

Total Disaster Risk Management for Sustainable Development
Mr. Satoru Nishikawa
Executive Director
Asian Disaster Reduction Center (ADRC)

Background

Natural disasters can be one of the biggest obstacles to the sustainable development and social security of a nation. The cost of a single disaster may even exceed a country's annual GDP.

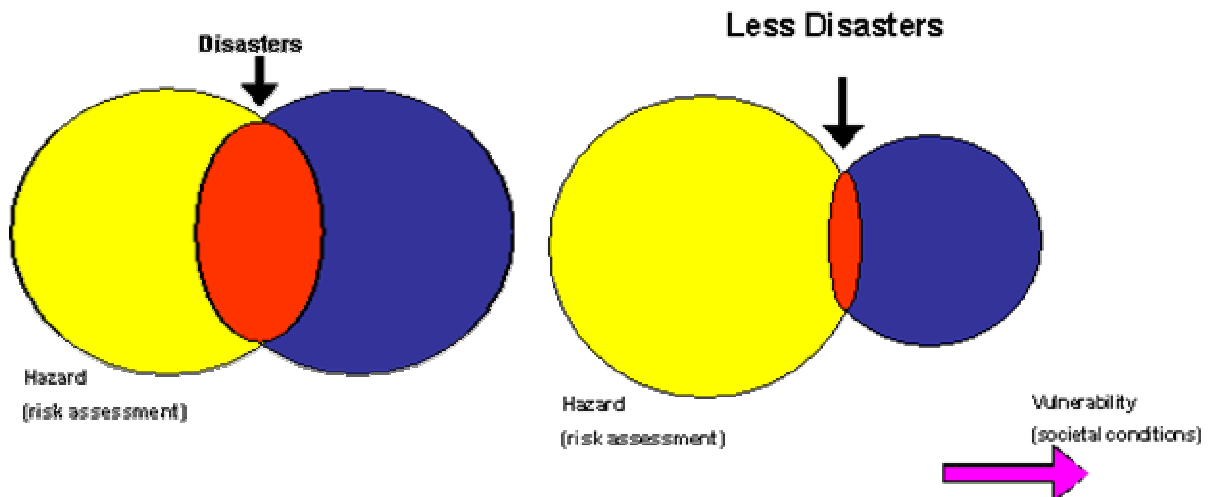
Ratio of Amount of Damage to GDP (Asia) (1975-2002)					
Country Name	Disaster Year	Disaster Type	Amount of Damage (BillionUS\$)	GDP (Disaster Year) (BillionUS\$)	Damage/ GDP
Armenia	1988	Earthquake	20.50	11.65	176%
Mongolia	1996	Wild Fire	1.71	3.68	47%
Yemen	1982	Flood	0.98	8.92	11%
Nepal	1987	Flood	0.73	12.79	6%
Lao, PDR	1993	Wind Storm	0.30	5.95	5%

Fig.1 Ratio of Amount of Damage to GDP

Source: ADRC, Japan, based on EM-DAT, CRED, Belgium and WDI, World Bank 2002

Disaster reduction is therefore a MUST to ensure sustainable development. When an earthquake or typhoon strikes an uninhabited island, it is considered just a natural phenomenon, not a disaster. But, when it strikes a vulnerable community, it becomes a disaster. Reducing vulnerability to disasters can effectively reduce the negative impact of a disaster.

Fig.2 Factor of Natural Disasters



Risk management flow

Risk management entails four steps:

- (1) Formulation of policies on a national and local level to deal with risk
- (2) Risk identification
- (3) Risk analysis and evaluation
- (4) Implementation of countermeasures

