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Strategy and need for conservation of Biodiversity in India

ORIGINAL ARTICLE

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Abstract

Biodiversity is the necessary aspect of any ecosystem, because presence of abundant biodiversity in any ecosystem makes that ecosystem healthier and balanced. Generally the meaning of biodiversity in any ecosystem is from presence of diverse, flora and fauna. Due to presence of these the flow of energy in the food chain happens smoothly, and whenever due to any reason if the bio-diversity decreases in any ecosystem then the food chain gets disturbed and impacted in adverse manner. Resultant of this situation, many species and plants come to an end. As the food chain gets disturbed, the flora and fauna including humans living in that area has to face consequences of in it. In this scenario, where population is rising at an alarming rate to meet the demand of these population, Capitalist seeing opportunity are inclined to Promote Industrialization and Urbanization, inculcating the idea of materialism in people across globe and India is too on this path. Because of this more people are turning to enjoy their senses and maintain luxury life to flex around them looking for more comfort in life. Because of which the natural resources are exploited indiscriminately. Therefore the bio-diversity is in danger, so it is necessary to take steps conserving it and promoting the idea of sustainable development so that meeting our need we can offer these resources to future generations, what is the reason for loss of bio- diversity in India? To conserve the bio-diversity Government of India has taken various measures steps. The scheme and policies launched by Government of India is covered in this paper. For writing this paper, researcher studied numerous books, authentic Government documents, magazines and research paper to understand the bio-diversity. The main objective of the paper is to know why it is necessary for India to protect biodiversity to reate awareness among people and making this concept easier.

Key Words

Biodiversity, Ecosystem, Resources, Conservation, Urbanization, Industrialization.

Concept of Biodiversity

Biodiversity convey the biological diversity and richness of earth as a whole or a part of it, consequently different species of flora and fauna found in any region make up the biodiversity. The region having abundant

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trees, plants and animals and their genetically variations, are categorized as rich of biodiversity, on the other hand, where their presence is inadequate or less, are categorized as poor in terms of biodiversity. (Darwin 1859).

In 1980, Thomas Eugene Lovejoy a biologist used the term biological diversity for first time. In 1985, Walter G. Rosen first used the word biodiversity, according to him the various types of characteristics and variations found in different trees, plants and animals of the earth are called biodiversity, but the foundational work to concept of biodiversity was first done by E.O.Wilson, on this basis he is known as father of Biodiversity. (S.K. Tripathi, 2020)

Definitions of Biodiversity

1. The 1992 United Nations Earth Summit in Rio de Janeiro defined "biodiversity" as "the variability among living organisms from all sources, including, 'inter alia', terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part. (UNCED, 1992)

2. Wilson defines biodiversity as all things living on the planet, and the rest as the physical world. (E.O. Wilson, 2014)

3. Biological diversity is the variety of life on Earth and the natural patterns it forms. The biodiversity seen today is the result of 4.5 billion years of evolution and, increasingly, of human influence as well. (UNDP, 2020)

Types of Biodiversity

There are three types of biodiversity:

1. **Genetic Diversity:** The genetic variability found in species is called genetic diversity, it is the result of different types of adaptation in different habitats of organisms which is regulated by climatic conditions. Due to this, differences are found in the color, height, quality etc. of a species living in different ecological regions. (E.O. Wilson, 2014)

2. **Species Diversity:** The diversity found in species is known as species diversity. In any particular community or ecosystem, organisms of the same species can be found in different sizes, shapes, colors and forms. (Rawat U.S. and Agarwal N.K., 2015)

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3. **Ecological Diversity:** Ecological diversity is on earth is referred to that ecosystem where species inhabits. An example of ecological diversity on a global scale would be the variation in ecosystems, such as deserts, forests, grasslands, wetlands and oceans. (S.K. Tripathi, 2020)
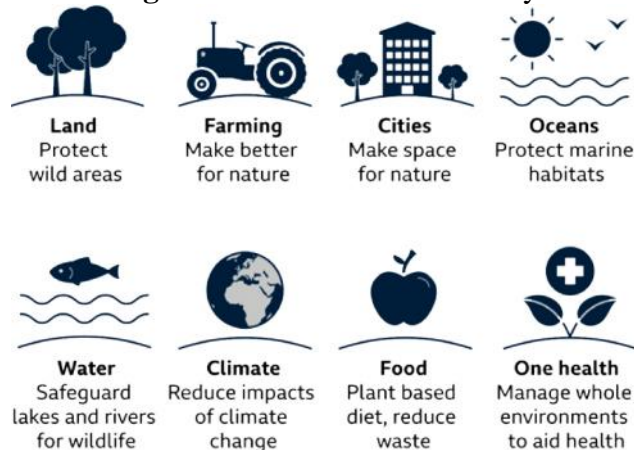
Biodiversity in India

