# HAZARD VULNERABILITY & RISK ASSESSMENT (HRVA)

HRVA

An integrated approach to address multi-hazards & associated physical, social vulnerability & risk using space technology in conjunction with field based surveys...


**North Eastern Space Applications Centre**
Government of India, Dept. of Space
Umiam-793103, Meghalaya
www.nesac.gov.in

**Assam State Disaster Management Authority**
Government of Assam, Assam Sachivalaya
Dispur-781006,Guwahati, Assam
www.sdmassam.nic.in

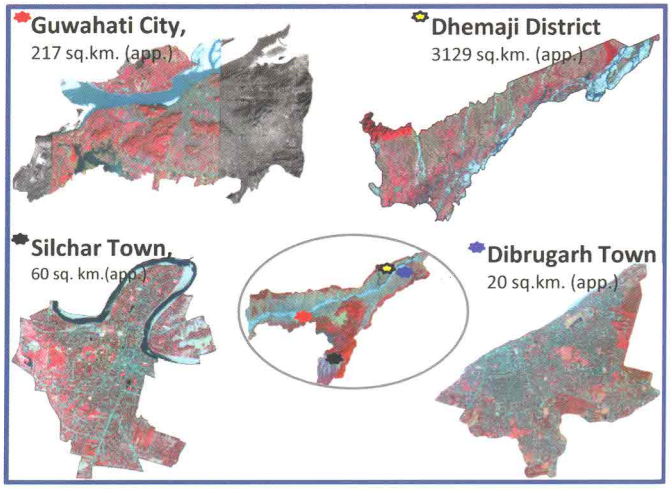
## Background

The State of Assam is vulnerable to various natural hazards like earthquake, flood, landslide etc. In recent years, the growth of population and unplanned development of settlements in hazardous areas have increased the relative vulnerability towards natural hazards as well as man made hazards (industrial).

Most of the naturally hazardous events are intrinsically complex phenomena caused by a large set of factors, such as tectonic movements, geological settings, climate change, river dynamics, unstable slopes and many more. Hence assessment of any hazardous incidence along with its probable impact to the society requires analysis of various thematic criteria, large number of historical records and sophisticated models in spatial domain.

In recent times with the advancement of geospatial technology, several sound, hazard investigations have been carried out and some of them constitute a reliable starting point for evaluating future hazards, social and physical vulnerability towards them and aimed to assess risk within an area.

## Study areas

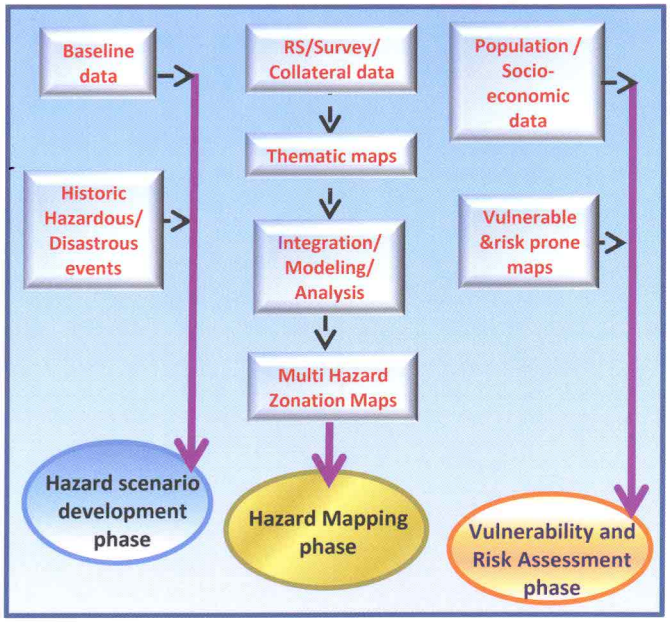



## Objectives

The project has two broad objectives. (I) To prepare GIS based multi hazard maps for Guwahati city, Silchar & Dibrugarh towns (1:10,000 scale) and for Dhemaji district (1:25,000 scale). (II) To prepare vulnerability and risk assessment maps for probable multi hazards for the areas under study.

## Overall methodology

In HRVA, there are three major phases: assessment of frequency-magnitude- damages related to past hazardous events for each study area; preparation of hazard zonation maps for probable hazards; to assess physical & social vulnerability and risk for each of the hazards.



