**Procedure International Journal of Science and Technology**

(International Open Access, Peer-reviewed & Refereed Journal)

(Multidisciplinary, Monthly, Multilanguage)

ISSN : 2584-2617 (Online)

Volume- 1, Issue- 2, January 2024

Website- www.pijst.com

# Information Technology enabled disaster management

**Dr. Sangita Katiyar**

*M.Sc (Chemistry), Ph.D., Dr. Bhimrao Ambedkar, University, Agra (U.P.),*
*Email: katiyarsangita@gmail.com*

**Abstract-**

In recent years, the increasing frequency and intensity of natural disasters, along with the evolving landscape of technological advancements, have necessitated a paradigm shift in disaster management strategies. Information Technology (IT) has emerged as a crucial enabler in enhancing the effectiveness and efficiency of disaster management processes. In present era when popullation increasing and the natural resources, and available agricultural land area is decreasing day by day, every country is trying hard to overcome the demands of this increasing population. The only way in industrial and economical developement. In a country like India where industrial development started very late as compared to western word we need more speedy industrial and economical developement. Our large popullation also Forces us to do so. After independence we have seen different phasen like industrial revolution, green revolution, white revolution etc. but the present era may be called the era of communication revolution and information technology revolution. The information technology is affecting our daily life continuously in a ponitriou manner by making various tasks of our daily life more easy and convenient. The latent implications of information technology in aur daily life may be seen as E-banking. E-governance, and E-marketing and E-learning, in rural areas E- chaupal has proved as tool to facilitate the farmers who are living in ramoti areas by proving them motocando latent informationn about the latest agricultural techniques.

**Key-words-** Information Technology, Disaster Management, Real-time Monitoring,

Transparency, Security, Internet of Things.

## Introduction-

From the beginning of civilization in every area man has tried to overpower the nature for his own benefits. But in this non ending conflict between man and nature whenever the nature shows its anger, any natural disturbance of a very short period like flood, earthquake or landslide demolishes the development of any country or society gained in a large number of years or decades. It causes any country to go back for a long period of times on the development scale. Such naturally occurring events are called the "natural disasters". After any natural disaster can have to manage the loses called by it, and a planned way to overcome the loses of any disaster is called the disaster management. The present paper in an attempt to discover that up to what extent the information technology is useful in the process of disaster management. First of all we should know that what a is a disaster. In National Disaster Management Act- 2005 of Government of India a disaster is defined as

"Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident negligence which results in substantial loss of life or human sufferings or damage to, and destruction of property or damage to or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area".[1]

All disasters may be devided in two catagories.

a. Natural Disasters - Disaster caused by nature such as earthquake, cyclone, tsunami, land slide, flood etc.

b. Manmade Disaster - Disaster caused by negligence or manmade causes or circumstances like Fire, explosion, industrial or transport accidents, dam demolition etc.

Out of there the man-made disasters affect only area effect a limited or the groups residing in this area, and their effects are also experienced for a definite and short period of time. But in care of natural disasters, their results may affect badly a large area of land and a large popullation living in that area. The effects of natural disaster may also be seen for a long period of time and sometimes it seems impossible to cops with them. The results of an earthquake or Flood sometimes may affect more than one country at the same time. Some rivers also pass through more than one country so their floods may affect more than one country if we talk about the damages caused by a disaster then during nearly 100 years of last century (from 1900 to 2007) the total number of deaths caused globally by earthquakes, Floods and storms was 3,77,41,411 out of which 91,38018 were in India alone, which in nearly 24.2 percent of global death toll[2] (EM-DAT, CRED) It indicates our preparedness at the occurence of a disaster during 20th century. If we consider the losses caused by flood alone during second half of 20th century in India, then the following table [3] indicates the damages caused by the flood.

### Effect of Floods in India (1950-2000)

| | Annual Average | Maximum Value(year) |
|---|---|---|
| Affected area (million) | 7.59 | 17.5 (1978) |
| Affected Population (million) | 32.0 | 70.45 |
| Affected agriculture land. (million hectors) | 3.53 | 10.15(1988) |
| Damaged Houses (millions) | 1.17 | 3.51 (1978) |
| Death cattle | 99713 | 6.18,248 (1979) |
| Human Death tall | 1504 | 11316 (1977) |
| Value of damaged houses, land and useful items (in crores) | 982.1 | 4630.3 (1988) |

It is clear from the table that on the last half century the properties damaged due to flood cost nearly 982 crores per year which means that if we can stop this then will be 5000 crore rupees available for development in every 5 year planning. Thus every year the disasters like flood or earthquakes pulls back the pace of our national development which in turn further weakens our preparedness against any upcoming disaster and puts our poor popullation at more risk or more vulnerable to disasters.

Actually the natural disaster is a unavoidable truth and they can't be stopped in any manner, all we can do is to minimize the effects of the disaster and the losses of property and human lives. It may be done effectively and in a planned way with the help of Information Technology.

In order to make an effective information technology enables disaster management program we divide our whole plan in following steps.