India having 2.4 % land area of the world, but around seven to eight percent of the world's biodiversity is found here. About 45000 species of plants, this is 7 percent of the total plant species of the world. Of these, 1336 species are on the verge of extinction. Similarly, about 15000 flower species are found in India, which is 6 percent of the world's flower species, out of which 1500 species are in danger of extinction. (Forest Report -2019, GOI) Around 91000 species of animals are in the world this is 65 percent of the total number of organisms of the world of these, 65000 species of insects, 2456 fish species, 1230 bird species, 372 mammals, 440 reptiles, 200 amphibians and 500 mollusk species are included. 400 species of sheep, 27 species of cattle and 22 species of goats are found in India. The above description shows that India is a museum of species. Almost most of the species are found here, which are found in different climatic regions around the world, the reason being that all types of climatic elevations or geographical regions are found in India.(Mukunda Dev Behera & Others, 2019)

India's Need for Biodiversity

India has a great latitudinal and longitudinal extent with 134 crore of population. In terms of land and population, India has 2.4 percent of the total area of world being seventh largest country and second most populous country after China respectively. Some of the key points are detailed below which refer to the need for biodiversity in India. (S.K. Tripathi, 2020)

1. **Ecological Necessity:** No plant or animal in the ecosystem develops without any reason. Everyone has their own importance, and dependent on each other as interdependence plays a major role in their survival. Greater Biodiversity richness in the ecosystem increases the ability of species to live in adverse conditions, making it stable one that's the reason India needs it. (Mukunda Dev Behera & Others, 2019)

2. **Economic Need:** Generally biodiversity is the storehouse of resources which can be utilized by humans for their different need. Its usefulness is helpful in food, clothing manufacturing, housing construction, drug manufacturing, cosmetics manufacturing, etc. About 134 crore people live in India, so to meet basic needs of life variations in biodiversity is needed. IRC (2002).

3. **Scientific Need:** Biodiversity helps in the research of evolution of flora and fauna. Each species tells us how life started and helps in projecting future that how it will evolve. It helps in research on facts like how the life of one species is dependent on another species in the ecosystem. The level of biodiversity is a good measure of our relationship with other living species. WCMC (1992)

Fig. 1: Plant to restore biodiversity

Land
Protect wild areas

Farming
Make better for nature

Cities
Make space for nature

Oceans
Protect marine habitats

Water
Safeguard lakes and rivers for wildlife

Climate
Reduce impacts of climate change

Food
Plant based diet, reduce waste

One health
Manage whole environments to aid health

(Source:UN/Convention on Biological Diversity)

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Main Reasons for the Loss of Species Diversity in India

Many species have reached the verge of extinction because in India more people are in clutches of materialism. For example tiger, cheetah, crocodile, musk deer, turtle, vulture, swan etc. The main reasons for drop in biodiversity are the following:

1. **Habitat Destruction:** To meet the housing demands of increasing population, urbanization and industrialization, the habitats of trees, plants and animals are being destroyed; consequently the food chain is getting disturbed. As a result we are seeing declining biodiversity in India. (Bajracharya, S.R., Mool, P.K., Shrestha; B.R., 2007)

2. **Habitat Fragmentation:** Due to rising population and their demands, a network of new cities, road and rail routes is being formed daily cutting major chunk of forest here and there leading to shrinking of forest cover, animals naturally feel safe in large habitats and when their habitats become small, so there will be more human intervention of the name of recreation disturbing animal life. Many cases of accident has been recorded because animals coming on streets get hit by vehicles die. (Gadgil & Madhav, 2008)

