Disasters and Development: Part 2: Understanding and Exploiting Disaster-Development Linkages

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Abstract

Disasters can impede the effectiveness of development resource allocation. The damage sustained from an event can be classified into four categories: (1) Loss of resources; (2) Interruption of programs and switching of crucial resources to other, shorter-term needs; (3) Negative impacts upon investment climates; and/or (4) Disruption of the non-formal sector (local businesses). Disasters have a particularly destructive economic impact in areas in which there are few alternatives for assets that are destroyed or in areas in which the resources already are at critical levels. Development processes can both increase and/or decrease the vulnerability of a society to hazards. There are clearly established linkages between poverty, marginalization, over-population, and vulnerability. To a large extent, vulnerability derives from poverty. The poor are more likely to live in vulnerable areas (slopes prone to landslides, flood plains, marginal agricultural land), have difficulty accessing education and information, have fewer assets to invest in resources to reduce vulnerability, and are more prone to become malnourished and have chronic illnesses that predispose them to injury and death. Development may be associated with the production of new hazards accepted by a society because the perceived benefits of the development project far exceed the relative risk associated with the project. Therefore, risk assessments must be part of any program planning and evaluation. Training and education are of critical importance in preventing increased vulnerability as a result of development strategies.

Development also can progress in a manner that will result in mitigation of the impacts of an event on a given society (increase absorbing capacity and/or buffering capacity, elimination of hazards or the risk of them producing a disaster). Such mitigation measures can be either structural or non-structural. There exists a wide range of options for incorporating mitigation measures in development projects.

Two case studies provide exercises that incorporate the concepts provided in this discussion: (1) The 1985 earthquake in Mexico City; and (2) Agricultural development in northern Sudan.

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Objectives

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

1. How disasters can impact development programs.
2. How development programs can increase vulnerability.
3. How development programs can be designed to decrease vulnerability.
4. How disaster recovery programs can be designed to promote development at the same time that they decrease vulnerability.

Impact of Disasters on Development Programs

Disasters can impede the effectiveness of development resource allocation. The damage occurs in many ways, and the impacts can be as complex as the economy itself. However, a broad picture of the mechanisms of disruption can be gained by reviewing four categories of impact:

1. Loss of resources;
2. Interruption of programs and switching of crucial resources to other, shorter-term needs;
3. The negative impacts on investment climates; and/or
4. Disruption of the non-formal sector.

1. Loss of Resources

Development resources are lost when a disaster wipes out the products of previous investment. The primary loss of development resources occurs from damage to capital stock and inventory. Initially, this is the most visible effect of disasters caused by sudden-onset. Tropical storms can destroy factories, fishing ports, power systems, and telecommunications. Earthquakes damage and destroy buildings, transport and logistics capabilities, and public utilities. Disasters have a particularly destructive economic impact in areas in which there are very few alternatives for assets that are destroyed or in areas in which those specific assets are critical.

There is a further loss of development resources from reduction in the production of goods and provision of services. This results from direct disruption by the disaster and its immediate local effects, and subsequently, from the increased costs of goods and services that then result. Income losses resulting from lost production have a depressing impact on consumer ability to purchase goods and services. Lost productivity also may result in loss of export markets; for example, a coconut plantation in India lost to cyclone damage will take five years to regenerate during which time other coconut producing countries can increase their respective market share.

2. Shifting Resources

Development activity also can be impacted negatively by interrupting on-going programs. This allows a shift in resources from long-term programs to highly visible, short-term recovery and emergency response programs.

The secondary effects of a disaster also disrupt the development process. These secondary effects of direct economic impact include inflation, balance of payment problems, increase in fiscal expenditures, and decreases in monetary reserves. An increase in the country's debt means that as the debt service burden increases, countries have fewer resources available to invest in productive enterprises. The outcome usually is the slowing of economic growth, delays to development programs, cancellation of programs, and disincentives to new investment.

3. Impact on Investment Climate

Repeated disasters, in particular, have a negative impact on the incentive for further investment. A climate of stability and certainty is required to encourage investors. At the individual level, repeated losses from hazardous events can discourage creative investment. Under conditions of uncertainty, both foreign and domestic investors generally will be very cautious about supporting entrepreneurial activity.

4. Impact on Non-formal Sector

Disasters have special negative impacts on the non-formal sector. The costs of disasters often are underestimated because disruption in this part of the economy usually is not taken into account. In many societies, the non-formal economy, while not usually included in national economic statistics, can involve a substantial portion of the total population. The non-formal sector is vulnerable especially to housing damage, since houses often serve as sites for business activity. Once local business is disrupted, there will be indirect costs from lost employment and income. Small business in this sector, may be especially sensitive to price increases. In addition, relief efforts can inhibit recovery in this sector. For example, import of relief items can create disincentives to small producers, particularly in the agricultural, personal, and household goods sectors.

