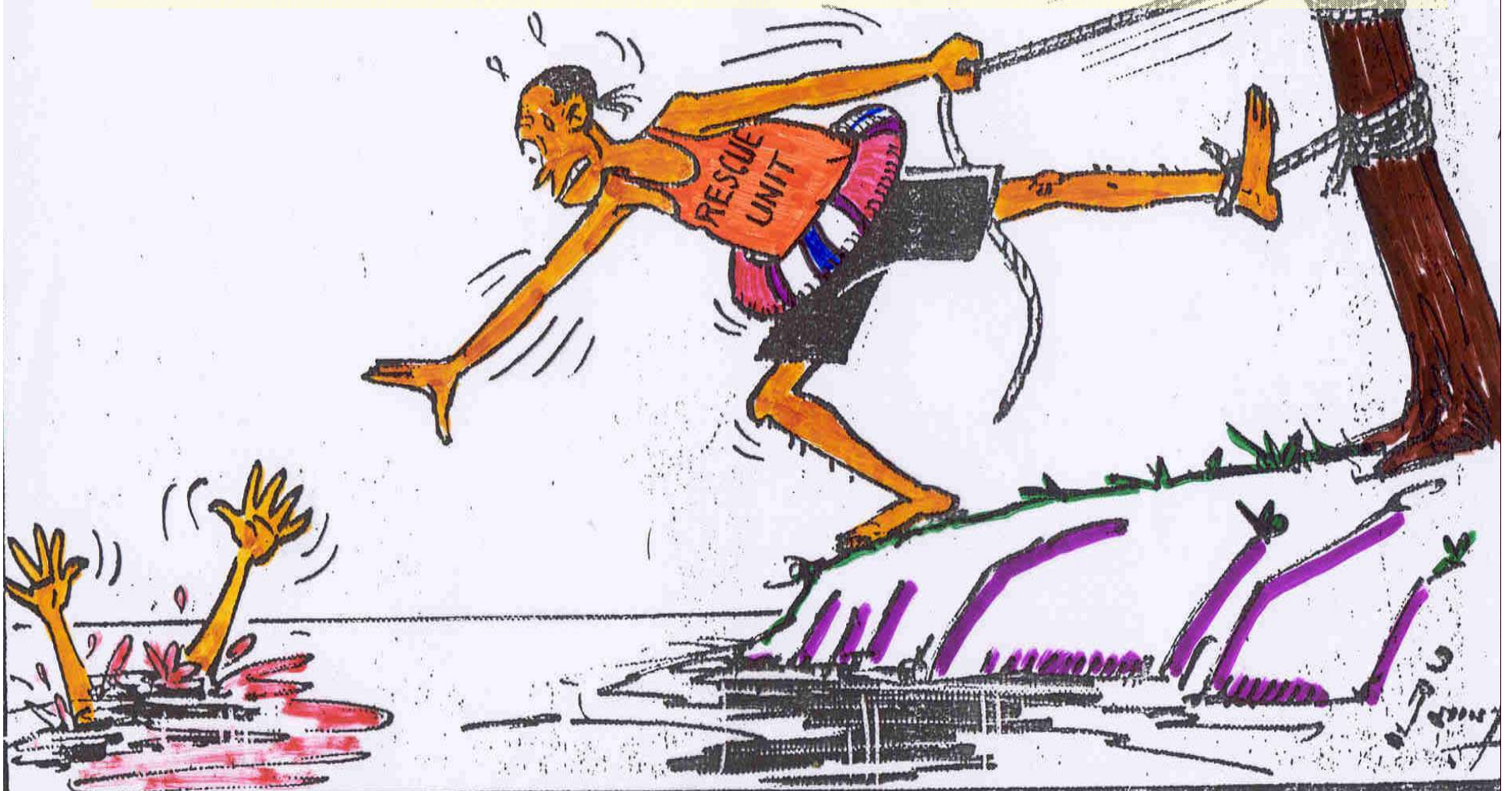


Earthquake Vulnerability Assessment and Vulnerability Reduction Measures



VULNERABILITY ASSESSMENT

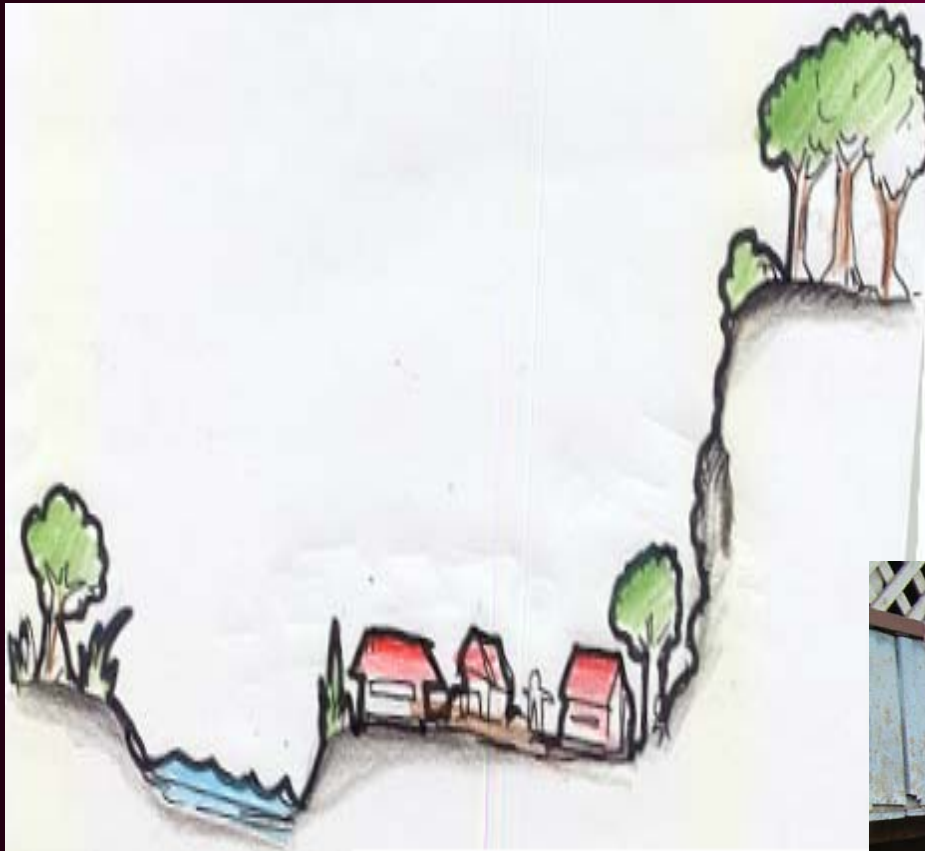
VULNERABILITY ASSESSMENT

Learning Objectives

At the end of this session, you should be able to:

- What is vulnerability
- Define different categories / types of vulnerabilities
- Explain the process of conducting vulnerability assessment
- EVR measures in different phases of disaster cycle

