

Table 2-4: Effects of Selected Disasters in Latin America and the Caribbean

Event	Economic performance	Fiscal effects	Balance of payments effects	Infrastructure and capital losses
Managua, 1972	GDP fell 15% overall and 46% in industrial and productive activity in Managua	Tax revenue fell 39%	Sixfold increase in current account deficit: reduction of almost 20% in exports and increase of almost 20% in imports due to extraordinary needs	Capital losses and lost production amounted to a sevenfold increase in investment requirements in fixed capital, both private and public
Honduras, 1974	GDP fell 6% overall and 23% in agriculture	Fiscal deficit grew 79% due to a decrease in current tax revenues of 15% and an increase in expenditures of 65%	Threefold increase in the current account deficit: imports grew 61%, and exports fell 66%	Loss of national assets and decrease in production represented almost twice the average annual investment
Antigua and Barbuda, 1974	GDP fell 12%, especially in oil refining, which fell 30%, tourism, basic services, and housing	Fiscal deficit increased 3 times	Balance of payments deficit increased 4 times	Damages to infrastructure represented around 4 times the average national investment
Grenada, 1975	GDP fell more than 20%; 10 years are needed to reach full agricultural production in plantations	Fiscal deficit increased more than 60%	External imbalance grew 4 times	Capital losses and damage to infrastructure amounted to 5 times the average annual investment
Dominican Republic, 1979	GDP fell 8%	Fiscal deficit increased 8 times	External deficit increased 27%	Capital assets lost twice the average of yearly investment
El Salvador, 1982	GDP fell 2%	Fiscal deficit increased 30%	External deficit grew 25%	Losses of capital and infrastructure equivalent to average investment in one year
Ecuador, 1982-83 ^a	GDP fell almost 3%	Fiscal deficit increased 20%	Balance of payments deficit increased 22%	Capital and infrastructure losses equivalent to 3 years of domestic investment
Bolivia, 1982-83 ^a	GDP fell 10%, 55% in agricultural sector	Fiscal deficit increased more than 275%	External sector imbalance grew 30%	Total losses were estimated at \$836.5 million
Peru, 1982-83 ^a	GDP fell 5%	Fiscal deficit increased 33%	Current account deficit in balance of payments increased 30%	Total losses were estimated at \$2.0 billion
Mexico, 1985	GDP fell 2.7%	Fiscal deficit increased 7%	Balance of payments effect was negligible	Total losses were estimated at \$4.1 billion
Nicaragua, 1988	GDP fell 2%, 17% in the agricultural sector	Fiscal deficit increased 20%	Balance of payments deficit increased 10%	Total damages estimated at \$839 million
Nicaragua, 1982 Cerro Negro (volcanic activity)	GDP fell less than 1%	Less than 10% increase in fiscal deficit	Balance of payments deficit increased 2%	Total damages estimated at \$19 million
Tsunami	GDP fell almost 1%	Fiscal deficit increased an additional 5%	Balance of payments deficit increased 24%	Total losses estimated at \$25 million

^a Estimated for 1983.

Source: ECLAC, on the basis of studies conducted in the field in each case.

the Mexican case, they had a much larger economic impact because they represented nearly 24 percent of GDP and about 40 percent of the national foreign debt at the time. Furthermore, the secondary effects on the macroeconomic aggregates were expected to be felt for several years after the disaster. The expected growth rate of GDP was expected to fall 2 percent in the year of the disaster due to decreased production in the sectors of commerce and industry. Public sector finances were foreseen to be severely affected by an estimated \$935 million in the five years following the disaster, including an increase of \$975 million in public outlays to face the requirements of the emergency, rehabilitation, and reconstruction phases, despite a net increase of \$40 million in tax revenues. This meant a net increase of 24 percent in the public sector deficit.

For that five-year period, the external sector position was expected to deteriorate by \$350 million as a result of increased imports for rehabilitation and reconstruction (\$450 million), despite disaster-related reinsurance payments and relief assistance. The net anticipated result was to nearly double the current account balance of payments deficit. Shortages in construction materials combined with the increased demand for rehabilitation and reconstruction were anticipated to affect consumer prices, resulting in annual inflation rates above values for the previous years.

