

## DISASTER MANAGEMENT: CAUSES AND CONSEQUENCES

**M. M. Sheikh**

Associate Professor (Geography)  
Govt. Lohia P.G. College, Churu, Rajasthan, India  
Email: mmskh@rediffmail.com

**Abstract:** *The human race has faced natural disasters since it has evolved. Natural disasters continue to strike unabated and without notice and are perceived to be on the increase in their magnitude, complexity, frequency and economic impact globally. These disasters pose a threat to human life, structures, and economic assets and assume disastrous proportions when they occur in areas of dense human habitations. For last seven decades, natural disasters have resulted in the loss of more than three million lives and affected many more. The economic costs are on the rise in alarming proportions, which has increased by a factor of 8 presently as compared to the 1960s. Globally, 90 percent of the natural disasters and 95 percent of the total disaster related deaths occur only in developing countries. The Indian subcontinent is highly vulnerable to cyclones, droughts, earthquakes and floods. Avalanches, forest fire and landslides occur frequently in the Himalayan region of northern India. Among the 35 total states/union territories in the country, 25 are disaster prone. On an average, about 50 million people in the country are affected by one or the other disaster every year, besides loss of property worth several millions.*

**Key words:** Natural and Manmade, Mitigation, Recovery, Emergency, Management

### Introduction

India has been vulnerable to natural disasters because of its geo-climatic conditions. Floods, droughts, cyclones, earthquakes and landslides have been recurrent phenomena. India is vulnerable in varying degrees to a large number of natural as well as man-made disasters. About 58.6 percent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 percent of land) is prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis; 68 percent of the cultivable area is vulnerable to drought and hilly areas are at risk from landslides and avalanches. The Andaman & Nicobar Islands, the East and West coast are vulnerable to Tsunami. The deciduous/ dry-deciduous forests in different parts of the country experience forest fires. The Himalayan region and the Western Ghats are prone to landslides. Further, the vulnerability to Nuclear, Biological and Chemical disasters and terrorism has also increased manifold.

Disaster risks in India are further compounded by increasing vulnerabilities. These include the ever-growing population, the vast disparities in income, rapid urbanization, increasing industrialization, development within high-risk zones, environmental degradation, climate change, etc. All these point to a future where disasters seriously threaten India's population, national security, economy and its sustainable development. Therefore, the urgent need for the preparation of the State Plan for Disaster Management (DM) and District Disaster Management Plan (DDMP) as mandated by the Disaster Management Act, 2005

(DM ACT, 2005). The DM plans will build hazard specific management tools in the context of regional and multi-hazard vulnerabilities.

A Disaster is an event that occurs in most cases suddenly and unexpectedly, causing severe disturbances to people, objects and environment, resulting in loss of life, property and human health. Such a situation causes disruption in normal pattern of life, generating misfortune, helplessness and suffering affecting the socio-economic structure of a region to such an extent that there is a need for immediate outside intervention. Disaster means a catastrophe, mishap, calamity or grave occurrence affecting any area from natural and manmade causes, or by accident or negligence, which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment and is of such a nature and magnitude as to be beyond the capacity of the community of the affected areas. (As per DM Act, 2005)

The disaster in Uttarakhand state in 2013 is a natural warning for politicians, environmentalists, development planners etc. There is an urgent need to look at ecological sensitivity of the place before starting any new development project. Before starting these projects “pre ecological audit” should be done. There is a very significant role of foresters and ecologist in planning development in eco-sensitive regions. The natural disasters directly impact economy, agriculture, food security, water, sanitation, the environment and health each year. Disaster management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters. The complete cycle of disaster management can be depicted by following figure 1.



## **DISASTERS**

### **Earthquakes**

India has had a number of earthquakes. Some of these have been the world's greatest earthquakes in the last century. In fact, more than 50 percent area in the country is considered prone to destructive earthquakes. The north eastern region of the country as well as the entire Himalayan belt is susceptible to great earthquakes of magnitude more than 8.0.

