Nota: Este documento contiene imágenes en mal estado.

PART 2 DISASTER MANAGEMENT

PART 2 DISASTER MANAGEMENT

The disaster continuum was introduced in Part One. This part will re-examine the disaster continuum from the perspective of disaster management and its activities.

Disaster management has been defined as:

> *A collective term encompassing all aspects of planning for and responding to disasters, including both pre- and post-disaster activities. It involves the management of the risks and the consequences of disasters.*

The scope of disaster management, therefore, can include all disaster-related activities. These activities become so inclusive that no one individual is responsible for the entire range. Instead the responsibility is divided according to functional parameters and defined by the limits of the organization within which the manager works. The Red Cross/Red Crescent Societies, for example, work mainly in preparedness and emergency response phases and rarely in reconstruction. Some NGOs, conversely, work only in reconstruction. Even government, with its broad responsibility for overall aspects of disaster management, breaks down these components to be managed by several of its agencies. The UN has similar allocations of responsibility as a function of its mandates and sectoral expertise.

The following chapters will discuss the component activities of disaster management. You will be asked to examine your individual and organizational responsibilities in relation to each phase of activity.

Learning Objectives

After reading this part of the text and completing the exercises, you should know the basic concepts, aims and elements of disaster and emergency management. You will be able to:

- identify the components of disaster preparedness planning
- describe appropriate vulnerability and risk assessment techniques
- name the activities within disaster response
- identify the main objective of assessment
- describe development opportunities within the disaster reconstruction phase

CHAPTER 5

Disaster preparedness

The concept of disaster preparedness is quite straightforward. Its objective is to ensure that in times of disasters appropriate systems, procedures and resources are in place to assist those afflicted by the disaster and enable them to help themselves. Yet while the principles and objectives of disaster preparedness are clear, the steps towards establishing a practical and implementable disaster preparedness plan can be fraught with problems.

The aims of disaster preparedness are to minimize the adverse effects of a hazard through effective precautionary actions, and to ensure timely, appropriate and efficient organization and delivery of emergency response following the impact of a disaster.

This definition establishes the broad framework for disaster preparedness, but it is worth dwelling on some of the points implicit in the definition.

. . . "to minimize the adverse effects of a hazard" . . .

Disaster risk reduction is intended to minimize the adverse effects of a hazard by eliminating the vulnerabilities which hazards otherwise would expose and by directly reducing the potential impact of a hazard before it strikes. Disaster preparedness in its starkest form assumes that certain groups of people will nevertheless remain vulnerable, and that preparedness will have to address the consequences of a hazard's impact.

. . . "through effective precautionary actions" . . .

It is important to note that the term used is "precautionary actions," for all too often the end product of disaster preparedness is seen as a static plan to be devised and then filed until it is needed. Disaster preparedness, to the contrary, must be seen as an active and continuing process. Of course, both plans and strategies are required, but they both must be dynamic ventures, which are frequently reviewed, modified, updated and tested

. . . "to ensure timely, appropriate, and efficient organization and delivery" . . .

Perhaps one of the most difficult aspects of disaster management is that of timing. Timing also impinges upon the concept of disaster preparedness. Speed and timeliness have often been treated synonymously, a major conceptual flaw. Decisions related to timing must consider the relationship between relief inputs and their effects. In some types of disasters, flood, for example, there are certain basics such as shelter and clothing that may be required immediately. In terms of alleviating immediate distress, speed is critical. However, there are other forms of relief assistance that, under certain circumstances, may be disruptive unless delayed. Food assistance provides one obvious example. Rushing in massive amounts of food aid before a clear assessment of local market conditions and agricultural prospects are known can create unwarranted dependency and undermine local economies. Timeliness—not speed—should be the preparedness criterion.

Similarly, appropriate assistance demands careful scrutiny. The litany of inappropriate assistance that finds its way to disaster affected communities is all too long. Yet, the issue goes beyond the standard stories of canned pork and high heeled shoes to flooded, Muslim communities. The issue goes to the important and natural link between disaster preparedness, recovery and rehabilitation. Ultimately we need to ask if one of the key objectives of disaster preparedness—the provision of appropriate assistance—is designed merely to ensure the immediate survival of affected communities or, in ensuring immediate survival, to simultaneously pave the way for recovery? Not only is this question vital to consider in determining the boundaries of disaster preparedness itself, but it also necessarily becomes a practical determinant in the type of measures and resources committed to implementing a disaster preparedness strategy and plan.

The recommendation stemming from this module is that you ignore the linkage among disaster preparedness, recovery and rehabilitation at your own peril, or, at least at the peril of the affected community. Effective disaster preparedness planning incorporates the types of measures that will be needed for communities not only to survive but to recover.

. . . *"efficient organization and delivery"* . . .

Efficient organization and delivery suggest obvious criteria for effective disaster preparedness. Systematic planning, well executed distribution, clear cut roles and responsibilities are all issues that will emerge in several sections of this module. However, at this stage it might be worth putting the concept of "efficient" and "delivery" into context. Too often disaster situations create conditions of chaos. The best laid plans can mitigate but not eliminate the chaos. In this same sense, efficiency also is relative. To the extent possible, preparedness plans should seek to anticipate the sources of chaos and equally as important should try to anticipate what to do when plans go awry. However, where a criterion of efficiency becomes particularly important is in the context of distribution. The key here is to ensure that efficiency is measured in terms of the ability to deliver needed assistance to those most vulnerable. All too often in disaster relief situations, food and non-food relief arrives at the scene of a disaster, but no system or structure has been established to ensure that those in greatest need are the beneficiaries. In the final analysis, the most important test of efficiency is that those in need are adequately provided for.

