

## II. THE STATE OF THE ART

### A. OVERVIEW OF THE PROBLEM OF DISASTERS

Natural disasters strike all over the world, whatever the level of economic development or geographic location of a country (although the level of development very much affects the impact of a disaster; see Section II-D.). Figure 1 indicates areas of the world vulnerable to various natural hazards. Through reviewing historical records and monitoring on-going phenomena, such as water levels in rivers or seismic activity of a volcano, localised vulnerability risk maps can be produced to graphically illustrate the areas vulnerable to particular hazards. For example, the areas likely to be affected by earthquakes in Peru are shown in Figure 2.

### B. LOCATION OF NEEDS

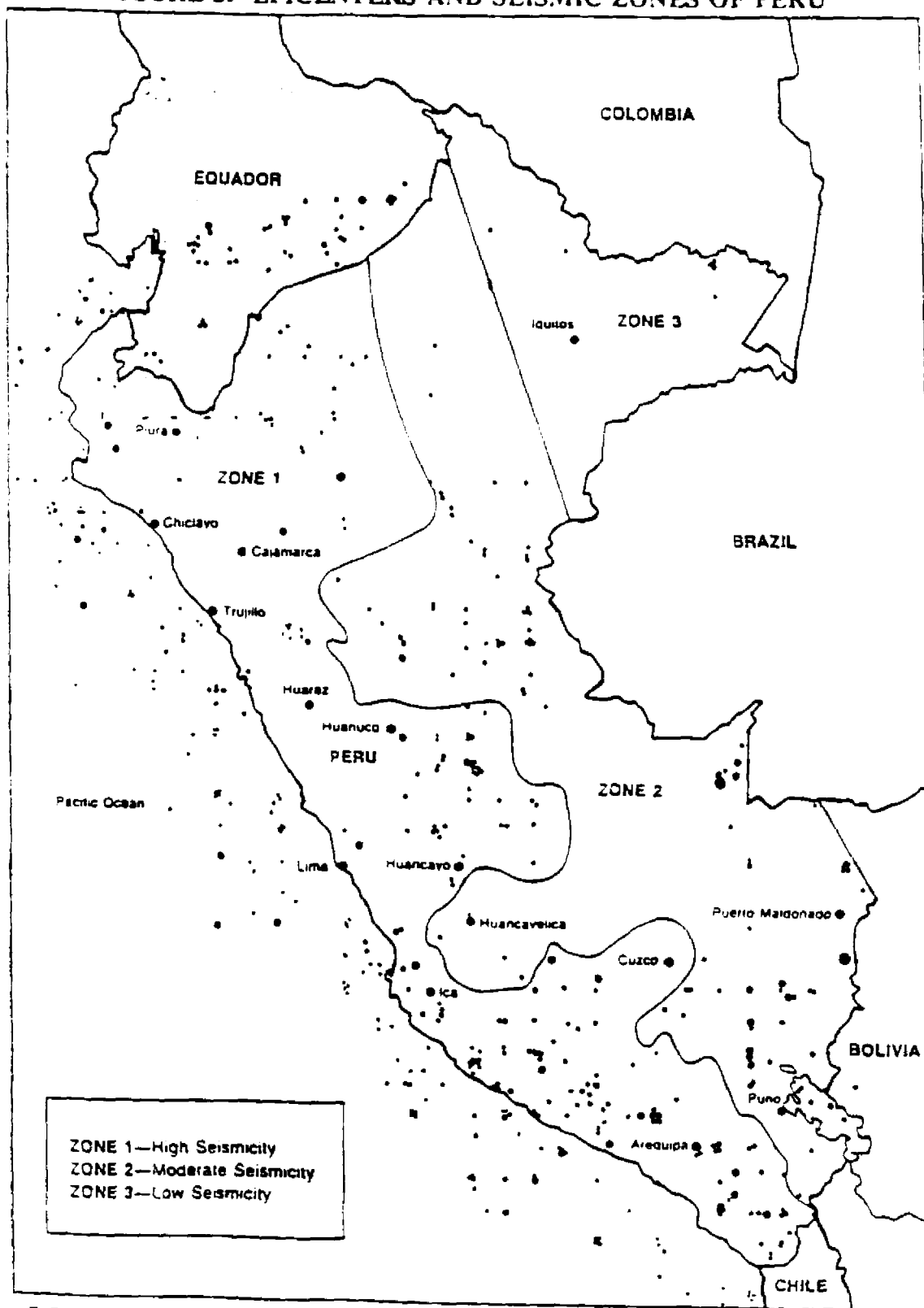
Geographically, the typical zones of greatest vulnerability are those most exposed to climatological extremes, population pressures and environmental degradation. Thus, for example, especially in Latin America but also in other parts of the world, the effects of natural disasters are magnified by the chaotic and uncontrolled process of human settlements in urban areas. Environmental impact assessment, risk analysis and contingency programmes and the lessons learned from past natural disasters have until recently rarely been taken into account prior to the establishment of new settlements in urban areas (Siegel and Witham, 1990). Similarly, in Bangladesh, people historically avoided living in constricted areas that were subject to flash floods, although some economic activities such as sand or gravel extraction were carried out. With rapid, unchecked population growth, many poor people have been forced into these areas and the threat to human life is growing annually.

