

A COMPREHENSIVE STUDY ON CLIMATE CHANGE AND THE SIGNIFICANT ROLE OF THE G20 PRESIDENCIES IN ADVANCING CLIMATE ACTION IN THE INDIAN CONTEXT.

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Abstract: Climate change can substantially affect the country's economic development and standard of living. The extensive enhancement in greenhouse gas (GHG) emissions, mainly due to the excessive use of fossil fuels across several industries, is generating climate change issues. India ranks fourth globally in terms of emissions. In 2008, India introduced the “National Action Plan on Climate Change” (NAPCC), which is associated with eight national schemes aimed at overcoming various problems posed by climate change through mitigation and adaptation strategies. The NAPCC also promotes the Sustainable Development Goals by highlighting these climate-related problems. India is concentrating on several schemes related to its G20 Presidency, which can promote “environmental sustainability”. The G20 agenda emphasises several priority areas to combat these challenges. The primary purpose of this study is to evaluate India’s current sector and component GHG emissions trend for the financial years 2012 to 2021. It delineates the crucial plan and recent status of implementation of eight national missions under the NAPCC scheme. Also, it indicates budgetary allocation in the case of climate action in India. Additionally, it evaluates the future roadmap of India's “G20 presidency” to overcome the hurdles of the climate change issue in India.

Keywords: Climate Change, GHG Emissions, NAPCC Programme, India’s G20 Presidency.

1. Introduction

Climate change, as highlighted by the United Nations Framework Convention on Climate Change (UNFCCC), refers to changes in climate patterns that are essentially the outcome of human activities. These actions substantially alter the atmosphere and create changes beyond natural disparities. An inclusive understanding of this phenomenon can equip us to delineate these difficulties collaboratively, to assure sustainable growth and a healthier planet for the future. (Breidenich et al., 1998; Craik et al., 2019). Moreover, due to rising human activity, especially the extreme use of fossil fuels, the release of these gases has increased, contributing to climate change and greater worldwide temperatures (IPCC, 2014; Banerjee, 2015). In India, climate change poses a significant challenge to daily life, particularly because the country depends on horticulture and fishing activities that are highly vulnerable to even slight environmental changes. The rapid pace of economic growth, production, and industrialisation leads to ecological instability, threatening sustainability and ecosystems, further exacerbating climate change issues. Rising temperatures and irregular rainfall patterns can intensify the challenges faced by livelihoods in India. Climate change is a complex worldwide issue, manifesting as natural disasters that impact many people. The policies of government authorities indicate that maintaining environmental sustainability is a top priority for the Indian government, given the sensitive nature of this issue. The “National Action Plan on Climate Change” (NAPCC) encompasses the eight essential missions that address these difficulties (Pandey et al., 2024; Deshpande et al., 2025). Several states and union territories have formulated different plans to achieve the climate change goals under the NAPCC. As attention to GHG increases, climate change has become a significant environmental issue, demonstrating a prominent challenge to humanity (Nayak & Nayek, 2023). For instance, climate change is gradually identified as vital to future growth. Several Studies have revealed the interconnection, trade-offs, and synergies among several policy areas, incorporating both empirical evidence and outcomes from worldwide. The study exhibits the vital role of the G20 presidency in denoting the “climate change” issue. It

represents that “G20 countries” have been offering as a global forum and as an intergovernmental platform, concentrating on the impact of climate on both the atmosphere and communities. The G20 presidency intends to provide a more open and inclusive international dialogue by taking several perceptions and aligning with transnational action to address climate change barriers (Mutluri et al., 2024).

