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Climate-smart natural resource governance in India: Policy and global perspectives

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ABSTRACT

This study examines India's approach to climate-smart natural resource management in the context of growing challenges related to climate change, environmental degradation, and sustainable development. India has adopted several policy initiatives, including the National Action Plan on Climate Change (NAPCC), State Action Plans on Climate Change (SAPCCs), the National Biodiversity Action Plan, and policies for water and coastal managementto address climate risks. At the global level, these efforts are linked with international frameworks including the Paris Agreement, Sustainable Development Goals (SDGs), and the Convention on Biological Diversity (CBD). The study emphasises the significance of governance, policy coordination, and the science–policy interface in attaining climate resilience. It argues that effective alignment between national policies and global commitments is essential for sustainable and inclusive natural resource management.

KEYWORDS

Climate Governance, Natural Resource Management, Indian Environmental Policy, SDGs, Paris Agreement, Sustainability

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Climate change has emerged as one of the most pressing challenges confronting contemporary global society. Scientific assessments have consistently demonstrated that rising global temperatures, changes in precipitation patterns, melting glaciers, and increasing frequency of extreme weather events are significantly altering natural ecosystems across the world (IPCC, 2022). These transformations have profound implications for the governance and management of natural resources. In many parts of the world, environmental resources form the basis of economic activity and human survival, and therefore climate-induced changes in ecosystems can generate far-reaching social, political, and economic consequences (Stern, 2007).

India presents a particularly important case in the study of climate governance. The country's large population, diverse ecological regions, and rapidly growing economy create complex interactions between development and environmental sustainability. Natural resources play a vital role in supporting agricultural production, rural livelihoods, and industrial development (Dubash, 2013). At the same time, these resources are increasingly under pressure due to population growth, urbanisation, industrial expansion, and environmental degradation. Climate change further intensifies these pressures by altering ecological patterns and increasing the vulnerability of communities that depend on natural resources (IPCC, 2022).

The governance of natural resources in India has evolved significantly over the past few decades. Earlier approaches to environmental management often focused primarily on resource extraction and economic growth. However, growing awareness of environmental degradation and climate change has gradually led to the development of policy frameworks that emphasise sustainability and ecological resilience (Guha and Gadgil, 1995). The concept of climate-smart governance has emerged as an important framework within this broader transformation. Climate-smart governance refers to policy approaches that integrate climate adaptation, mitigation, and sustainable resource management within broader development strategies (Bulkeley and Newell, 2010). India has adopted several policies aimed at promoting climate-smart natural resource governance. These policies include national initiatives such as the National Action Plan on Climate Change and sector-specific policies related to water management, biodiversity conservation, and forest governance (Government of India, 2008).

At the same time, India's environmental policies are influenced by international agreements and global governance frameworks that seek to address climate change at the planetary level (Gupta, 2014). This paper explores the evolving landscape of climate-smart natural resource governance in India. It analyses the interaction between domestic policy frameworks and international environmental commitments, while also examining the institutional challenges that influence policy implementation. By situating India's environmental governance within both national and global contexts, the study aims to contribute to a deeper understanding of climate governance in developing countries (Dubash, 2013)

Literature Review

Elinor Ostrom's Book Governing the Commons

Ostrom challenges the traditional assumption that common resources inevitably suffer from overuse or "tragedy of the commons." Instead, she demonstrates through empirical case studies that local communities are capable of managing shared natural resources effectively when appropriate institutional arrangements are in place.

Her work emphasises the importance of decentralised governance, local participation, and institutional diversity in managing environmental resources. These insights are particularly relevant to climate governance because climate change impacts are often experienced locally, requiring adaptive management strategies and community-based decision-making.

Harriet Bulkeley and Peter Newell's Book Governing Climate Change

The authors argue that climate governance operates through a complex network of actors and institutions that extend beyond traditional state-centred frameworks. They highlight the role of international organisations, local governments, private sector actors, and civil society groups in shaping climate policy outcomes. According to Bulkeley and Newell, climate governance is inherently multi-level and involves interactions between local, national, and global institutions. This perspective is particularly useful for analysing India's climate governance framework, where national policies interact with international agreements and sub-national initiatives.

