PART 4 DISASTER MITIGATION

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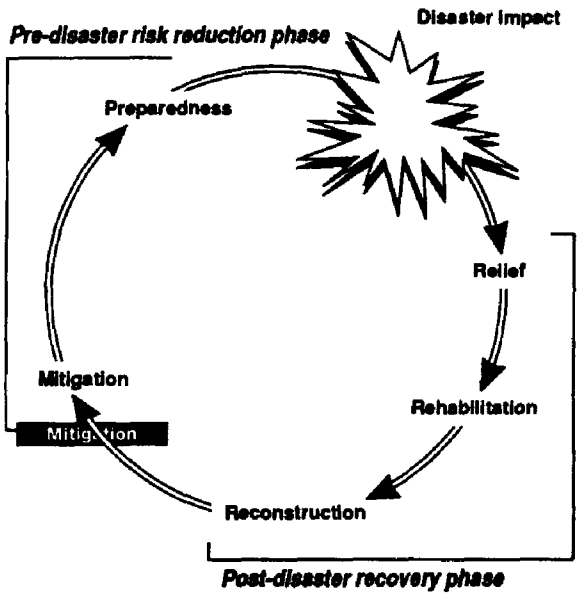
After reading Part Four and completing the exercises, you should know the basic concepts, aims and elements of disaster mitigation. You will be able to describe:

- *the principle objectives of disaster mitigation*
- *several available mitigation techniques*
- *how to consider disaster mitigation as a development theme*
- *how to appraise a country's capacity to implement disaster mitigation projects*
- *how to take hazards into account in project identification and formulation*

CHAPTER 13
Mitigation[1]



Mitigation is one of the positive links between disasters and development. Agencies, communities, and individuals can use their development resources to reduce the risk of hazards through mitigation projects. They can also ensure that their other development initiatives contain components that mitigate against future disaster.

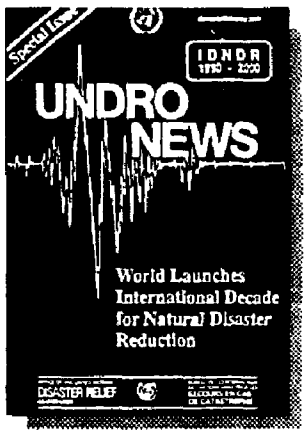
In its broadest usage, mitigation has become a collective term used to encompass all actions taken prior to the occurrence of a disaster (pre-disaster measures). This includes long-term risk reduction and preparedness measures.

Many individuals and institutions, however, apply a narrower definition to mitigation. They use mitigation to mean actions taken to reduce both human suffering and property loss resulting from extreme natural phenomena. The concept of mitigation accepts the fact that some hazard event may occur but tries to lessen the impact by improving the community's ability to absorb the impact with minimum damage or disruptive effect. More simply stated, for this group, mitigation is risk reduction.

Mitigation applies to a wide range of activities and protection measures that might be instigated: from the physical, like constructing stronger buildings or agricultural diversification, to the procedural, like standard techniques for incorporating hazard assessment in land-use planning.

In the 1990s, a major effort is underway to encourage the implementation of disaster mitigation techniques in development projects around the world. The General Assembly of the United Nations has adopted the decade of the 1990s as the International Decade for Natural Disaster Reduction. The aim is to make a significant reduction in the losses of life and material damage caused by disasters by the end of the decade.

[1] Adapted from the UNDP/UNDRO training module, *Disaster Mitigation* by A.W. Coburn, R.J.S. Spence, and A. Pomonis, Cambridge, June 1991.



Disasters have, until recently, been seen in much the same way as disease was in the early 19th century: unpredictable, unlucky and part of the everyday risk of living. Concentrations of people and rising population levels across the globe are increasing the risk of disasters and multiplying the consequences of natural hazards when they occur. However, the "epidemiology" of disasters—the systematic science of what happens in a disaster—shows that disasters are largely preventable. There are many ways to reduce the impact of a disaster and to mitigate the effects of a possible hazard, accident, or conflict.

