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IMPORTANCE OF VULNERABILITY IN DISASTER RISK MANAGEMENT

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ABSTRACT

Climate changes today result ever more frequently in large scale catastrophic events, such as floods, fires, tropical cyclones, hurricanes. The greatly endanger individuals, businessman and society as a whole. Countries, regions, local governments and the insurance sector have large problems resolving the consequences of such events. The likelihood of these events is difficult to influence. Nevertheless the large contribution to risk reduction can be achieved by reducing vulnerability in any of its four forms: infrastructural, environmental, economic and social vulnerability/ the main aim in this paper are to show the importance of vulnerability assessment in disaster risk management. The main result of this research is vulnerability assessment method; methods like one should contribute to shift from passive disaster related defence to proactive disaster risk management, as well as from emergency management only to disaster prevention, preparedness and mitigation activities.

KEY-WORDS: *risk, vulnerability, hazard, catastrophe*

INTRODUCTION

Understanding vulnerability requires more than simply understanding societies' past and present relations with regard to disaster and development. Vulnerability is also about people, their perceptions and knowledge. People's ideas about risk and their practices in relation to disaster constitute the sextant and compass with which they

measure and chart the landscape of vulnerability (Hilhorst and Bankoff, 2006: 4). The International Strategy for Disaster Reduction (UN/ISDR: 2004) defines vulnerability as “the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. Whereas in contrast of ISDR, the United National Development Programme (UNDP) defines vulnerability as “a human condition or process resulting from physical, social, economic and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard (UNDP 2004:11). Vulnerability may be defined as an internal risk factor of the subject or system that is exposed to a hazard and corresponds to its intrinsic predisposition to be affected, or to be susceptible to damage. In other words, vulnerability represents the physical, economic, political or social susceptibility or predisposition of a community to damage in the case of a destabilizing phenomenon of natural or anthropogenic origin (Cardona 2006: 37). It is fundamentally a political ecological concept which focuses on the relationship that people have with their environment as well as a close attention to the political economic forces characteristic of the society in which they live that shape and condition that relationship. At least from the perspective of hazards and disasters, vulnerability is the conceptual nexus that links the relationship that people have with their environment to social forces and institutions and the cultural values that sustain or contest them. Thus, combining elements of environment, society and culture in various proportions, the concept of vulnerability provides a theoretical; framework that encompasses the multidimensionality of disasters (Blaikie et al. 1994; Comfort et al. 1999; Cutter 1996; Hewitt 1983b). At the same time Cannon is also of the opinion that vulnerability is a characteristic of individuals and groups of people who inhabit a given natural, social and economic space, within which they are differentiated according to their varying position in society into more or less vulnerable individuals and groups. It is complex characteristic produced by a combination of factors derived especially (but not entirely) from class, gender and ethnicity (1994:19). Whereas in the Hazards-of-Place Model of Vulnerability as shown in fig. 1 of Cutter et al. (2003) vulnerability is identified as a combination of risk of hazardous events both from the context of biophysical as well as social vulnerability.

VULNERABILITY

The characteristics determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

Vulnerability is one of the defining components of disaster risk.

$$\text{Risk} = \text{Hazard} \times \text{Expose} \times \text{Vulnerability}$$

WHAT MAKES PEOPLE VULNERABLE?

Vulnerability is the human dimension of disasters and is the result of the range of economic, social, cultural, institutional, political and psychological factors that shape people's lives and the environment that they live in.

Vulnerability can be a challenging concept to understand because it tends to mean different things to different people and because it is often described using a variety of terms including 'predisposition', 'fragility', 'weakness', 'deficiency' or 'lack of capacity'.

Some definitions of vulnerability have included exposure in addition to susceptibility to harm. However, it is now understood that exposure is separate to the 'susceptibility' element of vulnerability since it is possible to be exposed, whilst at the same time not susceptible to natural hazards.

Despite some divergence over the meaning of vulnerability, most experts agree that understanding vulnerability requires more than analysing the direct impacts of a hazard. Vulnerability also concerns the wider environmental and social conditions that limit people and communities to cope with the impact of hazard.

Vulnerability is complex. Vulnerability is not simply about poverty, but **extensive research over the past 30 years has revealed that it is generally the poor who tend to suffer worst from disasters**. Poverty is both a driver and consequence of disaster risk (particularly in countries with weak risk governance) because economic pressures force people to live in unsafe locations (*see exposure*) and conditions. Poverty and the other multi-dimensional factors and drivers that create vulnerability mean that susceptibility to the impacts of hazards is often, but not always, associated with certain groups, including women, children, the elderly, the disabled, migrants and displaced populations, amongst others.¹

TYPES OF VULNERABILITIES IN DISASTER MANAGEMENT

A set of prevailing conditions which adversely affect the community's ability to prevent, mitigate, prepare for or respond to a hazard. Absence of coping strategies is also a part of vulnerability and has to be considered in vulnerability assessment e.g. living in hazard prone locations like near to a sea or river, above the fault lines, at the base of a mountain etc.

