

# INTEGRATED APPROACH FOR TOPOGRAPHICAL MAPPING WITH CADASTRAL AND LAND USE MAPPING

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## **1.0 INTRODUCTION**

Topographical information assumes a key role in any developmental activity. Topographical maps prepared by Survey of India are used for many developmental planning works. Any developmental work, properly planned, especially with consideration to topographical information is bound to save costs during execution stage. Cadastral Maps are prepared by State Survey departments and are on larger scales. These are not having the topographical information but have the details of revenue holdings, which also are key requirements in any developmental planning work. Though there are many common aspects considering the requirements of both topographical and Cadastral maps, there is vast difference in the method of preparation, especially the technical procedures. Hence there is a miss-match between the two. There is a need to streamline the methodology to exploit the wealth of information available in the two categories of the maps to make them available for various types of users in National Perspective.

## **2.0 STATUS OF TOPOGRAPHICAL MAPS**

Topographical maps are store houses of Geographical data. These maps are prepared by Survey of India on scales 1:250,000, 1:50,000 and 1:25,000. The country has been covered fully on 1:50,000 scale by 1980s. The sheets on 1:250,000 are prepared mainly by compilation process. The mapping on 1:25,000 scales is in progress and about 40% of the country has been mapped on this scale. Survey of India has not been able to keep in pace with the development, in incorporating the changes in topographical information on the surveyed maps from time to time. Hence most of the maps on 1:50,000 scales, especially of fast developing town/city area do not serve the purpose for effective planning. However, because of the strict quality control in the methodology followed and that the maps are with proper base in the national network, it is easy to integrate them and use as a national database. Hence the maps on 1:250,000 scales have been digitized and being used as the Digital Cartographic DataBase by many agencies in both government and private sectors. There is a proposal to digitize maps on 1:50,000 scale and use them as the base for National Spatial Data in the Digital form.

### **3.0 STATUS OF CADASTRAL MAPS**

Cadastral Data is very important for National revenue. They are prepared by State Survey Departments. They are prepared on different scales by different state governments. The methodology followed in data collection is different in different states. Instruments used for data collection are different. Tolerances for measurements are varying. Uniformity is not followed in projection. They are also outdated by about 50 years in most of the states. Because of this there is loss to the National exchequer. Because of the technical inconsistencies, it is not possible to integrate the maps. There is an effort by many state governments to computerize the available cadastral data.

As the Cadastral Maps are not accurately prepared there are lot of litigations among holders. Revenue and forestlands belonging to the state are not accurately mapped and accounted. This has lead to mass encroachment in many areas leading to social problems.

### **4.0 IMPORTANCE OF CONNECTION OF CADASTRAL DATA TO NATIONAL GRID**

If the cadastral data is also based on a common National Grid, with better technical standards, it will serve as a good input for assessment of National wealth. It is also possible to integrate the maps over a large area for analysis for developmental purposes in National scenario. It will be easy to use this data as an input to National spatial database. It will also be possible to use the latest available technique to map the area and collect the cadastral information by faster methods.

### **5.0 SUGGESTED PROCEDURE**

**a. Carry out mapping from whole to part by establishing a dense ground control network:** - In order to bring the Cadastral maps to National Grid, it is important to establish dense ground controls by using latest instruments like DGPS, Total stations and Electronic Distance measuring techniques. It is proposed that there should be control points at about 400 metres apart. The area covered within four of this grid of control points will form the Survey numbers. Along with this work of establishing such control points, the existing pillars forming the village junction pillars should also be coordinated.

- b. Uniform scale for map preparation:** - It is essential that all states follow uniform scale for preparing Cadastral maps to facilitate easy linking with national data. It is suggested that the following scales be adopted for Cadastral mapping: -
- ? 1: 1,000 scale for Cities and Towns
  - ? 1:5,000 scale for villages / cultivated / undulating plains
  - ? 1:10,000 scale for forest / hilly / desert areas
- c. Sheet layout:** - It is essential that the paper maps prepared should be easy to handle. Moreover, if the sheets are in uniform layout, integration of maps to smaller scales will be easier, to prepare village / Taluk / District maps. It is suggested that the following layout be adopted for mapping on different scales, as stated in (b) above: -
- i. 1:1,000 scale - 20 x 20 (60cm x 60cm paper size)
  - ii. 1:5,000 scale - 1.5 x 1.5 (- do -)
  - iii. 1:10,000 scale - 3 x 3 (- do -)
- d. Preparation of Base for field work:**- It would be easier to have the base duly marked with the control points for incorporating the collected information during field work. Such a base can be prepared by photogrammetric methods or by high-resolution satellite imagery data.
- e. Records to be prepared in field work:** - The data collected should be incorporated in the base map. The data can be collected in total stations and down loaded to a computer for offline processing of data. Revenue and demographic data should be collected in data sheets designed to collect different types of field data like details of ownership, family details, educational standards of persons in the house, type of construction of house, type of roof, type of soil, nature of irrigation, land use pattern etc.,

**f. Incorporation of data to digital database:** - The data so collected in field should be down loaded to computer or scanned for computer processing. This will also form the basic data for updating the Cartographic dataBase/ National Spatial Data which otherwise has been prepared from small-scale maps.

**g. Retrieval of Information:** - The data so stored in computer can be retrieved as desired, plot wise, survey number wise, village wise etc on suitable scales by using a suitable GIS software. Thematic maps depicting different land use or demographic information can be obtained at will without any more work for data collection.

## **6.0 APPLICATIONS**

If the above procedure is adopted in revenue data collection and mapping, it will form the best input for creation and maintenance of National Spatial Database for multi purpose use by different agencies. Updating of maps will become easier as it can facilitate use of different inputs like aerial photo or High resolution Imagery data. It can also be used for study of land use pattern. The data collected can also be used for preparation/ updating of topographical maps on any desired scale without further field work.

## **7.0 CONCLUSION**

Cadastral data is very important for national revenue. If this integrated approach is adopted during the data collection stage, it will save lot of effort, in such exercise by different agencies and facilitate preparation/ updating of Topographic maps. Overall cost of preparation of maps and updating will reduce. Data retrieval will be easy and easy to integrate data collected by other agencies in the National perspective.