



THE IMPACT OF CLIMATE CHANGE ON MARGINALIZED COMMUNITIES IN INDIA

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ABSTRACT

Climate change in India poses a severe challenge for marginalized and low-income communities. It exacerbates poverty, threatens food and water security, and increases health and livelihood risks for vulnerable populations. This review examines evidence on climate impacts among India's marginalized groups, focusing on how caste, tribal status, and gender influence vulnerability. We summarize findings on how extreme events and gradual climate changes affect health, agriculture, migration, and livelihoods. Using a vulnerability and environmental justice perspective, we highlight how social inequality shapes differential outcomes. Finally, we discuss policy implications for more inclusive adaptation and outline areas for future research.

Keywords: climate change; marginalized communities; vulnerability; India; policy.

INTRODUCTION

Climate vulnerability research in India has increasingly recognized the role of social inequalities in determining climate risk. The majority of India's population lives in areas exposed to floods, cyclones, droughts, and extreme heat, but exposure and resilience vary significantly across caste, tribal affiliation, gender, and income. For example, tribal groups are often located in remote, hazard-prone regions, while urban slum dwellers face intense heat and flooding. Scholars have introduced concepts like "thermal injustice" to describe how social hierarchy affects exposure to heat, and the "triple burden" of poverty, gender inequality, and climate risk facing women, but such concepts need clearer definition and analysis.

This paper reviews existing evidence on climate change impacts among India's marginalized communities. We focus on tribal communities, Dalits (Scheduled Castes), and low-income women, examining how intersecting social identities shape vulnerability to climate hazards. We also consider geographic (rural vs. urban) and socioeconomic (e.g., poverty, landlessness) factors that influence adaptive capacity. Our aim is to synthesize insights from academic research and credible policy reports within an environmental justice framework, highlighting how social inequalities translate into climate risk.

To conduct this review, we performed a structured search of scholarly and policy sources on climate change impacts in India. We prioritized peer-reviewed studies but also included key government and NGO reports where relevant. Findings were categorized by themes such as disasters, displacement, and livelihoods. The analysis highlights patterns and gaps in the literature without introducing new empirical data.



EVIDENCE OF CLIMATE IMPACTS ON MARGINALIZED COMMUNITIES IN INDIA

Marginalized groups in India face a range of climate-related impacts due to systemic inequalities. Tribal communities, comprising about 8.6% of the population, often live in remote, forested, or hilly areas with limited infrastructure. They have poor access to basic services such as safe drinking water, healthcare, and transportation, which makes them highly vulnerable when floods or droughts occur. Changes in rainfall and forest ecosystems can disrupt tribal peoples' traditional food and medicine sources, affecting their health and culture. Although tribal communities have rich ecological knowledge, this knowledge is often under-recognized by mainstream institutions, leaving them without support for climate adaptation.

Dalits (Scheduled Castes) also experience disproportionate impacts from climate change due to entrenched social discrimination. Many Dalit households work in low-income jobs, live in informal settlements, or on marginal lands that are vulnerable to flooding and other hazards. After disasters, Dalits often receive less relief and face barriers in accessing recovery aid. For instance, caste-based bias can mean that Dalit farmers have less access to water, irrigation, or insurance, and they may suffer greater losses during extreme weather. These systemic inequalities mean that Dalit communities have fewer resources to cope with climate risks.

Women in marginalized communities carry a heavier burden of climate change impacts due to gender roles and inequalities. In many rural households, women are mainly responsible for collecting water, fuel, and food for their families. When droughts or floods occur, water sources may dry up or become contaminated, forcing women and girls to travel longer distances in dangerous conditions. Climate-related crop failures and heat waves also increase women's workload and health stress because women continue to do most household tasks and caregiving. In India, climate change threatens to widen existing gender-based health disparities. Additionally, women often have limited land rights, credit, and access to information, which reduces their ability to adapt to climate changes.

NATURAL DISASTERS AND EXTREME WEATHER EVENTS

Extreme weather events like floods, cyclones, droughts, and heat waves have become more frequent and severe in India. Marginalized populations are often disproportionately affected by these disasters. They tend to live in more hazardous locations (such as low-lying floodplains, degraded forest edges, or urban slums with heat islands) and have weaker infrastructure and housing. For example, recent heat waves have caused thousands of deaths, disproportionately among outdoor workers and poor residents of informal settlements. Similarly, floods and cyclones inflict greater damage on communities that lack sturdy housing or early warning systems.



