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Environmental Governance in India: Towards carbon emission mitigation and adaptation

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Abstract

Environmental governance in India emerged in the seventies and gained public appeal in the subsequent years. In India, although Constitution and country's structure of polity provide possibility for a multi-tiered environmental governance system, yet this possibility has not been sufficiently explored. Now, environmental governance is prime focus of governments across the world. Thus, government is undertaking series of mitigation and adaptation measures under its policies and programmes. However, the research on environmental governance is very limited in India. Viewing this, this paper attempts to discuss the concept of environmental governance and policies of the government for low carbon emissions. The submission discusses environmental policy of the government, low electricity consumption, ***eco-friendly transports, fuel efficiency and financial measures****. Towards the end, a set of policy recommendations are discussed. The study is conducted mainly based on the existing secondary sources of data and analytical approach is followed in the paper. The aim of this paper is to identify the environmental governance measures undertaken by government for reduction of carbon emissions and curbing climate change.*

Key words: *Environmental Governance, Adaptation, Mitigation, Carbon emission, Environmental Policy*

Introduction

Environmental governance is an important agenda in the present international discourse. Environmental governance is a concept in political ecology and environmental policy that advocates sustainability. Environmental governance takes into account the role of all actors that impact the environment. Environmental governance is a concept in political ecology which promotes environmental policy that advocates for sustainable human activity. The International Union for Conservation of Nature (IUCN), define environmental governance as the multi-level interactions among three main actors, *i.e.*, state, market, and civil society. The actors while implementing policies in response to environment-related demands and inputs from the society; bound by rules and;

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possessing characteristics of good governance for the purpose of achieving sustainable development.

The environmental governance started in India in 1972. The same year the former Prime Minister, Indira Gandhi, attended United Nations (UN) Conference on Human, Environment and Development at Stockholm. Initially, the Constitution of India had no direct provision for environmental protection but after Stockholm Conference By 42nd Amendment to the Constitution in 1976, Indian Government enacted provisions for the protection of environment under Article 48A[2] and Article 51A(g)[3].

A National Environmental Planning and Coordination Committee and Central Pollution Control Board (CPCB) were established. It was followed by the establishment of state pollution control boards at states. Subsequently, environmental laws on water (1974), air (1981) and forest conservation (1981) and Environment Protection Act (1986) were passed. An Environment Policy and Strategy Statement were issued in the UN Conference on Environment and Development in 1992. Environment Impact Assessment (EIA) for many sectors became compulsory from the year 1992.

In 1996, India started environmental governance system with a series of governance measures on coastal zone management, hill development, disposal of wastes (*biomedical, plastic, hazardous*). The Supreme Court and high courts adjudicated Public Interest Litigation on environmental issues. Environmental governance was mainstreamed with the passage of Right to Forest, Right to Food, NREGA and Right to Information Bills.

The Ministry of Environment brought a National Forest Policy in 2016. Government introduced green tax under this policy. Similarly, government brought amendments in Environmental Impact Assessment 2016. The amendments increased the power of state governments to grant environmental clearance to development projects, particularly aiming at the controversial sectors of mining and river valley projects. Now, formation of district environmental approval committees is mandatory as per the 2016 amendment. Major changes can be seen when states are given power to clear river valley project up to 50,000 hectares.[4] Despite progress, the efficacy of state-level approval committee persists due to intense political interference.

[2] INDIA CONST. Art. 48A Protection and improvement of environment and safeguarding of forests and wild life. The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country

[3] INDIA CONST. art. 51A, cl. g. to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures

[4] *National Environment Policy 2006*, Ministry of Environment and Forest, Government of India, 2006

Expressing serious concern, National Green Tribunal viewed the construction industries emit nearly 22 per cent of India's total annual carbon emissions undermining country's commitment to the Paris Protocol to reduce carbon emissions. Intending to fulfil the commitment of shelter for all, Ministry of Environment petitioned to Supreme Court to exempt the real estate sector from environmental laws. Further, municipal bodies were mandated to constitute environmental committees for monitoring environmental aspects of real estate projects. However, the function of such bodies is questionable in view of the political influence. The country is prioritising development at any cost. On the contrary, India is to honour Sustainable Development Goals (SDG) as a signatory to UN declaration[5].

