

GIS Enabled Tool For Effective Land Records Management

Case Study: Wada Village

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Abstract—Land is the habitat of men. As land holds importance in many spheres, it is required to have a system to gather, distribute and update information of land records. Nowadays; everybody needs more detailed land information than it has been traditionally available. But Since last decade, it has been realized that the existing village maps are not geo-referenced. On the other hand, policy makers, planners, land administrators and individual citizens all have a dire need for right information in timely manner. Lack of proper land records, poor records keeping and inefficient judiciary makes concerning system vulnerable to high loss and its demands a system that keeps the accurate record of lands and makes it available in time. GIS technology is having capability of capturing, storing, analyzing and displaying geographically referenced information which is needed for present scenario. In GIS map of village is mapped and attribute data is entered in data sheet which will helpful to policy makers, planners, land administrators and individual citizens to find out Land Records within in minute. This paper brings out GIS is a tool that can be effectively used in Land records management system. It integrates non-spatial and spatial datasets for query and better display. Such Geo-referenced Maps can be used on a day-to-day basis by decision-makers at grass root level.

Keywords-c GIS; GPS; Land Records Management; Gram++.

I. INTRODUCTION

Land records are maintained by district administration for deciding ownership and boundaries of land. We do not have an efficient Land Management System which covers detailed information of each aspect. We are still dependent on the age-old methods of creating and maintaining the Land records. This system of manual surveys, cloth bound cadastral maps, non-uniform structures of record of rights, each state maintaining this database as a hard copy register created in their respective languages, lack of dedicated and qualified people who can maintain and update these records both in the record of rights as well as the cadastral maps, cannot meet the objective of being an efficient one.

Computerization is natural solution for all these problems. The government of India has already taken initiatives to computerize land records in the country. At present the scheme is being implemented in many districts excluding only those districts where there are no appropriate land records. Since last decade, it has been realized that the existing village maps are not geo-referred. On the other hand, policy makers, planners, land administrators and individual citizens all have a dire need for right information. Due to Lack of proper land records management, poor records keeping and inefficient judiciary has resulted in a high demand of a system that keeps the accurate record of lands, Records of right ownership and makes it available in time. Any project that is to be executed requires a basic planning at both macro and micro levels. To carry out this task one first requirement is basic land information, which is correct and available in time. For this, Re-survey of lands with the help of GPS and linking of its attribute data with the cadastral maps/village maps through GIS should be taken up. This paper discusses the importance of a Land Records and GIS Based Land Records management system and Benefits of such system in land records keeping, land use planning.

II. LAND AND LAND ADMINISTRATION

Land is defined as the solid surface of the earth that is not covered by water. Any developmental activity is nearly impossible to conceive without taking land into consideration [12].

Land administration is about registering land rights not only to secure these rights for the well-being of individual owners but also to support good governance and sustainable development. Land administration systems are about addressing these problems by providing a basic infrastructure for implementing land related policies and land management strategies to ensure social equity, economic growth and environmental protection [16].

A. Land Administration Functions

Land administration is not a new discipline. It has evolved out of the cadaster and land registration areas with their specific focus on security of land rights. The role of the cadaster as the engine of any land administration system [16].

The four land administration functions (land tenure, land value, land use, land development) are different in their professional focus, and are normally undertaken by a mix of professions, including surveyors, engineers, lawyers, land economists, planners, and developers.

B. Challenges to the Traditional Land Record System

- Old century systems are followed.
- Disputes of ownership of land.
- Bulky and decaying records.
- No Parcel Unique Identifications (PUI) of records.
- Double registration of same land as no ownership verification done at the time of sale.
- No digitization of textual data.
- No integration between textual and spatial data.

- Outdated revenue & survey records with large error margins.

III. GIS ROLE IN LAND RECORDS MANAGEMENT

GIS is a tool that can be effectively used for better visualization and spatial analysis applications. Maps are a powerful medium for planning, analysis and monitoring. It integrates non-spatial and spatial datasets for query and better display. Cadastral Maps can be used on a day-to-day basis by decision-makers at grass root level. The data of cadastral survey forms the basis for generation of any accurate high-level map [6].

