

Natural Disaster Risk Management —A Need for a Global Perspective—

自然災害のリスクのマネージメント

—地球的な視野の必要性—

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Although considerable progress has been made in managing natural disaster risk in developed countries, global risk to natural hazards is in fact increasing. By looking at natural disasters as a global challenge, general strategies are discussed to mitigate losses due to them.

1. Introduction

In the last 20 years, the United Nations reports that natural disasters have claimed almost three million lives and have adversely affected more than 800 million people worldwide. Earthquakes, floods, tropical storms (hurricanes, typhoons, cyclones), tornadoes, volcanic eruptions, avalanches, landslides, and tsunamis have accounted for most of the deaths.

Although considerable progress has been made in managing natural disaster risk in developed countries such as North America, Western Europe, Japan, etc. over the past four or five decades, there is still considerable risk at the global level. There are even suggestions that global risk due to natural hazards is in fact increasing. This may be due to changing socio-economic patterns around the world, massive increase in urbanization, and

changing priorities of governments to address the needs of their citizens. The unfortunate part of this situation is that many of the losses can be mitigated by structural and/or non-structural measures. For developing countries, it may not be realistic to build massive, capital intensive structural solutions, but they can implement some of the land use control, insurance, and education measures that could impact future losses. This paper presents a look at some of the risk management strategies that can help, in a cost effective manner, the mitigation of loss of human life and economic catastrophe due to natural disasters.

2. Natural Disaster - A Global Challenge

Natural disasters occur each year around the globe and exact a heavy toll in lives, property losses, social



Refuge Camp after Erzincan Earthquake, Turkey, 1992 (Photo by K. Meguro)

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disruption, and on future growth potential of the affected country. These events also impact on the fragile environment under which communities and societies need to co-exist. Rapid increase in urbanization of many regions

which are susceptible to natural disasters has added a new dimension to the potential for destruction and to the possible strategies for mitigation. The biggest impact of such disasters is on developing nations which are least prepared to recover after a disaster and which also are least prepared and protected for such disasters. It is estimated that the population of Mexico City will increase from 11.6 million in 1975 to 26 million by the year 2000. Corresponding numbers for two other cities in developing nations are: Jakarta from 5.5 million in 1975 to 13 million in 2000; Lima, Peru from 3.7 million in 1975 to 9.1 million in 2000. Similar trends exist in almost every part of the world. In light of such increases, how is a nation going to respond in preparing for future disasters? In the past 40 years alone, nearly twenty events have killed more than 10,000 people each¹. In Bangladesh alone, more than 100,000 people die due to natural disasters every year. Such massive devastation hinders the ability of nations to work towards social and economic development. We have seen over the years that even though the cost of prevention is many times smaller than the cost of recovery and reconstruction after a major disaster, nations do not invest in strategies to minimize future losses. To quote from the report cited earlier¹,

“Although preparation exceeding risk may waste community resources, risk exceeding preparation leads to disasters.

These facts—natural hazards facing the United States and the world, mounting losses of life and property, an imperfect but advancing understanding of hazard processes and predictability, mismatches between risk and preparation, and great potential for controlling losses through mitigation, engineering, and natural resource management— are the challenge to all who are at



Luzon Earthquake, Philippines,
1990 (Photo by M. Hakuno)

risk or who work to minimize losses from natural hazards”.

In response to this challenge, the United Nations General Assembly in December, 1987 approved resolution 42/169 and voted to designate the 1990s as the International Decade for Natural Disaster Reduction (IDNDR). By creating IDNDR, the United Nations has recognized that natural disasters are an international concern, a part of life that must be planned for and prepared for by those in areas at risk. The goals of IDNDR are:

- Improve the capacity of each country to mitigate the effects of natural disasters.
- Apply existing scientific and technological knowledge.
- Foster advances in science and engineering.
- Disseminate new and existing technical information.
- Develop measures for the assessment, prediction, prevention, and mitigation of natural disasters through technical assistance and technology transfer, demonstration projects, education and training, and evaluation of program effectiveness.

