

CLIMATE CHANGE AND CHALLENGES IN INDIA

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ABSTRACT

The issue of climate change is very important in India because it affects overall development. Therefore, this makes it mandatory to take steps to control the extent of climate change by reducing or at least limiting their carbon emissions to the current levels. India is a minor contributor to the global carbon emissions at around 3-4% of global levels but it still needs to take steps to limit its GHG emissions. The biggest and most important challenges for India in the climate change negotiations will be ensuring equitable burden sharing on the future time path of global GHG emission. Industrial countries have not been favorable to India's idea of controlling carbon emissions based on per capita targets. Though climate change poses a variety of challenges, the present paper would specifically focus on the issues of agriculture and food security, water stress and water insecurity, rising sea levels, biodiversity and human health.

INTRODUCTION

To many environmentalists, climate change seems to be nature's revenge on humanity for economic growth. The idea of adapting to it, rather than struggling to minimize will sound willfully irresponsible. Yet the harsh reality is that plenty of other kinds of environmental damage deserve greater priority (Brown, 211-12). This problem is not one which a single nation or community is facing in isolation. Rather, the issue is global in nature which is a consequence of the fact that the atmosphere is common to the entire mankind. Moreover, the problem needs to be viewed in the context of growth and development in the developing countries and how the presently poor in different parts of the world will be able to break the shackles of deprivation and

have adequate access to health, nutrition, education and other basic services needed for their well-being (Prasad & Kochher, 1). While we are reaping the benefits of the rapid industrial progress and technology we are also witnessing the effect of our economic growth on the environment. Today the most pressing environmental challenge is the climate change (Deshmukh, 32). Developing countries' green house gas (GHG) emissions will most probably exceed those of the developed world within the first half of this century, foregrounding the need for developing countries' concerted efforts to reduce the adverse impact of climate change. Even though developing nations have not been keen to accept binding emissions targets, asking that developed nations take action first, most of them are undertaking efforts that have reduced the growth in their own emissions significantly. In most cases, climate mitigation is not the goal, but rather an outgrowth of efforts driven by economic, security, or local environmental concerns.

The issue with climate change is that its impact is not limited to a certain area or bounded by geographical locations. This makes it mandatory for all the nations-whether major contributors to climate change or not, to take steps to control the extent of climate change by reducing or at least limiting their carbon emissions to the current levels. India is a minor contributor to the global carbon emissions at around 3-4% of global levels but it still needs to take steps to limit its emissions since they are on an upward trend due to the direct relationship between economic growth and GHG emissions.

The problem of climate change had its major emergence in the industrial revolution. All the activities in the industrialization process necessitate an increase in carbon emissions. Thus, the development processes of a country as well as its carbon emissions go hand-in-hand. The monumental problems of climate change faced by the world today are a cause of the rapid industrialization that took place in the last century. Thus, the developed world is the major culprit of this crime which led to the exploitation of our atmosphere. But, the developing countries, which have just recently begun their journey to the destination of development, are made to shoulder the responsibility of mitigating the adverse effects of climate change by reduction in the carbon emissions levels emitted by them. This is a cause of major hindrance in

the development process of a country like India and can be seen as unfair on the part of the developed nations to slow down the pace of development in such nations at such a crucial stage. About a third of India's population lives below the poverty line, earning less than US \$ 1 a day. Generally development must address issues of food, nutrition and energy deficits, but as India struggles to develop its economy, rising industrialization and urbanization will rapidly increase GHG emissions, which trap heat and contribute to global climate change. Although India signed the UN Framework Convention on Climate Change (UNFCCC) in June 1992, it has no binding commitment to reduce GHG emissions because it is a developing country. But India should be concerned about potential climate change for its own sake that it is likely to affect agriculture.