Since last decade, it has been realized that the existing village maps are not geo-referenced. On the other hand, policy makers, planners, land administrators and individual citizens all have a dire need for right information. Due to Lack of proper land records management, poor records keeping and inefficient judiciary has resulted in a high demand of a system that keeps the accurate record of lands, Records of right ownership and makes it available in time.

Today's needs are using GIS technology which is having capability of capturing, storing and analyzing and displaying geographically referenced information. As today every peoples are using computer and its minutes click to get the any information regarding their subject. In GIS map of village is mapped and Attribute data is entered in data sheet which will helpful to policy makers, planners, land administrators and individual citizens to find out Land Records within in minute.

IV. CASE STUDY

Wada is a City in Wada Taluka in Thane District of Maharashtra, India. It belongs to Konkan region. It belongs to Konkan Division. It is located 65 KM towards North from District headquarters Thane. Wada is a Taluka head quarter.

Spatial and attributes data were collected by making visits to revenue department office and survey department.

TABLE I. SUMMARY OF THE CASE STUDY

Sr. No.	Summary	
i	Study Region	Wada village
ii	Taluka	Wada
iii	District	Thane
iv	Latitude	19.65°N
v	Longitude	73.13°E
vi	Altitude	38 m (MSL)
vii	Populations	1,42,753

A. Methodology

To collect Cadastral maps and Attribute data for a Case study to developing a Land records management system using GIS Technology.

- Deciding Case study area for project.
- Collection of data regarding land records.
- The attribute data, generated through data entry process has to be linked with the village map/cadastral map using GRAM++.
- Develop GIS based Land records management model for Case study area using GRAM++.
- Run Queries on the developed model.
- Conclusions based on the Model.

V. INTEGRATION OF GIS MAP & SPATIAL DATA

Taluka Inspector of Land Records in Wada Taluka keeps all the spatial data of lands. 3 village maps of named, part-1, part-2 and part-3 of Wada city were provided by the Taluka inspector. Out of which, Part-1 map is considered for this study.

A. Generation of GIS Map of Study Area

The scanned copy of study region (Wada village). In this map, there are 220 plots. So, it is a considerable work for this limited time framework for the study.

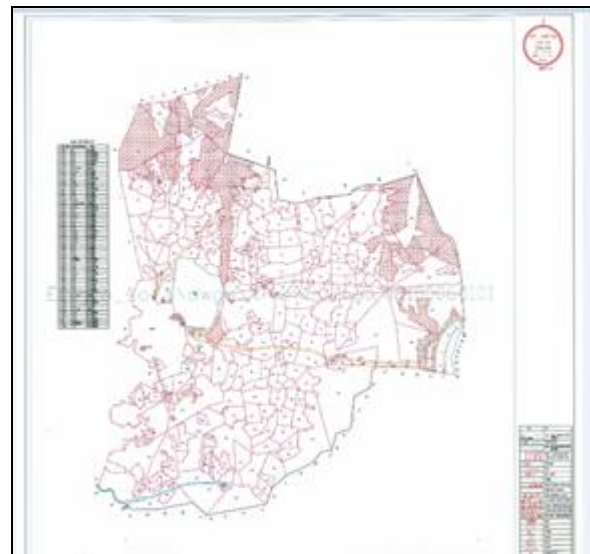


Figure 1. Conversion to bitmap image

B. Digitization of village Map

Wada Village Map is digitized in Gram++ software and then database are added. Different types of database are developed in with the help of this software. These databases are being used to run the different types of query.

