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Review Article

Adverse Effects of Climate Change on Human and Animal Lifestyles: A Socio-Ecological Perspective

Subham Sharma[1], Kulwinder Kaur[2], Vivek Gupta[3], Riti Mahajan[4]

[1,2]Assistant Professor, Department of zoology ,Guru Nanak Dev University College Pathankot, India
[3]Assistant Professor ,Guru Nanak Dev University College Pathankot, India
[4]Assistant Professor ,Smt. Rama Chopra Sanatan Dharam Kanya Mahavidyalaya, Pathankot, India
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Corresponding Author:
Subham Sharma, Guru Nanak Dev University College Pathankot, India
E-mail Id:
zoosubam@gmail.com
Orcid Id:
https://orcid.org/0009-0009-8156-840X
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A B S T R A C T

Climate change represents one of the most pressing challenges to both human society and natural ecosystems, as it profoundly alters patterns of daily life. This paper examines the adverse effects of climate change on the lifestyles of humans and animals from a socio-ecological perspective, highlighting how these effects go beyond issues of survival to encompass subtle but significant transformations in routines, behaviours, and social structures. Focusing on food security, occupational shifts, health outcomes, migration behaviour, and cultural practices, the study synthesises current research and real-world case studies to demonstrate the interconnected ways in which climate instability disrupts the fabric of social and ecological communities. Evidence shows that humans are compelled to change dietary habits, occupational roles, and social rituals in response to environmental instability, while animals are forced to adapt migration routes, feeding patterns, and breeding cycles under ecological stress. The paper discusses the critical parallels between human and animal adaptations, as well as the cascading effects such changes have on both groups' welfare and survival. Key recommendations emphasise the adoption of sustainable and climate-resilient strategies, such as diversified agriculture, urban green infrastructure, enhanced health systems, and conservation corridors, to support both human and animal adaptation in the face of accelerating change. By applying a socio-ecological lens, this research underscores the urgent need for integrated, cross-disciplinary approaches to mitigate the ongoing and future impacts of climate change on all aspects of life.

Keywords: Climate Change Impacts, Human and Animal Adaptation, Socio-Ecological Systems, Environmental Stressors

Introduction

Long-term shifts in temperature and weather patterns are known as climate change. Various natural processes can cause disruptions that lead to climate change; however, since the 19th century, the main driver has been human activities, including industrialisation, extensive use of fossil fuels, and deforestation.[1] Any change in substantial carbon dioxide levels in the atmosphere has adverse effects not only on humans but also on floral and faunal populations.[2] An increase of 30 percent is seen in carbon dioxide levels

in the last 100 years, which is causing a disturbance in humans and terrestrial as well as aquatic biodiversity. The increased concentration of particulate matter when incorporated into humans as well as other animals is responsible for numerous health disorders and accounts for 8 million human deaths, while the numbers of animals are unestimated.[3] Ocean acidification, sea level rise, and changes in many other components of the climate coincide with the average temperature shift. These processes interact with other global environmental changes (GECs), such as the loss of biodiversity, the alteration of biogeochemical cycles, and the extensive spread of substances and chemicals that negatively affect ecosystems and interfere with human-dependent services.[4] The three main sections of the paper discuss the adverse effects of climate change on humans and plants, as well as the socio-economic and technology-based solutions for conserving flora and fauna and mitigating these adverse effects.

Effects of climate change on Human Lifestyle

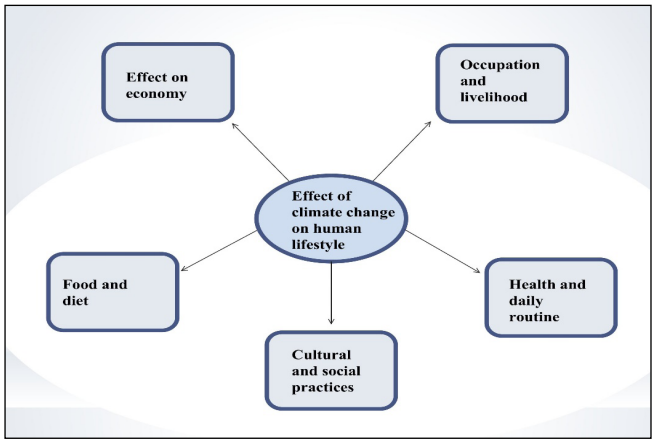

Figure 1.Effects of climate change on humans

Food and Diet

Numerous direct effects of climate change can be seen on agricultural productivity. The disruptions brought by climate change adversely influence the quality and quantity of the food produced.[5] Decreased food production forces people to opt for cheaper, non-nutritious food sources. Changing climatic conditions also lead to the emergence of new pathogens, which may lead to the increased use of pesticides. There is a strong need for climate-smart sustainable agriculture. Unsustainable agriculture: whenever it is disturbed by the climate, the market prices of crops skyrocket, and people in developing and underdeveloped countries are forced into malnutrition.[6]

Occupation and Livelihood.