The Energy Conservation Act (2001) ensured large energy consumers to follow energy consumption norms; new buildings to follow the Energy Conservation Building Code and appliances to meet energy performance standards and display energy consumption labels. The act empowered the central government to grant energy saving certificates to consumers whose energy consumption is less than the prescribed norms. Further, the Act ensured large energy-consuming industries are required to undertake energy audits and an energy-labelling programme. The Act establishes the Bureau of Energy Efficiency to implement the provisions of the Act. The 2008 National Climate Action Plan was built on this legislation to achieve its energy efficiency target. Parris Agreement in 2015 is an important milestone in the environmental governance in the world. Adhering to the agreements, India carried out series of measures for adaptation and mitigation.

Challenges of Environmental Governance

Various governments across the world have employed a variety of approaches to environmental governance. India is facing numerous challenges of environmental governance. First, as the infrastructure development is anathema to carbon emission, the dilemma is continuing between sustainable development and carbon emission reductions. Second, there is an inadequate institutional capacity in the government to undertake institutional governance. Many organs of the government are yet to be sensitised about environmental governance. Three, imbalance is somewhat noticed between environmental governance, trade and finance programmes. Limited credit facility is available for organizations running projects within the Global Environment Facility (GEF). Four, on a closure analysis, the impact of climate change is acute on under privileged sections. Notwithstanding,

[5] Ghosh, A.K. (2018), *Environmental Governance: India's Changing Scenario*, January 22, 2018, DownToEarth (last visited April 13, 2021) https://www.downtoearth.org.in/blog/environment/environmental-governance-india-s-changing-scenario

the marked absence of the gender perspectives and equity in environmental governance policies and programmes. Five, social acceptance is key to success of any programme. Somehow, government is unable to mobilise public opinion in favour of reduction of carbon emissions. All these challenges have impacted the governance directly or indirectly.

India and Paris Agreement

The Paris Agreement treaty on climate change was adopted by 196 countries to achieve carbon emission reduction targets. Undoubtedly, India will surely achieve two Paris targets. First, India has already reduced emissions intensity by 21 percent given its target to reduce emissions[6] intensity of GDP by 35 per cent by 2030. Second, with 38 per cent of non-fossil fuel capacity, India is just two per cent short of its 2030 target. India had forty per cent of non-fossil fuel electricity capacity. But on the third target, achieving three billion tonnes of carbon dioxide sinks by undertaking forest cover by 2030 is doubtful[7].

Similarly, India plans to install an ambitious 175 gigawatts (GW) of renewable energy by 2022 and 450 GW by 2030. The country already has 90 GW or renewable energy, representing 24 per cent of total capacity. Additionally, India has lowest solar tariffs globally. The India Cooling Action Plan at the national level and building cool roofs at the state level are also reducing heat trapping Hydro Fluoro Carbons (HFC).

On the international level, India is anchoring International Solar Alliance (ISA), International Coalition for Disaster Resilient Infrastructure (CDRI) and Leadership Group for Industry Transition. Apex Committee for Implementation of Paris Agreement (AIPA) was created to increase coordination among ministries, stakeholders and U.N. on delivery of the Paris Agreement. On the challenging side, India will require at least twenty-billion-dollar investment annually to meet country's energy renewable goals. Thus, Green Banks or Green Windows, which will attract private capital for the purpose will be proper.

The country has ambitious target for renewable energy and electricity for all. The Central Government has targets of 175 GW renewable energy target by 2022, *(100 GW of Solar energy, 60 GW of Wind energy, 10 GW of biomass and 5 GW of small hydel*

[6] Hindustan Times https://www.hindustantimes.com/india-news/5-years-on-where-india-stands-in-its-commitment-to-paris-agreement/story-M31plpICVbCP264U3q2h5L.html

[7] Economic Times https://auto.economictimes.indiatimes.com/news/industry/india-to-achieve-target-of-reducing-35-emissions-intensity-before-2030-javadekar/79439012

projects)[8]. Besides, the ambitious projects for emission reductions such as Swachh Bharat Mission, Cleaning of rivers, Zero Effect Zero Defect, Make in India, Smart Cities Mission, Housing for all deceit country's commitment.

The country has avoided emissions 3.59 billion tonne of carbon dioxide. The country's national plans are ambitious and thrust on renewable energy and promotion of clean energy, enhancing energy efficiency, sustainable green transportation network. India is rated at par with some of the Scandinavian nations in terms of climate change actions, ahead of the G20 countries. Prime Minister Narendra Modi received the CERA Week Global Energy and Environment Leadership Award[9] for India's leadership in sustainable development. India is already on track to fulfil its commitments made in its Nationally Determined Contribution (NDC) under the Paris Agreement.[10]

India firmly believes, the climate action of the country must be undertaken simultaneously with the financial, technical and capacity-building support to countries. The climate actions must include disaster risk measures, natural resource management, and human security into national development strategies. All will be feasible within the overall ambit of mitigation and adaptation.