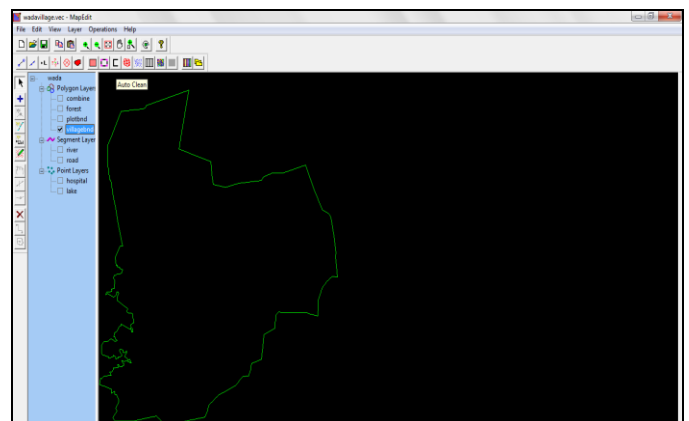


Figure 2. Digitized form of .vec file

C. Preparation of Data base and Integration

The data collected for all the plots were digitized using MS access 2010. It includes all attribute data.

- Plot Number (Land Parcel No.)
- Area in Acres / Hectares (description)
- Ownership name with place of residence
- Name of Plot Holder etc.
- Name of Crop
- Area sown

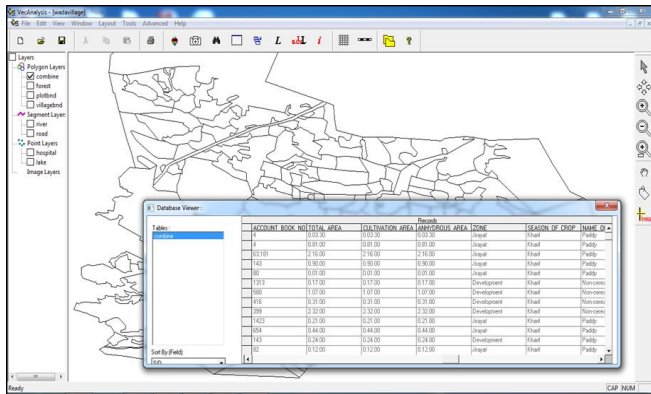


Figure 3. Creation of database

VI. APPLICATION OF GIS PLATFORM FOR LAND RECORDS MANAGEMENT

GIS is a tool that can be effectively used for better visualization and spatial analysis applications. Maps are a powerful medium for planning, analysis and monitoring. It integrates non-spatial and spatial datasets for query and better display. Cadastral Maps can be used on a day-to-day basis by decision-makers at grass root level.

A. Running Queries

Queries are then run to get the desired information from the database. GIS applications are tools that allow users to create interactive queries, analyze spatial information, edit data in maps, and present the results of all these operations. Different Queries will be run in GRAM++ after integrating with the spatial and attributes data. The outputs of various queries run in the Vector Analysis Module of Gram ++ are shown below:

- Query 1: Show Plots which are recorded in the Account book number is 1234

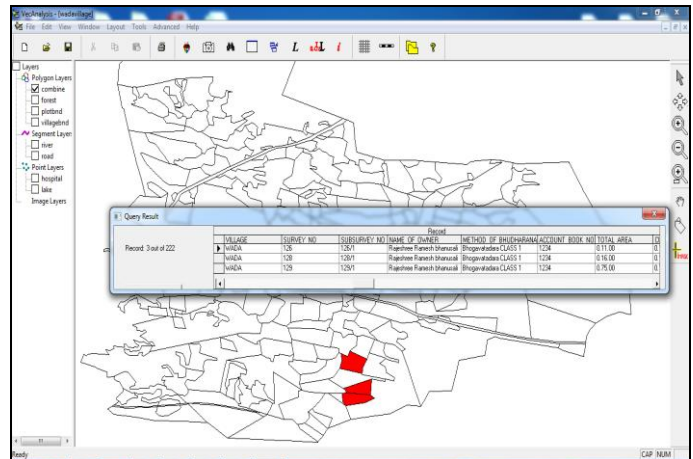
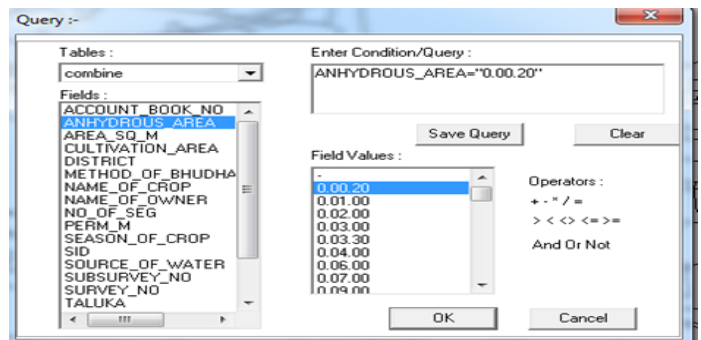


