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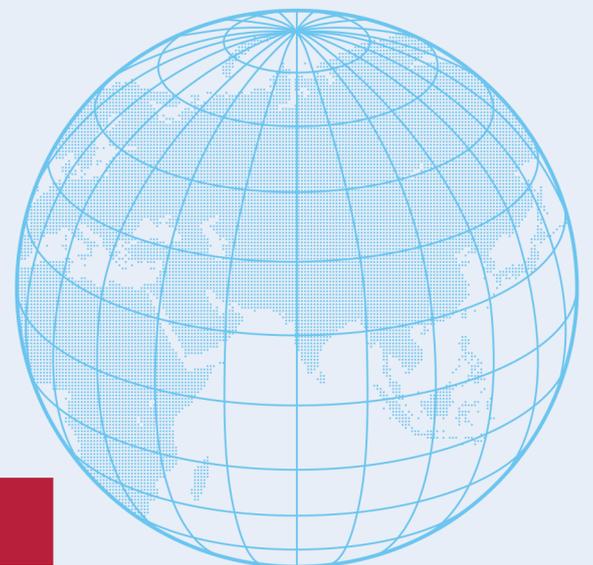
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Climate Change Governance in India

Building the Institutional Framework

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Designed by Mukesh Rawat

Climate Change Governance in India

Building the Institutional Framework

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Table of Contents

List of Abbreviations	5
Executive Summary	7
1. India's Global Commitments	9
1.1 Net Zero Emissions by 2070	9
1.2 Intermediate Targets for 2030	9
1.3 Sustainable Development Goals (SDGs).....	9
1.4 Mobilising Climate Finance	9
1.5 Enhanced Resilience and Adaptation	9
2. India's Federal Structure for Climate Change	9
2.1 Evolving but Uncoordinated Climate Institutions	10
2.2 Absence of Formal Climate Legislation	11
2.3 Constitutional Division of Powers in Climate Governance.....	11
2.4 Need for Institutional Coordination and Deliberation.....	11
3. International Evidence	11
3.1 Germany	13
3.2 Canada.....	13
3.3 Australia	13
3.4 United States.....	14
3.5 Switzerland	14
3.6 Brazil	14
3.7 Indonesia	15
3.8 South Africa	15
3.9 China	15
3.10 New Zealand	16
3.11 Key Takeaways for India	17
3.12 Conclusion	20
4. Specific Proposals for India's Institutional Structure	21
4.1 Establish a Clear Legal Framework for Climate Action	21
4.2 Strengthen the Role of State Governments.....	22
4.3 Enhance Coordination Mechanisms.....	22
4.4 Legal Mandates for Financial Mechanisms	23
4.5 Accountability and Transparency	23
4.6 Public Participation and Rights-Based Approach	23
4.7 Legal Support for Mitigation and Adaptation	24
4.8 Capacity Building and Knowledge Sharing	24
4.9 Legal Mechanisms for Conflict Resolution	24
4.10 Long-Term Monitoring and Legislative Review	25
4.11 Conclusion	25
5. Building a Green Public Finance Management Structure	25
5.1 Key Elements of a Green PFM Framework	25
5.2 Implementing Green PFM Practices: International Examples	27
5.3 Progress in Indian States and Institutions	27
5.4 Recommendations for India	27
5.5 Conclusion	28
6. Role of the Finance Commission in India	28
6.1 Strengthening the Forest Cover Criterion in Fiscal Transfers	29
6.2 A Legislative Mandate for Climate Action	29
6.3 International Experience	29
6.4 The Future Role of India's Finance Commission.....	30
6.5 Conclusion	30
7. Summary and Conclusions.....	30
7.1 Key Elements of a Strengthened Climate Framework	30
7.2 Conclusion	31
References	32
Appendix 1: Countries with Climate Framework Laws	35
Appendix 2: Summary Classification of Indian States: Climate Readiness, Mitigation Urgency	38

List of Abbreviations

Institutions and Government Bodies

AIPA	Apex Committee for the Implementation of the Paris Agreement
BMWK	Federal Ministry for Economic Affairs and Climate Action (Germany)
BNDES	Brazilian Development Bank (<i>Banco Nacional de Desenvolvimento Econômico e Social</i>)
CAG	Comptroller and Auditor General of India
CCC	Climate Change Commission (New Zealand)
CEEW	Council on Energy, Environment and Water
CEFC	Clean Energy Finance Corporation (Australia)
CO₂ Act	Swiss Climate Change Act
CSE	Centre for Science and Environment
DAK	Dana Alokasi Khusus (Indonesia)
DAK Lingkungan Hidup	Special Allocation Fund for the Environment (Indonesia)
DFFE	Department of Forestry, Fisheries, and the Environment (South Africa)
ECCC	Environment and Climate Change Canada
EEG	Renewable Energy Sources Act (Germany)
EPA	Environmental Protection Agency (United States)
ERF	Emissions Reduction Fund (Australia)
FC	Finance Commission of India
FOEN	Federal Office for the Environment (Switzerland)
IDB	Inter-American Development Bank
iCED	International Centre for Environment Audit and Sustainable Development
ICRIER	Indian Council for Research on International Economic Relations
IRA	Inflation Reduction Act (United States)
IMF	International Monetary Fund
INTOSAI	International Organization of Supreme Audit Institutions
IPCC	Intergovernmental Panel on Climate Change
JETP	Just Energy Transition Partnership (South Africa)
MEE	Ministry of Ecology and Environment
MoEFCC	Ministry of Environment, Forest and Climate Change (India)
NIPFP	National Institute of Public Finance and Policy
NSCCC	National Steering Committee on Climate Change
NZCCC	New Zealand Climate Change Commission
PMCCC	Prime Minister's Council on Climate Change (India)
RBI	Reserve Bank of India
SFC	State Finance Commission
TNGCC	Tamil Nadu Green Climate Company
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WGEA	Working Group on Environmental Audit

Climate Finance Mechanisms and Policies

CAPs	Climate Action Plans
CDM	Clean Development Mechanism
EFT	Ecological Fiscal Transfers
ETS	Emissions Trading System
ICMS Ecológico	Brazilian Ecological Value-Added Tax Transfer System
IGFT	Intergovernmental Fiscal Transfers
NAPCC	National Action Plan on Climate Change (India)
NAFCC	National Adaptation Fund on Climate Change (India)
NGT	National Green Tribunal
NKI	National Climate Initiative (Germany)
OBPS	Output-Based Pricing System
PFM	Public Financial Management
PIM	Public Investment Management
PNMC	National Policy on Climate Change (Brazil)
RGGI	Regional Greenhouse Gas Initiative (United States)
SAPCCs	State Action Plans on Climate Change (India)

Climate Governance and Monitoring Tools

CAT	Climate Action Tracker
CPI	Climate Policy Index
NDCs	Nationally Determined Contributions
SDGs	Sustainable Development Goals
SOEs	State-Owned Enterprises
ZBNF	Zero Budget Natural Farming

“Despite governmental policy and rules and regulations recognising the adverse effects of climate change and seeking to combat it, there is no single or umbrella legislation in India which relates to climate change and the attendant concerns.”¹

Executive Summary

The paper provides a comprehensive overview of India’s evolving framework for climate change governance, assessing India’s federal structure and proposing strategies for enhancing institutional support and coordination for climate action.² As India has committed to ambitious international goals, this study outlines the need for a robust domestic framework to achieve these commitments. While India’s climate commitments are in line with international targets, addressing localised vulnerabilities remains a challenge. Adaptation strategies should include state-specific climate initiatives tailored to the unique vulnerabilities of each region. For example, instituting climate-adaptation scorecards can aid in tracking state-level progress on climate action while ensuring that fiscal mechanisms prioritise high-risk regions such as flood-prone Assam or drought-affected Maharashtra. The framework must empower subnational governments to adapt to regional climate risks, foster resilience, and ensure accountability through measurable indicators such as climate-adaptation scorecards and appropriate fiscal mechanisms.

India’s Global Climate Commitments and Domestic Challenges

India has pledged to reduce emissions intensity by 45% from 2005 levels, achieve 500 GW of renewable capacity by 2030, and rely on renewables for 50% of energy needs. However, India’s centralised federal structure presents unique challenges, with the union government controlling significant resources, while states handle critical areas like water, agriculture, and electricity distribution.

Despite existing institutions like the Ministry of Environment, Forest and Climate Change (MoEFCC) and the Prime Minister’s Council on Climate Change (PMCCC) being designated as key drivers of national climate policy, their functioning has faced challenges.

The MoEFCC, while leading India’s climate negotiations and overseeing the National Action Plan on Climate Change (NAPCC), has experienced limited inter-ministerial coordination and engagement with states.

Similarly, the PMCCC, which was intended to serve as a high-level coordinating body, has seen irregular meetings and has not used its mandate to address the complex demands of climate governance.

The Apex Committee for the Implementation of the Paris Agreement (AIPA) is relatively new and plays a more specific role—focusing on implementing India’s Nationally Determined Contributions (NDCs) under the Paris Agreement. While it coordinates across ministries at the national level, AIPA does not currently have a strong framework for state-level coordination, a key gap in India’s federal structure for climate governance.

In addition, the lack of formal climate legislation and reliance on sector-specific laws, such as the Electricity Act of 2003, underscores the need for a cohesive legal framework to integrate climate goals across sectors and enhance the effectiveness of existing institutions (Dubash & Pillai, 2023).

Proposed Institutional Framework for India

Drawing on lessons from international models and recommendations from experts, the paper explores how India can apply fiscal federalism principles to empower states while maintaining national coherence.

Key proposals include:

- **National Climate Law:** To bolster climate action, the paper recommends a national climate law establishing clear roles across union, state, and local levels.
- **Institutionalised Coordination:** A central coordinating institution, either through a better-mandated existing institution (such as the PMCCC) or by forming a permanent intergovernmental council, is urgently needed to align climate action across different levels of government, address cross-state challenges, and facilitate cooperative governance.
- **Decentralised Implementation:** Empowering states to tailor climate policies to local conditions

¹ The Supreme Court of India’s judgement on climate change and human rights in *M.K. Ranjitsinh and Others vs Union of India and Others* on March 21, 2024.

² Among many others, we are grateful for comments from Vinod Thomas and Muthukumara Mani.

while aligning with national goals. Decentralisation is particularly effective for adaptation measures, as states and subnational entities are better positioned to address localised climate impacts. However, centralised regulation is essential for mitigation efforts to prevent free-ridership and ensure coherence in achieving national and global emissions reduction targets.

- **Climate Finance Allocation:** Establishing a dedicated Climate Fund to support state-led projects, with performance-based incentives for achieving emissions targets and investments in green innovation (Yilmaz & Zahir, 2022).
- **Role of the Finance Commission:** To become a key player in climate policy implementation and act as a bridge between policy and funding gaps, India's Finance Commission could expand its mandate to integrate environmental considerations into fiscal policy more comprehensively. Performance-based grants should reward states and localities for measurable climate outcomes, such as renewable energy installation or emissions reduction.
- **Carbon Pricing Framework:** Adopting a dual structure that combines an Output-Based Pricing System (OBPS) for industries with flexible, consumer-facing carbon pricing. As highlighted by international best practices, trade auctions using absolute emissions pricing rather than intensity-based benchmarks provide clearer financial incentives for reductions and robust market signals for industries. This approach promotes emissions intensity reduction without overly burdening firms while allowing states to innovate within a unified national policy.
- **Transparency and Accountability:** Requiring state-level reporting and independent audits, such as those led by the Comptroller and Auditor General (CAG), to track and verify climate spending and ensure transparency. In addition, an integrated climate expenditure dashboard should provide real-time insights into the usage of climate funds and their effectiveness, improving accountability and transparency.
- **Public Participation:** Strengthening grassroots engagement in climate planning, learning from successful state-level initiatives like Tamil Nadu's renewable energy leadership and Assam's flood management strategies.

Building Green Public Financial Management (PFM)

To integrate climate goals within India's fiscal strategy, the paper recommends adopting green PFM practices, which include:

- **Climate-Responsive Budgeting:** Expanding climate tagging and expenditure reviews to align resources with mitigation and adaptation goals.
- **Tracking and Monitoring Green Expenditures:** Leveraging tools to track environmental spending efficiently, inspired by models from Denmark and France.
- **Embedding Climate Risk into Public Investments:** Incorporating climate adaptation and mitigation criteria into public investment management, as seen in Peru and Brazil.

India has already made significant progress in this area:

- **Green Budgets:** States like Odisha and Assam have pioneered climate-responsive budgeting practices, directing resources towards disaster management and green infrastructure.
- **Capacity Building:** The International Centre for Environment Audit and Sustainable Development iCED in Jaipur has become a regional hub for building audit capacity on climate-related expenditures, under the leadership of the CAG.

These successes provide a strong foundation for scaling green PFM practices nationwide.

Framework

For India to achieve its ambitious climate goals, a comprehensive legal and institutional framework is essential. This paper offers a roadmap to integrate climate action across the three tiers of government. Any potential framework must also empower states and foster transparent governance. A decentralised yet unified approach, supported by a national climate law, with formal mechanisms of coordination, carefully designed incentives, a carbon pricing system (including absolute pricing in trade auctions), and the necessary transparency and accountability across the tiers of government will strengthen India's capacity to respond to climate challenges while also ensuring sustainable development. By building on state-level progress and integrating green PFM practices, India can create precisely such a cohesive and effective climate governance structure.

1. India's Global Commitments

India has made critical and relatively ambitious global commitments to achieving net zero by 2070, with milestones on the path towards this target to enhance renewable energy use and decrease carbon intensity by 2030.³ India has committed to balancing economic growth with environmental sustainability, focusing on phased transitions across various sectors.

1.1 Net Zero Emissions by 2070

India aims to reach net-zero greenhouse gas emissions by 2070, balancing emissions with removals. This commitment aligns with the Paris Agreement, aiming to limit global temperature rise to well below 2°C, with efforts towards 1.5°C.

1.2 Intermediate Targets for 2030

India is targeting a reduction in its emissions intensity (emissions per unit of GDP) by 45 percent from 2005 levels by 2030. India also aims to achieve 500 GW of non-fossil fuel-based installed power capacity. This includes solar, wind, hydro, and nuclear power expansion (Asian Development Bank, 2024; Grantham Research Institute, 2019). It intends to meet 50 percent of its energy requirements from renewable sources. It is estimated that this will further advance the transition to a low-carbon economy and lower cumulative projected carbon emissions by approximately 1 billion tonnes.

1.3 Sustainable Development Goals (SDGs)

India's strategy involves gradually reducing its coal dependence and increasing investments in renewable energy, electric mobility, and energy efficiency (Thomas, 2023). Increasing carbon sinks through reforestation and forest management, contributing to its net-zero targets by increasing natural carbon sequestration, would help achieve the SDGs. Investment in green technologies, including hydrogen, battery storage, and carbon capture, would facilitate the transition.

1.4 Mobilising Climate Finance

Achieving net zero will require substantial investments in clean energy infrastructure. India is actively seeking both domestic and international climate finance to support these efforts. Another method is to leverage public-private partnerships to drive innovation and scale renewable energy projects.

