservation Strategies

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Abstract

There is a continual extinction of over 90% of the species due to various factors such as increased human population, unsustainable resource consumption, habitat fragmentation, habitat degradation, alien species invasion, pollution, monoculture practices, climate change, loss of forest cover etc. Food, fodder, fuel, medicines, wood, crop plants are some of the natural resources received from the environment. Biodiversity also provides an ecosystem, social, and spiritual services to mankind. We must realize the significance of biodiversity on earth as a valuable resource that can help in developing new products for generations. A consensus has been developed to adopt a holistic view of biodiversity for its conservation and sustainable utilization. Numerous techniques have been proposed and implemented for the conservation of biodiversity and its genetic resources. Since we are dependent on nature for our livelihood, this review paper aims to address the biodiversity and its threats along with some conservation strategies which are not adopted on a large scale.

Keywords: Keystone, habitat destruction, invasive species, reproductive biology.

INTRODUCTION

The term "biodiversity" originated in 1985 when Walter and Rosen joined the terms "diversity" and "biological diversity." All living systems are based on biological diversity and natural resources. According to Kulshrestha (2016), it is the cornerstone of sustainable development, crucial to preserving the environmental health of the earth, and a source of both ecological and financial security for future generations.

Several studies suggest that because different species can contribute to different activities, biodiversity may be particularly important for the multi-functionality of ecosystems (Lohbeck *et al.*, 2016). Plants provide everything that life on Earth needs, including the air we breathe, food, and medication. However, around 50% of all flowering plant species face extinction, and it's likely that 75% of the world's undiscovered plant species face the same fate.

According to report of ENVIS Centre, Ministry of Environment & Forest, Govt. of India, "The biodiversity of our country is under considerable degree of threat due to various factors, both natural and man-made. Natural causes, such as natural calamities, competition between



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species and biological imparity of a species, have contributed, to some extent, towards the depletion of certain species, e.g. *Eremostachys superba*, *Frerea indica* (Angiosperms) *Aitchisoniella himalayensis*, *Monoselenium tenerum*, *Sewardiella tuberifera*, *Stephensoniella brevipedunculata* (Bryophytes), it is the man-made threats, such as clearance of prime forests for agriculture, mining, urbanisation, industrialisation, grazing, over-exploitation of components of floristic diversity and introduction of alien species which have severely threatened many of the wild species.

The district has a modest amount of forest resources; the overall estimated amount of forest cover, including hills, is 396830 hectares. This represents only 6.69 percent of the total geographic area of the national average. The district is almost half the national average due to its 13% forest acreage. The "Jant" tree, also known as the Khejri (*Prosopis specigera*), is the main species present in the woodland. It is widely distributed and used for a variety of things, including giving fuel for residential use, preventing soil erosion, and feeding the fauna when its leaves have dried up. "Babul (*Acacia nilotica*), Shisham (*Dalbergia sisso*), Neem (*Azadirachta indica*), Pipal (*Ficus religiosa*), Jal (*Salvadora oleoides*), and Bargad (*Ficus benghalensis*)" are other species that have been discovered. Additionally, mango trees (*Mangifera indica*) can be found in the mountainous regions of the Khetri and Udaipurwati tehsils. There is also the Beri tree (*Zizyphus mauritiana*), which gives the fauna "Pala" as fodder. At Jhunjhunu, there is a forest nursery. Several different kinds of grasses also develop there. The most common shrub is called Phog (*Calligonum polygonoides*) (Kumar, 2015). The current mass extinction, which is happening 100–1000 times faster than it would naturally, is the result of human activity. Human activities have significantly exacerbated factors associated with catastrophic extinction events. The loss of biodiversity can have three effects on an area's plant productivity: it can make the region less resilient to extreme environmental changes; it can also make ecosystem processes like plant yield, water use, and disease cycles more variable. Additional consequences of biodiversity loss include the co-extinction of species as a result of disruptions to the food web and food chain, the removal of alternative pathways that would have allowed the ecosystem to withstand harsh conditions, and the direct threat to human food security in a particular location (Bradley *et al.*, 2012).