Figure 4. Show Plot where account book number = 1234 Highlighted in red color

- Query 2: Show Plot where anhydrous area = 0:00:20



Utility: From the query, lands which are anhydrous or drought affected can be easily identified. It can be useful information for the agriculture department and meteorological department.

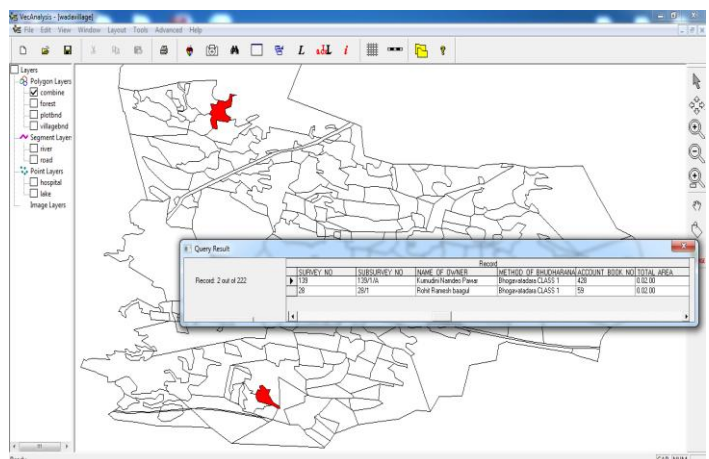
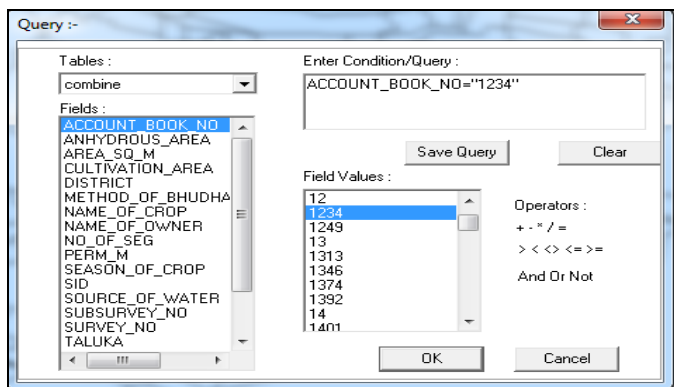
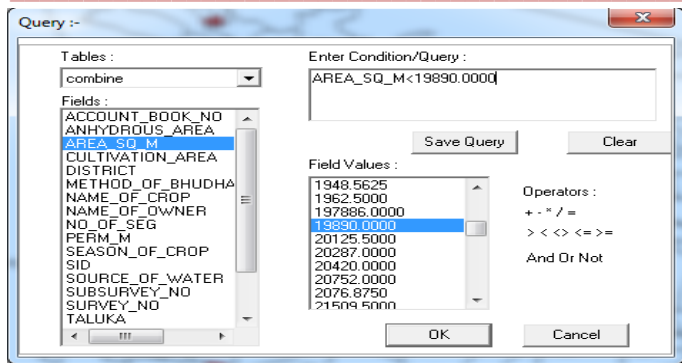


Figure 5 Show Plot where anhydrous area = 0:00:20 is highlighted in red color

- Query 3: Show no. of plots which has area < 1980 sq. m



Utility: From this query, all the plots recorded in book no. 1234 can be identified. Attributes related to the plot like, owner of the land, area, location, taxation details etc. can be collected. Therefore, it becomes easier for land records department to handle the records of land.