1.5 Enhanced Resilience and Adaptation

India's net-zero objectives also need to include strengthening resilience to climate impacts through adaptation initiatives, particularly in vulnerable sectors such as agriculture, water resources, and coastal areas. Efforts are also being made to utilise community-led and ecosystem-based approaches to enhance local resilience initiatives.

These international commitments need to be complemented by a comprehensive domestic climate policy framework to drive action. In its absence, the lack of enforceable legal mandates across the different levels of government is a significant gap (Dubash et al., 2024). A driver for change in this direction should come from the recent Supreme Court formulation of a new constitutional right to be free from the adverse effects of climate change (Kumar & Naik, 2024).

2. India's Federal Structure for Climate Change

India's federal structure presents unique challenges for climate governance, as it is highly centralised, with the federal government holding significant fiscal, bureaucratic, and jurisdictional powers compared to more decentralised federations. However, the reality is that Indian states effectively bear responsibility for critical areas tied to climate action, such as water management, healthcare, and the electricity sector, which is heavily reliant on fossil fuels. This duality necessitates carefully building mechanisms for cooperation between the union and state levels that recognise regional differences while ensuring cohesive governance for national climate goals.

³ These goals listed in this section are contained in a number of official documents, notably in Government of India (2021), Ministry of Power (2022), Ministry of Environment, Forest and Climate Change (2023), Ministry of Finance (2022), and in international reports such as United Nations (2021), International Energy Agency (2022), United Nations Framework Convention on Climate Change (2021), International Renewable Energy Agency (2023), and United Nations Development Programme (2022).

2.1 Evolving but Uncoordinated Climate Institutions

India has, over time, created some institutions and practices to respond to climate demands. However, these efforts still lack coordination. As Pillai and Dubash (2023) emphasise, in this situation, policies tend to be transient without clear links to overarching climate goals, which reflects a broader issue of centralised dominance in Indian climate federalism.

One such institution is the Prime Minister's Council on Climate Change (PMCCC), established in 2008. The PMCCC was designed to oversee India's climate agenda at the highest level, providing direction for national programmes and ensuring the integration of climate considerations into the broader development agenda:

- **Role in Overseeing the NAPCC and SAPCCs:** The PMCCC supervises the National Action Plan on Climate Change (NAPCC) and its eight flagship missions, including the National Solar Mission, National Mission for Enhanced Energy Efficiency, and National Water Mission. It ensures that these missions work towards India's long-term goals for sustainable development and also climate-related goals. It also serves as an important mechanism for linking national policies to State Action Plans on Climate Change (SAPCCs) by providing financial and technical guidance to align state and central priorities (Dubash et al., 2021).
- **Inter-Ministerial Coordination:** Chaired by the Prime Minister, the PMCCC includes senior cabinet ministers, academics, and domain experts, making it a critical platform for inter-ministerial coordination on climate policy. Members include the Ministers of Power, Environment, Agriculture, and others, ensuring collaboration across key sectors to address the multifaceted challenges of climate change (Government of India, 2021).
- **International and National Climate Strategy:** The PMCCC has played an important role in shaping India's positions in international climate negotiations, including its commitments under the Paris Agreement. At the national level, it has sought to balance climate priorities with developmental imperatives, emphasising the co-benefits approach in areas like renewable energy, forest management, and disaster resilience.

Despite its significant mandate, the PMCCC has suffered from irregular meetings, a lack of consistent follow-up mechanisms, and limited state-level engagement. To address these challenges, it is necessary to institutionalise more regular interactions, strengthen its monitoring and evaluation role, and create platforms for better inclusion of state governments and civil society.

Another pivotal institution is the Ministry of Environment, Forest and Climate Change (MoEFCC), which acts as the nodal agency for formulating and implementing India's climate policies. The MoEFCC is responsible for coordinating the country's compliance with international climate commitments, including the Paris Agreement, and managing domestic frameworks such as the NAPCC. The MoEFCC oversees key programmes like the NAPCC, the Green India Mission, and the National Adaptation Fund on Climate Change (NAFCC). It also plays a vital role in framing state-level guidance for SAPCCs, ensuring synchronisation between national and subnational climate action strategies (Ahluwalia & Patel, 2023). It represents India in global climate forums such as the United Nations Framework Convention on Climate Change (UNFCCC) and provides technical and legal inputs for negotiating international agreements. It is also fundamental to tracking and reporting India's Nationally Determined Contributions (NDCs) (Chen et al., 2022). Through initiatives like the Climate Change Knowledge Network and collaboration with academic institutions, the MoEFCC fosters research, knowledge sharing, and capacity building. It has also engaged with stakeholders to promote climate awareness and innovation, particularly in renewable energy and biodiversity conservation (Government of India, 2021).

While the MoEFCC has made notable strides in advancing India's climate agenda, its limited budgetary allocation, understaffing, and challenges in engaging with states hinder its ability to scale up its initiatives. Strengthening the MoEFCC's institutional capacity and expanding its mandate to address emerging climate risks are critical steps for improving India's climate governance framework.

The Apex Committee for the Implementation of the Paris Agreement (AIPA) is relatively new and plays a more specific role—focusing on India's NDCs under the Paris Agreement. While it coordinates across ministries at the national level, AIPA does not currently have a strong framework for state-level coordination, a key gap in India's federal structure for climate governance.

2.2 Absence of Formal Climate Legislation

India currently lacks formal climate legislation at both the union and state levels. Significant political milestones, such as the ratification of the Paris Agreement, have not catalysed substantial legislative changes, either by enacting new laws or amending existing ones to incorporate climate considerations (Dubash, 2024). Climate action has instead been pursued within existing legislative frameworks, including the Electricity Act of 2003 and the Energy Conservation Act of 2001 (Dubash & Ghosh, 2019). However, as Dubash (2024) notes, this reliance on sector-specific laws leads to inconsistencies and gaps in governance. A comprehensive climate framework law, similar to those in Germany and Canada, could integrate climate considerations across the government (Grantham Research Institute, 2019).

2.3 Constitutional Division of Powers in Climate Governance

The division of powers outlined in the Constitution (particularly in Schedule VII) assigns significant roles in climate governance to both the Centre and the states. This has resulted in a difficult mix of central direction and state-driven initiatives. The Constitution grants the union government authority over key sectors relevant to climate action, such as mining, petroleum, industry, and interstate waters, and the 42nd Amendment moved forests and wildlife to the Concurrent List, allowing both tiers of government to legislate on these matters. However, critical aspects of climate governance, including local governance, agriculture, and water resources, remain primarily within the jurisdiction of the states. As Pillai and Dubash (2023) have pointed out, national schemes and legislation have frequently influenced state actions in these areas. The electricity sector, which accounts for a significant portion of India's emissions, is an area of concurrent jurisdiction, with the union government setting broad frameworks and states exercising discretion within those parameters. In summary, while states play a major role in adaptation and mitigation, the overarching structure of Indian federalism often reinforces central dominance in climate governance.

2.4 Need for Institutional Coordination and Deliberation

This asymmetry in legal and fiscal powers underscores the importance of institutional forums for consensus-building on climate governance. Current climate-specific interactions are primarily mediated by the National Steering Committee on Climate Change (NSCCC), a body comprising senior bureaucrats from the Centre and some state representatives. As Pillai and Dubash (2023) have pointed out, the NSCCC serves more as a mechanism for ensuring “uniformity and coherence” in SAPCCs, guiding individual projects, and approving funding allocations.

In addition to the NSCCC, there are other forums that are not climate-specific but whose decisions could influence climate outcomes. These include the annual meeting of energy ministers, the Forum of Regulators for electricity policy, and the Inter-State Council, which, while currently relatively inactive, could play a significant role in addressing interstate climate challenges. However, the lack of a dedicated platform for climate policies limits the potential for strategic climate governance (Dubash & Pillai, 2023).

3. International Evidence

India can draw lessons from several countries that have used fiscal federalism to coordinate climate action across the government. Each country has unique strategies and institutions suited to its federal structure, helping to manage the complex interaction of national, regional, and local climate policies. The Climate Action Tracker (CAT) exercise provides key insights into the successes and challenges of global climate governance frameworks.⁴

As highlighted by the Grantham Research Institute (2019), there is a clear need for countries to adopt an overarching “framework law” that aims to be both comprehensive and unifying. Such a framework law would set the legal context for other laws and policies and provide the basis for local government, business, and community action on climate change.⁵ At the same time, to be effective, such framework climate

⁴ <https://climateactiontracker.org/>

⁵ The Intergovernmental Panel on Climate Change (IPCC) reports that by 2020, 56 countries had passed laws with the objective of limiting greenhouse gases, covering 53% of emissions. Since then, the number of countries has substantially increased (Appendix 1).

laws need to be carefully tailored to the national context. However, international experience also suggests that having a dedicated climate ministry does not necessarily resolve coordination challenges.⁶ In many countries with climate-specific ministries, such as Germany, Canada, and South Africa, there remain difficulties in aligning national and subnational priorities, coordinating across economic sectors, and integrating climate targets within broader development plans. For instance, Canada’s federal climate ministry, Environment and Climate Change Canada (ECCC), has struggled with provincial opposition to national carbon pricing, while South Africa’s Department of Forestry, Fisheries, and the Environment (DFFE) faces gaps in financial support and inter-agency coordination. Even Germany, which has one of the most structured climate ministries (Federal Ministry for Economic Affairs and Climate Action [BMWK]), faces challenges in aligning state (Länder) policies with federal emissions targets, particularly in energy and transportation.

Thus, while a dedicated climate ministry can provide institutional focus, its effectiveness is dependent on how well it coordinates with other ministries, state

and local governments, and national planning bodies. Countries that have improved coordination, such as New Zealand and Switzerland, have done so through strong intergovernmental councils and independent oversight institutions. These lessons can help India design a governance structure that maximises efficiency while avoiding coordination pitfalls.

Assessments like the CAT (2023; Table 1) offer additional insights into the performance of countries in meeting their Paris Agreement goal of limiting global warming to 1.5°C—categorising countries into five performance levels: “compatible,” “almost sufficient,” “insufficient,” “highly insufficient,” and “critically insufficient” (Table 1). These ratings emphasise the importance of aligning domestic action in line with international commitments. Notably, countries with advanced climate frameworks and coordinated subnational action tend to perform better, while others (including India) require ambitious reforms to bridge the gap.

This section reviews the approach and experience of key comparator countries’ climate policy and institutional framework.

Table 1: International Experience: Climate Action Tracker (CAT) Ratings

Country	CAT Rating	Key Challenges	Key Opportunities
Germany	Insufficient	Coal reliance, sectoral decarbonisation	Strong renewable energy investments
Canada	Insufficient	Federal-provincial alignment issues	Dual carbon pricing system
Australia	Highly Insufficient	Federal inertia, fossil fuel exports	State-level initiatives
United States	Insufficient	Federal-state policy gaps	Inflation Reduction Act (IRA) ⁷
Switzerland	Almost Sufficient	Transport and agriculture emissions	Decentralised governance
Brazil	Highly Insufficient	Deforestation, weak enforcement	Potential for Amazon reforestation
Indonesia	Highly Insufficient	Limited carbon pricing coverage	Recent carbon tax introduction
South Africa	Insufficient	Subnational funding gaps	Just Energy Transition Partnership (JETP)
China	Highly Insufficient	Coal dependency, lack of absolute caps	Leading renewable energy deployment
New Zealand	Almost Sufficient	Transport emissions	Innovative methane reduction policies

Source: <https://climateactiontracker.org/>

⁶ Thomas (2023) discusses the challenges of coordinating climate action across different levels of government, particularly in federal systems. He points out that even countries with dedicated climate ministries, such as Germany and Canada (discussed further below), face difficulties in aligning national and subnational priorities.

⁷ The IRA represents a significant federal initiative by the United States to address climate change. However, the effectiveness of this act may be influenced by the election of Donald Trump, which could affect the implementation of climate policies by the United States.

3.1 Germany

Germany has a central framework law, the Federal Climate Protection Act (*Klimaschutzgesetz*), enacted in 2019. This law sets legally binding emission reduction targets for various sectors and mandates annual emissions budgets, holding union and state governments accountable for climate goals (Ring, 2002).⁸ The *Länder* (states) play a significant role in implementing regional climate strategies that are in line with federal goals.

The Renewable Energy Sources Act (EEG) incentivises renewable energy through feed-in tariffs, enabling *Länder* to pursue renewable projects that suit their regional energy capacities. *Energiewende* is Germany's federal energy transition strategy that is closely linked to its long-term energy targets and is implemented with cross-governmental cooperation, allowing states to adapt initiatives to local contexts while aligning with federal emissions targets. BMWK oversees the *Energiewende*, collaborating with states to guide renewable energy growth. The Federal Environment Agency provides data and policy advice to support state-level planning. The National Climate Initiative (NKI) provides funding for local projects to reduce greenhouse gas emissions, with financial support extended to states and municipalities to achieve emissions targets and promote sustainable infrastructure.

The CAT assessment for Germany is rated as “insufficient.” While its legal frameworks and renewable energy investments are strong, reliance on coal and slow progress in decarbonising certain sectors hinder its ability to meet the Paris Agreement's 1.5°C target.

3.2 Canada

Canada has a central framework law, the Canadian Net-Zero Emissions Accountability Act, which was passed in 2021. This Act mandates national targets to reach net-zero emissions by 2050 and requires annual progress reports, creating accountability measures at the national level (Canada, 2023).

Canada's Pan-Canadian Framework on Clean Growth and Climate Change allows provinces and territories flexibility in designing carbon pricing systems that meet or exceed national benchmarks. A federal backstop applies if provincial systems do not meet these standards.

Canada's Output-Based Pricing System (OBPS) is a performance standard for industrial emitters, applying a price on emissions while offering flexibility for trade-exposed, heavy-emitting industries. Emitters pay only for emissions that exceed a baseline threshold, allowing them to remain competitive while contributing to emissions reductions (Canadian Climate Institute, 2023).

The Green Infrastructure Fund supports provinces and territories in building climate-resilient infrastructure, promoting green projects across diverse regions, and works with the Net Zero Accelerator Fund in this regard.

ECCC sets national climate goals and coordinates with provinces to synchronise provincial and federal efforts towards emissions reduction.

The Equalization Payments and Low Carbon Economy Fund are funding mechanisms that help less wealthy regions invest in climate initiatives, ensuring that all provinces can participate in achieving national goals.

The CAT assessment for Canada is rated “insufficient,” reflecting the need to strengthen policies for heavy emitters and ensure better provincial cooperation. Canada's dual carbon pricing mechanism (OBPS and consumer-facing pricing) is a globally noted model but requires deeper integration across provinces to ensure uniform emissions reductions.

3.3 Australia

Australia does not have a central framework law on climate change. Instead, it relies on federal oversight with state-driven initiatives, allowing adaptation to unique regional needs, such as drought and bushfire management (World Bank, 2020).

Australia's Emissions Reduction Fund (ERF) provides funding for local adaptation projects, such as reforestation and energy efficiency. Managed by the Department of Industry, Science, Energy and Resources, it was updated in 2020 with the Climate Solutions Fund, which provides additional funding in this regard.