India's Dual Commitments: Mitigation and Adaptation

India occupies an intriguing *dual* position in global climate politics—a poor country to achieve climate *mitigation and adaptation* goals. Despite oddities, India is committed to dual commitments. All the nations have been called to achieve net-zero emissions by 2050 to reach the 1.5 Celsius goal of the Paris agreement. However, emissions must fall by half by 2030. India is strongly committed to Nationally Determined Contributions (NDC) to achieve the Paris goal of limiting the global average temperate increase to below 2°C. In the Paris agreement, the developed countries were reminded to fulfil their pre-2020 commitments of carbon emissions and mobilise 100 billion dollar per year by 2020 in support of climate action in developing countries.

India's mitigation strategies have emphasised on clean and efficient energy systems, sustainable green mass urban transportation network; afforestation and integrating

[8] Report of the Expert Group on 175 GW by 2022, NITI Ayog, 2016

[9] Cambridge Energy Research Associates Week (CERAWeek): The CERAWeek Global Energy and Environment Leadership Award was instituted in 2016. It recognises the commitment of leadership on the future of global energy and environment.

[10] OpIndia (2021), *Hailed by the world but ignored in India: PM Modi has taken India far ahead of most nations in tackling climate change*, available at https://www.opindia.com/2021/03/pm-narendra-modi-climate-change-ujjwala-lpg-electric-vehicles-solar-power-world-leader/ (accessed on April 17, 2021)

green thinking across production and consumption sectors. The commitment of installing 450 gigawatt of renewable energy, elimination of single use plastic, electrification of railway and creation of carbon sink by restoring degraded land have emphasised the country's climate ambitions.[11]

Environmental Governance: Initiatives of Present Government

Towards achieving environmental governance, the Government of India made several attempts through Ministry of Environment and Forests. The following is an attempt to trace some of the governance measures undertaken by the ministry for protecting environment and undertaking sustainable development.

The Ozone Depleting Substances (Regulation and Control) Amendment, 2019: The Ministry of Environment, Forest and Climate Change notified the Ozone Depleting Substances (Regulation and Control) Amendment Rules, 2019 prohibited import or export of ozone depleting substances.[12]

Low Electricity Consumption: Energy efficiency has been achieved in India through the National UJALA (Unnat Jyoti by Affordable LEDs for All) mission. LED (Light Emitting Diode) bulbs are 75 percent more efficient than luminescent bulbs. The distribution of LED bulbs by government has reduced about 38.6 million tonnes of carbon emissions per annum.

Eco-friendly Transports: The transport sector is a key contributor to climate change, accounting for 23 percent of global energy-related greenhouse gas (GHG) emissions. The transport sector in India is emitting about 15 per cent of the carbon emissions, which are increasing at six per cent per annum. Viewing this, the government carried out shift from BS-IV norms to BS-VI to promote cleaner fuels.[13] As a result, the emission norms of two-wheelers in India are ahead of Europe and Japan. NITI Aayog aims to achieve 40 per cent electrification of cars and two-wheelers by 2032. All prove Government's intention for mass use of electric vehicles.

LPG Cooking Fuel in Households: The free LPG cylinders earmarked for Below Poverty Line (BPL) families helped in reducing air pollutions. LPG is a cleaner fuel compared to coal, wood and cow-dung. The carbon footprint of LPG is twenty

[11] Hindu, *Climate Change Mitigation Commitments, Idea of climate action should not be to move climate ambition goal post to 2050*: India at UNSC, February 24, 2021.

[12] The Ozone Depleting Substances (Regulation and Control) Rules, 2000, Ministry of Environment and Forests Notification, New Delhi, 19thJuly, 2000, available at https://npcb.nagaland.gov.in/wp-content/uploads/2016/03/Ozone-Rules-2000.pdf.

[13] The Bharat Stage Emission Standards (BSES) are emission norms instituted by the Indian Government to regulate the emission of air pollutions from motor vehicles. This means that all the vehicles manufactured and sold after April 2017 must be complied with BS IV.

percent lower than that of fuel oil and 50 per cent lower than coal. LPG use helped to reduce carbon emissions and reduced Black Carbon (BC) emissions.

