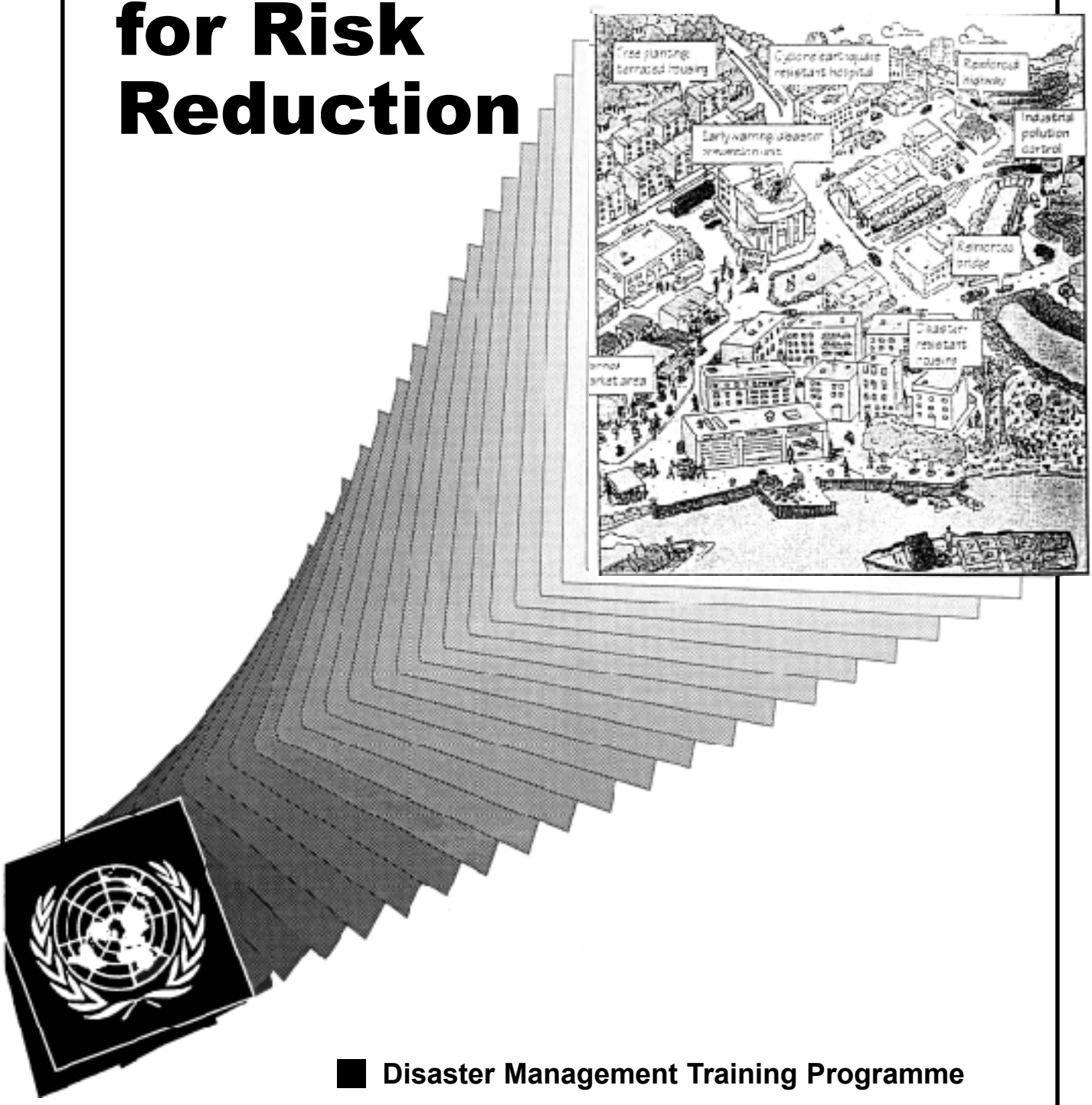
1st Edition

Building Capacities for Risk Reduction



Disaster Management Training Programme

Building capacities for risk reduction

1st Edition

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DHA

Disaster Management Training Programme **1997**

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ACKNOWLEDGEMENTS

This training module has been funded by the United Nations Department of Humanitarian Affairs. The draft for this text was reviewed by Stephen Bender of the Organization of American States, Terry Jeggle of the Secretariat of the International Decade for Natural Disaster Reduction, and Jean Parker of J. Parker & Associates.

Editorial services, including design and formatting, have been provided by InterWorks. Design consultation and desktop publishing have been provided by Artifax.

Several sections of this text are adapted from the DMTP modules *Vulnerability and Risk Assessment* and *Disaster Mitigation.* Readers who are particularly interested in these topics are encouraged to review these training modules as well.

Cover illustration: A Stop Disasters initiative of the International Decade for Natural Disaster Reduction (IDNDR) as part of the *1996 Cities at Risk Awareness Campaign*. Design: Mailyn Langfeld; illustration: Janet Petitpierre.

INTRODUCTION

Purpose and scope

This text is one of a series of training modules prepared for the UN Disaster Management Training Programme (DMTP). Since the inception of the DMTP in 1990, there has been considerable evolution in the field of disaster management. Within the UN system, more agencies are accepting an ever greater role in disaster management. The field broadened considerably as the perception of what constitutes disaster management grew to encompass crises that stem not only from natural hazards but also human-made hazards created by technological failures, environmental degradation, civil conflict and international wars. Perhaps most importantly, in terms of this module, there is also a growing realization that successful solutions to disaster management problems must be based don the capacity of local communities to prepare for, respond to, and mitigate disasters of all types. This contrasts with earlier beliefs that international responses to address disaster management issues through response mechanisms would be the essential ingredient to protecting and "rescuing" communities from calamities.

In this training module, we adopt the attitude that the first and best line of defense against disasters is the local community's knowledge and awareness of disaster reduction activities. Prior to the rise of international response to disasters in the early 1970s, national governments and local communities were the only sources for disaster management support, including all aspects of preparedness and response. As each successive major disaster brought more and more donor governments and non-governmental organizations into the process, the notion that outside resources were responsible for meeting the needs of disaster survivors increased and a sense developed that the international community would solve the problems of disasters through more efficient humanitarian response.

There is now, however, a growing awareness that this approach is not possible and creates dependency. Outsiders often are not well equipped to identify priority needs, and there are not nearly the resources or political will to support all of the needs of those affected. The pendulum must swing back to the earlier model of self-reliance and motivation, while acknowledging that the era of the "global village" can bring supportive outside concern, information, and resources.

The purpose of this training module is to describe a process of local capacity building for the purpose of risk reduction. In Part 1, we define the concepts of vulnerability, hazard, risk, and capacity building and consider how risk is affected both by the probability of occurrence of a hazard event and by the vulnerabilities of communities. In Part 2, we consider several strategies for risk reduction. In Part 3, we discuss in detail the concept of capacity building and its value in programs designed to reduce risk. Part 4, concludes with a brief section on management aspects of capacity building programs for risk

reduction. Our purpose is to highlight elements of project management which require special attention within the context of capacity building programs.

Audience

The audience for this module includes members of the development and disaster management fields who are interested in working with communities to reduce local community vulnerabilities as well as those officials having public policy responsibilities who make decisions affecting the well-being of a community; government officials, both national and local, who have disaster management responsibilities; and UN agency program officers with a disaster management component in their portfolio. The subject of this module is not related to "emergencies" but to on-going responsibilities of societies.

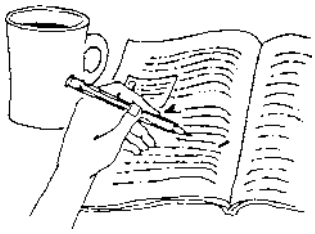
Training methods

This module is intended for both the self-study learner and the participant in a training workshop. The following training methods are planned for use in workshops and are included in the accompanying "trainer's guide".

Workshop training methods include:

- group discussions
- simulations/role plays
- supplementary handouts
- videos
- review sessions
- self-assessment exercises

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



PART 1

Hazards, vulnerability and risk[1]

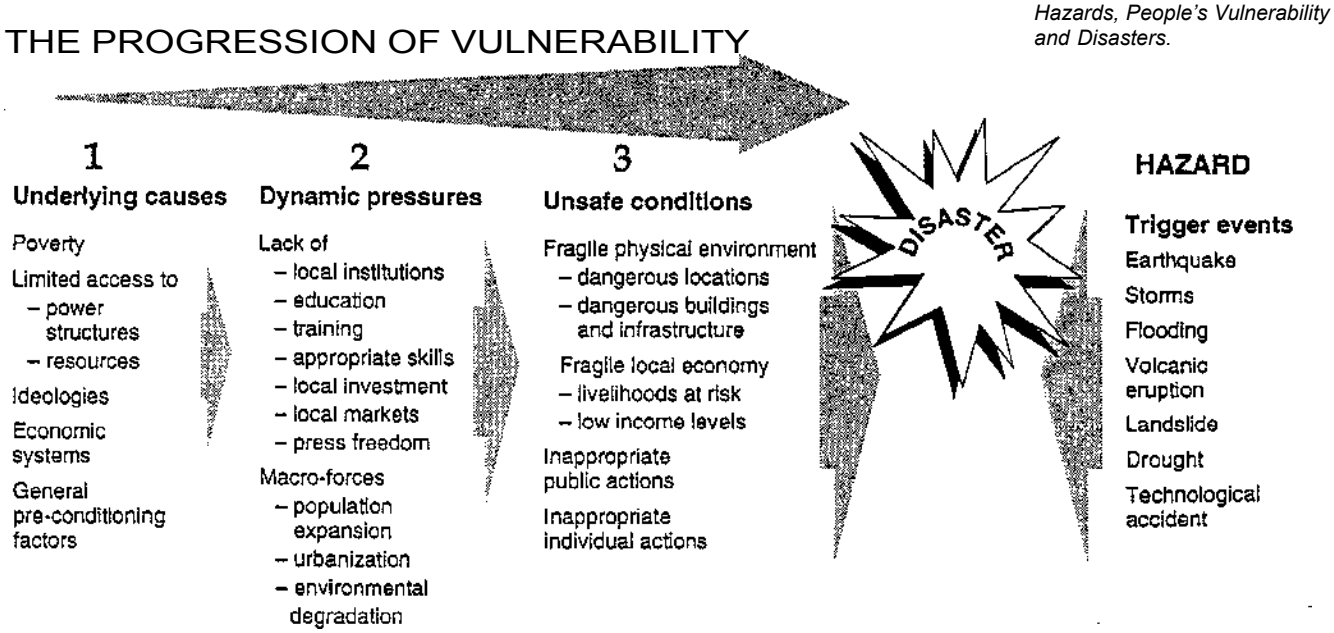
Learning Objectives

After completing this part of the module you will be able to:

- *define the terms hazard, vulnerability, risk and capacity building*
- *describe the relationship among hazards, vulnerability, risk, and capacity building*
- *describe the process of determining risk*

Disasters occur when natural hazards have an impact on human beings. Those who have more resources – both economic as well as social – often have a greater capacity to withstand the effect of a hazard than poorer members of a society. In developing countries, the root causes of vulnerability to hazards are poverty and inequitable development. Rapid population growth, urban or mass migration, inequitable patterns of land ownership, lack of education, and subsistence agriculture on marginal lands lead to vulnerable conditions such as unsafe siting of buildings and settlements, unsafe homes, deforestation, malnutrition, unemployment, underemployment, and illiteracy.
The figure below illustrates how the interface between vulnerable conditions and natural hazards can cause a disaster.

Figure 1
The Disaster Crunch Model
This material adapted from Blaikie, Cannon, Davis and Wisner, 1994. *At Risk: Natural Hazards, People's Vulnerability and Disasters.*



[1] This section is adapted from the DMTP module *Vulnerability and Risk Assessment.* Readers with an interest in this topic are encouraged to see that module directly for more information.

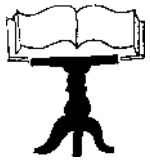
Figure 1 depicts how increasing vulnerability increases the likelihood that a disaster will occur as a result of a hazard event. Since most hazard events are difficult, if not impossible, to control, one way of reducing disaster risk is to decrease the level of vulnerability – of an individual, a community, or a country. This module is about how to enable local communities to reduce the risks they may face from potential hazard events. We focus on capacity building as the means to achieve this.

Despite an increasing vulnerability to natural disasters, many communities are not fully aware of the feasibility and efficacy of risk reduction measures. Risk reduction is often perceived as restrictive, costly and incompatible with the community's economic development goals. In order to make progress toward adoption of risk reduction practices, local and national leaders – both public officials and leaders of private industry – need to recognize the constraints and barriers they face, secure the commitment of local communities, and develop innovative solutions for working with them.

Figure 1 also illustrates how factors, such as population growth, urbanization, and changes in agricultural and construction practices, may lead to increased vulnerability. "As people move from their traditional life patterns toward modern lifestyles, which expose them to new and greater hazards, they leave behind a number of the social, familial, economic production, and moral/ethical structures and modes that helped them to cope with crises in the past" (Anderson, 1995, p. 51). Risk reduction strategies must consider traditional risk reduction techniques and build on, rather than replace them.

This part of the module considers the concepts of risk and vulnerability in relation to natural hazards. The following definitions serve as an orientation to these concepts.

VULNERABILITY
HAZARD
RISK
CAPACITY BUILDING



The concepts of vulnerability, hazard, and risk are dynamically related. Community risk depends on the probability of occurrence and the magnitude of a hazard event, and how the particular hazard connects with the community's vulnerability.

Vulnerability: The losses caused by a hazard, such as a storm or earthquake, will be proportionally much greater to more vulnerable populations – those living in poverty, with weak structures, and without adequate coping strategies. *Human vulnerability* is the relative lack of capacity of a person or community to anticipate, cope with, resist, and recover from the impact of a hazard. *Structural or physical vulnerability* is the extent to which a structure or service is likely to be damaged or disrupted by a hazard event. *Community vulnerability* exists when the *elements at risk* (defined below) are in the path or area of the hazard and susceptible to damage by it.

Hazard is defined as the potential occurrence, in a specific time period and geographic area, of a natural phenomenon that may adversely affect human life, property or activity to the extent of causing a disaster. The probability that a hazard will or will not occur, and its magnitude when it does occur also contributes to risk. Methods of predicting various hazards and the likelihood and frequency of occurrence vary widely by type of hazard.

Risk is defined differently by people in different situations. Risk as understood by a politician is different from risk to a seismologist, or to an insurance company executive, or to a family living in an earthquake zone. Risk is also different to local and national governments involved with disaster management. In this text we will consider the point of view of these local and national public policy authorities who make decisions for the well being of the community. For these policy makers, the *community elements at risk* include its structures, services, economic and social activities such as agriculture, commercial and service businesses, religious and professional associations and people. *Risk* is the expected losses to a community when a hazard event occurs, including lives lost, persons injured, property damaged and economic activities or livelihoods disrupted.

