

Georeferenced cadastral database, design & standards - the maharashtra state Experience

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The cadastral database consists of spatial information of each parcel of land holding, its unique identification number and its ownership. The quantitative aspects of the land includes the geometric dimensions, shape, area of each land parcel, crop yield, location of irrigation sources, location of buildings and trees and other structures standing on the land parcel, etc. Similarly the qualitative aspect of the land resources may be soil types, land forms, ownership details, crop types, irrigability status. Maharashtra State consists of about 44,000 village having more than 75000 map sheets spread over 352 talukas of 35 districts. The scale of cadastral of maps varies from 1:4000 to 1:10,000 prepared using chain or plain table survey and generally have no projection. These maps are not geo-referenced hence, cannot be directly integrated and analysed with other data sets. For effective utilisation, the cadastral maps pertaining to entire state of Maharashtra have been digitized and georeferenced using IRS PAN satellite data following the standard specifications designed and developed at MRSAC. The geo-referenced cadastral maps have been mosaiced on talukawise basis. The information however, can be extracted for any desired administrative or natural units.

Need For Geo-referenced Cadastral Maps: The traditional maps have inherent weaknesses due to different structure, specification and standard which does not facilitate analysis and integration with other data sets. Hence, there is an urgent need for standardisation and geo-referencing of database for effective utilisation at different administrative units i.e. village to state level for sustainable development. The utility of the geo-referenced cadastral database is immense and have been demonstrated in number of applications not only for planning and implementation purpose but also for impact assessment of development activities and damage assessment.

Database Design and Standards : Database standards are the important elements in database design. Standards enable to generate well constructed functionally and operationally efficient database and also reduces the cost of operation. The specifications and coding has been developed for each of the intermediate product stages of the final database. The standardization of the database has been implemented for every steps starting from scanning the paper maps, digitization, geo-referenced GIS database and mosaics.

Unique codification: The easily accessible common reference framework of Census codes of the year 2001 have been used as a base for identification (PIN) of the villages and the parcels (Survey Nos.). The unique codes have been designed for all attribute and spatial data feature like Polygon , line and point. The unique codification for the cadastral database in the digital format would facilitate the attachment of ownership revenue details ('7/12' records) to each parcel of land in a GIS environment.

Metadata: Metadata, describes the content, quality, condition, and other characteristics of geospatial data. Metadata has been generated for the entire database at different levels. Separate metadata sets have been formulated for scanned image files for cadastral maps, drawing files, geo-referenced individual villages and mosaics. The

details of the metadata include the original scale of maps, year of survey, scanning and digitization details, transformation errors and names of the person carried out the quality assessment with date.

Quality Assurance Standards : The Quality Assurance Standards (QAS) have been rigorously followed at three levels of the database generation and the reports documented. The formats for quality checks have been predefined for all the activities. Hierarchical QAS reporting were adopted for rapid rectification and corrections. Stringent quality control has been followed while scanning the cadastral maps, their digitization, data entry for text & parcel numbers, geo-referencing and mosaicing.

Geo-Data Warehouse: The Cadastral database for the entire state along with relevant attribute and metadata would be archived in the Geo-Data Warehouse. The database would include large quantum of natural resources database on various scales for the entire state of Maharashtra generated under various projects. The satellite data acquired periodically for the state on various resolution would also be archived. The database would be dynamic and would require constant updation for certain layers which change periodically. The database is being processed and systematically compiled for archival, storage, retrieval and subsequent dissemination.

Database dissemination: The database would be served to the user community by Map Serving software at the server side. The interface at the client end would be through a generic Internet browser. For the user departments of the state, a set of decision Support tools would be developed as application front-ends designed specifically for map based analysis for decision making. The maps server would utilise the existing the V-SAT network available for the entire state.

The geo-referenced cadastral database created for the state of Maharashtra in a GIS environment would be the backbone not only for planning and development activities but also for implementation of various schemes and impact assessment of various development activities. The use of the database in development of various information systems is already being exercised and shown excellent results.

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