The main cause of earthquakes in these regions is the movement of the Indian plate towards the Eurasian plate at the rate. Besides the Himalayan region and the Indo-Gangetic plains, even the peninsular India is prone to detrimental earthquakes as clearly illustrated by the Koyna (1967), Latur (1993), and the Jabalpur (1997) earthquakes. Indian earthquakes have shown some remarkable features which have implications on strategies for reducing earthquake disasters in the country.

### **Flood**

Floods cause extremely large numbers of fatalities in every country. Due to India's high population density and often under-enforced development standards, a large amount of damages and many deaths are caused. In the past, India has witnessed some of the largest and most catastrophic floods, causing irreparable damage to people's livelihood, property, and crucial infrastructure. Floods occur in almost all rivers basins in India. Twenty-three of the 35 states and union territories in the country are subject to floods and 40 million hectares of land, roughly one-eighth of the country's geographical area, is prone to floods. In the past years, the response around the world to such catastrophes was predictable, more dams, higher level and sturdier embankments to contain rising waters. The building of cities is the world's worst flood-prone plains. Major cities were situated near rivers for navigation advantage, but had high banks to withstand floods. Where mistakes were made, the cities, especially along the turbulent northern tributaries of the Ganges, got washed away. In the Uttarakhand floods, the destruction of bridges and roads left about 100,000 pilgrims and tourists trapped. More than 5,000 people were presumed dead. There was unimaginable loss of life and property.

### **Cyclone**

Cyclone is another major natural disaster that affects the coastal regions of India's cyclone. India has a coastline of about 7516 km. and it is exposed to nearly 10 percent of the world's tropical cyclones. About 71 percent of this area falls in ten states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Puducherry, Andhra Pradesh, Orissa and West Bengal). The islands of Andaman, Nicobar and Lakshadweep are also prone to cyclones. On an average, about five or six tropical cyclones form in the Bay of Bengal and Arabian sea and hit the coast every year. When a cyclone approaches the coast, a risk of serious loss or damage arises from severe winds, heavy rainfall, storm surges and river floods. There is a devastation of resources.

### **Drought**

In India, around 68 percent of the country is prone to drought in varying degrees. 35 percent which receives rainfall between 750 mm and 1125 mm is considered drought prone while 33 percent receiving less than 750 mm is chronically drought prone. Drought is a complex, slow-onset phenomenon of ecological challenge that affects people more than any other natural hazards by causing serious economic, social and environmental losses. With more than 70 percent of India's population relying directly or indirectly on agriculture, the impact of agricultural drought on human life and other living beings is critical. Drought affects all parts of environment as well as human life and livestock. About 16 percent of India's geographic area, mostly arid, semi-arid and sub-humid is drought-prone (Gol 2013a). Due to high temporal and spatial variability in rainfall and wide variations in physiographic and climatic conditions in the country, droughts are experienced in varying intensities (moderate or severe) almost every year irrespective of a good monsoon. Although the country has

experienced three major droughts between 2002 and 2012, the capacity to cope with the adverse impacts is steadily increasing due to improved technology and irrigation and partly due to diversification of rural economic activities away from pure farm activity (Gol 2013a). Several policy measures undertaken by the Government of India (GoI) help in building capacity for drought prevention, preparedness, mitigation and management. This has also led to a shifting perception of droughts from a 'crisis of an urgent nature' to a management issue.