The relationship of these elements can be expressed as a simple mathematical formula which illustrates the concept that the greater the potential occurrence of a hazard and the more vulnerable a population, then the greater the risk.

Risk = Hazard × Vulnerability

Capacity Building: There are numerous measures which can improve understanding, specific abilities, or management practices among the public and government or agency officials. These measures can be used to increase capacities to reduce risk. While it is usually not possible to reduce either the probability of occurrence of a natural hazard or its magnitude when it does occur (except for floods and drought), it is often possible to reduce the threat of human-induced hazards, such as industrial accidents. In these instances, capacity building efforts can also be directed toward reducing the hazard. Therefore, capacity building to reduce either the hazard or the vulnerability will decrease community risk. This module is about capacity-building as an effective and necessary strategy for reducing community risk.

Determining risk

As noted above, risk is a function of hazard and vulnerability. It is important to know how to develop useful estimates of the degree of risk for any type of hazard in any geographic location. There are three essential components to the determination of risk, each of which should be separately quantified:

1. The *hazard occurrence probability:* the likelihood of experiencing a particular hazard in a given location or region within a specific timeframe.
2. The *elements at risk:* identifying and making an inventory of people or buildings or other elements which would be affected by the hazard if it occurred, and, where required, estimating their economic value.
3. The *vulnerability* of the elements at risk: determining the potential level of injury to people or damage that buildings or other elements would sustain if they experience a particular hazard.

Hazards[2]

A critical component of determining risk is the existence or probability of occurrence of a particular hazard. The process of **hazard assessment** is used to determine the likelihood of occurrence of a particular hazard at a particular intensity. For example, seismologists may estimate the probability of a major earthquake occurring in Mexico City within the next ten years. Hazard assessment studies are based on available scientific information, such as geological and topographical maps, climate data, aerial photographs and satellite imaging. In addition, historical records of past occurrences of hazards of varying intensities, including oral accounts from long-term community residents, are an important tool in hazard assessment.

The hazards that pose risks to human settlements are often categorized as geological, climatic, environmental, epidemic, or industrial. Virtually every community in the world could be affected by at least one of the following hazards.

Geological hazards

- earthquakes
- tsunamis
- volcanic eruptions
- landslides

Climatic hazards

- storms (including tropical cyclones)
- floods
- drought
- tornados
- blizzards
- frost

Environmental hazards

- environmental pollution
- deforestation
- desertification
- pest infestation

Industrial accidents

- nuclear
- biological
- chemical

Epidemics of all types

[2] For summaries of hazards, their causes and effects, see the DMTP module *Introduction to Hazards.*

Q. *Which hazards potentially threaten your community?*

A.

Elements at risk

Community risk encompasses all potential losses from a hazard event. The elements at risk consist of a wide range of things that make up a society – people's lives and their health as well as their economic activities, where (and how) they live, their jobs, houses, equipment, crops and livestock. Community infrastructure – water, electricity, communications, roads and other forms of transportation – and services that people depend on, such as schools, hospitals, and religious institutions, can be additional elements at risk. In many cases, the natural environment on which the society depends, can also be an element at risk.

Q. *Select one of the hazards you identified above. What are the elements most at risk in your community from this hazard?*

A.

Vulnerability

As noted earlier, the concept of vulnerability includes both physical or structural vulnerability as well as human vulnerability. "We are also interested in recognizing and responding to levels of vulnerability where the potential for damage to health, life, or resources and property is significant – that is, where it is so large that the communities experiencing losses cannot handle them alone and need outside assistance to sustain life and health and to recover resources and property" (Anderson, 1995, pp. 41-42). In both human and physical/structural terms, people living in poverty are generally

more vulnerable to hazard events as they have fewer resources, and therefore, fewer options. For example, they often construct their shelters in hazard prone areas, putting both their lives and their physical possessions at risk. The excerpt below indicates the extent to which those living in poverty are more likely to be affected by hazard events.

Poor Suffer More

"All told, millions of people are affected by natural disasters every year, and at least 250,000[3] die on average as a direct result. The number of victims in developing countries is disproportionately high. In fact, the World Bank estimates, based on DHA's data, that 95 percent of the disaster-related deaths occur among the 66 percent of the world's population that live in the poorer countries…

While direct economic loses may be comparatively lower in developing countries because of lower investment in the physical environment and lower replacement costs, the [proportionally] higher costs in terms of the national capacity to absorb the loss make the poorer countries more vulnerable. On average, the losses as a percentage of GNP are 20 times greater in developing than in developed countries."

Case study source: Armillas, 1995, p. 16.

Photo: UNDRO News, UN EPPG/Jennifer S. Philby, p. 18.

To assist mitigation and preparedness planning, development planners should make some effort to *quantify* the tangible aspects of vulnerability and loss. The "intangible" aspects of vulnerability, such as students' lost time in education, are often as important as the "tangible" aspects and must not be neglected. Local experience is a good guide to what is vulnerable in a particular society. Therefore, a list of potentially vulnerable elements should be supplemented by a study of written reports and the knowledge of those who lived through previous disasters which unfortunately is often unrecorded.

[3] An alternate estimate of average annual deaths caused by natural disasters is calculated as 128,597 for the years 1971-1995. *World Disasters Report 1997,* the International Federation of Red Cross and Red Crescent Societies, Oxford University Press, 1997.

Assessing vulnerability

"The purpose of assessing vulnerability is to be able to take appropriate actions to reduce vulnerability before the potential for damage becomes actual" (Anderson, 1995, p. 41). To assess vulnerability, one must understand what makes either a physical element or a person or social group vulnerable. For example, houses built from cane and thatch that can be blown apart in a tropical storm are more *vulnerable* to wind effects than a brick building. Similarly, a brick building is more likely to disintegrate with the violent ground shaking of an earthquake than a strong reinforced concrete frame structure (or a cane and thatch hut) and is more *vulnerable* to earthquake hazard. Correctly assessing vulnerability is important for making meaningful risk assessments and ultimately for reducing the impact of disasters.

"The purpose of assessing vulnerability is to be able to take appropriate actions to reduce vulnerability before the potential for damage becomes actual."

This concept of vulnerability assessment can also be extended to social groups or economic sectors. For example, if food growers send their produce to market through a single mountain pass, they will be unable to sell their produce if the pass is blocked. Developing an alternative route to market will reduce the vulnerability of the agricultural sector to loss by disaster.

In some instances, it is useful to quantify vulnerability; the vulnerability of an element is usually expressed as a percentage of loss for a given hazard severity level. The measure of loss depends on the elements at risk, and accordingly may be measured as a ratio of the number of killed or injured to the total population, as a repair cost or as the degree of physical damage defined on an appropriate scale, such as the Modified Mercalli scale for earthquakes. For many elements, such as buildings, it may be defined in terms of the proportion of buildings experiencing some level of specified damage. For a full definition of vulnerability, the expected damage level at every magnitude of hazard severity needs to be defined. As the intensity or magnitude of the hazard increases, the level of damage will also increase.

Since the concept of vulnerability is not always easily quantified, it is important to identify the individuals, groups and communities that are most exposed to any given hazard when assessing vulnerability. "This aspect of the assessment must take into account more than mere proximity, however. It must include any of the physical, geographical, economic, social, political or psychological factors that cause some people to be particularly exposed to the dangers of any given hazard while others are, because of any of these factors, relatively protected" (Anderson, 1995, p. 54). The following example illustrates the importance of considering economic, social and political factors when working to reduce the vulnerability of individuals and communities.

> Urban disasters are selective in whom they strike hardest, and the poor are the most vulnerable. Those who can afford it avoid ravines prone to landslides following storms or earthquakes, or marshy areas and river banks prone to seasonal floods. As cities continue to grow exponentially, marginal land is often all that is left. In the absence of affordable sites, the urban poor live in these areas to be near a source of income (whether they are fertile flood plains or industrial factories).
>
> Conventional solutions for urban disaster mitigation in developed countries are not easily applicable to the urban poor. Building codes, zoning measures and urban planning techniques, for example, are difficult to enforce when people occupy land illegally. Consequently, these measures have had little impact in reducing vulnerability of the urban poor.

Source: ICE cited by DHA, 1996, p. 10.

The following matrix is a useful tool for assessing the social aspects of vulnerability. It can be used to improve understanding of the vulnerabilities of different individuals and communities as well as to provide a useful tool for encouraging discussion among individuals and communities when engaging in a process of building community capacities.

The matrix can be filled out for an individual, a community or a larger entity, such as a country. Complete the matrix by considering a particular hazard and an individual's or community's exposure, relevant to the factors listed in the left column. Estimate the community's capacity to withstand the effects of the hazard for each factor. Factors for which the community has a limited capacity to withstand a hazard indicate areas of vulnerability that need to be addressed.

***Who** (for example, individual, community, country):*

Hazard:

Factors	Exposure	Capacity to Withstand
Proximity		
Economic class		
Social status		
Political status		
Psychological condition		

Source: Anderson, 1995

EXERSICE. Consider a community in the area in which you work and a hazard event which has a high probability of occurring; complete the matrix based on the hazard you selected.

Reducing hazards vs. reducing vulnerability

Protection against risks can be achieved by removing its causes, or by reducing the consequences of the hazard effects if it occurs.

Protection against risk can be achieved by removing its causes (reducing or modifying the hazard), or by reducing the consequences of the hazard effects if it occurs (reducing the vulnerability of elements at risk). For many types of natural disasters, it is impossible to prevent the actual geological or meteorological process from occurring: volcanoes erupt, earthquakes occur, cyclones and wind storms rage. The focus of mitigation practices for these hazards is primarily on reducing the vulnerability of elements that are likely to be affected. Some natural hazards can be reduced in certain circumstances. The construction of levees along the banks of certain rivers reduces the chance of flooding surrounding areas. It is also possible to prevent potential known landslides and rockfalls by stabilizing land pressures, constructing retaining walls and improving drainage of slopes. Engineering works can contain the destructive agents of some natural hazards or can divert the threat away from important elements with channels and excavation. In some cases tree planting can be an effective way either to reduce the potential for floods and mudslides or to slow desertification.

Obviously, preventing industrial accidents from occurring in the first place is the best method of mitigating future industrial disasters. Fires, chemical spills, technological and transportation accidents are all hazards that are essentially preventable. The focus of disaster mitigation for these human-made disasters is preventing the hazards from occurring or reducing their impact if they do.

Understanding Risk

In an urban area prone to flooding, some houses have been constructed in a low-lying area close to the river. They are made of concrete block and have basements. Other houses made of corrugated iron, cardboard and thatch have been constructed in a dry river bed. When heavy rains fall up-stream, this hazard does not affect the houses or their occupants equally – even though they are all affected by the same rainfall rate. If flooding occurs, the water may wash through the basements of the concrete buildings, but leave the structures reasonably intact. In the river bed, however, the fragile dwellings will be completely destroyed. The increased risk for the occupants of the fragile dwellings does not occur as a result of the hazard alone. Instead, their risk is increased first by their own economic vulnerability which forces them to settle in the river bed, and second, by the structural vulnerability of their dwellings.

A key objective in disaster management is to reduce risks. This can be done in many ways. In this example, the risk might be reduced by civil engineering measures which can control the river flow rate up-stream during the rainy season. Such steps **reduce the hazard.** Expanding employment opportunities for the riverbed dwellers so they could afford to live elsewhere or relocating them to structurally sound accommodations outside the river bed, however, would **lower their vulnerability** to a seasonal threat.

Adapted from: "Disaster Reduction for Southern Africa" a training program of The International Federation of Red Cross and Red Crescent Societies Regional Delegation for Southern Africa.

Managing risk

In order to manage risk, decisionmakers and local communities need to understand the potential effects of a hazard, the magnitude of the risk faced (risk assessment), and the importance a society places on reduction of that risk (risk evaluation).

Risk assessment

By gathering data on the effects of various hazards, the prevailing conditions in which they are likely to occur, the estimated probability of future events, and the magnitude of related effects, scientists, economists and other professionals try to quantify risk to understand it and to compare it to other risks. The identification and understanding of causes, effects, and processes of disaster occurrence are critical to the assessment of future risks. Even though risk assessment is a structured and scientific activity, assessments may vary in terms of their sophistication, cost and accuracy.

To produce reasonably precise estimates of future risks, risk assessors need reliable information on similar past events and on prevailing geographical conditions, soil types, and local attitudes. Some risks are easier to quantify than others. The risks from the effects of minor floods and small earthquakes are easier to predict than those from catastrophic events because they have happened more often and there is more data on their occurrence. Likewise the recurrence of droughts may be predicted on the basis of historical experience. On the other hand, risks of events that have not yet happened, such as the melt-down of a nuclear reactor, have no past statistics and so have to be estimated from probabilities and forecasts.

The geographical location and the characteristics of the exposed population affect the assessment of risk from natural hazards.

The geographical location and the characteristics of the exposed population affect the assessment of risk from natural hazards. There is no one standard way of defining the population exposed to a risk. Therefore, statistical expressions of risk need to be carefully defined and explained to be useful. For example, gross levels of risk, taking the number of deaths from a given case, divided by some estimate of the population exposed can give an approximate ranking of the probability of death to an individual from different causes. This gives some idea of how disaster risk to an individual compares with other risks, and how disaster risk may vary from place to place. The probability of being killed in an earthquake in Iran during any one year for example, is obtained from the total number killed by earthquakes in Iran this century (120,000), divided by 90 years. This gives an average of 1,300 people killed annually. The population of Iran (currently 55 million people) averaged over the past ninety years is less than 30 million, so the average probability of being killed in an earthquake is given as 1 in 23,000. Of course not everyone in Iran is equally at risk. Some parts of Iran are more seismic than others, so those living in the seismic zones are more at risk. Those living in poorer quality houses are more at risk than people who live in strong seismically-resistant houses. But to define the exact seismic zones and the exact number of people in houses of different seismic resistance requires much more detailed analysis.

Risk evaluation

Risk evaluation is the social and political judgment of the importance of various risks by the individuals and communities that face them. This involves trading off perceived risks against potential benefits and also includes balancing scientific judgments against other factors and beliefs. Often these other factors and beliefs may have varying social, economic or political value for different elements of a community. Understanding the varying perceptions of risk within a society is key to a successful risk reduction program.

In an ideal setting, the process of risk evaluation might involve a government commission requesting experts to gather scientific and socio-economic evidence. Based on their findings, the politicians would then legislate and regulate for the benefit and with the implicit agreement of the general public. In practice, of course, things seldom work this way. Assessing risk from available data is not always as helpful as the experts would like. Politicians may make decisions based on interests and objectives other than simple considerations of risk mitigation. Similarly, the general public may not see things the same way as either the experts or the politicians.

Very high levels of perceived risk can be associated with actions to reduce risk.

