



Annex F

Climate Change

Most scientific experts agree that climate change induced by human activity is occurring and that further change is inevitable. The *Third Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC 2001) predicts that average global temperatures will rise between 1.4 and 5.8 degrees Celsius over the next 100 years, a rate of warming higher than any that has occurred over the past 10,000 years. The World Bank's work on climate change is predicated on IPCC's report that concludes that "most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas (GHG) concentrations." About 75 percent of the cumulative GHG emissions during the past 150 years have been emitted by industrialized countries. As a result of this energy-led development, their per capita GHG emissions today are five times higher than those of developing countries who now face the daunting task of enhancing energy utilization while protecting the environment. At the same time, the IPCC also concludes that "most less-developed regions are especially vulnerable" to the projected adverse impacts of climate change. These developing countries, therefore, would need to consider these impacts and adapt their development paths. The World Bank recognizes the threat posed by climate change to the development process, and seeks to support and facilitate the mainstreaming of climate change concerns in the development agenda.

DEVELOPMENT CONTEXT

Despite uncertainties about where changes in climate will occur (the regional patterns), by when (the rate of change), and by how much (the magnitude), there is little debate on at least two key points:

- Because of the rapid build-up of GHGs, the earth's overall temperature will warm significantly, precipitation patterns will change, and sea levels will rise.
- The adverse impacts of projected changes in climate conditions will pose major development challenges for most developing countries in the tropical and subtropical zones.

In developing countries, where human activities are already close to the margin of tolerance for current variations in climate, the impacts of the projected changes are expected to be far reaching, adversely affect-

ing virtually all aspects of social and economic life for the poorest of the poor. For instance, in countries where yields from dryland, nonirrigated agriculture are already near their maximum temperature tolerance, even small changes in temperature could have a devastating impact on agricultural output, with attendant consequences for food security. Similarly, changes in precipitation patterns associated with climate change could adversely affect the availability and quality of water, especially in areas where scarcity is already a problem. Sea level rise could displace millions of people living in low-lying areas of the Ganges River and the Nile delta and threaten the existence of small island states. Assisting clients to prepare for climate change is therefore inextricably linked to the Bank's mission of sustainable poverty reduction.

Developing countries fully recognize the implications of global climate change and the need for all nations to assume responsibility for protecting the global atmosphere, as reflected in their decision to ratify the United Nations Framework Convention on Climate Change (UNFCCC). However, because these countries' contribution to the cumulative increase in atmospheric concentrations of GHG emissions has been small relative to that of industrial countries, and because of the urgency of their short-term needs of providing food, energy, and other vital services for the poor, it was recognized that developing countries and economies in transition (non-Annex II parties to the UNFCCC) would be unwilling and unable to invest their scarce resources in measures yielding benefits in the distant future or outside their boundaries.¹

For that reason, based on the principle of *common but differentiated responsibility*, industrial country parties (Annex II parties) agreed to provide new and additional grant resources to their developing

country counterparts and to support the transfer of technology on beneficial terms, though initially only for GHG mitigation. A decision on similar support for vulnerability and adaptation was deferred pending a better understanding of the impacts of climate change. The UNFCCC regime and instruments are, as a result, expected to evolve in response to progress in understanding of the climate change phenomenon. The Bank will continue to review global experience, to learn from it, and to develop innovative instruments that meet the needs of its clients.

LESSONS FROM EXPERIENCE

The Bank's involvement in the area of climate change began in 1991, with the establishment of the Global Environment Facility (GEF), and expanded following the designation of the GEF as the financial mechanism of the UNFCCC. Since then, the Bank has focused primarily on assisting clients to reduce GHG emissions, as clients have been reluctant to borrow for vulnerability and adaptation activities, in the expectation that support would be forthcoming on concessional terms under the UNFCCC. In particular, to achieve GHG outcomes without compromising national development priorities, the Bank has assisted its clients to mobilize additional grant resources for operational support, mainly in the energy sector. The World Bank Group-GEF portfolio today includes 62 projects, for which \$6.2 billion has been mobilized—\$730 million from the GEF and the balance from the World Bank Group, donors, private investors, and government counterparts.