Just like the fight against disease, the fight against disasters has to be fought by everyone together. It must involve public and private sector investment, changes in social attitudes and improvements in the practices of individuals.

Governments can use public investment to improve their countries' infrastructure and to promote a physical environment where a disaster is less likely to occur. Individuals must also learn how to act to protect themselves. Just as public health depends on personal hygiene, so public protection depends on personal safety.

The type of cooking stove an individual uses, and their awareness that a sudden earthquake could tip it over is more important in reducing the risk of a disastrous fire than having the community maintain a large fire brigade. The type of house individuals build and where they consider a suitable place to live affects the potential for disaster in a community more than large engineering projects to reduce flood risk, or landslide stabilization efforts or sophisticated typhoon warning systems.

Saving life and reducing economic disruption

The worst effects of any disaster are the deaths and injuries caused to the population. The scale of disasters and the number of people they are capable of killing is the primary justification for mitigation. Understanding the way that people are killed and injured in disasters is a prerequisite for reducing casualties.

Q. Summarize what you think are the principal objectives of mitigation.

A. _____

Targeting mitigation where it has most effect

Understanding how the occurrence of a natural hazard or an accident turns into a disaster enables us to forecast likely situations where a disaster is possible. For example, some buildings (*elements*) are more *vulnerable* to earthquakes (*hazard*) than others. Identifying these *elements most at risk*, can indicate priorities for mitigation.

Identifying locations and situations where combined risk factors coincide helps indicate *the elements most at risk.* Elements most at risk are the elements (buildings, networks, social groups) that are likely to contribute most to the losses incurred in a future disaster or that are most likely to suffer from the effects of the hazard. These elements may be the least able to recover after the event. Within a city, for example, the portions of housing stock most likely to be damaged can be identified. Mitigation measures applied to that sector will again have the most effect on reducing risk.

Q. In Chapter 4, you identified the most likely disaster that could occur in your community or country. In the discussion on vulnerability in Chapter 8, you identified a community at risk. Within that community, what are the elements at risk?

A. _____

Actions to reduce risk

✔ **Reduce the hazard or reduce vulnerability**

Protection against the threats of disaster can be achieved by modifying or removing the causes of the threat, (reducing the hazard) or by reducing the effects of the threat if it occurs (reducing the vulnerability of elements affected). For most types of natural disasters, it is impossible to prevent the actual event from occurring. The focus of mitigation policies against these hazards is primarily on reducing the vulnerability of elements that are likely to be affected. Obviously, some natural hazards can be reduced. The construction of levees along a riverbank is an example of risk reduction.

✔ **Tools, powers and budgets**

It is evident that risk reduction is complex and needs to be built up through a range of activities happening together. Governments, for example, can employ a wide range of tools and use their powers in many ways to influence the safety of the community. Legislative powers, administrative functions, spending and project initiation are all part of the tools they can employ to bring about change. Powers of persuasion are sometimes classified into two types: passive and active. These are summarized toward the end of this chapter. Another power of persuasion is diplomacy, perhaps the most useful tool to mitigate against warfare or civil conflict.

ANSWER (page 103)

The principle objectives of mitigation include: saving lives; reducing economic disruption; decreasing vulnerability; increasing capability to resist disasters; decrease chance of civil conflict.

The menu of mitigation actions

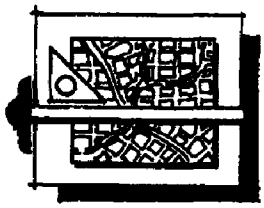
The range of techniques that an authority might consider in order to assemble an appropriate package for disaster mitigation can be classified into:

- engineering
- spatial planning
- economic
- management and institutionalization
- societal
- conflict reduction

Engineering

Engineering measures are those that result in stronger individual structures that are more resistant to hazards. This is sometimes referred to as "hardening" facilities against hazard forces. Building codes are critical defensive measures for achieving stronger engineered structures. Training techniques to teach builders the practicalities of disaster resistant construction are now well understood and form part of the menu of mitigation actions available to the disaster planner.