Very high levels of perceived risk can be associated with actions to reduce risk – when people think the risk of a volcano erupting is too high, they move. At some level the risk becomes unacceptable. What level constitutes an acceptable risk is a complex but critical issue. The concept of risk tolerance and thresholds of unacceptability are ultimately what determine whether official money is devoted to a flood dike project or whether people comply with building regulations to make their houses earthquake resistant.

Many risks can also be associated with benefits for some members of a society. Living close to a volcano may bring the benefit of fertile soils for good agriculture. The risks associated with vaccinations and traveling to work are generally considered acceptable because the benefits are immediately obvious. To most people in a community, the exposure to natural and environmental hazards does not have any specific benefit associated with it – the exposure is a simple consequence of living or working in a particular location. Generally, the levels of acceptable risk appear to increase according to the benefits derived from exposure. (Some segments of a community actually benefit from increased risk, such as builders who need to replace damaged structures or grain merchants whose profits increase from food shortages.)

The judgment of acceptable risk does not depend only on the actual risk level, but also on the value judgments held by different parts of a society or community. Nevertheless, factual information about risk, if it is widely circulated, understood and believed, can affect whether or not a particular risk is acceptable.

Summary

Natural disasters are a function of human vulnerability and the occurrence of a hazard. Vulnerability is the lack of ability or capacity to resist, cope with, and recover from a potentially damaging hazard event. It is greatest among the poor, but may also include large segments of the total population. Those who must seek housing in marginal, undesirable sites, and those with the least money available for providing adequate shelter will be the most vulnerable. Thus, strategies to reduce poverty are also strategies to reduce vulnerability to disaster. Although these strategies are necessary, they are not sufficient to address the broader social and economic implications of vulnerability.

The overall or community risk can be described as an equation where risk equals the resulting product of the intensity of a likely hazard and the community's vulnerability to that hazard. This is an important formulation since it makes clear that risk can be lessened by either reducing the effects of a hazard or the vulnerabilities to it.

Risk may also be described in other ways, depending on one's viewpoint and context. While scientific assessment of risk is possible and valuable, understanding the public's perception of risk is just as important in the development of appropriate risk reduction strategies. In order to reduce risk, the community itself must perceive the vulnerability to a hazard as a serious risk that merits attention. Part 2 will discuss the reasons and methods for reducing community risk.

NOTES

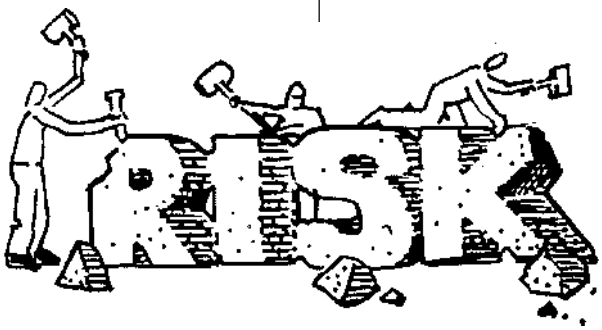
PART 2

Reducing risk

LEARNING OBJECTIVES

In this part of the module you will learn about:

- *the importance of risk reduction*
- *tools and techniques for risk reduction*
- *hazard-specific and sectoral-specific risk reduction strategies*



This part of the training module focuses on strategies for risk reduction. Referring to the "formula", Risk = Hazard × Vulnerability, we see that *reducing* risk can be achieved by any combination of reducing the threat or severity of hazards, reducing vulnerability, or improving the protection of elements at risk.

Each individual an agency in hazard-prone communities has a role to play in risk reduction. Policy makers and managers of agencies need to examine how they can support activities that reduce the risk of vulnerable communities either for specific sectors or for the community overall. We explore risk reduction strategies for those whose job responsibilities include aspects of disaster management, as well as for local communities and individuals.

Importance of risk reduction

The merits of improved disaster management are widely accepted and encompass all phases of disasters. But a high priority must be placed on preventing or mitigating disasters in the first place, to reduce the impacts of these disasters. Taking timely action to mitigate the impacts of potential hazards can transform a problematic future into one that is manageable. One way to illustrate the importance of risk reduction is to envision the results of successful risk reduction strategies. These results might include:

1. Societies routinely choosing appropriate uses for hazard-prone areas, based on the results of a comprehensive hazard identification and risk assessment process.
2. Countries providing public awareness, early warning, and preparation for natural hazards for all people, including special populations like the elderly and the disabled.

***T**aking timely action to mitigate the impacts of potential hazards can transform a problematic future into one that is manageable.*

3. Funding sources and effective incentives ensuring continued attention to development and application of hazard mitigation programs and techniques.
4. Regional, national, and local governments incorporating risk reduction considerations into all of their actions.
5. New structures, including critical facilities and infrastructure, being built to national multi-hazard standards as incorporated into building codes and enforced at all levels of government.
6. Programs for updating or retrofitting structures at risk from hazards.
7. Countries being able to recover from disasters with reduced disruption to individuals, communities, and the national and regional economy.[4]

Strategies for accomplishing such results include institutional, technological, and community-based approaches. These include legislation and policy initiatives, education and training in disaster prevention, engineering and technical solutions, preparedness and mitigation as well as the involvement and active participation of whole communities in disaster reduction, prevention and preparedness on an on-going basis.

EXERSICE: For each of the seven "results" of risk reduction strategies, identify at least one expected benefit from that result.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

4 Adapted from *National Mitigation Strategy: Partnerships for Building Safer Communities.* Federal Emergency Management Agency, Washington, D.C. 1995, p. 13.

Risk reduction menu[5]

In this section, we identify a wide range of tools and methods for risk reduction and classify them according to the categories used in the DMTP training module, *Disaster Mitigation:* societal measures, physical planning, economic measures, and engineering and construction. Some of these measures must be modified to accommodate unique community considerations. For example, a public information campaign to teach local builders in Guatemala about earthquake resistant construction techniques for earthen housing may be a more effective risk reduction technique if conducted in the indigenous language.

Societal measures

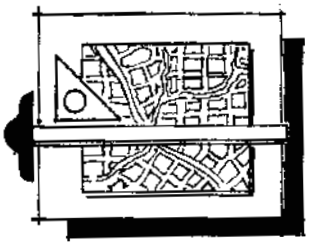
Risk reduction will only come about when there is a consensus that it is desirable, feasible and affordable. In many places, life-threatening hazards are not recognized, the steps that people can take to protect themselves are not familiar, nor is the demand forthcoming for the community to have themselves protected. Planning for risk reduction should aim to develop a "safety culture" in which people are aware of the hazards they face, assume a responsibility to protect themselves as fully as they can, and continuously support public and institutional efforts made to protect their community.

Everyone who lives in a hazard-prone area should understand the potential for hazards as a manageable fact of life.

Public education and awareness can be raised in a number of ways, from short-term, high-profile campaigns using broadcasts, literature and posters, to more long-term, low-profile campaigns that are carried out through general education. Education should attempt to familiarize and de-sensationalize hazards. Everyone who lives in a hazard-prone area should understand the potential for hazards as a manageable fact of life. Information about hazards should be part of the standard curriculum of children at school and be part of everyday information sources, with occasional mention of hazards in stories, TV soap operas, newspapers and other common media. The objective is to develop an everyday acknowledgment of hazard safety in which people take conscious precautions because they are aware of the possibility of hazard occurrence. Their understanding should include an awareness of what to do in the event of a hazard; and a sense that their choice of house, the placement of a bookcase or a stove and the quality of construction of the garden wall around an outdoor work or play area, all affect their own safety.

Community involvement in mitigation planning processes can include public meetings and consultations, public inquiries and full discussion of decisions in the normal political forum. Further awareness can develop through regular practice drills, practice emergencies and anniversary remembrances. In hospitals, schools and large buildings, it is necessary to rehearse what the occupants should do in the event of fire, earthquake or other hazard. In schools, children may practice earthquake drills. This reinforces awareness and develops automatic behavioral responses.

[5] This section is adapted from: A.W. Coburn, R.J.S. Spence, A. Pomonis, *Disaster Mitigation,* Disaster Management Training Programme, UNDP/UNDRO 1991.



Physical planning measures

Many hazards are localized with their likely effects confined to specific well-defined areas. Floods occur in flood plains, landslides occur on steep, soft slopes, and so on. The effects can be greatly reduced if it is possible to avoid the use of hazardous areas for settlements or as sites for important structures. Most urban master plans involving land use zoning already attempt to separate hazardous industrial activities from major population centers, but urban planners also need to integrate awareness of natural hazards and disaster risk reduction into the normal planning processes for the development of a city.

Physical planning measures are easiest to implement with public sector facilities, since government has direct control over their funding and placement. The careful location of public sector facilities can play an important role in educating the public and reducing the vulnerability of a settlement. Schools, hospitals, emergency facilities and major infrastructure elements like water pumping stations, electrical power transformers and telephone exchanges, represent a significant proportion of the core functioning of a town.

An important principle of risk reduction is reducing the concentration of essential elements at risk: services provided by one central facility are always more at risk than those provided by several smaller facilities. This principle also applies to population densities in a city: a denser concentration of people will always increase disaster potential compared to a more dispersed population. Indirect control of densities is sometimes possible through simple methods such as wide roads, height limitations and road layouts that limit the size of plots available for development. At a regional level, the concentration of population growth and industrial development in a single, centralized city is generally less desirable than a decentralized pattern of secondary towns, satellite centers and development over a broader region.

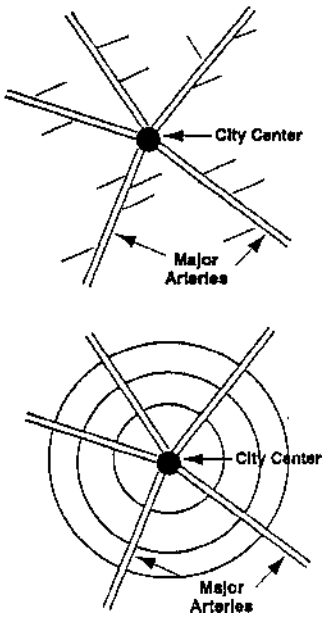


Figure 2
Road access in radial vs. circular ring road systems.

The design of service networks – roads, pipelines, and cables – also needs to be carefully planned to reduce risk of failure. The usefulness of long, linear supply lines is at risk if these lines are cut at any point. Networks that interconnect and allow more than one route to any point are less vulnerable to local failures, provided that individual sections can be isolated or circumvented when necessary. Vehicular access to a specific point in a city, for example, is less likely to be cut by road blockage in a circular ring road system than in a purely radial type (see Figure 2).

In many rapidly developing cities, the control of private sector land use through urban master planning and development policy guidelines is extremely difficult. It is often private sector land use, particularly the informal sectors and shanty towns that have the highest risk of disaster. Flood plains, steep slopes, and other marginal lands are often the only building sites available to lower-income communities and the most vulnerable social groups. The economic pressures that drive people, first to the city for jobs and opportunity, and second to these marginal lands to live, must be fully understood as the context for considering their risk.

Prohibitions, or other measures to clear settlers from hazardous areas, are unlikely to be successful if the underlying economic pressures are not addressed. Some indirect measures, such as making safer land available or making alternative locations more attractive, may be effective, but they can only succeed to the extent that there is strong understanding and support by

the people immediately affected. This may be accomplished through better access to public transport and better provision of services. Deterring further development in unoccupied areas by clearly declaring areas as hazard zones, denying services, reducing accessibility and limiting availability of building materials may also be effective. Ultimately, however, it is only when the local community recognizes the true extent of the hazard and accepts that the risks of being in a dangerous location outweigh the benefits that they will locate elsewhere or protect themselves in other ways.

Economic measures

Equitable economic development is the key to risk reduction. A strong economy in which the benefits are shared throughout the society is the best protection against a future disaster. A strong economy means more money to spend on stronger buildings and larger financial reserves to cope with future losses. The reality, however, is that many countries where hazard risk is high also have low income economies, and are unable to devote significant economic resources to addressing their risks.

Inevitably it is those who have least that, proportionally, lose most in a disaster.

Inevitably it is those who have least that, proportionally, lose most in a disaster. The weakest members of the economy have few economic reserves. If they lose their houses or their animals, they may have no means of recovering them. They are unlikely to have insurance or access to credit and can easily become destitute. Large-scale drought or flood disasters in rural areas can result in an acceleration of urbanization in the region and possible increased risks as families whose livelihoods have been destroyed migrate to cities in search of better opportunities. The destruction of industries and loss of jobs and incomes may well make recovery a long and slow process or make the region more vulnerable to a future disaster. Reconstruction plans often extend generous loans to victims to aid their recovery, but a family without an income has little prospect of making repayments and is therefore unable to benefit.

Economic development is likely to be the main goal of any regional planner or national government agency, regardless of risk reduction objectives. Some aspects of economic planning are directly relevant to reducing disaster risk. *Diversification* of economic activity is as important an economic principle as reducing concentration is in physical planning. A single industry (or single-crop) economy is always more vulnerable than an economy made up of many different activities. The linkages between different sectors of an economy—the transportation of goods, the flow of information, the labor market—may be more vulnerable to disruption from a disaster than the physical infrastructure. The reliance of industry and the economy on infrastructure—roads, transportation networks, power, telephone services, etc.—means that a high priority should be placed on protecting these facilities since the consequential losses or failures are costly to the whole community.

Economic incentives and penalties are an important part of the powers of any government authority. Grants, loans, taxes, tax concessions and fines can be used to influence the decisions people make to reduce disaster-related risks. The location of industrial assets is commonly influenced by government incentives which can be used to attract industry to safer locations or to act as a focus for population relocation. Property taxation can be used to discourage more vulnerable structures and structures built in less

POSSIBLE ANSWER
(for page 22)

1. Fewer elements at risk will be affected by a hazard.
2. The general public will make informed decisions regarding disaster preparedness.
3. Increasingly effective mitigation program ideas will become available.
4. The political will to implement risk reduction programs will increase.
5. Buildings, especially critical facilities, will be more likely to withstand disasters.
6. Unsafe old buildings will be safer.
7. More of the economy can be devoted to development instead of disaster recovery.

desirable locations. Grants and loans can be offered to assist owners in upgrading their property and making buildings more disaster resistant.

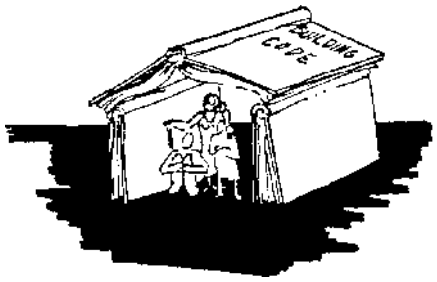
Insurance is also a major economic protection device, although more difficult to achieve in low income countries where the costs may seem expensive. If the risk of economic loss is spread widely over a large number of premium payers, the loss is safely dissipated. The more widespread that policy holding becomes, the lower the premiums are and the more widespread insurance use is likely to be. Disaster insurance is high-risk finance and only national or multi-national insurance companies can gather the resources to cover the losses of any sizable disaster. Unless backed by a large development or government agency, insurance is less likely to be available to protect poor or rural communities and their investments.

