

Inter-American Development Bank
Sustainable Development Department

Responding to Climate Change: A Proposed Framework for Action

Discussion Paper

Special Seminar
Tulane University Medical School
March 25, 2000

IDB/IIC Annual Meeting of the Board of Governors
New Orleans, Louisiana

Contents

1. Overview	1
2. The Challenge of Climate Change in Latin America and the Caribbean	2
Global Warming and Climate Change	
The Potential Contribution of Human Activities to Global Warming	
LAC's Present Role in Contributing to Greenhouse Gas Emissions	
LAC's Potential Future Contribution to Greenhouse Gas Emissions	
What Impact Could Climate Change Have on Development in LAC?	
3. Framework for Regional Action	8
The United Nations Framework Convention for Climate Change (UNFCCC)	
The Conference of the Parties (COP) Framework and the Kyoto Protocol	
Response of LAC to the Climate Framework	
Activities by Other Institutions and Countries to Support LAC Needs	
Remaining Challenges and Opportunities for the LAC Region	
4. IDB: The Region's Bank	15
Comparative Advantage in Meeting New Development Challenges to the LAC Region	
IDB Has Begun the Process of Responding to the Climate Change Challenge	
5. A New Partnership on Climate Change and Development	19
Incorporating the Climate Change Challenge into the Bank's Strategic Approach	
Incorporating the Climate Change Challenge into Bank Procedures and Operations	
Promoting Regional Knowledge and Capacity	
Support to Mitigation Opportunities	
Support to Adaptation Needs	
Mobilizing Financial Resources	
References	28

1. Overview

Latin America and the Caribbean (LAC), like the rest of the world, faces long term potential challenges to its development from Climate Change. Among the world's scientists, there is a growing consensus that human activities are contributing to an unprecedented warming of the earth's atmosphere. The consequences of these changes are not yet well understood, but it is increasingly clear that, while they may vary in nature and intensity from one country to another, and may not always be detrimental, such phenomena as changing weather patterns, rises in the level of the sea and increases in the frequency of extreme weather events will have pronounced impacts on agriculture, forests, biodiversity, and human health throughout the world. A central question for all countries, including those in Latin America and the Caribbean, is how best to provide for the economic development and social welfare of their peoples in light of the potential impacts of these evolving new conditions.

At the Earth Summit in Brazil in 1992, the international community responded to this challenge with the establishment of the United Nations Framework Convention for Climate Change or UNFCCC. Parties to the convention, which includes all of the Inter-American Development Bank's LAC member countries, agreed to a set of commitments and established an ongoing framework for reviewing progress and updating their commitments through regular meetings of the Conference of the Parties (COP). At the third COP, the Kyoto Protocol was signed, which strengthened the commitments of the developed countries and those from Eastern Europe and the former Soviet Union, and began to define a framework for trading emissions reduction credits from projects among the world's countries. Although the Protocol has yet to enter into force and leaves many uncertainties for future meetings of the COP to address, it does provide the framework in which discussions and negotiations can take place among nations about alternative strategies for addressing Climate Change.

For the nations of Latin America and the Caribbean to respond effectively to the Climate Change challenge, they need to be able to understand what

the impacts of Climate Change may be for each country and the extent of each country's contribution to the problem before they can define and implement effective strategies to mitigate and adapt to Climate Change. Many of these strategies could be "no-regrets" in nature, meaning that they are--cost-effective and bring multiple benefits that are desirable beyond the positive effect that they might have for Climate Change mitigation or adaptation. Other activities may only be implemented as part of a global response with additional financial resources and only if the economic development of the country is not imperiled. Finally, as the COP process progresses, LAC countries need to be able to contribute in an informed and coherent manner to ensure that their interests and problems are addressed as they move toward responses that capitalize on opportunities to foster sustainable development in the region.

As the development bank for Latin America and the Caribbean, the Inter-American Development Bank (IDB) has played a critical part in meeting the development challenges facing the region over the past 40 years. As such, the Bank has a key role to play, as well, in supporting the efforts of its member countries in Latin America and the Caribbean to address the issues posed by Climate Change and the opportunities that may emerge from the UNFCCC and the Kyoto Protocol. The IDB has certain comparative advantages which enable it to forge partnerships with its member countries that can evolve over time; responding in the near term to the region's need to increase its technical understanding of the impacts of Climate Change and of the characteristics and costs of alternative strategies to address them, and; supporting , in the longer term , the effective implementation of these strategies. At each stage in this evolution, the Bank can seek to integrate responses to Climate Change into its policy dialogue with countries, its overall country development strategies, its sectoral strategies and its on-going operations, while gradually developing more specialized capacity building, technical assistance, and lending instruments that directly address the demands of its members countries from Latin America and the Caribbean.

2. The Challenge of Climate Change in Latin America and the Caribbean

Over the last few decades, the world community has increasingly witnessed a variety of global phenomena that have provoked disruptions in local weather or Climate Change. These range from changing circulation patterns in the oceans that produce El Niño and La Niña, to the emergence of the hole in the atmospheric ozone layer, and the warming of the surface temperature of the earth. While many of these occurrences result from natural global fluctuations, the international community has progressively confronted the possibility that human activities are also contributing to these phenomena. In the 1980s, as evidence grew of an emerging “hole” in the atmosphere’s ozone layer, global consensus materialized that human activities were contributing to the phenomenon and needed to be reversed, leading to the adoption in 1987 of the Montreal Protocol on Substances that Deplete the Ozone Layer.

Global Warming and Climate Change

Similar concerns are emerging about the role of human activities in global warming. While there is a growing consensus that the surface temperatures on the earth have been rising in the most recent years of the past century, more disagreement remains on the extent to which human activities are contributing to the temperature rise. The Intergovernmental Panel on Climate Change (IPCC), an international panel of scientists established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to assess the scientific information on Climate Change and potential responses, has concluded that the human contribution is significant. In its second assessment report, released in 1995, the IPCC concluded that human activities are increasing the atmospheric concentrations of greenhouse gases—which tend to warm the atmosphere—and, in some regions, aerosols—which tend to cool the atmosphere. These increased concentrations are changing the earth’s radiation balance and, the IPCC concluded, collectively

warming the earth’s atmosphere. If current trends continue, the IPCC report added, climate models estimate that the average surface temperature of the earth will rise 1 to 3.5° C by 2100.

The consequences of global warming are subject to considerable uncertainty. The IPCC 1995 report projected that, depending on the degree of warming, the impacts may range from unprecedented increases in sea level, to greater frequency of local weather extremes, to adverse impacts on forests, agriculture and biodiversity.

The Potential Contribution of Human Activities to Global Warming

The principal greenhouse gases contributing to Climate Change are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). All are produced naturally as well as by human activities. The 1995 IPCC report concluded that the combustion of fossil fuels and, to a lesser extent, changes in land-use (loss of forests and other biomass-based land-cover) account for most of the human-produced global increase in carbon dioxide emissions. Man-made methane emissions were determined to result from livestock and other ruminant animals, and biomass burning and waste disposal. Most of man-made nitrous oxide emissions were identified to come from agriculture, predominantly from fertilizer use.

The IPCC report also concluded that though carbon dioxide emissions far exceed those of methane and nitrous oxides, the global warming potentials of the latter two gases are relatively high. Hence, the latter two gases contribute disproportionately more to the global warming effect than their substantially smaller atmospheric levels would suggest. Over the past 100 years, according to the report, carbon dioxide has contributed about 65 percent of the combined radiative effects that lead to global warming, compared with 20 percent from methane and 5 percent from nitrous oxides.

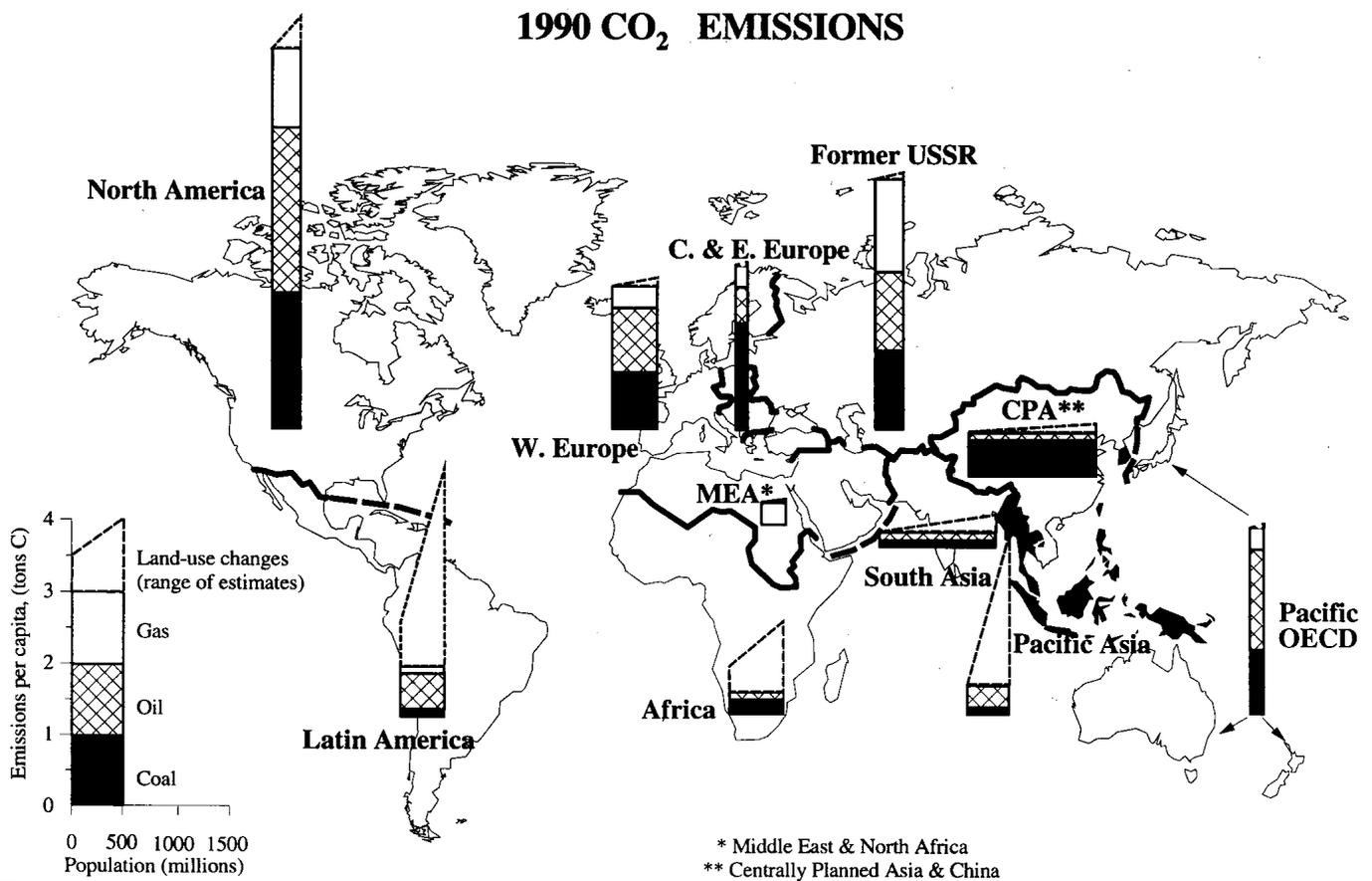
LAC's Present Role in Contributing to Greenhouse Gas Emissions

