

Cities and Climate Change

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This was prepared as a background paper for the World Development Report 2003, and was presented at the World Bank's Urban Forum in April 2002. Its four key messages are the following:

- a) Cities in developing countries are severely threatened by the impacts of climate change that already cost them billions of dollars and compound other ongoing developmental challenges;*
- b) Given the limited role of the developing world in the historical accumulation of greenhouse gases, there are increasing expectations that financial assistance for adaptation to climate change should be provided by OECD countries;*
- c) There is emerging evidence that some of The World Bank's infrastructure projects are vulnerable to the impacts of climate change and as a consequence may be unable to fully meet their objectives and provide the full range of benefits expected when they were financed; and*
- d) Given that some 30 percent of The World Bank's investments are in urban areas, an increased ability by the Bank's infrastructure staff to incorporate climate change considerations into project design would play a positive role in assisting cities.*

Impacts of Climate Change on Cities

In the latter part of the twentieth century, the earth's average temperature rose 0.6° C. Projections for further increases in the twenty-first century vary considerably, from a minimum of 1.4° Celsius to a maximum of 5.8° Celsius (see figure 1). The increase will depend upon the level of stabilization of carbon emissions, the pace of de-carbonization of the global economy, and the patterns of demographic and economic development. Such increases represent a dramatic shift with regard to natural variability in the planet's mean temperature which has remained within 0.5° C for the last 1,000 years. The latest report from the Intergovernmental Panel on Climate Change (IPCC), "Third Assessment Report: Climate Change 2001,"¹ establishes a direct correlation between the sustained use of fossil fuels (that occurred primarily in industrialized countries), the resulting accumulation of CO₂ and other gases in the atmosphere, and global warming.

Global warming manifests itself in many different ways in the biosphere. The two most relevant to the subject of this paper are the progressive rise in sea level and the increased intensity and frequency of climatic episodes leading to natural disasters. Both represent a significant threat to urban areas in developing countries.

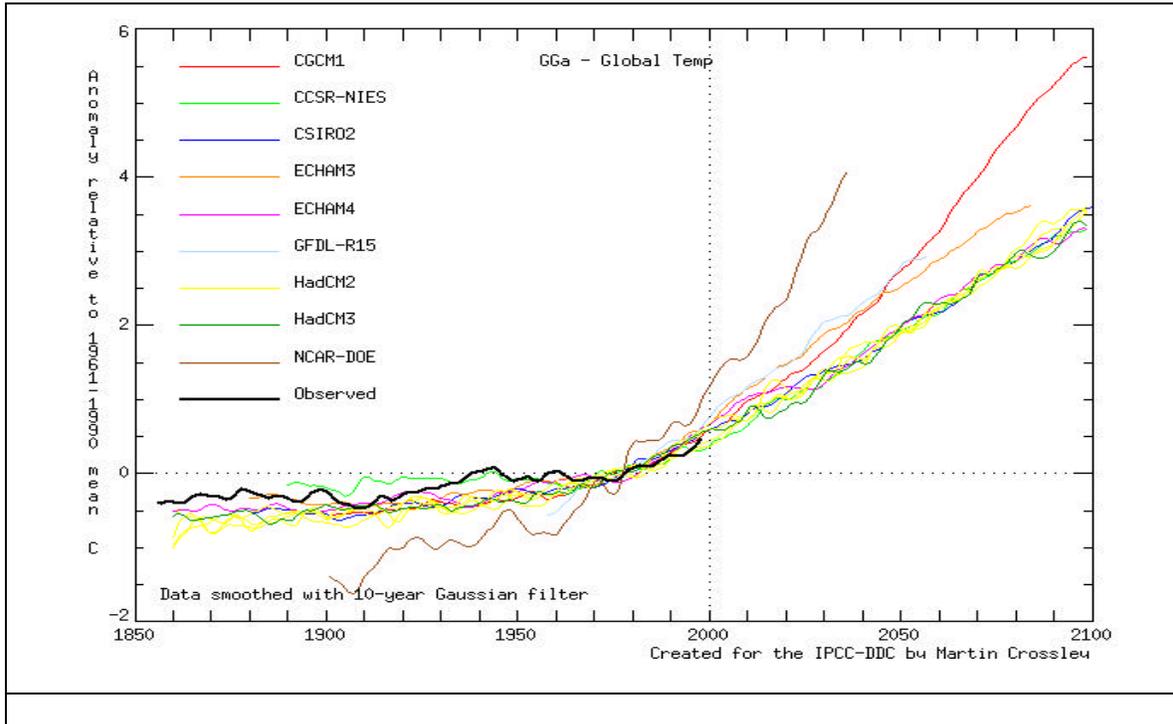
According to several projections, the sea level is expected to increase anywhere from 8 to 88 centimeters during the twenty-first century, mostly due to thermal expansion and the loss of mass from glaciers and ice caps.² The frequency and intensity of natural disasters are also growing rapidly worldwide. A recent analysis of great natural catastrophes since 1960 shows an increase in the 1990s by a factor of three and this seems to be directly correlated with global warming. Economic losses adjusted for inflation rose by a factor of nine.³

