



IDA15

**IDA AND CLIMATE CHANGE:
MAKING CLIMATE ACTION WORK FOR DEVELOPMENT**

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ABBREVIATIONS AND ACRONYMS

AAA	Advisory and analytic activities	IBRD	International Bank for Reconstruction and Devt.
ADAPT	Climate Change Screening Tool	IDA	International Development Association
AsDB	Asian Development Bank	IFC	International Finance Corporation
AfDB	African Development Bank	IPCC	Intergovernmental Panel on Climate Change
CAS	Country Assistance Strategy	LAC	Latin America and the Caribbean
CAT	Weather/catastrophic event risks	LDC	Least-developed country
CCRIF	Caribbean Catastrophe Risk Insurance Facility	LULUCF	Land use, land use change, and forestry
CDCF	Community Development Carbon Fund	MDB	Multilateral development bank
CDD	Community-Driven Development	MDG	Millennium Development Goals
CDM	Clean Development Mechanism	MFIWGE	Multilateral Financial Institutions, Working Group on Environment
CEA	Country Environment Analysis	MIGA	Multilateral Investment Guarantee Agency
CEIF	Clean Energy for Development Investment Framework	MNA	Middle East and North Africa
CF	Carbon Finance	NAPA	National Adaptation Programme of Action
CGIAR	Consultative Group for International Agricultural Research	NF	Nairobi Framework
COP	Conference of the Parties	ODA	Official development assistance
CO ₂ e	Carbon dioxide emissions	PPIAF	Public-Private Infrastructure Advisory Facility
CPIA	Country Policy and Institutional Assessment	PPP	Public-Private Partnership
DEC	Development Economics Department	PRSP	Poverty Reduction Strategy Paper
DFID	Department for International Development, United Kingdom	REDD	Reduced emissions from deforestation and degradation
DPL	Development policy lending	REEEP	Renewable Energy and Energy Efficiency Partnership
EAP	East Asia and the Pacific	SAR	South Asia Region
EBRD	European Bank for Reconstruction and Development	SCCF	Special Climate Change Fund
ECA	Europe and Central Asia	SEA	Strategic Environmental Assessment
EIB	European Investment Bank	SSA	Sub-Saharan Africa
ESMAP	Energy Sector Management Assistance Program	SWAp	Sectorwide approach
FCPF	Forest Carbon Partnership Facility	TA	Technical assistance
GFDRR	Global Facility for Disaster Reduction and Recovery	TFSD	Transformation Fund for Sustainable Development
GDP	Gross domestic product	UNDP	United Nations Development Programme
GEF	Global Environment Facility	UNEP	United Nations Environment Programme
GHG	Greenhouse gases	UNFCCC	United Nations Framework Convention on Climate Change
GIRIF	Global Index Reinsurance Facility	VARG	Vulnerability and Adaptation Resource Group
GPG	Global public good	WBG	World Bank Group
IADB	Inter-American Development Bank	WDR	World Development Report

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EXECUTIVE SUMMARY

- 1. The second meeting of the Fifteenth Replenishment of the International Development Association (IDA15) requested a report on the development case for climate action in IDA countries and the potential role of IDA in helping members adapt to climate change.** Participants at the meeting supported stronger IDA efforts in expanding access to energy and adaptation to climate change, and asked for a more detailed overview on IDA role in addressing climate change. This report responds to the meeting's request, outlining the significance of climate change for the IDA countries, current adaptation and mitigation actions, and the future role of IDA under IDA15.
- 2. There is now a strong consensus that climate change presents an urgent challenge to the well-being of all countries and particularly to the poorest countries and the poorest people within them.** Even if efforts to reduce greenhouse gas (GHG) emissions are successful, it is no longer possible to avoid some degree of global warming and climate change. The primary direct effects of climate change are an increase in droughts and floods, more seasonal peaks in river flow, and a higher probability of stronger tropical storms. The poorest countries and communities are likely to suffer the most because of their geographical location, low incomes, and low institutional capacity, as well as their greater reliance on climate-sensitive sectors like agriculture.
- 3. Climate action is a key priority in IDA countries, particularly regarding adaptation—understood as efforts to adjust to ongoing and potential effects of climate change.** Building up resilience to increasing climate variability is the most significant climate challenge facing IDA countries. Adaptation should be pursued not as an end in itself, but as a means to meet the development objectives of countries. Because IDA countries contribute the least to GHG emissions, mitigation (i.e. efforts to reduce emissions) is dealt with less extensively. Yet, some key mitigation actions – such as expanding access to clean energy (including through regional projects) as well as financing improved land management and forest management programs – can offer true win-win opportunities in IDA countries, both in terms of supporting good development and reducing global GHG emissions.
- 4. IDA is the appropriate platform to ensure that funding for climate action works for development, not against it.** IDA's primary focus on growth and poverty reduction can increase climate resilience in low income economies by helping them to diversify their economies. Countries will need to factor climate risks into their development planning, and consider the range of interventions that will increase their resilience to climate change. Given IDA's strengths in directly supporting countries – its lending and non-lending instruments, its multi-sectoral perspective, and its role as a platform for provision of aid by all donors – IDA is uniquely positioned to mainstream climate actions in the countries most at risk from climate change. This can be done in a cost-effective way.

5. **IDA has already built up relevant knowledge and experience in addressing climate change, but the work is still at a relatively early stage.** IDA countries have begun to build an important knowledge base and experience in dealing with adaptation to climate change through the Global Environment Facility (GEF) supported National Adaptation Plans of Action (NAPA) and Poverty Reduction Strategy Papers (PRSP). IDA's analytical work is also helping to build knowledge on adaptation: a growing number of projects explicitly recognize the challenges posed by climate change and tackle the issue with specific adaptation components. With respect to mitigation, IDA's experience and knowledge is more advanced, in particular in the area of access to clean energy and carbon finance.

6. **With adequate financing, an effective program of climate interventions under IDA15 will span knowledge creation and dissemination, policy dialogue and country strategy, and investment in innovative development projects.** Specific actions should focus on expanding analytical work, mainstreaming climate actions in country assistance strategies (CASs), integrating adaptation and mitigation actions in IDA investments, scaling up disaster preparedness, developing innovative insurance products and leveraging carbon finance to increase access to new technology. IDA can increase the climate resilience of client countries through adjusting its instrument choice and mix (e.g. more lending to deal with natural disasters or technical assistance projects for capacity building), sector composition of lending (e.g. greater emphasis on water storage infrastructure), and activities financed within projects (e.g. agriculture projects could include greater funding for research on drought resistant crops). IDA can also partner with institutions such as the World Meteorological Organization and the Consultative Group for International Agricultural Research (CGIAR) to ensure that knowledge on climate change and research on technologies to increase climate resilience is applied in IDA countries – efforts in these areas would in turn reduce the cost of climate adaptation to governments and the private sector.

7. **Scaling up action on climate change will require additional development finance.** While much of the adaptation effort will occur autonomously—as individuals, households and businesses respond to the changing climate—or through government-led investments, the international community can provide the policies, knowledge, infrastructure, and markets to make it happen in the most cost-effective way. Costs will be high and are likely to increase over time, especially if worldwide emissions are not curbed. The United Nations Framework Convention on Climate Change (UNFCCC) estimates that the additional flows of investment and finance that may be required through 2030 to enable developing countries to adapt to the impact of climate change is in the range of \$28–67 billion.

8. **IDA would need additional resources just to maintain country benefits from its projects at their 'without climate change' level.** Stern (2007) provides a range of estimates of the damages caused by climate change, and IDA projects will likely suffer similar levels of damage. The increase in IDA credits that would be required to maintain the net level of benefits to clients at their 'without climate change' level for each of the Stern climate damage scenarios range from \$600 million to \$1.9 billion per year (6 to 21 percent of total FY06 IDA credits).

9. **Going forward, IDA's role on climate change would continue to complement IDA's core poverty reduction mandate.** IDA would focus on adaptation investments which reduce the damages from climate change and yield net benefits that are competitive with alternative development projects. For climate mitigation the question of IDA's role is more complex. Some projects (reforestation, or improving land management, for example) may yield competitive net benefits while simultaneously reducing greenhouse gas emissions. Other projects, such as 'clean' energy investments, may yield lower net benefits compared with 'traditional' energy projects – in these cases, however, a subsidy provided by carbon finance may make the clean project competitive with the traditional one. In all cases, IDA would ensure that its role on climate change reflects country priorities.

10. **Making climate change action work for development requires harmonization within the development community.** Climate change adds a new development dimension and an additional challenge to aid effectiveness. While IDA is performing strongly in delivering and managing aid, it is also clear its effectiveness is linked to progress in implementing harmonization and alignment at the country level. Collaboration with the UN system, other Multilateral Development Banks (MDBs), bilateral donors, the GEF and other specialized funds, and the private sector is essential to achieve broad country coverage and maximize climate and development benefits.

IDA AND CLIMATE CHANGE: MAKING CLIMATE ACTION WORK FOR DEVELOPMENT

I. INTRODUCTION

1. **At the second meeting of the Fifteenth Replenishment of the International Development Association (IDA15), participants supported stronger IDA efforts to manage the impact of climate change,** particularly through greater access to clean energy and other adaptive means. The participants requested further details on IDA's potential role in helping members adapt to climate change. In response to that request, this report outlines: (a) the development case for action on climate change and for IDA involvement (Section II); (b) current IDA action in this domain, including that developed under the Clean Energy for Development Investment Framework (CEIF) of the World Bank Group¹ (WBG) (Section III); (c) the future role of IDA under IDA15 (Section IV); and (d) the coordination with other development partners (Section V).

2. **This paper complements the Progress Report on the WBG Action Plan on the CEIF,** submitted to the Development Committee for the October annual meetings. The progress report summarizes achievements in three areas of WBG involvement: (a) energy for growth, with a particular emphasis on access to energy in Sub-Saharan Africa; (b) transition to a low-carbon development trajectory; and (c) adaptation to the effects of climate change.

3. **Responses to climate change can generally be classified either as adaptation or mitigation.** Adaptation involves actions which reduce the impact of climate change on economic assets and human well being – examples include the adoption of drought-resistant crops or increasing water storage capacity in order to reduce the impact of climate variability. Mitigation aims at reducing the emissions of greenhouse gases or actually removing these gases from the atmosphere – here examples include the use of low-carbon technologies for electricity generation, or reforestation of degraded lands, which stores atmospheric CO₂ in forest biomass.

4. **In the face of climate change, IDA's core mandate must continue to be growth and poverty reduction.** Growth and poverty reduction allow more diversified economies which are inherently less vulnerable to climate change. But there will be climate investments that are compatible with this core mandate. This paper explores the potential role of IDA in climate change over the course of its 15th replenishment period.

¹ The progress report is the fourth in a series. See also, "CEIF: The World Bank Group Action Plan" (DC2007-0002, March 28, 2007), "Clean Energy and Development: Towards an Investment Framework" (DC2006-0002, April 2006), and "An Investment Framework for Clean Energy and Development: A Progress Report" (DC2006-0012, September 2006).

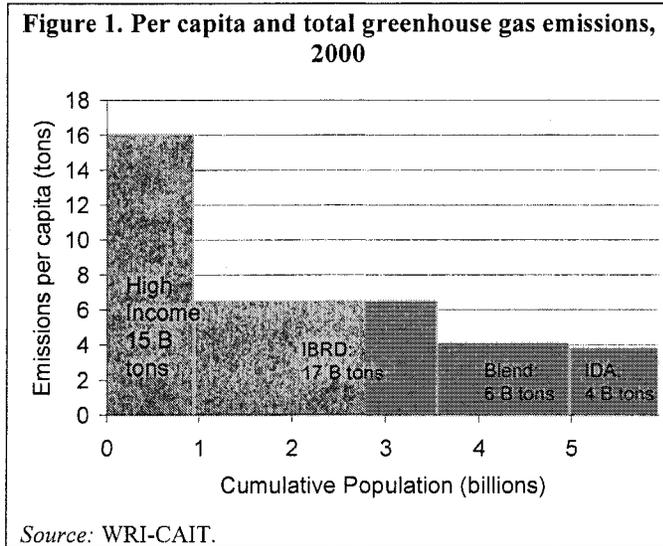
II. THE CHALLENGES: BACKGROUND AND RATIONALE FOR IDA INVOLVEMENT

A. The Development Case for Action on Climate Change

5. **There is now a strong consensus that climate change presents an urgent new challenge to the well-being of all countries—particularly the poorest countries and the poorest people within them.** Recent reports from the Intergovernmental Panel on Climate Change (IPCC) confirm that the globe already is experiencing the effects of climate change through changes in weather patterns and ecosystems.

