



## APPLICATION OF GIS IN FLOOD DAMAGE MANAGEMENT

Ankita M.Chavhan<sup>1</sup>, Darshan P. Bhojar<sup>2</sup>, Mukesh R. Zode<sup>3</sup>

<sup>1</sup>U.G.Student, Department of Civil Engineering , Jawaharal Darda Institute of Engineering and Technology Yavatmal, Maharashtra, India, [ankitachavhan2015@gmail.com](mailto:ankitachavhan2015@gmail.com)

<sup>2</sup>U.G.Student, Department of Civil Engineering , Jawaharal Darda Institute of Engineering and Technology Yavatmal, Maharashtra, India, [bhoyardarshan5@gmail.com](mailto:bhoyardarshan5@gmail.com)

<sup>3</sup>U.G.Student, Department of Civil Engineering , Jawaharal Darda Institute of Engineering and Technology Yavatmal, Maharashtra, India, [mukeshzode143@gmail.com](mailto:mukeshzode143@gmail.com)

**Abstract**

Nowadays, with technology information growth and its spread and effective application in Geometrics skills and sciences, more emphasis are on using non-structure methods based on geographic information system (G.I.S) in flood damage management. Benefits like capabilities in the monitoring, modelling and the estimate of risks and the damages from flood, learning and being multidimensional of their systems, high speed and accuracy and also facilitating changes and more compatibility with the environment and low costs of these information systems cause to using more and more geographic information system in flood damage management. The aim of this review is to synthesize the state of art literature in the application of Geographical Information Systems (GIS) and Remote Sensing (RS) techniques in all the flood management stages during flood types and common concepts in flood management are precisely explained. Case studies of flood management using GIS and RS are summarized. The aim of report is to review of geographic information system in three stages of after, before, and during flood

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**1 INTRODUCTION**

Geographical Information Systems (GIS) are computer-based systems that enable users to gather store, process, analysed and present spatial data. It provide an electronic image of information, called spatial data, about the Earth's natural and man-made kind A GIS references these real-world spatial data elements to a coordinate system. These features can base parated into different layers. A GIS system provisions each category of information in a separate "layer" for ease of maintenance, analysis, and visualization. rare wildlife habitats. Different application create and use unlike layers. A GIS can also store feature data, which side scriptive information of the map features. This attribute information is placed in Floods are between the most destructive acts of nature. World-wide, flood damages to agriculture, houses and public utilities amount to billions of dollars each year in adding to the loss of precious human and cattle lives. This can be due to excessive precipitation, combined with inadequate channel capacity. Over-spilling can also occur due to obstruction in or aggradation of the river bed. Flooding can also occur at confluences of streams when the main river is in high stage and backs up into the tributaries and areas

there about India is no exception as far as floods are concerned.

**1.1 Geographical Information System Application In Flood Crisis Management:**

Achievement is in all crisis management stages depends on having updated, accurate information. This information should be collected and arranged logically in terms of descriptive and location information in order to be used perfectly by managers, officials and urban planners in three stages of before, after and during crisis in line with desirable objectives. In that situation using geographic information system is a key to solve the all problem that using computer provides excellent possibilities for collecting, saving, retrieval, processing, analysing and finally producing appropriate visual outputs and including map, table, graph.

**1.2 Analytical Capabilities of GIS in Flood Crisis Management:**

Here, some capabilities of analysing a geographic information system in flood crisis management are referred:

1. Search capability: Means that finding of an appropriate and dependable solution for a special problem. For example, after determining flood area in

arithmetical map using the search capability of geographic information system, we are competent to find information.

2. Demographic: Using this system possibility is the ability to do arithmetical study in each stage of searching and researches. For example, we can guess approximate damaged people or near damages in especial range and the like with this capability.

3. Preparing combine maps: That means geographic information system means to merge data and information through putting information layers together and preparing combined maps.

## 2. FLOOD MANAGEMENT

Structural and non-structural measures. The huge losses constant from floods throughout the World have inspired actions to deal with flood problem as a priority issue. Both structural and non-structural measures have been undertaken to tackle the problem. It was at first believed that the way to reduce flood damages was to manage the rivers through structural measures and moderate the floods. Structural measures, as the name imply, are those which involve construction of structures like dams, embankments, drainage channels, etc. However, after spending large amounts of money on flood management works, it was realize that this approach did not work very well.

### 2.1 Flood Inundation Mapping

Flood mapping during the flooding and flood natural mapping after the flood recedes is necessary. One of the main information required is the nature and area of the damage caused by floods in the flood flat areas. Satellite remote sensing provide synoptic view of the flood-affected areas at frequent interval for assess the sequence and recession of the flood inundation in short span of time which can be used for planning and organizing the relief operations effectively. Remote sensing can effectively be used for mapping the flood-damaged areas. For mapping purposes, a damaged areas. For mapping purpose, a pre-flood scene and a peak flood image would be compared to describe the suffused area.

