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CLIMATE CHANGE POLICY IMPLEMENTATION FOR REDUCING IMPACTS IN INDIAN CONTEXT

Environmental Science

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ABSTRACT

Climate change policy has to be effective and require immediate implementation with proper technology applications and instruments. Climate change impacts are evidence based as there is increase in deaths due to heat stress in recent years, Hindu Kush ice mass at Himalayan region has decreased in the last two decades, increase in deaths due to heat stress in recent years, serious and recurrent floods in Northeast states of India, sea-level rise leads to intrusion of saline water into the fresh groundwater in coastal aquifers and thus adversely affects groundwater resources, more than 1 million people will be directly affected by 2050 from risk through coastal erosion and land loss, drying up of wetlands and severe degradation of ecosystems; and consequently the gross per capita water availability in India will decline from ~1820 m^3/yr in 2001 to as low as ~1140m^3/yr in 2050. National Environment Policy outlines essential elements of India's response to Climate change and these inter-alia include adherence to principle of common but differentiated responsibility and respective capabilities of different countries, identification of key vulnerabilities of India to climate change, in particular impacts on water resources, forests, coastal areas, agriculture and health, assessment of the need for adaptation to climate change and encouragement to the Indian industry to participate in clean development mechanism (CDM). Effective role of institutions and governance, sufficient and long term financing for environmentally sound technology and infrastructure, sustainable livelihood, capacity building and eco-friendly lifestyle choices are effective instruments for adaptation and mitigation strategies.

INTRODUCTION

India is growing rapidly and represented more than 8% of the increase in global energy-related CO_2 emissions between 2000 and 2014. India is the world's third-largest national emitter. At 2 gigatons in 2012, its carbon emissions ranked far behind those of the United States (5.2 gigatons) and China (9.9 gigatons). When adjusted for population, the average Indian emits four times less than the average Chinese and ten times less than the average American. The Intergovernmental Panel on Climate Change (IPCC) is a specialized body jointly established by the United Nations Environmental Program (UNEP) and the World Meteorological Organization mandated to prepare scientific assessments on various aspects of Climate Change [1-3].

The world's biggest CO_2 emitter China improved its performance compared to the previous year and climbed up to rank 46. The climate change performance index (CCPI) 2014 results illustrate the main regional differences in climate protection performance within 58 countries across the world and as per CCPI value, India has 57.16. Although there are lower growth rates of the global CO_2 emissions that give reason to hope for a successful climate protection in the future, for now still no country performed well enough to reach the category "very good" in the CCPI 2014. A further expansion of renewable energies and improvements in the efficiency sector remain the most promising strategies to tackle global emissions.

The CO_2 emissions are increasing relatively quickly in India. Its share of renewable energy is still good, but the development could be faster. There also is a need for India to catch up on efficiency developments. India is among 10 largest CO_2 emitters and rank-wise India has shifted from 24 (2013) to 30 (2014), while share of global GDP is 5.66 %, world population is 17.84 %, global CO2 emissions 5.14 % and global primary energy supply contribution is 5.72 % only. Climate Change is a serious global environmental concern [4-9]. It is primarily caused by the building up of Green House Gases (GHGs) in the atmosphere [10].

The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture. Global Warming is a specific example of the broader term "Climate Change" and refers to the observed increase in the average temperature of the air near earth's surface and oceans in recent decades [11-15]. The CDM allows developing countries to generate Kyoto permits that can be traded in an international market for projects that otherwise would not have been undertaken and which reduce emissions below a baseline. A CDM project must be voluntary, generate "real, measurable, and long term benefits related to the mitigation of climate change" and generate "reductions in emissions [16-18].

The biggest climate impact has been on changing weather patterns in South Asia [19-21]. Over the last 50 years, rising temperatures have led to a nearly 10 percent reduction in the duration and rainfall levels of the annual monsoons that are vital to nearly all Indian agriculture [22]. Moreover, the melting of Himalayan glaciers threatens the country's other vital water supply. In addition, rising sea levels have put hundreds of millions of Indians at risk in low-lying population centers in the Kolkata and Chennai metropolitan regions.

CLIMATE CHANGE IMPACTS IN INDIA

Climate change is impacting the natural ecosystems and is expected to have substantial adverse effects in India, mainly on agriculture on which 58 per cent of the population still depends for livelihood, water storage in the Himalayan glaciers which are the source of major rivers and groundwater recharge, sea-level rise, and threats to a long coastline and habitations. Climate change will also cause increased frequency of extreme events such as floods, and droughts. These in turn will impact India's food security problems and water security. The key environmental challenges in India have been sharper in the past two decades.

