SESSION 5: THE MITIGATION PROCESS

Topic 5.1 : Introduction

Perhaps the most important phase of disaster management is mitigation. Mitigation encompasses all actions and measures aimed at reducing and alleviating future disaster impacts. Every other phase contributes towards achieving mitigation since each phase has a direct impact upon reducing losses of life and damage to property.

Mitigation provides a framework and process for long-term and ongoing change directed at reducing and alleviating future disaster damages. It is the link between pre- and post-disaster planning environments. It is the process that monitors what actions are successful, what measures are lacking, and those that have proven inappropriate. Mitigation is the mechanism for breaking the cycle of repetitive damage and redevelopment, and for preventing unwise development.

Mitigation begins with planning. This process needs to be fulfilled by a mitigation planning team, directed by a co-ordinator. The Mitigation Co-ordinator is responsible for assembling hazard analyses to identify frequency, magnitude, and location of hazard occurrences by using existing information, which can be obtained in the following ways:

Coordinating with other local, regional, and national agencies.
Working with other agencies is essential to the success of the mitigation planning process, not only for the expertise agency representatives bring to the project but also for their assistance in helping to develop and implement the recommendations in the plan.

Evaluating existing programs.
The Mitigation Co-ordinator must know what systems are in place either to detect hazards or to help reduce their impact when a disaster occurs.

Questions to ask include:

1. Are there warning systems available?
2. What types of data collection are they based upon?
3. Who collects the data and what criteria is utilized to interpret its significance?
4. What structural measures are in place and who owns and maintains them; and what effect do they have upon the hazard or the potential hazard losses?
5. Are there hazard zone development ordinances, and are they adequately enforced?

The answers to these questions form the basis for identifying potential recommendations for the mitigation plan.

Implementing, monitoring, and maintaining the plan.
The Mitigation Co-ordinator is responsible for overseeing the implementation of the recommendations and monitoring the progress of plan implementation.

Monitoring changes in vulnerability.
The Mitigation Co-ordinator is also responsible for monitoring the changes in vulnerability that result from implementing plan recommendations This helps indicate the effectiveness of a particular activity.

Mitigation is long-term and ongoing change that is directed at reducing and alleviating future disaster damages. Accomplishing mitigation requires a concerted effort to co-ordinate technical and financial resources, evaluate existing systems, and monitoring vulnerability to hazards. Fulfilling these responsibilities requires the Mitigation Co-ordinator to utilize the knowledge and skills of other agencies; this is why a mitigation planning team is necessary

? a. Are there mechanisms in your situation to ensure disaster reduction in the planning process?
b. Is this mechanism organized or spontaneous?
c. Is there a need for a Mitigation Co-ordinator?

mitigation

Topic 5.2 : Integrating Mitigation In Development Planning

> The most fundamental deficiency of the contemporary approach to disaster planning is its separation from day to day decision making. There can be no clear-cut boundary between routine town and regional planning and disaster mitigation. Every land use decision, and indeed every social or economic policy, carries with it implications for risk. In consequence, each decision increases or decreases the potential for future disaster. It is this intimate relationship which is so frequently overlooked and, as a result, so often leads to catastrophe. If losses from natural and man-made hazards are to be reduced, then risk must be given greater cognizance by every level of government at every stage of decision making.

The order in which mitigation measures are developed is also of critical importance. An ideal sequence would be: public awareness leading to political will, leading to management, leading to the parallel and interactive processes of drafting laws and the development of risk-reduction measures. Finally training/education and cash incentives would be required to apply such measures.

Disaster mitigation should therefore not concentrate on a single measure, but should adopt a multi-level approach involving a long time-scale.

The most effective approach to reducing the long-term impact of natural hazards is to incorporate natural hazard assessment and mitigation activities into the process of integrated development planning and investment project formulation, and their implementation.

? a.Development planning is increasingly based on decisions made far away from the community concerned. This has disrupted traditional vulnerability reduction mechanisms. Can you suggest improvements?

mitigation-integration in development planning, mitigation

Topic 5.3 : Strategies and Tools for Mitigation Implementation

Strategies for implementing mitigation
Implementing mitigation requires new strategies to overcome existing obstacles.

The obstacles encountered in promoting mitigation are complex, and combine elements of a political, financial, institutional, and technical nature.
In view of these obstacles, developing countries can adopt a disaster mitigation strategy that overcomes the limited capacity of the public sector, and makes the best use of the resources available to the private sector. International development assistance agencies should take the lead in initiating this strategy, by integrating it in financial and technical support programs.

