



Climate Change Mitigation in India Today: A Review of Policy and Practice

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ABSTRACT

Climate change is one of the most widely debated issues, with far reaching adverse effects on agriculture, irrigation and water supply, health, energy, and so on. A universal understanding as well as coordinated action at the national level is required to address the impacts of climate change. There is a lot of contestation about the emission rate and carbon footprints of developed and developing countries. The major consensus lies in this area is that while developed countries contributed initially to the increased Green House Gases, while in the future, the blame is on developing nations. The adaptive capacity of the people in developing countries is generally low in developing countries, due to the inadequate attention given to this issue. However, the international policies adopted including the Kyoto protocol provisions and the efforts made by the UNFCCC are not enough to deal this global issue. Sustainable development strategies can be adopted by choosing energy-efficient ways, new and updated modifications in science and technology, renewable energy, advanced forestry methods, reforestation, and water saving strategies. Minimizing the vulnerability of the people belonging to different social and economic classes and ecosystems requires paramount consideration in the developing nations. Developing countries like India are facing the responsibility of mitigation and adaption strategies, affording the cost of such attempts and its inference for economic development.

KEYWORDS

Climate change, India, mitigation, vulnerability, policy

INTRODUCTION

The latest scientific assessment claims that the earth's climate system has changed abruptly since industrialization. The developed nations vindicate themselves from the cause and putting all the blame on the developing countries. But studies claim that most of the warming has been occurring during the past fifty years, the timeframe when the present developed countries extended their industrial activities (Synthesis Report. 2001). The Intergovernmental Panel on Climate Change (IPCC) forecast that the global average heat may rise between 1.4 and 5.8 degrees by 2100. This will exacerbate the impacts of current climate change, leaving intense damage on the global water cycle, ecosystems, agriculture, and ocean level rise. The tropical countries will be the most affected, including India.

Climate change impacts are part of larger sustainable development challenges. Climate policies should be embedded within broader strategies, to make the regional and national development path more sustainable (Revi, 2008, p. 212). Currently, the ability of a nation to achieve sustainable development goals lies with the efficacy in dealing with the impacts of climate variability and change, associated social and economic progress, and policy responses. The success of climate policies will be depended on the track of sustainable development goals. The technological advancements and socio-economic development strategies will largely affect the capability to adapt and mitigate (Nasir & Rao, 2020).

INDIA AND IT'S CONCERNS ABOUT CLIMATE CHANGE

About 700 million population from rural India depends on climate-dependent sectors: agriculture, forests, fisheries, and natural resources. Their livelihood and sustainability depend on the natural resources like water, biodiversity, grasslands, mangroves, and coastal zones.

The most affected will be the forest dwellers, dryland cultivators, fishermen communities and nomads (Ravindranath, 2002, p. 82). The National Communications Report of India shows that climate change will have a negative impact on the natural systems, there by the allied socio-economic systems (GOI, 2004). Adaption is receiving less attention than mitigation in the climate regime. Adaption is a private good while mitigation is a global public good. The lack of mitigation measures is often borne by individuals and communities. The costs of adaption are the insurance payments while the cost of not addressing the adaption is the damages from unmitigated risks. The nonlinearity, regional-scale variations, challenging multiple and non-climatic stresses are the main limitations climate change impact studies in India. There is lot of uncertainty linked with the impact studies in India, mainly due to the existence of regional

scale variations and non-climatic stresses (Bellard et al, 2011, p. 372). The costs of not addressing climate change or to adapt to it are very uncertain, but their welfare consequences are enormous (Sathaye & Shukla, 2006, p.322). Early actions on adoptions are usually considered precautionary. The forthcoming effects of climate change can be overcome by giving greater emphasis on adaption strategies, e.g. via an Adaption Protocol, where funding by developed countries supports the adaption activities in developing countries. Adaption planning and implementation, public-private insurance, allocation of climate funds, and development assistance can be additional policies for added benefits. There will be opportunity loss if proper steps are not taken to tackle climate change, considering the urgency of the issue (Synthesis Report, 2001). And moreover, the sustainable development goals could be enhanced by timely adaptation actions, applicable to both local and global level.

The implications of climate change can be far-reaching by having certain implications of different sectors: agriculture, water bodies, human health, desert formation and coastal vulnerabilities (Gupta, 2002). These changes can impact the water cycle, associated with intense droughts and frequent floods. The temperature rise will negatively impact the crop production, stressing the poor marginal farmers to submerge in poverty. Coastal area will be the first place to witness the intensity of climate change since tropical cyclones and post monsoon events would increase the chance of flooding in coastal areas.