Utility: This query can help us identify the plots having areas lesser than 19890 sq. m. This information can be useful to many. Buyers and sellers of the lands, real estate developers etc. can make a good use of this information for business purpose.

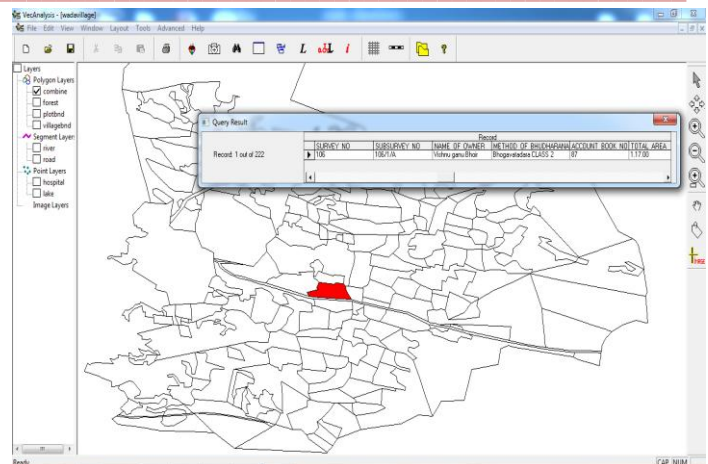


Figure 7 Show Survey number details= 160 highlighted in red color

- Query 5: Show Survey number where the owner is Government.

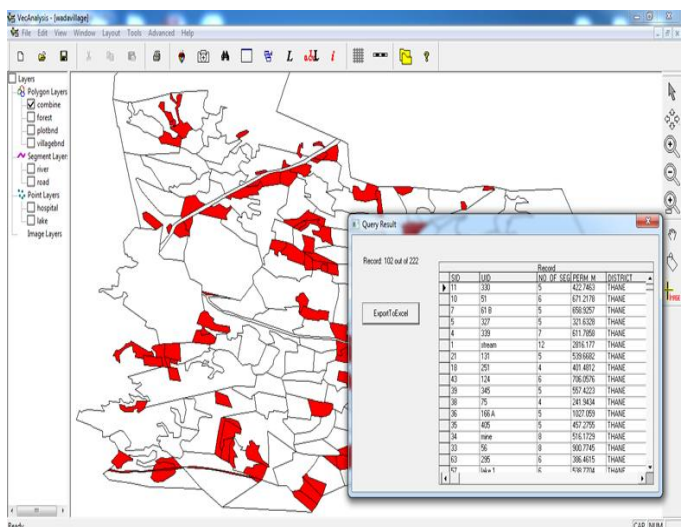
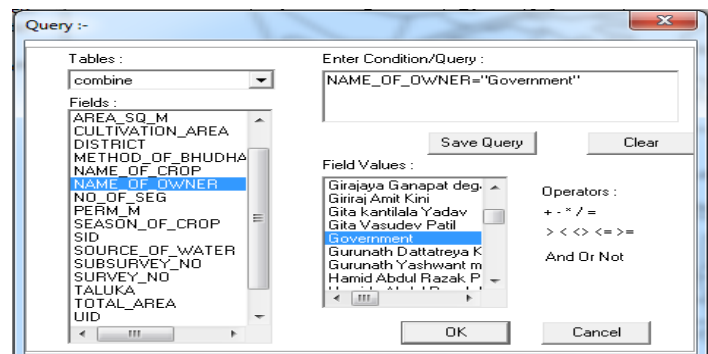
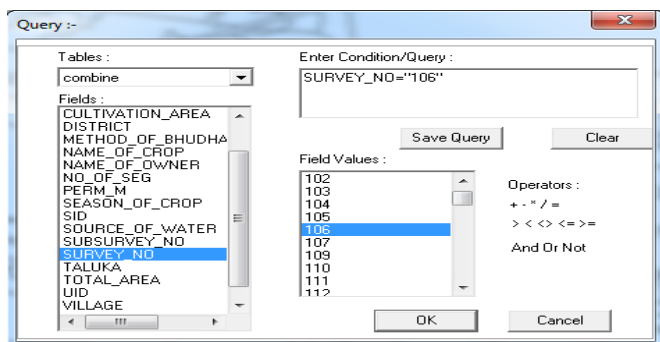