Climate Change is a global phenomenon. While the sources of human-produced greenhouse gas emissions may originate disproportionately from certain countries, the effects of Climate Change are felt globally.

Most human-produced greenhouse gas emissions come from industrialized nations and the Eastern European nations and members of the former Soviet Union now undertaking the transition to market economies. These countries accounted for about 75 percent of the global fossil fuel-produced carbon dioxide emissions in 1990, as estimated by the IPCC.

For Latin America and the Caribbean, the most comprehensive information on man-made greenhouse gas emissions is for carbon dioxide, especially from fossil fuel use. While emissions of other greenhouse gases are believed to be substantially lower for the LAC region, only a few countries in the region have begun to track these emissions. The IPCC's 1995 report estimated that per capita contributions of fossil fuel-produced CO₂ amounted to between .8 and .9 tons of carbon, a minor contributor on a global scale, and far exceeded within the developing world by such countries as China and India (see Figure A). This has been substantiated by the International Energy Agency, which estimates that fossil fuel-based carbon dioxide emissions from LAC amounted to only 5 percent of the total global emissions in 1995.

Figure A: Projected Emissions by Region



Source: UNEP/WMO, Climate Change 1995 Impacts, Adaptations and Mitigation of Climate Change: Scientific and Technical Analysis; Cambridge University Press, Cambridge, UK, p. 42

A major reason for the LAC countries' low contribution to global fossil fuel-based carbon emissions lies in the fuel mix used in the region. LAC makes little use of coal, the most predominant carbon dioxide producer of the fossil fuels, particularly to generate electricity. Rather, the region has relied heavily on carbon-emission-free hydropower to generate its electricity. The main source of fossil fuel-based carbon dioxide emissions for the region is from the transportation sector (37%) followed by the industrial sector (19%).

Within the region, only two countries, Mexico and Brazil, appear in the inventory of the world's top 20 CO₂ emitters from fossil fuel use. Together they accounted for 50 percent of the region's emissions of carbon dioxide from fossil fuels in 1996. Nevertheless, their annual levels of carbon dioxide emissions—no more than 100 million metric tons—are just a fraction of the emissions from such countries as the United States and Russia.

Information for the LAC countries on man-made carbon dioxide emissions from land-use changes is less complete; these emissions are difficult to track, subject to considerable controversy in their accounting, and vary considerably year-by-year due to changes in local climates. Nevertheless, the IPCC estimates that between .6 and 3 million tons of carbon per capita was produced from land-use changes in Latin America in 1990. If verified, the region would be one of the larger producers globally of land use-based carbon dioxide emissions from such processes as deforestation and agricultural conversion (see Figure A).

LAC's Potential Future Contribution to Greenhouse Gas Emissions

During the twenty-first century, developing countries—including those of LAC—are expected to become the dominant producers of human-produced greenhouse gas emissions. Annual emissions of human-produced carbon CO₂ from developing countries are projected to exceed those of developed countries by the year 2020, and match the total atmospheric inventories of carbon dioxide produced by developed countries by 2060. In Latin America and the Caribbean, projected greenhouse gas emissions will continue to be from fossil fuel sources and land use.

For LAC countries, energy is a vital element in the economic development of the region and will continue to grow in the years ahead. Spurred by economic development and population growth, the demand for energy in the region has been increasing at rates substantially above those of the OECD countries in recent years. The impacts of this growth on fossil fuel-based CO₂ emissions in the future depend on several factors. These include: how much hydropower continues to dominate in serving the electricity needs of the region; the degree to which natural gas successfully substitutes for petroleum use; the degree to which transportation needs of the region are met by effective modes other than personal cars and by clean alternative fuels; and the degree to which other renewable fuels and greater energy efficiency can meet the energy needs of the region. The International Energy Agency currently projects that LAC contributions to fossil fuel-based CO₂ emissions will grow to 6.5 percent of the global total by 2020.

In making these assessments, it is important to recognize that energy use is not homogeneous throughout the region. It is concentrated in a few more developed countries (Mexico, Venezuela, Brazil, and Argentina) which account for 73 percent of LAC's energy demand and 79 percent of the electric power. Among the Caribbean nations, on the other hand, where energy demand is much lower, per capita emissions of fossil fuel-based CO₂ are much higher than LAC as a whole due to the dependence on oil to generate much of their electricity needs. Across the LAC region, the largest energy consumers are industry (34%) and transportation (31%). Moreover, the transportation sector is the largest consumer of petroleum, accounting for 55 percent of its total use. Energy consumption in rural areas, a significantly smaller source of energy consumption at present, is dominated by the use of biomass for cooking.

The Role for Hydropower

Hydroelectricity is expected to decline in its dominant role in producing electricity for the region for a variety of reasons. Many of the best sites have already been developed and new sites face environmental requirements that raise the cost of this resource relative to other alternatives. In addition, with the reforms now ongoing in the en-

ergy sector in the region, including the privatization of the sector, private companies are less willing to assume the responsibility and associated risk for developing new “greenfield” large hydroelectric facilities.

Nevertheless, hydropower is expected to remain the main source for electricity for at least another decade in Brazil, the largest consumer of power for the region. Hydropower projects also continue in Venezuela, Peru, and Ecuador. Moreover, the development by the private sector of smaller hydroelectric facilities in Colombia and Costa Rica, facilities with a capacity of only 25 megawatts that are more environmentally benign, indicate a potentially promising new path for hydropower in the region. Current projections indicate that hydropower will fall as a percentage of the total installed power capacity for the region from 62 percent in 1996 to 58 percent in 2006.

The Role for Natural Gas

The use of natural gas in the LAC region is on the rise due to its relative cleanliness as a fossil fuel, deregulation of power and fuel markets, and regional economic integration. While in the 1980s, the only country in the region in which gas played a significant part of the energy mix was Argentina, today gas accounts for 51 percent of the energy mix in that country and Argentina is exporting gas to Chile, Uruguay and Brazil. Gas production is also on the rise in Bolivia, Ecuador, Colombia, Mexico, and Brazil. Almost all new power production in Mexico, Peru, Chile, Argentina, Bolivia and Colombia is projected to be generated by natural gas, and Mexico is substituting most of its existing oil-fired power generation for gas while Venezuela has almost completed this process.

To the extent that natural gas replaces oil use, either for industrial purposes or for power generation, the result will be lower emissions of carbon dioxide, since CO₂ emissions are lower per unit of energy consumed for natural gas than for oil. On the other hand, to the extent that natural gas replaces hydropower for power generation, emissions of carbon dioxide can be expected to rise. Projections indicate that natural gas-generated electricity will rise in its share of installed power capacity for the region from 14 percent in 1996 to

30 percent in 2006 while oil-generated electricity will decline from 20 percent to 8 percent over the same period.

The Role for Transportation

Economic growth and a high level of urbanization (75% of LAC’s population live in urban areas) have spurred the region toward a vehicle density significantly higher than other developing countries, approximately 68 vehicles per 1000 inhabitants. These levels are even higher in major cities. The demand for transportation services can be expected to continue to grow as economic development continues, particularly in countries with rising numbers of middle class consumers. As a result, this sector is the dominant source of fossil fuel-based carbon dioxide emissions (37 percent) and one of the most rapidly growing (4.2 percent annually over the past decade).

Transportation infrastructure investment in LAC, as in other parts of the world, has concentrated on road-building, thereby supporting personal vehicles as an important and growing means for meeting mobility needs. In contrast, investment in infrastructure promoting other modal uses, such as public transportation, has lagged behind. These trends are continuing and provoking a range of urban problems. Traffic congestion has grown substantially in Latin American cities, as has air pollution. While these problems are obvious in the larger cities of the region, they are also materializing in smaller cities in the region. Moreover, other problems are also emerging, including a rapidly rising demand for oil and declining access of urban poor to mobility options.

These problems are creating growing political pressure, particularly at the local level, to develop suitable solutions. As a result, more cities in the region are seriously pursuing transportation alternatives, including good public transportation and the use of cleaner fuels. To the extent that these alternatives are successfully implemented, increases in CO₂ emissions from the transportation sector in LAC will likely be slowed. To the extent that these efforts prove fruitless, carbon dioxide emissions from this sector will continue to increase at their current rate, if not higher.

The Role for Energy Efficiency and Renewable Energy

With energy reforms proceeding across the LAC region, economic barriers to energy efficiency and renewable energy are beginning to fall. Subsidies on energy resources are disappearing, and the prospects for independent power producers and power retailers are growing. As a result, opportunities for sustainable energy technologies and practices—ranging from energy service companies to improve the energy efficiency of industrial facilities to off-grid photovoltaic-generated electricity to provide power to remote rural populations—are beginning to emerge.