Navroz K. Dubash's Edited Volume Handbook of Climate Change and India: Development, Politics and Governance

This book brings together contributions from scholars, policymakers, and environmental activists to examine how India engages with climate change as both a developmental and environmental challenge. The volume argues that climate change debates in India have evolved from a focus on diplomatic negotiations to a broader discussion about domestic policy integration. Scholars contributing to the book emphasise that climate change policies in India must simultaneously address developmental priorities, energy security, and environmental sustainability. Dubash's work also highlights the importance of equity in global climate politics. India has historically argued that developed countries bear a greater responsibility for addressing climate change because they contributed most of the historical greenhouse gas emissions. At the same time, the book demonstrates that India increasingly recognises the domestic importance of climate mitigation and adaptation policies.

Scholars note that development strategies in India cannot ignore climate impacts, and therefore, policy integration between climate governance and economic development has become increasingly necessary.

Ramachandra Guha and Madhav Gadgil, **Book Ecology and Equity**

This work provides a historical and sociological analysis of environmental conflicts in India and argues that ecological degradation is often closely linked with issues of social inequality and resource distribution. The authors highlight how marginalised communities, including tribal populations and rural farmers, frequently bear the greatest burden of environmental degradation while benefiting the least from economic development. Their work introduces the concept of "environmental justice" within the Indian context and emphasises the need for policies that balance ecological sustainability with social equity.

Another important contribution by Ramachandra Guha is Environmentalism: A Global History. In this book, Guha traces the historical evolution of environmental movements across different regions of the world. He argues that environmentalism in developing countries often takes a different form compared to environmental movements in industrialised nations. While environmental movements in wealthy societies frequently focus on conservation and quality-of-life concerns, environmentalism in developing countries is often driven by livelihood issues such as access to forests, water, and land.

Guha's work, therefore, introduces the concept of "livelihood environmentalism," which is particularly relevant for understanding environmental governance in India. According to this perspective, environmental movements in India often arise from conflicts between local communities and large-scale development projects, such as mining, dam construction, and industrial expansion. These conflicts highlight the importance of integrating social justice considerations into environmental governance.

This Fissured Land: An Ecological History of Indiaby Madhav Gadgil and Ramachandra Guha

This book analyses how ecological systems in India have been shaped by political and economic transformations from the colonial period to the present. The authors argue that colonial policies significantly altered traditional resource management systems, leading to increased environmental degradation and social conflict. Their analysis provides important insights into the historical roots of contemporary environmental challenges in India.

Nicholas Stern's The Economics of Climate Change: The Stern Review

Stern's analysis demonstrates that climate change is fundamentally an economic issue because environmental degradation imposes high long-term costs on societies. He argues that early investment in climate mitigation and adaptation policies is economically beneficial because the costs of inaction are far greater than the costs of preventive measures. Stern's work has significantly influenced global climate policy discussions and provides an economic rationale for climate governance.

Research Methodology

This study adopts a qualitative research methodology to examine the evolving framework of climate-smart natural resource governance in India. Qualitative methods are particularly appropriate for analysing policy frameworks, institutional arrangements, and governance processes because they enable a deeper understanding of complex socio-political dynamics that shape environmental policymaking. Climate governance is not merely a technical issue; rather, it involves interactions between political institutions, economic interests, environmental knowledge, and social actors. Therefore, a qualitative approach allows the researcher to interpret these relationships within their broader political and institutional contexts. The research design is primarily based on policy analysis and secondary data. The study systematically examines major policy documents related to climate change and natural resource governance in India.

These include the National Action Plan on Climate Change (NAPCC), State Action Plans on Climate Change (SAPCCs), the National Biodiversity Action Plan, the National Water Policy, and other relevant environmental governance frameworks issued by the Government of India. These documents provide insights into the objectives, institutional mechanisms, and implementation strategies that guide climate governance in the country. Policy document analysis allows the study to evaluate how climate considerations have been integrated into national development planning and environmental management strategies. In addition to government policy documents, the research also relies on secondary sources such as scholarly books, peer-reviewed journal articles, and reports published by international organisations. Academic literature provides theoretical perspectives on climate governance, environmental policy, and natural resource management. Works by scholars such as Elinor Ostrom, Navroz K. Dubash, Ramachandra Guha, and Harriet Bulkeley provide important conceptual frameworks for understanding the relationship between governance institutions and environmental sustainability. Furthermore, reports published by international organisations, including the Intergovernmental Panel on Climate Change (IPCC), the United Nations Framework Convention on Climate Change (UNFCCC), and the World Bank, provide empirical data and global policy perspectives that help situate India's climate policies within a broader international context.

