

NATURAL RESOURCES DATA MANAGEMENT SYSTEM (NRDMS)

NRDMS Programme aims at promoting R&D in emerging areas of Geo Information Science and Technology. Studies supported under the Programme contribute to the development of systems, methods, and techniques for operationalising the concept of Geospatial Governance (g-governance) and building the required human resource base in support of this strategy. Sharing of spatial data by data providing agencies in the framework of Spatial Data Infrastructure (SDI) is an essential prerequisite. The National Spatial Data Infrastructure (NSDI) has thus been a major initiative of the Department in this direction. NSDI is now being upgraded and re-oriented to support implementation of the National Geospatial Information System (NGIS) during the XII Five Year Plan. An inter-departmental initiative of Ministry of Earth Sciences (MoES), Department of Space (DoS), Department of Information Technology (DIT), and Department of Science & Technology (DST), NGIS is expected to provide in a Mission-Mode the required information support to translate the concept of g-governance into a reality. Several activities have been completed towards the above goals during the year 2012-13. Based on the provisions of the National Data Sharing and Accessibility Policy (NDSAP), a mechanism has been established for sharing of data sets generated through public investments by creating data.gov.in. In order to provide web-based access to seamless 1:50,000 topographic data of Survey of India, the Surveykshan portal has been operationalised. A regional Geo Portal prototype towards development of the North East Spatial Data Infrastructure (NESDI) has been demonstrated. Web-enabled Gender Atlas and Geovisualisation Tools for landscape analysis and groundwater resource management have been developed. Results of studies covering various aspects of landslides and tsunami including inundation modeling and urban flood management have been useful in providing real time information for management of the geohazards by the authorities. Technical capacity has been built through a series of training and user awareness workshops amongst the scientific and the end user communities.

National Data Sharing & Accessibility Policy (NDSAP)

The National Data Sharing & Accessibility Policy (NDSAP) has been approved by the Union Cabinet and published in March 2012. Aimed at facilitating access to Government of India owned shareable data in a proactive and periodically-updatable manner, the Policy makes it mandatory for all Ministries/Departments or public-funded agencies to bring out a negative list containing the data sets those are not shareable in the public domain. Following the publication of the Policy, a mechanism has been set up by creating a data.gov.in portal through the National Informatics Centre (NIC) to help discover and access both geo-spatial and non-spatial data assets for developmental decision-making. The data assets could be used for developing a state-of-the-art National GIS for provision of value-added services for use by stakeholders from Government, Academia, Industry and the Public.

Study on perspectives for a National Geographic Information (GI) Policy

Setting up of a National Geographic Information System (NGIS) capability requires back-up of an all-encompassing and comprehensive Geographic Information (GI) Policy. Based on consultations held with many experts from Government, Industry, Academia, and Civil Society, a framework for a possible National GI Policy has been developed along with a draft policy covering imaging, mapping, surveying, and GIS. The draft framework seeks to ensure that benefits of GI are available as a g-governance service in the form of customized GIS-based decision support applications meeting needs of governance, citizens and enterprise; real-time availability of seamless and updated GIS asset is assured to support real-life decision-making; and leadership in GI technology and applications is

maintained towards discovering new knowledge and bringing competitive advantage to the Indian industry.

GIS data assets in domains of Topography and Forestry

As a part of the NSDI initiative, GIS data assets from Survey of India (SOI) and Forest Survey of India (FSI) have been made accessible and discoverable as OGC-compliant Web Map Service (WMS) from the newly launched Surveykshan Portal (www.surveykshan.gov.in) of Survey of India and the data portal of Forest Survey of India. Surveykshan was released by Shri Ajay Maken, Hon'ble Union Minister for Housing & Urban Poverty Alleviation in NSDI-2012 organised on 20-21 December 2012 at New Delhi in association with the Census of India.

