

# An Orientation to Disaster Risk Reduction

Presented by  
USAID  
Office of Foreign Disaster Assistance  
To  
PAHO's Meeting for  
Health Disaster Coordinators  
12 June 2007



# The DRR Course

- Three days duration
- Developed in collaboration with the CDB
- Available to sector specific or multi-sectoral groups
- Is available in English and Spanish
- Involves a number of exercises
- Will be conducted in Barbados, St. Lucia and Panama this year

# What is Disaster Risk Reduction?



# Risk Reduction

- Risk reduction is an evolving area of disaster risk management aimed at risk elimination or reduction by intervening in the vulnerability – of a community, of an area, of infrastructure, etc.

# Disaster Risk Management

- The systematic management of administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters.
- This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards. (ISDR, 2004).

# Framework for Disaster Risk Management

## Components - Activities

- Risk Identification - Hazard and Vulnerability Studies
- Risk Reduction - Prevention and Mitigation
- Risk Transfer - Insurance and Risk Financing
- Preparedness, Response - Forecasting, dissemination of warnings, implementing preparedness measures
- Recovery - Rehabilitation and Reconstruction

# Target Group

## Who must be involved?

Multi-sectoral, multidisciplinary strategic users which include a broad range of Disaster Risk Management stakeholders.


- Governmental and nongovernmental organizations at
  - Community, National and Regional levels,
- National Disaster Organisations
- Professional Associations.
- Lending Institutions
- Insurance Companies

.

# Basic Concept/Definition

## Hazard

A hazard is a potentially damaging physical event, natural phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation (U N ISDR, 2004).

The background of the slide features several faint, concentric circles in a lighter shade of blue, resembling ripples in water, located in the bottom right and bottom center areas.

# Origin of Natural Hazards

- Hazards may have different origins:  
Natural (geological, hydrometeorological and biological) or
- Induced by human processes  
(environmental degradation and technological hazards).

# Categories of Natural Hazards

There are three categories of natural hazards:

- Hydro-meteorological, geological and biological..
- 1. **Hydro-meteorological** hazards are natural processes or phenomena of an atmospheric, hydrological or oceanographic nature.
- 2. **Geological** hazards are natural earth processes or phenomena that include internal earth processes of tectonic origin as well as external processes such as mass movements.

# Hydro-meteorological Hazards

- Tropical waves and depressions
- Tropical Storms
- Hurricanes
- Storm surges
- Torrential rains
- Floods
- Tsunamis
- Droughts



# Geological

- Volcanic eruptions
- Landslides
- Mud flows
- Earthquakes



# Key Terms

## **Vulnerability**

- The condition determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (ISDR, 2004).

# Key Terms

## Resilience

- Resilience is the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. (ISDR, 2004).

# Key Terms

## **Risk**

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damage) resulting from interactions between natural or human-induced hazards and vulnerable conditions (ISDR, 2004).

# Key Terms


## **“Acceptable Risk”**

Refers to the specific value of damage a community is willing to assume.

# Key Terms

## **Disaster**

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources (ISDR, 2004).

The background of the slide features several faint, concentric circles in a lighter shade of blue, resembling ripples in water, positioned in the lower right and bottom center areas.

# Disaster Risk Management

Components	Activities
Risk Identification	Hazard and Vulnerability Studies
Risk Reduction	Prevention and Mitigation
Risk Transfer	Insurance /Risk Financing
Preparedness, Alert, Response	Forecasting, dissemination of warnings, implementing preparedness measures
Recovery	Rehabilitation and Reconstruction

# Risk Identification

Risk identification is the systematic use of available information to determine the probability of certain adverse events occurring and the related consequences.



# Risk Identification - Examples

- Hazard data collection and mapping – identification, dimensioning, frequency of the hazard
- Vulnerability assessments – identification of who (population) and what (infrastructure) are vulnerable to the hazard
- Risk assessments – determining the expected loss from a hazardous event
- Post-disaster assessments
- (30)

# Risk Reduction

- Risk reduction is an evolving area of disaster risk management aimed at risk elimination or reduction by intervening in the vulnerability. In other words, risk reduction involves clear and explicit effort to avoid the occurrence of disasters. Risk reduction comprises two components: **Prevention and Mitigation.**

# Prevention

- Activities to provide outright avoidance of the adverse impact of hazards and the means to minimize related environmental, technological and biological disasters (ISDR, 2004).

# Mitigation


- Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards (ISDR, 2004).