The analytical framework used in this study focuses on three major dimensions of climate-smart natural resource governance. The first dimension involves policy design, which refers to the objectives, strategies, and institutional mechanisms embedded within climate-related policies. By analysing policy documents, the study identifies the key goals and priorities guiding India's climate governance framework. The second dimension concerns institutional coordination, which examines how different governmental agencies, ministries, and administrative levels interact in the process of policy implementation. Climate governance often involves multiple sectors such as energy, agriculture, water, and forestry; therefore, effective coordination among institutions is essential for successful policy outcomes.

The third dimension focuses on policy implementation and governance challenges, including issues related to institutional capacity, scientific integration, and community participation. A comparative analytical perspective is also employed to examine the relationship between India's domestic policy frameworks and global environmental governance systems. International agreements such as the Paris Agreement, the Sustainable Development Goals (SDGs), and the Convention on Biological Diversity (CBD) serve as important reference points for evaluating India's climate governance strategies. By comparing national policies with global frameworks, the study identifies areas of policy convergence as well as gaps that may affect implementation effectiveness.

Policy Frameworks and Global Environmental Governance in India

India's response to climate change and environmental challenges has gradually evolved through a combination of domestic policy initiatives and engagement with international environmental governance frameworks. As one of the largest developing economies and a country highly vulnerable to climate change impacts, India faces the complex task of balancing economic development with environmental sustainability (IPCC, 2022). Over the past two decades, the Indian government has adopted several policy frameworks aimed at promoting sustainable natural resource management, climate resilience, and ecological protection. At the same time, India has actively participated in global environmental governance processes that shape international climate policy and cooperation (Gupta, 2014). One of the most significant policy initiatives introduced by the Government of India is the National Action Plan on Climate Change (NAPCC), launched in 2008. The NAPCC represents the central pillar of India's climate governance architecture and outlines the country's strategy for addressing climate change through a combination of mitigation and adaptation measures (Government of India, 2008). The plan is structured around eight national missions that focus on different sectors of the economy and environment. These missions include the National Solar Mission, the National Mission for Enhanced Energy Efficiency, the National Water Mission, the National Mission for Sustainable Agriculture.

The National Mission for Sustaining the Himalayan Ecosystem, the Green India Mission, the National Mission on Sustainable Habitat, and the National Mission on Strategic Knowledge for Climate Change. Together, these missions seek to promote renewable energy development, improve resource efficiency, enhance ecosystem protection, and strengthen climate research and knowledge systems (Dubash, 2013). A distinctive feature of India's climate governance framework is the emphasis on decentralisation through the development of State Action Plans on Climate Change (SAPCCs). Recognising that climate impacts vary significantly across different regions of the country, the central government encouraged individual states to formulate their own climate strategies based on local environmental conditions and socio-economic priorities (Government of India, 2014).

SAPCCs allow state governments to identify specific vulnerabilities, develop adaptation strategies, and integrate climate considerations into regional development planning. This decentralised approach reflects the federal structure of India's political system and highlights the importance of multi-level governance in addressing climate challenges (Bulkeley and Newell, 2010). In addition to climate-specific policies, India has also developed policy frameworks focused on the conservation and sustainable use of biodiversity and natural ecosystems. The Biological Diversity Act of 2002 established institutional mechanisms for biodiversity conservation and created bodies such as the National Biodiversity Authority and State Biodiversity Boards. These institutions aim to regulate access to biological resources, promote conservation initiatives, and ensure equitable sharing of benefits derived from biodiversity (Government of India, 2014). Biodiversity protection plays a critical role in climate resilience because healthy ecosystems provide essential services such as carbon sequestration, soil conservation, and water regulation (Guha, 2000). Water governance is another crucial component of India's natural resource management strategy. Climate change is expected to significantly affect water availability in India through changes in rainfall patterns, increased frequency of droughts, and melting of Himalayan glaciers (IPCC, 2022).

