

Geographic Information System for Land Acquisition Process: A Social Need for Road Infrastructure Development in India

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1 ABSTRACT

India is a developing country and it requires fast space quality infrastructure development, which is the need of current times. For any development, land is required and the land belongs to the people. Government is acquiring land for public purpose for the development of National Highways through National Highway Act of India 1956. Acquisition of land for public purpose displaces people, forcing them to give up their home, assets and means of livelihood. The Government of India (GoI) recognizes the need to minimize large scale displacement to the extent possible and, where displacement is inevitable, the need to handle with utmost care and forethought issues relating to Resettlement and Rehabilitation (R&R) of Project Affected Families (PAF) and formulate R&R Policies (NRRP 2007). But the ground reality differs from R&R policy. For assessment of land details are recorded in a system which is more than two hundred years old. This conventional system is not fulfilling the changing demands of time and ground truthing of space. The upcoming technologies such as Geographical Information System (GIS), data warehousing and web based information dissemination shall be very much helpful in land records management for decision making, strategy planning and predictive modeling. The use of these technological leverages can make land records management efficiently.

Since time immemorial, it has been a constant endeavour of human being to pursue various aspects of life with ease. In the present era of high-end computing, this endeavour of simplifying things is well achieved by an effective tool like GIS, when applied to, as complicated a process as land acquisition. Unlike the conventional procedure of simultaneous handling of various maps such as village cloth maps, engineering drawings and Layout plans etc., which are of different scale, GIS helps to prepare the maps and peruse the maps of multiple types at the same instance through registration of geographic coordinates. The concept of layer mechanism and subsequent superimposition one above the other is used so as to store both non-spatial and spatial data in different thematic layers. GIS technique has determined a fair and accurate location of linear alignment of proposed road corridor from current highways and to manage cadastral information which has to be obtained by satellite imagery, land records, Physical survey and land parcel creation more proactively by Overlay Analysis in accordance with name of the village and plot number basis. For the planners this entire process is made available at fingertips at the Personal Computers (PCs) without unfolding the age old cloth maps. The major hindrance in acquisition is calculation of proposed required area from a specific parcel or environmental sensitive areas, defense lands, alteration of topography etc. Through this approach an effort is made to analyse the various causes of mismatch between the map area and the old-recorded area and also the present manual system of superimposition of maps. In this context this paper describes a proposed automated process of land acquisition through Geographic Information System there by reducing the malpractice of resettlement and rehabilitation issues particularly in road development project in India.

Keywords: Geographical Information System, Land Acquisition, Land Parcel, Data Warehousing, Web based data Information system, Overlay Analysis.

2 HISTORY OF LAND RECORDS

The Process of Land Records Management in India is very old. The Arthashastra is supposed to be the first Indian work to mention of the village officers known as “gopa” maintained records on village fields, transfers, due taxes, etc. but that was in a very rudimentary level. Attempt to reform the system was first made by Sher-Shah-Soori (Ruled from 1534-1545) whereby land was categorized, measured and a schedule of crop rates fixed. The system was reformed during Mughal King Akbar regime (Ruled from 1556-1605) by adviser Todar Mal. The subsequent colonial rule by the British implemented the system on scientific lines whereby large scale cadastral surveys were conducted to demarcate the boundaries and extent of each individual landholding, Soil fertility to levy revenue from landholders of each and every village. A “Patwari or Revenue Officer” was responsible for collecting agricultural revenue, reporting the transfer or transition information, maintaining pedigree database and managing land records of the area of his jurisdiction that is

known as a Patwar circle. After passing about two hundred years the system retain the same character and only minor changes have been made according to the needs of the time.

3 OBJECTIVES OF THE STUDY

- Understand existing land record system of India
- Identify Land acquisition act in the case of development of National Highways,
- Methodology for collection of land records
- Steps for preparation of land acquisition plan
- Suggest procedure for developing a computerized Land Records in Road Project Interface
- Information Management System and its implementation plan, for decision making and strategy planning.