# Risk Reduction - examples

- Physical measures
  - Socio-economic measures
  - Environmental measures
  - Post-disaster measures
- 
- (31-33)


# Preventable hazards and impacts that can be mitigated

## *Preventable Hazards*

- Oil Spill
  - Toxic waste contamination
  - Industrial pollution
  - Landslide
  - Flooding
- 

# Preventable hazards and impacts that can be mitigated

## *Hazards which can be mitigated*

- Oil spill
  - Toxic Waste Contamination
  - Industrial pollution
  - Landslide
  - Flooding
- 

# Preventable hazards and impacts that can be mitigated

## *Hazards whose impacts can be mitigated*

- Earthquake
- Hurricane
- Volcanic eruption
- Landslide
- Flooding



# Risk Transfer

- Risk Transfer refers to instruments that share/hedge economic risks before losses occur.

# Risk Transfer - Examples

- Budget self-insurance
  - Market Insurance and Reinsurance
  - Public asset coverage
  - Risk pooling and diversification
  - Risk financing
- 
- (33-35)

# ***Budget Self-insurance***

- Budget self-insurance is the measure taken by individual property owners to allocate a modest yearly budget for improvement, maintenance and selected retrofit investments for their property (buildings, land, infrastructure) which helps to reduce future expected losses in the event of a disaster.

# Market Insurance

- Market insurance is the mechanism by which losses are stabilised through prepayment in the form of regular premium payments.

# Public asset coverage

- Public asset coverage financing is the process by which governments seek to finance the reconstruction of damaged critical public assets. Usually this comes from annual budgets, but needs to be augmented by outside sources.

# Risk pooling & diversification

- Diversification of the risk pool is done by banking with others from other geographic areas or industries which can help reduce insurance premiums for all participants.



# Catastrophe Bond

- A cat bond is a bond that is purchased by investors which transfers risks to the global capital market.

# Risk Transfer

- Risk transfer ensures that funds are readily available to rectify the damage or replace the facility, should a loss occur. It does not reduce actual vulnerability. As a result, risk transfer mechanisms should always be implemented in support of, rather than as a replacement for, broad disaster risk reduction initiatives, such as improved building practices and land use planning.

# Preparedness

- Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations (ISDR, 2004).

# Alert

- A formal declaration of the near or imminent occurrence of a hazard. This information should lead emergency organisations to activate previously established mechanisms, and the population to take specific precautions

# Response

- The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration. (ISDR, 2004).

# **Recovery** - Rehabilitation and Reconstruction

## **Recovery**

Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken “community”, while encouraging and facilitating necessary adjustments to reduce disaster risk (ISDR, 2004).

# Rehabilitation

## Rehabilitation


- This is the transition period that begins during response to re-establish temporary critical basic services in the short-term.

## Reconstruction

- Reconstruction is the process of infrastructure repair, restoration of the production system, and resumption of the population's normal life pattern.

# Phases of Disaster Risk Management

## Pre-Disaster

- Risk Identification
  - Risk Reduction
  - Prevention and Mitigation
  - Risk Transfer
  - Preparedness
- 

# Phases of Disaster Risk Management

## Post-Disaster

- Response
- Recovery - Rehabilitation and Reconstruction

# Damage from natural hazards

## *Direct Damage:*

- Direct damage is all damage sustained by immovable assets and inventories of finished and semi-finished products, raw materials, other materials and spare parts (UNECLAC, 1991).

# *Indirect Damage*

- This is damage to the flows of goods that cease to be produced or the services that cease to be provided during a period of time beginning almost immediately after the disaster and possibly extending into the rehabilitation and reconstruction phase (UNECLAC, 1991).

# Disaster Risk Management and Development

- Natural events such as earthquakes, volcanoes, hurricanes and floods, within the context of expanding population and economic growth in the Caribbean Region, pose a growing threat to national and regional development strategies.



