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EFFECTS OF CLIMATE CHANGE IN INDIA: CHALLENGES AND IMPLICATIONS

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ABSTRACT

Climate change has emerged as one of the most pressing global challenges, with India being one of the most vulnerable countries to its effects. Rising temperatures, erratic monsoons, extreme weather events, and rising sea levels have had profound impacts on India's environment, economy, and society. This paper examines the key effects of climate change in India, focusing on environmental degradation, agriculture, water resources, health, and socio-economic consequences. The study highlights the need for urgent mitigation and adaptation strategies to address these challenges.

KEYWORDS: *Climate change, India, global warming, agriculture, water resources, socio-economic impact, environmental degradation, adaptation strategies, mitigation policies.*

1. INTRODUCTION

India, home to over 1.4 billion people, is highly susceptible to the effects of climate change due to its geographic diversity and economic dependence on climate-sensitive sectors such as agriculture and fisheries. This paper explores the significant ways in which climate change has affected India and discusses potential strategies for mitigating its impact.

2. ENVIRONMENTAL IMPACTS

- **Rising Temperatures:** India has experienced an increase in average temperatures, with heatwaves becoming more frequent and intense. Cities such as Delhi and Ahmedabad record temperatures above 45°C during summer, posing severe health risks.
- **Glacier Melting:** The Himalayan glaciers, which are a crucial source of freshwater for major rivers such as the Ganges, are retreating at an alarming rate. This threatens water security for millions of people.
- **Sea-Level Rise and Coastal Erosion:** Rising sea levels are causing coastal erosion and increased flooding, particularly in low-lying areas such as the Sundarbans and Mumbai. Saltwater intrusion threatens freshwater resources and agricultural land.

3. IMPACT ON AGRICULTURE AND FOOD SECURITY

- **Erratic Monsoons:** The Indian monsoon has become increasingly unpredictable, affecting crop yields and food production. Prolonged droughts and unseasonal rains have led to crop failures, impacting farmers' livelihoods.
- **Soil Degradation:** Rising temperatures and changes in rainfall patterns have contributed to soil degradation, reducing agricultural productivity.
- **Pest Infestations:** Warmer temperatures have led to an increase in pest populations, causing significant damage to crops such as wheat, rice, and pulses.

4. WATER RESOURCES AND HYDROLOGICAL CHANGES

- **Reduced River Flows:** Many rivers, including the Ganges and Brahmaputra, are experiencing reduced flows due to glacier retreat and altered rainfall patterns.
- **Groundwater Depletion:** Excessive extraction of groundwater for irrigation and drinking water, coupled with changing rainfall patterns, has led to water scarcity in many regions.
- **Increased Flooding:** Extreme rainfall events have led to devastating floods in states like Bihar, Assam, and Kerala, causing loss of life and property.

5. HEALTH IMPACTS

- **Heat-Related Illnesses:** Rising temperatures have increased cases of heatstroke, dehydration, and cardiovascular diseases.

- **Vector-Borne Diseases:** Climate change has expanded the range of mosquitoes, leading to an increase in diseases like malaria and dengue.
- **Air Pollution and Respiratory Problems:** Rising temperatures and industrial emissions contribute to worsening air quality, leading to respiratory illnesses.

6. SOCIO-ECONOMIC CONSEQUENCES

- **Impact on Livelihoods:** Farmers, fishermen, and daily wage laborers are facing economic hardships due to reduced agricultural productivity and climate-related disruptions.
- **Climate Migration:** Climate-induced displacement is forcing people to migrate from rural areas to urban centers, exacerbating urban overcrowding and unemployment.
- **Economic Losses:** Climate change-related disasters cause significant economic losses, impacting GDP growth and increasing poverty levels.

7. ADAPTATION AND MITIGATION STRATEGIES

- **Renewable Energy Transition:** Expanding solar and wind energy to reduce dependence on fossil fuels.
- **Sustainable Agriculture Practices:** Implementing climate-resilient crop varieties and water-efficient irrigation methods.
- **Disaster Preparedness:** Strengthening early warning systems and disaster management infrastructure.
- **Afforestation and Reforestation:** Enhancing green cover to absorb carbon emissions and prevent soil erosion.
- **Policy and Governance:** Implementing stringent environmental policies and international collaborations such as the Paris Agreement.

8. CONCLUSION

Climate change poses severe threats to India's environment, economy, and public health. The country must adopt comprehensive mitigation and adaptation measures to combat these challenges effectively. Collective efforts from the government, private sector, and individuals are essential to building a resilient and sustainable future for India.

9. REFERENCES

- [1]. Intergovernmental Panel on Climate Change (IPCC) Reports
- [2]. Ministry of Environment, Forest and Climate Change, Government of India

- [3]. National Action Plan on Climate Change (NAPCC)
- [4]. World Bank Reports on Climate Change in South Asia
- [5]. Research articles from Nature, Science, and other peer-reviewed journals
- [6]. Reports from the Indian Meteorological Department (IMD)