Engineering and construction measures

Engineering-dependent mitigation activities are of two types. Those that result in stronger individual structures that are more resistant to hazards, and those that create structures whose primary function is to protect against disaster – flood control structures, dikes, levees, and infiltration dams.

Actions to make structures more resistant to hazards primarily involve improvements in design, construction and maintenance of buildings,

achieved through institutional means such as design standards, building codes and performance specifications for facilities designed by engineers as well as local builders trained in appropriate construction techniques.



Building codes based on disaster-resistance are unlikely to result in stronger buildings unless the engineers and builders who implement them accept their importance and endorse their use. In addition, engineers and builders must understand the code and the design criteria required of them. Responsible authorities must fully enforce the code by checking and penalizing designs that do not comply. Methods for achieving risk reduction through "engineering" measures also include increased training for engineers, designers, and builders; explanatory manuals to interpret code requirements and the establishment of an effective administration to check code compliance in practice. The recruitment of ten new municipal engineers, for example, to enforce an existing code may have more of an effect on improving construction quality in a vulnerable community than proposing legislation for higher standards in existing building codes.

A large number of the buildings likely to be affected by disasters are not designed by engineers and will be unaffected by safety standards established in building codes. These are houses, workshops, storerooms and agricultural buildings built by owners themselves or by craftsmen or building contractors based on their own designs. In many countries these non-engineered buildings make up a large percentage of the total building stock.

The engineering measures needed to improve the disaster-resistance of such non-engineered structures involve the education of local builders in practical disaster-resistant construction techniques. The resistance of a house to cyclone winds, for example, is ultimately dependent on how well the

roofing sheets are nailed down, the quality of joints in the building frame and its attachment to the ground. Training techniques to teach builders the practicalities of disaster resistant construction are now well understood and form part of the available menu of risk reduction activities.

Builder training is effective when it persuades owners and communities to build safer, more disaster-resistant structures and to pay the additional costs involved in constructing such structures. While building contractors may play a role in persuading clients, contractors are unlikely to find many customers unless there is general public awareness of the disaster risk and an acceptance of the need for greater protection. Incentives for improving the hazard resistance of non-engineered buildings include grant programs, preferential loans and supply of appropriate building materials. Legalizing land ownership and giving tenants protective rights also encourages people to upgrade building stock as a result of their secure tenure and a larger stake in their own future.

Q. *Select a hazard of concern for your community. For each risk reduction measure give an example that would be effective for that hazard.*

A. *Hazard* _____

Societal _____

_____

_____

_____

_____

Economic _____

_____

_____

_____

_____

Physical planning _____

_____

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Engineering and construction _____

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Risk reduction strategies by hazard type

Having considered a broad menu of risk reduction tools and methods, we now focus on specific activities that individuals or local communities can do to reduce their risk to particular hazards. In addition to these, other risk reduction strategies that require long-range planning and resources are listed for each hazard type.

EARTHQUAKES

Local risk reduction activities

An important element of earthquake mitigation is community awareness and participation. Awareness of earthquake risk and desire to live in houses safe from seismic forces may help motivate construction of earthquake-resistant buildings. In addition, risk can be reduced by carrying out daily activities and arranging building contents with the possibility of ground shaking in mind. For example, sources of open flame and dangerous appliances can be made stable and safe.

Knowledge of what to do in the event of an earthquake can be increased by participation in earthquake drills and public awareness programs. Community fire-fighting and first aid training groups can also be formed. These groups can take responsibility for readiness and maintenance of fire extinguishers, excavation tools and other civil protection equipment.

General risk reduction strategies

There are several mitigation strategies for earthquakes. Structures can be engineered to withstand vibration forces and governments can develop and enforce seismic building codes and higher standards of construction quality. Governments can also ensure that important public sector buildings are constructed according to high engineering design standards.

Besides structural engineering, the effects of earthquakes can be mitigated by implementing location planning to reduce urban densities on geological areas known to amplify ground vibrations.

VOLCANIC ERUPTIONS

Local risk reduction activities

Communities have an important role in mitigating their risk from volcanic eruptions. Community members should be aware of volcano risk and should identify potential danger zones. In addition, communities and families can prepare and practice evacuation plans.

General risk reduction strategies

Potential methods for reducing the impact of volcanic eruptions include location planning that ensures that areas close to volcano slopes are not used for important activities. In addition, lava and debris flows may be channelled, dammed or diverted away from settlements by engineering works. Monitoring of volcanoes is often feasible and can provide significant lead-time information about volcanic activity.

Risks associated with volcanic eruptions can also be reduced by promoting fire-resistant structures as well as engineering structures to withstand the additional weight of ash deposits.

LAND INSTABILITIES

Local risk reduction activities

Communities should be trained to recognize potential land instabilities, identify active landslide areas, and avoid siting houses in hazardous locations. In addition, communities can reduce the risk from land instabilities by constructing structures with strong foundations, compacting ground, preventing deforestation of slopes, stabilizing slopes through terracing and forestry, and creating rockfall barriers using trees and earth banking.

General risk reduction strategies

A primary mitigation strategy for landslides is location planning to avoid hazardous areas being used for settlements or as sites for important structures. In addition, landslide risk may be reduced by creating shallower slope angles in hillsides through excavation of the top layers of earth; by increasing deep drainage and surface run-off drainage capacity; and by constructing engineering works such as pilings, ground anchors, and retaining walls. Terracing slopes and reforestation can also prevent loss of surface material. If expected, debris flows can be directed into specially constructed channels and rockfall protection barriers such as trenches; silt dams and vegetation barriers can also be constructed to protect settlements.

FLOODS AND WATER HAZARDS

Local risk reduction activities

Communities can be actively involved in reducing the risk of flood damage. Where construction in a flood-prone site is necessary or cannot be avoided, houses can be constructed to be flood resistant using materials resistant to water damage and strong foundations. Awareness of water hazards can be reflected in living practices such as constructing elevated storage and sleeping areas. Crop cycles can be modified to avoid the flooding season, and flood-resistant crops can be introduced. In addition, community members should be aware that deforestation can exacerbate flooding.

Communities can reduce the risk of personal harm by preparing flood evacuation plans which include identification of evacuation routes, and locations for the availability of boats or other appropriate transport and rescue equipment. Monitoring and warning systems at the local (and regional) level are also important to a risk reduction strategy.

General risk reduction strategies

The main risk reduction strategies for floods and water hazards include land-use control and planning to avoid locating vulnerable facilities in potential flood plains. Retaining walls and levees along rivers, and sea walls along coasts may keep high water levels out of flood plains (although levees may create other problems over time, or elsewhere downstream). Structures which are located in flood plains should be engineered to withstand flood forces and designed with elevated floors to reduce damage from flood waters.

Water regulation (slowing the rate at which water is discharged from catchment areas) can be achieved by constructing reservoirs, increasing vegetation cover to slow down run-off, and building sluice systems. Removing silt buildups or dredging deeper channels and constructing alternative drainage routes (new river channels, spillways and pipe systems) may prevent river overload. Storm drains in towns assist drainage rates; and beaches, dune belts, and breakwaters can sometimes reduce the power of tidal surges.

STORMS (typhoons, hurricanes, cyclones, tropical storms and tornadoes)

Local risk reduction strategies

Communities can help reduce their risk of damage from storms by preparing evacuation plans and warning systems to be implemented in the event of a storm; by constructing wind-resistant or easily rebuilt houses; by securing elements that could blow away and cause damage or injury elsewhere, such as metal sheeting, fences, and signs; by taking shelter in strong, wind-resistant buildings; by taking protective measures for boats, building contents or other possessions at risk; and by protecting food storage facilities from storms.

General risk reduction strategies

The main mitigation strategies for hazards due to storms include a public well informed regarding the hazard and an effective warning system. Engineering structures to withstand wind forces, developing wind load requirements in building codes and wind safety requirements for non-structural elements are also important. In addition, siting key facilities in less vulnerable areas (such as in the lee of hillsides), planting windbreaks, and planning forestry areas upwind of towns can also reduce the risk associated with storms. Strong, wind-safe public buildings which can be used for community shelter in vulnerable settlements can also reduce the risk to community members whose homes are not safe in storms. Crops can be protected by introducing agricultural practices and crops which are more resistant to high winds.

DROUGHT AND DESERTIFICATION

Local risk reduction activities

Communities can construct check dams, reservoirs, wells, and water tanks, as well as develop planting and re-forestation efforts to reduce the risk of drought and desertification. They can also change cropping patterns and livestock management practices, introduce water conservation policies, and develop alternative non-agricultural industries.

General risk reduction strategies

Although rain shortfall is uncontrollable, drought and desertification can be reduced by improved land and water management practices, such as water conservation practices, infiltration dams, irrigation, forest management, and range management (control of land use and animal grazing patterns).

The main risk reduction strategies for drought and desertification include water rationing; conserving or replacing failing water supplies through watershed management and construction of dams, pipelines or aqueducts; conserving soil and reducing erosion rates by using check dams, leveling, planting, and managing herds; reducing firewood cutting by improving fuel stoves; introducing flexible farming and cropping patterns; raising awareness about the benefits of population control; and developing education and training programs.

TECHNOLOGICAL HAZARDS

Local risk reduction activities

Communities should participate in actions to monitor pollution levels, ensure inspection and enforcement of existing safety standards, and improve safety legislation. They should also develop evacuation plans to be followed in the event of a technological disaster as well as regulate hazardous-materials transport routes away from schools and residential areas.

General risk reduction strategies

Technological hazards can be reduced by improving safety standards in plant and equipment design; by anticipating possible hazards in plant design; by developing safe design and operating procedures; and by dispersing hazardous materials, through legislation, and through proper preparedness planning. In addition risk reduction strategies include improving fire-resistance by using fire-resistant materials, building fire barriers or installing devices to extract smoke; improving detectors and warning systems; engaging in preparedness planning by improving fire-fighting and pollution dispersal capabilities, and emergency relief and evacuation planning for plant employees and nearby settlements (crew and passengers in the case of vehicles). In addition, on-site and off-site safety plans should be initiated, and drills should be conducted in conjunction with local fire departments and other civil authorities.

The effects of a technological disaster may be reduced by providing accurate inventories and maps of storage locations of toxic/hazardous substances and their characteristics to those responding to technological disasters. In addition, steps taken to limit or reduce the storage capacity of dangerous or flammable chemicals will reduce the probability of occurrence of a technological disaster.

Q. *Select a hazard of concern to your community and describe the extent to which the listed strategies have been and/or could be used.*

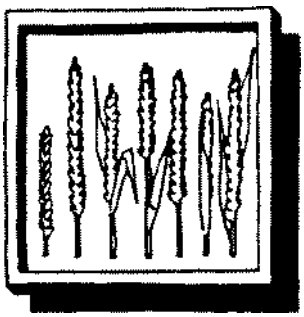
A.

Q. *Are there other strategies being used in your own community which are not included in these summaries? If so, briefly explain them.*

A.

Actions within professional disciplines[6]

While it is often useful to consider overall risk reduction strategies based on the probability of occurrence of a particular hazard event, many individuals and organizations have a sectoral focus on disaster management. For example, people who work for a ministry of agriculture, for agricultural development NGOs, and agricultural credit institutions as well as farmers will all view disaster management from an agricultural perspective. Their understanding and appreciation of the feasibility of reducing risk in their discipline (or sector) will increase their desire to adopt risk reduction strategies. Examples of risk reduction activities by sector follow.



Agriculture

The agriculture sector is at risk from various natural hazards, including drought, insects (e.g. locusts), floods, frosts, windstorms and volcanic eruptions. There are several macro-level risk reduction strategies that can be applied in the agriculture sector. These include strengthening research, extension and training facilities to attain crop diversification. Countries that rely primarily on one crop are particularly vulnerable to disasters. Diversifying crops by adding other basic grains, such as wheat, maize, sorghum and rice, in addition to the existing staple grain, will increase food security and improve overall agricultural development. In addition, introducing drought- or wind-resistant strains can also increase food security. Through research and training, institutions can identify which crops are best suited for the local area and can work with farmers and agricultural workers to introduce new crops or cropping patterns.

Countries can develop plans for strengthening seed production, and establishing (or increasing) seed and food reserves. Improving community food storage systems is a major risk reduction strategy. “It has been estimated that up to one-half of all developing country agricultural production is lost between maturity in the field and delivery to consumers. Most of this lost occurs on the farm due to improper storage and handling techniques” (Intertect, 1991, p. 29). Establishing flood protection measures around existing food warehouses and building local and district-level grain silos and warehouses will result in safer grain storage facilities, especially if these silos and warehouses are designed to resist insect/rodent infestation and spoilage.

Governments should also consider economic programs that benefit farmers, such as tax/loan incentives to increase cultivation of drought- or flood-resistant crops, delineating special agricultural development areas, expanding agricultural credit programs, and establishing alternative employment for drought-affected farmers. Increasing areas under cultivation and promoting terracing and other conservation techniques will also reduce risk to a society’s agriculture sector.

[6] Adapted from INTERTECT, *Disasters and Development: A study in institution building,* UNDP, New York, 1991.

Education

Community education is an important component of any risk reduction strategy. People must be properly informed of the risks they face as well as what they can do to reduce those risks. Risk reduction should be incorporated into the education program at all school levels and into informal community education programs. This may include programs for school-age children which teach, for example, basic understanding of the environment in which they live and likely hazards which occur. More specific practices can be presented, such as how to take shelter in a cyclone or what to do in the event of an earthquake. Programs for adults can focus on the risks associated with the construction of a specific type of dwelling or with living on a steep hillside.

In addition, education programs should also be developed for builders, developers, public administrators and educators. These programs might focus on how improved construction standards can reduce risk, especially with regard to public structures such as schools which may serve as temporary refuges during a hazard event.

Forestry and other natural resources

Protection of forest and other natural resources helps reduce risks associated with floods, drought, landslides, strong winds and desertification. Trees aid in reducing pollution and are vital for stopping erosion which occurs more readily in deforested areas. Furthermore, areas with adequate vegetation can slow the spread of flood waters and reduce the risk of flooding. Some risk reduction strategies that can be applied to the forestry sector in order to encourage forest growth and discourage deforestation include:

- planting trees and other vegetation to deter flood damage
- establishing new tree plantations
- encouraging strip planting of roads
- supporting nursery development
- using tree-planting projects for income-generation and employment projects (food-for-work, cash-for-work)
- adopting tax incentives for maintaining forested land
- introducing alternative fuels and/or fuel efficient stoves
- promoting all aspects of forestry development (reforestation and afforestation, wildlife, soil and water conservation and research)

Similar measures can be taken for other resources such as wetlands and coastal zones. For example, protecting mangroves can help reduce the impact of storms and stabilize the coastline.