¹ IPCC (Intergovernmental Panel on Climate Change). 2001. "The Scientific Basis." In *Third Assessment Report, Vol. 1*. Cambridge: Cambridge University Press.

² Ibid. p. 16.

³ Munich Re., Press Release March 15, 1999, p. 1.

Figure 1: Global Mean Temperature, 1850 - 2100 -- readings and projections Ó IPCC



The rapid pace of urbanization compounded with an ever increasing population burden has also significantly increased the overall vulnerability of urban areas to natural disasters. The location of many urban areas with large populations and critical economic assets in high-risk zones contributes to the increased attention given to impacts in urban areas of disasters induced or enhanced by climate change.⁴ In the case of cities in developing countries, the size and vulnerability of informal settlements, generally built in unstable areas such as coastal zones, flood-prone planes and ravines, and geologically unstable slopes, greatly increases their vulnerability. The impacts of a rising sea level and more frequent and intense natural disasters in rural areas will likely generate an additional influx of people to cities. Such “environmental refugees” often become permanent, thus increasing the vulnerability of cities yet again.⁵

Developing countries are considered to be particularly vulnerable to climate change as many are in tropical and sub-tropical zones with economies and societies highly dependent upon the climate and heavily impacted by its variations. Many of the largest cities in Africa, Asia and Latin America are port cities, historically linked to a colonial past, and directly subjected to the impacts of a rising sea-level. The high cost of land in a central city and around ports has often encouraged major commercial developments on land reclaimed from sea and river estuaries that are especially vulnerable to a rise in sea level.⁶

⁴ Munich Re. “World of Natural Disasters.” CD-ROM, Geospecials/Megacities, 2000.

⁵ Jorge Hardoy et al., *Environmental Problems in an Urbanizing World*, (London: Earthscan 2001), 207.

⁶ *Ibid.*, p. 205.

The IPCC Third Assessment Report Volume 2: “Impacts, Adaptation and Vulnerability,” updates existing knowledge and provides integrated field studies, results of modeling simulations, and other available information on the projected impacts of climate change on urban areas.⁷ According to the IPCC report, the main threats to the urban populations and physical assets of developing cities, impacted with more or less intensity based on the actual climate changes that unfold, are the following:

- ***A rise in sea level:*** This is the most fundamental challenge that urban settlements face from global warming. The threat will likely increase due to the ongoing influx of people and economic assets into coastal zones. At risk are entire sections of coastal cities and their infrastructure, beaches subject to erosion, river floors in estuarine zones subject to sedimentation, and wetlands and tidal flats subject to flooding. Furthermore, groundwater risks increased salinization, and coastal aquifers risk diminishing, affecting fresh water supplies and peri-urban agriculture.
- ***Tropical cyclones:*** Increasingly frequent and intense tropical and extra-tropical cyclones will likely cause severe wind damage and storm surges which, compounded with a rise in sea level, are expected to become a severe problem for low-lying coastal regions and cities. Ports and other coastal infrastructure are especially at risk.
- ***Flooding and landslides:*** Expected increases in the scale, intensity and frequency of rainfall in most developing countries will severely strain or overwhelm the storm drainage systems of many urban centers. This could lead to periodic flooding of low-lying areas as well as landslides and mud-slips on geologically unstable slopes, often subject to informal settlements. Cities built next to rivers and on reclaimed lands in riverbed planes will be prone to additional inundations.
- ***Water quality and shortage:*** Urban flooding damages water treatment works and flood wells, pit latrines and septic tanks. Sewage treatment systems and solid waste disposal areas can also be affected, contaminating water supplies. Where overall rainfall decreases, droughts will likely compromise the replenishment of the water tables, the normal sources of water supply.
- ***Heat and cold waves:*** Intense episodes of thermal variability could severely strain urban systems by adding an environmental health risk for more vulnerable segments of the population, imposing extraordinary consumption of energy for heating and air conditioning where available, and disrupting ordinary urban activities.