Spatial planning



Many hazards are localized with their likely effects confined to specific known areas. For example, floods affect flood plains, and landslides affect steep soft slopes. The effects can be greatly reduced if it is possible to avoid having hazardous areas used for settlements or as sites for important structures. Urban planning needs to integrate awareness of natural disaster risk mitigation into the normal procedures of planning a city.

For populations displaced by hazards or conflict, opportunities to reduce their risk include the identification of safe zones for resettlement in areas with adequate security and resources to support displaced persons.

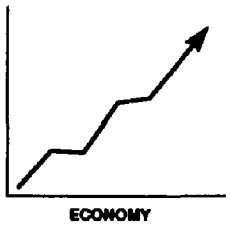
Economic

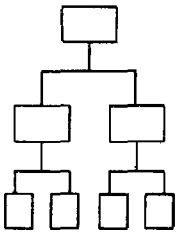
Economic development is key to disaster mitigation. A strong economy is the best protection against a future disaster. A strong economy means more money to spend on stronger buildings, safer sites, and larger financial reserves to cope with future losses.

Mitigation measures can help a community reduce future economic losses. They can help members withstand losses and improve their recoverability after loss and measures that make it possible for communities to afford higher levels of safety are important elements of an overall mitigation programme.

Economic activities which help a community which hosts displaced persons to absorb this population can mitigate against the development of serious social or political problems.

Some aspects of economic planning are directly relevant to reducing disaster risk. *Diversification* of economic activity is an important economic principle. A single-industry 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, and the labor market may be more vulnerable to disruption from a disaster than the physical infrastructure that is the means of production.





Management and institutionalization of disaster mitigation

Disaster mitigation also requires certain organizational and procedural measures. The timescale over which a significant reduction can be achieved in the potential impact of a disaster is medium and long term. Changes in locational planning, upgrading structures and changes in the characteristics of building stock are processes that take decades. The objectives and policies that guide the mitigation processes have to be sustained over a number of years. They have to survive the changes in political administration that are likely to happen within that time, the changes in budgetary priorities and policies on other matters. The institutionalization of disaster mitigation means the acceptance of a consensus of opinion that efforts to reduce disaster risk are of continual importance.

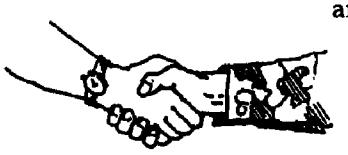
Education, training and the development of professional expertise are necessary components of institutionalizing disaster mitigation.

Societal

The mitigation of disasters will only come about when there is a consensus that it is desirable. In many places, the individual hazards that threaten do not result in disasters, the steps that people can take to protect themselves are not known and the mandate of the community to have itself protected is not forthcoming. Mitigation planning should aim to develop a disaster "safety culture," one in which the general public is fully aware of potential hazards, chooses to protect itself as fully as possible and can readily support protective efforts made on its behalf.

Conflict reduction

In the disasters and emergencies created by conflict, mitigation must include conflict reduction. Measures at conflict reduction must start with identifying and addressing the root causes of the conflict. Although negotiation will often be the primary tool of conflict reduction, the issues may arise over such causes as land tenure, employment, access to resources, and intolerance of ethnic or religious differences. These issues need to be anticipated through a form of early warning and defused before conflict erupts.



Classification of mitigation measures

Developing a mitigation strategy should include a structure to facilitate decision making. The following series of questions suggests such a structure.

What risk is being reduced?

To what level should the risk be reduced?

What criteria are used to reduce the risk?

Who decides what the criteria are?

What is the political process to implement the measure?

Mitigation measures may be classified in several ways. The following list of such classifications includes many categories which overlap in their implementation.