Health

When hazard events occur, people who are more vulnerable as a result of their physical health are at greatest risk. Health care facilities should be available in or near areas with high disaster risk (either because they are located in hazard-prone areas or because the population is particularly vulnerable if a hazard strikes). Health strategies to reduce risk concentrate on the overall wellness of the population on an on-going basis. For example, nutritional surveillance programs may provide important famine warnings

which must be acted upon to prevent a major disaster from occurring. Health facilities should also establish emergency reserve commodity stores.

Additional risk reduction measures include protecting the health infrastructure, including the safety of the structures and the support systems (such as electricity, water and sanitation). Health facilities should prepare emergency plans and practice them with drills for hospitals and emergency medical services.

Infrastructure

Newly developing and transitional countries often have fragile industrial installations and infrastructure which a hazard event can easily damage or destroy. Governments can take steps to minimize losses to these facilities. In areas prone to hazards, insurance should be promoted for disaster resistant structures, when available. Building codes with hazard-resistant standards should be developed along with enforcement mechanisms to assure compliance. Giving incentives to builders and owners should be considered. To reduce risk of loss to public facilities from floods and storms, key public works and offices should be elevated or sited in areas above flood level. Power supplies which are essential to industry and households can be protected from floods by constructing dikes around power substations, raising substation premises and strengthening transmission and distribution facilities.

Roads and highways are also critical elements of a community's infrastructure. Care should be taken when constructing roads through hills and mountains not to destabilize slopes, thereby increasing the chance of landslides. To reduce flood risk to roads and highways, roads should be raised so they cannot be easily washed away. In addition, road networks should incorporate flood control and water drainage measures.

Rural areas face many of the same risks as urban areas. Therefore, many of the risk reduction strategies applicable to urban infrastructure also apply to rural institutions. These include:

- constructing drains, culverts, bridges and feeder roads in order to reduce the risk of loosing roads due to flooding
- building new public buildings (schools, government offices) which are above the normal flood level
- locating tube wells in elevated positions
- establishing realistic building codes with incentives and enforcement mechanisms

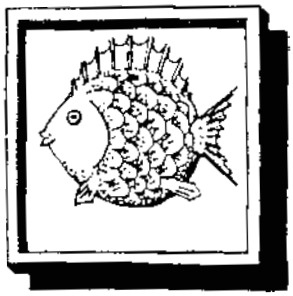
Livestock

Since livestock plays a key role in the food resources of many countries, agriculturalists should consider the possible effect of hazard events on livestock. Field assistants and farmers should be trained in basic livestock care, including how to protect livestock during floods, how to make preliminary diagnoses and begin treatment of diseases following flooding or other hazard events, and how to carry out emergency feeding during natural hazards.

Fisheries

Communities which have farmed and open fisheries are at risk from flooding and storms and should consider measures to reduce that risk. Structures such as dams and levees can greatly reduce the risk of flooding. Other actions to mitigate against the effects of flooding on fisheries are:

- supporting research, development and management of aquaculture in flood plains
- increasing fish culture and development in open waters
- raising embankments around fish ponds



Q. *In areas where you are involved, have any of the described risk reduction measures been undertaken for the sectors listed? Why or why not?*

A. _____

_____

_____

_____

_____

Q. *Can you identify other risk reduction measures for those sectors?*

A. _____

_____

_____

_____

_____

Case studies

Aside from categorization of mitigation and other risk reduction techniques, it is important to consider the context in which these strategies have taken place and to learn from the experience of similar programs in various settings. Actual case histories can illuminate other important factors in the implementation of these programs. Although the following is only a sample listing, the selected examples illustrate several risk reduction strategies.

Caribbean Disaster Mitigation Project (CDMP)

The Caribbean Disaster Mitigation Project is a regionally-based project executing a range of activities aimed at reducing the risk to natural disasters. The project received its initial five year funding from the USAID Office of U.S. Foreign Disaster Assistance in 1993 and is implemented by the Organization of American States. The project's purpose is to establish sustainable public/private sector mechanisms which measurably lessen

Case study source: OAS and USAID, "Caribbean Disaster Mitigation Project", brochure.

loss of life, reduce the potential for physical and economic damage, and shorten the disaster recovery period in the project area.

The activities of the CDMP include:

- support to the Caribbean Development Bank to include consideration of natural hazards in the project formulation process
- CDMP-produced hazard maps that are used in Jamaica's National Land Policy
- establishment of building standards and practices through support to the development of country-specific building codes using the Caribbean Uniform Building Code standards
- vulnerability audits of electrical utilities in several countries to reduce loss of lifeline services in disasters
- strengthening the informal housing sector by conducting a campaign directed at making low income housing in selected countries more hurricane resistant, promoting the use of improved building practices by home owners and builders, and making small loans available for retrofits
- generation and use of natural hazard information by using a computer model that estimates storm surge, wave action, and flooding potential for coastal areas in the Caribbean region
- community preparedness by a public-private-NGO partnership carrying out an extensive program of public information and training in the Dominican Republic and Haiti

Safe houses for hurricanes at low cost: Caribbean

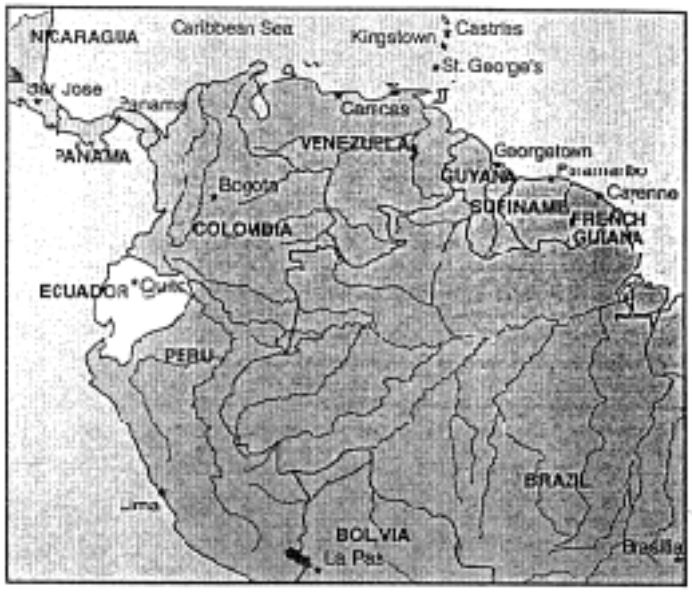
Case study source: Keith Ford, in "Cities at Risk: Making Cities Safer… Before Disaster Strikes", IDNDR, p. 23.

The existence of building codes, including those that take disasters into account, is typically not enough to ensure safe construction. Builders may ignore the codes, insurance companies don't necessarily provide incentives to build safely, and established housing often has been built without taking disaster risks into account. Building codes also are often too sophisticated for non-engineered homes.

One way to provide for safer housing at low cost is by retrofitting (modifying the building to make it more resistant to high winds, ash fall, tremors, etc.). With funding from the CDMP, one inexpensive, successful example of retro-fitting homes to protect them from hurricanes is being carried out jointly by the Organization of American States, CARITAS Antilles and the National Development Foundation of Dominica. In 1994, the two NGOs trained 100 builders, who retrofitted over 50 homes in Dominica and St. Lucia. The total cost for a complete retrofit ranged from $200 to $700 per house for building materials and construction costs. The project provided loans of $185 to $500. Other project related costs included training sessions in safe construction techniques.

All of the retrofitted homes in Dominica withstood the impact of Hurricane Marilyn in 1995, and one was used as a hurricane shelter by residents. Local financial institutions provided additional funds to retrofit more houses. The project was also replicated in Antigua by the National Development Foundation. Finally, some Caribbean insurers have indicated their willingness to adjust insurance rates for residents who retrofit their houses.

Earthquake risk management project: Quito, Ecuador



The purpose of the Earthquake Risk Management Project in Quito was to create and test a procedure to improve the management of urban seismic risk in developing countries. It was conducted from 1992–1994, involving over one hundred national and international participants drawn from the fields of seismology, structural and soils engineering, planning, emergency preparedness, banking and insurance. The process included a workshop which brought together national and international leaders to design a comprehensive set of programs that would manage the city's risk. Their recommendations were based on the technical analysis of the project, the Ecuadorian participants' detailed knowledge of Quito, and the international participants' experience with programs that have proved successful in other earthquake-threatened cities.

Quito is a city of 1.2 million residents with a high risk for earthquakes. The project assessed this risk for a range of possible earthquake incidents, then analyzed the vulnerability of the city's infrastructure. A detailed estimate of damage from various potential earthquakes was then prepared. More significant to this project was the "scenario" that was written, describing life in Quito during the month following one of the hypothetical earthquakes. This scenario helped government officials, business leaders, and the public to visualize the consequences of a major earthquake for their city and provided them with the motivation and understanding required to act.

The project's planners believed that this was the first time a scenario had been developed for which the primary purpose was to help community leaders and the public visualize the consequences of a future major earthquake.

Case study source: Carlos Villacis et al, "Using Earthquake Scenarios of Risk Management in Developing Countries", from Solution for Cities at Risk, UN-IDNDR and Quipunet Internet Conference, 1996.

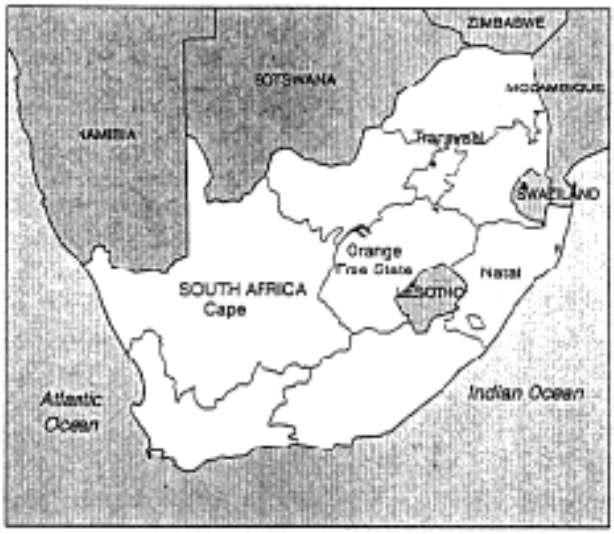
Community participation reduces vulnerability to floods: South Africa

Droughts and civil conflict in South Africa have forced many people in rural areas to move to cities for personal security and employment. They frequently settle in dried low-lying areas, close to rivers and streams, or close to industrial installations – places local authorities consider inappropriate for human settlement.

The precarious economic and living conditions reflect several problems:

- poor building materials (plastic sheeting, wood, cardboard, hardboard) which catch fire easily
- no telephones are available to call the Fire Department
- fire fighting squads have difficulty finding fires because streets and addresses are not recorded on township plans
- during floods, muddy water gushes through the flimsy structures, carrying away household belongings and damaging remaining ones
- health, education and other basic social services are rarely available

Summarized from Mandisa Kalako-Williams, "Disaster and Urbanization: South African Examples" and printed in "Cities at Risk: Making Cities Safer… Before Disaster Strikes", IDNDR, p. 20



Fires, floods and winds devastate these communities regularly, but the South African Red Cross has supported efforts to address these risks. After numerous flood relief operations in an informal settlement in Port Elizabeth, residents, government officials and local NGOs agreed to relocate 500 affected households. They moved to higher land above the regular flood level, cleared the area of bushes, paved the streets, allocated bigger plots and used better building materials.

Several organizations started community and household gardens for improved food security, and enough was produced for home consumption as well as sales. Development committees were set up to discuss community needs and aspirations. Keys to the program's success were identified as community participation in identifying local vulnerability to floods, generating solutions, and developing a workplan.

Checklists of risk reduction activities

The following checklists may be useful tools for organizations and communities to organize and plan risk reduction programs

Checklists from the National Research Council, p. 62.

Awareness and Education

COMMUNITY ACTIONS	COMMUNITY PROGRESS		
	NO ACTION	ACTION STARTED	ACTION COMPLETED
Identify target groups/areas			
Create family and neighborhood awareness, education, preparedness campaigns			
Work with local media, coordinate emergency public information			
Inform public officials on their role and responsibilities, including legal aspects; prepare and distribute checklists for them to use during emergencies			
Develop a workplace hazard awareness and education campaign; collaborate to identify safety problems, increase business survivability			
Promote awareness, education, and preparedness at schools; encourage safety drills; distribute materials through schools			
Prepare elderly, disabled, and other groups with special needs by providing materials on steps to take, telephone numbers, etc.			
Promote awareness and education among professional groups (e.g., engineers, educators, city managers); work with professional associations			
Incorporate information into a community-wide awareness and education campaign, promote hazard awareness week, use local and voluntary organizations to assist in implementing programs			

Mitigation			
COMMUNITY ACTIONS	COMMUNITY PROGRESS		
	NO ACTION	ACTION STARTED	ACTION COMPLETED
Acquire property (enables local government to manage development of hazardous areas)			
Implement zoning and subdivision regulations (restrict/guide new development and reconstruction)			
Write and implement building codes (establish structural standards for new construction)			
Create tax credits (provide owner incentives to limit development or build in mitigation)			
Construct structural measures (dams, building retrofit)			
Implement nonstructural measures (minimize injuries and property damage, e.g., by securing equipment)			
Implement training programs (for multi-disciplinary audience, should include technical and scientific programs)			
Provide technical assistance (for local government, business, utilities; should address mitigation policy and practice)			
Implement programs in awareness and education (for general public)			

Summary

This part of the module presented a basic risk reduction menu which included societal, physical planning, economic, and engineering and construction measures. In most instances a balanced use of several of these methods may be needed to achieve effective risk reduction in the community.

Two other approaches for classifying risk reduction measures are classification by hazard type and by sector(s) affected. Both of these may be used to help outline typical strategies for reducing risk in your own community. These systems make it clear that different hazard types and different sectors require different mitigation strategies.

Several representative case studies were cited as examples of actual implementation of different possible risk reduction strategies. These case studies serve only as illustrations of the kinds of programs that have already been implemented in different communities around the world. It is recommended that any planning for similar initiatives incorporate a literature search and case study analysis of similar programs in order to capture lessons learned from these and other ongoing activities.

Finally, we provided checklists that a community group or organization can use to organize their risk reduction activities. These checklists can serve as a tool for planning and monitoring the status of risk reduction activities in your own community.