The Clean Energy Finance Corporation (CEFC) is a government-owned green bank that collaborates with state governments and the private sector to finance

⁸ The Federal Climate Protection Act was amended in 2021 to increase emission reduction targets.

renewable energy projects and other green initiatives.

In Australia, federal and state governments share responsibilities for environmental issues, encouraging region-specific adaptation strategies. States can set climate goals suited to their unique environmental and economic conditions. States like New South Wales and Victoria have developed their own emissions reduction and renewable energy targets, furthering climate action within a flexible federal framework.

The CAT assessment for Australia is rated “insufficient,” with its reliance on state initiatives highlighting the need for stronger federal leadership and targets. Federal inertia and continued investment in fossil fuels remain major concerns.

3.4 United States

The United States does not have a single federal framework law on climate change. Instead, climate policy is governed by a combination of sector-specific regulations, state-led programmes, and federal initiatives. The Clean Air Act enables the Environmental Protection Agency (EPA) to set national emissions standards, while states can have their own climate policies. The Regional Greenhouse Gas Initiative (RGGI) is a collaboration among northeastern states that caps carbon emissions and reinvests proceeds into renewable energy.

California’s Cap-and-Trade Program demonstrates the potential of state-led climate policy, supported by federal tax credits and funding initiatives. The Infrastructure Investment and Jobs Act provides federal funding to support state-led renewable energy and climate-related projects, ensuring resources are available for climate adaptation. The EPA sets national environmental standards and works with states to enforce compliance.

The Inflation Reduction Act (IRA) is the most comprehensive federal climate law to date, allocating significant funds for clean energy incentives, electric vehicles, and climate adaptation projects. However, its future implementation remains uncertain amid shifting political dynamics.

The CAT assessment for the US is rated “insufficient” due to policy volatility and lack of a comprehensive federal framework. While the IRA represents a major step forward, its viability faces significant uncertainty, particularly as the Trump administration has signalled a rollback of climate commitments, potential

weakening of EPA authority, and renewed support for fossil fuels. This raises concerns about inconsistencies in federal climate leadership and the continued reliance on state-level initiatives to drive progress. The absence of legally binding federal climate targets leaves the U.S. vulnerable to frequent shifts in policy direction depending on electoral outcomes.

3.5 Switzerland

Switzerland has a central framework law, the Swiss Climate Change Act (CO₂ Act), which establishes national CO₂ emissions targets and mandates measures across sectors, setting binding emissions reductions for the country. The CO₂ Act was updated and expanded in 2023 by the Federal Act on Climate Protection Goals, Innovation, and Strengthening Energy Security, with enhanced funding for innovation and green technology.

The Federal Office for the Environment (FOEN) coordinates climate policies at the national level, ensuring alignment with cantonal initiatives. Cantons create local Climate Action Plans (CAPs) supported by national funding to achieve Switzerland’s climate goals. Regular funding from the federal government assists cantons in implementing regional climate strategies, promoting emissions reduction and resilience initiatives at the local level.

The CAT assessment for Switzerland is rated “almost sufficient,” reflecting leadership in integrating climate goals into decentralised governance but requiring additional measures to enhance renewable energy deployment and emissions reduction in transportation and agriculture for full synchronisation with 1.5°C goals.

3.6 Brazil

Brazil does not have a single comprehensive framework law on climate change. Instead, it uses a combination of fiscal transfers and high-level environmental policies to incentivise conservation and support climate resilience across states (Wills et al., 2021).

While Brazil lacks a binding framework law, the National Policy on Climate Change (PNMC) provides high-level emissions reduction targets and climate goals for states to follow, with sectoral targets for regions.

Brazil’s Ecological Value-Added Tax Transfer System (ICMS Ecológico) is a fiscal mechanism linking state tax revenue distribution to environmental conservation, incentivising sustainable practices. The Amazon

Fund was recently strengthened to channel resources to reduce deforestation and support reforestation in the Amazon region. The Ministry of Environment (MMA) oversees national policies and coordinates with states on environmental and renewable energy initiatives. Brazil's National Development Bank (BNDES) finances green infrastructure, ensuring regional governments have access to funds for sustainable development.

The CAT assessment for Brazil is rated “highly insufficient,” highlighting that deforestation in the Amazon remains a critical issue that undermines Brazil's global climate commitments, and that substantial reforms are needed to address illegal logging and land use.

3.7 Indonesia

Indonesia does not have a single framework law but relies on multiple policies and decentralised financing mechanisms to promote climate mitigation, resilience, and adaptation (Nurfatriani et al., 2015).

Among these, the National Action Plan on Climate Change (NAPCC) Adaptation provides a high-level policy framework for addressing climate-related action across sectors. The Dana Alokasi Khusus (DAK) Lingkungan Hidup allocates resources to regional governments for reforestation, waste management, and other sustainable practices. The Ministry of Environment and Forestry sets environmental standards and supports local climate action initiatives. The Village Fund (Dana Desa), originally focused on rural development, now includes climate resilience and encourages local adaptation strategies. Indonesia distributes revenue from carbon taxes to help promote sustainable practices across localities.

The CAT assessment for Indonesia is rated “highly insufficient,” underscoring the need to expand policy ambition and strengthen implementation at the local level. Limited sectoral coverage and weak enforcement mechanisms remain significant barriers to progress.

3.8 South Africa

South Africa has recently enacted a central framework law, the Climate Change Bill, which will be the country's first comprehensive climate legislation, setting legally binding emissions targets and establishing a framework for resilience and sustainable development (South Africa's Just Energy Transition Partnership [JETP], 2021).

South Africa's national adaptation plans allocate grants to provinces based on climate risk, enabling tailored regional responses. The Department of Environment, Forestry and Fisheries (DEFF) coordinates climate policy across national, provincial, and local levels, ensuring cohesive efforts. The South African National Biodiversity Institute (SANBI) focuses on integrating climate resilience into biodiversity conservation. The Green Fund, managed by the Development Bank of Southern Africa, finances regional projects in renewable energy and water management, supporting climate goals across provinces.

South Africa's Just Energy Transition Partnership (JETP) was launched in 2021 and mobilised US\$8.5 billion in international finance from countries to support South Africa's transition away from coal. The partnership focuses on decommissioning coal plants, developing renewable energy, and addressing the socio-economic impacts on coal-dependent communities. While promising, its success depends on the effective utilisation of funds, robust governance mechanisms, and coordination between national and provincial levels.

The CAT assessment for South Africa is rated “insufficient,” reflecting progress but highlighting gaps in implementation and funding for subnational initiatives. The JETP represents a significant opportunity for South Africa to address these gaps, but its outcomes will rely heavily on the government's ability to integrate international finance into its broader climate strategy.

3.9 China

China does not have a single, centralised framework or law for climate change-related action. Instead, it employs a centrally coordinated, multi-sectoral strategy within broader national development and regional green development plans (Chen et al., 2022). Recent legislative efforts, including the new Energy Law, aim to provide a cohesive framework to support China's energy transition, enhance energy security, and achieve climate targets.

China's climate objectives are embedded within its Five-Year Plans, with the 14th Plan targeting peak carbon emissions by 2030 and carbon neutrality by 2060. These plans serve as roadmaps for sustainable development across sectors. China's Renewable Energy Law of 2005 has promoted solar, wind, and hydropower development, providing subsidies and incentives that enable provinces to leverage local renewable resources according to their geographic advantages.

China's new Energy Law, effective January 1, 2025, takes a broader approach and establishes a comprehensive framework for energy management and is now intended to be central to China's emissions targets. The new law emphasises the widespread adoption of renewable energy sources, including wind, solar, biomass, geothermal, and hydrogen. To support this shift, it calls for the construction of a modernised power grid capable of accommodating high levels of renewable energy integration. The strategy also outlines energy security measures and emergency management protocols to ensure a stable and resilient energy supply. Furthermore, it proposes the establishment of a unified electricity market by 2030, which will play a crucial role in facilitating the seamless integration of renewable energy sources into the national power system. These initiatives collectively aim to transform the country's energy landscape, reducing reliance on fossil fuels and paving the way for a more sustainable future.

Among China's other initiatives is the Emissions Trading System (ETS), launched in 2021, which allows for regional flexibility, supporting tailored emissions reduction approaches across provinces. The Ministry of Ecology and Environment (MEE) oversees climate policy at a national level, working with regional governments to implement and monitor policies that align with national climate objectives, ensuring coordinated action across sectors. Established in 2020, the National Green Development Fund finances regional adaptation and emissions reduction projects, demonstrating China's approach to government-led green financing in support of SDGs.

Strengthened by the new Energy Law, China's climate governance framework seeks to combine economic development with sustainable practices, emphasising renewable expansion, regional adaptability, and green financing to meet its long-term climate goals.

The CAT assessment for China is rated "highly insufficient," with significant progress in renewable energy; however, continued reliance on coal-fired power plants and the lack of stringent absolute emission caps are major barriers to 1.5°C alignment.

3.10 New Zealand

New Zealand offers a well-structured and comprehensive approach to climate governance, underpinned by its Climate Change Response (Zero Carbon) Amend-

ment Act of 2019. This legislation sets legally binding targets and institutionalises oversight mechanisms, ensuring accountability and consistency in climate action (New Zealand Climate Change Commission, 2023).

The Climate Change Response (Zero Carbon) Amendment Act mandates net-zero carbon emissions by 2050, with specific provisions for biogenic methane reductions (10% by 2030 and 24%–47% by 2050, compared to 2017 levels). It establishes a system of five-year emissions budgets, providing a clear and incremental pathway to achieve climate targets. Finally, it requires the preparation of National Adaptation Plans to address vulnerabilities and climate risks.

The Climate Change Commission (CCC) is an independent advisory body that provides evidence-based recommendations to the government on setting emissions budgets and policies. It monitors progress and publishes regular reports, ensuring government accountability and facilitates public and stakeholder engagement, including indigenous Māori communities, to ensure inclusivity.

New Zealand operates a cap-and-trade ETS, covering multiple sectors such as energy, waste, forestry, and agriculture. Revenue generated from the ETS is reinvested in climate adaptation, renewable energy, and other green projects.

Recognising that agriculture accounts for nearly half of its total emissions, New Zealand has adopted a unique approach to reduce biogenic methane emissions while providing transitional support to farmers. Financial incentives encourage the adoption of sustainable farming practices and technological innovations.

New Zealand's approach emphasises collaboration with Māori communities, incorporating traditional ecological knowledge into climate policies. Specific programmes address the socio-economic impacts of climate change on indigenous groups, ensuring equitable participation in climate action.

The CAT Assessment for New Zealand is rated "almost sufficient," reflecting robust frameworks but needing additional measures to achieve net-zero by 2050, in particular the need for greater ambition in reducing emissions from transport and other high-emission sectors.

3.11 Key Takeaways for India

These examples illustrate fiscal federalism models India could adapt to enhance its climate governance framework:

Decentralised financial incentives

India could follow the lead of countries like Germany, Canada, and New Zealand, which have established mechanisms that provide autonomy and incentives to subnational governments based on climate performance.

Germany's sector-specific emission budgets and the integration of climate targets within states' plans ensure that national and subnational goals are synchronised. India could adopt a similar approach, setting emission budgets across sectors and rewarding states for performance.

New Zealand's system of five-year emissions budgets, combined with legal mandates for net zero by 2050, offers a structured, decentralised model to drive state-level action. India could develop state-specific targets under the broader national objectives.

China's integration of climate objectives in its Five-Year Plans demonstrates how combining climate policies with economic growth objectives can also help incentivise states to actively participate in achieving national goals. India's own development plans could embed climate goals more comprehensively to encourage state compliance.

Public-private partnerships and capacity building

Countries such as Brazil, Australia, and New Zealand demonstrate the importance of leveraging public-private partnerships and building technical capacity.

Brazil's fiscal mechanisms incentivise sustainable practices by linking state-level revenue with conservation outcomes, particularly through the ICMS Ecológico and Amazon Fund. India could emulate this model to mobilise resources for climate action.

New Zealand's sector-specific focus on agriculture and investment in sustainable farming practices highlight the importance of targeting high-emission sectors with tailored solutions. India could support similar efforts in agriculture by creating dedicated funds and providing technical support to high-emission states.

Australia's CEFC model demonstrates how green banks can partner with the private sector to fund renewable energy projects. Establishing such institutions could boost India's clean energy transition.

Targeted environmental funds

Inspired by Indonesia's and Switzerland's models, India could establish funds based on state-specific climate needs, enabling superior local adaptation strategies.

Indonesia's Carbon Tax Revenue Distribution showcases how revenues from carbon pricing can be reinvested in state-level climate initiatives.

New Zealand's reinvestment of emissions trading revenue into renewable energy and adaptation projects demonstrates how targeted funds can support region-specific priorities while ensuring financial sustainability.

South Africa's JETP offers an innovative funding model for coal-dependent regions transitioning to renewable energy. India could explore similar financing for its coal-intensive states like Jharkhand and Chhattisgarh.

Carbon pricing with revenue sharing

Similar to Canada and Indonesia, India could consider a flexible carbon pricing regime, with revenue shared back to states to support regional climate initiatives (Thomas, 2023).

Canada's OBPS ensures industrial competitiveness while incentivising emissions reductions. India could adopt a similar mechanism for energy-intensive industries (Box 1).

New Zealand's cap-and-trade ETS, covering multiple sectors, provides a robust framework for India to develop its own sector-specific ETS, with revenues reinvested in climate action.

China's National Carbon Market highlights the potential of piloting regional carbon markets for India's energy and heavy industries.

Germany, as under the EU's direction, follows absolute carbon pricing through auction-based systems and offers a clear, predictable model India could adapt to set stronger market signals while minimising loopholes.

Box 1: Canada's Carbon Pricing Model: Lessons for India

Canada's dual carbon pricing model—combining an OBPS for industries with consumer-facing carbon pricing—offers valuable insights for India's carbon pricing strategy. This framework balances flexibility and equity while fostering emissions reductions across sectors.

Output-Based Pricing System (OBPS):

The mechanism of OBPS sets the emissions intensity benchmarks for high-emission, trade-exposed industries like steel, cement, and chemicals. Firms pay only for emissions exceeding these thresholds, with those below the threshold receiving credits or allowances.

Its relevance to India can be understood when looking at the OBPS approach to promote efficiency and cleaner production without deterring industrial growth—critical for India's manufacturing sector. However, transitioning to absolute carbon pricing in trade auctions, as opposed to intensity-based models, would provide more consistent and predictable market signals, encouraging deeper decarbonisation.

Consumer-Facing Carbon Pricing:

The mechanism of carbon pricing applies to fuels and carbon-intensive products, engaging individuals and small businesses. Revenue recycling supports households and green projects.

It ensures broader participation and public acceptance by redistributing revenues to vulnerable communities, such as coal-dependent regions and low-income households.

Adapting Canada's Model to India's Federal Structure:

India's federal structure, marked by significant regional disparities, requires a tailored carbon pricing framework. Canada's fiscal federalism model provides a blueprint for adaptation.

A national system with minimum benchmarks allows states to innovate based on their unique contexts. For instance, Gujarat could pursue ambitious renewable energy goals, while coal-dependent states like Jharkhand might require phased implementation.