¹ <https://www.preventionweb.net/understanding-disaster-risk/component-risk/vulnerability>

Physical Vulnerability

The physical vulnerability of an area also depends on its geographic proximity to the source and origin of the disasters e.g. if an area lies near the coast lines, fault lines, unstable hills etc. it makes the area more vulnerable to disasters as compared to an area that is far away from the origin of the disaster. Physical vulnerability includes the *difficulty in access* to water resources, means of communications, hospitals, police stations, fire brigades, roads, bridges and exits of a building or/an area, in case of disasters. Furthermore, the lack of proper planning and implementation in *construction of residential and commercial buildings* results in buildings that is weaker and vulnerable in earthquakes, floods, landslides and other hazards.

Economic Vulnerability

Economic vulnerability of a community can be assessed by determining how varied its sources of income are, the ease of access and control over means of production (e.g. farmland, livestock, irrigation, capital etc.), adequacy of economic fall back mechanisms and the availability of natural resources in the area.

Social Vulnerability

A socially vulnerable community has weak *family structures*, *lack of leadership* for decision making and conflict resolution, *unequal participation* in decision making, *weak or no community organizations*, and the one in which people are *discriminated* on racial, ethnic, linguistic or religious basis. Other social factors such as *culture, tradition, religion, local norms and values, economic standard*, and *political accountability* also play a vital role determining the social vulnerability of a community.

Social vulnerability to natural phenomena is greatest among the poorest people in developing countries owing to a lack of information and resources with which to take the appropriate measures. Within this group, children, women and the elderly are considered to be the most vulnerable. To reduce social vulnerability, all of the above factors must be addressed but this requires knowledge and understanding of the local conditions, which can – in most cases – only be provided by local actors.²

Attitudinal Vulnerability

A community which has negative attitude towards change and lacks initiative in life resultantly become more and more dependent on external support. They cannot act independently. Their sources of livelihood do not have variety, lacks entrepreneurship and do not possess the concept of collectivism. This brings about disunity and

² <https://career101.in/disaster-vulnerability-types-of-vulnerability-in-disaster-management/4759/>

individualism in the society. Thus, they become victims of conflicts, hopelessness and pessimism which reduces their capacity of coping with a disaster.³

Vulnerability is an Essential Element for Defining Disaster Impacts and its Threat to People.

Vulnerability is defined as the extent to which a community, place, structure or organization are in exposure to the threat. There are many different factors that determine vulnerability. A degree of vulnerability determines the impact of the disaster. So, the disaster event activities occur when the vulnerabilities and hazards meet. Hazards can also be called 'Trigger Events'. When one hazard meets with a vulnerable community a disaster is likely to occur. E.g. Poverty will have people build houses with weaker materials and in more dangerous areas.

Vulnerability describes the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. Here, susceptibility is the fact of being exposed. One can be susceptible but not vulnerable, e.g. a landslide is threatening a house but the owners have built a wall to protect it. The holistic approach to risk and vulnerability assessment insists that the methodology of vulnerability should consider multi-disciplinary and inclusive indicators. Therefore, the vulnerability can be assessed through the various factors like (a) Exposure and physical susceptibility, (b) Social and economic fragilities, (c) Lack of resilience or ability to cope and recovering etc.⁴

Resilience is the capacity to adapt and recover. E.g. the owners of the house threatened by the landslide have a second house in town. One might be susceptible but when the resilience is high, one is not vulnerable. Therefore, capacity and vulnerability are opposite facets of the same coin. The more capacity one has, the less vulnerable one is, and vice versa.

Characterization of Disaster Vulnerability

Scientific Method-

This method is used to determine the various indicators to mitigate or reduce the disaster event activities. It is done through the considerations of various theories, research, and methodologies that help in understanding the impact of the vulnerability in a particular area.

Geographical Information Systems (GIS) and CEM

GIS is a powerful tool that should be used in every phase of Comprehensive Emergency Management (CEM) as it can dramatically improve the efficiency of CEM activities. Comprehensive Emergency Management (CEM) is an emergency management cycle for disaster event activities. CEM is a system of applying science and technology to

³ <http://www.mnestudies.com/disaster-management/vulnerability-types>

⁴ <https://research-paper.essayempire.com/examples/social-science/vulnerability-research-paper/>

manage and deal with disasters that can exert an enormous amount of damage. It demonstrates four phases in terms of pre and post-disaster event activities; Response, Recovery, Mitigation and Preparedness. It is a multi-dimensional method that covers all four phases throughout the temporal and spatial dimension of the disaster events.

