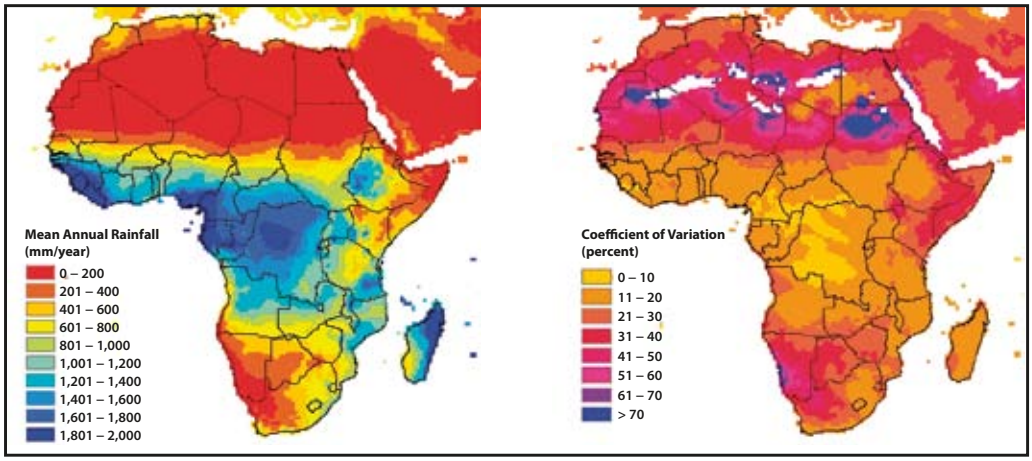
Frank Sperling

KENYA

In the climate change debate, long-term change often gets all the attention. As a result, the role of current climate in influencing development processes can be overlooked. This applies in particular to Africa. Africa is the only continent that resides almost exclusively within tropical latitudes. Two-thirds of its land surface can be classified as dryland. Moving from the equator either south or north, there is a steep decline in average annual rainfall accompanied by an increase in variability (see *Figure* below). This broad picture is somewhat modulated by the influence of larger-scale atmospheric circulation and topography. For example, the western equatorial regions are wetter than the eastern.



Average annual precipitation [mm/year] (left) and coefficient of variation [%] (right) over Africa derived from UEA-CRU 1951–2000 monthly time series. While agriculture is often the mainstay of economies in Africa, the figures illustrate that for large parts of the continent marginal climates for natural-resource-based activities, characterized by high degrees of rainfall variability, predominate.

Source: A. Lotsch, 2007, Pers. Communication.

The Ethiopian highlands experience a cooler and wetter climate than the surrounding lowlands.

Over the past century, the average surface temperature over the African continent has increased by about 0.5° C (for example, Hulme, Doherty, and Ngara 2001). The warming trend is becoming more pronounced; by the end of this century, the median increase in temperature is projected to be 3 to 4° C higher than present-day conditions (IPCC 2007).

The projected changes in rainfall suggest that the existing differences in water availability across the continent will be exacerbated. This generally means already wet areas will receive more rainfall, while already dry areas will receive even less.

Rising temperatures will also increase evaporation rates. A recent analysis of the combined effects of changes in temperature and precipitation suggests that the length of the growing period tends to decrease for large parts of Sub-Saharan Africa, with the most notable exceptions being highland areas (Thornton and others 2006).

Aside from changes in average conditions, the effects of climate change on climate variability and the exposure to extreme events are a grave concern. There is growing evidence for shifts and changes in the characteristics of the rainy season.

Key Vulnerabilities

The frequent and increasing occurrence of climate-related disasters, particularly droughts and floods, underscores that the region's adaptive capacities are often already overwhelmed under current climatic conditions (OFDA/CRED database).

Livelihoods and economic activities are heavily dependent on natural resources and ecosystem services. In Sub-Saharan Africa, the livelihoods of over 420 million people, almost 60 percent of the region's population, are centered on agriculture, hunting, fishing, or forestry (FAO 2004). For most African countries, agriculture continues to be the main pillar of the economy in terms of employment and contribution to GDP. With limited access to irrigation, livelihood activities are highly vulnerable to variations in rainfall. For example, agricultural growth for Ethiopia closely follows variations in annual rainfall (see Sadoff and Grey, pages 28–29). For the large number of subsistence-based livelihoods, however, it is particularly the impact on nonmonetary assets that reinforces conditions of food insecurity and poverty.

Among other factors, climate-related vulnerabilities are affected by land use change and environmental degradation and demographic trends. Agricultural growth has been largely achieved through expansion of cultivated areas and not productivity gains (IEG 2007). By 2030, every third person born in the world will live in Sub-Saharan Africa.

In light of the existing vulnerabilities, the impact of climate change on natural resources and ecosystem services and the associated implications for food security and agricultural productivity represent key concerns. Climate change lends further urgency to the sustainable management of land and water resources and the reduction of environmental degradation.