⁷ IPCC (Intergovernmental Panel on Climate Change). 2001. “Human Settlements, Energy and Industry,” in *Third Assessment Report, Vol. 2*. Cambridge: Cambridge University Press, pp. 383-416.

Box 1: Coastal Cities and Small Island States

By mid-century, more than 70 percent of the population in settlements that could be flooded due to a rise in sea level are likely to be located in West and East Africa, along the southern coast of the Mediterranean, and South and Southeast Asia. With a 40 centimeter rise in sea level, the midpoint of the IPCC projection ranges for the end of the century, the world population at risk from annual flooding is expected to increase from the current 10 million to 22-29 million by the 2020s, to 50-80 million by the 2050s, and to 88-241 million by the 2080s.⁸ The biggest impacts, however, are expected in the small island states of the Atlantic, Pacific and Indian Oceans.

Cities such as Alexandria, Egypt; Banjul, The Gambia; Tianjin, China; Jakarta, Indonesia; and Bangkok, Thailand will be affected. A 50 centimeter sea level rise along Egypt's coastal zones would affect 2 million people, 214,000 jobs, and cause land and real estate losses worth US\$ 35 billion.⁹ Alexandria's Old City, 12 meters above sea level, is safe from the direct effects of a rise in sea level. However, the port area and newer suburbs are at risk since, with the aid of flood defenses, they were constructed on lowlands. Low marshes and lagoons that surround the city could be lost or seriously contaminated with saltwater due to a rise in sea level. Ultimately, the city could become a peninsula, surrounded by the Mediterranean and only accessible by bridges and causeways.¹⁰

The average number of people in Africa impacted by coastal flooding could increase from the one million of 1990 to a worst case scenario of 70 million by 2080.¹¹ Through coastal erosion and a rise in sea level, Banjul, capital of The Gambia, could disappear by mid-century. East African coastal settlements are also at risk.

In most small island states, coastal planes have provided the best locations for urban centers and population concentrations, physical assets, economic activities and services. On most Caribbean islands, for instance, more than half of the population lives within two kilometers of the coast. On atolls, the most important infrastructure and population clusters are less than 100 meters from the shoreline. The threats induced or enhanced by climate change will severely affect this group of nations and their cities¹² that are becoming acutely aware of their vulnerability.

In addition to these major threats, the IPCC report indicates additional risks related to:

- Increased possibility of urban fires and severe hail and windstorms;
- Negative impacts on the productivity of fisheries and agriculture on which some urban economies partially depend;
- Worsening urban air pollution exacerbated by increased ground ozone formation;
- Enhanced effects of urban heat islands due to higher overall temperatures.

The indirect impacts of such climatic threats are, of course, much wider. They include environmental health problems due to the expected changes in geographic ranges and the incidence of vector-borne and infectious diseases, allergic and respiratory disorders, nutritional disorders due to climate-related food shortages, and the physical damage to and institutional strains imposed upon the health care system.¹³ Where impacts are felt, urban economic activities

⁸ Nichols et al. 2001. "Increasing Flood Risk and Wetland Losses due to Global Sea-level Rise: Regional and Global Analyses." *Global Environmental Change* 9: S69-S87 as quoted in IPCC *Third Assessment Report*, Vol. 2, Chapter 7.

⁹ Mohamed El-Raey. 1997. "Vulnerability Assessment of the Coastal Zone of the Nile Delta in Egypt to the Impacts of Sea-level Rise." *Ocean and Coastal Management* 37(1): 29-40 as quoted in IPCC *Third Assessment Report*, Vol. 2, Chapter 7.

¹⁰ Turner et al. 1990. "Cities at Risk." London: BNA International as quoted in Hardoy et al.

¹¹ Nichols et al as quoted in IPCC *Third Assessment Report*, Vol. 2: 515.

¹² IPCC *Third Assessment Report* Vol. 2: 847 and 864.

¹³ Jorge Hardoy et al., 203.

will likely be affected by physical damage to infrastructure, services and businesses. There will also be repercussions on overall productivity, trade, tourism and the provision of public services.

