A Review On Current Climate Changes Are Forerunners Of Major Changes In Living Creatures In The Future

Mr. Laxman Dasharath Ghaywat* and Mr. Balasaheb Kacharu Tapale**

Department of Zoology

SMBST, Arts, Science & Commerce College, Sangamaner*

Adv. M. N. Deshmukh College Rajur, Tal-Akole, Dist – Ahmednagar**

Abstract

Human activities, such as urbanization, deforestation, and agriculture, alter the landscape, leading to changes in land use and land cover. Over exploitation of natural resources, such as overfishing, deforestation, and excessive extraction of minerals, can lead to the degradation of ecosystems and the loss of biodiversity. Natural events like wildfires, disease outbreaks, and invasive species can disturb ecosystems, impacting their structure and function. Pollution from various sources, including industrial activities, agriculture, and waste disposal, can contaminate air, water, and soil, harming both human and ecosystem Climate change amplifies the impacts of these stressors, leading to more severe and widespread consequences for ecosystems. Ecosystems already under stress are likely to respond more rapidly and acutely to the added pressure of climate change, potentially leading to tipping points or irreversible changes. Recognizing the interconnectedness of environmental stressors is vital for developing comprehensive and effective climate adaptation strategies.

Keywords

Climatic Change, Biodiversity, Ecosystem, Mitigation, Resilience, Impact, Global Warming.

Introduction

Climate change has emerged as a new and growing danger to natural systems. Climate change is a threat in and of itself, with complex interdependence. Because many ecosystems are already stressed, the effects are complex and interconnected, and people's adaptation and mitigation responses to climate change across sectors can also have an impact on ecosystems. Individual stresses can be mitigated, but the cumulative effects of climate change and other stressors usually result in increased stress on ecological systems. A stressful event in one system may have an adverse, neutral, or even beneficial effect on another. These interactions have the potential to influence the execution, distribution, and severity of ecosystem stresses. Natural systems that have previously been relatively unscathed by human activity may become more vulnerable.

Objectives of the Study

- Identify species and ecosystems that are particularly vulnerable to current climate changes.
- Investigate how alterations in climate patterns may disrupt ecological interactions and relationships within ecosystems.

Europe, while their pollinators, like bees, haven't adjusted their activity periods at the same rate. This has led to declines in fruit set and seed production. Heat waves can directly stress plants, impacting their reproductive processes and reducing flower and fruit production. Additionally, extreme heat can damage pollen and pollinator physiology, further hindering fertilization. Heatwaves can also make plants more vulnerable to pests and diseases, further reducing their reproductive output. Climate change can contribute to habitat fragmentation, isolating plant populations and making it harder for pollinators to reach them. This can lead to reduced gene flow and decreased genetic diversity, impacting plant resilience and adaptability.

Rising sea levels and changes in precipitation patterns can disrupt natural corridors used by pollinators for migration and foraging, further hindering their ability to reach plants. Mangrove forests are important carbon sinks, absorbing and storing large amounts of carbon dioxide from the atmosphere. As climate change alters temperature and precipitation patterns, mangrove ranges are expanding in some regions, potentially offsetting some of the greenhouse gas emissions from other sources. It is important to remember that mangrove expansion can have other ecological impacts, such as displacing existing coastal communities and altering tidal patterns.

Understanding the dynamic interplay between kelp forests, seaweed turfs, and herbivorous fish populations is crucial for protecting these important ecosystems and mitigating the potential negative consequences of their decline. Research and conservation efforts should focus on addressing the root causes of kelp forest decline, promoting restoration efforts, and finding ways to manage herbivory in a way that preserves the ecological balance. Furthermore, rising water temperatures have exacerbated conditions that are far beyond the physiological tolerance levels of kelp communities. Another relevant threat is the extinction of critical species, which has far-reaching consequences for the entire community in that habitat. This is particularly noteworthy in light of the fact that climate change makes no mention of specific populations or communities. Global warming-induced species redistribution may eventually reduce carbon storage and net ecosystem productivity. Common disruptions include effects on marine and terrestrial productivity, the formation of marine communities, and the long-term invasion of toxic cyanobacteria blooms.