Fig.3 Risk Management Flow

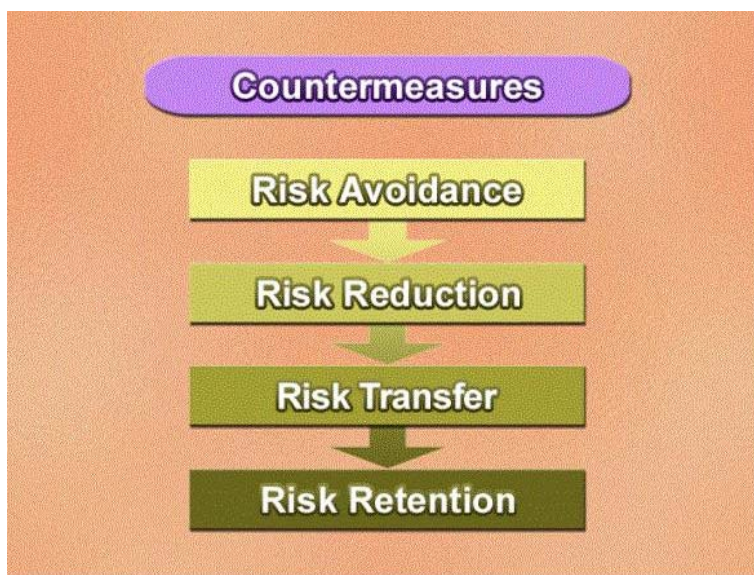


Regarding countermeasures, the first countermeasure to be taken is "risk avoidance." One example is not to locate residences in areas where there is frequent flooding. However, not all types of risky conditions can be totally avoided. Thus, the second-stage countermeasure is "risk reduction." It includes both structural measures such as levies and dams, and non-structural measures such as enhancing information systems and raising public awareness. Another useful measure is "risk transfer." One example is obtaining insurance to cover anticipated economic losses. But it is difficult to adopt measures that completely deal with all types of risk.

As a result, some kind of risk always exists.

Effectively minimizing this remaining risk requires a comprehensive approach to disaster risk reduction.

Fig.4 Countermeasures

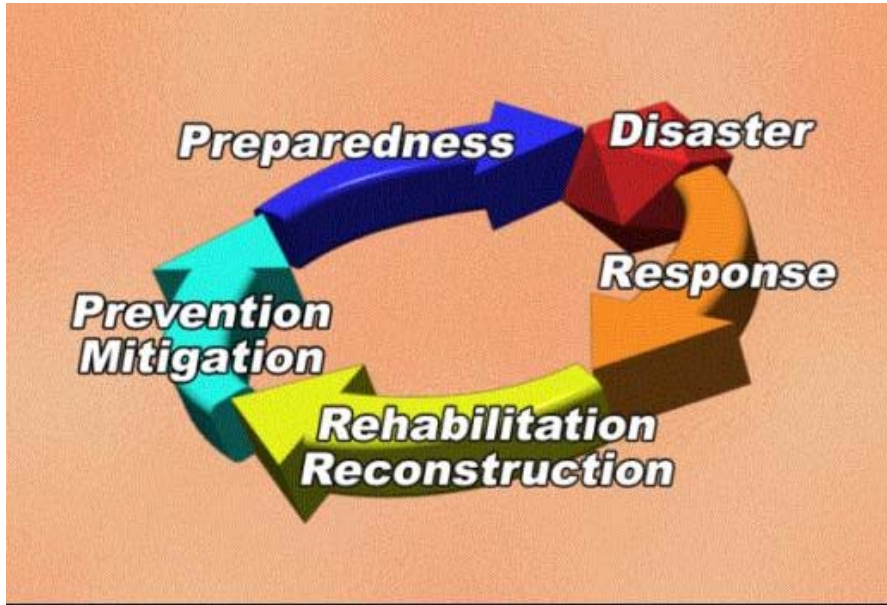


For this purpose, the Asian Disaster Reduction Center (ADRC) and the UN OCHA Kobe developed the Total Disaster Risk Management (TDRM) approach. But what is Total Disaster Risk Management?

Disaster risk management phases

Total disaster risk management has four phases: Prevention/Mitigation, Preparedness, Response, and Rehabilitation/Reconstruction.