Nevertheless, there remain a host of barriers that are hindering widespread utilization of these technologies. These range from the lack of private sector actors providing services and technologies in these areas, to regulatory and other policy barriers, to cost barriers often related to limited demand. The degree to which these are successfully addressed will determine how extensively these technologies enter the markets of the LAC region in the future.

Potential Future Contributions to Land-Use-Based CO₂ Emissions

The future role that the LAC region will have in contributing to land-use-based carbon dioxide emissions is uncertain. With a substantial fraction of the world's temperate and tropical forests—and the biodiversity and other benefits they offer—many of the countries of the region have begun to act to limit the loss of these forests and other land-use changes that contribute to CO₂ emissions. The success of their efforts will be determined by a variety of factors, including the competition for capital to invest in conservation efforts.

What Impact Could Climate Change Have on Development in LAC?

While uncertainties remain on the impacts of Climate Change, if current global greenhouse gas emissions trends continue, during the twenty-first century, the earth may witness significant changes in local climates, sea level, natural habitats and biodiversity, water supplies, agriculture, and

health and societal systems. The impact of these changes on LAC's development, although not necessarily all detrimental, could be important.

The IPCC, in response to a request to analyze potential regional impacts of Climate Change, released a report in 1997 projecting that for Latin America and the Caribbean these impacts could include: a higher frequency of extreme local weather phenomena, a rise in sea level, changes in natural habitats that could threaten biodiversity, changes in water supplies, stress on agriculture, and threats to human health. These projections underscore the need to understand the nature of these impacts more precisely in order to develop effective long-term adaptation strategies for the region.

Higher Frequency of Extreme Local Weather Phenomena

Extreme local weather phenomena, such as recently occurred in Central America and Venezuela, may well increase in frequency as a result of Climate Change, according to the IPCC. This could result in a substantial loss of life and property to the specific impacted LAC areas. For LAC countries and other developing countries with institutions and infrastructure that are less able to handle emergencies than developed countries, the capacity to respond quickly and limit losses could well be constrained.

Sea Level Rise

The IPCC projects that average sea level rise from Climate Change may be 15 to 95 centimeters (cm) by 2100, compared with a rise of 10 to 25 cm over the past century. Given that in the LAC region, economic growth and human settlements have shifted closer to coastal areas, sea level rise could disrupt infrastructure and economic production. Moreover, coastal erosion problems could worsen, contamination of freshwater aquifers could increase, and in so doing, human health could be threatened. The island nations of the Caribbean, many of which rely heavily on tourism for economic growth, may be particularly hard-hit.

Changes in Natural Habitat

In LAC, the IPCC report projects that Climate Change may put additional stress on forests, rangelands and particularly mountain ecosystems and transitional zones. The range of warming anticipated by the IPCC could effectively yield a poleward shift of temperature isotherms 150 to 550 kilometers, the 1997 IPCC report concludes. The result could be the disappearance of entire forest types and their associated biodiversity. In addition, due to temperature changes and altered rainfall patterns, the report notes that Climate Change could exacerbate existing deforestation problems in LAC, especially in the Amazon rainforest, leading to biodiversity losses, reduced rainfall and runoff in the Amazon Basin, and eventually adversely affecting the global carbon cycle.

Changes in Water Supplies

Climate Change could contribute to changes in precipitation patterns, according to the IPCC, leading to changes in water supply. In some areas, this may result in greater stress on water supplies, while in others water supplies may increase. Arid and semi-arid areas in LAC are projected to be most vulnerable.

Given the high share of hydroelectric generation in the LAC region's power production mix, changes in precipitation patterns would affect the region's power production patterns. The region already has witnessed the impact of changing precipitation patterns on power production during the 1990s as a result of the El Niño and La Niña phenomena, which, though not necessarily resulting from Climate Change, caused important disruptions in power sector operations in several Central American and Andean countries. New investments in transmission facilities, hydroelectric reservoirs, and thermal generation facilities may therefore be required, potentially adding to the region's output of greenhouse gases.

Stress on Agriculture

Although some food crops may benefit from increasing concentrations of carbon in the atmosphere, the impact on crop yields and productivity will vary widely according to changes in temperature, precipitation patterns, and other climatic factors. Given that these changes are likely to disrupt established patterns of agricultural production, the agriculture-intensive countries of LAC may be particularly vulnerable, according to the IPCC. Livestock production could also decrease if the temperate grasslands face water shortages.

Threats to Human Health

The IPCC report notes that Climate Change could affect the quality of human health in LAC. The impacts could include a rise in heat mortality, and an expansion southward and to higher altitudes in the geographic distribution of vector-borne diseases (e.g., malaria, dengue) and infectious diseases (e.g., cholera). As a result, already serious chronic malnutrition and diseases for some populations in LAC may be aggravated. In addition, in urban areas, pollution and high concentrations of ground-level ozone could be exacerbated by higher surface temperatures, thereby potentially increasing the negative health impacts on local populations.

While there is a broad understanding of the potential impacts on Latin America and the Caribbean from Climate Change, the precise nature and intensity for Latin America remains unclear. This information is critical for the region's planning, underscoring the importance of undertaking additional analysis and scientific assessment to understand these impacts. Of particular importance to policy makers is information on the potential costs of the impacts and the costs and benefits of alternative strategies to adapt to these impacts and mitigate them over the longer term.

3. Framework for Regional Action

The challenge to development from Climate Change facing Latin America and the Caribbean could be substantial, as it may well be to all nations of the world. The global community responded to this potential challenge by creating a binding international framework for action. This framework simultaneously committed its parties to an initial set of obligations while establishing a process for adapting those obligations over time as greater understanding of the impacts of Climate Change emerges and as a greater understanding evolves of the effectiveness of existing commitments.

The United Nations Framework Convention for Climate Change (UNFCCC), submitted for approval at the Earth Summit in Rio de Janeiro, Brazil in 1992 provided the initial framework for actions. The UNFCCC secretariat in Bonn, Germany with responsibility for monitoring the response and regular meetings of the Conference of the Parties (COP) to the UNFCCC as the ultimate authority of the Convention to amend the obligations as needed defined the process for adapting the framework over time. Among the changes made to the original UNFCCC was the Kyoto Protocol, negotiated and submitted for approval at the third meeting of the COP.

The United Nations Framework Convention for Climate Change (UNFCCC)

Signed by 154 countries, including all the LAC member countries of the IDB, the UNFCCC entered into force on March 21, 1994. This convention identified two major groups of signatories or parties: Annex I countries—developed countries and the Eastern European nations and members of the former Soviet Union now undertaking the transition to market economies, all of whom have historically been the major contributors to man-made greenhouse gas emissions; and non-Annex I countries—developing countries.

All signatories to the convention agreed to measure their national inventories of sources of man-

made greenhouse gas emissions and their removal by existing “sinks”, defined as any process, activity or mechanism which removes a greenhouse gas from the atmosphere. They also agreed to formulate national programs containing measures to mitigate greenhouse gas emissions and measures to facilitate adequate adaptation to Climate Change.

Although non-Annex I parties had no specific mitigation targets, Annex I parties committed to submit national plans to mitigate their greenhouse gas emissions, with the aim of returning their emissions levels by 2000 to the levels they were in 1990. Furthermore, UNFCCC allowed for the potential for Annex I countries to implement projects and policies *jointly* with other parties to the convention so as to achieve the emissions reduction goals of the Convention. Finally, developed country parties among the Annex I countries agreed to provide new and additional financial resources to meet the costs incurred by the commitments made by developing country signatories and to promote and facilitate the transfer of environmentally-friendly technologies to developing countries.

The Conference of the Parties (COP) Framework and the Kyoto Protocol

The first meeting of the Conference of the Parties, COP1, was held in Berlin in 1995. Since then, there have been four additional meetings of the COP, including COP4 hosted by the LAC region in Buenos Aires, Argentina in November 1998. The most recent, COP5, was held in Bonn in 1999, and the next, COP6, will be hosted by the Netherlands in the Hague in November 2000.

During COP3, held in Kyoto, Japan in December 1997, an additional legal instrument was submitted for approval in response to growing concerns that the levels of emissions targets originally agreed to in the UNFCCC were insufficient to buffer the threat of Climate Change. Known as the Kyoto Protocol, it contains new, more aggressive emis-

sions reduction targets for Annex I countries—the reduction of their emissions of six key greenhouse gases by at least 5 percent (below 1990 levels) by the period 2008-2012. No emissions reduction targets were established for non-Annex I countries.

The Kyoto Protocol also provided more definition for how countries could implement projects and policies *jointly*. The process was divided up between emissions reduction credits realized in Annex I countries and those realized in non-Annex I countries. Among Annex I countries, provision was made for trading of verifiable emission reduction credits, often referred to as “Joint Implementation”. For non-Annex I countries, including those of LAC, a “Clean Development Mechanism” (CDM) was defined for the purpose of assisting developing countries to achieve sustainable development. Under the CDM, a developing country that executes a project producing a reduction in greenhouse gas emissions may receive credits for that project. These credits may be purchased by Annex I countries to meet their reduction targets, and, in so doing, provided a source of investment finance for the developing country. As defined, such investments may be made by private companies or by governments.

The future of the Kyoto Protocol and the proposed CDM remains uncertain. The Protocol has yet to enter into force because the requisite minimum number of parties to the original UNFCCC still have to ratify the Protocol. Among these parties has been the U.S. government, which signed the protocol but has not ratified it. The U.S. has often stated its concern that developing countries adhere to at least voluntary emissions reduction targets. To date, within LAC, only Argentina has joined the ranks of the two non-Annex I countries which have committed to voluntary emissions reduction targets. If the Kyoto Protocol enters into force without ratification by the U.S., the largest simple Annex I producer of carbon emissions, there is concern that the Protocol will not have the international credibility to move forward on implementing CDM.

