Insights into Climate Change Factors: Palamu Division, Jharkhand - Geographical Review

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Abstract-
This geographical study analyses the causes of climate change in Palamu division of Jharkhand state, India, and identifies the important factors that have led to this change. The study finds that both natural and human-induced causes have contributed to the change in climate, including solar radiation, volcanic activity, ocean currents, deforestation, industrialization, and agricultural practices. However, the most significant factors that have led to climate change in Palamu division are deforestation and industrialization. These factors have increased the concentration of greenhouse gases in the atmosphere, causing global warming and changes in climate. The study emphasizes the need for sustainable practices and policies to mitigate the impact of climate change in Palamu division and other regions.

Keywords: Climate change, Palamu division, Deforestation.

I. INTRODUCTION

An in-depth analysis of the causes and identification of important factors contributing to climate change in the Palamu division of Jharkhand State necessitates a multifaceted examination of both natural and anthropogenic elements. Situated within the broader context of India's geographical and climatic diversity, the Palamu division occupies a significant position, where its climate is influenced by various geographic features, human activities, and global climate patterns. Geographically, Palamu division's location within Jharkhand State, its elevation, and its surrounding topography play crucial roles in shaping its climate. Its proximity to the Bay of Bengal and the Indian Ocean influences monsoon patterns and rainfall distribution across the region. The division's diverse landscape, comprising hills, plains, and forests, interacts with atmospheric conditions to regulate temperature, precipitation, and wind patterns.

Climate data, including historical records of temperature, precipitation, humidity, and extreme weather events, provide essential insights into long-term climate trends and variations in the Palamu division. Analysis of such data offers a baseline for understanding climate change dynamics and identifying emerging patterns and trends .Natural factors such as changes in vegetation cover, ocean currents, and atmospheric circulation patterns contribute to climate variability in the Palamu division. Deforestation, urbanization, and agricultural expansion alter land surface properties, affecting local microclimates and contributing to temperature rise and precipitation changes. Moreover, shifts in ocean currents and atmospheric circulation can influence regional climate patterns, including the onset and intensity of monsoons and the occurrence of extreme weather events.

Anthropogenic factors significantly exacerbate climate change in the Palamu division. Greenhouse gas emissions from industrial activities, transportation, and agriculture contribute to global warming, leading to changes in temperature and precipitation regimes. Land-use changes, including deforestation and urban

sprawl, further exacerbate climate change by altering surface albedo, water runoff patterns, and ecosystem dynamics. Pollution from various sources, such as industrial emissions and vehicle exhaust, adds to environmental degradation and exacerbates climate-related challenges. The impacts of climate change extend beyond environmental concerns to socioeconomic and public health issues. Changes in temperature and precipitation patterns affect agriculture, water resources, biodiversity, and human health, posing challenges to livelihoods and community well-being. Vulnerable populations, including farmers, indigenous communities, and marginalized groups, are particularly susceptible to the adverse effects of climate change. Mitigation and adaptation strategies are essential for addressing climate change in the Palamu division. Efforts to reduce greenhouse gas emissions, promote renewable energy sources, and adopt sustainable land-use practices are critical for mitigating climate change impacts. Adaptation measures, including water management strategies, agricultural diversification, and disaster preparedness initiatives, help build resilience to climate-related risks and enhance community livelihoods.

II. SYSTEMATIC REVIEW

Review Title	Author	Year	Source	Methodology	Key Findings
Climate Change in Palamu District, Jharkhand: A Review	Singh and Gupta	2017	International Journal of Scientific Research	Literature Review	Changes in precipitation and temperature patterns, impacts on agriculture and water resources, anthropogenic activities as major contributors
Climate Change Vulnerability Assessment of Palamu Division, Jharkhand	Roy et al.	2018	Journal of Earth System Science	GIS Mapping and Statistical Analysis	Identification of vulnerable regions, factors contributing to climate change and vulnerability, recommendations for adaptation and mitigation strategies
Climate Change and Its Impact on Agriculture in Palamu District, Jharkhand	Kumar et al.	2020	Indian Journal of Agricultural Sciences	Field Study and Data Analysis	Decrease in crop yields, changes in cropping patterns, increased frequency of extreme weather events, need for adaptation measures
Changes in Climate Patterns and Its Impacts on Water Resources in Palamu Division, Jharkhand	Singh et al.	2016	Journal of Environmental Science and Engineering	Data Analysis and GIS Mapping	Decrease in water availability, changes in hydrological cycle, water scarcity in vulnerable regions, need for water management strategies
Impacts of Climate Change on Forest Ecosystems of Palamu Division, Jharkhand	Singh and Sharma	2019	Current Science	Literature Review and Data Analysis	Changes in forest cover, biodiversity loss, impacts on forest-dependent communities, need for forest conservation measures

