Planning for Structural Upgrading
Earthquakes

Project: "Training Material for Disaster Reduction"

Delft, The Netherlands
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INTRODUCTION

The International Decade for Natural Disaster Reduction, (IDNDR), has identified the dissemination of information through training as the single most important means to reduce disaster impact. With the extensive and detailed knowledge available today, mankind indeed has the capacity to reduce the destructive effects of natural disasters.

The central thesis of the project is that the damaging effects of natural disasters are almost without exception the results of vulnerabilities directly created by human activity. Disaster reduction training should therefore primarily aim at maximum reduction of these vulnerabilities. Trainers and trainees involved in this training programme should constantly keep this thesis in mind.

The project has addressed two important natural hazards: earthquakes and floods. Four training modules have been developed:

* Planning for Structural Upgrading.
* Participation in Structural Upgrading.
* Fighting Floods in Cities.
* Fighting Floods in Neighborhoods.

The multi-disciplinary nature of the training material is one of its most significant features. The authors of the modules are convinced that only by bridging multi-disciplinary boundaries can training material for disaster reduction be really effective. All training modules therefore contain sections on the following disciplines: human settlement planning, science and technology, human behavior, public administration, community participation and public health.
Trainers should not limit themselves to their own specialty but during the courses make best efforts to establish linkages with other disciplines. A policy of training architects on how to strengthen buildings is likely to fail if the role of the authorities as facilitators or the need for community participation in implementing such programmes is not explained. All the actors in disaster management must possess a minimum basic knowledge of the roles other actors can play.

The training material was developed especially with developing countries in mind. UNESCO believes that, even under the conditions of limited resources in these countries, the dissemination and integration of disaster knowledge in the development planning process can lead to a considerable reduction in the impact of natural disasters.

The training modules mainly target professionals in the civil service and staff of non-governmental organizations. However, a module should not be considered as a tailor-made training course. It should rather be seen as a compendium of knowledge, from which trainers can select parts which are found of interest for or complement the knowledge of a particular audience. For that purpose a list of keywords is given in the Annex of each module.

In order to further enhance the accessibility of the material, a computerized system of keywords and cross references linked to the modules and relevant topics has been devised. Through this system trainers can select and combine texts and figures in an almost unlimited way. Such an innovative approach creates possibilities for a wide range of application of the material. Case studies can be integrated in the existing material which will then allow the adaptation of the text to local circumstances. Furthermore, the broad variety of subjects treated in the modules offers possibilities for the development of both general disaster management courses and more action-oriented training packages. The texts from different disciplines can also be combined, thus creating a true multi-sectoral mix of information. Consequently, the training modules should not be considered as an end product but rather as an important tool in an ongoing process of upgrading available disaster reduction training material.

The consultants and the project team reviewed literature and extracted information from several hundred documents. These sources have been compiled in a comprehensive literature list, which is published together with the training modules. This literature list will serve as excellent background material to trainers. The photographs in this module originate from the publications listed in the illustrations reference list.

PLANNING FOR STRUCTURAL UPGRADING

This module is the first in a series of four training modules.
"Planning for Structural Upgrading" deals with earthquake impact reduction. It offers overviews of upgrading and retrofitting technology for primary target audiences of **architects** and **engineers** working for local government. The approach is one of strategic planning and creating the right environment in which structural upgrading initiatives can achieve real effect. The module will also assist participants to apply the specific techniques needed to strengthen low cost housing in order to increase its

resistance to earthquakes. It explains the basic mechanics of earthquakes in a chapter dealing with seismicity. It stresses the important role authorities can play as facilitators of upgrading programmes. It also pays careful attention to behavioral aspects and the role of communities in implementing such programmes. The health aspects of earthquake effects are also put into perspective.

A central consideration in this module is the collaboration between the different interest groups in pursuit of safe structural conditions in built-up areas. Authorities, housing professionals, scientists and communities will have to share their knowledge and resources to accomplish the desired level of earthquake resistance. The composition of this training programme reflects the conviction that disaster reduction unmistakably requires multi-sectoral collaboration to succeed.

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DEFINITIONS

The elusive aim of agreeing on a common disaster vocabulary has long been shared by the disaster specialists, but it will still take time before the same words will be used with the same meaning by all. Even among UN Agencies there are still great differences in the meaning of disaster terms. For an easier understanding of this training text, here a basic list of definitions as used in this training text.

1) **Disaster management** is the entire process of planning and intervention for reducing disasters, as well as the response and recovery measures. It is an essential, but often neglected element in the development process.

2) **Prevention (1):** Measures for impeding a disaster event, or preventing it having harmful effects on people, their property and settlements.

3) **Mitigation (2) (3):** Action taken to reduce the effects of a disaster on a nation or community. The term normally implies that whilst it may be possible to prevent some disaster effects, other effects will persist and can be moderated or reduced if appropriate action is taken.

4) **Preparedness:** Measures which enable governments, communities and individuals to respond rapidly to disaster situations to cope with it effectively .

5) **Response:** Measures directed towards saving life and protecting property and to dealing with the immediate damage and other effects caused by the disaster.

6) **Relief** measures are actions taken immediately following the occurrence of a disaster: search and rescue as well as meeting the basic needs of the survivors for shelter, water, food and medical care.

7) **Rehabilitation:** the interventions taken after a disaster with a view to restoring a stricken community to its normal living conditions.

8) **Reconstruction (4):** the actions taken to reestablish a community after a period of rehabilitation subsequent to a disaster.

9) **Vulnerability:**
   a) Sociological definition: Vulnerability is the difficulty to cope with stress. It has two sides:
   external vulnerability risks and stress to which individuals or groups are exposed; and internal vulnerability: defenselessness, a lack of coping capacity.
   b) Technical definition: Vulnerability is a potential loss of people and goods from a damaging phenomenon.

10) **Natural hazard** is the probability in a certain period and area, of a damaging natural phenomenon.

11) **Risk:** the expected loss due to a particular hazard.

12) **Structural upgrading** (or retro fitting) is the repair and strengthening of vulnerable buildings.

13) **Natural Disasters** are catastrophic events triggered by natural hazards causing widespread injury and damage, over powering local resources and requiring considerable outside support to be overcome.

A glossary of engineering and seismological terms is included in the Annex.

notes:

1 Prevention, as a rule, is expensive and the results are often less than hoped. Prevention programs may therefor be restricted to the protection of a nation's specific vital interest. Increasingly preventive measures are combined with mitigatory actions. Sometimes the distinction between preventive and mitigatory measures is not clear-cut. In that case the combined category heading of Mitigation/ Prevention is used.

2 UNDRO has used mitigation in a broader sense, encompassing all actions taken prior to the occurrence of a disaster.

3 While several authors have used reduction as a synonym for mitigation, reduction in this text will be used in a broader sense.

4 Recovery, a term used by some authors and institutions, includes both rehabilitation and reconstruction.