Fig.5 Disaster Phases



a) Prevention/Mitigation

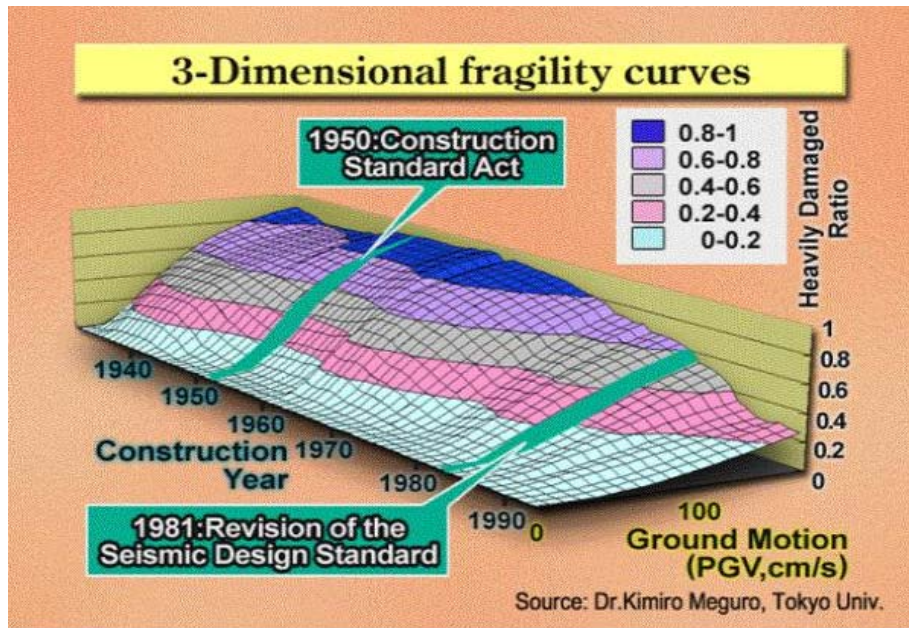
In 1995, 6,400 people lost their lives in Japan's Great Hanshin-Awaji Earthquake. 92% of those who died were killed within the first 15 minutes as a result of being crushed or suffocated beneath collapsed buildings.

Fig.6 Time when casualties were killed

Time when the casualties were killed due to Hanshin-Awaji Earthquake	
Time of death	No. of Casualties
1/17 5:46~6:00	2,221 (91.9%)
~9:00	16 (92.6%)
~12:00	47 (94.5%)
~23:59	12 (95.0%)
unidentified	110 (99.6%)
1/18	5 (99.8%)
1/19	0 (99.8%)
1/20	2 (99.9%)
1/21	1 (99.9%)
1/22	1 (100 %)
1/23	0 (100 %)
1/24	0 (100 %)
1/25	1 (100 %)
Total Number	2,416

[in Kobe City, after Hyogo Medical Examiners]

Fig.7 Fragility Curves of the buildings



Most of the buildings that collapsed were constructed prior to 1981, when seismic design standards were still inadequate. Even among buildings in the same location, properly designed buildings had almost no damage. This means mitigation makes a big difference and is the most effective way to directly reduce the loss of life.

b) Preparedness

In 1985, the eruption of the Nevado del Ruiz Volcano in Colombia caused mudslides that killed more than 20,000 people. Although experts had prepared an accurate hazard map one month prior to the eruption, local residents had not been informed. The areas inundated by mudslides were precisely as predicted by the hazard map. This means that the human loss caused by the disaster could have been prevented if the information about the potential danger had been communicated to the public.

Fig.8 Nevado del Ruiz Volcano in Colombia and its Hazard Map



In contrast, when the Mayon Volcano in the Philippines erupted in 2000 and 2001, residents were swiftly evacuated based on seismic monitoring, hazard maps, and other preparatory measures. As a result, in spite of the great force of the eruption, no deaths occurred. In this way, results can greatly differ depending upon the amount of preparation. A variety of information channels must be

established to ensure suitable communication, such as providing hazard map information and early warnings to communities at risk.

c) Response

In the Marmara Earthquake that struck Turkey in 1999, 50,000 people were rescued from beneath fallen debris; 98% were rescued by local residents. In times of catastrophic disaster, the community plays a vital role.