### **Forest Fire**

As per the latest state of forests report of the Forest Survey of India (FSI) the actual forest cover of India is 19.27 percent of the geographic area, corresponding to 63.3 million hectares. Only 38 million hectares of forests are well stocked (crown density above 40 percent). This resource has to meet the demand of a population of 950 million people and around 450 million cattle. As such, country has to meet the needs of 16 percent of the world's population from 1 percent of the world forest resources. The same forest has also to cater for the 19 percent of the world cattle population. Nearly 55 percent of the total forest cover in India is prone to fires every year. An estimated annual economic loss of Rs.440 crores is reported on account of forest fires over the country. Forest fires in India have environmental significance in terms of tropical biomass burning, which produces large amounts of trace gases, aerosol particles, and play a pivotal role in tropospheric chemistry and climate. The forests of the country are therefore, under tremendous pressure. Forest fires are a major cause of degradation of India's forests. While statistical data on fire loss are weak, it is estimated that the proportion of forest areas prone to forest fires annually ranges from 33 percent in some states to over 90 percent in other. About 90 percent of the forest fires in India are created by humans. The normal fire season in India is from the month of February to mid-June. India witnessed the most severe forest fires in the recent time during the summer of 1995 in the hills of Uttar Pradesh & Himachal Pradesh. The fires were very severe and an area of 677,700 hectares was affected by fires.

The Forest Survey of India, data on forest fire attribute around 50 percent of the forest areas as fire prone. This does not mean that country's 50 percent area is affected by fires annually. Very heavy, heavy and frequent forest fire damages are noticed only over 0.8 percent, 0.14 percent and 5.16 percent of the forest areas respectively. Thus, only 6.17 percent of the forests are prone to severe fire damage. In the absolute term, out of the 63 million hectare of forests an area of around 3.73 million hectares can be presumed to be affected by fires annually. These figures are alarming.

### **Landslide**

Landslides are simply defined as the mass movement of rock, debris or earth down a slope and have come to include a broad range of motions whereby falling, sliding and flowing under the influence of gravity dislodges earth material. They often take place in conjunction with earthquakes, floods and volcanoes. The formation of river blocks can cause havoc to the settlements downstream on its bursting. In the hilly terrain of India including the Himalayas, landslides have been a major and widely spread natural disaster the often strike life and property and occupy a position of major concern. The two regions most vulnerable to landslides are the Himalayas and the Western Ghats. The Himalayas mountain belt comprise of technically unstable younger geological formations subjected to severe seismic activity. The Western Ghats and Nilgiris are geologically stable but have uplifted plateau

margins influenced by neo-tectonic activity. Compared to Western Ghats region, the slides in the Himalayas region are huge and massive and in most cases the overburden along with the underlying lithology is displaced during sliding particularly due to the seismic factor. In June 2013, a multi-day cloudburst centered on the North Indian state of Uttarakhand caused devastating floods and landslides in the country's worst natural disaster, which saw more than 5,700 casualties and other major losses.

### Loss in India

The following table shows the overall loss due to major disasters in India from 2001-02 to 2013-14. India due to its geo-climatic and socio-economic condition is prone to various disasters. During the last thirty years' time span the country has been hit by 431 major disasters resulting into enormous loss to life and property.

**Table 01 Major Losses in India due to Disasters, 2001-2013**

Year	Lives Lost	Cattle Lost	Houses damaged (in lakh)	Cropped area affected (in lakh hectare)
2001-02	834	21,269	3.47	18.72
2002-03	898	3,729	4.63	21.00
2003-04	1,992	25,393	6.82	31.98
2004-05	1,995	12,389	16.03	32.53
2005-06	2,698	1,10,997	21.20	35.52
2006-07	2,402	4,55,619	19.35	70.87
2007-08	3,764	1,19,218	35.27	85.13
2008-09	3,405	53,833	16.47	35.56
2009-10	1,677	1,28,452	13.60	47.13
2010-11	2,310	48,778	13.39	46.25
2011-12	1,600	9,126	8.76	18.87
2012-13	984	24,360	6.72	15.34
2013-14	5,677	1,02,998	12.10	63.74

