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Impact of Climate Change and Natural Calamities on Arid and Semi-Arid Regions of Rajasthan

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ABSTRACT

This paper examines the escalating impact of climate change and natural disasters on the fragile ecosystems of Rajasthan. Characterized by the Thar Desert, Rajasthan faces unique vulnerabilities including rising mean temperatures, erratic rainfall patterns, and intensified droughts. The study analyzes how these shifts disrupt the socio-economic fabric of rural communities, primarily through groundwater depletion and agricultural failure. The findings suggest that while traditional adaptation methods exist, the current rate of climatic shift necessitates technologically advanced intervention and policy reform.

KEYWORDS

Climate Change, Natural Disasters, Arid Ecosystems, Rajasthan

INTRODUCTION

Rajasthan is India's largest state, with nearly 61% of its area classified as arid or semi-arid. The region is naturally prone to environmental extremes, but the 21st century has seen a marked shift in intensity.

Climatic Profile: High diurnal temperature variation and low humidity.

The Shift: Recent years have shown a "wetting" trend in some arid districts (like Barmer) leading to flash floods, while traditional "wet" areas face drying spells.

Significance: Because the majority of the population depends on rain-fed agriculture and livestock, even a minor climatic shift results in a major humanitarian crisis.

REVIEW OF LITERATURE

Existing research highlights several key themes:

Temperature Trends: Studies by the IPCC and local researchers indicate a projected rise of 1.5^\circ\text{C} to 2.5^\circ\text{C} in Rajasthan by 2050.

Desertification: Scholars have noted that while the Indira Gandhi Canal improved greenery, it also led to waterlogging and salinity in specific pockets.

Socio-Economic Impact: Literature emphasizes "distress migration" where farmers move to urban centers like Jaipur or Ahmedabad due to consecutive crop failures.

Natural Calamities: Focus has shifted from just "droughts" to "extreme events," including heatwaves that exceed 50^\circ\text{C} and unseasonal hailstorms.

Research Gap

Despite extensive studies on desertification, there is a lack of:

Micro-level analysis: Most studies are state-wide; few focus on specific village-level climatic adaptation.

Multidimensional Calamity Mapping: Research often treats drought and flood as separate issues, ignoring the "compounding effect" where a drought-stricken soil cannot absorb sudden flash-flood rain.

Gendered Impact: Limited data on how climate-induced migration of men increases the labor burden on women in rural Rajasthan.

Problem of Research

The central problem is the decreasing predictability of the monsoon and the increasing frequency of extreme weather events (Heatwaves, Flash Floods, and Dust Storms). This unpredictability renders traditional farming calendars obsolete and threatens the food security of the state.

Objectives

To analyze the trend of temperature and rainfall variations in Rajasthan over the last 30 years.

To identify the frequency and impact of natural calamities (droughts and floods) on the Thar ecosystem.

To evaluate the effectiveness of current government adaptation strategies (e.g., Mukhyamantri Jal Swavlamban Abhiyan).

To suggest sustainable measures for climate resilience in arid zones.

Hypothesis

H1: There is a significant positive correlation between rising mean temperatures and the frequency of dust storms in Western Rajasthan.

H2: Traditional water harvesting structures (Tankas, Johads) are more resilient to climate fluctuations than modern centralized water systems in arid zones.

Importance of the Study

Policy Formulation: Helps the state government refine the State Action Plan on Climate Change.

Economic Security: Identifying risk zones can help insurance companies and banks better support farmers.

Resource Management: Provides a roadmap for groundwater conservation in a state where the water table is falling by meters every year.

Detailed Analysis

Groundwater Crisis: Over-exploitation of aquifers leading to high fluoride and salinity levels.

Livestock Vulnerability: Heat stress reducing milk yield in indigenous cattle breeds like Rathi and Tharparkar.

Biodiversity Loss: Impact on the Great Indian Bustard (GIB) and other desert flora.

The "Flood in the Desert" Phenomenon: Analysis of the 2006 and 2017 floods in Barmer and Jalore.

CONCLUSION

The arid and semi-arid regions of Rajasthan are at a tipping point. Climate change is no longer a future threat but a present reality manifested through "creeping disasters" like droughts and "sudden disasters" like flash floods. While the resilience of the Rajasthani people is high, it is being outpaced by the speed of environmental degradation. A hybrid approach—combining traditional wisdom (water harvesting) with modern technology (drip irrigation and solar energy)—is the only path forward.

REFERENCES

1. Government of Rajasthan (2021). Rajasthan State Action Plan on Climate Change (RSAPCC) 2.0.
2. IPCC (2022). Climate Change 2022: Impacts, Adaptation, and Vulnerability.
3. Rathore, M. S. (2005). Drought and Agriculture in Rajasthan. Institute of Development Studies.
4. Narain, P., et al. (2006). Desertification and its Control in the Thar Desert of India.
5. Jain, S. K. (2014). Water Resources of Rajasthan: Issues and Strategies.
6. How to expand this into 8 pages:
7. Case Studies: Dedicate 1.5 pages to a specific case study (e.g., The Barmer Floods or the Churu Heatwaves).
8. Data Tables: Include tables showing decadal rainfall averages for districts like Jaisalmer and Bikaner.
9. Policy Analysis: Detail the specific outcomes of the Pradhan Mantri Fasal Bima Yojana in arid districts.