Rural areas that have recently been deforested or are sited downstream of these areas are especially vulnerable to drought, through changes in the weather, and to flood, because of soil washed into rivers, causing them to overflow their banks. Regions of countries that were marginally sufficient to maintain pastoralists or low-level agricultural exploitation easily become drought-prone when human and/or animal populations increase and low rainfall occurs for one or more years. Finally, coastal zones are vulnerable to tropical storms and tidal waves causing flooding and wind damage.

### C. IMPACT ON POPULATIONS, ESPECIALLY THE POOR

The types of damage likely from various hazards are shown in Table 1. When disasters hit vulnerable populations, the effects can be devastating. In Bangladesh, a cyclone in 1970 killed an estimated 300,000 people, and another cyclone in 1985 killed 10,000. The

**FIGURE 2: EPICENTERS AND SEISMIC ZONES OF PERU**



Source: F.C. Cuy, *Disasters and Development*, Oxford University Press, 1983, p. 213.

1987 and 1988 floods brought fewer deaths, but affected almost the whole country, and brought economic devastation.

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### DAMAGE FROM RECENT FLOODS, BANGLADESH

#### 1987:

- 50 out of a total of 64 districts flooded;
- 347 out of a total of 460 *upazilas* affected;
- 50,540 sq. km. out of a total area of 147,867 sq. km. under flood water;
- 24 million people out of a total of 100 million affected by the flood;
- 4.5 million acres out of a total cultivated area of 20.15 million acres affected or damaged;
- 800 people dead;
- 1,500 km. of roads and highways destroyed;
- 1,200 bridges, culverts and segments of embankments washed away;
- 6,800 schools and other educational institutions destroyed.

#### 1988:

- 1.2 million homes totally destroyed and 2.4 million damaged;
  - 81% of totally destroyed homes belonged to rural poor;
  - approximately 1.5 million acres of crop land affected, with loss of crop production in damaged area estimated at about 1.6 million tons.
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The 1988 drought in Ethiopia, due to sequential rain failure and other factors, affected eight million people and may have left one million dead, as well as devastating livestock herds. The country presently faces another drought affecting up to five million people (Daily Telegraph, 1990).

The 1987 earthquake in Ecuador caused direct and indirect damages totalling over US\$1 billion. Some 1,000 lives were lost, over 500 persons were evacuated, nearly 3,000 homes were lost, and social and industrial infrastructure were destroyed. The catastrophe directly affected the well-being of 400,000 persons. Floods in Ecuador have recently covered large parts of the richest agricultural lands, affecting the livelihood of many farmers.

In all these instances, it is usually the poor who suffer the most, because they lack the resources to overcome their economic losses. Accepted definitions of natural disasters emphasise the fact that disasters result more from the environment in which they take place than from the physical phenomena themselves. The real root of the heavy impact of a hazard event is the vulnerability of the community it strikes. Examples abound of disasters of similar magnitude that devastate a community in a vulnerable country but have far less effect in a developed one, such as the comparison between similar earthquakes in Armenia in 1988 (over 20,000 deaths) and in California in 1989 (fewer than 100 deaths). A drought in a developed country may affect agricultural production, and may even force some families to lose their farms, but will certainly not lead to the large loss of life occurring in major droughts in Africa.

In most cases, this vulnerability derives from poverty. Poor people are more likely to live in areas known to be disaster-prone, since these are the least expensive sites. Poverty is the reason why communities develop on steep hillsides in cities, which are vulnerable to landslides, or in flood-prone areas along river valleys. This vulnerability is further exacerbated because the poor who must live in these areas are less likely to know about, or to be able to afford to undertake, measures to reduce their risk in case of natural disasters.

#### D. IMPACT ON, AND LINKAGE TO, DEVELOPMENT

It is only in recent years that the linkages between disasters and development have become the subject of study, discussion and action. This shift from focusing on relief actions to thinking about longer-term issues is encouraging since the effects of natural disasters in developing countries continue to be exacerbated where the linkages are unrecognised.

The relationship between disasters and development is a complex one, since effective disaster mitigation cannot take place without development (some experts say that prevention is development), and development proceeds more slowly where disasters occur. As a further complication, the occurrence of a disaster, despite its short-term negative implications, in some cases brings positive long-term consequences to a society. For example, a disaster may serve as a catalyst for introducing mitigation activities and also create a political and economic climate wherein developmental changes occur more quickly than normal.

TABLE 1: EFFECTS OF MAJOR NATURAL HAZARDS

<u>HAZARD</u>	<u>EFFECTS</u>	<u>CONSEQUENCES</u>
Flood (can be caused by unusually intense rainfall or by changes to earth's surface such as deforestation upstream)	Inundation	Results in damage to human settlements; forces evacuation; erodes topsoil; may change course of streams, rivers; destroys most crops; deposits silt in some downstream areas that may be beneficial.
Drought	Decreased or irregular water availability	Lowers crop yields; stimulates migration (especially rural to urban); causes disruption of nomadic lifestyles; livestock die.
Tropical Cyclone	High winds	Damage buildings and other man-made structures; destroy some standing crops, especially basic grains; damage orchards and other trees.
Earthquake	Tremors (ground shaking)	Damage buildings, dams; cause avalanches; can collapse underground structures such as caves, tunnels.
	Liquefaction	Buildings on surface sink into soil.
	Ground failure	Landslides; settlement.
	Ground rupture (horizontal displacement)	Damages buildings on the rupture; breaks utility lines in the ground; may alter flow of subsurface streams; offsets streams, roads and bridges.
	Tsunamis (seismically-generated sea waves)	Flooding and impact damage from giant waves destroy manmade structures and crops; scour land; salinate wells and standing water.

