International Journal of Advance and Applied Research (IJAAR)
Peer Reviewed Bi-Monthly

ISSN – 2347-7075
Impact Factor – 7.328
Vol.9 No.4 Mar – Apr 2022

REMOTE SENSING AND ITS APPLICATION IN DISASTER MANAGEMENT IN INDIA

Dr. Uday N. Suryawanshi

M. P. Patil Mahavidyalaya, Borgaon.
Tal. Walwa, Dist. Sangli, (Maharashtra)

ABSTRACT:

Application of remote sensing is well development advanced technology in Geography. This technology is useful the natural and manmade disaster management. Today Impact of natural disasters on life and property and ability to predict them would be one of the main contributions of remote sensing technology. Involving remote sensing with GIS and GPS technology makes it an extremely powerful tool to identify indicators of potential disasters. Information sharing through internet reduces data acquisition time and thus providing efficient way to carry out real time disaster predictions (floods, forest, fire, tsunami and hurricane etc.) Changing land use and assessment of its impact on the system in general within reasonable time frame and with greater degree of accuracy becomes possible with new technology.

Key Words: Natural Disasters, Earthquakes, landslides, volcanoes, Remote Sensing, GIS. Application

INTRODUCTION:

Remote sensing is a revolutionary tool that can be used for obtaining information an object by observing it from a distance and without coming into actual contact with it. In fact, when we see an object and understand what it is, our eye is sensing that object remotely. This is a broad definition but we generally use this term for observing our earth's surface from space using satellites or from the air using aircraft which have been modified suitably.

Remote sensing useful to many varieties of application in the areas of high relevance to every country in the world. The civilian application areas include Agricultural, Settlement, forestry, oceans the study of Biodiversity monitoring, urban growth, country boarder movements, Armey department, mapping of

waste lands, Tsunami etc. Disaster management and managing water resources, identification of Drought regions. These studies are very important especially to the Developed, developing countries and Under development. Natural disasters are events which are caused by purely natural phenomena and bring damage to huma n societies (such as earthquakes, volcanic eruptions, hurricanes); • Human-made disasters are events which are caused by human activities (such as atmospheric pollution, industrial chemical accidents, major armed conflicts, nuclear accidents, oil spills), and Human-induced disasters are natural disasters that are accelerated/aggravated by human influence.

Space platforms or satellite systems comprise of three categories:

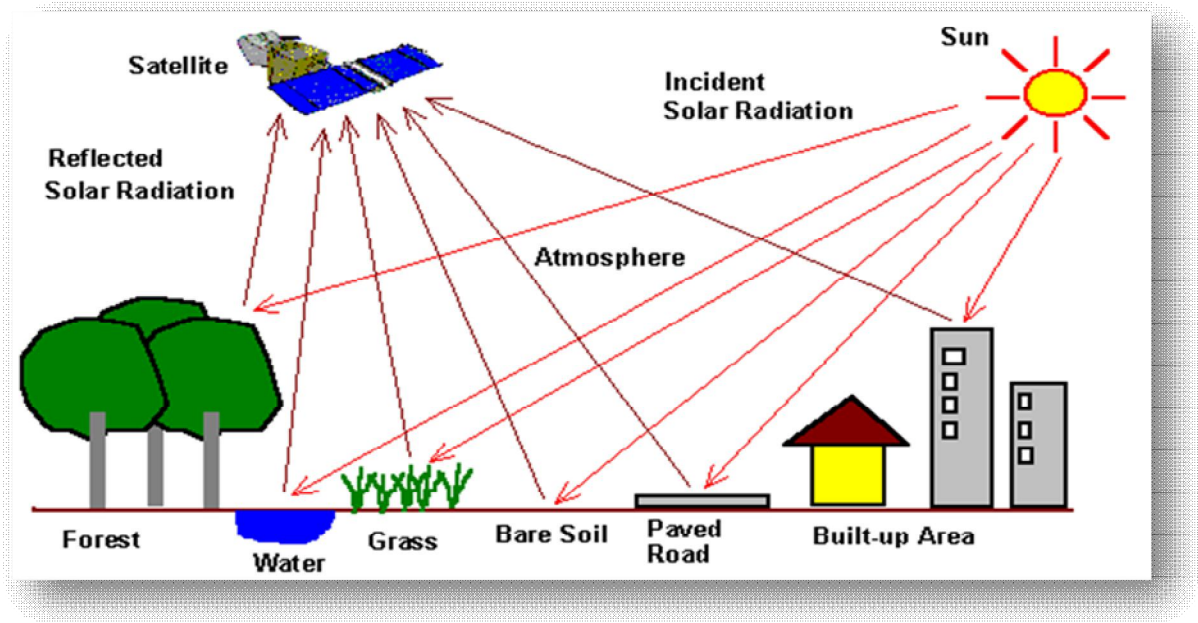
1) Space segments 2) Sensor system 3) Ground segments.