Components of disaster preparedness

There are seven major components involved in disaster preparedness which provide a basis upon which a national disaster preparedness strategy can be developed. A precursor and prerequisite to these components is the assessment of vulnerability.

Assessing vulnerability

Fundamental to all aspects of disaster management is information. It is a point that may appear obvious, but it is frequently overlooked. The disaster manager may know that a particular geographic region or community is susceptible to the impacts of sudden or slow-onset hazards. However, in reality, until a decision is made on systematic ways to compile and assess information about disaster vulnerabilities, the manager is and will be working in a void.

Developing and compiling vulnerability assessments is one way of approaching a systematic means of establishing an essential disaster management tool. There will be more on this subject in the next chapter.

Planning

Throughout all the activities designed to promote disaster preparedness, the ultimate objective is to have plans in place that are agreed upon, that are implementable and for which commitment and resources are relatively assured. The plan itself will have to address the following points.

Institutional framework

A coordinated disaster preparedness and response system is a prerequisite to any disaster preparedness plan. There is no standard way of ensuring effective coordination. Each design will depend upon the traditions and governmental structure of the country under review. However, without ensuring that there is "horizontal coordination" at central government levels among ministries and specialized government bodies and "vertical coordination" between central and local authorities, a plan will rapidly disintegrate. This requires a structure for decision-making, inter-ministerial committees to coordinate the plan, focal points within each ministry to be responsible for the plan implementation and communication, as well as regional and community structures to implement the plan at the local level.

Information systems

The preparedness plan must have an information system. For slow onset disasters this should consist of a formalized data collection process, and early warning system (especially for regions prone to famine), and monitoring system to update the early warning information. For sudden onset disasters a similar system must be in place for prediction, warning, and evacuation communication.

Resource base

The requirements to meet an emergency situation will clearly depend upon the types of hazards the plan anticipates. Such requirements should be made explicit, and should cover all aspects of disaster relief and recovery implementation. The range of relief requirements is too extensive to put in this module, but this list indicates some of the major requirements:

- shelter
- medicines
- food
- supplementary food
- communications systems
- logistics systems
- relief workers
- clearance equipment

Response mechanisms

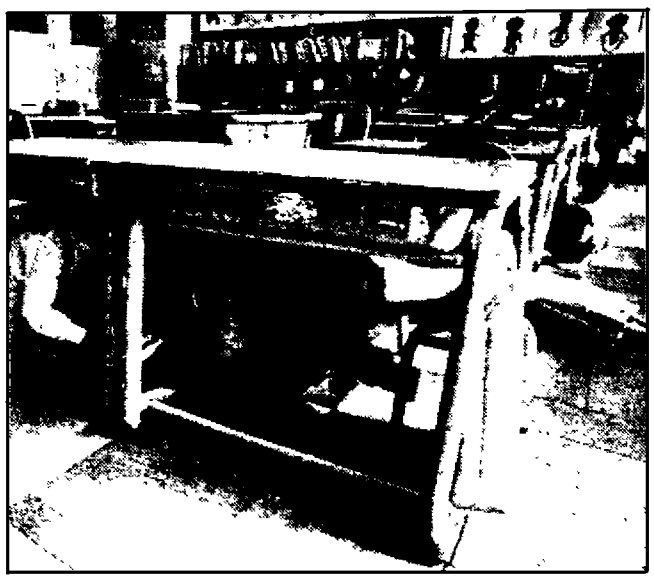
The plan's ultimate test is the effectiveness of response to warnings and disaster impacts. At a certain stage in the warning process, various responses will have to be mobilized. The staging of responses becomes an essential factor in designing a preparedness plan. Chapter 7 lays out the required responses.

Public education and training

The focus of a disaster preparedness plan should be to anticipate, to the extent possible, the types of requirements needed for action or responses to warnings and a disaster relief operation. The plan should also specify the most effective ways of ensuring that such requirements are met. Yet, the process will only be effective if those who are the ultimate beneficiaries know what to do in times of disasters and know what to expect. For this reason, an essential part of a disaster preparedness plan is the education of those who may be threatened by disaster. Such education takes many forms, such as: (1) Public education in schools for children and young adults, emphasizing what actions should be taken in case of a disaster threat (for example, earthquake tremors); (2) Special training courses, designed for an adult population either specifically or as an extra dimension of on-going programmes such as Preventive Health Care or Maternal and Child Health programmes; (3) Extension programmes, in which community and village-based extension workers are instructed to provide relevant information and trained for the tasks they should undertake during the event, (4) Public information, through mass media, be they television, radio or the printed word, will never really replace the impact of direct instruction. However, if sensitively designed and presented, mass media may provide a useful supplement to the overall educational process.

Rehearsals (drills)

As military maneuvers cannot fully portray the reality of battle, neither can disaster preparedness rehearsals portray the full dynamics—and potential chaos—of a disaster relief operation. However, that fact should provide no excuse for avoiding the need to rehearse the disaster preparedness plan. Not only will rehearsals reemphasize points made in separate training programmes, but they will also test the system as a whole and, invariably, reveal gaps that otherwise might be overlooked.[1]



Fujieda, Japan
School children practicing an earthquake safety drill.
From *Nature on the Rampage*. Photo by Paul Chesley

The preceding part of this chapter is drawn from the UNDP/UNDRO training module of the same name written by Randolph Kent

Preparedness for slow onset and sudden onset disasters

Preparedness activities for slow onset disasters often vary from those of sudden onset. Slow onset disasters may require more active involvement on the part of planners, especially in terms of monitoring early warning systems, for famine, war, and civil strife. The remedial response to problems indicated by the early warning (of potential disasters) is an extension of preparedness.

Preparedness for sudden onset disasters include the monitoring of the predictions and warnings of disasters that may occur within a matter of days or hours. The emergency may develop over a very brief time frame and depend on a very different set of procedures and resources than the slow onset emergency.