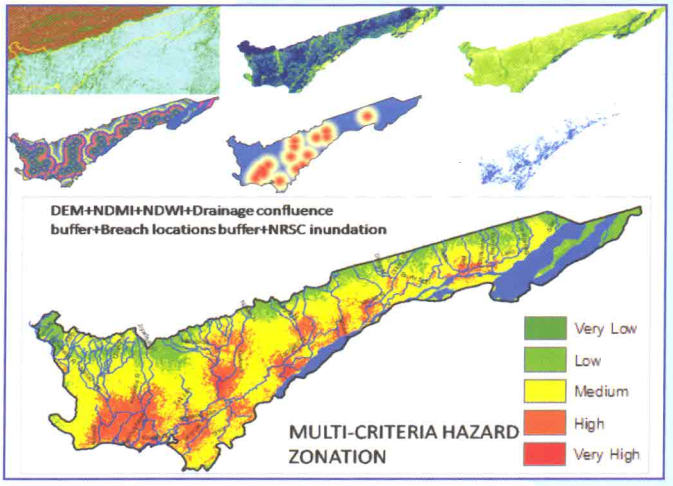

## Hazard Zonation

Historical evidences showed that study areas are vulnerable to frequent flood incidences including flash floods, while Guwahati city is also prone to landslide activities especially during the monsoon period. There are some major industrial installations in and around the study areas, also making them vulnerable to industrial hazards. NE region falls into seismic zone V, hence, needs special emphasis to ascertain behaviour of the study areas for a given magnitude of earthquake in future to minimize related damage.

## Flood Hazard Zonation

Flood is one of the most recurrent hydro-meteorological disasters. Urban flash flooding mainly due to inadequacy of drainage conveyance within urban areas is common for Guwahati City, Silchar and Dibrugarh towns. To address this, base flood elevations are established using a coupled hydrologic-hydraulic simulation platform on high resolution topographic base layer aided by detailed ground survey through Electronic Total Station.

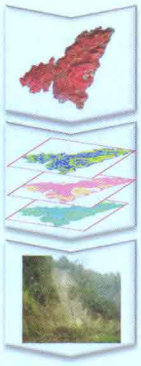
In case of Dhemaji district, a multi-criteria based Reverine Flood Hazard Zonation map along with sand deposition studies has been carried out.

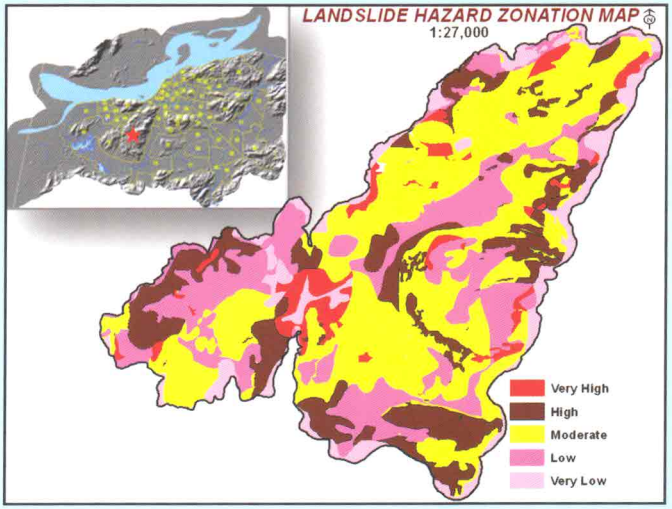




## Landslide Hazard Zonation

Landslide Hazard and related disastrous incidences are also a major societal and environmental concern for Guwahati City. Out of 60 municipal wards 21 are fully or partially affected by landslide (rock fall/slide & debris slide) and monsoonal rainfall is one of the main triggering factors.

Hazard Zonation Map is prepared by integrating various thematic criteria e.g., lithology, geomorphology, drainage and lineament density, weathering condition of the rocks, land use, soil etc using Analytical Hierarchy Process. In addition, few geo-technical investigations, namely, Rock Quality Designation, strength of rock and soil are also determined from both field and laboratory investigations to evaluate hazard scenario.

