

# GIS AND REMOTE SENSING: A VITAL ROLE IN DISASTER MANAGEMENT

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## Abstract

IT is useful to prevent as well as recover them. Disaster management being a key part of emergency management encompass wide range activities. Emergency management program are developed and implemented through the analysis and information. The majority of information is spatial and can be mapped. now in the age of technology it has been easier to manage the disasters both natural and manmade .We can manage them by using various features of information technologyIt may be observed that advancement in information technology in the form of internet, GIS, Remote sensing, satellite communication etc.GIS allows emergency management to identify onset of any disaster.

**Keywords :**Information Technology, GIS and Remote sensing, Satellite communication

## 1. INTRODUCTION

It is a well known fact that natural disasters strikes countries, both developed and developing, causing huge destruction and creating human sufferings and producing negative impacts on national economies. Due to various geo-climatic conditions prevalent in different parts of the globe, different types of natural disasters like floods, droughts, earthquakes, cyclones, landslides, volcanoes, etc. strikes according to the vulnerability of the area. India is considered as the world's most disaster prone country. It has witnessed devastating natural disasters in recent past like droughts, floods, cyclones, earthquakes, and landslide.

## 2. NATURAL DISASTER

A natural event such as a flood, earthquake, or hurricane that causes great damage or loss of life. "the number of people suffering food crises as a result of natural disasters has tripled in the last thirty years".

India is a large country and prone to a number of natural hazards. Among all the natural disasters that country faces, river floods are the most frequent and often devastating. The shortfall in the rainfall causes droughts or drought like stimuli in various parts of the country. The country has faced some severe earthquakes causing widespread damage to the life and property India has a coastline of about 8000 km which is prone to very severe cyclonic formations in the Arabian Sea and Bay of Bengal.

## 3. APPLICATION OF IT IN DISASTER MANAGEMENT

it is not possible to completely avoid the natural disasters, but the sufferings can be minimized by creating proper awareness of the likely disasters and its impact by developing a suitable warning system, disaster preparedness and management of disasters through application of information technology tools. The changing trends have opened up a large number of scientific and technological resources and skills to reduce disaster risk. There are mainly applications we can use to manage disasters: GIS and Remote Sensing and Internet.

## 4. GIS(Geographical Information System)

it provides a tool for effective and efficient storage and manipulation of remotely sensed data and other spatial and non-spatial data types for both scientific management and policy oriented information. This can be used to facilitate measurement, mapping, monitoring and model ling of variety of data types related to natural phenomenon. What is the definition for GIS?Geographic Information Systems is a computer-based tool that analyzes, stores, manipulates and visualizes geographic information, usually in a map.

#### 4.1 ADVANTAGES OF GIS

- Geographic Information Systems can visualize spatial information , It has the power to create the maps with the images shown , It can be used for a vast range of tasks involving geography , It can provide the solutions for the problems and it can model seismic activity precisely .
- It allows us to view understand question interpret & visualize the data in many ways that reveal relationships , patterns and trends in the form of maps , globes , reports and charts .
- It allows us to view, understand, question , interpret & visualize the data in many ways that reveal relationships , patterns and trends in the form of maps , globes , reports and charts.
- A GIS helps you answer the questions and solve the problems by looking at your data in a way that is quickly understood and easily shared , GIS technology can be integrated into any enterprise information system framework.
- GIS data is used in the natural resource management that can include hill slope gradients, the aspects , the stream networks , the stream gradients , vegetation and the other watershed features and there is another type of GIS information which is vector (line) data such as the stream channels .

#### 4.2 DISADVANTAGES OF GIS

- Geographic Information System is very expensive software , It requires enormous amount of data inputs to be practical for some tasks , It makes it prone for error , It has relative loss of resolution and it has violation of privacy.
- Geographic Information System signal needs to be found in remote areas , It is too heavily relied on , The geographic error is increased as you get into a larger scale as the earth is round , Funding for GIS is needed because it is more costly , there will be a loss of knowledge of geography .
- GIS layers cause some costly mistakes when the property agents are to interpret the GIS map or the design of the engineer around the utility lines of the GIS , The data availability is a major issue , If the data is not available, then the GIS system is useless .
- Disadvantages of using GIS are that its technical nature may portray results as being more reliable than they actually are and the errors and the assumptions can be hidden , leading to a lack of questioning into the results .
- Another issue of analyzing the results from a GIS is that the results will only be as accurate as the data that they come from So , the data may not be able to serve different contexts , particularly if the data is not applicable.

#### 5. REMOTE SENSING

The scanning of the earth by satellite or high-flying aircraft in order to obtain information about it. Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation, especially the Earth. Remote sensing is used in numerous fields, including geography, land surveying and most Earth Science disciplines.

Remote sensing makes observation of any object from a distance and without coming into actual contact. Remote sensing can gather data much faster than ground based observation, can cover large area at one time to give a synoptic view. Remote sensing comprises Aerial Remote Sensing which is the process of recording information, such as photographs and images from sensor on aircrafts and Satellite Remote Sensing which consists of several satellite remote sensing system which can be used to integrate natural hazard assessments into development planning studies. These are: Land sat, SPOT Satellite, Satellite Radar System.