Q. *1) In your country, what government agency is the focal point for disaster preparedness? 2) Which existing instituting agency or social structure at the local level is most effective to promote "grass roots" disaster preparedness?*

A.

Preparedness within the United Nations [2]

The UN system at the country level must be able to facilitate and deliver appropriate and co-ordinated assistance in an emergency. The UN Disaster Management Team (UN-DMT) is the standing inter-agency body for this.

The UN-DMT should meet at regular intervals to:

- review prevention and preparedness arrangements within the country, including the progress of any relevant ongoing development projects
- review preparedness arrangements within the UN team of agencies (as described below)
- discuss the analysis and interpretation of data from in-country and external famine early warning systems
- decide on any specific actions to be taken by members of the group individually and/or collectively.

[2] The remainder of this chapter is reproduced from the **UNDP/UNDRO Disaster Manual.**

Up-to-date knowledge and information

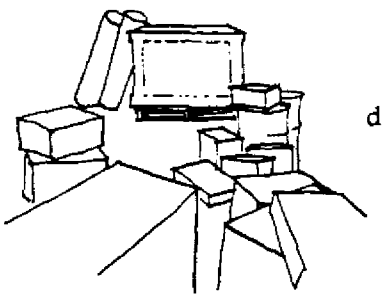
DISASTER PROFILE

Within the UN-DMT, arrangements should be made to ensure that both the team and each individual member agency:

a) Are aware of the possible **disaster scenarios** which might arise in different parts of the country. Each should have a common, documented "disaster profile" of the country which includes: the history of the incidence of particular types of disasters in different areas; the impacts on the populations and the economy; the types of assistance provided from all sources in the past; the effectiveness of that assistance and the problems faced—or "lessons" learned.

b) Know the **Government's structures** and responsibilities in relation to disaster mitigation (risk reduction and preparedness) and relief assistance, and their **operational plans and capacities** for responding to emergencies of various kinds. Copies of relevant Government plans and standing orders should be available to all members of the UN-DMT together including up-to-date lists of concerned officials with telephone numbers. Copies should also be sent to UNDRO, Geneva.

c) Have established relationships with the Government bodies responsible for disaster management in the spheres of competence of the agencies concerned. The resident coordinator should have established links or relationships with the relevant central coordination authority(ies).

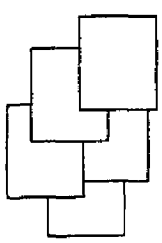


d) Anticipate, based on 'a' and 'b' above, the kinds of material and other assistance which might be required from the international community in particular types of foreseeable disaster situations—and the types of assistance which would almost certainly ***not*** be required. Corresponding lists should be kept together with the disaster profiles and government data. Copies should be sent to UNDRO, Geneva.

e) Maintain an up-to-date listing of the potentially useful technical and other **human resources** available to be called on in-country within the UN, including project personnel, and from other sources including national bodies, bilateral agencies and NGOs. This should normally include practical expertise in public health, water supplies, agronomy, civil and irrigation engineering, and logistics.

f) Keep up-to-date lists of potential **in-country suppliers** of the kinds of supplies which might need to be purchased and delivered at short notice to meet emergency needs.

g) Maintain similar lists of the means of **transport** which may be mobilized or contracted for moving both personnel (especially during the initial assessment phase) and supplies. This could include commercial transporters, and flying clubs.



h) Keep a readily accessible collection of **publications** and other documents pertinent to all aspects of disaster management, including the handbooks, manuals, and relevant technical guidelines of all concerned organizations.

In order to facilitate rapid, appropriate responses to disasters, the UN-DMT should have readily available all of the kinds of information described in the UNDP/UNDRO Disaster Manual Appendix 3A: *Disaster Preparedness Basic Information Required by a UN-DMT*. The checklist from this appendix is reproduced at the end of this chapter.

The parties responsible for obtaining all of this information and filling in the checklist will vary from country to country. All of the information is relevant to the government which may, in fact, have it in some format. UNDP national officers may also have the responsibility to execute the checklist or to be the repository of it. In the latter case, the national officer will need to monitor who is doing it as well as the systematic coverage of all sectors. UNDRO has provided technical assistance in this area in some countries.

Receipt and monitoring of warnings and indicators

Arrangements must be made for the UN-DMT to receive any warnings of the approach or imminent impact of disaster hazards which might result in sudden disasters, and immediate notice of their occurrence. The field office should determine what sources are available and make arrangements to receive warnings from the bodies concerned.