4 LAND RECORD SYSTEM OF INDIA

Land record system is at transition stage from 200 year old land record system to more advance computerization systems now. The Computerization of Land Records (CLR) was started in 1988-89 with the intention to remove the inherent flaws in the manual system of maintenance and updation of Land Records. In 1997-98, the scheme was extended to tehsils to start distribution of Records of Rights (ROR) to landowners on demand. So far the scheme has been extended to 582 districts and 3286 tehsils. Computerized copies of ROR are being issued to landowners from 1976 tehsil/talukas across the country. This project can safely claim to be the first successful initiative of e-Governance in India, at the grass-root level. The focus of the entire operation has always been to employ state of the art information technology (IT) to galvanize and transform the existing land records system of the country.

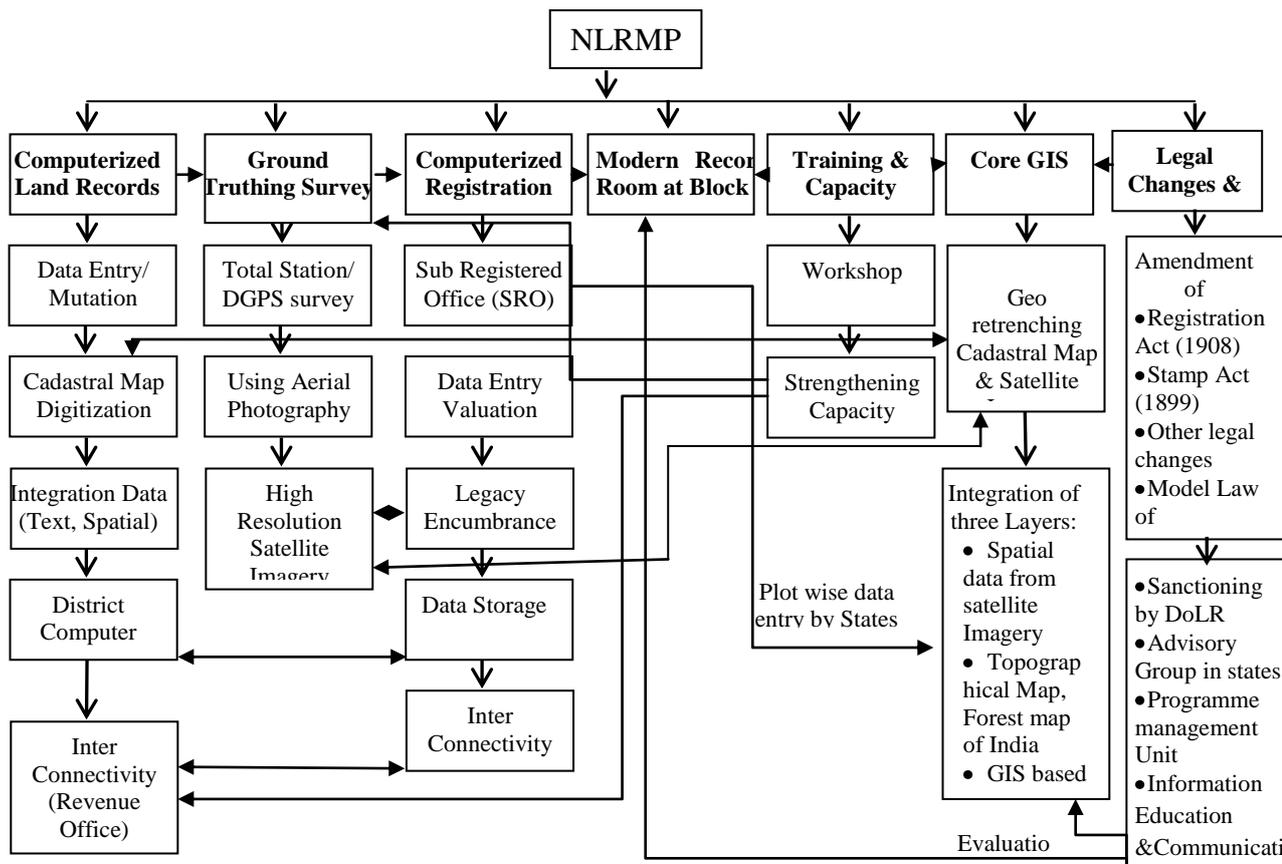


Fig 1: Basic System Architecture towards NLRMP

The Government of India has decided to implement the Centrally-Sponsored scheme in the shape of the National Land Records Modernization Programme (NLRMP)[4] by merging two existing Centrally-Sponsored Schemes of Computerization of Land Records (CLR) and Strengthening of Revenue Administration and Updating of Land Records (SRA&ULR) in the Department of Land Resources (DoLR),

