



Climate Change and Poverty: An Integrated Strategy for Adaptation

Louise Cord, Catherine Hull, Christel Hennet, and Gregory Van der Vink

Developing countries are most exposed to the impact of climate change and within these countries, the poor face the brunt of the burden. Climate change is not a discrete problem that can be dealt with through isolated reforms: impacting economic growth, health, and institutional capacity, it represents a full-frontal challenge to development. This note traces the multi-dimensional impacts of climate change, particularly on the poor, and proposes a three pronged integrated response to promote adaptation and help poor households cope with related risks.

Climate change and poverty— the transmission channels

Climate change is expected to have a growing direct impact on the environment, leading to natural resource degradation, elevated levels of disease and loss of habitats, among others. These direct impacts are likely to have further complex effects at the household and aggregate or national levels, leading to increases in both income and non-income poverty and the possibility of permanent poverty traps. Figure 1 provides a simplified schematic of the impact of climate change on poverty, from its direct effects on the environment to its indirect impacts on households, the economy and society.

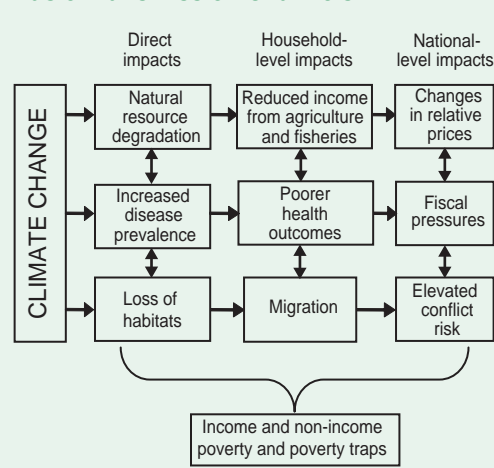
storms could also affect landlocked countries such as Mongolia and Moldova.

Such changes in climate will have an impact on agricultural productivity. Yields from rain-fed agriculture in parts of Africa could be reduced by up to 50 percent as early as 2020; and by 2060, drought affected areas in Sub-Saharan Africa could expand by 60–90 million hectares. Salinization from rising sea levels could render key agricultural areas of Vietnam and the Nile Delta infertile. However, longer, more favorable growing seasons could lead to significant expansions of agriculture in North America (40 percent) and the Russian Federation (64 percent).

From Direct to Household Level Impacts

The direct effects of climate change will vary by region, but will be particularly severe in the tropics. Current projections of climate change at the regional level suggest that droughts are likely to become a more severe problem in Sub-Saharan Africa in particular, while floods and sea-level rise will have a greater impact in South and South-East Asia, especially in low lying regions in Bangladesh and Vietnam. Increases in the frequency and severity of storms will have their greatest effects in the hurricane belt of the Pacific and Indian Oceans, although winter

**Figure 1: Climate Change and Poverty—
Basic Transmission Channels**



While climate change is likely to bring some localized health benefits, such as decreased winter deaths in temperate zones, its impact on public health is expected to be preponderantly negative. IPCC scenarios suggest that rising temperatures could lead to significant increases in malaria in Brazil, Southern Africa, and the Horn of Africa. Flooding is also associated with higher risks for typhoid and other water borne diseases. In Ethiopia and Kenya, children are respectively 36 and 50 percent more likely to be malnourished if they are born during a drought. This suggests that further climate change will lead to significant increases in malnourishment in some of the world's most drought-prone countries.

The poor are most exposed to the risks of climate change.

Poor households are more likely to reside in areas exposed to flooding and drought and rely on income from rain-fed agriculture and natural resources. Between 60 and 70 percent of the world's poor currently reside in rural areas and directly or indirectly derive a significant share of their income from agriculture. Across 54 countries, environmental income contributes almost twice as much to the income of the poor than the non-poor (32 and 17 percent, respectively).

Climate change increases the risk of permanent poverty traps. The poor are often forced to sell their only productive assets for survival during emergencies. They may resort to low-risk, low-return activities (such as subsistence agriculture using low-yield varieties) in the face of increasingly frequent extreme weather events.

Climate change is also expected to have a disproportionate impact on the health of the poor. The poor tend to have more preexisting conditions, less immunization, and limited access to health care. When disaster strikes they resort to temporary shelters, where the risks of disease transmission are elevated.

Both the gradual effects of climate change and extreme weather events are likely to prompt migration and displacement. Although such estimates are difficult to substantiate, one study foresees 150–200 million “environmental refugees” by the middle of this century. With limited social networks, job skills, and capital assets, migration will be more difficult for the poor.