GLOBAL MITIGATION AND IMPLICATIONS FOR INDIA

One major international commitment, Kyoto Protocol, was ended in 2012. The participating countries have already engaged in dialogues within the UNFCCC and to decide on post-2012 commitments on emission reductions. The common demand was to mandate regulation on GHG emissions to sector-specific ones in all countries. The use of insurance-based approaches and innovative financing mechanisms can be used to address the post-2012 climate regime. There is a growing interest in evaluating the role that innovative insurance mechanisms and other risk-spreading activities may offer in addressing adaptation needs (Mills, 2005, p.1042). public-private risk transfer mechanisms, weather derivatives, micro-insurance, and weather derivatives can reduce potential climate change impacts. The complications involved in the nuanced insurance industries in the developing nations should undergo further study.

In India, the ability to adapt to climate change is closely associated with sustainable development and poverty reduction (TERI, 2019). It is beneficial as increasing adaptive capacity can entail additional benefits to poverty reduction and sustainable development. Impacts of climate change can alter the existing sustainable development plans that would

create an economic uplift in the rural sector, this also boost the poverty reduction plans. Sustainable development activities of some countries make the system more vulnerable to climate change, usually called maladaptive. It is often suggested to integrate adaption responses to sustainable development and poverty reduction processes.

Developing a global climate regime takes time and effort. The current framework for mitigation markets are not worth, and not accepted as it is mixed with controversies as well not cost effective. An ideal regime architecture still need improvisation to include flexibility (Sathaye & Shukla, 2006, p.323). Broader involvement and more conclusive progress towards an eventual intention are necessary for a sturdy and efficient regime architecture.

In countries like India, the climate-related issues are effectively managed as a component of sustainable development concerns derived from the Millennium Development Goals and should be linked with goals and targets in favour of the nation. In India, the initial communication of sustainable development goals are effectively conveyed, imparting value added benefits to climate change mitigation measures (GOI, 2004). The economic wellbeing of their people remains an important target for developing countries. The climate regime can act as a hindrance to these developments, thus would fail to garner wide support, results in inefficient and lack of co-ordination. The success of the next climate regime would depend on the instruments that would best align with sustainable development goals and activities.

CLIMATE CHANGE IN INDIAN CONTEXT

Climate change is rising importance in the scientific world, involving different streams of specializations: biology, social sciences, and physical sciences. The literature on climate change and policy is also gaining significance. There are three broad groups of scientific estimation as perceived by the IPCC (2001):

1. The science of climate change; climate modelling and projections (Working Group-I)
2. Impacts, vulnerability, and adaptation to climate change (Working Group-II).
3. Mitigation and policies (Working Group-III)

Most developed countries are focusing on scientific and policy arena of climate change including modelling and projections. India should focus on all three aspects. The involvement of developing countries is moderate. India have completed four national assessments which focus on impacts and mitigation activities. The studies were conducted by ALGAS (Asian Least-Cost Greenhouse Abatement Study), which was supported by Asian Development Bank

and Global Environment Facility. Multiple sources reported including India's initial National Communications to the UN conveyed that the national communications are very effective and impactful. The national communications were carried out by 131 teams, both from academic and research institutes, mainly focused on three challenges; climate projections, impacts and adaptation, mitigation.

To assess the various aspects of climate change, The National Communications project has initiated a network of institutions and research teams in India. India should have efficient Research and development(R&D) team to study the various aspects of climate change science including climate projections, climate impacts, integrated assessments, adaption, and mitigation.

Certain issues need to be addressed with priority include the following.

- Unpredictability to understand, detect and attribute the current climate change in the regional level hinders from projecting the future climate changes. Moreover, more relationships on the cause-effect analysis linking the human and non-human components can be well analysed using biogeochemical models (IPCC 2001).
- The better study on subjection and sensitivity of the ecological and social systems at the local level must be focused on (IPCC 2001)
- Climate mitigation in the background of development and sustainability should be assessed at different level: regional, national, and global level (IPCC 2001)

CLIMATE CHANGE AND FORESTS IN INDIA

Climate change can create frequent disturbances in the forest ecosystem including forest fires, the occurrence of invasive species, storms, and floods, insect outbreaks, or even biodiversity loss. Discussions on the sustainable management practices of forest resources to adapt to current climate change are limited. Adaptation in its very own sense, aim to rectify the complications involved in uncertainty over climate change risks to reduce the risks (Ohlson, 2005). Climate change makes the forest system more vulnerable, further leaves the forest-based community in trouble. Any changes in the forest ecosystem can affect the socio-economic structure associated. The economic opportunities, land value, availability of non-timber forest products that sustain the local population show an aberrant pattern with the change. A significant rise in CO₂ and temperature levels and altering precipitation affect forest growth and productivity. Warming temperature can alter the specific geographical locations in which a certain kind of tree species occur. Melting polar ice causes the shift of forest line towards the

tundra region. And tree species that already exist in the northern point will face threat as the overall temperature rise. Climate change is often associated with the risk of extreme droughts. Droughts can induce wildfire, where dried shrubs and trees can provide fuel to the fire.

IMPACTS, MITIGATION, AND ADAPTION

Climate change is a major concern in the Indian forestry sector because of the concerns of the vulnerability of forest ecosystems, sustainable production of timber, industrial wood, fuelwood, and biomass for energy.

