



GIS Based Approach in Assigning Non-Agriculture Permission in Rural Area to the Agriculture Land from Remote Sensing Imageries

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Abstract— Decision makers always require information in concise and organized format so that the information gets the status of intelligent data vital for analytical assessment. With the advent of new technologies like Remote sensing and GIS, the inputs in the form of intelligent maps attached with the attribute information are now available and the user agencies are ready to harness the potential of this transparent and powerful technology. However the decision makers are typically not familiar enough with spatial data analysis to leverage its fullest use on a regular basis. So there exists a demand for a highly flexible, easy to operate and interactive spatial information systems designed to support decision-making. The District Administration Support System is an effort to address the existing demand. The non-agriculture (NA) permission system based on RS & GIS utilizes decision models, database, and interactive analytical modelling process and rules of the state government to reach a specific decision in granting permission in conversion of agriculture land to non-agriculture purpose. The paper describes important areas of spatial technology, which are put to use for making accurate decisions in transparent, effective and efficient manner. The paper argues that the development of such systems will allow enhanced support for decision makers through generation of spatial knowledge base.

Keywords— Geographical information system (GIS), remote sensing (RS), civic amenities, Civic information system (CIS), Spatial and non-spatial database, GIS Commercial software's, Multi-user environment, District Administration Support System, Decision Support Systems (DSS), information systems (IS), non-agriculture (NA)

I. INTRODUCTION

Decision Support Systems (DSS) is a well-established area of information system's (IS) application. There is general agreement that these systems focus on specific decisions and on supporting rather than replacing the user's decision-making processes. Definitions of DSS also emphasize the need to support semi-structured and unstructured decisions. Also, there is a general consensus in the definitions of DSS that interface, database and model components are usually required to fully support decisions.

The system is developed to address the challenging scenario of decision making in the modern day-to-day functioning of the state administration. E-governance is the solution for the fast pace at which decisions are required to be taken and conclusions arrived. Also, an unbiased tool is required to guide the decision making process. RS & GIS is the technology, which serves, as eye in the sky and its utilization for the district administrators is made possible by easy to operate graphical user interface under the District Administration Support System, which is developed for different specific modules.

The system is developed with the objective to benefit people in getting transparent and fast decisions using Spatial Information technology and software. The objective of this system is to run intensive queries against databases in order to analyse information for reporting purposes. These queries are best supported by existing and established rules of the state government. DSS queries run against databases using the various set of computer-oriented tools in GIS environment designed to assist decision makers in making decisions. Effective usage of the spatial technology RS and GIS to decision making, single platform integrated analysis system on the desktop of decision maker, uniform approach, elimination of biased elements, a strong platform for regional planning activities, spatial information based system to keep pace with the challenging scenario, high level of confidence, accuracy and transparency in administration, saving on the valuable resources like manpower, time and money.

II. METHODOLOGY

- Database is generated in the GIS environment.
- Database elements are validated using the satellite images for accuracy.
- Database is assigned to a common reference system for uniformity.
- Database elements both spatial & non-spatial are formatted to be in NRIS standards.
- Inputs for NA project are included from various departments. Lot of efforts are required to format data according to project need.

A rule-based approach is used for arriving at the decision support for assisting the NA applications.

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Given the advances in computer technology in general and GIS techniques in particular, DASS has been designed as an important component for demonstration of applications in Decision-making. This trend will be driven by the relevance of spatial information as a component of the information needed for a wide range of decisions.

This class of DSS will make an important contribution, not because of its use of the latest technology, but because it will allow decision makers incorporate a spatial dimension with the attribute databases in their decision-making, which hitherto was not included in the traditional approach of decision-making. Comprehensive decision support has been provided with effective integration of attribute data and building system with GIS as a framework.

In the Conventional approach for granting the Non agricultural permission, the Application moves to various departments, NOC's (No objection certificates) from all such departments are sought for clearance of the conversion of agriculture land to non-agriculture use. In the present NA Model, an approach of business process re-engineering is adopted. The Objections of the relevant department in context of the specific limitations are recorded in the database in spatial context.

The spatial input of maps is used to attach the tags of all such limitations and the constraints are checked one after another at the time of checking the permission. The process is very fast as the constraints / limitations for conversion to non-agriculture are available in a single system and the result is delivered in very short time (<10 min) in contrast to the conventional process, which takes minimum 3 months (90 days working) to give the decision.

NA is a single platform integrated analysis system on the desktop of the Decision makers. It is developed after integration of attribute database from the records of the district administration with the thematic maps generated from the Geo-informatics technology. It is a strong platform for the Regional planning activities. It imparts a strong confidence, accuracy and transparency in the administration.

It helps to save valuable resources like manpower, time and money. To achieve this task, a system is developed by integrating the latest resources situation in the district with the status of the various land parcels in the records of the district administration. The spatial inputs (maps) are provided by MRSAC and the non-spatial inputs (attributes / tables) are provided by the collectorate, from the Revenue records. The inputs are validated in the ground and also by the respective authorities of the administration. The concept is depicted in the Fig.1.

