Karnataka NRDMS program

Conceptual changes in the practice of planning was brought in, around late 70s, by adopting the decentralized or local level planning to ensure that the development is sustainable, area-specific and takes into account the felt needs of the local people.

The 73rd and 74th Constitutional Amendments empowered the State Governments to form the institutions of local self-governance i.e. Rural Local Bodies (RLB's/Panchayaths) and municipalities (ULB's) in rural and urban areas.

KSCST recognizing the need for both spatial and non-spatial data to local level planning across Karnataka established Karnataka Natural Resources Data Management System (NRDMS) program in 1992 to develop a comprehensive spatial data management system for easy access to data and information to support RLB's/ULB's.

Over the years, the utilization of geospatial data and services for a wide range of uses has seen steady growth in the requests for both data and services by planners and administrators. The NRDMS centres have been continuously updating the Centre's technology approaches to help meet this growing demand.

Application domains include, for example, public health and education, transportation, water quality/quantity, watersheds, elections, environmental analysis and mapping, disaster planning and management, and developmental planning.

NRDMS centers provide value-added information, spatial decision support systems, training and support to planners and administrators in local governments.

The NRDMS program now has been institutionalized in the state through RDPR and Karnataka is the first State to institutionalize spatial data for decision-making.

Major Activities/Achievements

1. NRDMS centers have been providing custom applications, value-added information, training and support to planners and administrators.
2. Developed a standardized seamless spatial data for storing and sharing through Karnataka Geo-portal.
3. Development of web based geospatial applications/decision support system
4. Initiated mapping of urban local bodies as well as resource mapping for PRI's
5. NRDMS centers have been continuously updating information (spatial and non-spatial) for the benefit of user departments.
6. Conducted District level workshops in all the districts to create awareness among end users.
Major objectives

1. Demonstrate and promote the use of Spatial Data Technologies at micro level to support decentralized planning process.
2. Collate and organise spatial database in digital form at district level to enable planners and administrators for easy access of data/information.
3. Provide S & T inputs for framing Policies related to geospatial technologies.
4. Provide value addition to spatial database generated at various organisation.
5. Develop & Demonstrate Karnataka Geoportal to support Karnataka NRDMS program.
6. To organise training programs and workshops to create awareness among end-users.

Typical applications/publications

1. Election information and management system.
2. Rural Health Facilities-Allocation/Location and its jurisdiction.
3. Impact of stone crushers on environment.
5. Education Management Information system.
6. Rural water supply and water quality for PRI's.
8. Prioritization of MI tanks
9. Watershed and related applications
10. Digital Tourism ATLAS.
11. Gram Panchayath ATLAS - 2018
## Applications based user need assessment using UML

<table>
<thead>
<tr>
<th>Name of the application</th>
<th>Seasonal Depth to Water Level Fluctuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the Department</td>
<td>Mines and Geology department</td>
</tr>
<tr>
<td>Brief about the application</td>
<td>The water level fluctuation is mapped for assessment of drought and ground water recharging using Interpolation method</td>
</tr>
<tr>
<td>Application Query</td>
<td>To Estimate Seasonal fluctuation of Water</td>
</tr>
<tr>
<td>Data required</td>
<td>Administrative Boundaries, Observation wells (Depth to water level of pre-and post-monsoon)</td>
</tr>
<tr>
<td>Description</td>
<td>Administrative Boundaries: District Boundary, Village boundary DTW: Fluctuation level range -0.5 to 5 mbgl GPS: Observation well points</td>
</tr>
<tr>
<td>Conceptual design of the application</td>
<td>1. Display District and Village Boundary. 2. Calculate seasonal water level fluctuation from post and pre-monsoon depth to water level by finding the difference. 3. Interpolation of seasonal fluctuation level values using Inverse Distance Weighting method. 4. Final map shows distribution of interpolated seasonal level fluctuation with ranges of variation.</td>
</tr>
</tbody>
</table>

UML class diagram model showing interpolation of seasonal water level fluctuation
Spatial Data Infrastructure

Spatial Data Infrastructure (SDI) is a collection of technologies, policies, institutional arrangements, financial and human resources to facilitate availability, access and effective utilization of spatial data.

