

# AN INTEGRATED SPATIAL DECISION SUPPORT SYSTEM (SDSS) FOR RURAL DEVELOPMENT DEPARTMENT OF ORISSA

by  
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## **Abstract:**

Geographic Information Technology has developed at a remarkable pace over the past two decades and will play a key role in development of nations in the 21st Century; thereupon many countries have already prepared their strategic development plans for application of GIS Technology with gigantic financing endeavors. Now time has come for all decision makers to discuss the appropriateness of GIS technology and its applications to rural development, forest management, urban development planning, land information systems and agricultural development. This will also provide a suitable solution for the use of GIS for educational infrastructure development with special emphasis on rural sector in India.

Educationists, planners, researchers, decision makers, administrators, communication professionals and officials from different departments and some reputed NGOs should be invited to discuss the role of GIS Technology and should implement the same outcome immediately for ensuring sustainable development and socio-economic and educational uplifting of the country.

It is concluded that a state like Orissa in India which has immense potential of development and has maximum tribal population residing in rural area urgently needs a GIS based e-governance system such that it will help the government in planning, implementation and monitoring of various projects for development in different fields at much faster rate which in turn will make the state technologically more developed.

## **Introduction:**

In a developing country like India where 73% of the population resides in rural area and 27% in urban areas, we need a very structured planning procedure such that the development activities and infrastructure facilities are available at both urban and rural area. However, in such a condition where majority of people live in rural area and are provided with the least infrastructure facilities, creates a regional imbalance in development, causing shift in population from rural to urban areas. Hence administrators or decision-makers require an efficient GIS based tool which will assist them to get the updated scenario of the region

Orissa as a state, it faces a number of challenges in the path of development. One of the main causes is absence of accurate digital data in the form of maps. The data generated by various state government departments such as Education, Health, PWD e.t.c are enormous but poorly maintained; particularly the spatial data shows the maximum inaccuracy.

The present study emphasizes the power of GIS technology which will help the state government of Orissa to better understand and evaluate spatial data by creating graphic displays using information stored in the database

hosting the maps on the Internet in such a way clients can view the information query.

It is concluded that a state like Orissa which has immense potential of development and has maximum tribal population residing in rural area urgently needs a GIS based e-governance system such that it will help the government in planning, implementation and monitoring of various projects for development in different fields at much faster rate which in turn will make the state technologically more developed.

- To provide the planners an accurate spatial view of the district at different levels such as district, block, village level as well as road and rail network, drainage network e.t.c.
- To provide the planners detailed demographic data and education & health related data on desktop in a GIS environment.
- To assist the planners in finding out the possible locations for the schools and health centers depending on several parameters such as for health; population density ,number of health centers required and its optimum location ,number of disease infected persons etc. and

.As GIS does more than just display the data; it enables the user to dynamically analyze and update the information linked to those locations spatially and can further strengthen the e-governance

One district will take as a case study covering all the blocks with villages. The administrative maps were digitized and non-spatial attribute data, prepared on MS-Excel, were incorporated to each of the villages in spatial data. In the present study among several parameters – health and education were taken as a model to demonstrate the GIS based e-governance. Similarly other amenities can also be linked and a holistic analysis of the regional development can be found out. The purpose of this study is to locate existing health and education facilities and indicate upgradation /new creation of such facilities require as per the norms. An interface was customized where the user can query on the datasets to retrieve tabular and spatial information. GIS software were used for creating maps (to the scale) and for creating the GIS based information system. Provision is made for background of the hierarchical system approach and

valuable experiences of spatial data handling a consistent spatial information database can be created. Despite problems with data accuracy, logical consistency and completeness of data, a powerful tool for regional and local planning can be developed which can serve as a framework for a variety of planning purposes at the local and regional levels, as well as the transfer of know-how between governmental agencies and institutions using an interactive approach

### **Decentralized Planning at District Level in India**

A study was undertaken in the tribal-oriented and rural-based district in India to demonstrate the integration of village-level spatial and non-spatial data in GIS environment into a useful informatics tool for decentralized planning. A simple and robust tool, called ‘VLIS’ (Village-Level Information Systems) will assist the decision-makers to generate various eco-socio-economic views/scenarios for identifying villages for rural watershed management schemes. The paper also envisages future development and usefulness of this community GIS tool for grass-root level planning.

