

ED-I- What is Disaster? Alternative Approaches to Disaster Analysis

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1 Introduction

The Centre for Research on the Epidemiology of Disasters (CRED) has defined disaster as “a situation or event which overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering”. According to the National Policy on Disaster Management, Disaster is “a catastrophe, mishap, calamity or grave occurrence from natural or man-made causes, which is beyond the coping capacity of the affected community”.

Hallegatte and Przulski (2010) have defined disaster from an economic perspective. They have defined a natural disaster “as a natural event that causes a perturbation to the functioning of the economic system, with a significant negative impact on assets, production factors, output, employment, or consumption”. Fritz (1961) has defined disaster as an event concentrated in time and space, in which a society or one of its subdivisions undergoes physical harm and social disruption, such that all or some essential functions of the society or subdivision are impaired. Kreps (1995) has modified this definition and defines disasters as “nonroutine events in societies or their larger subsystems (e.g., regions, communities) that involve social disruption and physical harm. Among, the key defining properties of such events are (i) length of forewarning, (ii) magnitude of impact, (iii) scope of impact, and (iv) duration of impact”.

There are different types of disasters. For example earthquakes, storms, hurricanes, intense precipitations, droughts, heat waves, thunderstorms and lightning. Earthquakes in Gujarat, El Salvador and Peru; floods in many countries of Asia and Africa; droughts in Afghanistan, Africa and Central America; cyclone in Odisha and Madagascar; tsunami in South Asia; Hurricane Katrina in New Orleans (USA); wild fire in Greece are some examples of disaster (CEE, 2007).

According to the Annual Disaster Statistical Review (2013), 330 naturally triggered disasters were reported in 2013. The top five countries that are most frequently hit by natural disasters are China, the United States, Indonesia, the Philippines and India. According to the geographical distribution of

disasters, Asia was most often hit by natural disasters in 2013 (40.7%) followed by America (22.2%), Europe (18.3%), Africa (15.7%), and Oceania (3.1%). In 2013, two disasters that killed more people are: cyclone Haiyan in the Philippines (7,354 deaths) and the monsoonal flood in India (6,054 deaths). Figure 1 gives a picture of the total victims (sum of deaths and total affected) from natural disaster all over the world from 1990 to 2013.

According to the figure, the year 2002 had the highest number of victims from natural disaster. According to UNEP (2002) record breaking rains, floods in Europe, destruction of homes across the Caribbean, mudslides in Nepal, India and Bangladesh are the major reasons of this. The major disasters are: Eruption of Mt. Nyiragongo, Kongo, monsoon floods in central and south China, Typhoon Rusa in South Korea, Hurricane Lili, Caribbean, USA.