The San Salvador earthquake had a very negative effect on the main macroeconomic aggregates of the country, which lacked the capacity to face the challenges of reconstruction while facing the preexisting social problems, such as housing shortages and high unemployment rates. In view of that, the El Salvadoran government decided to elicit international cooperation—both financial and technical—to

support the rehabilitation and reconstruction program.

THE 1987 EARTHQUAKE IN ECUADOR

This earthquake imposed an estimated \$1 billion in damages. Direct losses represented \$185 million; indirect losses represented \$815 million (ECLAC 1987). The total estimated losses were significant, constituting approximately one-tenth of GDP at that time. However, indirect damages were more important, since anticipated production losses amounted to 7 percent of GDP and 33 percent of expected exports for 1987. GDP in 1987 was expected to decrease 2.7 percent—instead of growing 2.8 percent as estimated prior to the disaster—as a result of a 37 percent decline in value added due almost exclusively to declines in the oil-production sector. Minor reductions in the agricultural and domestic trade sectors were also foreseen.

The economy's external sector was expected to suffer an important negative impact. The balance of payments was expected to experience a drop of \$554 million in the export of crude oil and by-products and an increase in imported goods worth \$135 million to meet internal demand for fuel and to initiate the reconstruction of damaged infrastructure. A further \$20 million were required to transport foreign crude oil acquired or borrowed from friendly nations in order to comply with sales contracted in the international market.

Furthermore, the position of public sector finances was expected to worsen. Public expenditures to meet rehabilitation and reconstruction requirements were expected to increase, and current income from the export of oil products and tax revenues from decreased economic activities were expected to decline. Before the quake, the fiscal deficit was expected to decrease, when compared with 1986;

after the disaster, it was predicted to increase nearly 40 percent.

The analysis conducted revealed the vulnerability of the oil-producing and export activities of Ecuador's economy, at a time when the government was making important but still not totally successful efforts to stabilize it. The analysis also revealed that the country's capacity to undertake by itself the investment needed for reconstruction was seriously compromised by the earthquake's anticipated effects on both the finances of the public sector and the position of the external sector. It could be foreseen, however, that due to the nature and relatively limited amount of damage done to infrastructure, reconstruction and restoration of the country's production and export capacities could be achieved with relative ease, if international cooperation could be obtained on a timely basis.

The long-term impact of disasters

Disasters significantly and negatively affect the prospects of long-term development of most of the Latin American and Caribbean countries. Countries having relatively small economies suffer those effects for a particularly long period of time. The speed with which the international community assists countries affected by natural disasters also has a bearing on the duration of the recovery period.

Impact on development prospects

A first consequence of a disaster is the immediate decline in national average living conditions; this effect is naturally more concentrated on the population living in the area directly affected by the disaster. In addition to losses due to damaged infrastructure and to the provision of public services, personal and family assets are also destroyed. Such is the case

of housing and household and personal effects, which may not be replaced for several years. In the interim, the allocation of private and public resources may have a positive—albeit temporary—effect on the growth of GDP. The increased investment, insofar as it is destined for reconstruction, merely replaces a portion of lost capital. Replacement often reduces well-being from the level prevailing prior to the disaster.

Twenty years after, the effects of the Managua earthquake can still be seen in the precarious urban conformation of the destroyed capital city (see ECLAC 1973). Due to the nature of that earthquake, its effects were felt by the total population of Managua, the capital. Some low- and middle-income groups were affected particularly severely because their housing units were not built to resist earthquakes.

In other cases, the manner in which reconstruction programs were designed and undertaken further aggravated the already unequal distribution of wealth and did not permit the well-being of the population most directly affected to be restored (see ECLAC 1976). Still in other cases, disasters modified the very pattern of development because they affected key sectors of the economy. Consider the case of Peru, which in both the 1972–73 and the 1982–83 occurrences of the El Niño phenomenon suffered important setbacks in its fishing and related industries, when some of the fish varieties virtually disappeared from the Pacific coastal areas. The direct impact on the fishermen and the negative consequences for the export sector were very high (see ECLAC 1983b).