Even if the Kyoto Protocol enters into force with the U.S., considerable details about the CDM’s structure and implementation schedule have yet to

be worked out. The COP4 meeting in Buenos Aires established a Buenos Aires Plan of Action, which laid out a process roadmap for taking decisions necessary to implement the Kyoto Protocol. Several key issues, some of which are quite divisive, are to be addressed at COP6 in the Hague. They include: whether land-use change and forestry are to be included in the CDM; capacity building for CDM implementation; and the potential recognition of credits from the pilot Activities Implemented Jointly (AIJ) program.

Land-Use Change and Forestry

The Kyoto Protocol mentions three forestry-related activities that could be eligible for quantified emission reduction commitments of Annex I countries—afforestation, reforestation, and deforestation—but is vague on the definitions of the three. It is also vague on additional land-use change activities that might qualify. Most LAC countries favor including all of these activities in the CDM. Some have agreed with other non-Annex I countries, which argue that CDM should not include any forestry or land-use change activities, but should instead concentrate on energy and transportation projects.

Capacity-Building

The UNFCCC Secretariat has requested that non-Annex I countries present specific capacity-building requests to the Annex I countries at COP6. In previous COP sessions, the LAC countries have expressed a need for Climate Change-related technical training, including in carbon quantification and project preparation, as well as assistance with preparation of greenhouse gas inventories and adaptation plans.

Pilot AIJ Program

In response to the mention within the UNFCCC of the potential for Annex I countries to implement policies and programs *jointly* with other parties so as to be able to meet their emissions reduction targets, a pilot Activities Implemented Jointly (AIJ) pilot program was approved at the first meeting of the COP in 1995. Under this agreement, the pilot was to involve specific projects in both Annex I and non-Annex I countries. After the Kyoto Pro-

protocol was negotiated, making the distribution between Joint Implementation within Annex I countries and CDM within non-Annex I countries, the COP continued to support the AIJ pilot as a means of testing how the credit process could proceed under either mechanism. An issue that will be addressed during COP6 is whether AIJ projects can qualify for CDM credits as the CDM is operationalized. The LAC countries agree that AIJ projects should not be excluded from qualifying for CDM credits, but they diverge on the specifics of what might qualify. Some argue that credits for AIJ projects should begin to accrue only that CDM becomes operational, while others argue that credits should begin to accrue in 2000, the date originally established in the Kyoto Protocol for CDM to become operational.

Response of LAC to the Climate Framework

The LAC region has been substantially involved in the UNFCCC, the COP process, and in the subsequent Kyoto Protocol. Brazil hosted the Earth Summit at which the UNFCCC was initially presented for approval. And the governments of Brazil, Argentina, and Costa Rica played a major role in defining the CDM for inclusion in the Kyoto Protocol. All of the IDB's LAC member countries are parties to the UNFCCC. 65 percent of them are also signatories to the Kyoto Protocol, although only a quarter so far have formally ratified it (see Table A).

In response to the commitments they made, most of the LAC signatories to the UNFCCC have established contact offices or focal points to coordinate implementation of their commitments. Some have also established offices to oversee and certify AIJ pilot projects. However, limited funding for the offices has generally sharply constrained their activities and staffing. Hence, most LAC signatories have not made appreciable progress in pre-

paring their national inventories of greenhouse gas emissions, both sources and sinks. Similarly, they have made limited progress in identifying mitigation and adaptation strategies.

For those LAC signatories that have established AIJ/ CDM offices, capabilities range considerably. Most LAC countries with AIJ/CDM offices have limited technical staff and funding. Costa Rica, however, which has created the Office of Joint Implementation (OCIC), and also established a financial instrument designed for the international commercialization of greenhouse gas emission reduction credits, known internationally as Certifiable Tradable Offsets or CTOs. CTOs are a determined quantity of greenhouse gas emission reductions, expressed in equivalent units of carbon, which have been reduced or compensated through AIJ projects implemented in Costa Rica, and which have been reported to the Secretariat of the UNFCCC. Costa Rica has sold CTOs internationally and is currently negotiating further sales.

An effort has just been launched with the goal of expanding the Costa Rican program across all Central American countries. Coordinated with the Central American Commission on the Environment and Development (CCAD) and supported by the U.N. Food and Agriculture Organization (FAO), the project is in its early stages of development.

Other regional organizations within LAC have also been active in responding to the Climate Framework. The Forum of Environment Ministers has assigned this as one of its highest priorities, and established a working group to formulate common regional approaches to COP meetings. And OLADE, the group of Latin American energy organizations, regularly monitors the fossil fuel-related carbon dioxide emissions for countries in the region.

IDB Borrowing Member Country

Table A: Status of LAC Involvement in the UNFCCC

Country	Date of Convention Ratification	Date of Kyoto Protocol Signature	Date of Kyoto Protocol Ratification	UNFCCC Focal Point	CDM/AIJ Office	Initial Submission on Commitments
Argentina	11 March 1994	16 March 1998		Yes	Yes	27 July 1997; includes GHG inventory, vulnerabilities, mitigation policies
Bahamas	29 March 1994	9 April 1999		Yes	Pending	
Barbados	23 March 1994			Pending	Pending	
Belize	31 October 1994			Yes	Pending	
Bolivia	3 October 1994	9 July 1998		Yes	Yes	
Brazil	28 February 1994	29 April 1998		Yes	Pending	
Chile	22 December 1994	17 June 1998		Yes	Pending	
Colombia	22 March 1995			Yes	Under development	
Costa Rica	26 August 1994	27 April 1998		Yes	Yes	
Dominican Republic	7 October 1998			Yes	Pending	
Ecuador	23 February 1993	15 January 1999		Yes	Pending	
El Salvador	4 December 1995	8 June 1998	30 November 1998	Yes	Yes	
Guatemala	15 December 1995	10 July 1998		Yes	Yes	
Guyana	29 August 1994			Yes	Pending	
Haiti	25 September 1996			Pending	Pending	
Honduras	19 October 1995	25 February 1999		Yes	Yes	
Jamaica	6 January 1995			Pending	Pending	
Mexico	11 March 1993	9 June 1998		Yes	Under development	9 December 1997; includes GHG inventory, vulnerabilities, mitigation policies, national action plan
Nicaragua	31 October 1995	07 July 1998		Yes	Under development	
Panama	23 May 1995	8 June 1998	5 March 1999	Yes	Yes	
Paraguay	24 February 1994	25 August 1998		Yes	Pending	
Peru	7 June 1993	13 November 1998		Yes	Pending	
Suriname	14 October 1997			Yes	Pending	
Trinidad and Tobago	24 June 1994	7 January 1999	28 January 1999	Yes	Pending	
Uruguay	18 August 1994	29 July 1998		Yes	Pending	15 October 1997; includes GHG inventory, vulnerabilities, mitigation policies.
Venezuela	28 December 1994			Yes	Pending	

Source: <http://www.unfccc.org>

Activities by Other Institutions and Countries to Support LAC Needs

Responding to the UNFCCC requirements, several institutions and countries have made commitments to support the needs of developing countries, including those of Latin America and the Caribbean. In addition, efforts have been made to experiment with emissions trading and create a carbon credits market.

Global Environment Facility (GEF)

The GEF was created with the intent of assisting developing countries and nations transitioning to market economies to develop programs and policies that benefit the global environment. With commitments predominantly from Annex I countries currently \$2.75 billion, the GEF is designated as the financial mechanism under the UNFCCC. After a 3-year pilot phase, the GEF was re-shaped into its current form in 1994. The U.N. Development Programme, the U.N. Environment Programme, and the World Bank are its implementing agencies. Beginning in May 1999, Regional Development Banks have been invited to participate as executing agencies, partnering with implementing agencies to develop and manage GEF projects. The GEF provides grant financing for projects in four areas, including mitigating Climate Change; historically, Climate Change projects have accounted for 38 percent of the projects in the GEF portfolio. The current GEF pipeline for LAC in Climate Change includes 14 projects, mostly addressing renewable energy technologies, but also dealing with carbon dioxide sequestration, methane gas recapture from landfills, reduction of methane leaks from a natural gas distribution system, and conversion to low emission fossil fuels.

Prototype Carbon Fund (PCF), World Bank

The PCF, designed and developed by the World Bank and approved in July 1999 by its Board of Directors, will invest in projects producing high quality greenhouse gas reductions that may be registered with the UNFCCC for the purposes of the Kyoto Protocol. The PCF will invest contributions made by companies and governments in projects designed to produce emissions reductions fully consistent with the emerging framework for

emissions trading, including the CDM. Contributors in the PCF will receive a pro rata share of the emissions reductions, verified and certified in accordance with agreements reached with the countries hosting the projects. As a pilot activity, the PCF does not endeavor to compete in any emerging emissions reductions market; it is restricted to \$150 million of investment and is scheduled to terminate in 2012.

Latin America Carbon Program, Andean Development Corporation (CAF)

The CAF is a multilateral financial development institution, headquartered in Caracas, Venezuela whose principal members are Bolivia, Colombia, Ecuador, Peru, and Venezuela. It has recently announced a Latin American Carbon Program that will have the following components:

- *Technical assistance* to support member countries in the development of informed positions, support the public and private sectors with project design and implementation, and contribute to the financial input and options for the design for the CDM;
- *Technical exchanges* to support CDM projects and related negotiations;
- *Regional workshops and meetings* to promote regional dialogue and exchange of experiences among member countries;
- *Publications and outreach materials*, including proposals for the CDM prepared by member country organizations, and public awareness and education materials; and
- *Project development support* for projects that are profitable, use methodologies acceptable under the Kyoto Protocol, and generate verifiable carbon reductions.

Central American Environmental Fund (FALIDES), Central American Bank for Economic Integration (CABEI)

CABEI is the multilateral development bank for the integration and development of Central America. The Central American Environmental Fund, FALIDES, is a new financial mechanism within CABEI with the goal of managing and preserving

resources in environmental projects for the sustainable development of Central America. The fund's operations include credit, pre-investment support, participation in investment funds, and creation of trust funds. The Board of CABEI is currently considering the establishment of a Regional Carbon Fund as well.