From Household to Aggregate Impacts

Changes in relative prices and trade opportunities will hurt the poor.

Climate change will lead to short-run variability in the relative price of basic commodities as well as long-run hikes in real prices. The increased frequency of severe weather events is leading to more variable food prices. Over the medium to long run, small temperature increases associated with climate change could push food prices down (due to a positive impact on agricultural output in mid to high latitudes), but larger increases of 3°C possible for the later half of this century are likely to prompt prices to rise.

As the recent food price crisis shows, rising food prices have strong poverty effects, given the high share (50–60 percent) of income spent by the poor on food. Higher food prices may also heighten inequality, as larger farmers are better equipped to withstand weather shocks and take advantage of higher prices than small producers and the urban poor. Climate change is expected to increase the reliance of developing countries on international grain trade by 10 to 40 percent according to some estimates.

Rising and variable energy and water prices also affect real incomes and disease incidence among poor households, as well as their ability to sustain agricultural production and diversify into nonagricultural activities.

Many climate change shocks are likely to be location specific. The ability of national markets to diffuse shocks will depend upon the presence of efficient factor and product markets. Given the high transactions costs and thin markets in rural areas, particularly in much of Africa, location and sector specific shocks can be expected to hit poor rural households the hardest.

Fiscal pressures resulting from climate change will limit the resources available to help the poor.

The fiscal effects of climate change could place significant strains on national and local budgets, threatening macroeconomic stability and undermining governments' ability to undertake expenditures to help the poor cope with climate-related risk.

Both climate-induced disasters and gradual change can have major fiscal impacts. Disasters lead to production losses, damage to infrastructure and health crises. For instance, Malawi's

budget deficit increased by 23 percent over three years during droughts in the early 1990s, as expenditures grew rapidly and revenues shrank. In the case of gradual climate change, elevated disease levels can place increased demands on health systems and reductions in food supplies can prompt governments to shift expenditure from growth-oriented investments to expensive subsidy programs.

Lower growth rates from climate change could also reduce fiscal revenues. The Stern Review, for example, projects potential losses of 1–2 percent of GDP in 2050 rising to 2–8 percent of GDP by 2100, with losses in developing countries higher still.

Climate change will heighten the risk of conflict, leaving the poor particularly exposed to the devastating impact of violence.

Conflict theory identifies resource scarcity, decreasing livelihood opportunities, and refugee crises to be among the principal causes of conflict. Climate change has the potential to create a potent combination of all three of these effects. The poor – who tend to be marginalized in political debates and are subject to insecure ownership of land and other assets – often bear the brunt of losses during conflict.

Since conflict is the product of a complex web of factors, climate change alone is unlikely to be the sole cause of violence. But where climate change coincides with preexisting tensions, the risk and severity of conflict is elevated. West Africa and the Nile Basin have been identified as at risk of future conflict due to climate-induced water scarcity, compounded by high levels of water interdependence between neighboring states and rising populations.

Adaptation: Increasing the Resilience of the Poor to Climate Change

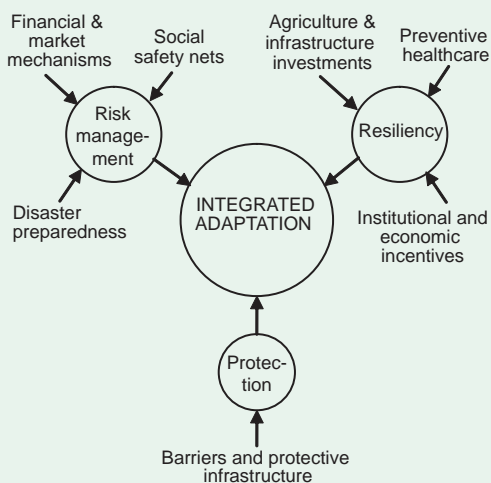
Strategies for adaptation will need an integrated multi-sectoral approach that increases countries’ resilience to the effects of climate change and pays particular attention to vulnerable groups whose adaptation capacities are constrained. An integrated strategy to reduce vulnerability and adapt to climate change could have three complementary lines of action (Figure 2).

The “protection” component of adaptation strategies focuses on infrastructure investments (such as dikes and levees) to protect assets from the natural environment and the direct effects of climate change, particularly flooding and rising sea levels. It is a common strategy used by developed countries.