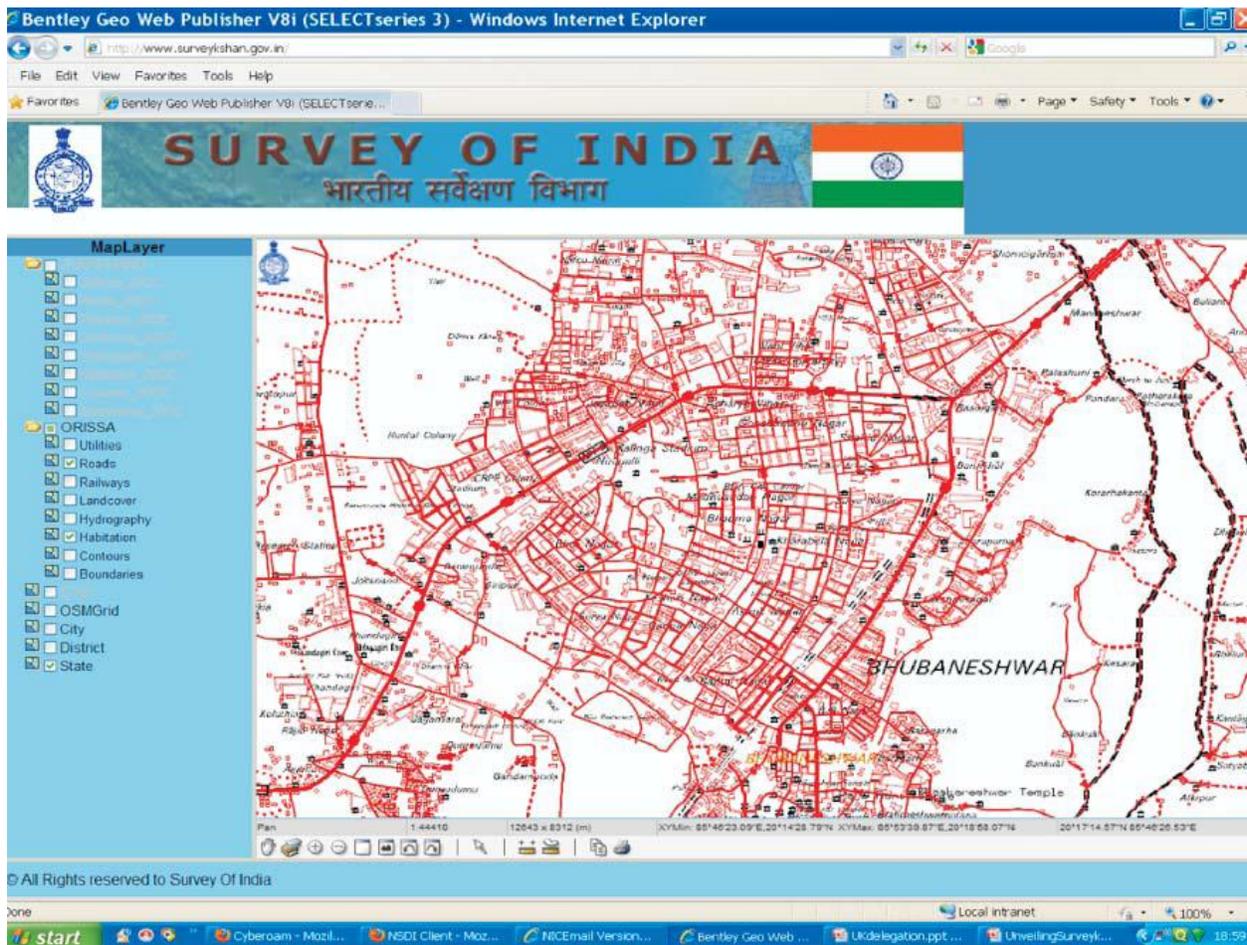


Fig. 5.20: (Web Map Service from SOI's Surveykshan Portal showing 'road' and 'habitation' layers from 1:50,000 OSM sheets of Bhubaneswar, Odisha)

The Portal will be useful for accessing and visualizing seamless 1:50,000 topographic maps of Survey of India concurrently with the satellite imageries and other data layers from various data providing agencies accessible on NSDI's India Geo portal. Experimental provision of Web Feature Service (WFS) was demonstrated for selected layers of 1:50,000 SOI topographic sheets and FSI's Forest Cover/ Crown Density maps in the OGC-compliant Geography Mark up Language (GML) format. A Content standard on

Soils was also released by the Hon'ble Union Minister during the event. Standardised WFS/ GML and content standards for various domains from the data providing agencies will be a vital input for setting up of the National GIS and State GIS capabilities.