The space segments consist of the satellites, which are placed in the orbit and in which a sensor system is mounted on it which in turn acts as the instrument that observes and transmits information to the earth receiving stations. In some cases, provision exists in the form of a tape recorder, which records the observed information and transmits it to the earth receiving stations located at a different place other than the place which is being observed. The process of observing and transmitting the information to the earth receiving station is a continuous process.

Sensors are an instrument which sense the objects on the surface of the earth and records them. Camera is also a form of sensor. Which records the objects it looks at and the light reflected reacts with the sensitized coating on the film which, when processed reveals the object

Satellite mounted sensor sense the various objects in the form of dig talk format of the energy reflected. the data obtained in digital form can be converted to picture format by electro-optical conversion. Thus, we get a picture or image of each scene covering on the earth's surface. Different types of sensors, depending upon the design and specify needs.

Figures



Remote sensing theology uses the visible inferred and microwave regions of the solar radiation to collect information about the various objects on the earth's surface. The various objects on the earth's surface the electromagnetic spectrum have a visible region, which we use to view an object with our eyes. The suns energy, when it falls on the earth gets reflected that we generally use in remote sensing and its application.

ADVANTAGES OF SATELLITE REMOTE SENSING:

1) A large wide area can be covered by a single image / photo. Different satellite with different sensor systems may cover different extent of area.
2) We can get the data of any area repeated at regular intervals of time enabling monitoring of changes.
3) Coverage of inaccessible or difficult terrain like mountains, thick forests etc. are imaged.
4) Since data is obtained in digital form & in different channels, computer processing and analysis becomes possible.
5) To accrued Environmental Disasters' information.
6) Economic in cost and time

DISASTER MANEGMENT:

The impact of natural disaster s can be reduced through a proper disaster management, including disaster prevention, disaster preparedness (forcastes, warning, agricultural, manmade disasters, natural disasters etc. prediction), rapid and adequate disaster relief. Redaction of manmade and natural disaster can be successful only when adequate knowledge is obtained about the expected frequency and magnitude of hazardous event. Some type of disasters, like flood, tsunami, volcanoes, cyclone, clouds burst, terrisimes movement, borders movement or earthquakes may originate very rapidly and may affect larger areas. The use of synoptic earth observation methods has proven to be especially suitable in the field of disaster management. In a number of countries, where warning systems and blinding codes are more advanced, remote sensing of the earth's has been found successfully to predict the occurrence of disastrous phenomena and to warn the people on time.

DISASTER MAPPING:

Disaster mapping is the drawing of areas disturbed through excessive natural or manmade troubles resulting in loss of life, property and national infrastructures. It is normally possible to define the area affected by the disruption. The delineation can occur through the use of ground-based observations or through the use of remote sensing devices such as aerial photographs or satellite images. From the information gathered, it is possible to map the affected areas and provide information to the relief supplying groups. Disaster mapping is a tool for assessing, storing and conveying information on the geographical location and spread of the effects, or probable effects of disasters. The difficulty with traditional manual maps is that they are tedious and time consuming to prepare, difficult to update and inconvenient to maintain. Remote sensing is emerging as a popular means of map preparation while GIS can be used for storage, analysis and retrieval. Under remote sensing techniques, maps can be prepared using satellite data or aerial photographs and then digitised and stored on computers using GIS software. Disaster maps generally show risk zones as well as disaster impact zones. These are marked areas that

would be affected increasingly with the increase in the magnitude of the disaster. These could include landslide hazard maps, flood zone maps, seismic zone maps, forest fire risk maps, industrial risk zone maps etc.