Fig.9 Marmara Earthquake of Turkey



So, enhancing the capacity for local response is very important. If a disaster is so large that there is a need for international assistance, the affected countries can call for international support. OCHA can, in consultation with national authorities, dispatch a United Nations Disaster Assessment and Coordination team to support national relief efforts.

Fig.10 UNDAC Team



d) Rehabilitation/Reconstruction

The earthquake that struck Gujarat, India in 2001 claimed about 14,000 lives. Most of the victims were killed by the collapse of poorly constructed buildings. Today, those houses are being rebuilt with greater earthquake resistance, while still employing traditional materials. This type of recovery also helps to reduce future losses by preparing for the next disaster.

Fig. 11 Shaking Table Test



Retrofitted Housing

Non-Retrofitted Housing

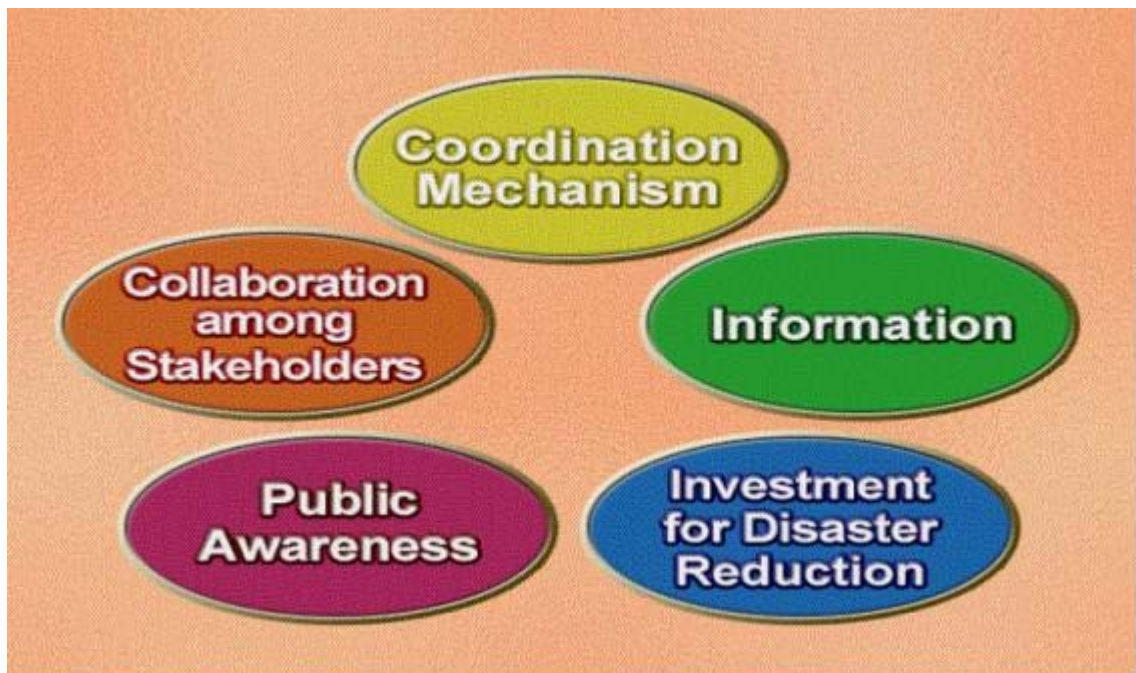
Source: UNCRD, Hyogo Office, Japan

Thus, it is necessary to implement Total Disaster Risk Management — TDRM — throughout all four phases of Prevention/Mitigation, Preparedness, Response, and Rehabilitation/Reconstruction.

Strategies

Now let's take a look at the main strategies of TDRM — a Coordination Mechanism, Information, Investment for Disaster Reduction, Public Awareness, and Collaboration among Stakeholders. In 1959 Japan was struck by the Ise Wan Typhoon, which resulted in 5,000 persons dead or missing. This disaster highlighted many existing problems, including a disaster management organization that was overwhelmed by temporary stopgap measures, inadequate warnings, and urban development lacking consideration for disaster prevention.

