Chapter 09

Understanding Risks – Vulnerability and Risk Assessment

Terminologies in Vulnerability & Risk Assessment

Before undertaking vulnerability and risk assessment, it is important to understand some terminologies used in this assessment and how they are inter-connected?

- Threat:

  It is a potentially damaging event that can occur and has a detrimental impact on the economy. Postal administrations regularly face many threats, both natural and man-made.

  Threats, when they actually materialise, become hazards or disasters.

Terminologies (contd.)

- Hazard:

  It is any phenomenon or situation, which has the potential to cause disruption or damage to people, property, environment.

  E.g., Earthquake, Flood, Terror Attacks.

  When the disruptions or damage are severe, hazards become disasters.

  Hazards are the sources of risks. They create risks.

Terminologies (contd.)

- Vulnerability

  It is a set of conditions which increase susceptibility (*meaning* chance of getting harmed) to physical, economic losses from the impact of natural disasters.

  Example:

  Post Offices located in flood zone are vulnerable to the risk of being harmed during floods

Terminologies (contd.)

- Exposure

  The situation of people, infrastructure, production facilities, operative offices and other assets located in hazard prone areas.

  If more people and assets are exposed, higher is the vulnerability.

Terminologies (contd.)

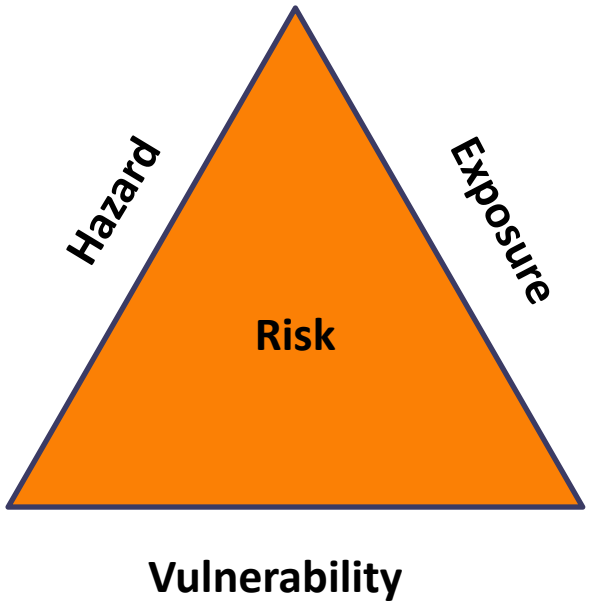
- Risk

  Risk is defined as the probability of harmful consequences or expected losses resulting from interactions between natural hazards and vulnerable conditions.

Understanding Risk - The Risk Triangle

Risk is a combination of the interaction of hazard, exposure and vulnerability, which can be represented by the three sides of a triangle.

Understanding Risk - The Risk Triangle (contd.)



- If any of these sides increases, the area of the triangle increases, hence the amount of risk also increases
- If any of the sides reduces, the risk reduces

Understanding Risk (contd.)

- Risk is a statistical concept. It is defined as:

  Probability of a threat occurring
  multiplied by
  Expected impacts from the threat.

- Considering both probability of occurrence of various threats and the expected impacts from these threats, postal administrations can classify various threats as high-risk threats, low-risks threats etc through a **Risk Matrix**.

- The Risk Matrix is explained below.

