

# Disasters and Development: Part I. Relationships between Disasters and Development

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## Abstract

This module introduces a paradigm for understanding the disaster/ development interface. Specifically, the module asserts that disasters and development are linked closely in that disasters can both destroy development initiatives and create development opportunities, and that development schemes can both increase and decrease vulnerability. The module consists of four parts:

*Part One* introduces these concepts and discusses how disasters can vary from one type of hazard to another, as well as from one type of economic condition to another.

*Part Two* develops the paradigm in depth, and provides case examples to amplify the points made in the text.

*Part Three* describes and discusses different methods and tools for analyzing decisions for potential investment of resources, and should enhance the reader's capacity to analyze the mitigational benefits of development alternatives in both the pre- and post-disaster context.

*Part Four* conceptualizes the role of UN agencies, NGOs, and the affected communities in promoting development based on the concepts discussed in the module.

This training module, *Disasters and Development*, initially was designed to introduce this aspect of disaster management to an audience of UN organization professionals who form disaster management teams, as well as to government counterpart agencies, non-governmental organizations (NGOs), and donors. The educational process has been designed to increase the audience's awareness of the nature and management of disasters, in order to lead to better performance in disaster preparedness and response.

The content has been written by experts in the field of disaster management and in general follows the UNDP/UNDRO *Disaster Management Manual* and its principles, procedures, and terminology.

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The self-study learner is invited to use this text as a workbook. In addition to note-taking in the margins, you will be provided with opportunities to stop and examine your learning along the way through questions included in the text. Write down your answers to these questions before proceeding in order to ensure that you have captured key points.

## Content Outline

### Introduction

#### Part 1: Relationships between Disasters and Development

- Introduction
- Definitions
- How disaster effects can vary from one type of hazard to another
- How vulnerability varies between and within countries
- Newly industrializing economies
- Rural/agricultural economies
- Small island economies
- Highly stressed economies
- Case Studies*
- Summary

#### Part 2: Understanding and Exploiting Disaster/Development Linkages

- The impact of disasters on development programs
- Loss of resources
- Shifting resources
- Impact on investment climate
- Impact on the non-formal sector
- Case Study*
- Development programs can increase vulnerability
- Case Study*
- Development programs can decrease vulnerability
- Case Study*
- Disasters as opportunities for development initiatives
- Case Study*
- Summary

#### PART 3: Assessing the Trade-offs in Investing in Vulnerability Reduction

- Will the losses occur?
- Pay now or pay later?
- Assigning values to costs and benefits
- Judging the effectiveness of mitigation packages
- Case Study*
- Summary

#### PART 4: Forging the Links between Disasters and Development

- The UN and the NGO role
- Building links between disasters and development—the community's role
- Summary

## Part 1: Relationships Between Disaster and Development

### Learning Objectives

This part of the module is designed to help to enhance your understanding of:

1. The conceptual relationship between disasters and development,
2. The terms frequently used to discuss these concepts, and
3. How vulnerability to hazards can vary.

### Introduction

This training module provides a conceptualization of the relationship between disasters and development. This model has been growing in the development community over the last decade, and is a major philosophical conclusion of the United Nations Disaster Management Training Programme.

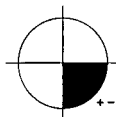
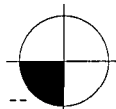
Rarely a week goes by when a major disaster is not reported in the public media. A disaster may wipe out years of development programming, slow the course of improvement in developing world countries that already are behind, and may waste precious resources.

Generally, the cause and effect relationship between disasters and social and economic development has been ignored. Ministries of Planning and Finance and other development planners did not concern themselves with disasters. Development planners hoped that disasters would not occur and, if they did occur, they felt that disasters were handled most effectively by relief from donor countries and relief organizations. Development programs were not assessed in the context of disasters. The effect of the disaster on the development program and whether the development programs increased the likelihood of a disaster or increased the potential damaging effects of a catastrophic event (actualization of a hazard) were not considered.

Disasters were seen in the context of emergency response—not as a part of long-term development programming. When a disaster did occur, the response was directed towards meeting emergency needs and cleaning up. Communities under disaster distress were seen as unlikely places to institute development. The post-disaster environment was seen as too turbulent to promote institutional changes aimed at promoting long-term development.