Fig. 2: Biodiversity & Factors Responsible for Decline
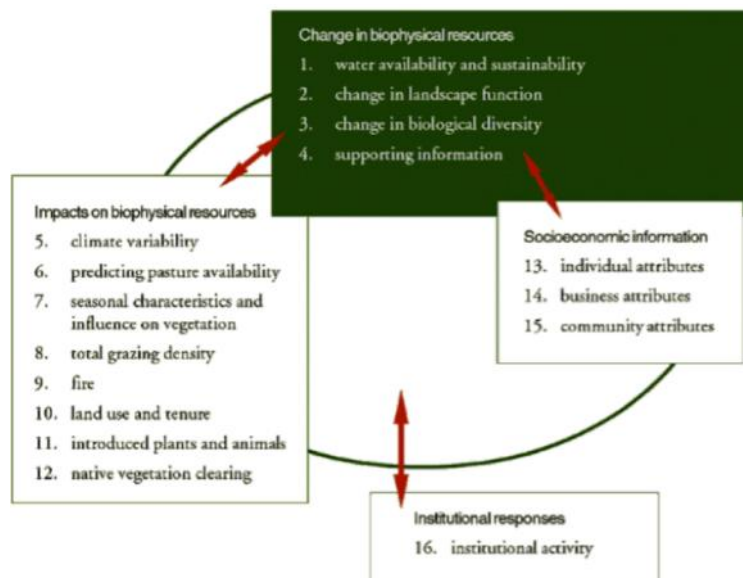
3. **Environmental Pollution:** Due to increasing environment and global warming, many species of trees and plants are getting destroyed and due to this, the animals living, their lives on the related trees and plants also become part of their ecosystem. They are dying due to pollution. Therefore, environmental pollution is a great threat to biodiversity. MoEF (2000)

4. **Invasion of Plants of Foreign Origin:** With the rising connectivity the whole world has become a global village, this access allowed different species to spread in different regions of the world, of them few foreign species invaded the indigenous species and reduced them to a great extent. This being also one of the main reasons in aiding decline in biodiversity in India. Over-exploitation: Forest resources are being over-exploited to meet the needs of the growing population. Due to this, many species of trees and plants of the country and the species of animals dependent on them are being destroyed, due to which the biodiversity in the country is decreasing. (UNDP, 2020)

5. **Hunting of Wildlife:** Many hunters and smugglers in the country kill rare animals and sell them. Leather and other organs are sold at expensive prices and many people also buy them, due to this, many living beings are getting extinct. Similarly, the wood of trees like sandalwood is also in great demand in the market, because of which many people cut it and sell it in the market at expensive prices. This is one of the main reasons for loss of biodiversity in India. (IUCN 2004)

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6. **Destruction of Forests:** To meet demands of increasing population, forest cover is utilized for agriculture and housing use. Decreasing forest cover leads to decline in biodiversity in India. (Ravindranath, N.H. and Sukumar, R., 1998)

7. **Overgrazing:** Overgrazing is big problem in India, animals in different parts of the country are grazing without any check because of which many species of trees and plants are getting extinct and other living organisms that dependent on these are also decreasing. This is also one of the reasons for the decline in biodiversity in the country. (Nikolaos Th. Skoulikidis, 2021)

8. **Use of Pesticides:** After the Green Revolution in the country, the use of fertilizers and pesticides has increased rapidly in agriculture and plantation agriculture. Due to this many species of trees and plants are getting destroyed and depending animals and plants that feed on leaves of trees and plants containing pesticides are getting extinct. For these reason vultures, eagles etc. Have almost become extinct. (Bajracharya, S.R., Mool, P.K. & Shrestha B.R., 2007)

Efforts for Conservation of Biodiversity in India

India is one of the few countries in the world which started efforts for the conservation of biodiversity since 1972. For this, many efforts and legal regulations are being made for the conservation of forests and animals in the country. Many national parks, sanctuaries and biosphere reserves have been established for the conservation of forests. Many creatures have been kept in the category of protected and their hunting has been banned. [Wildlife (Protection) Act ,1972] Apart from this, many schemes are going on in the country for the conservation of species; the details of some are given below:

Forest conservation: Forests have a complex relationship with life and environment. Forests directly and indirectly provide a lot of benefits to us and other living beings, so conservation of forests has an important role in biological and human development, that is why the Government of India has made, a forest conservation policy in 1952 which was formulated for the whole country, it was revised in 1958, this policy was again revised in 1972. In the year 1988, the new forest policy was implemented in the country. According to this policy, the Government is emphasizing on sustainable forest management, which will conserve and develop forest resources, on the other hand, the needs of the local people will also be met.(MoEF report of protected area network, 2009) Following are the main objectives of this forest policy:

1. Forest will be planted on 33 percent area of the country, whereas at present only 22 percent of the area is forest. (National Biodiversity Action Plan, 2008)

2. To maintain ecological balance, emphasis will be laid on planting forests in ecologically imbalanced areas.

3. Conservation of country's natural heritage, biodiversity and genetic flowers.

4. Efforts will be made on stopping soil erosion, desertification and floods.

5. Expansion of forest covers area by social forestry and forest plantation on vacant land.

6. By increasing the productivity of forests, timber, fuel, fodder, food, etc. will be made available to the people dependent on forests.