# DRM & Development (cont'd)

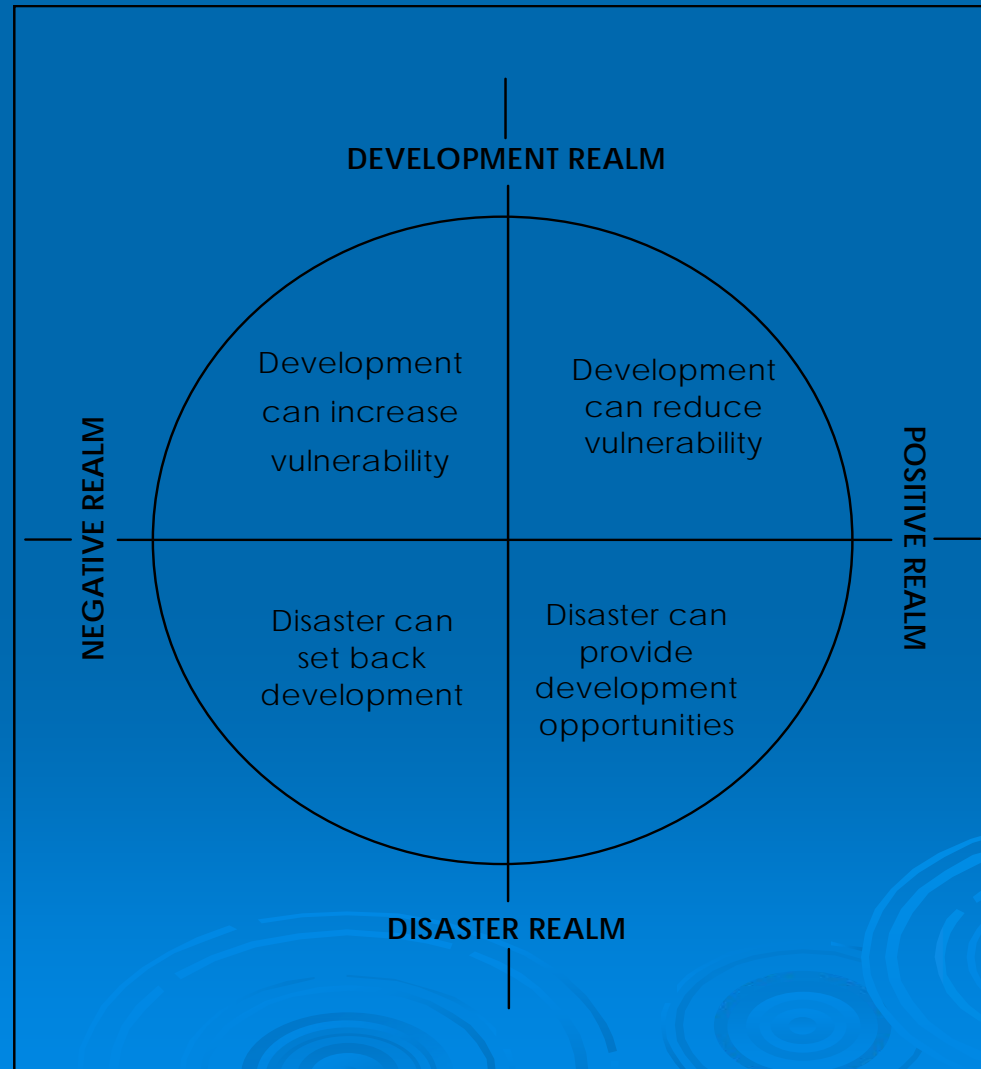
- Natural hazards can delay future development due to the loss of resources. They may also cause a shift of scarce resources earmarked for development projects to emergency response and reconstruction following the events.



# DRM & Development (cont'd)

- They can also depress the investment climate. Proactive Disaster Risk Management, which involves priority investment in mitigation and prevention, must be an essential strategy for sustainable development in the Caribbean Region.

# Development - Vulnerability



# Disaster Risk Management

Components	Activities
Risk Identification	Hazard and Vulnerability Studies
Risk Reduction	Prevention and Mitigation
Risk Transfer	Insurance /Risk Financing
Preparedness, Alert, Response	Forecasting, dissemination of warnings, implementing preparedness measures
Recovery	Rehabilitation and Reconstruction

# What is Disaster Risk Reduction?

- The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development (ISDR, 2004).

# The Disaster Risk Reduction Framework

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;
- Knowledge development including education, training, research and information;
- Public commitment and institutional frameworks, including organizational, policy, legislation and community action;
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;
- Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.

# Disaster Risk Reduction Measures

There are five categories of Disaster Risk Reduction measures:

- Physical
- Socio-economic
- Environmental
- Management and institutional and
- Post disaster.

# ***Physical Measures***

## **Physical Risk Reduction Measures**

- Physical risk reduction measures are structural and non- structural measures that are undertaken to help avoid or alleviate the damage and losses that result from hazards.

# Structural Measures

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure (ISDR, 2004).

## Examples

### Construction;

- Strengthening of facilities;
- Altering of the environment

# Non-Structural Measures

- Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts (ISDR, 2004).

# Non-Structural Measures

- **Examples:**
- Engineering design such as designing for vibration, lateral loads, wind loads, load surcharges, flood resistance;
- Physical development plans that identify land use zones that are developable and those that are hazard prone;
- Development regulations (design standards, building codes);

# ***Socio-economic measures***

Socio-economic risk reduction measures are those that are designed to address gaps and weaknesses in the systems whereby communities and society as a whole prepare to respond to disaster events.



# Socio-economic measures

## ➤ Examples:

- Build awareness of hazards and vulnerabilities at the community level
- Create community mutual assistance networks
- Develop employment protection programs

# Environmental Measures

## Environmental Risk Reduction measures

- Environmental risk reduction measures are those that are designed to protect existing, or rehabilitate degraded, environmental systems that have the capacity to reduce the impact of natural hazards.