Latin American and Caribbean Bureau, United Nations Development Programme (UNDP)

As part of an agenda to support sustainable development, the Bureau explicitly addresses the Climate Change challenge for the region. Among the elements of this agenda are the provision of regional support for promoting political dialogue among countries about the Kyoto Protocol and its implementation; assistance to countries to fulfill the obligations stated in the UNFCCC; provision of capacity-building on Climate Change; identification of the opportunities for CDM in the region; and development of financial tools for preparation and implementation of Climate Change-related projects.

Country Studies Program, US Government

The U.S. Department of Energy and the U.S. Environmental Protection Agency have jointly supported a program of capacity-building and technical assistance to developing country signatories of the UNFCCC. The program aims to assist countries in developing their national inventories of greenhouse gas emissions and for developing national plans for mitigating those emissions and adapting to Climate Change. Only a few countries have completed their national inventories under this program, and even fewer their mitigation or adaptation plans.

Activities Implemented Jointly (AIJ) Pilot Projects, Various Annex I Countries

Various Annex I countries are participating in AIJ Pilot Projects in LAC countries, involving both carbon sequestration/land-use and carbon emissions reductions/energy and transportation activities. Examples of projects range from forest protection to renewable energy. Most of these involve both private companies and national governments. Among the countries with projects in

the region are the U.S., Netherlands, Norway, Switzerland, Austria, Germany, France, the U.K., and Finland.

Inter-American Institute for Global Change Research (IAI)

The IAI is an intergovernmental organization supported by 18 countries in the LAC region with the goal of increasing understanding of global change phenomena and their socio-economic consequences in the region. It is intended to augment the scientific capacity of the region and to provide information in a useful and timely manner to policy makers. A priority is comparative and focused studies based on scientific issues important to the region as a whole. The U.S. National Science Foundation hosted the IAI Secretariat from September 1994 until September 1996 and the U.S. National Oceanic and Atmospheric Administration, Office of Global Programs, hosted the office of the IAI Executive Scientist from 1993 to 1995. The IAI became fully operational with the establishment of the IAI Directorate located on the campus of the Instituto Nacional de Pesquisas Espaciais (INPE) in São José dos Campos, Brazil, in March 1996.

Remaining Challenges and Opportunities for the LAC Region

The countries of LAC face a variety of challenges and opportunities in responding to Climate Change directly and as part of the global community's response through the UNFCCC. These challenges and opportunities are temporal in nature. Some needs are immediate; more are likely to materialize over time.

In the short term, obligations have already been made by LAC countries as parties to the UNFCCC. Only three countries in the region have already submitted their national inventories and initial plans for mitigation and adaptation to the UNFCCC (see Table A); technical and financial assistance could assist others in the region in meeting these obligations.

As the COP process continues, short term opportunities are emerging for the region, which, if its members are well-prepared, could provide the

countries of the region with new financial instruments and technical assistance for meeting their development needs in the future. In particular, COP6 may well define further the structure for CDM, as well as defining and gaining commitments to support capacity-building needs. To be ready to seize the opportunities and shape them to meet their needs, countries of the region will likely require analysis of the range of their options, and the costs, as well as fora in which leaders and other stakeholders can discuss their responses and how they might work together to ensure their interests and concerns are addressed.

Many of the challenges and opportunities posed by Climate Change remain clouded by uncertainty, however. The evolving framework of the UNFCCC is unclear, with the fate of CDM's entry into operations and the Kyoto Protocol undetermined. Future obligations for the region are also unknown; as the COP process proceeds, for example, additional countries may opt to make voluntary commitments to emissions reductions. As these elements materialize, financial and technical assistance for the LAC countries, along with capacity-building support, would be important. If the CDM becomes operational, the region would need to establish regulatory structures for moni-

toring the process and ensuring the projects meet the developmental priorities of the country, methodologies for determining the baseline from which credits are measured as well as for measuring the reductions, and a capacity-building process for the individuals involved in the implementation of the process. If support for voluntary commitments to emissions reductions grows among LAC countries, the countries would need to prioritize how to achieve those reductions with a minimal threat to economic development, giving highest priority to "no regrets" strategies that bring a variety of other benefits in addition to emissions reductions.

Similarly, the specific impacts on the LAC region from Climate Change remain uncertain in an environment where debates are still raging about whether global warming is occurring, and, if so, how much of that warming is due to human activities. Even if human contributions to rising surface temperatures on earth are increasingly accepted as fact by the global scientific community, relatively little research has transpired on the specific impacts Climate Change will have on the region, much less how the region could respond. As impacts become clearer, analysis could identify "no regrets" adaptation strategies that make sense for the region.

4. IDB: The Region's Bank

The Inter-American Development Bank (IDB) was created to meet the development needs and challenges of its member countries in Latin America and the Caribbean. The first of the regional development banks, it was established in 1959, to provide a range of services to its member countries, including loans, technical assistance, and non-lending services. With offices in each of its 26 borrowing member countries, the Bank has expanded over the years in meeting the developmental needs of the region to include the Inter-American Investment Corporation (IIC) and the Multilateral Investment Fund (MIF), both of which promote private sector development in the region. Since its founding, the IDB Group has mobilized financing for projects that represent a total investment of \$240 billion. Annual lending has grown substantially from \$294 million in loans approved in 1961 to \$9.5 billion in 1999.

Public Sector Loans

The wide range of investment projects financed by the Bank includes building roads, installing hydroelectric facilities and power lines, opening health clinics, providing safe drinking water, and promoting small businesses. Bank lending by sector has evolved with the shifting development needs of the region. The IDB's 1999 lending program emphasized the productive sector, infrastructure development, poverty reduction and modernization of the state. In addition to infrastructure loans, the types of loans proffered by the Bank include:

- *Microenterprise loans* to foster the growth and development of the microenterprise sector in LAC;
- *Small and medium enterprise loans* geared to support and strengthen small and medium enterprises as an engine of economic growth for the LAC region;
- *Science and technology loans* to support the technological upgrade of businesses and the strengthening of the scientific and research capabilities of the region;

- *Urban and municipal development loans* to support the expanding urban and municipal needs of the region, especially as government responsibilities for the region decentralize from the national level to local levels;
- *Environmental loans*, including for clean urban water supply, sanitation, pollution control, and conservation of natural resources;
- *Emergency relief loans*, often fast-dispersing, to enable member countries to respond to emergency situations, be they economic or prompted by physical disasters such as flooding or earthquakes; and
- *Sector adjustment loans*, to provide flexible support for institutional and policy changes on the sector or subsector level, through fast-disbursing funds.

Private Sector Loans through the Private Sector Department (PRI)

These types of loans emerged in response to the needs of LAC countries that had adopted new policies during the 1990s to increase private sector participation in providing basic services such as energy, transportation, and sanitation. The PRI may lend up to 5 percent of the Bank's capital directly to private infrastructure projects without government guarantees. In addition, the PRI may provide guarantees to private sector lenders of infrastructure projects in the LAC region to mitigate the risk perceived by equity investors or lenders in the private sector. These include partial risk guarantees that cover up to 100 percent of a loan for a specific political risk and partial credit risks that cover a portion of financing providing by private financiers.

Technical Assistance

The Bank's technical assistance helps member countries in LAC prepare, finance, and carry out national or regional development plans and projects, and train development specialists. Such as-

stance is either directly tied to project preparation for investment or aimed at specific capacity-building objectives. The Bank provides technical cooperation through grants, reimbursable loans, or contingent-recovery funds. In 1999, non-reimbursable technical cooperation operations totaled \$80.9 million, much of which was financed by Trust Funds established within the IDB member countries (usually non-borrowing members) and international entities. Reimbursable technical assistance loans may be provided separately or as part of a larger investment loan. Contingent-recovery technical cooperation is repayable only when it leads to a loan from the Bank or another financial institution to execute a project.

Non-Lending Services

The IDB also proffers a range of non-lending services to provide technical and policy advice to its members as they face specific developmental challenges. These services include policy analysis, research, conferences and fora to address important issues, and assessments of best practices across a variety of sectors.

Inter-American Investment Corporation (IIC)

The IIC was created in 1989 to provide financing directly to private sector entities in the LAC region, preferably small and medium in scale. No governmental involvement is required nor is any government guarantee needed. As a result, the governing structure of the IIC is different from that of the IDB; co-located with the IDB, it coordinates its investment decisions with the operational arms of the IDB.

IIC financing may include direct loans, direct equity investments, lines of credit to local financial intermediaries, and investments in local and regional venture capital funds. The IIC serves as a catalyst for attracting other resources, including additional financing, technology, and know-how. These resources are mobilized through co-financing and syndication, support for security underwritings, and identification of joint venture partners.

Multilateral Investment Fund (MIF)

The MIF was established in 1993 with a complementary set of tools to that of the PRI and the IIC for supporting private sector development. It is a \$1.3 billion grant and investment fund managed by the IDB, with a special emphasis on small and medium enterprises. The types of projects that MIF funds include:

- *Technical cooperation* to assist in the development and modernization of the financial, regulatory and public sector framework needed for an effective and competitive private sector;
- *Human resource development* to build the skills and capabilities of the region's workforce; and
- *Small enterprise development* through grants to NGOs, government agencies and industry associations for small business development and through participation in equity funds making investments in small businesses and investment in financial institutions focusing on the micro and small business market.

Comparative Advantage in Meeting New Development Challenges to the LAC Region

As displayed repeatedly during its history, the IDB is an institution with many strengths that provides it with a comparative advantage in meeting new development challenges to the LAC region. These strengths were just reviewed in the Bank's new Corporate Strategy, issued in July 1999.

Major Multilateral Bank Lender

The Bank is the main source of multilateral development bank financing for the LAC region. Moreover, it maintains a presence in all the key development sectors for the LAC region, including those that may face development challenges from Climate Change. These include energy, transportation, education, health, rural development, agriculture, forestry, and municipal development.