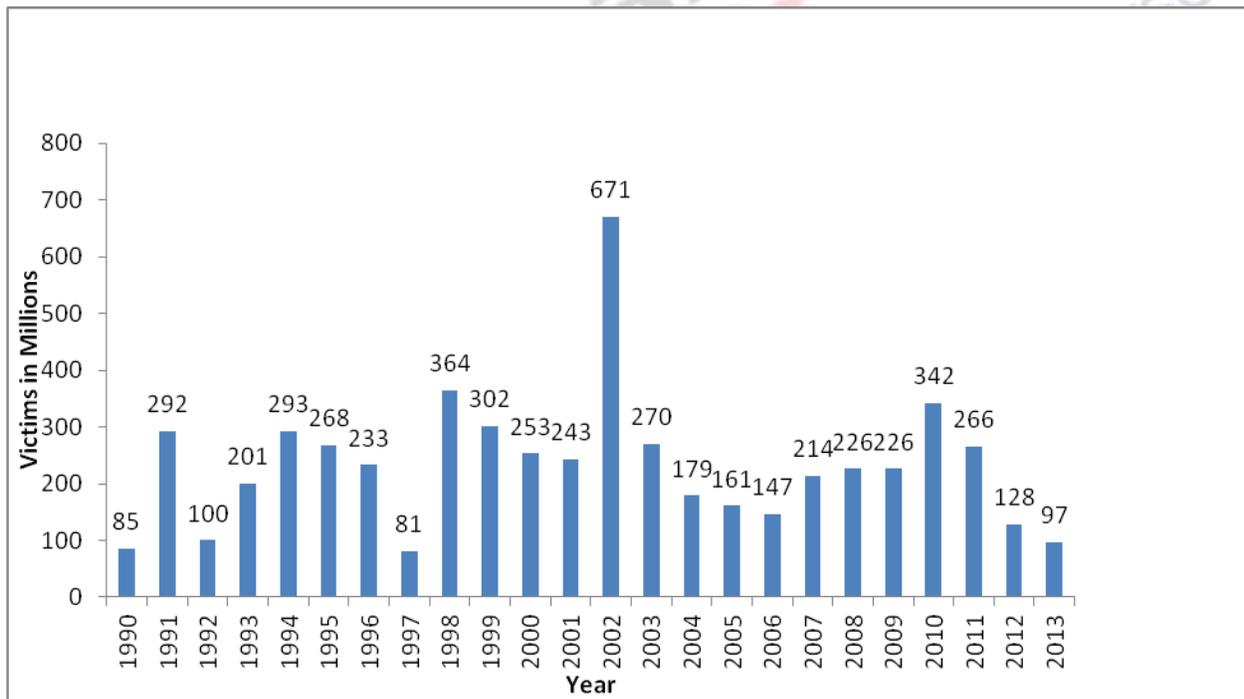


Figure 1: Total Victims of Natural Disaster

Source: CRED (2013)

The frequency and size of natural disasters are increasing all over the worlds (Annual Review: Natural Catastrophes, 2002). The main reasons are:

- (a) Rise in world population
- (b) Better standard of living all over the world
- (c) Concentration of people and values in large conurbations
- (d) Settlement and industrialization of exposed regions

- (e) Susceptibility of modern societies and technologies
- (f) Man-made changes in environmental conditions aggravate the risk situation.

CRED publishes EM-DAT, The International Disaster Database. CRED (2015) also gives a country-wise profile of disaster. Table 1 presents the disaster profile of India. According to the data, the major disasters in India are floods and cyclones. So far the total deaths in India from natural disasters count to more than nine million. The number of total people affected count more than a billion. The frequently counted disasters are riverine floods, tropical cyclones, landslides and viral diseases. In 2013, India is the second country in terms of disaster mortality (7119 deaths), third in terms of number of victims (16.72 millions), eighth in terms of damage (\$2.38 billion). In India, the major disasters in 2013 were flood in June and heat wave in April-June. Tropical cyclone Phailin was the second biggest natural disasters in terms of victims.

All this above data do not include technological and biological disasters. The next section discusses the classification of disasters in detail.

Table 1: Disaster: India Profile (1900 – 2015)

Disaster Type	Subtype	Events Count	Total deaths	Total affected	Damage ('000 \$)
Drought	Drought	14	4250320	106184100	2441122
Epidemic	Bacterial disease	24	4103948	70856	0
	Viral disease	33	436222	197485	0
	Parasitic disease	5	3411	57135	0
Extreme Temperature	Cold wave	29	5269	25	144000
	Severe winter	1	180	0	0
	Heat wave	24	9426	225	400000
Flood	--	132	33611	462703212	11898059
	Coastal flood	4	569	11500000	275000
	Flash flood	22	7419	23443526	416200
	Riverine flood	142	29663	333436962	41204929
Landslide	Landslide	37	4188	3828660	4500
	Avalanche	8	844	10456	5000
Storm	Convective storm	31	2479	574811	2226000
	Tropical cyclone	104	159349	101862130	16871996
Wildfire	Forest fire	2	6	0	2000

Source: The International Disaster Database (2015)

2: Learning Outcome

The main learning outcome of this module is to have a basic understanding of disaster. Types of disasters are clearly explained. Social science research has different approaches to disaster. By the end of this module student will learn about all these different approaches to disaster.

3: Classification of Disasters

CRED divided disasters into Natural and Technological. They have divided natural disasters into five subgroups:

- (a) Geophysical: Events originating from solid earth.
- (b) Meteorological: Events caused short-lived/small to meso scale atmospheric process (in the spectrum from minutes to days)
- (c) Hydrological: Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up.
- (d) Climatological: Events caused by long-lived/meso to macro scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability).
- (e) Biological: Disaster caused by the exposure of living organisms to germs and toxic substances.

Table 1.2 gives a detailed classification of disasters. This classification of disasters does not include technological disaster.

Table 2: Classification of Disasters (A)

Disaster Group	Disaster Sub - group	Disaster Main Type	Disaster Sub Type	Disaster Sub-sub Type	
Natural	Geophysical	Earthquake	Ground shaking		
			Tsunami		
		Volcano	Volcanic eruption		
			Mass Movement (dry)	Rockfall	
		Avalanche		Snow Avalanche	
				Debris Avalanche	
		Landslide		Mudslide	
			Lahar – Debris Flow		
		Subsidence	Sudden Subsidence		