The growing body of knowledge on the relationships between disasters and development indicates four basic themes (Figure 1). These basic themes include:

1. Disasters set back development programming, destroying years of development initiatives—Infrastructure improvement (e.g., transport and utility systems) is destroyed by a flood.
2. Rebuilding after a disaster provides significant opportunities to initiate development programs—A self-help housing program to rebuild housing destroyed by an earthquake teaches new skills, strengthens community pride and leadership, and retains development dollars that



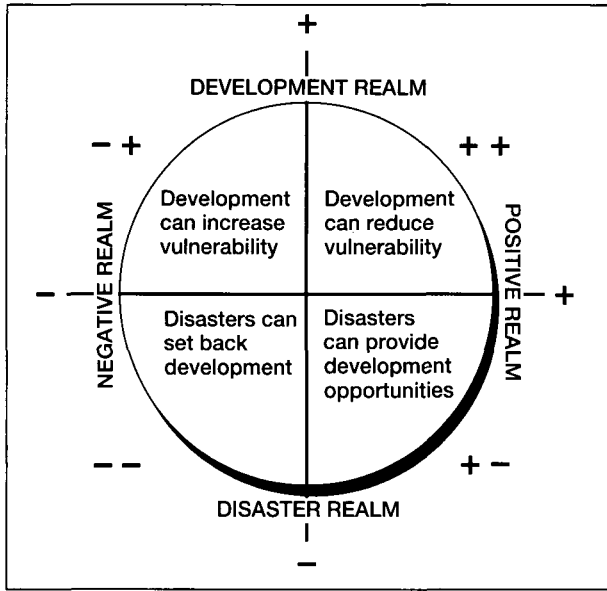
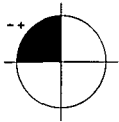


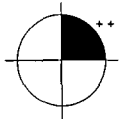
Figure 1—Four realms of disaster and development

otherwise would be exported to large construction companies.

3. Development programs can increase an area's susceptibility to disasters—A major increase in livestock development leads to overgrazing, which contributes to desertification and increases vulnerability to famine.



4. Development programs can be designed to decrease the susceptibility to disasters and their negative consequences—Housing projects constructed under building codes designed to withstand high winds result in less destruction during the next tropical storm.



Decision-makers who ignore the relationships between disasters and development fail the people who place their trust in them. Around the world, forward thinking Ministries of Planning and Finance, with the support of officials of the United Nations and Non-Governmental Organizations (NGOs), are assessing development projects in the context of disaster mitigation, and are designing disaster recovery programs with long-term development needs in mind.

Development requires institutional and structural transformations of societies to speed up economic growth, reduce levels of inequality, and eradicate absolute poverty. Over time, the effects of disasters can decrease a country's long-term potential for sustained development, causing governments to modify their economic development priorities and programs.

At the same time, disasters often provide opportunities for development. They can encourage the favor for change, and create a rationale to establish development programs such as job training, housing construction, and land reform. However, poor management of the relief and rehabilitation responses may have severe negative implications

Type of event	Deaths	Cost (US \$)
Floods and wind storms	6,054	1,896
Drought, hail, and cold storms	0	163
Eruptions and earthquakes	33,500	6,453
<b>Total</b>	<b>39,554</b>	<b>8,512</b>

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Table 1—Losses associated with disasters caused by natural events (cost in USD billion)

for development for years to come, and even may increase the vulnerability of the society to future hazards.

The following discussion highlights the importance of considering the likely potential, risks, and consequences of disasters as part of development program planning. It emphasizes the opportunities for preventing and mitigating damage and disruption that arise when disaster considerations are integrated into project planning for development. The module underlines the need to consider emergency responses in the context of development, and the integration of development considerations into emergency response planning. The discussion should increase your understanding of development-disaster linkages, broaden your view of intervention possibilities, provide examples of how development planners assess the costs and benefits of these types of programs, and identify negative and positive examples of putting these ideas into practice.

**Definitions**

This discussion concerns the relationship of several concepts (e.g., disasters, development, adjustment, mitigation, and reconstruction). Several of these concepts already may be familiar to the reader. However, readers may wish to review definitions of the less common terms, particularly those associated with disaster planning.

An event occurs when the hazard is realized or becomes manifest. Thus, it means an occurrence that has the potential to negatively affect living beings and/or their environment.