In response, the National Water Policy emphasises integrated water resource management and sustainable utilisation of water resources (Government of India, 2012). The policy encourages efficient water use in agriculture and urban sectors, promotes watershed management, and supports rainwater harvesting initiatives. These measures aim to enhance water security while addressing the environmental impacts of climate change.India's environmental policies is closely connected with international climate governance frameworks. The country has actively participated in global climate negotiations and is a signatory to several major international environmental agreements. Among these, the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) represents the most important global framework for addressing climate change (UNFCCC, 2015).

Adopted in 2015, the Paris Agreement aims to limit global temperature rise and promote climate resilience through international cooperation. India has committed to reducing the emissions intensity of its economy and expanding the share of renewable energy in its energy mix as part of its nationally determined contributions (NDCs) under the agreement (Dubash, 2013). Another important international framework influencing India's environmental policies is the United Nations Sustainable Development Goals (SDGs). The SDGs provide a comprehensive global agenda for sustainable development, covering issues such as poverty reduction, environmental protection, and economic growth (United Nations, 2015). Several of the SDGs are directly linked to climate governance and natural resource management, including SDG 6 (Clean Water and Sanitation), SDG 13 (Climate Action), SDG 14 (Life below Water), and SDG 15 (Life on Land). India has integrated many of these goals into its national development planning processes, reflecting the interconnected nature of climate policy and sustainable development.India is also a party to the Convention on Biological Diversity (CBD), which aims to promote the conservation of biodiversity, sustainable use of biological resources, and equitable sharing of benefits arising from genetic resources (CBD, 2010). Through its national biodiversity policies and conservation programs, India seeks to fulfil its commitments under this international agreement.

Challenges in Climate-Smart Natural Resource Governance

Despite the development of comprehensive policy frameworks aimed at addressing climate change and promoting sustainable resource management, India continues to face several challenges in implementing effective climate-smart natural resource governance. One of the most significant challenges is institutional fragmentation. Environmental governance in India involves multiple ministries and governmental agencies, including the Ministry of Environment, Forest and Climate Change, the Ministry of Agriculture, the Ministry of Water Resources, and the Ministry of New and Renewable Energy. While each of these institutions plays an important role in environmental policy implementation, coordination among them is often limited. Overlapping mandates and administrative complexities sometimes lead to inefficiencies in policy execution and hinder the development of integrated environmental strategies.Another major challenge relates to the gap between policy formulation and implementation. Although India has introduced several ambitious environmental policies and climate action plans, the effectiveness of these initiatives often depends on the administrative capacity of state governments and local institutions. In many cases, limited financial resources, lack of technical expertise, and bureaucratic constraints reduce the effectiveness of climate-related programs at the local level.

This implementation gap is particularly evident in sectors such as water management, forest conservation, and agricultural adaptation, where policies require sustained coordination between multiple stakeholders. The integration of scientific knowledge into policymaking also remains a critical issue. Climate change is a complex phenomenon that requires continuous monitoring, data collection, and scientific analysis. While India possesses strong scientific institutions and research organisations, there is often a disconnect between scientific research and policy decision-making. Policymakers may not always have access to the most recent climate data or may face difficulties translating scientific findings into practical governance strategies. Strengthening the science-policy interface is therefore essential for improving climate governance.

Social and economic inequalities further complicate climate-smart natural resource governance in India. Many rural communities, including small farmers, pastoralists, and tribal populations, depend directly on natural resources for their livelihoods. Climate change increases the vulnerability of these communities by affecting agricultural productivity, water availability, and ecosystem stability. However, policy frameworks sometimes fail to adequately incorporate the perspectives and knowledge of local communities. Without meaningful participation of local stakeholders, environmental policies may encounter resistance or fail to achieve their intended outcomes.Another challenge concerns balancing economic development with environmental sustainability. India's rapid economic growth has led to increased demand for energy, infrastructure, and industrial expansion. While development is essential for poverty reduction and economic progress, it can also place additional pressure on natural resources. Large-scale infrastructure projects, mining activities, and urban expansion sometimes lead to deforestation, land degradation, and biodiversity loss. Policymakers must therefore navigate complex trade-offs between development priorities and environmental protection.