Development Programs Can Increase Vulnerability

Underdevelopment predisposes a population to the adverse consequences of natural and other hazards. At the same time, however, the development process, may increase the vulnerability of the society to disasters. This section reviews the variety of forces that shapes this relationship between vulnerability and the character of development activity.

There is a clearly established linkage between poverty, marginalization, over-population, and vulnerability. To a large extent, vulnerability derives from poverty. Poor people are more likely to live in vulnerable areas; for example, on slopes vulnerable to landslides; in flood-prone areas; or on marginal agricultural land. Poorer countries, generally, are more likely to have a poor building stock, often as a result of inadequate resources to enforce appropriate building codes as well as a lack of public awareness and education.

Lack of access to education and information often has wider implications for vulnerability—people simply may be unaware of the options open to them for vulnerability reduction. Poor people have far fewer assets to invest in resources that may reduce their vulnerability, and they may be unwilling to make any significant investment without the assurance of clear and obvious benefits. Poor people are less likely to be in a position to organize collectively to reduce risks, partially because poorer groups usually have a higher proportion of women, young children, elderly people, and the sick and disabled. Furthermore, after a disaster, the effects of malnutrition and chronic illness place the affected people at additional risk.

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Although, in aggregate terms, development usually will contribute to a reduction in vulnerability to natural disasters, development activity within an area may increase certain types of vulnerability. Examples include:

1. Urban development often leads to an influx of relatively low-income groups, with large-scale settlements on marginal land or in high density, poor quality housing. Buildings may be sited on earthquake faults, in flash-flood zones, or on slopes prone to landslides.
2. Marine and coastal zone development leads to population concentrations exposed to possible storm-surge, high winds, flash-flood, and landslide risks. Tourist development can increase potential vulnerability when low lying beach areas are targets for infrastructure and capital investments. Tsunamis and tropical storms can destroy these improvements as well as place tourists and workers at increased risk for death or injury.
3. Transport construction and poorly managed forestry programs may lead to deforestation and increased risks for landslides.
4. Water resource management projects, including dams and irrigation schemes, also increase risks to large populations, either by displacement to more hazardous areas, by increased risks for severe flooding, or by risks from dam failure.
5. Investment in poorly controlled, hazardous industries may lead to concentrations of population around the plant, increases in air and water pollution, and exposure to hazards from both chronic and catastrophic releases of toxic materials.
6. Livestock development projects can lead to severe loss of vegetation cover and conditions of near-desertification around points such as wells.
7. Agricultural projects promoting cash crops may reduce production of staple foods.

Each of these examples illustrates the importance of including risk assessment as part of program planning and evaluation, and highlights the critical importance of training and education in these areas.

Development Programs Can Decrease Vulnerability

The term *mitigation* increasingly is applied to measures that reduce economic losses, as well as those that reduce the numbers of persons killed or injured. *Structural mitigation* includes measures to reduce the economic and social impact of hazard agents and construction programs, especially dams, windbreaks, terracing, and hazard resistant buildings. *Non-structural mitigation* most commonly is used to refer to policies and practices, including land-use policies, zoning, crop diversification, building codes, and procedures for forecasting and warning. In a broader context, non-structural mitigation also can include education, awareness, environmental understanding, community organization, and empowerment strategies.

Mitigation is most effective as part of a medium- to long-term development program that incorporates hazard-reduction measures into regular investment projects. Under these conditions, risks can be assessed analytically and explicitly in the context of national planning and investment program reviews. The cost-effectiveness of specific emergency preparedness measures and hazard reduction activities can be assessed. There are opportunities to build links between government and international organizations involved in relief and recovery, and to provide opportunities for investment institutions to help governments gain access to new developments in hazard-reduction technologies. In regular investment project design and sector loans, attention can be given to early warning systems and other elements of emergency preparedness through financial or technical assistance.

These uses of development programs to decrease vulnerability increasingly will be incorporated into every level of program and project preparation and review within the United Nations Development Program (UNDP) country programming and other financial and technical assistance projects. Structured review procedures will require that the disaster implications of new projects be explicitly taken into consideration.

There is a wide range of options for incorporating mitigation measures into regular development programs. Each of the following examples suggests ways for protecting populations and critical economic assets against hazards and for reducing the overall impact of a disaster.