This decade-long involvement, representing first generation work in GHG mitigation, has been instrumental in opening up new prospects for energy efficiency, distributed supply, and off-grid service

delivery, especially in remote rural areas. In addition, it has generated a number of key lessons of experience. In particular:

- Policy reforms are essential for mobilizing private capital for efficient energy development, for creating a level playing field to foster competition, and for promoting alternative approaches to energy service delivery, including incentives for service providers to diversify and innovate and to enable clean technologies and fuels to compete on equal terms.
- Many cost-effective options for reducing GHG emissions in developing countries also have substantial economic and local environmental benefits.

STRATEGIC PRIORITIES

The Bank recognizes that achieving objectives related to climate change will be a long-term process that will require integration of the GHG mitigation and the vulnerability and adaptation agendas into mainstream operational work. In this regard, the differences in the relative priorities and needs of the developing countries are also recognized, as is the need for an array of supporting instruments. These instruments include planning, policy dialogue, generation and dissemination of knowledge, and investment lending, all of which are primarily aimed at promoting national development priorities. Striking the right balance between national development priorities and protecting the global commons will therefore be critical.

Bank support to clients for better managing climate change is envisaged in three key areas: (a) mitigation of GHG emissions; (b) reduction of vulnerability, and adaptation to climate change; and (c) capacity building. In the area of GHG mitigation, the Bank will continue to promote policy and

regulatory reforms, as these tend to have large and sustainable impacts on improving the efficiency of resource use and, consequently, reducing GHG emissions. In the context of these reforms, the Bank will mobilize resources from the GEF and the Prototype Carbon Fund (PCF) to support GHG abatement measures that simultaneously address poverty reduction and sustainable development goals. In the area of vulnerability and adaptation, where the decision on UNFCCC support is pending, the Bank will mobilize donor financing for a Vulnerability and Adaptation Facility (VAF) to better prepare for climate change. Over the medium term, the Bank will focus on improving the understanding of the potential impacts of climate change and on identifying and implementing no-regrets measures to reduce vulnerability to current climate and to climate change. Finally, the Bank will assist clients in building the capacity needed to deal with GHG abatement and with vulnerability and adaptation.

GREENHOUSE GAS MITIGATION

To provide a strategic focus for the Bank's work on the energy-environment nexus and to consolidate the gains of the decade-long association with the GEF, in July 1999 the Bank's Executive Directors discussed Fuel for Thought (FFT), an environment strategy for the energy sector (see box 4.1 in chapter 4). This strategy highlights the importance of getting the policy fundamentals right. In that context, it explicitly recognizes the need to help clients tackle global climate change by capturing win-win opportunities for improving energy efficiency and promoting distributed and off-grid electricity supply in rural areas, using clean technologies and fuels. In addition, the strategy recognizes that there are valuable opportunities beyond win-win interventions for combating regional and global prob-

lems. It calls for incorporating these opportunities into Bank programs to promote sustainable development and reduce the marginal cost of GHG mitigation through the use of external resources, particularly those of the GEF, the PCF, and the private sector resources stimulated by the carbon-trading mechanisms of the Kyoto Protocol.