Active and passive: For active measures, authorities promote desired actions by offering incentives. For passive measures, authorities prevent undesired actions by using controls and penalties.

Structural and non-structural: Structural mitigation involves physical measures taken to reduce risk by erecting structures (such as dams). Non-structural measures are policies and practices of development whose implementation reduces the risks to development.

Short-term and long-term: Short-term measures are those which are taken rapidly and which have a short life or usefulness such as sand bag reinforcements of a dyke. Long-term measures may include a process that is itself long in implementation, consider an extended timeframe, and change public attitudes through education.

Restrictive and incentive: Restrictive measures result in practices that promote safety by making some actions or development unlawful or prohibitively expensive. Incentive measures provide financial, legal or other advantages to promote activities which are also beneficial in terms of mitigation.

Sectoral based activities: Sectoral based activities start from the vantage point of a sector, such as agriculture, and ask: "within this sector, what can be done to reduce risk?" A response might be to introduce hazard resistant crops, or to diversify cropping patterns.

Timing for mitigation

The risk reduction measures of mitigation are often placed in the pre-disaster time frame. In fact, the most opportune time to implement mitigation is in the period after a disaster. Public awareness of the problems posed by hazards is high and the political will to act may also be at its peak. This period probably will not last for more than two to three years before other development priorities take precedence.

Q. Select one of the mitigation activities from the preceding discussion and apply it to the ***element most at risk*** *that you identified in the previous question. Describe one example of a mitigation activity that will reduce the vulnerability to an element at risk.*

A. _____

CHAPTER 14

UN assistance to disaster mitigation–

Including risk reduction and preparedness in the UNDP country programme[1]

This chapter focuses primarily on promoting disaster mitigation in the context of long-term development planning and programs, in particular through the UNDP country program and other projects funded through UNDRO. Mitigation measures must also be actively promoted in the context of post-disaster rehabilitation and reconstruction.

Disaster mitigation as a development theme

Hazards are a part of the natural and human-made environment. Exposure to hazards and the risks of disastrous consequences must be considered in all development planning. They must certainly be considered by UNDP at an early stage of program and project formulation and design.

An awareness of the relationship between disasters and development must be maintained in the UNDP country program and project cycles. The needs and options for mitigation must be specifically addressed in:

- The continuing dialogue between UNDP, other UN agencies, the Government, and aid donors.
- The country program cycle: in the preparation of the UNDP Advisory Note and the Administrator's Note, and in the country program document, review and evaluation processes.
- The project cycle: in project identification, design and formulation, approval (PAC/A.C.), implementation (PPER, TPR), and evaluation.

It is essential that government bodies responsible for development priorities and planning be fully aware of the impact of natural and man-made hazards on societies and economies. This itself may require certain institution-building initiatives during both the preparation and the implementation of the country program.

The UN-DMT should review the priorities and possibilities for international assistance, especially in cases where technical assistance is anticipated in different sectors and different UN organizations or agencies and expected to be involved or provide financing.

The context for disaster mitigation efforts lies within the policy for UNDP and UNDRO as set forth in the following panel.

[1] This chapter is adapted from Chapter 2 of the **UNDP/UNDRO Disaster Management Manual.**

Panel 2A/1
Disaster-related policy goals of UNDP and UNDRO

With the aim of ensuring that developing countries are fully aware of disaser risks and take advantage of the most effective techniques for disaster mitigation, UNDP and UNDRO seek to:

- Strengthen the ability of societies to avoid, or protect themselves, their property and means of livelihood, against the risks associated with natural and human-made hazards.
- Encourage the integration of disaster risk reduction and preparedness measures in planning and budgetary processes related to development in all sectors.
- Build on local understanding and experience of disaster threats and coping mechanisms.
- Facilitate exchanges between disaster-prone countries of experience, knowledge and skills related to disaster management.
- Ensure that programmes and projects funded by UNDP contribute to lessening of risks, are not themselves subject to major risks and do not exacerbate the potential adverse effects of hazards.