Knowledge of the Region and Presence in the Region

The Bank is seen as an institution that understands the region and its problems well. A governance structure which gives a majority shareholding to borrowing member countries, along with the practice of recruiting staff from the region, gives the institution a distinct perceived advantage in understanding the borrowing member countries and their problems. In addition, it maintains an enduring presence in borrowing countries through its resident representatives in each country and through a continual flow of missions to member countries invited by them to address a broad range of issues. This allows for an open and frank discussion of difficult issues.

Persistence and Responsiveness

With its ongoing presence in the region and substantial institutional stability, the Bank also is able to provide considerable continuity over time in the pursuit of its objectives. Since there is a growing awareness that those public policies which have the greatest impact are those where a consistent direction can be sustained over time, the Bank's ability to persist constitutes a strong potential advantage in the development process. The Bank is generally perceived to be responsive to its member countries, needs, and willing to join them in tackling new and challenging problems.

Multilateral Character

As a multilateral institution with a heavily regional focus, the Bank is uniquely positioned to be a focal point for international cooperation to support development in LAC. Discussions about development policy facilitated by the IDB frequently form the basis for regional consensus on challenges and opportunities and the assistance role the international community can provide. Moreover, the Bank's capacity to manage financial resources renders it an effective intermediary of funds to support the LAC region's development from bilateral and other multilateral development institutions.

Broad Range of Instruments to Provide Support

The Bank has developed a broad range of lending and non-lending instruments to provide support to both governments and the private sector. These include technical assistance, non-lending services, public sector loans, private sector loans, equity investments, and guarantees. Furthermore, the Bank has demonstrated that, when the need for new instruments develops, it can and will add them to its portfolio.

Well-Established and Recognized Research Network to Strengthen LAC Capacity

Since 1991, the Bank has had in operation a Research Network throughout LAC, now numbering 240 institutions, to strengthen policy formulation throughout the LAC region and inform and guide the institutional reform agenda for the region through analysis of major social and economic issues. It has also promoted the creation of FON-TAGRO, the Regional Fund for Agricultural Technology, which finances agricultural research of regional interest through a competitive mechanism. Furthermore, through its support of the Institute for the Integration of Latin America and the Caribbean (INTAL), inaugurated in 1964, the Bank has been actively involved in research activities, technical cooperation, and training in support of the integration and regional cooperation processes.

IDB Has Begun the Process of Responding to the Climate Change Challenge

Following COP3, in 1998 the Bank provided support to a working group under the Forum of Ministers of Environment of LAC to define a common approach to COP4, and later in the year (September 29-30, 1998), it convened a forum in Washington, D.C. on "A Regional Approach to the Kyoto Challenge: The Role of the IDB". The main conclusions of the September 1998 forum, attended by over sixty public and private sector participants from LAC and North America and other international and regional institutions, were:

- Actions of the IDB should complement the evolution of the international negotiations and the requirements of its member countries.
- A high priority for the IDB should be to educate itself about the Climate Change issues in general and the CDM in particular.
- IDB should consider providing support for its borrowing member countries in the preparation of their national positions and, if possible, facilitate regional consensus-building on strategies and priorities.
- In determining any potential role with regard to Climate Change, IDB should focus on its strengths, concentrating on those activities with the most development impact on borrowing member countries and a high level of replicability.
- Suggested priorities for an IDB Strategy on Climate Change included:
 - *Capacity-building and technical support* in such areas as developing inventories of greenhouse gases and mitigation and adaptation plans; preparing for future international negotiations; and analyzing and potentially developing projects for the CDM, particularly in poorer countries;
 - *Strengthening information networks* in the areas mentioned above and working with the Research Network to develop and study critical issues such as how to determine baselines for carbon emissions; and
 - *Facilitating private sector investment* through the appropriate application of its instruments, such as guarantees, and, when the CDM becomes operational, potentially serving as a match-maker or facilitator between investors and host countries.

The IDB has played a key role in meeting the development challenges facing the LAC region in the past. It continues to enjoy a comparative advantage in meeting the development challenges facing the LAC region in the future. Climate Change is likely to be one of those challenges and IDB can work in partnership with its borrowing member countries in LAC to respond to their evolving needs to implement mitigation and adaptation strategies that address the challenge of Climate Change.

5. A New Partnership on Climate Change and Development

The IDB is in a strong position to support the needs of its LAC member countries in responding to the challenge of Climate Change. Recognizing that the Climate Change-related challenges facing LAC countries are likely to change and evolve over time, the Bank will work in *partnership* with its member countries to respond to their development and Climate Change needs as they arise. As a result, the Bank's Climate Change activities are likely to be evolutionary in nature, evolving as the UNFCCC framework and the Kyoto Protocol are further defined, as the impacts of Climate Change on LAC countries are clarified, and as the countries of the region assess and define the actions they wish to take to address these impacts.

The partnership between the Bank and LAC member countries should be centered around the present strengths and instruments of the Bank, but be flexible so as to move into new areas and develop new instruments for assistance as the need emerges. Moreover, the partnership should complement, rather than compete with, activities of other institutions working on Climate Change in LAC; allowing the Bank to work cooperatively with these institutions to ensure the needs of its LAC member countries are recognized and met. Furthermore, the Bank's partnership with its LAC countries should be based on a shared vision that their development needs are extensive and resources are limited. Hence, investment priorities need to be selected carefully, without ignoring pressing needs in sectors not immediately touched by Climate Change. Potential investments in adaptation and mitigation needs will therefore be reviewed in the context of competing investment needs, with preferences likely to be made for "no-regrets" strategies, those that will yield a variety of benefits in addition to Climate Change.

For the IDB, this means incorporating the Climate Change challenge into its strategic approach, and into its procedures and operations, a process that will necessarily change over time as the UNFCCC framework evolves and the understanding of the impacts of Climate Change become clearer. By

doing this, the Bank can be ready to respond to the needs of its member countries as they face the challenges and opportunities posed by Climate Change.

With its historic strength in supporting research and education, the Bank could support LAC countries' requests to promote regional knowledge and capacity in the impacts of Climate Change and how to respond to these impacts. Similarly, building upon its investment strength in the sectors that are producing greenhouse gas emissions, the Bank could provide critical assistance in mitigating those emissions, both from fossil fuel use as well as from forestry and other land-use practices. Moreover, with its complementary investment strength in sectors likely to be impacted by Climate Change, the Bank could also provide effective adaptation assistance to its member countries. And finally, the Bank could mobilize the finance necessary for LAC countries to implement a coherent response to Climate Change.

Incorporating the Climate Change Challenge into the Bank's Strategic Approach

The IDB is in the process of updating its strategic vision of its role and activities. This vision both recognizes the progress made during the past 40 years, the changing development needs of the LAC region, and the new challenges facing the region.

The emerging vision for the Bank targets four areas for specific attention: social sector reform, modernization of the state, competitiveness and regional integration. Among the priorities for social sector reform are elimination of the rural poverty; improvement of living conditions in cities; and development of human capital formation. Among the priorities identified for modernization of the state are improvement of governance, including at the local level; and the fostering of a climate of cooperation between the state, civil society, and private enterprise.

Among the priorities identified for competitiveness are continued development of the private sector, especially small and medium-sized businesses; ensuring new technologies are developed to meet new needs; and supporting the development of adequate infrastructure, including energy and transportation and among the priorities for regional integration are furthering trade and integration, and regional cooperation.

Many of these targeted activities could be adversely impacted by Climate Change. The rural poor, for example, have had a long history of being the most adversely affected by changing social, economic and environmental conditions. At the same time, some of the opportunities presented by the Kyoto Protocol could offer benefits for the Bank's priority areas. The CDM, in particular, could offer a new mechanism for attracting foreign investment into these countries. Hence, the Climate Change challenge and the opportunities that emerge need to be integrated into the Bank's strategic vision as the state of knowledge and the tools such as CDM evolve.

Complementing this overall strategic vision, the Bank has developed a series of strategies and "best practice assessments" in the environment area that enunciate new priorities. They deal with energy, water resources, forestry and biodiversity, sustainable agriculture and rural development, coastal management, and environmental resources management. All identify priorities that are compatible with mitigation and/or adaptation priorities, but in most cases, they do not explicitly recognize the Climate Change challenge. As a result, they do not address the potential adverse impacts on their sector from Climate Change nor the potential benefits that may emerge from new financial instruments or new activities. This integration needs to occur for the strategies to be effective. As with the overall strategic vision, this is likely to be an evolutionary process as more information become available about the impacts of Climate Change and as more progress is made in defining the details of the UNFCCC process.

Energy

The Bank's energy strategy emphasizes the development of market-compatible projects in energy

efficiency and renewable energy resources and switching to gas as a cleaner fuel (compared with other fossil fuels). In most cases, these are also choices that will mitigate greenhouse gas emissions. The strategy calls for a series of tools to help facilitate these choices. These include an extensive energy and environmental dialogue as part of the Bank's programming dialogue with each country, substantial use of technical assistance in guiding policy choices and removing regulatory and other barriers to the development of clean energy projects, and the establishment of a Clean Energy Fund using trust funds to develop clean energy projects and integrate them into the operations of the Bank.

The integration of the Climate Change connection with energy will undoubtedly reinforce the need for all these Bank tools. Although not elaborated in detail, the energy strategy recognizes that "... the Bank is also to be seen as the natural source of support for efforts by countries in the region to comply with their obligations under the United Nations Framework Convention on Climate Change and to avail themselves of the opportunities provided by the Clean Development Mechanism (CDM) of the Kyoto Protocol". For this reason, the strategy proposes the initiation of dialogue with countries on their Climate Change agenda as one of the activities to be begun during its first year of implementation. In particular, for the energy strategy to meet the needs of LAC countries, the potential impacts on hydropower of Climate Change and the Climate Change impacts of fuel switching choices should be addressed in related IDB activities and projects.

Urban Transportation

As one of the fastest growing energy demand sectors, urban transportation is explicitly addressed in the energy strategy. The strategy endorses increased financing of projects to meet urban transportation needs that adopt a comprehensive approach including, among other measures, rational land-use management, effective public transportation, disincentives for the urban use of cars if alternative transportation is available, and the use of cleaner alternative fuels, as appropriate.