Carbon pricing revenues should return to states for investments in local priorities, such as renewable energy, climate-resilient infrastructure, and disaster management. Its equitable redistribution can address regional disparities and foster public support, mirroring Canada's rebate system for households.

OBPS-like mechanisms can set intensity benchmarks for power generators, encouraging cleaner energy production without increasing costs for consumers.

Addressing financial losses in electricity distribution companies (discoms) is critical. Discom reforms—subsidy rationalisation, linking payments to performance metrics, and debt restructuring—could improve their finances, enabling investments in renewable energy integration and emissions reductions.

States achieving emissions targets or implementing carbon pricing mechanisms can be rewarded with additional funding to promote healthy competition and ambition.

Feebates (fees for above-average emissions and rebates for below-average emissions) could complement carbon pricing, offering flexibility while reducing administrative complexity.

Some Learnings from the Canadian Model:

- **Economic Disparities:** A tiered pricing approach can balance growth and emissions reductions in less-developed states.
- **Discom Financial Challenges:** Financially viable discoms are essential for integrating carbon pricing in the power sector. Revenues from carbon pricing could help alleviate discom losses and fund modernisation efforts.
- **Public Awareness:** Transparent communication and equitable revenue recycling are crucial to gaining public acceptance and ensuring the system's success.

Finally, adopting Canada's dual carbon pricing model offers India a structured yet flexible pathway to achieving its emissions goals while addressing developmental needs. Integrating revenue recycling, regional flexibility, discom reforms, and complementary mechanisms like feebates, along with a shift towards absolute carbon pricing for trade-auctioned sectors, could enable India's transition to a sustainable, low-carbon economy without compromising growth.

Institutional support for local adaptation

India could establish an independent Climate Commission, modelled after South Africa's and New Zealand's frameworks. South Africa's Climate Change Act aligns national goals with localised adaptation efforts, offering lessons for India in integrating state-level priorities into federal strategies. New Zealand's CCC ensures independent oversight and monitoring of climate policies. India could establish a similar institution to depoliticise climate action and provide technical and financial guidance to states.

Strengthening the State Finance Commissions (SFCs)

While the Finance Commission plays a role in national-level fiscal transfers, as discussed later in this paper, India's State Finance Commissions (SFCs) could be leveraged to allocate climate funds at the local level—an approach similar to Switzerland's cantonal system. This would ensure that local bodies (municipalities, panchayats) have direct access to climate-responsive fiscal transfers.

Coordination and accountability challenges

Ensuring transparency in climate finance and accountability in achieving targets is critical. While Germany's BMWK plays a key role in *Energiewende*, coordination challenges exist between federal and state governments, leading to inconsistent policies. India must ensure vertical integration across government levels to avoid similar bottlenecks. Given the potential for political shifts, US climate policies are highly dependent on electoral cycles. India must

avoid this instability by ensuring legislative backing for climate actions at all levels. Progress reports and independent audits in Canada ensure compliance. India could incorporate similar mechanisms, involving institutions such as the Comptroller and Auditor General (CAG), to ensure state-led climate projects are aligned with national objectives and provide value for money.

Adapting global models to India's context

India's diversity in climate vulnerabilities and socio-economic conditions necessitates a flexible yet robust approach. Lessons from international experiences (Table 2) can be tailored to India's needs at every level of government.

Embedding climate goals in national and state plans would ensure better alignment between economic development and climate objectives, similar to China's integration of climate objectives in its Five-Year Plans. Establishing targeted funds for vulnerable states and regions allows India to follow models similar to Indonesia's carbon tax revenue distribution. Thus, India could direct funds where they are most needed. Providing fiscal incentives for achieving state-level climate targets allows India to draw from Brazil's ICMS Ecológico experiences. Fiscal transfers could reward states that show measurable climate performance. Encouraging innovation through public-private partnerships and capacity building to support green financing models, as demonstrated by Australia's CEFC, could help India attract private investment and foster clean technology solutions.

3.12 Conclusion

Drawing from the international experiences discussed, India must focus on creating a cohesive yet decentralised framework for climate governance. The country can adapt successful models by integrating sector-specific targets, financial incentives, and accountability mechanisms that support states' diverse needs. A comprehensive, structured approach will ensure that both national and regional climate goals are met, and that India's transition to a low-carbon economy is just and inclusive.

As well documented by many in the literature, a central, legally binding climate framework, paired with decentralised adaptation strategies and targeted financial mechanisms, will be critical to help India achieve its ambitious climate goals while addressing

regional disparities. This balanced approach, fostering innovation and ensuring transparency, will pave the way for India's successful climate governance transformation.

Additionally, India should explore a centralised regulatory approach for mitigation—where uniform standards prevent free-ridership—while enabling decentralised adaptation measures to address regional vulnerabilities.

By adapting these models to its unique federal structure, India can create a cohesive yet decentralised framework for climate governance. A strong institutional backbone, coupled with financial incentives and transparency mechanisms, will be essential to achieving India's climate goals while ensuring sustainable development.

Table 2: Analysis: Lessons from Key Countries

Country	Key Features	Lessons for India
Germany	Federal Climate Protection Act (<i>Klimaschutzgesetz</i>) mandates legally binding sector-specific emission budgets and annual targets. The NKI funds subnational projects.	India could adopt sector-specific emission budgets across industries and create a national Climate Fund for sub-national projects, ensuring that states align with national goals.
Canada	Net-Zero Emissions Accountability Act (2021) mandates national net-zero targets by 2050 and uses flexible carbon pricing (OBPS).	Flexible carbon pricing systems with fiscal incentives for states to ensure compliance and equity.
Australia	State-led initiatives dominate, complemented by the Federal ERF and CEFC, which support renewable projects and adaptation measures.	Decentralised climate initiatives allow for state-specific solutions; India can establish a Green Bank at the national level, while empowering states to implement specific climate policies tailored to their needs.
United States	No federal framework law; states lead with individual policies like California's cap-and-trade program and the RGGI.	Allow states to set their own ambitious targets, supported by federal funding mechanisms, while aligning national policies like renewable energy promotion.
Switzerland	The CO ₂ Act (2023) integrates federal and cantonal policies, supported by decentralised governance and national funding.	Decentralised climate action with federal funding can empower Indian states while maintaining national oversight.
Brazil	PNMC establishes high-level emissions targets. Incentives like the ICMS Ecológico link fiscal transfers to environmental conservation, while the Amazon Fund supports reforestation efforts.	Incentivise state conservation efforts by linking fiscal transfers to environmental outcomes and creating dedicated funds.
Indonesia	Decentralised funding mechanisms like Carbon Tax Revenue Distribution and Dana Desa support local adaptation.	Establish state-specific funds for local climate adaptation strategies. A decentralised framework, like Indonesia's, could address India's diverse climate challenges.
South Africa	The Climate Change Bill sets national adaptation frameworks and legally binding mitigation targets, supported by targeted funds like the Green Fund for regional initiatives.	Targeted regional funds for adaptation can address the diverse needs of India's states and national coordination.

Country	Key Features	Lessons for India
China	Centralised, sector-specific targets embedded in Five-Year Plans. The National Carbon Market covers the power sector and promotes regional flexibility.	Embed climate goals within India's development plans and pilot regional carbon markets for energy and heavy industries.
New Zealand	Zero Carbon Act (2019) establishes legally binding targets for net-zero emissions and emission budgets. Independent CCC ensures oversight and accountability.	India can benefit from an independent oversight body to depoliticise climate action and ensure continuity across government administrations.

Source: Authors' compilation, based on Section 3.

4. Specific Proposals for India's Institutional Structure

India's institutional framework for addressing climate change requires significant enhancements to ensure cohesive action across governance levels. Drawing on successful international and domestic models, these proposals aim to establish a stronger foundation for climate governance in India, fostering collaboration and capacity-building while addressing local developmental priorities. However, these proposals will need to be carefully developed to ensure their full consistency with India's needs.

4.1 Establish a Clear Legal Framework for Climate Action

As Pillai and Dubash (2023) have emphasised, a robust legal framework is the foundation for climate action, providing clear mandates, timelines, and enforcement mechanisms.

A unified national climate law, carefully tailored to India's federal context and diversity, is needed. It would provide the necessary legal backbone to climate action across India, clarifying roles, timelines, and sectoral targets to ensure cohesive and enforceable measures. This should include clear mechanisms for implementation, enforcement, and review, ensuring states know their obligations and timelines. As Dubash et al. (2020) and Pillai and Dubash (2023) highlight, the absence of a single, overarching climate law in India has led to fragmented policy implementation across states, with climate action being pursued through sector-specific policies that lack legal enforceability and long-term coordination.

This law should not only regulate emissions but also guide development choices, ensuring that all new policies, infrastructure, and planning decisions

embrace low-carbon and climate-resilient goals. It must provide enforceable mandates, sectoral targets, and institutional structures for review and enforcement. Additionally, the law must embed principles of social equity, ensuring vulnerable populations are prioritised in adaptation and resilience measures. According to several studies, such laws must also include social equity measures to address the impacts on marginalised groups.

There are certain challenges that India currently faces. India does not yet have a comprehensive climate law, which means climate policies are often pursued through sector-specific laws that were not initially designed with climate change in mind. This leads to fragmented and reactive approaches that lack enforceability and fail to promote cohesive climate governance across sectors. Without a dedicated climate law, it is challenging to establish long-term strategies that incorporate mitigation, resilience, and adaptation actions with national and state priorities. Moreover, addressing the environmental goals in the (now dated) Environment (Protection) Act, 1986, requires a modernised approach. The challenge is for India's law to carefully balance a regulatory approach (focused on emissions reduction) with an enabling approach (integrating climate resilience into broader development goals).

Each state must develop dynamic CAPs, regularly updated with new data and climate projections. These plans should address both emissions reductions and adaptation needs, integrating inputs from local communities and experts to ensure equitable development. Dubash (2019) highlights that while many states have made significant strides, their plans remain insufficiently aligned with national targets and often lack the institutional capacity. (Box 2 summarises lessons from the past CAPs.)

Box 2: Lessons from State Action Plans on Climate Change (SAPCCs)

Since their inception in 2010–2011 as part of the NAPCC, SAPCCs have offered critical lessons for improving state-level climate governance in India.

Some of the strengths include enhanced awareness and action at the state level, especially in sectors like water, agriculture, and forestry. Some states, such as Odisha and Tamil Nadu, have integrated climate adaptation into disaster management (MoEFCC, 2022).

There are certain challenges present as well. SAPCCs often lack alignment with the NAPCC and national policies. Insufficient funding and capacity hamper implementation and limited stakeholder engagement at the local level reduces effectiveness.

Thus, the lessons learned are that SAPCCs should strengthen vertical and horizontal coordination to ensure they complement national goals. There should be enhanced funding and technical support from the central government (Dubash et al., 2020), and SAPCCs should be periodically revised to integrate updated climate data and science (Indian Council for Research on International Economic Relations [ICRIER], 2021).

Implications for Future Policy:

To address these challenges, India must institutionalise mechanisms to ensure greater integration and provide states with financial and technical resources to update and implement SAPCCs effectively.

4.2 Strengthen the Role of State Governments

Empowering state governments is crucial for tailoring climate action to local conditions and fostering innovative, region-specific solutions.

Firstly, it is imperative to empower states with greater fiscal and legal autonomy to tailor climate actions to local conditions. Decentralisation should include mandates for local adaptation plans at the district and municipal levels to address region-specific vulnerabilities, such as urban flooding or rural drought. Dubash and Pillai (2023) argue that decentralisation promotes better-targeted climate solutions and enhances local responsiveness.

Secondly, India's current centralised structure poses challenges to the ability of states to conceptualise and implement localised climate solutions. States have limited fiscal and legal autonomy to drive their own climate agendas, resulting in a top-down dominance that stifles local innovation and responsiveness to specific climate vulnerabilities. Expanding state roles is critical to fostering more context-specific climate responses, particularly in addressing regionally distinct vulnerabilities such as drought-prone agriculture or coastal resilience planning. Greater fiscal and legal autonomy would enable

states to innovate with locally tailored climate strategies while ensuring accountability mechanisms are in sync with national goals.

Thirdly, establishing state-level climate commissions that coordinate between local governments, industries, and civil society allows them to ensure state efforts are in line with national goals while fostering innovation and best practices within the state. They should work closely with a newly established national low-carbon development commission to ensure coherence across India.

State Finance Commissions (SFCs) should be tasked with allocating climate finance equitably across local governments, ensuring that resources are directed towards climate adaptation and mitigation projects at the grassroots level. Integrating SFCs into climate finance allocation will promote efficient fiscal federalism and improve local accountability.

4.3 Enhance Coordination Mechanisms

It is well understood that intergovernmental coordination is essential for synchronising national, state, and local climate actions; Pillai and Dubash (2023), for instance, highlight the need for institutional platforms to resolve conflicts, align goals, and share best practices. A permanent intergovernmental cli-

mate-focused council should be formed, comprising central, state, and local government representatives. This body should ensure inter-ministerial and inter-state collaboration on climate action. It can also take on other areas such as cross-border challenges on shared water resources, air pollution, energy grids, etc. The Council could also provide a formal platform for dialogue, coordination, and conflict resolution.

The existing NSCCC and other intergovernmental forums discussed earlier in the paper (such as the PMCCC or AIPA) pose certain challenges, such as, they are not equipped to handle comprehensive climate coordination across states. They often focus on ensuring uniformity rather than facilitating deep collaboration. The lack of a dedicated climate platform prevents states from jointly addressing cross-border issues such as river basin management and air pollution.

Another mechanism would be to embed climate considerations into all national and state development plans. This would require joint ministerial accountability for meeting climate goals, particularly in energy, agriculture, transport, and urban planning. A climate resilience framework can be integrated into urban master plans, emphasising sustainable transport, flood defences, and green infrastructure.

4.4 Legal Mandates for Financial Mechanisms

Dedicated financial mechanisms are essential to sustain climate action across governance levels. Introduce budget tagging to track and report climate-related expenditures across the government. Establish a dedicated Climate Fund to support state and local initiatives, prioritising high-impact projects and innovations. World Bank (2022) advocates performance-based incentives to reward states that exceed climate targets or lead in adaptation and mitigation measures.

India's current climate finance mechanisms are insufficient to meet the vast investment needs of climate resilience and mitigation. The lack of a dedicated and consistent funding mechanism limits long-term planning and restricts states' ability to initiate impactful projects. Additionally, central government funding often comes with restrictive criteria that may not meet local priorities (International Monetary Fund [IMF], 2021).

Incentives for states include channelling part of the climate finance to fund R&D in renewable energy,

sustainable farming practices, and urban climate adaptation. Legal provisions for performance-based financial incentives would reward states that demonstrate leadership in climate action.

4.5 Accountability and Transparency

A robust accountability framework that ensures climate funds are used effectively and achieves intended outcomes is among the key recommendations. Toward this, a national climate reporting framework that requires states to submit periodic progress reports should be implemented and would be critical for helping create a nationally coordinated approach. Reports within this framework should include metrics on emissions reductions, adaptation progress, and financial expenditures. Making all climate progress reports publicly available to enhance accountability would also be an important element of such action. Moreover, leveraging digital platforms to engage citizens in monitoring and reporting on local climate initiatives has also been suggested (CAG, 2022). In addition, as Pillai and Dubash (2023) argue, regular, independent audits by India's CAG would help verify that funds are being used appropriately, strengthening domestic and international confidence in India's climate policies.