6. **Most GHG emissions come from industrialized countries and several middle income countries.**

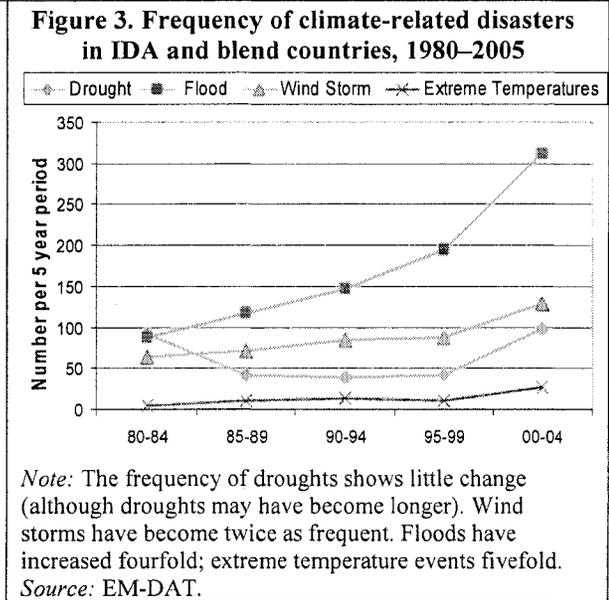
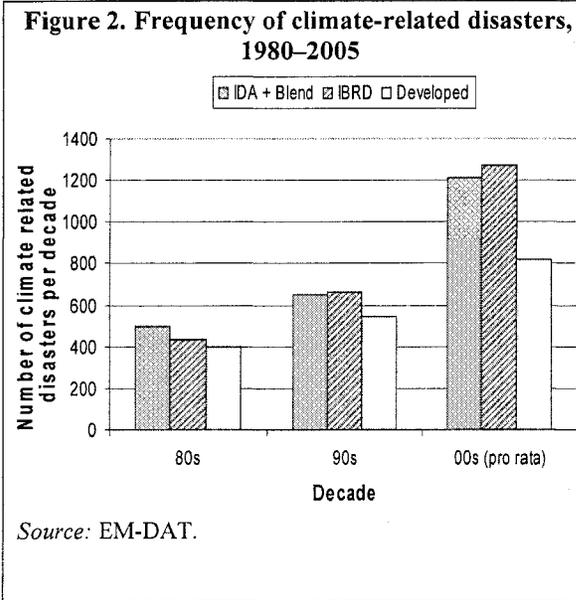
Figure 1 depicts the emissions (total and per-capita) and population of the high-income countries, those eligible for loans from the International Bank for Reconstruction and Development (IBRD), IDA-only countries, and the small group of “blend” countries that are both IBRD- and IDA-eligible. Around the world, and especially in the GHG intensive economies, transformational policies and strategies will be needed to meet national expectations of secure, safe,



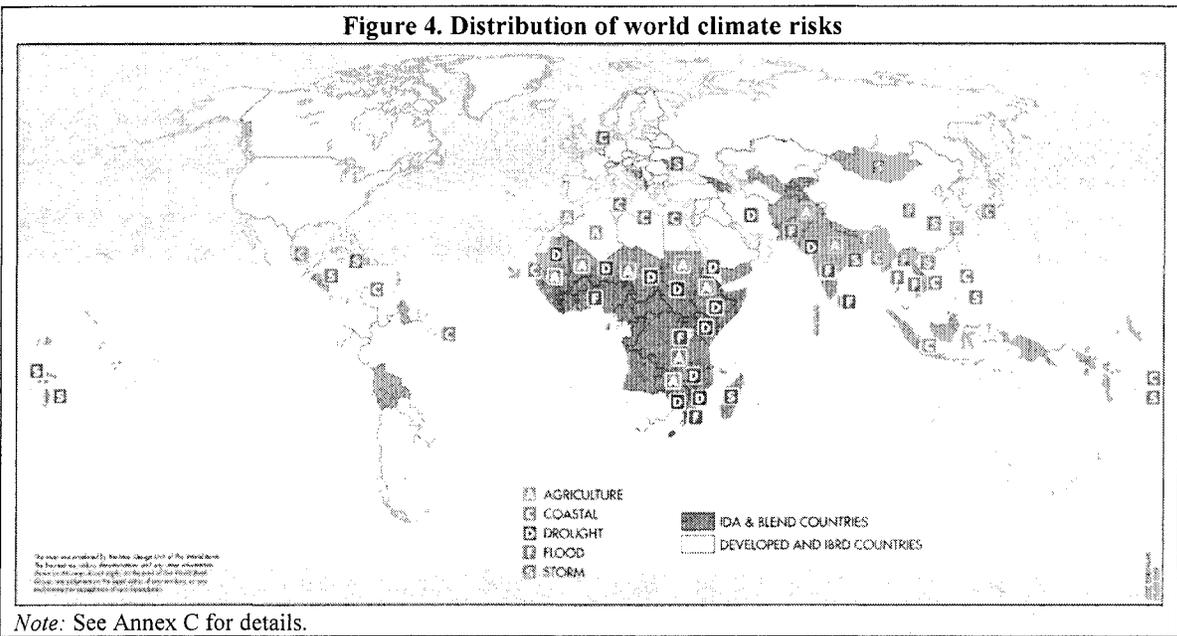
clean and efficiently used energy, sustainable management of forests and natural resources, and managing the impacts of climate change, while sustaining and improving living standards. The burden of action should be consistent with the recognition in the United Nations Framework Convention on Climate Change (UNFCCC) of common yet differentiated responsibilities for coping with climate change.

7. **There is increasing evidence that climate change has increased the frequency of damaging climate events since 1980** (Figure 2). Growing anecdotal evidence of changes in weather extremes is strongly supported by weather observations and by changes in the types of damaging events experienced. WBG clients have taken the biggest hit, with the toughest challenges being faced by IDA countries owing to their lower coping resources. For example, flood events appear to be increasing more rapidly than droughts and wind storms throughout IDA countries (Figure 3). In IDA-eligible countries, 870,000 people have been killed and almost 2.5 billion affected² by a climate-related disaster over the last 25-year period.

² *Affected* means injured, displaced from a home, or deprived of a livelihood for a significant period.



8. **The distribution of major climate-related risks around the world is skewed against poor countries** (Figure 4). Sub-Saharan African countries dominate the list of the most drought-affected and consequently also suffer the largest negative impacts on agricultural productivity. South and Southeast Asia are disproportionately flood-affected. Storms have their greatest effects in the hurricane belt of the Pacific and Indian Oceans, but winter storms in land-locked countries are also important.



9. **The impact of climate change spans multiple sectors and development issues, and IDA countries are at significant risk.** The primary direct effects of climate change are an increase in temperature and slightly increased, but shifting and more erratic, rainfall patterns. This combination leads to an increase in droughts and floods, to more

seasonal peaks in river flow (as snow melts earlier and the buffering capacity of glaciers is lost), and, probably, to stronger tropical storms. IDA-eligible countries are the most vulnerable to risks associated with (a) extreme weather events such as floods, droughts, and storms; (b) rising sea levels and related coastal issues; and (c) changes in agricultural production (Table 1).³

Table 1. Countries most at risk from climate-related threats

<i>Drought</i>	<i>Flood</i>	<i>Storm</i>	<i>Coastal 1m^a</i>	<i>Coastal 5m^a</i>	<i>Agriculture</i>
Malawi	Bangladesh	Philippines	All low-lying Island States	All low-lying Island States	Sudan
Ethiopia	China	Bangladesh	Vietnam	Netherlands	Senegal
Zimbabwe	India	Madagascar	Egypt	Japan	Zimbabwe
India	Cambodia	Viet Nam	Tunisia	Bangladesh	Mali
Mozambique	Mozambique	Moldova ^b	Indonesia	Philippines	Zambia
Niger	Laos	Mongolia ^b	Mauritania	Egypt	Morocco
Mauritania	Pakistan	Haiti	China	Brazil	Niger
Eritrea	Sri Lanka	Samoa	Mexico	Venezuela	India
Sudan	Thailand	Tonga	Myanmar	Senegal	Malawi
Chad	Viet Nam	China	Bangladesh	Fiji	Algeria
Kenya	Benin	Honduras	Senegal	Vietnam	Ethiopia
Iran	Rwanda	Fiji	Libya	Denmark	Pakistan

Note: Bold and grey shaded = high income countries. Light green = IBRD. Non-shaded = IDA-only and blend countries. The typology is based on both absolute effects (e.g., total number of people affected) and relative effects (e.g., number affected as a share of GDP). See Annex C for more detail on the indices used.

a. Meters above the seal level.

b. Winter storms.

- **Agriculture and food security are at stake.** Most projections suggest that agricultural production will fall in tropical and most temperate regions. A recent analysis by Cline (2007) suggests that even if basic adaptive measures are taken (such as changing crop types) global agricultural production will decline by 3 percent by 2080, with an 8 percent *increase* in developed countries offset by a 9 percent decrease in developing countries. Other reviews (e.g., IPCC, 2007) are broadly consistent with Cline's conclusions.
- **Water stress will increase.** Climate change is expected to lead to slightly more precipitation in most parts of the world; however, projected increases in temperature will lead to higher evaporation and often drier conditions. Rain is also expected to fall in fewer, more intense, events, thus increasing the frequency of both droughts and floods. Climate models also project decreasing precipitation in some already dry areas, such as much of northern Africa. In South Asia, earlier snow melt and the loss of glacial buffering in the Hindu Kush-Himalayas will affect the seasonality of water supply for large segments of India's population. The flooded area of Bangladesh is projected to increase by 23–29 percent or more with a global temperature rise of 2°C.

³ The table is purely indicative, as the ranking depends very much on the indices used and on the random nature of climate events even over a 25-year period. However, almost every index shows that IDA countries are disproportionately vulnerable to risks associated with climate change.

The effects of climate change on water resources could significantly affect hydro power in many IDA countries, placing even greater stress on inadequate energy infrastructure. Larger facilities for water storage will be needed in many parts of the world. More erratic river flows will affect water quality and consequently human and animal health. Extreme weather events already threaten vulnerable infrastructure, such as roads.

- **Ecosystem services provided by forests and wetlands are at risk.** Changes in water flows through river systems and from coastal storm surges threaten to destroy many wetlands, with the loss of the filtering and buffering services they provide. Hot, dry conditions increase the risk of wildfires in all types of forest, while warmer and longer growing seasons in mountain forests can lead to population explosions among pests.
- **Coastal areas are vulnerable** from rising sea levels, flooding, storm surges, and stronger winds. Close to 150 million people in IDA countries live less than five meters above sea level.⁴ Flooding from the rising sea level and storm surges will threaten the viability of some islands and major deltas, such as the Nile and Mekong, during this century. The IPCC (2007) projects that sea levels will rise by 20 to 50 cm during this century. There is however large uncertainty about the rate at which the ice sheets of Greenland and Antarctica are melting, so the sea level rise estimate could be significantly exceeded. A one-meter rise in sea level would affect more than 5 percent of mainland Vietnam and severely affect more than 10 percent of the country's population, which is concentrated in its most productive delta areas (Dasgupta et al., 2007).
- **Urban areas face multiple impacts from climate change.** Coastal cities are particularly vulnerable to sea-level rise and storm damage. However, increased flooding from more intense rains and higher peak river flows also present significant inland threats. Failures of sewerage and storm water systems could lead to major disease outbreaks. And, with growing dependence on air conditioning, increasingly frequent heat waves could lead to major losses in productivity and life if power supplies fail. Rural-to-urban migration is likely to increase under climate change, as many rural livelihoods become less viable. To cope with the threats, urban design, building codes, and energy efficiency will need to be reassessed.
- **Patterns of diseases are likely to change, making disease control more difficult.** Climate change also affects human health through increases in heat-stress mortality, tropical vector-borne diseases such as malaria, and urban air pollution (ground-level ozone levels are sensitive to ambient temperatures). Africa, for example, is already vulnerable to several climate-sensitive diseases—among them Rift Valley Fever, which afflicts both people and livestock; cholera, associated with both floods and droughts; and malaria.

⁴ World Resources Institute – Climate Analysis Indicator Tools at <http://cait.wri.org/cait-va.php>.

Warming has already resulted in the extension of malaria to the highlands of Kenya, Rwanda, and Tanzania.

- **The impacts of climate change are likely to affect women and girls more severely.** Women and girls will need to spend more time collecting water and fuelwood and more time caring for sick family members. In addition, because most agricultural work in many IDA countries is done by women, any increased work load is likely to fall on them.

10. **Climate change has the potential to escalate existing tensions, spurring conflict.** While it is important to note that many of the linkages between biophysical hazards and conflict are complex, there is evidence that the scarcity of renewable resources can fuel internal conflict. For example, many observers note that the increasing frequency of drought cycles in Darfur, coupled with differing interpretations of rights of access to water and land among nomadic and sedentary groups, have contributed to the escalation of latent ethnic tensions. In addition to these direct effects, second-order effects may also link climate change to conflict. When livelihoods are negatively affected for some groups, or when masses of people move in response to climate change, conflict can arise, especially in poor and fragile countries.

11. **These negative potential impacts of climate change in IDA countries require appropriate adaptive measures.** Many of these measures are consistent with good development practice and, in particular, with practices that better cope with current climate variability. Proper adaptation policies can improve the local environment, increase resilience to natural disasters, and facilitate the dissemination of innovative technologies. Adaptation policies can also reduce resource scarcity within specific social groups or regions—thereby addressing some of the principal causes of social unrest and violent strife.

B. Dealing with Climate Change – Knowledge and Capacity Needs

12. **Climate change poses a broad challenge for IDA countries and their development partners.** As noted, climate change has implications for many economic sectors. Integrating climate issues into other aspects of development work (by mainstreaming them into strategies for growth and poverty reduction) and defining a common agenda for action will require investments in research and knowledge generation specific to the problems of the least-developed countries, together with institutional strengthening and financing—all within a coherent framework.

13. **Gaps persist in our knowledge of the impact of climate change in IDA countries.** Knowledge gaps are a key impediment to integrating climate risks into development initiatives and major high-value infrastructure investments. Developing-country policy makers and their development partners need to answer important questions. First of all, information on the likely damages at the country, sector, and local levels for a set of climate change scenarios is needed. It is also useful to know how will adaptation unfold at the grassroots level, and how can the process be supported by national policies. Social impacts need to be explored by understanding how the rural and

urban poor will be affected by climate change, how migration within and across borders will take place, and to what extent climate change will exacerbate conflicts. In order to maximize opportunities and minimize costs, governments need to understand what interventions are likely to generate both development and climate benefits, and what the most cost-effective interventions are, and what can be done to ensure that IDA countries have access to needed technologies. Understanding the trade-offs and opportunity costs of different policy options is also important. If IDA finance is to be effective in dealing with climate change, significant investments in knowledge generation will be required to answer these questions—and so provide relevant advice to countries at risk.

14. Strengthening institutional capacity of IDA countries to adapt to climate change will be critical to their sustainable development. Most of the activities required to respond to climate change are consistent with good development practice. However, in many IDA countries the capacity to make and implement the necessary policies is limited. Data from Country Policy and Institutional Assessments (CPIA) show that the policy and institutional capacity of IDA countries is generally weak. Moreover, the CPIA scores for public sector management and policies and institutions for sustainable development in these countries are significantly below their overall scores, showing that these aspects of managing the development process are particularly weak.

15. Efforts to build capacity to tackle climate change will contribute to overall development capacity. Examples include increased water storage, reforestation, better soil management, stronger and more resilient infrastructure, and greater control over disease vectors such as mosquitoes. Provision of a sound enabling environment for private sector engagement in the development and implementation of adaptation technologies is critical to success. Similarly by creating the right incentives and institutions to fulfill their broader development potential, IDA countries will become more resilient to the effects of climate change.