The genetic makeup of plankton communities plays a crucial role in marine ecosystems as they are at the base of the food chain. Changes in their genetics can have cascading effects on the entire ecosystem. Warmer temperatures can influence the distribution and composition of plankton species, potentially favouring certain types of plankton over others. Genetic modifications in plankton can impact their ability to adapt to changing environmental conditions, affecting their survival and reproductive success. The mentioned shifts in aquatic producer communities, such as diatoms and calcareous plants, highlight the vulnerability of key components in aquatic ecosystems. Diatoms, for instance, are crucial primary producers and play a significant role in the carbon cycle. Changes in their abundance or distribution can affect carbon sequestration and nutrient cycling in aquatic environments. Alterations in the composition of aquatic producer communities may have implications for biological carbon recycling. Changes in the types and quantities of these producers can influence how carbon is fixed, transferred through the food web, and eventually recycled within ecosystems. The potential link between these ecological shifts and carbon dioxide variations between glacial and interglacial periods of the Pleistocene underscores the far-reaching consequences of species loss risks in distribution modelling studies based on climate change contexts, local adaptability and morphological manoeuvrability should be taken into account.

The Human Impact of Climate Change

Forest Communities

For approximately 1.6 billion people worldwide, forests are the primary source of income, with 350 million relying on them more heavily [10]. There are 1.2 billion people in agroforestry-dependent communities, and 60 million indigenous people rely solely on forests and their products for survival.

More than two-thirds of Africans, for example, rely on forest resources and woodlands for a living, including food, fuelwood, and grazing. Climate disruptions have a greater impact on the lives of these people, making life more difficult. Temperature and rainfall both have an adverse effect on agroforestry crops, resulting in lower growth and yield [11]. According to [12], as a result of unfavourable temperature regimes and rainfall patterns, forest-dependent smallholder farmers in the Philippines face the mystery of delayed fruiting, increased insect and pest incidences, and altered rainfall patterns.

The Himalayan people have been experiencing frequent skin-borne diseases such as malaria and other skin diseases as a result of increasing mosquitoes, wild boar, and new wasp species, particularly at higher altitudes where they were almost non-existent prior to the last 5–10 years. Similarly, people living at high altitudes in Bangladesh have been confronted with mosquito-borne disasters on a regular basis. Furthermore, the prevalence of other waterborne diseases has increased.

More intense climate broadening may benefit mobile organisms with shorter generation times because they can flee harsh conditions faster and are better adapted to new environments. Insects adapt quickly to global warming because of their mobility. Trees (forests) are more vulnerable victims owing to previous outbreaks. Prior to warming temperatures, the previously mentioned factors, such as droughts and storms, had an impact on the forests, making them vulnerable to insect pest interventions; however, the global forests have remained steadfast, assiduous, and green. The most plausible explanation is that insect herbivores were controlled.

Climate Change's Impact on Human Health

Climate change is widely recognized as a major threat to human health [13]. Climate change, according to the WHO, may result in a further 250,000 fatalities annually between 2030 and 2050 [14]. Extreme weather-related morbidity and mortality, as well as the global spread of vector-borne diseases, have been held accountable for these deaths [15];[16];[17];[18]. Some of the emerging health issues associated with this global issue are briefly discussed below.

Many pharmaceutical industries generate enormous quantities of antimicrobial agents, and pathogenic microbes are gradually acquiring resistance to them, demonstrating how powerfully this aspect can shake national and global economies. The fact that antimicrobial resistance is not limited to a single region or country offers credibility to this claim. With economic implications, Anti-microbial resistance is complicated and contributes to global health issues. Health professionals all over the world are concerned about this phenomenon, Certain species may become extinct as a result of global warming, while new organisms may thrive. Pathogens can reappear after going undetected or unreported for a long time, according to [21]. Pathogenic microorganisms will soon demonstrate this concept [22]; [23]; [24]. Storms have a greater impact on global forest survival as a result of climate change [25], especially with higher winter precipitation, resulting in wetter soils and weak root anchorage of trees [26]. Ascending temperature regimes modify typical precipitation patterns, posing an important challenge to temperate forest survival [27];[28], exposing them to severe stress and disturbances that harm local tree species [29];[30];[24].

