**IMPACT OF CLIMATE CHANGE ON BIODIVERSITY**

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**Abstract:**

Biodiversity is the ‘Full variety of Life on Earth’. It includes diversity within species, between species and of ecosystem. Biodiversity plays an important role in climate regulation. Biodiversity conservation will lead to strengthening of ecosystem resilience and will improve the ability of ecosystem to provide important services during increasing climate pressures. But due to anthropogenic activities the global climate has changed since last few decades. This climate change adversely affected the biological resources of the country. This review basically discuss the importance of biodiversity, the consequences faced by the plants, animals, humans and ecosystem owing to the climate change and also control measures or strategies should be taken for the conservation of biodiversity which can protect the earth from the consequence of climate change.

**1.INTRODUCTION**

Biodiversity is the ‘Full variety of Life on Earth’. It includes Diversity within species, between species and of ecosystem. The term biodiversity is generally used for natural Environment and its conservation. According to UNCED (United Nations Conference on the Environmental and Development), ‘Biodiversity means 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; this includes Diversity within species, between species and of ecosystems.’ In the simplest sense, biodiversity may be defined as the sum total of species richness, i.e. the number of species of plants, animals and microorganisms occurring in a given region, country, continent of the entire globe. Broadly speaking, the term biodiversity includes genetic diversity (Diversity of genes within a species), species diversity (Diversity among species), ecosystem diversity (Diversity at the level of community/ecosystem) and habitat diversity. Himalayas, North-east India and Andaman Islands, and the Western Ghats. Biogeographically, India is situated at the tri- junction of three realms: Afro-tropical, Indo-Malayan and Paleo-Arctic realms, and therefore, has characteristic elements from each of them. This assemblage of three distinct realms makes the country rich and unique in biological diversity. It has a great wealth of biological diversity in its forests, wetlands and in its marine areas. It is estimated that over 46,000 species of plants and 81,000 species of animals are found in India. The flowering plants comprise 15,000 species of which about 7000 species are endemic. Among the animal species diversity more than 50,000 species of insects, 4,000 molluscs, 6,500 other vertebrates, 2,546 fishes, 197 amphibians, 408 reptiles, 1224 birds and 350 species of mammals are found in different habitats (Myers et al., 2000).

**2.CLIMATE CHANGE AND IT’S IMPACTS**

The word climate refers to the weather variation of any specific area over a period of time. Climate includes the average temperatur e, amount of precipitation, days of sunlight, and other variables that might be measured at any given site. However, there are also changes within the Earth’s Environment that can affect the climate. Climate change refers to any change in the environment due to human activities or as a result of natural processes. Climate change Refers to significant and long-term changes to a region’s climate. These changes can occur over a few decades, or millions of years. Climate change alters entire ecosystems along with all of the plants and animals that live there. Plants and animals are sensitive to fluctuations in temperature and climate. Evidence of organic evolution Clearly indicated that rapid climate changes have been associated with mass extension of plants and animals. Rapid climatic changes could lead to increased diseases, land slide, forest fire which result in destruction of animals and plants. All organisms are adapted to a particular range of climatic conditions. Change in the climatic condition has a danger of extinction of several plants and animals species. Although all species are not directly influenced by changes in environmental conditions but also indirectly influence Through their interactions with other species.

**3.IMPACT OF CLIMATE CHANGE ON ENVIRONMENT**

**Global warming:** The impact of the greenhouse gases is the Warming near surface global temperature through the green House effect. The average global temperature has increased By 0.6°C since mid 1800s and is predicted to rise by 1.4-5.8°C By the year 2100. The global warming affects plants, animals And microorganisms both by changing their habitats and by Directly affecting their physiological processes. The means Sea level has risen by 10 to 20 cm and may further rise to 88cm Rathore and Jasrai, 2013). Climate change has resulted in an Increase in the temperature to about 5°C to the normal and has Resulted in the melting of the ice, increase in sea level which is Threatening the endemic species (polar bears, walruses, seals, Emperor penguins, krill and ringed seal).

**Coral bleaching**:

Another important phenomenon Associated with temperature rise is coral bleaching. When Corals become affected by the rising temperature and other Climatic issues they lose their beautiful colours turning white. The rising temperature results into increase in sea Temperatures which negatively impacts the corals resulting in Vanishing of the reefs which are considered to be one of the Most bio-diverse ecosystems.

**Water resources**:

Climate change affects the water resources Thought increased evaporation rate. Increased evaporation Rates are expected to reduce water supplies in many regions. The greatest deficits are expected to occur in the summer Leading to be decreased soil moisture levels and more Frequent and severe agriculture drought. More frequency and Severe droughts arising from climate change will have serious And management implication for water resource users. Such Droughts also impose costs in terms of wildfires both in Control costs and lost timber and related resources.