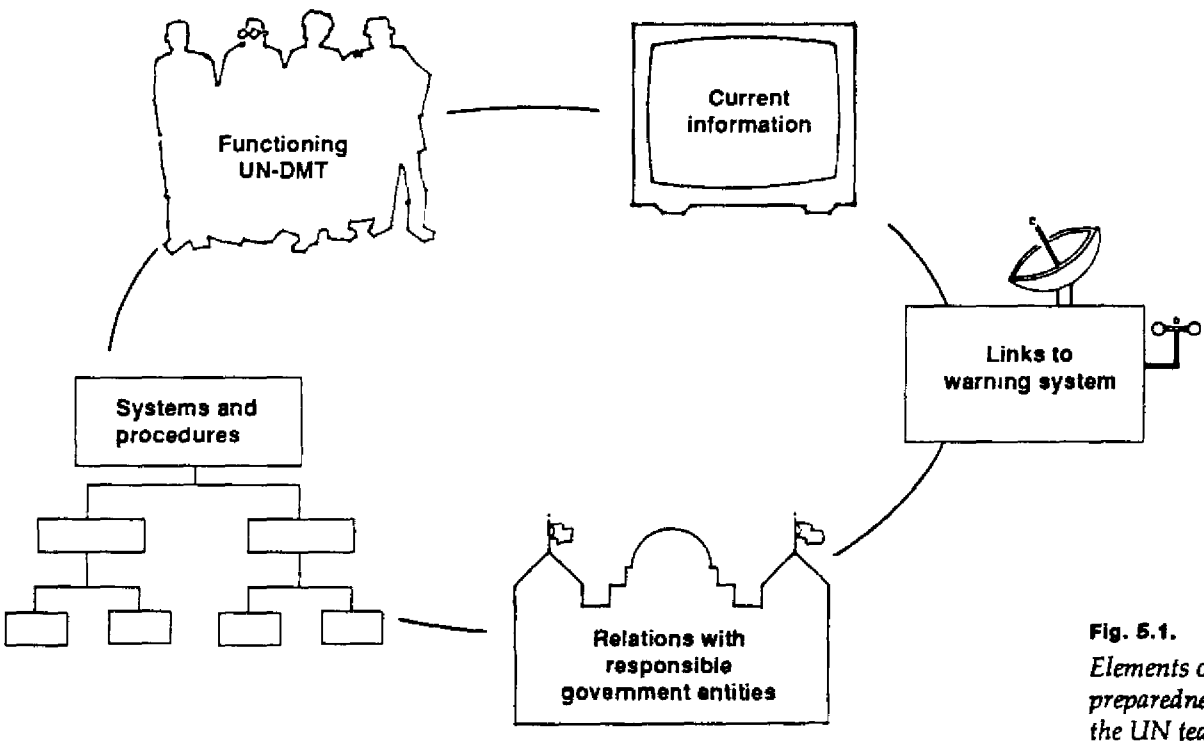


Fig. 5.1. *Elements of preparedness within the UN team at the country level*

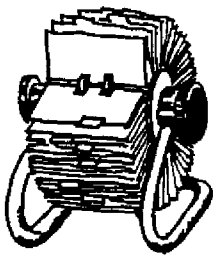
Checklist of basic information required by a UN-DMT [3]

In order to facilitate rapid, appropriate responses to disasters, the following kinds of information should be readily available in advance to all members of the UN-DMT.

The Government should have much of this information incorporated and maintained up-to-date in the framework of a national disaster preparedness plan. This information should be made available to the Resident Coordinator, and member agencies of the UN-DMT.

If this information is not available, or only partially available, the UN-DMT should compile and maintain it as a team effort, normally in collaboration with national counterparts. The specialized agencies would each address respective areas of concern. The resident coordinator should see that all sectors are covered.

The check list presented here should be adapted to local circumstances Special care and attention should be given to information relevant to areas and communities which are particularly vulnerable and disaster-prone.



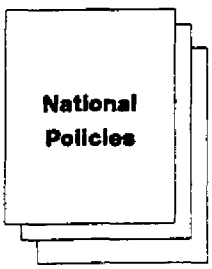
This checklist often refers to agency or organizational contacts. To keep your information current, you should have for all contacts:

- name
- office address and telephone, fax, and telex numbers
- home address and telephone number
- electronic mail address, if the person has one

You should have the same information for any alternates or deputies.

Disaster profile of country

- ☐ The history of the incidence and magnitude of particular types of disasters in different areas; their impacts on the population and the economy.
- ☐ The types of emergency and post-disaster assistance provided from all sources in the past; the effectiveness of that assistance given the problems faced—the lessons learned.
- ☐ The kinds of needs which can therefore be anticipated in particular areas and circumstances, and the kinds of assistance interventions which might be required.



National policies, objectives and standards

- ☐ Policies with regard to the soliciting, acceptance and use of international assistance, including external personnel.
- ☐ The authority delegated to local institutions, and the possible roles of national NGOs and outside assistance agencies.
- ☐ Policies (both whether or not and how) regarding vaccinations, prophylactic distribution of drugs, the care of unaccompanied children, and salvaging of materials.
- ☐ Policies and criteria for any distribution of relief: whether to be on a free, for-sale or on-credit basis; what, if any, differentiation should be encouraged within and between different population subgroups
- ☐ The particular objectives and standards which should be applied to ration scales for food and water, and any distribution of shelter materials and household supplies.

[3] From the UNDP/UNDRO Disaster Manual

DMT CHECKLIST

- ☐ Specification of the kinds of food and other commodities which are appropriate and acceptable as donations, and those which are not.
- ☐ General specifications for the kind of energy sources normally preferred for vehicles (diesel or petrol) and generators and pumps (diesel or electric).
- ☐ General priorities for the restoration of infrastructure and services.
- ☐ Policies and arrangements for importing emergency assistance supplies, such as arrangements for waiving fees and taxes, and for the clearance of special relief flights.

Government structures for warning and emergency response

- ☐ The contact responsible for all national hazard forecasting and warning systems.
- ☐ The government contact (and deputy) normally responsible for the management of emergency relief and post-disaster assistance operations in a central co- ordination body, if one exists. Contacts in individual ministries.
- ☐ The address and telephone/fax/telex numbers of any national disaster co-ordination centre, and whether and how foreign donor officials will have access to the centre during emergencies.
- ☐ The procedures established (at national and local levels) for assessing damage, needs and resources following the impact of a disaster.
- ☐ The contacts in the national disaster management body or the sectoral ministries responsible for arranging and assuring:
  - Coordination and liaison with the international community (UN system, embassies, NGOs)
  - Search and rescue operations
  - Post-disaster surveys and assessments
  - Food supply assistance, where needed
  - Medical and preventive health care
  - Water supplies
  - Environmental sanitation
  - Emergency shelter and other relief supplies
  - Communications
  - Logistic services (transport, storage and handling)
  - Information management (including records and reports)
  - Security
- ☐ Role of the national armed forces and relationship between the civil and military authorities in directing operations.