State Geo Portals

A prototype of the Geo Portal under development for the North East (NE) comprising of the seven NE States and Sikkim has been demonstrated. Open Source tools have been used in the development of the prototype being used for training of the scientists and personnel from the concerned State Governments. The prototype framework will be used for setting up of the State data nodes for providing

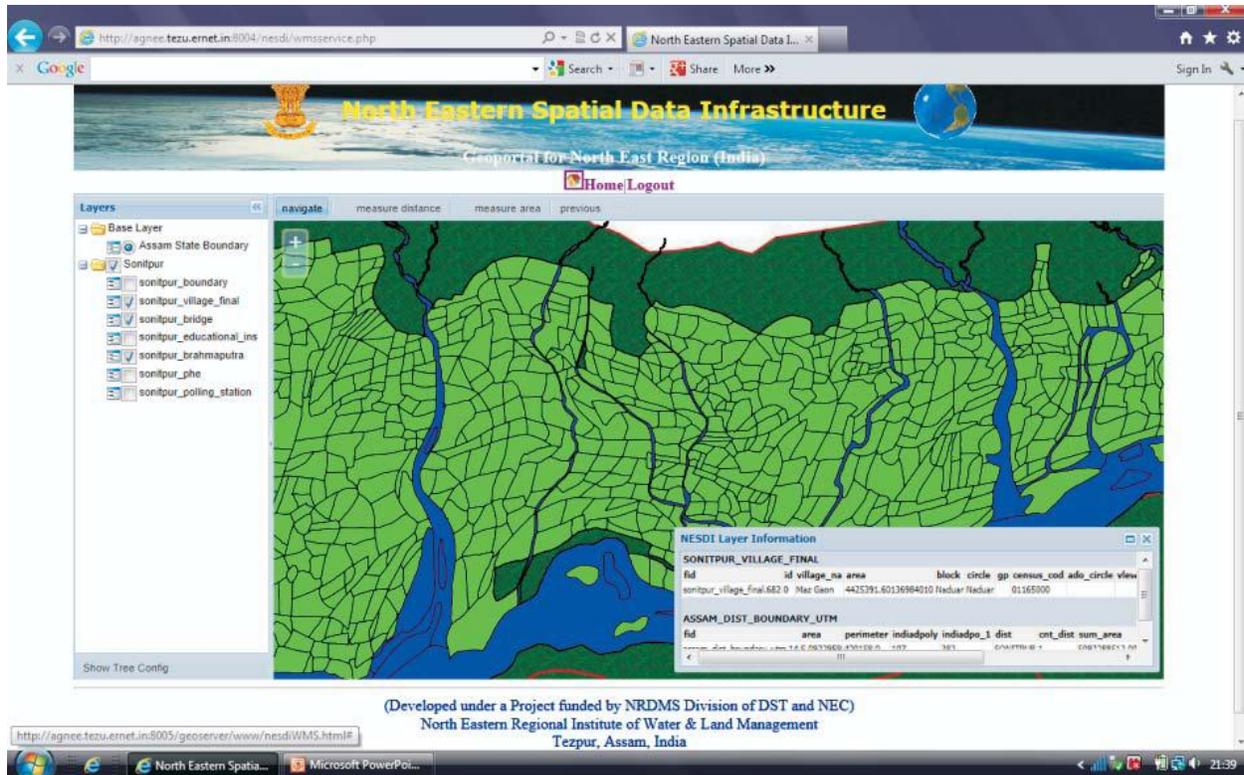


Fig. 5.21: (NESDI Geo portal showing village boundaries of Sonitpur district of Assam with attribute information as WMS on an Open Source tool)

access to geospatial data sets owned by the State Governments. State SDI Committees have been constituted in Assam, Meghalay, and Arunachal Pradesh and Nodal Agencies identified in all the 8 States to coordinate the activities. To facilitate operationalisation of Uttarakhand Geo Portal and sustenance of the information flow from the Districts to the State Geo Portal, District GIS Cells have been set up in Almora, Nainital, and Rudraprayag with the identification of geo-spatial information needs of the end users through three separate workshops. The Karnataka Geo Portal is being re-oriented towards development and demonstration of value-added services to the end users in the sectors of 'Watershed Management' and Health' on mobile devices. Geo Portals of West Bengal, Haryana and Jammu & Kashmir are under development.

Gender atlas

A web-based atlas using the Open Source Tools and Open Standards (OGC-compliant WMS Specifications) has been prepared on gender vulnerabilities across class, caste and social locations. The Atlas is expected to help identify spatial concentration of vulnerabilities in order to eventually develop a micro-level model for policy intervention. The atlas is aimed at providing vulnerability information in easily understood formats to the policy makers, planners, members of NGOs and civil society and grass root level workers over the web for effective use. Variables used in the preparation of the Atlas have been classified under (i) population and demography; (ii) literacy, education & skills; (iii) employment & livelihood; (iv) survival, health & well-being; and (v) living environment. A Gender Deprivation Index has been developed using the three variables like sex-ratio (0-6), gender disparity in literacy rate; and average age of mother at the first birth for a district wise comparison of gender vulnerability.

