

Methodology For Creation Of Land Information Management System

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ABSTRACT

Land revenue is the main source of income for state governments. It may come from land holdings by private individuals, real estate transactions or other natural resource being tapped by various sections of the society. Hence collection of land information, information about natural resources and maintenance of the information is very important for an efficient revenue collection system.

The respective state governments have their own system of collection, depiction and maintenance of land information. Cadastral records form the input to assess land revenue. The land use information is not updated from time to time. This leads to under valuation of the holdings leading to loss in revenue during transactions. In most of the states, the land administration is managed by using hard copy revenue data either in the form of maps or descriptive documents. These have been prepared decades ago and not updated.

Drawbacks in the system adopted by the State Government, need for achieving nation connectivity and suggested approaches have been discussed in the paper based on the experience gained in the Pilot Project taken up by STI, Hyderabad.

In conclusion, rationalization of procedures in collection of land information and topographical information will help compatibility in spatial data. This will also help to avoid duplication of efforts in the data collection and integration, analysis and decision making process in the national scenario in the context of NSDI.

INTRODUCTION

Land revenue is the main source of income for state governments. It may come from land holdings by private individuals, real estate transactions or other natural resource being tapped by various sections of the society. Hence collection of land information, information about natural resources and maintenance of the information is very important for an efficient revenue collection system.

STATUS OF THE SYSTEM

The respective state governments have their own system of collection, depiction and maintenance of land information. Cadastral records form the input to assess land revenue. The land use information is not updated from time to time. This leads to under valuation of the holdings leading to loss in revenue during transactions. In most of the states, the land administration is managed by using hard copy revenue data either in the form of maps or descriptive documents. These have been prepared decades ago and not updated. They have the following drawbacks:-

(a) The records are in a mutilated condition.

(b) They are not on uniform or standardized scale.

(c) The procedure adopted during data collection did not ensure that the inconsistencies are detected and minimized to keep it within tolerance.

(d) They are not on a national framework. Hence integration to smaller scales and analysis on national basis is not possible, within acceptable limits of discrepancies.

(e) They are outdated by decades and hence the government is undergoing loss due to incorrect assessment of taxes.

(f) The land use information is not made known by the owners from time to time or as and when the land use gets changed, which is binding as per the law.

(g) The land use has changed over the years and records are not updated with the change.

(h) In many cases the records are not even available.

(i) Due to inconsistencies in records and measurements, lot of litigations have cropped up.

ACTION BY THE STATE GOVERNMENTS

Different state governments have taken different type of actions in dealing with the problem as follows:-

- (a) **Microfilming**:- Some of the state governments have taken up the task of microfilming the cadastral documents for preservation. Some of them have a wrong conception that microfilming itself will lead to computerization. Microfilming can only serve as a storage medium, in a computerized environment, without any scope for editing and query.
- (b) **Scanning The Record/ Documents**:- Some of the state governments are scanning and keeping the records in computers. Print out is taken from the scanned documents to meet the user needs. This also is being thought as a computerized method of handling land records. However, it must be realized that scanning the records will not achieve automation and it can be only used as a method of storing the documents. However, this is better than microfilming, as raster data permits overlay of other spatial data using some GIS software.
- (c) **Digitization Of Documents/ Cadastral Maps**:- Some state governments are getting the cadastral maps/ records digitized and use in the GIS platform for retrieval. This method, though the best out of the above efforts, cannot be used for effective land information management as the inherent errors in the documents leading to inconsistency have not been removed. Some efforts to force matching the adjacent records/ maps will only complicate the matter. This may also lead to further litigation.

NEED FOR NATIONAL CONNECTIVITY

Cadastral records need to be corrected for creation of a scientifically designed Land Information Management System. Correction cannot be done in an ad-hoc manner because public will have no faith in the system. Hence it is necessary that the records are created afresh, by actual survey on the ground. During the process, most modern methods of survey should be adopted so that the errors in the records due to inconsistent methodology are removed. While doing so, if the national connectivity can be achieved, it will be easy for integration of the data and analysis on a national scenario. In the present scenario of E-Governance and it's benefits in

creating a transparent management system, it should be possible to integrate data produced by different government, NGO and private agencies to facilitate accurate presentation, integration, analysis and decision making process. There is also requirement to streamline the procedures in carrying out the filed data collection so that inconsistency can be removed to the maximum extent.