The “resiliency” component aims to boost the tolerance of households and the economy to the evolving natural environment. Among other activities, it involves investments in drought resistant agriculture (including irrigation), preventive healthcare, stronger building codes, and climate-resilient public and private infrastructure. Houses on stilts in the floodplains of Thailand and floating primary schools in Bangladesh are among some of the efforts to enhance the resiliency of communities to the effects of climate. At an institutional level, resiliency consists of improved frameworks for managing natural resources and economic incentives to shift out of climate sensitive activities.

The final component strengthens “risk management” to help households, particularly the poor, cope with climate change. This emphasizes investments in safety net programs, disaster preparedness and monitoring plans, as well as financial and market risk management mechanisms, such as microfinance, forward markets, warehouse systems and insurance. One example of such an activity is the weather

Figure 2: The Basic Elements of an Integrated Adaptation Strategy



indexed insurance scheme offered by the World Bank to small-scale farmers in Malawi.

Each of these three components cuts across sectors and involves actions at both the local and national level. Each can be undertaken through a blend of public and private actions. Since many activities will yield significant positive externalities, the public sector will have an important role in boosting the incentives for private actors to engage in adaptation.

Effective adaptation strategies should be targeted to the poor and integrated into national poverty reduction strategies, especially given their multi-sectoral nature. When designing these strategies, particular attention should be paid to releasing the binding constraints to adaptation. In a survey of adaptation capacity across African countries, farmers consistently cited poverty and the absence of credit as critical constraints, while successful adjustment to a changing climate was positively associated with education. These findings underline the cross-sectoral nature of the interventions which may be necessary to enable the poor to effectively adapt to climate change.

The correct blend of options will of course be context specific, weighing benefits against costs over the immediate to long term. In some cases, protection and risk management options with short-term benefits may entail an elevation of risk in the longer term. For instance, while protective infrastructure may appear to be an attractive short-term solution, it could promote high-risk land use and even contribute to large-scale disasters, as vividly demonstrated in 2005 in New Orleans. On the other hand, activities that boost resilience of households and firms tend to carry little moral hazard risk, making them a particularly promising line of action.

While a strong multi-sectoral approach that focuses heavily on the poor is vital for reducing countries' vulnerability to changes in the natural environment, overall economic development underpinned by good macro policies, equitable structural and sectoral programs,

and good governance offers the best strategy for continued poverty reduction in the face of climate change. Mobilizing the resources and implementing the three pronged strategy for adaptation outlined above will place a significant strain on national, regional and local governments. Strengthening government capacity at all levels, including implementing stronger accountability mechanisms, will be essential to help governments design and implement an effective response to climate change.

This brief draws from L. Cord, C. Hennem, and G. van der Vink (2008), "Climate Change and Poverty—Towards an Integrated Policy Framework for Adaptation," PREM Economics of Climate Change Discussion Papers. The necessary references can be found here.

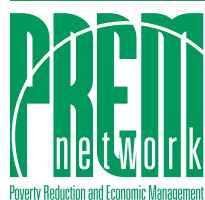
About the authors

Louise Cord is the sector manager with the Poverty Reduction Department, PREM Network. Catherine Hull is a consultant with the Poverty Reduction Department, PREM Network. Christel Hennem is with Terrametris, LLC. Gregory Van der Vink is at Princeton University and Terrametris, LLC.

About the note series

The PREM notes on the Economics of Climate Change are part of the effort conducted by the Poverty Reduction and Economic Management Vice Presidency of the World Bank to raise awareness on poverty, distributional, financial, fiscal, and trade related issues that tend to be underestimated in the more scientific and political debates surrounding Climate Change. The notes do not necessarily reflect the view of the World Bank, its board or its member countries. However, they do reflect the content of some of the internal debates among economists interacting traditionally on emerging or overlooked economic consequences of environmental policies.

For questions, please contact Milan Brahmabhatt at [mbrahmbhatt@worldbank.org](mailto:mbrahmabhatt@worldbank.org).



This note series is intended to summarize good practices and key policy findings on PREM-related topics. The views expressed in the notes are those of the authors and do not necessarily reflect those of the World Bank. PREMnotes are widely distributed to Bank staff and are also available on the PREM Web site (<http://www.worldbank.org/prem>). If you are interested in writing a PREMnote, e-mail your idea to [Madjiguene Seck](mailto:Madjiguene.Seck@worldbank.org) at mseck@worldbank.org. For additional copies of this PREMnote please contact the PREM Advisory Service at x87736. PREMnotes are edited and laid out by Grammarians, Inc.