2. Literature Review

Pandve et al. (2009) conducted a study to scrutinise the NAPCC programme in India, which has been established to reduce the adverse effects of climate change. The study provides a comprehensive overview of this innovative programme, integrating insights from several regulatory bodies and organisations. Prasad et al. (2009) examined the worldwide hurdles of climate change, particularly in India. The study precisely evaluates the Government of India's role in safeguarding the environment from the adverse impact of climate change. Moreover, it discussed the importance of policies for India's future mitigation and adaptation roadmap. Climate change is a critical issue that affects environmental, socio-economic, and ecological components, leading to extreme temperature increases worldwide (Battisti & Naylor, 2009; Schuurmans, 2021; Westheimer & Palmer, 2005; Yadav et al., 2015). Chandel et al. (2016) described several strategies regarding renewable energy, which point out climate change issues and power production policies as an overview in the NAPCC. The study demonstrated the recent status of several renewable energy sources in India and the hurdles encountered during their application. It is identified that the adverse impacts of climate change can be reduced through focused concentration and proactive measurement aimed at mitigating adverse effects, such as irregular weather patterns, health concerns, and rising sea levels (Izaguirre et al., 2021; Jurgievich et al., 2017). Slaughter et al. (2017) highlighted that the G20 has launched exclusive viewpoints on the essential climate change programme. As a global platform and policy-making authority, the G20 facilitates transnational collaboration to explore the climate change issue and its adverse effects on society. The study denies the importance of climate change policy while noting that certain states have exhibited limited engagement with G20 initiatives (Eckersley, 2012; Naim, 2009). The G20 represents a robust platform capable of providing resources and activities designed to mitigate the adverse impact of climate change on the atmosphere. However, only a limited number of states are actively involved in global summits dedicated to intergovernmental cooperation in developing official and unofficial climate strategies consistent with the objectives of “G20 leaders” (Alexandroff & Brean, 2015; Feinberg, 2020).

3. Legal Framework for Climate Change in India

The Paris Agreement has established crucial targets to regulate the global temperature, aiming to keep it below 2 degrees Celsius, with an ideal target of 1.5 degrees Celsius. To achieve this, global emissions must be reduced by approximately 45% by 2030, and reaching net-zero emissions is a goal for 2050. Around 140 countries have engaged with the Nationally Determined Contributions (NDC) framework to meet this net-zero target and decrease emission intensity. Many countries have developed legal frameworks to align with international targets related to climate change. In 2022, the nation increased its NDC program in India and made several commitments to reach “Net-zero Emissions” by 2070. The country has adopted various policies and legal schemes, such as the NAPCC and the “State Action Plan for Climate Change” (SAPCC), to reinforce its commitments to climate action. India's climate action efforts would benefit from a solid regulatory framework. The country lacks a robust legal environment at the central and state levels. However, several environmental frameworks address climate change issues and actions in India (Pandve, 2009). Recent amendments and sector-specific regulatory frameworks, including the “Electricity Amendment Act” (2023), have been introduced to support climate action by promoting renewable energy. This amendment emphasises enhancing the regulatory framework, improving sectoral effectiveness, and reporting on climate-related activities in India.

Table 1: Regulatory Framework of Climate Change in India

<ul style="list-style-type: none"> ● Air (Prevention and control of pollution) Act (1981) ● Environment Protection Act (1986) ● Energy Conservation Amendment Act (2022) ● Electricity Amendment Act (2023)

4. Objectives of The Study

The objectives of the study are discussed below –

- To evaluate the current trend of India’s sector-wise and components-wise greenhouse gas (GHG) emissions from 2012 to 2021.
- To describe the crucial plan and recent status of implementation of eight national missions as per the NAPCC scheme, and also indicate budgetary allocation in the case of climate action in India.
- To evaluate the future roadmap of India’s “G20 presidency” to overcome the hurdles of climate change in India.