Forests are characterized by a varied variety of vegetation types. The forest system in India is studied based on the equilibrium model, in which one type of forest is replaced by another forest type. The short-lived phase reaction of plant species to climate change is not studied. There is an urgent need to evaluate the current vegetation models to measure the implications of climate change, by incorporating a tropical species dynamic model. The main agenda is to reduce the vulnerability of the forests. India is set to implement broader range Clean Development Mechanism (CDM) projects in the forestry sector. The influence of climate change on mitigation potential, adaption, and carbon sink must be analysed to ensure sustainable management of forests, a constant supply of forest timber, industrial wood, and non-timber products. The need to develop a database on the growth rate of biomass and soil carbon accumulation rates is essential in different ecozones of India. The realistic assessment of the mitigation potential of the forestry sector for CDM projects requires these data.

Forests, climate change, and adaption require detailed research needs in a certain area. The current vegetation composition of different forest types in different ecozones must be evaluated. Properties of the woods including durability and strength, identifying invasive species should consider while studying various adaption aspects. The sensitivity of mangroves to changing climate, dynamics of the insect population, tree canopy, population dynamics of certain insect groups, the productivity of plantations can be developed as indicators of climate change responses.

INTERNATIONAL CLIMATE NEGOTIATIONS AND POLICY ANALYSIS

Kyoto Protocol (KP), LULUCF

Climate change is considered a serious threat by UNFCCC, urging nations to act on conservation measures of the ecosystem such as forests, as they act as a sink for GHGs. Deforestation can affect the accumulation of GHGs in the atmosphere. About 1.6 ± 0.8 GtC of Greenhouse gases were emitted every year during the 1990s, solely because of the land use

changes (Rawat and Kishwan.2019). India's initial national communications give estimates of emissions by sources and removals by sinks of methane, CO₂, and nitrous oxide.

The LULUCF sector provides an option for comparatively low-cost opportunities to mitigate climate change, by accelerating the absorption of GHGs from the atmosphere through carbon sinks or checking the emissions through deforestation. The development of the projects under CBM is not efficient in India. The process of submission of CDM reports to the Executive Board is cumbersome.

Improper understanding of CDM procedures might be a reason for the failure of these projects. There is a greater requirement of stakeholders in the development of CDM projects. ICFRE(2006) recommends some changes in the existing framework which includes description of possible CDM A/R areas, precision in the definition of CDM forest, involving CDM part in the new working plans, including CDM research in the state forest departments, including CDM element in JFM programs, promoting forestry based CDM over other projects such as renewable energy or fuel switching -with Jatropha oil-programs, allocating financial support for implementing CDM project and the institutional strengthening and capacity building of the stakeholders (Rawat and Kishwan, 2008, p.273)

WAY FORWARD

Sustainable development and poverty alleviation are closely linked with the climate change. It can be sustained by enhancing adaptive capacity which focus on accessibility to resources and better infrastructure, but the sustainable development activities can be deterred by the impact of climate change. And it is stated that adaptation process has to be stressed at the ground level in order to involve the communities in the decision-making process (Chandler et al, 2002). There are lot of complications involved to understand and detect the current change, that will limit the future process to predict the catastrophe.

Legal framework that deals with climate change is absent in India. The Air (Prevention and Control of Pollution) Act of 1981 is the only one that comes in the perspective of Constitution of India. this act focusses on the air pollutants that are injurious to human, animal and plant health. The Environment Protection Act of 1986 is the next one that emerge to seal the gap that exist in India 's environment system (Dhar et al, 2019). A core legal framework is essential in checking the general emission standard, by monitoring the production of ozone depleting substances (Peel, J, 2019). Article 21 of the Indian Constitution is mainly focusing on the legal implications of climate change (Ganguly,G et al, 2018).

Insurance as an adaption strategy is another growing trend in the climate change literatures, with more private insurance dealers are aiding farmers. But there is high cost and risk associated with establishing a contract (Badiger,2010). Also Index insurance is beneficial to large scale business and local governments, it would be burdensome to the poor marginal farmers (Ramaswami,2010). Catastrophe insurance is promising to the small cultivators, but it requires further research on the topic. The practicality in dealing with the weather fluctuations around a changing climate is currently not clear.

CONCLUSION

India is a large developing country with its majority of population depending on climate-sensitive sectors such as forests, fisheries, and agriculture. Food production, water supply, biodiversity, and livelihoods will be affected by the projected climate change in the future. Thus, India has a prime stake in scientific and technological advancements as well as an international understanding to accelerate mitigation and adaption. This requires a broad consultation process, networking, capacity building, and scientific understanding. Both climate adaption and mitigation in India is a challenging process since the population counts over 1/6th of the world's population, contributing GHG for their human and social developmental needs. Therefore, the efforts to climate change mitigation activities also corresponds the developmental challenges. Climate finance, bilateral cooperation on clean technology and success of carbon markets will have notable impacts on the India's efforts to combat climate change.

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