Economic Valuation of Climate Change Impacts on Cities

Of the major threats to cities described above, only the rising sea level has an exclusive correlation with climate change. The other four threats are natural disasters and climatic episodes that are exacerbated in their intensity and frequency by climate change. Thus, the major attempts at valuating, in economic terms, the impacts of climate change on physical infrastructure generally refer to a rise in sea level and are based on the funds needed to defend the coastal areas and replace physical assets. For instance, the cost of protecting port facilities and coastal structures, raising wharves and quays, and reconstructing water gates and pumping stations for a one meter rise in sea level (the high point of the IPCC projection ranges for the end of the century) in 39 prefectures in Japan has been estimated at US\$ 194 billion, or about 7 percent of annual GDP.¹⁴

Box 2: Natural Disasters: What Percentage is Due to Climate Change?

In 1982, Peru's GDP declined by 12 percent, half of which was attributable to the El-Niño – related floods of that year. Between 1989 and 1996, China experienced annual losses from natural disasters averaging 3.9 percent of GDP. In 2000, flooding in Mozambique resulted in direct and indirect losses of some 6 percent of GDP.¹⁵ Damage and losses from Hurricane Mitch in 1999 equaled 80 percent of GDP in Honduras and 49 percent in Nicaragua.¹⁶

These figures have not been disaggregated to show losses that occurred in cities as opposed to rural areas. Nor can we ascertain how many of these disasters or how much of their intensity was due to the inducing or enhancing effects of climate change. However, they help us understand the order of magnitude of the problems faced by cities in developing countries due to climate change. Further detailed analysis is needed, however.

Conversely, the incremental nature of the intensity and frequency of violent climatic episodes due to climate change is hard to disaggregate from the “baseline” even if scientific evidence has proven the correlation of intensity and frequency with the recent increase in atmospheric temperature. Data on economic losses associated with catastrophic events show that in constant 1999 US dollars, they have increased worldwide from an average of US\$ 71.1 billion in the 1960s to an average of US\$ 608.5 billion in the 1990s.¹⁷ Although the economic impacts of these catastrophic episodes are relatively evenly split between developed and developing countries, when related to respective GDP, the economic losses are significantly higher in developing than in developed countries.¹⁸ Average economic losses in developing countries due to climate change were tentatively estimated at two to nine percent of GDP by the IPCC in its Second Assessment Report, but variability in the underlying assumptions is considered high.

¹⁴ Mimura N. and H. Harasawa, eds. 2001. *Data-book of Sea-level Rise 2000*. Tsukuba: Center for Global Environmental Research, NIES as quoted in IPCC *Third Assessment Report*, Vol. 2: 396.

¹⁵ Ibid.

¹⁶ FAO. 1999. *The State of Food Insecurity in the World* as quoted in IPCC *Third Assessment Report*, Vol. 2: 409.

¹⁷ Freeman, K. 2000. “Infrastructure, Natural Disasters and Poverty.” *Managing Disaster Risk in Emerging Economies*. Edited by A. Kreimer and M. Arnold. Washington, D.C.: The World Bank.

¹⁸ M. Sharma et al. 2000. “Reducing Vulnerability to Environmental Variability.” *Environment Strategy Background Paper*. Washington, D.C.: The World Bank, 5.

Adaptation of Cities to Climate Change

Throughout history, cities and human settlements have adapted to climate variability, but the intensity and pace of the present and forthcoming climate changes induced by the continued and ongoing use of fossil fuels are already and will increasingly be a major challenge to many of them. Urban adaptation to climate change can be defined as the sum of all physical and organizational adjustments to urban life that will be required to cope with the profound and durable changes in weather and climatic patterns. Determinants of adaptive capacity include the availability of financial resources, technology, specialized institutions and human resources, access to information and the existence of legal, social and organizational arrangements,¹⁹ all assets that are typically scarce in developing countries and cities. In cities with a proven vulnerability to climate change, investments will likely require:

- “Hardening up” of the infrastructure systems, including storm-drainage systems, water supply and treatment plants with protective physical improvements.
 - Protection or relocation of solid waste management facilities, energy generation and distribution systems.
 - Consolidation of hydro-geologically fragile areas.
- Coastal cities will likely need to invest in heavy physical infrastructure projects specifically related to sea level rise, such as:

- sea-surge protective barriers and dams.
- reconstruction of harbor facilities.
- flood barriers and Tsunami-prevention facilities.²⁰

Such expenditures represent a significant burden for the public sector, for private utility companies, and indirectly for urban economies as a whole.