*Variations in Effects of Events*

Events vary considerably in the scale of their impact, the geographical scope, and the duration of their effects. Consider briefly the range of hazards prevalent in your area: these may include flooding, landslides, tropical storms, earthquakes, drought, urban fires, civil conflict, and/or technological and industrial hazards. Each of these has a different potential for disruption, depending on the intensity of the impact of the precipitating and secondary events, and its geographic relation to populations, economic assets of the society affected, and the type of economic activity in progress.

Several conclusions can be drawn by analyzing information about the type and extent of social and economic losses caused by some of the recent major disasters. The Economic Commission for Latin America and the Caribbean (ECLAC) has focused on evaluations of the effects of several disasters in their region. Several important lessons can be drawn that relate not only to Latin America and the Caribbean, but to other regions as well (Table 1).

Losses & Effects	Earthquakes		Hurricanes	Floods/Droughts
	Mexico City 1985 <sup>b</sup>	Ecuador 1987 <sup>c</sup>	David & Frederick 1979 <sup>d</sup>	El Niño 1982-1983 <sup>e</sup>
<b>Total Losses</b>	4,337	1,001	1,057	3,970
<b>Direct Losses</b>	3,793	186	842	1,311
Capital stock	3,777	184	506	1,060
Inventories	16	2	230	251
Production	0	0	106	0
<b>Indirect Losses</b>	544	815	215	2,659
Production	154	704	185	1,284
Services	390	111	30	1,375
<b>Secondary Effects</b>	4,050	794	606	0
Public sector finances	1,899	397	303	0
Increased expenditures	2,025	55	264	0
Decrease in revenues	(126) <sup>f</sup>	342	39	0
<b>External Sector</b>	8,579	781	464	621
Reduction of exports	1,650	635	167	547
Increase in imports	9075	155	296	74
Disaster-related income	(2,146) <sup>f</sup>	(9) <sup>f</sup>	0	0

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**Table 2**—Adapted from J. Roberto Jovel, "Los Efectos Economicos y Sociales de los Desastres Naturales en America Latina y el Caribe," ECLAC 1989

<sup>a</sup> All figures adjusted for inflation through 1987 to enhance comparability.

<sup>b</sup> Secondary effects estimated for 1986 to 1987, and projected thereafter through 1990.

<sup>c</sup> Includes damages caused by ensuing floods and mudflows which represent a very high percentage of the total.

<sup>d</sup> Damages refer to the Dominican Republic only, even though other countries were affected as well.

<sup>e</sup> Damages refer to Bolivia, Ecuador and Peru, although other countries were affected as well.

<sup>f</sup> Figures in parentheses refer to income gained.

Damage	*\$44,000,000,000
Insurance payments	*\$30,000,000,000
Replacement value of taxable property	*\$800,000,000,000
<b>Buildings</b>	
Uninhabitable	25,000
Unsafe to occupy	7,000
Restricted use	22,000
People rendered homeless	22,000
<b>Hospitals</b>	
closed	9
Beds lost	2,500
Bridges collapsed	9

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**Table 3**—Costs associated with the 1994 Northridge earthquake (\* = US dollars)<sup>7</sup>

By analyzing the phenomena that caused the natural disaster (Table 2), ECLAC has concluded that:

1. Natural events of meteorological origins, such as floods, tropical storms, and droughts, generally affect a larger geographical area than do geological events. This conclusion is substantiated by comparing the effects of the El Niño current in 1982–1983 with recent earthquakes. El Niño affected the entire Pacific Coast of South America (from Colombia to Chile). In comparison, recent earthquakes have affected urban centers and other smaller geographical areas.
2. Due to population density, the number of victims resulting from geological natural disasters (i.e., earthquakes), is

greater than is the number resulting from meteorological phenomena. For example, the Guatemala earthquake of 1976 caused 22,000 deaths, while Hurricane Joan of 1988 caused only a few deaths in Nicaragua.

3. Losses of capital stock resulting from earthquakes, affecting both the social and physical infrastructure, tend to be much greater than are those resulting from floods. The estimated loss of capital stock from the 1985 earthquake in Mexico, for example, was placed at US\$3.8 billion (the highest figure considered reliable). By comparison, El Niño caused loss of capital stock one-third this amount in Bolivia, Ecuador, and Peru in 1982–1983.
4. Unlike losses of capital stock and production, other indirect losses generally are much greater in the case of floods and droughts. For example, El Niño caused indirect loss of \$2.7 billion, whereas the Mexican earthquake caused indirect loss of only one fifth of that amount.
5. When a geological phenomenon causes floods or mudslides, production losses and other indirect losses are much greater than in cases of other geological disasters. The 1987 earthquake in Ecuador is a clear example of this conclusion: Indirect losses comprised 82% of the total losses.