Source: Adapted from F.C. Cuny, Disasters and Development, Oxford University Press, 1983, p. 213.

Economic losses, as either direct or indirect effects of disasters, can set back economic growth notably. Jamaica's Gross Domestic Product (GDP) for calendar year 1988 (the year when Hurricane Gilbert hit) fell by 2% as against an expected growth of 5% (Vermeiren, 1989b). In recent years, Sri Lanka lost over 2% of its Gross National Product (GNP) as damage loss and costs of adjustment due to floods (Funaro-Curtis, 1982). The Bangladesh case study showed that government revenue declined from a pre-flood surplus to a deficit in 1988-89.

The direct effects of physical damage to infrastructure that is key to on-going development programmes can delay or cause these programmes to be cancelled, and may discourage new investment in such schemes.

Another negative impact of disasters is that the attention of the public and government officials may be diverted from long-term development needs to short-term ones because of pressures resulting from reporting in the media and external donor demands. Thus, government and private resources destined for development may be diverted to meet emergency needs for relief, rehabilitation or reconstruction. In countries with limited skilled manpower, this change of priorities may be especially felt. In Ethiopia, because of political factors, most donors were only willing to contribute relief assistance -- not development aid - despite the government's expressed commitment to long-term solutions to drought problems.

Formulation of reconstruction programmes following major disasters has had a significant impact on national, regional and local development planning processes in disaster-prone countries. The degree to which these programmes have been integrated into existing planning processes varies considerably from country to country and occurrence to occurrence. The most typical response has been the creation of a reconstruction planning process in parallel with existing planning processes. The preference of international donors and lenders has been to implement reconstruction programmes outside the mainstream of development activities in the hope of expediting execution and avoiding bureaucratic delays. As a result, sectoral reconstruction efforts take place without an assessment of the broader post-disaster needs of the particular affected area. Reconstruction of damaged production facilities, infrastructure and settlements without formulation of a comprehensive development strategy based on the post-disaster situation has often led to missed opportunities for incorporating disaster mitigation measures into this process, and acknowledging the importance natural hazard risks should have in development planning decisions (Bender, 1984).

Post-disaster programmes -- even reconstruction programmes, which are considered by some donors as synonymous with development -- are often planned and carried out in haste. The rush may occur because of the reconstruction planners' perceived need to return the community to "normal" as soon as possible or because of time constraints on donor funding. Thus, the careful planning and community involvement necessary for development planning are often overlooked. Without such planning, these programmes may infringe upon longer-term development efforts or delay their implementation. Reconstruction programmes that are ill-planned and merely return communities to the *status quo* may leave them almost

as vulnerable again to a future disaster, while at the same time creating a sense of complacency because something has been seen to be done.

The side effects of well-meaning development efforts sometimes have disastrous consequences (see Table 2). Development projects implemented without taking into account existing environmental hazards may increase vulnerability to natural disasters. For example, projects designed to increase employment opportunities and thus income in towns usually attract additional population growth. Low-income people may then have to seek housing in areas previously avoided, on hillsides or in floodplains, as noted earlier. The costs of relief assistance after a landslide or flood can easily outweigh the benefits to the economy of more jobs in these situations.

In addition, development projects infrequently take advantage of simple measures which might lessen the impact of a disaster, such as planting flood-resistant crops in coastal areas, planting drought-resistant crops in dry areas, or terracing to reduce erosion.

#### E. HOW DISASTERS AND MITIGATION HAVE TRADITIONALLY BEEN VIEWED BY GOVERNMENTS

In the past, many governments have acted as though disasters will not occur in their countries, or at least under their administration. This situation arises sometimes because high-level officials do not have appropriate information about risks, or because they fear that acknowledging the risks would discourage investment or tourism, or simply because they do not know what to do about the problem.

Other governments have acknowledged the possibility of disasters, but see them as primarily unpredictable and unavoidable events that should be dealt with in isolation. In other cases, officials believe that, if a large disaster strikes, the international community will carry much of the burden, so that national resources can be reserved for development unrelated to disaster issues.

None of these attitudes are particularly conducive to formulating a national approach to disasters that recognises that mitigation should be built into development programmes, and that development initiatives should be designed taking disaster risks into account. This situation is especially true because disaster mitigation is often perceived by government planners and disaster managers in a very narrow manner. Many see it in terms of stockpiling blankets, tents and medical supplies; developing emergency response plans; and developing standardised operating procedures for the specialised agencies. In this view, disaster mitigation appears as a civil defense or para-military operation. Clearly, a wider perspective is needed for development linkages to take place.