5. Research Methodology

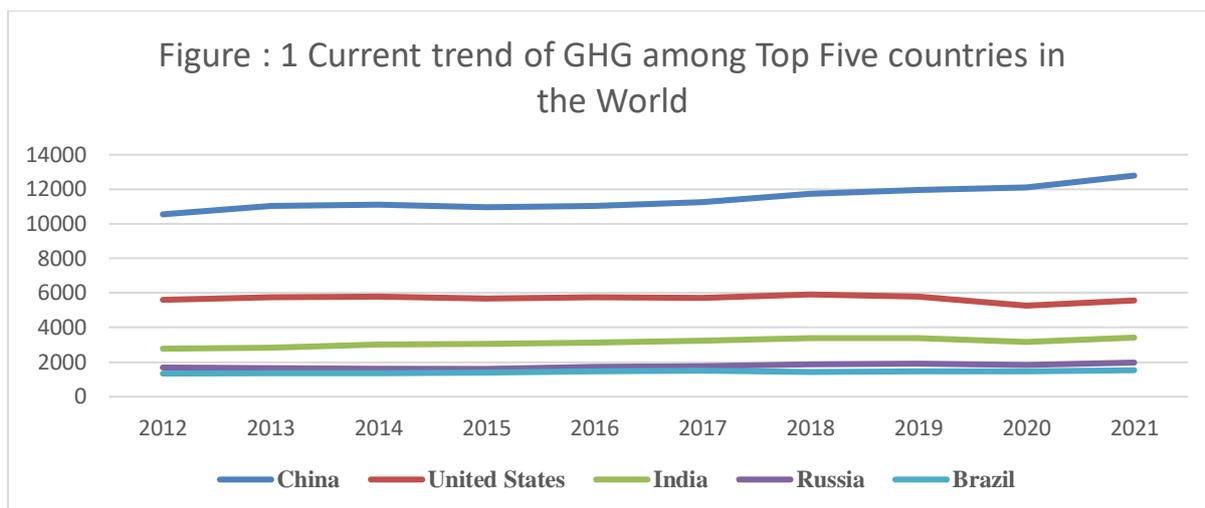
The study primarily applied secondary data obtained from various sources, including published research papers, websites, and databases such as the “World Resources Institute” (WRI-Cait), The “Ministry of Environment, Forest and Climate Change” (MoEFCC), “G20 India”, “MyGov.in”, the “Ministry of External Affairs”, as well as various newspapers and books. The study has collected valuable information from the “WRI-Cait” database covering 2012 to 2021. Based on this data, a thorough analysis was conducted to achieve the study's objectives. The researcher then presented conclusions based on these insights.

6. Analysis And Findings

Table 2: Current trend of GHG among the Top Five nations in the World

Year	China	United States	India	Russia	Brazil
2012	10551	5598	2777	1679	1335
2013	11033	5741	2841	1635	1356
2014	11102	5788	3023	1630	1369
2015	10976	5678	3043	1608	1382
2016	11028	5756	3118	1740	1465
2017	11256	5702	3242	1773	1487
2018	11752	5915	3407	1867	1445
2019	11953	5798	3385	1919	1467
2020	12119	5268	3176	1836	1470
2021	12791	5564	3419	1975	1531

Source: WRI-Cait



In the 21st century, global greenhouse gas emissions have risen dramatically, primarily driven by increased emissions from China, with the United States, India, and Russia contributing significantly. China, the United States, India, Russia, and Brazil are the top countries responsible for greenhouse gas emissions. The table shows that the United States, India, and China have all elevated their emissions compared to 2021, with India experiencing a substantial rise of around 5%. In contrast, Russia reduced GHG emissions by approximately 2.4% in 2022. Meanwhile, China, the United States, and Russia have proactively adopted various policies to mitigate GHG emissions, leading to significant reductions in 2022. China, the United States, and India are the largest suppliers of global GHG emissions, far exceeding emissions from other countries.

● Evaluating the current Sector-Wise GHG Trend in India, from 2012 to 2021.

Table 3: Current trend of Sector-Wise GHG in India

Year	Agriculture (MtCO _{2e})	Transportation (MtCO _{2e})	Manufacturing (MtCO _{2e})	Electricity (MtCO _{2e})	Industrial Processes (MtCO _{2e})	Energy (MtCO _{2e})	Building (MtCO _{2e})
2012	695	227	436	994	115	1945	135
2013	697	232	474	1011	124	2002	137
2014	700	241	506	1129	133	2173	141
2015	703	264	509	1108	135	2186	145
2016	705	276.27	531.04	1102.44	143.31	2217.71	149.94
2017	712.	298.7	562.97	1161.63	142.62	2332.28	152.24
2018	722	313.25	573.27	1263.02	162.24	2468.71	156.92
2019	731	315.85	557.32	1235.14	168.55	2431.19	161.25
2020	751	276.44	509.45	1121.98	149.37	2224.18	162.49
2021	752	167	568	1230	178	2427	167

