Climate change and the impact on balance of natural existence among various flora and fauna

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Abstract

Some of the most notable impacts of climate change include the greenhouse effect, temperature change, ozone depletion, and epidemics, all of which have direct or indirect effects on the biological resources and life-supporting systems of the natural world. There is a global uproar about the problem of climate change. The overuse of natural resources is to blame for both this problem and the ensuing change in the weather pattern. The weather, wind pattern, and upper-atmosphere flow have all been disturbed due to global warming caused by human activities like the combustion of fossil fuels and the clearance of forests.

Keywords: Climate, green house, global warming, ozone, deforestation, atmosphere, climatic change

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Introduction

When it comes to the effects of global warming, India is not immune. Some major instances of climate change stated under the Indian perspective are the melting of glaciers, the drying up of perennial rivers, the failure of the monsoons every year, the persistent rain in the coastal regions, the shortening of winter, and the lengthening of summer (Thomas, 2007).

With a size of 3,287,263 square kilometres, “India is the seventh biggest country in the world and the second largest in Asia. From 84°4′ N to 37°6′ N and 68°7′ E to 97°25′ E” is the extent of the Indian subcontinent's landmass. Among India's many ecologically diverse regions, Northeast India stands out for its wide range of climatic, edaphic, and altitudinal changes.

India's tremendous biodiversity of plant and animal life is well-known across the globe.

Taxanomic Group	Species	Endemic Species	% Endemic of (SI)
Plants	10,000	3160	31.6
Mammals	300	12	4
Birds	977	15	1.5

Reptiles	176	48	27.3
Amphibians	105	42	40
Fresh Water Fishes	269	33	12.3

Source: Myers *et al*., 2000

There are around 65,000 known animal species and 45,000 known plant species in India. Among the 15,000 species of blooming plants, 5,000 to 7,000 are unique to their region. There are almost “50,000 species of insects, 4,000 species of mollusks, 6,500 species of other vertebrates, 2,546 species of fish, 197 species of amphibians, 408 species of reptiles, 1224 species of birds, and 350 species of mammals.” The country has been identified as a global biodiversity centre due to its very high levels of plant and animal life (Hot-Spot). Eastern Himalaya and Western Ghat are two of India's most biodiverse regions (MoEF, 2000 and Myers et al., 2000).

The tropical climate is a result of the Himalayan area. The area's geology provides a fertile environment for the mining of several valuable metals. The region's glaciers, lakes, and rivers not only provide its inhabitants with drinking water, but also serve as sources of irrigation for farming and electricity for industry. There are around 35,000 kinds of flora and wildlife in the Himalayan region, therefore the area's biological resources are very varied.

Climate Change and Its Impact in the Higher Reaches

The term "climate" is used to describe the aggregate of measurable environmental factors in a location, such as the mean annual temperature, monthly precipitation total, and annual number of sunny days. Yet, alterations to Earth's interior may also have an impact on the planet's weather. The term "climate change" is used to describe a shift in weather patterns “that is either directly or indirectly attributable to human activity that modifies the composition of the global atmosphere.” The greatest threat to life on Earth will come from a rise in average yearly temperatures. When discussing climate change, it is important to consider both the averages and the outliers. Maximum and minimum temperatures may shift, and more intense downpours and storms may be triggered, as a result of climate change. Forecasts for the Indian subcontinent call for less winter rain and more summer monsoon rain, with winter rains decreasing by 10–20% and summer monsoon rains increasing by 30% by 2050. The Himalayas will be profoundly affected by climate change and global warming. In the Indian Himalayas, you may find more than 5,000 glaciers. They are responsible for 50-70 percent of the rivers in the western Himalayas and a little less percentage in the eastern Himalayas.

Because of its mild climate, the subcontinent is home to an abundance of plant and animal life. It's conducive to a vast variety of plant and animal life. The eastern Himalayas are home to one of the country's big biodiversity hubs. The exceptional biological variety in the globe

is supported by the many global heritage sites that act as national parks, sanctuaries, biosphere reserves, and other types of protected places. The Indian subcontinent may see a temperature increase of 3.5 to 5.5 °C by the year 2100. The Tibetan Plateau is predicted to see an even higher growth rate. Fast melting will increase river flow, which will first deplete the ice reserve below a critical threshold and then cause catastrophic floods (also called the "mountain tsunami") that may wipe out all forms of human subsistence in a single event (Bajracharya et al., 2007).
Research on the effects of climatic and environmental change on Himalayan residents' standard of living is urgently needed. The availability of Himalayan water is likely to be impacted by the predicted changes (Eriksson, 2006). Green house effect, global warming, and ozone depletion are major outcomes of climate change. The world's average surface temperature rose by 0.6 (0.2) degrees Celsius in the twentieth century and is projected to rise by another 1.4 (2.8) degrees Celsius by 2100. Temperatures at the region's surface have risen by 0.3–0.8 oC on average during the previous century (IPCC, 2007). The world's biological resources are under increasing strain due to the growing global population's insatiable want for them. Environmental and climatic changes are mostly caused by human activity, such as industrialization, urbanisation, transportation, and deforestation (IRC, 2002).

