U.G.Generic 2nd semester.(Theory-Disaster Management.).Puja Karmakar.

Vulnerability and Risk

What is Vulnerability

Vulnerability describes the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include:

poor design and construction of buildings,

inadequate protection of assets,

lack of public information and awareness,

limited official recognition of risks and preparedness measures, and

disregard for wise environmental management.

Vulnerability varies significantly within a community and over time. This definition identifies vulnerability as a characteristic of the element of interest (community, system or asset) which is independent of its exposure. However, in common use the word is often used more broadly to include the element's exposure.

The above explanation was taken from the United Nations (UN) International Strategy for Disaster Reduction (ISDR) Terminology on Disaster Risk Reduction. Follow the link to look up other terminologies.

There are four (4) main types of vulnerability:

1. Physical Vulnerability may be determined by aspects such as population density levels, remoteness of a settlement, the site, design and materials used for critical infrastructure and for housing (UNISDR).

Example: Wooden homes are less likely to collapse in an earthquake, but are more vulnerable to fire.

2. Social Vulnerability refers to the inability of people, organizations and societies to withstand adverse impacts to hazards due to characteristics inherent in social interactions, institutions and systems of

cultural values. It is linked to the level of well being of individuals, communities and society. It includes aspects related to levels of literacy and education, the existence of peace and security, access to basic human rights, systems of good governance, social equity, positive traditional values, customs and ideological beliefs and overall collective organizational systems (UNISDR).

Example: When flooding occurs some citizens, such as children, elderly and differently-able, may be unable to protect themselves or evacuate if necessary.

3. Economic Vulnerability. The level of vulnerability is highly dependent upon the economic status of individuals, communities and nations The poor are usually more vulnerable to disasters because they lack the resources to build sturdy structures and put other engineering measures in place to protect themselves from being negatively impacted by disasters.

Example: Poorer families may live in squatter settlements because they cannot afford to live in safer (more expensive) areas.

4. Environmental Vulnerability. Natural resource depletion and resource degradation are key aspects of environmental vulnerability.

Example: Wetlands, such as the Caroni Swamp, are sensitive to increasing salinity from sea water, and pollution from stormwater runoff containing agricultural chemicals, eroded soils, etc.

What is Risk

Risk (or more specifically, disaster risk) is the potential disaster losses (in terms of lives, health status, livelihoods, assets and services) which could occur to a particular community or a society over some specified future time period. (Reference UNISDR Terminology)

It considers the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environmentally damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions.

Risk can be calculated using the following equation: Risk = Probability of Hazard x Degree of Vulnerability.

There are different ways of dealing with risk, such as:

Risk Acceptance: an informed decision to accept the possible consequences and likelihood of a particular risk.

Risk Avoidance: an informed decision to avoid involvement in activities leading to risk realization.

Risk Reduction refers to the application of appropriate techniques to reduce the likelihood of risk occurrence and its consequences.

Risk Transfer involves shifting of the burden of risk to another party. One of the most common forms of risk transfer is Insurance.

Bhopal gas tragedy:

The Bhopal gas tragedy was an industrial accident. It happened at a Union Carbide Pesticide plant in the city of Bhopal, India. On 3 December 1984, the plant released 42 tons of toxic methyl isocyanate (MIC) gas, exposing more than 500,000 people to toxic gases. The Bhopal disaster is frequently cited as the world's worst industrial disaster.

The first official immediate death toll was 2,259. Another estimate is that 8,000 died within two weeks of incidence.

Critical analysis on how it happened:

Ø Bhopal is the capital of a state, Madhya Pradesh, which is essentially underdeveloped. This state provided a number of incentives to start industries, such as backward area investment allowance.

Ø When UCIL applied for a license to manufacture MIC, the Administrator of the city suggested that the unit should be shifted outside the city, but this was not accepted by the Government and UCIL was given license to manufacture MIC in the existing premises.

Ø On December 3, the MIC plant supervisor ordered washing of MIC lines assuming that there was a blockage in the line. At about 9.30 pm on 3 December 1984, the operator began washing out four lines in the MIC storage area, and all these were connected to the RVVH. The operation started pumping water under high pressure into the four lines, but he found that some lines were clogged (blocked).

Ø The operator need to insert a slip blind (spectacle blind is a safety device used to isolate a section of line or piece of equipment when the line or equipment needs to be inspected or removed from service) so that water would not go into the MIC tank before washing but the absence of using a slip blind while washing the lines was the triggering event.

Analysis of failure:

§ Poor perception of risk involved.

§ Failure to perceive the gravity of the situation after the trigger event.

§ Poor safety specification.

§ Poor training and use of inexperienced operators.

§ Poor emergency procedures and standards.

§ Poor maintenance of machines and faulty alarm system.

§ No limits for the exposure of chemical and toxic substances was present.

Environmental and Physical Effects

So, what made this gas so deadly? Officially, most of the victims of the Bhopal tragedy died from suffocation. The gas was so heavy and thick that it filled their lungs, essentially drowning them. However, methyl isocyanate also reacts strongly with organic tissues, and many victims suffered severe chemical burns to eyes and skin.

Unfortunately, the impacts were not limited to just that night. Researchers estimate that 500,000 to 600,000 people were impacted by the chemical gas, most of whom suffered long-term illnesses. Few studies have been done on the effects of methyl isocyanate, but researchers suggest that this chemical can lead to numerous chronic diseases as well as higher rates of spontaneous abortion and birth defects. It's worth noting that the rates of stillborn babies in the region rose by 300% following the disaster, and the rates of neonatal mortality rose by 200%.

Apart from the human toll, we also can't ignore the environmental impacts of the disaster.Many animals force to leave there habitat, and a huge number of birds, domestic animals are died.River,Air,soil become polluted and thus because agriculture productivity affected.