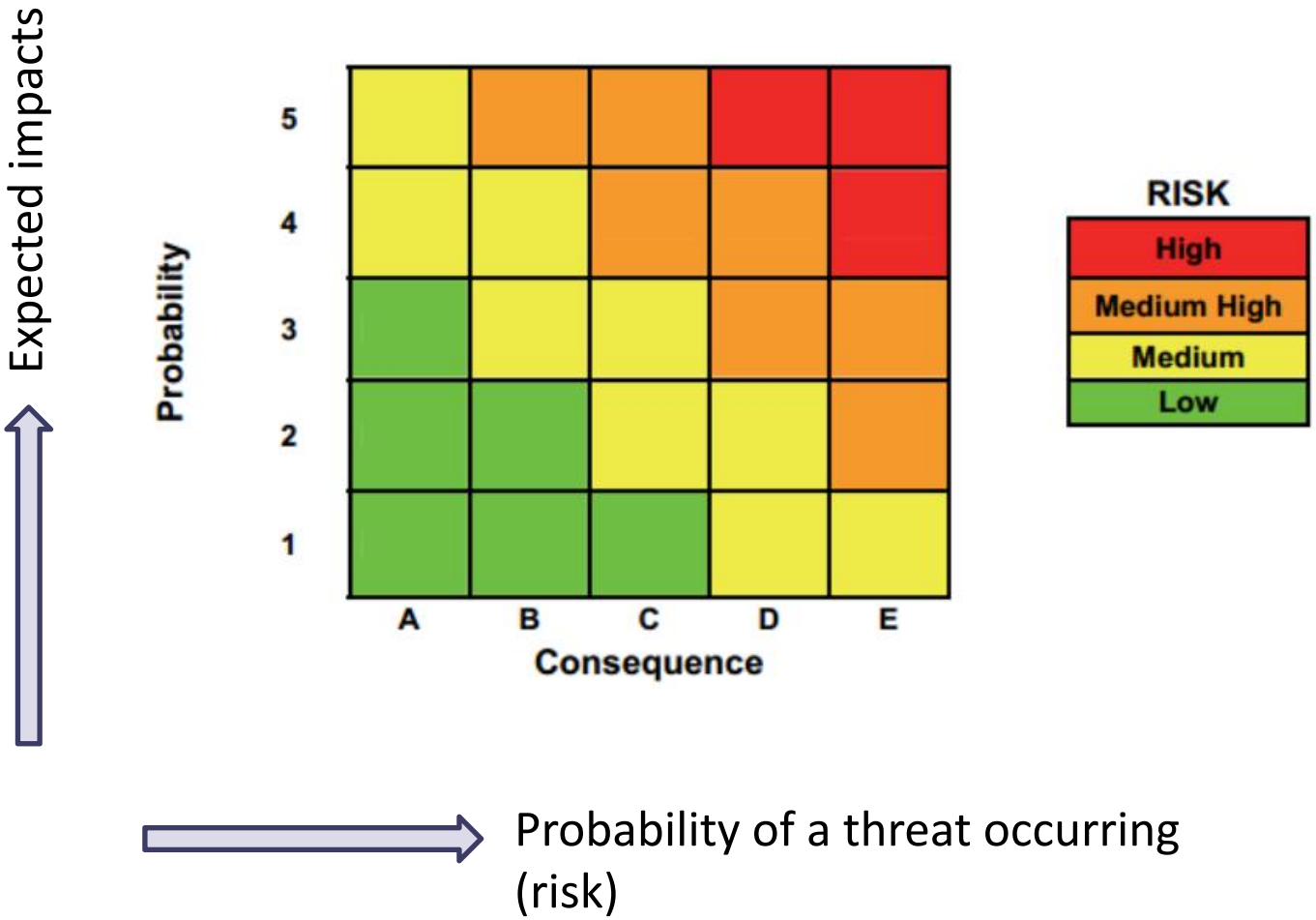
Risk Matrix

- Identification of various threats and then subsequently their classification through a Risk Grid is a very effective approach in disaster risk management.

- The Grid helps managers to find out the top-risk threats (high-risk high-impact scenario), to focus on them and to prioritise risk mitigation and preparedness measures to face them.

- A Risk Matrix is shown in the next diagram.

Risk Matrix


Expected impacts
Probability
5
4
3
2
1
A
B
C
D
E
Consequence
RISK
High
Medium High
Medium
Low
Probability of a threat occurring (risk)

Risk Matrix (contd.)