ACTION PLAN FOR MITIGATION

The National Action Plan on Climate Change (NAPCC) coordinated by the Ministry of Environment and Forests is being implemented through the nodal Ministries in specific sectors/areas. On June 30, 2008, Prime Minister of India released India's first National Action Plan on Climate Change (NAPCC) outlining existing and future policies and programs addressing climate mitigation and adaptation. The plan identifies eight core "national missions" viz. National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a "Green India", National Mission for Sustainable Agriculture, and National Mission on Strategic Knowledge for Climate Change. Emphasizing the overriding priority of maintaining high economic growth rates to raise living standards, the plan identifies measures that promote our development objectives while also yielding co-benefits for addressing Climate Change effectively.

The NAPCC also describes other ongoing initiatives, including: (i) Power Generation; (ii) Renewable Energy; and (iii) Energy Efficiency. All national missions have been approved by the Prime Minister's Council on Climate Change and are at different stages of implementation. Under advice of the Central Government, State Governments are also preparing State Action Plans on Climate Change that are aimed at creating institutional capacities and implementing sectoral activities to address Climate Change. So far, 21 States namely Andaman and Nicobar, Andhra Pradesh, Arunachal Pradesh, Assam, Delhi, Jammu & Kashmir, Kerala, Karnataka, Lakshadweep, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tripura, Uttarakhand, and West Bengal have prepared document on State Action Plan on Climate Change (SAPCC).

Various other science initiatives are planned by the Ministry as part of the Climate Change Action Program (CCAP). These include National Carbonaceous Aerosols Program (NCAP), Long Term Ecological Observatories (LTEO), and Coordinated Studies on Climate Change for North East region (CSCCNE). The NCAP is a major activity involving multi-institutional and multi-agency study; and these include National Carbonaceous Aerosols Program (NCAP), Long Term Ecological Observatories (LTEO), and Coordinated Studies on Climate Change for North East region (CSCCNE). The NCAP is a major activity involving multi-institutional and multi-agency study launched in 2011. In this initiative, Ministry of Environment and Forests will collaborate with the Ministry of Earth Sciences, the Indian Space Research Organization (ISRO), the Ministry of Science and Technology and other associated agencies to enhance the understanding of the role of Black Carbon in climatic change through monitoring and assess the impacts of black carbon through various modeling techniques. The work Program envisages three Working Groups namely Long term Monitoring of Aerosol (also known as Working Group-I), Impact of Aerosol on Himalayan Glaciers (Working Group-II) and Modeling of Black Carbon emissions inventory India and assessment of its impacts (Working Group-III). Steps have also been taken to increase capacity at the institutional level for conducting research into Climate Change science and making necessary assessments. The Ministry has already set up a network, namely the Indian Network for Climate Change Assessment (INCCA) comprising of 127 research institutions tasked with undertaking research on the science of Climate Change and its impacts on different sectors of economy across various regions of India. INCCCA has helped the Ministry put together its Green House Gas (GHG) Emissions Inventories and in carrying out other scientific assessments at more frequent intervals.

India's 12th five year plan (2012-2017) calls for faster, more inclusive and sustainable growth towards reducing its emission intensity of gross domestic product (GDP). The Government has a domestic mitigation goal of reducing emissions intensity of gross domestic product (GDP) by 20-25% by 2020 in comparison with 2005 level. The energy intensity of India's output has shown a declining trend owing to improvements in energy efficiency, autonomous technological changes and economical use of energy. This domestic goal and the objectives of the National Action Plan on Climate Change are proposed to be achieved through a sustainable development strategy under the Twelfth Five-Year Plan. Several thrust areas have been identified in the Twelfth Five-Year Plan for this purpose and a coordinated initiative to identify Nationally Appropriate Mitigation Actions and implement them towards this end will be taken during the Plan period. At the initiative of the Ministry, Planning Commission has recognized Climate Change as a major area of environmental intervention.

During 12th Five year Plan, Climate Change Action Program (CCAP) has been approved by the Planning Commission for implementation. The scheme aims at advancing scientific research, information and assessment of the phenomenon of Climate Change, building an institutional and analytical capacity for research and studies in the area of Climate Change, and supporting domestic actions to address Climate Change through specific Programs and actions at the national and state level. India organized the Xth BASIC Ministerial Meeting on Climate Change in New Delhi during 13-14 February, 2012 to facilitate exchange of views on outcomes of the Durban Conference and evolution of common BASIC position on key issues in Climate Change. Besides the BASIC countries comprising of Brazil, South Africa, India and China, representatives of Swaziland, Singapore and Qatar were also invited to the meeting. During the year three more meetings of the BASIC group were held in different locations in South Africa, Brazil and China. India also participated in the meetings of the Major Economies Forum and the organized by the United States of America (USA) and the Petersburg Dialogue initiated by Germany. At the sub-regional level, India partnered with Bhutan, Nepal and Bangladesh for cooperation to address adverse effects of Climate Change through adaptation actions in the four thematic areas of Food, Water, Energy and Biodiversity.