### **Generation of Spatial Village Maps**

District and taluka boundaries were drawn from the SOI topographical maps. These were brought in as GIS coverage’s after following the standard procedure: digitization, geo-referencing, etc. Taluka maps, collected from the local government offices in the district, contain village boundaries with contour lines and other topographical information. These taluka maps, which do not show geographical co-ordinates, were traced, marking GCPs with respect to the SOI base map, digitized and brought to the real world coordinate system after projecting the maps (polyconic system) and carrying out

similarly for education; percentage literates, number of primary schools and middle schools required and its optimum location, number of teachers posted, vacancy and required as per norms etc. in a village.

Educationists, planners, researchers, decision makers, administrators, communication professionals and officials from different departments and some reputed NGOs should be invited to discuss the role of GIS Technology and should implement the same outcome immediately for ensuring sustainable development and socio-economic and educational uplifting of the country. The implementation of GIS in Research Programme raised a variety of conceptual questions for both the ecological and the socio-economic sectors of this regional, integrated research programme. In addition to these basic units of research, spatial links between the two sectors and levels of data abstraction for the spatial database had to be defined. Using the theoretical

generated in the present study integrating the spatial village maps with non-spatial or tabular information can be demonstrated for its potential for grass-root level development planning taking into consideration the local needs and constraints. It has also established its usefulness to the decision-makers in the district to generate views/scenarios for decision-making at local-level. This prototype Community GIS tool will serve as a first step towards the development of Decision Support System for decentralized planning at district/sub-district level.

### **DISTRICT PLANNING AND DEVELOPMENT AUTHORITY**

The various divisions of administrative bodies from the district to village who will be directly benefited through this proposed system to take economic and administrative decision for the village people are shown as under

The Government also intends to set up Service Delivery Points (SDPs) progressively at convenient locations for rural people to access services. These may include in the long run – Information Kiosks having intelligent public interface with touch screen monitors, or cord operated phones in public places such as shopping centers, post offices, railway stations & libraries, private centers and STD /ISD booths etc.

### **PRESENT SCENARIO OF PLANNING & MONITORING**

In the present scenario the project planning of the state has been carried out in the conventional manner, i.e., both maps and the database for planning and the development, and the planning process itself are conducted on paper. With GIS methodology not only small-scale but the large scale planning of a system is to create a base for development of the society, implementation and evaluation of the socio-economic status for easy operation and execution. The

the editing functions such as appending, edge-matching, etc. in GIS package. Each village in this map was assigned unique ids (user-defined) in a regular sequence. Thus, taluka map with village boundaries with in-built table having aerial extent, village-ids, etc., can be generated for district. The village map was opened for Further processing.

#### **Integration of Spatial and Non-spatial Database**

The MS Excel file was converted into text format to enable & open. The Tables of both spatial village map and non-spatial census information were opened and joined together, with the help of user-defined ids, using table-join function.

Thus, an information system has been generated for the district showing the village map with its boundaries and the relevant census information containing eco-socio-Economic dimensions.

#### **STRATEGY & OBJECTIVE OF THE SYSTEM**

VLIS tool, with a motto 'turning data into information',

- Estimation of Location specific Resource analysis
- Monitoring and trend analysis for various factors
- Identification of risk factors
- Planning model on poverty eradication programme
- Allocation of resources
- Frame work for monitoring & control of administrative factors.
- The system can be implemented in macro level as well as in micro level Decision Support System.
- Information can be updated easily and analysed quickly.

There will be a scope of further data enhancement in database, the effect of which will be directly reflected on the GIS map.

#### **JUSTIFICATION & BENEFIT OF THE PROPOSED SYSTEM**

It is needless to say that our proposed system is equipped with the total solution required by the Local Govt. for implementing the development program effectively. GIS has the potential to link data visually on a common denominator, analyze it and make predictions, which is essential in rural planning. Electronic Governance through GIS has the potential to revolutionize District administrative bodies at different levels.

- **The proposed GIS based e-governance offers the flexibility and excludes the problem of**

traditional procedure and database created in the registers cannot be used conveniently either for first decision making or for implementation of policy in operation or for evaluation of the efficiency of the schemes.

#### **BENEFITS OF THIS APPLICATION**

There have been immense efforts to correlate Panchyat and the Geographical environment. A GIS based Rural surveillance system is proposed in the instant proposal. With the intensity, distribution and its trends is proposed for better monitoring, control and decision making as well as instant management information.

GIS Application can capture, describe the problem areas and distribution features. GIS allows spatial data handling, manipulation and analysis with new dimension and unparalleled flexibility. This system provides more accurate base maps and redefines several methods of data capturing within accepted level of accuracy.