Other key vulnerabilities that need to be considered include the effect of climate change on the disease burden in humans and livestock, given the prevalence of water- and vector-borne diseases. Another grave concern is the loss of housing and infrastructure due to floods and coastal erosion processes, which is already well documented for a number of African countries, such as Mozambique and South Africa (IPCC 2007). Inadequate roads also hamper efficient emergency relief and access to markets when it is most needed. Changes in extremes and run-off also will have implications for energy infrastructure in African countries.

Adaptation to Climate Change—Climate Risk Management

Adaptation to climate change should be viewed as part of a continuous process of managing climate risks. Risk mitigation strategies need to take into account the time horizon and scope of development activities. At the local level, practical interventions will be predominantly focused on reducing vulnerabilities to current climate variability and climatic changes, which are already visible. At the district and national level, it is important that, first, an enabling environment is established to manage existing climate risks and, second, programs (for example, education, incentives for economic diversification) are initiated that will help reduce vulnerabilities to medium- to long-term risks associated with climate change. The latter implies assessing the implications of climate change for the viability of livelihoods, development strategies, and long-term structural investments.

Climate change also requires regional dialogue and cooperation. Sixty-seven main water courses are shared by 47 countries. There is a need for knowledge partnership and joint capacity development in order to address and respond to changes in water and natural resources efficiently and effectively and defuse conflict potential. Tackling resource management—especially water resources management at the basin level—and fostering transboundary cooperation is one response that the Bank has supported in several major basins in Africa.

At the country level, coordination mechanisms on climate change need to be strengthened and embedded in existing country partnership strategies. Uganda re-

ceives about 630 new donor projects and activities per year, Tanzania 700, Ethiopia 790, and Mozambique 845 (Paris 2006). Client countries often participate in a broad range of multilateral agreements. In light of these complexities, it is important that there is clear communication between client countries and donors on key vulnerabilities and ways to address them.

World Bank Activities

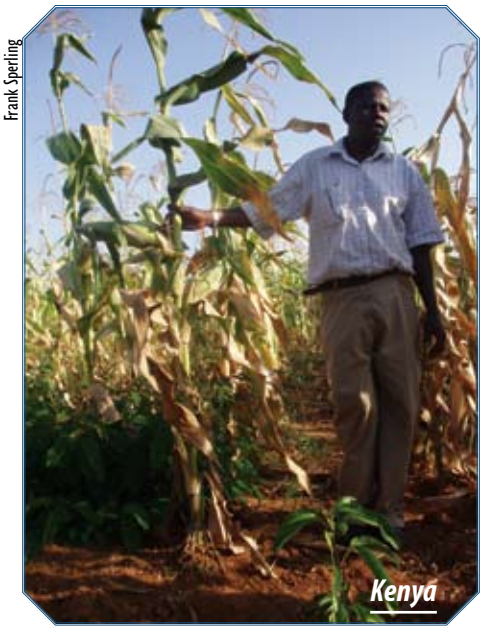
The overarching objective is to make more development processes more resilient to climatic risks to ensure their sustainability. A growing number of World Bank IDA projects include adaptation components, recognizing climate change rarely can be addressed through stand-alone projects but rather has to be viewed in terms of its effects on the achievement of core development objectives. Integrating climate risk management perspectives into IDA investments represents the key entry point for reducing vulnerabilities. In addition to directly addressing climate risks in IDA projects, the World Bank is using supplemental grant finances from the Global Environment Facility, the Global Facility of Disaster Risk Reduction, and various trust funds (TFESSD, BNPP). These resources are also underpinning a range of analytical and capacity building activities (for example, see pages 58–61) that seek to inform development investments about climate impacts, vulnerabilities, and adaptation options. Some examples follow:

Cross-regional and multicountry. The World Bank is engaged in the multistakeholder TerrAfrica partnership, which aims to harmonize and scale-up sustainable land management investments. The program recognizes climate risk management as an integral component of its activities, which include coalition building at the global, regional and national level, knowledge development and management, and investments.

Regional, river-basin specific. The Bank is also engaged in mainstreaming climate risk management at the basin level. For example, in the Nile Basin, such activities include consideration of climate change scenarios in the Strategic Social and Environmental Assessment for the Nile Equatorial Lakes Region. In addition, climate information and scenarios are being factored into both the Nile Decision Support System and the Eastern Nile Planning Model, which are intended to help identify future investments and improve cooperative basin management.

Kenya. A range of project activities in Western Kenya and the country's arid and semi-arid lands address climate-related vulnerabilities. These include knowledge development; providing investments for watershed, drought and flood management; strengthening early warning systems; promoting community-driven development efforts focused on improving local capacities to manage near-term risks; and supporting capacities at the district and national level to manage medium- and long-term risks associate with climate change.