Other external and national assistance organizations

- ☐ The contacts at the principal embassies and donor agencies, the potential contributions of their governments and organizations to post-disaster assistance operations, and the resources they have on immediate call locally.
- ☐ The contacts at the national Red Cross/Red Crescent Society and the principal NGOs, their potential contributions to emergency and post-disaster assistance operations, and the resources (human, material, and financial) they have on immediate call.

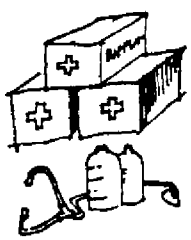
Base-line data on each distinct disaster-prone area

- ☐ Demographic details: the location, size and socio-economic characteristics of communities, including average family size, sources and levels of income, and any traditional patterns of seasonal migration.
- ☐ Formal and informal leadership structures, any particular social or religious considerations, traditional community support processes at times of disaster, and any taboos.

- ☐ General climatic conditions, including day and night temperatures at different times of year.
- ☐ Local food habits, including weaning practices, of the various socio-economic groups.
- ☐ "Normal nutritional status of children, including any normal seasonal variations.
- ☐ Diseases endemic to the area, including prevailing patterns of mortality and morbidity.
- ☐ Normal sources of water: sources and methods of extraction; treatment; and distribution.
- ☐ Food supply systems and local production: types, seasonal production cycles and normal yields of both major crops and small gardens, and average on-farm stock retention levels.
- ☐ Services operating (official and non-official). health, education, rural development, public works, and social welfare. This should include the location and specific nature of the services provided and the personnel employed.
- ☐ Coverage and general condition of the infrastructure, including roads, telecommunications, and electricity supplies

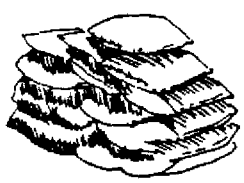
Resources: material and human

"Resources" include supplies and services which can be mobilized in-country for emergency and post-disaster assistance operations. Potential sources include government bodies, commercial companies (locally or in a neighboring country), NGOs and other aid organizations and development projects operating in or near the areas at risk.



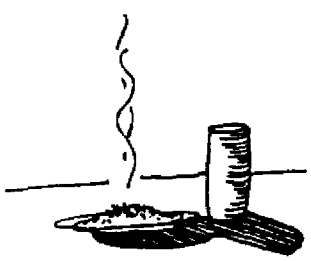
Medical/health care[4]

- ☐ Hospitals, clinics and other health facilities. number of beds. ambulances. availability of special equipment, number of trained doctors, nurses and nurses' aides; contacts at all facilities.
- ☐ Stocks and sources of medical supplies: names, addresses, and telephone/fax/telex numbers of all medical supply stores; manufacturers of pharmaceuticals and supplies; and laboratories producing vaccines and serums.



Food supplies

- ☐ Location, capacities, and normal stock levels of food stores; telephone/fax/telex numbers of government marketing boards, food supply departments, commercial importers, food wholesalers, and food aid donors.
- ☐ Details of existing food rationing and distribution programmes (including food-for-work), their organizational arrangements, procedures, and capacity to meet emergency needs.



Nutrition and epidemiology[5]

- ☐ Nature, location, and capacity of any nutritional rehabilitation (therapeutic feeding) activities: their organizational arrangements, procedures and capacity to meet emergency needs.
- ☐ Extent and validity of any nutritional status surveys or surveillance programmes; in-country sources of nutritional expertise (with relevant field experience).
- ☐ Location and capacity of epidemiological surveillance and survey expertise linked to communicable disease control programmes.

[4] This information should be assured by WHO staff in the context of the preparedness profiles issued by WHO headquarters

[5] Nutrition aspects may not be a priority concern in the immediate aftermath of a sudden natural disaster, but are crucial in all emergency situations of extended duration, especially droughts, famines, and in all cases involving population displacements.

DMT CHECKLIST

Water supplies, hygiene and environmental sanitation

- ☐ Names, addresses, telephone/telex numbers of producers, large wholesalers, and retail outlets for the following types of supplies, including location and usual stock levels on inventory:
  - Water pumps, tanks, pipes and fittings
  - Road tankers for hire or purchase
  - Lime or other chemicals for water disinfection
  - Hard bar soap, detergents, and disinfectants
  - Materials for establishing temporary latrines
  - Supplies and equipment for vector control operations
- ☐ The quantities of these supplies normally available in government stocks in specified locations.
- ☐ The availability of mobile water treatment units and generators through the military or major contractors.
- ☐ Sources of trained personnel and tools to undertake rapid repairs or to construct new or temporary installations.

Emergency shelter and relief materials

- ☐ Names, addresses, telephone/telex numbers of producers, large wholesalers, and retail outlets for the following types of supplies, including location and usual stock levels on inventory:
  - Heavy-duty tents, tarpaulins, thick polythene sheeting
  - Corrugated roofing sheets, lumber, cement
  - Blankets
  - Cooking pots and utensils (household size, and institutional size for communal kitchens)
- ☐ The quantities of these supplies normally available in government stocks in specified locations.

Construction equipment

- ☐ Names, addresses, telephone/telex numbers of road and building contractors, including their approximate availabilities of bulldozers, drag-lines, hoists, cranes, hydraulic jacks, mobile generators, and pumps.
- ☐ Contact points of government sources for the same types of equipment, for example, within the Ministry of Public Works or Defense.

Communications

- ☐ Contacts within the responsible authorities for establishing telecommunications services, including the repair of normal systems and the installation of temporary radio networks, where needed.
- ☐ Policies concerning the use of communications equipment by international teams and aid organizations.

