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THE INDIAN CLIMATE PARADOX: HOW A DEVELOPING ECONOMY IS OUTPERFORMING CLIMATE TARGETS WHILE MAINTAINING GROWTH

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Abstract

By meeting its initial NDC targets well in advance of schedule, India has become a global leader in climate action. The country maintained 7% GDP growth while reducing emission intensity by 33% by 2019 (9 years early) and reaching 40% non-fossil fuel power capacity by 2021 (11 years early). The energy transition has advanced significantly, as evidenced by the fact that renewables now account for 45.4% of installed capacity, up from 32% in 2014. Decoupling economic growth from emissions is one of India's major accomplishments. Spending on climate adaptation increased from 3.7% to 5.6% of GDP between 2005 and 2019, while GDP grew at a 7% CAGR and emissions increased at a mere 4%. Through afforestation efforts, the nation has produced 1.97 billion tonnes of CO_2 equivalent carbon sinks, which is one billion tonnes short of its 3-billion-ton target. To encourage sustainable practices, India has introduced the Green Credit Program and issued ₹36,000 crore in sovereign green bonds. Key legal innovations driving India's transition include: The Sovereign Green Bonds Framework (2022) creating legal pathways for ₹36,000 crore climate financing, Perform, Achieve and Trade (PAT) scheme established under the Energy Conservation Act, Green Credit Programme rules incentivizing environmental actions through market mechanisms, Renewable Purchase Obligations legally enforced through state electricity regulatory commissions. According to the Economic Survey, programs like the Perform, Achieve and Trade (PAT) scheme, the Energy Conservation Building Code, and the development of EV charging infrastructure have resulted in an annual savings of ₹1.94 lakh crore and a reduction of 306 million tonnes of CO_2. The expansion of renewable energy still faces obstacles, though, mainly related to the need for land and reliance on vital minerals for energy storage. While battery technologies face supply chain constraints due to geographically concentrated mineral sources, the majority of renewable energy sources still require a lot of land. Through the International Solar Alliance, the Coalition for Disaster Resilient Infrastructure, and the Lifestyle for Environment (LiFE) movement, India is at the forefront of global climate initiatives. Through these initiatives, India is positioned to be a crucial voice for developing countries looking to strike a balance between economic growth and climate action.

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Keywords: Climate Action, NDC Targets, Energy Transition, Carbon Sequestration, Green Finance

INTRODUCTION

India, being the third largest economy in the world and the one with the huge population has managed to maintain both thereby outperforming climate targets while maintaining growth. In order to achieve these, India had introduced several policies, and yes, growth and climate targets are achieved simultaneously to some extent, but not fast enough to meet global climate goals[1]. Over the years, India has brought in many policies and has been party to treaties and protocols in order to achieve its climate targets while maintaining growth and has a reduction in the greenhouse gas (GHG) emissions as per the Ministry of Environment, Forest and Climate Change report of 2025. On December 30, 2024, India sent the UNFCCC its 4th Biennial Update Report (BUR-4). According to the report, overall GHG emissions in 2020 were 7.93% lower than those in 2019.[2] India's strategy combines cutting-edge laws, global pledges, and community-based projects to show that environmental sustainability and economic growth are not incompatible. The historical development, policy frameworks, regional implementations, and upcoming challenges of India's climate paradox are all examined in this paper. It illustrates India's position as a global leader in climate action and a role model for developing economies aiming to strike a balance between sustainability and growth through case studies and empirical data.

HISTORY OF CLIMATE SUSTAINABILITY AND ECONOMIC GROWTH

During the tenure of Prime Minister Jawaharlal Nehru from 1947-1964, India's focus was primarily centred on industrialization and development (first 2 FYPs). Climate change was not a significant concern at that epoch[3]. His tenure saw significant societal and political changes, but not the kind of drastic shifts in global climate patterns that are currently observed and attributed to greenhouse gas emissions[4]. India, after the era of Jawaharlal Nehru, has signed treaties and protocols since 1964. The Montreal Protocol (1987), which India is a party to had aimed to phase out ozone-depleting substances (ODS) and transition to non-ODS technology

[1] The Sustainable Development Goals Report 2024, U.N. Doc. ST/ESA/STAT/SER.F/ (July 25, 2024)
[2] *Press Information Bureau, 7.93% Drop in GHG Emissions (Jan. 12, 2025)*
[3] Author Social Links, *India's Role in Climate Change and Sustainability: Navigating the Global Landscape*, The India Way Magazine (Aug. 22, 2024)
[4] Utkarsh Mishra, *'Hindutva Must Refute Nehru To Make Its Case'*, Rediff.com India News (May 27, 2024)