C. Dealing with Climate Change – Financial Needs and Opportunities

16. Scaling up climate change action will require additional financial resources. Climate change will likely impose important costs on IDA countries and especially on their poorest citizens. Stern (2007) estimated that global losses in current per capita consumption owing to market impacts, risk of catastrophes and non-market impacts⁵ ranges from 5 percent to as high as 14.4 percent relative to a scenario with constant climate. While there are as yet no firm estimates of the cost of adaptation, the financial requirements are likely to far exceed the resources available to most low-income countries. Some adaptation efforts will occur autonomously as a consequence of the actions of private agents (e.g., farmers changing cropping patterns), while other efforts will require careful public planning (e.g., construction of large infrastructure). There are however limits to what adaptation can achieve and there will always be residual costs from climate change (e.g. farmers may adopt more drought resistant crops but at the cost of lower annual yields).

⁵ In Stern (2007) estimates, market impacts include those on agriculture, energy use and forestry; non-market impacts include those on human health and the environment.

17. **The global costs of adaptation are likely to increase over time.** Owing to the uncertainty regarding the impacts of climate change and the type and scope of adaptation options needed, it is very difficult to obtain a firm estimate on the global costs of adaptation. What is known is that such costs will be high and likely increase over time, especially if no action to limit emissions is taken. UNFCCC estimates that the additional investment and financial flows that could be required by 2030 for developing countries to adapt to the impacts of climate change could be in the range of \$28-67 billion.

18. **IDA would need additional resources just to keep client benefits from its projects at their ‘without climate change’ level.** IDA’s first priority should be to maintain a steady level of net benefits to clients in the face of climate change. Stern (2007) predicts a range of costs of climate change: the low estimate assumes market impacts only, the medium estimate assumes a higher sensitivity of global climate to GHG emissions, while the high estimate includes both higher climate sensitivity and non-market impacts in the form of damage to human health. Table 2 shows the increase in IDA credits that would be required to maintain the net level of benefits to clients unchanged for each of the Stern climate damage scenarios (Annex B provides the technical basis for these estimates). An increase of \$600 million to \$1.9 billion per year (6 to 21 percent of total FY06 IDA financing) would be required to keep client benefits at their ‘without climate change’ level.

Table 2. Estimated IDA credits needed to safeguard benefits to clients

<i>Current IDA financing: \$9.00 billion (FY06)</i>	<i>Stern Review Damage Estimates</i>		
	<i>Low</i>	<i>Medium</i>	<i>High</i>
Increase in IDA financing to offset projected benefit losses caused by climate damages (\$ bn)	\$0.58	\$1.36	\$1.89
Percent increase in IDA financing	6%	15%	21%

Source: Stern (2007), authors’ estimates. See Annex B for methodology.

19. **In addition to adaptation, efforts to mitigate climate change offer some important opportunities for development.** At least three types of opportunities can be highlighted:

- Mitigation efforts in IDA countries often coincide with income-generating opportunities, including the promotion of clearly defined property rights, the adoption of sustainable land use and agricultural practices, and the use of local indigenous renewable resources for rural development.
- Because of their low levels of energy use and massive energy investment needs, IDA countries are in a position to develop their energy sectors in a lower carbon manner compared to the historical patterns of industrialized countries by using modern technologies, which are cleaner and more efficient, including innovative renewable applications. The carbon finance market offers important funds that can facilitate adoption of these technologies. (See Section II. C).

- GHG emissions mitigation often coincides with reductions in local air pollutants, thus decreasing impacts on human health such as respiratory infections, cardio-pulmonary diseases and lung cancer.

20. **Climate change is imposing itself as a major development issue, but dealing with it must not crowd out other development priorities.** Some countries may be legitimately concerned that the recent emphasis on climate change will shift resources away from the core urgent development issues such as education, health, infrastructure, and poverty reduction. Therefore, the challenge for IDA will be to frame action on climate change—and especially efforts at adaptation—as ways of meeting the core development challenges of IDA countries. Donors and clients should select high-impact climate actions that protect hard-won development gains while generating additional opportunities. While IDA can serve as a platform to ensure that climate action works for development, not against it, IDA would need increased financial resources to effectively play such a role.

III. IDA AND CLIMATE CHANGE TODAY

21. **Before delineating the role of IDA in the next replenishment cycle, a stocktaking exercise is useful.** A consensus on the need to tackle climate change as a multisectoral issue has emerged only recently. Work has focused on building knowledge, building resilience through projects, and addressing recovery after extreme events. However, valuable lessons have been learned recently, and there are a number of actions that could be scaled up as more resources are made available.

A. Adaptation's Track-Record: Building on Experience

22. **IDA countries have begun to build an important knowledge base and experience in dealing with adaptation to climate change.** The least-developed countries are identifying their immediate needs with regard to adaptation to climate change through the development of National Adaptation Programmes of Action (NAPAs)⁶ supported from the Least Developed Countries Fund, managed by the Global Environment Facility (GEF) with guidance from the UNFCCC. NAPAs focus on enhancing the country's capacity to adapt to climate variability, which is expected to help them cope with the adverse effects of climate change. Forty-four IDA-only countries are preparing NAPAs. As of September 2007, 21 had formally submitted their NAPA to the UNFCCC.

⁶ The NAPAs focus on urgent and immediate needs – those for which further delay could increase vulnerability or lead to increased costs at a later stage. NAPAs should: (i) use existing information; (ii) be action-oriented and country-driven; (iii) be presented in a simple format, easily understood both by policy-level decision-makers and by the public. The steps for the preparation of the NAPAs include synthesis of available information, participatory assessment of vulnerability, identification and prioritization of key adaptation measures. The development of a NAPA also includes short profiles of projects and/or activities intended to address urgent and immediate adaptation needs of LDCs.

23. **Adaptation to climate change is regularly identified in Poverty Reduction Strategy Papers (PRSPs).** In recent years, several countries and regions have developed vulnerability and adaptation assessments in their PRSPs, as well as practical policy proposals and strategic implementation plans to address climate change (World Bank, 2003). In the recent Cambodia PRSP II, adaptation to climate change is discussed in connection with sectoral interventions under the Cambodian Adaptation Programme of Action to Climate Change. Vulnerability to natural disasters stemming from climate change is underscored in Dominica’s PRSP. There has been a sharp increase in the number of national PRSPs that address adaptation and mitigation (Table 3). Table A1 in Annex A provides more details on the PRSPs considered.

Table 3. Evolution in the mention of adaptation or mitigation in selected PRSPs

<i>Percent</i>	<i>Adaptation</i>	<i>Mitigation</i>	<i>Both</i>
Interim	9	27	0
PRSP I	46	73	46
PRSP II	73	91	73

Note: the information is based on countries that have completed an interim PRSP and two full-sets of PRSP.

24. **The Bank’s analytical work is helping to build knowledge on adaptation.** Among the important issues being researched in analytical work underway at the World Bank are the implications of projected changes in climate on water resources and agricultural productivity, comprehensive risk-mitigation strategies, and cost-effective forms of adaptation to climate change. Selected examples of country-level or regional analyses of different aspects of the adaptation problem in low-income countries include:

- The “Overcoming Drought” and “Thirsty Farms, Flooded Fields” studies, which explored the impacts of climate change on rural communities in India, and subsequently spurred the Andhra Pradesh Drought Adaptation Initiative to support adaptive actions by community-based organizations.
- “Adaptation to Climate Variability and Change”, which explores the implications of projected changes in climate on Nepal’s water resources, with special emphasis on agriculture and livelihoods.
- “Managing Environmental Risks in Sub-Saharan Africa”, which places climate change in the context of other development risks in Kenya, Tanzania, and Ethiopia, while providing support for risk identification and prioritization of risk mitigation measures.
- A global study with particular focus on Sub-Saharan Africa and South Asia, entitled “Adaptation to Climate Change for Agriculture and its Supporting Natural Resources Systems,” which identifies: (a) key challenges to adaptation within agricultural and natural resource systems; (b) good adaptive practices; and, (c) means of communicating timely and effective guidance to development practitioners and policy makers.
- “Regional Climate, Water, and Agriculture: Impacts on and Adaptation of Agro-Ecological Systems in Africa,” a study by the Bank’s Africa region, which examines the physical and economic effects of climate change in 11 African countries.

- “Climate Change and Rural Poverty in Latin America”, which examines the economic impacts of climate change on agricultural productivity and the livelihoods of the poor in seven countries of the region. The study also assesses adaptation measures undertaken by farmers.

25. **A growing number of projects explicitly recognize the challenges posed by climate change and tackle the issue with specific adaptation components** (Table A2, Annex A). Examples include:

- The Kenya Arid Lands Resource Management Program with co-financing from the Special Climate Change Fund administered by the GEF, is designed to improve the use of information on climate variability and long-term climate trends for the purpose of increasing the sustainability of rural livelihoods.
- The Kiribati adaptation project and the Caribbean regional project on adaptation measures in coastal areas of Dominica, St. Lucia and the Grenadines (funded by both GEF and the World Bank) are designed to identify development issues linked to climate change and to design cost-effective adaptation solutions.
- The Madagascar technical assistance program on adaptation and risk management, described in Box 1, focuses on improving risk assessment tools and information gathering.

Box 1. Adaptation and risk management in Madagascar

Madagascar is exposed to a variety of natural hazards, including seasonal cyclones, floods, and droughts that have a severe impact on the national economy, rural development, and public finances. These climate-related effects are expected to be exacerbated by climate change. The World Bank began to provide technical assistance on adaptation and risk management in October 2006, focusing on national capacity building and the links between adaptation and hazard risk management. Better management of current-day natural climate hazards was seen as the best strategy, while at the same time taking into account the long-term climate changes underway. Areas addressed by the program include:

- Developing long-term meteorological trends for the 22 regions of Madagascar, and long-term projections of climate change. Maps of historical and future trends of climate change will be produced for each of the regions, covering the periods of 1960–2005 and 2000–2100.
- Cyclone trend maps extending over 200 years reveal changes in the probability of hurricane-strength cyclones as a consequence of climate change.
- Rice is the most important crop in Madagascar, but climate change may cause shifts in the most suitable areas for its cultivation—a phenomenon studied using agro-climatic modelling.

Through more systematic risk assessment and modeling, this work provides sound information on climate patterns and weather hazards to support ongoing activities in risk management, risk transfer, and climate change adaptation.

Source: World Bank.

26. Other adaptation efforts are implicit in a large number of projects that contribute to increased resilience, for example, by augmenting the capacity for water storage (water infrastructure investments) or improving the adaptation response of social groups and

communities (through community-driven development (CDD) projects). These projects and programs, while not necessarily designed specifically to deal with climate change, offer experiences that could be scaled up to strengthen IDA's work adaptation to climate change—if additional resources were made available. A detailed list of the growing and evolving set of IDA project examples capable of advancing adaptation appears in Annex A, Table A3.

27. IDA has played a leading role in disaster response and in addressing the challenge of displaced populations. Disaster response projects focus on both physical and social rehabilitation. For instance, the Flood Emergency Recovery project helped Mozambique maintain its macroeconomic stability after the floods of 2000. The program resettled more than 40,000 families to less flood-prone areas. Using IDA's resettlement framework, community inputs assured that policies on housing and land access were appropriately designed and implemented. In other countries, IDA's resettlement and post-conflict work has yielded solutions to aid people displaced by natural disasters and conflict, based on lessons from IBRD and IDA countries alike.

28. IDA has supported increased capacity of national safety nets to respond better and faster to disaster events. Effective safety-net responses have been crucial in avoiding post-disaster famine and helping affected households and communities to recover from disaster. For example, the World Bank's South Asia region works with the Global Facility for Disaster Reduction and Recovery (GFDRR) to improve the capacity of South Asian countries to systematically provide support to households affected by disasters (Box 2 provides more details about the GFDRR). In Nicaragua, IDA, together with bilateral donors, supports an innovative pilot program that combines conditional cash transfers with additional transfers aimed at increasing the income-generating capacity of poor rural households exposed to weather risks.

Box 2. The Global Facility for Disaster Reduction and Recovery

The Global Facility for Disaster Reduction and Recovery (GFDRR) is a unique long-term global partnership under the United Nations International Strategy for Disaster Reduction system, aimed at reversing the trend in disaster losses by 2015. It operates on three tracks: (i) global and regional advocacy, partnerships, knowledge management, and standardization of disaster risk management tools, (ii) country-level programs on institutional development, innovative hazard mitigation projects, and learning, research and knowledge management, and (iii) a standby recovery financing facility for low income countries stricken by natural disasters, to be implemented through IDA.

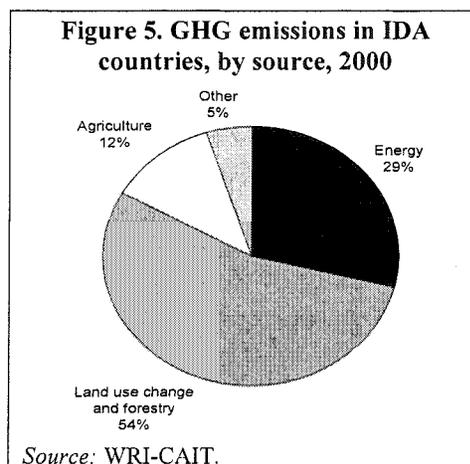
Example programs under the GFDRR discussed with countries to date include: In Vietnam work on index-based flood risk insurance, sub-national government capacity building, and review of infrastructure building codes; in Nepal preparation of a national hazard risk assessment, a 'Glacial Lake Outburst' study, development of an earthquake safety programme and a review of the government's emergency response capacity; in Mozambique, the establishment of a national contingency plan for natural disasters and strengthening the capacity of the National Meteorological Institute to predict extraordinary weather patterns; in Nicaragua, preparation of a detailed risk profile, by type of risk, type of asset and geographic location, and a review of economic capacity to respond to disasters; and in Malawi, mainstreaming disaster risk reduction into country planning processes, especially into CAS, improved weather risk management, contingency planning, and strengthening the national meteorological services.