Permanent changes to local ecosystems induced by climate change such as the salinization of ground-water and river estuaries might also alter the local economic base. Adaptation to such changes may be difficult to achieve, but it is essential. An integrated adaptation response might involve coastal zone protection, the creation of new breeding grounds for fish, the expansion of irrigation agriculture, the implementation of new public health measures, appropriate land-use planning, and building codes that internalize climate change constraints.²¹ While private investment must become part of the strategy, the public sector will have overall responsibility for the adaptation plans and managing such transitions.

In some cities in developing countries, relocation or “managed retreats”²² of resident populations and economic activities to less vulnerable sections of urban areas will have to take place over time. This would require a mix of market incentives and public sector planning and investments. Increased awareness of vulnerability to climate change can induce private firms to relocate, especially when the differential costs for insurance and re-insurance, where applicable, represent a powerful incentive to do so. However, this would not apply to the informal sector or to small businesses that do not have the necessary resources. Replacement of ozone-harming assets at the end of their productive lifecycles may create opportunities for adaptation through upgrades or relocation. Land-use planning should channel new residential developments and industrial investments toward less vulnerable areas. However, residents of poor and informal settlements and slums – unless assisted -- would in all likelihood lack the tenure and resources to vacate the vulnerable areas in exchange for safer ones.

In the context of scarce financial and technical resources and of competing developmental priorities, investments related to the adaptation of cities -- their physical infrastructure, local

¹⁹ I. Burton, M. Van Aalst. 1999. “Come Hell and High Water – Integrating Climate Change Vulnerability and Adaptation into Bank Work.” *ESSD Climate Change Series*. Washington, D.C.: The World Bank.

²⁰ IPCC, Vol. 2, 405.

²¹ I. Burton, M. Van Aalst, 6.

²² IPCC, Vol. 2, 405.

economy, basic urban services and residential settlements -- to the impacts of climate change will not be popular. They will only be possible if there is an increased understanding of urban vulnerability and the ability to demonstrate that the investments will be targeted at aspects of urban development that require urgent attention. Informal settlements and critical infrastructure such as water supply and drainage systems may be already stretched to the limit and would be first priorities.

Management and institutional aspects of climate change adaptation can be just as challenging, if not more so, than financial ones. These include:

- Generation of reliable and comprehensive assessments of risk vulnerabilities for exposed cities and the dissemination of such information;
- Establishment of early warning systems and evacuation plans, including emergency preparedness and neighborhood response systems;
- Improved efficiency of water supply management, by minimizing leakages and instituting market-based pricing mechanisms;
- Improving health education and institutional capacity in urban environmental management;
- Regularizing property rights for informal settlements and other measures to allow low-income groups to buy, rent, or build good quality housing on safe sites.²³

Mitigation of Greenhouse Gas Emissions in Cities

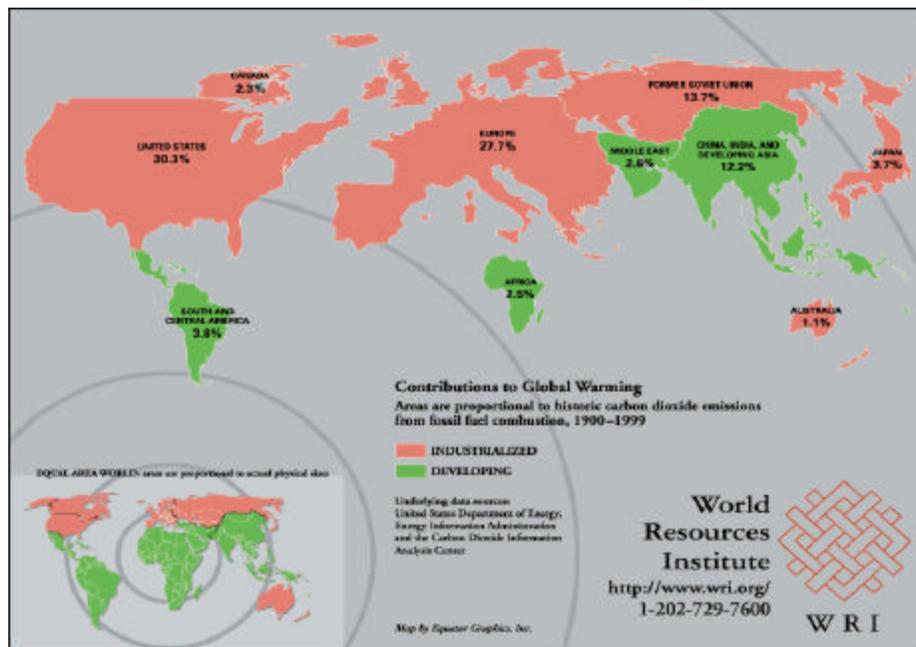
Cities in developing countries can contribute to the mitigation of global greenhouse gas (GHG) emissions by reducing the volume of CO₂, methane and other gases that they release. Overall, however, the contribution of developing countries to global emissions is low, estimated at some 21 percent of the total, or 35 percent if the transition countries of the former Soviet Union are included (see figure 2).