TYPES OF NATURAL DISASTER:

a) Earthquakes:

Remote sensing technology can give additional information available through seismic techniques. Generally, the faults associated with earthquakes can be identified on good resolulation satellite imaginary. For this purpose, land use and geological map can give vital pointers towards potential earthquakes zones. Satellite sensors that are active in the visible and near Infrared spectral band would be useful. Though IRS, NOAA (www. Usgs.gov.), SPOT (www.SPOT image.fr), LANDSAT (www.nasa.gov), and IKONOS (www.spaceimaging.com) all of them collect the required data, LANDSAT imageries are more popular because of the satellite and its cost effectiveness. Conventially, aerial remote sensing (airborne radar) would be thought as more effective to delineate unconsolidated deposits sitting on fault zones, upon which most of the destruction occurs and to identify area where an earthquakes can trigger landslides but now with 1m resolution satellite imaginaries professional are very hopeful to apply more and more of remote sensing techniques.

b) Volcanic Eruption:

Volcano monitoring is important simply because an unexpected awakening can save thousands of lives over a wide area. Remote sensing techniques can play an important role by providing the vital information with only limited fieldwork, which saves effort and money. Thermal infrared (TIR) imagery can capture the volcanic heat provided the spatial resolution is high enough. Also PAN stereo pair imagery, due to its 3-D capabilities, of moderate resolution would serve the purpose of finding out the evidence of hazardous activities. An IR pattern of geothermal heat in the vicinity of a volcano is an indication of thermal activity, which many inactive volcanoes display. Changes in thermal patterns can be obtained for a volcano only through periodic IR imageries of very high resolution, like that of IKONOS, taken under similar conditions of data acquisition. The temperature and gas emission change

however, can be monitored, through a geostationary satellite, at ideal locations identified on thermal imagery.

c) Tsunamis:

Tsunamis are water waves or seismic sea waves caused by large-scale sudden movement of the sea floor (due to earthquakes, landslides; volcanic eruptions or man-made explosion) with increasing population and development along most coastline, there is a corresponding increase in tsunami differ from other earthquake hazards in that they can cause serious damage thousands of kilometers from the causative faults. Once they are generated, they are nearly imperceptible in mid ocean, where their surface highest is less than a mate. They travel at incredible speeds, as much as 900 km/hr, and the distance between wave crests can be as much as 500 km. as the waves approach shallow water, a tsunamis speed decreases and the energy is transformed into wave height, sometimes reaching as high as 25m but the interval of time between successive waves remains unchanged, usually between 20 and 40 minutes. When tsunamis near the coastline, the sea recedes, often to levels much lower than low tide and then rise as a giant wave. Satellite or aerial photography, especially when combined with a good GIS database of an area can provide critical information for emergency managers, including damage to structures, transportation and communication links and other life- line infrastructure components.

d) Hurricanes:

These large –scale low –pressure systems occur throughout the world over zones referred to as “tropical cyclone basins”. The determination of past hurricane paths for the region can be derived from remotely sensed data from the U.S. National Oceanographic and Atmospheric Administration (NOAA) Satellite sensors designed and operated for meteorological purposes. The tropical analysis and forecast branch of the tropical Predication Center (TPC) provides Year-round Products involving marine Forecasts, analysis. Aviation forecasts and warnings (SIGMETs) and Surface. The unit also provides satellite interpretation and satellite rainfall estimates for the international community. The Technical supports Branch provides support for satellite data processing. One of the key lessons NASA learned during Hurricane Andrew was that it is critical to select appropriate data and put it tougher to make informed decisions. Due to the lengthy processes required to grater the data it was suggested that communities not wait until a disaster happens to do so Imagery is an important

aspect of a community's databases. The next generation of satellites such as Earth Watches Early Birds and Astro vision will significantly enhance the remote sensing capabilities. At present, for plotting new data the best sensor is the AVHRR with its 2940 km swath, twice-a-day coverage and appropriate resolution. The red band is useful for defining day time clouds and vegetation, while the TIR band is useful for both day time and night time clouds observation.

e) Floods:

According to the Federal Emergency Management Agency (FEMA) of the USA, Floods are the Seconds most Common and Widespread of all natural disasters. Within the USA an average of more than 225pepole are killed and more than S3.5 billion in property is damaged by heavy rain and flooding each year 6,11. Scientists and funds in finding out more predict and estimate flood depth and Extent. Satellite imagery can be very effective for flood management in the following way:

1) Detailed mapping that is required for the production of hazards assessment maps and for input to various types of hydrological models;
2) Developing a large-scale view of the general flood situation within a river catchment or coastal belt with the aim of identifying areas at greatest risk and in the need of immediate assistance; and
3) Monitoring land use/cover changes over the years to quantify prominent changes in land use cover in general and extent of impervious area in particular.