Renewable Energy Use: The use of renewable energy points towards distinctive commitment towards environmental goals. Even during the tenure as the Chief Minister of Gujarat, the Prime Minister introduced canal-top solar plants. This innovative idea addressed the problem of land for solar power, reduced evaporation of water and increased the efficiency of panels in a cooling temperature. India is now the fifth largest country in the world in terms of solar power capacity after China, USA, Japan and Germany. India has an ambitious target of 450 gigawatts of renewable energy capacity by 2030. International Energy Agency (IEA) has claimed, India will be augmenting an additional 690 gigawatt of solar power by 2040.[14]

Increase Share of Non-Fossil Fuel Based Electricity*:* The aim of this project was to achieve forty per cent of electric power installed capacity from non-fossil fuel by 2030. This is with quantum jump of 33 percent over non-fossil fuel capacity of 2015. The 175 GW target by 2022 will result in reduction of 326 million tons of carbon dioxide per year. The Central government will include wind power, solar, hydropower, biomass, waste to energy and nuclear power.

Further, solarisation of all petrol pumps and toll plazas across the country were planned under the scheme. The central government has aimed at development of 25 solar parks, ultra-mega solar power projects, canal top solar projects and one lakh solar pumps for farmers. Similarly, the country plans to anchor a global solar alliance and launch new missions on wind energy and waste to energy.

Enhancing Forests Carbon Sink*:* Management of forests enhances the storage of carbon dioxide from the atmosphere. It offsets the emissions of greenhouse gases. India has to create additional carbon sink of nearly three billion tonnes of carbon dioxide equivalent through additional forest cover.

Green India Mission (GIM): It was launched under the National Action Plan on Climate Change (NAPCC). GIM aimed at protecting, restoring and enhancing India's forest cover and responding to climate change by adaptation and mitigation measures.

Plantation along Highways*:* Adhering to the policy of Green Highways in September 2015, The Ministry of Road Transport and Highways launched a National Green Highways Mission (NGHM).

[14] *International Energy Agency, Renewable 2020*, available at *uhttps://www.iea.org/reports/renewables-2020*

The Green National Highways Corridor Projects (GNHCP) supports the implementation of the NGHM and the provision of green and safe transport. India has launched Green Highways Policy by undertaking tree plantations of 140,000 km long "tree-line along the both sides of national highways.

Plantation along River Beds*:* Tree p*lantation along* the *river* bank areas prevents soil erosion and provides services to the local communities. It provides nutrients for aquatic animals. This is also part of the *Namami Gange* Mission. The Finance Commission has proposed incentives for creation of carbon sink and devolution of funds to states from central government sources.

CAMPA Act*:* CAMPA (*Compensatory Afforestation Fund Management and Planning Authority)* Act or Compensatory Afforestation Fund Act 2016 provided an institutional mechanism to ensure quick utilization of funds released in lieu of forest land diverted for non-forest purpose which would mitigate the impact of diversion of such forest land.

REDD-plus: Reducing Emissions for Forest Deforestation and Forest Degradation (REDD-plus) programme was launched to mitigate climate change through reducing emissions of greenhouse gases and enhanced forest management. In the last two decades, studies confirmed that the land use change, including deforestation accounts for 12-29 per cent of global greenhouse gas emissions.[15] For this reason reducing emissions from land use change is considered essential to achieve the objectives of UNFCCC.

National Agro-forestry Policy (NAP): This *p*olicy was aimed at improving agricultural livelihoods by maximizing agricultural productivity for mitigating climate change. Agroforestry programme aims to mixes trees and shrubs on farmlands for higher production and sustainability of ecosystem.

National Afforestation Programme (NAP): NAP was introduced to reduce greenhouse gas emissions and ecological restoration of degraded forests. NAP supported forest conservation and management of forests by Joint Forest Management Committees at village level.

Climate Change Adaptation

Adaptation to climate change is feasible by enhancing investments invulnerable sectors to climate change such as agriculture, water resources, coastal regions, health and disaster management. Vulnerability of India to climate change is marked due to poverty and dependence of large segment of population on climate sensitive

[15] Fearnside, Philip (2000), Global warming and tropical land-use change: Greenhouse gas emissions from biomass burning, decomposition and soils in forest conversion, shifting cultivation and secondary vegetation, *Climatic Change*. 46: 115–158. doi:10.1023/a:1005569915357

sectors for livelihood. Government has undertaken series of climate resilience actions in sensitive sectors such as agriculture, water, health, coastal region and islands, disaster management, protecting biodiversity.

