"Use of GIS and Remote Sensing Technology in Disaster Management"

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Geographic information system (GIS) and remote sensing (RS) are very useful and effective tools in disaster management. Various disasters like earthquakes, landslides, floods, fires, tsunamis, volcanic eruptions and cyclones are natural hazards that kill lots of people and destroy property and infrastructures every year.
India is vulnerable to natural and manmade disasters. GIS techniques act as a decision support tool. Decision making can possible by analysis of different GIS layers.

Currently socio-economic and geo-spatial data is useful for management and planning of disasters as well as tackling of disastrous condition.

GIS, RS & GPS is useful in disaster management applications & for decision making.

GIS is useful for hazard zone mapping and during emergency conditions mitigation of people can easily possible using this maps.

GIS and RS much beneficial in mitigation strategies and preparedness plans. Real time geographic data can improve the allocation of resources for response. It is also provides decision support system in disaster management.
Introduction to Geographic Information system

**GEO:** Earth.

**Geography:** Study of earth and where things are.

**Information:** For capturing, managing, analyzing and understanding information.

**System:** A set of Software, hardware and Data.
What is GIS? A geographic information system (GIS) is a framework for gathering, managing, and analyzing data. GIS integrates many types of data. It analyzes spatial location and organizes layers of information into visualizations using maps and 3D scenes.

There are three types of GIS data:

1. Points - Fire hydrants, manholes, etc.
2. Lines - Water lines, streets, rivers, power lines, etc.
3. Polygons (area) - Parcels, land use, lakes/ponds, etc.

A GIS will provide detailed information for any given location through any number of layers.
Application of GIS in Disaster Management.

- Identification of cyclone shelters location.
- Use in Automated Weather Stations (AWS)
- Preparation of the district vulnerability maps.
- Strengthening of embankment,
- Repair of roads
- Identification of weak points in the embankments.
- Preparing the base map indicating location.
Remote sensing is a type of geospatial technology that samples emitted and reflected electromagnetic (EM) radiation from the Earth’s terrestrial, atmospheric, and aquatic ecosystems in order to detect and monitor the physical characteristics of an area without making physical contact.

What is Remote Sensing?
Remote sensing is the art and science of making measurements of the earth using sensors on airplanes or satellites.
Application of Remote sensing in Disaster Management

- Earthquake
- Landslide
- Tsunami
- Volcanic Eruption
- Flood mapping
- The Snow Factor
Indian Imaging Capability

- Aerial Laser Terrain Mapper
- Digital Camera
- Synthetic Aperture Radar (SAR)

- Met/Ocean Observations
- Emergency communication
- All weather mapping
- Aerial
- LEO
- Geo.

- High-Res. Imaging
- Real Time Mapping
- Ground based
- DWR

- Satellite, Aerial & Ground Systems

- 1km: 30 min.
- 1m: 2 weeks
- 2.5m: 5 days
- 5.8m: 5 days
- 23m: 24 days
- 55m: 2 days
- 188m: 5 days
- 360m:

- Aerial
- ALTM
Disaster Management Support Services

Floods
- Flood Inundation Maps
- Damage Assessment
- Hazard Zonation
- Bank Erosion Studies

Earthquake
- Damage Assessment

Cyclone
- Inundation Maps
- Recession Maps
- Damage Assessment

Landslide
- Damage Assessment
- Hazard zonation

Drought
- Monthly Agril. Drought Report
- End-of-the-Season Agril. Drought Report

Forest Fire
- Active Fire Detection
- Damage Assessment
Using multi-satellite datasets, the coastal districts were monitored on daily basis.
12-hourly Monitoring with RISAT-1

Baleswar, Odisha

- Severely affected districts like Balasore, were monitored on 12-hrly basis during peak floods and changes in inundated areas / village can be seen
Damages near Berhampur
High Resolution Cartosat-2 data

1-Central Warehousing Corporation - Godowns
2-Food Corporation of India - Godowns
Dharahara Tower, Kathmandu

Before: Cartosat-2 (05-Jan-2015)

After: Cartosat-2 (27-Apr-2015)

Nepal Earthquake – April, 2015
Observation: A new major landslide has blocked the valley resulting in development of a lake. Several other small new landslide are also seen.

Location of the landslide: 84° 47' 30" E & 28° 33' 8" N
3D WEB GIS APPLICATION FOR FLOOD MODELING:
SPATIAL ANALYSIS AND VISUALISATION THROUGH THE WEB
Aims and objectives of the study

1. To display 3D Flood modelling in web application.

2. To develop a strategy for creating a 3D model to visualize flood levels within study area.

3. To evaluate the ability of the created 3D model to communicate flood-risk to the rural areas.

4. To formulate recommendations for future applications of 3D Geo-visualization for flood-risk management.
### STUDY AREA VILLAGES

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<tr>
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<th>District</th>
<th>Mandal</th>
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<td>Kolluru</td>
<td>East Godavari</td>
<td>Rampa Chodavaram</td>
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DATA SETS & SOFTWARE

- LISS –III
- DEM (30 meters Contour)
- Village boundary
- QGIS 3.1 version

Free GIS Software
PROCESSING STEPS 3D FLOOD MODEL WORKFLOW

- Bhuvan (NRSC)
- QGIS software
- Study area 5km Buffer
- DEM
- LISS-III
- Qgis2threejs

3D WEB APPLICATIONS
CONCLUSION

1. The 3D Web GIS application provides a better platform for visualizing flood situations.

2. This provides a better tool for analyzing and preparing for emergency measures. It also presents a near to reality situation that can easily be understood.

3. Simulation can also be used to trace and analyze underground utilities by making all top layers above them transparent.

4. Flood scene animations can be published to website for public access.
Thankyou