Open Source Geospatial Information for Natural and Induced Disaster Risk Management - Indian Perspective -

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Disaster Management in India

- India is traditionally very vulnerable to a wide variety of natural disasters on account of its unique geo-climatic conditions
- Additionally, India is at the receiving end of human-induced disasters on account of its rapid growth, diverse political and its boundary conditions

Guidelines for Geospatial data preparedness

- Data integration at regional and local level
- Human services – Establish Geospatial teams
- Training – train to handle geospatial data in emergency
- Data access – Open access keeping secured information safe
- Data quality – Assess the needs
- Data gathering – two way data distribution
- Data improvement – Joint ventures
- Information delivery – Understand needs
- Hardware and Infrastructure


Examples of One stop geospatial data services

http://gos2.geodata.gov/wps/portal/gos

Geoinformation for Disaster Management

A conceptual model of the modeling, operational and data domains and their interrelationships


Major Drawbacks

- Do not have one stop data source
- Differences in understanding of data requirement
- Integration of geospatial data
- Very limited data access
- No practice of quality standards
- There is no deployed system to gather data automatically
- Limited or no updatings
- No standard test data or actual data delivery mechanism exist
- Participation of Government/NGOs/Academia/Private and Research organisations together...
- And many more...
Example of Geospatial data scenarios in India

Good to have such one stop geospatial data centre in India !!!

Geoinformation @ Stages of Disaster Management

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In Planning - to run what-if scenarios, calculate anticipated consequences, and consider best actions, and think about who is likely to need what information for what purpose in each stage of disaster. E.g., HAZUS

HAZUS (HAZards United States) is a GIS-based natural hazard loss estimation software package developed and freely distributed by FEMA

Although HAZUS-MH itself is free, it requires the users to have ArcGIS with ArcView license level. In addition, ArcGIS Spatial Analyst extension is required for Flood Model.

Geoinformation @ Stages of Disaster Management

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Mitigation - do things such as rehearse roles and test communication; gather information and run models to make decisions about how to protect communication channels or where to strengthen levees or locate field hospitals; and inform citizens about what they will be asked to do.

Response - use information systems to maximize real-time situational awareness, weigh decisions, seek consensus and compliance, send warnings, send orders, launch rescues, etc.

Recovery - bring relief, assess damage, clean up, rebuild, reconstruct and analyze events, and note the effectiveness or failures of work done in stages 1 through 4 to improve our management of the next disaster.

The Challenge: Providing Geospatial Data, Tools, and Information Where and When They Are Needed
Open Source Geospatial data and GIS

- Open source gained popularity with the rise of the Internet, which provided access to diverse production models, communication paths, and interactive communities.
- Examples for Data: OGC, OSGeo, Google Earth, Yahoo maps, GLCF, NASA, USGS, CIGAR (SRTM), etc...
- Examples for Software: OGC, OSGeo, QGIS, MapwindGIS, GRASS, ILWIS, OpenJump, etc...

OGC and OSGeo

<table>
<thead>
<tr>
<th>Open Source Geospatial Foundation</th>
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<tr>
<td><strong>Abbreviation:</strong> OSGeo</td>
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<tr>
<td><strong>Formation:</strong> February 1994</td>
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<td><strong>Type:</strong> ISO/TC 211</td>
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<tr>
<td><strong>Purpose/Scope:</strong> Open source geospatial software</td>
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The Open Geospatial Consortium (OGC), an international voluntary consensus standards organization, originated in 1994. In the OGC, more than 375+ commercial, governmental, nonprofit, and research organizations worldwide collaborate in an open consensus process encouraging development and implementation of standards for geospatial content and services, GIS data processing and data sharing.

v/s Disaster Management

The ability to rapidly share, integrate and apply geospatial information is critical to disaster management and risk management in all relevant industry domains: emergency services, civil protection, telecommunications, energy, transportation, banking and finance, water supply, and healthcare.

Source: http://www.opengis.org

The Challenges Open source Geoinformation

- Geospatial data accessibility
  - Data Sharing
  - Interoperability
  - Data Quality
- Geospatial data security
- Overhead Imaging
- Communication of reports to and from the field
- Backup, Redundancy, and archiving
- Tools for data exploitation
- Education, training, and accessing human resources
- Funding issues

Open Geoinformation Standards

- ISO/TC 211 Geographic information/Geomatics is responsible for the ISO geographic information series of standards.
- Many bodies are actively engaged in the work of ISO/TC 211, national standardization bodies, the OpenGIS Consortium (OGC), international professional bodies, UN agencies, and sectoral bodies
- To establish a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth.
- Standards may specify, for geographic information, methods, tools and services for data management (including definition and description), acquiring, processing, analyzing, accessing, presenting and transferring such data in digital/electronic form between different users, systems and locations.