##### 5.1 ADVANTAGES OF REMOTE SENSING TECHNOLOGY

1. Large area coverage: Remote sensing allows coverage of very large areas which enables regional surveys on a variety of themes and identification of extremely large features.
2. Remote sensing allows repetitive coverage which comes in handy when collecting data on dynamic themes such as water, agricultural fields and so on.
3. Remote sensing allows for easy collection of data over a variety of scales and resolutions. A single image captured through remote sensing can be analyzed and interpreted for use in various applications and purposes.
4. There is no limitation on the extent of information that can be gathered from a single remotely sensed image.
5. Remotely sensed data can easily be processed and analyzed fast using a computer and the data utilized for various purposes.

##### 5.2 DISADVANTAGES OF REMOTE SENSING TECHNOLOGY

1. Remote sensing is a fairly expensive method of analysis especially when measuring or analyzing smaller areas.
2. Remote sensing requires a special kind of training to analyze the images. It is therefore expensive in the long run to use remote sensing technology since extra training must be accorded to the users of the technology.
3. It is expensive to analyze repetitive photographs if there is need to analyze different aspects of the photography features.

4. Powerful active remote sensing systems such as radars that emit their own electromagnetic radiation can be intrusive and affect the phenomenon being investigated.
5. The instruments used in remote sensing may sometimes be un-calibrated which may lead to un-calibrated remote sensing data.

## 6. USE OF INTERNET IN AWARENESS

The internet is a globally connected network system that uses TCP/IP to transmit data via various types of media. The internet is a network of global exchanges – including private, public, business, academic and government networks – connected by guided, wireless and fiber-optic technologies. The terms internet and World Wide Web are often used interchangeably, but they are not exactly the same thing; the internet refers to the global communication system, including hardware and infrastructure, while the web is one of the services communicated over the internet.

### 6.1 FEATURES OF INTERNET

- It facilitates, the opportunities to enhance the capabilities of addressing hazard awareness and risk management practices before, during, and following emergency events. Internet sites providing an increasing array of information related to various hazards.
- Internet Sites also provide more information about the growing number of organizations and professional disciplines addressing them.
- It provides a new and potentially revolutionary option for the rapid, automatic, and global dissemination of disaster information.
- A number of individuals and groups, including several national meteorological services, are experimenting with the Internet for real-time dissemination of weather observation, forecasts, satellite and other data.
- Network equally provides the means of access to more reference and resource material to more people, in more ways.

## 7. WARNING AND FORECASTING SYSTEM

An advance system of forecasting, monitoring and issuing early warnings plays the most significant role in determining whether a natural hazard will assume disastrous proportions or not. The country has the following forecasting systems:

### 7.1 INDIAN METEOROLOGICAL

Department (IMD) IMD provides cyclone warnings from the Area Cyclone Warning Centers (ACWCs) It has developed the necessary infrastructure to originate and disseminate the cyclone warnings at appropriate levels. It has made operational a satellite based communication system called cyclone warning dissemination system for direct dissemination of cyclone warnings to the cyclone prone coastal areas. IMD runs operationally a Limited-area Analysis and Forecast System (LAFS), based on an Optimal Interpretation (OI) analysis and a limited area Primitive Equation (PE) model, to provide numerical guidance.

### 7.2 NATIONAL REMOTE SENSING AGENCY(NRSA)

Long term drought proofing programmers on the natural resources of the district have been greatly helped by the use of satellite data obtained by NRSA. Satellite data can be used very effectively for mapping and monitoring the flood inundated areas, flood damage assessment, flood hazard zoning and past flood survey of river configuration and protection works.

### 7.3 SEISMOLOGICAL OBSERVATION

Seismological observations in the country are made through national network of 36 seismic stations operated by the IMD, which is the nodal agency. These stations have collected data over long periods of time.

### 7.4 WARNING SYSTEM FOR DROUGHT

The National Agricultural Drought Assessment and Management System (NADAMS) has been Developed by the Department of Space for the Department of Agriculture and Cooperation, and is primarily based on monitoring of vegetation status through National Oceanic and Atmospheric Administration (NOAA) Advanced Very High Resolution (AVHR) data. The drought assessment is based on a comparative evaluation of satellite observed green vegetation cover (both area and greenness) of a district in any specific time period.

## 8. CONCLUSION

It may be observed that advancement in Information Technology in the form of Internet, GIS, Remote Sensing, Satellite communication, etc. can help a great deal in planning and Implementation of hazards reduction. For maximum benefit, new technologies for public Communication should be made use and natural disaster mitigation messages should be conveyed through these measures. GIS can improve the quality and power of analysis of natural hazards assessments, guide development activities and assist planners in the selection of mitigation measures and in the implementation of emergency preparedness and response action. Remote Sensing, on the other hand, as a tool can very effectively contribute towards identification of hazardous areas, monitor the planet for its changes on a real time basis and give early warning to many impending disasters. Communication satellites have become vital for providing emergency communication and timely relief measures. Integration of space technology inputs into natural disaster monitoring and mitigation mechanisms is critical for hazard reduction. It is absolutely necessary to create awareness amongst the public as well as decision makers for allocating resources for appropriate investments in information technology. Awareness and training in Information technology in a much greater measure is required to develop human resources, particularly in the developing countries, who are chronically suffer from natural disasters. The disasters usually occur in the well-defined areas, even though the community does not know the coping mechanism for the disaster. The disaster mitigation programmers' must be extensively taken up covering various aspects at national level to minimize the disaster damages. There should be a greater emphasis on development of new technologies in disaster mitigation.

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