Renewable Energy Procurement Obligation (RPO) has been the major driving force in India to promote the renewable energy sector. However, the NAPCC has not set any target for RPO. The Mission Document on Jawaharlal Nehru National Solar Mission has indicated that RPO is the key driver for promoting solar power. Further, the National Tariff Policy (NTP) 2006 was amended in 2011 to prescribe that solar-specific RPO be increased from a minimum of 0.25% in 2012 to 3% in 2022. The Government closely works with its partner countries in the international negotiations on Climate Change. Negotiations in this regard are being conducted under the auspices of United Nations Framework Convention on Climate Change (UNFCCC).

At the Doha Conference, India pursued the strategy of working together with the Group of 77 & China in order to protect the overall interests of developing countries. During the Conference, India raised the issues of equity in Climate Change related actions and commitments, technology-related Intellectual Property Rights (IPRs) and unilateral measures taken by some countries in the name of Climate Change and succeeded in having these issues included in the ongoing work of various bodies of the Convention. India successfully defended the nature of its voluntary domestic goal of reducing emissions intensity of its Gross Domestic Product (GDP) by 20-25% by 2020 in comparison with 2005 level and ensured that agriculture, a sensitive sector of our economy, was not included in the mitigation work Program proposed to be launched at the global level.

CLIMATE CHANGE LAWS IN INDIA

Various international environmental treaties and laws binding on world community were framed and international responses are mentioned in Table1. International Climate Change Law applicable includes UNFCCC: signature (10 June 1992), ratification (1 Nov 1993), and entry into force (21 March 1994); Kyoto Protocol: accession (26 August 2002) and entry into force (16 February 2005); Vienna Convention: accession (18 Mar 1991); Montreal Protocol: accession (19 Jun 1992) are some of the important international instruments. Indian Government also passed and implemented some Acts for the safeguard of environment.

The Environmental (Protection) Act of 1986, Act No. 29 to act as "umbrella" legislation designed to provide a frame work for Central government co-ordination of the activities of various central and state authorities established under previous laws, such as Water Act & Air Act. The Air (Prevention and Control of Pollution) Act of 1981, No. 14, 29 March 1981, implemented to provide for the prevention, control and abatement of air pollution. The Ozone Depleting Substances (Regulation and Control) Rules, 17 July 2000, was to enact rules for regulating ozone depleting substances.

The Energy Conservation Act of 2001, No. 52, 29 September 2001, came into existence to provide for efficient use of energy and its conservation and for matters connected therewith or incidental thereto; and later it was Energy Conservation (Amendment) Act, 2010, No. 28, 24 August 2010, to amend the Energy Conservation Act

of 2001. Electricity Act 2003, Amended 2007, was implemented to better coordinate development of the power sector. The Indian Forest Act of 1927, No. 16, 21 September 1927, was made to consolidate the law relating to forests, the transit of forest-produce and the duty leviable on timber and other forest- produce. Forest Conservation Act of 1980, No. 69, 27 December 1980, was initiated to provide for the conservation of forests and for matters connected therewith or ancillary or incidental thereto.

Environmental Impact Assessment was initiated with National Green Tribunal (NGT) Act, 2010 and National Environment Appellate Authority (NEAA) Act, 1997. The National Green Tribunal Act, 2010, No. 19, 2 June 2010, came into force to provide for the establishment of a Green Tribunal for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons or property and for matters concerned therewith or incidental thereto. The National Environment Appellate Authority Act, 1997, No. 22, 26 March 1997, formulated to provide for the establishment of a National Environment Appellate Authority to hear appeals with respect to restriction of areas in which any industries, operations or processes or class of industries, operations or processes, shall not be carried out or shall be carried out subject to certain safeguards under the Environment (Protection) Act, 1986 and for matters concerned therewith or incidental thereto.

The Water (Prevention and Control of Pollution) Cess Act, 1977, 7 December 1977, amended 1992, was to provide for the levy and collection of a cess on water consumed by persons carrying on certain industries and by local authorities, with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Coastal Regulation Zone Notifications, 1991, 19 February 1991, amended 16 August 1994 and 18 April 1996, to impose the following restrictions on the setting up and expansion of industries, operations or processes, etc., in the said Coastal Regulation Zone.