4.6 Public Participation and Rights-Based Approach

Public engagement and the protection of environmental rights are vital for ensuring equitable and effective climate action. In this context, Kenya's bottom-up adaptation approach offers a workable model, engaging local bodies in climate initiatives to ensure equitable policy implementation (Tye & Suarez, 2021). Successful models in India, such as Tamil Nadu's Climate-Sharp Village Project and Maharashtra's Jalyut Shivar Abhiyan, could provide the learnings for a more comprehensive rollout.

While India's institutional structure includes some mechanisms for public engagement, these are often limited to high-level consultations. There is a need for greater inclusion of local stakeholders, particularly vulnerable communities, in decision-making processes to ensure that climate policies are equitable and reflective of on-the-ground realities.

Strengthening environmental rights would help citizens hold governments accountable. Mechanisms such as the National Green Tribunal (NGT) play a

critical role in adjudicating environmental disputes, and expanding legal pathways for climate-related grievances would reinforce India's commitment to sustainable development (Pillai & Dubash, 2023; Centre for Science and Environment [CSE], 2021).

As mentioned above, and as Appendix II highlights, there are already many successful climate-change practices in states with greater community-led initiatives and public engagement—in areas like renewable energy adoption, water conservation, and sustainable farming practices. These practices provide good models to be used across India to build community and public engagement.

4.7 Legal Support for Mitigation and Adaptation

Tailored sectoral regulations can ensure greater effectiveness of mitigation and adaptation efforts.

Tailoring climate regulations for key sectors would provide clear and enforceable standards, ensuring sectors like energy and transport contribute to mitigation and adaptation goals. This could include specific mandates for renewable energy adoption, green building standards, and waste management reforms.

India's focus has been predominantly on mitigation through renewable energy targets, while adaptation efforts are less emphasised and often lack dedicated institutional support. There is a need for regulations that specifically address climate action across sectors, especially those heavily affected by climate impacts such as agriculture and water resources.

Enforcing standards for climate-resilient infrastructure would mitigate the risks of climate impacts on public assets, enhancing long-term sustainability and reducing future costs related to climate damage and adaptation.

4.8 Capacity Building and Knowledge Sharing

Capacity building is critical for enabling subnational governments and institutions. Formal capacity-building mandates include the creation of a national technical assistance programme to strengthen subnational governments' capacities towards climate initiatives. Training programmes should focus on building local expertise in renewable energy, climate-smart agriculture, and urban adaptation and resilience.

India's subnational governments also often lack the technical capacity to implement climate adaptation and resilience initiatives. This is recognised internationally as a key constraint not just in India but across the global south. The union government can play a crucial role by establishing units with the necessary capacity and then transferring this expertise to the states. The capacity gap hampers the ability to plan and respond to climate threats and limits access to data and expertise needed for local-level innovation.

By encouraging state-level research and innovation, India can also tap into localised knowledge and foster innovations suited to regional climate challenges—including the timing of reductions in methane and nitrous oxide. Providing tax incentives or grants would stimulate investment in climate technology and solutions.

4.9 Legal Mechanisms for Conflict Resolution

Effective dispute resolution mechanisms are essential for addressing inter-state and state-centre disagreements over climate resources, governance, and funding allocations. One way to facilitate dispute resolution is to establish climate arbitration panels to resolve disputes between states or between states and the central government. These panels should address resource-sharing conflicts (e.g., river basins) and disagreements over climate-related funding allocations. Given India's federal structure, strengthening intergovernmental conflict resolution mechanisms is essential to ensuring that states can pursue coordinated climate policies without unnecessary legal or political gridlock (Pillai & Dubash, 2023).

India's existing dispute resolution mechanisms, such as the Inter-State Council, are not fully utilised for climate-related issues. Many climate-related conflicts—including disputes over water resources, forest conservation, and energy policy—remain unresolved due to the absence of a climate-specific arbitration mechanism. ICRIER (2021) highlights that many of India's climate disputes, such as those concerning river basin management, remain politically sensitive and lack structured mechanisms for resolution. In this context, arbitration typically provides a neutral and systematic approach to addressing disagreements on funding allocations and responsibilities among different components of the government (NITI Aayog, 2021).

Structured climate arbitration could facilitate smoother conflict resolution, particularly for contentious issues like river basin management and shared resources, which are likely to intensify as climate impacts worsen. Dubash et al. (2020) emphasise the need for institutional mechanisms to prevent climate-related disputes from derailing policy progress.

4.10 Long-Term Monitoring and Legislative Review

Monitoring and periodic review of climate policies are critical for ensuring long-term success and adaptability. A long-term monitoring framework that can provide a consistent, data-driven basis for tracking climate impacts and policy measures is critical. Establishing climate observatories at the national and state levels would also enable systematic data collection and analysis to inform decision-making. MoEFCC (2022) highlights the importance of real-time climate data for ensuring that policies remain adaptive to changing environmental conditions.

The framework should incorporate independent climate assessments conducted by research bodies, such as ICRIER, National Institute of Public Finance and Policy (NIPFP), and CSE, to provide unbiased evaluations of India's climate strategies (ICRIER, 2021). Additionally, ensuring that state-level climate monitoring units are in line with national goals would help in aggregating climate data across regions.

India lacks a centralised framework for monitoring and reviewing climate policies, which limits the ability to adapt and refine strategies based on progress and emerging data. The absence of standardised indicators for emissions reductions, adaptation efforts, and financial expenditures has made it difficult to track national and state performance in a meaningful way (Pillai & Dubash, 2023).

CAG (2022) recommends that climate expenditure tracking should be integrated into India's budgetary processes to ensure transparency and accountability in climate-related financial flows. IMF (2022) similarly emphasises the importance of climate finance audits in strengthening governance and attracting international climate investments.

Periodic legislative reviews of climate legislation would ensure that laws remain relevant and responsive to scientific advancements, technology developments, and shifting climate realities. Pillai and Dubash (2023) also argue that India's legal framework

must be periodically reviewed and updated to remain in line with international climate commitments, such as those under the Paris Agreement. Additionally, Dubash et al. (2020) highlight that periodic legislative reviews help maintain alignment between climate goals and India's socio-economic priorities.

4.11 Conclusion

By implementing these recommendations, India can establish a superior institutional framework for climate action. This would empower state governments with the autonomy and capacity to lead climate initiatives. Ensuring transparent and accountable financial flows would improve climate finance governance. Additionally, it is necessary to foster inter-governmental collaboration for coordinated policy implementation. Developing structured mechanisms for climate dispute resolution between states and the central government is therefore essential. Finally, it is crucial to institutionalise long-term monitoring mechanisms for policy evaluation and adaptation.

Through a decentralised approach that aligns national and state efforts, India can leverage its federal structure to drive meaningful progress on climate goals. By drawing from international best practices and adapting lessons from other federal systems, India can design an institutional climate framework that is both legally robust and socio-economically inclusive.

5. Building a Green Public Finance Management Structure

To integrate climate goals into Public Financial Management (PFM), governments must adopt comprehensive green PFM practices. These practices ensure national and sectoral strategies are in sync with climate commitments, create fiscal frameworks that reflect climate policy impacts, and establish transparent, accountable green spending mechanisms. This section outlines the key elements of a green PFM framework, supplemented by international examples and progress already being made in Indian states and institutions.

5.1 Key Elements of a Green PFM Framework

National development strategies and medium-term fiscal frameworks should explicitly integrate climate mitigation and adaptation commitments, embedding

environmental considerations in the planning phase to allocate resources. For example, China and South Africa require that national development strategies are in line with climate commitments, ensuring a cohesive approach to sustainable development that prioritises climate action at the national level.

Budgets should incorporate climate impact assessments, expenditure tagging, and green spending reviews to ensure that allocations support climate objectives and enable targeted investments in green initiatives. For example, Kenya provides specific guidelines in its budget circulars to incorporate climate-related factors into budget submissions, ensuring that government spending is in line with climate goals. The Philippines similarly practises climate budget tagging and mandates climate impact analysis of budget measures to guarantee alignment with national climate objectives.

Effective budget execution involves systems to track and monitor green expenditures, ensuring that resources are used efficiently and climate targets are met. For example, Denmark uses macro-fiscal forecasting and modelling tools that consider climate impacts, informing budget execution and tracking green spending. France has also introduced climate budgeting within its annual budget process to better ensure that spending is in line with carbon neutrality goals.

National audit offices and oversight institutions should be equipped to analyse climate-related expenditures, enhancing transparency and ensuring efficient use of climate funds. For example, Canada combines climate change considerations into audit methodologies, allowing for comprehensive evaluations of climate expenditures and their effectiveness. The United Kingdom's National Audit Office also audits climate-related spending and publishes reviews of government progress towards emissions targets.

A strong legal framework is essential for mandating climate-responsive budgeting and ensuring compliance with environmental standards. For example, the Philippines mandates that climate impacts be assessed for new fiscal measures, while New Zealand's Climate Change Response Act requires public sector agencies to report on climate adaptation and emissions reduction, ensuring that new policies support climate goals.

Public Investment Management (PIM) processes should include climate adaptation and mitigation cri-

teria to ensure that public investments, especially in infrastructure, are resilient to environmental shocks. For example, Peru integrates climate risk considerations into all public investment projects, ensuring that infrastructure is resilient and that investments support long-term sustainability. Brazil's Amazon Fund also supports climate-resilient projects focused on reforestation and sustainable development.

Governments should ensure fiscal transparency by publishing reviews of climate-related expenditures and outcomes, fostering public trust and enabling scrutiny of green spending. For example, Italy regularly publishes ex post reviews on the climate impacts of budget policies, enhancing transparency and allowing for policy adjustments. Canada's annual reports on climate spending also contribute to accountability in green finance.

Green PFM practices can serve as a critical enabler for India's transition to carbon pricing mechanisms. Effective tracking and reporting systems established through climate-responsive budgeting and expenditure tagging will provide a transparent framework for assessing the economic impact of carbon pricing on various sectors. By aligning fiscal strategies with carbon pricing revenues, states can leverage these funds to invest in green infrastructure, renewable energy projects, and local adaptation initiatives. This integration can further ensure that carbon pricing revenues are equitably redistributed to address regional disparities and support vulnerable communities.

Green PFM practices should extend to subnational governments and state-owned enterprises (SOEs) to ensure alignment with national climate objectives. Well-designed coordination mechanisms are essential for seamless implementation across governance levels. For example, South Africa has strategies to align national climate commitments with subnational government, facilitating coordinated efforts for sustainable development. The European Union also requires member states to integrate national and subnational climate goals, promoting consistency across governance levels.

To overcome the financial constraints faced by state governments, especially in climate-vulnerable regions, stronger synergies between central and subnational governments are essential. The central government can play a facilitative role by earmarking climate-specific grants and providing technical support to states, while ensuring alignment with national goals. Mechanisms such as centrally spon-

sored schemes can be redesigned to include climate performance indicators, enabling states to access funding based on measurable progress in mitigation and adaptation efforts. These synergies would not only enhance the fiscal capacity of states but also drive a more equitable distribution of resources for climate action.

5.2 Implementing Green PFM Practices: International Examples

Several countries provide valuable lessons in adopting green PFM practices. China and South Africa combine national strategies with climate commitments, illustrating how climate goals can be integrated into all levels of fiscal planning. Kenya and the Philippines offer templates for embedding climate considerations in budget preparation and fiscal measures, respectively. Denmark's macro-fiscal forecasting tools provide guidance on developing data-driven, climate-focused fiscal strategies. Bangladesh, Italy, and Canada demonstrate transparency and accountability practices through published reviews and audits of climate expenditures.

5.3 Progress in Indian States and Institutions

India has already made notable strides in integrating climate considerations into PFM. These efforts demonstrate the growing commitment at both state and national levels to align fiscal practices with environmental sustainability and climate goals.

States such as Odisha and Assam have pioneered the use of "green budgets," which embed environmental and climate considerations into fiscal planning. These budgets help prioritise resource allocation towards disaster protection and management, green infrastructure, and renewable energy projects. While Odisha focuses on climate resilience, particularly in cyclone-prone areas, with budget tools to track environmental expenditures, Assam emphasises climate adaptation, with targeted investments in flood management and sustainable agriculture. These efforts provide a template for other states to adopt climate-responsive budgeting practices tailored to their regional challenges.

The CAG has taken significant steps to build capacity for environmental audits. The Working Group on Environmental Audit (WGEA), as part of the International Organization of Supreme Audit Insti-

tutions (INTOSAI), has enabled the CAG to evaluate the efficiency and impact of public spending on environmental programmes. Moreover, the International Centre for Environment Audit and Sustainable Development (iCED), located in Jaipur, functions as a hub for training Supreme Audit Institutions (SAIs) across the Asia-Pacific, enhancing audit capacities for climate-related expenditures. These initiatives ensure greater transparency and accountability in public spending on environmental programmes.

We also find renewable energy leadership in different states, demonstrating how regional policies can align with national climate goals. States like Gujarat, Tamil Nadu, and Karnataka lead in renewable energy development. Gujarat is strong in green hydrogen and solar projects, with significant private investment. Tamil Nadu pioneers in wind and solar energy, including offshore wind exploration. Karnataka excels in solar capacity and EV infrastructure development. In addition, Maharashtra and Kerala are integrating climate resilience into public infrastructure planning, with projects focused on flood management, disaster resilience, and sustainable urban development.

5.4 Recommendations for India

Building on this progress, India should adopt a comprehensive green PFM framework to mainstream climate considerations into fiscal systems across all levels of government. Toward this, it would help to build legislative mandates to integrate climate in fiscal decisions. These would require all parts of the government to assess climate impacts in public expenditure planning and budgeting. Laws mandating climate-responsive budgeting should be enacted to ensure accountability and alignment with national climate goals. Equally, climate tagging should be expanded by adopting budget tagging nationally to monitor climate-related expenditures and prioritise green projects. This could encourage states to replicate green budgeting initiatives, such as those in Odisha and Assam, which integrate climate considerations into fiscal planning processes.

To ensure greater oversight and accountability, strengthening audit mechanisms is essential. This can be achieved by building on the CAG's environmental auditing capabilities and institutionalising audits of climate-related expenditures across sectors. Enhanced transparency can be fostered by publishing regular reports on climate spending and outcomes to foster public trust and enable policy adjustments.

Greater knowledge-sharing between states would help replicate successful initiatives (e.g., renewable energy in Gujarat and Tamil Nadu) and encourage states to develop innovative approaches to climate-responsive budgeting and investment. Equally, SOEs need to be incentivised to align their investments with national and subnational climate objectives. Toward these outcomes iCED's role can be expanded by leveraging it as a training hub for local governments and state-level institutions to improve capacity in green public finance.

To build climate-resilient infrastructure, climate adaptation criteria need to be incorporated into all public investment processes, ensuring infrastructure projects are environmentally sustainable. India can replicate best practices to promote approaches such as Peru's integration of climate risk into infrastructure and Brazil's Amazon Fund to support sustainable development projects.