**TABLE 2: EXAMPLES OF DEVELOPMENT  
LEADING TO DISASTERS OR INCREASED VULNERABILITY**

<u>SECTOR</u>	<u>DEVELOPMENT ACTIVITY</u>	<u>RESULTS</u>
Industry	Construction of chemical plant generating employment	Deaths due to inadvertent release of chemicals; increased health problems; hazardous or toxic waste accidents.
Agriculture, Forestry and Fisheries	Introduction of new species to control pests	Uncontrolled expansion of new species into environment, bringing crop failure.
	Irrigation schemes	Flooding where canals counter natural water flow.
	Increase in pesticide or fertiliser use to augment crop yields	Contamination of potable water supplies.
Natural Resources	Construction of hydro-electric dam	Displacement; salinisation.
	Drilling of water wells in marginal areas	Desertification due to population clustering around wells.
Transportation, Communications	Road building in rain forests	Landslides; deforestation.
Education	School construction on earthquake fault line	Deaths/injuries due to structural failure
Development Issues, Policies and Planning	Centralisation of planning process	Famine due to lack of organisation of local governments.
	Concentration of tourist facilities on vulnerable coastlines, unstable hills	Exposure of large populations to risk of death/injury/loss in storm surge, high wind storms, tsunami, landslide.



The approach of a government to disasters -- and thus its receptivity to taking mitigation measures seriously -- depends on many inter-related factors, including:

- the time since the last major disaster occurred;
- the stage of development of the country;
- the physical characteristics of the country;
- the available resources;
- the likelihood of a disaster occurring;
- the probability of different kinds of disasters, some being more amenable to prevention and preparedness activities than others;
- the external assistance likely to be available in case of disaster;
- other events occurring in the country or region;
- the likely impact of known types of disasters;
- the accessibility and availability of assistance;
- the personalities involved.

The importance of the first factor on this list should not be under-estimated. Most countries are very willing to examine ways to mitigate future disasters immediately after suffering one.

## F. EXAMPLES OF NEW INITIATIVES

Fortunately, due to the initiatives of officials of the governments concerned, the UN system, donors and NGOs, new developments are taking place in the way disasters are viewed by governments, resulting in the integration of disaster concerns into development programmes, and development concerns into disaster mitigation efforts. UNDP has been actively involved in promoting, funding, providing technical assistance or otherwise supporting many of these efforts.

Examples of these endeavours can be seen in the case studies, project proposals for disaster mitigation activities, and experience from other countries.

1. Bangladesh: Bangladesh has a comparatively long history of incorporating disaster mitigation into government administration and development planning because of the disaster-proneness and particular history of the country. However, despite the internalisation of some measures, the floods of 1987 and 1988 had serious impacts on the country's development. This situation aroused serious discussions within and outside Bangladesh, particularly among government and donor agencies. One effect was a sharpening of government focus on disaster mitigation and the consciousness-raising of competent authorities regarding the need to devise a comprehensive strategy for disaster mitigation.

Two major initiatives thus arose out of the floods. One was the development of a comprehensive Flood Action Plan, designed to prevent flooding of urban areas and infrastructure, and to mitigate its effects in other places. UNDP worked actively with the World Bank to formulate and conduct a number of studies related to flood

protection as a basis for this plan. While some aspects of the resulting plan are controversial, it is encouraging that such a comprehensive approach to flood control is taking place.

Another major initiative is one particular project within this plan, an office of disaster preparedness. The two principal functions of such an office would be to adjust the nation's overall development strategies and programmes as necessary to reflect an active rather than a passive response to disasters, and to analyse the potential impact of proposed projects on disaster risks when undertaking environmental impact assessments.

While a Ministry of Relief and Rehabilitation has long existed, this office has traditionally been responsible for disaster preparedness (in a narrow sense) and response activities, but not mitigation. Its institutional location parallel with the regular line ministries has meant that it has not been in a position to participate in macro-level planning, nor even in sectoral planning. Thus, a high-level body to centrally coordinate and control mitigation activities has been lacking. Experts who designed the disaster preparedness plan and major donors have attempted to assign the functions related to mitigation to a new high-level office.

While problems exist in developing this office, making it operational and extending its mandate beyond floods, this initiative is paving the way for a more comprehensive approach to integrating disaster concerns with long-term planning. Currently, a dialogue is continuing between donors and the Government of Bangladesh over where this office should finally be placed.

Ethiopia: Like its Bangladeshi counterpart, the Relief and Rehabilitation Commission (RRC), which was formed as a result of the 1974-75 famine, has been involved in the management of assistance to disaster victims, but not in efforts to mitigate the effects of future disasters beyond logistical and stockpiling concerns. More recently, however, it has begun to actively participate in mitigation measures.

One of the reasons for this initiative has been the lead of the UNDP Resident Representative in his role as Chairman of the Emergency Prevention and Preparedness Group (EPPG), formed in 1985 as a continuation of the Emergency Office for Africa. While "prevention" is part of the EPPG's title, and while it has attempted to focus some attention on the issue, it has mostly been concerned on a day-to-day basis with relief. However, the chairman of the EPPG has used his position and prestige with the government to promote the development of a national disaster preparedness and prevention strategy. An important step in this direction was a national conference at the end of 1988 which attracted experts from Ethiopia and throughout the world. UNDP funded this meeting, which was hosted by the Office of the National Committee for Central Planning (ONCCP), the national body with overall responsibility for development planning. Attended by senior representatives of major UN and donor agencies, this was an important event as, prior to this time, there had been little attempt to integrate disaster issues into development planning.

With UNDP and other donor assistance, this conference led to the preparation of a national strategy published in 1989. It was hoped that, once the strategy is approved, the UN agencies would be able to re-orient their country programmes towards its objectives, particularly in support of early warning systems, transport infrastructure improvements, training, labour-intensive public works, and so on (Priestley, 1989). UNDP and UNICEF current country programmes, formulated at the time of the 1984-5 drought, have a drought-related orientation but in no sense are linked or integrated.