Mobilizing Financial Resources: The government of India mobilized domestic and additional funds from developed countries to implement the mitigation and adaptation actions. Approximately, 2.5 trillion USA dollar required for meeting India's climate change actions by 2030.[16]

Technology Development and Transfer*:* The goal was to build capacities, create domestic framework and international architecture for quick dissemination of climate technology in India and collaborative research for future technologies. Critical technologies need to be facilitated through Green Climate Fund (GCF).[17]

Cleaner Economic Development (CED)*:* This aimed at a climate friendly economic development. At a comparable level, India's growth path is much cleaner and greener. India's current per capita GDP in PPP (Purchasing Power Parity) terms achieved at a lower level of emissions compared to developed countries. The emission Intensity of developed countries at similar economic level as India's today was approximately 0.9 kg carbon dioxide per dollar; whereas India's emission intensity is merely 0.36 kg, nearly sixty percent less comparted to developed countries.[18]

Mitigation Initiatives

Airport Maintenance by Solar Energy: Maintenance of Kochi Airport, worlds' first airport powered by solar energy. India's Cochin International Airport, Kerala is the first airport in the world to be powered entirely by solar energy. The energy bills compelled the airport management to install 12-megawatt solar plant supported by 46,000 solar panels.

Solar Powered toll Plazas: The Ministry of Road Transport and Highways and Shipping developed solar powered toll plazas on national highways across the country. As compared to toll plazas powered by conventional sources of energy, solar powered toll plazas have a reduced carbon footprint.

Delhi Metro and other MRTS*:* The Delhi Metro Rail Corporation (DMRC) has been certified by the United Nations (UN) to get carbon credits for reducing greenhouse gas emissions. DMRC reduces pollution levels in the city

[16] Ray, Rajasree (2021) India's experiences in assessing needs and priorities in relation to mitigation actions, available at https://unfccc.int/sites/default/files/resource/8_Rajasree%20Ray.pdf

[17] Green Climate Fund, *GCF in brief: support for technology*, https://www.greenclimate.fund/document/gcf-brief-support-technology

[18] India's Intended Nationally Determined Contributions – Towards Climate Justice, available at http://moef.gov.in/wp-content/uploads/2018/04/revised-PPT-Press-Conference-INDC-v5.pdf

by 6.3 lakh tons every year thus reducing global warming.[19]

National Smart Grid Mission in Carbon Emission Reduction: The country is pursuing an ambitious plan of solar energy and has boosted energy efficiency through radiant light bulbs with LEDs.

Similarly, on carbon free cooking gas, the government has supplied liquefied petroleum gas connections to eighty million households, thereby reducing the exposure from biomass cooking stoves, a major cause of respiratory diseases.[20] India is also introducing important energy pricing reforms in the coal, oil, gas and electricity sectors which are fundamental to energy market. The country is enhancing energy security by fostering domestic production through Hydrocarbon Exploration and Licensing Policy (HELP).

India joined the IEA family in March 2017, a major milestone in our energy collaboration. The IEA benefits greatly from this partnership given India's importance in global energy markets and remarkable insights it provides to other IEA members. National Grid Mission worked with the slogan of Zero Effect-Zero Defect to enhance energy and resource efficiency.

Swachh Bharat Mission: Access to proper sanitation is a distant dream for many rural households. India is still grappling with fundamental issues like sanitation and access to clean energy especially for rural communities. Therefore, taking the pledge for a cleaner environment, the country took the Swachh Bharat Mission or Clean India Mission (CIM). This mission helped in carbon emission reduction.[21]

Establishment of 100 Smart Cities: Smart city technologies have unrealized potential to improve quality of life. Beyond many benefits, smart cities can ensure improvements in the environmental sector. Smart-city solutions such as air quality monitoring, energy use optimization and waste tracking can produce results such as **10 to 15 percent fewer GHG emissions, 30 to 130 fewer kilograms of solid waste** reduction per person per year and **25 to 80 litters of water saved** per person per day.[22]

***FAME* (Faster Adoption and Manufacturing of Hybrid Electric Vehicles)**: FAME India is a part of the National Electric Mobility Mission Plan. FAME programme