Figure 6 Show Survey number details where area < 19890 sq. m is highlighted in red color



Utility: This query can help us identify the sections where the plots are owned by government. It can be useful for everyone for future planning of betterment of area.

- Query 4: Show Survey number = 106



Utility: This query can help us identify particular locations where some important structures, industrial zones or educational campuses are located. this application can help us to know, at the planning stages, which are the sections which need more attention while planning and design.

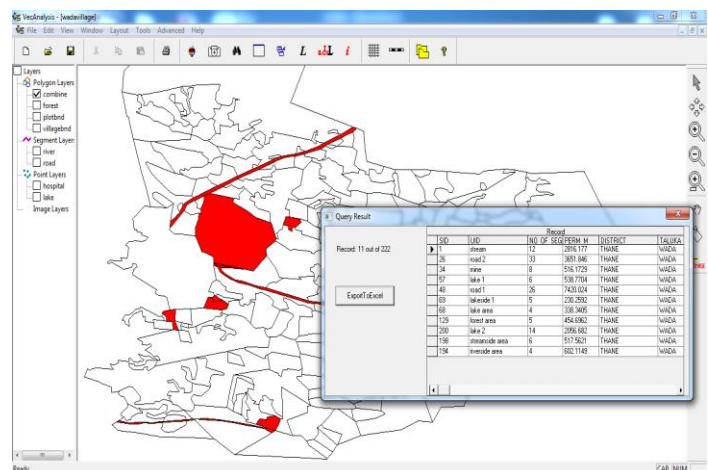


Figure 8 Show Survey number where owner is Government highlighted in red color

VII. CONCLUSION

In this paper, a flexible and user friendly information system on GIS platform using Gram++ software was developed

to assist planners, administrators, land managers and common public for village level planning with reference to managing the records the lands of wada village. Development of GIS model included digitization and geo referencing of village map, extensive survey and interaction on ground in order to obtain attribute data, integration of the geo referenced map with the attribute data and its application in land records management by running various queries.

The study has brought out the inherent advantages that a GIS platform offers in management of land records system over the present unautomated methods. Timely and easy access to accurate information on land records will facilitate easier, faster and more effective decision making. It will benefit all the stake holders including land owners, planners, policy makers and land administrators by the improved, effective and efficient methodology of land records management offered by GIS platform.

One of the major limitations in preparation of such GIS models is the extensive attribute data that need to be converted for integration into the GIS platform. Moreover, regular updating needs to be carried out at stipulated intervals on regular basis to keep the data updated. A certain degree of expertise needs to be acquired in the handling staff in order to understand the operating procedures of Gram++ so that they can operate the GIS models as per their requirement. As in date, cost remains an important limitation in restricting the implementation of such automation of land records at micro level.

It is only within the periphery of GIS that the full potential of the Land Information System can be exploited. All analysis, study of evolving patterns, manipulation of resource assets, strategic planning based on What-If scenario studies, creation of conceptual models, presentation of patterns by thematic mapping, the list is endless in uses, doors to which GIS will open up by its strong concepts while manipulating the Land Information System database. GIS provides powerful tools for agricultural planning and modeling. These tools include data automation and processing, conversion, analysis, and visualization.

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