Ministry of Rural Development[1]. The integrated programme would modernize management of land records, minimize scope of land/property disputes, enhance transparency in the land records maintenance system, and facilitate moving eventually towards guaranteed conclusive titles to immovable properties in the country. The major components of the programme are computerization of all land records including mutations, digitization of maps and integration of textual and spatial data, survey/re-survey and updation of all survey and settlement records including creation of original cadastral records wherever necessary, computerization of registration and its integration with the land records maintenance system, development of core Geospatial Information System (GIS) and capacity building. The following is an outline of the components and activities to be taken up under the NLRMP.

5 IDENTIFICATION OF LAND ACQUISITION ACT IN THE CASE OF DEVELOPMENT OF NATIONAL HIGHWAYS

The importance of land requirement in development projects needs no introduction. The ownership of such land may vest with the Government or any private person. For linear pattern projects such as the construction of roads, canals, pipelines, etc., minimum horizontal strip of land is required for acquisition. The land acquisition is generally spread over administrative boundaries of different districts. This necessitates co-ordination between the concerned administrative units. Further, another general feature observed is of encroachment along such linear projects. In this project, on examination it has been observed that such encroachment (Government Land) has been prominent at settlement stretches along the corridor. Such encroachments will be cleared due to requirement of land for the project corridor improvement.

Acquisition of Private Land: However, for the legal private property holders, the acquisition of the land would be taken-care of under the aegis of the Land Acquisition Act 1894 (amended 1984) (L.A Act)[2]. The L.A Act is applicable to all parts of India, but Land Acquisition by this process is lengthy. So for faster land acquisition National Highway Act of 1956 has introduced. Under the provisions of this act, the Government or any department of the Government can acquire land from the people for public purpose.

Legal Framework for Land Acquisition: With the increase of movement of traffic on account of industrial advancement it was found necessary that important highways of the country be developed and maintained by the Central Government. To achieve this objective The National Highways Bill, 1956 was introduced in the Parliament. The Land Acquisition (LA) for this project is to be undertaken in accordance with the provisions of this act. The following are the major provisions of the act for the land acquisition:

Section 3A: Provides for notification to landowners (Notification should be published in two daily newspapers; one in the regional language and the other in English. The same should be published in the Hindi Government Gazette) about the interest of the Government to acquire the notified land;

Section 3B & 3F: Provides power and right to the person authorized by the central government to make inspection, survey, measurements, valuation or inquiry;

Section 3C: Permits landowners to express their objections against such land acquisition;

Section 3D: Declaration of acquisition if no objections has been made to the competent authority;

Section 3E: Provides power to take possession of land once the amount determined by the competent authority has been deposited under sub-section (1) of section 3H;

Section 3G: Allows the competent authority to decide on the compensation to be paid;

Sections 3H: Provision for deposit of payment determined under section 3G in the manner as may be laid down by rules made in this behalf of the central government and

Under Section 3J: As per the provision of this section nothing in the Land acquisition act 1894 shall apply to an acquisition under this act.

6 METHODOLOGY FOR COLLECTION OF LAND RECORDS

In order to determine the extent of private property that will be acquired under the project, it is requested the respective District Magistrate of the district to arrange through the concerned revenue officials to provide the Revenue maps of all the villages through which the corridor traverses. The concerned officers from the Revenue Department of different Talukas/Tehsils of respected District were then approached to obtain a copy of the village maps with the demarcated individual plots. The widening plan developed as part of the

Feasibility study was superimposed on these village maps to identify the individual plots that are being affected. The plots numbers of these affected plots were provided to the Revenue Officer for verification of plot numbers and provide the land records for each of them. All this has been compiled as part of the Land Acquisition Report, an independent document prepared for the project.

7 STEPS FOR PREPARATION OF LAND ACQUISITION PLAN

Summary of procedure adopted for land acquisition plan are followed:

Step-1 (Project Initiation): The user agency shall issue letters to Concerned District Collectors, acknowledging them about the project and also ask for providing necessary documents to the user agency. District Collectors have issued letters to Tehsildars, who consecutively directed Revenue Officer to provide respective Village Maps, Revenue Records and Cost of Land to the User Agency for preparation of LAP.