1. Strengthening of urban utility systems and industrial support infrastructure is a common aim of development projects. This is achieved through a variety of external inputs, including loans, technical assistance, and institutional development support. So called "lifeline systems"—water, electric power, transport links, and communications—can be made more effective as well as more selectively resistant to particular hazards.
2. Investments in transport and communications also improve a country's ability to respond to and to recover from a major emergency. For example, improvements in road capacity may facilitate evacuation. Better communications may lead to improved early warning and more effective preparedness and response measures. Investments in airports and bridges can speed up the delivery of relief needed resources.

CASE STUDY 2a
The 1985 Earthquake in Mexico City

An earthquake of extraordinary magnitude, 8.1 on the Richter scale, caused extensive damage in a densely populated sector in the center of Mexico City in September 1985. The earthquake and its aftershocks caused the deaths of more than 10,000 persons; another 30,000 suffered injuries or psychological effects, and about 150,000 were left homeless. Approximately 33,600 dwellings were destroyed

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and 65,000 more suffered considerable damage. The health sector facilities were especially hard hit, with many hospitals and clinics destroyed. Nearly one-fifth of the schools in the city were destroyed or seriously damaged. Also seriously damaged or destroyed were the water, electrical, and telecommunications systems in the central city.

The direct losses were estimated at [US]$3.8 billion. These losses included the urban infrastructure, public service facilities and their equipment, housing, health and educational facilities, communications, small industry, and businesses. The indirect losses were estimated at [US]$544 million, and included the decrease of income and the increase in the costs to small industry and businesses, communications, tourism, and the personal services sector. The total losses caused by the earthquake amounted to [US]$4.4 billion, making this disaster the most damaging in recent years in the region.

More serious than the absolute losses was the effect that the rehabilitation and reconstruction had on the macroeconomics of Mexico. The effects are especially significant considering that the total losses represented only 2.7% of the Gross Domestic Product of Mexico. However, the disaster occurred at a time when the government was applying a policy of austerity in public expenditures, the banks had limited assets to meet the increased demand for credit, and when more external restrictions were foreseen.

It was estimated that during the five years following the earthquake, the negative effect in the balance of payments reached $8.6 billion in spite of considerable income from insurance and foreign donations. It also was estimated that the fiscal deficit increased approximately $1.9 billion due to the expenses of rehabilitation and reconstruction.

The demands for reconstruction required the Mexican authorities to revise their economic policy in order to accommodate greater needs for public funding, credits, and imports. The priorities for public expenditures were reoriented to reconstruction projects leaving many of the predisaster problems of the city unattended.

Summary

The damage resulting from an event may disrupt many aspects of a society in addition to the loss of the life of many of the inhabitants of the affected area. Often, such damage is not accounted when assessments of the costs of the disaster are assessed. Development projects can increase and/or decrease the vulnerability of a society. Therefore, the risks and benefits accrued by every development project must be assessed prior to its implementation.

Question 1

Identify at least two large scale development projects that you are familiar with that have been affected by disasters:

If you are unable to identify development projects, select two strategies from the list below and answer the questions:

1. Irrigation, rural infrastructure and agricultural services for yield increases;
2. Forest resource management projects;
3. Restructuring of National Agricultural Credit Bank;
4. Integrated Rural Development Projects (IRDP)—Extension services, on-farm adaptive research and technology testing, irrigation and rural water supply, farming and fishing inputs, road rehabilitation and maintenance, training for agricultural co-ops, technical assistance and training;
5. Improvements in farm-access roads, training, and diversification of agricultural production;
6. Education planning, training capacity for specific sectors, vocational training support;
7. Strengthening of national electric power program—finance restructuring and institution development;
8. Restructuring of enterprises with export orientation;
9. Technical and marketing support for small and medium size industry;
10. Malaria control projects;
11. Strengthen urban food distribution systems and supplementary feeding programs;
12. Credit and technical assistance for small enterprises;
13. Institution building assistance to national railway authorities and ministries of transport; and
14. Transport sector adjustment and investment credit.

Answer

Question 2

Based on your experiences, identify some of the ways that these programs have been interrupted by disasters.

Answer

Question 3.

Identify a development program from your personal experience, that has increased the vulnerability of the population and describe how and why vulnerability was increased.

Answer

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CASE STUDY 2b

Agricultural Development as an Agent of Disaster in Northern Sudan *

Although they are conceived with the intention of helping boost a nation's economy, agricultural development schemes can make rural farmers more vulnerable to drought and famine. Such was the case in northern Sudan prior to the 1984–1985 famine, in which the ability of 4.5 million people to gain access to the resources they needed, was severely disrupted and in some cases completely taken away.