Impact on economic performance

Long-term macroeconomic effects are expressed in terms of a number of significant variables that signify a reduction of

per capita income. The Latin American and Caribbean experience confirms the hypothesis developed by researcher Ken Sudo, who has drawn an interesting correlation between GDP per capita and the number of disasters a year (see Sudo 1994). The absolute dimension of a disaster and the context in which it occurs (size and characteristics of the economy affected) also have a bearing on its long-term impact. The 1985 earthquake in Mexico did not have noticeable long-term negative effects on the country's macroeconomic variables—in part due to timely corrections of economic policy—even though eight years after its occurrence, a small number of the affected population still lacks permanent housing. On the other hand, the long-term effects of the disasters in Nicaragua in 1972, Guatemala in 1976, and El Salvador in 1986 are still being felt.

In addition to the macroeconomic impacts mentioned above, some specific long-term effects can be seen and measured over the years. These specific areas include the destruction of economic infrastructure, imbalances in the external sector, extraordinary fiscal imbalances, and inflation.

DESTRUCTION OF ECONOMIC INFRASTRUCTURE

Even though damage to and destruction of infrastructure occur immediately after a disaster and have a short-term impact, full replacement of these losses requires a relatively long period of time in most cases. During that time, the economy—and the most affected sectors especially—functions in a distorted fashion. Reconstruction of lost infrastructure thus tends to slow the rate of growth and development. Some concrete examples of the long-term impact of the destruction of infrastructure include highways and agriculture, in the case of Hurricane Fifi

in Honduras, electricity services in San Salvador, and marine resources in Nicaragua and Peru.

EXTERNAL SECTOR IMBALANCES

Although these imbalances occur in the short term, they increase the economy's indebtedness and place an additional burden on its service profile, which affects the future capacity of the government to assign resources to investment and social expenditure in the long term. In this case, the experience of Latin America and the Caribbean confirms Sudo's analysis (for example, Guatemala in 1976, El Salvador in 1986, and Peru, Bolivia, and Ecuador in 1982).

EXTRAORDINARY FISCAL IMBALANCES

Short-term fiscal imbalances occur because special budgetary allocations are needed to undertake unexpected emergency and immediate rehabilitation following a disaster. These imbalances may persist in the medium term because direct and indirect economic effects of the disaster cause fiscal revenues to fall. Over time and gradually, these imbalances affect the government's capacity to sustain or improve its specific activities and to provide quality public services. This is evident particularly in social services such as education and health. Furthermore, a worsening of an existing fiscal imbalance may have repercussions for existing financial adjustment arrangements with international lending institutions that involve conditionalities.

INFLATIONARY PROCESSES

The immediate effects on prices that are the result of market disorders due to a disaster are compounded by the monetary effects associated with the reconstruction expenses undertaken with donated resources or external financing. In addition, fiscal deficits tend to have an inflationary effect in cases where fiscal

and monetary policies and controls do not address these matters. Added to this short- and medium-term inflation, insofar as damages to infrastructure cause an increase in production costs, further price increases occur that affect the functioning of the economy as a whole. Thus, reconstruction—when of significant size in relation to the economy—may overheat the overall economy. In some instances, this effect may be incompatible with the country's stabilization and structural adjustment efforts. These inflationary processes weaken the country's capacity to grow and invest, further deteriorate income distribution profiles, and exacerbate poverty.

Effects on institutional arrangements

Major disasters may affect the institutional arrangements in the affected country. To facilitate responses to the event, emergency committees are normally established to identify the most pressing needs and to channel aid. At a later stage, institutions may be set up—usually in the form of special reconstruction committees—as parallel structures to existing public administration ministries or bodies in the field. These new institutions are intended to expedite action, uninhibited by certain administrative and bureaucratic rigidities in the “normal” public apparatus, in matters such as purchasing and allocation of resources. Such institutions—created to attend a specific reconstruction program—tend to perpetuate themselves (the case of Guatemala comes to mind), duplicating functions and tapping scarce resources. Such institutions, however, sometimes develop an effective capacity for identifying and executing projects and improve the government's ability to channel and use international cooperation fruitfully. This is particularly true in countries

with weak organizational structures. These institutions also help to assure donors that their resources are used adequately and without bias. Although in many cases this may not lead to the establishment of a national or regional institution for the prevention of disasters, these institutional arrangements for tackling reconstruction after disasters help some countries to face new disasters.