Discussions surrounding mitigation have led to a heated political debate between developing and industrialized countries over bearing responsibility for past emissions and regulating current emissions. Developing countries insist that industrialized countries assume the burden of past emissions that led to global warming and that developing countries be allowed unrestricted access to energy generation and consumption, considered critical for their future economic growth. They argue that costly mitigation measures are now required on account of the historical accumulation of carbon emissions and the high level of fossil fuels currently consumed by industrialized countries that should henceforth pay the costs of mitigation.

The reduction of GHG emissions has a globally beneficial effect wherever it occurs. The commitment of some industrialized countries to reduce their national global emissions in the future (subject to ongoing negotiations at the international level) and the relatively lower costs of GHG emissions reductions in developing countries provides the rationale for international carbon emissions trading. This represents an opportunity for “win-win” investments in cities in developing countries provided that the projects financed have sound local *and* global objectives.

²³ IPCC, Vol. 2, 405-406.

Figure 2: Size of continents and regions based on their historic CO2 emissions 1900-1999



In cities, the direct sources of global emissions include energy generation, vehicle use, industrial and point-source use of fossil fuels, and burning of biomass. Indirect sources include electrical energy produced for public lighting, transportation, and industrial, commercial and household consumption. Added together, these determine overall urban energy demand. Examples of interventions that combine significant local benefits with GHG emissions abatement that can generate revenues for developing cities are:

- **Improved building materials and energy efficiency:** reduce energy requirements for heating, lighting and cooling and can increase efficiency in the use of building materials and the building cycle itself;
- **Transport demand management:** reduces the total volume of CO2 emissions of vehicles by promoting greater ridership in mass transportation systems, pedestrian zones, non-motorized transportation, and the use of more fuel-efficient vehicles and environmentally-friendly fuels;
- **Methane recuperation from landfills:** channels harmful methane gas emissions that would normally be released into the atmosphere into power generation – a viable investment with good economic returns;
- **Cleaner energy generation:** uses carbon sequestration to reduce pollution by switching power plants from coal to natural gas, promoting the use of gas and clean energy sources to replace biomass, and cogenerating heat and electricity – results in significant local pollution abatement.

Financing of Adaptation and Mitigation Projects in Developing Cities

The United Nations Framework Convention for Climate Change (UNFCCC) was established to forge international cooperation in the mitigation of further climate change, therefore its provisions and implementation mechanisms primarily address opportunities for GHG emissions abatement. The Global Environment Facility (GEF) was set up as the financial mechanism of the UNFCCC to assist developing and transitional countries with four global challenges: biodiversity conservation, ozone depletion, international waters protection, and climate change. In the latter

area, GEF has so far exclusively focused on the implementation of projects with GHG emissions abatement or mitigation objectives.

During the 1990s, the climate change community paid relatively less attention to adaptation, while on the other hand, awareness of and preparedness for natural disasters have significantly increased. This may be changing rapidly, however, as the impacts of climate change are beginning to be felt more strongly. Developing countries are now increasingly asking for project and financial assistance from industrialized countries for adaptation projects and their related costs.

Providing funding to developing countries is controversial, however. Many of the problems relating to global warming were caused by industrial countries' sustained use of fossil fuels for the past 150 years in which accumulated carbon emissions became trapped in the atmosphere. Consequently, it can be argued that the costs of adaptation should be presented as "reparation costs" for which industrialized countries must pay. This is not reflected in the letter or spirit of the UNFCCC agreements, however, and many industrialized countries do not want to address this issue.

