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.

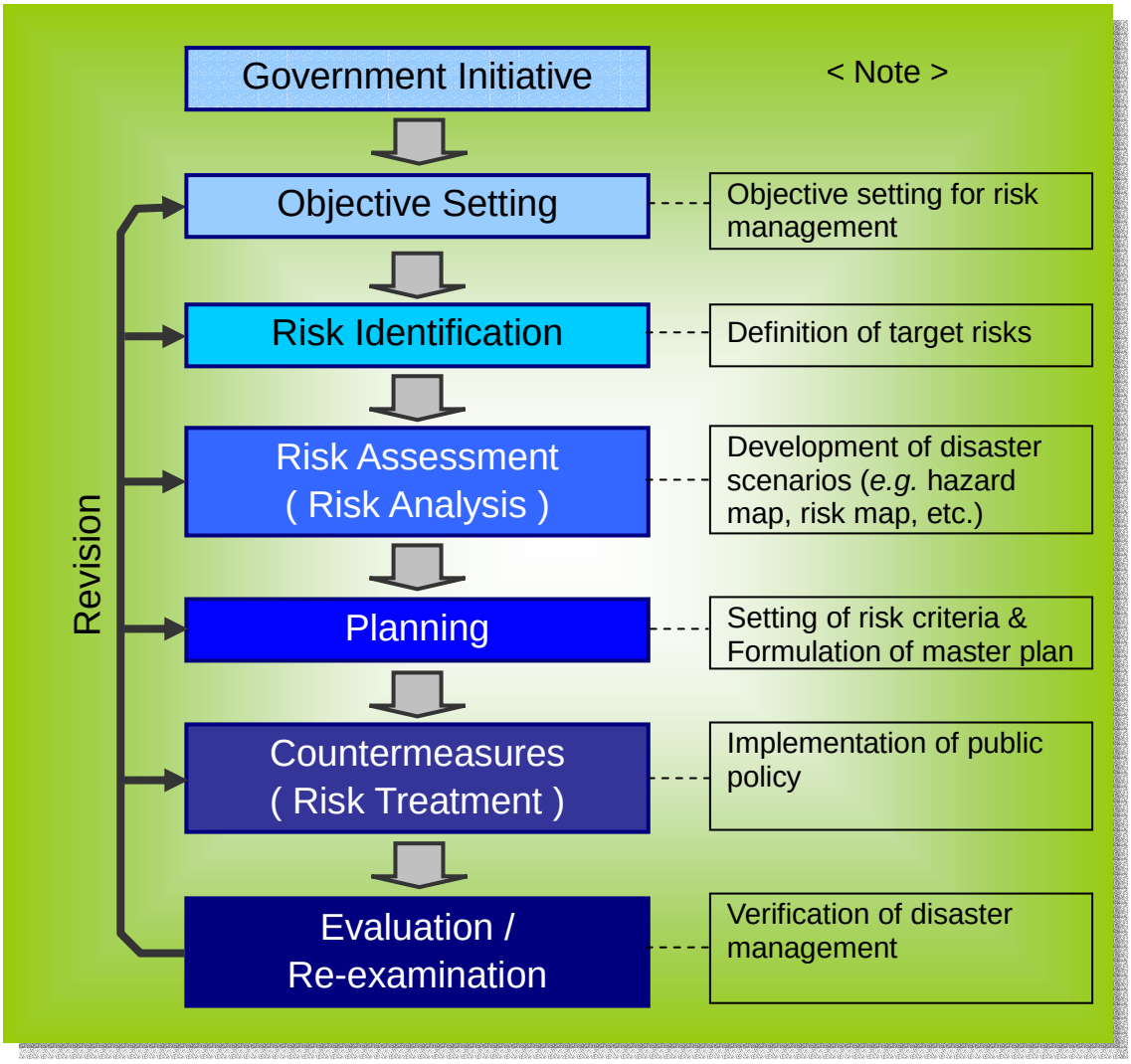

Figure 2.3 Risk Management Flow

(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.