7. Creating awareness among the people to plant trees and running a mass movement for the conservation of trees.

To fulfill these objectives, the concept of social forestry has also been adopted. Social forestry is the forestry of the society, by the society and for the society. Through this, for the purpose of helping in environmental, social and rural development, management and protection of forests and empty barren forests, and a forestation is done on Government land. Under this, the villager's plant forests on the borders of fields and on the vacant land along the roads, railway tracks and canals and use their fruits, wood etc.

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For the protection of forests and wildlife in India, emphasis is being laid on the creation of three types of protected areas. (Forest Policy, 2018 Government of India)

1. **National Park:** It is a completely regulated and protected area by the Government, it has complete control over human activities, its boundary is fixed. At present, there are 106 national parks in the country, in which there is a ban on grazing of animals, cutting of trees etc. (Forest Survey of India, 2020)

2. **Sanctuaries:** These are partially protected areas in which grazing of animals or cutting of wood for fuel etc are allowed. There are 564 sanctuaries across the country. (Forest Survey of India, 2020)

3. **Biosphere Protected Area:** It is also a protected forest area; its size is very large, protected areas may include national parks or sanctuaries. Its central part is called the buffer zone, which is completely protected, no human work is allowed in it, while the other is the outer area, in which some wood cutting, grazing of animals can be done with permission. (Forest Survey of India, 2020)

Table 1: Protected Areas of India (As on December, 2021)

Name	No.	Total Area (km^2)	Coverage % of Country
National Parks	106	44372.42	1.35
Wildlife Sanctuaries	564	122509.33	3.73
Conservation Reserves	99	4726.24	0.14
Community Reserves	218	1445.71	0.04
Protected Areas (PAs)	987	173053.69	5.26

(Source: Forest Survey of India, 2020)

Bio-conservation: Many efforts are being made by the Government for the conservation of fauna in the country along with forests; in this sequence the Wild Animal Act 1972 was passed which creates a legal framework for the conservation and protection of wild animals. There are two main objectives of this act. [Wildlife (Protection) Act,1972]

1. To provide protection to the endangered species listed in the schedule.
2. Creation and protection of safe residential areas for wildlife.

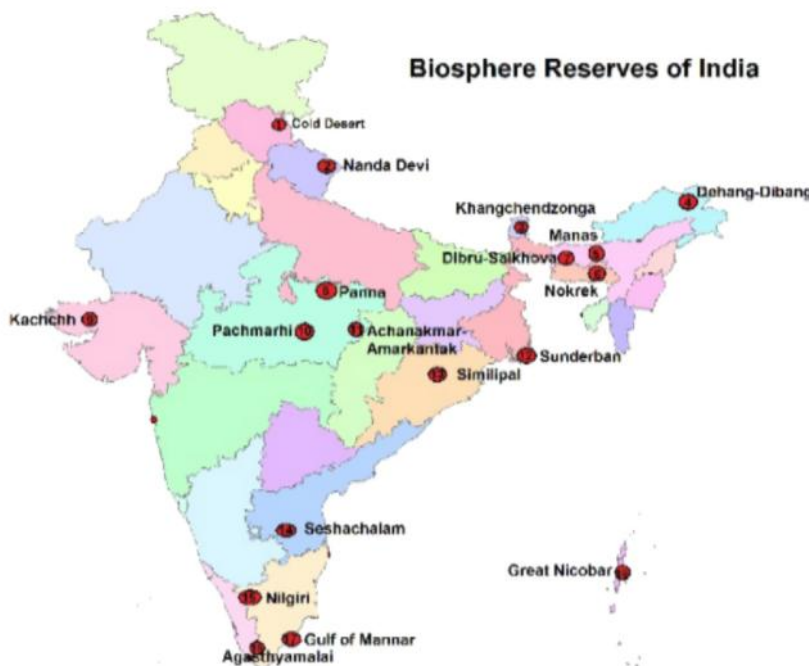**Fig 3:** Biosphere Reserves of India

Biosphere Reserves of India

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Table 2: Protected Areas of India from 2000 to 2021 (As on December, 2021)