In its 2001 Report, the Intergovernmental Panel on Climate Change (IPCC) predicts global temperatures will rise by 1.4–5.8 degrees Celsius over the next 100 years, including a 2.7–4.3 degrees Celsius increase over India by the 2080s. The panel also predicted an increase in rainfall over the sub-continent by 6–8 per cent and that sea level would rise up to 88 centimeters by 2100. Local climate change will affect the region in various ways. Changing rainfall patterns are likely to affect food security. Extreme events, such as droughts, torrential rain, flash floods, cyclones and forest fires, could become more common. Rising sea levels could threaten coastal mangrove and wet land systems, and increase the flood risk faced by the quarter of India's population that lives on the coast.

MAJOR POLICIES IN INDIA TO MITIGATE CLIMATE CHANGE

India though not bound by legal agreements to cut down its carbon emissions, has taken major steps in reducing its carbon emissions. India signed the UNFCCC on June 10, 1992 and ratified it on November 1, 1993. India hosted the eighth Conference of Parties to the UNFCCC in October 2002 in Delhi. It signed and ratified the Kyoto Protocol, one of the most important international agreements on climate change on August 26th, 2002. Kyoto has failed. Despite so many admonitions from the IPCC, the reality is that emissions of carbon dioxide in the world are going up by over 3% per year. This is the failure of the countries that signed up to Kyoto, and even more so, of those like the US who stayed outside the timid Kyoto framework (Martinez-Alier & Temper, 16). The Global Environmental Facility is funding many projects that India has taken up

with the aim of reducing GHG emissions. These projects are mostly related to small-scale projects which are largely based on renewable energy sources.

Government of India enacted various policies and laws at the national level for mitigating climate change are:

- **The Environment (Protection) Act (EPA), 1986** obligates the central government to protect and improve environmental quality, control and reduce pollution from various sources, and prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds.
- **The Environment (Protection) Rules, 1986** lay down procedures for setting standards of emission or discharge of environmental pollutants.
- **The objective of Hazardous Waste (Management and Handling) Rules, 1989** is to control the generation, collection, import, storage, handling and treatment of hazardous waste.
- **The Manufacture, Storage, and Import of Hazardous Rules, 1989** define the terms used in this regard, and sets up an authority to inspect yearly, the industrial activity connected with hazardous chemicals and its storage facilities.
- **The National Environmental Tribunal Act, 1995** was created to award compensation for damages to persons, property, and the environment arising from any activity involving hazardous substances.
- **The National Environment Appellate Authority Act, 1997** was established to hear appeals with respect to restrictions of areas in which classes of industries etc. are carried out or prescribed subject to certain safeguards under the EPA.
- **The Environment (Siting for Industrial Projects) Rules, 1999** lay down detailed provisions relating to areas to be avoided for siting of industries, precautionary measures to be taken for site selecting as also the aspects of environmental protection which should have been incorporated during the implementation of the industrial development projects.
- **The Municipal Solid Wastes (Management and Handling) Rules, 2000** apply to every municipal authority responsible for the collection, segregation, storage, transportation, processing, and disposal of municipal solid wastes.

- **The Ozone Depleting Substances (Regulation and Control) Rules, 2000** have been laid down for the regulation of production and consumption of ozone depleting substances.
- **The Biological Diversity Act, 2002** is an act to provide for the 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 and knowledge associated with it.
- **The Wildlife Protection Act 1972 and Amendment 1991** provides for the protection of birds and animals and for all matters that are connected to it whether it be their habitat or the waterhole or the forests that sustain them.
- **The Forest (Conservation) Act and Rules, 1981**, provides for the protection of and the conservation of the forests.
- **The River Boards Act, 1956** enables the states to enroll the central government in setting up an Advisory River Board to resolve issues in inter-state cooperation.
- **The Merchant Shipping Act, 1970** aims to deal with waste arising from ships along the coastal areas within a specified radius.
- **The Water (Prevention and Control of Pollution) Act, 1974** establishes an institutional structure for preventing and abating water pollution. It establishes standards for water quality and effluent. Polluting industries must seek permission to discharge waste into effluent bodies. The CPCB (Central Pollution Control Board) was constituted under this act.
- **The Water (Prevention and Control of Pollution) Cess Act, 1977** provides for the levy and collection of cess or fees on water consuming industries and local authorities.
- **The Water (Prevention and Control of Pollution) Cess Rules, 1978** contains the standard definitions and indicate the kind of and location of meters that every consumer of water is required to affix.
- **The Coastal Regulation Zone Notification, 1991** puts regulations on various activities, including construction, are regulated. It gives some protection to the backwaters and estuaries.