Source: WRI-Cait

Figure 2: Current trend of Sector-Wise GHG In India

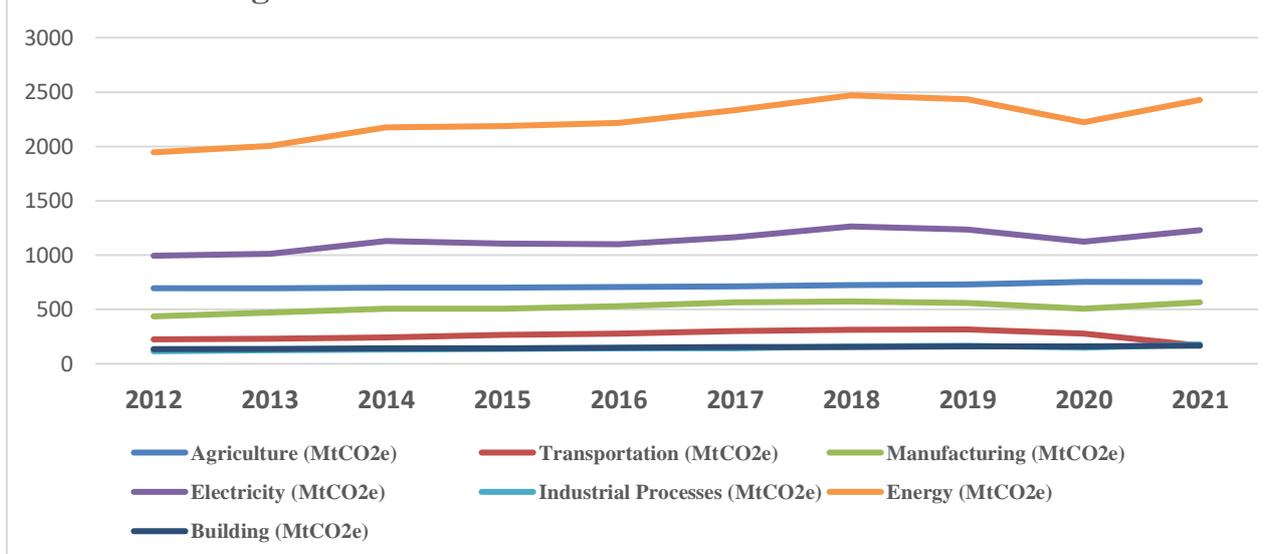
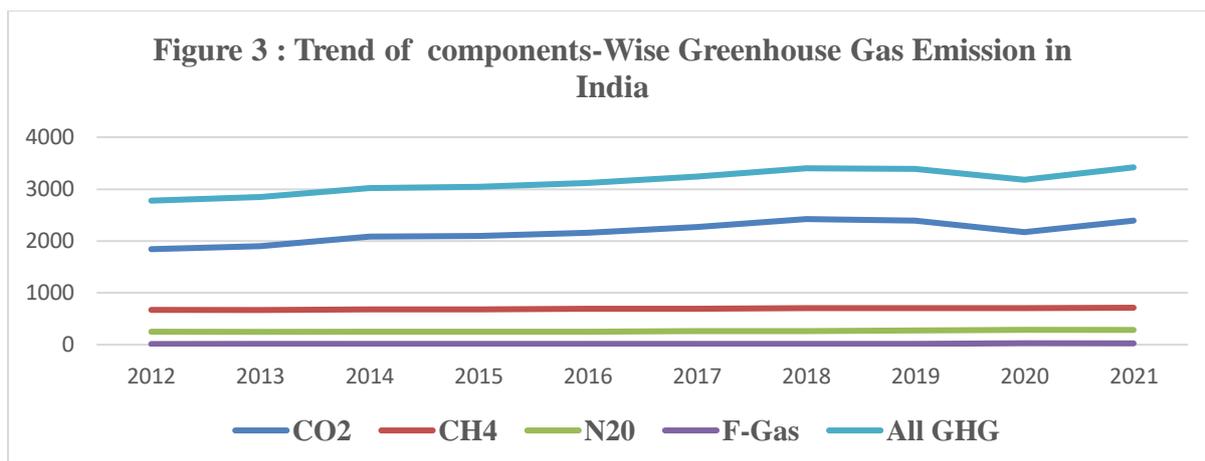


Table 1: The following analysis comprehensively examines GHG emissions in India from 2012 to 2021. Emissions are categorised by sector: “horticulture”, “transportation”, “production”, “energy generation”, “industrial processes”, and “building”. The agricultural sector consistently demonstrates the highest emissions, while the transportation and manufacturing sectors show a clear upward trend. Conversely, emissions from electricity generation remain stable, whereas those from industrial processes and energy exhibit significant variability. Notably, there has been a modest increase in building industry emissions. About NAPCC, the Indian government issued this strategic initiative on June 30, 2008. The NAPCC has been established to improve India’s environmental sustainability activities increasingly and launch a comprehensive framework to overcome the climate change issue in India. This plan embraces the necessity of simulating meaningful development to increase living standards in India while efficiently reducing the effects of climate change on everyday life (Banerjee, 2015). It also considers eight primary missions concentrating on vital areas such as climate change, energy efficiency, adaptation, and mitigation, assuring a positive approach to sustainability and environmental stewardship.