- For classification of threats through a Risk Matrix, postal administrations need to estimate

  (a) the probability of occurrence (likelihood) of the threats

  (b) the expected impacts from these threats.
- 'Vulnerability & Risk Assessment' of the threats help to estimate the impacts.

How to Conduct the Vulnerability and Risk Assessment

Three tasks are to be completed for this:

1. Collect data of hazards that happen in your administration and find out about their
   - Frequency
   - magnitude &
   - location

This will help to estimate which hazards (or say, threats) and locations have higher risks or probability of occurrence

Vulnerability & Risk Assessment (contd.)

2. Make a vulnerability assessment to find out all ‘exposed’ employees and assets to such higher risks hazards.

   More the number of such ‘exposed’ elements, higher is the vulnerability and consequently, higher is the expected damage and losses, should a disaster occur

Vulnerability & Risk Assessment (contd.)

3. Make a Risk Assessment to estimate possible impacts (i.e. damage and losses) from a particular hazard or multiple hazards. To do this:

   (i) Consider the Hazards

   (ii) Count the elements at risk, .

   People, Physical Structures (Buildings), Equipment, Vehicles etc.

Vulnerability & Risk Assessment (contd.)

(iii) Assess their vulnerability based on

Age, sex, physical disabilities

Type of construction of buildings etc.

(iv) Estimate potential losses (impacts) of exposed people, property, infrastructure etc.

This is Vulnerability and Risk Assessment.

Vulnerability & Risk Assessment (contd.)

Understanding risks through Vulnerability and Risk Assessment (also known simply as Risk Assessment)

Postal administrations will be able to estimate what and how much risk they face and what actions can be taken in advance.

Risk Assessments help managers to classify threats (*refer to the following slide*) and to prioritise resources & focus efforts on most critical and highest-risk threats.

Classification of Threats based on Risk Assessments

- A threat is plotted on a grid considering its
  (i) probability of occurrence (likelihood) and
  (ii) expected impacts from that threat
- Other threats can similarly be plotted.

- Position of the threats can now be seen in the four zones.

- Threats are thus classified as High-High, High-Low, Low-High and Low-Low threats. Administrations can focus on high-risk threats.

Risk Assessment – Assumptions

While making Risk Assessment, the following should be kept in mind to estimate accurately what and how much risks is there and what can be prepared in advance

- A major emergency or incident can happen at any time with little or no warning
- Availability of staff and resources may be severely limited during such emergencies
- Actual or threatened emergencies may adversely affect the ability to perform essential internal operations

Assumptions (contd.)

- Emergencies should be managed at local level first
- Emergencies require cooperation/coordination with first responders and other external entities at the city, province, regional and national levels
- Basic services like electricity, water, natural gas, heating, telecommunications and other information systems may be interrupted
- Buildings and other structures may be damaged
- Normal suppliers may not be able to deliver goods