In enacting the IDNDR, the Secretary- General of the United Nations called on the people of the world as well as their governments to work towards greater security against natural disasters. “The governments of all countries should participate actively in the Decade by educating and training their citizens and (should) make available the power of science and technology to reduce disaster losses...”.

3. Strategies to Mitigate Losses due to Natural Disasters

The world today is intricately woven together through economical, technological, political, social, and cultural ties. It is thus important that international cooperation is used in meeting the challenge of mitigating losses due to natural disasters. In such co-operations, we must find ways of using new and existing knowledge in a synergistic fashion. Natural disaster risk management involves selection of one or more of the structural or non-structural strategies. Some developed countries have spent considerable resources to manage risk through structural solutions. Most developing countries need to use more non-structural solutions to manage their risk. Amongst the strategies available for managing natural disaster risk, the following are the most effective.



Mexico Earthquake, 1985 (Photo by M. Hakuno)

Structural Strategies

- Damage and failure protection through engineering design.
- Engineered systems to protect populations from being exposed to events that can cause life loss or property loss. Examples are flood hazard management systems (dams, flood control channels, etc.) developed in Japan.

Non-Structural Strategies

- Forecasting, prediction, early warning, etc.
- Insurance
- Land use
- Education and training
- Disaster planning

Structural strategies are in general most effective. They save lives and minimize short and long term economic losses. However, they are very resource intensive. Not only such solutions require capital intensive efforts, but they also have the potential of causing environmental imbalances. Never the less, many nations who have prepared themselves with such strategies have reduced their losses due to natural hazards. Whether such

strategies can be equally effective across economic, social, political and national boundaries need to be properly studied in terms of cost-benefit analysis.

The greatest payoff that could occur in terms of cost-benefit equation is through the non-structural strategies. It has been shown over and over again that well informed, well prepared communities fare a lot better during and after natural disasters than those communities which were not well prepared or informed. One of the most under-utilized and potentially efficient strategy is that of insurance. This strategy in the short term helps with distributing risk over time and space. However, in the long term, it effects the economic market forces. Increase in insurance premiums or unavailability of insurance causes the value of that investment to go down over time. This results in changing land use pattern or changing design requirements and thus affecting structural measures. Education, insurance and market forces work together to reduce long term risk. Thus it is important to develop an integrated risk management strategy which incorporates the interplay between education, land use, insurance, and disaster planning. The cost to individuals and to society of non-structural options such as the ones mentioned above is a lot less than some of the structural measures. However, non-structural measures will not work unless they are implemented together with structural measures. Each nation at risk needs to look at these strategies, and in cooperation with other nations, needs to develop its own integrated strategies. The know-how for managing natural disaster risk does exist. What is the right mix of strategies that any nation should or can use will depend on the innovativeness and desire of that nation to deal with this ever present and increasingly complex problem. Again quoting from reference 1,

Hindukush Earthquake, 1991
(Photo by F. Yamazaki)Loma Prieta Earthquake, USA, 1989
(Photo by M. Hakuno)



Destruction by Erzincan Earthquake, Turkey, 1992 (Photo by K. Meguro)

“Effective disaster reduction requires each of these steps, carefully integrated with the others. Research into the physical and biological processes and prediction of a hazard does little good unless it is linked with mechanisms for risk reduction such as alternative management practices, warning systems, building codes for hazard resistant structures, and evacuation plans. Conversely, engineering and management practices designed to reduce the impacts of natural hazards require an understanding of the hazard itself. Even the most elegant scientific and technical solutions to the problems presented by hazards are practically worthless unless those measures are founded on the understanding of needs, wishes, and commitment of local citizens and community leaders. History is replete with tragic examples of short memory in which lessons learned from one disaster are forgotten

shortly before the next disaster strikes. Integration across each of these steps is essential for effective disaster reduction”

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