Financial provisions for vulnerability and adaptation in the UNFCCC are currently limited to two percent of project investments in developing countries resulting from the trade of Carbon Emission Reduction (CER) certificates. Such trade will start only when the Kyoto Protocol is ratified and the Clean Development Mechanism (CDM), conceived as the certification and clearing house for the trading of emissions between developing and transitional economies on one side, and industrialized countries on the other, becomes functional. Ratification of the protocol is expected in 2002 or 2003, after which national regimes for emissions reductions will be adopted.

Several industrialized countries (Canada, Iceland, Norway, New Zealand, Australia, Switzerland, and members of the European Union) are considering the establishment of a Special Climate Change Convention Fund or Adaptation Fund to be administered by the GEF. The fund would make limited financial resources available to developing countries for climate change adaptation purposes. The overall endowment of the fund would be some €50 million annually and it is expected to become effective in 2005.²⁴ Least developed countries would be the primary beneficiaries as their GHG emissions (one percent of the total) would not entitle them to any significant gains from the Clean Development Mechanism for emissions trading, while their adaptation needs are often the largest. The World Bank's Environment Strategy also refers to the creation of a Variability and Adaptation Facility (VAP) to be financed by donor governments in the near future.²⁵

In the case of mitigation, on the other hand, UNFCCC financial resources and mechanisms that can be accessed by the public and the private sector to contribute to the abatement of GHG emissions are already in place. Targeted interventions include land-use planning, urban transport, energy generation and efficiency, and urban environmental management.

The UNFCCC has established Activities Implemented Jointly (AIJ), also known as the Joint Implementation (JI), as the formal mechanism for collaboration between industrialized and developing countries to implement projects that have GHG abatement objectives. Under AIJ, an industrialized country partners with a developing country to provide financial and technical assistance for a project.²⁶

GEF Operational Programs (OP) in the climate change area are all highly relevant to cities. These programs co-finance development projects that combine significant local objectives with global ones for which GEF provides grants equivalent to the "incremental costs." These are:

- OP 5: Removal of Barriers to Energy Efficiency and Energy Conservation

²⁴ Personal communication with Alan Miller, Senior Environmental Specialist, GEF, January 28, 2002.

²⁵ The World Bank. Environmental and Socially Sustainable Development. 2001. "Climate Change." *Environment Strategy*. Washington, D.C., The World Bank, 175.

²⁶ See <http://unfccc.int/program/coop/aij/index.html>.

- OP 6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs
- OP 7: Reducing the Long-Term Costs of Low Greenhouse Gas Emitting Energy Technologies
- OP 11: Promoting Environmentally Sustainable Transport.²⁷

The World Bank Group-GEF portfolio consists of sixty-two projects, for which \$6.2 billion has been mobilized -- \$730 million from the GEF and the remainder from The World Bank Group, donors, private investors, and governments.²⁸

Finally, in the wake of the Kyoto Protocol ratification and the effectiveness of the CDM, the Prototype Carbon Fund (PCF) was established by The World Bank. The PCF is a pilot project to test carbon emissions trading, channel financial resources and information, and build capacity in developing countries on GHG emissions abatement issues. PCF emphasizes the development of renewable energy projects such as wind, small hydropower, solar direct and photovoltaic, landfill gas, and refuse-derived fuel. Additionally, energy efficiency projects involving buildings and appliances are also financed under the PCF which has a significant share of such projects in its portfolio.²⁹ The capital of the PCF is currently \$145 million.

An analysis of the World Bank/GEF portfolio in the area of climate change provides an encouraging example of the proactive work in which the Bank could further engage itself should the Adaptation Funds mentioned earlier become available. The Bank could focus on assisting its client cities by designing programs and projects aimed at relevant local developmental priorities and incorporating climate change objectives – mitigation or adaptation – to be supported by concessional financing at no cost to the client.

Implications for The World Bank’s infrastructure projects in urban areas

A number of key strategies call for the integration of climate change in The World Bank Group’s work: the 1999 Energy and Environment Strategy, “Fuel for Thought;” the 2001 Environment Strategy, “Making Sustainable Commitments;” and the 2002 (forthcoming) Urban Transport Strategy, “Cities on the Move.” Climate change is also classified as a corporate public good priority and forms part of the Millennium Development Goal³⁰ of ensuring environmental sustainability. While the Bank is active through its lending operations in the mitigation of future climate change, however, vulnerability and adaptation objectives are rarely found as part of the developmental objectives of its projects or as project risks that need to be mitigated through given interventions.

