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Climate Change and Sustainable Development

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Abstract: *Climate change is the most significant challenge to achieving sustainable development, and it threatens to drag millions of people into grinding poverty. At the same time, we have never had better know-how and solutions available to avert the crisis and create opportunities for a better life for people all over the world. Climate change is not just a long-term issue. It is happening today, and it entails uncertainties for policy makers trying to shape the future. Climate change is one of the most important global environmental challenges, with implications for food production, water supply, health, energy, etc. Addressing climate change requires a good scientific understanding as well as coordinated action at national and global level. This paper addresses these challenges. Historically, the responsibility for greenhouse gas emissions' increase lies largely with the industrialized world, though the developing countries are likely to be the source of an increasing proportion of future emissions. The projected climate change under various scenarios is likely to have implications on food production, water supply, coastal settlements, forest ecosystems, health, energy security, etc. The adaptive capacity of communities likely to be impacted by climate change is low in developing countries. The links between climate issues and sustainable development are manifold. Given these interconnections, the lack of close integration of the sustainable development and climate change literatures is puzzling; part of the reason for this lack of connectivity may be the very different research and policy traditions out of which each field developed. This paper argues that integrating climate change and sustainable development approaches, concepts and methods may have some important benefits. To demonstrate this point, we briefly discuss recent developments in both the climate change and sustainable development fields. The most effective way to address climate change is to adopt a sustainable development pathway by shifting to environmentally sustainable technologies and promotion of energy efficiency, renewable energy, forest conservation, reforestation, water conservation, etc.*

Keywords: *Climate change, Environment sustainability, industrialization, efficiency.*

Introduction

Climate change is one of the most important global environmental challenges facing humanity with implications for food production, natural ecosystems, freshwater supply, health, etc. According to the latest scientific assessment, the earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era. Further evidence shows that most of the warming (of 0.1°C per decade) observed over the last 50 years, is attributable to human activities. The change is expected to have severe impacts on the global hydrological system, ecosystems, sea level, crop production and related processes. The impact would be particularly severe in the tropical areas, which mainly consist of developing

countries, including India. The climate change issue is part of the larger challenge of sustainable development. As a result, climate policies can be more effective when consistently embedded within broader strategies designed to make national and regional development paths more sustainable. The impact of climate variability and change, climate policy responses, and associated socio-economic development will affect the ability of countries to achieve sustainable development goals. The pursuit of these goals will in turn affect the opportunities for, and success of, climate policies. In particular, the socio-economic and technological characteristics of different development paths will strongly affect emissions, the rate and magnitude of climate change, climate change impacts, the capability to adapt, and the capacity to mitigate. The participation of all countries, including the developing countries such as India, is essential for a successful worldwide effort to arrest the growth of greenhouse gas emissions.

India, the fifth largest emitter of greenhouse gases from fossil fuel in the 1990s, has suggested that the 'right' to pollute the atmosphere be apportioned to all countries on the basis of their population. Using this gauge, China and India, the only countries with populations in excess of a billion each, could legitimately emit greenhouse gases to a greater extent, than other countries with lesser population, for some decades. But, as their greenhouse gas emissions today are less than this proposed allocation, they could 'sell' some of the 'rights' to the industrialized countries. Countries usually propose burden-sharing formulae that favour their economies, and other countries have suggested schemes based on inherited and future emissions, a country's contribution to temperature change, GDP, and land area and other resource endowments. In the global climate change debate, the issue of largest importance to developing countries is reducing the vulnerability of their natural and socio-economic systems to projected climate change. Their concerns include increasing food security, reducing freshwater scarcity, protecting the livelihoods of forest dwellers, dry land farmers and coastal settlements and reducing health risks. Though there is a visible shift in the global discussions towards adaptation at the Climate Convention related meetings, the focus continues to be on mitigation of greenhouse gas emissions. Adaptation can complement mitigation as a cost-effective strategy to reduce climate change risks. The impact of climate change is projected to have different effects within and between countries. Developing countries have to carefully evaluate the need for, and the roles of global and national institutions in promoting both mitigation and adaptation programmes.

Impacts of climate change:

Developing countries are faced with immediate concerns that relate to forest and land degradation, freshwater shortage, food security and air and water pollution. Climate change will exacerbate the impacts of deforestation and other economic pressures, leading to further water shortages, land degradation and desertification. Increasing global temperatures will result in rising sea levels. Populations that inhabit small islands and/or low-lying coastal areas are at particular risk of severe social and economic disruptions from sea-level rise and storm surges that could destroy cities and disrupt large coastal livelihoods. The

widespread retreat of glaciers and icecaps in the 21st century will also lead to higher surface temperatures on land and increasing water stress. Estimates of the effects of climate change on crop yields are predominantly negative for the tropics, even when adaptation and direct effects of CO2 on plant processes are taken into consideration. Ecological productivity and biodiversity will be altered by climate change and sea-level rise, with an increased risk of extinction of some vulnerable species. Even though the ability to project regional differences in impact is still emerging, the consequences of climate change are projected to be more drastic in the tropical regions. This is true for all sectors that are likely to bear the brunt of climate change – sea level, water resources, eco-systems, crop production, fisheries, and human health. The populations of the developing world are more vulnerable as their infrastructure is not strong and extensive enough to withstand a deleterious impact.