Finally, to move in this direction, such climate actions would need to be rewarded. This could be achieved by introducing financial incentives for states that achieve climate targets or develop innovative green policies. At the same time, vulnerable communities would need to be supported by allocating resources to help coal-dependent regions transition to renewable energy and to support adaptation in climate-vulnerable areas.

5.5 Conclusion

By scaling these recommendations and learning from existing state-level successes, India can establish a robust green PFM framework. The mandate of India's MoEFCC can be updated toward these ends to track climate-related expenditures and integrate climate goals within fiscal policies.

6. Role of the Finance Commission in India

India's Finance Commission has increasingly recognised the importance of environmental conservation in fiscal planning. In recent years, it has incorporated ecological criteria into its horizontal resource allocation framework to encourage sustainable practices at the state level.

The 14th Finance Commission (2015–2020) made a notable step by including forest cover as a criterion for resource allocation, assigning it a 7.5% weight among other criteria. The 15th Finance Commission (2021–2026) increased this weight to 10%, further incentivising states to maintain and expand forest cover. Both Commissions took a straightforward approach by using net forest cover as the ecological indicator within the devolution formula, alongside non-ecological factors like population, area, and income distance.

By including forest cover in fiscal transfers, these Commissions incentivised states to protect and grow forested areas. They argued that states should be compensated for the opportunity costs associated with maintaining forests, a consideration that helps create political space for pro-forest policies. The 15th Commission's interim report also noted that both state and Central governments advocated for a stronger focus on environmental and climate change issues during consultations.

Empirical evidence suggests that these ecological criteria in intergovernmental fiscal transfers (IGFT) have had mixed results on net forest cover in India. While some econometric studies (Busch & Mukherjee, 2017; TERI, 2019; Busch et al., 2020) show a positive correlation between IGFT and increases in net forest cover, others highlight the absence of earmarking and uncertainty about continued fiscal incentives as limiting factors. This has important implications for the 16th Finance Commission in India as it will likely look to expand its approach to climate and environmental criteria.

Looking ahead, India's climate change framework should work in tandem with the Finance Commission to ensure that climate policies are effectively implemented and incentivised across states, with a focus on financial resources, incentives, and accountability mechanisms. Considering the vastly different climate risks, resources, and capacities across India's states, and with equity in resource allocation and public service delivery already being a major plank of their mandate, the Finance Commission should be part of the process of implementing overlapping climate responsibilities in India. This approach is part of a global trend where fiscal commissions and intergovernmental bodies in federal systems come together to play a central role in climate policy and environmental governance.

6.1 Strengthening the Forest Cover Criterion in Fiscal Transfers

The 16th Finance Commission has been constituted under the chairmanship of Arvind Panagariya, with its recommendations expected to cover the period from 2026 to 2031. While the specific criteria for the devolution formula are yet to be finalised, discussions are underway on expanding the ecological parameters within this framework.

Several options exist for enhancing the role of forest cover in fiscal transfers.

Instead of relying solely on static forest cover data, the Commission could implement a dynamic forest cover assessment system that rewards states based on their year-on-year improvements in forest density and quality. This approach would encourage not only the preservation of existing forests but also active afforestation and reforestation initiatives.

Additionally, developing an index that measures biodiversity richness along with the provision of vital ecosystem services—such as carbon sequestration and water purification—could further incentivise states. Those achieving higher scores on this Biodiversity and Ecosystem Services Index could receive greater fiscal benefits, promoting the conservation and maintenance of diverse, ecologically valuable forest ecosystems.

Furthermore, allocating additional funds specifically to states that successfully implement community-based forest management programmes would enhance the effectiveness of conservation efforts. Empowering local communities to actively participate in managing forests has been consistently shown to improve forest cover and health. Providing fiscal recognition for these community-led activities would strengthen participatory governance models and encourage broader involvement.

Finally, integrating climate resilience metrics into the evaluation process would ensure that forests are recognised for their critical role in enhancing climate resilience. Metrics could include the capacity of forests to prevent soil erosion, mitigate floods, and maintain groundwater levels. States effectively leveraging their forests for climate resilience could be rewarded, aligning fiscal incentives with broader environmental and societal benefits.

6.2 A Legislative Mandate for Climate Action

Future climate change legislation in India could explicitly require the Finance Commission to consider climate action as a core criterion in its recommendations. This would involve integrating factors such as climate vulnerability, adaptation needs, and mitigation efforts into the criteria for distributing central funds to states.

6.3 International Experience

The experiences of Finance Commissions and similar bodies in other federations—such as Brazil, South Africa, and Indonesia—offer valuable insights that could help India enhance climate policy implementation through its Finance Commission:

Brazil: Leveraging fiscal transfers for conservation

Brazil's fiscal federalism includes environmental performance in fiscal transfers through mechanisms like the ICMS Ecológico, rewarding municipalities that protect biodiversity and natural resources.

India could adopt a similar model, expanding ecological fiscal transfers to incentivise states and local bodies that demonstrate measurable climate actions, such as reforestation, emission reductions, and developing climate-resilient infrastructure. The Finance Commission could structure incentives for states and local bodies that demonstrate measurable climate benefits.

South Africa: Targeted funds for climate adaptation

South Africa's adaptation framework emphasises resilience, with the national government providing targeted grants to provinces and municipalities based on climate vulnerability, enabling tailored responses to local climate challenges.

Similarly, India's Finance Commission could create climate-action funds specifically for highly vulnerable regions, such as coastal, drought-prone, and flood-prone areas, allocating resources based on vulnerability assessments to support adaptation initiatives nationwide.

Indonesia: Performance-based transfers and local empowerment

Indonesia's fiscal framework incorporates performance-based grants that incentivise subnational governments to meet environmental targets, rewarding localities for milestones like reducing deforestation and improving waste management.

Similarly, India's Finance Commission could introduce performance-based funding mechanisms for states and local bodies, emphasising key climate indicators such as renewable energy adoption, pollution reduction, and sustainable land use, thereby encouraging accountability and progress towards national climate goals.

6.4 The Future Role of India's Finance Commission

To become a central player in climate policy implementation and bridge policy and funding gaps, India's Finance Commission could expand its mandate to incorporate environmental considerations into fiscal policy. It could achieve this by:

- Closely collaborating with national institutions (such as NITI Aayog, the Inter-State Council, the Reserve Bank of India (RBI), and the MoEFCC), expanding ecological fiscal transfers to drive climate goals like carbon sequestration, renewable energy, water conservation, and urban greening, and engaging more actively with State Finance Commissions and local bodies through targeted grants and capacity-building programmes for ground-level implementation.
- Institutionalising climate performance grants and incentives—such as rewards for emissions reduction, renewable energy installation, and climate-resilient infrastructure.
- Promoting transparency and accountability in climate spending through regular reporting, audits, and public expenditure tracking, which would further strengthen governance and funding effectiveness.

6.5 Conclusion

Through strategic collaboration, targeted funding mechanisms, and the adoption of international best practices, India's Finance Commission can evolve into a key institution for climate action. Expanding its

mandate to incorporate ecological and climate-based criteria can help drive ambitious environmental policies, ensuring effective allocation of resources and incentivising climate leadership among states. Collaborating across federal, state, and local levels, and working with institutions like NITI Aayog, the Inter-State Council, and the RBI, the Finance Commission can become a unifying force in India's journey towards a sustainable and resilient future.

7. Summary and Conclusions

India's ecological transition requires a cohesive climate governance framework that strengthens institutional mechanisms, enhances fiscal incentives, and ensures accountability across all levels of the government. While India has set ambitious global climate commitments, translating these into effective domestic action requires a well-structured legal and institutional framework. This paper highlights key institutional and financial reforms that are needed to strengthen climate governance in India's federal system.

7.1 Key Elements of a Strengthened Climate Framework

A national climate law should define federal, state, and local responsibilities, ensuring decentralised adaptation (disaster resilience, sustainable agriculture) while maintaining centralised mitigation policies (emission targets, carbon pricing). Establishing strong compliance mechanisms, modelled on Germany's sectoral emission budgets and South Africa's Climate Change Bill, would help India's climate framework.

Greatly strengthening one of the existing Councils on Climate Change (such as the PMCCC) or establishing an independent Climate Commission (as in New Zealand) to coordinate intergovernmental climate efforts would enhance coordination. Improving institutional engagement between central and state bodies through permanent intergovernmental climate forums for joint planning and knowledge sharing would enhance governance.

The Finance Commission of India should play a greater role in integrating climate objectives into fiscal policy. Expanding ecological fiscal transfers (EFTs) beyond forest cover to include carbon sequestration, renewable energy adoption, and cli-

mate adaptation indicators would strengthen state incentives for climate action. The Finance Commission could also work closely with the Union Ministry of Finance to develop performance-based grants that reward states for achieving measurable emission reductions, renewable energy targets, and disaster-related improvements. Lessons from Brazil's ICMS Ecológico and South Africa's climate-resilience funds indicate that financial incentives drive subnational climate action, making the Finance Commission a potentially key institutional player in India's climate governance.

A structured carbon pricing system should be implemented, drawing from Canada's OBPS and the EU's absolute pricing models. This would also help build climate finance and could be complemented by expanding public-private partnerships (PPPs) for green investments, with state-specific climate resilience funds to support disaster-prone regions.

Transparency and accountability in climate action are essential. This can be achieved by institutionalising state-level climate reporting and ensuring independent audits (e.g., by CAG and iCED). Creating a national climate expenditure dashboard would facilitate real-time tracking of climate finance flows and project outcomes.

Governance mechanisms should be localised and adaptive. Toward this, strengthening the role of Panchayats and municipalities by directing climate-resilience funds toward community-driven projects is essential. States should also be encouraged to lead innovations in climate adaptation (e.g., Odisha's green budgeting, Tamil Nadu's water conservation).

7.2 Conclusion

India must enact and institutionalise comprehensive climate legislation that combines fiscal federalism, transparent governance, and decentralised implementation. A well-defined national framework, supported by strong institutional coordination, climate-responsive fiscal mechanisms, and transparency measures, will allow India to combine state-led initiatives with national climate goals.

The Finance Commission's expanded role in climate finance, combined with carbon pricing, performance-based incentives, and local empowerment, will enable a just and sustainable ecological transition. By drawing on international best practices (e.g., Brazil's EFTs, New Zealand's Climate Commission, and South Africa's resilience funds), India can lead in climate governance while ensuring equitable development and environmental sustainability.

References

- Ahluwalia, M. S., and U. Patel. (2024). *Climate Change Policies for Developing Countries*. New Delhi: Center for Social and Economic Progress. <https://csep.org/working-paper/climate-change-policy-for-developing-countries/>.
- Ahmad, E., and N. Stern. (2009). Effective Carbon Taxes and Public Policy Options: Insights from India and Pakistan. *Working Paper* 28.
- Alm, J., and H. S. Banzhaf. (2012). Designing Economic Instruments for the Environment in a Decentralized Fiscal System. *Journal of Economic Surveys*, Vol. 26(2), p. 177-202.
- Asian Development Bank. (2024). *Asia-Pacific Climate Report 2024: Catalyzing Finance and Policy Solutions*. ADB.Org, Manila, Philippines.
- Atteridge, A., M. K. Shrivastava, N. Pahuja, and H. Upadhyay. (2012). Climate Policy in India: What Shapes International, National and State Policy? *Ambio*, Vol. 41(Suppl. 1), p. 68-77. <https://doi.org/10.1007/s13280-011-0242-5>.
- Aydin, S. O., B. Battersby, F. Gonguet, C. Wendling, J. Charaoui, and M. Petrie. (2022). How to Make the Management of Public Finances Climate-Sensitive—'Green PFM'. *IMF How to Note 2022/006*. International Monetary Fund, Washington, D.C.
- Bhattacharya, A., M. Ivanyna, W. Oman, and N. Stern. (2021). Climate Action to Unlock the Inclusive Growth Story of the 21st Century. *IMF Working Paper WP/21/147*. Institute for Capacity Development Department, IMF, Washington, D.C.
- Busch, J., A. Kapur, and A. Mukherjee. (2020). Did India's Ecological Fiscal Transfers Incentivize State Governments to Increase Their Forestry Budgets? *Environmental Research Communications*, Vol. 2(031006). <https://doi.org/10.1088/2515-7620/ab817c>.
- Busch, J., and A. Mukherjee. (2017). Encouraging State Governments to Protect and Restore Forests Using Ecological Fiscal Transfers: India's Tax Revenue Distribution Reform. <https://doi.org/10.1111/conl.12416>.
- Canadian Climate Institute. (2023). How Large-Emitter Trading Systems Work. <https://climateinstitute.ca/large-emitter-trading-systems-explained/>.
- Canada. (2023). How Carbon Pricing Works. *Government of Canada*. <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/putting-price-on-carbon-pollution.html>.
- Centre for Science and Environment (CSE). (2021). National Green Tribunal: A new Beginning for Environmental Cases? New Delhi: Retrieved from <https://www.cseindia.org/national-green-tribunal--a-new-beginning-for-environmental-cases-2900%20citation>
- Chen, W., F. Jaumotte, and K. Zhunussova. (2022). A Comprehensive Package of Macroeconomic Policy Measures for Implementing China's Climate Mitigation Strategy. *IMF Working Paper*; Asia and Pacific Department, IMF, Washington, D.C.
- Climate Action Tracker. (2023). Tracking National Climate Commitments and Governance Ratings. Retrieved from <https://climateactiontracker.org/>.
- Comptroller and Auditor General of India (CAG). (2022). Performance Audit on Climate Change Finance and Governance. Government of India. <https://cag.gov.in/uploads/PressRelease/PR-Climate-Change-Finance-2022.pdf>.
- Dubash NK. Unpacking Climate Policy. *Science*, 2024 Jun 7;384(6700):eadq0862. doi: 10.1126/science.adq0862. Epub 2024 Jun 6. PMID: 38843322.
- Dubash NK. Design National Framework Climate Laws to Enable Low-Carbon Resilient Transformation. *Science*, 2024 Feb 16;383(6684):eado0317. doi: 10.1126/science.ado0317. Epub 2024 Feb 15. PMID: 38359123.
- Dubash, N. K. (2021). Varieties of Climate Governance: The Emergence and Functioning of Climate Institutions. *Environmental Politics*, 30(sup1), 1-25. <https://doi.org/10.1080/09644016.2021.1979775>
- Dubash, N. K. (2019). *India in a Warming World: Integrating Climate Change and Development*. New Delhi: Oxford University Press.
- Dubash, N. K. (2013). The Politics of Climate Change in India: Narratives of Equity and Cobenefits. *WIREs Wiley Interdisciplinary Reviews: Climate Change*, Vol. 4(3), p. 191201. <https://doi.org/10.1002/wcc.210>.
- Dubash, N. K., S. Ghosh, and A. V. Pillai. (2024, July 1). Court on Climate Right and How India Can Enforce It. *The Hindu*.
- Dubash, N. K., and A. V. Pillai. (2023). Climate Governance and Federalism in India. In *Climate Governance and Federalism: A Forum of Federations Comparative Policy Analysis*, edited by Fenna A, Jodoin S, Setzer J. Cambridge University Press; p. 177-97.
- Dubash, N. K., A. V. Pillai, C. Flachsland, K. Harrison, K. Hochstetler, M. Lockwood, R. MacNeil, M. Mildemberger, M. Patterson, F. Teng, and E. Tyler. (2021). National Climate Institutions Complement Targets and Policies. *Science*, Vol. 374, Issue 6568, p. 690-93.
- Dubash, N. K., and S. Ghosh. (2019). National Climate Policies and Institutions. In *India in a Warming World*. Oxford University Press, p. 197-220. <https://doi.org/10.1093/oso/9780199498734.003.0010>.
- Dubash, N. K., and A. Jogesh. (2014). From Margins to Mainstream? State Climate Change Planning in India as