**Components**

1. Policies & Institutional Arrangements (governance, data privacy & security, data sharing, cost recovery)
2. People (training, professional development, cooperation, outreach)
3. Data (digital base map, thematic, statistical, place names)
4. Technology (hardware, software, networks, databases, technical implementation plans)

**Karnataka Geoportal**

Strength of Karnataka NRDMS program formed the basis for setting up of 1st State Geoportal of the country in Karnataka. In the year 2009, a web based geo-portal was developed to acquire, process, store, distribute and improve the utilization of geo spatial data in the state of Karnataka.

Karnataka Geoportal is dedicated to advancing applications of geographic information system technology within Karnataka State for local government applications.

The portal is designed and developed based on standard specifications from International Standardization Organizations (ISO) and Open Geospatial Consortium (OGC).
The Underlying Database

A Centralised Spatial Database forms the key component of the Karnataka Geoportal. A detailed Need assessment taken up to understand the SDI Concepts, functional/non-functional components, potential applications, data, category of users and user requirements. For imagery provision, the portal is supported by Google and Bhuvan API’s.

Karnataka Geoportal Services

The modules in the Karnataka Geoportal are categorized into

1. Map viewer - Web Map Service (WMS),
2. Product catalogue/metadata - Catalogue Service on Web (CS-W),
3. Services specific service/feature data sets - Web Feature Service (WFS),
4. Simple Applications (Query based decision support)
5. Coverage services/images - Web Coverage Service (WCS)
6. Help/support

Query related to administrative boundaries, election and Panchayath Raj
State Geo-portal for Watershed Management

Karnataka Watershed Development Department (KWDD) - an agency under Government of Karnataka is in-charge of running various watershed schemes/Projects, formulating policies, planning, organizing, coordinating the activities and implementing the watershed programs. Under this program, KWDD’s MIS database is integrated to provide standards-based online geospatial information services to end users.

Features of the Portal

KSCST showcased the utilization of Geospatial Technologies by developing geospatial applications on the Karnataka State Geo-portal to evaluate watersheds in Belagavi Division of Karnataka under the Phase I and Phase II projects of PMKSY. Development and deployment of the "State Geo-portal for Watershed Management" enabled the users to query on various geo-spatial and non-spatial (attribute) parameters at cadastral/beneficiary level for activities taken up under agriculture/ horticulture/forestry sectors. Crowd sourcing of data for data updating, mobile compatibility and online editing of data sets are some of the Technology’s major highlights. Now, under KGIS and in-house portal of Watershed Department, the solution is being extended to the entire program.

Village Information System (VIS)

The Village Information System project provides digital spatial data on demography, natural resources, climate, land use land cover patterns and socio-economic aspects etc. to aid and support the decision makers and planners to make informed decision-making at village/cadastral level.

Under this project the Principal Investigator, Mr H Hemanth Kumar brought out a document along with Dr K Srinivasa Raju titled Preparation of Digital Base Maps from Cadastral Maps and RS data products. This document provides detailed workflow of generating cadastral base maps using existing cadastral maps, High Resolution Satellite Imageries and through field survey. Based on these guidelines, 10 states generated digital maps of over 120 villages in different parts of India showing cadastral (parcel/hissa), settlements, assets and soil and water parameters using publicly available high-resolution satellite imageries, cadastral maps, SOI topo maps, GPS/DGPS and extensive filed verification and validation.
Project Deliverables

2. Unique identification code for habitation/dwellings.
3. Customized solutions on soil and water parameters at village level.
4. Detailed statistical analysis of each of the parameters to provide inputs for provisioning amenities.
5. Prevalence of diseases in different regions and their relation with season and climatic changes along with possible hotspots for varied diseases.
6. The roof/outer dimensions of the buildings are mapped as "built up areas".
7. The program using the database provides inputs on the optimum requirement of public facilities/utilities like schools, PHC, veterinary hospitals etc., based on the population/spatial coverage and govt. of India's standards/guidelines.
8. Around 150 to 250 man-days required depending on the terrain conditions to complete VIS mapping for each Gram Panchayath costing around Rs. 9 lakhs.
9. Publications:
   i. Digital VIS ATLAS
   ii. A Handbook on the methodology and the strategies adopted in village information system
   iii. A special volume of a journal highlighting the specific achievements of each of the nine projects.
Presentation digital village maps at Kote GP, Udupi Taluk