In the global climate change debate, the issue of largest importance to developing countries is reducing the vulnerability of their natural and socio-economic systems to projected climate change. Over time, there has been a visible shift in the global climate change discussions towards adaptation. Adaptation can complement mitigation as a cost-effective strategy to reduce climate change risks. The impact of climate change is projected to have different effects within and between countries.

One approach to balancing the attention on adaptation and mitigation strategies is to compare the costs and benefits of both the strategies. If adaptation of climate change could be carried out at negligible cost then it may be less expensive, at least in the short-term, than any alternate strategy. Of course, there are complications in establishing the benefits of adaptation policies and consequent avoided damages. In recent years, the development planning in India has increasingly incorporated measurable goals for enhancement of human wellbeing, beyond mere expansion of production of goods and services and the consequent growth of per capita income. India's carbon emissions per person are twentieth of those of the US and a tenth of most Western Europe and Japan.

The endogenous responses generated to achieve the 'development goals' are the key factors shaping the economic growth, endogenous technological change and consumption preferences that drive the energy and emissions trends. The goal of providing universal access to electricity, for instance, from the present fifty-five per cent coverage, has vital implications for development and greenhouse gas emissions. The policies to achieve 'development goals' could deliver double dividends for economies that are below the production frontier. In India's case the recent history and the trends show that the economic reforms are enlarging choices that are delivering double dividends, as is evident from the declining trend of energy, electricity and carbon intensities of the Indian economy.

India has potential to supply substantial mitigation at a relatively low price. Major opportunities exist both on the supply and demand side of energy, in case of carbon emissions. There are also low cost opportunities for mitigation of methane and nitrous oxide. Adaptation is a private or local public good, whereas mitigation is a global public good. The individuals or communities bear the risk wherever there is undersupply of adaptation

measures. Adaptation costs are the insurance payments and the costs of not addressing adaptation are the dam-ages from unmitigated climate risks. India is a large developing country with diverse climatic zones. The livelihood of vast population depends on climate-sensitive economic sectors like agriculture, forestry and fisheries. The climate change vulnerability and impact studies in India assume high degree of uncertainty in the assessment. The costs of not addressing climate change or to adapt to it are very uncertain, but their welfare consequences are enormous. Early actions on adaptation therefore are prudent and consistent from the viewpoint of 'precautionary principle'. The future regime architecture can reduce the climate burden by giving greater emphasis to adaptation.

Sustainable development has become an integrating concept embracing economic, social and environmental issues. Sustainable development does not preclude the use of exhaustible natural resources but requires that any use be appropriately offset. This concept is not acceptable to many developing countries since it seems to disregard their aspirations for growth and development. Further, sustainable development can-not be achieved without significant economic growth in the developing countries. Three critical components in promoting sustainable development are economic growth, social equity and environmental sustainability. The question often asked is, should the current economic growth (GNP, employment, etc.) be sacrificed for long-term environmental conservation? Policy makers in developing countries often perceive a trade-off between economic growth and environmental sustainability. However, there is a growing evidence to show that environmental conservation for sustainability of natural resources is not a luxury but a necessity when considering long-term economic growth and development, particularly in the least developed countries. The decline and degradation of natural resources such as land, soil, forests, biodiversity and groundwater, resulting from current unsustainable use patterns are likely to be aggravated due to climate change in the next 25 to 50 years. Africa, South Asia and some regions of Latin America are already experiencing severe land degradation and freshwater scarcity problems. There are many ways to pursue sustainable development strategies that contribute to mitigation of climate change. A few examples are presented below. • Adoption of cost-effective energy-efficient technologies in electricity generation, transmission distribution, and end-use can reduce costs and local pollution in addition to reduction of greenhouse gas emissions. • Shift to renewables, some of which are already cost-effective, can enhance sustainable energy supply, can reduce local pollution and greenhouse gas emissions. • Adoption of forest conservation, reforestation, afforestation and sustainable forest management practices can contribute to conservation of biodiversity, watershed protection, rural employment generation, increased incomes to forest dwellers and carbon sink enhancement. • Efficient, fast and reliable public transport systems such as metro-railways can reduce urban congestion, local pollution and greenhouse gas emissions. • Adoption of participatory approach to forest management, rural energy, irrigation water management and rural development in general can promote

sustained development activities and ensure long-term green-house gas emission reduction or carbon sink enhancement. • Rational energy pricing based on long-run-marginal-cost principle can level the playing field for renewables, increase the spread of energy efficient and renewable energy technologies, and the economic viability of utility companies, ultimately leading to greenhouse gas emission reduction.

The ability to adapt to climate change is intertwined with sustainable development and poverty reduction in both a positive and negative sense. In the positive sense, enhancement of adaptive capacity entails a variety of similar actions to sustainable development and poverty reduction (e.g. improved access to resources and improved infra-structure). On the negative side, sustainable development and poverty reduction can be hampered by the impacts of climate change. Further, some sustainable development activities could make countries more susceptible to climate change. Some climate policy-makers and development policymakers have supported the need to 'mainstream adaptation' – where adaptation responses are considered and integrated into sustainable development and poverty reduction processes. While in general, most agree that this is an important aspect of adaptation response, its implications for on-the-ground actions need to be addressed.

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