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back in 1992 and has proved to phase out Chlorofluorocarbons, Carbon tetrachloride, Halons, Methyl Bromide and Methyl Chloroform for controlled uses[5]. The Rio Earth Summit, influenced India's approach to a sustainable development and climate targets. Agenda 21 was adopted by India, which gave a blueprint for India's national policies and programs related to environment and development[6]. In 2002, India ratified the Kyoto Protocol (1997) which had its main focus towards the developed countries but India's ratification was more of a symbolic gesture to reaffirm its commitment towards multilateral efforts in addressing climate change.[7] Post Kyoto Protocol, India had ratified the Paris Agreement on climate change on October 2, 2016.[8]

POLICIES INCORPORATED FOR ACHIEVING CLIMATE TARGETS WHILE MAINTAINING GROWTH

India has introduced many policies in order to achieve the climate target while maintaining growth simultaneously and has also achieved results from the policies. India has shown that environmental sustainability and development can coexist by enacting a comprehensive set of climate policies that successfully strike a balance between economic growth and greenhouse gas (GHG) reduction. India's climate strategy is based on the National Action Plan on Climate Change (NAPCC), which was introduced in 2008. It comprises eight National Missions that focus on important areas like energy efficiency, sustainable agriculture, renewable energy, and forest conservation. With installed capacity soaring from 25 MW in 2010 to over 36 GW by 2020, the National Solar Mission (NSM) has been especially transformative, propelling India into a global leader in solar energy and preventing about 50 million tonnes of CO2 emissions annually while lowering energy costs and creating jobs. In support of this, the National Mission for Enhanced Energy Efficiency (NMEEE) has promoted industrial energy savings through creative initiatives like Perform, Achieve and Trade (PAT), which improved industrial competitiveness while reducing emissions by 60 million tonnes and exceeding its targets by 30%.

[5] *Ministry of Environment, Forest and Climate Change celebrates 29th World Ozone Day*, (Sept. 16, 2023)
[6] *The Rio Conventions*, United Nations Framework Convention on Climate Change
[7] Press Information Bureau, *India Ratifies Kyoto Protocol* (Aug. 7, 2002)
[8] Paris Agreement, art. 2, Dec. 12, 2015, T.I.A.S. No. 16-1104

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The National Mission on Sustainable Habitat has promoted urban sustainability by incorporating climate considerations into city planning, which has led to the construction of energy-efficient buildings, the expansion of metro networks, and better waste management. Through micro-irrigation, the National Water Mission has encouraged climate-resilient water use in agriculture, conserving 20–50% of water while sustaining productivity growth. The Green India Mission (GIM), which has expanded forest cover by 15,000 sq km and improved carbon sequestration by 50–60 million tonnes yearly while assisting communities that depend on forests, is a sign of India's dedication to nature-based solutions. Through soil health cards and water-efficient farming methods, the National Mission for Sustainable Agriculture has made farming more climate-resilient, guaranteeing food security in the face of climate variability. Together, these measures have allowed India to cut its emission intensity by 24% between 2005 and 2016 while sustaining strong GDP growth of 6–7% per year, proving that climate action can spur economic growth rather than impede it.

In addition to the NAPCC framework, other programs like the FAME India Scheme for electric vehicles and the Ujjwala Yojana, which connected 80 million people to clean cooking gas, have further decreased emissions while enhancing livelihoods. India's success is a result of policies that have created widespread political and public support for climate action by delivering several co-benefits, including energy security, job creation, better health, and agricultural resilience. The findings speak for themselves: while maintaining economic growth and reducing poverty, industrial energy efficiency has significantly improved, forest carbon stocks have increased by 703 million tonnes, and 38% of installed power capacity is now made up of renewable energy. Developing countries can learn a lot from India's experience, which shows that climate-conscious development is not only feasible but also can spur innovation, increase energy independence, and create jobs. India's policy framework offers a replicable model for attaining both environmental sustainability and inclusive growth as it continues to ramp up its climate efforts.[9]

CASE STUDY

Through Project Prakriti – Growing with Nature, its flagship ESG initiative, the company declared in FY 2022–2023 that it would become a Net Zero Emissions Enterprise by FY 2045. Targeting 15 key ESG impact areas determined by a thorough evaluation of the business's

[9]Press Information Bureau, *India's Climate Policy Achievements* (Dec. 1, 2021).