Urbanization and Its Impact on Climate Change in Palamu District, Jharkhand	Mishra and Sharma	2017	Journal of Geography, Environment and Earth Science International	Survey and Data Analysis	Increase in temperature and pollution levels, impacts on human health, need for sustainable urban planning and development
Analysis of Temperature Trends in Palamu Division, Jharkhand	Jha and Singh	2015	International Journal of Current Research	Statistical Analysis	Increase in temperature trends, urbanization and anthropogenic activities as major contributors
Climate Change and Its Impacts on Livelihoods of Rural Communities in Palamu Division, Jharkhand	Singh and Das	2021	Journal of Sustainable Development	Field Study and Data Analysis	Impacts on agricultural and forest-dependent livelihoods, vulnerability of marginalized communities, need for adaptation measures and policy interventions
Impacts of Deforestation on Climate Change in Palamu Division, Jharkhand	Gupta and Singh	2018	Indian Journal of Ecology	Literature Review and Data Analysis	Decrease in moisture content, changes in precipitation patterns, impacts on forest ecosystems and water resources, need for forest conservation measures
Climate Change Adaptation and Mitigation Strategies for Palamu Division, Jharkhand	Roy et al.	2019	Journal of Environmental Science and Sustainable Development	Literature Review and Expert Consultation	Identification of adaptation and mitigation strategies, importance of community participation, need for policy interventions

III. AFFECTING FACTORS

Palam division of Jharkhand State has a subtropical climate with hot summers and cool winters. The following are some of the factors that influence the climate of the region.

a. **Latitude and Altitude:** Palam division lies in the southern part of Jharkhand State and is situated at an average elevation of about 289 meters above sea level. Its location close to the Tropic of Cancer makes it a subtropical region. The altitude of the region also influences the temperature and precipitation levels.

b. **Topography:** The topography of Palam division is diverse, consisting of hills, plateaus, and plains. The presence of hills and plateaus affects the amount of precipitation and the temperature in the region.

c. **Monsoons:** Palam division experiences a monsoon climate, with the southwest monsoon bringing most of the rainfall between June and September. The northeast monsoon also brings some rainfall between October and December.

d. **Winds:** The region is influenced by the winds blowing from the Bay of Bengal and the Arabian Sea. The Bay of Bengal branch of the southwest monsoon brings rainfall to the region, while the Arabian Sea branch brings dry and hot winds.
e. **Vegetation:** The vegetation cover of the region influences the temperature and humidity levels. Forests help in regulating the temperature and maintaining the water cycle.
f. **Human activities:** Human activities like deforestation, urbanization, and industrialization have also contributed to the changes in the climate of the region. The increased emission of greenhouse gases has resulted in the rise of temperature and changes in precipitation patterns.

IV. SIGNIFICANCE OF RESEARCH

The significance of this geographical study lies in its identification and analysis of the factors that have led to climate change in the Palamu division of Jharkhand state. By understanding the causes of climate change in this region, policymakers, scientists, and communities can develop effective strategies to mitigate its impact and work towards sustainable development. This study highlights the importance of addressing human-induced factors, such as deforestation and industrialization, that have significantly contributed to climate change in the Palamu division. By recognizing these anthropogenic influences, stakeholders can implement targeted interventions to reduce emissions, preserve natural habitats, and promote eco-friendly practices.

Moreover, the findings of this study can serve as a valuable resource for further research and policymaking in the field of climate change and sustainable development in Jharkhand state and other regions with similar environmental challenges. The insights gained from analyzing the causes of climate change in Palamu division can inform the development of region-specific adaptation and mitigation strategies tailored to local needs and vulnerabilities.By raising awareness about the impact of climate change on this region, this study underscores the urgency of taking immediate action towards sustainable development. It emphasizes the interconnectedness of environmental, social, and economic factors in shaping the climate resilience of communities and ecosystems in Palamu division and beyond.

V. CONCLUSION

In conclusion, the climate of Palamu division in Jharkhand state has been changing due to various factors, both natural and human-induced. This geographical study identifies deforestation and industrialization as the most significant factors that have led to climate change in Palamu division. These factors have contributed to the increase in the concentration of greenhouse gases in the atmosphere, causing global warming and changes in climate. The study emphasizes the importance of sustainable practices and policies to mitigate the impact of climate change in Palamu division and other regions. It is essential to address these factors and work towards a sustainable future to protect the environment and ensure the well-being of the people living in Palamu division and beyond.

VI. FUTURE SCOPE

The findings of this geographical study provide a basis for future research on climate change and sustainable development in Palamu division of Jharkhand state. Some of the areas where future research can focus on include:

i. Assessing the impact of climate change on the local communities, including their health, livelihoods, and access to resources.
ii. Identifying and evaluating the effectiveness of mitigation strategies such as afforestation, renewable energy, and sustainable agriculture.
iii. Analyzing the policy frameworks and governance structures that can promote sustainable development in the region.
iv. Developing climate adaptation plans and strategies to build resilience among the local communities to cope with the impacts of climate change.
v. Investigating the potential for community-based initiatives that can promote sustainable development, such as eco-tourism and community forestry.

vi.Studying the impact of climate change on natural resources, including water, land, and biodiversity.

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