Themes of VIS ATLAS

1. Land Use Land Cover
2. Lineaments
3. Hydrogeomorphology
4. Soil
5. Category - Road Type
6. Drinking Water Source, Transmission lines and amenities
7. Availability to Aadhar / phone / Bank - Account Digital India
8. Sanitation and Drainage - Swatch Bharath
9. Ministry of Petroleum and Natural Gas - Availability of LPG
10. Household - Availability of drinking Water
11. Household - Availability of Electricity
12. Literacy
13. Land Ownership
14. Household - Annual Income
12. Occupation
13. Category - Caste
14. Family Size
15. Category - Building Types
16. Age of Building
17. Category - Roof Types
18. Category - Floor Types
19. Dwelling Rooms
20. Cattles
21. Availability of Farm Vehicles
22. Household - Motor Vehicles (car and two-wheeler)
### District NRDMS Centre - Technical Officers

<table>
<thead>
<tr>
<th>Name</th>
<th>District</th>
<th>Name</th>
<th>District</th>
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<tbody>
<tr>
<td>Mr. Manjunath S Totad</td>
<td>Belagavi</td>
<td>Mr. Vikram R</td>
<td>Udupi</td>
</tr>
<tr>
<td>Mr. Chandrashekhhar K Gund</td>
<td>Bagalkot</td>
<td>Mr. Sharanappa Appananavar</td>
<td>Chikkamagluru</td>
</tr>
<tr>
<td>Mr. Kethan Kumar</td>
<td>Vijayapura</td>
<td>Mr. Sathish M.V</td>
<td>Tumakuru</td>
</tr>
<tr>
<td>Mr. Mahesh Reddy</td>
<td>Bidar</td>
<td>Mr. Pradeep Kumar B M</td>
<td>Mandya</td>
</tr>
<tr>
<td>Mr. Mohammad Farook Ali</td>
<td>Raichur</td>
<td>Mrs. Mamatha K S</td>
<td>Dakshina Kannada</td>
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<tr>
<td>Mr. Guruswamy P</td>
<td>Koppal</td>
<td>Mr. Kiran Raj K</td>
<td>Kodagu</td>
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<tr>
<td>Mr. Omkar Kori</td>
<td>Gadag</td>
<td>Mr. Vinodha M</td>
<td>Mysuru</td>
</tr>
<tr>
<td>Ms. Pratibha V Hubballi</td>
<td>Dharwad</td>
<td>Mr. Karthik M S</td>
<td>Chamarajnagar</td>
</tr>
<tr>
<td>Mr. Basavaraj Barki</td>
<td>Haveri</td>
<td>Mr. Bhimshen L Kulkarni</td>
<td>Kalaburagi</td>
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<tr>
<td>Mr. Ramachandra Reddy G B</td>
<td>Ballari</td>
<td>Mr. Siddha Reddy R</td>
<td>Yadgir</td>
</tr>
<tr>
<td>Mr. Anand Kabbur</td>
<td>Chitradurga</td>
<td>Mr. Niranjan Kumar R</td>
<td>Kolar</td>
</tr>
<tr>
<td>Mr. Gangadharappa R</td>
<td>Davanagere</td>
<td>Ms. Manjula R Chandugol</td>
<td>Chikkaballapura</td>
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<tr>
<td>Mr. Shankar P</td>
<td>Shimamogga</td>
<td>Mr. Madhu G</td>
<td>Ramanagara</td>
</tr>
<tr>
<td></td>
<td>Bengaluru Rural</td>
<td>Ms. Sowmya A</td>
<td>Bengaluru Urban</td>
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### Senior Officers @ District NRDMS Centres

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Mr. Phalanetra H R</td>
<td>Hassan</td>
</tr>
<tr>
<td>Mr. Anil R Naik</td>
<td>Uttara Kannada</td>
</tr>
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### Project Associates @ State NRDMS Centre

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Mrs. Ramyashree M K</td>
<td></td>
</tr>
<tr>
<td>Dr. Binny Gopal</td>
<td></td>
</tr>
<tr>
<td>Mrs. Anusha H C</td>
<td></td>
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