The proposed strategy is sector specific, and is intended to be carried out with maximum involvement of the different interest groups of the sector, and in particular, those that are directly affected by disasters. It is believed that this approach is most effective in raising the awareness of decision-makers in the sector, and in facilitating implementation of recommended loss-reduction measures. It would consist of the following four steps:

1. Select critical or priority sectors in the national or regional economy, and identify interest groups directly affected by disasters.
2. For each sector selected, carry out, with direct involvement of those interest groups, a hazard assessment, a vulnerability analysis, and the identification of possible mitigation options.
3. Prepare a systematic economic analysis of the loss-reduction alternatives for the sector. Realistic estimates will be needed of the costs of mitigation measures.
4. Adopt an effective institutional framework in which public, private, and community interests can agree to set priorities among loss reduction measures.
5. Make link with private and government insurance policies.

Clear and well defined technical cooperation is required between the development community, the scientific and engineering research community, and the agencies in charge of disaster preparedness and response. Together these three groups must provide technical assistance, training, and technology transfer, regionally, nationally, and internationally. The public sector must provide continuity, support, and more focused direction than it has provided in the past, and should encourage the increased participation of the private sector.

Community Level Mitigation

Mitigation is key in any community planning program. Though there are some standard mitigation practices, it is better if each community develops its programs based on its vulnerabilities. Hence communities must receive information on the strategies that may be selected.

Mitigation Actions:

1 *Avoid constructing buildings on slopes which are covered in boulders or loose soil.*

2 *Avoid placing structures at the base of such slopes.*

3 *Avoid cutting into slopes which are unstable and thus subject to slipping.*

4 *Leave such slopes covered with natural vegetation.*

5 *Where slopes must be disturbed, they should be terraced parallel to contours. Terracing can be done with grasses and shrubs*

6 *Employ earthquake resistant building techniques for all new construction.*

7 *Recover or anchor objects in buildings which can fall and cause injuries. This is particularly important in public buildings such as schools*

8 *Be aware of secondary hazards which can cause loss of life and property. For example, dams can be weakened or ruptured by an earthquake or aftershocks, causing flooding. This needs to be borne in mind in siting structures.*

9 *Fires and chemical spills are also secondary hazards in an earthquake. Planning must include response to such threats.*

10 *Structures made from weak material such as dried mud or unreinforced masonry can be strengthened by simple techniques such as using mesh. This should be done during the preparation stage.*

Generally, mitigation is divided into structural aspects and non-structural aspects. Structural mitigation for flood reduction involves enacting measures such as building retaining walls, constructing drains and for earthquake reduction such options as building earthquake resistant structures and retrofitting buildings. Nonstructural measures include planning, practicing evacuations, promoting public education programs, enacting zoning regulations, and developing building codes and standards. Mitigation measures should be tailored to a community's needs, and imposition of standard solutions should be avoided. In considering issues of mitigation, economic vulnerability should also be considered. For example crops planted on unstable slopes will be lost if the slope fails.

This should be factored into any agricultural planning for the community. Other examples - a community tank if placed on a stand could be toppled in an earthquake leaving the community without clean water. This should be taken into account when designing tanks and in planning.

Tools for Mitigation

In order to accomplish mitigation/prevention, it is necessary to be familiar with the available tools. These fall into four general categories:

1. *Altering the hazard.*
   Seeding hurricanes or triggering avalanches may eliminate a hazard before a disaster occurs.
2. *Averting the hazard.*
   A seawall or dune restoration program helps keep water away from people by redirecting the impacts away from a vulnerable location
3. *Adapting to the hazard.*
   Seismic safety provisions incorporated into building codes result in structures that are more able to withstand impacts of earthquakes.
4. *Avoiding the hazard.*
   River corridor projects create multiple beneficial uses of the floodplain while relocating structures to less vulnerable locations.