- **The Factories Act, 1948 and Amendment in 1987** was the first to express concern for the working environment of the workers. The amendment of 1987 has sharpened its environmental focus and expanded its application to hazardous processes.
- **The Air (Prevention and Control of Pollution) Act, 1981** provides for the control and abatement of air pollution. It entrusts the power of enforcing this act to the CPCB.
- **The Air (Prevention and Control of Pollution) Rules, 1982** defines the procedures of the meetings of the Boards and the powers entrusted to them.
- **The Air (Prevention and Control of Pollution) Amendment Act, 1987** empowers the central and state pollution control boards to meet with grave emergencies of air pollution.

The regulations that India has formalized for the achievement of lower levels of GHG emission have a restraining effect on the development of the country. Climate change is likely to exacerbate the degradation of resources and socio-economic pressures. Thus, countries such as India with a large population dependent on climate-sensitive sectors and low adaptive capacity have to develop and implement adaptation strategies (Sathaye, Shukla & Ravindranath, 319). The power sector is the major contributor to a country's total annual GHG emissions. So, for India, pursuing the goal of climate change mitigation is a conflict of interest in achieving its developmental goals. Thus, the objective of the future should for the time being be the development of this sector since this would shoulder the responsibility of taking India towards higher rates of economic growth. The climate mitigation steps involving high costs can be delayed for some time for the more important goal of development since after India is developed, it would be equipped with the requisite financial and technological base to abate its carbon emissions to a larger and more fruitful extent.

CHALLENGES OF CLIMATE CHANGE

At the international agenda, the biggest and most important challenges for India in the climate change negotiations will be ensuring equitable burden sharing on the future time path of global GHG emission. But the political and intellectual ground is shifting beneath India's feet. Industrial countries have never been sympathetic to India's idea of controlling carbon emissions

based on per capita targets. They prefer targets based on reductions in total emissions by developing countries, comparable or equivalent to those undertaken by them (Subramanian, Birdsall & Mattoo, 43). Though climate change poses a variety of challenges, the present paper would specifically focus on the issues viz. agriculture and food security, water stress and water insecurity, rising sea levels, biodiversity and human health, which have immense relevance from the perspective of developing countries in general and India in particular.

(i) Agriculture and Food Security: India's agriculture has been predicted to suffer more than any other country's as a result of climate impacts. Projected surface warming and shifts in rainfall could decrease crop yields by 30 % by the mid 21st century. There will also be reductions in arable land with resulting pressures on agricultural output ((Kapur, Khosala & Mehta, 35). Climate Change is projected to have significant impacts on conditions affecting agriculture, including temperature, precipitation and glacial run off. It affects agriculture in more ways than one. It can affect crop yield as well as the types of crops that can be grown in certain areas, by impacting agricultural inputs such as water for irrigation, amounts of solar radiation that affect plant growth, as well as the prevalence of pests. Rise in temperatures caused by increasing GHG is likely to affect crops differently from region to region. The Third Assessment Report of the IPCC, 2001 concluded that climate change would hit the poorest countries severely in terms of reducing the agricultural products. The Report claimed that crop yield would be reduced in most tropical and sub-tropical regions due to decreased water availability, and new or changed insect/pest incidence.

