



Economic Premise

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Social Implications of Climate Change in Latin America and the Caribbean

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Climate change is the defining development challenge of our time. More than a global environmental issue, climate change is also a threat to poverty reduction and economic growth and may unravel many of the development gains made in recent decades. Latin America and the Caribbean account for a relatively modest 12 percent of the world's greenhouse gas (GHG) emissions,¹ but communities across the region are already suffering adverse consequences from climate change and variability (De la Torre, Fajnzylber, and Nash 2009). As highlighted in "Reducing Poverty, Protecting Livelihoods, and Building Assets in a Changing Climate" (Verner 2010), climate change is likely to have unprecedented social, economic, environmental, and political repercussions.

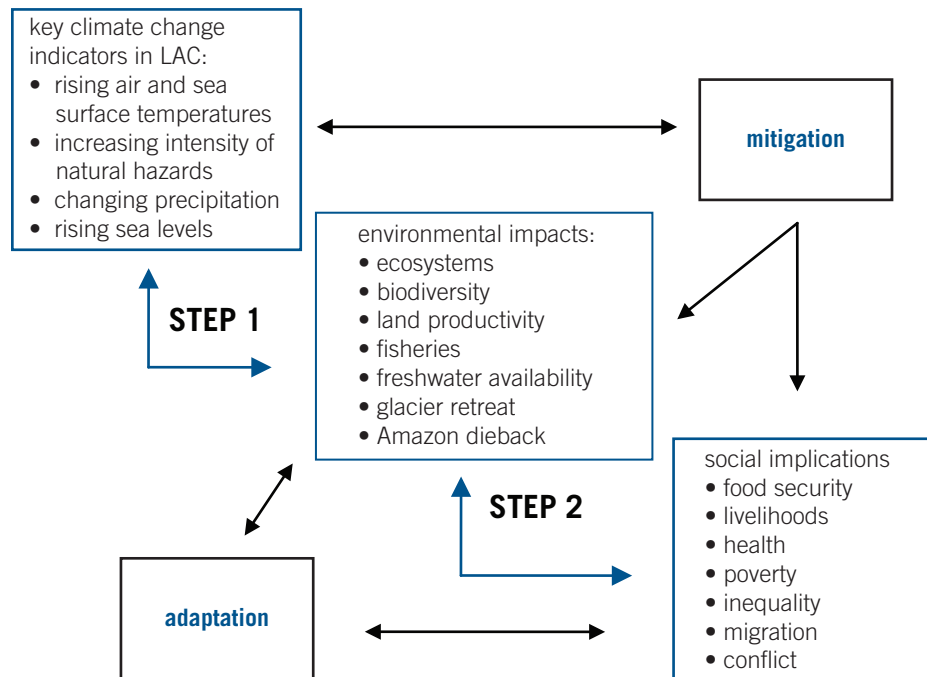
Assumptions and Analytical Framework for Assessing the Social Implications of Climate Change

Climate change compounds existing vulnerabilities by eroding livelihood assets. For the poor in particular, the detrimental effects of climate change on the environment erode a broad set of livelihood assets—natural, physical, financial, human, social, and cultural. The resilience of the poor to disaster is already low. Many depend directly on fragile natural resources for their livelihoods and well-being, and many live in environmentally fragile areas that are especially prone to natural hazards such as drought, floods, rising sea levels, and landslides. When circumstances change for the worse, the poor are hard put to adapt. For many, the effects of climate change are compounded by other pressures, including a growing scarcity of land viable for agriculture, joblessness, difficulty obtaining enough food, poor

health, lack of education, social marginalization, and lack of access to credit and insurance. Although livelihoods have constantly adapted to change throughout history, it is very likely that the impacts of climate variability and change will push poor people beyond their capacity to cope. It is a fact that many indigenous peoples in LAC have already reached this point (Kronik and Verner 2010).

The progression of cause and effect sketched in figure 1 shows how GHG emissions resulting from human activity are linked to their environmental impacts (step 1). This environmental degradation affects the availability and quality of water for human consumption (including domestic, agricultural, and industrial use and power generation), as well as terrestrial and marine flora and fauna ecosystems. The environmental impacts have social implications, as presented in step 2, affecting people's livelihoods, food security, and health. Excessive stress on those determinants of human well-being

Figure 1: Climate Change and Its Social Implications



Source: Verner 2010.

will increase poverty and income inequality. It may also cause migration to swell and has the potential to heighten the risk of conflict.