#### **The general objectives are:**

**Objective: Identification of Rural resources for generating self employment and stronger village based rural economy.  
To identify opportunities and constraints to Rural Development  
To empirically validate the benefits of self-governance in fostering rural development.**

#### **Strategy :**

- **To provide greater access to simple, low-cost data management and mapping systems to Panchayat administrators at District and sub-District levels.**
- **To expand the network of Logistics support and data distribution channels.**
- **To stimulate partnerships at all levels in an effort to synergies approaches to GIS and mapping for Rural Development.**

#### **Objectives**

- **Support and strengthen surveillance, monitoring and management of Panchayat areas.**
- **Support and strengthen planning capacities of District & Sub-District Level for more rationalized use of resources.**
- **Develop and strengthen local, District, and State Level capacities in surveillance information management and analysis.**

**The following main objectives would be achieved by the proposed system:**

- huge record keeping in papers.
- This system compliments the fully functional database that can be updated regularly.
- It not only benefits the planning for Rural Development but also help to make proper decision by the policy makers in the appropriate direction and in right time.
- Our designed System acts as a powerful tool by proper interpretation of a huge database with Maps for all kinds of planning & implementation in the fields of Economy, Agriculture, Drinking Water Supply, Irrigation, Drainage, Sanitation, Land Use and effective use of Rural Resources.
- The proposed system has been designed in a comprehensive manner so that it becomes beneficial and will facilitate Panchayat Administration, Revenue Dept, Block Development Authority, Police, Telephone Dept, and Electricity Dept and all department related to rural areas.

avalanche of information, not only for scientific research, but also for information transfer to a broader public and for planning or policy purposes. Several reasons may explain this information explosion in planning and policy-making.

#### Linkage of Spatial and Non-Spatial Data

GIS allows the linkage of spatial and non-spatial data based upon a defined relationship. A one to one relationship can be defined for each of the spatial entity with the non-spatial data. For performing the linkage operation the following steps were done:

- Identification of relation between spatial and non-spatial data such as one-to-one relationship between each of the village entity with non-spatial data for them.
- Selection of key field as linkage item which may be Census-code, polygon – id obtained after topology creation.
- Linkage has been done in a environment of the GIS coverage's, as they are easily accessible and performing Join operation.

#### Method of Analysis

In a GIS based system any analysis can be done and its output can be shown in a much better way only by integrating non-spatial data with spatial data. The core of all analysis is:

- A combination of different parameter whether spatial or non-spatial.

- Objective 1: Perform Regional Economic Analyses/Quantifying the Rural Community-Agriculture Linkages**
- Objective 2: Non-Market Valuation of the Benefits of Agriculture and Cottage Industry, Self Employment schemes in Fostering Rural Development.**
- Objective 3: Identifying Constraints to Increased Agriculture/Community Economic Expansion Study of Basic Services – Education, Health, Law & Order, Transport, Roads etc. for identifying the rural standard of living.**
- Objective 4: Rural Community Development - Social Structure, Cultural Heritage, Tribal history**

#### Conclusions

The introduction of computers, micro-electronic equipment and telecommunication services have paved the way for an

- our complex society needs insight to the mechanisms and structures determining intertwined socio-economic, spatial and environmental processes;
- the high risks and costs of wrong decisions require a careful judgment of all alternative courses of action;
- the scientific progress in statistical and economic modeling has led to a clear need for more adequate data and information monitoring;
- modern computer software and hardware facilities (e.g. decision support systems) have provided the conditions for a quick and flexible treatment of data regarding all aspects of policy analysis; and
- many statistical offices have produced a great deal of data which can be usefully included in appropriate systems. It is evident that a user-analyst communication is necessary for removing the above mentioned bottlenecks. It is of course important that the user or client is not disconnected from an information system, but it is equally important that an analyst is informed about the way a certain policy issue or problem is structured. In several choice situations, however, interactive simulation experiments and computer graphics, designed by experts, can nowadays already directly be used by decision-makers and planners, so that policy and analysis may be brought closer together in the future. For further development, technology will not be a limiting factor. Geographical information

- Derivation of mathematical indices from non-spatial data and representing them spatially.

In present case our main emphasis was to derive such indices which reflects the level of infrastructure development of each village, identifies the gaps so as to be taken up for development considering two basic amenities education and health.

systems will be open and will continue to evolve to harmonize with our ever changing needs. The main challenge will continue to be in our ability to understand spatial processes, and to translate them into computer algorithms and computer environments for use by different kind of people, including decision makers.