One of the foremost impacts is food security. Agriculture is important for food security in two ways: it provides the food and also the primary source of livelihood for 38.7 percent of the world's total workforce. In Asia and the Pacific, this share accounts for approximately 50 percent and in sub-Saharan Africa, nearly two-thirds (63 per cent) of the working population still make their living from agriculture. If agricultural production in the low-income developing countries of Asia and Africa is adversely affected by climate change, the livelihoods of large numbers of the rural poor will be put at risk and their vulnerability to food insecurity will be manifold.

(ii) Water Stress and Water Insecurity: Lack of access to water is a perturbing issue, particularly in developing countries. At present a whopping 1.1 billion people around the world lack access to water and 2.6 billion people are without sanitation. Climate change is expected to exacerbate current stresses on water resources. By 2020, between 75 and 250 million people are projected to be exposed to increased water stress due to climate change. Spreading water scarcity is contributing to food insecurity and heightened competitions for water both within and between countries. As the world population expands and the consumption of water spirals upwards, water problems are bound to intensify. By 2025, 40 per cent of the world's population, more than 3 billion in all, may be living in countries experiencing water stress or chronic water scarcity. Increase in temperature due to climate change has been widespread over the globe. Warming has resulted in decline in mountain glaciers and snow cover in both hemispheres and this is projected to accelerate throughout the 21st century. This will in turn lead to reducing water availability, hydropower potential, and would change the seasonal flow of rivers in regions supplied by melt water from major mountain ranges (e.g. Hindu-Kush, Himalaya, Andes) where more than one-sixth of the world population currently lives.

A warmer climate will accelerate the hydrologic cycle, altering rainfall, magnitude and timing of runoff. Available research suggests a significant future increase in heavy rainfall events in many regions, while in some regions the mean rainfall is projected to decrease. The frequency of severe floods in large river basins has increased during the 20th century and it is likely that up to 20 per cent of the world population will live in areas where river flood potential could increase by the 2080s.

The most serious potential threat arising from climate change in India is water scarcity. The gross per capita water availability is projected to decline from 1820 m³/year (2001) to 1,140 m³/year (2050). The per capita availability of fresh-water is expected to drop from 1,900 m³ (2007) to 1000 m³ (2025). More intense rain and more frequent flash floods during the monsoon would result in a higher proportion of runoff and a reduction in groundwater recharge.

Glacier melt in the Himalayas is projected to increase flooding and affect water resources within the next two to three decades. The implications of melting Himalayan glaciers and sharing of scarcer river-basin water resources will pose a formidable challenge, and lead to acute shortages of water for drinking and arming. If current warming rates are maintained, Himalayan glaciers could decay at extremely rapid rates, shrinking from the present 500000 km³ to 100000 km³, by the 2030s. This will also be reason for concern when considering Himalayan hydropower as a partial solution to India's energy needs, as climate change will sharply reduce the effectiveness of the planned mammoth investments. River flow data is critical when planning hydropower projects. However, historical river flows will no longer be a good measure for future flows not only due to glacier melts, but also due to the changing patterns, duration and intensity of rainfall and the seasonal distribution of river flows((Kapur, Khosala & Mehta, 35).

(iii) Rise in Sea Levels: Nearly 70 % of Earth's surface comprises of water in the form of seas and oceans. Sea level rise under warming is inevitable. Sea level rise is both due to thermal expansion as well as melting of ice sheets. Thermal expansion would continue for many centuries even after GHG concentrations have stabilized causing an eventual sea level rise much larger than projected for the 21st century. If warming in excess of 1.9 to 4.6°C above pre-industrial level be sustained over many centuries then the final rise in sea level due to melting polar ice could be several meters, because it will be in addition to that of rise of sea level due to thermal expansion. The present scenario clearly indicates that the sea level will definitely rise.