After a disaster, recovery is usually slower for these communities. Limited financial resources and social networks mean that poorer households struggle to rebuild homes and replace lost assets. Disaster relief and reconstruction programs often fail to reach marginalized families effectively. Studies have documented cases where compensation and aid were distributed unevenly, with Dalit and tribal households receiving less support. These post-disaster inequalities trap vulnerable people in a cycle of loss and make them more exposed to the next hazard.

CLIMATE-INDUCED DISPLACEMENT AND MIGRATION IN INDIA

Climate-related disasters and gradual environmental changes are already causing internal displacement in India. Every year, millions of people are affected by floods, cyclones, and droughts, forcing them to move temporarily or permanently. Many of these climate migrants come from poor rural areas, including tribal and low-caste communities. For example, recent major floods displaced hundreds of thousands of people in central and eastern India, a large share of whom were from marginalized villages.

Migration patterns are complex and often seasonal or distress-driven. Some people move short distances to find temporary work when their local farms fail; others undertake longer journeys to cities when their homes are lost. However, climate migrants often have insecure legal status and lack social safety nets at their destinations. Many live in informal settlements without legal rights to land or services. Because climate migration is not yet well integrated into policy, the needs of these displaced populations remain largely invisible. Estimates suggest that, by 2050, India may face internal migration of up to 45 million people due to climate change. These population movements will disproportionately affect marginal groups, who have the fewest resources to migrate or adapt locally.

LOSS OF LIVELIHOODS AND FOOD SECURITY

Agriculture provides livelihoods for a large portion of India's rural poor, so climate change has a major impact on their income and food security. Erratic monsoon rains, more frequent droughts, and heat stress have reduced crop yields in many regions. Smallholder farmers and landless laborers-many of whom are poor or belong to marginalized castes-suffer the most from these changes. Surveys in some states have found that the majority of small farmers reported income losses and crop failures during recent climate shocks. Crop failures force these farmers to take costly loans or sell assets, deepening cycles of debt and poverty.



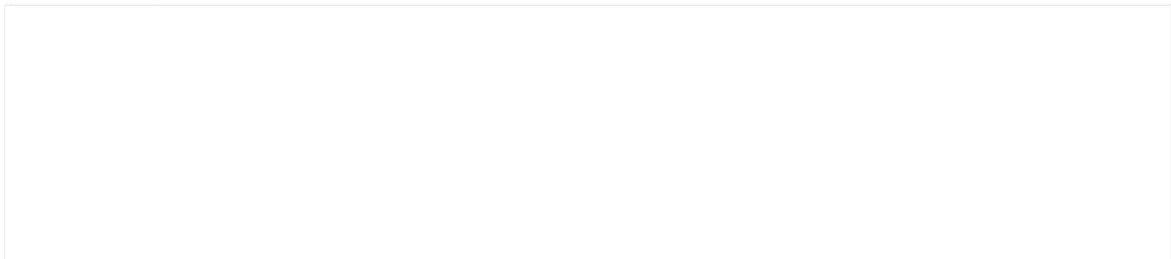
Non-farm livelihoods are also climate-sensitive. Declining groundwater levels and changing rainfall patterns have harmed freshwater fisheries, grazing land, and forest products that many marginalized people depend on. Many informal-sector workers (such as outdoor vendors, construction laborers, or rickshaw drivers) are vulnerable to extreme heat and flooding because their income depends on daily wages. Estimates suggest that poor rural households can lose several percent of their annual income to climate-related agricultural shocks. This income loss contributes to higher debt levels and reduced ability to afford food or healthcare.

Food security is further threatened when climate change disrupts agriculture. Lower crop production and supply chain disruptions can lead to higher food prices. National-level studies estimate that climate stressors increase India's agricultural income losses by tens of billions of US dollars each year. When food becomes scarce or expensive, vulnerable families often reduce meal quality or quantity, leading to malnutrition and health problems. In this way, climate change deepens poverty and food insecurity among marginalized households.