Madagascar. The World Bank provides technical assistance on the linkage between hazard management and adaptation, exploring in particular the evolution of cyclone and drought risk. Working with the government, this analytical work guides the identification of risk management and risk transfer schemes.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Malawi. Activities are focused on supporting efforts to mainstream disaster and climate risk management into development processes, such as strengthening meteorological services, contingency planning, and piloting index insurance schemes.

Burkina Faso. The World Bank is engaged in community-based activities focused on sustainable management of natural resources, which includes managing current and future climate risks within the broader project context.

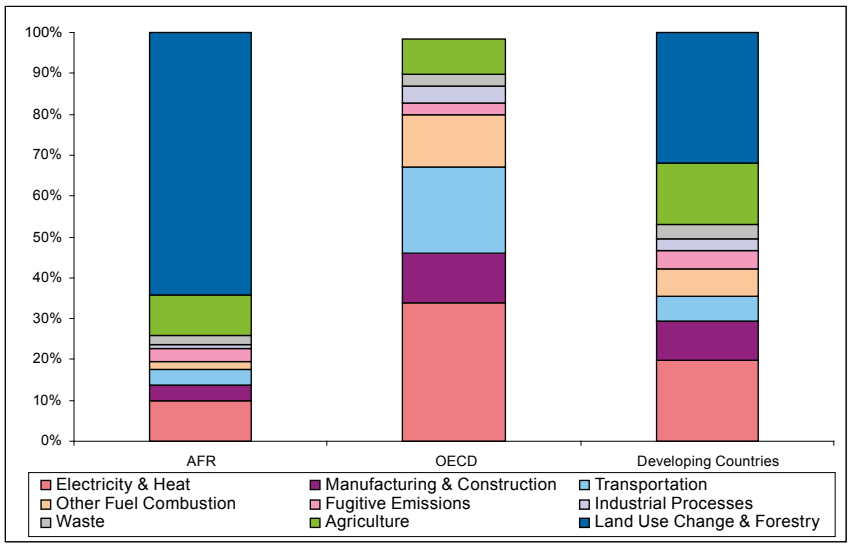
Other regional or country-specific projects that include adaptation activities are under execution or preparation in West Africa, Southern Africa, the Niger Basin, Ethiopia, Mozambique, São Tomé, Sudan, and Tanzania.

Linking Mitigation and Adaptation

Reducing vulnerabilities to climate variability and change within the development context represents a priority concern for Africa, as most African countries have small per capita greenhouse gas (GHG) emissions and contribute little in aggregate terms to the world's total emissions. However, it is important not to overlook opportunities for Africa through the emerging carbon market and to consider the implications of climate change for the energy infrastructure, given the high dependency of many African countries on hydropower.

Deforestation and land degradation processes are not only a source of GHGs (see *Figure* on next page), but often also contribute to an increased vulnerability to climate risks. Carbon finance provides new opportunities to counteract some of these trends while contributing to local development objectives. Implemented under the World Bank's

A Comparison of Greenhouse Gas Emission Sources. While in other regions of the world emission sources are linked to the combustion of fossil fuels, the dominant emission sources in Africa are land use change, including deforestation. Land degradation processes not only contribute to an increase in atmospheric greenhouse gas concentrations, but often exacerbate vulnerabilities to climate-related risks.



BioCarbon Fund, projects are under way in Kenya, Madagascar, Mali, Niger, and Uganda that combine carbon sequestration with sustainable development and environmental conservation objectives. The establishment of the new Carbon Forest Partnership Facility will provide additional value for the protection of existing forests by creating incentives for reducing forest degradation. This will help to further promote sustainable forest management.

As reflected in the World Bank's Africa Action Plan, improving energy access in Africa has to be a high priority for development. In Sub-Saharan Africa, only 25 percent of households have access to electricity. Investment decisions taken today will decide the type of energy infrastructure for decades to come. As climate change impacts are increasingly becoming visible, it is prudent to ask how climate change may impact on the ability to generate energy, for example, through changes in run-off and where opportunities exist for Africa to leapfrog to more energy-efficient or clean energy technologies.

Next Steps

In response to the internal and external recognition of climate change as a development issue that will threaten the development gains of recent years, the World Bank's Africa Region is now working on building a systematic approach to addressing climate change issues. The goal is to mainstream climate risk management perspectives into the general project portfolio of the World Bank to ensure that development objectives are sustainable and not compromised by climate change.

The Bank's Africa Region is currently developing a strategy for making development more resilient to climate variability and change. The main pillars of the strategy are (a) adaptation, (b) mitigation, and (c) knowledge and capacity building. This strategic and conceptual framework is accompanied by two analytical and technical assistance components that are focused on assessing the implications of climate variability and change for water resource and land management and on studying the economics of adaptation. The goal of this work is to generate a common and consistent knowledge resource tailored to the information needs of the World Bank and its client countries to improve the resilience to current climate variability and be prepared for future change.

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