Because of the frequent occurrence of disasters in Latin America and the Caribbean and the repetition of errors and mistakes in reacting to them, temporary institutional arrangements set up in the wake of one disaster sometimes become permanent structures that conduct risk analysis and define plans on how to react to potential disasters. They may also disseminate experiences and educate the population about measures that can be taken, on a preventive basis, to reduce risks and, once a disaster occurs, to react in an orderly and coordinated way when reconstruction begins. This implies a sustained education effort that includes educational and training programs, modified zoning and construction codes, and so forth.

Implications for the international donor community

In the Latin American and Caribbean region, ECLAC frequently undertakes, immediately following a major disaster and at the request of the affected country, a comprehensive damage assessment. This assessment evaluates the direct and indirect costs involved, identifies the sectors that require priority attention in the rehabilitation and reconstruction phase, and analyzes the macroeconomic effects of the disaster. The assessment is prepared in a relatively short period of time—usually within four to six weeks of the disaster—and provides the means with which

to determine the ability of the affected country to face by itself the requirements of rehabilitation and reconstruction. The document is also a tool with which the international donor community can orient its technical and financial cooperation, specifically the substantive contents of aid and the conditions concerning interest rates and repayment periods (recently, the ECLAC member states issued a mandate to the Secretariat to undertake this type of damage assessment on a systematic basis; see the resolution adopted by ECLAC during its twenty-fifth period of sessions—Cartagena, April 20–27, 1994—which is presented in appendix 2-1).

Although resources to attend the most pressing needs of the emergency phase are usually available through internal budgetary reallocations and the generous and timely assistance of the international community (both international organizations and donor governments), the rehabilitation and reconstruction programs following major disasters require sizable fresh resources under soft terms. The urgency with which these new resources are needed requires that the international donor community make special efforts. Important steps have been taken in recent years as a result of major disasters in Latin America, the Caribbean, and elsewhere. They include the ability to reorient existing development loans, more flexible requirements for formulating projects, and quicker processing of requests for loans. However, further work may be necessary if the international donor community is to help developing countries face reconstruction and tackle prevention and mitigation activities.

In this respect, the international donor community should bear in mind that cooperation on rehabilitation and reconstruction should be in addition to the normal development cooperation already

approved or earmarked for the affected country. Only in this fashion can developing countries seek to solve long-standing social problems that are aggravated by a major disaster. The flexibility to reorient existing loans certainly allows countries to address promptly the unexpected problems generated by a disaster but may also postpone or even cancel the execution of other much needed development programs and projects. International lending organizations and even donor governments through their bilateral cooperation programs may wish to consider establishing special programs designed exclusively to provide fresh, additional resources to finance unexpected rehabilitation and reconstruction plans after major disasters.

The international community may also wish to relax its normal institutional counterpart requirements for development assistance, by accepting—in the case of disasters—that the rehabilitation and reconstruction loans or grants be channeled through national institutions—including nongovernmental organizations—specifically set up for this task, instead of through the ministry or other public sector organization that would usually execute development loans and projects. This flexibility would ensure a faster response and still provide adequate assurances. A prerequisite may be that these resources be kept apart from the public administration's regular budget to ensure direct accountability.

In cases where the disaster is of significant magnitude but its impact is minor in relation to the size of the national economy, the government may wish to make full use of available domestic credit and financial resources before requesting external cooperation. The international donor community should be prepared to reinforce these domestic efforts.

The international donor community should also consider carefully the situation of a country seeking cooperation for rehabilitation and reconstruction following a disaster whose financial position is limited by an adjustment and stabilization program. Such a country may have accepted conditionalities related to its monetary, fiscal, and external financing policies, and these may block the need to expand liquidity and thus mobilize the resources needed to face emergency, rehabilitation, and reconstruction. In these cases, international lending institutions should be prepared to accept the affected government's request for flexibility in the fulfillment of those goals and conditionalities. Failure to do so may mean that sufficient fiscal resources are not assigned to the most pressing needs of the population during the emergency phase and, worse still, that social unrest emerges when reconstruction needs are not met.

