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Research Article

Socio-Economic Vulnerability of Climate Change: A Geographical Study Of Rajasthan

Pragati Pandey [1*], Prof. Monika Kannan [2]

[1]Assistant Professor, HOD, Dept. Of Geography, SMM Government Girls College, Bhilwara, Rajasthan, India

[2]HOD, Department of Geography & Dean Research, Coordinator, IQAC, Sophia College, Autonomous, Ajmer, Rajasthan, India

Corresponding Author: *Pragati Pandey

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Abstract

Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts may result from natural processes or human activities. But since the 1800s, human activities have been the main driver of climate change. Rajasthan, a state that is located in north-western India, is known for its arid and desert landscapes. While climate change has a huge impact throughout the geographical area of Rajasthan, certain regions are still more vulnerable than others. The effects of climate change are not the same and differ for various population groups. Some social groups are more susceptible to climate change than others because of their inability to cope, adapt, and heal. Knowing which communities are more vulnerable to climate change than others is crucial for making better policies. The identification of indicators that can estimate the current state of socioeconomic conditions is necessary for examining the socioeconomic vulnerability to climate change. This research aims to evaluate the socio-economic susceptibility of the 10 most populated districts of Rajasthan and suggest strategies to mitigate it. For this Study, data is collected from Secondary Sources like the Census of India, RSAPCC (Rajasthan State Action Plan on Climate Change). For this study, Socio-Economic Indicators like Population density, Female Literacy, Mean household size, Population growth rate, etc., are used to calculate Socio-Economic vulnerability. Mean, Standard Deviation, and Principal Component Analysis will be used for the analysis of data.

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KEYWORDS: Climate Change, Vulnerable People, Socio-Economic vulnerability, Socio-Economic Indicators.

1. INTRODUCTION

Climate is the long-term pattern of weather in a particular area. The classical period is 30 years, as defined by the World Meteorological Organization (WMO,2017). Climate affects every aspect of human life, from food sources to transport, from what clothes we wear to where we go for holiday. It has a huge impact on our daily lives, our health, and our future. According to UNO, Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural or due to human activities. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil, and gas. Climate scientists have shown that humans are responsible for virtually all global heating over the last 200 years. Rajasthan state action

plan on climate change 2022 says that total precipitation has increased in the western and northern parts of Rajasthan (RSAPCC,2022). According to some other reports average temperature has increased, and heat waves are more frequent and severe. Socio-economic vulnerability to climate change refers to the sensitivity of the social and economic status of the community to the adverse impacts of climate change. It is decided not only by the exposure to climate risks but also by the capacity of individuals, households, or sectors to cope with and recover from climate change impacts. At present, Climate change is a global threat. Research on climate change and vulnerability to natural hazards has made significant progress over the last decades. Most of the research has been devoted to improving the quality of climate information and hazard data. Less attention has been given to the assessment of vulnerability.

Aspects of Vulnerability: -

- Exposure
- Sensitivity
- Adaptive Capacity

Study Area

This study aims to evaluate the socio-economic vulnerability of the 10 most populous districts of Rajasthan. So, the 10 most populous districts of Rajasthan State have been chosen for this geographical study. Table 1, which is given below, shows showing population of those districts. Figure 1 shows showing Locational map of the study area.

Table 1: Population of the districts

NAME OF THE DISTRICT	TOTAL POPULATION
JAIPUR	6,626,178
JODHPUR	3,687,165
ALWAR	3,674,179
NAGAUR	3,307,743
UDAIPUR	3,068,420
SIKAR	2,677,333
BARMER	2,603,751
AJMER	2,583,052
BHARATPUR	2,548,462
BHILWARA	2,408,523