Satellite observations available since the early 1990s show that since 1993, sea level has been rising at a rate of around 3 mm per year, significantly higher than the average during the previous half-century. IPCC predicts that sea levels could rise rapidly with accelerated ice sheet disintegration. Global temperature increases of 3–4°C could result in 330 million people being permanently or temporarily displaced through flooding. Warming seas will also fuel more intense tropical storms. With over 344 million people currently exposed to tropical cyclones, more intensive storms could have devastating consequences for a large group of countries. The 1 billion people currently living in urban slums on fragile hillsides or flood-prone river banks face

acute vulnerabilities. People living in the Ganges Delta and lower Manhattan share the flood risks associated with rising sea levels.

(iv) Coastal Areas: The coastal states of Maharashtra, Goa and Gujarat face a grave risk from the sea level rise, which could flood land (including agricultural land) and cause damage to coastal infrastructure and other property. Goa will be the worst hit, losing a large percentage of its total land area, including many of its famous beaches and tourist infrastructure. Mumbai's northern suburbs like Versova beach and other populated areas along tidal mud flats and creeks are also vulnerable to land loss and increased flooding due to sea level rise. Flooding will displace a large number of people from the coasts putting a greater pressure on the civic amenities and rapid urbanization. Sea water percolation due to inundations can diminish freshwater supplies making water scarcer. The states along the coasts like Orissa will experience worse cyclones. Many species living along the coastline are also threatened. The coral reefs that India has in its biosphere reserves are also saline sensitive and thus the rising sea level threatens their existence too, not only the coral reefs but the phytoplankton, the fish stocks and the human lives that are dependent on it are also in grave danger. Coastal ecosystems will be affected by sea-level rise and temperature increases. Heavily populated mega-delta regions, in particular, will be at greatest risk due to increased flooding. The changes in the Godavari, Indus, Mahanadi and Krishna coastal deltas will potentially displace millions of people. Projected sea-level rise could damage aquaculture industries, and exacerbate already declining fish productivity. There will also be higher risks of increased frequency and intensity of coastal surges and cyclones. (Kapur, Khosala & Mehta, 35).

(v) Ecosystems and Bio-diversity: Climate Change has the potential to cause immense biodiversity loss, affecting both individual species and their ecosystems that support economic growth and human well being. It is difficult to predict the overall result of climate changes on animal and plant kingdom. Devastating effects on the native habitats of many animals and plants due to global warming is likely to drive a considerable number of today's known animal and plant species to extinction. Mass extinctions of the Earth's flora and fauna have occurred before

also but those were driven by natural factors. However, the projected extinctions of flora and fauna in the future will be human driven i.e. due to adverse impact of human activities.

According to International World Wildlife Fund (WWF) and National Wildlife Federation in the United States species from the tropics to the poles are at risk. Many species may be unable to move to new areas quickly enough to survive changes that rising temperatures will bring to their historic habitats. WWF asserted that one-fifth of the world's most vulnerable natural areas may be facing a "catastrophic" loss of species. Climate change is expected to exacerbate threats to biodiversity resulting from land use/cover change and population pressure. Along the coastline, marine wetlands, tropical ecosystems and species such as mangroves and coral reefs are threatened by changes in temperature, rising sea levels and increased concentrations of Carbon dioxide, in the atmosphere (Kapur, Khosala & Mehta, 35).

(vi) Health: Increasing temperatures and projected changes in the hydrological cycle will lead to an increase in temperature-related illnesses, vector-borne diseases, health impacts related to extreme weather events (particularly, floods and droughts), and health effects due to food insecurity. Increase in coastal water temperatures would exacerbate the abundance and/or toxicity of cholera (Kapur, Khosala & Mehta, 35). Climate change poses a host of threats to the survival of mankind. Arguably, it has catastrophic effects on human health. Each year, about 800,000 people die from causes attributable to air pollution, 1.8 million from diarrhea resulting from lack of access to clean water supply, sanitation, and poor hygiene, 3.5 million from malnutrition and approximately 60,000 in natural disasters. A warmer and more variable climate would result in higher levels of some air pollutants, increased transmission of diseases through unclean water and through contaminated food.