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operations, the project is intended to be a strategic response to global issues such as inequality, plastic pollution, water scarcity, and climate change. The initiative, which takes a scientific approach, aims to improve natural ecosystems and community well-being while lowering GHG emissions throughout the value chain. Supported by well-defined policies, focused interventions, and proactive supplier cooperation, Project Prakriti incorporates sustainability into the business's fundamental operations and cultivates an environmentally conscious culture. In line with the company's long-term goal of fostering an inclusive future and a greener planet, the initiative not only reduces risks but also opens doors for sustainable growth.[10]

Being a significant contributor to climate change and a vulnerable victim, India faces two challenges. Being the third-largest emitter of greenhouse gases, its rapid economic expansion and rising emissions stand in stark contrast to its vulnerability to extreme weather events that threaten agriculture, livelihoods, and GDP, such as heatwaves, floods, cyclones, and glacier collapses. Given that almost half of its workforce works in climate-sensitive industries, projections indicate that if emissions are not reduced, India may lose up to USD 35 trillion by 2070. India has committed to net zero emissions by 2070 and a 45% reduction in emissions intensity by 2030, but its current climate pledges fall short of the Paris Agreement's 1.5°C target despite historically low per capita emissions. It will take trillions of dollars to finance this transition, which is still a major challenge. To increase green finance, encourage ESG disclosures, and incorporate climate risk into financial systems, the Reserve Bank of India and SEBI have taken regulatory action. Even though there has been progress, India still needs to strike a balance between its development needs and vigorous climate action to maintain resilience and sustainability over the long run.[11]

SUSTAINABLE DEVELOPMENT IN THE INDIAN STATES: ALIGNING CLIMATE TARGETS WITH ECONOMIC GROWTH

In India's third most urbanized state, the Telangana Cool Roof Policy (2023–2028) is a ground-breaking climate adaptation program designed to reduce the urban heat island effect. The policy, which builds on Hyderabad's 2017 pilot and is in line with national frameworks such as ICAP and the National Mission on Sustainable Habitat, calls for 300 square kilometres of cool roofs by 2028 in order to save 600 million units of electricity annually and lower indoor

[10] *Dabur India Ltd., *Digital Annual Report 2023-24* 45 (2024)*
[11] Maxine Nelson, *India: A Case Study in Climate Mitigation and Adaptation*, Global Ass'n of Risk Professionals (Sept. 14, 2023)

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temperatures by 2.1 to 4.3°C. While encouraging voluntary adoption for smaller homes and retrofits, it requires cool roofs for large residential, commercial, and government buildings. Technologies that meet specific solar reflectance and thermal emittance standards include high-albedo tiles, reflective coatings, and membranes. GHMC, HMDA, and DTCP are in charge of implementation, and TS-bPASS is used to track compliance. The policy places a strong emphasis on stakeholder collaboration and public awareness, drawing inspiration from international best practices. Its anticipated results, which position it as a scalable model for heat-resilient urban development, include significant CO_2 reduction, 20% lower cooling costs, and enhanced thermal comfort for vulnerable communities.[12]

The Brihanmumbai Municipal Corporation (BMC) unveiled the Mumbai Climate Action Plan (MCAP) in March 2022. It provides a detailed plan for making Mumbai a net-zero emissions, climate-resilient city by 2050. Urban heat islands, frequent flooding, declining air quality, coastal erosion, and landslide hazards are the five major climate threats that the city faces, according to a thorough Climate Risks and Vulnerability Assessment that served as the foundation for the plan. The MCAP, which uses 2019–20 emissions (26.75 million metric tons of carbon dioxide equivalent) as the baseline, sets aggressive emission reduction targets that are in line with the objectives of the Paris Agreement: 30% by 2030, 44% by 2040, and net-zero by 2050. Through 24 distinct action tracks, the strategy's six main sectors—energy and buildings, sustainable mobility, waste management, urban greening and biodiversity conservation, air quality improvement, and integrated water resource management—are put into practice. Mumbai has led the way in climate-responsive budgeting, incorporating climate action priorities into the municipal financial framework to guarantee efficient implementation. The climate-aligned capital budget for the fiscal year 2025–2026 was 16,321 crore Indian rupees, or 37.81% of the BMC's total capital expenditure. Important organizations like the Brihanmumbai Electric Supply and Transport Undertaking, which has allocated 40% of its capital works budget to climate initiatives, are now included in this budgeting approach. Even though these actions show great progress, the plan still has obstacles to overcome before it can fully decentralize climate action, especially when it comes to strengthening ward-level implementation capacity. Enhancing real-time environmental data collection systems, increasing private sector involvement in green finance, and bolstering community-based adaptation planning—particularly in vulnerable informal settlements—are additional crucial