Table 4: Trend of component-wise Greenhouse Gas emissions in India

Year	CO ₂ (MtCO ₂ e)	CH ₄ (MtCO ₂ e)	N ₂ O (MtCO ₂ e)	F-Gas (MtCO ₂ e)	All GHG (MtCO ₂ e)
2012	1842	671	250	13	2777
2013	1905	674	248	13	2841
2014	2080	678	250	14	3023
2015	2091	683	253	15	3043
2016	2159	690	253	17	3118
2017	2272	691	260	19	3242
2018	2422	700	265	21	3407
2019	2388	702	273	22	3385
2020	2164	704	282	23	3176
2021	2395	713	285	26	3419

Source: WRI-Cait



The study clearly shows India's recent trend in GHG emissions from 2012 to 2021, classified by different factors. The emissions are classified into diverse key factors such as “carbon dioxide” (CO₂), “methane” (CH₄), “nitrous oxide” (N₂O), and “fluorinated gases” (F-gases). During the study period, CO₂ emissions exhibited a stable increase, making them the major contributor to GHG emissions. In addition, the emissions of CH₄ and N₂O have also grown significantly, and there has been a measurable increase in F-gas emissions. CO₂ is among the most harmful greenhouse gases, with CH₄, N₂O, and F-gases following closely. The regulatory body must implement robust legal guidelines that enforce minimum emission thresholds for greenhouse gases across all nations. This policy must be implemented successfully to fulfil substantial developments in climate mitigation.

Table 5: Major objectives and crucial implementation of the NAPCC Programme in India

Missions	Major Objectives	Implementation
“National Solar Mission”	<p>The primary purpose of this objective has been pointed out as follows:</p> <ol style="list-style-type: none"> To encourage India to be a superior international leader in solar energy production. The policy intends to formulate and apply strategies within all states in India. The mission also seeks to create a supportive environment that facilitates the effective utilisation of solar technology in India at both centralised and decentralised levels. 	<ol style="list-style-type: none"> In 2020, it achieved a cumulative solar energy capacity of 36.9 GW. The study confidently increased our targeted solar energy from “20000 MW” in 2021-2022 to “100000 MW” in 2022-2023. Solar energy project targets are clearly defined, with a robust goal of 40 GW for rooftop installations and 60 GW for large and medium-sized grids.
“National Mission for Enhanced Energy Efficiency” (NMEEE)	<ol style="list-style-type: none"> Establish a thriving market for energy efficiency by implementing effective regulations and policies in India. Promote a robust, sustainable business strategy that will significantly enhance energy production. 	<ol style="list-style-type: none"> The “Perform Achieve and Trade” (PAT) program is a cornerstone resource of the “National Mission for Enhanced Energy Efficiency” (NMEEE), and it was introduced successfully in 2012. PAT Cycle I (2012-2015): This inaugural cycle effectively targeted a reduction in Specific Energy Consumption (SEC) across eight key

		<p>sectors, involving nearly 478 participants. As a result, it successfully saved approximately 31 million tonnes of CO₂.</p> <p>3. PAT Cycle II (2016-2017 to 2018-2019): During this phase, it established ambitious targets for reducing SEC across 11 energy-intensive sectors, such as railways and refineries. This cycle succeeded in an impressive deduction of 66.01 million tonnes of CO₂.</p> <p>4. PAT Cycle III (2017-2018 to 2019-2020): Set to conclude on March 31, 2020, this cycle is anticipated to conserve around 1.745 million tonnes of oil equivalent (MTOE) in energy.</p> <p>5. PAT Cycle IV (2018-present): This cycle has already made significant strides, reducing energy utilisation by 0.6998 million tonnes.</p> <p>6. PAT Cycle VI (2020-present): This cycle targets an impressive total energy savings of 1.277 MTOE for this cycle.</p> <p>7. PAT Cycle VII (2022-2023 to 2024-2025): This upcoming cycle is set to drive substantial energy savings, with a clear target of 6.627 MTOE. It is confident in its ability to achieve these goals and continue improving energy efficiency.</p>
<p>“National Mission on Sustainable Habitat”</p>	<p>1. It is imperative to develop comprehensive, sustainable habitat guidelines that directly address the challenges associated with climate change.</p> <p>2. Integrating these insights into urban development plans is essential for realising a sustainable and prosperous future.</p> <p>3. By formulating specialised strategies that enhance energy efficiency and affordability, it is possible to cultivate vibrant and sustainable urban environments.</p>	<p>1. The “Atal Mission for Rejuvenation” and the “Swachh Bharat Mission” are the major platforms of the scheme.</p> <p>2. Approximately 335 buildings across all states have been made using technology-related assistance.</p> <p>3. Around 1,987 projects have been completed, with an additional 4,375 projects underway. Achieving a 10 per cent energy gain from solar energy is essential, and about 80 per cent of the buildings must be energy efficient. Furthermore, the budget for the smart cities tender was 166000 crores, which includes 125000 crores for orders and 27000</p>