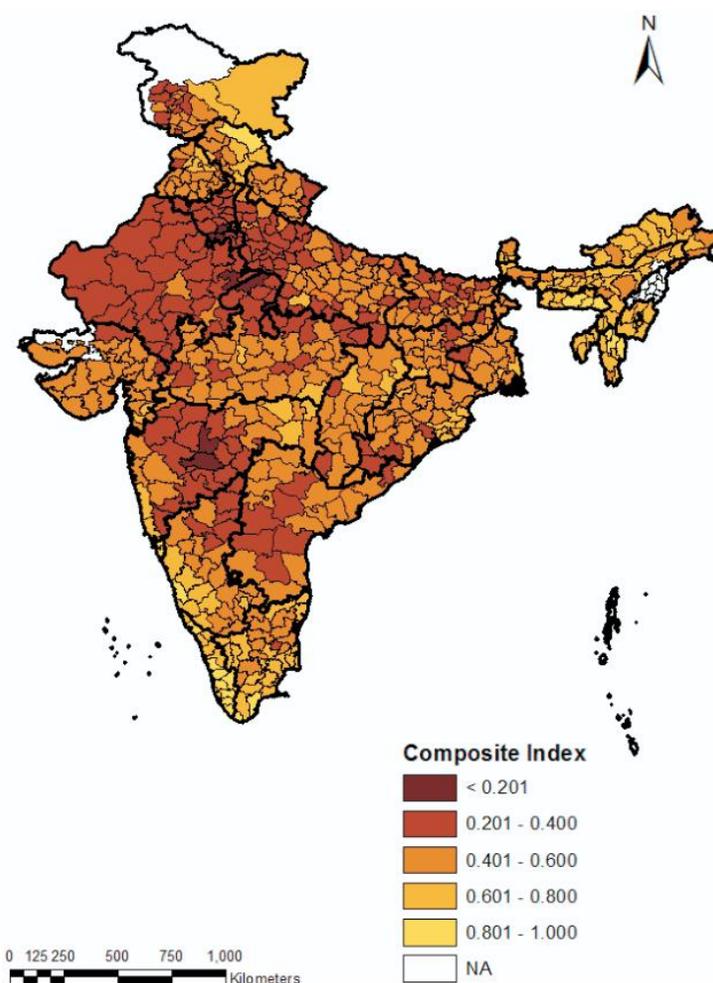


Fig. 5.22: (District wise Gender vulnerability based on a composite gender deprivation index using 2011 Census data).

Advanced Lab on Geo-Information Science & Engineering (GISE)

Ontology-based agro-advisory solution to cotton farmers, secured supply of drinking water using geo-spatial analysis in Thane district (Maharashtra), GIS-based building evacuation planning tool, and 3D campus GIS have been some of the activities pursued at the Advanced Lab set up at IIT Bombay during the year. An ontology for cotton crop was constructed to represent knowledge on good and bad farming practices, farming techniques; soil & climatic conditions; recommended varieties for specific locations; reasons, symptoms, and cure for various related diseases and pests to support providing faster agro-advisories to farmers. The ontology also contains concepts like hoeing, sowing, irrigation, fertilizing, spraying, harvesting along with their timeliness so that the farmers could be advised on the activities and practices based on the local conditions like weather or attack by diseases and pests. A flexible query system has been developed to store information on the past records of the farmer like varieties sown, time of sowing, fertilizing, irrigating, spraying of insecticides/ pesticides etc. Capable of responding to farmer's queries using a graph-based search on the above ontology and the farmer's information, the query system returns the best suitable match meeting the exact requirement of the farmers. Such activities are pursued in the Laboratory by the Masters and Research students of the Department of Computer Science that also offers courses on Geo-information Science & Engineering as a part of regular curriculum.

Tsunami wave propagation and inundation modeling

Modeling of tsunami waves generated by earthquakes using Danish Hydrologic Institute (DHI) MIKE 21 Nested grid approach involves calculation of initial conditions and application of numerical settings for tsunami wave propagation and inundation. The model has been used to study the tsunami waves inundating the Nagapattinam and Chennai coastal areas of Tamilnadu. Effects of bed resistance based on land cover are derived and implemented as Manning's number. A comparison between the MIKE 21 Nested Grid approach and NGI comMIT models has been carried out. Given appropriate initial conditions, the MIKE 21 Nested grid could be used to efficiently simulate the propagation of tsunami waves generated by earthquake. Results at 02:34:31.6 Hours after the earthquake describing phase characteristics of the sea level changes along the selected profiles have been in good agreement with the ComMIT model. Comparison of the inundation pattern for the two different models MIKE 21 and ComMIT at two different times of propagation for the Mw9.3 source has been shown in the Figure 5.23.