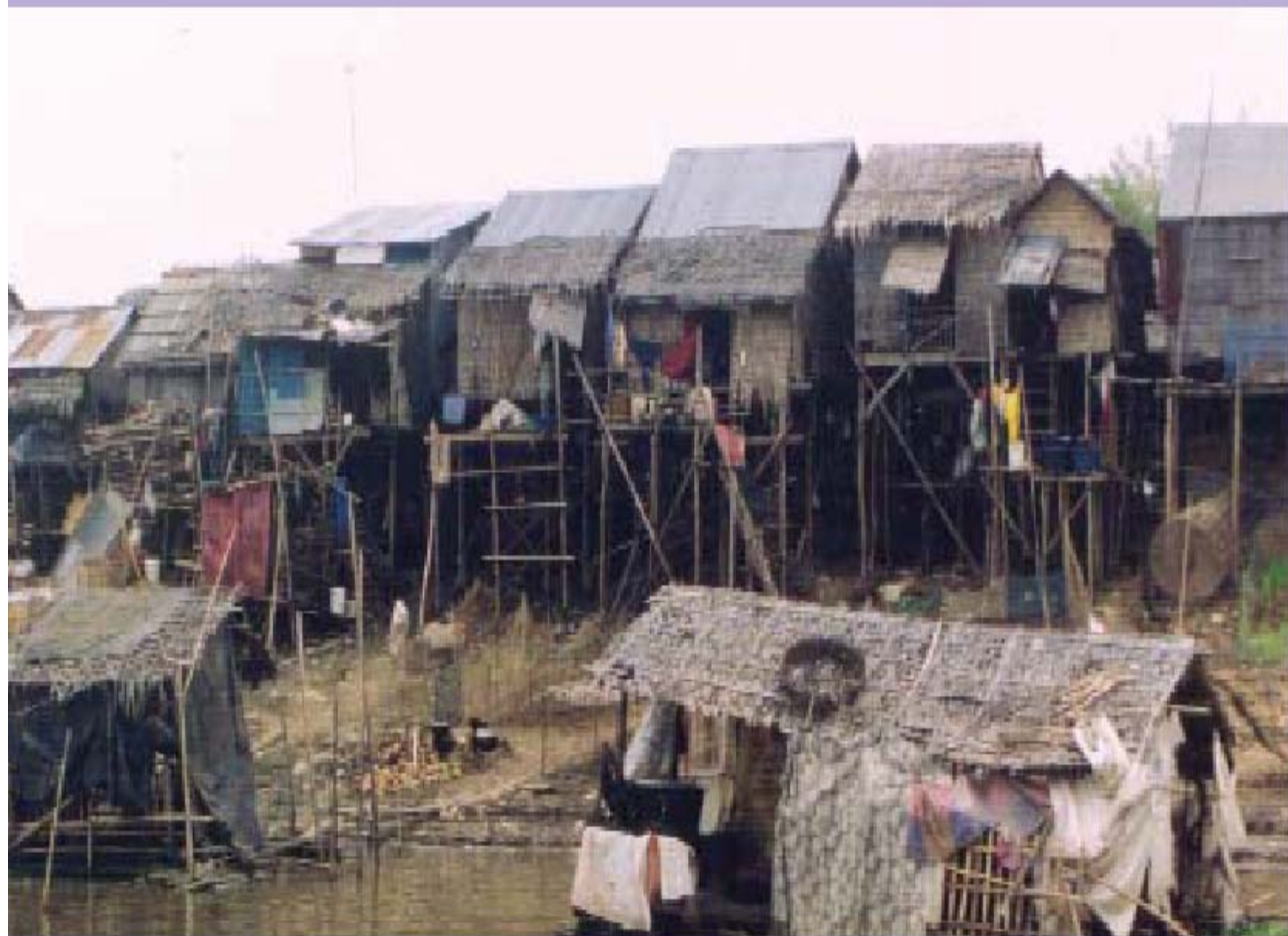
Vulnerability



A set of prevailing or consequent conditions which adversely affect the community's ability to prevent, mitigate, prepare for or respond to hazard events













Bangkok post

Assessment & EVR measures
inhabited Pakistan



A police officer is forced to travel by boat in Tha Rua district in Ayutthaya, which was inundated after the Pasak Cholasit dam in Lop Buri released water in its reservoir into the Central Plains to prevent the dam overflowing. — TAWATCHAI KEMGUMNERD

adpc

Asian Disaster Preparedness

Monday, september, 16, 2002



Vulnerability Assessment



- A participatory process to identify what elements are at risk per hazard type, and to analyze the root causes of why these elements are at risk

Categories of Vulnerability



- **Physical / Material**
- **Social / Organizational**
- **Motivation / Attitudinal**

Physical / Material Vulnerability



- Hazard-prone location of the houses, farmlands, infrastructure, basic services
- Design and construction materials of houses and buildings

Physical / Material Vulnerability



- Lack of basic services: education, health, safe drinking water, shelter, sanitation, roads, electricity, communication
- Exposed to violence (domestic, community conflicts or war)