General roles of GIS in emergency management are:

- (a) It helps in collecting spatial data and integrating them within the systems to manage the disaster event activities.
- (b) GIS helps in dynamic monitoring and interoperability on human and physical processes
- (c) Applying the concept of GI, uncertainty, scale, and spatial analysis into the system, a beneficial gain of decision support systems (DSS)

So, scientific data/information can be used to estimate the impact/damage of a place or structure in case of disaster. The disaster event activities can be reduced by acting accordingly.

Like (a) Avoiding settlement in the vicinity of prone areas or putting alarm measure to get the warning of disaster in advance.

(b) Promoting wood construction in the hilly areas to reduce the economic losses of the people.

(c) Avoiding settlement in the fault line areas.

Site-Specific-

Every site and locality has its own vulnerability and is different from others.

Policy & Programme Method- An Efficient Way of Characterizing Disaster Vulnerability

Policy and programme help in addressing the challenges related to adaptation capacity, rehabilitation & long-term reintegration of the affected community. It is a spatial method which demarcates prone zone, put in pre and post hazard methodology to tackle against the vulnerability to disaster.⁵

Capacity building, an alternative arrangement for settlement, Readiness of disaster and coordinating among various dependent in the wake of a disaster (Health, Home and other institution) will characterise the vulnerability to disaster.

Preparedness

Preparedness is a continuous cycle of organizing, training, equipping, exercising, evaluation, and improvement activities that ensure effective coordination and the enhancement of capabilities to prevent, protect against and mitigate against the disaster events. It helps to categorise the vulnerability to disaster.

⁵ Adger NW. Social and ecological resilience: are they related? Progress in Human Geography, 2000; 24:347-364.

Preparedness increases the capacity of society to withstand disaster event activities with the necessary steps such as by resilient building, SOP's in place, Evacuation procedures etc. So, in the preparedness phase, the Emergency Management Department (EMD) develops plans of action to manage and counter risks of disaster. Even, it takes requiring action to build the necessary capabilities needed to implement such plans.

RISK AND VULNERABILITY IN DISASTER MANAGEMENT

Investigate the relationships in the RISK / DISASTER equation

Risk, as shown in the **disaster risk**

equation, increases as hazardous events become more common, people become more vulnerable and their capacity to cope decreases.

Risk can be reduced by reducing vulnerability, increasing capacity or reducing hazard frequency and/or magnitude.

$$R = \frac{H \times V}{C}$$

R= RISK, H= FREQUENCY OR MAGNITUDE
HAZARD,
V= VULNERABILITY LEVEL, C= CAPACITY
TO COPE

Since there is little/no evidence that the magnitude or frequency of tectonic events is increasing, any increases in risk must be due to increasing vulnerability of certain populations and/ or a reduction in the capacity of a society to cope Note. Some evidence points to increasing number of earthquakes but this may be due to better detection and reporting techniques source : EM-DAT international disaster database.⁶

Risk: The probability of harmful consequences, or expected losses, resulting from interactions between natural or human-induced hazards and vulnerable conditions.

Hazard: A potentially damaging physical event, phenomenon or human activity that ay cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Vulnerability: The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

Capacity to cope: A combination of all the strengths and resources available within a community, society or organisation that can reduce the level of risk, or the effects of a disaster.

⁶https://padletuploads.blob.core.windows.net/aws/63886985/8db4cfd28f64c809d2a83bb2bcba7463/004_Tectonics_risk_equation_flip_ped.pdf

Vulnerability is important because it helps to determine the exact impact a hazard will have on a population. In general, developing countries and regions are more vulnerable than developed ones. Capacity to cope is generally lower in the developing world, so hazard impact lasts longer than in the developed world.

Vulnerability has social, economic, environmental and physical aspects. Poverty, poor social conditions, environmental degradation and unfavourable physical geography all increase vulnerability.⁷

Decreasing vulnerability

- Warning and emergency-response Systems
- Economic wealth
- Government disaster-assistance Programmes
- Insurance
- Community initiatives
- Scientific understanding
- Hazard engineering

Increasing vulnerability

- Population growth
- Urbanisation and urban sprawl
- Environmental degradation
- Loss of community memory about hazards
- Ageing population
- Ageing infrastructure
- Over-reliance on technological fix

CONCLUSION

Disaster management is a very important activity that countries should embrace in order to prevent disasters and lesson the negative consequences of disasters. However, disaster management has limitations that restrict the techniques ability to implement successfully.

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