Floods are result of excess runoff, which cloud increase or decriers depending on various factors, such as intensity of rainfall, snow melt, soil type, soil moisture conditions and land use and cover. Runoff from rural and urban areas is generally a response of excess water after the processes of infiltration. Obviously, urban regions will have more of impervious land where infiltration a not occur. On the other hand, rural drainage area will have some water absorbed in the soil till it reaches saturation level sending the rest to contribute to direct runoff si=oil. Soil erosion, too is greatly controlled by vegetation. Hence, land use classes, as determined by remote sensing, have an implicit hydrological significance in terms of water yield, peak flows and soil erosion. Continuing deforestation leads to more sediment yield downstream causing damages in flood plain agricultural fields. Since, sudden increase in river flows might also cause floods, the stakeholders here are not only the watershed management agencies

and people living in the region but also insurance agencies who provide insurance against flood damages

f) Landslide:

Landslide is a natural problem in the world and it's occurred to the environment various movement and disturbance to the Earths surface and some of natural events. These problems solve the remote sensing tecquenic and reduced the problems, mountain regions to the most landslide area so that area is applicable to remote sensing tecquenic and to get information to the landslide

g) Drought:

The drought monitoring is very essay to the identification of drought pron region is to remote sensing. Drought is the natural disaster type and its reduce the intention of drought to remote sensing application, major drought in India and affected part of India is highly so the problems is solving the these techquenic are use full. The technique is very important to the India and is use to agricultural development.

CONCLUSION:

Natural disasters cause damage to life and property all over the world in various forms. The pressure on the earth's resources caused by increased vulnerability of human and their infrastructure to the natural hazards, which have always existed. The result is a dynamic equilibrium between these forces in which scientific and technological development plays a major role. Recurring occurrence of earthquakes, floods, landslide and forest fires need to be studied using today's advanced technology to find effective preventive measures. Space Technology can help the disaster mitigation process through better future scenario predication; detection of disaster-prone areas; location of protection measures and safe alternate routes etc. post-disaster satellite date acquisition helps in disaster satellite recovery; damage claim process and fast compensation settlement. Use full tools of the disaster management in world and India is Remote sensing key of the Disaster management.

REFERENCES:

1. Alexander, D. (1993). Natural disasters. UCL Press Ltd., University College London. 632 pp.

2. Barrett, E.C., (1996) The storm project: using remote sensing for improved monitoring and prediction of heavy rainfall and related events. Remote Sensing Reviews, vol 14, 282 pp.
3. **3.**CEOS/IGOS (1999) CEOS/IGOS disaster management support project. http://www.ceos.noaa.org/
4. Chakraborti, A.K. (1999) Satellite remote sensing for near-real-time flood and drought impact assessment- Indian experience. Workshop on Natural Disasters and their Mitigation - A Remote Sensing & GIS perspective, 11-15 October 1999, Dehradun, India.
5. Corr, D. (1983) Production of DEM's from ERS -1 SAR data. Mapping awareness, 7, pp. 18-22. Cova, T.J. (1999) GIS in Emergency management. In: Geographical Information Systems, management and Applications.
6. Longley, P.A., Goodchild, M.F. Maguire, D.J., and Rhind, D.V. Daag, A. and Van Westen, C.J. (1996). Cartographic modelling of erosion in pyroclastic flow deposits of Mount Pinatubo, Philippines. ITC Journal 1996-2: 110-124
7. Drury, S.A (1987) Image interpretation in geology. Allen and Unwin, London, 243 pp.
8. Francis, P. and Rothery, D. (1987). Using the Landsat Thematic Mapper to detect and monitor volcanic activity. Geology 15, pp. 614-617.
9. van Westen, C.J. 1616 International Archives of Photogrammetry and Remote Sensing. Vol. XXXIII, Part B7. Amsterdam 2000.
10. Hays, W.N. (1980) Procedures for estimating earthquake ground motions. U.S. Geological Survey Professional Paper 1114, 77 pp. Keefer, K. et al. (1987) Real-Time Landslide Warning During Heavy Rainfall. Science 238, pp. 921-925.
11. Kesseler, M. (1995). ` Modelisation et cartographie de l'area volcanique de Vulcano (Iles Eoliennes, Italie) par un Systeme d'Information Georeferee. Publications du Departement de Geologie et Paleontologie. Universite de Geneve. pp. 1-72.
12. Krueger, A. et al. (1994). Volcanic hazard detection with the Total Ozone Mapping Spectrometer (TOMS), U.S. Geol. Surv. Bulletin, 2047, pp. 367-372.
13. G.S. Pankiewicz, international journal of Remote sensing. 19,2,365-371, 1998
14. P.A. Townsend, and S.J. Walsh, Geomorphology, 21.295-312, 1998
15. http//www.fema.gov/library.
16. Shrikant Karelkar – Remote sensing
17. www.isro.in