

Vulnerability and Adaptation in Developing Countries

November 2005

International Institute for Sustainable Development

Understanding Adaptation to Climate Change in Developing Countries

There is growing consensus in the climate science and policy communities that even if all emissions were to cease today, global warming and sea level rise will continue for centuries to come. This situation emerges from the inertia of the global climate system; some greenhouse gases have long residence times in the Earth's atmosphere (100 years for carbon dioxide; 120 years for nitrous oxide) and oceans respond slowly to warming. The inertia of the climate system means that the rise in global temperatures taking place now is only a partially response to the accumulation of greenhouse gases in the Earth's atmosphere over the past 100 years.

In its Third Assessment Report (2001), the Intergovernmental Panel on Climate Change predicted that developing countries, and primarily the poor, will be the most adversely affected by climate change. The poor are more dependent on climate-sensitive economic activities (such as subsistence agriculture) and local ecological resources. They also typically have more limited financial, institutional and human capacity.

Even a modest increase in global temperatures could have a large impact on people in developing countries. Perhaps 100 million people worldwide are at risk of experiencing direct climate impacts like sea-level rise. Several *billion* people are at risk of experiencing indirect climate change impacts such as water scarcity caused by less precipitation. Reduced water availability in turn will impact that ability of people to grow food for their own consumption and to sell as a source of income.

Some of the regional impacts of climate change are predicted to be:

Region	Likely Regional Impacts of Climate Change
Africa	<ul style="list-style-type: none">• Increase in droughts, floods and other extreme events would add to stress on water resources, food security, human health and infrastructure, constraining development.• Grain yields are predicted to decrease, diminishing food security, particularly in small, food-importing countries.
Asia	<ul style="list-style-type: none">• Extreme events have increased in temperate Asia, including floods, droughts, forest fires and tropical cyclones.• Sea level rise and an increase in intensity of tropical cyclones would displace tens of millions of people in low-lying coastal areas of temperate and tropical Asia.
Latin America	<ul style="list-style-type: none">• Loss and retreat of glaciers would adversely impact runoff and water supply in the areas where snowmelt is an important water resource.• Increases in the intensity of tropical cyclones would change the risks to life, property and ecosystems from heavy rain, flooding, storm surges and wind damages.

Region	Likely Regional Impacts of Climate Change
Small Island States	<ul style="list-style-type: none"> The projected sea level rise would cause enhanced soil erosion, loss of land, poverty, dislocation of people, increased risk from storm surges, reduced resilience of coastal ecosystems, saltwater intrusion into freshwater resources, and high resource costs to respond to and adapt to changes. Coral reefs would be negatively affected by bleaching and by reduced calcification rates due to higher carbon dioxide levels.

From: African Development Bank *et al. Poverty and Climate Change: Reducing the vulnerability of the poor through adaptation*. 2002. Adapted from IPCC 2001.

Climate Change and Achievement of the Millennium Development Goals

Climate change will likely affect the ability of developing countries to obtain their poverty reduction and sustainable development objectives as captured in the Millennium Development Goals (MDGs). Climate change could affect the achievement of these goals as follows:

- *MDG 1: Eradicate poverty and hunger* – Climatic changes are predicted to reduce the livelihood assets of poor people, alter the path and rate of national economic growth, and undermine regional food security due to changes in natural systems and infrastructure impacts. These changes would increase the number of people at risk of experiencing extreme poverty and hunger.
- *MDG 2: Achieve universal primary education* – Climate change could lead to a reduction in the ability of children to participate in full-time education by causing destruction of infrastructure (such as schools), loss of livelihood assets (increasing the need for children to engage in income-earning activities) and the displacement and migration of families.
- *MDG 3: Promote gender equity and empower women* – Depletion of natural resources and agricultural productivity could place additional burdens on women's health and limit time to participate in decision-making and income-generation activities. Female-headed households, particularly those with few assets, are traditionally more heavily affected by climate-related disasters.
- *MDGs 4, 5 and 6: Reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases* – Increased illness and death are expected to occur as a result of climate change-induced extreme weather events, greater prevalence of some vector-borne and water-borne diseases, heat-related mortality, declining food security and decreased availability of potable water. All of these factors could lead to increased child mortality, reduced maternal health, and undermine the nutritional health needed by individuals to combat HIV/AIDs.
- *MDG 7: Ensure environmental sustainability* – Climate change will have a direct impact on environmental sustainability as it causes fundamental alterations in ecosystem relationships, likely reducing the quality and quantity of natural resources and ecosystems.

Vulnerability and Adaptation: Understanding the Linkages

The vulnerability of communities, regions and countries to climate change is determined by a combination of their exposure to the impacts of climate change and by their *adaptive capacity*—their capacity to effectively prepare for and respond to changes such as those that will occur as a result of climate change. In trying to understand how communities and countries may adapt to the long-term impacts of climate change, researchers and policy-makers are increasingly looking at their adaptive capacity. This focus has emerged from the fact that while there is general agreement on the expected impacts of climate change at the global and continental level, uncertainty remains regarding the specific effects it may have on a regional or local scale. As we currently cannot predict exactly how a community will be impacted by climate change, emphasis is put on increasing the capacity a community has to respond to a range of possible impacts.

The adaptive capacity of poor communities in developing countries is typically low as local people lack the income; access to basic social services and natural resources; and empowerment needed to rebuild their lives in response to (for example) the loss of food crops due to an increase in the number of drought years. Increasing the adaptive capacity of these communities requires ensuring access to resources; income generation activities; greater equity between genders and social groups, and an increase in the capacity of the poor to participate in local politics and actions. In other words, increasing adaptive capacity requires promoting many activities associated with sustainable development. As stated by the IPCC (2001), climate adaptation, sustainable development and improved equity can all be mutually reinforcing if policies are advanced that lessen resource pressure, improve environmental risk management and increase welfare for the poorest members of society.

Adaptation, Mitigation and Sustainable Development

It is possible to promote poverty eradication in developing countries while at the same time reducing current or future greenhouse gas emissions. Some of the ways in which the potential synergies between sustainable development, climate change mitigation and climate change adaptation can be achieved include:

- *Promoting ecosystem practices such as reforestation and grassland management.* These practices can improve watershed function through reduced runoff and increased deep percolation, thereby increasing the land's resilience to key climate stresses such as floods and droughts. These practices also enhance the formation of carbon sinks and can contribute to efforts to combat desertification and maintain biodiversity.
- *Expanding the use of renewable energy sources.* These technologies not only reduce greenhouse gas emissions, the energy provided through wind, solar, bioenergy and micro-hydro systems can (for example) reduce the need to collect fuelwood from natural forests. Not only would this change result in greater protection of forests, women and children could benefit from no longer having to spend hours each day travelling to collect wood for cooking and heating. Renewable energy can also free up money currently being used by national governments to purchase imported oil, making it available to spend on other activities, such as education and health care.
- *Switching to less polluting fossil fuels.* Along with encouraging greater fuel efficiency, switching from the use of coal to natural gas in energy production will reduce emissions not just of greenhouse gases but also pollutants such as nitrous oxide and sulphur dioxide. Fuel switching helps reduce urban air pollution, which in turn contributes to the health and well-being of millions of people.

Summary

The process of climate change has already been initiated; it is a process that will affect the economic and social development of all people for decades, and likely centuries to come. Although stimulated largely by emissions produced by the developed world, the poorest members of the global community, the ones least able to adapt to its impacts, will be most strongly affected. Addressing climate change requires a recommitment to the implementation of practices consistent with sustainable development, in a manner fully cognizant of the fact that the climate of today will no longer be the same as the climate of the future.