Source: Disaster Management Annual Report

### Preparedness

The concept of disaster preparedness encompasses measures aimed at enhancing life safety when a disaster occurs, such as protective actions during an earthquake, hazardous materials spill, or terrorist attack. It also includes actions designed to enhance the ability to undertake emergency actions in order to protect property and contain disaster damage and disruption, as well as the ability to engage in post-disaster restoration and early recovery activities. Preparedness intersects with both of these two areas, serving as a temporal connector between the pre-impact and post-impact phases of a disaster event. Preparedness is typically understood as consisting of measures that enable different units of analysis—individuals, households, organizations, communities, and societies—to respond effectively and recover more quickly when disasters strike. Preparedness efforts also aim at ensuring that the resources necessary for responding effectively in the event of a disaster are in place, and that those faced with having to respond know how to use those resources. The activities that are commonly associated with disaster preparedness include developing planning processes to ensure readiness; formulating disaster plans; stockpiling resources necessary for effective response; and developing skills and competencies to ensure effective performance of disaster-related tasks. Preparedness helps us reduce the total amount of losses.

### **Hazard Identification and Risk, Impact, and Vulnerability Analysis**

All preparedness activities must be based on knowledge about hazards, the likelihood of different types of disaster events, and likely impacts on the natural and built environment, households, organizations, community institutions and communities. Types of information that provide a focus for preparedness activities include the potential for detrimental impacts of the hazards on health and safety, continuity of operations and government, critical facilities and infrastructure, delivery of services, the environment, economic and financial conditions, and regulatory and contractual obligations. Community-based disaster scenarios also provide a solid basis for preparedness efforts. Community outreach and the development of plans for crisis communications and public information are vital for the continuity of operations in businesses and to ensure public trust within a community. Partnerships between public and private entities that have been established and maintained prior to a disaster event will influence the sharing of resources through mutual aid and enable a capability to deliver emergency public information through previously identified channels. Activities include the identification of public and groups of people that will be in need of information and developing communications plans and identifying private resources that can be used in service to the community for response and recovery. They can be kept connected and informed.

### **Management, Direction, and Coordination (MDC)**

This dimension of preparedness centers on strategies that make it possible for households, organizations, and other units of analysis to manage both preparatory activity and response processes. The MDC dimension includes identifying lines of authority and responsibility and specifying how resources will be managed, information analyzed, and decisions made. For example, guidance documents advise businesses to prepare for disaster by organizing an emergency management group that includes representation from the affected area, security, safety and health, environment, maintenance, human resources, planning and logistics, and public relations. Local emergency management agencies and crisis-relevant organizations must now adopt the National Incident Management System (NIMS) which requires the identification of organizational roles, titles, and responsibilities for each incident management function specified in the emergency operations and response plan. The MDC dimension also includes activities that are designed to ensure that emergency operations will be carried out effectively when disaster strikes. These activities include training, drills and exercises, and educational activities for members of the public, households, and businesses. MDC also includes developing policy, vision, and mission statements; developing and using enabling authorities; setting performance objectives; and assigning responsibilities in areas such as oversight and coordination. Synchronization will be a great help in this direction.

### **Conclusion**

Natural disasters are very common all over the world; there is no escaping from them. Yet, something must be done to deal with such stressful situations. Being seventh largest country in the world, India is very prone to natural and human-caused disasters. The geographical and geological setup of the country makes it extremely susceptible to disasters. Disaster management specialist holds a very responsible position as it requires them to make immediate decisions when it comes to saving lives of people in emergency situations. Apart from loss of human lives, natural disasters inflict severe damage to ecology and economy of a region. With installation of new technologies India has developed an operational

mechanism for disaster warning especially cyclone and drought, and their monitoring and mitigation. However, prediction of some events like earthquake and volcanoes are still at experimental level. India has relatively high frequency of great earthquakes and relatively low frequency of moderate earthquakes. Moderate earthquakes create awareness and lead to improvements in constructions at relatively low human costs, which could be very effective in the long run. With adequate alertness, many losses can be prevented.

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