

Climate Change and Sustainable Development; With Reference to India

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Abstract: The goal of sustainable development is to encourage the type of growth that minimises environmental issues and satisfies current wants without jeopardising the ability of future generations to satiate their own needs. There are connections between how climate change affects many societal sectors. Human health and food productivity can be harmed by drought. Flooding can cause infrastructural and ecosystem damage as well as the spread of disease. Issues with human health can reduce labour productivity, affect food availability, and increase mortality. Shifts in rainfall patterns and agricultural seasons will occur from global and regional changes brought on by rising temperatures. More droughts and floods are being caused by El Nio episodes as they get more intense. Adopting a sustainable development strategy that promotes energy efficiency, renewable energy, forest conservation, reforestation, water conservation, and other ecologically friendly practises is the most effective way to combat climate change. Reducing the susceptibility of their socioeconomic and ecological systems to the anticipated climate change is the problem of greatest relevance to developing nations. India and other emerging nations will have to face the issue of advocating mitigation and adaptation measures, paying for such an effort, and dealing with its effects on economic growth. India is a sizable developing nation with nearly 700 million rural residents who directly rely on natural resources (such as water, biodiversity, mangroves, coastal zones, and grasslands) and sectors (such as agriculture, forests, and fisheries) that are sensitive to the effects of the climate on their subsistence and way of life. Additionally, the potential for adaptation of forest inhabitants, fishermen, and nomadic shepherds is quite low.

1. INTRODUCTION

One of the most significant worldwide environmental issues currently facing humanity is climate change, which has effects on things like freshwater availability, health, natural ecosystems, and food production. The earth's climate system has changed demonstrably from preindustrial times on a global and regional scale, according to the most recent scientific study. More data demonstrates that human activities are mostly to blame for the warming (about 0.1°C per decade) seen over the past 50 years. According to the Intergovernmental Panel on Climate Change (IPCC), the average global temperature may rise by 1.4 to 5.8 degrees Celsius (C) by the year 2100. The global hydrological system, ecosystems, sea level, food output, and related processes are all predicted to be severely impacted by this unprecedented surge. The impact would be especially severe in the tropical regions, which are primarily developed nations like India. The problem of climate change is a component of the more significant problem of sustainable development. As a result, when systematically incorporated into larger plans intended to increase the sustainability of national and regional development trajectories, climate policies can be more effective. The ability of nations to accomplish sustainable development goals will be impacted by the effects of climatic variability and change, climate policy responses, and accompanying socioeconomic development.

The prospects for and success of climate policies will be impacted by the pursuit of these objectives. Particularly, the socioeconomic and technological traits of various growth routes will have a significant impact on emissions, the pace and scale of climate change, its effects, human capacity for adaptation, and human capacity for mitigation. The Framework Convention on Climate Change (FCCC), established as a result of the UN Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro, laid the groundwork for the eventual stabilisation of greenhouse gases in the

atmosphere while acknowledging shared but distinct responsibilities, individual capacities, and social and economic conditions. In 1994, the Convention went into effect. In the wake of this, the 1997 Kyoto Protocol, which went into effect in 2005, reaffirmed the significance of stabilising greenhouse gas concentrations in the atmosphere and following sustainable development principles. A participating industrialised nation's obligation to limit its emissions of six greenhouse gases—carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, hydro fluorocarbons, and per fluorocarbons—was outlined in the Protocol's regulations and guidelines. It calls for industrialised nations (designated as Annex B nations in the Protocol) to cut their emissions of greenhouse gases by a weighted average of 5.2% from 1990 levels. By the end of the five-year period, which runs from 2008 to 2012, the reduction must be attained. The developing nations are not required by the Kyoto Protocol to cut back on their greenhouse gas emissions.