Logistics systems and facilities

Logistics considerations include details of normal transport routes and capacities to and within the disaster-prone areas, and knowledge of the specific logistical problems likely to be faced moving supplies following a disaster.

- ☐ Roads
  - Have copies of the best available maps
  - Identify essential road links and best alternative routes
  - Mark potential constraints on truck traffic (such as bridge load capacities and ferry movement capacities), and any points vulnerable to occurrences such as flooding or landslides

- ☐ Trucking capacity
  - Government fleets: the number and condition of trucks of specified types and capacities in different departments and locations which might be available to transport relief supplies
  - Commercial capacity: private transport contractors able to operate to or within the areas concerned, including details of their fleets, the locations of their offices and maintenance facilities, and normal rates
- ☐ Railways
  - Track gauges, wagon capacities, and any loading constraints on various lines
  - Daily movement capacities on various lines, and the numbers of locomotives and wagons which might be available during each season
  - Reliability and operational constraints, including any feasible measures to improve performance
- ☐ Sea and river ports
  - Harbor depths, quay lengths, cargo handling equipment
  - Daily discharge capacity, and seasonal patterns of exports and imports
  - Size of covered and open storage areas, and amount normally available at different seasons
  - Normal offtake capacities: road and rail.
- ☐ Coastal and river craft
  - Government craft: the numbers and condition of boats, tugs and barges (of specified types and capacities) in different locations which might be available for rescue operations or to transport relief supplies
  - Commercial capacity: contacts with private shipping contractors able to operate in the areas concerned, including details of their fleets and normal rates
- ☐ Airports and air-strips
  - The precise locations and the length, width, surface and load classification of runways in the affected areas
  - Largest type of aircraft able to operate
  - Fuel availability (avgas and jet fuel)
  - Navigation and landing aids, and hours open for flying
  - Cargo handling equipment and storage capacity
- ☐ Aircraft and air transport
  - Government: number and types of aircraft and helicopters likely to be available to transport personnel and relief supplies; the approximate costs of operation of military and other government aircraft and helicopters
  - National airline and other companies: number and types of aircraft and helicopters likely to be available to transport personnel and relief supplies; approximate charter costs
- ☐ Storage and handling
  - Government warehouses: the location, size, and type of stores in different areas which might be available for relief supplies; the general condition of the stores, level of security, access to road and rail transport, the availability of pallets, hand trucks, and forklifts, and the adequacy of staff and record systems
  - Private warehouses: as above for stores which might be requisitioned or rented.
- ☐ Fuel supplies (diesel and petrol)
  - The locations, capacities, and normal stock levels of government and commercial fuel storage depots; the arrangements by which fuel can be drawn or delivered from those depots.

DMT CHECKLIST

Q. *The information referred to in the checklist must be assembled from a variety of sources. Where would you be able to obtain the information requested under each main heading?*

A.

Disaster profile of country _____

National policies, objectives and standards _____

Gov't structures for warning/post-disaster response _____

Other external and national assistance organizations _____

Base-line data on each distinct disaster-prone area _____

Human and material resources:

- Medical/health care _____
- Food supplies _____
- Nutrition and epidemiology _____
- Water supplies, hygiene and environmental sanitation _____
- Emergency shelter and relief materials _____
- Construction equipment _____

Communications _____

Logistics systems and facilities:

- Roads _____
- Trucking capacity _____
- Railways _____
- Sea and river ports _____
- Coastal and river craft _____
- Airports and air-strips _____
- Aircraft and air transport _____
- Storage and handling _____
- Fuel supplies _____

CHAPTER 6

Vulnerability and risk assessment

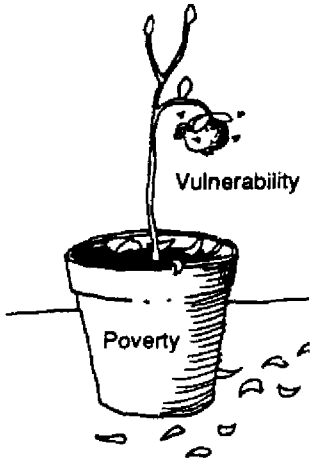
Vulnerability is the propensity of things to be damaged by a hazard. Vulnerability is an expression of the extent to which a special group, community, structure, service or geographic area is likely to be damaged or disrupted by the impact of a particular disaster hazard. The poorer the quality of construction or more dangerous the location, the more likely the damage will occur.

For engineering purposes, vulnerability may be expressed as a mathematical function defining the degree of loss to elements at risk expected to result from the impact of a disaster hazard of a given magnitude. It is specific to a particular type of structure, and expressed on a scale of 0 (no damage) to 1 (total damage).

For more general socio-economic purposes and macro-level analyses, vulnerability is a less-strictly-defined concept. From this view it incorporates considerations of both the intrinsic value of the element(s) concerned and their functional value in contributing to communal well-being. In many cases, it is necessary (and sufficient) to settle for a qualitative classification in terms of "high," "medium," and "low," or explicit statements concerning the disruption likely to be suffered.

Vulnerability assessment is the process of estimating the vulnerability of specified elements at risk to potential disaster hazards. For general socio-economic purposes it involves consideration of all significant elements in society, including physical, social and economic considerations, and the extent to which essential services will be able to continue functioning.

Risk assessment determines the scale of the estimated losses which can be anticipated in particular areas during a specified time period.



As we have noted the *root causes of vulnerability to disasters in developing countries 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.

It is the interface between these vulnerable conditions and natural hazards such as an earthquake, tropical storm, drought, and heavy rains, that results in a disaster or protracted emergency. (See Fig. 1.1 on page 2.)

Vulnerability derived from poverty can best be addressed by long-term development projects targeted at the underlying reasons that large population groups remain poor, while at the same time introducing measures to mitigate disaster effects.