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[19] *UN Body Credits Delhi Metro-6.3 Lakh Carbon Credits for Modal Shift Project*, Delhi Metro Rail Corporation Ltd. http://delhimetrorail.com/press_reldetails.aspx?id=746xECETA6Qlld

[20] *India 2020 Energy Policy Review and International Energy Agency*, International Energy Agency, (Jan, 2020) https://niti.gov.in/sites/default/files/2020-01/IEA-India%202020-In-depth-EnergyPolicy_0.pdf

[21] Banerjee, T., Kumar, M., Mall, R. *et al.* Airing 'clean air' in Clean India Mission. *Environ Sci Pollut Res* 24, 6399–6413 (2017). https://doi.org/10.1007/s11356-016-8264-y

[22] Katie Johnson, Environmental benefits of smart city solutions, Foresight, (Mar. 19, 2018) https://www.climateforesight.eu/cities-coasts/environmental-benefits-of-smart-city-solutions/

encourages mass use of electric vehicles by providing subsidies.

Passenger Vehicle Fuel-efficiency*:* In 2014, Government of India finalized the country's first passenger vehicle fuel-efficiency standards. The standard set the efficiency targets for new cars at the equivalent of 113 *grammes* of carbon dioxide per kilometre in 2021. The standards will reduce fifty million tons of carbon dioxide by 2030.[23]

National Air Quality Index Launched*:* The national Air Quality Index (AQI) was launched in 2014 with the goal of providing clean air to all preferably to city dwellers. The government has taken several measures to inform the people about air quality and effects of toxic air on health.[24]

Climate Resilient Agriculture*:* The programme National Innovations on Climate Resilient Agriculture (NICRA) *improved* resilience of agriculture to climate change through research and technology use. The adaptation and mitigation research of Indian Council of Agriculture Research (ICAR) covered crops, livestock, fisheries and natural resource management. Similarly, ICAR launched efforts for conservation of agriculture in rainfed areas.[25]

Bureau for Water Use Efficiency: Government of India will soon release a new National Water Policy to bring key changes in water governance structure, regulatory framework and setting up of a National Bureau of Water Use Efficiency.[26] Water experts opine that hydrological boundaries rather than administrative divisions should be part of the water governance structure.

Fuel Efficiency*:* The country's energy demand is increasing due to economic growth and modernization. Seeing the demand of fossil fuel and huge motor vehicle fleet in roads, the government targeted to reduce ten per cent reduction in fuel products import by 2022.[27] Bureau of Energy Efficiency (BEE) is working on fuel efficiency norms for vehicles that could moderate the demand of fuel. In August 2017, the Government of India finalized fuel efficiency norms for commercial heavy vehicles.

Climate Finance Policies

National Adaptation Fund for Climate Change: Under the management of National

[23] *India: light-duty: fuel consumption*, Transport Policy, https://www.transportpolicy.net/standard/india-light-duty-fuel-consumption/

[24] Down to Earth, DTE Staff, *Government Releases National Air Quality Index, CSE Welcomes it*, (Apr. 6, 2015) https://www.downtoearth.org.in/news/-government-releases-national-air-quality-index-cse-welcomes-it-49297

[25] National Innovations on Climate Resilient Agriculture (NICRA), http://www.nicra-icar.in/nicrarevised/index.php/home1

[26] Chander Mohan, *National Bureau of Water Use Efficiency to Be Set up Soon*, Krishi Jagran https://krishijagran.com/news/national-bureau-of-water-use-efficiency-to-be-set-up-soon.

[27] *Fuel Efficiency*, Bureau of Energy Efficiency (BEE), https://beeindia.gov.in/content/fuel-efficiency.

Agricultural Bank for Rural Development (NABARD)[28], National Adaptation Fund for Climate Change (NAFCC) was established in 2015 to meet the cost of adaptation to climate change. The projects under NAFCC prioritized the needs on climate resilience in the areas under state and national action plan on climate change.[29]

Reduction in Fossil Fuel Subsidies: Fossil fuels drive negative public health impacts, environmental pollution, climate change impacts and costs. In order to address the negative impacts, the Central government reduced the subsidy and coal cess increased from rupees 50 to rupees 200 per ton.