Panel 2A/1
Disaster-related policy goals of UNDP and UNDRO.
From *UNDP/UNDRO Disaster Management Manual.*

Q. At what point in the UNDP country programming and project cycle can a program officer address mitigatin opportunities?

A. _____

Appraising disaster mitigation needs, policies, and capacity

Almost all countries have established some institutional arrangements for the various aspects of disaster management. Many have instituted some risk reduction and/or disaster preparedness measures. Some countries are well-advanced, others less so. This national capacity for risk assessment, mitigation planning, and implementation will need to be determined, based on an appraisal of the Government's mitigation policies, strategies, and measures.

Appraisal is needed and must enable the resident representative to determine, with the Government:

- Whether technical assistance is required for hazard and risk assessments.
- The priority to assign to risk reduction and preparedness in the country program.
- The extent to which risk reduction measures can be incorporated into projects being planned or undertaken in various sectors.
- The need for "freestanding" risk reduction and/or preparedness projects.

Informed judgments must be made concerning the likely hazard effects, the adequacy and cost-effectiveness of existing risk reduction and preparedness measures, and on the capacity of all concerned to act on these measures. Appendix 2B of the manual lists what to consider in this appraisal.

The appraisal will be the basis for the inclusion of disaster-related concerns in the UNDP Advisory Note and Administrator's Note, which draw on or address the issues listed in panel 2B/1 of the manual. They may also refer to UNDP's policy with respect to reaching the objectives of the International Decade for Natural Disaster Reduction.

Panel 2B/1

Elements to be explicitly considered during the early stages of country programme development.

UNDP/UNDRO *Disaster Management Manual.*

Panel2B/1

Elements to be explicitly considered during the early stages of country programme development

- The experience of recent disasters.
- The extent to which the relationship between hazards and socio-economic objectives is explicitly addressed in national development plan, sectoral or multi-sectoral studies.
- The effects of natural disasters on past development activities, including those funded by UNDP through the country programme .
- Discussions in World Bank Consultative Group meetings, and UNDP-assisted Round Tables, that underscored the link between disaster and development.
- The options available for reducing overall socio-economic losses and setbacks to development by integrating risk reduction and preparedness measures into general development activities.
- Specific possibilities for reducing risks and enhancing national and local-level preparedness through technical assistance within sectoral programmes.
- The availability of national and international resources for mitigation.
- The possible usefulness of technical assistance to assess needs in disaster mitigation.
- The institutional arrangements for inter-sectoral co-ordination of disaster mitigation activities.

Q. Choose one sector with which you are familiar, such as housing, health, agriculture, etc. Then, with this sector in mind, analyze your own experiences and responsibilities with the elements in Panel 2B/1.

A.

Identify the most recent major disaster in your country _____

_____

Is the extent of the relationship between hazards and socio-economic objectives explicitly addressed in national development plan, sectoral or multi-sectoral studies? _____

_____

_____

What have been the effects of natural disasters on past development activities? _____

_____

_____

Are there discussions in World Bank Consultative Group meetings and UNDP-assisted Round Tables that underscore the link between disaster and development? _____

_____

_____

What are the options available for reducing overall socio-economic losses and setbacks to development by integrating risk reduction and preparedness measures into general development activities? _____

_____

Identify one specific possibility for reducing risks and enhancing national and local-level preparedness through technical assistance within sectoral programs. _____

_____

_____

What is the availability of national and international resources for mitigation? _____

_____

_____

What is the possible usefulness of technical assistance to assess needs in disaster mitigation?

_____

_____

What institutional arrangements exist for inter-sectoral coordination of disaster mitigation activities?

_____

_____

Sources of information: needs for technical expertise

The integration of all elements involved in risk assessment is a complex, multidisciplinary task. The resident representative, in collaboration with other members of the UN-DMT, should:

a) Determine whether the relevant government ministries or other organizations have already compiled relevant risk assessment data, or whether they are capable of doing so.

b) Review the available information, and identify any gaps or inadequacies in the available information.