Subsequently, UNDP supported a small unit for mitigation in the environmental section of the ONCCP. The unit was placed in the ONCCP to enable it to oversee development activities to ensure that they will not increase the country's vulnerability to disasters, and also ensure that disaster concerns are taken into account in development programmes. The unit is still weak and not formally established, given the other priorities of the government, including the war and the on-going drought emergency. Although the strengthening of linkages between the RRC and the ONCCP is a task that remains to be fulfilled, this demonstrates an important first step in the process.

3. Ecuador: In the spirit of the IDNDR, Ecuador has formed a high-level commission (in mid-1990, as yet unnamed) for directing planning and advising in emergency prevention, assistance and rehabilitation. Its objective is to cope with the problems and decrease the effects of natural phenomena during the 1990s. The commission's work is geared fundamentally toward prevention of floods on the coast, and it is thus entrusted with establishing permanent monitoring of oceanographic and meteorological variables to make it possible to predict with reasonable advance notice and certainty the appearance of the El Niño phenomenon.

Another initiative is the formation, within the General Secretariat of Planning of the National Development Council, of a frame of reference for linking the prevention of natural disasters (and others involving ecological impacts and inappropriate use of natural resources) with development planning. The Secretariat has also organised a division for security and development and another for natural disaster prevention. The national development plan for the current period includes, for the first time in the history of national planning, topics relating to disaster mitigation.

## **G. LESSONS FROM CASE STUDIES**

Efforts at integrating disaster concerns with development planning have had limited results so far, and there are many lessons to be learned from present endeavours.

- Governments are willing and able to develop strategies linking development to disaster vulnerability, but because they develop other priorities as recent disasters fade from memory, long-term orientation and assistance for this objective are required.

Most governments are interested in the concept of integrating disaster concerns into development planning. This interest is especially evident while the memory of a recent disaster lingers in the minds of politicians. However, as the time since a disaster event increases, it is hard to maintain this interest, especially when it comes to a choice of resource allocations. The continuation of broad-based mitigation activities for disasters that do not seem imminent may then depend on whether donors are willing to continue to prioritise and/or fund mitigation activities.

- **The inability to enforce solutions because of perceived economic constraints or other factors, such as civil war, means that strategies cannot always be implemented as planned.**

The severe economic difficulties which many countries now face have erroneously convinced many governments that they cannot implement effective mitigation measures. For example, Ecuador has been suffering from inflation, devaluation of the national currency, and a general weakening of the economy. In light of present-day pressures, it is difficult for the government to devote resources to policies that may not show an impact for a long time. In fact, there are many low-cost mitigation efforts that could take place even in these circumstances, but governments are usually unaware of them or do not consider them seriously.

Similarly, countries facing civil wars or disturbances, or a present emergency of another nature, may be unable to prioritise actions not aimed at maintaining the government in power or immediately saving lives. Thus, in Ethiopia, the conflict and the continuing threat of famine have meant that disaster management institutions are currently concerned with moving large quantities of food and medical supplies. The measures needed to attack the causes of famine (such as reforestation and soil conservation) cannot be undertaken on a sufficiently large scale to be meaningful. Similarly, the regulation of markets and economic mitigation measures that could keep drought from leading to famine cannot be implemented in rebel areas or where normal marketing mechanisms between insurgent-held and government-held territory have broken down.

- **Many government and other officials still find it difficult to focus on "prevention and mitigation" as separate from "relief and reconstruction".**

In general, government planners appear to have a good feeling for how disasters impact on development and the linkages between the two, while officials working in disasters have a vaguer perception. However, even with planners, it is sometimes hard to separate disasters in their minds from relief, and especially from commodity distribution.

- **Existing national relief agencies do not want to yield dominance in disaster mitigation, even where their institutional framework and resources may not be appropriate for the broader role of integrating development with disaster vulnerability.**

In the many countries which now have a Ministry of Relief or similar office, these institutions often come to accept as part of their mandate that they should be the lead agency

for all disaster concerns, despite the fact that they may not be equipped institutionally or vested with the necessary authority to plan and carry out mitigation measures involving macro-level, multi-sectoral planning and decision-making. These relief agencies do not accept that most mitigation actions are more appropriately carried out by line ministries coordinated by a central planning organisation.

- **Donor imposition of external solutions that are politically or bureaucratically unacceptable is unlikely to yield good results in the short term.**

A common tendency of external experts, when seeing that no system is in place for integrating disaster considerations with development concerns or that the institution in charge of disaster relief is not capable of also undertaking mitigation functions, is to advocate creation of a new institution. While in some cases this solution may be desirable and practical, it may simply add yet another agency without solving the underlying problems. Pushing for a new institution, before understanding the reasons why the existing structure has failed or the internal political situation which established the present system, may backfire.

- **Planners at all levels in key organisations lack essential technical information to take disaster vulnerability into account, and to integrate disaster concerns with development planning.**

Very little information on disaster vulnerability is available to planners in disaster-prone countries. Sometimes such information exists, but is not distributed systematically beyond the agency which collects it. For example, in many countries where a great deal of effort has gone into risk-mapping of vulnerable areas, the existence and location of this information may not be known to all parties for whom it could be useful.

In some cases, early warning systems (EWS) which could trigger mechanisms to mitigate famine break down or are ineffective because information collection and dissemination is inadequate. In Ethiopia, the credibility of RRC data from its EWS has been seriously questioned, partly for political reasons. A lack of resources and manpower in-between disasters, when priorities may have changed, may mean that the information obtained is more random than systematic.

