2. Concept of Total Disaster Risk Management

2.1 Outline of TDRM

The Asian Disaster Reduction Center (ADRC) has been promoting a culture of disaster reduction by advocating disaster reduction as a core part of government policy and raising public awareness in the Asian Region. ADRC and the Asian Disaster Response Unit of the United Nations Office for the Coordination of Humanitarian Affairs Kobe (UN-OCHA/Kobe) have developed the Total Disaster Risk Management (TDRM) as an effective and strategic approach to disaster reduction that is based on many years of experience in coping with natural disasters worldwide, particularly in Asia.

The concept of TDRM centers around two crucial principles: "the involvement of all stakeholders" and "implementation at all phases of disaster risk management," namely the prevention/mitigation, preparedness, response and rehabilitation/reconstruction phases (Figure 2.1). Since damage stems from the combination of hazards, exposure and vulnerability, TDRM, as a holistic approach which covers relevant stakeholders and all phases, is essential in disaster risk management.

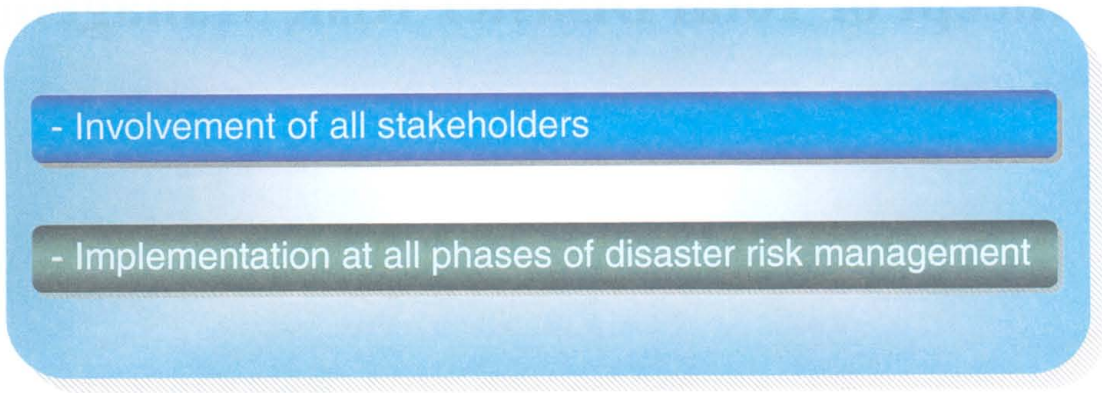

Figure 2.1 Principle of TDRM

The essence of TDRM can be understood in the following three pillars:

1) Disaster Risk Management Cycle
   Four phases: Prevention/Mitigation, Preparedness, Response, Rehabilitation/Reconstruction

2) Risk Management Flow
   Specific methodology of risk management

3) TDRM Strategy

- Establishment of coordination mechanisms and legal framework for disaster reduction
- Integration of disaster reduction concept into development planning
- Improvement of information sharing and management
- Promotion of education and public awareness
- Development of multi-stakeholder partnerships and citizen participation

2.2 Disaster Risk Management Cycle

The disaster risk management cycle, shown in Figure 2.2, consists of four phases: Prevention/Mitigation and Preparedness in the pre-disaster stage, and Response and Rehabilitation/Reconstruction in post-disaster stage. In the "Prevention/Mitigation" phase, efforts are made to prevent or mitigate damage (*e.g.* construction of dikes and dams against floods). Activities and measures for ensuring an effective response to the impact of hazards are classified as "Preparedness" (*e.g.* emergency drills and public awareness) and are not aimed at averting the occurrence of a disaster. "Response" includes such activities as rescue efforts, first aid, fire fighting and evacuation. In the "Rehabilitation/Reconstruction" phase, considerations of disaster risk reduction should form the foundations for all activities. Examples of measures taken in each phase are listed in Table 2.1. Taking appropriate measures based on the concept of disaster risk management in each phase of the disaster risk management cycle can reduce the overall disaster risk.