Vulnerability may also be a result of factors more easily solved by specific risk reduction measures. These factors include inappropriate building codes and materials, and a lack of public awareness. However, many of these measures depend on the extent of a society's development. For example, it is unrealistic to expect building codes to be enforced where governments do not have staff and resources to carry out inspections. Likewise, public awareness depends, to some

extent, on the community's educational level and the availability of communication facilities, which are frequently deficient in developing countries.

Vulnerability and risk assessment is the link between development project implementation and disaster mitigation. In UNDP, for example, a proposed project should be examined against the vulnerability and risk of the project location. If the location or the nature of the project design are inherently vulnerable to disasters, then the location should be reconsidered or disaster mitigation/risk reduction measures must be taken. (See Chapter 11 for additional discussion on how this may be achieved.)

Tools and techniques for planning risk reduction

Reducing the harmful effects of the impact of natural disasters requires actions on three fronts: reducing vulnerability of the physical settlements and structures (including infrastructure); reducing vulnerability of the economy; and the strengthening of the social structure of a community, so that coping mechanisms can help absorb the shock of a disaster and promote rapid recovery.

Reducing physical vulnerability

Hazard mapping

Reduction of the physical vulnerability for communities and human settlements has been emphasized more than any other activity to date, and the methodology employed has been thoroughly tested. The ***first step*** is to identify the high-risk areas. This is done by relating a hazard, such as an earthquake, to the terrain and to the probability that such an event will occur. This activity is known as hazard assessment and the results of the analyses are usually presented in the form of "hazard maps," which show the probability of a natural hazard of particular intensity occurring in given geographic locations. Earthquake hazard mapping, for example, is based on a study of faults and the underlying geological conditions of the locality. Flood hazard mapping indicates the areas likely to be covered by water flooded to particular depths.

Hazard mapping requires technical skills and the application of various scientific disciplines. Hazard mapping is usually undertaken by such groups as geological departments, meteorological services, and water resource management departments. The disciplines involved could include geology, meteorology, hydrology, engineering, geophysics, geography, agriculture, forestry, physics, cartography, and remote sensing.

This is not to say that high-risk areas cannot be identified by nontechnical means. Certainly, historic patterns of disaster and the recurrence of disaster hazards can provide a practical guide in determining whether or not a community is at risk from certain phenomena.

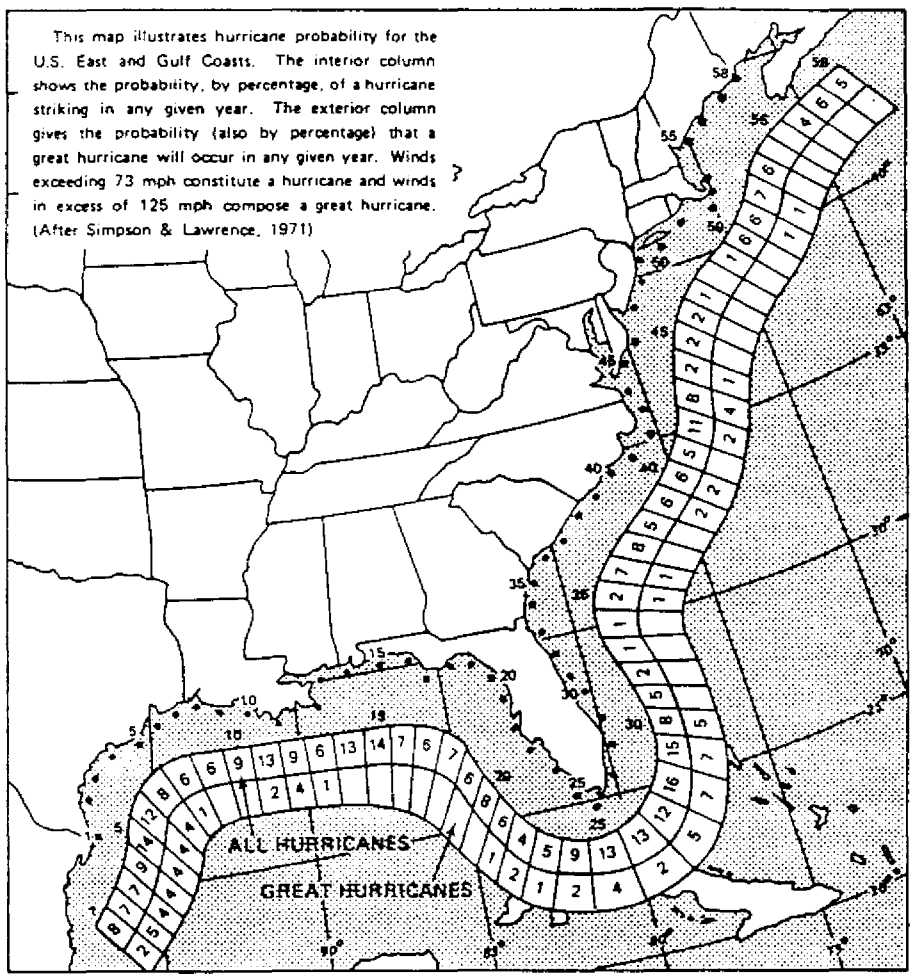
Elements at risk; vulnerability assessment

The ***second step*** in planning for risk reduction is to identify those communities that are particularly susceptible to damage or destruction. This is done by comparing the map of the zones of high hazards to the location of human settlements and the quality of their structures. One determines whether a community is situated on a site within a high-risk area, and if this is the case, the specific areas that are the most vulnerable. This is based on the analysis of the more detailed information about that site. At the same time, critical facilities,

buildings and structures (such as dams and hydroelectric facilities) are evaluated to determine if they can withstand the forces in nature to which they may be subjected.