Before the introduction of large-scale, mechanized farming, northern Sudan's rural farmers practiced cultivation and herding techniques that helped preserve the fertility and regenerative power of the land. Though they were subsistence farmers, the social order involved an intricate web of interdependence and reciprocal support, in which people helped each other through hard times by sharing their resources.

However, beginning in the mid 1970s, the rapid expansion of the mechanized agricultural sector disrupted the social order of the rural farmers, and made conservation farming techniques impossible. People were displaced from the land they had used for cultivation and grazing. Social networks were torn apart as the new market-based economy gained influence. Traditional political leaders lost a great deal of their power, and the extended families became fragmented, thus disrupting the tradition of redistributing wealth.

At the end of the 1970s, approximately 1.6 million hectares (4 million acres) were being used for mechanized farming, with the landholding of each farm averaging 400 hectares (1,000 acres). By 1982, this number had risen to 2.5 million hectares (6 million acres). By contrast, the land used for traditional cultivation remained constant throughout that time at 3.6 million hectares (9 million acres).

While the amount of traditional farmland remained constant, the population did not. More and more people relied on the land for their livelihood. The mechanized farms' concentration on cash crops raised for export left the poor increasingly dependent on the market for their food needs and more vulnerable to fluctuations in prices and job availability. In addition, the mechanized farms often cut through traditional rangelands, migratory routes, and sources of water.

The result was an emergence of a new class of poor people. This class was the product of a fragile market economy. In order to produce enough food, rural farmers had to intensify their farming techniques. They no longer were able to rotate crops, maintain weeding regimes, and leave pasture lands fallow as was necessary for regeneration. These changes hastened soil degradation, deforestation, and water source depletion.

Drought is not an infrequent occurrence in northern Sudan, yet, not every drought becomes a famine. For a famine to occur, the population must be vulnerable and unable to employ the preventive measures necessary to minimize the effects of drought. When the rains failed in the early 1980s, these new poor already were vulnerable to price increases, crop failure, loss of livestock, and lack of employment opportunities.

The mechanized farms responded to the drought by cutting back their planting, thus leading to a sharp decline in the amount of work available. By the end of 1983, an estimated 1 million people in northern Sudan already had been affected by the drought *(Office of US Foreign Disaster Assistance of the Agency for International Development statistic).*

The social and economic consequences of agricultural development have proved disastrous for the rural, poor farmers, undermining their ability to ensure themselves against drought and environmental degradation, and at the same time preventing them from attaining economic viability.

**This case study adapted from: Duffield M: From Emergency to Social Security in Sudan—Part 1: The Problem. Disasters 1990;14, No. 3.*

Self-Assessment Quiz

Multiple Choice (Choose the most correct answers)

1. Development projects may increase the vulnerability of a population by:
   a. Forcing poor persons to live on disaster-prone land
   b. Increasing the production of staple foods rather than cash crops
   c. Producing hazards that are new to an area
   d. Displace people to alternative, safer sites
   e. All of the above.

2. Development projects may be used to decrease the vulnerability of a society by:
   a. Removal of hazards
   b. Performance of risk assessments
   c. Including mitigation measures as a mandatory part of the project
   d. Defining and improving evacuation routes
   e. All of the above

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3. Disasters may result in a loss of resources from:
   a. Direct damage to stocks and inventories
   b. Impairment of exports
   c. Increased utilization by production processes
   d. Impaired ability to purchase products
   e. All of the above

4. Resources may need to shifted during recovery from a disaster due to:
   a. The impact on the investment climate
   b. Inflation
   c. Inability to attract international aid
   d. Decreased employment opportunities
   e. All of the above

True-False (Indicate whether statement is T (true) or F (false))

5._____Damage to small, local businesses often is not included in assessments of the costs of the disaster.
6._____Damage expressed as a function of the Gross Domestic Product of the affected country is an accurate assessment of the impact of a disaster on the economy.
7._____Relief activities often contribute to the continuation of development projects.
8._____Expansion of farming through the implementation of mechanization is beneficial to conservation of productive lands.
9._____Mechanization of agriculture may result in the emergency of a new class of poor.
10._____Agricultural development may foster deforestation, drought, and environmental degradation.

Answers: 1. a,b,c; 2. e; 3. a,b,d; 4. a,b,d; 5. T; 6. F; 7. F; 8. F; 9. T; 10. T

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