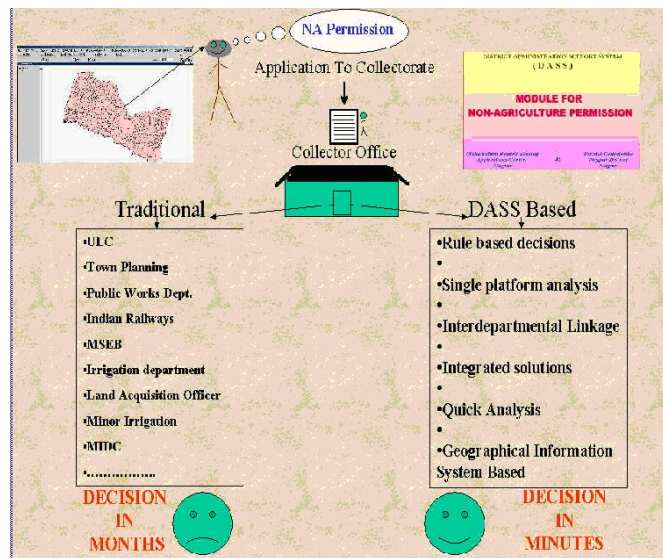


Fig.1 Concepts of District Administration Support System

The various departments which play a role in granting the Non-agriculture permission includes the Indian Railways, MIDC, PWD, MSEB, Land Acquisition officers, Irrigation Department, Revenue Department.

In this module the application for Non-Agriculture permission is validated in the system unlike the traditional system where the application moves from one department to another for getting the No-Objection certifications (NOC). Here the concept is little different. The Objection areas are already feed into the system and the request is checked for getting the result. This is advantageous as the Objection areas feeding is one time activity in contrast to the checking of each and every application from all the departments. This is in tune with the already established concept of single window Clearance under the head of E-governance.

Efforts are required to bring the databases of different departments in a common reference system. Validations and cross verifications are undertaken to ascertain the correctness of the information. The latest maps generated from the satellite images are used and the hitherto available information is refined with this latest technology input. The Application for the Non-agriculture permission is validated for 3 checks. Spatial, non-spatial, and the Goathan expansion rules. Under the Spatial criteria checking are done for the various buffers of Railway lines, Roads, MSEB High Tension Lines, Irrigation Canals, according to the national standards. These buffers are the restricted zones where the NA

permission cannot be provided. Under the Non-spatial Criteria checking the various prohibited and already identified areas are not granted the permission for NA and these includes the lands acquired for MIDC, MINING, Land under the submergence zones, and the land identified by the Town planning departments and also the Urban Land Ceiling areas. The lands other than these lands can be provided for NA permission.

To prevent the haphazard development, there are rules for goathan expansion. The NA permission for Residential purpose is allowed in the zones around goathan based on the population. Various buffers / zones are derived through the system and the parcels / parts of the parcels inside these buffers are granted permission. When the application is received the operator has to select the district, tahsil, village and parcel number from the predefined list available in the system and run the process module. One by One all these three criteria's are checked and immediately after internal processing the result is provided by the system in a required graphical format. This makes the decision unbiased, fast, efficient, and time saving and also saving on the precious human resources.

III. RESULTS

- The land parcel under consideration gets verified for its spatial status in terms of administrative and natural resources situation along with the various attribute status in terms of revenue development. Three possible results are delivered as Non-Agriculture permission = Allowed, Partially Allowed or Not Allowed.
- Positive Outcomes / Changes resulting from the project / Initiative are listed below -
- Access to data - both attribute & spatial for analysis,
- Access to data for output (maps, reports),
- Access to GIS tools and procedures (e.g. overlay and proximity analysis) ,
- Access to models or rule-based approach,
- Methods to account for discrepancies and errors,
- Availability of tools for logging the decisions made ,
- Removal of need of tracking the document required in the decision process,
- Methods to evaluate alternative scenarios / situations.

IV. CONCLUSIONS

The Given the advances in computer technology in general and GIS techniques in particular, the NA will be an important component in future. This trend will be driven by the relevance of spatial information as a component of the information needed for a wide range of decisions. The spatial dimension, which is not fully catered in traditional systems, is an important feature of the NA application. The challenge is to achieve an appropriate synthesis of modeling techniques and interface with database approaches, drawn from the GIS and specialized domains, to provide effective decision support for these areas.

The developments of NA have been carried out with the use of software. The commercial software Arc View from ESRI has been used. As its name suggests, this software is primarily designed to allow the user to view and query spatial data. Arc View has its own macro language: Avenue / ARC Objects, which can interact with SQL database servers, and the ability to use platform specific links with other software. Arc-View works well with its ability to support spatial queries. The association of GIS used for making NA with Microsoft product can help a broad spectrum of users, and not just those traditionally associated with DSS.

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