Chapter 2

Risk awareness and assessment

2.1 Understanding the nature of risk
2.2 Emerging trends in hazards, vulnerability patterns and the impact of disasters
2.3 Risk Assessment

2.1 Understanding the nature of risk

Disaster risk is part of every day life. Awareness of risk is therefore a necessary condition to engage in disaster risk reduction. A focus on risk management, rather than on disaster events alone, reflects a proactive attitude for dealing with potential threats to social and material assets, before they are lost.

The analysis and lessons learned from prior experiences of disasters help to define profiles of risk related to people, activities and places that share attributes, in the face of particular potential sources of loss or damage.

Understanding risk relates to the ability to define what could happen in the future, given a range of possible alternatives to choose from. Assessing risks based on vulnerability and hazard analysis is a required step for the adoption of adequate and successful disaster reduction policies and measures.

This chapter will discuss:

- *the nature of risk, with emphasis on the linkages between hazards and vulnerability;*
- *emerging trends in hazard and vulnerability patterns and the impact of disasters; and*
- *risk analysis and assessments with examples of the application of these methodologies.*

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

Levels of risk awareness depend largely on the quantity and quality of available information and on the difference in people's perceptions of risk. People are more vulnerable when they are not aware of the hazards that pose a threat to their lives and property. Risk awareness varies among individuals, communities and governments, according to their particular perceptions. These can be influenced by the knowledge of hazards and vulnerabilities, as well as by the availability of accurate and timely information about them.

Risk notation

Risk = Hazard x Vulnerability

Two elements are essential in the formulation of risk: a potential damaging event, phenomenon or human activity – hazard; and the degree of susceptibility of the elements exposed to that source – vulnerability.

The negative impact – the disaster – will depend on the characteristics, probability and intensity of the hazard, as well as the susceptibility of the exposed elements based on physical, social, economic and environmental conditions.

The recognition of vulnerability as a key element in the risk notation has also been accompanied by a growing interest in linking the positive capacities of people to cope with the impact of hazards. It conveys a sense of the potential for capabilities to reduce the extent of hazards and the degree of vulnerability.

Social dimensions are intimately linked to the decision-making process to deal with disaster risk, as they embrace a range of risk perceptions and their underlying causes.

A closer look at the nature of hazards and the notions of vulnerability and capacities allows for a more comprehensive understanding of the challenges posed by disaster risk reduction.

Understanding the nature of hazards

Understanding the nature of natural hazards involves a consideration of almost every physical phenomenon on the planet. The slow movements in the earth's mantle – the convection cells that drive the movement of continents and the manufacture of ocean floors – are the starting and also the sticking point. They lift mountains and shape landscapes. They also build volcanoes and trigger potentially catastrophic earthquakes.

Like those other invisible movements that take place on a vast scale through the atmospheric medium – the carbon cycle and the water cycle and the nitrogen cycle – volcanoes and earthquakes, along with technological advancements, provide the bedrock of strong nations, rich industries and great cities. They do, of course, have the potential to destroy them.

While most natural hazards may be inevitable, disasters are not. By seeking to understand and to anticipate future hazards by study of the past and monitoring of present situations, a community or public authority can minimize the risk of a disaster.

It is a measure of people's wisdom and a society's values if a community is able to learn from the experiences of others, rather than to suffer its own. There is a wealth of knowledge about the nature and consequences of different hazards, expected frequency, magnitude and potential geographic impacts, but many fewer examples of lessons learned from them.

Hazards are dynamic and with highly varying potential impacts. Due to changing environments, many countries and regional organizations require a greater knowledge of hazard characteristics.

A wide range of geophysical, meteorological, hydrological, environmental, technological, biological and even socio-political hazards, alone or in complex interaction, can threaten lives and sustainable development. Hazards have often been divided into those deemed natural or technological, based on their origins. As environmental degradation continues to worsen, the intensity, frequency and impacts of hazards are also affected.

While natural hazards can be divided into three broad categories – hydrometeorological, geological and biological – the variety, geographical coverage and types of impacts vary considerably.

Forest fires, for example, are recognized as a natural hazard but are often referred to as environmental hazards. In order to distinguish between different types of hazards some institutions have developed hazard catalogues. Figure 2.1 summarizes current hazard thinking.

The compound relationship between different hazards means that cataloguing a hazard is often complicated. At what stage does a landslide, typically recognized as a geological hazard, become a mudflow, which is often classified as a hydrological hazard?

In the same vein, primary hazards often give rise to collateral or secondary hazards. In many cases, these present greater threats to a community than do the primary hazards. Tropical cyclones and other storms can trigger other hazards, in particular storm surges, flash floods and landslides. Often the most serious impacts of storms come from the associated coastal and river floods. Similarly, damages related to earthquakes are often caused by landslides, fires, tsunamis or floods.

Almost all communities – whether urban or rural – are vulnerable to hazards. Hydrometeorological hazards are most common and floods alone account for two-thirds of people affected by natural hazards. However, different regions will be more prone to certain types of hazards than others.

Floods and windstorms are the hazards that most frequently lead to disasters in Asia, the Pacific, Europe and North America. Droughts and epidemics are reported more often in Africa, while the Pacific and Caribbean islands are most vulnerable to the effects of tropical cyclones.

El Niño events, floods, volcanic eruptions and earthquakes have a greater impact on the Andean and Central American countries. Even within a specific region, such as the Pacific, the frequency and intensity of specific hazards varies from one country to another.