				Long lasting Sundidence		
Meteorological	Storm	Tropical Storm	Extra-Tropical Cyclone (Winter Storm)			
			Local/Convective Storm	Thunderstorm/Lightening		
				Snowstorm/Blizzard		
		Sandstorm/Dust storm				
		Generic (severe) storm				
		Tornado				
		Orographic storm (strong winds)				
		Hydrological	Flood	General river flood	Flash flood	
					Storm	
					Surge/Coastal flood	
Mass Movement (wet)	Rockfall					
Landslide	Debris flow		Debris avalanche			
			Avalanche	Snow Avalanche		
Subsidence	Sudden subsidence		Debris Avalanche			
			Long lasting subsidence			
Climatological	Extreme Temperature		Heat Wave	Cold Wave	Frost	
				Extreme Winter conditions	Snow pressure	
		Icing				
		Freezing				
		Rain debris				
	Avalanche					
	Drought					
Wild fire	Forest fire	Land fires (grass, scrub, bush etc.)				
Biological	Epidemic	Viral infectious diseases				
		Bacterial				

			infectious diseases	
			Parasitic infectious diseases	
			Fungal infectious diseases	
			Prion infectious diseases	
			Insect infestation	Grasshoper/Locust/Worms
			Animal Stampede	

Source: <http://www.emdat.be/new-classification>

The Centre for Environment Education (2007) has included technological disaster in their classification of disaster. They have defined disaster in terms of cause, extent of damage and time period.

Table 3: Classification of Disasters (B)

Classification based on	Types	Example
1. Cause	Natural	
	(a) Geological: earthquakes, volcanic eruptions, landslides, avalanches, tsunamis	Earthquake: Bhuj, Gujarat, India, 2001. Volcano: Tambora, Sumbawa Island, 1815. Avalanches: Montroc, France, 1999. Tsunami: South Asia, 2004.
	(b) Meteorological or Climatic: hurricanes, droughts, heat and cold waves	Hurricanes: New Orleans, USA, 2005. Droughts: Russia, 1921-23. Cold Wave: South Asia, Jan-Feb, 2003.
	(c) Biological : Pest infestations	Pest infestations: coconut leaf beetle infestation, Philippines, 2007.
	Man-made	
	(a) Technological:	
	(i) Industrial hazards: Mining disasters	Monongah, West Virginia, USA 1907.
	(ii) Structure collapse: Engineering failures	Can Tho Bridge collapse, Vietnam, 2007
	(iii) Power Outage: Extended power outages	New York City blackout, 1977
(iv) Fire: Bush fire, Mine fire, Wildfire, Firestorm	Forest fires, Greece, 2007	
(v) Transportation (Not War): Bus, Ship, Train	Titanic, 1912.	

	(vi) Aviation: Helicopters, Airlines	Japan Airlines Flight 123, 1985.
	(vii) Space Disasters: Shuttles	Disintegration of space shuttle, Columbia, Texas, USA, 2003.
	(viii) Hazardous materials: Radiation contamination, CBRNs	Atomic bombing at Hiroshima and Nagasaki, 1945.
	(b) Civil disturbance: riots, terrorism, war	Sarin gas attack on the Tokyo subway, 1995.
	(c) Sociological hazards: Crime	Arson
2. Extent of Damage	(a) Major: earthquakes, floods, cyclones, hurricanes, typhoons, industrial disasters. (b) Minor: heat and cold waves	Bhopal Gas Tragedy, 1984.
3. Time period to manifest	(a) Sudden onset: (0-2 hours): earthquakes, tsunamis, volcanic eruptions, industrial accidents (b) Intermediate onset (1-7 days): cyclones, floods (c) Slow/Long onset: several weeks, months to a year): drought, climate change	

Source: Centre for Environment Education (2007)

4: Cycle of Disaster

The cycle of disaster has been divided into four phases: Response phase, Recovery phase, Mitigation phase, preparedness phase (CEE, 2007)

- (a) **Response Phase:** These activities are done immediately after a disaster. The main activities are: evacuation, relief distribution, setting of camps for the survivors, searching for survivors, burial or cremation of the deceased.
- (b) **Recovery Phase:** During this phase people try to regain their lives. The major factors in this phase are local capacity of the people to recover in their individual capacity, restoration of livelihoods, helping them in designing the layout and construction of a

house, and coordination and communication between different stakeholders who come to help the affected people.

- (c) Disaster Mitigation: These are measures taken in advance to reduce its impact on society. Creation of stronger and better infrastructure, better communication technology, creating early warning systems, early evacuations are some of the measures.
- (d) Preparedness Phase: This phase is complementary to the mitigation phase and ensures an increased survival rate. They are ability to predict, respond to and cope with the effect of a disaster. This should be done at community level.

