

Chapter 8

Impacts of Climate Change on Biodiversity and Ecosystem Services: Current Trends

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ABSTRACT

The chapter illuminates the effect of climate change on biodiversity and ecosystem services. It also explains the present scenario of biological resources with biological diversity. The author describes the known biological resources and their uses with the help of flow chart and also shows the linkage among them. The author clearly explicates the inter-relationship between human activity, climate change, and biological diversity with charts. In the last section, the author talk about the effect on the paleo climate and impact of climate change on different parts of ecosystem services.

INTRODUCTION

In the context of subject matter (Impact of Climate change on Biodiversity and Eco-system services), it is imperative to consider broad definitions for (a) Climate Change (b) Biological diversity including biological resources.

Climate Change

In general, Climate change represent a change in the statistical distribution of weather patterns and that change persists for an extended period (ex. for decades together). Factors that influence climatic variations are termed as climate forcing or forcing mechanisms which can be both internal (and natural to the climatic system itself) and external.

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Of all the forcing mechanisms, the anthropogenic influences on climate change are considered more critical and relevant in the context of environmental policies at both national and global levels (Rabindranath et al., 1998). Anthropogenic climate changes often referred to as “global warming.” The term “global warming” became synonymous with climate change induced by human activity. However, there are intricate differences between global warming and climate change. The former term refers to surface temperature increases while climate change includes global warming and everything else that can be affected by increasing levels of greenhouse gases.

Biological Diversity and Biological Resources

Though these two expressions are used in an inter-mingling fashion, they have visible delineations.

- **Biological Diversity:** Precise and widely acceptable definition of biological diversity is provided by the treaty of Convention on Biological Diversity (CBD) as under:

“Biological diversity” means the variability among living organisms from all sources including, among other things, 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 (Glowka, 1994).

- **Biological Resources:** Any biological entity that has a known or potential application in the economic, environmental, social and cultural well-being of mankind can be defined as “biological resource” in a broader sense. Further, the term biological resource in this broad definition invariably includes the species as a whole or its parts and genetic material. The CBD treaty defined biological resources as under.

“Biological resources” includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with the actual or potential use or value for humanity (Cardozo & Comp, 2003).

As a matter of fact, this kind of broader definition seeks to encompass the interactions between the human being and the rest of our nature. Nonetheless, it has been customary to consider the biological resource purely from an economic perspective (existing, potential or perceived) only. The following chart attempts to capture well known economic applications of biological diversity- specifically in the context of botanical species.

Factors Contributing to Climate Change

Regarding human-induced factors leading to climate change, it is important to understand the carbon cycle. An inter-play between oceans, fossil fuel reserves, soil and vegetation and atmosphere comprise of global carbon cycles. To available estimates, the global carbon distribution in nature is as under (Table 1).

As against this distribution, estimates for carbon release volume and absorption patterns since 1850 are as shown in Table 2).

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