Where more data collection and analysis is required, the resident representative and the UN-DMT should:

a) Identify in-country and regional institutions that could be approached to gather and consolidate the required data.

b) Encourage the Government to begin the required studies.

c) Define requirements for technical assistance in data gathering and analysis, where needed.

Technical assistance from UNDRO should be requested as necessary.

The analysis should be undertaken before the Advisory Note is prepared, where possible. With Government and UNDP Headquarters consent, SPR funds may be made available for this purpose if required.

The analysis and the consequent discussions with the government and other concerned agencies should lead to the definition of a strategy that addresses disaster-related issues in the country program.

Project identification and formulation

Project identification and selection must take into account hazard-related risks and national mitigation policies and strategies. There are two contexts to consider:

a) Possible interaction between proposed projects in all sectors, and known hazards in the project areas. The chief aim of such projects is improvement in the sector concerned. But because a project is in a known hazard area, it must:
   - Be protected from the hazard
   - Not increase the vulnerability of the population to the hazard
   - Not worsen the existing hazard or create a new one.

b) Possible need for "freestanding" disaster mitigation projects to reduce the risk of disaster or enhance national preparedness. The chief aim of such projects is to improve some aspect of disaster management — for example to prepare national and local-level preparedness plans, or to equip and train officials and community leaders for effective disaster response.

Freestanding disaster mitigation projects aim at reducing the risk of disaster by reducing or eliminating the hazard or society's vulnerability to it, or by increasing the capacities of organizations, officials, and communities to prepare for and respond to the hazard. Such projects can be placed within one organizational sector, for example a Ministry of Health or Interior. However, the "multi-sectoral" impact of disasters makes it more appropriate to place the project in more than one sector, or under the domain of a lead entity responsible for coordinating multiple sectors.

Typical freestanding disaster mitigation projects are:

a) Institution-building projects which strengthen the capacity of governmental institutions to incorporate disaster management considerations in the planning process, or to undertake risk assessment.

b) Projects to prepare national or sub-national disaster preparedness plans, develop warning and response mechanisms, and ensure the necessary training.

c) Projects to introduce or strengthen particular kinds of protective measures, such as controlling floods or introducing cyclone- or earthquake-resistant construction.

d) Projects to strengthen famine early warning systems, and the links between these systems and disaster management bodies, in countries prone to drought, crop failure, and uncertain food supply.

Projects which have one or more aspects of disaster mitigation as their principal objective should normally be designed by—or at least be developed in consultation with—UNDRO.

Disaster risk appraisal of all projects in hazardous areas

Projects whose activities are located in known hazardous areas must be appraised from a disaster risk perspective, regardless of their sector or institutional framework. This is the same approach used to review projects from an environmental perspective, or from a women-in-development perspective. This applies to the reviews conducted at both field and headquarters levels. While it may be easy to see the necessity for incorporating risk reduction in a project involving the construction of infrastructure, it also applies to institution-building projects. For example, health personnel should be trained in how to deal with the aftermath of a disaster, and school teachers should be involved in organizing their communities' response to warnings

Appraisals must consider whether the project and its outputs might be adversely affected by, and therefore need to be protected against, a hazard; whether it will increase the vulnerability of the population in the area, or worsen the existing hazard or create a new one.

The appraisal must determine whether adequate sageguards — possibly including specific risk reduction measures — are built into the project, and if not, what further steps should be taken to assure that they are.

The "Disasters and Development" (DAD) Project Review Form (Appendix 2B of the manual) should be completed and attached to the Project Document for use in project reviews and evaluations. The results of the appraisal should be reflected in sections D and J of the PFF, and B6(f) and F of the Project Document.

If a project can make a significant contribution to risk reduction (directly or indirectly), this should be so noted in sections of both the PFF and the Project Document as a "problem to be addressed." This should also be noted as a project objective, and the corresponding outputs, activities and inputs be specified.