NOTES

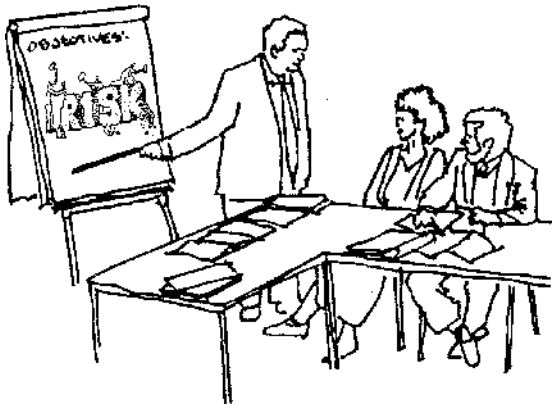
PART 3

Capacity building programs for risk reduction

In this part of the module you will learn about:

- *the levels at which capacity building for risk reduction may be directed – individual, organizational, and institutional*
- *four techniques for capacity building*

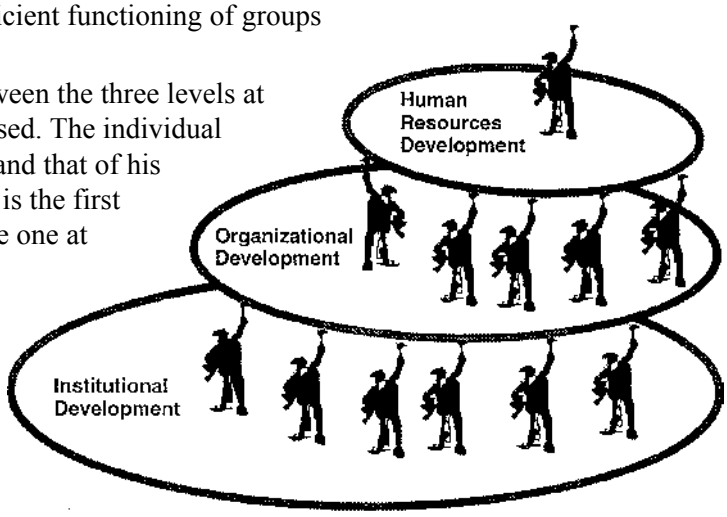
LEARNING OBJECTIVES



Capacity building

Capacity building focuses primarily on people and their actions rather than infrastructure or the environment. While the population explosion is often described as a root case of most disasters, capacity building approaches look for ways of converting this perspective of seeing people as the problem to one of seeing people as the solution. The focus of capacity building activities is on creating or further developing abilities within a community.

Capacity building equips people to work better in their own day-to-day affairs. To do this, capacity building must include the elements of **human resource development** (individual training), **organizational development** (improving the functioning of groups and organizations), and **institutional development** (the formalization of group initiatives into social structures with legal and regulatory authority to allow efficient functioning of groups and individuals).



The diagram illustrates the relationship between the three levels at which capacity building programs may be focused. The individual must have the capacity to reduce personal risk and that of his or her immediate family. This level of capacity is the first defense against vulnerability to hazards, and the one at which many risk reduction measures will ultimately be targeted. Individuals, however, are often not well-served in situations of little or no community organization or limited cooperation. Community organization is often required to set the stage for change at the local level. Finally, organizations and community groups of all kinds must in turn be supported by institutions such as ministries with authority and power of law and institutional support systems such as building codes that enable them to perform more effectively.

While all of these levels may not need strengthening in all situations, each level's support of disaster mitigation actions must be considered.

Consider the following examples of capacity building programs and the level (individual, organizational, or institutional) for which each is targeted.

Case study source: "Saving Lives After Disaster Strikes", Rosemary Fieth, *Stop Disasters,* number 24, 1995, p. 5.

Photo: Women preparing ORS for disaster affected areas. UNICEF photo printed in *Disaster Management Handbook for Bangladesh,* p. III-42.

Saving lives after disaster strikes

Be it earthquake, flood, cyclone, or drought, it's often not the disastrous event itself that causes the highest number of deaths but the aftermath, when affected individuals are located in over-crowded, inadequate shelter, with insufficient food, contaminated water supplies, and no sanitation. It's in these awful post-disaster conditions that epidemics and disease take their toll – especially on women, children, the sick and the elderly.

Outbreaks of dysentery, cholera, and typhoid spread rapidly and children quickly succumb to the dehydrating effects of diarrheal diseases. Measles epidemics can claim the lives of hundreds of children in a short time while others contract pneumonia because of the lack of warmth and shelter.

The most effective way to protect children from the epidemics and disease that follow disasters is to involve their mothers. Women are traditional and instinctive providers for, and protectors of, their children. If these natural strengths are supported by basic health and nutrition education, mothers will ensure that their children are vaccinated, that they have as nutritious a diet as resources can permit, and that they are given the simple salt and sugar preparation that can even be made at home (oral rehydration solution) in the event of diarrhea – all of which protect their children against the impact of disasters and save young lives.

In Bangladesh, for example, village women were trained in a simple seven point message about diarrhea prevention and its treatment, and in how to make a homemade version of oral rehydration solution. They then went from village to village, door to door, instructing other women in this basic lifesaving therapy. In this manner, 12 million households – far more than could ever be reached by conventional health service coverage – were made aware of the importance of oral rehydration therapy in the treatment of diarrhea in their children.

Q. *Does the type of program described above reduce vulnerability to hazards? If so, how?*

A. _____

_____

_____

_____

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_____

Q. *What types of programs exist in your community that focus on reducing individual vulnerability to disasters?*

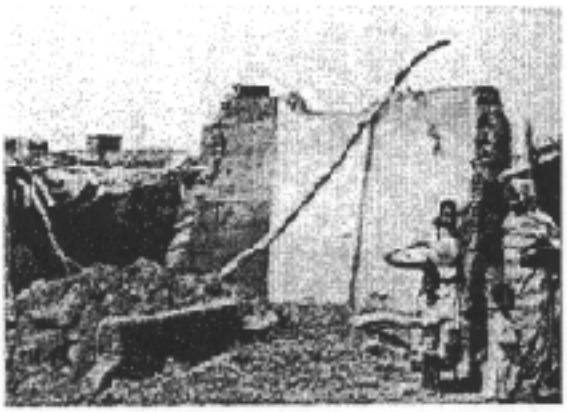
A. _____

_____

_____

_____

Flood committees help local areas take protective measures: the Sudan



The Sudanese government's decision to form a national network of flood committees is making a difference in how local authorities reduce vulnerability to floods. Khartoum, Sudan's capital, is situated at the juncture of the White Nile and the Blue Nile rivers. The city population has swelled in recent years to 4.2 million people; 1.6 million have migrated to the city due to civil conflict and famine. In 1988, floods from seasonal rains covered nearly 40% of Khartoum. The city's residents had no warning about the impending flood, which was the worst one to hit the area since 1946. Millions of dollars worth of property were destroyed and 28% of the people were affected.

The floods were used as a case study at a national workshop of the UN Disaster Management Training Programme, attended by government officials, NGOs and UN agencies in 1993. Following a workshop recommendation, the Sudanese government subsequently decided to form a National Flood Committee and additional sub-committees in flood-prone communities throughout Sudan.

A local community sub-committee immediately started work on flood embankments, with help from the national government, NGOs and community residents. In 1994, Sudan experienced floods similar to those in 1988. A combination of the new flood embankments, early warning measures and greater community awareness made a difference. In 1994, there was very little damage to areas previously affected by flooding.

Case study source: Adapted from "Flood Committees Help Local Areas Take Protective Measures" by Yousef Bakheit Idris in *Cities at Risk – Making Cities Safer… Before Disaster Strikes,* IDNDR, page 31.

Photo: Victims in North Khartoum outside their ruined home. LRCS photo from *UNDRO News,* Sep/Oct 1988, p. 5.

Q. *At what level was this capacity building program addressed? How? What other levels may have been involved in strengthening the various committees? How might they have been involved?*

A. _____

_____

_____

_____

Case study source: "Medellin: A Citywide Effort Shows that 'Prevention Pays'" from UN-IDNDR and QUIPUNET Internet Conference, Solutions for Cities at Risk, 26 August 1996-25 October 1996.

Photo: STOP Disasters, No. 15, 1993, p. 23.

Capacity building through institutional development in Medellín

The city of Medellín, Colombia has a population of 1.8 million people and a very high annual growth rate. It faces many natural hazards on a regular basis. The city's infrastructure and inhabitants are vulnerable to landslides, floods, and earthquakes as well as a generally worsening socio-economic situation.

Some 200,000 people live in slum settlements on the city's steep hillsides. After a landslide killed more than 500 people in 1987 and left another 3,500 homeless, the people committed themselves to reducing risk from landslides. A new municipal system for prevention, response and rehabilitation has been able to integrate risk management strategies with municipal physical, social and economic planning. Community participation has changed local attitudes about reducing risk, and these new strategies have been effective. Landslides have decreased from 533 in 1993 to 222 in 1994, and 191 in 1995.

Disaster prevention and management strategies are incorporated in the Strategic Development Plan of Medellín, approved by the city council and endorsed by popular consensus through open discussions and exhibits. The strategic plan includes the creation of a Municipal System of Prevention, Response and Rehabilitation that depends on the Mayor's Office, and an Executive Board (consisting of 12 Committees, including education, planning, housing, response, rehabilitation, etc.). A special financial management account within the municipal budget is evidence of the city's financial commitment to disaster management.

Q. *What institutions in your community support risk reduction? Based on this example, what ideas do you have for strengthening local institutions in order to reduce disaster risks in your community?*

A. _____

_____

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_____

_____

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_____

ANSWER (for page 34)

By training village women about diarrhea prevention and its treatment, the program described above reduces the vulnerability of children to hazards. Knowledge of how to avoid diarrhea and how to treat it if it does occur should prevent massive outbreaks of disease following the occurrence of a hazard.

ANSWER (for page 35)

The Sudan capacity building program was addressed to the organizational level. As a result of a national workshop of the UN Disaster Management Training Programme, the Sudanese government formed a National Flood Committee and additional sub-committees to work on reducing community risks due to flooding.

In the previous example, it is possible that both institutions and individuals were involved in the vulnerability reduction efforts. The National Flood Committee may have been given some regulatory or enforcement authority in local areas. Community residents who participated in the work on flood embankments (and possibly the implementation of early warning and community awareness activities) may have increased their knowledge of flood mitigation techniques.

Techniques for capacity building

Developing risk reduction measures depends on the strength of local people – individually, organizationally and institutionally. Their capacities can be strengthened through several different methods which can be loosely categorized as follows:

Training/technology transfer

- transfer of talent and technician exchange programs
- centers of appropriate technology providing access to essential information
- organized vocational training

Community organizing

- community meetings
- community outreach services
- efforts to involve the community in risk reduction activities

Threshold or trigger funding

- revolving credit schemes
- long-term, low interest loans and base grants
- material and equipment grants
- local banks which support such funding

Awareness campaigns

- public awareness media campaigns
- awareness raising workshops
- school and workplace programs

These categories indicate a range of approaches to capacity building. They are presented as individual ideas or strategies which can be combined into a single program or family of programs. The case studies that illustrate these techniques highlight the degree to which various ideas can be combined in order to develop suitable, locally appropriate programs.

Training/technology transfer

Programs that transfer technology provide essential information that local people and institutions need to reduce risk effectively. While appreciating existing local strengths and coping mechanisms, program designers also recognize non-indigenous coping mechanisms, technologies, or approaches which may be valuable in the local situation. The objective of these programs is to bring the "missing" technology or knowledge to the community. There are different methods for achieving this objective: local representatives may obtain training in the countries where the technology is available, the technology may be disseminated at the level where it is needed through model programs or technology centers, or formal training programs may be developed to incorporate these technologies into national and local training institutions.

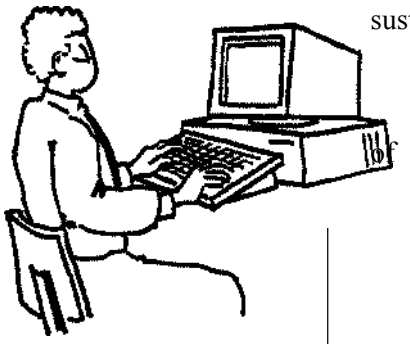
Capacity building for electronic communication in Africa (CABECA)

In many ways the lack of access to information heightens vulnerability and risk of communities. Capacity building in the information sector begins with work to broaden access to information. CABECA is a three year program for the development of computer-based information access and networking systems for Africa. The program is funded by a grant from the Canadian International Development Research Centre (IDRC) and is implemented by the Pan African Development Information System (PADIS) of the United Nations Economic Commission for Africa (UNECA).

CABECA's overall objective is to provide technical assistance to bring about sustainable and affordable computer-based networking which is accessible to a wide variety of users from both the private and public sectors. To build African capacity for computer networking, CABECA will train a corps of system operators. This corps will then be responsible for training other users in their area and for offering continuing support to fledging users to ensure the sustainability of national nodes with connections to international networks.

Case study source: Capacity Building for Electronic Communication in Africa (CABECA), Pan African Development Information System (PADIS), United Nations Economic Commission for Africa
P.O. Box 3001
Addis Ababa Ethiopia
e-mail:
cabeca@padis.gn.apc.org.

The project's aim is to offer inexpensive and easy access to local and international information services on systems run by local operators and sustained by revenue generated from users. Users will be able to exchange electronic mail worldwide at a fraction of the cost of a fax or telex; they will also have access to conference mail, file transfer and databases. In addition, efforts will be made to facilitate African connections to the expanding range of Internet information services.



CABECA offers the following services to projects, institutions, organizations and individuals in Africa. They are treated as grants to institutions selected as national nodes, and billed on a fee-for service basis to all others.

- initial site visits and evaluations
- design of electronic communications plans
- information and sensitization workshops
- skills training for system operators and network users
- procurement, delivery and installation of hardware and software
- supply of manuals and documentation
- assistance in forming users groups
- technical support system operators and users

Community organizing

Local communities often have the technology or knowledge required to reduce their own vulnerability, but may be missing some key community or social structure that prevents them from realizing the benefits of vulnerability reduction at the community level. The objective of community organizing is to empower local people to act together and to overcome barriers to successful community action. These programs depend on the ability to create an active community "spirit" for change.

In many instances, the first requirement is to create an environment which fosters, rather than discourages community spirit. There are various methods to achieve this change in attitude; one well documented approach is called *community animation* which has long been used as a model by both grassroots as well as international development organizations, such as OXFAM. The following short illustration is taken from an OXFAM sponsored program in Jamaica.

Capacity building through organizatonal development: a process of animation for communities in Jamaica

In 1990, through a series of workshops and other community outreach events, members of several local development agencies and NGOs worked together in a process of "community animation" with leaders from several communities. These communities needed many essential services as well as the organizational structure and spirit for achieving them by working together. Community animation techniques were used to begin the journey from disinterest and antipathy to real community organization. The processes that were followed and insights to the community animation process were recorded in a publication entitled **"Who Am I?"** produced by the Ministry of Youth, the Urban Project for Children and Mothers.