5: Alternative Approaches to Disaster Analysis

Alexander (1993) has identified six different approaches that social scientists researcher have used to study disaster. They are:

- (a) Sociological Approach
- (b) Anthropological Approach
- (c) Development Studies Approach
- (d) Disaster Medicine and Epidemiology Approach
- (e) Geographical Approach
- (f) Technical Approach

5.1: Disaster: A Sociological Approach

Over the years Sociologists have agreed on the definition of disaster. They have “interpreted disasters as special types of social phenomena, in part because they are dramatic historical happenings (events), and also because they compel collective reactions (social catalysts)”. The sociologists study a range of different types of events. They are natural hazards (tornadoes, floods, hurricanes, earthquakes, volcanic eruptions), accidents (air disasters, explosions, large scale fires, breaking of dams). Not lots of sociological disaster studies have been done on famines, epidemics, economic depressions, political revolutions and wars.

According to the sociologists, disasters are not more important than other social phenomenon. However, they are different. According to them the key dimensions are (Kreps 1995):

- (a) Examining how social systems react to physical harm and social disruption after the occurrence of an event?
- (b) Examining what social systems do to increase or mitigate the risk of physical harm and social disruption before the occurrence of an event?

However, there are other dimensions as well. According to the sociologists, there are different dimensions in thinking disaster as events.

- (a) Length of Forewarning: This is the gap between the identification of hazardous conditions and the actual effects on a particular location. This gap in time can be very short or long.
- (b) Magnitude of Impact: This is the magnitude of social disruption and physical harm.
- (c) Scope of Impact: This is the geographical and social boundaries of the physical harm and social disruption. The scope can be a regional one or a global one.
- (d) Duration of Impact: This is the time between the starting of social disruption and physical harm to the end. This duration can be short or long.

5.2: Disaster: An Anthropological Approach

According to the Anthropologist “Disaster is seen as a process leading to an event that involves a combination of a potentially destructive agent from the natural or technological sphere and a population in a socially produced condition of vulnerability” (Oliver-Smith and Hoffman, 1999). Henry (2005) has given an anthropological contribution to the complete life cycle of disaster, from issues of vulnerable and perceived risk, to individual and social responses and coping strategies, to relief and recovery efforts.

- (a) **Pre-Disaster Risk and Vulnerability:** Within the same social system, a group of people are more vulnerable to disasters than others. This inequality increases discrimination as well as tensions both during the times of crisis and relief. The severity of disaster impact is increased by conditions like poverty, racism, gender inequality, history of colonial exploitation, global inequities, imbalances of trade and underdevelopment.

- (b) **Responses to Disaster:** The anthropology of disaster has focused on changes occurring within cultural institutions like religion, ritual, economic organization, politics (local cooperation or conflict), the ability of local institutions to mitigate the impact of a disaster , and the differential capabilities of response due to ethnicity, gender, age and socioeconomic status (Henry, 2005). They have shown adaptive coping strategies that have been used traditionally to cope with disasters. They have noted how disasters change political organizations and power relations between individuals, the state and international actors. They have also looked at the changes that disasters bring to economic system in the form of employment, sharing etc.
- (c) **Providing Relief:** Development and Power: They supported a more developmental approach to prevent future disasters than a top-down strategy.

5.3: Disaster: A Development Studies Approach

This approach looks at the problems of providing aid and relief to Third World Countries. Mainly it addresses the problems of refugee management, health care and the avoidance of starvation (Alexander, 1993). Most of the disaster impact occurs in developing countries. This increases poverty and human vulnerability. This approach is more concerned about the issues of vulnerability and livelihood security.

5.4: Disaster: A Medicine and Epidemiology Approach

This approach mainly focuses on the management of mass casualties, treatment of physical trauma and the epidemiological surveillance of communicable diseases. The incidence of such disease generally increases after a disaster as there is a disruption of public health (Alexander, 1993). Medical support is the first priority after initial search and rescue phase (Beinin, 1985). For example disasters like floods can create epidemic in the form of diarrhea, respiratory and infectious diseases. Disasters like earthquakes and technological accidents create problems like bone fractures and psychological trauma. If medical facilities are delivered to the victims in the first few hours of disaster, that saves more number of lives (Smith, 2001).

5.5: Disaster: A Geographical Approach

This approach has used the social science methods and emphasis is given to the spatio-temporal distribution of hazards, impacts and vulnerability. They have discussed how choices are made between different types of adjustment to natural hazards (Alexander, 1993).

5.6: Disaster: A Technical Approach

This is the approach of physical and natural scientists. They give more stress to seismology, volcanology, geomorphology and other geophysical approaches (Alexander, 1993). The emphasis here is on nature, scale, intensity and impacts on human structure or engineering. It may have some elements of human ecology.

6: Summary

The term disaster has many definitions. Disasters are also of many types. Mainly they are classified as natural disaster and technological disaster. Disaster is also a cycle with four phases. The main phases are response, recovery, mitigation and preparedness. There are different approaches to the study of disaster. The approaches discussed here are sociological, anthropological, geographical, medicine and epidemiology and a technical approach.

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