FFT remains consistent with the Bank's evolving agenda in the energy sector and will continue to underpin work on GHG abatement, but the scope of support will be expanded to include sectors such as transport, urban development, environment, agriculture, and forestry. There can be tradeoffs between local and global environmental benefits. One of the Bank's key goals, however, will be to identify and support GHG reduction when it is an ancillary benefit of improving the quality of life or achieving other development objectives at the local and national levels. These efforts will thus serve to initiate and consolidate low-carbon development paths. The interventions envisaged include:

- Energy sector reform and restructuring, which are key to improving supply- and demand-side efficiency, as well as to creating a level playing field for alternative energy sources, including renewables
- Energy efficiency improvements and fuel switching (for example, from coal to gas), which can reduce urban and indoor air pollution, improve thermal efficiency, and reduce GHG emissions
- Improved access to modern energy in rural or remote locations through renewable energy technologies for household lighting, water pumping, grain processing, small cottage industries, clinics, and schools, all of which yield direct economic and social benefits to rural residents
- Reduction of energy intensity in the transport sector, through land-use planning, traffic management, promotion of nonmotorized transport, and more efficient technologies, which brings

about human health and livelihood benefits, especially for the poor, in addition to reducing GHG emissions

- Forest regeneration through community participation, with the aim of offering substantial economic benefits to millions of poor households while increasing forest cover, sequestering carbon, and reducing pressure on natural forests

Energy Environment Reviews (EERs) have been applied as an important strategic tool, often supported by the joint UNDP–World Bank Energy Sector Management Assistance Programme (EMAP) (see box F.1). The Bank will continue to work with the GEF in identifying and supporting cost-effective GHG mitigation investments, increasingly stressing the need for synergy with national economic and environmental concerns in all climate change interventions. In addition, in contrast to past support for one-off projects, the Bank will support larger regional or global efforts to catalyze market development for GHG reduction:

- The Bank-GEF Strategic Partnership for Renewable Energy will focus on long-term development of the most promising technologies and market opportunities for renewable energy, including grid-connected and off-grid technologies (see, for example, box 3.4 in chapter 3).
- The Bank will explore opportunities for a more programmatic approach to improving energy efficiency. Through the support of the GEF, ESMAP, and other donors, the Bank will look to replicate the model used in China of support for energy efficiency improvements.
- Two new GEF operational programs provide opportunities to promote environmentally sustainable options in the transport sector and sustainable development of multiple ecosystems, including forestry, which has a significant carbon

BOX F.1**Strengthening environmentally responsible energy strategies through Energy Environment Reviews**

Energy Environment Reviews (EERs) extend traditional Bank energy sector work by addressing the cross-sectoral environmental impacts associated with energy production and consumption at the local, regional, and global levels. EERs are an important tool for supporting the implementation of Fuel for Thought, the Bank’s environmental strategy for the energy sector. Through their emphasis on upstream analysis, EERs aim to:

- Ensure that fuel and technology choices are considered before they are frozen in the context of specific project designs
- Maximize cost-effectiveness by examining pollution prevention and reduction options across the fuel supply and consumption chain
- Expand local participation and capacity building among analysts and decisionmakers.

To date, most EERs have been motivated by local environmental concerns, but many activities simultaneously address local, regional, and global effects.

In Turkey, for example, an ESMAP-supported initiative on key aspects of energy and environment/GHG strategy was largely motivated by decisionmakers’ desire to compare different options for mitigating GHG emissions; but the modeling effort also provided specific guidance on least-cost control strategies for sulfur and particulate emissions in the power sector.

ESMAP and the Canadian International Development Agency (CIDA) supported a regional study, *Cleaner Transportation Fuels for Air Quality Improvement*, which examined the linkages between fuel quality, vehicle emissions, and air quality in the eight countries of Central Asia and the Caucasus. The study made recommendations for improving air quality and vehicular emissions monitoring systems and for adopting improved fuel quality regulations and controls in the coming decade. It emphasized, in particular, the rapid phaseout of lead in gasoline and the possibility of harmonizing fuel quality requirements in the region. In addition to improvement of urban air quality, the proposed measures have implications for fuel and engine efficiency and for carbon dioxide emissions.

In Mexico, an environmental strategy for the energy sector supported by ESMAP has assisted the Ministry of Energy in identifying pricing policy options for eliminating environmentally damaging subsidies in the power sector. In parallel, the Ministry of Environment has concentrated on vehicle emissions standards and the improvement of vehicle emissions performance. The EER has helped improve communications between Mexico’s energy and environment ministerial authorities and has opened up the Bank’s previously limited dialogue on key policy and structural issues in the energy sector.

sequestration potential in addition to local benefits.