Source: Census of India 2011

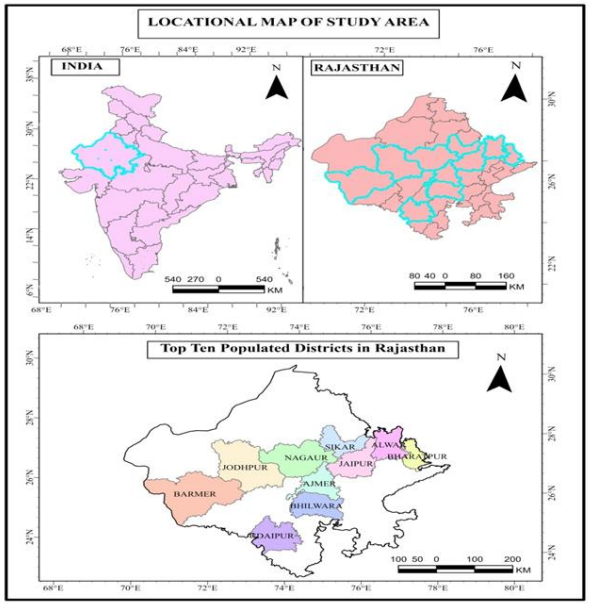


Figure 1: Locational map of the study area
Source: Census of India 2011

OBJECTIVES

1. To find out the most Vulnerable district among the 10 most populated districts of Rajasthan.
2. To suggest strategies to mitigate vulnerability.

DATA COLLECTION AND METHODOLOGY

This paper is a review paper. This study analyzes the socio-economic vulnerability of climate change. Data is collected from secondary sources only. Secondary data is collected from the Census of India 2011, Rajasthan state action plan on climate change, IPCC reports, websites, reports of the United Nations, fact sheets, district statistical handbook of selected districts, articles, brochures, publications, journal, and newspapers etc. A total of six socioeconomic indicators have been chosen for Vulnerability mapping. Indicators are population density, Sex Ratio, Population in the age group 0-6, Literacy rate, working population Percentage, and Growth rate of Population.

- Statistical tools like sum, average, mean, and mean deviation are used for the analysis of the Data.
- Study Area map and vulnerability map created by GIS Software.
- Showed Zones of Vulnerability through Thematic mapping.
- Maps, diagrams, and graphs are used to show the data.

RESULT AND DISCUSSION

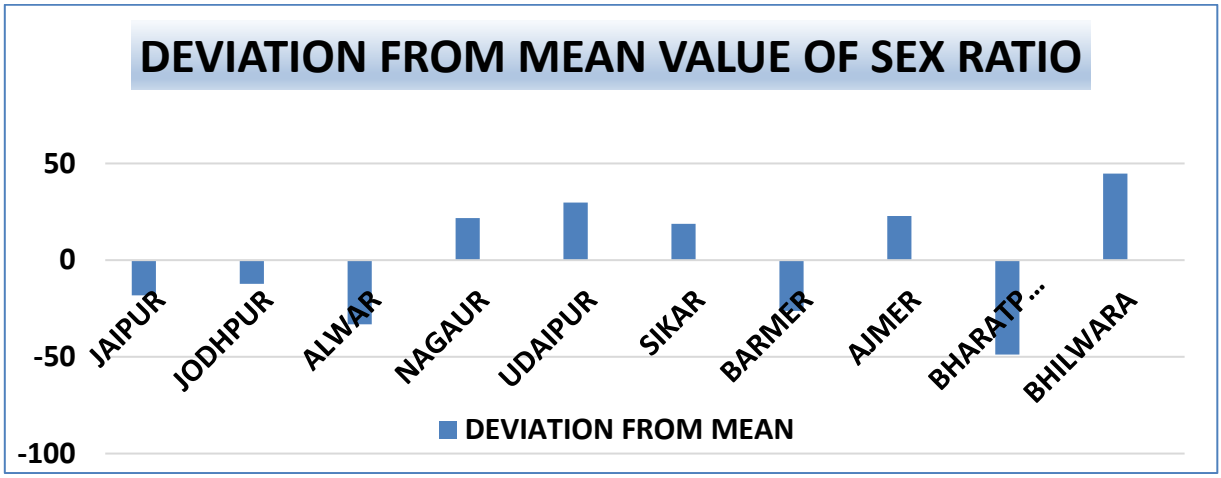
The present study examines the socio-economic susceptibility of the ten most populated districts of Rajasthan to climate change. The analysis is based on selected socio-economic indicators, including Sex Ratio, Population in age group 0-6, Literacy rate, working population Percentage, and Growth rate of Population. The deviation of each indicator for every district was calculated from the Rajasthan state mean value of every indicator. These deviations were then aggregated to get a composite score to show the relative vulnerability of each