**4.IMPACT OF CLIMATE CHANGE ON BIODIVERSITY**

Only a small change in pattern of climate has severe impact On the biodiversity, altering the habitats of the species and Presenting a threat for their survival, making them vulnerable To extinction. Millennium Ecosystem Assessment (MEA) Predicts climate change to be the principal threat to the Biological diversity (Anonymous, 2007).Due to increase in temperature several plant species like Berberisa siatica, Taraxacum officinale, Jasminum officinale Etc.have shifted towards higher altitude in Nainital. Teak Dominated forests are predicted to replace the Sal trees in Central India and also the conifers may be replaced by the Deciduous types. According to Gates (1990) 3°Cincrease in Temperature may leads to the forest movement of 2.50 km/ Year which is ten times the rate of natural forest movement.

**5.IMPACT OF CLIMATE CHANGE ON ECOSYSTEM**

Millennium Ecosystem Assessment (MEA) predicts that only A small change in climate has severe impact on the Ecosystems (Anonymous, 2007).Marine and Coastal ecosystem: 70% of earth’s surface is Covered by oceans comprising unique ecosystems like Mangroves, coral reefs, sea grass beds. Climate change is Leading to sea level rise, increased coastal erosion, flooding, Higher storm surges, sea salinity ingress, increased sea-Surface temperatures, ocean acidification and coral Bleaching. Rising sea level presents extreme threat to marine Ecosystems which can lead to disturbance in habitat and Patterns of survival of marine species. Wetlands and coastal Ecosystems are at a huge risk due to increasing sea levels. Many communities have already become climate refugees to Evade rising sea level (Anonymous, 2007). Indian coastal Areas vulnerable to climate change are Sunderbans, Maharashtra, Goa and Gujarat (Rann of Kutch). Species Composition and distribution will surely be affected by such Changes (Rathore and Jasrai, 2013). The Sundarbans is the Largest natural low-lying mangrove ecosystem in the world, Distributed over 10,000 square kilo meters. The sea level rise Recorded over the past 40 years is responsible for the loss of 28% of the mangrove ecosystem. Modelling suggests that up To 96% of suitable tiger habitat in the Sundarbans could be Lost in the next 50–90 years (Loucks et al., 2010).

**Himalayan ecosystem:**

Temperatures in the Himalayan Ecosystem are increasing at a rate of 0.9°C annually, which is Considerably higher than the global average of 0.7°C per Decade. Due to this changes mosquito are seeing first time in Lhasa and Tibet cities, located 3490 meters above sea level. There are similar reports of flies at Mount Everest base camp In Nepal. The presence of these insects suggests the possible Spread of vectorborne diseases, such as malaria and dengue Fever, to areas where cooler temperatures previously Protected people from these threats (FAO, 2012).

**Island ecosystem**:

Islands are rich in biodiversity and has High economic importance. But at present due to climate Change more than 23% island species are becoming Endangered and hence economic loss in the tourism sector.

**Inland water ecosystem**:

It includes lotic and lentic fresh Water ecosystem and comprising 0.8% of the earth’s surface, But support 6% of the total species. They are rich source of Food, income, employment and biodiversity. Changing Climatic conditions like rainfall and temperature lead to Changes in the phenology, physiology and migration trends of Some organisms like migratory fishes and birds.

**6.CONCLUSION**

It is evident that the loss in biodiversity is due the change in climate. All these changes in environment, adversely affecting the biodiversity, are mainly due to the human activities.The increase in the greenhouse gases is leading to global warming at a faster rate and impacts on biodiversity, ecological balance and humans. The ecological balance is an indispensable need for human survival (Verma 2018b). Every change in the ecosystem process or in ecological balance works on the principle of Newton’s law of motion (Every action has an equal and opposite reaction) which may be damaging or complimentary. Even a small change in the climate can lead to the extinction of some vulnerable and sensitive species. Climate change results in the impact on the biodiversity like change in their distribution pattern, migration of species, invasion of invasive species, change in the phonological behaviour like breeding period, migration time etc., increase in the forest fires and pest attacks (Rathore and Jasrai, 2013). To maintain the balance of ecosystem, interaction between the plants, animals and biodiversity needs to be understood, hence promoting its conservation and protection by designating the hotspots as biosphere reserves, increasing aforestation, reforestation and agro-forestry practices. Biodiversity-based adaption and mitigation strategies willenhance the resilience of ecosystems and prevent damage to human and natural ecosystems.Increasing our understanding of the affects of climate change on biodiversity, developing ways of mitigating such effects and reduced anthropogenic activities are critical to limit such damage. Without conserving the biodiversity and minimizing the anthropogenic activities, it is almost impossible to get the inclusive and sustainable development (Verma, 2019). Thus, there is a growing realization among decision-makers that biodiversity is not an optional bonus in human affairs, but the very foundation of our existence. Moreover, biodiversity conservation tailored to changing climatic conditions is not only necessary to help species and habitats to adapt to change, but such action is also likely to mitigate climate change (FAO, 2012). In terms of agriculture, there is a need for climate resilient farming systems. Climate literacy should be spread and a cadre of Community Climate Risk Managers should be formed in villages. The calamity of climate change should be converted into an opportunity for developing and spreading climate resilient format techniques and systems .

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