Step-2 (Identification of Villages): The user agency shall identify the villages through which the project corridor is passes.

Step-3 (Collection of Revenue Maps): After the identification of villages, the user agency shall approach respective Revenue Officer for collecting Revenue Maps

Step-4 (Overlapping of Revenue Maps): Once after gathering Revenue Maps, the proposed widening plan would be overlapped or superimposed on the Revenue maps with the help of software packages.

Step-5 (Identification of Affected Plots): The exercise of overlapping could bring out specifically the affected plots. Such affected plots have been market out.

Step-6 (Demarcation): After identification of affected plots, the specific area of the affected plot could be demarcated.

Step-7 (Collection of Land Records): On demarcating the affected area, land records would be collected from Revenue Officer. This could fulfil the requirements of 3A.

Step-8 (Compilation): After collecting land records for all the plots from respective Revenue Officer, the same has been sorted out for affected plots.

Step-9 (Final Land Acquisition Plan): All the information collected from Revenue Officer has been worked out with respect to proposed widening plan there after the final land Acquisition Plan was prepared.

8 FRAMEWORK FOR DEVELOPING COMPUTERSIDED LAND RECORDS IN ROAD PROJECT INTERFACE

In conventional system, query of land records is laborious, time consuming and revolves round a single person (Patwari) that is why integration of geographic data and their pertinent alphanumeric data is indispensable to develop and maintain a comprehensive Land Records Information Management System (LRIMS). The geospatial techniques of the present information age can prove to be very useful to transform the conventional system into an efficient, easy-to-use, updatable, remotely accessible and above all practically applicable LRIMS. The proposed system will not only be useful for the revenue department regarding Information updating, query, reporting, customization, leakage detection and predictive modeling but will also beneficial for other system stakeholders regarding the identification of legal precinct of their respective lands. For land acquisition plan in road infrastructure man machine interface model makes data capturing, ground truthing, plot details, land parcel details and acquisition plan more accurate and less time consuming. As NRLIP is only used for land records and revenue collection but through interface of different stakeholders and department of India LRIMS may role pivotal for decision making process as under:

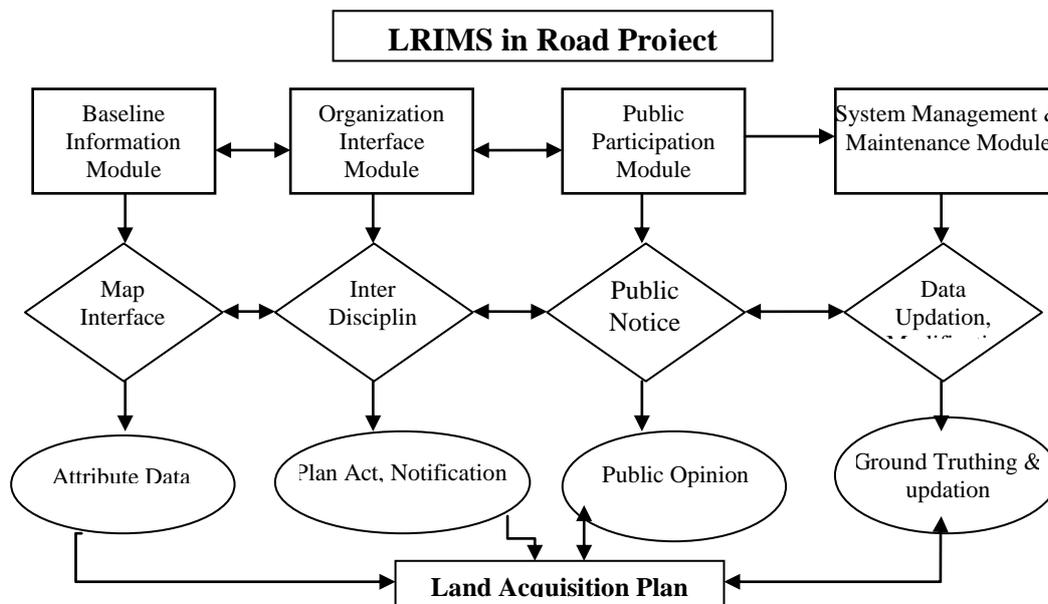


Figure 2: Land Records Information Management System (Land Acquisition Plan)