UNDRO should be invited to review and comment, from a risk perspective, on projects whose activities would be located in areas prone to sudden disasters (natural or technological).

Disaster risk reduction planning checklist for UNDP country programme purposes

From Appendix 2A, *UNDP/UNDRO Disaster Management Manual.*

Disaster risk reduction planning checklist

In order to appraise disaster mitigation needs, policies, and capacity, an informed judgment must be made concerning likely hazards and their effects, the adequacy and cost-effectiveness of existing risk reduction and preparedness measures, and the ability of all concerned to act on these measures. This checklist shows what to consider in this appraisal.

National policies towards disaster risks and development planning

- ☐ Are hazard-related risks considered in development planning? Is there a policy for risk reduction: At national level? For specific disaster-prone areas?
- ☐ Are there institutional mechanisms to integrate risk concerns into development planning and ensure inter-sectoral co-ordination?
- ☐ If/when new human settlements are planned, are natural hazards and risk of disaster considered, and appropriate measures built into the planning?

Awareness and analysis of risks and options

- ☐ What is the level of awareness of the hazard-related risks among officials in central planning and sectoral bodies?
- ☐ What impact have disasters (and all forms of hazard impacts) had on development efforts and on the situation of the most vulnerable groups in society?
- ☐ Have data on known hazards (natural and human-made) been analysed? Have hazard maps been prepared? Are the data and maps updated as hazard conditions change, or as new populations or economic activities move into the hazardous areas?
- ☐ Have the populations, infrastructure, agricultural and industrial economic assets, essential services, and development programmes and investments at risk been fully identified?
- ☐ Have specific estimates been made of the likely social and economic effects of particular hazard impacts on the various elements at risk and on the society as a whole?
- ☐ What measures have been taken, or are planned, to reduce the risks? How effective are they? Have additional specific measures been identified as feasible options? Why have they not been adopted or implemented yet?

Institutional arrangements for disaster management

- ☐ What arrangements exist at national level? Is there an entity in the national government with specific responsibility for all phases of disaster management? Is it adequately staffed, trained, and funded? Is it properly placed within the government structure?
- ☐ Are there specific entities at the regional, subregional, and community levels specifically responsible for disaster management? Are they adequately staffed, trained, and funded?

Warning and other preparedness measures

- ☐ Are mechanisms in place that can issue warnings of disaster threats to populations at risk? Are warnings given with sufficient lead time? Do they make clear the risks involved and the action to take?
- ☐ Are there established arrangements at local and national levels? Are all concerned aware of their responsibilities, the procedures to follow, and arrangements for co-ordination? Are these plans widely understood and regularly tested?
- ☐ Are there adequate communications systems, including back-up systems, for use in disaster response?

Human resources for disaster management

- ☐ Is there a training programme for disaster managers?
- ☐ Is there a public information and education programme?

Disasters and Development (DAD) Project Review Form

(DRAFT FOR EXPERIMENTAL USE)

* Form completed as an attachment to:
Prodoc / Annual Review / Evaluation / Other _____

_____
Project no and title

_____
Proposed UNDP budget Expected duration

_____
Geographical location

Disaster history (summary) of the location/area [Type, frequency (every___ months/years or unpredictable), effects, last occurred]

The underlying and direct causes of the vulnerability of the society to the known hazards·

Effects which hazards could have on project structures and activities. how these have been taken into account in project design. [Which elements are vulnerable and what will be done to reduce the vulnerability]

The effect the project will have on current vulnerability and risks

Additional activities which could be promoted/undertaken within, or in parallel with, the project which would contribute to reducing vulnerability and risks:

_____
Signed Date

* Use this form during project formulation, at the time of approval, and for annual reviews and evaluation for projects whose objectives, outputs and activities are set in disaster-prone areas. Attach it to the corresponding documentation

Disasters and Development (DAD) project review form

From Appendix 2B, *UNDP/UNDRO Disaster Management Manual.*— DRAFT for experimental use.