Fig. 12 Strategies for TDRM



a) Coordination Mechanism

In response, the Disaster Countermeasures Basic Act was enacted in 1961. The Central Disaster Management Council was established, chaired by the prime minister, and the roles and responsibilities of the national and local governments and of the public were clarified. Both the national and local governments were legally required to formulate and implement the Basic Disaster Management Plan for preventing and dealing with disasters.

b) Information

Prior to the Ise Wan Typhoon, Japan's typhoon monitoring was dependent on the U.S. Air Force. To closely monitor approaching typhoons while still distant, a radar facility was constructed on top of Mount Fuji, Japan's highest peak, and a meteorological satellite was launched. Those efforts made it possible to predict the typhoon's course and amount of rainfall a couple of days in advance, providing people with more time to evacuate and to prepare for possible danger.

c) Investment for Disaster Reduction

Major investments were also made in physical infrastructure to prevent and mitigate disasters, including the construction of levies, dams, and erosion control.

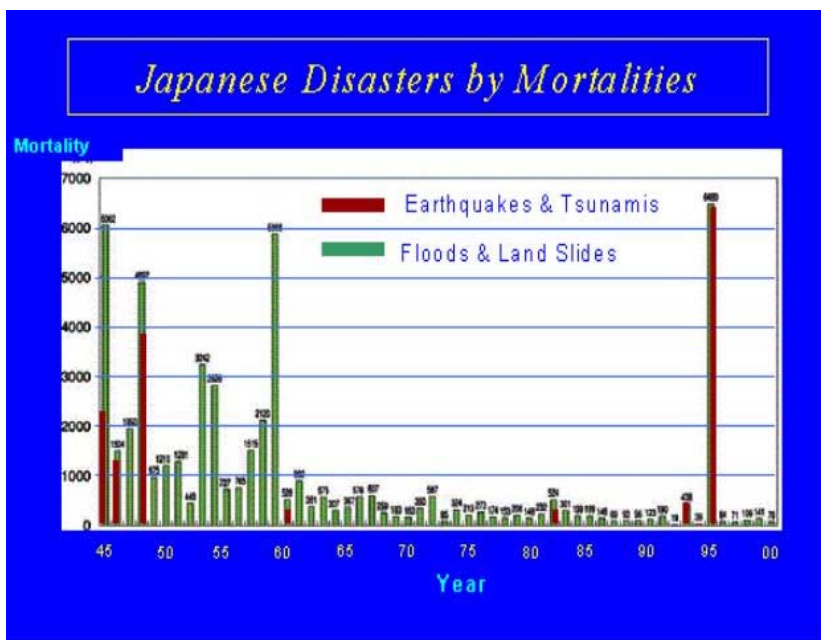
d) Public Awareness

September 1st was designated "Disaster Prevention Day." On this day, disaster drills and demonstrations are held throughout the country. In addition, a month-long Disaster Reduction Poster Exhibition is organized to raise public awareness. The Development of hazard maps with community involvement has been encouraged to better inform the public on how to live with risk.

e) Collaboration among Stakeholders

Under a clear national policy of disaster risk management, collaboration and cooperation among all stakeholders, including the Meteorological Bureau, mass media, waterway authorities, and educational sector, to name but a few, is the key to Total Disaster Risk Management. And, the most important element should never be forgotten -- a close link to the people. As a result of these efforts, since 1960 the number of deaths in Japan from typhoons and floods has drastically decreased.

Fig. 13 Japanese Disasters by Mortalities



For sustainable development

Prevention/Mitigation, Preparedness, Response and Rehabilitation & Reconstruction — Total Disaster Risk Management encompasses all four phases. The main strategies of TDRM are a Coordination Mechanism, Information, Investment for Disaster Reduction, Public Awareness, and Collaboration

among Stakeholders. To ensure sustainable development, it is necessary to learn from past experience and adopt a TDRM Approach suitable for the conditions in each country.