Tax free infrastructure bonds for renewable energy*:* In order to achieve India's clean energy and climate goals, new innovative green bonds were floated to tap into international resources. Despite this, government needs to scale up wider investor base such as pension funds and sovereign wealth funds. Indian government estimates that the country needs to spend 7 to 8 percent of its GDP on green infrastructure; an annual investment of 200 billion USA dollar up to 2030.[30]

Role of Judiciary in Environmental Governance and Mitigation and Adaptation of Climate Change

In Association for Protection of Democratic Rights v. The State of West Bengal and Others[31]

on March 25, 2021, the SC issued an order establishing an expert committee to "develop a set of scientific and policy guidelines with respect to tree cutting for developmental projects." The order was in response to a petition challenging the government of West Bengal's plans to cut hundreds of trees, and in order to construct roads over bridges. The Court emphasized the need to consider the impact of such projects on carbon emissions and climate change. Highlighting the importance of the petition, the Court observed India's climate commitment to increase tree cover from 23 per cent to 33 per cent. So, the Court instructed the committee to produce the guidelines on this matter.[32].

In the case of *Hanuman Laxman Aroskar v. Union of India*[33], the petition filed by Hanuman Laxman Aroskar and NGO Federation of Rainbow Warriors challenged the clearance for an airport in the state of Goa. The Supreme Court rejected the

[28] NABARD (National Agricultural Bank for Rural Development) is regulatory body for overall regulation and licensing of rural banks and apex cooperative banks in India.

[29] *National Adaptation Fund for Climate Change*, National Bank for Agriculture and Rural Development (NABARD) https://www.nabard.org/content.aspx?id=585

[30] Ministry of Finance, Economic Survey 2018-19, New Delhi: 2020, https://www.indiabudget.gov.in/budget2019-20/economicsurvey/index.php

[31] Association for Protection of Democratic Rights v. The State of West Bengal and Others, Special Leave Petition (Civil) No. 25047 of ***2018***

[32]http://climatecasechart.com/climate-change-litigation/non-us-case/association-for-protection-of-democratic-rights-v-the-state-of-west-bengal-and-others/

[33] Hanuman Laxman Aroskar v. Union of India, (2019) SCC Online SC 441

clearance for an airport in Goa and ordered the government to review the clearance. The Court halted the environmental clearance because of the government's failure to consider impact of the project on the environment. The Court mentioned the Paris Agreement and India's Nationally Determined Contribution to the Paris Agreement as key of India's environmental rule of law and government was required to balance environmental concerns with development goals.

Later on, Supreme Court lifted the suspension of the environmental clearance after receipt of the compliance of environmental norms. The government took a commitment to make the airport a zero-carbon airport operation. The Court expressed satisfaction because government addressed concerns outlined in its 2019 decision. National Environmental Engineering Research Institute was appointed by the Court to oversee government's compliance with the environmental conditions.[34]

In re Court on its own motion v. State of Himachal Pradesh and others": National Green Tribunal issued a ruling on its own motion restricted activity around the Rohtang Pass, Himachal Pradesh. NGT found that Black Carbon released from vehicles is a factor for rapid melting of glaciers in the Himalayan region. NGT furnished a study suggesting that forty per cent of the glacial melting is noticed due to the Black Carbon impact. The court ruled that citizens have the right to a clean environment, ensured by Article 48A¸ 51A and 21 of the Constitution of India.

The court affirmed the applicability of the "polluter pays" principle to the respondents in this case, the court ordered the government of Himachal Pradesh to undertake measures to reduce pollution, including random pollution checks, use of compressed natural gas, electric buses and implementing a reforestation programme. These measures must be overseen by a Monitoring Committee, who in turn should report to the court.

In the Case of *Pandey v. India,*[35] Ridhima Pandey, a plaintiff from Uttarakhand, filed climate change case in March 2017 with the National Green Tribunal of India. Ridhima's petition argued India's commitments under Paris Agreement and India's existing environmental laws compels greater action to mitigate climate change. It also argued that the term "environment," as used in the Environment

[34]http://climatecasechart.com/climate-change-litigation/non-us-case/hanuman-laxman-aroskar-v-union-of-india/
[35]Ridhima Pandey v. Union of India and Ors. (Original Application No. 187/2017) (National Green Tribunal)

(Protection) Act 1986, necessarily encompassed the climate. The case was brought pursuant to section 2(m) of the National Green Tribunal Act 2010, In addition to the legal provisions, the petition cited the principles of sustainable development, precaution, and intergenerational equity, judicial decisions based on legal principles in the Netherlands (Urgenda Foundation v. Kingdom of the Netherlands), Pakistan, (Leghari v. Pakistan), and the U.S. (Juliana v. United States).