29. **IDA has enhanced communities' capacity to adapt to changing environmental conditions through community-driven development initiatives.** For example, by using the participatory structures created by the Malawi Social Fund, the Malawian government was able to quickly channel resources to communities affected by drought. The participatory structures also allowed citizens to identify, and channel funds to, their most urgent priorities. Similarly, the Western Kenya CDD and Flood Mitigation Project used participatory decision-making structures to enhance communities' capacity to overcome persistent flooding and generate additional income to carry them through difficult times.

B. Securing Energy Access and Exploiting Low Carbon Opportunities

30. **The WBG's endorsement of the Clean Energy Investment Framework (CEIF) in 2006 has been instrumental in maintaining energy access as a top priority in IDA countries.** The focus of the CEIF has been to increase the access to energy for growth (particularly in Sub-Saharan Africa), support the transition to low-carbon development, and advance adaptation to climate change (World Bank, 2007). The WBG's energy lending increased from an annual average of \$2.3 billion between FY03 and FY05 to reach an annual average of \$4.2 billion between FY06 and FY07. Energy financing to IDA countries has also increased significantly, from an annual average of \$0.9 billion between FY03 and FY05 to an annual average of \$1.8 billion between FY06 and FY07⁷. Lending to Sub-Saharan Africa (SSA) has also increased rapidly, practically doubling between the two periods. WBG financing to SSA countries was on average \$0.9 billion in FY06-FY07, up from \$0.5 billion in FY03-FY05 (Annex A, Table A4). Projects in FY07 include the IDA-supported (\$296 million) Regional and Domestic Power Markets Development project for the Democratic Republic of Congo. The project, critical to the future development of regional energy trade in southern Africa, will leverage a total investment of \$500 million for hydropower capacity rehabilitation, transmission, and distribution to areas lacking electricity.

31. **Although adaptation and access to energy are the main priorities, finance to mitigate climate change offers additional opportunities in IDA countries.** IDA countries contribute the least to GHG emissions (Figure 1). For that reason, IDA's resources are best spent on adaptation and energy access. But the mitigation of climate change is not irrelevant for IDA's low-income clients. Mitigation financing can provide income generation opportunities, access to energy and cleaner environment. For example, because GHG emissions from IDA countries stem mainly from land use changes and deforestation (Figure 5), direct mitigation efforts in IDA can go hand in hand with sustainable land management



⁷ This number excludes IFC regional projects as it is not possible to estimate share of funds going to IDA countries within a region.

operations while providing adaptation benefits. The GEF, bilateral donor agencies, and the emerging carbon market offer valuable resources for IDA countries.

32. **A major mitigation opportunity in IDA countries arise from the development of low carbon energy.** IDA's low-carbon energy portfolio has been growing steadily, albeit with significant year-to-year variation in total commitments that reflect the extreme "lumpiness" of energy projects (Annex A, Table A5). Given their low levels of access to modern sources of energy, IDA countries have an opportunity to leapfrog to cleaner technologies and in the process obtain additional benefits from lower energy costs and increased efficiency. But successful leapfrogging depends on improvements in countries' institutional capacity to acquire such technologies and use them well (Box 3).

Box 3. The World Bank Group's Lighting Africa program

Lighting Africa, a WBG program initiated by the IFC, will increase access to modern lighting services in many IDA countries in Sub-Saharan Africa, beginning with Kenya, Ghana, Tanzania and Zambia. The program works, among other things, by supporting market research, tightening links between lighting industry and local service providers, financing suppliers and end-users. The program recently received the funding it needs for full-scale operation. Its goal is catalytic: to mobilize the private sector to reach 250 million "energy-poor" customers by 2030 with low-cost, reliable, affordable lighting services in support of achieving the Millennium Development Goals. Lighting Africa has four objectives: (a) improved low-cost lighting technology and product innovation; (b) strengthened private sector capacity in manufacturing, marketing, and distribution; (c) greater affordability; and (d) reduced transaction costs while mitigating risks. Through these activities, Lighting Africa aims to help offer superior alternatives to consumers in Africa who presently spend \$40 billion annually on costly and inefficient fuel-based lighting products, notably kerosene lanterns, that provide light of poor quality while generating significant indoor pollution. Lighting Africa focuses on promoting broader use of technologies such as light-emitting diodes and solar lanterns. By aggregating use of such products the project aims to generate carbon credits under the Clean Development Mechanism. The program is designed to facilitate the entry of efficient lighting programs as a WBG lending product, starting in FY08. Lighting Africa is also supported by about \$8 million in contributions from the European Union, the GEF, the Energy Sector Management Assistance Program, the Public-Private Infrastructure Advisory Facility, Norwegian Trust Funds, the Government of Luxembourg, and the Renewable Energy and Energy Efficiency Partnership.

Source: World Bank and IFC.

33. **The International Finance Corporation (IFC) is supporting the development of clean energy activities across IDA countries,** with assistance in some cases from advisory assignments and donor trust funds. IFC is preparing projects, conducting analysis, and considering financing for various investments in climate change mitigation, including expansions of geothermal energy (in Ethiopia, Nicaragua, and Kenya); wind energy (in Mongolia, Kenya, and Honduras); hydroelectric power (Nepal, Sri Lanka, Guyana, and Cameroun); and biomass energy (in Nicaragua and Haiti). IFC is also involved in evaluating off-grid rural electrification using renewable energy sources in pilot projects in Cameroon and Uganda.

34. **Investments in mitigation opportunities have been seized without compromising other IDA investments and by tapping financial flows from other sources, especially carbon finance mechanisms.** Annex A Table A6 presents examples of energy projects in IDA countries with carbon offset objectives. These range from sustainable production of forest products in Moldovan rural communities (Box 4) to

small hydropower projects in Honduras. As of August 2006, of the 118 carbon-offset projects financed by the World Bank's Carbon Finance facility, 42 were in IDA countries.

Box 4. Development and climate-change mitigation in Moldova

The Moldova Soil Conservation project is an example of how the Bank's Prototype Carbon Fund can be used to promote projects that sequester carbon, restore degraded lands, and sustainably enhance supplies of forest products to local communities. The project is reforesting 20,000 hectares of degraded and eroded state-owned and communal agricultural lands throughout Moldova. Initiated in 2002, the project is expected to sequester about 1.07 million tons of carbon dioxide equivalents by 2012 and about 2.22 million tons by 2017. The additional funds provided by carbon finance overcame the financial constraints of the state forest agency and local councils, which had been an impediment to investment.

The project will prevent soil erosion, restore the degraded lands, and improve their productivity. The newly forested area will produce fuelwood, timber, and nontimber products to meet the needs of rural communities. Social benefits include the creation of local employment for both men and women through planting, weeding, tending, thinning, protection, and harvesting of tree species. Several biodiversity benefits are also expected from the restoration of habitats. The active cooperation and involvement of the local councils that own about half of the land under the project will ensure sustainable management of the forested lands.

Source: World Bank.

35. **IDA also has a number of projects dealing with forestry, methane capture, gas flaring, sustainable land management, and potential biofuels.** Rural development policies and projects in IDA countries, such as the promotion of sustainable land management and agricultural practices, often coincide with mitigation objectives. Investments in these areas are producing new income and welfare benefits, thus meeting both climate and growth objectives. The Community Development Carbon Fund is explicitly designed to bring the benefits of carbon finance down to community level. Since more than half the emissions from IDA countries are from land use, land use change and forestry (LULUCF), climate change mitigation through reduced emissions from deforestation and degradation (REDD) is of tremendous interest to many IDA countries. The newly established Forest Carbon Partnership Facility (FCPF) will respond to this interest by facilitating the development and testing of mechanisms to reward avoided deforestation. Similar benefits will originate from the GEF's Sustainable Forest Management (SFM) program and the LULUCF programming to reduce GHG emissions. As another example, a study entitled "Using *Jatropha Curcas* (Physic Nut) as an Energy Crop for Land Rehabilitation and Enhancing Biofuels Energy in Kenya" analyzes the formulation of a biofuel strategy, action plan, and policies related to the improved management of the *Jatropha* crop for the economic development of the country, with major interventions in arid and semi-arid lands.

IV. THE ROLE OF IDA UNDER IDA15

36. While IDA and other development partners have been gaining valuable experience on increasing climate change resilience, as seen in the previous section, the issue going forward is how to scale up climate interventions at least cost. One option might be the use of specialized climate funds. But climate change is inherently a

development issue and mainstreaming climate change interventions into development programs will likely be the most cost-effective way to deal with the problem.

A. IDA's Comparative Strengths

37. **IDA's primary focus on growth and poverty reduction can increase climate resilience by diversifying economies.** Growth leads to more diversified economies, which are inherently less vulnerable to climate change. IDA has an opportunity to create a 'virtuous circle' on climate change—greater IDA resources lead to economic growth and diversification, which lead to greater climate resilience.

38. **Climate change interventions should build upon the core strengths of IDA's "platform",** which are crucial to implement specific actions to deal with climate change in client countries:

- *Multisectoral perspective.* Climate change affects many sectors – agriculture, water, energy, infrastructure—and IDA is active in all these sectors.
- *Financial resources and leveraging power.* Dealing with climate change will require extra financial resources, which IDA could provide. In addition, IDA credits leverage financial resources from other sources, including the private sector, thereby helping to maximize development impact.
- *Knowledge base and policy advice.* Advisory and analytic activities at the World Bank, including a growing research program on climate change and clean energy housed in the Development Economics Vice Presidency, provide important knowledge to support IDA operations.
- *Convening power, global reach, and local presence.* The World Bank's convening power will be important in achieving collective action on climate change. IDA collaborates closely with other development agencies across the globe and applies lessons learned from IBRD countries to the low-income-country context. Sector staff in local offices can tap this global knowledge.
- *Strong fiduciary, environmental, and social safeguards.* The WBG ensures that all its lending operations (including those on adaptation and mitigation) are in line with its fiduciary, environmental, and social safeguards.

B. IDA's Country-Based Model

39. **Countries vary widely in their development priorities and climate risks.** Many climate risks are region-specific and it will be important to tailor country programs to deal with these risks. IDA's country-based model can ensure that climate interventions will meet country development priorities.

- **In SSA, agriculture and water storage are crucial to sustain the region's poverty reduction efforts.** An agricultural adaptation work program should include assistance to farmers in optimizing crop patterns, the development of

risk management mechanisms and the provision of timely disaster relief. Several African countries have the potential to make significant progress in water resources management. Important lessons can be learned from the recently approved *Niger Basin Water Resources Development and Sustainable Ecosystem Management Project*. The project is promoting regional integration by providing a platform for policy harmonization in the Niger Basin.

- **Preparedness and adaptation measures against sea-level rise will be essential in East Asia and the Pacific (EAP).** IDA is in the position to provide natural disaster planning and recovery to many of its clients in EAP. For example, through the Kiribati Adaptation Program, the Bank is helping this island to adapt its economic development plans and actions in ways that will make the economy more robust to sea level rise and greater storm frequency and intensity. IDA can scale up impact analysis. Pacific Island countries that plan ahead and act early to avert the impacts from climate change related and other natural disasters, will do far better in the long term than those countries that wait for disasters to hit and then repair the damage.
- **Europe and Central Asia (ECA) provide important opportunities for low carbon developments.** IDA countries in ECA have in general high levels of access to energy, compared to their peers in other regions. Yet, they fare poorly in terms of efficiency. There are many synergies between improving efficiency, reducing emissions and pursuing local growth. But there will be also many trade-offs. IDA's role in supporting high-carbon development projects, such as lignite power plants, oil pipelines, or highway construction will need to be defined and mainstreamed in the overall set of actions on climate change. On the adaptation front, different IDA countries in ECA face a variety of increased climate-related shocks (floods, heat waves, storms), as well as water stress. Investments in infrastructure (e.g. water storage and irrigation, power and communication lines) will be required in addition to hazard management.
- **The increasing frequency and intensity of hurricanes and glaciers retreat in the Andes require disaster preparedness and water resources management in Latin American and the Caribbean (LAC).** Countries in this region will benefit from capacity building and financial resources to enhance meteorological observation networks, strengthen the information systems and the national communications process on climate related shocks. Risk management tools offer great opportunities. The Caribbean Catastrophe Risk Insurance Facility (CCRIF), for example, will provide participating governments from the Caribbean region with immediate liquidity, if hit by a natural disaster such as a hurricane or earthquake. By pooling their risks together, participant countries will save approximately 40 percent over individual premia.
- **Enhancing water storage in Middle East and North Africa (MNA) is paramount.** Yemen and Djibouti are the only IDA countries in MNA, yet the

nature of the challenges they face span across different sectors: water storage (Yemen), fisheries resilience (Djibouti), sea-level rise (Djibouti). The issue of groundwater in Yemen merits particular attention, as the country has some of the most pressing water resource problems in the world. The impacts are resulting in major economic stress and social conflicts. In Djibouti, IDA has an on-going lending to help rehabilitation after major flooding. Experience learned from current interventions can be scaled up to provide important learning as IDA work to "climate proof" new activities (e.g. the upcoming Djibouti urban poverty loan).

- **Actions in South Asia (SAR) will encompass the strengthening of agriculture resilience and adaptation to glaciers' retreat.** Improved climate risk management offers a low-cost opportunity for deriving greater benefit from existing land and water resources through better use of knowledge already gained. There are trade offs: changes in farming systems may compensate for some yield reductions, although additional inputs such as fertilizers and increased irrigation may be needed, involving extra costs to the farmers. By developing monitoring and information systems, IDA can help Himalayan countries (such as Pakistan and India) to fill important knowledge gaps and develop climate inventories and assessments with respect to glaciers' retreat. As analytical work takes place (e.g. the current *Climate Change Risks Assessment in High Altitude Countries project*) insight can be gained to improve the institutional set up for screening and policy interventions.

40. **IDA also has a major role to play in large blend countries such as India and Pakistan.** Responding to the need to improve sustainable water development and management of water resources, watershed development projects can increase the productive potential of selected watersheds and their associated natural resource base, while strengthening community and institutional arrangements for natural resource management. Adaptation to climate change can be facilitated by preventing and/or controlling land degradation via restoration of degraded (agricultural and forested) lands and biomass cover. Important lessons can be drawn from the ongoing *Karnataka Watershed Development Project* and the *India Sustainable Land and Ecosystem Management Country Partnership Program*.