To understand the social implications of climate variability and change, it is useful to identify risk factors and protective factors. Although not necessarily causal, these factors can be important predictors, and understanding them can help shape policies and programs to strengthen people's resilience and capacity to adapt. Risk or vulnerability factors increase the likelihood that a person or community will experience negative outcomes: experience shows that the risks associated with climate change increase when combined with poverty, poor governance, and poorly maintained infrastructure. How vulnerable people are to these risks often depends on local social, political, and economic realities and government policies.

Protective factors increase the likelihood that a person or community will make a successful transition. Important factors that protect against the negative impacts of climate change exist at the household, community and societal levels, and include good public policies, such as provision of public health services, education, social protection schemes, and the like; social connectedness, whether to relatives, neighbors, civil society organizations (CSOs) or government agencies; solid and well-maintained infrastructure; good governance; and healthy public finances.

Climate Variability and Change in Latin America and the Caribbean

Precise projections about climate variability and change in the Latin America and Caribbean (LAC) region cannot be made. Too little detailed historical information is available on the region's weather conditions, sea levels, and extreme events to allow robust regional climate models to be developed, and global climate studies yield relatively few robust statements and projections for the region (IPCC 2007a).

Nonetheless, the available evidence clearly shows that climate change is taking place and gathering speed in the region:

- *Projected temperature changes.* Overall, like the world as a whole, the LAC region is projected to warm. Most of South America is forecast to warm more than the global average, the exception being the Southern Cone. This implies that, over most of the region, temperatures in all seasons will continue to rise during the 21st century. Heat waves are likely to be more frequent and more intense, and the higher temperature level in general will tend to favor a longer warm season, with possible related extreme events such as hurricanes. In the high Andes, the temperature rise is projected to be greater than the mean values for the region. This means that less water will be stored because snow, ice, and glaciers will continue melting. In the Amazon region, the expected higher temperatures are likely to

worsen the destructive effects of deforestation and increase the risk of wildfires.

- *Projected precipitation.* The patterns of probable change show dry areas becoming dryer and wet areas becoming wetter.² Mean annual precipitation is projected to decrease over northern South America near the Caribbean coasts, as well as over large parts of northern Brazil, Chile and Patagonia, and to increase in Colombia, Ecuador, Peru, around the equator, and in southeastern South America. The mid-continental areas, such as the inner Amazon and northern Mexico, are projected to become dryer during the summer months, with increased risk of droughts and forest fires. Annual precipitation is likely to decrease in the southern Andes, with relative changes being largest in summer. How annual and seasonal mean rainfall will change over northern South America, including the Amazon forest, is uncertain.
- *Extreme events.* Most areas of LAC have experienced several instances of severe weather in recent decades, with torrential rain and hurricanes causing thousands of deaths and damaging properties, infrastructure, and natural resources. These events are widely interpreted as reflecting climate change and increased variability, but no formal scientific detection of such a relationship at the regional level has been made.³ Neither is there evidence that the recent extreme events are less or more severe than those that may be experienced in the future. That said, the available models clearly suggest that the changes that will take place over