The process resulted in a description of the roles and responsibilities of the various actors in the process of forming a community. It illustrated many of the roles required for effective community animation:

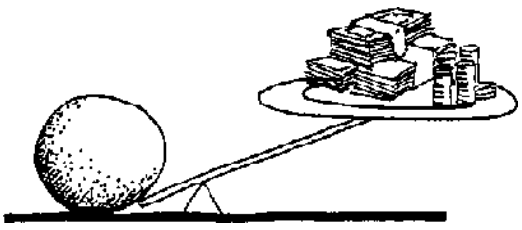
the convener	brings the group together
the enforcer	acts as time keeper and keeps the community on schedule in its task.
the secretary	records all details and information
the opposer	voices the other side of an "argument"
the messenger	borrows or trades ideas from community to community
the artiste	initiates cultural affairs
the counselor	brings and encourages peace
the observer	"takes stock" of what happens within the community

Issues involved in the strengthening of community groups are described as:

- finding a common priority among communities
- learning how to handle disagreement
- reaching a compromise
- the role of the elected representative in the constituency—the role of the Member of Parliament and the need to utilize these services for the benefit of the people

The tools and methods used in the community workshops were:

- inviting, bringing people together, organizing groups
- hand picking some members (responsible people)
- using posters
- communication by word of mouth
- meeting regularly
- conducting role plays, open discussion, drawings
- not spoon feeding members



Threshold or trigger funding

Sometimes the local community knows how to reduce vulnerability and has an active base of individuals willing to work on reducing community risks. Their capacity may be limited, however, by lack of access to funds or equipment that would allow them to put their knowledge, skills and plans into action. Threshold or trigger funding may be the key to launching a risk reduction program in such a community. Such threshold funding can be made through:

- revolving credit schemes
- long-term, low interest loans and base grants
- material and equipment grants
- the involvement of local banks which support these ideas

One example of this approach is the micro-credit delivery system of the Grameen Bank in Bangladesh and elsewhere. This program provides small loans to individuals for self-help schemes and small business ventures which produce enough money for borrowers to pay off the loans. Borrowers have used this method as a way to develop self-sustaining businesses. For risk reduction activities with an economic payback, initial funding may be the critical element that is lacking in order to implement the activity.

Awareness campaigns

At times communities lack neither organization nor funding; rather, they may lack adequate information on the nature of a hazard. Awareness campaigns enable community members to act in a well-informed manner.

These campaigns range from specific radio and news announcements about evacuation routes in situations of hurricanes and/or flooding to the inclusion of general information about hazards and recommended responses in the public school curricula. These programs may include:

- public awareness media campaigns
- awareness raising workshops
- school and workplace programs

One general awareness-raising campaign is the International Decade for Natural Disaster Reduction (IDNDR), implemented within the United Nations Department of Humanitarian Affairs. It has initiated a global awareness campaign called "Learning About Natural Disasters: Games and Projects for You and Your Friends" which is designed to help initiate a "culture of prevention" among children in vulnerable communities. The booklet is general in scope and international in approach as it includes materials from many countries and different cultures.

Learning about natural disasters: games and projects for you and your friends

The booklet includes information about the basic scope and types of natural disasters, and the accompanying risks associated with them. With a colorful format and simplified illustrations, the booklet provides ideas for activities that children can do in their classrooms and communities to reduce risks. Activities described in the booklet include: community mapping exercises, a "preparedness" game, awareness raising through art exhibits, community "reporting" and a pen pal forum for school children based on natural disasters.

Many of the ideas in this booklet are taken from projects done by children around the world. The booklet is designed to help young students:

- appreciate natural forces in the environment, and how to protect things important to them
- consider the contributions they can make in their community by participating in disaster prevention and preparedness activities
- exchange ideas with other children around the world, in order to enhance their own safety and that of their community

For more information about IDNDR and disaster reduction programs in your area, or for a copy of this booklet, contact:

International Decade for Natural Disaster Reduction (IDNDR) Secretariat
UN Department of Humanitarian Affairs
Palais des Nations
1211 Geneva 10, Switzerland
tel.: 41 22 798 6894
fax: 41 22 733 8695
e-mail: dhagva@un.org

Synthesis of approaches

It is rare for any one of these capacity building techniques to be the sole risk reduction effort. Physical engineering measures or land use planning strategies are often used with capacity building techniques to increase the probability that real risk reduction will occur. The following example describes several programs which have successfully mixed various development, infrastructural, and capacity building approaches in a complementary way.

Reducing cyclone risk – Andhra Pradesh, India

Nations and societies are galvanized into action when a disaster occurs. The Indian experience with cyclones in the state of Andhra Pradesh is a dramatic example. Andhra Pradesh is the fourth most populous state in India. It is located on the southeastern part of the Indian Peninsula and has a population of approximately 60 million people, approximately 195 people per square kilometer. It has a vast coast line of 1,030 km abutting the Bay of Bengal. Two of India's largest rivers, Krishna and Godavari, flow through the state. The nine densely populated coastal districts have extremely fertile land. Two out of every five cyclones arising in the Bay of Bengal affect this coast line. From 1900–1990, approximately 57 devastating cyclones hit the coastal districts.

Case study source: B. Narasimhan. 1995. "Andhra Pradesh's (India) Hard Road Forward." *Stop Disasters,* No. 25.

In 1977, a catastrophic cyclone, with wind speeds measuring 200 km/hr accompanied by tidal waves over 15 meters high, moved inland up to 12 km and affected 3.4 million inhabitants – killing 10,000 people and 230,000 head of cattle. In 1990, another cyclone, with wind speeds of 240-250 km/hr, tidal waves of over four meters and heavy rainfall for 48 hours moved inland up to 25 km in the same area. It affected 7.7 million inhabitants and resulted in the death of 910 people and 27,000 cattle. This dramatic reduction in cyclone impact reflects the State's deliberate shift from relief to preparedness.

After the traumatic 1977 cyclone, the State put together a long-term strategy to face the constant threat of cyclones. *Information, involvement and initiatives* were the three dimensions of the strategy. After 1977, there was a concerted effort to improve the Disaster Warning System for direct dissemination of cyclone warnings to the user through INSAT satellites and a network of HAM amateur wireless radio operators. In addition, more accurate cyclone forecasting made early warning and real time information on the progress of cyclones a reality.

Soon after 1977, the State formulated and operationalized a detailed contingency plan on evacuation, emergency relief and health care. NGOs in the area embarked on a major education campaign regarding cyclone warnings and preparedness to handle sanitation and emergencies during the isolation period following the cyclone.

The contingency plan laid out complete details on the logistics of evacuation, identification of cyclone shelters and prepositioning of medicines. The plan provides for a unified command, pre-determined rescue teams and emergency health teams. By 1990, 740 cyclone shelters were in place at strategic locations. Thanks to the preparedness measures, nearly 650,000 people were evacuated to safer places in 1,098 relief camps. Nearly 2,000 rescue teams and 543 health teams could be pressed into service well in time.

What are the lessons of the 1977 and 1990 cyclones in Andhra Pradesh? Better warning systems, community education and involvement, efforts to improve facilities and operational efficiency contributed to significant reduction in the impact of disasters.

EXERCISE: Read through the following excerpt from the UN Convention to Combat Desertification. In the space provided, identify the capacity building technique and level(s) at which it is targeted (individual, organizational or institutional).

Excerpts from Article 19: Capacity building, education and public awareness

1. The Parties recognize the significance of capacity building—that is to say, institution building, training and development of relevant local and national capacities—in efforts to combat desertification and mitigate the effects of drought. They shall promote, as appropriate, capacity building:

	Technique	Level(s)
(a) through the full participation at all levels of local people, particularly at the local level, especially women and youth, with the cooperation of non-governmental and local organizations		
(b) by strengthening training and research capacity at the national level in the field of desertification and drought		
(d) by fostering the use and dissemination of the knowledge, know-how and practices of local people in technical cooperation programs, wherever possible		
(f) by providing appropriate training and technology in the use of alternative energy sources, particularly renewable energy resources, aimed particularly at reducing dependence on wood for fuel		
(h) through innovative ways of promoting alternative livelihoods, including training in new skills		
(i) by training of decision makers, managers and personnel who are responsible for the collection and analysis of data for the dissemination and use of early warning information on drought conditions and for food production		

3. The Parties shall cooperate with each other and through competent intergovernmental organizations, as well as with non-governmental organizations, in undertaking and supporting public awareness and educational programs in both affected and, where relevant, unaffected country Parties to promote understanding of the causes and effects of desertification and drought and of the importance of meeting the effect of this Convention. To that end, they shall:

	Technique	Level(s)
(b) promote, on a permanent basis, access by the public to relevant information, and wide public participation in education and awareness activities		
(c) encourage the establishment of associations that contribute to public awareness		
(e) assess educational needs in affected areas, elaborate appropriate school curricula and expand as needed, educational and adult literacy programs and opportunities for all, in particular for girls and women, on the identification, conservation and sustainable use and management of the natural resources of affected areas		
(f) develop interdisciplinary participatory programs integrating desertification and drought awareness into educational systems and in non-formal, adult, distance and practical educational programs		

Summary

There are different levels at which capacity building programs may be implemented: individual, organizational, and institutional. While any of these levels may be specifically targeted by a program, it must be understood that each level is dependent on the success of the others. This means that successful programs must operate in a context where all three levels of capacity are adequately addressed.

Four techniques for capacity building were discussed:

- training and technology transfer
- community organization
- threshold or trigger funding
- public awareness campaigns

While each of these methods of capacity building addresses different needs, planners typically use one or more of these methods simultaneously, and at different levels, as a way to ensure that programs can function in a sustainable way. For example, a program to reduce community vulnerability to high winds might:

- import a (locally) new technology using metal angles for tying roof rafters to walls better
- conduct a public information campaign about the dangers of unsafe roofs and new methods for improvement
- implement a "safe roof" building code, and widely publicize it
- provide threshold funding for local production of metal angles
- organize the community to develop and maintain neighbourhood brush clearing and emergency repair and retrofit crews in preparation for the arrival of storms
- train building inspectors to identify unsafe roofs
- design school programs related to preparation and response to storms for different age groups

In this way capacity is built through various techniques and at all levels.

The final part of the module, **Managing Capacity Building Programs for Risk Reduction,** includes a discussion of the issues involved in the day-to-day running of programs that build capacity. We will discuss management through monitoring, correcting and evaluating program activities and results.

NOTES

ANSWERS (for page 42)

	Technique	Levels
1(a)	animation	individual, organizational
1(b)	training/ technology transfer	institutional
1(d)	training/ technology transfer	individual, organizational
1(f)	training/ technology transfer	individual
1(h)	training/ technology transfer	individual, organizational
1(j)	training/ technology transfer	institutional
3(b)	public awareness	institutional
3(c)	public awareness, community animation	organizational
3(e)	public awareness	individual
3(f)	public awareness	individual, organizational

PART 4

Managing capacity building programs for risk reduction

After completing this section, you will be able to describe various management aspects of programs for building capacities in risk reduction, including how to:

- *document the context and the process*
- *set objectives*
- *set standards for program evaluation*
- *measure sustainability*
- *budget and staff capacity building programs*
- *coordinate among agencies*

LEARNING OBJECTIVES

Like any other project, risk reduction programs must be managed and monitored in order to determine whether vulnerability or risk has decreased and capacities have increased. Funding agencies must be able to determine whether or not money is being well spent, and training programs for building capacity must be evaluated to determine their impact. Putting programs into practice requires a work plan that details personnel, schedule, equipment, and budget needs. All the normal project management functions must be implemented as well as hiring people and monitoring their ongoing activities.

Before initiating capacity building programs, however, program planners must address two primary questions.

1. How can an outside agency determine that assistance is needed locally?
2. How can assistance be offered so that it strengthens rather than weakens local capacities?

Taking into consideration these two questions may ensure the successful implementation and long-term viability of risk reduction activities.

If the goal of capacity building programs is to empower local communities to plan their own risk reduction activities, why is an outside program or stimulus needed? Doesn't support from outside sources simply weaken local capacities?

Participatory approaches

Building capacities for risk reduction depends on the participation of those who are potentially affected by a hazard event—including representatives of governments, businesses and other organizations, as well as individuals. In Part 3, we discussed the three levels at which capacity building programs can be targeted as well as the technique of community organizing, or "animation". Since the early 1980s, the disaster relief community has moved from a position of outsider as "expert" to one where the views and experiences of those affected by a disaster are listened to and appreciated.

This move to a more participatory approach, however, is not without difficulties (Mitchell, 1997).

Outsiders may be quick to characterize and identify "the community" with which they are working, without carefully understanding the history, structures and dynamics of the group. Communities may be defined by geographic boundaries or by "a group of people who relate to each other through clear notions of reciprocity, legitimate authority, and a body of accepted rights, norms, duties and obligations" (Mitchell, 1997, p. 30). Nevertheless, it is not realistic to expect that all members of a community will have similar views. There may be different sub-groups defined by ethnicity, religion, clan, etc. Those who choose to work in a given location should try to understand the different sub-groups and the political implications of working with one group rather than another.

Identification of leaders is another critical component of a participatory approach. There are many types of leaders within a community – from formal leaders such as government officials and traditional leaders to business leaders and informal leaders such as the local water management expert described below. Leaders—especially non-traditional leaders—should be identified through discussion with local residents.

Case study source: Chenje, 1994 in von Kotze and Holloway, 1996, p. 89.

Photo: Von Kotze and Holloway, 1996, p. 101.

Rural water management conquers drought

"Peter Mosweu has no formal training but the skill he has acquired over eight decades qualifies him as a rural water-management expert and drought survivor.

The 84-year-old farmer from Botswana, who never went to college or university, today hosts groups of students from a Gaborone agricultural college at his 51-hectare farm in Dinkgwana communal lands, to show them his water-harvesting skills.

'I did not go to school to train as a water engineer', says the grey-haired, five-foot Mosweu, 'but I have equally good knowledge on how to harness water and I have used those skills to build two dams.'

Fed up with the 10 km trek his family had to make almost every other day to and from a district borehole in Mochudi village about 40 km north of the capital, Gaborone, the farmer built his first dam using a spade. The dam, on a fast-flowing underground stream, took three years to complete. It now holds about 400 cubic metres of water, according to local estimates.

Since the dam was built more than 15 years ago, Mosweu, his family and livestock have escaped largely unscathed by the cycles of drought that grip Botswana almost on a regular basis. During the 1991–92 drought, described as the most severe in living memory, Mosweu's family and about 100 neighbours survived with their animals intact.

While many people in Botswana lost some of their animals or could not use them as draught power because they were too weak, Mosweu's livestock – cattle, donkey, pigs, goats and sheep – was in good shape.

He supplies his neighbours with water, 'because it's good neighbourliness to do so'. His philosophy is simple: Love thy neighbour. He explains that while he may have abundant water supplies today, he may suffer shortages in other necessities tomorrow and believe his neighbours will come to his aid.

Mosweu's fame as a rural water expert has attracted the attention of the Forum on Sustainble Agriculture, a Gaborone-based non-governmental organisation. It has invited him to participate in its farmer-to-farmer programme whose aim is to get Botswana farmers to learn from each other's experiences and share skills."