C. Actions Under IDA15

41. **A clear general principle for IDA involvement in climate change is that any climate interventions financed by IDA should be competitive with alternative development investments after any subsidy is taken into account.** This principle helps ensure the compatibility of adaptation projects with IDA's core poverty reduction mandate. For climate mitigation the question of IDA's role is more complex. Some projects (reforestation, or improving land management, for example) may yield competitive net benefits while simultaneously mitigating greenhouse gas emissions. Other projects, such as 'clean' energy investments, may yield lower net benefits compared with 'traditional' energy projects—in these cases, however, a subsidy provided by carbon finance may make the clean project competitive with the traditional one. In

addition, some investments may yield less tangible benefits, such as access to new technology, which are nonetheless valued by developing countries.

42. **An effective program of climate interventions under IDA15 will span knowledge creation and dissemination, policy dialogue and country strategy, and investment in innovative development projects.** With adequate funding IDA would be in a position to mobilize its comprehensive platform to provide financing for climate change solutions. Actions under IDA15 should focus on the following:

- *Expanding analytical work on climate change.* Analysis will be needed at multiple levels: (i) country climate risk assessments to help prioritize across countries, (ii) in depth assessments of adaptation and mitigation needs within countries, and (iii) screening of projects for climate risks.
- *Mainstreaming climate actions in country assistance strategies (CASs) by responding to country priorities.* IDA will need to include climate change in the country policy dialogue and to assist client countries in defining climate interventions in the context of country needs and priorities.⁸
- *Integrating adaptation and mitigation actions in IDA investments.* Based on analytical work and country priorities as expressed in the CAS, IDA will need to finance projects spanning technical assistance (TA), specific investments, and development policy loans (DPL) to deal with climate change.
- *Scaling up disaster preparedness and developing innovative insurance products.* IDA investments in disaster preparedness must include prevention, response, and recovery. These investments must be complemented by the development of insurance products such as weather-indexed insurance for small scale agriculture – Box 5 provides an example from Malawi.
- *Leveraging GEF and carbon finance to increase access to new technology.* IDA investments in clean energy and other mitigation projects can benefit from subsidies provided by carbon finance. These investments can form an important pathway for low income countries to access new technologies.

⁸ Climate change is being addressed with increasing frequency in IDA CASs (Annex A, Table A7).

Box 5. A promising approach to weather risk insurance in Malawi

Bad weather and other catastrophic natural events often hobble developing countries, exerting especially severe effects on low-income and rural households.

In Malawi, IDA is working with the government and other development agencies to use market-based tools to hedge the drought risk in agricultural production. Malawi's GDP, together with the income of a substantial portion of the population, relies heavily on agriculture. Drought-related shocks to agricultural production (most recently in 2005 and 2006) continue to lock family farmers into a poverty trap and have prevented the country from reaching its productive potential. Together with the World Bank's Treasury and the Commodity Risk Management Group, IDA is exploring the feasibility of supporting a weather derivative contract in Malawi, either as an intermediary or guarantor, with private-sector insurance providers. The ultimate goal is to have Malawi and other IDA countries buy drought insurance contracts directly on the market, based on a multiyear track record intermediated by IDA. For such drought insurance to work, however, rainfall volumes need to be independently monitored. Malawi has 23 weather stations with long historical records and few missing data points, which would enable effective drought monitoring in any given period.

Source: World Bank and IFC.

43. IDA climate activities will generate a number of knowledge and financial assistance outputs, including:

- Cross-country climate risk assessments
- In-depth country assessments of adaptation and mitigation needs
- Project screening for climate vulnerability in high-risk countries
- CASs in high-risk countries incorporating significant climate interventions in the form of analytical work or projects
- TA, investment or DPL operations containing significant climate components
- Disaster preparedness/climate risk insurance operations in high-risk countries
- Carbon co-finance in IDA operations

Management will report on progress in IDA climate change activities through annual reports as well as during the IDA15 Mid-Term Review. Given the country-specific nature of these activities, it would not be appropriate to set across-the-board targets for the quantity of analytical work carried out or the number of operations incorporating climate components.

44. The country-based assistance for adaptation will need to be complemented by global and regional efforts. IDA's development platform can provide assistance on a scale that could make a significant difference, bringing the private sector into the effort and accelerating technology transfer. IDA cannot do this alone. It can partner with specialized organizations, such as the World Meteorological Organization, in the provision of information services (e.g. monitoring, forecasting and dissemination of knowledge about the impacts of climate change) and assist in the application of this knowledge at the country level. IDA could also work with the Consultative Group for

International Agricultural Research (CGIAR) and other centers to ensure that research on increasing the climate resilience of agriculture (e.g. improved crop varieties, better technologies) and on methods to combat land degradation and erosion is applied in the field. These efforts would reduce the cost of adaptation for both governments and the private sector.

V. STRENGTHENING THE CLIMATE CHANGE AID ARCHITECTURE

45. In the context of increasingly complex global aid architecture, climate change adds a new development dimension and an additional challenge to aid effectiveness. IDA has made substantial efforts with other multilateral development banks (MDBs), and other donors, to establish common processes and procedures, or other understandings to enhance collaboration, reduce transaction costs for clients, and thus increase its effectiveness at the country level. A companion paper on alignment and harmonization has also been prepared for the Dublin meeting of IDA15.⁹ The goal of coordinated action on climate change is shared by many development partners and was first reflected in a joint paper on poverty and climate change, issued by 10 multilateral and bilateral development agencies in 2003.¹⁰ Such collaboration is essential to achieve broad country coverage and effectiveness at the country level.

46. Harmonizing adaptation efforts will be crucial going forward. IDA's country-based model, in combination with the efforts of other development agencies, provides a strong potential for advancing efforts in a harmonized way. Specialized, or 'vertical'¹¹, funds dedicated to climate change, such as the GEF, carbon finance, as well as bilateral donor funds, have been particularly useful for launching climate change related initiatives (Table A8 in Annex A highlights the resources available to IDA countries to address climate change). Going forward, the proposed Adaptation Fund, to be derived from a 2 percent tax on Clean Development Mechanism (CDM) transactions, offers an important opportunity for the adaptation work. As suggested in the preceding section of the role of IDA, however, the most effective strategy for development partners to deal with climate change is to fully integrate climate change actions into their core development business.

47. On the mitigation agenda, there is a longer track record on donor harmonization. As seen in section III.B, IDA plays an important role in linking

⁹ See "IDA's Role in Enhancing Country-level Effectiveness: Strengthening Harmonization and Alignment", 2007.

¹⁰ Poverty and Climate Change – Reducing the Vulnerability of the Poor Through Adaptation. Prepared by: AfDB, ADB, DFID, EC, Germany, the Netherlands, OECD, UNDP, UNEP, World Bank. 2003. Recognizing climate change as a serious risk to poverty reduction that threatens to undo decades of development efforts, the authors argue that integrating adaptation into development planning is fundamental to achieve the MDGs, including the over-arching goal of halving extreme poverty by 2015, and sustaining progress beyond 2015.

¹¹ Vertical funds are defined as partnerships and related initiatives whose benefits are intended to cut across more than one region of the world and in which the partners: (a) reach explicit agreement on objectives; (b) agree to establish a new (formal or informal) organization; (c) generate new products or services; and (d) contribute dedicated resources to the program. In other words, global programs focus "vertically" on specific issues or themes, in contrast with the "horizontal" approach of the country-based model of aid.

mitigation to key development objectives, such as access to energy and air quality improvements. On the important question of building opportunities for carbon finance in Africa, the Nairobi Framework helps to coordinate the activities of the different development institutions (Box 6).

Box 6. The Nairobi Framework

In November 2006, the Nairobi Framework (NF) was established as an interagency capacity-building mechanism focusing on developing the carbon market in Africa. Partner agencies participating in this framework are the World Bank, United Nations Development Fund (UNDP), United Nations Environment Programme (UNEP), African Development Bank, and UNFCCC. Its aim is to substantially scale up the participation of Africa in the carbon market through improved coordination and increased funding.

The Framework partners have conducted a mapping exercise to identify potential overlaps in current work and opportunities for synergy. The World Bank also has undertaken an Africa-wide assessment of potential carbon mitigation projects. The partners have also agreed on a number of coordination measures for sharing and enriching capacity-building activities.

The World Bank has accordingly launched project identification and preparation activities in 16 countries and signed several emission reduction purchase agreements, especially via the Community Development Carbon Fund (CDCF). A notable project in this area is the 85 MW geothermal project in Kenya.

Capacity-building programs under Carbon Finance (CF)-Assist have also been launched in nine African countries, with a principal focus on CDM project portfolio development and institutional strengthening.

Source: World Bank.

48. Owing to the presence of multiple stakeholders a clear division of labor is essential to maximize the benefits from cooperation. Through the country-based model IDA supports a platform for the broader delivery of aid by all development partners. IDA's ability to provide a platform for others does not mean, however, that it plays a leading role among donors in every sector or country. Determining when IDA takes the lead or follows will be done by looking at each stakeholder's comparative advantage:

- *GEF continues to be essential in meeting local incremental costs of global public goods.* GEF has been at the core of climate change activities of UN agencies and MDBs in the past 15 years. The GEF continues to be an important partner for IDA in addressing climate change (see Box 7 for two important examples of GEF's engagement). GEF funding is necessary to meet the incremental costs associated with the global benefits of climate mitigation actions. The GEF is now moving to support a more programmatic approach to investment in many areas. This is important for IDA countries since the resource allocation framework (RAF)¹² provides them with small GEF allocations. In adaptation, which is not subject to the RAF, programmatic approaches can achieve greater cross-sectoral integration between the GEF's priorities, such as adaptation, biodiversity, land degradation, and wider development goals.

¹² The Resource Allocation Framework (RAF) is the system adopted by the GEF Council in September 2005 to allocate GEF resources to recipient countries based on global environmental priorities and country-level performance.

Box 7. Two GEF programs in IDA countries: TerrAfrica and the Pacific Alliance for Sustainability

The TerrAfrica Partnership is based on a cross-cutting, cross-sectoral approach through the connectivity and linkages between the three pillars – (a) investments, (b) research and strategy, and (c) dissemination and partnerships – with the four thematic areas, all of which guide and improve the quality and efficiency of one another. TerrAfrica includes a climate-risk management element that is supported by GEF's Strategic Investment Program.

Small Island Developing States are particularly vulnerable not only to sea level rise, but also to changes in storm paths and droughts related to climate change. With support from the GEF, the Bank is assisting in the formation of a Pacific Alliance for Sustainability to develop strategic investment programs on: Biodiversity; climate change mitigation and adaptation; international waters; and cross-cutting issues integrated across sectors such as land and water management. Amounting \$US 100 million, the Alliance will provide an opportunity for building consensus, consolidating partnerships, sharing learning and harmonizing strategies among participants. Through these activities, the Alliance is expected to build the basis for better targeted IDA support and donor coordination.

Source: World Bank and GEF.

- *UN agencies have a comparative advantage in fostering capacity building at the country level:* Over the past years, and thanks to GEF resources, IDA has forged important partnerships with other UN agencies, in particular the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP), in capacity building and strengthening of environment institutions. The World Bank has cooperated with the UNISDR (United Nations International Strategy for Disaster Reduction) to harmonize approaches to disaster risk reduction and adaptation to climate change leading to a four country comparative study and workshop on the finding.¹³ Currently, a Vulnerability and Adaptation Resource Group (VARG), coordinated by the World Bank, brings together experts from multilateral and bilateral donors, UNEP and UNDP to share knowledge and experience in promoting adaptive actions.
- *MDBs can expand the reach of climate change actions in a way consistent with the country-based model.* As joint activities are scaled up, MDBs are in the process of upgrading their knowledge base and staff capacity in identifying and preparing adaptation activities. Like IDA, the AsDB, AfDB, and IDB are now expanding their knowledge in operational programs, and developing tools for assessing development projects and programs for potential sensitivities to climate change. In addition, many of the MDBs are undertaking a series of country, regional, and sector studies to build a body of good practice guidance on managing climate risks. The AsDB is working with the World Bank on an initiative to assess the impacts of climate change in several large Asian coastal cities in terms of local and national economic growth, as well as regional and global economics. The AfDB is undertaking a study on the Impact of Climate Change on the Gambia River Basin. In addition, there is a proposal to extend such a study to cover all the River Basins in Africa.

¹³ World Bank. 2005. *Disaster Risk Management in a Changing Climate*. World Bank Discussion Paper.

- *The private sector can provide solutions to climate change issues. An important role of IDA is helping create the appropriate business environment. Though challenging in IDA countries, increased private sector engagement will be critical for successful action on adaptation and mitigation. IFC can play a catalytic role in leveraging private capital and broadening the role of the private sector in addressing climate change in IDA countries. This will be done through IFC's own investments engaging local and international private sector partners, resource mobilization using Trust Funds and other financing vehicles, together with focused advisory assignments, and technical assistance programs with capacity building components. A priority task for IFC is the further development of innovative financing mechanisms, designed to promote market-based solutions and private investments (see Box 8 for an example).*

Box 8. IFC partnering with the private sector to provide infrastructure

In collaboration with IFC, IDA can scale up private sector's engagement in climate change issues. Two recent initiatives illustrate this.

In September 2007 the Board approved the allocation of USD 100 million to the Global Infrastructure Project Development Fund ("IFC-Infra Ventures"). The creation of the Fund would extend IFC's activities in IDA countries to play a key role in early stages of development of private and PPP infrastructure projects. IFC would provide risk capital to fund the early stages of development of infrastructure projects in IDA countries through a variety of financial instruments, and expertise in critical areas of project development in order to bring the projects successfully to financing stage. IFC can make a difference in the early stage infrastructure project development thanks to its institutional recognition and standing as member of World Bank Group. It is expected that the IFC-InfraVentures Fund is able to draw upon and coordinate a wide range of technical advisory and financial products and services across the World Bank Group to support infrastructure development in IDA countries.