Given the experience in the Latin American and Caribbean region and the frequency and intensity of disasters that affect it, the international donor community should provide more flexible mechanisms to facilitate the flow of cooperation for financing emergency and reconstruction. Lack of such mechanisms will result in greater medium- and long-term social and economic costs for the countries affected by disasters. Their unmet needs and damaged infrastructure will affect the functioning of the economy, slow economic growth, compromise the achievement of goals set forth in stabilization programs, and hinder overall development.

Summary and conclusions

The experience of Latin America and the Caribbean shows a significant increase in the frequency and complexity

of disasters, with a growing incidence of quasi-natural and social disasters. The pattern of disasters is unpredictable, making it difficult to measure the long-term consequences of a disaster, because several variables related to the event itself interact in complex ways, affecting the economy, the country's relations with the international community, and the conditions prevailing when the disaster strikes.

Advances have been made in the ability to assess damages and organize actions for the emergency, rehabilitation, and reconstruction phases. In the experience accumulated by ECLAC, the diverse variables and a methodology have been developed and made systematic and can be applied in general to all disasters. Unfortunately, no major advances nor sustained efforts have been made to develop the capacity to predict and prevent disasters, even those caused by phenomena that are cyclical or repetitive in nature.

In most disasters, the economic evaluation of their immediate and short-term impact, although complex, may be feasible. The consequences, particularly the social impact over a long time frame, are harder to measure and project. Regarding the effect of a disaster on a country's long-term prospects for economic and social development, the nature and size of the phenomenon tend to be in inverse relation to the size of the affected economy: the larger the disaster and the smaller the economy, the more significant the impact.

The economic effects of disasters include, among others,

- A negative impact on development prospects that not only immediately downgrades living conditions, especially of the population most directly affected, and temporarily defers or

cancels development plans that seek to address long-standing social needs, but that also modifies the very production patterns of developing economies when key productive sectors are affected.

- A deterioration of economic performance, which can be measured in terms of short-term reductions in the growth of GDP and per capita income; when productive activities are affected, the result is both short- and long-term imbalances in the external sector.
- Imbalances in the fiscal budget, because fiscal resources are reallocated to meet the urgent and unexpected emergency requirements, fiscal revenues decline, and conflicts arise in the need to fulfill commitments the country may have made to adjustment loan conditionality.
- Immediate and medium-term inflationary pressures stemming both from market disorders that occur right after the disaster and from the monetary effects associated with reconstruction expenditures undertaken with external financing and donations.

These consequences of disasters for developing economies also have implications for the international community, which is called to assist affected countries in the following ways:

- Continuing to offer international assistance to developing countries whose domestic fiscal resources are insufficient to meet the urgent requirements of the emergency stage immediately following a disaster.
- Assigning priority to disaster prevention and mitigation cooperation plans and projects from developing countries that result in diminished reha-

bilitation and reconstruction needs when future disasters occur.

- Making the already accepted scheme of reorienting existing sectoral loans and loan application requirements more flexible to attend unexpected needs.
- Making additional fresh resources—perhaps through the creation of a special fund—available to meet rehabilitation and reconstruction needs arising from disasters and to avoid the deferment or cancellation of other much-needed development projects; this special fund would involve soft terms for interest rates and repayment periods to avoid compromising the developing country's limited capacity to repay.
- Accepting temporary noncompliance by developing countries of adjustment and stabilization loan conditionalities related to fiscal austerity, when outlays required by rehabilitation and reconstruction modify their fiscal budget situation.
- Reinforcing rehabilitation and reconstruction financing when affected governments—following disasters having limited macroeconomic effects—elect to resort to domestic credit and financial resources.
- Making institutional counterpart requirements more flexible for rehabilitation and reconstruction financing by accepting that resources may be channeled through national institutions—including nongovernmental organizations—especially established for the purpose, as opposed to the normally accepted government ministries or decentralized institutions.

Note

1. A billion is 1,000 million.

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*Appendix 2-1. Resolution on Economics and Natural Disasters:
Twenty-Fifth Session, Cartagena de Indias, Colombia,
April 20–27, 1994*



The Economic Commission for Latin America and the Caribbean

Considering that the Latin American and Caribbean region is frequently affected by natural disasters of diverse origin and intensity, adversely affecting the economic development of the countries and the living conditions of the population,

Taking into account that preliminary estimates made by ECLAC show that annual losses caused by natural disasters in the countries of Latin America and the Caribbean exceeded 1.5 billion dollars,

Considering also that it is possible to reduce these losses to less significant amounts through the identification and implementation of preventive measures and mitigation actions that require important investment resources which, nevertheless, are at only a fraction of the level of losses estimated at present,

Further taking into account that although ECLAC has developed methodologies to estimate the economic effects of disasters, the region does not account with the nec-

essary quantitative arguments to enable competent authorities the prompt adoption of investment policies geared to the prevention and mitigation of disasters.