Climate change is a major factor in the spread of infectious diseases. Diseases, confined to one specific geographic region spread to other areas. The World Health Organization (WHO) in their studies have indicated that due to rising temperatures, malaria cases are now being reported for the first time from countries like Nepal and Bhutan. It has also been predicted that an additional 220-400 million people could be exposed to malaria- a disease that claims around 1 million lives

annually. Dengue fever is already in evidence at higher levels of elevation in Latin America and parts of East Asia. Climate change could further expand the reach of the disease. Studies suggest that climate change may swell the population at risk of malaria in Africa by 90 million by 2030, and the global population at risk of dengue by 2 billion by 2080s. Rising temperatures and changing patterns of rainfall are projected to decrease crop yields in many developing countries, stressing food supplies. This will ultimately translate into wider prevalence of malnutrition/under nutrition. In some African countries, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020. Emission of the Green House Gases (GHG) has been responsible for the depletion of ozone layer, which protects the Earth from the harmful direct rays of the sun. Depletion of stratospheric ozone results in higher exposure to the ultra violet rays of the sun, leading to an increase in the incidents of skin cancer. It could also lead to an increase in the number of people suffering from eye diseases such as cataract. It is also thought to cause suppression of the immune system.

The projections by WHO and IPCC suggest that the negative effects of climate change on health are greater. In addition, the negative effects are concentrated on poor populations that already have compromised health prospects, thus widening the inequality gap between the most and the least privileged. The balance of positive and negative health impacts will vary from one location to another, and will alter over time as temperatures continue to rise.

CONCLUSION

The impact of Climate Change is so far-reaching that no country can now afford to sit on the sidelines. India, with 17 per cent of the world's population, contributes only 4 per cent of the total global GHG emissions against 30% approx. of the US and 25% of the EU countries. In terms of per capita GHG emissions, India is further lower at only 1.1 MT CO₂ (about 23% of the global average) as compared with the per capita emission of 22 MT CO₂ in US and 15 MT CO₂ in EU. Indian government policy on climate change so far has not been motivated by domestic demand, but by external pressure. This is deeply ironic since India is in much greater immediate danger from climate change than are the affluent countries that are pressuring it to act. The government has shown little interest in operationalizing its own National Action Plan on Climate change that was in 2008 (Somanathan & Somanathan, 51). The divergence in the status becomes

starkly obvious when seen against the backdrop of the fact that around 55 per cent of India's population still does not have access to commercial energy. It has been India's stand not to agree to any commitments related to reducing GHG emissions. India stands for equity in global negotiations on climate change. India believes that since developed countries are more responsible for the problem, owing to their historical as well as current emissions, they must deliver on their commitments to stabilize and reduce their emissions of GHGs. In order to meet the demands of rising standards of living and providing access to commercial energy to those lacking it, the total emission of green house gases is bound to increase in India and also in other developing countries. India has been pressing at the UNFCCC and other international conferences for collaborative development of clean technologies and immediate transfer of existing technologies which are environment friendly. India has also been trying to impress upon developed countries to transfer environmentally sound and cleaner energy technologies into the limited public domain for use by developing countries for early adoption, diffusion and deployment accompanied with transfer of financial resources. India had also called for early operationalization of the Adaptation Fund and Special Climate Change Fund under the UNFCCC for addressing Climate Change issues in the developing countries. India is a partner to the new Asia Pacific Partnership on Clean Development and Climate which consists of key developed and developing countries— Australia, China, Japan, South Korea and the USA. It focuses on development, diffusion and transfers of clean and more efficient technologies and is consistent with the principles of the UNFCCC and complements the efforts under the UNFCCC and will not replace the Kyoto Protocol. To cope with these challenges, India will have to devise its strategies carefully. On the one hand, it will have to resist the international pressure on it to take binding objections with regard to CO₂ emissions as this will seriously affect the prospects of economic growth. On the other, it will have to undertake suitable adaptive measures to ensure that its economic growth is based on sound principle of energy efficiency resource conservation. As India is being labeled as a significant emitter, it will also have to craft its negotiating position carefully to safeguard its national interests without being isolated.