In May 2006, IFC partnered with the Veolia Environmental Group, a world-leader in environment services to improve water and sanitation services in Africa, the Middle East and North Africa and the Indian Sub-Continent. IFC's role was to support the Group's expansion into target regions - particularly Africa - helping mobilize equity, supporting a successful model of private participation in the water and sanitation sectors and encouraging the entry of other international sponsors and creating a platform to encourage closer cooperation between the private sector and the World Bank Group. The project's development impact focused on improving the health, quality of life and productivity of target regions through the provision of cleaner water, more efficient management of water resources—all relevant for addressing impact of climate change—and the transfer of knowledge and best practices across concessions.

Source: IFC.

49. **Climate change adaptation presents a complex set of challenges that span geographic regions and development issues.** Most actions to minimize the impacts from climate change will be taken by private actors (i.e. individuals, households and businesses). Much adaptation should be an extension of good development practice and be geared to reduce vulnerability. In this IDA has a comparative advantage and can join forces with other MDBs and the private sector to increase coverage of its interventions. Collaboration with UN agencies and the GEF is crucial to provide technical assistance and resources where clear incremental opportunities arise.

VI. CONCLUSIONS

50. **Climate change is rapidly affecting the poorest countries.** IDA countries are especially vulnerable to climate change because of their geographic location, low incomes, relatively weak institutional capacity for mitigation and adaptation, greater reliance on climate sensitive sectors such as agriculture and larger parts of the population living in weather-vulnerable informal urban settlements.

51. **IDA has built a considerable amount of knowledge on how to deal with climate change in the development arena.** It has done so by leveraging on important climate change dedicated resources. Looking forward, a broad strategy for IDA15 action on climate change should focus on country strategies, knowledge generation and tailored interventions in the form of investment or policy lending.

52. **IDA can continue to tap specialized financial resources to deal with climate change interventions.** This however should not lead to the building of another silo in the development business. The more streamlined, targeted and well-designed development actions are, the less the need for incremental adaptation components to projects. More IDA resources are essential to (a) tailoring the intervention in the development agenda of IDA clients and (b) counter the negative effects of the already ongoing climate change.

53. **IDA, through its development platform, can combine finance, knowledge, and multisectoral perspective in ways that are critical to deal with climate change.** IDA is especially well-suited to channel financial resources to help countries adapt to ongoing effects and mitigate emissions. This can be done by identifying needed interventions to potentially be included in CASs, mainstreaming climate change across relevant sectors, using its finances to leverage government, private sector and donor finance, investing in knowledge, and tapping knowledge generated across the World Bank.

54. **IDA's role on climate change will support overall development priorities.** Some IDA countries may be legitimately concerned that additional IDA resources, for climate change will shift away resources from other urgent development issues. Therefore, the challenge for IDA15 will be to select high impact climate change actions that protect hard-won development gains while generating additional opportunities. IDA is the appropriate platform to ensure that such interventions work for development, not against it.

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ANNEX A: SUPPLEMENTARY TABLES

Table A1. PRSPs that address adaptation and/or mitigation

<i>Country</i>	<i>Interim</i>			<i>PRSP I</i>			<i>PRSP II</i>		
	<i>Adapta- -tion</i>	<i>Mitiga- -tion</i>	<i>Both</i>	<i>Adapta- -tion</i>	<i>Mitiga- -tion</i>	<i>Both</i>	<i>Adapta- -tion</i>	<i>Mitiga- -tion</i>	<i>Both</i>
Cambodia	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Ghana	No	No	No	No	Yes	No	Yes	Yes	Yes
Guinea	No	Yes	No	No	Yes	No	No	No	No
Lesotho	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Madagascar	No	Limited	No	No	No	No	No	Yes	No
Malawi	No	Yes	No	No	Yes	No	Yes	Yes	Yes
Mozambique	No	No	No	Yes	Limited	Yes	Yes	Yes	Yes
Nicaragua	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Tanzania	No	No	No	Yes	No	No	No	Yes	No
Vietnam	Yes	No	No	No	Yes	No	Yes	Yes	Yes
Zambia	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Table A2. Highlights of IDA-supported projects (including GEF) that specifically tackle adaptation to climate change in IDA countries

<i>Country/ region</i>	<i>Project</i>	<i>Status</i>	<i>Approval /delivery</i>	<i>Total budget (\$M)^a</i>	<i>IDA commit- ment (\$M)^a</i>
Kiribati	Adaptation Program - Pilot Implementation Phase (KAP II) (GEF ^c)	Active	FY06 (A)	6.58	0
Niger Basin	IDA Niger Basin Water Resources Development and Sustainable Ecosystems Management	Active	FY08 (A)	233	186
Burkina Faso	Community Based Rural Development II	Active	FY07 (A)	103	74
Kenya	Agricultural Productivity and Sustainable Land Management (GEF ^b)	Pipeline	FY08 (A)	71.88	0
Kenya	Kenya Adaptation to Climate Change in Arid Lands Project linked to the Arid lands resource Management Program Phase 2 Loan (GEF ^c)	Pipeline	FY08 (A)	7.5	0
Mozambique	Zambezi Valley Market Led Smallholder Development (GEF ^b)	Pipeline	FY08 (A)	27.4	0
Mozambique	Zambezi Valley Market Led Smallholder Development	Active	FY07 (A)	21.31	20
Tanzania	Tanzania Water Sector Management (SWAP)	Active	FY07 (A)	951	200
Tanzania	Marine and Coastal Environment Management Project (GEF ^b)	Active	FY06 (A)	62.75	51
Madagascar	National Action Program to Adapt to Climate Changes (NAPA) (GEF ^c)	Active	FY05 (A)	0.25	0
Sao Tome	National Action Program to Adapt to Climate Changes (NAPA) (GEF ^c)	Completed	FY05 (A)	0.2	0
Ethiopia	Sustainable Land Management	Pipeline	FY08 (A)	22	20
Ethiopia	Sustainable Land Management (GEF ^c)	Pipeline	FY08 (A)	10.3	0
Southern Africa Development Community	Agricultural Productivity Program	Pipeline	FY09 (A)	80	30
West Africa	West Africa Agricultural Productivity Program	Active	FY07 (A)	51	45
Ethiopia, Sudan, Egypt	Eastern Nile Flood Preparedness and Early Warning System	Pipeline	FY08 (A)	55	35
Guyana	Conservancy Adaptation Project (GEF ^c)	Pipeline	FY08 (A)	5	0
Yemen	Adaptation to Climate Change Using Agrobiodiversity Resources in the Rainfed Highlands (GEF ^b)	Pipeline	FY09	7.30	0
Caribbean	Implementation of Adaptation Measures in Coastal Zones (GEF ^c)	Active	FY07 (A)	5.47	0
St. Lucia	Coastal/Wetland Ecosystem Conservation and Sustainable Alternative Livelihoods (GEF ^c)	Active	FY03 (A)	1	0
Caribbean	Mainstreaming Adaptation to Climate Change (GEF ^c)	Active	FY03 (A)	10.95	0
Honduras	Natural Disaster Mitigation	Active	FY00 (A)	12.01	10.82
Honduras	Natural Disaster Mitigation—Additional Scale Up Financing	Active	FY07 (A)	9	9
India	Sustainable Land and Ecosystem Management Country Pilot Partnership (GEF ^b)	Pipeline	FY08 (A)	TBD	20

a Adaptation may constitute only a portion of total project cost or the IDA commitment.

b The project is co-financed by a WBG-approved GEF grant.

c The project is fully financed by a WBG-approved GEF grant.

Table A3. Types of measures to support adaptation

<i>Example of active projects that support adaptation</i>			<i>IDA credit or grant \$M</i>
<i>Theme</i>	<i>Title and country</i>	<i>Description</i>	
Hazard response	Vietnam: Natural Disaster Risk Management Project	<p>Establish and implement a comprehensive natural disaster risk management framework</p> <p>Strengthen the capacity of national and local disaster risk management institutions</p> <p>Reduce the vulnerability to flood and storm hazards in project areas</p> <p>Increase the efficiency of post-disaster recovery and reconstruction efforts</p> <p>Includes disaster prevention and mitigation investments, community-based disaster risk management, and post-disaster reconstruction support.</p>	86
Urban development & resource management	Ethiopia - Urban Water Supply and Sanitation Project	<p>Increase access to sustainable water supply and sanitation services in Addis Ababa and four secondary cities</p> <p>Improve operational efficiency by reducing non revenue water</p> <p>Improve financial management, billing and collection, and customer management</p> <p>Improve governance by the water boards.</p>	65
Community-driven development	Kenya: Western Kenya CDD and Flood Mitigation Project	<p>Empower local communities to engage in sustainable and wealth creating livelihood activities and reduce their vulnerability to flooding</p> <p>Support community-prioritized investment projects to improve livelihoods and promote catchment management to address catchment degradation which exacerbates flooding</p> <p>Identification and preparation of mid-catchment multipurpose structural flood protection options</p> <p>Immediate floodplain management options</p> <p>Establishment of a flood early warning system</p> <p>Development of new opportunities for economic growth in the region</p>	86
Post-conflict work and resettlement	Guinea-Bissau : Multi-sector Infrastructure Rehabilitation Project	<p>Increase the availability of urban power, water and roads infrastructure services</p> <p>Improve the institutional and management capacity and governance in the power, water and roads sectors</p> <p>Restoring access, reliability and quality of electricity supplies and services in the city of Bissau to pre-conflict levels</p> <p>Restore and increase access to and quality of water supply services in the city of Bissau to the pre-conflict levels</p> <p>Rehabilitate damaged roads in the city of Bissau.</p>	15
Social protection and safety nets to cope with increased disaster frequency	Ethiopia - Productive Safety Nets	<p>Shift away from a focus on short-term food needs met through emergency relief to address the underlying causes of household food-insecurity</p> <p>Contribute to the reduction in the number of Ethiopians suffering from extreme hunger, malnutrition, and poverty and to the rehabilitation of the environment by strengthening soil and water conservation, making agriculture more productive and sustainable</p> <p>Continue to improve the efficiency, effectiveness and fairness of the program in terms of ensuring, e.g.: (i) timely, well-targeted transfers, (ii) the quality and environmental impact of the public works, (iii) local accountability dimensions of the program, and (iv) Ethiopia's ability to respond to drought.</p>	175

Table A4. Energy Lending in the World Bank Group

Sum of Commitment amount (\$ millions)			Region							Grand Total	
Recipient type	Fiscal Year Approved	Source of finance	AFR	EAP	ECA	LCR	MNA	SAR	WORLD		
IBRD countries	2003	Carbon Finance				8				8	
		GEF		26	17	6				48	
		IBRD		141	254	73				468	
		IFC		1	96	310				406	
		MIGA			309	33	50			391	
	2003 Total			167	675	429	50			1322	
	2004	Carbon Finance	3		9	12					24
		GEF		21	8	22	1				51
		IBRD		33	176	50					259
		IFC		60	42	295	20				416
		MIGA				56					56
	2004 Total		3	114	235	435	21			807	
	2005	Carbon Finance			54	5	17			2	77
		GEF			58	34	1		9		101
		IBRD		5	87	332	170				593
		IFC		30	59	199	146	11			445
		MIGA					26				26
		Other				77	40				117
	2005 Total		35	258	646	400	20	2		1359	
2006	Carbon Finance			38	1	25				64	
	GEF			20		35				55	
	IBRD		6	134	1008	160	260			1568	
	IFC			133	454	474	10			1072	
	MIGA				118	72				190	
2006 Total		6	325	1581	766	270			2948		
2007	Carbon Finance			50	10	28				87	
	GEF		6		5	49	43			104	
	IBRD			75	297	10	100	23		504	
	IFC			124	70	140	15			348	
	MIGA					212				212	
	Other			0			48			48	
2007 Total		6	248	381	439	206	23		1302		
IBRD Total			50	1113	3517	2469	566	24		7739	
IDA countries	2003	Carbon Finance								2	
		GEF		2	6		4			12	
		IDA		250	145	9	24		151		577
		IFC		45		8	30		45		128
		MIGA		47	118						165
		Other			75						75
	2003 Total		346	343	17	58		196		959	
	2004	Carbon Finance			11						11
		GEF		7	6						12
		IDA		143	34	64	0		131		373
		IFC		19		30			75		123
		MIGA		2	15						17
	Other		30							30	
2004 Total		200	66	94	0		205		566		
2005	Carbon Finance					1				1	
	GEF		5	5	1		1			12	
	IDA		225	221	97	3		84		630	

Sum of Commitment amount (\$ millions)			Region							Grand Total
Recipient type	Fiscal Year Approved	Source of finance	AFR	EAP	ECA	LCR	MNA	SAR	WORLD	
		IFC	30	48		50			74	201
		IFC-Carbon							10	10
		MIGA	116	91						206
		Other	58	154						212
	2005 Total		433	519	97	54	1	167		1272
	2006	Carbon Finance	7		2				14	23
		GEF	6	5	3	2				16
		IDA	378	288	93	13	57	470		1299
		IFC	110		15				19	144
		IFC-Carbon							13	13
	2006 Total		501	293	114	16	57	516		1495
	2007	Carbon Finance	23						34	57
		GEF	7	13						20
		IDA	634	39	19	9	147	221		1070
		IFC	148		1	3		519		670
IFC-Carbon								7	7	
MIGA		204							204	
Other	115	1					1	117		
2007 Total		1132	53	20	13	147	782		2146	
IDA Total		2612	1275	342	141	205	1866		6439	
Other (West Bank and Gaza, Oman)	2005	IFC						40	40	
	2005 Total							40	40	
	2007	Other						5	5	
	2007 Total							5	5	
Other Total							45		45	
Regional / World activities	2003	GEF		0	18				10	28
		IFC	0		75					75
	2003 Total		0	0	93				10	103
	2004	IDA	179							179
		IFC						40	125	165
	2004 Total		179					40	125	344
	2005	GEF				0				0
		IDA	40							40
		IFC	61			1			25	87
		Other	50							50
	2005 Total		151			1			25	177
	2006	GEF							3	3
		IDA	127							127
IFC					10	60	150	1	221	
2006 Total		127			10	60	150	4	351	
2007	GEF			5					5	
	IFC			50	20	10		65	145	
2007 Total				55	20	10		65	150	
Region/World Total		457	0	148	31	70	190	229	1124	
Grand Total		3118	2387	4007	2641	886	2080	229	15346	

Note: Other sources of finance include guarantees, special financing and recipient executed activities. GEF includes both World Bank and IFC executed activities.