1. Preventive measures
2. Preparedness before disaster
3. Response at the time of disaster
4. Rehabilitation

**1. Preventive measures:** In order to arrange the successful and effective preventive measures against any natural disaster, we must learn that sensitiveness against any natural disaster will be different for different groups of people having the different backgrounds and also for every geographical area of country. Thus the level of prevention for these different people and area will be also different. There are mainly two reasons for higher sensitiveness against any natural disaster.

**a) Geographical Reasons:** The level of sensitiveness against a disaster is different for people residing in different geographical areas of country. The people living in hilly regions will be highly sensitive against earthquake and landslides

while least (almost zero) sensitive against flood a tsunami. Similarly the people residing in cities and villages developed near riverbanks will be more sensitive against floods and people living in coastal areas will have higher sensitivity against tsunami and cyclones.

**b) Social Reasons:** For the persons living in same geographical area of country may have different levels of sensitivity against a disaster according to their economic status and the resources they have. Any disaster will be affecting the poor people more as compared to the rich and resource persons. For example the person having fishing as their livelihood will be affected more by a tsunami as they have no option but to reside in coastal areas.


On the basin of above two factorn the preventive meanuken may also be clannified into two steps.

**1.1 Land use zonation-** By using the images captured by satellites and the census data we may divided the whole geographical area of country in various zones. In India whole country is divided in I to IV zones depending on the possibility of the occurrence of earthquake. This zonation indicates the sensitivity of any area for earthquakes, and the planning of disaster management for each zone will be different. This can be done easily with the help of information technology by making a database each zone containg the maps, of road network, hospitals and other amenities and a database of telephones of number of essential services.

**1.2 Monitoring and Premonition-** The extent of damage and loss due to any natural disaster is decided by the fact that can we issue an alert before any disaster and the time we get to prepare ourselves before the occurance of a disaster. A highly sensitive monitoring and quick premonition system reduces the ponsibility of losses of property and human lives upto a large extent. We may clear it by an example. In 1975, in Hecheng province of China a large number of snakes and other reptiles were seen on ground leaving their pits and hales two or three days before a massive earthquake. Due to this abnormal behavior of reptiles a warning was issued and people were prepared thus the death tale was nearly tenthounand (10,000). While the next year i.e, in 1976 the Thangshan province was hit by another

earthquake of nearly same intensity on Richter scale but no such indications were seen there before the earthquake and no warning could be issued. Due to this earthquake the death had risen up to six lakh fifty five thousands. [4] In these two cases only premonition about a disaster made such big difference in damage and loss of lives caused by a disaster.

We can make use of Remote sensing techniques and Information technology to issue an alert before a natural disaster for a large popullation living in a disaster-prone geographical area of country. For example if we study the change in the water level of a river during monsoon for the past twenty or Forty years then we may approximately predict the upcoming Flood in that river during current monsoon season and alert the people living in areas clone to the river banks. Besides it making are of this remote sensing data the agriculture department may advise the farmers to grow such variety of crops that become ready to be cultivated before the estimated time of heavy monsoon or the possible timings of Floods.

**2) Preparation before disaster:** We know that as cannot prevent the occurrence of natural or manmade disaster, the only thing we can do is to prepare ourselves in such a way that whenever we are hit by a disaster then to face it in a proper manner we must have correct and sufficient means and a large group of well trained and enable rescue persons. We may divide our pre-disaster preparation in two parts.

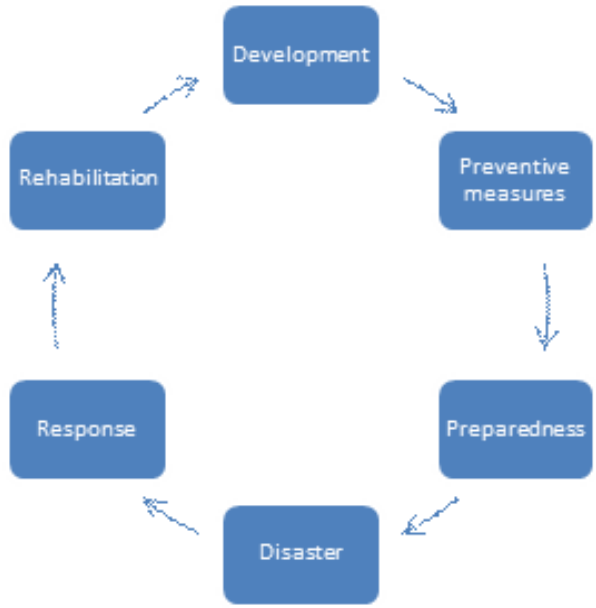
**a) Preparation of database of trained rescue worker and resources-** In various parts of the country on the basis of disaster normally hitting that area, the main and resourceful institutions of those areas may train properly the National Service Scheme (N.S.S.) and National Cadet Core (N.C.C.) volunteers to response quickly before any disaster and for well-arranged and controlled rescue works. The list of names and contact number may be stored in a data base at district and state level disaster management centre. At the time of any emergency these trained person may be collected on a very short notice. In addition a list of all government and private vehicles may also be stored in such a data base at district headquarter. A list of voluntary blood donorn may also be stored with their contact numbers for any emergency situation.