TRADITIONAL ECOLOGICAL KNOWLEDGE AND ADAPTATION

Many marginalized communities have valuable traditional ecological knowledge (TEK) that aids their adaptation to environmental change. Tribal groups, in particular, use diverse farming practices and forest management methods that enhance resilience. For example, they may cultivate multiple crops together, save drought-resistant seed varieties, or harvest rainwater in traditional ways. Communities often rely on environmental indicators (such as plant flowering or animal behavior) to plan planting and harvesting schedules. These locally-rooted practices help manage risks from changing rainfall and temperature patterns.

However, traditional knowledge is often under-recognized in formal adaptation efforts. Government programs and research institutions tend to favor technical solutions or generic approaches, overlooking community practices. In many areas, local councils and women's groups already implement sustainable measures (such as watershed conservation, agroforestry, or community seed banks) that build resilience. Integrating TEK into policy would require more participatory planning and respect for local rights, which current top-down systems of government rarely allow.





BARRIERS TO ADAPTATION AND POLICY RESPONSES

Marginalized communities face multiple barriers that limit their adaptation to climate change. Economic inequality and lack of assets can trap households in vulnerability. For example, without savings, credit, or insurance, poor farmers cannot afford new irrigation systems or replant crops after a failure. Social and political exclusion is another barrier: tribal peoples, Dalits, and the poor are often underrepresented in decision-making bodies for agriculture, forestry, and disaster management. As a result, their specific needs are frequently ignored when climate policies and programs are designed.

Information and technology gaps also hinder adaptation. Many rural and poor households lack access to timely weather forecasts, climate advisories, or agricultural extension services. Low literacy, language barriers, and limited internet access prevent marginalized groups from receiving climate information. Training programs and climate services are often directed at larger or commercial farmers, while smallholders and women farmers are missed. Gender norms can further limit women's access to information and services. These gaps reduce the capacity of marginalized households to prepare for or respond to climate events.

India has expanded climate finance and social protection programs, but these often fail to reach the poorest effectively. Crop insurance schemes, for example, have low enrollment among marginal farmers and usually cover only certain crops. Rural employment guarantee and food subsidy programs provide important support, but they are not always linked to climate shocks. Urban poor lack targeted programs for heat or flood resilience. International climate funds tend to be allocated through national agencies and often do not fund grassroots adaptation initiatives directly. As a result, funding and aid programs frequently bypass the communities that need them most.

RECOMMENDATIONS

Addressing climate impacts on marginalized communities requires integrated policies that combine social justice with climate adaptation. Programs should explicitly account for caste, tribal, and gender considerations. For example, disaster relief systems can include mechanisms to ensure that Dalit and tribal families receive aid without discrimination. Agricultural extension and credit programs should target small and women farmers, providing resources for climate-resilient farming. Involving marginalized groups in local governance (such as village councils and planning committees) can help ensure that their perspectives shape adaptation strategies.