The petition asked the court to order the national government to undertake environmental impact assessments, preparation of a national greenhouse gas emissions inventory, and national carbon budget against which particular projects' emissions impacts can be assessed.

In 2019, the National Green Tribunal dismissed the case, arguing that the climate change has covered in the process of impact assessments under the Environment Protection Act of 1986, and therefore, Paris Agreement's commitments are reflected in the policies of the Government of India and every aspect is considered in granting environment clearances.

Conclusion and Recommendations

Curbing climate change is an important issue for this government. Therefore, all the policy initiatives across sectors have shown concerns for climate. The initiatives of the government discussed above are all aiming at curbing climate change. While the present government's successful actions to address climate change have become a template for the developing world, the government should think twice before committing to zero emission. India's development needs cannot be ignored. Nonetheless, India should not be compelled to meet the targets above the parameters set under Paris agreement. Sincerely, India is trying to meet its nationally determined contributions under the Paris agreement. India's emission targets are within reach on two key parameters. Emission intensity of GDP has declined by 24 percent between 2005 and 2016 against a target of 33-35 per cent reduction by 2030.[36] However We need a comprehensive and all-encompassing legislation that covers all aspects of Indian policy so far has been to avoid legislation and combat through policies[37].

[36] *First things first: Climate summits should focus on mechanisms for easier transfer of technology*, Times of India (Apr. 16, 2021.) https://timesofindia.indiatimes.com/blogs/toi-editorials/first-things-first-climate-summits-should-focus-on-mechanisms-for-easier-transfer-of-technology/

[37] Press Trust of India, *Experts want India's emission-cut pledge in Paris backed by stringent law*, Business Standard, (Dec. 5, 2019) https://www.business-standard.com/article/pti-stories/india-must-enact-stringent-law-to-combat-rapidly-changing-climate-experts-119121500225_1.html

Now, much needs to be done in the areas of green technology. Developed nations should now focus on transfer of green technology to developing nations. The commitments are yet to be backed by finance to meet the transition costs and mechanisms to facilitate technology transfers. As India's economy grows, the gradational growth generates lower level of emission. This trend will intensify with availability of clean technologies. The future climate talks must focus on getting this mechanism to work better.

Recommendations

Climate policy alone will not solve the emission reduction problem. India has a huge backlog of sustainable development and poverty reduction priorities. The climate change mitigation and adaptation policies must be integrated with developmental priorities. India must galvanise the climate vulnerable countries and orient these countries that future climate policies must capitalise on the strengths of Paris Agreement and overcomes the weaknesses of the Paris Agreement. The policymakers should pursue a low carbon, climate resilient developmental path. The climate polices must include emission reduction and adaptation commitments in vigorous manner and ensure compliance provisions. In general, the environmental governance measures can follow the undermentioned recommendations.

Regarding Mitigation

a) India offers many low-cost, effective mitigation opportunities. India can make a contribution to global climate change objectives with effective transfer of new technologies.
b) Solar and wind energy are yet to realise the potentials. India can rope in other countries with similar resources and must attempt to explore these resources with global partnership.
c) As India's urban population is increasing, a multi-pronged approach to address the climate change impacts in urban areas must be implemented.
d) Besides the existing climate fund policies, India must promote voluntary carbon markets and other market mechanisms for mitigation,

Regarding Adaptation

Climate extremes already impacted the physical and livelihood of the farmers. The adaptation measures need to be implemented intensively. Specific recommendations regarding adaptation must include:

a) Policy makers must mainstream climate change adaptation measures into economic development and agricultural programmes. All major development policies and measures must undergo adaptation screening.
b) Private sectors must be roped in to enhance the adaptation measures. The resource base to support adaptation efforts must be increased by involving the private sectors. Private partners must build up adaptation measures on existing indigenous coping strategies.
c) Conservation of water resources must be prioritised as adaptation mechanism. Policy makers must integrate adaptation measures into water resource management plans and strengthen water resource management systems to cope with the climate change.
d) Many fail to realise the synergy between climate change and sustainable development and treat them as separate domains of environmental governance. All the polices of the climate change must be addressed within the context of sustainable development goals.
e) Project-wise contribution to sustainable development must be documented. Policy makers must assess project's contribution to sustainable development and replicate those projects that ensure low carbon emission but high developmental benefits.
f) Unused lands can be used in effective way. The government must formulate policies to use the wasteland for oil crops like jatropha for biofuels.