- **Governments tend to centralise mitigation functions and are sometimes reluctant to use the expertise and interest available from non-governmental organisations and the private sector.**

While the incorporation of disaster considerations into macro-level planning is clearly an endeavour for government at the national level, the collection of information for planning these measures and their implementation is a local-level concern. Where local-level agencies and officials are not oriented, given responsibility and provided with resources to see that such measures are carried out, the best of national planning efforts will fail. Thus, for example in Ecuador, the Law of Municipalities contains a detailed section on physical planning and regulation of urban development. Unfortunately, Municipal Councils have not enforced these regulations, apart from rare exceptions. Thus, many areas around cities

remain vulnerable, with construction in areas unsuited for such use, or even in zones declared as natural parks or wildlife preserves. In many cases, local government agencies are given instructions on what to do in case of emergency (usually involved with commodity distribution), but are not oriented to disaster mitigation at the local level, nor consulted on what practical measures might be taken.

In rural areas, the organisations that have the most knowledge, experience and ability to promote the adoption of mitigation measures are often ignored until a disaster strikes. In Bangladesh, NGOs have become the primary agents for development work in rural areas, and have the links with communities to communicate and implement work that involves taking disasters into account. However, they are often overlooked when it comes to setting government policy or consulting with communities.

### III. OPPORTUNITIES

#### A. PUTTING DISASTERS IN A DEVELOPMENT CONTEXT

The case studies and examples from other countries illustrate how disasters can be put into a development context.

1. Ethiopia: The result of the Disaster Prevention and Preparedness conference funded by UNDP at the end of 1988 was the drafting of a National Disaster Prevention and Preparedness Strategy (NDPPS). This document spells out the links between disasters and development, and sees work in the prevention and preparedness field as ultimately leading to development. In particular, it states that close links will be developed between the NDPPS and the National Conservation Strategy to ensure that conservation and improved natural resources management contribute to disaster prevention and ensure environmentally-sustainable development.

An important part of the strategy is that line ministries will actively incorporate prevention and preparedness activities within their normal ministerial responsibilities. Appropriate budget allocations are to be made to enable line ministries to undertake these activities. They will also be responsible for preparing and supervising projects to be implemented by NGOs involved in rehabilitation, preparedness and development activities relevant to specific line-ministerial mandates.

A Disaster Prevention and Preparedness Unit in the ONCCP has been proposed to review projects of line ministries for their disaster implications.

The NDPPS incorporates many aspects of disaster mitigation efforts from other countries that periodically experience drought or other circumstances which may lead to famine, including:

- special disaster preparedness fund;
- emergency code;
- national logistics plan;
- local food security reserves;
- government-subsidised food retail outlets;
- "off-the-shelf" food-for-work/cash-for-work public works programmes;
- cattle camps and animal protection systems;
- tax and debt relief;
- seed banks;
- secondary economic activities.

In order to ensure links with mitigation, the strategy states that all development programmes -- particularly soil and water conservation, afforestation, small-scale irrigation, rural industrialisation and rural roads construction -- wherever feasible, should automatically incorporate aspects of preparedness; conversely, all preparedness measures should be regarded as platforms for development. An Interministerial

Committee on Disaster Prevention and Preparedness is meant to ensure that all development programmes and mitigation measures are to the extent possible integrated and consistent with the National Food and Nutrition Strategy.

2. Bangladesh: The case study points out that many mitigation efforts in Bangladesh have become institutionalised because the country has faced so many disasters in the past. Thus, efforts at mitigating disasters are in one sense really normal development programmes.

One example is food-for-work programmes. These programmes, which are on-going in normal times but are increased in scope after disasters, have been designed to provide a source of food or income in return for work on community projects. The community projects, when well-selected, assist in development. Since these projects include such elements as repair to elevated roads or embankments, they also serve to protect against floods. In the past, these projects were not always of good quality (for example, embankments that easily washed away) or did not take all factors into account (for example, those where roads were built that impeded the normal flow of water). However, the government and WFP, which provides many of the commodities for this programme, increasingly take these matters into account.

3. Sudan: In Sudan, which is currently experiencing civil war and is constantly threatened by famine, a number of interesting proposals have been developed to use UNDP development resources to prevent or mitigate the effects of these disasters.

The UNDP Emergency Unit proposed a broad community-based approach for dealing with the large numbers of displaced persons fleeing the conflict in the South; the approach could also apply to situations where there are population movements because of drought, slow flooding, etc. Previously, most efforts had been focused on providing food, shelter and water to those people living in camps along primary routes out of the conflict zone. In the new approach, UNDP advocated treating the displaced as migrants and focusing development aid in the communities where the displaced were congregating. One objective of this approach was to increase employment opportunities that would provide sufficient income for the displaced to take care of their own needs. It was argued that, with an expanded economy, the need for costly relief would be reduced and people would be able to live a more normal life until they could return to their homes.

The second objective was to reduce the likelihood that a population influx would lead to localised conflict. Most of the affected communities had insufficient resources to accommodate large numbers of migrants. Most towns in the semi-arid areas of Sudan have marginal water supplies even in the best of times, and agriculture is limited due to the lack of irrigation and technical input. Thus, the existing population has quickly come to resent the influx of outsiders, and the potential for conflict has been high. The UNDP programme was designed to pre-empt the situation by increasing the resource base through expanding water resources, ensuring food security in the marketplace, and expanding economic opportunities for both the local and incoming populations.