- The PCF is designed to show how a market for carbon emission credits for developing countries can work under the Kyoto Protocol’s proposed flexible mechanisms. The PCF, a public-private partnership, will develop best practices in the identification and implementation of develop-

ment projects that can utilize these mechanisms to lower carbon emissions from developing countries.

VULNERABILITY AND ADAPTATION

Experience over the past two decades suggests that vulnerability to extreme weather events (floods,

droughts, storm surges, and so forth) has increased markedly. Reflecting in part the rapid growth of population—and in part, the pattern of development itself—loss of life, displacement, and damage and destruction of natural, social, and physical capital have all increased, and the losses are relatively greater for the poor in poorer countries. Now, with the projected global warming and the associated higher probabilities of intense precipitation and more extended dry periods, the frequency and severity of droughts, floods, and storm surges are expected to increase, along with the vulnerability of the developing countries. These developments will exacerbate the problems related to climate that face these countries today.

Many of the countries that are most vulnerable to climate change are already close to the margin of tolerance with respect to current climate variability. Hence, the most important measures that will enable these countries to deal with future climate conditions are essentially the same as those needed to deal with the current climate. The Bank, therefore, will focus on reducing present-day climate vulnerability through the implementation of no-regrets measures. Because there is no single best or universal approach to adaptation, learning by doing will be a critical aspect of the Bank's work over the short to medium term.

Drawing on activities of partners, including the Bank's Disaster Management Facility, the following initiatives are proposed:

- Support vulnerability assessments to better understand past weather events and their physical, economic and social consequences and to develop and test indicators of current and future vulnerability
- Strengthen regional institutions to improve climate forecasting and verification systems and

to promote more effective communication and use of climate information at the national and local levels

- Evaluate the longer-term consequences of disasters to increase awareness among policymakers of the potentially serious threat that variations and changes in climate pose to sustainable development, as well as of the potentially high economic and social returns that investments in reducing vulnerability can yield
- Conduct backcasting studies of at least two countries and two projects to determine whether incorporating climate risks explicitly (a) would require a fundamental change in macroeconomic and sector policies pursued to date, or a simple realignment and phasing of priorities, and (b) would have yielded additional benefits, given past and actual climate variability
- Develop a framework for incorporating climate risks in economic analyses, with a view to reorienting the Bank's project work toward adaptation
- Support pilot initiatives in vulnerable countries to promote community-level activities aimed at, among other objectives, reforestation, conservation and restoration of wetlands, protection of mangroves and coral reefs, and strengthening of local institutions to reduce income-related risk and thus improve the capacity of the poor to cope.

As noted above, because developing countries are unwilling to borrow for adaptation, the Bank will establish, with donor financing, a VAF to support short-to-medium-term strategic priorities. The aim of such a measure would be to better prepare the World Bank Group and its clients to deal with climate change. To leverage VAF resources and ensure that the output from the activities supported by them are fully integrated into the Bank's main-

stream operational work, these three approaches are proposed:

- The focus on vulnerability in the 2000/2001 *World Development Report* has already placed the issue squarely on the Bank's agenda, and data on vulnerability in the areas of health, environment, infrastructure, and social protection are already being collected for the Poverty Reduction Strategy Papers (PRSPs). The proposed vulnerability assessments would complement this work by generating good practices that could be incorporated into the broader PRSP agenda.
- For studies and pilot initiatives that are country specific, a cost-sharing arrangement with the country team is envisaged to enhance the prospects of buy-in. In this regard, the Environment Department will work closely with the Disaster Management Facility on continuing operations (in Honduras and Mozambique). This would allow for the integration of no regrets pilot initiatives into ongoing operations and reduce their monitoring and supervision costs.
- For methodological work and studies, including vulnerability assessments, that have implications for Bankwide work, the VAF will cover the full costs. As much of this work will require specialized skills, the Environment Department will give priority to developing and strengthening partnership within both the Bank and the broader scientific community.