Figure 2.4 shows the classification of risk treatment. “Risk treatment” is divided into “risk control” and “risk finance.” Risk control is further broken down into “risk avoidance” and “risk reduction,” while risk finance is composed of “risk transfer” and “risk retention.” In this figure, examples are also cited.
Figure 2.5 describes the concept of disaster risk treatment. Risk treatment measures depend on the relationship between loss and the probability of loss. Risk is defined as follows:

$$(Risk) = (Probability\ of\ \ Loss) \times (Loss)$$

In this formula, a case of low probability of loss with little loss would yield low risk, while a case of large loss with a high probability of loss would yield a high risk. If a significant degree of loss with high probability is expected, risk avoidance should be selected as the best countermeasure. When a significant degree of loss with low probability is expected, risk transfer would be an appropriate measure. In the case of a low degree of loss without reference to probability, risk retention is one of the options to be selected. In a several cases, risk treatment would not be possible through countermeasures alone. Risk reduction would be the mainstay of these countermeasures. Risk reduction measures against earthquakes are, for example, the introduction of seismic designs, retrofitting of buildings and residences, development of early warning systems, and emergency drills conducted by relevant organizations and the general public. Risk reduction, which is illustrated as a composed vector in the figure, is accomplished through a combination of prevention/mitigation and preparedness efforts.

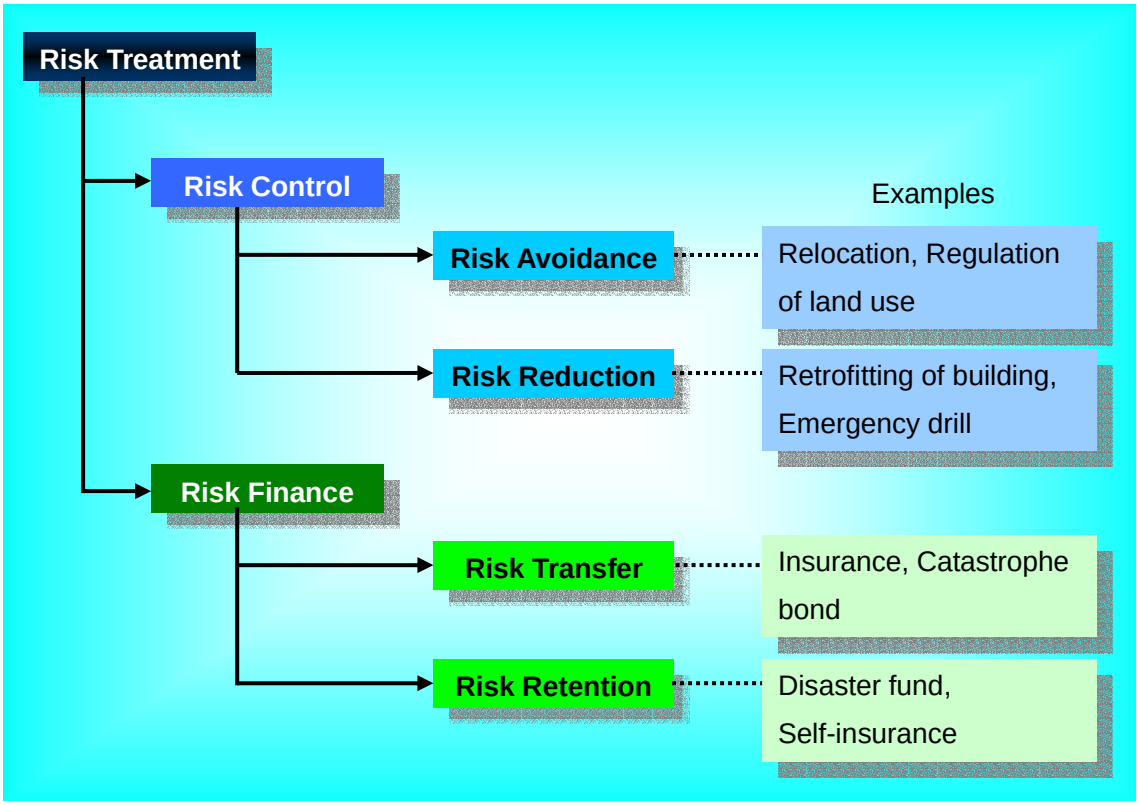

Figure 2.4 Classification of Risk Treatment for Natural Disasters

The total loss can be reduced by risk control measures, though remaining damage may be unevenly distributed among certain population. The population can be assisted by a number of non-affected people with risk finance (Risk Transfer and Risk Retention). Since risk finance cannot reduce the physical damage, optimal assortment of risk treatments (*e.g.* Figure 2.6) is significant for the efficient disaster risk management. Combination ratios are determined based on the type of disaster, economic strength, social conditions, historical background, and other factors.