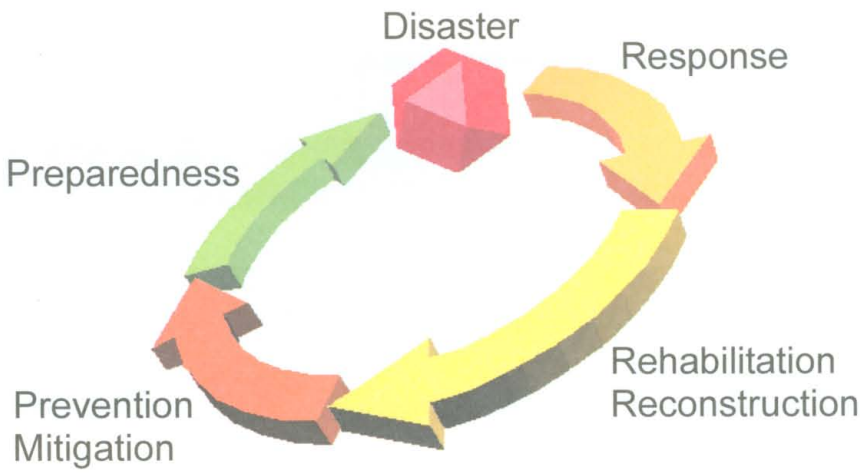

Figure 2.2 Disaster Risk Management Cycle

Table 2.1 Example of Measures in Each Disaster Risk Management Phase

Phase \ Disaster	Earthquake	Flood	Storm (cyclone, typhoon, hurricane)	Landslide
Prevention/ Mitigation	- Seismic design - Retrofitting of vulnerable buildings - Installation of seismic isolation/ seismic response control systems	- Construction of dike - Building of dam - Forestation - Construction of flood control basins/ reservoirs	- Construction of tide wall - Establishment of forests to protect against storms	- Construction of erosion control dams - Construction of retaining walls
Preparedness	- Construction and operation of earthquake observation systems	- Construction and operation of meteorological observation systems	- Construction of shelter - Construction and operation of meteorological observation systems	- Construction and operation of meteorological observation systems
	- Preparation of hazard maps - Food & material stockpiling - Emergency drills - Construction of early warning systems - Preparation of emergency kits			
Response	- Rescue efforts - First aid treatment - Fire fighting - Monitoring of secondary disaster - Construction of temporary housing - Establishment of tent villages			
Rehabilitation/ Reconstruction	- Disaster resistant reconstruction - Appropriate land use planning - Livelihood support - Industrial rehabilitation planning			

2.3 Risk Management Flow

To reduce disaster risk, it is important to take implement risk management procedures step by step. The disaster risk management flow under TDRM is illustrated in Figure 2.3.

(1) Government Initiative

Disaster risk management starts with strong government initiative.

(2) Objective Setting

Risk management guidelines should reflect the social need for the protection of life and property from natural disasters, and should clarify the objectives to be achieved through the implementation of a risk management system. These also include the commitments by the central and local governments and other public authorities and organizations.