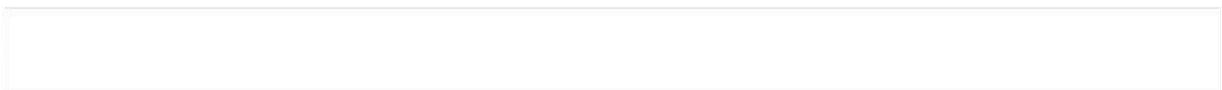
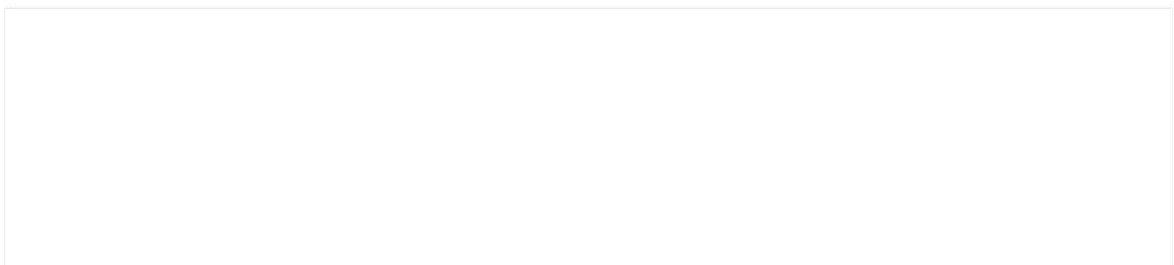
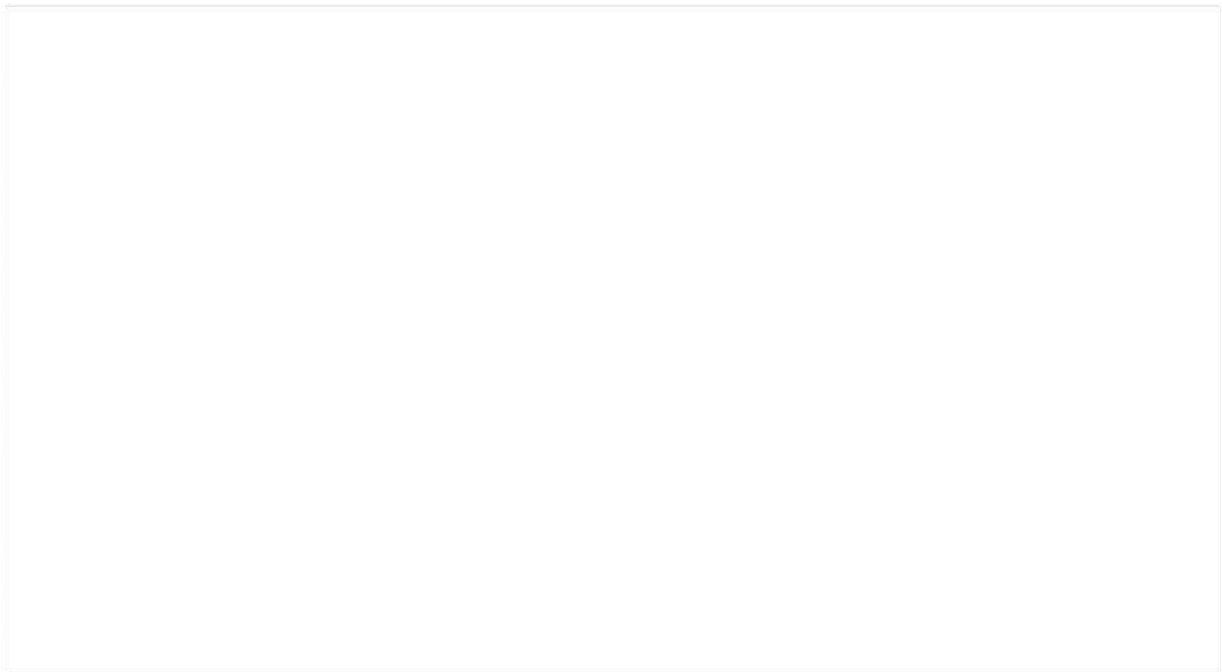
Social protection schemes can be aligned with climate goals to strengthen resilience. For instance, rural employment programs could focus on building flood defenses or water-harvesting infrastructure, while food assistance could be scaled up after droughts. Creating local adaptation funds, managed by community organizations, would allow villages to invest in context-appropriate solutions (like improved irrigation or community seed banks). Improving data collection to monitor how climate events affect different social groups would help policymakers target resources more effectively. Overall, adopting a climate justice approach—one that emphasizes equity, rights, and participation—can make India's climate response more inclusive and effective.



CONCLUSION

This review highlights that climate change impacts in India are deeply intertwined with social inequality. Caste, tribal identity, gender, and poverty shape who bears the greatest burdens of climate hazards. We find that marginalized communities face higher exposure to extreme events, greater risks of displacement, and larger livelihood losses, often due to historical exclusion and lack of resources. Addressing climate vulnerability in India therefore requires not only technical solutions but also social and institutional change to reduce inequality.

Our paper synthesizes diverse evidence on these issues, but it has limitations. The review relies on existing studies, which are uneven across regions and topics. Much of the data comes from case reports and qualitative analyses rather than large-scale empirical studies, and some claims need further validation. We did not attempt to quantify impacts due to limited data. Future research should include local case studies and evaluations of adaptation strategies that directly involve marginalized groups. Despite these limitations, the review underscores that reducing inequality is crucial to climate resilience.





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