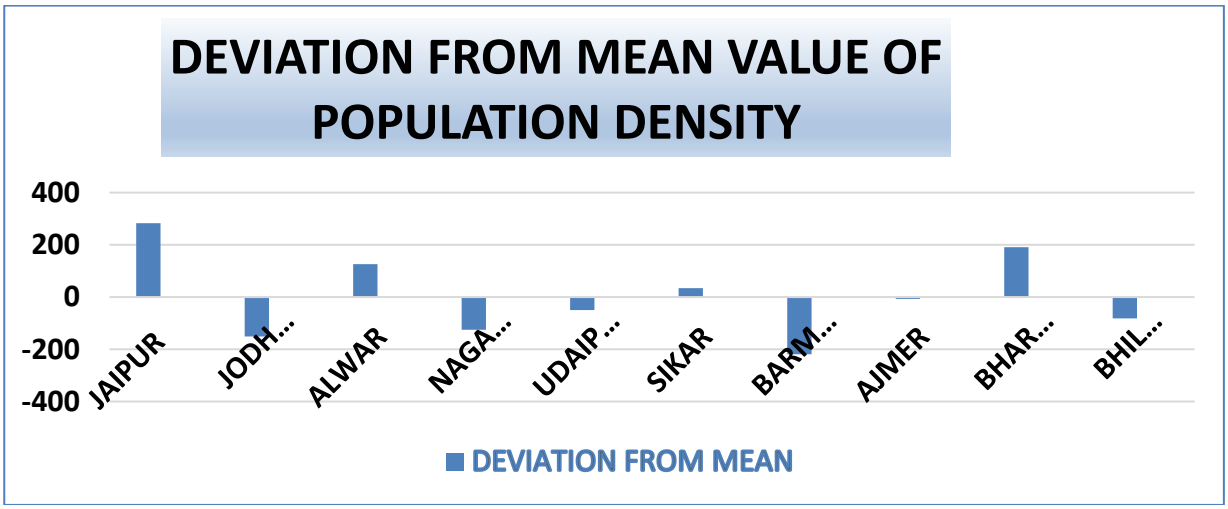
district. A higher summed value indicates lower vulnerability, while a lower summed value signifies higher vulnerability.