Recent events raise questions about the second conclusion above. Hurricane Mitch (1989) resulted in >20,000 dead or missing. This human damage unrelated to mudslides from the massive rain combined with deforestation.



An estimated 500,000 persons were rendered homeless.

The following effects are common to all types of disasters resulting from natural events:

1. If there are a considerable number of victims, the limited qualified human resources in the affected countries may be diminished. Such was the case in Guatemala after the 1986 earthquake, which directly affected 19% of the total population.
2. Often, there is a significant decrease in the availability of housing and in the infrastructure related to health and education. This may exacerbate shortages that existed prior to the disaster. The San Salvador earthquake of 1986 left some 50,000 people without housing or with seriously damaged housing, while 75% of the health-related infrastructure was totally destroyed.
3. Often, there is a temporary decrease of income among low wage earners lasting up to several months while there is a simultaneous increase in the rates of under-employment and unemployment.
4. Usually, there are temporary breakdowns of services providing water, sanitation, electricity, communication, and transportation.
5. Finally, temporary shortages of food and raw materials for agricultural and industrial production are common effects of natural disasters.

The ECLAC has estimated that in the 15 years between 1962 and 1976, Central American countries were affected by different types of natural disasters that caused 39,600 deaths as well as loss in capital stock, production, and material goods amounting to some \$8.5 billion (in 1987 dollars). When the above figures are combined with those of the mentioned case studies, for the disasters for that there is only partial information available, it can be concluded that Latin America and the Caribbean have sustained annual losses of over 6,000 lives and over \$1.5 billion (in 1987 dollars) due to natural disasters. Two case studies [to be published in next issue of PDM] that illustrate these differential effects of disasters use the examples of Hurricane David and Frederick in the Dominican Republic, and the Phenomenon of El Niño of 1982–1983 in South America (Table 2).

More recently, more than 800,000 persons were killed in Rwanda during the civil war and genocide (1993); the floods in China consumed >300,000 lives; >400,000 persons were killed in Bangladesh; >25,000 deaths resulted from the 1988 earthquake in Armenia; and >5,000 persons died from the Great Hanshin-Awaji earthquake in Japan in 1995.

The Northridge Earthquake of 1994 that struck the heavily populated Los Angeles area was the costliest disaster in U.S.A. history. The extent of the damage created by the 15-second quake with a magnitude of 6.7 (Mw) is summarized in Table 3. It created US\$44 billion in damage but caused only 51 deaths. More than 9,000 persons were injured. In comparison, the 1989 earthquake of the same magnitude in Armenia resulted in more than 25,000 deaths.

#### *Variations in Vulnerability*

Development is, in part, a process of investment and capitalization of economies over many year periods. There are widely differing types of economies, each subject to different

processes and patterns of investment, institutional change, and structural re-organization. Each type will exhibit a different sensitivity to disasters of short and long duration, and the impacts from various kinds of major disasters and hazard agents.

For analytical purposes, consider four commonly defined categories of economy as examples. It should be emphasized that these economies represent generalized stages of development, and overlap is inevitable. The main purpose here is to focus on broad differential effects. The four types of economies are:

1. *Newly Industrializing Economies*—highly urbanized, with high-density urban populations.
2. *Rural/Agricultural Economies*—characteristic of less developed countries—structurally adjusting, resilient, decentralized.
3. *Small Island Economies*—single crop or single commodity economies.
4. *Highly Stressed Economies*—highly vulnerable and can slip into catastrophic decline quickly. The situation often is caused or exacerbated by civil war or related forms of internal conflict or disruption.

Using these four categories, an overview can begin to be developed of how the various types of economies differ in their overall vulnerability to each type of shock.

#### *1. Newly industrializing economies*

The economies of newly industrializing areas are fairly indifferent to agricultural damage. They usually can withstand losses in this sector. For example, there are sufficient financial reserves available to purchase food on global commercial markets. There also may be more short-term, alternative sources of employment for agricultural workers. On the other hand, these economies may be vulnerable to damage to infrastructure (e.g., power systems, transport, communications, and public utilities), by earthquake and tropical storms.