**b) Rescue Planning:** When a disaster like earthquake or flood hits any part of country then in general the road and rail notwork of that area also gets damaged. In this situation it becomes imposible for rescue team to reach the affected people intime and in many cases delay of each hour worsen the situation and the chances of saving many lives also get decreased. To overcome this type of emergency situation we should in advance prepare a data base of all main and link roads with the additional information of vehicle that can easily move on these link or interior roads. In addition to this on each district headquarter we must prepare the database such person who may reach the affected area for primary rescue work before the main resucers team from district headquarter or the main control room. These persons may include the Gram Pradhans, panchayat members of nearby villages, village developement officers, the teachers and shiksha Mitras of government primary schools. All these person being residents of that area are more familiar with geographical situations and road map of that area than any other official reaching there from the contral room. A short term training program should be arranged for these people so that they may quickly inform rescue work in time as

trained personals. [5]

**3) Response at the time of disaster:** When a natural dixanter hita an area our rescue operation and planning is divided into three main parts. First is to save human lives, second is to provide food and shelter to the affected popullation and the third is to carry the affected people away from the disaster hit area to reduce the possibility of any further risk. Here we are the pre-established data. base of trained rescue workers, the road maps and the nearest possible centers providing the essential rescue material. [6]

The most important part any rescue operation is to prevent the unnecessary mob from reaching the accidental spot out of curiosity otherwise all rescue operation will become unplanned and uncontrolled. We must ensure the entry of only those people who are trained for such disaster management, so that there should be no hotch-potch and the rescue and relief operations may be operated in a speedy and planned way. Along with all such precautions we should also sure that the information reaching the common people should be unbiased but controlled so that there may not be an chaos among the people regarding the damage caused by the disaster and the daily life outside the disaster areas may run normally. [7]




Disaster Management Cycle

**4) Rehabilitation:** During this era of industrial and technological development all countries specially the developing Countries are lacking in financial resources due to their continuously increasing population. The countries like India are struggling to fulfil the basic needs of their large population like food, water, education, headh etc. In this scenario each natural disaster pushes the country back by many steps on developement scale as most of the resources are spent to overcome the effects of disaster. [8] According to a world bank report during the ten years of ninety decade the total global loss of wealth and property due to disaster was nearly 6,08,000 million American dollars. As a comparison for developed

countries the yearly loss due to disasters was 2 to 5 percent of grand domestic product (G.D.P.) while for developing countries it was 12 to 15 percent of their G.D.P., while in a country like India only 1 percent of G.D.P. in spent on research and development of science and technology. [9] On the basis of above facts may say that for a country like India it is necessary to reduce the cost of losses due to disaster. The rehabilitation of affected people should be done in such a way that their chances of facing such disaster again gets reduced for this purpose our data base of land use zonation may be helpful.

**Conclusion-** Information Technology (IT) has become an indispensable asset in revolutionizing disaster management strategies across the globe. The integration of advanced technologies, such as Geographic Information Systems (GIS), Remote Sensing, Big Data Analytics, Artificial Intelligence (AI), Internet of Things (IoT), and Communication Technologies, has significantly enhanced the efficiency and effectiveness of every phase of disaster management, from preparedness to recovery. We may conclude from above discussion that from preparedness before disaster to rehabilitation work after any disaster at every level of disaster management the use of information technology is a must. The Information technology (I.T.) now a days has come up as an excellent tool for quick and accurate response at the time of any man made or natural disaster.

**References-**

1. National Disaster Management Act-2005, www.ndma.gov.in
2. EM-DAT, CRED (International disaster database, Centre to research on epidemiology & disaster) Murphy, RR & Overholt, J., Disaster Resilience: An Integrated Approach, Cambridge, UK, 2014, p. 59
3. Annual Disaster Statistical Review: Numbers and Trends, 2008, Jose, Rodriguez Li, Fernake vos, Regina, Below, Debarati, Guha, Sapir, CRED, Brussels, 2001

4. Dhawan, Nidhi Gauba, Khan Ambring Sardar, er dimanter Manangement and Preparednenn", CBS Publication, delhi. 2012, P.127

5. Jha, Muktinath, Vigyapan Aur Janasampark", Rajkamal Prakashan, N. Delhi, 2023. P.29

6. 'Indra" yearly reference book, 2018, ministry of Information and Broadcanting, Gov G.O. I., N. Delhi.
7. Paton, Douglas, Geographic Information Systems (GIS) for Disaster Management, Springfield, IL, USA, 2017, p.145
8. Murphy, RR & Overholt, J., Disaster Resilience: An Integrated Approach, Cambridge, UK, 2014, p. 59
9. Turban, Efraim, Internet of Things for Disaster Management, Hoboken, NJ, USA, 2018