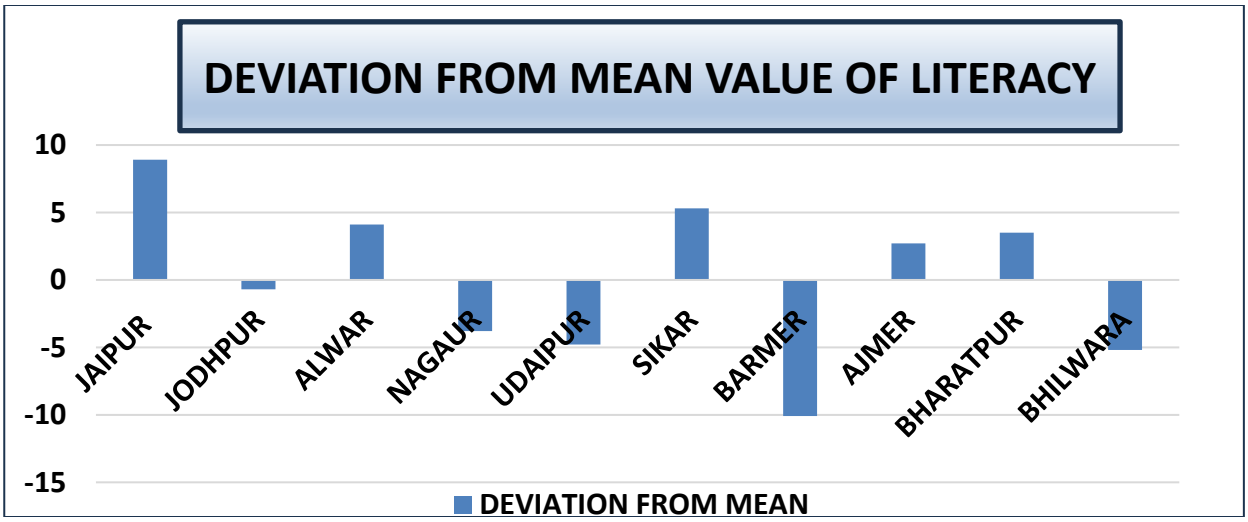
Table 2: socio-economic indicators

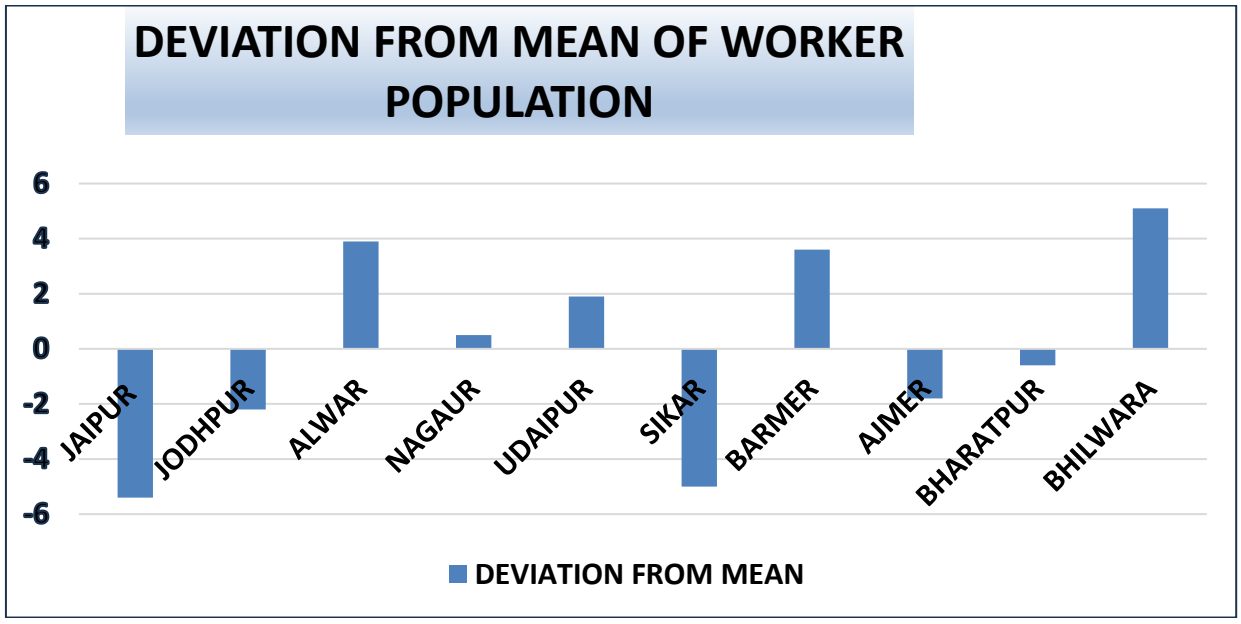
INDICATORS	Hypothesized relationship between the indicators and socio-economic vulnerability
Population density	High population density is normally associated with ith environmental degradation.
Sex Ratio	An increase in the percentage of the female population shows a decrease in socio-economic vulnerability.
Population in age group 0-6	higher the population in the 0-6 age group, the higher the dependant population and thus the higher the vulnerability.
Literacy rate	The higher the literacy rate, the lower the vulnerability.
working population Percentage.	The higher the increase in population growth rate, the higher the vulnerability.
Growth rate of Population	The higher the increase in population growth rate, the higher the vulnerability.