Occupation and occupational health both suffer from climate change. Numerous industries are directly or indirectly affected by changes in agricultural patterns due to disturbances in climate patterns. Global warming is intensifying the suffering of workers in outdoor occupational sectors such as fieldwork, construction, and transportation.[7] Prolonged heat exposure reduces human efficiency and indirectly affects the gross domestic production of a country. Vulnerability to human health due to ambient heat is already there.[8]

Health and Daily Routine

Climate change elicits discomfort in human populations, especially in urban areas. Increased temperature and commuting through areas already affected by noise and air pollution leads to several chronic, respiratory and skin disorders.[9] $2.5 trillion worth of damages were seen between 2011 and 2020 due to changes in global climate and shifts in weather patterns. People living near coastal areas and those living in mountains are facing a change in their nature-derived earning patterns due to changes in floral and faunal structure.[10] Increased infectious disease outbreaks due to global warming are becoming common year by year. Effects on climate patterns such as El Niño are also causing greater damages directly and indirectly. Seasonal disease outbreaks have expanded significantly in scale and no longer adhere to their traditional patterns.[11] Critical effects of climate change are seen in numerous small and large communities around the world; however, the vulnerability is greatest in the smaller communities residing near Himalayan and coastal regions. This shift in climate patterns is causing significant changes in the food and dietary habits of communities living in smaller, nature-adjacent areas, such as forests and coastal regions.[12] Feelings of solastalgia are rising among numerous people, leading to chronic distress and altered psychology. Communities experiencing changes in the ecological patterns of their native environments often struggle to sustain the customs and traditions that are closely tied to those ecosystems.[13]

Cultural and Social Practices

Critical effects of climate change are seen in numerous small and large communities around the world; however, the vulnerability is greatest in the smaller communities residing near Himalayan and coastal regions. This shift in climate patterns is causing significant changes in the food and dietary habits of communities living in smaller, nature-adjacent areas, such as forests and coastal regions.[12] Feelings of solastalgia are rising among numerous people, leading to chronic distress and altered psychology. Communities experiencing changes in the ecological patterns of their native environments often struggle to sustain the customs and traditions that are closely tied to those ecosystems.[13]

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Effects on Animal Lifestyle

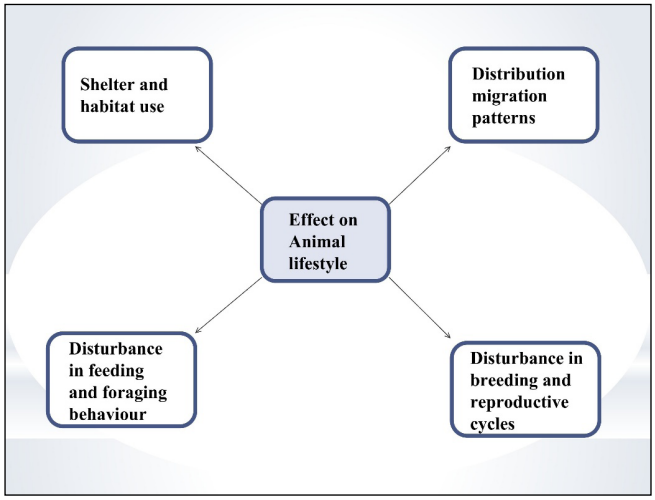

Figure 2.Effect of climate change on Animals

Migration Patterns

The ecology of numerous places depends on the migratory and foraging patterns of migratory species. Migration timings directly depend on the indications provided by the environment. The alteration of environmental conditions disrupts established ecological cues, thereby impacting multiple facets of ecosystem functioning. Numerous phenological indicators, including migratory behaviours and the timing and location of hatching events, have been observed to be significantly affected by the profound and often abrupt changes associated with climate change.[14] Long-distance migrations are adapted in such a way that migratory species take advantage of the food available along migratory paths and face less pressure from predation and parasitism. Climatic shifts have changed several phenological cues, and migratory species now are under pressure of reduced food availability and high risk of predation and parasitism.[15]