Base line information Module: The base line information module basically comprise of map, graphic, raster image, base line information, attribute data related to spatial information in one platform i.e. Geographic Information system (GIS)[3]. The module will have the capabilities of querying building, presentation of the result of the query in both graphical and tabular presentation through overlay analysis. The information system will have zooming facilities starting from 1:1or 2 million scale and zooming up to 1: 500 scale depending upon the resolution imagery and the level of study (Figure:3)

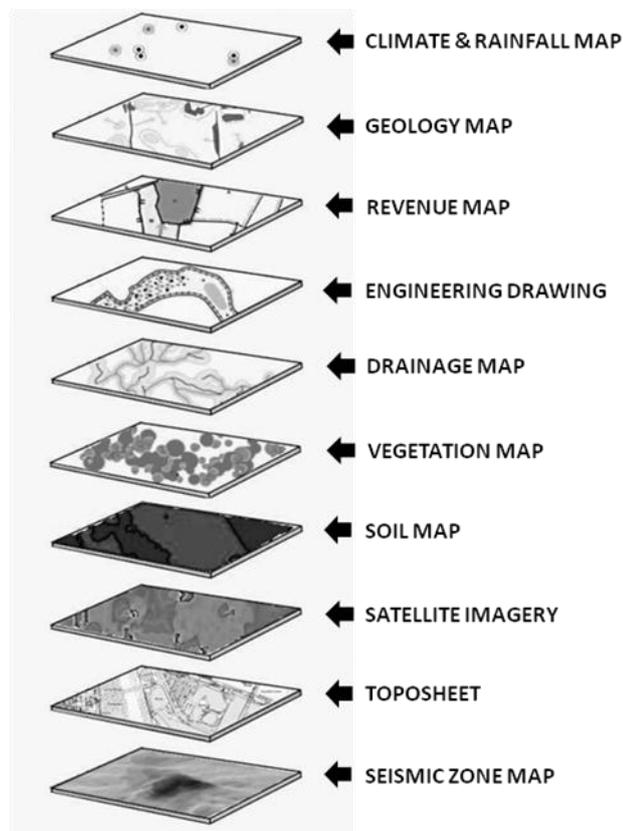


Figure 3: Baseline Information Mapping

The information content of this module will be cadastral map showing details of each land parcel with physiography, Demography, Landuse, Physical and Social infrastructure, sensitive location, housing, open areas, transportation (road, rail, waterways), utilities (water supply, electricity), hot spots, location of

monuments, polluted stretch, problem areas, tourist spots, pilgrim areas, tribal settlement, earth quack prone areas and environmental status and their details etc.

Organizational Interface Module: Broadly speaking in Indian scenario the development, management and decision making bodies for road sector are Ministry of Road and Transportation (MoRTH), National Highway Authority of India (NHAI), Public Works Department (PWD), Rural Road (MDR), Border security Force (BSF). But these bodies are individual. This module will have three sub modules with highway, state roads and others roads. This module will contain alphanumeric data like Jamabandi, Khasra Girdawari, Pedigree Sheet. The basic booklet to be incorporated in thin module will be Government notifications, norms, infrastructure development standards various gazetteer, guidelines and directions published by Government.

Public Participation Module: Public participation is one of the major tasks in land acquisition process. Sections 3A to 3H are involved with different stakeholders. The module will act as a platform for sharing the plan and progress of land acquisition in this computerized interface. This module will contain land parcel details, status of acquisition process, disbursement of compensation and public grievances.