The study area is also affected with biodiversity loss. *Prosopis juliflora* was purposely introduced into the region as a resilient invasive species, but it has since become a significant danger to local fauna and flora. For disturbed forest areas, *Croton sparsiflorus* and *Lantana camara* also posed a serious hazard. *Conyza boneriensis*, *Parthenium hysterophorus*, *Cirsium arvense*, and *Ageratum conyzoides* are examples of Asteraceous species that have hairy appendages on their tiny seeds to assist in wind dispersal. As a result, they are dispersing in the study region at an alarming rate. Due to mostly biotic pressure and human involvement, species



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like *Calligonum polygonoides* were found to be extremely infrequent in the forest region. The region's significant decline in forest cover is currently being caused by a number of problems, including the overgrazing of animal herds and the usage of plants for fuel, medicines, and other purposes. The loss of the forest affects several species that are important for medicinal purposes. The preservation of floral diversity is essential for ensuring the well-being of present and future generations, as it plays a crucial role in several industries such as agriculture and medicine (Chaudhary and Shringi, 2017). The consequences of biodiversity loss are dire. It is well known that human activity's excessive exploitation, pollution, and loss of habitats are largely to blame for the high rates of modern extinctions. The ability of nature to provide basic needs like food, clean water, and a stable, livable climate is being jeopardized by these extinction rates. Because of this, it is imperative to preserve biodiversity, and many organizations worldwide are making great efforts in this regard (WHO, 2015). However, correlating extinction of species to biodiversity loss ignores other subtle events that endanger the long-term ecosystem health

Factors causing Biodiversity Loss

The major reasons of Biodiversity Loss are explained as follows-

Habitat Loss and Fragmentation: It is one of the primary causes of the variety loss in an ecosystem. One of the more prominent reasons of the decline in biodiversity is the loss of forest cover. They used to make up 14% of the land area of Earth, but now they only make up roughly 6%. One example of biodiversity loss is the decline in populations of migrating birds, locally unique species, etc., which is brought on by pollution and human activity that destroys their natural habitats and living conditions.

Over-Exploitation: Due to the growing human population alone, natural resources that were limitless only a few thousand years ago now seem to be dangerously depleting. Furthermore, over time, the ambition of various human undertakings and organizations has led to an overuse of natural resources, which has itself caused biodiversity to decline.

Invasion of Alien Species: Any species that did not originally dwell or have not evolved in a specific environment for that area is referred to as an "alien species". When a foreign species is introduced, whether on purpose or accidentally, it may become invasive and cause biodiversity to disappear from the area. The new species compete with the native species for the same niche and eventually drive them out, which negatively impacts the entire ecosystem that supports and surrounds them. In addition to the loss of biodiversity in the immediate environment, ecosystems are also being lost at the same time.

Co-Extinctions: In this case, the meaning of loss of biodiversity is defined as the extinction of a species, together with the extinction of allied plant and animal species. A decline in biodiversity in this case suggests co-extinction. When the host fish species goes extinct, the collection of parasite species will suffer the same fate.



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BIODIVERSITY CONSERVATION

The preservation and management of biodiversity with the aim of attaining sustainable resource development is known as biodiversity conservation. The three main objectives of biodiversity conservation are the maintenance of essential ecological mechanisms, the sustainability of species and ecosystems, and the preservation of species diversity. Biodiversity conservation is the preservation, management, and upkeep of ecosystems and natural habitats to ensure their health and functionality.