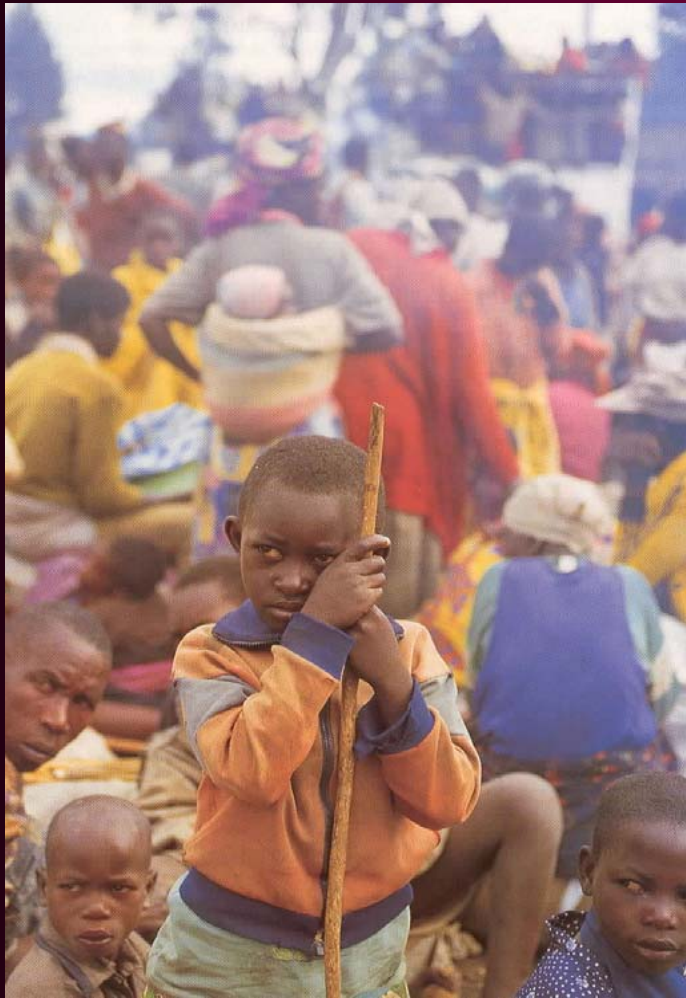
Physical / Material Vulnerability

- Lack of access and control over means of production (land, farm inputs)
- Inadequate economic fall-back mechanisms
- Dependence on money-lenders
- Occurrence of acute or chronic food shortage
- Lack of adequate skills and educational background
- High mortality rates, malnutrition, occurrence of diseases, insufficient caring capacity
- Over exploited natural resources

Social / Organizational Vulnerability

- **Weak family / kinship structures**
- **Lack of leadership and initiative to solve problems or conflicts**
- **Exclusion of certain groups from decision-making about community life or unequal participation in community affairs**

Social/Organizational Vulnerability



- conflicts: ethnic, class, beliefs, caste, ideology
- No or neglected relationship with government, administrative structures
- Isolated from outside world

Motivational / Attitudinal Vulnerability

- Negative attitude towards change
- Passivity, fatalism, hopelessness, dependency
- Lack of initiative or “fighting spirit”
- Dependence on external support mentality

Progression of Vulnerability

Root Causes	Dynamic Pressures	Unsafe Conditions
Lack of entitlement to resources	Rapid population growth	Dangerous location
Unequal access to power	War	Unprotected infrastructure
Ideologies	Urbanization	Low and stable incomes
Political and economic systems	Weak local markets	Weak institutional structures for public action
	Epidemics	Disease

Vulnerability Assessment

- We should recognize that vulnerability assessment is complex
- Vulnerability is specific to location, sector, interest group, etc.
- Vulnerability and poverty are strongly linked



Vulnerability Assessment (Hazard Specific)