Table A5. IDA-supported low-carbon energy projects (including GEF), FY05-07

<i>Country</i>	<i>Title</i>	<i>Low-carbon-dedicated commit. amt. (\$ millions)</i>	<i>Total budget (\$ millions)</i>	<i>IDA commit. amt. (\$ millions)</i>
FY07				
Haiti	HT Electricity Project	6.0	7.47	6.0
Uganda	UG-Priv Power Generation (Bujagali-FY07)	115.0	798.6	115
Madagascar	MG -Pwr/Wtr Sect. Recovery and Restruct.	9.3	10.0	10.0
Nepal	Nepal Village Micro Hydro Carbon Offset Project	2.0	59.1	5.5
Nigeria	Aba Cogeneration Project	9.0	100.0	N/A (IFC-fin)
Kenya	Olkaria II Geothermal Expansion	8.7	76.3	27.6
Senegal	Felou Hydro Project	3.1	96.9	75.0
Uganda	West Nile Electrification	2.6	75.0	30.0
Ghana	Urban Transport Project (GEF ^a)	7.0	90.0	25.0
Mongolia	MN- Renewable Energy for Rural Access (GEF ^a)	3.5	23.0	3.15
Pacific Islands	4P Sustainable Energy Finance (GEF ^b)	9.5	58.5	N/A (GEF funds only)
Tajikistan	TJ Prg. Development Policy Grant	1.0	10.0	10.0
Total FY07		176.7	1,404.9	307.3
FY06				
Guinea	GN-Elec. Sec. Eff. Impr. SIL (FY06)	2.3	11.7	7.2
Ghana	GH-PRSC 3 DPL (FY06)	12.5	125.0	125.0
Moldova	Biomass Heating / Energy Conservation	2.0	59.0	50.7
Vietnam	VN-Trans & Distrib 2	200.0	324.0	200.0
Nepal	Biogas Program	7.0	58.4	N/A
Yemen, Rep.	RY-Power Sector	6.1	75.0	50.0
Sierra Leone	Bumbuna Hydro	6.9	53.0	50.5 ^c
Liberia	LR-Emergency Infrastructure ERL (FY06)	2.7	30.0	30.0
Sri Lanka	INCaF Eco Power	4.6	4.6	N/A (IFC-fin)
Bosnia and Herzegovina	EECSEE APL3	36.0	286.6	36.0
Armenia	Renewable Energy (GEF ^a)	5.0	25.1	5.0
Armenia	Urban Heat	3.8	22.0	15.0
Total FY06		289.0	1,074.4	569.4
FY05				
Burkina Faso	SBPH	0.1	9.0	N/A (IFC-fin)
Zambia	ZM-Econ Mgmt & Growth Credit (FY05)	4.0	40.0	40.0
Eritrea	ER-Power Distribution SIL (FY05)	45.0	57.2	50.0
Burkina Faso	BF-Power Sec Dev (FY05)	3.4	130.3	63.6
Senegal	SN Elec Srv for Rural Areas (FY05) (GEF ^a)	9.1	71.7	29.9
Senegal	SN-Elec Sec Effi. Enhanc. Phase 1 APL-1	15.7	95.4	15.7
Vietnam	VN-Rural Energy 2 (GEF ^a)	225.3	329.5	220.0
Moldova	RE From AG Waste Biomass (GEF ^b MSP)	0.7	2.7	N/A (GEF funds only)
Lao PDR	LA-Nam Theun 2 Power Project	152.6	1,450.0	70.0
Benin	BJ-Energy Srv Delivery APL (FY05)	5.7	95.7	45.0
Kenya	KE-Energy Sec Recovery Proj (FY05)	41.1	225.5	80.0
Congo, Rep.	CG-Econ Recovery Credit ERL (FY05)	4.5	30.0	30.0
Chad	D-Inst Reform Sup Credit SAL (FY05)	0.5	25.0	25.0
Sierra Leone	SL-Bumbuna Hydro Guarantee (GU) (FY05)	50.5	91.8	50.5
Sierra Leone	SL-Power & Water SIL (FY05)	1.4	47.2	35.0
Honduras	Honduras: La Esperanza Hydroelectric Project	1.4	13.7	N/A
Congo, Dem.	CD-Emergen Living Conditions Impr (FY05)	12.3	82.0	82.0
Tajikistan	Energy Loss Reduction	8.6	30.0	18.0
Haiti	HT Economic Governance Reform Adj. Ope.	3.1	61.0	61.0
Rwanda	RW-Urgent Electricity Rehab SIL (FY05)	3.0	31.3	25.0
Albania	ECSEE APL2 (Albania)	27.0	52.1	27.0
Senegal	SN-Elec Sec Efficiency Enhance GU (IDA Partial Risk Guarantee, FY05)	29.2	95.4	15.7
Yemen, Rep.	RY-Rural Electrification & Ren. Egy Dev	1.0	1.8	N/A (GEF funds only)
Total FY05		645.2	3,068.3	983.4

- a. The project is co-financed by a WBG-approved GEF grant.
b. The project is fully financed by a WBG-approved GEF grant.
c. Also see SL- Bumbuna Hydro Guarantee FY05.

Table A6. Highlights of IDA-supported projects (including GEF) that contribute to climate mitigation

<i>Project name</i>	<i>Country</i>	<i>Type / brief description</i>	<i>Approval date</i>	<i>IDA commitment</i>
Forestry				
Forest Additional Financing Project	Bosnia and Herzegovina	Improve forest information system	06/19/2007	3.35 ^a
Kenya - Natural Resource Management Project	Kenya	Protection and sustainable use of forests. Reduction of encroachment in forest areas	03/27/2007	68.5 ^a
Second Agricultural Technology Project	Nicaragua	Promote community management of forests	11/29/2005	12 ^a
Lao Environment And Social Project	Lao People's Democratic Republic	Strengthen conservation and livelihood improvement in and around protected areas	06/30/2005	4 ^a
Natural Resources Development Project	Albania	Carbon stock enhancement - Provision of carbon credits to communities for setting aside and protecting land	06/09/2005	7 ^a
Rural Environment Project	Azerbaijan	Support community based reforestation and subsequent management (GEF ^a)	06/09/2005	8 ^a
Forest Sector Development Project	Vietnam	Establishment of forest plantations and promotion of small-scale tree growing by rural communities	07/08/2004	39.5 ^a
Forests And Rural Productivity	Honduras	Community agro-forestry and forestry management	06/24/2004	20 ^a
Sustainable Forestry For Rural Development Project	Lao People's Democratic Republic	Support the establishment of sustainable forest management systems based on shared management responsibilities between Government staff and villagers. Plantations establishment	06/24/2003	9.9 ^a
Forest Development & Conservation Project	Bosnia and Herzegovina	Strengthening technical capacity for SFM	06/10/2003	3.75 ^a
Energy Access Project	Ethiopia	Creation of new forest to produce a stable supply of wood fuels	09/19/2002	132.7 ^a
Forests Development Project	Georgia	Forest protection and reforestation in selected priority areas	08/01/2002	15.7 ^a
Andhra Pradesh Community Forest Management Project	India	Forest management and community development	07/16/2002	108 ^a
Forest Conservation And Management Project	Tanzania		02/26/2002	31.1 ^a
Coastal Wetlands Protection And Development Project	Vietnam	Improved ecosystem management and protection by communities	11/23/1999	31.8 ^a
Pico Bonito Sustainable Forests Project	Honduras	Carbon Offset	06/30/2006	0
Precious Woods Project	Nicaragua	Carbon Offset	04/12/2006	0
BioCF Kenya Greenbelt Movement	Kenya	Carbon Offset	11/15/2006	2.2
Methane Capture				
Conakry Compost And Landfill Gas Capture And Flaring	Guinea	Carbon Offset	12/31/2007	0.86
Sustainable Land Mgmt				
Bi-Agriculture Rehabilitation & Sustainable Land Mgmt	Burundi	The project will allow conservation of on-farm and wetland biodiversity and storage of carbon in forest and wetland sinks.	07/27/2004	35 ^a
Soil Conservation Project	Moldova	Carbon Offset	01/23/2004	5.18

Table A6. Highlights of IDA-supported projects (including GEF) that contribute to climate mitigation

<i>Project name</i>	<i>Country</i>	<i>Type / brief description</i>	<i>Approval date</i>	<i>IDA commitment</i>
		Energy		
Energy For Rural Transformation Project	Uganda	Carbon Offset	03/25/2003	0
Energy Conservation & Emissions Reduction Project (Community Development Carbon Fund)	Moldova	Carbon Offset	02/24/2006	0.48
La Esperanza Hydro Project	Honduras	Carbon Offset	12/02/2004	1.4
Nepal - Biogas Program	Nepal	Carbon Offset	06/02/2006	4.5
Public Heating Biomass Systems In Moldovan Rural Communities (Community Development Carbon Fund Facility)	Moldova	Carbon Offset	02/24/2006	1.49
Nepal - Village Micro Hydro	Nepal	Carbon Offset	06/30/2007	1.9
^a	The project is co-financed by a WBG-approved GEF grant.			

Table A7. Percentage of World Bank and IDA CASs that mention of mitigation or adaptation

<i>Year</i>	<i>World Bank (IBRD, IDA and Blend)</i>			<i>IDA only</i>		
	<i>Mitigation (%)</i>	<i>Adaptation (%)</i>	<i>CC (%)</i>	<i>Mitigation (%)</i>	<i>Adaptation (%)</i>	<i>CC (%)</i>
FY00	17	11	23	0	0	0
FY01	36	27	50	11	22	22
FY02	40	13	47	0	25	25
FY03	24	12	24	13	0	13
FY04	42	15	46	25	8	33
FY05	42	12	48	25	12.5	37
FY06	56	25	62	62.5	12.5	62
FY07	56	32	64	38	31	46

Note: The data is based on select keywords search for adaptation and mitigation.

Table A8. Resources available to IDA countries to address climate change

<i>Financing source^a</i>	<i>Role</i>	<i>Amount (US\$ million)</i>	<i>Examples of ongoing activity in IDA countries</i>
Climate Change Specific Sources of Funds			
Global Environment Facility (GEF)	GEF projects in climate change help developing countries and economies in transition to contribute to the overall objective of the United Nations Framework Convention on Climate Change (UNFCCC).		
GEF Mitigation	Projects that reduce or avoid greenhouse gas emissions in the areas of renewable energy, energy efficiency, and sustainable transport.	Most IDA countries are members of a group of 115 countries with a joint allocation of \$148.6 million in GEF-4. A country in the group can access up to \$3.1 million. A few IDA countries have their own, larger allocations.	Ghana Urban Transport Project (FY07; \$7 million from GEF. Total amount \$90 million) Mongolia Renewable Energy and Rural Electricity Access Project (FY07; \$7 million from GEF. Total amount \$23 million)
GEF Adaptation	Interventions that increase resilience to the adverse impacts of climate change of vulnerable countries, sectors, and communities. All adaptation funds combined Special Climate Change Fund (SCCF)	Currently about \$225 million \$60 million	Guyana Conservancy Adaptation Project (approved FY07; GEF amount \$3.8 million. Total costs \$20 million)
	Least Dev'd Countries Fund (LDCF)	\$115 million	LDCs prepare their National Adaptation Programme of Action (NAPA).
	Strategic Priority on Adaptation (SPA)	About \$50 million	Zambezi Valley Market Led Smallholder Development Project (approved FY06); GEF amount \$6.55 million. Total cost \$27.55 million.
Carbon Finance ^b		Over \$2 billion	
BioCarbon Fund	Projects that sequester or conserve carbon in forest and agro-ecosystems. Special effort to bring in IDA countries through capacity building and targeted business development. It delivers carbon finance to many developing countries that otherwise have few opportunities to participate in the Clean Development Mechanism (CDM).	Tranche 1: \$58 million Tranche 2: \$37 million, still open to contributions.	Examples under Tranche 1: Kenya—Green Belt Movement Niger—Acacia Community Plantations
Community Development Carbon Fund (CDCF)	Projects that measurably benefit poor communities and their local environment will receive verified Kyoto-compliant emission reductions. CDCF aims at extending the benefits of carbon finance to the poorest countries and poor communities in all developing countries.	\$128.6 million	Kenya—Olkaria II Geothermal Expansion Nigeria—Aba Cogeneration Project
Carbon Partnership Facility and Forest Carbon Partnership Facility			Not yet operational
Bank-managed Trust Funds and Partnerships			
ESMAP	A Bank-executed global technical assistance program focusing on pre-investment activities. In sub-Saharan Africa, ESMAP is supporting country-led initiatives to systematically address the root causes of low energy access.	\$3 million for the Africa scale-up program in FY08	Cameroon—Capacity-building among Smallscale Off-grid Energy Suppliers Sub-Saharan Africa—Lighting Africa with GEF, PPIAF and other donors as co-sponsors Mozambique—Modern Biofuels Studies