Many conservation strategies keep the biosphere in good condition. A healthy ecosystem has access to resources, a clean, healthy environment, and well-functioning food systems. The degree to which humans rely on the environment for their basic necessities and well-being is a critical consideration. We rely on a wide variety of plant and animal species to survive. Because of this, it is imperative to save these species and their ecosystems, which are in danger due to a number of human activities. Threats to biodiversity put humanity at jeopardy. Numerous grave problems, such as pollution, loss of habitat, depletion of resources, climate change, extinction of species, outbreak of diseases, and more, might have it at their core. Preserving and safeguarding biodiversity is essential for pragmatic and vital reasons (Chandrakar, 2012).

In Situ Conservation- refers to the preservation and protection of the species in their natural habitat. It is the conservation of genetic resources within native animal or plant populations. In situ conservation is the management of biodiversity in its natural environment.

Biosphere Reserves- These are areas that national governments have chosen; they are important ecosystems that can span up to 5000 square kilometers and preserve the native habitat and way of life of the ecosystem's inhabitants.

National Parks- The government maintains these restricted regions to protect the wildlife and the environment. National parks are devoid of all human activity and are solely designed to safeguard native wildlife.

Wildlife Sanctuaries- The preservation of wild animals is the main objective of wildlife sanctuaries. The minimal human activities allowed here, such as farming, wood harvesting, and the gathering of other forest products, must not interfere with the conservation of the animals.

Biodiversity Hotspots- If there are at least 1500 different species of vascular plants in a protected area and 70% of the habitat has been lost, the region is deemed a biodiversity hotspot.

Gene Sanctuary- A gene sanctuary is a designated region under protection that is utilized only by plants.

Sacred Groves- Communities preserve animal habitats in Sacred Groves as an act of respect for their own beliefs. It is typically a section of the forest where all of the animals is fully protected.

Ex Situ conservation is used to describe the preservation of life outside of its natural habitat. This is a method whereby all or a portion of the population of a vulnerable, endangered species is



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evacuated from its native home, and the species is maintained and reproduced in artificial environments. These artificial ecosystems might be found at zoos, nurseries, botanical gardens, and other similar establishments. Ex-situ biodiversity conservation refers to the breeding and upkeep of endangered species in man-made environments such as zoos, nurseries, botanical gardens, gene banks, etc. The species do not compete much for resources such as food, water, and available space. One of the many advantages of ex-situ conservation is that it allows humans to alter essential life-sustaining elements like the climate, the availability of food, and veterinary care. The species can be protected from poaching, and population control measures can be successfully implemented. Through the use of gene methods, the species' population can be boosted and subsequently released back into the wild (Chandrakar, 2012).

TRADITIONAL ASPECTS OF DIVERSITY CONSERVATION

Moral beliefs are also held by people, and these beliefs often help them maintain control over their interactions with the natural world. The customs are also reflected in the many ways that trees, woods, and water are used and managed. These systems serve to mitigate the effects of harvesting, although maintaining less biodiversity than do natural ecosystems. For instance, there are fifteen distinct resource management approaches in Rajasthan's arid ecosystems that support biodiversity preservation and landscape diversity. The Bishnoi community's environmental ideals encourage compassion for wildlife and prevent destroying the *Prosopis cineraria* trees that exist there. According to Bishnoi teachings, "the deal is cheap if one needs to lose head (life) for rescuing a tree (Jajodia, 2018).

In light of the global goals and the simultaneous need to realize and develop the features of traditional knowledge, governments and other relevant parties can choose the following courses of action. In addition to sharing their knowledge, indigenous communities ought to be more actively involved in the formulation of policies and in the decision-making process. It is imperative that both communities and parties protect, preserve, and advance traditional knowledge about sustainable usage and biodiversity conservation. Governments need to support and encourage the equal distribution of the advantages brought about by employing such traditional knowledge (Chakrabarty and Kaur, 2021; Kashish, 2021)

STRATEGIES FOR CONSERVATION

The location of and threats to biodiversity are distributed unevenly. Moreover, there is always a limitation of funds and time. Hence, prioritization is essential to minimize the biodiversity loss and the cost of conservation. To address this need, biodiversity conservation organizations have proposed nine templates of global priorities over the past decade (Brooks *et al.*, 2006). The strategies for the conservation of forest biodiversity are as follows:



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1. **Protected Areas and Reserves:** Establish and maintain protected areas and reserves to safeguard diverse ecosystems and their inhabitants and ensure effective enforcement of regulations within these areas to prevent illegal logging, poaching, and other activities that threatens biodiversity.
2. **Habitat Restoration:** Implement habitat restoration projects to rehabilitate degraded forests and promote the recovery of native species as well as to conduct reforestation and afforestation efforts to increase the overall forest cover and connectivity.
3. **Community Involvement:** Engage local communities in conservation efforts, as they often have traditional knowledge about the forests and can contribute to sustainable management practices.
4. **Biodiversity Monitoring:** Establish monitoring programs to track changes in biodiversity over time.
5. **Corridor Creation:** Create wildlife corridors to connect fragmented habitats, enabling species to move freely between different areas
6. **Invasive Species Management:** Implement measures to control and manage invasive plant and animal species that can disrupt natural ecosystems and out compete native species
7. **Policy and Legislation:** Advocate for and implement strong conservation policies.
8. **International Cooperation:** Foster collaboration between countries to address trans-boundary conservation issues and share best practices. Several regional and international efforts by different government and organization against species extinction have been the main driving force for the emergence of the global conservation regime. Keystone species has been determined as a species that plays a central role in sustaining community structure, biodiversity conservation, nutrient conservation and ecosystem functioning by maintaining the stability of the ecosystem (Power et.al,1996) The research on keystone species can provide important evidence for habitat management, conservation biology, ecosystem stability, species richness, and biodiversity (Jiang et al 2015).

CONCLUSION:

Biodiversity, its types, importance, and threats have been acknowledged worldwide. However, there is unawareness regarding diverse conservation strategies. Governments should play a substantial role in the effective conservation of species. Awareness programmed should be organized to prioritize various conservation strategies in nations. Where an economic and political part is more dominating. Generally developing country contains abundant biodiversity. The conservation process should be implemented analyzed and improved time to time. Nearly half of the world's biological diversity is still unexplored. Several techniques and strategies have been proposed and implemented for the conservation of plant genetic resources. Stop illegal



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grazing of grasses and cutting of trees, Prevention of Unauthorized people, Research and Monitoring, Awareness among Villagers to Grow fodder crops Encroachment, Other Illegal Activities and Illegal Removal of Non-Timber Forests, Monitoring Protected Area by Revenue Authorities, Harsh legal requirements for regular criminals and renowned wood cutters, Protective Infrastructure and its Development, Create modules for resource restoration and to repopulate threatened species, Rotational Grazing Pattern, Effective Agricultural and Animal husbandry management techniques are suggested for proper conservation. Promote community-based conservation initiatives involving local populations to raise awareness, enhance stewardship and support sustainable biodiversity management. Strict law against all kind of destructive activities can only be the solution for proper management and conservation of this floristic wealth of the forest. Not only the scientific community but also the Government, Non-Governmental Organizations and general public should come forward to protect the rare wealth of this forest Reserve. It is imperative that all the resources of the forest should be conserved for the posterity. The documentation of floral diversity is crucial for preserving plant species and their genetic resources, supporting conservation efforts and ecological restoration. Traditional conservation practices as sacred groves, Oran and rainwater harvesting play a vital role in mitigating desertification and land degradation. Effective ecosystem management is achieved when traditional conservation methods integrated with modern approaches. Resilience to climate change and soil fertility management can only be achieved by creating modern technologies. Younger generations may not fully appreciate traditional knowledge, making it essential to implement incentive-driven efforts such as ecotourism and community-based projects that generate income and also preserving local knowledge. Integrating traditional and modern conservation approaches will ensure the long-term resilience of ecosystems and the preservation of biodiversity for future generations.

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