# Environmental Measures

- **Examples:**
- Policies and programmes such as development control or environmental impact assessments that reduce or eliminate the effect of human activities on the environment;
- Physical measures that restore or fortify damaged environmental systems such as mangrove replanting, coral reef protection, reforestation of critical watersheds or restoration of degraded river courses;

# Management and Institutional Measures

Institutionalising disaster risk reduction requires:

- Education, training and professional competence, access to information and political will.
- The professional training of engineers, planners, economists, social scientists and other managers to include hazards and disaster risk reduction within their normal area of competence.
- Information is a critical element in planning for disaster risk reduction.

# Post-disaster Measures

- Reconstruction and rehabilitation work during the post-disaster period determines the capability of the system to weather future hazards.
- The recovery period can be seen as a window of opportunity for implementing a comprehensive disaster risk reduction programme.

# Active and Passive Risk Reduction Measures

## *Active Risk Reduction Measures*

- Active Measures are those used by the authorities to promote desired actions by offering **incentives**. These measures are often associated with development programmes in areas of low income.

# Examples of incentives are:

- Tax exemptions and other incentives for those who fulfill planning regulations such as adoption of the building code;
- Economic assistance (grants and preferential loans);
- Subsidies on safety equipment, safer building materials, etc;
- Provision of financial opportunities for the construction of key facilities: safer buildings, shelters, refuge points, storage;
- Training and education;
- Public information dissemination and awareness raising;
- Promotion of voluntary insurance; and
- Creation of community organizations.

# Active RR Measures

## ➤ Advantages:

- May produce better results because they:
  - Tend to promote a safety culture
  - Do not rely on the economic capacity of the community
  - Do not rely on enforcement by local authorities

# Active DRR measures

## ➤ Disadvantage:

- More costly – require large budgets, skilled workforce and extensive administration

# ***Passive Risk Reduction Measures***

- Passive measures are those used by the authorities to prevent undesired actions, as for example **controls and penalties** (as opposed to incentives). However, these actions are usually more appropriate for well-established local authorities in areas with higher incomes.

# Examples:

- Land use regulations;
- Requirements to conform with building design codes;
- Checking compliance of controls on site;
- Not approving the construction of utilities and infrastructure in areas where development is undesired;
- Imposing court proceedings, fines, closure orders on offenders; and Compulsory insurance.

# Disaster Risk Reduction Stakeholders

Local organizations E.G. Non-governmental Organizations and Community Based Organisations
Local Disaster Committees
Local Governments
National
Central Government
National Disaster Offices
Private Sector
Sub-regional and Regional
Organisation of Eastern Caribbean States
Caribbean Disaster Emergency Relief Agency
Caribbean Development Bank
Multi-Lateral and Bi-Lateral Lending Institutions and Development Partners

# **Summary Matrix of Roles and Activities of Stakeholders**



# What is Disaster Risk Reduction?

- The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development (ISDR, 2004).

# Disaster Risk Management

Components	Activities
Risk Identification	Hazard and Vulnerability Studies
Risk Reduction	Prevention and Mitigation
Risk Transfer	Insurance /Risk Financing
Preparedness, Alert, Response	Forecasting, dissemination of warnings, implementing preparedness measures
Recovery	Rehabilitation and Reconstruction

# The Disaster Risk Reduction Framework

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;
- Knowledge development including education, training, research and information;
- Public commitment and institutional frameworks, including organizational, policy, legislation and community action;
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;
- Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.

# Importance

- Risk reduction reduces vulnerability
- Reduced vulnerability reduces impact of future hazardous events
- Reduced impact means quicker recovery
- Quicker recovery allows return to development activities

THE END

QUESTIONS???

THANK YOU



# ***Vulnerability Assessment***

- Vulnerability assessments are systematic examinations of population, buildings, infrastructure and selected geographic areas to identify who, what and where are susceptible to damage from the effects of natural hazards.

# ***Vulnerability Analysis***

## **Determine vulnerable elements**

- Determine the elements that are vulnerable to the hazard: population, neighborhoods, or environmental zones.
- Identify critical facilities such as:  
Shelters, schools, hospitals, clinics and fire stations;
- Lifelines such as water, sewerage, telecommunications, energy and gas systems;
- Housing;
- Historical buildings and archaeological sites.

# Vulnerability Analysis cont'd.

## **Determining characteristics of vulnerable population:**

- number of residents;
- health condition;
- socio-economic characteristics.

## **Establish community's response capability:**

- level of knowledge on risk issues;
- resilience shown by the community;
- participation in the design, test and planning execution.