		crores for major projects under the smart cities scheme.
“National Water Mission”	<p>1. This program introduces a valuable water resource management technique that assists in decreasing wastage, preserving water, and ensuring an appropriate water allocation across the country.</p> <p>2. This scheme also issues the guidelines or rules regarding the national water policy and determines an agenda for appropriate water consumption.</p> <p>3. Fulfil the demand for a significant portion of freshwater in urban areas and coastal cities using recycled wastewater and embracing practical tools and technologies.</p> <p>.</p>	<p>1. To further recognise and promote the exceptional contributions of women in this sector, the governing authority has introduced the “Swachh Sujal Shakti Samman” policy.</p> <p>2. The President of India has awarded a total of 18 commendations.</p> <p>3. The Government of India has inaugurated the “Swachh Sujal Shakti Abhivyaakti” and the “Jal Shakti Abhiyan”. These initiatives aim to acknowledge the notable efforts of women in water management and to motivate others to engage actively in this critical sector.</p> <p>4. In 2019, India introduced the “Jal Jeevan Mission” (JJM) to secure tap water for every village by 2024. At present, 110 million rural residents are benefiting from this initiative.</p> <p>5. The initiative “Jal Shakti se Nari Shakti” underscores the importance of women's empowerment in water management policies.</p> <p>6. India has also introduced the “Swachh Bharat Mission-Gramin” (SBM-G) to evaluate and enhance the sanitation sector.</p>
“National Mission for Sustaining the Himalayan Ecosystem”	<p>This initiative is focused on critically preserving the ice sheet and protecting the atmosphere within the Himalayan ecosystem. The primary objectives are to:</p> <p>1. Safeguard and conserve wildlife.</p> <p>2. Advocate for strategic planning that promotes the sustainability of the Himalayan ecosystem while ensuring the conservation of biodiversity and wildlife.</p> <p>The overarching aim is to effectively sustain the Himalayan ecosystem for</p>	<p>1. To protect the Himalayan ecosystem, several schemes have been introduced, such as the Himalayan Cryosphere, which serves as a national network scheme, and the “Human and Institutional Capacity Building” (HICAB) initiatives, introduced as a comprehensive program in 2018-2019.</p> <p>2. A knowledge network has been established across six states within the Himalayan region, resulting in approximately 18 initiatives and seven research and development</p>

	the benefit of future generations.	(R&D) schemes. 3. Furthermore, three principal Centres of Excellence have been established at “Kashmir University”, “Sikkim University”, and “Tezpur University”, promoted under this scheme.
“National Mission for a Green India”	<p>This initiative addresses the climate change issue by strategically incorporating adaptation and mitigation policies to enhance carbon sinks within ecosystems. The primary objectives of this scheme are as follows:</p> <ol style="list-style-type: none"> 1. To expand forested areas by over 5 million hectares. 2. To bolster ecosystems by improving biodiversity and carbon storage. 3. To enhance the incomes of around 3 million households from forest resources. 	1. A total of ₹343.08 crore has been allocated to 13 states throughout the country from the fiscal years 2015-16 to 2019-20 to implement afforestation initiatives over an area of 142,000 hectares.
“National Mission for Sustainable Agriculture”	<p>The mission seeks to enhance the sustainability of production within the agriculture sector by developing a range of strategic initiatives. These initiatives will focus on effective soil and water management practices, as well as the integration of rain-fed technologies.</p>	<ol style="list-style-type: none"> 1. Nearly 7,960 farms were established in 2019. 2. This initiative promotes water efficacy, technological upgradation, and enhancements in distribution systems under the “On-Farm Water Management” (OFWM) policy. 3. The “Soil Health Management” (SHM) program has been launched to further the action related to “Integrated Nutrient Management” (INM). 4. Approximately 7,960 machinery farms were introduced in 2018-2019 to mitigate crop residue burning. 5. Nearly 74175.41 hectares and 55902.92 hectares have been identified for “integrated farming systems”, Around 414,000 hectares of organic farming have been developed under the Rainfed Area Development project.
“National Mission on Strategic Knowledge for Climate Change” (NMSKCC)	1. To achieve the purpose of ecological sustainable growth in India, this initiative seeks to build an effective “dynamic knowledge system” to promote the corresponding national activities.	1. The primary aim is to establish around 12 “Excellence-related centres” and ten “Climate Change centres” in Indian rural areas. Furthermore, eight “Global Technology Watch Groups”