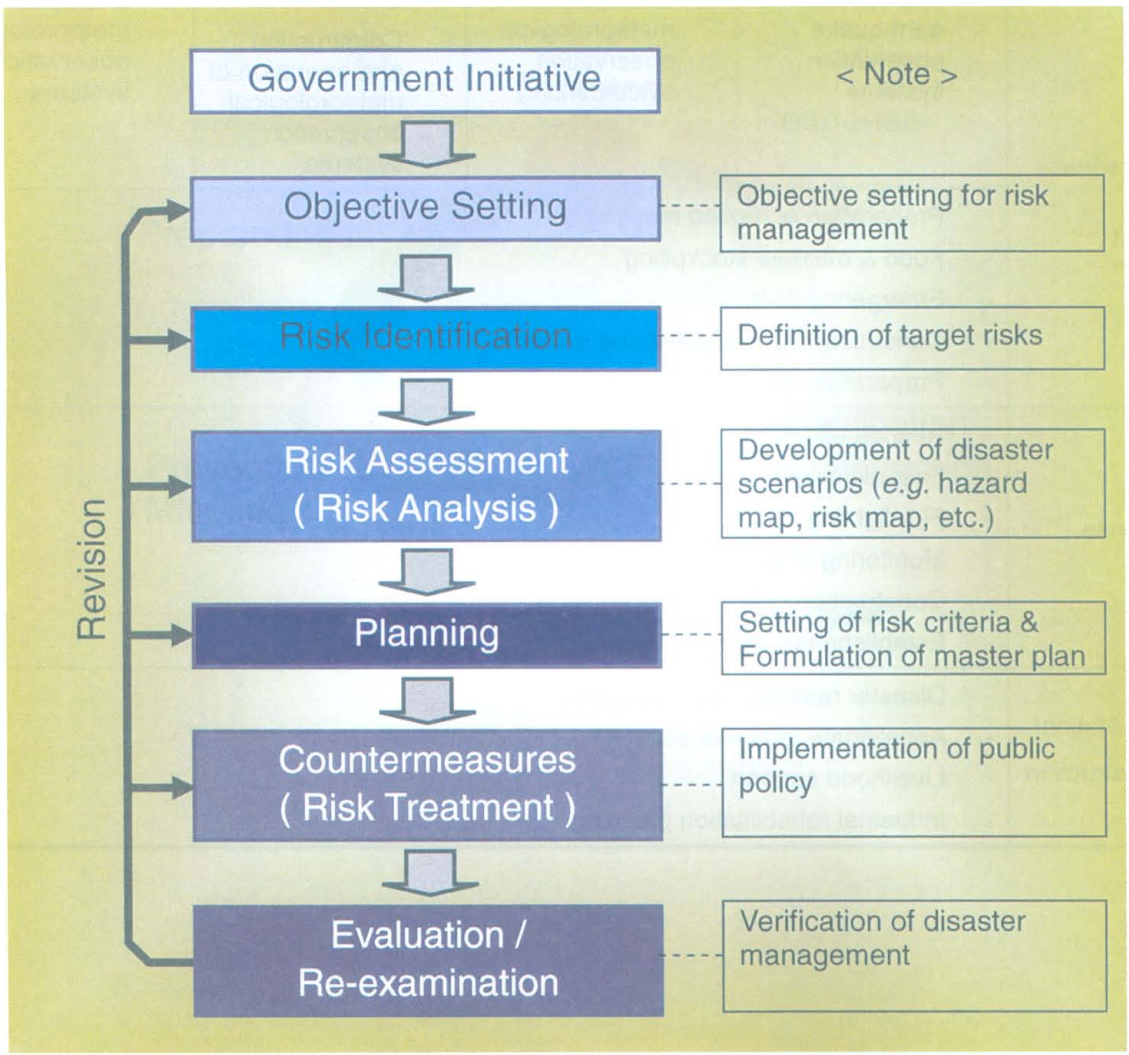

Figure 2.3 Risk Management Flow

(3) Risk Identification

In the risk identification process, target risks are isolated based on past disaster experiences and the losses and severity observed in those events domestically as well as in other countries Risk identification should be conducted in using several different methods in cooperation with experts since the risks that need to be addressed involve a great deal of uncertainty and can tend to be overlooked.

(4) Risk Assessment (Risk Analysis)

Risk assessment is performed to estimate the quantitative damage that can be expected to result from natural hazards and their impacts on society. When it is impossible to conduct a quantitative estimation, risks are ranked by qualitative assessment. Risk assessments are generally carried out by technicians or engineers. Disaster scenarios are developed based on assessed damage.

(5) Planning

The assessment is used to develop concrete objectives and policies that specify the target risks to be managed (*e.g* disaster type, area to be protected) and to develop effective countermeasures. In this process, the targeted risk criteria, budgets, project periods and priorities are established. A master plan for disaster risk management is then formulated with ample consideration given to such topics as the continuity of contents in a master plan, adequate procedures, review mechanisms, and the assignment of responsibilities.

(6) Countermeasures (Risk Treatment)

In this process, countermeasures are executed in accordance with policies. Disaster risk management countermeasures consist of four elements: risk avoidance, risk reduction, risk transfer and risk retention (see the next page). These countermeasures are formulated as public policy based on the master plan. Policies should be open to the public in order to increase mutual understanding between governments and citizens (necessity of risk communication).

(7) Evaluation/Re-examination

Risk management performance (*i.e.* the implementation status of plans and countermeasures) and efficacy (*e g.* achievement of objectives, validity of the whole project and its components) need to be evaluated. For example, the evaluation of risk criteria is important for confirming achievements. The crucial point in this process is to constantly review the risk identification and assessment processes in order to take appropriate countermeasures against frequent changes in the environment, geographic features, social structures, localities, and other factors.