CAPACITY BUILDING

The climate change agenda is relatively new and evolving. As a result, the generation and dissemination of relevant knowledge—through analytical work to plan, prepare, and implement GHG mitigation measures and to manage climate change concerns in general—are critical first steps in capacity building. As in the recent past, the Bank will

continue to focus on providing hands-on experience through methodological, technical, and investment work to clarify how market mechanisms can benefit our clients; development of national policies to identify potential investments for possible future international cooperation; evaluation of options for reducing GHG emissions through sectoral planning; and upstream work in investment planning to identify options for mitigating the negative local, regional, and global environmental impacts of energy development. The scope of support will be expanded to include vulnerability and adaptation, as well. The following are illustrative examples of capacity-building activities related to climate change to be supported by the Bank:

- *National Strategy Studies (NSS) Program*. Since 1997, with the support initially of Switzerland and subsequently of other donors, the Bank has assisted 26 client countries to develop national policies on Joint implementation under the Kyoto Protocol and the Clean Development Mechanism (CDM). The Bank will also help these countries identify potential investments for possible future international cooperation for climate change mitigation.
- *Prototype Carbon Fund*. The PCF, through financial support for project specific investments, will help create the market infrastructure necessary for CDM projects. It will also help develop a knowledge base to maximize the value of its experience by collecting, analyzing, and disseminating information and knowledge to a broad range of stakeholders.
- *CEM-Assist Program*. To help Sub-Saharan African countries take advantage of CDM, a CDM-Assist Program, funded by ESMAP and a number of bilateral donors, is being prepared.
- *Adaptation activities*. As part of the identification and preparation of adaptation projects under the UNFCCC mandate, the Bank will help

mobilize resources to help clients prepare for adaptation to the impacts of climate change.

- *Training.* Plans are being developed for training through the World Bank Institute (WBI) to support activities for assessing vulnerability. Such training would be offered on a regional basis through seminars, workshops, and short courses.

Within the Bank, compliance with Operational Policies and Bank Procedures OP/BP 4.01 on Environmental Assessment and OP/BP 10.04 on Economic Evaluation of Investment Operations requires, at the design and selection stage, assessment and consideration of lifetime GHG emissions from Bank-supported projects. This would be facilitated through the development of methodologies and through training for Bank task teams provided by the WBI.

Implementation and Resources

Implementation: Our goal is to integrate the agendas for GHG mitigation and for vulnerability and adaptation into the Bank's mainstream operational work. Progress has been made in the area of GHG mitigation, but more at the project than at the policy level. We will therefore work closely with ESMAP on energy and environment reviews, which respond to the need for sectoral environmental assessments well upstream of lending operations.

In the area of vulnerability and adaptation to climate change, implementation of the strategic pri-

orities concentrates on learning by doing to generate good practices and to disseminate these widely to clients both within and outside the Bank. In this regard, we will focus specifically on developing analytical and methodological tools that have implications for Bankwide work. In addition, we will collaborate with the Regions, and particularly with the Disaster Management Facility, on pilot initiatives and on monitoring their implementation.

Resources: The resource requirements for the implementation of the strategic priorities related to climate change are not expected to be demanding. The resources required for the work on GHG mitigation are financed fully by the GEF, and no change in this arrangement is envisaged. The only additional resource requirements, therefore, are for the implementation of work on vulnerability and adaptation. It is expected that a significant portion of these requirements will be covered by the VAF, but these resources would have to be supplemented, in part through the prudential use of consultant trust funds to mobilize specialized skills and in part through the Bank budget for staff time.

NOTE

1. "Annex II parties to the UNFCCC" refers to industrial countries and "non-Annex II parties" to all others, principally developing countries and the economies in transition.