The Government of India has taken many measures to improve the situation regarding Climate Change. The Ministry of Environment and Forests is the nodal agency for climate change issues

in India. India has initiated several Climate-friendly measures, particularly in the area of renewable energy. India had adopted the National Environment Policy 2006 which provides for several measures and policy initiatives, to create awareness about climate change and help capacity building for taking adaptation measures. A revamp of the Indian environmental governance system has been under consideration for many years. Now, Civil society groups have been raising demands with regard to various aspects of the system-from increased transparency and public participation in environmental decision-making to better quality and credible environment impact assessment and appraisals to effective monitoring of post-clearance conditions (Ghosh, 13). The National Forest Policy also envisages active measures for expanding carbon sinks through increase in forest and tree cover to 25% by 2007 and 33% by 2012. A major forestation program covering 6mn hectares has been launched under the XIth Plan for this purpose. On 30th June 2008 India unveiled its National Action Plan on Climate Change (NAPCC) with a view to lay down the priorities and future actions of the Government for addressing climate change and updating India's national program relevant to addressing climate change. The National Action Plan identifies measures that promote our development objectives while also yielding co-benefits for addressing climate change effectively. Eighth national missions (solar mission, energy efficiency, sustainable habitat, water, Himalayan ecosystem, green India, Eco-green agriculture and knowledge) have been specifically outlined to simultaneously advance India's development and climate change related objectives of adaptation and GHG mitigation. However, we have not set any quantitative goals towards emission reduction. A Council has also been set up under the Chairmanship of the Prime Minister of India on 6 June 2007 constituting eminent persons to evolve a coordinated response to issues relating to climate change at the National level and provide oversight for formulation of action plans in the area of assessment. Besides, the Indian Government has initiated "Green India" program which envisages undertaking massive forestation of degraded forests land in the country. The "Green India" program will cover about six million hectare in the country in about 10 years. The Rio Declaration of the UNFCCC emphasizes that human beings are at the centre of concerns for sustainable development and are entitled to a healthy and productive life in harmony with nature. This principle affirms that considerations of human well-being should guide policymaking for sustainable development and that conservation of natural entities must be reckoned as part of

such well-being (Ghosh, 44). India, being a fast growing economy has many obligations towards its own citizens to provide them with better standards of living which can only be obtained through a massive expansion of the economy.

Climate change is the defining issue of our times. It is perhaps, the greatest challenge to sustainable development. It should be addressed by all countries with a shared perspective, free from narrow and myopic considerations. The developed countries need to look beyond their narrow self interests and work jointly with the developing countries to evolve cooperative and collaborative strategies on the issue of climate change, which is of immense relevance for the future of mankind. However, the efforts so far in the direction of meeting the challenges of climate change have been sporadic and incoherent. We urgently need a new economic paradigm, which is global, inclusive, cooperative, environmentally sensitive and above all scientific. Sustainable development based on addressing the needs of the poor and optimal harnessing of scarce resources of water, air, energy, land, and biodiversity will have to be sustained through more cooperative endeavors. Then alone, we could make some headway in saving our lone planet from the brink of climate disasters.

Though India understands the gravity of the situation, the mitigation of climate change at the cost of its development seems like an unfair bargain. The major emitters of the previous century which increased their carbon emissions incessantly to pursue the path of rapid development cannot expect developing countries to forget their own development to clean up the developed countries' mess. Climate change or no climate change, pockets of India face frequent droughts while monsoon floods ravage others. National programs to improve watershed and ground water management may qualify as adaptation strategies, but they have not been put in place with adaptation in mind. Small efforts are underway. Some non-governmental organizations have already begun assessing the risks of climate change to local communities. The Energy Resources Institute (TERI) in Delhi has studied climate-sensitive regions of India to assess the dual impacts of climate change and globalization.

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