Vulnerability analysis is a technical function. Many of the disciplines involved in hazard mapping are also involved here, but emphasis clearly shifts to engineering, architecture, and physical planning.

Fig. 6.1
Hazard map—Hurricane probability on the east and Gulf coasts of the US.



Vulnerability reduction strategy

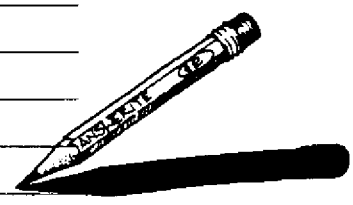
The ***third step*** is the selection of the vulnerability reduction strategy. This requires two sets of actions. First is the determination of the site strategy. Options may include construction of protective works, such as embankments to protect from flooding; zoning to control development of the site; restricted development (to ensure that any development meets certain standards that take into consideration the threat to the sites, and land swaps, which would provide alternatives to development of the site.

The second set of actions determines the structural strategies for reducing vulnerability. These include the imposition of design criteria or building standards to govern construction; the modification of existing structures; and the replacement of existing structures with newer buildings more resistant to disasters.

The selection of vulnerability reduction strategies is again considered both an engineering and a planning function, but a new dimension—the political one—is added at this point, for in the end, the strategies selected will be the result of political decisions, based as much on a government's capabilities as on its perception of the possibilities, potential, and value of mitigation.

Q. *Identify a community in your country that you believe to be vulnerable to a hazard. Has a hazard map been prepared for that community? Where can you obtain a copy?*

A.



Reducing economic risks

Reducing economic vulnerability follows much the same pattern as does reducing physical vulnerability. ***Step one***, for example, is the same, namely, identifying those areas where there is a high probability that a disaster event could occur. The ***second step*** is to identify the sectors of the economy that are vulnerable in disasters. This is done by relating risk to economic activities or means of production. The key elements of the economy and those that are particularly vulnerable to a disaster are identified. Often this is not difficult, especially for countries that have one-crop economies, or only a few industries, or are earners of foreign currency. Every economic activity should be examined, however, to determine whether each type of threatening event could affect a significant portion of that activity. This type of analysis should be conducted both at the macro and micro levels. While a flood may not have a significant economic impact on a country as a whole, it may have a major impact on a community or region.

In determining economic vulnerability, there are other critical activities and installations that should be considered. Energy facilities and systems are of prime concern, as are transportation networks and road systems, in addition to financial institutions. Vulnerability studies in Jamaica, for example, revealed that the main power generating station, the fuel-oil depot, the principal wharfs, the largest airport, the central bank, and the government's central data processing center, as well as the major financial institutions, were all located in areas subject to damage from earthquakes, tropical storms, flash floods, and land subsidence in earthquakes, not to mention fire or explosion from a nearby refinery.

Vulnerability reduction

The third step is the selection of a vulnerability reduction strategy. Economic protection can be provided in three ways: diversification, insurance, and the establishment of reserves.

Diversification spreads the risk, so that if a disaster occurs, the total losses in any one area or sector are acceptable. For many countries, diversification can be a difficult choice. Small nations that are dependent upon one or two crops for their livelihood may find it politically difficult to justify diversification simply on grounds of disaster mitigation. Once again, long-term development choices come into play, and ultimately the decision may rest more on political or economic factors than on disaster-mitigation strategies.

Insurance is another method for spreading the risk and providing adequate capital and resources for reconstruction.

Reserves can be established at all levels. Governments and UN organizations can establish cash and food reserves that can be released following a disaster. Families can also be encouraged to establish savings upon which they can rely in lieu of insurance. Many innovative methods have been tried. Recent efforts to protect against famine include development of food banks and an international food reserve system.

Other simple measures can also be effective. In tropical storm areas where crops are harvested just before the tropical storm season, small farmers can be encouraged to build ferro-cement or other strong grain silos to help protect harvests until they are sold.

Q. *Which economic sector is most vulnerable to a hazard in your country? Do you have an idea that could reduce the vulnerability to that sector?*

A.

Reducing vulnerability of the social structure of a community

Reducing the vulnerability of a community social structure is the most difficult of the mitigation measures. For the most part, this can best be accomplished through extending normal development work in one of three ways. The first is ***institution building***. Local governments, finanacial and other organizations or techniques can be identified and strengthened, for example, traditional water and food storage systems. A conscious effort can be made to increase their capacities and skills, thus enhancing their ability to deal with a crisis.

The second activity is to ***increase the number of coping mechanisms*** within a community. By developing informal, social institutions and linking these groups to outside resources, one establishes a vehicle for intervention and the provision of assistance.

The third activity is to ***broaden the contacts of local groups*** and to encourage whatever promotes cooperation among the different elements or groups within the society. Such cooperation can reduce the social impact of a disaster. It is especially important to identify dependency relationships, particularly those that are strengthened in disasters, and work to eliminate them.

By increasing self-sufficiency and reliance on internal resources, agencies improve the ability of local people to cope with disaster. This can be a mitigating factor and can help to speed recovery. [4]

Reducing vulnerability for displaced persons

Much of the previous discussion on vulnerability and risk is more focused on sudden onset disasters than for slow onset and population displacements. Nevertheless, much of the assessment process and technologies apply to these situations. For example, mapping of hazards is also of prime concern to identify areas subject to drought, or even civil conflict. Meeting the needs of a migrating population or one recently arrived at a new location will be assisted by mapping the best routes and survival resources along the way. Strategies for vulnerability reduction in zones of conflict might include development inputs which can reduce the conflict, such as installing water points for nomads in areas where water is a scarce resource subject to competition.

[4] The above material is drawn from **Disasters and Development**, by Frederick C. Cuny, Oxford University Press, 1983.