Open Geoinformation Standards

- The following objectives need to be kept in mind while formulation of standards towards open sharing of geoinformational resources:
- In the geospatial technology world, the Open Geospatial Consortium (OGC) is the main open consensus standards organization
- Development of appropriate standards towards modeling and moving data in general, that is, ability to deal with both geo-spatial and traditional information.
- Enable handling of any kind of geo-spatial data including the data with extensive attribute description and those with geometry defined by vector or raster structures in two/three dimensions.
A Open Source based product from RMSI

- PIER – Profiler for Insurance Exposure and Risk
- An Interactive web-based visualization tool

PIER – Profiler for Insurance Exposure and Risk

Key Features

- Comprehensive nation-wide database up to the Pincode Level
- Interactive web-based visualization tool with hazard data overlaid on Google Maps
- Information on Earthquake, Cyclone and Flood Hazard Layers
- Comprehensive Hazard Risk Profile Report for each pincode in India
- Easy integration with external data

Features – Risk Profile Report

Risk profile for a pin code
- Gives segregated profile for each of the hazards along with themed map
  - Soil Condition, Soil Susceptibility, Wind Zone and Wind Speed
  - Seismic Zone, Earthquake Fault Lines and historical epicenters within 100
  - Flood zone, River Basins and historical rainfall in that river basin to determine flood risk
  - Distance to coast, historical cyclone tracks and landfall points within 25 kms

Features – Cyclone and Earthquake Risk Map

- Cyclone Map showing
  - Distance to the coast
  - Historical Cyclone Tracks
  - Historical Landfall Locations

- Earthquake Map showing
  - Seismic Zones
  - Earthquake Fault Lines
  - Historical Earthquake Epicenters

Architecture

- Integration with existing IT systems
  - Integrate with DRR/risk inspection workflow systems
  - No need to duplicate exposure data
- Open source
  - No need for additional expensive licenses
- Web architecture
  - Provide easy access to DRR/Disaster Managers
  - No need for any client application (only IE or Firefox required)
About RMSI – RMSI Overview

RMSI is...

...A professional services company providing geospatial and application software services to clients worldwide

- A part of Daily Mail and General Trust plc.
- Wholly owned subsidiary of RMS – world leader in natural catastrophe modeling
- Global business with operations in North America, UK, Continental Europe, Middle East and Asia
- We operate from three geographic locations in India:
  - New Delhi (Corporate office – outside New Delhi)
  - Hyderabad, capital city of Andhra Pradesh
  - Dehradun, capital city of Uttarakhand State
- More than 1,500 GIS, engineering and software professionals – 300 working on Modeling, Risk Initiatives and Disaster Management

About RMSI – DRR Services

- Risk Modeling Services
  - Modeling natural hazards
  - Tropical cyclone
  - Earthquake
  - Flood
  - Weather
  - Drought
  - Climate change
  - Developing exposures
  - Analyzing vulnerabilities
- Analytical Services
  - Data cleansing and enhancement
  - Portfolio analysis
- Risk Assessment Applications
  - Planning
  - Preparedness and Awareness
  - Risk transfer

Past Experience – Disaster Management

- Modeling Catastrophe Risk in Select States of India
  - Client: The World Bank
  - Duration: 8 months
  - Main Project Features:
    - Historical Cataloging Compilation
    - Catastrophic Risk Assessment
    - Vulnerability Evaluation
    - Exposure Development
    - Loss Analysis Viewer
    - Vulnerability and Adaptation to Drought in Andhra Pradesh: Economic Impact Scenarios
  - Client: The World Bank
  - Duration: 7 months
  - Main Project Features:
    - An agri-meteorological model to analyze the impact of drought on crops
    - Probabilistic Drought Risk Model
    - Macroeconomic and Financial Model
    - Recommendations for cost effective risk financing and risk transfer arrangements

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About RMSI – RMSI Certifications and Accolades

- Quality certifications
  - ISO 27001: 2005
  - ISO 27002: 2005
  - SSD/CMII Level 3
- Awarded "Best Place to Work" consecutively for 3 years under the Great Places to Work and The Economics Times Survey
- Top 5 amongst Best Indian IT Employers for the seventh year in a row in the IDC-Data Quest Survey
- Bagged CII Corporate Wellness Award 2009
- Confirmed the "Hi5 Excellence Award for Technology" at the Sixth Global Summit 2009 at Arynt International Business School, Arynt University, Noida
- RMSI ranked a High Second in the NASSCOM "Top 15 Exciting Companies to Work For" Survey 2008
Thank you