In sum, UNDP simply used crisis-induced migration as an indicator of where to target and focus development aid. Relief was left to NGOs while a broader, "whole community" approach was adopted by the UN system.

The second set of activities designed to put disasters in a development context related to UNDP's proposals to counter famine. The first step was the design of an Area Development Scheme targeted on one of the most vulnerable agricultural areas in Sudan. At the same time, UNDP began to support development of a famine EWS based in the vulnerable regions.

Before these two programmes became fully operational, a food crisis began to develop in mid-1990. This crisis was a result of poor economic planning and extensive drought in Western Sudan, and pressures on the economy and food supply created by the conflict in the South. These factors combined to force food prices upward to a level where the poor in drought-affected areas could not afford to buy food, leading to a sell-off of livestock which collapsed the livestock market. However, there were some remaining reserves of food from previous years, and grain was being produced on the irrigated farms between the two Niles.

The UN recognised that the crisis could only be managed with a flexible response and a mix of interventions tailored to the needs of the different groups of people in the afflicted areas. The overall objective was to re-energise food markets in rural villages and provide income support to draw locally-available grain into those markets. A programme was developed to demonstrate effective counter-famine measures and strengthen regional and local government institutions that manage emergencies.

To meet those objectives, a portfolio of projects was developed including market interventions, food loans, price supports for livestock, and accelerating development projects in drought-affected areas. By using its development expertise, UNDP was able to address the underlying causes of the food crisis and utilise its existing resources.

Relief programmes such as food-for-work, assistance for vulnerable groups and medical support were also planned, but were designed to be carried out by NGOs or other UN agencies, such as UNICEF.

## **B. OVERVIEW OF HOW DEVELOPMENT INPUTS CAN BE INTEGRATED INTO DISASTER MITIGATION EFFORTS**

Many experts believe that prevention, or the elimination of those factors that promote vulnerabilities, is synonymous with development. Prevention and preparedness activities are usually divided into structural and non-structural measures (see definitions in Section I.C. above). A wide variety of both types of mitigation measures have been carried out in different places, some more relevant to long-term development than others. Examples of these activities include planning measures, such as modifying vulnerability through protective techniques or site improvements; reduction of building or infrastructure losses by

strengthening buildings or structures; the use of regulations or land use controls (zoning or resettlement) to guide development away from hazardous areas; or expansion of infrastructure systems, also to guide development towards safer areas (Lohman, 1989). The relationship between some development activities and the types of disasters they can mitigate is shown in Table 3.

A variety of ways exist to integrate individual development inputs into an overall framework which contributes to wide-scale mitigation. Figure 3 illustrates how various activities can work to complement each other to decrease the risk of flooding in vulnerable areas.

Examples from the Ecuador case study show how regional agencies can incorporate mitigation measures into area development efforts. The Programme for the Development of the Southern Region of Ecuador (PREDESUR) was established to implement the plan for the use of bi-national watersheds covering both Ecuador and Peru. PREDESUR has a well-defined integrated development plan for the region. Two natural disasters affecting the area are the advance of the desert along the border strip with Peru in the province of El Oro and the periodic droughts affecting the heavily eroded land of Loja province. As part of its development plan, PREDESUR attempts to mitigate the consequences of these disasters by tapping resources to provide irrigation water and by reforestation, thus integrating socio-economic development aims with natural disaster mitigation.

The Commission for Studies for the Development of the Guayas River Basin and the Peninsula of Santa Elena (CEDEGE) was founded in 1965 to conduct research, studies and projects for the integrated development of this region. Among its explicit functions are reduction of the vulnerability of agricultural production and physical infrastructure to flooding. In 1988, it took charge of studies and projects to control flooding of the lower Guayas basin, in consultation with the Ecuadoran Institute of Water Resources (INERHI). Earlier, it completed the studies for conveyance of Daule River waters to the Santa Elena peninsula, a very arid zone with saline soil and scant rainfall, in order to provide agricultural irrigation water and drinking water supply.

### C. NEEDS AND PRIORITIES

The main requirements for integrating development inputs into disaster mitigation efforts depend on the type of disaster being faced. However, coordination between sectors is of primary importance in all types, to ensure that inputs are mutually supportive and that there is no unnecessary duplication of efforts. Coordination should ensure that responsibility for high-priority activities is accepted by the indicated agency, and that these activities are indeed carried out. Mechanisms for monitoring and evaluation should be as fundamental a part of mitigation efforts as for any development endeavour.