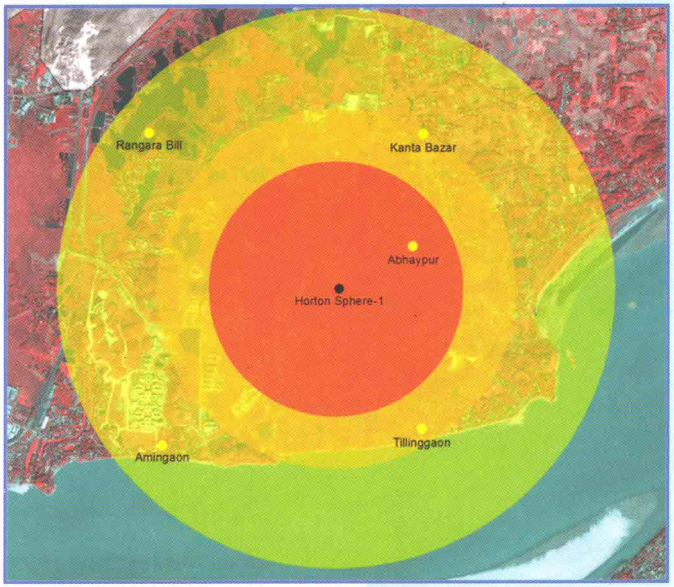





## Industrial Hazard Zonation

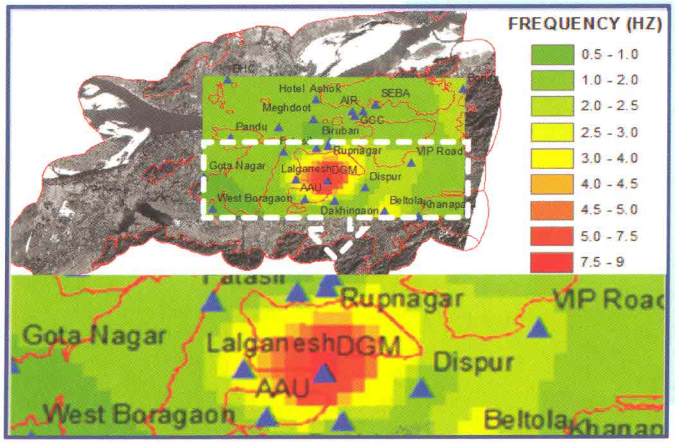
Accidental failures of design or management in industrial setup resulting a life-threatening risk on a community scale leads to industrial hazards. In Assam about 30 Major Accident Hazard Industries are reported. The probable threats are mostly associated to those industrial facilities which are handling petro-chemical products.

Industrial hazard map is prepared using Areal Locations of Hazardous Atmosphere (ALOHA) software considering various physical, chemical and atmospheric parameters. The hazard map is depicted as various level of threat zones.



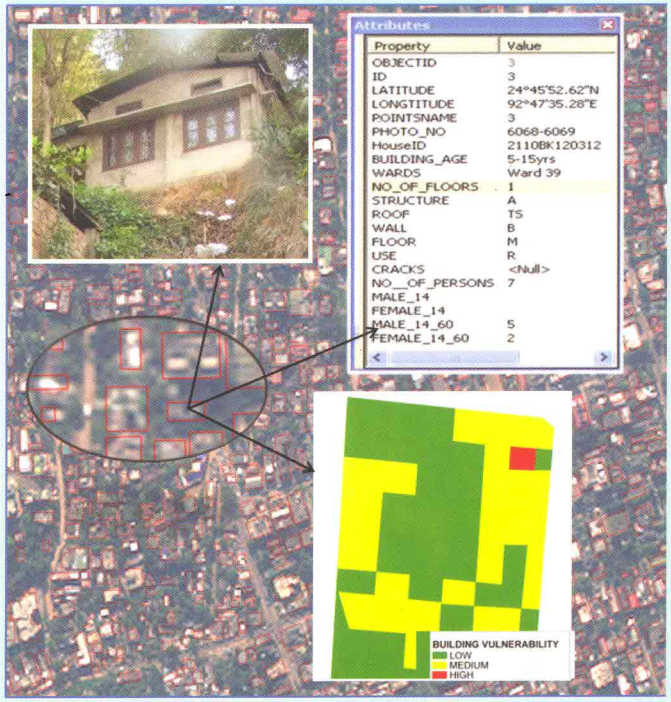

## Seismic Hazard Assessment

In an area, intensity of damage due to earthquake also depends on site characteristics, usually represented by Predominant Frequency, Peak Ground Acceleration etc. In this project, site characterization assessment is done using empirical method from available subsurface data.




## Vulnerability & Risk Analysis

In the light of preparedness for disasters, vulnerability and risk analysis is important for urban areas and district as a whole which are prone to different disasters. Vulnerability and risk has been assessed for infrastructure and population through socio-economic survey. Building foot prints have been derived from high resolution data. Combining buildings and socioeconomic characteristics (population pattern and temporal distribution) high priority zones are identified.




**For more details, please contact**

Dr. S.Sudhakar

Director, NESAC

Government of India, Department of Space

Umiam-793103, Meghalaya

Ph +91 364 2570141/ Fax + 91 364 2570139

Email: s.sudhakar@nesac.gov.in,

director@nesac.gov.in