- a ‘Door Opener’ to a Sustainable Future. *Centre for Policy Research (CPR), Climate Initiative Working Paper 2014/2*. Research Report. New Delhi: CPR.
- Dubash, N. K., M. Hagemann, N. Höhne, and P. Upadhyaya. (2013). Developments in National Climate Change Mitigation Legislation and Strategy. *Climate Policy*, Vol. 13, p. 649–64. <https://doi.org/10.1080/14693062.2013.845409>.
- Fay, M., S. Hallegatte, A. Vogt-Schilb, J. Rozenberg, U. Narloch, and T. Kerr. (2015). Decarbonizing Development: Three Steps to a Zero-Carbon Future. Climate Change and Development. World Bank, Washington, D.C.
- Fifteenth Finance Commission. (2022). *Strengthening India’s Forest Sector: Recommendations to the Fifteenth Finance Commission*.
- Georgieva, K., and T. Adrian. (2022). Public Sector Must Play Major Role in Catalyzing Private Climate Finance. *IMF Blog*, International Monetary Fund.
- Goel, K. (2019, October). Deep-decarbonization Strategy for India: Balancing Climate Change and Economic Development: kleinmanenergy.upenn.edu.
- Government of India, Ministry of Environment, Forest and Climate Change (MoEFCC). (2023). *India’s National Adaptation and Climate Resilience Strategy*. <https://moef.gov.in/>.
- Government of India, Ministry of Finance. (2022). *Budgetary Framework for Green Investments and Climate Finance*. <https://www.finmin.nic.in/>.
- Government of India, Ministry of Power. (2022). *Renewable Energy Targets and Policies Report*. <https://powermin.gov.in/>.
- Government of India, Economic Survey. (2021). “Sustainable Development and Climate Change,” Chapter 6 (2020–2021); https://www.indiabudget.gov.in/economic-survey/doc/vol2chaptre/echap06_vol2.pdf.
- Grantham Research Institute. (2019). *National Laws and Policies on Climate Change Adaptation: A Global Review*. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2019/12/National-laws-and-policies-on-climate-change-adaptation_A-global-review.pdf.
- Gupta, S., S. B. Das, and S. Gupta. (2024). Carbon Pricing Through Emissions Trading in Asia and the Pacific: Comparative Analysis and Way Forward, (Background paper was prepared for the report Asia-Pacific Climate Report 2024); Asian Development Bank.
- Gupta, S. (2014). Environmental Policy and Governance in a Federal Framework: Perspectives from India, in *Environmental Policies in Asia*, Jing Huang and Shreekrant Gupta (eds.). World Scientific.
- Hahn, R. W., and R. G. Noll. (1981). Designing a Market for Tradable Emissions Permits. *Social Science Working Paper*, No. 398. California Institute of Technology, Pasadena, CA.
- Iacobuta, G., N. K. Dubash, P. Upadhyaya, M. Deribe, and N. Höhne. (2018). National Climate Change Mitigation Legislation, Strategy and Targets: A Global Update. *Climate Policy*. Vol. 18, Issue 9, July.
- International Renewable Energy Agency. (2023). India’s Pathway to A Renewable Future: Green Hydrogen and Energy Storage. <https://www.irena.org/>.
- International Monetary Fund. (2022). *Fiscal Monitor Report—From Pandemic to War*. International Monetary Fund, Washington, D.C.
- International Energy Agency. (2022). India Energy Outlook 2022. <https://www.iea.org/reports/india-energy-outlook-2022>.
- Issac, T. (2022). GST and India, in *India International Centre Quarterly Journal*, New Delhi, India.
- Kaur, A., R. K. Mohanty, L. Chakraborty, D. Rangan. (2021). Ecological Fiscal Transfers and State-level Budgetary Spending in India: Analysing the Flypaper Effects in India. No. 332, NIPFP.
- King County Climate Action Team (eds.). (2020). King County 2020 Strategic Climate Action Plan. King County, Washington.
- Kumar, P., and A. Naik. (2024). *India’s New Constitutional Climate Right: Examining the Significance of M.K. Ranjitsinh and Others v. Union of India and Others for Climate Litigation in India*. VerfBlog, 2024/4/25. <https://verfassungsblog.de/indias-new-constitutional-climate-right/>. DOI: 10.59704/a03c6e7b7b3cc925.
- Mandal, S., and M. G. Rao. (2007). Overlapping Fiscal Domains and the Effectiveness Environmental Policy in India, Chapters, in: Albert Breton, Giorgio Brosio, Silvana Dalmazzone, and Giovanna Garrone (eds.), *Environmental Governance and Decentralization*. (Chapter 8), Edward Elgar Publishing.
- Martinez-Vazquez, J. (2021). Adapting Fiscal Decentralization Design to Combat Climate Change. Climate Governance Papers. 2021 International Bank for Reconstruction and Development / The World Bank. And International Center for Public Policy Working Paper 21-05, Georgia State University.
- Ministry of Finance, Government of India. (2019). Climate Summit for Enhanced Action: A Financial Perspective from India Climate Change. *Finance Unit, Department of Economic Affairs. Discussion Paper*.
- Mukhi, N., S. Rana, S. Mills-Knapp, and E. Gessesse. (2020). World Bank Outlook 2050: Strategic Directions Note. Supporting Countries to Meet Long-term Goals of Decarbonization. World Bank, Washington, D.C.
- New Zealand Climate Change Commission. (2023). *Five-Year Climate Budget Reports*. <https://www.climatecom->

mission.govt.nz.

NITI Aayog. (2021). Designing the Future of Dispute Resolution: The ODR Policy Plan for India. <https://www.niti.gov.in/sites/default/files/2023-03/Designing-The-Future-of-Dispute-Resolution-The-ODR-Policy-Plan-for-India.pdf>

Nurfatriani, F., D. Darusman, D. R. Nurrochmat, A. E. Yustika, and M. Z. Muttaqin. (2015). Redesigning Indonesian Forest Fiscal Policy to Support Forest Conservation. *Forest Policy and Economics*, Vol. 61 (December): p. 39–50.

Parry, I., S. Black, and J. Roaf. (2021). Proposal for an International Carbon Price Floor Among Large Emitters. IMF Staff Climate Notes 2021 (001). International Monetary Fund, Washington, D.C.

Rajaraman, I., and M. Gupta. (2022). Fiscal Transfers for Forest Cover Aligning National and Subnational Objectives in a Federal Setting. *Economic and Political Weekly* LVII(1), p. 50–57.

Rajaraman, I. (2017). Continuity and Change in Indian Fiscal Federalism. *India Review*, Vol. 16:1, p. 66–84, DOI: 10.1080/14736489.2017.1279927.

Rao, M. G. (2017). The Effect of Intergovernmental Transfers on Public Services in India, Working Papers 17/218, National Institute of Public Finance and Policy.

Ray, S., Jain, S., & Thakur, V. (2021, February). *Financing India's Disaster Risk Resilience Strategy*. Working Paper (404). Indian Council for Research on International Economic Relations.

Ring, I. (2002). Ecological Public Functions and Fiscal Equalisation at the Local Level in Germany. *Ecological Economics*, p. 415–27.

Singh, A. (2023, September 6). Let Us Deploy Fiscal Federalism Against Climate Change. *Mint Premium*.

Singh, A. (2023, August 20). Environment Policy Needs Federalism to Play a Big Role. *Mint Premium*. <https://www.livemint.com/>.

Singh, V. P., and G. Sidhu. (2021). Investment Sizing India's 2070 Net-Zero Target, Council on Energy, Environment and Water (CEEW). Issue Brief, November 2021.

Smoke, Paul J., and M. J. Cook. (2022). Administrative Decentralization and Climate Change: Concepts, Experience, and Action (English). Climate Governance Papers, World Bank Group, Washington, D.C. <http://documents.worldbank.org/curated/en/099040001252284476/P1725690d761df0fa08f5e0c9bd504c19ae>.

South Africa's Just Energy Transition Partnership (JETP). (2021). *International Climate Finance and Subnational Adaptation Strategies*.

Sridhar, A., Dubash, N. K., Averchenkova, A., Higham, C., Rumble, O., & Gilder, A. (2022). Climate Governance

Functions: Towards Context-Specific Climate Laws. Centre for Policy Research, Grantham Research Institute on Climate Change and the Environment, Centre for Climate Change Economics and Policy, London School of Economics and Political Science, and Climate Legal.

Stef, N., and A. Ashta. (2023). Dynamics in Environmental Legislation, *International Review of Law and Economics*, Vol. 76.

Stern, N. (2006). *Stern Review: The Economics of Climate Change*. Retrieved from http://mudancasclimaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview_report_complete.pdf, 2008. "The Economics of Climate Change." *American Economic Review*, p. 1–37.

TERI Report for the 15th Finance Commission. (2019). *Strengthening India's Forest Sector Recommendations to the Fifteenth Finance Commission*. https://fincomindia.nic.in/asset/doc/commission-reports/15th-FC/reports/studies/Strengthening_India's_Forest_Sector.pdf.

Thomas, V. (2023). *Risk and Resilience in the Era of Climate Change*. Singapore: Palgrave Macmillan.

Tye, S., and I. Suarez. 2021. "Locally Led Climate Adaptation: What Is Needed to Accelerate Action and Support?" Working Paper. Washington, DC: World Resources Institute. Available online at <https://doi.org/10.46830/wriwp.20.00039>.

United Nations Development Programme (UNDP). (2022). *Building Climate Resilience in India: Community and Ecosystem-Based Approaches*. <https://www.undp.org/>.

United Nations. (2021). Paris Agreement Progress Report. United Nations Framework Convention on Climate Change. <https://unfccc.int/process-and-meetings/the-paris-agreement>.

Wills, W., E. L. La Rovere, C. Grottera, G. F. Naspolini, G. Le Treut, F. Ghersi, J. Lefèvre, and C. B. S. Dubeux. (2021). Economic and Social Effectiveness of Carbon Pricing Schemes to Meet Brazilian NDC Targets. *Climate Policy*, Vol. 22, Issue 1, p. 48–63: <https://doi.org/10.1080/14693062.2021.1981212>.

World Bank. (2020). *World Bank Reference Guide to Climate Change Framework Legislation*. <http://hdl.handle.net/10986/34972>.

World Bank. 2015. What Are Green Bonds? <http://documents1.worldbank.org/curated/en/400251468187810398/pdf/99662-REVISED-WB-Green-Bond-Box393208B-PUBLIC.pdf>.

Yilmaz, S., and F. Zahir. (2022). Fiscal Tools for Subnational Ecosystem and Climate Action. *Decentralized Governance and Climate Change Conference*. World Bank and Georgia State University.

Zhang, T. (2020). Sustainable Transformation of Societies—A Green Consensus for Macro-Fiscal Policies? *IMF Blog*. <https://www.imf.org/en/News/Articles/2020/10/09/sp100920-sustainable-transformation-of-societies>.

Appendix 1: Countries with Climate Framework Laws

This list reflects countries that have enacted comprehensive climate change framework laws, specifying national policies and legally binding targets for reducing greenhouse gas emissions. The years indicate when each law was adopted or enacted. Some laws have been amended or updated since their original adoption.

Country	Framework Climate Law	Year Adopted
Albania	Law No. 155/2020 on Climate Change	2020
Andorra	Law 21/2018 on the Promotion of the Energy Transition and Climate Change	2018
Argentina	Law 27,520 on Minimum Budgets for Adaptation and Mitigation to Global Climate Change	2019
Australia	Climate Change Act	2022
Austria	Climate Protection Act	2011
Bahamas	Climate Change and Carbon Market Initiatives Act	2022
Benin	Law No. 2018-18 Regulating Climate Change Actions	2018
Brazil	Law No. 12,187 Establishing the National Policy on Climate Change	2009
Bulgaria	Climate Change Mitigation Act	2014
Canada	Canadian Net-Zero Emissions Accountability Act	2021
Chile	Framework Law on Climate Change	2022
China	Energy Law	2024
Colombia	Law 1931 Establishing Guidelines for the Management of Climate Change	2018
Croatia	Law on Climate Change and Ozone Layer Protection	2019
Denmark	Climate Act	2014 (Revised in 2020)
European Union	European Climate Law (Regulation (EU) 2021/1119) Establishing the Framework for Achieving Climate Neutrality	2021
Fiji	Climate Change Act	2021
Finland	Climate Change Act	2015 (Amended in 2022)
France	Law No. 2021-1104 on Climate and Resilience	2021
Germany	Federal Climate Protection Act (<i>Bundes-Klimaschutzgesetz</i>)	2019 (Amended in 2021)
Ireland	Climate Action and Low Carbon Development (Amendment) Act	2021
Kenya	Climate Change Act	2016
Mexico	General Law on Climate Change	2012
Netherlands	Climate Act (<i>Klimaatwet</i>)	2019
New Zealand	Climate Change Response (Zero Carbon) Amendment Act	2019
Nigeria	Climate Change Act	2021
Norway	Climate Change Act	2017
Pakistan	Pakistan Climate Change Act	2017
Peru	Framework Law on Climate Change	2018
Philippines	Climate Change Act	2009
South Africa	Climate Change Act	2024

Country	Framework Climate Law	Year Adopted
South Korea	Framework Act on Carbon Neutrality and Green Growth to Respond to the Climate Crisis	2021
Spain	Law 7/2021 on Climate Change and Energy Transition	2021
Sweden	Climate Act	2017
Switzerland	Federal Act on Climate Protection Goals, Innovation, and Strengthening Energy Security	2023
Uganda	National Climate Change Act	2021
United Kingdom	Climate Change Act	2008

Notes:

Belgium: While Belgium has multiple laws related to climate change, it does not have a single comprehensive climate framework law. Climate policy is coordinated through various federal and regional legislation.

Switzerland: In June 2023, Swiss voters approved the Federal Act on Climate Protection Goals, Innovation, and Strengthening Energy Security, aiming for net-zero emissions by 2050.

Source: **Climate Change Laws of the World** database maintained by the Grantham Research Institute on Climate Change and the Environment.