TABLE 3:

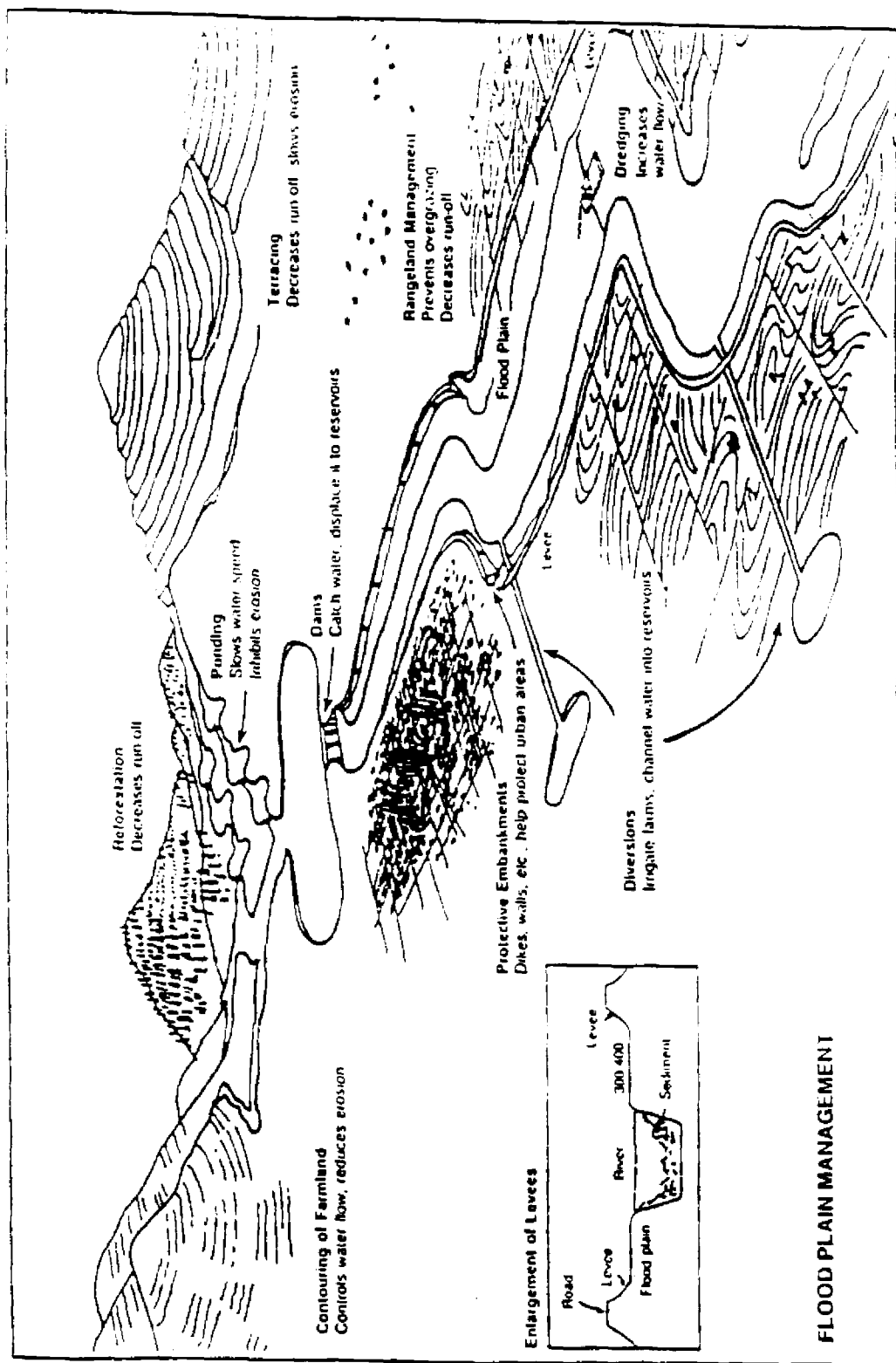
## EXAMPLES OF HOW DEVELOPMENT ACTIVITIES CAN MITIGATE DISASTERS

<u>SECTOR</u>	<u>DEVELOPMENT ACTIVITY</u>	<u>CAN HELP MITIGATE THE EFFECTS OF:</u>
Employment	Job creation, small-scale enterprise development	Any disaster where increased income is necessary for mitigation
Agriculture, Forestry and Fisheries	Reforestation	Flooding, siltation, erosion, drought, famine
	Counter-desertification measures	Famine, drought, erosion
	Food security, storage	Food shortage, drought, famine
	Resistant crops, improved cropping patterns	Flooding, pest infestation, drought, famine, erosion
Health	Nutrition programmes	Food shortage, drought, famine
Natural Resources	Water harvesting	Drought
Transportation, Communications	Public works	Flooding, drought
Education	Primary education	Any disaster in which public awareness is important
Development Issues, Policies and Planning	Development administration	Any disaster requiring efficient response of local authorities
	Regional, national or local planning with integral hazard and vulnerability analyses	All disasters in varying degrees
	Urban development where appropriate building and zoning codes are adopted and enforced	Earthquake, flooding, severe storm
	Institution-building of offices of disaster preparedness and training in disaster management	All types
Other	Housing and other construction programmes that include hazard resistant techniques, components	Typhoon, cyclone, hurricane, earthquake

Source: Adapted from Management Systems International, 1990

Another need is for prioritisation of the inputs that will be provided. In mitigation, priorities should be determined by looking at a variety of factors such as: which are the highest risk areas?; which inputs would have the greatest impact?; which could be implemented most quickly and at lowest cost? The most obvious way to prioritise is to have a national mitigation strategy (usually encompassing preparedness as well) that spells out the national objectives, the basic framework for achieving them, and who has responsibility for certain activities. Within the context of this strategy, individual government agencies should be able to identify where proposed actions would fit, and determine whether they are appropriate and cost-effective.

**FIGURE 3: COMPLEMENTARY MITIGATION ACTIVITIES IN FLOODPLAINS**



Source: INTERTECT, Disasters and Development: A Training Module, Peace Corps, 1984, p. 150.