Year	No. of National Parks	Area Under National Parks (km²)	No. of Wild Life Sanctuaries	Area Under Wild Life Sanctuaries (km²)	Area Under Wild Life Sanctuaries (km²)	Area Under Community Reserves (km²)	No. of Conservation Reserves	Area Under Conservation Reserves (km²)	No. of Protected Areas	Total Area under Protected Areas (km²)
2000	89	37803.10	485	108862.50	-	-	-	-	574	146665.60
2006	96	38392.12	503	111229.48	1	0.31	4	42.87	604	149664.78
2007	98	38428.88	507	111529.04	5	21	7	94.82	617	150073.74
2008	99	39441.74	510	113123.35	5	21	45	1259.86	659	153845.93
2009	99	39441.74	512	113395.36	5	21	45	1259.86	661	154117.94
2010	102	40283.62	516	113842.87	5	21	47	1382.28	670	155529.77
2011	102	40283.62	518	113998.75	5	21	52	1801.29	677	156104.66
2012	103	40500.13	526	114933.44	5	21	59	2012.93	693	157467.50
2013	102	40500.13	532	117123.63	19	30.94	64	2232.61	717	159887.31
2014	103	40500.13	535	118290.66	43	58.22	64	2232.61	745	161081.62
2015	103	40500.13	541	118866.44	44	59.51	71	2548.82	759	161974.90
2016	103	40500.13	543	118917.71	45	59.66	72	2566.20	763	162043.70
2017	103	40500.13	544	118931.80	46	72.61	76	2587.95	769	162092.49
2018	104	40501.13	544	118931.80	46	72.61	77	2594.03	771	162099.47
2019	101	40564.03	553	119756.97	163	833.34	86	3858.25	903	165012.59
2020	104	43716	566	122420	214	1302	97	4483	981	171921.00
2021	106	44372.42	564	122509.33	218	1445.71	99	4726.24	987	*173053.69*

(Source: National Wildlife Database, Wildlife Institute of India 2021)

At present, many projects are being run for the protection of wildlife across the country, some of them are important. Which are mentioned below:

1. **Tiger Conservation Project:** This project was started in 1973, under which many protected areas were created for the conservation of tigers in the country, including Dudhwa National Park and Corbett National Park in Uttar Pradesh, Gir in Gujarat. Sanctuaries, Nandankanan Sanctuary of Orissa are the main one. (Varun Khandelwal, 2005)

2. **Elephant Conservation Project:** This project was started in 1992 from Singhbhum district of Jharkhand. The project aimed to increase the dwindling elephant population in the country, under which the first sanctuary was established at Kor in Kerala. Under this, there are also sanctuaries in Lemo, Arrow and Badalkhol in Chhattisgarh were established. Apart from this, many other elephant conservation areas have been established by the Government of India. (S S Bist, 2002)

3. **Crocodile Conservation Project:** This project was started in 1974. So far 16 crocodiles in the country breeding centers have been established. Similar crocodile breeding center was established in Kukrail area in Lucknow. (De Vos A., 1984)

4. **Musk Deer Conservation Project:** This project was started in 1970 from Kedarnath Sanctuary in Uttarakhand. Dachigram Sanctuary of Jammu and Kashmir has also been created for the protection of musk deer. (Rawat, G.S.,1994)

5. **Turtle Conservation Project:** In 1975, the Orissa Government started a scheme for the conservation of turtles. Firstly it was also started in Bhitarkanika Sanctuary, later it was expanded in many other sanctuaries as well. (NBA Annual Report, 2009-10)

Conclusion

In this article, while explaining the basic concept of biodiversity, its definition given by various scholars and simplified analysis of its different types have been done. Thereafter, an authenticated description of the status of biodiversity in India has been given. The need for biodiversity in India has also been highlighted. In the end, mentioning the main reasons for the loss of biodiversity in India, the efforts being made by the

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Government of India for its conservation have also been given in detail. It is believed that this article will prove to be an important link in the series of studies of biodiversity.

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