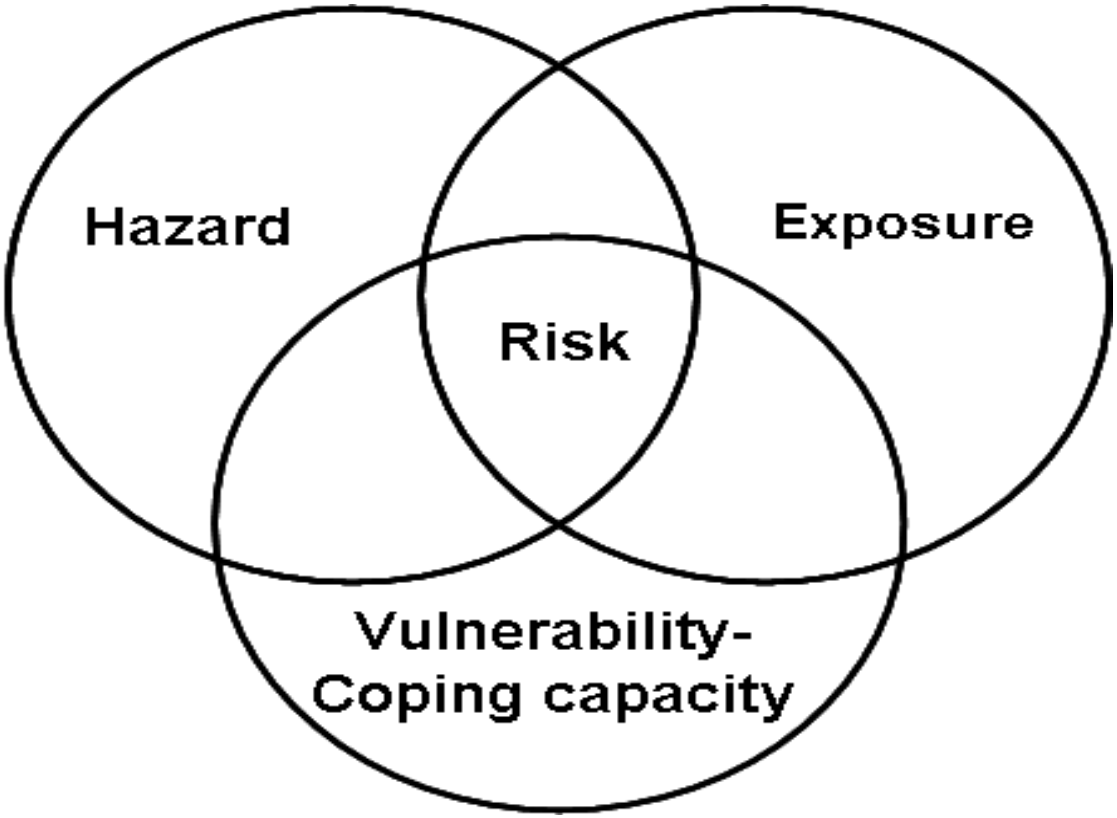
ENVIRONMENTAL GEOGRAPHY AND DISASTER MANAGEMENT

***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 management is a way of preparing a community by employing measures to minimise impacts, and preparing them to cope with impacts. This includes planning to minimise impacts, well prepared emergency plans and measures to protect the most vulnerable people of the community

Risk management

- Risk mitigation (i.e. moderating the severity of a hazard impact) is the main objective of risk management. It aims to reduce the physical and economic impacts of an event and limit the human, material, economic and environmental costs of an emergency or disaster. Therefore, it is necessary to have good information on the costs of natural disasters. These are estimated with a risk analysis.
- Following the risk analysis, the risks are evaluated in a risk assessment process to decide whether they are tolerable/acceptable. Both risk analysis and assessment are normally part of an integrated risk management process and produce crucial information that is relevant to decision makers for identifying viable options for risk reduction.



Intersection of hazard, exposure, and vulnerability yields the risk (Reese & Schmidt 2008, p.5)

*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

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.

It can be best explained by

- **Disaster Risk = Hazard × Vulnerability/Capacity**
- The relationship between these four components, indicate that each of the three variables that define risk - the hazard, the elements exposed and their vulnerability are of equal value. Reducing any one or more of the three contributing variables will lessen the risk to a community. In reality, however, there is little opportunity to reduce the hazard component, therefore, only the vulnerability and the elements at risk will vary. When hazard and vulnerability are high, it will cause disaster but when capacity is present, it will decrease the impact. Hence, to reduce the risk of a disaster,

1) Decrease the vulnerability of the community; and
2) Increase the capacity of the community

TERMINOLOGIES

- **UNDRR-**United Nations Office for Disaster Risk Reduction
- **It was formerly UNISDR(**United Nations International Strategy for Disaster Reduction)

REFERENCES/SOURCE

*Environmental geography,Savindra Singh

*Environmental geography,R.C Chandna

*Websites-Office of Disaster preparedness And Management(Govt. Of the Republic of Trinidad)