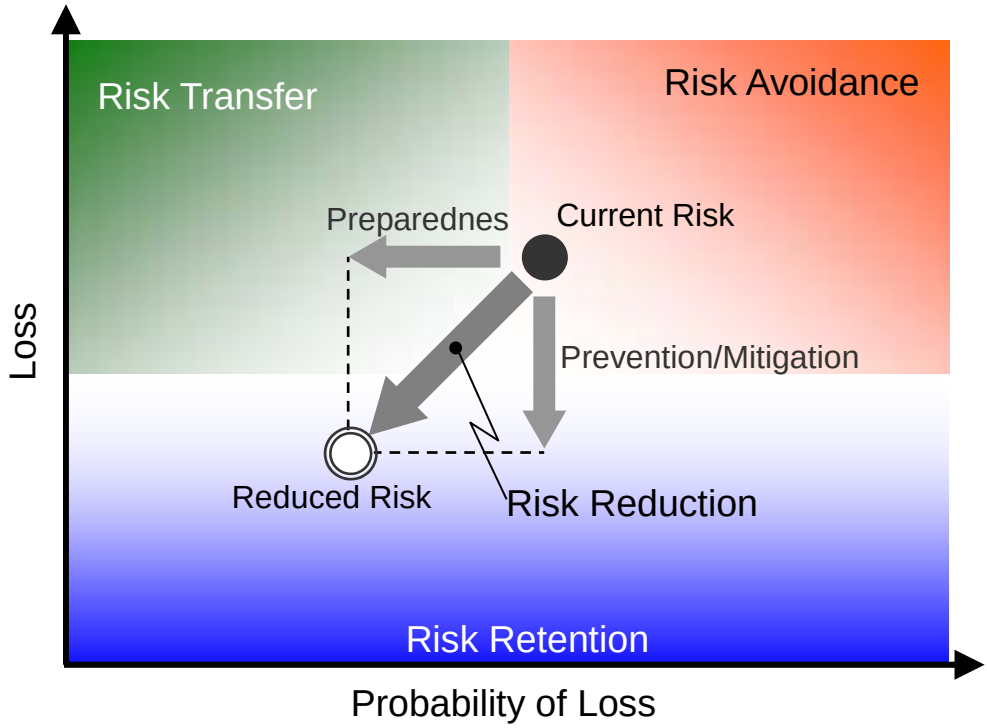

Figure 2.5 Concept of Disaster Risk Treatment

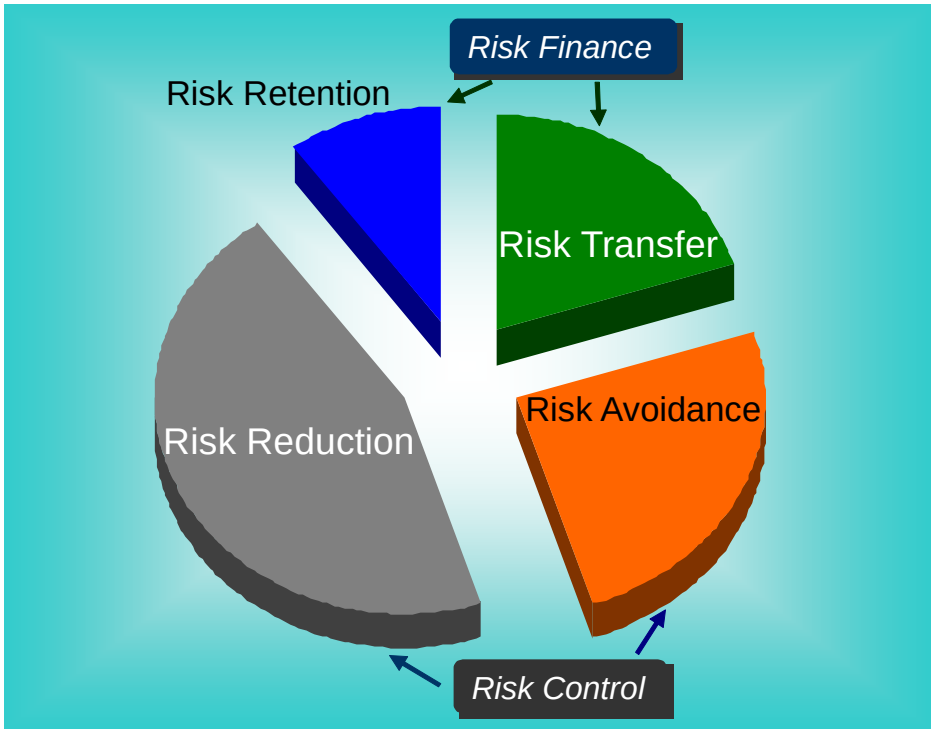

Figure 2.6 Best Matching of Risk Treatment Elements (image)