#### *2. Rural/agricultural economies*

These economies, which often characterize less developed countries, are relatively immune to disasters of sudden onset and short duration. However, they are susceptible to disasters that have extensive rural impact; especially drought, severe pest damage, and civil conflict.

#### *3. Small island economies*

Island economies often are highly dependent on a few crop types or commodities. They are often particularly susceptible to tropical storms (with crop destruction and damage to ports), drought, and volcanic eruptions. Two hurricanes in Dominica in the late 1970s caused direct, indirect, and secondary losses of US\$1,700 million. In Jamaica in 1988, the Gross Domestic Product fell an estimated 2% after Hurricane Gilbert, as compared with a projected growth for that year of 5%. It has been estimated that 80% of Honduras's production capacity was lost following Hurricane Mitch.

#### *4. Highly stressed economies*

Generally, economies under exceptional stress and civil

conflict are particularly vulnerable to drought and widespread floods. Almost any disaster-related shock will have a destabilizing impact on these economies.

Disasters also can destabilize other processes that complement or impede development activity, most notably, structural adjustment activity. The requirements for immediate recovery and reconstruction after a sudden disaster can reverse and disrupt this adjustment process, while further compounding its negative impacts. For example, depending on the particular conditions of the disaster, public expenditure requirements may increase substantially, while at the same time, employment and output fall and investment and savings decline. The outcome will be a further decline in the prospects for future development. These

concepts are developed further in the Conceptual Framework for Disasters provided in the Guidelines.<sup>1</sup>

### Summary

The relationship between disasters and development can be summed up with the following four concepts: 1) Development can increase vulnerability; 2) Development can reduce vulnerability; 3) Disasters can set back development; and 4) Disasters can provide development opportunities. In addition, the effects of an event vary with the hazard type causing the disaster. Lastly, vulnerability varies between different societies and economies. Four basic types of economies analyzed are: 1) Newly industrializing economies; 2) Rural/agricultural economies; 3) Small island economies; and 4) Highly stressed economies.

### Reference

1. Health Disaster Management: Guidelines for Evaluation and Research in the Utstein Style to be published as a Supplement to Volume 17 & 18 of *Prehospital and Disaster Medicine*.

### Self-Assessment Test

#### Multiple Choice

Circle letter of correct answers

1. In order for a disaster to occur:
  - a. A hazard must become an event.
  - b. More than 20 persons must be injured or killed.
  - c. Only transient impairment of basic societal functions occurs.
  - d. Events of equal severity produce similar amounts of damage.
  - e. The society impacted must be highly developed.
2. Development of a society:
  - a. Generally decreases its risk for the occurrence of a disaster.
  - b. May increase the vulnerability of the society to a specific type of event.
  - c. Is obliterated by the occurrence of a disaster.
  - d. Requires institutional and structural transformations.
  - e. Is independent of disasters.
3. Which of the following effects seem common to most disasters regardless of type of precipitating event.
  - a. Available human and material resources become diminished.
  - b. Basic societal functions may become impaired or dysfunctional.
  - c. Incomes of many of the members of the affected population may cease.
  - d. Housing and shelter needs increase profoundly.
  - e. Secondary events may cause more damage than did the precipitating event.
  - f. All of the above.

### Mix and Match the statements in the right column with the most likely type of economy on the left

- |   |   |
|---|---|
| <input type="checkbox"/> 4. Newly Industrializing | a. Any event will destabilize                                 |
| <input type="checkbox"/> 5. Rural/Agricultural    | b. Relatively indifferent to agricultural damage              |
| <input type="checkbox"/> 6. Small Island          | c. Relatively immune to sudden-onset events                   |
| <input type="checkbox"/> 7. Highly Stressed       | d. Dependent upon a few crops                                 |
|   | e. Particularly vulnerable to tropical storms                 |
|   | f. Particularly vulnerable to drought and floods              |
|   | g. Financial reserves minimize disruption                     |
|   | h. Highly susceptible to structural and infrastructure damage |

True (T) or False (F)

8. Disasters may result in stimulating more rapid development.
9. Indirect costs from a disaster may exceed direct costs.
10. Disasters may increase expenditure requirements and also increase employment opportunities and output.
11. Recovery from a disaster includes development.
12. Lives lost from an event relate directly to population density.

**Answer Key**

1. a 2. b,d 3. f 4. b,g,h 5. c 6. d,e 7. a,f 8. T 9. T 10. F 11. F 12. F

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