Implications and Impact of Climate Change

"Several aspects of biodiversity, from ecosystems to individual species, may be affected by climate change. Temperature and precipitation have a profound influence on the distribution of species and the limits of ecosystems. A diverse collection of species, some of which may be at or near the limit of their ranges but most of which will not, make up any given ecosystem. Climate change may force those living on the outside of their ranges to relocate" (Lemoine and Böhning-Gaese, 2003).
By the year 2000, the area has lost 15 percent of its forest cover compared to the 1970s. About all of its woods will be gone by the year 2100. Several native species rely on the deep forest that will disappear in the western Himalaya, and just a third of that forest will be left (NSE, 2006). Recent decades of warming temperatures have had a major effect on the glacier ecosystem of the world's highest mountains. When the ambient temperature fluctuates even little, glaciers notice it immediately. Because of this, glaciers are seen as reliable indicators that allow us to put a numerical value on climate change. "The rapid melting of glaciers in the Himalayas has been generally attributed to the effects of global warming. Rising temperatures in the Himalayas are shown by the melting of a Shiva Lingam (created with natural ice) at the sacred cave of Amaranth in Jammu & Kashmir" (DDNEWS, 2007). If global warming continues at its present rate, glaciers in the Himalayas are expected to decrease in size from their current "500,000 square kilometres (193,100

square miles) to a more manageable 100,000 square kilometres (38,610 square miles) by the 2030s" (Kireet Kumar, 2005). With their perennial river systems, the Himalayas serve as the "water tower" of the South Asian area, supplying millions of people in the Indo-Gangetic Plains with a direct source of freshwater. The runoff from Himalayan glaciers provides a significant portion of the freshwater used in agriculture and hydroelectric power production in the area. The rivers Ganga, Yamuna, Indus, Brahmaputra, etc., which originate in the Himalayas, are among the world's biggest and provide a significant portion of the water used for agriculture, industry, commerce, and household purposes in India's interior and other non-peninsular regions. A dramatic shift is now taking place in the "water-rich Himalayan area, which not only dispels illusions about the region's water supply but also highlights the urgent need for sustainable water management strategies."

"The glacier system in the Himalayan area is experiencing considerable changes due to human-induced climate change and the growing temperature regime", making residents and the water security of the region more susceptible in the future. There is a significant lack of water and electricity in the northern part of India. Over 500 million people rely on the Indus and Ganges rivers, which get their water from glaciers, for agriculture and drinking. These rivers, however, are predicted to first rise and then sink to dangerously low levels, especially during the summer, when the Himalayas thaw. Scientists are concerned about the vanishing glaciers that global warming is causing. Very fast melting of Himalayan glaciers threatens the reliability of water supplies in the northern Indian subcontinent (Pachauri, 2007).

Historical Perspective on Trends of Environment Degradation

Human use of fossil fuels, which began in the 1850s with the industrial revolution and has accelerated ever since, "has raised the concentration of CO2 from 280 ppm to more than 380 ppm today. It is predicted that these rises would exceed 560 ppm by the end of the 21st century. It is well-established that current atmospheric carbon dioxide levels are far greater than any time in the last eight hundred thousand years." Increases of 1.4–5.6 oC were predicted for the decade after 1990, a time period that also saw growing methane levels.

Changes in biodiversity are one of the first areas where the consequences of recent climate change are becoming evident. Many plant and animal species, both wild and domestic, have reproductive cycles that are timed to coincide with seasonal and climatic shifts. Due to a combination of a steadily shrinking water budget and a steadily rising sediment load, the smaller drainages have becoming "choked," and the larger river system is being steadily silted up. Discharge during the summer months on the powerful Ganga River has decreased dramatically in recent years. Extreme weather is a real risk in mountainous regions. Seasonal shifts, droughts, and sudden deluges have all grown more regular in recent years. All

river valleys are more vulnerable to natural disasters, and it is increasingly doubtful whether or not they can sustain their previous levels of food production. Water quality issues may become more severe as a result of climate change.