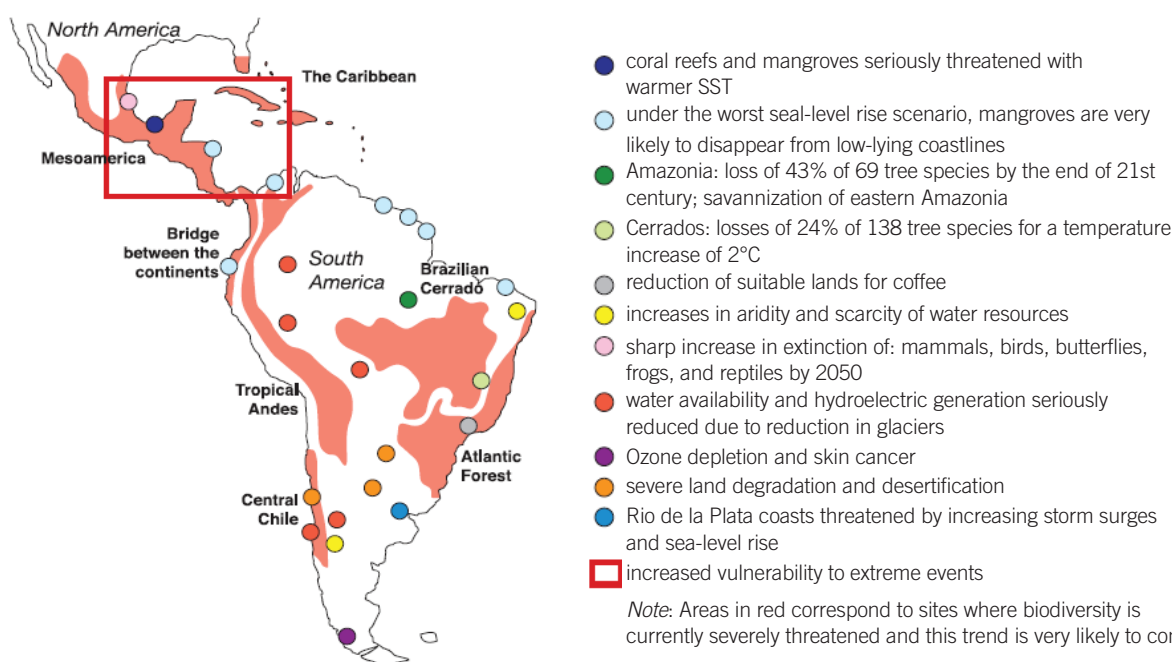
this century will generally be in the more extreme direction, that is, more intensive precipitation, longer dry spells and warm spells, heat waves with higher temperatures than generally experienced up to now, and more numerous, severe hurricanes. According to the International Panel on Climate Change (IPCC 2007a), further increases are expected in the number of floods and droughts and in the intensity of tropical cyclones (see figure 2).

The countries in the Caribbean and the Gulf of Mexico, which are often assailed by intense hurricanes, can expect these storms to become even fiercer as a result of climate change. Other important issues are the destruction of coral reefs and the growing threat to southeast Pacific fish stocks due to increasing sea surface temperatures. A rise in sea level would likely bring flooding to low-lying regions such as the coasts of El Salvador and Guyana and could exacerbate social and political tensions in the region.

For the Andean countries, the most momentous climate effects include major warming, changes in rainfall pattern, rapid tropical glacier retreat, and impacts on mountain wetlands. These effects will combine with increasing precipitation variability to significantly affect water availability (IPCC 2007c). These effects may lead to greater migration and risk of conflicts.

In the Amazon region, the most pressing issue is the risk that the forest will die back—that rising temperatures and decreases in soil moisture in the eastern Amazon region will lead to the replacement of tropical forest by savannah. When that danger is combined with the deforestation caused by human

Figure 2: Key Climate Change Hot Spots for Latin America



Source: Verner (2010) based on IPCC (2007b).

activities, the outlook is dire. If present deforestation trends continue, 30 percent of the Amazonian forest will have disappeared by 2050. That, with the transformation of tropical rainforest into dry grassland savannah, would lead to the extinction of a great number of plant and animal species unique to the area.

The overall effects of climate change will be negative in the LAC region. There will, however, be exceptions, particularly with respect to increasing temperatures. In the southernmost part of South America and in the Andes, rising temperatures will expand the range of some crops, and the higher concentration of carbon dioxide (CO₂) in the atmosphere will increase yields. But elsewhere, crops such as coffee and maize are already being grown in close-to-optimum temperatures, so temperature increases, especially if coupled with declining rainfall, will lead to significant yield reductions. Higher temperatures not only will affect plant growth, but will also cause more heat- and disease-related stress and mortality for livestock and humans alike.

The Road Ahead

Although many of the effects of climate variability and change are already unavoidable, much scope remains for human agency and ingenuity in crafting mitigation strategies to address the causes of climate change itself and in adapting to address the consequences.⁴ An optimal national strategy would employ both mitigation and adaptation efforts and should embody good governance and include public voice, representation, and social accountability.