The Indian Wildlife Protection Act, 1972, was amended in 1993. The Wildlife (Protection Act) Amendment Act, 2002, No. 16 of 2003, 17 January 2003, formulated to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country.

Biological Diversity Act, 2002, No. 18 of 2003, 5 February 2003, implemented to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.

Recycled Plastics Manufacture and Usage Rules, 1999, 2 September 1999, came into force to define rules for the manufacture and uses of recycled plastics carry bags and containers. In addition to these rules and Acts, Government of India worked and formulated many important documents like National Action Plan on Climate Change, 2008; India: Taking on Climate Change – Post Copenhagen Domestic Actions, 30 June 2010; India's 12th Five-Year Plan, October 2011; National Electricity Plan, January 2012; Integrated Energy Policy Report, 2006; India: Greenhouse Gas Emissions, 2007; National Solar Mission (consequence of National Action Plan on Climate Change), June 2010; Incentives for Wind Power, 2009, ceased March 2012; Solar Power Generation Based Incentive, 2008; Energy Conservation Building Code, 2007; Ethanol Production Incentives, 2007; Tariff Policy, 6 January 2006, amended 2011; National Electricity Policy, 3 February 2005; National Auto Fuel Policy, 2003; Auto Fuel Vision and Policy, 2025 etc.

Table 1. International response to climate change events and important initiatives [23]:

Year	Events and initiatives
1979	The first World Climate Conference (WCC) takes place
1988	The Intergovernmental Panel on Climate Change is set up.
1990	IPCC's first assessment report released.
1991	First meeting of the Intergovernmental Negotiating Committee (INC) takes place.
1992	The INC adopts UNFCCC text. At the Earth Summit in Rio, the UNFCCC is opened for signature.
1994	UNFCCC enters into force.
1995	The first Conference of the Parties (COP 1) takes place in Berlin.
1996	The UNFCCC Secretariat is set up to support action under the Convention.
1997	Kyoto Protocol formally adopted in December at COP3.
2001	Release of IPCC's Third Assessment Report. Bonn Agreements adopted, based on the Buenos Aires Plan of Action of 1998.
2005	Entry into force of the Kyoto Protocol.
2007	IPCC's Fourth Assessment Report released. Climate science entered into popular consciousness. At COP13, Parties agreed on the Bali Road Map
2009	Copenhagen Accord drafted at COP15 in Copenhagen.
2010	Cancun Agreements drafted and largely accepted by the COP, at COP16.
2011	The Durban Platform for Enhanced Action drafted and accepted by the COP, at COP17.
2012	The Doha Amendment to the Kyoto Protocol is adopted by the CMP at CMP8.
2013	COP of UNFCC at 19th session held in Warsaw in November 2013 to intensify domestic preparations for their intended nationally determined contributions (INDC)
2014	UNFCCC COP20 Lima, Peru, December 2014 for adequate long term finance for clean technology
2015	UN Special Summit on Climate Change i.e. Paris meeting of the UN climate negotiation in 2015.

CONCLUSION

Vulnerability to climate change coupled with other environmental issues has a strong linkage with poverty and responsible to create multiple stresses on the growth of the nation. The Government is implementing the National Action Plan on Climate Change (NAPCC) with a view to enhance the ecological sustainability of India's development path and address Climate Change. The Government regularly reviews the progress under the National Action Plan on Climate Change (NAPCC), based on the information provided by the concerned nodal Ministry. India has aggressive renewable energy targets and industry energy efficiency policies, but faces significant infrastructure challenges, which may derail otherwise good policy.

Some researchers predicted that after few decade there shall be a scenario of 4 ºC rise in global temperature, would result in increased climate extreme events such as heat waves, sea level rise, more storm surges, droughts and flooding in the South Asian region including India. The coastal and deltaic regions of India are reported to be particularly vulnerable to the risks of flooding including two Indian cities of Mumbai and Kolkata. The Ganges, Indus, and Brahmaputra—are also vulnerable to the effects of climate change due to the melting of glaciers and loss of snow cover resulting in significant risk of flooding.

Prime Minister's Council on Climate Change in evolving a coordinated response to issues relating to Climate Change at the national level and to monitor the implementation of the eight National Missions and other initiatives under the NAPCC are important steps for climate change mitigation strategies. Law carbon initiatives are recommended to achieve sustainable development. There is a need to ensure climate resilient development especially in developing and least developed countries where there are greater needs for adaptations, due to their higher vulnerability to the adverse impacts climate change. Multiple strategies like low carbon developments can be helpful for adaptations and mitigation purposes and to meet equity, energy security and livelihood security.

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