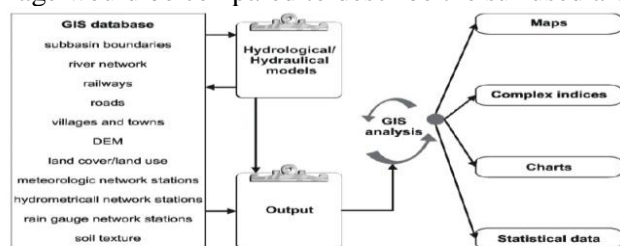


Fig.1.Integration of hydrologic model outputs and GIS info layers for preparing flood risk map

Flood inundation maps can be used:

- To define spatial point of flood inundation.
- To identify the most poor inundation affected areas.
- To evaluate conflict of flooding lying on ecological concern such as, coastlines, forests, open space etc.

- To map free operation.
- To weigh damage

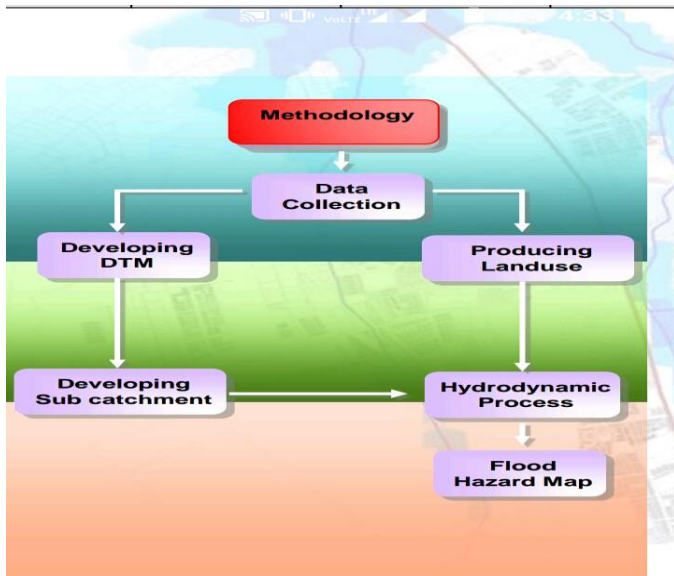
## 3. APPLICATION OF GIS IN FLOOD MANAGEMENT

Advancement in the remote sensing technology and the (GIS) help in true time monitoring, late warning and quick damage assessment of flood disasters. A Geographic Information System is a tool that can assist floodplain managers in identifying flood flat areas in their community. With a GIS, geographical information is stored in a database that can be query and graphically displayed for analysis. By go beyond or intersecting different geographical layers, flood flat areas can be branded and over fire for improvement or stricter floodplain management practices. Remote Sensing can be very successful for flood management in the following way:

- Detailed map that is required for the production of hazard valuation maps and for input to different types of hydrological models.
- Initial a overweight scale view of the broad flood situation within a river basin with the aim of identifying area at greatest risk and in the need of direct help Remote sensing and GIS technique has successfully straight its application in following areas of flood management such as downpour outpouring mapping, flood plain zoning as well as river morphological studies

## 4. METHODOLOGY

Hydraulics and hydrologic models in RS capable to forecast the release and water level all along the river and floodplain. The water level will then will be put on top using GIS function in the hydrodynamic software to produce the extent of flood.“The DTM was helps to produce and display ground level contour and forms the basis used for dynamic flood mapping” The land use map is produced digitizing process using GIS software, satellite picture The group of land use shown in different colours Sub catchments were produced from the contour layer of 5m gap The hydrodynamic process mainly consists of hydrologic and hydraulic apparatus The river model is extended to the flood plain to generate the flood amount Info Works. RS allows model results to be overlaid onto the underlying DTM to cause accurate and reproducible flood extent maps Able to show flood extent and depth, and can be animated to show the succession of a flood event The completed flood map is then export as a shape file ArcGIS is then used to overlaid the flood map with other layer such as land use map to produce flood risk map.



Flow chart of methodology of GIS

### 3. CONCLUSION

Remote sensing data accumulated from long-ago ten years and GIS data base of command area will give exact progressive and environmental aspects for the best use for framing policy decisions. One of the main aim of study is to take accurate decisions on future settlement pattern in order to avoid disaster effect in present river valley. From above information we have conclude that:

1. Flood hazard map produce form the hydrodynamic replication can be making available in GIS format. GIS tools shall then help to make a better decision making by the Department or the top management during the progress or after completion of project implementation.
2. Flood hazard map produce form the hydrodynamic imitation can be making available in GIS format.

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3. Flood hazard map produced from flood imitation analysis can be used by Government. Agencies to regulate floodplain by establish the development and redevelopment policies to restore the functionality of the floodplains.
4. Flood Hazard Map can be used as a show towards spot the suitable location for Flood Relief Centre in the floods flat areas during the flood events.

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