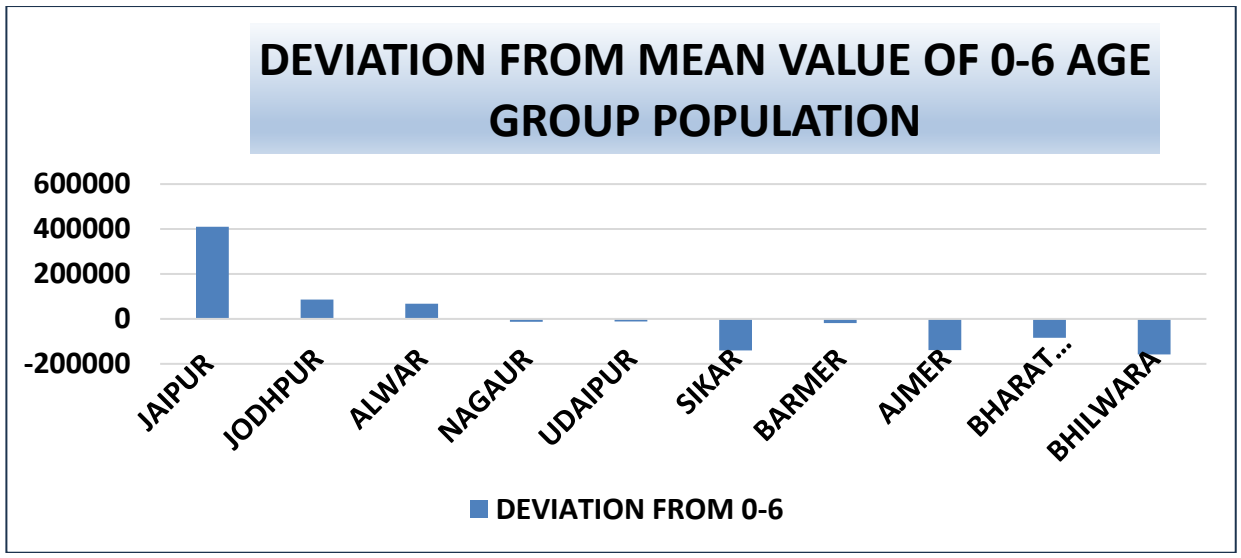
Source: RSAPCC, 2022











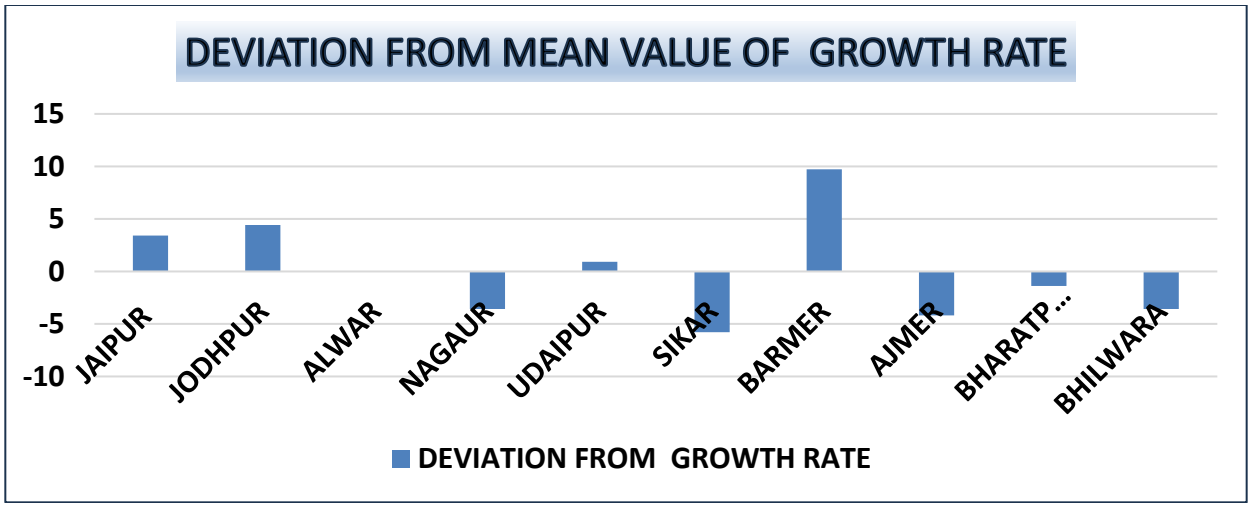


Table 3: Zones of Vulnerability

ZONE OF VULNERABILITY	VALUE	DISTRICTS
VERY HIGH	ABOVE 40	JAIPUR
HIGH	30-40	UDAIPUR, BARMER, ALWAR, JODHPUR, BHARATPUR
MEDIUM	20-30	NAGAUR, SIKAR, AJMER
LOW	BELOW 20	BHILWARA