India's Case Studies of Community-Led State Climate Action Plans

State	Project	Type	Primary Focus	Model	Success Highlights
Maharashtra	Jalyukt Shivar Abhiyan	Water Conservation	Groundwater recharge and drought resilience	Community-led water management	Improved water availability, reduced reliance on tankers; strong community ownership.
Maharashtra	Climate-Resilient Agriculture in Marathwada	Climate-Resilient Farming	Drought-tolerant crops and water-efficient farming	Grassroots training in climate-smart farming	Increased crop resilience, reduced water dependency, sustainable irrigation practices.
Maharashtra	Solar Microgrids	Renewable Energy	Rural electrification through solar power	Community-managed microgrids	Affordable and reliable power access for remote areas; locally managed for sustainability.
Tamil Nadu	Climate-Smart Village Project	Climate-Resilient Farming	Organic farming, water efficiency, and crop diversification	Farmer training, cooperative planning	Enhanced resilience to climate variability; scalability to other regions.
Tamil Nadu	Mangrove Restoration	Nature-Based Solution	Coastal resilience and biodiversity conservation	Community-driven mangrove replanting	Increased coastal protection, biodiversity gains; new income through ecotourism.
Tamil Nadu	Tamil Nadu Green Climate Company (TNGCC)	Integrated Climate Action	Renewable energy, afforestation, and water resource management	Public-private partnerships, decentralised renewables	Advanced renewable energy goals; effective collaboration across sectors.
Gujarat	Charanka Solar Park	Renewable Energy	Large-scale solar power generation	Centralised solar park with community employment	Enhanced energy security; job creation; and rapid renewable expansion.
Rajasthan	Bhadla Solar Park	Renewable Energy	Large-scale solar power generation	Public-private partnerships	World's largest solar park, significant renewable energy capacity; job creation.
Rajasthan	Traditional Water Harvesting (Johads)	Water Conservation	Groundwater recharge using traditional methods	Revival of traditional methods and community involvement	Improved water availability, revitalised traditional knowledge; engaged local communities.
Kerala	Community-Led Flood Management	Disaster Resilience	Proactive flood forecasting and disaster response	Local disaster committees and decentralised planning	Reduced flood damage, high community engagement; enhanced early warning systems.
Kerala	Food Waste Management	Waste Management	Reduction and recycling of food waste	Urban-local partnerships and community involvement	Minimised food waste; improved waste management infrastructure; community benefits.
Sikkim	100% Organic Farming	Sustainable Agriculture	Organic farming practices across the state	State-led organic policy with grassroots training	First fully organic state; improved soil health; increased rural incomes.
Odisha	Joint Forest Management (JFM)	Forest Conservation	Sustainable forest management and livelihoods	Government-community partnership	Increased forest cover; sustainable incomes; community stewardship.
Andhra Pradesh	Zero Budget Natural Farming (ZBNF)	Climate-Resilient Farming	Chemical-free and low-cost farming	State-supported natural farming model	Reduced farming costs; enhanced soil fertility; high adoption rates.
Bihar	Off-Grid Solar Projects	Renewable Energy	Electrification for remote communities	Community-owned solar microgrids	Improved quality of life; community-managed systems ensuring sustainability.
West Bengal	Sundarbans Coastal Resilience	Disaster Resilience	Mangrove restoration and cyclone protection	Community-led mangrove restoration	Enhanced coastal resilience; biodiversity recovery; reduced disaster vulnerability.

Appendix 2: Summary Classification of Indian States: Climate Readiness, Mitigation Urgency⁹

I. High Climate Readiness, High Mitigation Urgency

These states have robust renewable energy initiatives but face high emissions from industries and urbanisation, requiring urgent action.

Maharashtra

Readiness: Strong renewable energy infrastructure (solar and wind) with international and state-level support. Urban centres like Mumbai and Pune are advancing EV adoption and green building practices.

Urgency: High emissions from industrial activities and transportation, along with coastal vulnerability to flooding and sea-level rise.

Vulnerability Level: Moderate.

Gujarat

Readiness: A leader in renewable energy, especially solar and wind, supported by green hydrogen initiatives. Policy frameworks and private investment are well established.

Urgency: High emissions from petrochemical industries and urbanisation in cities like Ahmedabad and Surat.

Vulnerability Level: Moderate.

Tamil Nadu

Readiness: Advanced investments in wind and solar energy. Actively exploring offshore wind projects and renewable storage solutions.

Urgency: High emissions from transportation and industry, especially in urban hubs like Chennai. Coastal areas face significant climate impacts.

Vulnerability Level: Moderate.

II. Medium Climate Readiness, High Mitigation Urgency

These states are advancing in renewable energy development but face urgent climate vulnerabilities and emissions challenges, particularly from industries and urbanisation.

West Bengal

Readiness: Expanding solar projects in urban areas and improving coastal resilience strategies.

Urgency: High emissions from Kolkata's industries and significant climate risks in the Sundarbans region.

Vulnerability Level: High.

Uttar Pradesh

Readiness: Progress in rural solar electrification and biomass-based projects. Still lacks comprehensive renewable energy strategies for urban and industrial regions.

Urgency: High emissions from coal-based power and transport, compounded by severe air pollution.

Vulnerability Level: Moderate.

Odisha

Readiness: Moderate renewable energy development with a focus on solar projects and coastal resilience.

Urgency: High emissions from mining and steel industries, with significant exposure to cyclones and floods.

Vulnerability Level: High.

Punjab

Readiness: Progress in solar energy, particularly for agricultural applications. Exploring biofuels to address stubble burning emissions.

Urgency: High agricultural emissions and air quality challenges due to stubble burning.

Vulnerability Level: Moderate.

⁹ Key indicators for building a climate resilience scorecard that could be used to tie funding to specific climate goals and to evaluate regional progress and measurable outcomes.

Haryana

Readiness: Modest progress in renewable energy, with solar-powered water pumps and small-scale solar projects.

Urgency: High industrial and transportation emissions, with significant urban pollution.

Vulnerability Level: Moderate.

Chhattisgarh

Readiness: Limited renewable energy development. The state has potential for solar and biomass but lacks significant progress.

Urgency: High emissions from coal-based industries and mining, with deforestation adding to climate vulnerability.

Vulnerability Level: High.

Jharkhand

Readiness: Limited renewable energy infrastructure. Focus on mining and coal has delayed progress in energy transition.

Urgency: High emissions from coal and industrial activities, with growing deforestation concerns.

Vulnerability Level: High.

III. Low Climate Readiness, High Mitigation Urgency

These states face significant vulnerabilities and high emissions but lack institutional capacity and renewable energy infrastructure to address these challenges effectively.

Bihar

Readiness: Minimal renewable energy capacity, with slow progress in solar electrification.

Urgency: High emissions from biomass usage and a rapidly growing transport sector.

Vulnerability Level: High.

Assam

Readiness: Moderate renewable energy capacity with a focus on solar and hydro in rural areas.

Urgency: High vulnerability to floods and emissions from agriculture and deforestation.

Vulnerability Level: High.

Madhya Pradesh

Readiness: Limited progress in renewable energy development, with some solar and wind projects.

Urgency: High emissions from agriculture and forestry. Vulnerable to droughts and extreme heat.

Vulnerability Level: Moderate.

IV. High Climate Readiness, Medium Mitigation Urgency

These states have advanced renewable energy infrastructure and institutional support but face relatively moderate emissions challenges compared to high-urgency states.

Karnataka

Readiness: Leading renewable energy capacity with integrated grid solutions for solar and wind projects. Strong EV and public transport policies in Bangalore.

Urgency: Moderate emissions from urbanisation and transport, making clean energy adoption and urban air quality priorities.

Vulnerability Level: Low.

Kerala

Readiness: Well-developed climate resilience policies focusing on flood and coastal management. Solar projects are being expanded in urban and rural areas.

Urgency: Moderate emissions but high sensitivity to climate risks such as monsoon variability and coastal erosion.

Vulnerability Level: Low.

Himachal Pradesh

Readiness: Strong reliance on hydropower and green policies for tourism and rural development.

Urgency: Low emissions but facing glacial melt risks due to climate change.

Vulnerability Level: Low.

A summary of these states is contained in the attached Table.

Classification Table: Readiness and Urgency

Readiness Level	Urgency Level	State	Commentary
High Readiness	High Urgency	Maharashtra	Strong institutional framework and renewable energy infrastructure, with investments in solar and wind. Industrial emissions and urbanisation necessitate urgent decarbonisation and electrification measures.
		Gujarat	Advanced renewable energy deployment, particularly in green hydrogen; robust industrial base contributes to high emissions and requires focused mitigation strategies in petrochemicals and manufacturing.
		Tamil Nadu	High renewable energy penetration, especially in wind and solar; strong disaster management capacity. Urgent actions are needed for industrial emissions reduction and coastal climate adaptation.
Medium Readiness	High Urgency	West Bengal	Gradually improving renewable infrastructure, with urban solar initiatives; high vulnerability to cyclones and the Sundarbans region. Industrial emissions and adaptation-need drive urgency.
		Uttar Pradesh	Expanding rural solar electrification and renewable projects; significant emissions from coal power and transport sectors make energy transition, and air quality measures urgent priorities.
		Odisha	Moderate progress in renewables with solar and coastal resilience projects. High emissions from mining and steel industries, along with cyclone vulnerability, drive urgent mitigation, and adaptation needs.
		Punjab	Advances in biofuel and solar initiatives, especially targeting agricultural emissions from stubble burning. Significant emissions from agriculture and industry require immediate action.
		Haryana	Modest renewable energy development, focused mainly on agriculture; industrial emissions and urban pollution necessitate renewable adoption and air quality improvements.
		Chhattisgarh	Limited renewable capacity but high potential for biomass and solar energy. Emissions from coal-based industries and mining drive an urgent need for clean energy transition and emission controls.
		Jharkhand	Underdeveloped renewable energy sector, coupled with deforestation and high emissions from coal and mining. Urgent focus is required on climate resilience and renewable energy policies.
Low Readiness	High Urgency	Bihar	Minimal renewable energy development, with efforts in solar electrification. Rising emissions from transportation and biomass burning highlight the need for clean energy expansion and urban air quality measures.
		Assam	Moderate solar and hydro capacity; flood-prone and high agricultural emissions necessitate integrated adaptation and mitigation strategies.
		Madhya Pradesh	Limited renewable energy growth, with some progress in solar and wind projects. High agricultural emissions and drought vulnerabilities require urgent climate action.

Explanatory Note:

Climate Readiness: Refers to a state's institutional, technical, and financial capacity to implement effective climate policies and transition to a low-carbon economy. It includes factors such as renewable energy development, policy frameworks, disaster preparedness, availability of green financing, and societal awareness of climate issues.

Mitigation Urgency: Reflects the level of immediate action required to reduce greenhouse gas emissions and address climate vulnerabilities. It considers emissions intensity, dependence on fossil fuels, vulnerability to climate impacts (e.g., floods, droughts, cyclones), and alignment with national and international climate targets.

About the authors



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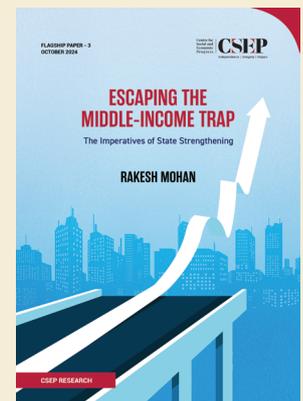
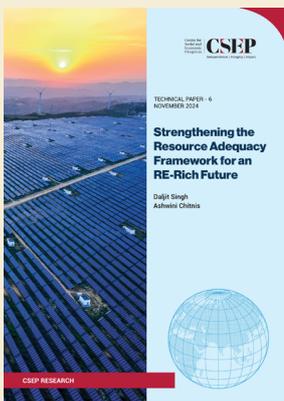
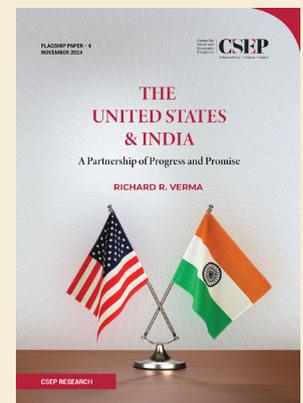
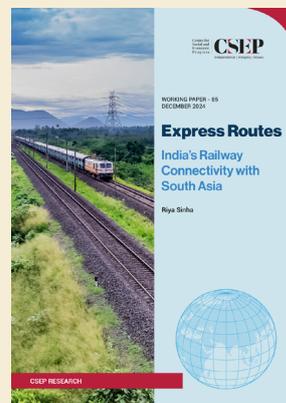
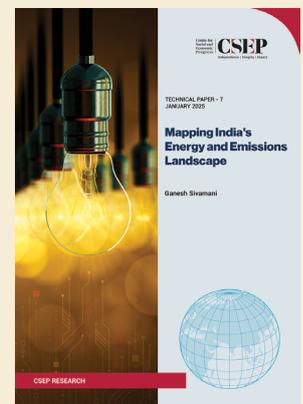
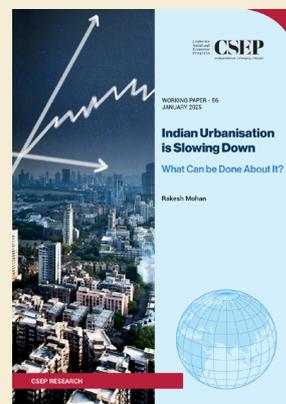
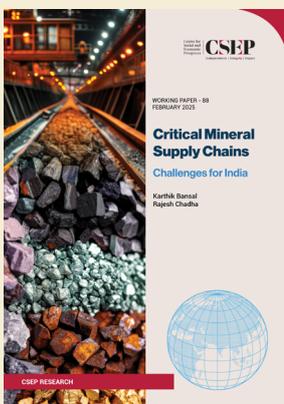
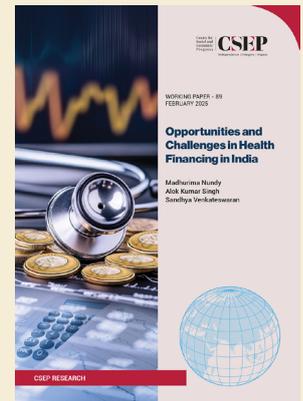
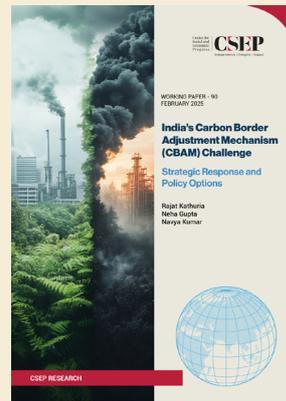
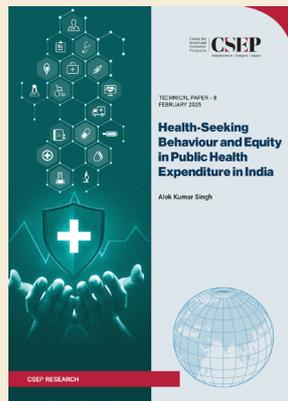
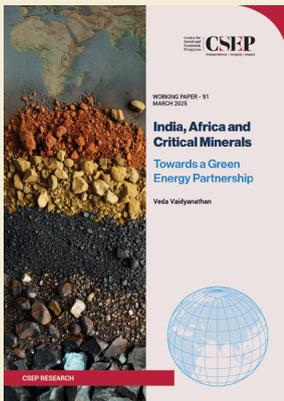


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