Table A8. Resources available to IDA countries to address climate change

<i>Financing source^a</i>	<i>Role</i>	<i>Amount (US\$ million)</i>	<i>Examples of ongoing activity in IDA countries</i>
Multi Donor Trust Fund for Clean Energy Investment Framework (CEIF)	Provides advisory, analytical and knowledge services to support the implementation of CEIF.	Approx. \$6.7 million was pledged over a three year period	India Low Carbon Country Study
Bank Netherlands Partnership Program (BNPP)	Provides financing and a priority-setting framework for activities of a global and regional nature, for issues including environmental threats. It has been suggested that the Networks allocate over 50% of grant funds to finance activities that address the development problems in Africa.	\$43.3 million per year	Africa Region - Effective Institutions for Adaptation to Climate Change, Grant: \$707 thousand.
Japan Policy and Human Resources Development Fund (PHRD)—Technical Assistance Program	Assists in preparation and implementation of Bank-supported operations financed by IBRD loans and IDA credits and grants. In addition, this program supports a range of climate change related programs.	\$250 million contributed since FY2000 by Govt. of Japan	Mali—Smallholder Treecrop Plantation Project (FY07) Grant: \$475 thousand Yemen—Adaptation to Climate Change using Agrobiodiversity Resources in the Rainfed Highlands of Yemen. Grant: \$780 thousand.
Trust Fund for Environmentally and Socially Sustainable Development (TFESSD)	A multi-donor trust fund providing grant resources for World Bank activities aimed at mainstreaming the environmental, social and poverty reducing dimensions of sustainable development into overall Bank work. Fifty percent of the funding goes to Africa.	\$87 million (cumulative disbursements) as of January 2007.	Madagascar—Mainstreaming Hazard Risk Management. Grant: \$200 thousand. Niger, Senegal—Responding to Climate Change in West Africa. Grant: \$300 thousand.
Global Facility for Disaster Reduction and Recovery (GFDRR)	Ongoing Track (II) will provide technical assistance to assist developing countries mainstream disaster risk reduction in strategic planning documents	\$8 million initially available for Track II. (Track II is a Multi-donor Trust Fund that will require over \$20 million in Year 1 and over \$40 million in Year 3 onwards.)	Studies beginning (July 07) in Mozambique, Malawi, Nepal, Nicaragua and Vietnam. Several more IDA country studies to follow in FY08 and FY09.
Consultative Group on International Agricultural Research (CGIAR)	Involved in a range of research on crop varieties and cultivation practices aiming at reducing sensitivity to climate change.		A wide range of agricultural improvements in Kenya (e.g., new varieties of high-yield beans) and Uganda (e.g., maintaining banana crop diversity).
Caribbean Catastrophe Risk Insurance Facility (CCRIF)	Allows countries to pool hurricane and earthquake risk and reduce individual insurance premium by about 40%. Haiti is the only IDA country in this region.	Has secured \$110 million of claims paying capacity as of June 1.	n/a
Norwegian Trust Fund for Private Sector and Infrastructure (PSI)	Provides grant resources for World Bank Group activities aimed at mainstreaming the investment climate, provides technical assistance in areas related to governance and infrastructure services for the poor, and promotes structured cooperation on petroleum sector governance issues.	\$7.8 million for ongoing and new activities in FY08	Preparing for climate change in Asian and African coastal cities. \$ 200 thousand. Lighting Africa -web portal. Grant: \$ 250 thousand.
ASTAE: Asia Alternative Energy Program	Established to mainstream <u>alternative energy</u> (renewable energy and energy efficiency) in the World Bank's power sector lending operations in Asia, ASTAE continues to support a broad portfolio of alternative energy projects and activities throughout Asia.		Bangladesh- Rural Electrification and Renewable Energy Development

Table A8. Resources available to IDA countries to address climate change

<i>Financing source^a</i>	<i>Role</i>	<i>Amount (US\$ million)</i>	<i>Examples of ongoing activity in IDA countries</i>
Global Gas Flaring Reduction	Facilitates and supports national efforts to use currently flared gas by promoting effective regulatory frameworks and tackling the constraints on gas utilization, such as insufficient infrastructure and poor access to local and international energy markets, particularly in developing countries.	\$1.75 million disbursed in funding in FY07	GGFR is assisting Algeria, Cameroon, Equatorial Guinea, Kazakhstan, Nigeria, and Qatar to meet identified dates for zero flaring, through increased collaboration between operators, the national oil company and the regulator. GGFR has developed a unique web-based tool to report flared and vented data by country. The data tool will be implemented in GGFR partner countries, starting with Cameroon, Nigeria, Algeria and Qatar.
Public-Private Infrastructure Facility (PPIAF)	The Public-Private Infrastructure Advisory Facility (PPIAF) is a multidonor technical assistance facility aimed at helping developing countries improve the quality of their infrastructure through private sector involvement.		Africa - Financial Feasibility Study - Inga 3 Hydroelectricity Facility and Related Transmission Corridor BRAZIL - Conceptual Framework for Public Private Partnerships in irrigation Africa—Lighting Africa

^a These instruments apply to IDA as well as other Bank countries.

^b Some of the other carbon funds are also financing projects in IDA countries, e.g., the Prototype Carbon Fund (Moldova, Uganda) and the Spanish Carbon Fund (Senegal).

ANNEX B: BOUNDING IDA INVESTMENTS IN CLIMATE ADAPTATION

1. There are a variety of efforts underway to estimate the annual costs of adapting to climate change. These efforts face major difficulties in identifying incremental investment costs and determining how much adaptation will be required. This annex poses two questions: What impact could climate change have on IDA credits? And what could IDA do about it?
2. Rather than bottom-up cost estimates, the attempt here is to put some bounds on the problem by looking at how climate change could affect the returns on IDA investments. The question then posed is: How much more IDA finance would be required in order to return the benefits to IDA clients to their 'pre-climate change' level? This is useful because any bottom-up costing of adaptation that exceeds the 'compensating IDA credit' would indicate that these costs were not efficient from an economic perspective.
3. Climate change threatens the sustainability and viability of development efforts and is likely to impact IDA investments. The table below shows how much IDA commitments would need to increase in order to maintain a constant level of net benefits to client countries after accounting for climate change impacts. The results are presented for three different levels of climate change impacts as derived from the Stern Review. The table shows that an increment in IDA commitments of between \$0.6 and \$1.9 billion (compared with the total credits in FY06 of \$9 billion) would be needed in order to offset the effects of climate change.

	<i>Stern Review damage estimates</i>		
	<i>Low 5.0%</i>	<i>Medium 10.9%</i>	<i>High 14.4%</i>
Current IDA credits: \$9.00 billion (FY06)			
1. NPV of benefits with constant climate (client perspective)	\$7.46	\$7.46	\$7.46
2. NPV of benefits with climate change (client perspective)	\$7.01	\$6.48	\$6.16
3. Loss of benefits owing to climate change	\$0.45	\$0.98	\$1.30
4. Increase in IDA credits to bridge the development gap	\$0.58	\$1.36	\$1.89
5. Percent increase in IDA credits	6%	15%	21%

4. The results are obtained by simulating the flow of investments and project benefits in an imaginary IDA country that receives a \$9 billion credit from IDA (this is the total amount of IDA commitments in FY06). It is assumed that the investment will generate an economic rate of return of 10 percent, and that the present value of benefits over 25 years (a typical asset lifetime) just equals the 'project' cost of \$9 billion. From the country's perspective, and accounting for the favorable IDA terms, an IDA credit of \$9 billion has a present value cost of \$1.54 billion using a 10 percent discount rate. As a result, from the client perspective, the net present value of benefits from the project is \$7.46 billion (line 1). From the IDA perspective, \$9 billion worth of credits create \$7.46 billion worth of net benefits to the low income country.
5. Climate change will likely increase the risks to food production, health, infrastructure and social development. The Stern Review on climate change estimates that losses in current per capita consumption owing to market impacts, risk of catastrophes and non-market impacts could be as high as 14.4 percent *relative to a*

scenario with constant climate—this is the relevant baseline for the IDA simulation shown in the table. If non-market impacts are excluded, and more conservative climate change scenarios are used, the impact could be a cut in per capita consumption of 5 percent. These Stern Review estimates of damages reduce annual net benefits from the IDA project to the levels shown in line 2 of the table. This results in a decrease in net present value of benefits lying between \$0.45 and \$1.30 billion, depending on the severity of climate change impacts (line 3). The final two rows of the table indicate how much IDA credit would be needed in order to boost net benefits back to the original level of \$7.46 billion.

6. The difference in net benefits, with and without climate change (line 3 in the table) could simply be transferred directly to the client country. From an IDA perspective, however, this would be undesirable, since IDA is not in the business of subsidizing consumption. IDA is in the *development* business, and therefore the relevant question is the one answered in the table.

7. The results are a rough (illustrative) estimate based on constant net benefit, and they apply only to future IDA: the country still has to absorb the loss on past IDA as indeed on all other investments made. In addition, the results presented are likely to be the upper bound of a range of possible estimates of investment needs. If donors and recipient countries take adaptive measures and decrease emissions of greenhouse gases, then the level of climate damages would be lower than the range shown in the table. The Stern Review concludes that climate can be stabilized at 550 ppm atmospheric CO₂ concentration at a cost of 1 percent of GDP if the most timely and cost-effective mitigation and adaptation actions are taken.

8. These results are only indicative, but they do suggest the range of IDA resources that may be required to deal with climate change.

ANNEX C: WHO IS MOST AT RISK FROM CLIMATE CHANGE?

1. This Annex describes the methods used to prepare an indicative list of countries that appear to be most at risk from the effects of climate change. Such a list can be prepared in many ways, each producing a different ranking of countries. Simple changes in the indicators chosen or in data sets used (e.g. period over which statistics are collected) can affect the precise ranking. Also analysis done at the country level can hide the variability in vulnerability between geographic regions or between social groups within the country.

2. The terms ‘risk’, hazard and ‘vulnerability’ have been used in many different, confusing and contradictory ways. Their use here is similar to that in discussions about disaster risk reduction and hazard management and often represented by the ‘equation’:

Risk = Hazard * Exposure * Vulnerability

- The overall **risk** of damage or losses is determined by the nature, intensity and frequency of the **hazard**, (e.g. the frequency of flood of a certain level);
- The **exposure** to the hazard (e.g. the number of people living on a flood plain), and
- The **vulnerability** to the hazard; i.e. the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards¹⁴.

Climate change will change the frequency and intensity of hazards; population increase and settlement patterns will change exposure, and social, economic and environmental factors will change vulnerability. Adaptation seeks to reduce exposure and vulnerability to the hazards associated with climate change.

3. **Recent impacts of climate hazards.** The first three indices seek to capture the risk of human populations to extreme climate events – droughts, floods and storms – based upon the impacts in the recent past. The indices are based on a global data base that records loss of life, injuries and number of people affected¹⁵ by different types of disasters. The data base also contains estimates of the costs of damages but these were often not recorded and are unreliable, especially for developing countries. The number of people affected¹⁶ over the period 1980 to 2005 is used in these analyses as it best reflects a usefully sized sample of the totality of the recent impacts of disasters on communities. These indices are a direct measure of current climate risks. They obviously fail to capture projected climate change but as most areas are expected to have an increase in the frequency of both droughts and floods and that storm intensities will generally increase (i.e. the hazard parameter in the above equation is increasing), the impact of recent events

¹⁴ UNISDR Secretariat Basic terminology, <http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm>.

¹⁵ See Centre for Research on the Epidemiology of Disasters (CRED) Emergency Events Database - EM-DAT at <http://www.em-dat.net/who.htm>.

¹⁶ Defined as “People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance.

should be a strong guide to future risks. Clearly exposure and vulnerability may change in the future which is the goal of adaptation actions – i.e. to reduce either one or both of exposure and vulnerability.

4. In seeking indicators of relative country risks, three measures of risk are used in each index:

1. Number affected per capita of population
2. Total number of people affected
3. Number affected per \$M of GDP (nominal)

5. None of the measures is ideal – the first is a direct measure of personal risk, but a poor indication of national risk as it excludes a large element of exposure. This is partially corrected by the second which is a better indicator of national risk, but if used alone leads to rankings dominated by populous countries. The third is an indication of the limits to the capacity that countries might have to deal with the impacts of climate hazards (i.e. vulnerability). Countries were ranked for each of the three measures and their rank positions added to give an overall rank for each of the three measures.¹⁷

6. **Impact on Coasts.** The IPCC projects that sea levels might rise by 0.18 to 0.59 meters by the end of this century. Coastal damage will extend beyond the region that might be directly flooded by global sea level rise due to storm surges, wind damage and salinisation of aquifers etc. Assessment of coastal threats from climate change require detailed analysis of coastal morphology, distribution of assets etc, however, height above sea level or distance from the coast are often used as a first indicator. Here the land area and people living less than 1 meter above sea level¹⁸ is used as the indicator of future hazard and current exposure, and thus in indicator of risk if exposure and vulnerability were to remain unchanged – i.e. without adaptation. A combined index based on absolute numbers and the proportion of the population affected was calculated as above. As the 1 m data set did not cover the full range of developed countries, a similar analysis was done with a more comprehensive set of 5 m data.¹⁹

7. **Impact on Agriculture.** Here a direct estimate of the changing hazard from future climate change measured as change (decrease) in crop yield was based on the recent work of Cline (2007). Cline estimated the changes in crop yield on a country basis using blended estimates of crop yield (value per unit of area) from the two main groups of yield models; Ricardian statistical models and detailed models of crop physiology processes.²⁰ The climate projections for late this century were based on a consensus of six climate models. Crop yield fails to incorporate national exposure to agricultural

¹⁷ Alternative means of combining the data were tried – e.g. ranking only into top decile, second decile etc and then adding these ranks – but they made only small differences to the result.

¹⁸ From Dasgupta S., Laplante B., Meisner C., Wheeler D. & Yan J. 2007. The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis. World Bank Policy Research Working Paper 4136.

¹⁹ World Resources Institute – Climate Analysis Indicator Tools <http://cait.wri.org/cait-va.php>.

²⁰ Cline presents projections for both with and without the CO² fertilization effect. Here, the more optimistic with-CO² results were used; however, the without-CO² results all showed a 10 percent to 12 percent reduction in yield so this had little effect on the index used here which is based on ranked data.

losses so a second index based using current cropping area and yield to give projected losses in national production was also calculated. A combined index based on the change (decrease) in yield and decrease in production was derived as above. A few countries are projected to have increased yield under climate change. These are dominated by high latitude developed countries, but also include Bangladesh, China, Egypt, Kazakhstan and Kenya. These gains derive entirely from the Ricardian modeling and are mostly reversed if the CO₂ fertilization effect is excluded.

8. These indices do not cover the full range of threats from climate change. Water and human health are the prime omissions. At this stage there is no simple way to characterize the threat to water use from climate change at a country level. Gross water availability statistics hide huge variation in geographical distribution, allocation and accessibility. Also climate projections show significant changes in net water supply (balance between increased precipitation and higher evaporative demand) at a within country scale. Human health is even more problematic as there are many components and great variation at the sub-national scale. The World Health Organization has estimated that climate change already experienced led to the loss of 5.5 million DALYs²¹ in the year 2000 with Africa and South and South-East Asia contributing 80 percent and developed countries less than 0.2 percent.

²¹ Disability Adjusted Life Years.