

Climate Change in Lucknow City: A 50-Year Retrospective

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Abstract— This research paper examines the climate change trends in Lucknow, India, over the past 50 years. It analyzes temperature variations, precipitation patterns, and the socio-economic impacts of climate change on the city. The study utilizes historical climate data, satellite imagery, and local case studies to provide a comprehensive overview of how climate change has affected Lucknow's environment and its inhabitants.

I. INTRODUCTION

Climate change is a global phenomenon that has far-reaching effects on local environments and communities. Lucknow, the capital city of Uttar Pradesh, India, has experienced significant climatic shifts over the past five decades. This paper aims to explore these changes, focusing on temperature increases, altered rainfall patterns, and the implications for urban planning and public health.

II. METHODOLOGY

This study employs a mixed-methods approach, combining quantitative data analysis with qualitative case studies. Historical climate data from the Indian Meteorological Department (IMD) and satellite imagery from NASA's Earth Observing System Data and Information System (EOSDIS) were analyzed. Additionally, interviews with local residents and experts provided insights into the socio-economic impacts of climate change.

III. HISTORICAL CLIMATE DATA ANALYSIS

3.1 Temperature Trends

Data from the IMD indicates a consistent increase in average temperatures in Lucknow over the last 50 years. The average annual temperature rose from approximately 23.5°C in the 1970s to around 26.5°C in the 2020s. The frequency of extreme heat days has

also increased, with summer temperatures occasionally exceeding 45°C.

3.2 Precipitation Patterns

Rainfall data reveals significant changes in precipitation patterns. The monsoon season, which traditionally spans from June to September, has become increasingly erratic. While total annual rainfall has not drastically changed, the intensity and distribution of rainfall events have varied, leading to both flooding and drought conditions.

IV. SOCIO-ECONOMIC IMPACTS

4.1 Agriculture

The agricultural sector in Lucknow has faced challenges due to changing climate conditions. Farmers report reduced crop yields and increased pest infestations, attributed to higher temperatures and unpredictable rainfall. Traditional farming practices are becoming less viable, prompting a shift towards more resilient crop varieties.

4.2 Public Health

Rising temperatures and altered rainfall patterns have implications for public health. Increased heat has led to a rise in heat-related illnesses, while changes in water availability have affected sanitation and hygiene, contributing to the spread of waterborne diseases.

4.3 Urban Infrastructure

Lucknow's urban infrastructure is under strain due to climate change. Increased flooding has damaged roads and public transport systems, while heatwaves have raised energy demands for cooling. Urban planning must adapt to these challenges to ensure sustainable development.

V. CASE STUDIES

5.1 Flooding in 2010

The heavy monsoon rains in 2010 resulted in significant flooding in Lucknow, displacing thousands and causing extensive damage to property and infrastructure. This event highlighted the city's vulnerability to climate extremes.

5.2 Heatwave of 2019

The summer of 2019 saw one of the hottest months on record, with temperatures soaring above 45°C. The heatwave had severe impacts on daily life, leading to increased hospital admissions for heat-related illnesses.

CONCLUSION

The last 50 years have seen significant climate change impacts in Lucknow, characterized by rising temperatures and altered precipitation patterns. These changes pose serious challenges to agriculture, public health, and urban infrastructure. To mitigate these impacts, it is crucial for local authorities to implement adaptive strategies, promote sustainable practices, and enhance community resilience.

REFERENCES

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