Feeding and Foraging Behavior

Climate change is disrupting food chains worldwide, causing some animal populations to decline due to food scarcity, while others are adapting by altering their foraging behaviours and dietary choices. This adaptability leads to new dependencies on species and resources that were not previously part of their ecological niche, reshaping traditional food web dynamics.[16] The plasticity in the behaviour not only reduces the survivability but also disrupts the coexistence of numerous species. Higher temperature often leads to lower consumption efficiencies and these cause a change from the individual to the macroecological level.[17]

Breeding and Reproductive Cycles

Different effects of climate changes on breeding and reproductive cycles were transpired by meta-analysis of numerous species. Prolonged brooding seasons are seen in multi-brooded species, but shortened seasons are evident in single-brooded species. Adverse effects are incorporated in the reproductive behaviour of sedentary, short, and long migrants, as the peak availability of food and climatic conditions cannot be easily tracked by them.[18] Livestock and other longer-lived mammals will face issues related to reproductive maturity and seasonal activation of hormones and gonads as the average temperatures in numerous ecological groups are changed with global warming.[19]

Shelter and Habitat Use

Decline in habitat capacity is there due to climate change, and this will continue to increase with the changing climate. Decreased habitat capacity is directly linked to more chances of reduction in the number of species, affecting all the species present in a given food web.[20] Other effects of climate change, such as drought, forest fires, and heavy rainfall, directly disrupt the habitat of several species. Extinction or endangerment can occur in several endemic species.[21]

Comparative Discussion

Humans and animals are constantly subjected to the pressures of climate change. Human economics, finances, and psychological well-being are closely tied to natural systems, so any adverse climatic shift can lead to a decline in both economic stability and mental resilience of both humans and animals. Impacts of climate change on fauna inevitably cascade back to humans. Although humans and many mammalian and animal species show some adaptive plasticity, species with narrow micro niches or restricted geographic ranges exhibit very low tolerance to environmental shifts. When the foraging habitats of wildlife deteriorate, human communities that depend on those resources are compelled to switch to alternative food sources, which may be less nutritious or less energy-efficient. Moreover, even a single behavioural change in a migratory species can unsettle the ecological balance of migratory grounds, ultimately influencing the foraging patterns of both local animals and human populations.

Case Studies

Punjab and Himachal Floods (India): It is predicted that climatic effects such as El Nino and El Nina intensify the monsoon rains in India.[22] The floods not only destroyed the thousands of acres of farmland, houses, and buildings but also claimed the lives of several hundred people in

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both states. Many endangered and critical species of the Ramsar site Harike Wetland such as Gharials were also swept away by these floods into Pakistan, thus disturbing the ecological balance of local flora and fauna.[23]

Conclusion

To effectively mitigate the harmful impacts of climate change, it is essential to urgently implement strong climate-action policies and practices. Achieving this requires a thorough understanding of socio-ecological systems, along with the strategic use of artificial intelligence, sustainable industrial methods, and regenerative agricultural approaches.

A major limitation in current global efforts is the absence of comprehensive, real-time monitoring systems capable of evaluating how well mitigation measures are working in response to the rapidly intensifying effects of climate change.

Truly effective mitigation strategies should include:

- Advancing sustainable cultivation techniques, enhancing biodiversity-orientated cropping patterns, and broadening the range of food resources. The adoption of Agriculture 5.0 is crucial because it enables accurate prediction of climate change intensity and shifting weather patterns. With these data-driven insights, farmers can make better seasonal and annual decisions regarding crop selection, planting schedules, and overall farm management.
- Expanding urban green spaces, passive cooling designs, and renewable infrastructure for human resilience. Developing wildlife corridors, protected areas, and habitat restoration programmes to facilitate animal adaptation. Prediction of Using AI and machine learning to predict food web models is essential for identifying ecological changes and guiding the implementation of targeted restoration and species-recovery programmes across diverse ecosystems.
- Formation of buffers such as the 'Great Wall of Japan' wherever possible to protect ecological diversity.
- Strengthening global health infrastructure to anticipate and mitigate vector-borne diseases and mental health effects of climate change by focusing on climate resilient healthcare systems.

Interdisciplinary strategies integrating ecology, social policy, and technology can help build resilience for all species in the Anthropocene era.

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