1. *Decide* to request that the ECLAC Secretariat
 - a) Undertakes the systematic research and pertinent quantitative analysis to determine, as soon as possible, the total economic effects of disasters in the countries of the region as well as their reduction to smaller levels through the undertaking of actions to prevent and mitigate them;
 - b) Presents the governments of the region concrete proposals for the introduction of the issue of disaster prevention and mitigation in national development plans, as part of the efforts being carried out during the International Decade for the Reduction of Natural Disasters; and
2. *Recommends* that the Secretariat seeks and obtains additional extra-budgetary resources in order to carry out these tasks.

Appendix 2-2: Map Showing the Location of Selected Disasters



The Context of Disasters and Sustainable Development: Case Studies of a Growing City and Urban-Rural Linkages in Bangladesh

Atiq Rahman

Natural disasters threaten sustainable development worldwide, and the need for integrating natural disaster into the conventional development process is paramount. Natural disasters often destabilize communities, ecosystems, and production bases and make them more vulnerable to additional shocks such as other disasters and economic or political instability. The response of poor societies to natural disasters is often complex. It depends on many factors, including the type and intensity of the disaster, disaster preparedness, and the institutional support system—both formal and informal. Poorer societies, even if initially resilient, are often destabilized by natural disasters to the extent that their sustainability is completely undermined.

More detailed case studies would be helpful in improving countries' efforts to make disaster reduction an integral part of development planning. Presently, there is only a relatively small body of knowledge about the complex interplay between disasters and sustainable development. New case studies are needed to explore and analyze the linkages between natural disasters and sustainable development in two settings: a megacity with rapid population growth, like Dhaka City, which is one of the fastest growing cities in South Asia; and a metropolis in a more regional setting, such as the coastal city of Chittagong and its adjoining areas, which were badly affected by a major cyclone in April 1991. Outlined below are the issues that such studies would help to illuminate.

Bangladesh: The setting and the disaster

Bangladesh is faced with rampant poverty, high population density, increasing population, recurring natural disasters, and a dwindling base of natural resources. Furthermore, there are geomorphological and political instabilities, a high level of dependence on external aid in the economy, and democracies and democratic institutions in the early stages of formation.

More than 5 percent of the gross domestic product (GDP) is lost annually to recurrent natural disasters. Recurrent floods cover large areas, often up to 30 percent of the country. They affect and damage crops, seeds, trees, livestock, housing, infrastructure, and the economic and productive units in the formal and informal sector both in urban and rural regions. Floods can enhance erosion by rivers, with a consequent loss of valuable arable lands and increased vulnerability of affected communities. Areas hit by cyclones are not very large, but the devastation can be enormous: the cyclone of April 1991 killed more than 130,000 people. In the recent cyclone of May 1994, casualties fortunately were limited to 200, but calculated damages exceed hundreds of million of dollars, which the country can ill afford.

The northwest part of Bangladesh is vulnerable to drought and the northeast to flash floods. The country is on a zone of low-scale tectonic activity. Exogenous factors such as changes in global climate and the consequential rise in sea level threaten the coastal communities, home to more than 15 percent of 120 million people. A recent study on the vulnerability to climate change and rise in sea level predicted that coastal inundation of the south and increasing drought in the northwest will have devastating economic and environmental impacts. The stark conclusion is that if the predicted impacts of changes in global climate are true, and if neighbors refuse to cooperate on making water from common rivers available (for example, the sharing of the Ganges water with India), then all the development efforts for the next thirty years will be totally negated by exogenous factors for which the people of Bangladesh are not responsible. Sustainable economic development will continue to be a farfetched goal. Furthermore, the greatest disaster is the existing poverty, which undermines the basis for sustainable development.

