

SEC-2 Impacts of Climate Change Flora and Fauna

Model Prepared by- Syfujjaman Tarafder, Gour Mahavidyalaya, Malda

Introduction:

Climate change, driven by human activities and the emission of greenhouse gases, has emerged as one of the most significant global challenges of our time. Its far-reaching consequences are already being felt across various ecosystems, with profound effects on flora and fauna. This essay aims to explore the impact of climate change on plants and animals, highlighting the intricate relationships between climate, ecosystems, and biodiversity.

Shifts in Species Distribution:

Climate change disrupts the delicate balance of ecosystems by altering temperature and precipitation patterns. Flora and fauna that are sensitive to these changes face challenges in adapting or relocating. Many species have already experienced shifts in their distribution ranges, with some moving toward higher latitudes or elevations in search of suitable habitats. However, not all species can migrate or adapt quickly enough, leading to population decline or local extinction.

For instance, in alpine regions, the upward migration of plant species due to warming temperatures can lead to the displacement of cold-adapted species.

Similarly, animal species face challenges due to habitat loss and fragmentation. Many species are unable to adapt to rapidly changing environmental conditions. As a result, there are instances of range shifts, where species move to higher latitudes or elevations in search of suitable habitats. For example, the Poleward Range Expansion of certain bird species has been observed in response to warming temperatures.

Phenological Changes:

Climate change also affects the timing of biological events, known as phenology, such as flowering, breeding, and migration. With rising temperatures, many plants now bloom earlier in the spring, and some animals alter their migration patterns. However, these changes can disrupt the synchrony between species that rely on specific cues for survival and reproduction. For instance, if plants flower earlier but the insect pollinators are not synchronised, it can negatively impact both the plants and the pollinators.

Phenological shifts also impact animal species, particularly those reliant on specific flowering or fruiting events for food. Migratory birds, for instance, time their arrival at breeding grounds based on the availability of insects or the emergence of plant resources. Any mismatch in timing can disrupt food availability, affecting reproductive success.

Altered Ecosystem Dynamics:

Ecosystems are complex webs of interdependencies, where changes in one species can have cascading effects throughout the system. Climate change disrupts these dynamics by affecting species interactions. For example, changes in ocean currents and temperatures have led to shifts in the distribution and abundance of plankton, which, in turn, affect fish populations that rely on them as a food source. These disruptions in trophic relationships can destabilise entire ecosystems, leading to biodiversity loss and ecosystem degradation.

For example, shifts in flowering times can result in a mismatch between plants and their pollinators, leading to reduced pollination and potentially impacting fruit and seed production. Additionally, changes in plant chemistry due to increased CO₂ levels can influence herbivory rates and alter interactions between plants and herbivores.

Changes in species interactions extend to predator-prey dynamics as well. Alterations in the distribution and abundance of species can affect predator-prey relationships. For instance, if a predator's range shifts faster than its prey's range, it can lead to reduced predation rates or increased predation pressure on other species, leading to ecological imbalances.

Habitat Loss and Fragmentation:

Climate change exacerbates the existing pressures on natural habitats. Rising temperatures and changing precipitation patterns contribute to habitat loss through increased frequency and intensity of wildfires, desertification, and coastal erosion. As habitats shrink or become fragmented, many species are left with reduced suitable living spaces, limiting their ability to survive and reproduce. Fragmented habitats also lead to increased isolation of populations, reducing gene flow and genetic diversity.

Increased Extinction Risk:

The cumulative impacts of climate change on flora and fauna are placing numerous species at a heightened risk of extinction. Small and geographically restricted populations, such as endemic species or those inhabiting islands or mountain ranges, are particularly vulnerable. Small and isolated populations may lack the genetic diversity necessary to adapt to rapidly changing conditions. Additionally, certain plant species, such as those in montane or arctic environments, face reduced habitat availability due to warming temperatures, making them more susceptible to extinction.

Animal species face similar challenges, especially those with limited dispersal capabilities or specific habitat requirements. For instance, polar bears, dependent on sea ice for hunting and breeding, face significant threats due to the melting of Arctic sea ice. Likewise, amphibians,

already facing population declines due to other factors, are highly sensitive to changes in temperature and moisture, making them more vulnerable to climate change impacts.

Climate change acts as an additional stressor, exacerbating existing threats such as habitat destruction, invasive species, and pollution. The loss of species not only disrupts ecosystems but also has profound consequences for human well-being, as we depend on diverse ecosystems for resources and services.

Coral Bleaching and Ocean Acidification:

Climate change profoundly affects marine ecosystems, with detrimental consequences for coral reefs. Rising ocean temperatures lead to coral bleaching, a phenomenon where stressed corals expel their symbiotic algae, causing them to turn white and become more susceptible to disease. Additionally, increasing carbon dioxide (CO₂) emissions are absorbed by the oceans, leading to ocean acidification. Acidic conditions hinder the ability of corals and other shell-building organisms to form their protective structures, threatening the foundation of marine biodiversity.

Range Expansion of Invasive Species:

As climate zones shift, some species are expanding their ranges into new territories. While this can result in increased biodiversity in certain areas, it also creates opportunities for invasive species to thrive. Invasive species can outcompete native flora and fauna, leading to a loss of biodiversity and disruption of ecosystem processes. They can also introduce new diseases and alter nutrient cycles, further compromising ecosystem resilience.

Conclusion:

Climate change poses significant challenges to flora and fauna across the globe. From shifts in species distribution and phenological changes to habitat loss, altered ecosystem dynamics, and increased extinction risk, the impacts are far-reaching and interconnected. Urgent action is required to mitigate climate change, reduce greenhouse gas emissions, and implement adaptive measures to protect vulnerable species and ecosystems. Preserving biodiversity and restoring ecosystem health is not only crucial for the well-being of plants and animals but also for the resilience and sustainability of our planet and future generations.