		(GTWGs) have been designed in key sectors, such as promoting renewable energy, fostering energy efficiency, enhancing green forestry, developing sustainable habitat, and enhancing water resource management techniques.
Source: MoEFCC		

Table 6: Budgetary Allocation for Climate Action in India for 2014-2015 to 2023-2024

Year	Mitigation	Adaptation	Others
2014-2015	The concentration on infrastructure development and renewable energy	The “National Adaptation Fund for Climate Change” (NAFCC) was developed for \$14 million.	Provide long-run credit fund benefits with NABARD credit schemes.
2015-2016	Reduced the Funds capacity for the “Ministry of New and Renewable Energy” (MNRE).	Enhanced fund for agriculture adaptation	Divided resources and responsibilities between states and centres for climate adaptation.
2016-2017	Promote Funding Capacity for MNRE, encourage renewables and invest around \$428 million in nuclear power production.	Promote food security and crop insurance benefits in rural areas, Stronger funding limit for the MoEFCC	Provide monetary benefits to rural farmers in the SC and ST categories.
2017-2018	Focus on Proper electrification in rural areas and a reduction in MNRE allocations.	Foster MoEFCC allocations and promote climate adaptation.	Budget allocation relating to maintaining the practical function of the Nationally Determined Contributions (NDCs).
2018-2019	Amplify budgetary allocation for MNRE by 8.5%.	Strengthen Investment for NAFCC by USD 0.2 million.	Introducing some innovative schemes for air pollution control.
2019-2020	Reduction of around \$2 million for the Central Pollution Control Board (CPCB).	Enhanced the budget for MoEFCC by	Promote several innovative schemes for controlling air pollution.
2020-2021	Around 9.48% allocation has been raised for MNRE.	Increased allocation for MoEFCC by 4.91%	Established thermal power plants and invested around 297 million in installing power and renewable energy.
2021-2022	There was no change in the allocation for MNER.	Reduction in allocation for MoEFCC by 7.42 %.	Around 29.9 million has been invested in controlling air pollution in Urban areas.
2022-2023	Around 19.94% allocation has been increased for MNRE.	Increased allocation for MoEFCC by 5.57%	Provide monetary benefits to rural farmers in the SC and ST categories.
2023-2024	Around 19.94% allocation has been increased for MNRE	Strengthen allocation to MOEFCC by 1.63%	Green credit policies, Investment for pollution

			control mechanisms.
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Source: Based on Singh, 2017 and Union Budget documents

Table 6 outlines the budgetary allocations for various climate actions from 2014 to 2024. The regulatory bodies have implemented robust strategies for both climate mitigation and adaptation. Climate mitigation prioritises several critical areas, including expanding renewable energy, infrastructure development, and producing and distributing power to rural communities. This program is enhancing their funding capacity and ensuring effective resource allocation for the “Ministry of New and Renewable Energy” (MNRE) and the “Central Pollution Control Board” (CPCB). In the case of climate adaptation, the study describes several policies towards food security, crop insurance, agricultural adaptation, and important investments, aligning with strategic funding for the “Ministry of Environment, Forest and Climate Change” (MOEFCC) and the “National Adaptation Fund for Climate Change” (NAFCC).

Moreover, the study dynamically addresses several climate-related activities to deal with the challenges of climate change in India. These activities encompass establishing long-run credit facilities, using air pollution control measurement techniques, formulating green credit policies, investing in thermal power plants, and establishing renewable energy centres.