A proposed study on these issues would analyze historic disasters and their economic costs, different disaster scenarios, disaster management concepts, and institutionalized responses. This study would also analyze the different phases of disasters and their comparative costs and benefits and demonstrate the linkages between economic activities and natural disasters and their relevance to sustainable development.

Case studies

As mentioned above, two detailed case studies—one looking at a mega-city and the other at urban-rural linkages—would provide a more accurate view of the country's vulnerability to disasters and sustainability. Although urban centers are focal points of enhanced economic activity, particularly in the industrial and formal sectors, disaster analysis should not treat them in isolation because urban-rural linkages are multifaceted and intense.

The urban case study: Dhaka City

Dhaka, the capital of Bangladesh, is one of the fastest growing Asian cities, with an annual population growth rate of more than 6 percent. Dhaka had a population of 6.1 million in 1991, which will have increased to 11.2 million by the year 2000. The average background population growth rate is around 2.2 percent, migration from rural areas accounts for the rest. The dominant push factors are landlessness and poverty, and the major pull factors are some, albeit precarious, employment opportunities and the potential to form slums with little or no sanitary and infrastructure support. The lowest strata in society, as in most mega-cities, live on the wastes of the affluent.

The major recent natural disasters were floods in 1987 and 1988. Part of the reason for the massive economic devastation and impact was excess water from outside, but the dominant reason was waterlogging caused by poor planning and by so-called protection plans for the construction of embankments. These embankments, and the choking of drains by rampant and ill-conceived construction, make the city and its dwellers more vulnerable to flooding.

Other disasters are typhoons—short, sharp events—which can be devastating, particularly if they hit infrastructure of economic importance such as industries, power plants, and bridges. Fire hazards also remain a major threat because of the population congestion and poor housing. Again, the poor are the most vulnerable.

The proposed case study would analyze in detail the economic effect of disasters and their preferential impact on different economic sectors such as industry, transport and roads, buildings, waterways, health and sanitation, power, and institutions. The study would also explore the impacts of disasters on different social classes and their responses, illustrating the vulnerability of the poor to natural disasters and the ways in which the elite distort planning priorities and influence decisions that are ultimately socioeconomically suboptimal for the city and the country.

Urban-rural linkages: Cyclone of April 1991

The coastal areas of Bangladesh were devastated by a cyclone in April 1991. The victims of the cyclone and associated water surge were not only the 130,000 who lost their lives and the millions marooned and disabled, but all components of the economy—human beings, animals, trees, soil, bodies of water, infrastructure, and commercial products such as shrimp, salt, and textiles. A recent study has shown that the Port of Chittagong alone sustained a loss of Tk1,616 million (\$400 million). Some twenty-two vessels sank, including a port dredger and a floating crane. The airport was severely damaged, as were forty-three major industries in the Export Promotion Zone. An estimated Tk10 billion (\$2.4 billion) of plant was damaged in the export sector alone. This is equivalent to the nation's total annual development budget. Several offshore islands were totally devastated: 75 percent of the houses and 65 percent of the schools in Sandwip Island were wiped away.

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A case study of this experience would systematically analyze peoples' reaction to disasters, economic losses, and management strategies: what has worked, what has not, and how people cope with such disasters. However, the dominant conclusion remains that the more effective participation of the people is the best approach to improving disaster management and mitigation. Preparedness is the essence of reducing the impact of disasters and achieving economic development overall. While disasters themselves inflict great harm, the greatest killers are underdevelopment and poverty.

Conclusions

Floods, cyclones, tidal bores, and earthquakes are not the only disasters: poverty and illiteracy are more deadly, and they also are barriers to better disaster management. Forward planning to cope with exogenous and extended phenomena such as global warming and a rise in sea level tend to be embedded in economic activities in an intricate and interconnected world, where often the poor states, and even poorer communities, are most vulnerable. The poor are pushed toward the disaster-prone and environmentally degraded areas, making them even more vulnerable, and locking them into an economic and ecological downward spiral.

Development is the greatest antidote to disaster. Proper economic growth offers the best opportunities, and only effective participation of the populace in this decisionmaking can make economic-ecological sustainability possible. The deadly triad of population growth, natural disasters, and environmental degradation can only be addressed with the emerging tools of sustainable development and economic opportunities for the people, particularly the poor.