Setting	Elements At Risk (EAR)	Effects on Different EARs	Characteristics of EARs That Contribute to Vulnerability
Urban	People	Injured, died, starvation, trauma	Age, Gender, physical health, Social, economic & demographic
	Buildings (houses, others)	Partial damage/fully damage	Construction materials, design, location, height
	Infrastructure (roads, bridges, telecommunications, electricity)	Partial damage/full damage	Size, height/depth, design, materials, level of exposure
	Industry	Damage to building, products, raw materials, machinery, (labor, management)	size, type of products, type of raw material,

Vulnerability Assessment (Hazard Specific)

Setting	Elements At Risk (EAR)	Effects on Different EARs	Characteristics of EARs That Contribute to Vulnerability
Rural	Crops and fodder	Destroyed, put on fire,	Height, water dependent / non-dependent
	Environment	Damage to vegetation, harm to flora and fauna, damage to water ways, mountains, etc	Terrain type, nature of flora and fauna
	Land	Erosion, salinity, deposits, desertification,	Location, elements of soil, terrain
	Irrigation system	Deposit of silt, breaking of channels, damage to machinery (tube-wells, tractor)	Location, design, construction materials
	Animals	Injured, died, disease,	Location, characteristics of specie, health

Earthquake Vulnerability Reduction Measures

EVR in different phases of the disaster cycle

EVR in Mitigation

- Periodic hazard & vulnerability assessments, recognizing the dynamics and continuously evolving nature of hazard, vulnerability and the potential contributory role of policy changes and economic developments
- Encouragement of the private sector, communities and individuals to consider the hazard, vulnerability implications of their own actions and decisions, both directly for themselves and society
- Encouragement of the insurance industry to offer reduced catastrophic insurance premiums to domestic property and commercial policy holders who have implemented sufficient structural mitigation measures

EVR during Preparedness

- Sustained investment in scientific monitoring and dissemination activities
 - Provide public information in an easily understood and usable form
 - Requires international, regional and national funding, human resources and political commitment to co-operate
- Strengthening of disaster-preparedness capacity of
 - government, NGO and community
- Institutional preparedness
 - disaster preparedness and response plans
 - roles and functions not only of government but also of civil society and private –sector organizations
- Fully operational and effective early warning and evacuation systems, including the equipment and training of local volunteers
- Construction and maintenance of evacuation shelters
- EVR in Development Process

EVR during Relief and Reconstruction

- Post-disaster maximization of locally available labor and resources in reconstruction efforts
- Transparency in the delivery of relief and reconstruction
- Ensure that funding constraints do not force diversion of funding for planned development into post-disaster relief and reconstruction.....
- Use opportunities of reducing future vulnerability
 - reconstructing earthquake-resistant all buildings
 - Use newer technologies
- Sustained Financing of Reconstruction/Rehabilitation
 - long-term international aid
 - Financial contingency planning
 - Spread disaster cost over longer time span: Disaster Funds.....
 - Insurance: Spread the risk in wider areas
 - Support micro.-finance institutions and credit cooperatives

Difficulties in vulnerability reduction

- Earthquake vulnerability reduction needs long-term endeavor
- Scarcity of capital resources to enable appropriate decisions
- Hard choices have to be made about safety vs. investment
- Availability of knowledgeable engineers, architects or technicians
- Motivating Stakeholders to invest (at households, community or higher levels) in earthquake vulnerability reduction
- The reality of implementing regulations must be fully comprehended. They must be fully enforced at all levels

EVR Options

- Modifying the hazard: CAN NOT DO MUCH!
 - Protective measures
 - Improvement of sites
- Reducing structural vulnerability
 - Strengthening of buildings, infrastructures
- Changing the functional characteristics of settlement
 - Regulation of land use

Structural vulnerability reduction measures

- **Reducing the physical vulnerability of all typical structures and infrastructure**
 - Reducing the vulnerability of structural components of buildings and infrastructures, and/or
 - Applicable both to engineered and non-engineered structures
- **New Construction**
 - Focus on good design and construction practices
 - Soil/structure interaction
- **Existing buildings**
 - Retrofitting and strengthening of vulnerable structures

Non-structural vulnerability reduction measures

- **Measures of EVR of an individual, community, city or region, nation through non-physical, organizational and societal-cultural measures**
 - Legal framework
 - Incentives
 - Training and education
 - Public awareness
 - Institution building: organizations, coping mechanism, co-ordination/co-operation
 - Land use planning
 - Warning system
 - Emergency preparedness improvement

Interdependences Between Structural & Non-structural EVR Methods

- **Building Codes**

- Public awareness campaign, training of the construction profession and industry, adequate legal framework and law enforcement system, building permit process and control etc.