SUGGESTED PROCEDURE

To achieve the above goals two approaches are suggested:-

(a) Ground Method:

- i) **Creation of Framework and National Connectivity**:- This can be achieved by using Global Positioning System for establishing control at a density of at least 2 points per village. The control data may be with reference to the Survey of India Geodetic data or in WGS system.
- ii) **Establishing control for each village boundary**:- Each village boundary will be identified on ground and controlled by using EDM/ Total Station/ GPS using the two control points established for each village. These traverse stations will be used as reference points for further densification of control within the village for use during detail survey.
- iii) **Creation of Grids for densification of control for detail survey**:- The village boundary traverse and control points will be used for establishing grid at 200m apart in the village which will be used for detail survey of each holdings within the village.
- iv) **Detail Survey of Cadastral information and topographical information**:- The detail survey of each land holding will be done using Total station instrument automatically recording the data which later is down loaded to computer for taking plot output using a suitable software. Before starting the survey, the surveyor should prepare a sketch of each grid indicating the plot corners and details to be surveyed. This will ensure that information is not omitted while surveying.
- v) **Collection of other information required for land management**:- A suitable data base form should be devised to collect and record the land information and demographic information which will help assessment of tax and economical state

of families or each plot owner. Information should be collected for each plot and ownership on a well designed format, with a key field which can be used as link between different thematic information for that ownership. This **KEY FIELD** will help, query and analysis.

- vi) Certain information regarding water source and soil classification can be obtained from the respective organization and incorporated in the data base.
- vii) Analysis and output:- The collected information on control, topography and cadastral details can be processed in the computer using a suitable software for getting plot, grid and village map outputs. Other data collected will help in assessment of tax and economical status of the families. Land use information collected will help analysis from local level to national level.
- viii) Integration of Topographical maps on small scale from large scale data:- During the cadastral survey the information on topography is also collected. This also will be in the computer. Hence, by a suitable generalization technique, the integration of topographical maps on small scale may be done so that the data on cadastral records and topographical maps will be compatible. This will help integration of Natural resources data in the context of NSDI.

(b) **Digital Photogrammetry combined with ground method:**

Large scale aerial photography on 1:10,000 scale can give plan accuracies upto 15 to 20cm by adopting digital photogrammetry technique. In this, Plan and Height control required for digital photogrammetry will be provided by GPS. The photographs can be orthorectified and used as hard copy paper maps or soft copy in palm tops and information from field can be incorporated. Wherever further collection of information is necessary because of tree cover or forest, total station can be used to obtain the coordinates and incorporated. This method will speed up the data collection compared with the total station method of data collection as explained in (a) above. Orthorectified aerial photo can easily derive the surface area without any additional work. Aerial photo will also provide a

true representation of the ground information at the time of photography. Such level of accuracy cannot be achieved even by using the high resolution satellite imagery like **IKONOS** or **QUICK BIRD**.

CASE STUDY

Survey Training Institute, Survey of India, on the request from Survey Settlement and Land Records Department of Government of Karnataka, has imparted training to about 70 surveyors of their department. **In this method of building a sustainable Land Information Management System**, immediately after the training the surveyors were deployed on field work as a pilot project with financial assistance from Government of India and Government of Karnataka and the details of the project are as under:

- (a) **Area of Pilot Project:-** 35 revenue villages in Maddur Taluk of Mandya District were taken up for the Pilot Project. Approximate area of each village was about 5 sq kms.
- (b) **Establishing National Connectivity:-** Using available GT stations established by Survey of India, two control points were established in each village to facilitate start and close of further traverse work for each village.
- (c) **Village Boundary Coordinates:-** Stones were pitched at all change points defining the village boundary using the village records in the presence of adjacent village heads. Total station was used to run traverse starting and closing the traverse at the two control points already established. The data was computed using computer programs and coordinates of pillars defining the village boundary were computed.
- (d) **Establishing Grids:-** Approximately square grids of 200m X 200m Grids were established by running traverse connecting the village boundary points.
- (e) **Sketching the plot boundaries and topographical information in each Grid:** After establishing the Grids, sketch on approximately 1:1,000 scale was prepared for each grid to identify plot boundaries and details in order to ensure that minimum time is spent during data collection using total station. This would also help the surveyor to plan his survey work during data collection and

ensure that the details are not missed during detailed data collection.

compilation of village map and Taluk map on desired scale.

(f) **Details Survey using total station:** Each surveyor will collect data using total station by establishing instrument at the grid corner points and at any other point as required for collection of all data. Attribute information was collected using a data base format.

This approach of training and job being carried out by the local government persons builds capacity among them in the new technology. This will also help in creating confidence among the public and also develop confidence among the staff in their ability to carry out field work using modern techniques.

(g) **Processing:-** The processing of the data collected using total station was done using a customized software and outputs taken for further completion of records as per departmental procedure for objections and confirmation. Application modules were designed to get Land Record Certificate for individual holding,

CONCLUSION

Rationalization of procedures in collection of land information and topographical information will help compatibility in spatial data. This will also help to avoid duplication of efforts in the data collection and integration, analysis and decision making process in the national scenario, in the context of NSDI.