Generally speaking, these are tactics that will also mitigate the greenhouse gases produced by the oil predominantly used by this sector. However, the potential role that Climate Change could have in exacerbating local air pollution and the relative roles of different types of alternative fuels insofar as their effects on greenhouse gas emissions should be addressed in related Bank projects.

Water Resources

The Bank's strategy emphasizes integrated water resources management that promotes comprehensive sub-regional and national water resources planning. As more is understood of the localized impacts of Climate Change on water resource availability, the Bank should work with affected LAC member countries to integrate this into sub-regional and national planning.

Forestry and Biodiversity

The Bank has long endorsed a "best practices" approach that emphasizes investments in forest conservation, and rehabilitation and reforestation of degraded natural forests. LAC has about one-quarter of the world's existing forests and more than half of its tropical forests, containing a wealth of products in growing demand, including those that offer local and global environmental benefits.

With land-use changes and particularly loss of forests serving as one of the major sources of greenhouse gas emissions for the region, the ancillary benefits for forest conservation projects of reducing greenhouse gas emissions should be included in programming mission dialogue with member countries. Moreover, the potential adverse impact of Climate Change on forest resources should be addressed in relevant Bank projects. Finally, the potential role for CDM, insofar as contributing to forest conservation efforts, should also be assessed if progress is made in operationalizing this instrument.

Sustainable Agriculture and Rural Development

The Bank's strategies in this area emphasize the need to look at the rural economy as a whole, investing in the modernization of agriculture and in rural non-farm economic activities. Key priorities

have been identified to include institutional development of regulatory and administrative bodies responsible for natural resources, integrated management of micro-watersheds at the community level, and capacity building on soil conservation techniques and the sustainable management of natural resources.

The potential stress and benefits that might be imposed by Climate Change on agriculture and the possible responses should be assessed as Bank projects are developed in this area. At a time when the impact is not yet being felt, the opportunities provided by incorporating these issues into research agendas could be evaluated

Coastal and Marine Resources Management

The Bank's strategy in this area emphasizes incentives and the development of sufficient local regulatory and administrative oversight to maintain the quality of coastal and marine resources while ensuring their continued economic development in a sustainable manner. For many countries, these areas are a major contributor to their economic development through tourism and the fisheries industries.

One of the first manifestations of Climate Change may be in sea level rise. Support for research to determine cost-effective responses to the rise in sea level could be considered in coastal projects. Similarly, for projects investing in the development of coastal resources, identifying cost-effective "no-regrets" strategies now for dealing with that threat may make sense. For example, if choices exist between building a bridge at a given level versus a higher level with no appreciable difference in costs or impacts, the higher level might be selected.

Environmental Resources Management

As the Bank calls attention to progress in good governance, it has emphasized the need to establish a sound legal and governmental structure and processes for environmental management. The link between sound environmental management and the new challenges posed by adaptation to Climate Change should be addressed in related Bank assistance and projects. In particular, if pro-

gress is made in operationalizing the CDM, the Bank could support analysis and research by interested countries on suitable regulatory regimes for monitoring the process.

Incorporating the Climate Change Challenge into Bank Procedures and Operations

To be effective in its partnership with LAC member countries in addressing the challenges and opportunities posed by Climate Change, this issue needs to be integrated into Bank procedures and operations. It begins with the Bank educating itself about the issue, and the evolving challenges and opportunities. But it also involves incorporating this issue into the Bank's procedures to identify and review possible projects and evaluate their effectiveness once implemented.

Educating the Bank about Climate Change

The Bank has a variety of options to educate itself about Climate Change, its impacts and the opportunities emerging from the UNFCCC process. Recognizing the temporal nature of the issue, the educational process can not be of limited duration, but rather conducted on an ongoing basis. The Bank can host regular discussions and seminars for staff with Climate Change-related specialists from key sectors and disciplines, potentially in cooperation with its Office of Learning. It can support staff-specific training in Climate Change-related areas. And, as gaps are discovered in understanding specific impacts of Climate Change or responses to it, the Bank can support research to achieve that understanding, potentially in collaboration with its Research Department.

Mainstreaming Into Bank Procedures

The Bank has developed an effective procedure for responding to LAC country priorities, introducing new issues, and evaluating the effectiveness of its projects and activities. This starts with the programming and policy discussions with the Bank's member countries that define future projects and loans. The Bank could begin to look for opportunities to introduce the Climate Change issue in its programming and policy discussions, especially in key sectors. To the extent that the operating departments of the Bank or the borrow-

ing countries would benefit from an accounting of the projected greenhouse gas emissions from alternative projects, these analyses could become part of project preparation. Additional opportunities for mitigation and adaptation investments may be evaluated as part of this process.

In addition, the Climate Change impacts on a proposed project and the possible impact on Climate Change of the project can begin to be introduced as appropriate during project review.

Finally, the Bank may consider post-evaluation of projects for their impacts on greenhouse gas emissions, especially in the key energy and land-use sectors. This information will be important for learning from Bank activities so as to improve their effectiveness and structure in the future in responding to the challenge of Climate Change.

Promoting Regional Knowledge and Capacity

The Bank has had a long-standing commitment to building regional capacity so as to be able to successfully confront emerging problems and opportunities. In response to requests from its LAC member countries, the Bank could also invest in capacity-building to enable the region to better understand Climate Change and how it could respond. Among these activities the Bank could undertake to accomplish this task are: strengthening the existing Research Network in the area of Climate Change; convening and participating in regional fora on Climate Change and the UNFCCC process; and strengthening the capacity of the Climate Change offices in LAC member countries.

Including Climate Change in the Agenda of the Research Network and Building Centers of Excellence in This Area

The IDB could regularly organize exchanges with the Research Network already in place in LAC to convene key stakeholders in the region and define key policy areas requiring research in the area of Climate Change impacts and the region's response to them. In addition, through its existing science and technology operations as well as those in the pipeline, the Bank could identify opportunities to build strength in existing research and educational

institutions in LAC to respond to Climate Change. These may well include operations in the area of geological and topographic mapping as part of vulnerability assessments; regional agricultural research focused on developing technologies for sustainable production systems through FON-TAGRO; programs for conservation of natural resources, including forestry and biodiversity; meteorological and hydrological services to forecast weather impacts; and information gathering and dissemination systems.

Regional Fora on Climate Change

Continuing an activity the Bank initiated in 1998, the Bank can maintain a strong role in supporting regional fora on Climate Change, participating as appropriate. These fora may include a range of stakeholders from national and local governments to private sector companies and NGOs. Among the topics they may address are: coordinated approaches for future COPs; what Climate Change is and what impacts it may have on the region; learning from the experiences of others on specific mitigation and adaptation activities; and defining common needs of the region in responding to Climate Change.

Strengthening Climate Change Offices

In response to requests from LAC countries, and in coordination with other institutions providing support in this area, the Bank could support the development of effective Climate Change offices as part of its ongoing role in LAC to strengthen critical national institutions. The specific support provided would depend on the country, but could include technical and policy assistance, training support, and financial assistance to enable the offices to hire the necessary staff. Among the initial priorities for these offices is completion of their inventories of greenhouse gas emissions sources and sinks and their national action plans for mitigating greenhouse gas emissions and for adapting to Climate Change. IDB activities would also seek to ensure that support for these offices are integrated into any simultaneous efforts to strengthen the research network and centers of excellence in Climate Change.

Support to Mitigation Opportunities

Many of the best mitigation opportunities for greenhouse gases in LAC are “no-regrets” in nature. They are cost-effective and yield a host of other benefits ranging from lower levels of air pollution to greater economic productivity to rural development. As a result, they have been identified as priorities in the IDB’s strategies and best practices for the energy, agriculture and forestry sectors. Barriers that have hindered the development of projects in these priority areas have included their innovativeness and the limited experience policymakers have had with them, and limited private sector involvement. The Bank has already committed to undertaking activities in these critical areas, and has established mechanisms to mainstream these innovative areas within the operations of the Bank. The greenhouse gas benefits that these projects also deliver only further underscores the need for the Bank to maintain its commitments in these areas.

Over time, however, additional mitigation opportunities are likely to emerge with trading in emissions reduction credits garnered from specific projects and practices, especially if the CDM is successfully operationalized. The Bank may also provide assistance in defining this regime as well.

Energy and Urban Transportation

The Bank has already given priority to the development of market-compatible energy efficiency and renewable energy projects in the energy sector, and to integrated urban transportation projects that emphasize good land-use management, alternative transportation modes and clean fuels; these also offer greenhouse gas mitigation benefits. Moreover, through its Sustainable Markets for Sustainable Energy (SMSE) Program, the IDB has devised a means for helping to bring these types of projects into the mainstream of the market as well as into the mainstream of Bank operations. Hence, the pipeline of projects with energy efficiency, renewable energy and clean, integrated urban transportation components can be expected to increase in the years ahead.

Forestry and Agriculture (Land-Use)

The Bank is moving forward in developing conservation and sustainable management programs for forests and other agricultural lands because of the range of benefits they offer. These also provide major carbon-sequestration benefits.

The Bank also continues to explore better mechanisms to achieve its conservation priorities. In the forestry sector, the Bank has begun efforts to define “environmental services” that may be reaped from forest conservation areas, so as to increase the attractiveness of forest conservation projects and create a stream of revenue that will enable its member countries to pay back loans for forest conservation. In response to demand from LAC countries, additional projects could be developed.

In the agricultural sector, the Bank’s Regional Environment and Natural Resource Divisions and the Rural Development Unit within the Sustainable Development Department should assist in the development of conservation-friendly rural development programs. Moreover, through its role in fostering the development of FONTAGRO and now housing its secretariat, the Bank will continue to play an important role in supporting climate-friendly research that is supported across the LAC region, and in so doing, build up long term support for the use of these strategies in implementation.