2. INDIA SHOULD BE CONCERNED ABOUT CLIMATE CHANGE, BUT WHY?

India is a sizable developing nation with nearly 700 million rural residents who directly rely on natural resources (such as water, biodiversity, mangroves, coastal zones, and grasslands) and sectors (such as agriculture, forests, and fisheries) that are sensitive to the effects of the climate on their subsistence and way of life. Additionally, the potential for adaptation of forest inhabitants, fishermen, and nomadic shepherds is quite low. According to India's National Communications Report to the UNFCCC11, all natural ecosystems as well as socioeconomic systems are projected to be impacted by climate change. The following are the most recent high resolution climate change scenarios and forecasts for India based on the Regional Climate Modelling (RCM) system, developed by the Hadley Center and applied for India using IPCC scenarios.

By the end of the century, the annual mean surface temperature will rise by 3 to 5°C under the A2 scenario and 2.5 to 4°C under the B2 scenario, with warming being more evident in northern India. Extremes in maximum and minimum temperatures are also anticipated to rise, and similarly extreme precipitation shows substantial increases, particularly over the west coast of India and west central India. A 20% increase in all India's summer monsoon rainfall is projected, and further increases in rainfall are projected over all states except Punjab, Rajasthan, and Tamil Nadu, which show a slight decrease. Following are a few predicted effects of climate change in India.

3. WATER RESOURCES

The hydrological cycle is anticipated to change, and certain portions of India are likely to see more severe droughts and floods. Additionally, a general decrease in the amount of accessible run-off is anticipated.

4. AGRICULTURE

In several locations of India, simulations employing dynamic crop models show a decline in crop output as temperature rises. However, at moderate temperature increases, this is mitigated by an increase in CO₂, and at higher warming, a detrimental impact on crop yield is anticipated due to shorter crop cycles.

5. FORESTS

Under the A2 and B2 scenarios, respectively, 77% and 68% of India's wooded grids are anticipated to see a change in forest type, according to climate impact assessments using the BIOME-3 model and climatic forecasts for the year 2085. In the absence of human impact, indications point to a shift towards wetter forest types in the northeastern region and drier forest types in the northwest region. Under the A2 scenario and over 70% under the B2 scenario, increasing atmospheric CO₂ concentration and climatic warming may also enhance net primary production.

6. COASTAL ZONE

A rise in the frequency of tropical cyclones in the Bay of Bengal is predicted by simulation models, with particularly powerful occurrences predicted during the post-monsoon season. According to projections, sea level rise will cause population displacement in coastal areas, worsen flooding in low-lying coastal areas, reduce agriculture output due to flooding, and lead to Stalinization.

7. HUMAN HEALTH

The likelihood of malaria is high in many states, and it may spread to new areas. The length of the malaria transmission windows is also anticipated to lengthen in the north and west and narrow in the south.

8. DESERTIFICATION

1900 Mha of land worldwide are affected by land degradation, of which 300 Mha are in Latin America and 500 Mha are in each of Africa and the Asia-Pacific. Land degradation that results in desertification could be further exacerbated by climate change that causes warmth and water stress. Land degradation is a problem that is related to climate change and is being addressed by the United Nations Convention to Combat Desertification (UNCCD). The natural resources (groundwater, soil, biodiversity, etc.) and climate-sensitive industries (forests, agriculture, coastal zones) are already under strain as a result of socioeconomic pressures. Climate change is probably going to make socioeconomic pressures and resource degradation worse. As a result, nations like India, who have a sizable population dependent on climate-sensitive industries and limited capacity for adaptation, must create and put into practise adaptation policies.