[12] Natural Resources Defense Council, *Telangana Cool Roof Policy Booklet* 12 (Apr. 3, 2023)

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gaps. Accelerated adoption of renewable energy, increased climate literacy among all stakeholder groups, and fair access to climate-resilient infrastructure in high-risk areas determined by the city's Climate Risks and Vulnerability Assessment are all necessary for future success. As it continues to develop its strategies to address Mumbai's complex climate challenges, the MCAP stands as a trailblazing effort in urban climate governance, establishing significant standards for other Indian cities.[13]

As part of its ambitious plan to achieve carbon neutrality, the government of Himachal Pradesh has unveiled an updated State Action Plan on Climate Change (SAPCC 2021-30). In addition to encouraging sustainable development, the plan places a strong emphasis on adaptation, mitigation, and enhancements to rural livelihoods. The adoption of electric vehicles (EVs) and the shift to green transportation, such as extending ropeway networks to ease urban congestion, are important initiatives that aim to make Himachal a Green Energy State by 2026. With intentions to produce 500 MW by December 2024, the state is also increasing the production of renewable energy, especially solar power, which is anticipated to reduce electricity costs by ₹1,000 crore a year. In order to guarantee sustainable river basin management, the government is also putting Integrated Catchment Area Treatment (CAT) plans into action.[14] The state does, however, face difficulties, such as political disagreements over water rights and energy policies. Chief Minister Sukhvinder Singh Sukhu has accused the central government of impeding the collection of water cess and chastised the former BJP government for allegedly favouring specific hydro projects. In response, the opposition has refuted these allegations, claiming that water cess laws are applied consistently in every state. In spite of these obstacles, Himachal Pradesh is dedicated to achieving its climate goals and is using solar energy, electric vehicles, and environmentally friendly infrastructure to create a more sustainable future.[15]

Tamil Nadu is using a multifaceted strategy to aggressively pursue its goal of reaching net-zero emissions before India's 2070 target. In order to identify the sources of emissions, the state has established a ₹1,000 crore Green Climate Fund and developed India's first Greenhouse Gas Inventory, of which the energy sector accounts for more than 80%. Prohibiting new coal plants and encouraging solar, wind, and green hydrogen energy through the recently established TN

[13] Brihanmumbai Municipal Corporation, *Mumbai Climate Action Plan: Capital Budget Report 2025- 26* 37 (June 5, 2025)
[14] *HP Ready with Action Plan on Climate Change*, Times of India (Dec. 25, 2023).
[15] Anand Bodh, *State Government Will Amend Energy Policy to Make Himachal Self-Reliant: CM Sukhu*, Times of India (Dec. 19, 2023)

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Green Energy Company are important initiatives. In Chennai alone, the government intends to increase urban green cover with 60,000 new saplings and is putting creative heat mitigation techniques into practice, such as cool roof paints that lower temperatures by 8°C. Restoring 40 square kilometres of mangroves and creating a Blue Carbon Agency to profit from carbon stored in ocean ecosystems are two examples of coastal conservation initiatives. With 71 schools transformed into green campuses, 10 villages created as climate-resilient communities, and 500 self-help groups trained as climate ambassadors, grassroots engagement is at the heart of the strategy. This year, the state plans to plant 10 crore geotagged saplings and establish 1,000 mini-forests on industrial lands as part of its ambitious afforestation goals. Through its distinctive fusion of policy innovation, community engagement, and ecosystem restoration, Tamil Nadu is positioned as a national leader in climate action, further supported by plans for wetland conservation and beach Blue Flag certification.[16]

CONCLUSION

India's impressive strides in striking a balance between climate action and economic growth show that sustainable development is not only possible but also aspirational. India has established a global standard by utilizing green finance, policy innovation, and community-driven projects. But in order to maintain this momentum, the nation needs to address important issues like financing gaps, supply chain vulnerabilities, and land-use conflicts. It will be crucial to scale urban resilience initiatives, improve domestic mineral supply chains, and accelerate the adoption of renewable energy. Furthermore, by taking the lead in international forums, India can promote fair climate solutions and make sure that developing countries are not left behind. The way forward necessitates audacious, inclusive, and cooperative action; however, India's progress thus far indicates that the twin objectives of sustainability and growth are achievable. In addition to meeting its climate goals, India can spur a global movement toward a more sustainable and just future by sharing its achievements and improving its tactics.

[16] Shantha Thiagarajan, *How Tamil Nadu Plans to Walk the Green Mile*, Times of India (June 27, 2024)

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