- **Non-engineered structure vulnerability reduction**

- Training of mason and craftsmen, public awareness campaign to building owners, adequate information on good, simple, earthquake resistant practices, participation of the local community, proper incentive system for promoting safer construction materials and techniques, etc.

Understanding Vulnerability

- Myths prevail that vulnerable conditions are caused by vulnerable sitting
- The role of improper decisions, policies and activities of non-vulnerable
 - the principle cause of vulnerability increase is not understood, or deliberately not accepted even when understood
- Vulnerability reduction is possible only through development and a wrong policy surely will increase society's vulnerability
- Development can be molded to reduce the vulnerability of a community to disasters

Decentralization of Vulnerability Reduction

- For a long time, the state was considered as the center of all authority as well as action in dealing with disasters
- Concepts now have changed significantly with the shift of focus on mitigation and preparedness
- A new concept develop with the participation of all, from the top of the government to an individual potential victim

Decentralization of Vulnerability Reduction

- A positive intervention is required to decentralize the efforts of disaster management
 - decentralization of power and devolution of governance authority
 - mitigation efforts at grassroots levels
- Decentralization of disaster risk reduction efforts and responsibility should be coordinated by the municipalities and wards or at village levels

Decentralization of Vulnerability Reduction

Appropriate Disaster Reduction Policies

- Review, Revise, Update and Operationalize Disaster Risk Reduction Policies and Acts
- Review and Update the National Action Plans for Disaster Management

Decentralization of Vulnerability Reduction

Integration of Disaster management in governance

- Generate and Disseminate Basic Knowledge on Potential Hazards
- Apply Science and Technology in Disaster Mitigation
- Develop and Implement Standards and Codes
- Develop Emergency Response System and Professional Capability
- Ensure Fail-safe Operation of Critical Facilities

Mainstreaming Vulnerability Reduction With Development

- Disasters continue to be regarded as abnormal phenomena and disassociated from the normal development process.
- Most crucially, disaster management has become separated from the development of everyday affairs that create vulnerability (Lewis, 1999)

Mainstreaming Vulnerability Reduction With Development

- **Community Participation**
 - Existing Coping Mechanism May Not Work Fully,
but Should Be the Starting Point
- **Involvement of Non-Governmental
Organization (NGO)**

Learning Lessons from Disasters

- Disaster events
 - provide unique opportunity to
 - learn the physical process and the intricate relationship between society and the hazardous process
 - reveal vulnerabilities and help identify the adjustments necessary in society to avoid similar destruction in future
 - reveal the inherent weaknesses in our construction practices, approaches and coping mechanisms
 - provide the lead for prioritizing actions
- lessons are mostly valid beyond a single community, country, and region

Measuring EVR is a difficult task

- The success of disaster risk reduction initiatives could be measured by
 - Acceptability of the measures by the community
 - what is accepted is more important than what is necessary..**India**
 - Involvement of community in the decision-making processes and subsequent replication of the measures
 - Raised awareness, development and enactment of disaster preparedness and emergency response plans
 - Conduct of drills & incorporation of disaster preparedness in school curricula
 - Number of masons trained in earthquake –resistant construction and their increased demand and salary.

Dissemination and Internalization of EVR Message

- Lessons from past disasters
 - have not been sufficiently disseminated to the general public
 - continued to be confined within the affected populations or within the academic circle
- Information should be more widely disseminated
 - using organized and institutionalized approaches and mechanisms
 - so that people not only have access to the lessons learned, but they practice them as well.

QUESTIONS DISCUSSION