Table 1

Environmental Alterations	Diseases	Resulting Pathway
Forest depletion	Malaria	migration of vulnerable people
Ocean warming	Red tide	Poisonous algal blooms
Farming	Lyme disease	Tick hosts, outside revelation
Construction of canals, dams,	Schistosomiasis Malaria Helminthiases River blindness	Snail host locale, human contact Upbringing places for mosquitoes Larval contact due to moist soil Blackfly upbringing
Agro-strengthening	Malaria Venezuelan haemorrhagic fever	Crop pesticides Rodent abundance
Suburbanization Water-gathering rubbishes Cutaneous	Cholera Dengue leishmaniasis	deprived hygiene, asepsis; Aedes aegypti mosquito upbringing sites augmented water municipal assembling pollution Sandfly vectors
Deforestation	Malaria	migration of vulnerable people

Research Suggestions

• Develop sustainable agricultural practices and policies to adapt to changing climate conditions; and

• Evaluate the potential for conservation and restoration of these ecosystems.

• Investigate the possibility of species adaptation or migration as a result of changing climate conditions.

Future Research

A better understanding of the interactions between Climate change and multiple environmental stressors will be essential for developing management strategies. There is only a nascent understanding regarding the precise pathways, types and character of interactions.

References:

1.Abraham E, Chain E (1988) An enzyme from bacteria able to destroy penicillin. 1940. Rev Infect Dis 10(4):677 Adger WN, Arnell NW, Tompkins EL (2005) Successful adaptation to climate change across scales. Glob Environ Chang 15(2):77–86.

2. Allen CD, Macalady AK, Chenchouni H, Bachelet D, McDowell N, Vennetier M, Hogg ET (2010) A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forests. For Ecol Manag 259(4):660–684.

3. Bates AE, Pecl GT, Frusher S, Hobday AJ, Wernberg T, Smale DA, Colwell RK (2014) Defining and observing stages of climate mediated range shifts in marine systems. Glob Environ Change 26:27–38.

4. Bank W (2008) Forests sourcebook: practical guidance for sustaining forests in development cooperation: World Bank.

5. Berg MP, Kiers ET, Driessen G, Van Der HEIJDEN M, Kooi BW, Kuenen F, Ellers J (2010) Adapt or disperse: understanding species persistence in a changing world. Glob Change Biol 16(2):587–598.

6. Brázdil R, Stucki P, Szabó P, Řezníčková L, Dolák L, Dobrovolný P, Suchánková S (2018) Windstorms and forest disturbances in the Czech Lands: 1801–2015. Agric for Meteorol 250:47–63.

7. Cruz DLA (2015) Mother Figured. University of Chicago Press. Retrieved from, https:// doi. org/ 10. 7208/ 97802 26315 072.

8. Costello A, Abbas M, Allen A, Ball S, Bell S, Bellamy R, Kett M (2009) Managing the health effects of climate change: lancet and University College London Institute for Global Health Commission. The Lancet 373(9676):1693–1733.

9. Davis, M.B., Shaw, R.G. (2001). Range shifts and adaptive responses to quaternary climate change. Science. 292:673–9.

10. Flannigan M, Cantin AS, De Groot WJ, Wotton M, Newbery A, Gowman LM (2013) Global wildland fire season severity in the 21st century. For Ecol Manage 294:54–61.

11. Huntley, B. (1991). How plants respond to climate change – migration rates, individualism and the consequences for plant communities. Ann Bot (Lond). 67:15–22.

12. Hartmann H, Moura CF, Anderegg WR, Ruehr NK, Salmon Y, Allen CD, Galbraith D (2018) Research frontiers for improving our understanding of drought-induced tree and forest mortality. New Phytol 218(1):15–28.

13. Hubbart JA, Guyette R, Muzika R-M (2016) More than drought: precipitation variance, excessive wetness, pathogens and the future of the western edge of the eastern deciduous forest. Sci Total Environ 566:463–467.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, 2022

26. UNEP (2017) United nations environment programme: frontiers 2017. from https:// www. unenvironment. org/ news- and- stories/ press- release/ antimicrobial- resistance-environmental-pollution-among-biggest.

27. Walther, G.R., Post, E., Convey, P., Menzel, A., Parmesan, C., Beebee, T.J., et al. (2002). Ecological responses to recent climate change. Nature. Mar;416(6879):389–95.

28. Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W, Cooper A (2015) Health and climate change: policy responses to protect public health. The Lancet 386(10006):1861–1914.

29. WHO (2018) WHO, 2018. Antimicrobial resistance.

30. Yang B, Usman M (2021) Do industrialization, economic growth and globalization processes influence the ecological footprint and healthcare expenditures? Fresh insights based on the STIRPAT model for countries with the highest healthcare expenditures. Sust Prod Cons 28:893–910.