More specific categories of tools can be defined as follows:

1 *Corrective Measures*

Floods:
- Acquisition
- Devedevelopment
- Retrofit modifications

Earthquakes
- Building upgrading
- Foundation drainage
- Cross bracing

2. *Public Works Measures*

Floods·
- Dams
- Buttresses
- Seawalls
- Debris Basins

Earthquakes.
- Block Subdivision

- Upgrading

3. *Planning and Regulatory Measures*
- Landuse regulations (e.g., zoning)
- Development regulation(e.g.,subdivision regulations)
- Codes (e.g.,health codes for wells and septic systems)
- Moratoria (e.g.,delays in post-disaster reconstruction for redevelopment planning purpose)
- Taxation (e.g.,financial incentives and disincentives)

4. *Public Education and Awareness Measures*
- Public information
- Surveys and polls
- Public education
- Public relations

A wide variety of tools exist to support and accomplish effective mitigation. Many of the tools are available to communities through the activities they pursue on a normal day-to-day basis. This underscores an important point. Often, community mitigation is embedded in those activities that are currently being done.

a. Can you think of structural or non-structural mitigation measures to be taken in your neighborhood/community?

b. Are there communication and authority channels to achieve vulnerability reduction at the community level in your country?

c. Structural upgrading programs can be categorized as a tool of
- preparedness
- structural mitigation
- non-structural mitigation
- prevention
- mitigation/prevention

Why?

d. Of the list given below what are according to you the major barriers for implementing mitigation measures in your country ?
- lack of awareness
- financial constraints
- lack of know how
- lack of political will
- administrative weakness
- dependence on relief
- no legal framework
- others...

mitigation, community

SESSION 6: LEGISLATION

Topic 6.1 : Earthquakes and legislation: building regulations

Legislation can direct new human settlements away from hazard-prone areas or assist in mitigating/preventing the risk of disaster in already occupied zones. One example is the adoption of appropriate and rigorous building regulations regarding the design, construction and upkeep of buildings in earthquake prone areas.

The actual supervision of building regulations is crucial to their success. It demands a strong administrative structure, generally at the municipal level. In many developing countries building codes are applied selectively: while in high-income areas certain safety measures are enforced, in other areas, such as slums and/or illegal settlements, these regulations are not applied at all.

Selective application can partly be explained by the fact that a building code encompasses not only safety stipulations but also provisions on comfort, living standard etc.. In earthquake-prone areas however, provisions of the building code related to earthquakes must be applied to all sections of the population.

An effective supervisory machinery ie also needed to ensure that buildings, once constructed, are kept in good condition. Structural decay can be averted by the adoption of housing and other codes, such as a fire code and codes imposing special safety stipulations for structures such as hospitals and schools.

An appropriate rigorously-enforced building code can be instrumental in mitigating the destructive effects of natural phenomena. However, in many developing countries building codes have too rarely been enforced in practice. Hence attention should be paid to design and implementation strategies of enforcement suitable for developing countries.

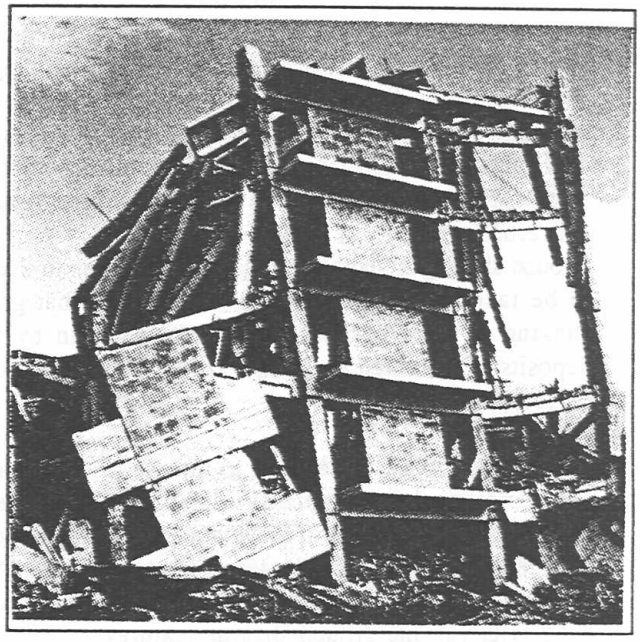

Figure 6.1-1 A combination of rigorously-enforced building codes and land-use regulations can greatly reduce future risks and help avoid the recurrence of above-like devastation.

? a. Do building regulations in your country have special stipulations on earthquake resistant building ?
If so, are these measures being enforced ? What are the problems ?
b. Does the building code apply to low income areas ?
c. How can substandard buildings be made to comply with seismic regulations ?

legislation, building regulation

Topic 6.2 : Legal aspects of surface faulting

A number of legal devices are available to regulate the type and location of structures to be allowed within an earthquake-prone area.

With regard to the problem of surface faulting, a number of legal measures are available. In the proximity of active fault traces the area can be zoned to prevent construction altogether. At the very least, municipal zoning regulation should forbid the construction of residential buildings or structures for public service facilities (such as bridges and utilities) on active fault traces. Municipalities can also determine fault hazard easements requiring differing setback distances, dependent on the nature of the structure concerned.
Ground shaking is another geological phenomenon that has to be taken into consideration. It is known that ground shaking is more perilous on places underlain by thick deposits of saturated sediments rather than those located on bedrock.