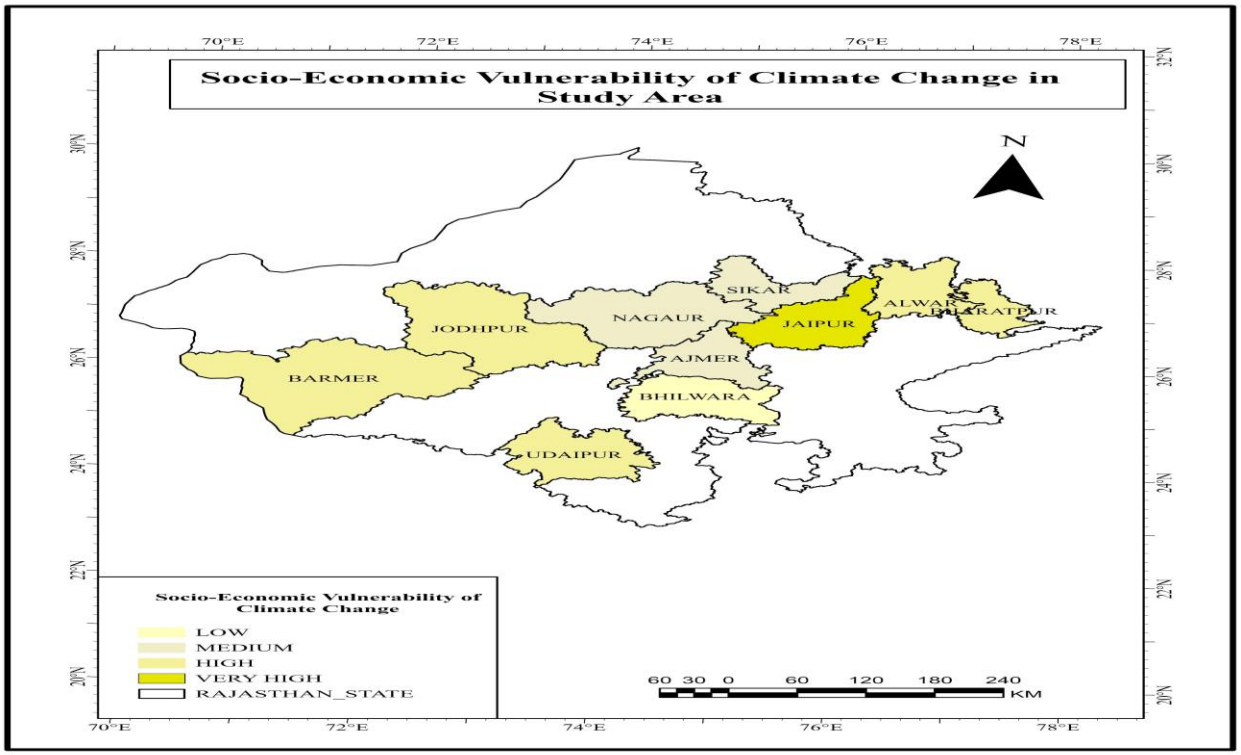


Figure 2: Thematic map for zones of Vulnerability

Table 3 and Figure 2 both show that Jaipur is the most vulnerable and Bhilwara is the least vulnerable among the ten most populated districts in Rajasthan.

Suggestions to mitigate Vulnerability

1. Education – it enables people to make wise decisions, and it encourages them to change their attitudes and perspectives towards climate change.
2. Reduce poverty - by increasing employment, Skill development for jobs, and an increase in household industries.
3. The housing department should make urban areas more spacious and liveable.
4. Reduction in the number of non-working population should be done.
5. Strict Efforts for Population Control.
6. Reduce Migration by providing better services in all sectors.
7. Quality of life should be improved.

CONCLUSION

The present study focuses on the spatial variation in socio-economic vulnerability to climate change across the ten most populated districts of Rajasthan. The results clearly show that socio-economic factors of the study area significantly influence the adaptive capacity of people towards climate change. Overall, all this research work emphasizes that climate vulnerability in Rajasthan is as much a socio-economic issue as it is an environmental one. Reducing vulnerability needs an integrated approach that integrates economic development, education, and infrastructure improvement with efficient climate adaptation strategies. Policymakers and the government should focus on district-specific plans to enhance resilience, particularly in rural and arid regions. Future research may expand this research work by including more districts, integrating environmental indicators, and using advanced statistical methods or GIS-based tools and techniques to further refine the vulnerability assessment framework.

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About the Corresponding Author

Pragati Pandey is an Assistant Professor in the Department of Geography at SMM Govt Girls College, Bhilwara, Rajasthan, India.

Climate change, climate change vulnerability, socioeconomic development, and environmental sustainability are the topics of her research. She has presented her work at workshops and national conferences. Her current work contributes to policy-oriented geographical studies by examining the socio-economic effects of climate change in Rajasthan.