The most comprehensive review to date of the Bank’s performance in this area is to be found in “Come Hell or High Water – Integrating Climate Change Vulnerability and Adaptation into Bank Work,” by Ian Burton and Maarten van Aalst, Environment Department Paper No.72, 1999. The review finds the level of integration modest, and provides numerous examples of projects that have failed to internalize obvious climate change risks, to the detriment of the Bank’s clients and the institution’s integrity.

Among the examples provided in the review, an emergency loan for potable water service recovery and restoration and flood protection for the city of Georgetown, Guyana, after the 1997-98 El Niño episode, was reviewed. Despite the fact that a significant portion of the city is below sea level and the emergency loan addressed damage caused by a climatic episode, the intensity of

²⁷ See http://www.undp.org/gef/undp-gef_focal_areas_of_action/sub_climate_change.html programs.

²⁸ The World Bank. *Environment Strategy*, 174.

²⁹ PCF (Prototype Carbon Fund). 2001. *Annual Report 2001*, Washington, D.C.: The World Bank, 17.

³⁰ The eight Millennium Development Goals are: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability, and develop a global partnership for development.

which was enhanced by global warming, no new assessment of the risks was made in project design. This is often the case in hurried emergency operations, making the new investment equally vulnerable to further climate-induced damage.

In the absence of concessional financing for adaptation, it is understood that Bank clients would be unwilling to borrow for climate change, but the authors argue that the Bank –in addition to promoting more awareness of climate change concerns -- should at the very least:³¹

- ***Address climate change concerns in the Country Assistance Strategies (CAS):*** Currently CASs do not generally cover such risks. Especially for those countries that are known to be particularly vulnerable, the CAS could highlight activities to be avoided or discouraged as well as new activities designed to take advantage of new opportunities opened up by climate change if milder climates or increased precipitation affect previously cold or dry regions.³²
- ***Minimize the vulnerability of the Bank's portfolio to climate change:*** Based on examination of the Bank's portfolio in countries with known vulnerability,³³ an average of 37 percent of projects are at some degree of risk due to their location or design or for failing to have taken into account climate change impacts on water flows, sea level rise, and related issues.
- ***Maximize the role of the Bank's portfolio on vulnerability and adaptation:*** As part of the same portfolio review, the authors found that 43 percent of the projects could help reduce vulnerabilities to climate change by incorporating adaptive considerations into their designs such as the heights of bridges and embankments, the expected frequency of coastal storms, or other “no regrets” or non-controversial measures.³⁴

These recommendations are particularly relevant for the Private Sector Development and Infrastructure (PSI) Vice-Presidency of The World Bank, home to three sectors responsible for the majority of the Bank's urban infrastructure investments: energy and mining; transportation; and water, sanitation and flood protection. They are also relevant for urban development, a PSI theme that carries the overall responsibility for assisting client cities with their development strategies, improving urban livability and reducing urban poverty, through physical investments and policy guidance. The Disaster Management Facility (DMF) and the Cities Alliance are working on closely related issues. The first, as it addresses concerns of disaster awareness, preparedness and reconstruction; the second, as it focuses on the elimination of urban slums and informal settlements built in vulnerable locations.

About 30 percent of the Bank's overall investments, or \$6 -7 billion, take place in urban areas. Only five percent of this is handled directly by urban sector units. Urban projects, in addition to internalizing climate change mitigation and adaptation concerns in the design of their physical components, could also provide opportunities to ensure that such integration occurs as well in all urban projects regardless of sector.

Some short-term measures to begin to address these issues could include:

- Collection and validation of information on specific vulnerability to climate change in urban areas of countries at risk;
- Review a sample of active projects in urban areas of at-risk countries to identify opportunities for minimizing risks and including “no regrets” measures;
- Disseminate practical information on mitigation measures and financial mechanisms, in an urban context, to urban and infrastructure staff.

As climate change continues to dramatically manifest itself with loss of life and property and affect profound changes to livelihoods in cities of the developing world, The World Bank has the obligation to better assess its importance and assist its client cities in addressing these special challenges. While its agenda will still be driven by the mission of reducing poverty and the Millennium Development Goals, the increasing prominence of climate change must be taken

³¹ I. Burton and M. Van Aalst, 35.

³² Ibid., 19.

³³ Bangladesh, Ecuador, Guyana, Papua New Guinea, Samoa and Zimbabwe.

³⁴ I. Burton and M. van Aalst, 18, table 3.2.

fully into account and internalized to design and implement development projects that target the special needs of populated and growing urban areas.