Areas likely to be susceptible to intense ground shaking can be reserved for low-density land use. It is therefore crucial that the legality of a seismic zoning regulation is founded on rigorous risk assessment of the area. Also, appropriate building code stipulations can be adopted for areas with varying ground shaking features.

Older, non-earthquake resistant buildings make up one of the greatest sources of destruction. This problem can be tackled by the adoption of a hazardous building abatement regulation which would dictate the structural upgrading, or the ultimate destruction, of buildings considered particularly unsafe. The most practical way to proceed is to make a selection of buildings that are considered as most hazardous and having the highest occupancies, and then to take on the structures posing a lesser threat and with lower occupancies.

Surface faulting and ground shaking are two important effects of earthquakes that can be regulated by a number of legal instruments The type and density of structures in the vicinity of an active fault can be subject to municipal zoning regulations. Areas susceptible to severe ground shaking can be zoned for certain uses only, while the structures should be submitted to appropriate building code provisions. Existing non-earthquake resistant buildings should either be structurally upgraded or demolished.

legislation, zoning regulation, building regulation, surface faulting

SESSION 7: FINANCING STRUCTURAL UPGRADING PROGRAMS AND THE ROLE OF INSURANCE.

Topic 7.1 : The role of government in financing structural upgrading programs.

> Economic incentives can often provide better inducements for mitigation than legal impositions. Government subsidies as well as property taxes may help to persuade both the landlords, occupants and contractors to include mitigation measures (such as structural upgrading) in their reconstruction and building activities.

An key element of a structural upgrading program is the financing system. In most developing countries government (central, regional and local) constitutes the largest single source of finance for housing and related programs for low-and middle income groups. The virtue of direct government intervention is that the type and scale of structural upgrading can be controlled and prices can be set accordingly. Disadvantages include:

1. heavy administrative costs;
2. a tendency to set standards that do not always reflect economic conditions;
3. capital sources must be found for an expected large budgetary demand for structural upgrading programs.

Governments can use various financing systems like subsidies, loan programs and mortgage programs.

Subsidies (national and local)

Outright cash grants :

while administratively the easiest system, outright gifts may weaken local self-help mechanisms and create a dependency relationship. Because of its high cost the number of people it can serve is limited.

No-cost self-help :

the government gives the building materials and usually provides supervisory and administrative personnel to a group of families who are involved in structural upgrading programs. The recipients do not repay any money for the cost of the materials.

Cross-subsidies :

constitute an unequal distribution of development costs within a larger group of participants, whereby the weakest members are contributing proportionally much less than others. This mechanism originates from settlement upgrading programs in Thailand, whereby certain commercial buildings are charged high rates, which in effect subsidize the building costs of others in the scheme.

Loan programs

The government as a non-profit lender is capable of providing advantageous terms of repayment. Specific loan conditions can vary considerably : subsidies in the form of low interest, no interest, repayment of only a percentage of the principal, long term repayment or repayment at an affordable proportion of the family's incomes.

Mortgage programs

The government agency guarantees mortgage loans made by local private banks or other financial institutions.
It is essential that the government establishes a common approach to the various financing systems in function Only when a functional relationship is installed between all parties concerned, that means dweller/owner-contractor-housing finance institution and government, the housing finance system is likely to accomplish its goal
To be efficient, governments have to seek a balance between supportive and enforcing measures. An incentive governments therefor might consider is a property or excise tax on buildings that are not earthquake-resistant The proceeds of this tax could then be put into a fund to pay for structural upgrading programs.

Government can play a major role in financing structural upgrading programs The main financing arrangements used are subsidies and loan and mortgage programs Government has also an important role to play in coordinating the financing of structural upgrading programs from other sources. Property tax on non earthquake-resistant buildings could be used to pay for the structural upgrading programs.

Private and international sources

Private domestic sources are playing an increasingly important role in the financing of housing and related programs (such as structural upgrading programs). Financing by the private sector includes both the bank sector and self-financing groups International financing can entail both bilateral and multilateral sources.