Policy Recommendations and Future Prospects

Addressing the challenges associated with climate-smart natural resource governance in India requires a comprehensive and integrated policy approach. One of the most important priorities is strengthening institutional coordination among different governmental agencies responsible for environmental governance. Establishing more effective mechanisms for inter-ministerial collaboration can help ensure that climate policies are implemented in a coherent and coordinated manner. Integrated policy planning that links sectors such as agriculture, water management, energy, and forest conservation would enable policymakers to address environmental challenges more effectively. Another important recommendation is improving the integration of scientific research into policymaking processes. Strengthening the science-policy interface can enhance the quality of environmental decision-making and ensure that policies are based on reliable data and evidence.

This may involve greater collaboration between government institutions, academic researchers, and scientific organisations. Expanding climate monitoring systems, investing in environmental research, and improving access to climate data can significantly enhance the effectiveness of climate governance. Enhancing the role of local communities in natural resource governance is also essential. Community participation has long been recognised as a critical component of sustainable resource management. Local communities possess valuable traditional knowledge about ecosystems and resource use practices that can contribute to climate adaptation strategies. Encouraging participatory governance through community-based forest management, watershed management programs, and local biodiversity initiatives can improve the sustainability and legitimacy of environmental policies. Financial resources and institutional capacity must also be strengthened to support climate adaptation and mitigation efforts. Many climate-related initiatives require significant investments in infrastructure, technology, and capacity building. Increasing financial support for climate programs, particularly at the state and local levels, can help ensure effective policy implementation. International climate finance mechanisms and partnerships with global institutions may also provide additional support for India's climate initiatives.

Conclusion

Climate change has increasingly emerged as one of the most significant environmental and developmental challenges confronting contemporary societies. Its impacts extend far beyond ecological systems and affect economic development, social stability, and political governance. For a country like India, where a large segment of the population depends directly on natural resources such as forests, water, agricultural land, and biodiversity for their livelihoods, climate change poses serious risks to sustainable development. In this context, the governance of natural resources has become closely linked with climate adaptation and mitigation strategies. Climate-smart natural resource governance therefore represents an essential framework for addressing environmental challenges while ensuring long-term socio-economic resilience.

This study has examined the evolving landscape of climate-smart natural resource governance in India by analysing the interaction between domestic policy frameworks and global environmental governance systems. The analysis demonstrates that India has made significant progress in developing policy initiatives aimed at integrating climate considerations into environmental governance. Policies such as the National Action Plan on Climate Change, State Action Plans on Climate Change, biodiversity conservation frameworks, and water governance strategies reflect the growing recognition within the Indian policy system that environmental sustainability must be incorporated into development planning. The study also highlights the role of international environmental governance frameworks in shaping India's climate policies. Global agreements such as the Paris Agreement, the Sustainable Development Goals, and the Convention on Biological Diversity provide important normative and institutional frameworks that influence national policy approaches.

India's engagement with these global initiatives demonstrates the interconnected nature of environmental governance, where domestic policy strategies are increasingly influenced by international cooperation and global climate commitments. However, the analysis also reveals that several challenges continue to affect the effectiveness of climate-smart natural resource governance in India. Institutional fragmentation, coordination gaps among government agencies, limited integration of scientific knowledge into policymaking, and insufficient participation of local communities remain important barriers to effective policy implementation. In addition, the need to balance economic development with environmental sustainability continues to create complex policy dilemmas, particularly in sectors such as energy production, infrastructure development, and industrial expansion. Addressing these challenges requires a comprehensive and integrated approach to environmental governance. Strengthening institutional coordination among ministries and administrative levels can improve the coherence and effectiveness of climate policies. Enhancing the science-policy interface will enable policymakers to utilise scientific knowledge more effectively in designing climate adaptation and mitigation strategies.

Equally important is the need to promote inclusive governance by encouraging greater participation of local communities in natural resource management. Community-based approaches can improve both the legitimacy and sustainability of environmental policies. Looking ahead, climate-smart natural resource governance will play a crucial role in shaping India's development trajectory in the coming decades. As climate change continues to intensify environmental pressures, the need for adaptive and resilient governance systems will become increasingly important. By integrating environmental sustainability into development planning and strengthening its engagement with global environmental governance frameworks, India has the potential to contribute significantly to international efforts aimed at addressing climate change while safeguarding its own ecological and socio-economic future.

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