Evaluate the future roadmap of India's G20 presidency to overcome the hurdles of climate change in India.

Priority areas for climate change	<ol style="list-style-type: none"> 1. Commitment to Wildlife Conservation 2. Mission LiFE: Promoting a Sustainable Lifestyle for the Environment. 3. Strong Focus on Environmental Preservation 4. Mission Amrit Sarovar: Leading Water Conservation schemes. 5. Driving Climate-related Activities and Ensuring Environmental Sustainability 6. Proactive Measures Against Biodiversity Loss and Control Pollution. 7. Bold Strategies for a Sustainable and Resilient Future.
Additional initiatives	<ol style="list-style-type: none"> 1. Effective water management strategies. 2. Promoting extended producer responsibility. 3. Advancing the circular bioeconomy. 4. Engaging in discussions on the circular economy within the steel sector. 5. Enhancing the global land initiative 6. Developing a comprehensive implementation framework for Gandhinagar
Various remarkable themes	<ol style="list-style-type: none"> 1. Enhancing land and biodiversity is fundamental to fostering sustainable ecosystems. 2. Developing effective water resource management strategies will address critical environmental challenges. 3. Promoting resource efficiency and adopting a circular economy can lead to sustainable growth. 4. The study is focused on actively implementing the key pillars of the Paris Agreement to drive meaningful change. 5. Restoring ecological systems is an important step toward achieving environmental resilience. 6. Incorporating marine spatial planning will enable us to utilise ocean resources sustainably and responsibly.

Place of meeting, discussions and deliberations	Bengaluru, Gandhinagar, Mumbai, Chennai
Source: G20 Summit Report	

Table 7 presents a comprehensive overview of discussions regarding India’s commitment to addressing climate and environmental issues, which are critical challenges globally. The meeting outcomes highlighted several important areas for climate change, introduced some crucial schemes, and discussed various significant themes, reinforcing India’s dedication to implementing impactful climate action within the G20 nations (Mutluri et al., 2024). The G20 presidency outlined various important aspects concerning climate management and environmental issues. These include initiatives related to water management, rehabilitating mining-affected areas, and response strategies for forest fire-affected areas. The meeting provided substantial insights into implementing key areas such as water resource management, environmental and climate tracking, and circular economy practices. It delineates the importance of collaborative action to deal with climate change and environmental degradation (Ali et al., 2023). Furthermore, it encouraged individuals to participate actively in conservation efforts, highlighting the effectiveness of public involvement in initiatives such as "Mission Amrit Sarovar" and the LiFE (Lifestyle for Environment) mission. In India, the G20 presidency emphasises the development of various initiatives, including sustainable water management, a resilient blue economy, and the introduction of circular economy principles in the steel sector and bioprocessing. Committee members are engaged in creating several frameworks to enhance “global land initiatives” within G20 nations.

7. Conclusion

The study decisively examines the trend of GHG emissions among five countries, establishing that India ranks third, following China and the United States. It emphasises sector-wise and component-wise contributions to GHG emissions in India, revealing that the energy and electricity sectors are significantly responsible for and vulnerable to climate change issues, as they account for a substantial portion of emissions compared to other sectors. Notably, CO₂ and CH₄ are major contributors to environmental damage and climate change among the four main greenhouse gas components (Banerjee, 2015). This study provides a comprehensive overview of the “National Action Plan on Climate Change” (NAPCC) and its eight national objectives, which effectively address the issue of climate change while promoting the establishment of green and renewable energy units to diminish dependency on fossil fuels in electricity production. The initiative delineates the significance of various renewable energy resources in generating electricity, including solar, wind, biomass, and hydropower. The goal is clear: to significantly reduce GHG emission intensity in line with international climate change standards (Deshpande et al., 2025). Despite this, the recent landscape in India discloses a lack of wide-ranging policies or standards to mitigate climate change, and the implementation of existing strategies has been suboptimal. The government of India and other regulatory bodies must issue comprehensive policies and programs that help to mitigate the adverse impact of climate change in India (Nayak, 2017). Furthermore, the study illustrates budgetary distributions for climate action, such as several practical mechanisms for climate mitigation and adaptation in India. Eventually, the study delineates that the “G-20 summit” represents a pivotal opportunity for recent business ventures on a global scale. Transitioning from fossil fuels to renewable energy is valuable and significant for sustainable development and future growth (Ali et al., 2023; Dadhich et al., 2025).

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