Municipal and Urban Lending

With high levels of urbanization and decentralization of governance reforms ongoing throughout the LAC region, the Bank’s portfolio of urban lending projects has been increasing. About \$5 billion of urban loans are presently in the Bank’s pipeline. These can play an important role in mitigation of greenhouse gases because the buildings and infrastructure built with these loans can support efficient use of energy and good public transportation, and the landfill sanitation sites can capture and utilize methane emissions rather than emitting them to the atmosphere. Through the SMSE program, the Bank has already begun identifying project opportunities and it will continue to do so in the future.

Investing in Greenhouse Gas Emissions Reduction Credits

As international negotiations progress on defining the CDM and how and when it will become operational, the Bank will evaluate whether it can play a role with the existing instruments it now has. For example, it may be appropriate to support the efforts of LAC governments to develop appropriate regulatory structures for the CDM to operate effectively.

In response to specific requests of its member LAC countries, the Bank also could become involved in projects to support greenhouse gas emissions reduction trading within an appropriate existing framework, national or regional. For example, Costa Rica has already established a domestic framework for carbon trading; in that context, IDB could consider getting involved in activities to strengthen the effectiveness of the process. Similarly, the Bank might provide support to the efforts of the Central American Commission on Environment and Development (CCAD) to extend this program across Central America.

Support to Adaptation Needs

The adaptation challenges for LAC countries remain indeterminate presently because the potential impacts of Climate Change are uncertain. Nevertheless, the costs could end up being very high, potentially higher than many mitigation investment projects.

The adaptation challenges for the region are likely to fall into two categories. The first is appropriate adaptation responses to gradual non-catastrophic impacts on key sectors of LAC economies. The goal of such responses is to minimize adverse impacts and capitalize on beneficial ones. The second type of challenge is appropriate responses to preparing for potentially catastrophic events (e.g., hurricanes, floods) whose frequency may increase as a result of Climate Change.

The first type of challenge involves identifying—as projected impacts become clearer—adaptation strategies for key economic sectors in LAC countries, as well as investment priorities.

The latter type of challenge involves integrating the response to potentially catastrophic events resulting from Climate Change into the Bank's new action plan for disaster response.

Adaptation Strategies for Key Sectors

Preliminary information has already tentatively identified key sectors in the LAC region that may be most vulnerable to Climate Change impacts. These include the agriculture sector, health sector, coastal areas, and forests and biodiversity sectors.

As part of the UNFCCC process, LAC member countries have committed to identify adaptation strategies. Depending on the specific country, these sectors are likely to be addressed within these strategies. While information on Climate Change impacts is unclear and sketchy at the moment, in response to member country requests, the Bank could support initial efforts to identify adaptation strategies. With impacts that stretch across country borders, these adaptation analyses could also be sub-regional in nature. Initial strategies could then be updated as more information emerges about the impacts of Climate Change on the region and the global community's response through the UNFCCC framework.

As initial adaptation strategies emerge, the Bank could consider investing in "no-regrets" types of strategies that carry multiple benefits regardless of whether the anticipated Climate Change impact would actually occur with the time frame and with the severity anticipated. For example, for cities with rising air pollution levels that might be exacerbated by rising temperatures, no-regrets investments could include air pollution abatement programs and projects to develop urban green spaces, particularly trees planting, to bring down the ambient temperatures of the cities. Similarly, for forest areas that may be subject to substantial changes in ambient conditions, a no-regrets investment could be support for biological corridors to enable the "migration of species", such as the Meso-American Biological Corridor in Central America.

Moreover, as adaptation strategies identify research needs for key sectors, the Bank could support those efforts. In agriculture, for example, through FONTAGRO, the IDB could support re-

search on how regions can adapt their agricultural sector to such anticipated Climate Change impacts as reduced water availability, higher temperatures, richer carbon dioxide environments, or new susceptibilities to pests and diseases.

Integration into New Action Plan for Disaster Response

The Bank is developing an action plan on disaster response that emphasizes disaster prevention so as to reduce the sources of vulnerability and hence prevent a natural event from escalating into a catastrophe of tragic human and economic dimensions. Among the elements of this plan are:

- identification of at-risk areas and targeting these areas for concentrated efforts to support sustainable development and hence reduce the risk of catastrophic consequences (with a particular emphasis on reducing the vulnerability of the poor);
- establishment of effective early warning systems that can identify looming disasters, including the modernization of weather services and forecasting capabilities;
- fostering of the conditions for the development of insurance markets and encouraging the use of other risk-spreading financial instruments; and
- the potential establishment of a facility for innovation in disaster prevention to mobilize grant and loan resources to support innovative programs in disaster prevention risk management.

Climate Change has the potential for placing certain areas within LAC at higher risk of disasters than others. These could include areas susceptible to heavy rains and winds, to health epidemics, to droughts and resulting fires, or to coastal flooding. As more information emerges about the impacts of Climate Change on the LAC region, and hence on which areas may be more susceptible to disasters, this information will be integrated into the ongoing risk analysis that will be undertaken as part of the Bank's disaster action plan. Based upon interest from LAC countries, these areas could then be included among the regions targeted for assistance in developing and implementing sustainable de-

velopment strategies; potentially, these areas could also receive priority in access to the proposed facility for innovation in disaster prevention.

The identification of areas most vulnerable to Climate Change impacts will also be critical to the development of private sector insurance and other financial risk-spreading instruments. Information on the areas at risk will also be provided to the institutions involved in the early warning systems to ensure that they monitor these areas carefully to be able to identify quickly signs of looming disasters. Moreover, the Bank could explore with private sector entities how incentives may be incorporated into their risk-spreading instruments to spur greater resistance to catastrophes in these vulnerable areas.

Mobilizing Financial Resources

Ultimately, the Bank's success in responding to Climate Change hinges on mobilizing financial resources. With nearly \$10 billion in lending last year and a range of other financial instruments at its disposal, the Bank has considerable resources at its disposal.

Nevertheless, there are areas that warrant additional attention. To focus grant resources on developing climate-friendly projects, the Bank will explore the development of an Environment, Clean Energy and Climate Change Fund, supported by bilateral and multilateral development institutions. The Bank will strengthen its activities with the GEF in order to respond to the need for concessional resources to support the development of projects that have important Climate Change mitigation and adaptation benefits but may not be immediately cost-effective. Depending on the evolution of the UNFCCC process and the emerging understanding of Climate Change impacts on the region, the Bank could also explore the establishment of a facility for Climate Change innovation to support demand for investment in innovative projects of its borrowing member countries in LAC to meet their Climate Change needs.

Focusing Existing Financial Resources

The Bank already has a panoply of financial tools available to meet the needs of its member countries in responding to Climate Change. They include public and private sector loans, trust fund grant resources for technical assistance, and equity investment funds. The SMSE program, the Rural Development Unit, and FONTAGRO can help mobilize resources to develop climate-friendly projects that flow into these portfolios of the Bank. In addition, financial tools are under development, which could prove important mechanisms for responding to Climate Change. Among these are the Clean Technology Fund, a new equity fund being examined by MIF for investment in innovative companies in LAC that utilize clean technologies to improve industrial processes or replace the need for fossil fuel use. Among the eligible sectors would be fuel conversion that reduces the use of fossil fuels; renewable energy; waste recycling, process improvement, and other energy-efficiency related activities; and alternative cogeneration approaches.

Environment, Clean Energy and Climate Change Fund

Many projects with positive mitigation or adaptation impacts on Climate Change require considerable preparation and development time to reach the investment stage. They are small and innovative and have few examples of success upon which to model themselves. While existing trust funds have successfully been tapped in the past to develop such projects, the effectiveness of approaching separate trust funds one at a time will become increasingly time-consuming and inefficient as the number of projects increases. Hence, the Bank is exploring the establishment of a grant facility encompassing grant resources from a variety of bilateral and multilateral donors specifically to support the development of climate-friendly projects.

Global Environment Facility (GEF)

Along with other Regional Development Banks, the IDB has been strengthening its relationship with the GEF, and has already begun to develop a potential pipeline of projects. This partnership

between the GEF and IDB will be critical in the years ahead because GEF was intended by the UNFCCC to be a major source of concessional funding to support adaptation programs and to develop new innovative mitigation projects.

Future Options for Lending

The Bank is considering new flexible lending instruments to meet the changing development demand of the countries in the LAC region. These instruments would allow the Bank to respond in a timely manner to investment needs using less complex procedures and fast-track processing review and approval mechanisms. They include an *Innovation Loan* of up to \$5 million to support pilot projects; a *Multi-Phase Program with a focus on phase-based operations*; a *Sector Facilities* for

operations that address specific issues of a sectoral or cross-sectoral nature; and a *Project Preparation and Execution Facility* to provide support for project preparation, start-up, and implementation activities.

Recognizing that the Climate Change challenge is cross-sectoral, will require innovative responses and will need to spend considerable time on project development and preparation, these instruments could well be suited to future Climate Change-related needs. Should these new investments be adopted by the Bank, they could also be applied to the development of innovative projects to meet countries, needs to address capacity-building, mitigation and adaptation programs for Climate Change.

References

Government of Brazil Submission to UNFCCC, COP3

International Energy Agency, CO₂ from Fuel Combustion: 1971 – 1997, Paris, 1999.

International Energy Agency, Energy Statistics for 1996,
http://www.iea.org/stats/files/keystats/stats_98.htm

IPCC, Climate Change 1995, Impacts, Adaptation and Mitigation of Climate Change: Scientific-
Technical Analysis.

IPCC Special Report, *The Regional Impacts of Climate Change: An Assessment of Vulnerability*, November 1997.

OLADE, <http://www.olade.org.ec/varios/sectorEnergéticoCap5.htm>

UNEP/WMO, Climate Change 1995 Impacts, Adaptations and Mitigation of Climate Change: Scientific
and Technical Analysis; Cambridge University Press, Cambridge, UK

UNFCCC, Greenhouse Gas Inventory Database, <http://194.95.39.33/>

UNFCCC, Kyoto Protocol, <http://www.unfccc.de/resource/convkp.html>

UNFCCC, <http://www.unfccc.de/resource/conv/index.html>