Documenting the context and the process

It is important to carefully analyze the context of the local community at the beginning of the capacity building initiative. A thorough understanding of the community and their existing vulnerabilities and strengths will greatly enhance the design of a capacity building program and is required to adequately launch the program. In addition, a credible baseline of information must be established at the beginning of the project if end results are to be measured later.

One way to gather this information is through a process of mapping hazards, vulnerabilities, capacities and resources. This mapping process can be conducted at multiple levels – geographic area, local community, household. Local residents create these maps by identifying both physical and social elements of an area (or community or group of households). Participants in the mapping process use different symbols to indicate hazards, vulnerabilities and capacities. When analyzing these maps, groups should consider the following questions (von Kotze and Holloway, 1996):

- Where was the data from the maps obtained?
- How do participants know the information is accurate?
- What additional information would be useful and where could it be obtained?
- Which sources of information are particularly useful for hazard, vulnerability and capacity assessment? Why? How?

By beginning a mapping process with a geographic area and then analyzing the local communities within that area, the maps may begin to illustrate how different communities may be differentially affected by a hazard event. By taking the process to the household level, participants may generate information about the vulnerabilities of specific groups of people within a community, such as women, children and the elderly. Participants in a Southern Africa workshop on reducing risk commented that the mapping process, specifically "itemising (in drawings) what there is, gives us a picture of elements we might have overlooked" (von Kotze and Holloway, 1996, p. 98). Three dimensional mapping is a further adaptation of this way of analyzing a community's vulnerabilities and resources.

Three dimensional mapping in the Philippines

"The Philippines is one of the most disaster prone countries in the world. Aside from cataclysmic events like the eruption of Mount Pinatubo, the country – an archipelago of hundreds of islands – is battered every year by dozens of typhoon storms… Igbalangao is a medium sized village beside the Cangaranan river a few miles from the west of the coast of the island of Panay.

In 1995, a research team consisting of staff from a local NGO, residents and members of the village council in Igbalangao and five visitors with knowledge of building, disaster management and development issues in the Philippines set out to determine how people in the Philippines cope with these recurring natural hazards and whether their knowledge and practical ways of mitigating natural hazards are relevant to others.

The research team spent five days in Igbalangao. The entry points for the study—buildings and typhoons—were explained to the village kabalaka—people's organisation—which was hosting the research team. With the encouragement of the chair of the kabalaka, several hundred villagers took part in a five-day workshop. The most detailed picture of vulnerability and capacity created by the group was contained in a three dimensional map of the village and a miniature house which local artisans built.

The map was made on a sheet of 8ft×4ft (2.4 m x 1.2 m) plywood. Plywood is a popular building material in the Philippines. The village street plan was drawn first, then the surrounding hills which form the local watershed were modelled in flour and water dough. The river and seasonal streams were marked and every house in the village plotted. This map became the key reference point for all the other workshop sessions. Day-by-day more detail was added. Often, **people were found arguing over whether a particular house was well maintained—and therefore more likely to withstand the next typhoon—or whether the people who lived near the river had somewhere dry to store their harvest.**

Each house was classified by size, materials and state of repair (different seeds and stones represented various features that people decided were important). Thus **the situation of every household was mapped.** Many are tenants, particularly those living in the most flood prone corner of the village. They were thought to be especially vulnerable to the effect of a typhoon, or a drought as **most are wage labourers with no land holding.** A small minority of these families own a bullock which they rent our for ploughing, but the poorest have almost nothing to fall back on when there is no work in the rice fields. The mapping gave people a chance to identify who were the most vulnerable and it led into workshop sessions which described both how the situation had changed in recent years and what-if forecasting. What if the bullock drowned, or what if the son of the widow who now lives alone is unable to reach the village when the road link is cut by flooding?

Kabalaka members said this information was thoroughly familiar, but **the map had given them an overview which would be invaluable for the disaster management plan which the community [was] supposed to prepare as part of the government's decentralisation strategy.**

Case study course: N. Hall, "Incorporating Local Level Mitigation Strategies into National and International Disaster Response" in *Mitigating the Millennium,* Intermediate Technology, pp. 41-43.

Photo: N. Hall, Intermediate Technology.

Mapping exercises, then, are not merely an effort to provide a picture of vulnerabilities and capacities. Rather, once the picture is drawn, actions must be taken to reduce the identified vulnerabilities, further strengthen identified capacities and develop capacities where they are lacking.

Setting objectives

Clear objectives – such as a series of actions, a sustained process, continued building on previous accomplishments – must be set at the beginning of the capacity building process. While many people see capacity building as an end in itself, it is essential to define measurable outcomes, targeted to specific risk reduction areas, if meaningful monitoring and evaluation is to be undertaken. Even though different aspects of the program will require different objectives and methods for establishing whether or not the objectives have been met, guidelines, such as the following, for formulating project objectives may be useful.

- "An objective should be realistic in terms of time, quantity, quality, and cost. The beneficiaries should be clearly identified in number and location. If the objectives are not defined precisely, what remains is simply a vague statement of intent.
- The planning process must involve people, and objectives should be defined with people and not for them. Involvement of project stakeholders in planning a programme generally results in their greater commitment to implementation.
- In some cases the main objective of a programme might result from an outsider's perception of a given community's needs, and might differ from those perceived by the community itself. However, the participants in the project must be able to see some objectives in the project which relate to their own experience; there will otherwise be no reason for them to continue working with the programme" (Oxfam, 1985, p. 85).

You may want to consider developing objectives that address:

- sustainability (is the program viable after the initial implementation stage?)
- participation of beneficiaries
- demonstration of increased risk reduction skills among project participants
- implementation of risk reduction strategies

Setting standards for program evaluation

For risk reduction programs, such as physical infrastructure improvements and the construction of earthworks or dams, progress can be directly monitored with easily quantified variables. Was the structure built on time? for the budgeted amount? to the contract specifications? If the answers are all positive, project performance to the stated targets was successful. What similar standards can be used to evaluate capacity building programs?

If the program design requires a specific group of participants to be trained, their knowledge of the program areas, methods, techniques, and activities can be determined prior to program implementation using an

"entry questionnaire". Thorough information should be gathered to facilitate later follow-up with program participants as a component of program monitoring or evaluation. The results of the questionnaire should be archived with an organization which is likely to remain in existence.

For a community awareness-raising campaign, the goal may be to disseminate information to the public alerting them of potential hazards, and advising them of possible preparation and response measures they can take. If the television and radio messages were finished on time and broadcast as contracted, was the program a success? Is a better indicator needed? If a survey were conducted and seven out of ten people responded that they had heard all or part of the campaign on the radio, was the program a success? If during the next hazard occurrence there is a reduction in damage reported by the community, is this a measure of program success? How can it be proven that the awareness campaign, and not some other factor, had any impact on the reduced level of damage to the community?

Plainly, capacity building programs pose many difficulties for the program evaluator. These difficulties can be lessened, however, if some quantifiable standards are established at the outset of the program by which success may be measured. For public education programs, saturation may be measured by post-information-campaign surveys. If the focus of the public education campaign is reducing risks by changing people's behaviors, surveys may ask what preparedness activities the respondent and his/her family carried out in order to decrease their vulnerability to a potential hazard. In addition, after a hazard event occurs, a survey of local residents may solicit information regarding:

- What respondents knew/heard about the approaching hazard?
- When they knew/heard about the approaching hazard?
- How they found out about the approaching hazard?
- What the family did after they learned of the approaching hazard?

Answers to these questions may be helpful for evaluating whether information and public education campaigns had an impact on what steps people took to reduce their vulnerability to a hazard event. Program planners should budget from the beginning for follow-up surveys.

Measuring sustainability

A primary goal of capacity building programs is *sustainability.* Sustainability is measured not by how the program was implemented, but to what extent it "lives on" after initial implementation. Designing for, and ultimately measuring, sustainability can be managed if the proper groundwork is done in the initial stages of the project or program. "Although a great deal of information is collected on whether programs are implemented on time and within their budgets, little is known about whether the massive social and economic development programs actually achieve their intended objectives and produce the benefits of changes for which they were designed" (Valadez and Bamberger, 1994, p. 27).

This bias toward monitoring implementation arises because most government resources go into project implementation (that is construction of new roads, schools, factories and hospitals). Fewer resources are devoted to budgets which fund on-going operations and maintenance. Similarly, the focus of international assistance agencies is primarily on monitoring project

implementation. Long-term impact evaluations are rarely conducted. The fact that most governments and implementing agencies focus more on the assessment of *inputs* than on the evaluation of *outputs* further constrains project evaluation. This focus limits the demand for evaluations of the quality or cost-effectiveness of outputs or the estimation of impacts.

A broader problem arises from the fact that most governments and policy-makers operate within a specific budgetary time cycle. Most countries continue to operate on annual budget cycles, and consequently planners and operational agencies tend to focus on short-term implementation objectives. This means that one of the most powerful applications of evaluation – namely long-term prospective studies – is rarely used (Valadez and Bamberger, 1994, pp. 27-28).

The difficulties associated with measuring sustainability, however, should not preclude efforts to determine whether risk reduction measures will be adopted as an on-going part of a community's disaster plans. In general the following types of questions must be answered to evaluate a project's sustainability:

- Whan can be measured in the short-to medium-term (or during the project) that will tell whether something is likely to be sustained?
- What longer term impact is expected?
- How can the impact be measured?

Examples of indicators for determining sustainability include:

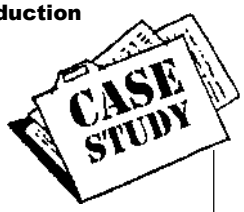
- If households, communities or local governments are committed to successful implementation of risk reduction measures, look for a willingness on their part to invest their own resources in the project.
- If municipal governments are committed to enforcing or implementing risk reduction policies, look for a dedicated amount in their budgets for enforcement or implementation.
- If training has improved the technical capability of an agency to forecast flood levels or storm surges. For example, look for continued use of the forecasting methods, accuracy of forecast results, interest from other agencies, acceptance and use of the information by insurers/ investors/planners, etc.

Budgeting

Budgeting for capacity building programs will depend on the type of program. Aside from materials or funds needed for initial threshold funding or other start-up costs, money is necessary for project management, reporting, monitoring, implementation of needed program corrections, and eventual program evaluation.

Even in relatively low-budget programs such as community organizing or the promotion of public volunteers, program planners should carefully consider associated costs which are necessary for the success of the project. Volunteers will often need equipment for awareness raising activities and for physical mitigation and response activities such as clearing brush and planting trees.

Communications equipment is often needed for capacity building programs and should be planned for in the initial budgeting phases. Budgets for training programs on the use of new equipment are also often necessary. This is illustrated in the following case study.



Case study source: *World Disasters Report,* 1995, International Federation of the Red Cross and Red Crescent Societies, p. 78.

Bangladesh cyclone warning system: Investing in local capacity

Although the program employs 101 paid staff, it relies on a network of 27,000 Bangladesh Red Cross Society (BDRCS) volunteers. They often risk their lives to inform villages of approaching cyclones and of orders to evacuate. The Cyclone Preparedness Program (CPP) is organized in 2,707 units (village groups) in all 257 unions (divisions) of the 30 thanas in the High Risk Area. A unit comprises a leader and nine other volunteers, serving 2,000 to 3,000 people. They manage five key factors: warning, evacuation and shelter, rescue, first aid, and relief. Despite being unpaid and on-duty throughout the April-June and November-December cyclone seasons, many seek the status of CPP volunteer. Tough selection criteria include an upper age limit of 45, literacy, physical fitness and commitment to the voluntary ideal.

The volunteers' mandate is to ensure that accurate warnings reach local people, particularly in remote areas, and to assist in evacuation. Each unit should have a siren, megaphone, transistor radio, bicycle, light, raincoat, BDRCS vest and signal flags. After the 1991 cyclone, it was noted that too much basic CPP hardware was old or broken. With support from National Societies, the International Federation of Red Cross and Red Crescent Societies undertook a training/re-equipment program, spending 2.5 million Swiss Francs on a wide range of items including communications equipment (HF/VHF radios, walkie-talkies, solar panels, masts), warning materials (flags, megaphones, sirens), transport equipment (motorcycles, bicycles), training (badges, handbooks) and first aid materials.

Staffing

Sketch from D. Werner and B. Bower, **Helping Health Workers Learn,** 1987, p. 6-5.

Staffing issues for capacity building programs are also essential to their success. Since capacity building approaches depend on the interpersonal and organizationals kills of the initiators, staff selected for these responsibilities must be properly oriented and skilled in these areas.

One aspect of staffing which must be carefully analyzed in all capacity building programs is sustainability. These programs should not simply address a narrow range of actions. Rather, the process itself should be self-replicating. Local people who are likely to remain in community service can be supported and trained rather than expatriate experts, although such experts may be useful in the initial phases of the program and for program evaluation. They often have a wider range of program experience with which to compare the outcomes of a local program.

Coordination

This module has established that there are many ways to build capacities for risk reduction. Because the opportunities for risk reduction and the strategies for implementation are so varied, the advantages of coordinating efforts are considerable. These advantages include potential for:

- improved efficiency and cost-effectiveness
- a framework for strategic decision making on issues common to several agencies
- a coherent approach to risk reduction
- elimination of gaps and duplication in programs designed to reduce risk
- an appropriate division of responsibilities among implementing agencies

Coordination should result in more agencies being aware of each other's (and the local community's) activities and therefore provide a better understanding of each actor's comparative advantage. This understanding will allow agencies and organizations to work to their inherent strengths, which in turn will result in a stronger overall approach.

EXERSICE

1. Draw a rough map of your community – identify potential hazards and vulnerabilities as well as capacities within the community.
2. Identify a risk reduction project that is a priority to your community or that would help build capacities for risk reduction.
3. What will be the objectives of the program?
4. What standards will you use for evaluation of the program?
5. How will you ensure the sustainability of the program? What indicators will you use to measure sustainability?
6. What are the approximate budget and staff requirements for the program?
7. With what other agencies will you coordinate to increase overall program effectiveness?

Summary

In this part of the module, we outlined management aspects of capacity building programs for risk reduction. We advocated the need for clear objectives as an important step in program development. These objectives need to include criteria that support the sustainability of risk reduction activities, even beyond the life of a funded program. In addition, we considered the special requirements of capacity building programs related to such management aspects as staffing, budgeting, monitoring and evaluation.

The success of capacity building programs for risk reduction will be assessed on the basis of their accomplishments in terms of enabling participating countries or communities to inventory and value their resources; identify their vulnerabilities; define and assess options to mitigate the impact of hazard events; and make informed decisions based on reliable, relevant and accurate data. Indicators for specific projects are most likely to be related to measuring an improved knowledge base, attitudinal changes, enhanced skills, and the ability to attract resources to sustain the projects.

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