9. TAKING INTO ACCOUNT CHANGES IN THE CLIMATE AND WORKING TOWARDS SUSTAINABLE DEVELOPMENT

Due in large part to the approval of Agenda 21 and the many Conventions that came about as a result of the UNCED-1992, sustainable development is now discussed in all climate change policy discussions at the international level. According to the Brundtland Commission, "development that meets the demands of the present without compromising the potential of future generations to meet their own needs"¹⁹ is the universally recognised and used definition. The idea of sustainable development now encompasses economic, social, and environmental concerns. The use of finite natural resources is not prohibited by sustainable development, but any use must be suitably offset. Many developing nations find this idea unacceptable since it seems to reject their objectives for development and growth. Furthermore, without significant economic growth in the developing countries, sustainable development cannot be accomplished²⁰. Economic expansion, social justice, and environmental sustainability are three important factors in supporting sustainable development. Should current economic growth (GNP, employment, etc.) be sacrificed for long-term environmental preservation is a common question. Policymakers in emerging nations frequently believe that environmental sustainability and economic growth must be traded off. However, there is mounting evidence that preserving the environment for the long-term sustainability of natural resources is not a luxury but rather a need, particularly in the least developed nations. In the next 25 to 50 years, climate change is predicted to exacerbate the decrease and degradation of natural resources, such as land, soil, forests, biodiversity, and groundwater, caused by present unsustainable usage practises. Significant land degradation and freshwater scarcity issues already exist in Africa, South Asia, and some portions of Latin America²¹. There are numerous approaches to pursue sustainable development techniques that aid in climate change mitigation. The instances that follow are a few.

- ❖ In addition to lowering greenhouse gas emissions, adopting cost-effective energy-efficient technology in the production, delivery, and use of electricity can lower costs and local pollution.
- ❖ A switch to renewable energy sources, some of which are now affordable, can improve the supply of sustainable energy and lower greenhouse gas emissions as well as local pollution.
- ❖ Adopting measures like forest conservation, reforestation, afforestation, and sustainable forest management can help protect watersheds, preserve biodiversity, provide rural jobs, boost the incomes of forest residents, and improve carbon sinks.
- ❖ Rapid, dependable public transportation options like metro rails help lessen traffic congestion, local pollution, and greenhouse gas emissions.
- ❖ Adopting a participatory approach to forest management, rural energy, irrigation water management, and overall rural development can encourage sustained development activities and guarantee long-term greenhouse gas emission reduction or improvement of carbon sinks.
- ❖ By levelling the playing field for renewable energy sources, promoting the adoption of energy-efficient and renewable energy technologies, and enhancing the financial viability of utility companies, rational energy pricing can ultimately result in a decrease in greenhouse gas emissions.

10. CONCLUSION

Several initiatives are being pursued to measure and report an entity's progress on sustainable development. An example is the Leadership in Energy and Environmental Design (LEED) – a US Green Building Council organization that uses 69-point criteria to award a certificate at platinum, gold and other levels to buildings. Criteria include sustainable sites, water efficiency, energy and atmosphere, materials and resource use, indoor environmental quality, and innovation and design process. As part of this international process, hundreds of buildings have received certification worldwide, including several in India some of which have received the platinum rating. Another example is the Global Reporting Initiative (GRI), which is a multi-stakeholder process and an independent institution whose mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines. These guidelines are for voluntary use by organizations for reporting on the economic, environmental and social dimensions of their activities, products, and services. Started in 1997, GRI is an official collaborating centre of the United Nations Environment Programme (UNEP) and works in cooperation with UN's Global Compact. The motivation for using the above types of reporting criteria is diverse. In a recent evaluation of GRI, 85% of the reports addressed climate change, and 74% of respondents identified economic reasons and another 53% ethical reasons for reporting their company's performance to GRI. India's ITC Limited, for example, has won a platinum LEED rating for its Gurgaon building, and also reports its sustainable development performance to GRI as a carbon positive corporation, i.e. it sequesters more carbon than it emits. Over time, as indicators and measurement tools become available, the pursuit of sustainable development is moving out of academic discourses, and being put into practice increasingly by institutions and private industry. The trend is likely to strengthen globally as nations come to recognize the limits on access to and development of natural resources.

but in India Rain-deficit monsoon and unseasonal rains have disturbed the crop-cycles. Water: Some parts of India are facing shrinking of water supplies, others are facing rising seas. Biodiversity: Climate change, along with habitat loss and fragmentation is a major threat to biodiversity still these issues to be addressed by the scientific and effective environmental policy measures to overcome the challenges of Climate change to lead sustainable development.

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