It is critical that policy makers in LAC address the social issues related to climate change. Even if global mitigation efforts improve, the climate trends that are already under way have considerable momentum and will dramatically affect economic, human, and social development for years to come. Thus, as the *Stern Review on the Economics of Climate Change* argues, it is paramount that climate variability and change become fully integrated into development policy (Stern 2007). Social development is key to efforts to reduce the loss of livelihood systems, forced migration, and potential conflicts. Indeed, an overriding message that emerges from the study that this note describes is that almost all of the policies, investments, and institutional reforms advocated here are good development policies. The realities of climate change may give them added value, but, in most cases, they would have significant benefits even in its absence. Thus, when devising adaptation policies, they should be “climate-proofed” in the sense that they enhance resilience and enable adaptation. For example, physical infrastructure is in dire need of improvement, both to enhance people’s living conditions and economic opportunities and to enable people to cope with climate change. At-risk communities need special attention because risky climate situations are costly not just to the households affected, but to society at large. Although this note focuses on the external aspects of household and commu-

nity transitions, climate change is also affecting the psychological transition—a period of breaking free of traditional patterns of thinking and resolving problems, of increased competition over resources, and of emphasis on the present over the future. The poor and vulnerable who live a day-to-day existence and lack the assets to allow long-term planning have little experience addressing these issues; they typically behave in ways that are rational for their objectives and perceptions of risk, which by necessity employ a very short-term perspective. Planning for a future with a changing climate is extremely difficult when an individual’s or a household’s asset base is barely sufficient to survive on from day to day, especially given frustrations that arise from economic turbulence, blocked participation, and marginalization in the community.

Although fraught with risks, climate variability and change also present opportunities for households, communities, local and national governments, society, and the economy. Decisions about adaptation strategies, developing skills, and engaging with the broader civic community will determine the quality of life for the next generation. With more knowledge about how climate change affects the poor and vulnerable, governments may be better able to understand and serve this group. If policy makers do not invest now in mitigation and adaptation, they will miss a unique opportunity to equip the poor and vulnerable populations with the tools to break the downward spiral of poverty and inequality and become drivers of growth and sustainable development.

About the Author

Dorte Verner is the *Climate Change Coordinator* in the *Middle East and North African Region* of the *World Bank*. Previously, Ms. Verner was a *Senior Economist* in the *Latin America and Caribbean Region* and led the *Social Implications of Climate Change* program in the *Latin American and Caribbean Region*. She has published extensively in the areas of poverty and on rural and social development issues. Most recently she has written books and papers on climate change in relation to indigenous peoples, agriculture, health, migration, poverty, and rural issues. Before joining the *World Bank* in 1996, Ms. Verner worked as an economist at the *Organisation for Economic Co-operation and Development (OECD) Development Center* and as a researcher at the *European University Institute* in Florence, the *Sorbonne* in Paris, and the *University of Aarhus* in Denmark. She holds a PhD in macroeconomics and econometrics from the *European University Institute* and a postgraduate degree in economics from the *University of Aarhus*.

Notes

1. WRI (2005). The figure falls to 6 percent of global emissions if emissions from energy use only are taken into account. When land-use changes are included, the proportion rises to 12 percent of the world’s GHG emissions, mainly as a result of the

large-scale deforestation taking place in the region. Yet, despite the region's small contribution to global warming, its people still find their well-being, homes, and livelihoods threatened by climate variability and change. The inverse relationship between responsibility for global warming and vulnerability to its effects is often ignored (UNDP 2007).

2. There will be local exceptions to these broad tendencies, but existing models do not give robust results for every part of this large region. In particular, there are still many unresolved issues related to changes in the Amazonas, because important aspects of the interaction between vegetation and climate are still not well understood.

3. To formally attribute change or occurrence of particular events to a cause, a statistically sound number of events must normally be considered. By nature, extreme events are rare at a given location. Events that occur over a large geographical region, such as LAC, cannot simply be lumped together for study because the causal chains leading to them most likely differ from event to event and from location to location, which precludes a simple statistical treatment of the data. Therefore, the recent IPCC reports have very little to say about recent changes at a regional level, and even less about the national or provincial level, and their possible links with global climate variability and change.

4. The essence of mitigation policies should be to price carbon and carbon equivalent gases to reflect their true costs—including social costs. This note does not address these policies in any detail.

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