There are several kinds of private financial institutions that can play a role in financing structural upgrading programs. Examples are commercial banks, building societies and housing banks. A disadvantage is that these institutions usually serve large businesses and the more wealthy members of society. Poor families and new small enterprises often cannot meet the requirements-such as minimal savings deposits, salary and work histories-for financing through these institutions. A possible way out of this problem is self-financing. Low-income people can combine their savings and create new community-based credit mechanisms. There are a variety of community-based institutions that can meet the credit needs of low-income families : credit unions (CU), mutual building societies (MBS) and co-operative housing-finance societies (CHFS). A CU is the most appropriate mechanism for improvement of individual houses. CHFSs provide loans for community improvements. The interest charged on loans by these financial organizations is kept to a minimum as their main goal is service not profits. Another innovative and increasingly popular credit system is a saving lottery, whereby by drawing lots one person wins the savings of the other participants.

Theoretically, international aid or foreign credit can be an alternative source for developing countries to supplement their human settlements budget. Since the mid seventies the World Bank started to insist more on an "user pays"-approach. Governments were asked to create local financial institutions, such as housing banks, to provide loans for construction and improvement of houses. Loans by bilateral donors have also been an additional source of capital for these banks. International housing finance institutions are rare in the developing word : Shelter Afrique (Nairobi) is one of the few organizations to operate in a regional context. UNDP has funded some house improvement projects, implemented by HABITAT, while the World Bank is mainly providing loans on a commercial basis. Moreover, the implementation of these projects through international funding is not necessarily consistent with the priorities of the recipient countries if the funding received is in hard currency.

The commercial banking sector has proved to be an essential but often too costly mechanism for financing structural upgrading programs. For that reason, all kinds of community-based credit mechanisms, such as credit unions, co-operative housing finance societies and saving lotteries came into being. The amount and reliability of international aid for housing improvement schemes is limited.

upgrading-financing

Topic 7.2 : Insurance premium differential as an incentive for structural upgrading programs.

> Disaster insurance can be a complementary tool of hazard reduction. By building in premium differentials, incentives for upgrading existing structures can be created. Policymakers may be more successful in changing social behavior by modifying the incentives of the marketplace than by issuing regulations.

Few developing countries use insurance systematically as a strategy in disaster mitigation. In most countries the coverage is still too fragmented and property owners have to purchase different policies in order to insure against specific hazards such as earthquakes or floods. Moreover, whatever protection does exist lacks incentives to stimulate loss mitigation. The insurance industry seldom includes disaster vulnerability information in their premium structure. In some cases they do not even cover damage done to a building by a disaster. Higher premiums for poorly engineered structures and lower premiums for earthquake-resistant buildings could act as an economic incentive to protect a country from the effects of disasters. Moreover, a strong premium differential would create a stimulus for structural upgrading programs.

However, the discussion about the workability of insurance as a strategy in disaster mitigation becomes somewhat theoretical for two reasons : the current weakness of the insurance sector in developing countries and the fact that few insurance companies are-because of the enormous risks involved and the impossibility of calculating a realistic premium-eager to build up an earthquake portfolio. Re-insurance has not taken a clear position in this respect in developing countries. It is here that the private sector and the government can collaborate to decrease vulnerabilities. It is therefore of great importance that experts in low income housing and insurance experts collaborate in improving this situation. *It is widely accepted that the insurance sector in developing countries can by using premium differentials play a role in the implementation of hazard reduction measures. But the actual weakness of insurance-and re-insurance-in the developing world and the reluctance of the insurance industry to cover earthquake risks, makes the whole debate rather academic.*

? a. Insurance has the objective to spread risks over a large number of participants. Can this apply to shelter improvements for low income groups ?

upgrading-role of insurance

Topic 7.3 : Rent control systems:the example of Egypt

> In Egypt there is an enormous housing problem in the major cities. Cairo counts well over thirteen million inhabitants and the rapid growth of the city has overpowered the supervisory authorities. This has in recent years been acknowledged by the start of upgrading projects.

In line with the high degree of government intervention in all sectors of the economy and public life, there is a strict rent control act in force, setting minimum rents in order to make housing accessible for low income groups. These regulations however have no linkage with the actual construction costs and the result is, that not only building regulations are not applied, but that in many cases elementary engineering principles are ignored. Concrete composition, reinforcement and other basic construction elements are often unsafe. The rent control act has by many Egyptian engineers been identified as the main reason for the extreme vulnerability of apartment buildings in Cairo. It is clear that government policies are not always unified and safe and this should be recognized as a crucial factor in causing vulnerabilities. Other factors contributing to this vulnerability are the building inspection procedures and the existence of conflicting bye-laws on the legal/illegal status of apartments.

rent control
Egypt