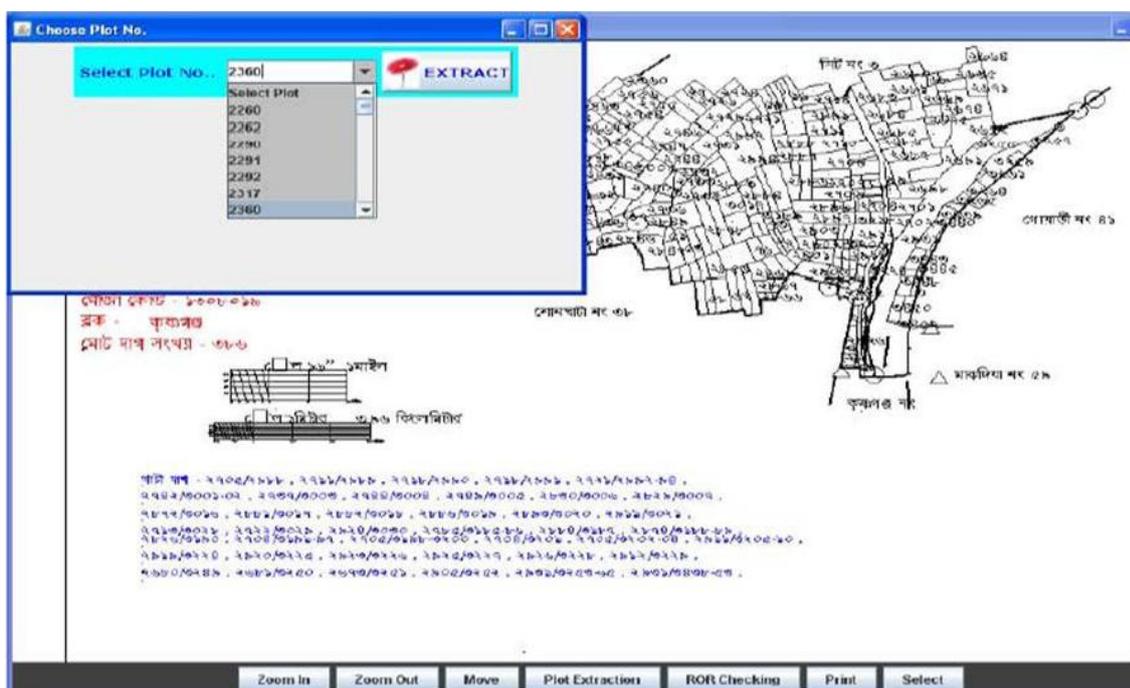


Fig 4: Public participation Module

The system management and maintenance module: The module deals with the maintenance and management of the LRIMS in Land Acquisition system itself. It is basically a user management module. It deals with the various authorization for access, viewing, updation, modification of data, information etc. The user management function may add and delete users for the system and moreover the module-wise authorization will also vary. The data, graphic and map updation may authorized to different user to update the baseline and other information. The system management will be at block level, district level and state level. The average users will only be able to use data, analyse and compare the data but could not be able to revise, add, delete or modify.

9 INFORMATION MANAGEMENT SYSTEM AND ITS IMPLEMENTATION

Integration of Field Measurement Books (FMB) and alphanumeric data is indispensable to have a full-fledged LRIMS. The technologies like GIS, spatial data warehousing and web are very much helpful to generate a complete LRIMS. All Block offices will have right to update the information as well as to keep a track of ownership, crop yield and revenue and as well as land acquisition status on it. With the aid of these recent technologies all the land record information will be under fingertip (click of mouse). The implementation of this interface will help:

A gateway to dynamic planning: A developing country like India which is in the transition stage of office automation this information system will act as platform of integration of traditional data and information system and the modern and dynamic GIS based information system.

Efficient data management: Land acquisition exercise needs a wide range of data and information. In GIS platform every data and information are stored in different coverage. It helps in integration and differentiation of graphic and data base information with the data table and text.

Tools for data analysis: This information system has the capability of performing the user – based data query. The types of data analysis used by infrastructure planners, developer, decision maker, land owners will be different from the academician, general public. Ever user will retrieve, plot, and analyze the data as per the requirement.

Transparent planning: With the dynamic nature of the information flow the planning, monitoring and management exercise will be more transparent.

Active public participation in planning: the proposed information system will be web based and it would not be software biased. Information Technology could be opened with any operating system. As all the information are easily available the people will be able to take active participation in the land acquisition and developmental activity.

10 CONCLUSION

Modern GIS integrates various kinds of advanced, dynamic, multi-layered, time series data and graphical information which transform the tedious data analysis job to a faster, dynamic and realistic exercise. Regular updation of information makes the monitoring and management of land parcel in records more transparent and realistic approach towards road development. This information system can be used as a tool for road development as well as it can also be a useful support system for change of ownership, land value evaluation and ultimately land acquisition.

11 REFERENCES

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