A widening of the gap between wet and dry periods might lead to ever more extreme examples of both. In the Himalaya, access to clean water is very restricted already. Malaria, yellow fever, and schistosomiases are all examples of vector-borne illnesses that will be impacted by climate change. Agricultural and horticultural practises, as well as some of our most trusted and time-honored staple crops, are more vulnerable to pests and rot (Eriksson, 2006). An increase in the average temperature of the atmosphere has been shown to hasten the maturation of several crops, reducing the time needed for their full development. In cereal crops, for instance, improper vernalization (e.g., accelerated blooming) might result in poorer yield. The region's fruit orchards have relocated to more elevated locations. The key food grain producing areas of Punjab, Haryana, and Western Uttar Pradesh are all shown to have suffered losses (IPCC, 2007).

“Climate change is having a significant impact on the Himalayan region and the plains adjacent to major rivers, increasing the extinction rate of floral and faunal species, altering the rainfall pattern, reducing the length of the vegetative growth and maturity period, and slowing the overall growth of crop plants.” Damage to forest ecosystems and biodiversity due to climate change might lead to the extinction of various species. Adapting forest ecosystems to climate change is a slow process. Forest ecosystems and plant species are expected to be unable to keep up with the pace of climate change. The susceptibility of forest ecosystems to climate change may be mitigated by the development and implementation of appropriate technologies and methods; however, little study has been conducted in this area. Changes in plant types in the Himalayas, due to warming, have serious consequences for forest loss and biodiversity on scales from modest to global (Ravindranath and Sukumar, 1998).

Management of Climate Change

“As a responsible member of the world community and in its own self-interest, India can play a dual role in addressing the problem of climate change”. The reaction to global warming has two parts: mitigation and adaptation. In order to mitigate the effects of climate change, it is necessary to take action to rein in the processes that are causing it. Reduced greenhouse gas emissions may help lessen the severity of climate change's effects including rising temperatures, glacier melting, river floods, and habitat loss. The area might benefit from reforestation efforts.

Producing and consuming goods and services with lower greenhouse gas emissions might be encouraged through policy tools. Greenhouse gas emissions worldwide will rise steadily in the future decades unless new mitigation programmes are implemented. Stabilizing

the atmospheric concentration of greenhouse gases will need "rapid global investment and implementation of mitigation technology, as well as research into new energy sources. Floods, harsh weather, and coastal erosion are all phenomena linked to climate change, although improved physical infrastructure may provide some protection." The effects of climate change and variations in water availability on agriculture may be mitigated by adopting new crop types, seed varieties, or farming methods. Assistance with adaptation may be gained via education, training, and rural extension programmes. Better communication and weather forecasts may aid in evacuation, relief, and recovery efforts.

Because of the climate change, forest design and management need to be flexible. "There are practical solutions, such as better crop and grazing land management (including better agronomic methods, fertiliser utilisation, and tillage and residue management), restoration of organic soils that are drained for crop production, and restoration of degraded lands." To maintain a dynamic balance between the climate, ecosystems, and human civilization, mitigation actions must be taken to minimise global greenhouse gas emissions. "Greenhouse gases have been building up in the atmosphere since the preindustrial period, and they will continue to impact global climate for a long time to come owing to the inertia of both the climate system and our energy infrastructure." When you include in the preexisting vulnerability of many populations and assets to weather extremes, you can see why adaptive measures are necessary to improve the resilience of precious ecosystems, at-risk people, and at-risk infrastructure (Rhys et al., 2003)

"Anthropogenic activities, such as deforestation, combustion, and emission of green house gases, are a major contributor to climate change, according to the Intergovernmental Panel on Climate Change (IPCC) assessment" (Pachauri, 2007). Thus, it is imperative that all of these procedures be outlawed. Reducing consumption as a means of combating global warming is an approach that has proven effective. As part of the effort to mitigate global warming, fossil fuel alternatives need to be discovered and developed. Governments may use a number of policy measures, including legislation, taxes, tradable permit systems, subsidies, and voluntary agreements, to incentivize mitigation activity (UNDP, 1998).

Conclusion

The Himalayas and the regions downstream are particularly vulnerable to the effects of climate change, which threaten the region's economic, ecology, and environment. Many glaciers, rivers, and rare plant and animal species call this region home. In their own special ecological spheres, the world's immense flora and faunal genetic resources are supported by a broad diversity of diverse habitat types. Climate change has had a negative impact on the biological resources of the sub-region due to habitat

loss, changes in land use/cover, land degradation, and forest fires. Substantial shifts in biodiversity, ecology, and geophysics are occurring throughout the region's many altitudinal zones. Clear evidence of a major change in weather patterns in the area include an increase in both the frequency and severity of natural disasters. In order to prevent the Himalayan region's natural resources from further depletion, a wide range of control measures and management steps, such as "afforestation, reforestation, landscape management, tourism management, reducing energy consumption, increasing energy efficiency, promoting renewable energy technologies, controlling greenhouse gas emissions, developing a prediction model, regularly monitoring conditions, and conducting more research on climate and biodiversity, are required."

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