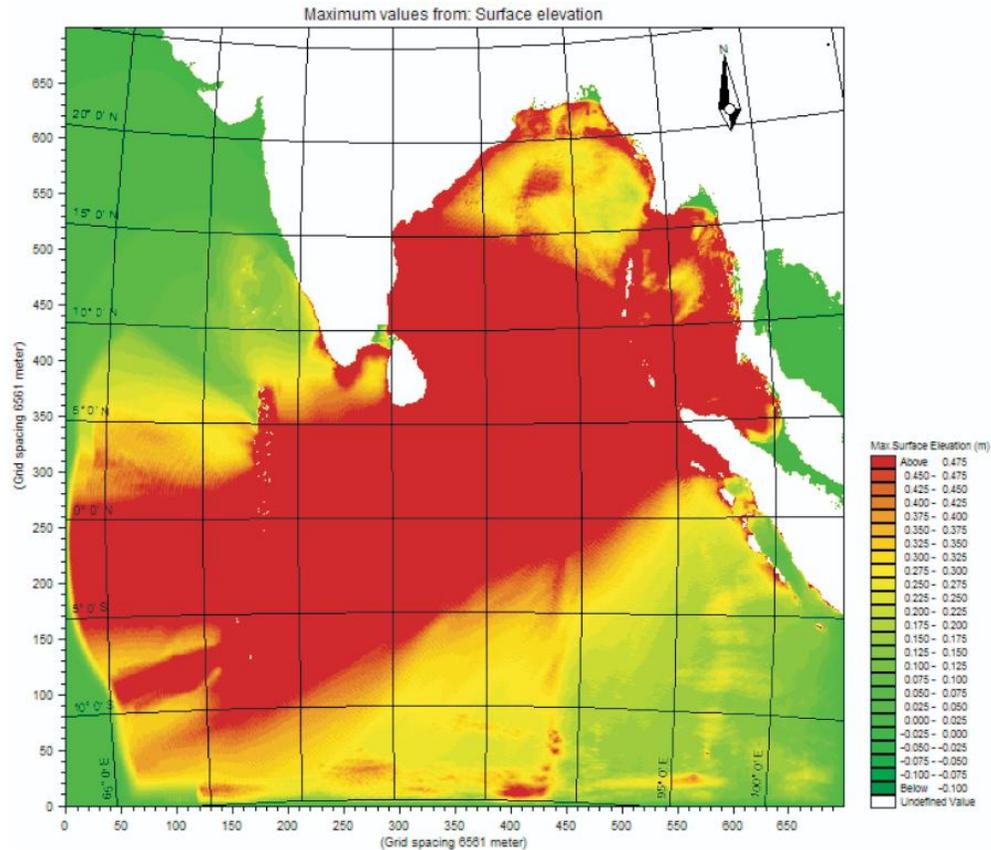


Fig. 5.23: (Maximum surface elevation of the given source Mw 9.3)

Rainfall induced landslide study in Ooty

Under the Landslide Hazard Mitigation Programme, the prominent Linga landslide in Ooty (Tamilnadu) has been studied for monitoring and developing the rainfall landslide relationship. Fully automatic rainfall monitoring device has been installed to record the real time rainfall data and studying the impact of intensity of rainfall on the occurrence of landslides. The relationship is potentially useful in developing the landslide early warning system for the area around Ooty. In this process, efforts have been made to collect rainfall data with the time and observe triggering condition arising out of high rainfall intensity in shorter periods of time. A sound co-relation between rainfall and the induced landslide has been built. Similar test sites in Himachal Pradesh and Kerala have been selected for rainfall-induced landslide monitoring and validation of the relationship.

National Geotechnical Facility

With the recruitment of scientists and research personnel and procurement of hardware & software, the facility is currently operational at the Wadia Institute of Himalayan Geology (WIHG), Dehradun.

Projects in support of SC/ST

R& D projects have been supported to study and provide scientific solutions to the problems being faced by the SC/ST communities and improving their socio-economic conditions in different States like Haryana, Madhya Pradesh and U.P.

Training and Capacity building

A set of 22 training programmes have been organized to train about 600 participants from the faculties of universities and engineering colleges on the emerging tools and technologies. A national portal has been set up for providing access to training materials on GI Science & Technology. Development and demonstration of test-beds around the upcoming interoperability specifications like Web Processing Services (WPS), RESTful Web Processing Services, GeoSMS, and IndoorGML from the Open Geospatial Consortium (OGC) have been initiated to support development and demonstration of value-added interoperable services and provision of training to staff and personnel in this emerging area.