

# Cadastral Level Village Mapping Using Spatial and Non Spatial Data at Arcgis Platform

Dr. Kavita<sup>#1</sup>, Dr. M. Anji Reddy<sup>\*2</sup>

Associate professor, Dept. of Civil Engineering, Institute of Aeronautical Engineering, Dundigal, Hyderabad- 500043

Director of Research and Development Cell, Jawaharlal Nehru Technological University Campus, Kukatpally, Hyderabad 500 085

## Abstract

Village and Land information refers to legal, physical, economic and environment about features of land in an area given. The conception, formation and maintenance of information of land in India, is controlled by various agencies like central survey office, Revenue department, land records department, registration department, Public works department and Land Administration. These agencies will create and maintain data base pertaining to their activities for example land records department and Revenue department maintains the details of land and Land ownerships. A well organized and efficient village level planning requires digital cadastral level information system of the villages with association with other subsystems like economic data and resource data. Different thematic maps for example soil, water, transportation, land use and land cover, is generated at large scale (i.e.1:5,000). Contrasting small scale map like base map is generated from (SOI Toposheet) Survey of India Toposheet. Detailed Information of any village requires a base map indicating parcel boundaries at 1:5,000 scales. The village maps prepared by land records and survey department and are old surveyed maps and available in the form of paper maps or scanned images. Hence the digitization and georeferencing of these maps are necessary to prepare the base map. Therefore the toposheet maps are scanned and digitized in order to prepare base maps of the Karamchedu village. And the same maps are utilized to prepare thematic mapping of different resources and socioeconomic parameters.

**Keywords** — Geographic Information System, Cadastral Map, Land Information System, mapping, Surveying

## I. INTRODUCTION

Land is the very important assets of any nation. The land contains every important resource such as forests, rivers, Minerals, oil, and agricultural etc. Ownership records describe the nature of rights in the individuals and respective parcels. It usually includes a geometric description of land parcels linked

to other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements.[1] Computerization of map and parcel data can enhance the capability to manage, analyse, summarize, display, and disseminate geographically referenced information [2].

Allowing users to make sophisticated queries that may draw on the power of the host GIS's software and hardware [3]

Computerized mapping systems may be referred to by several names. They include [4]:

- Geographic information system (GIS).
- Land information system (LIS).
- Digital multipurpose cadastre.
- Multipurpose land information system (MPLIS).

A GIS can be viewed in three ways [5]:

- 1) The Database View.
- 2) The Map View.
- 3) The Model View.

## II. LAND PARCEL DATABASE

The most popular and common way presenting cadastral information is through maps. In general cadastral level information stored as paper records containing list of areas, parcels, landholders, and other items related to land. All the developing countries including India, the cadastral survey uses the following 3 methods:

- (i) Ground survey using GPS and Total Station, (ii) Aerial photographs or, (iii) Satellite images with very high resolution.

## III. OBJECTIVES OF THE STUDY

- The main and primary objective of cadastral level mapping is to retain, maintain and record the reliability at all the times. Then only it can be used for administrative, legal, planning and developmental purposes.

- To Identify and update the parcel information with the help of high resolution satellite imagery brought from National Remote Sensing Centre, Balanagar, Hyderabad.
- To prepare thematic layer like Land use/Land cover and linkage of attribute data at ArcGIS 10 Platform.

#### IV. STUDY AREA

Karamchedu Village of Karamchedu Mandal is selected for the study area which is located in the Prakasam district. The village is having an area of 38.645 sq km with a Geographical Aerial extent of Longitude: 800 16' 31" to 800 21' 46" Latitude : 150 54' 51" to 150 50' 54".

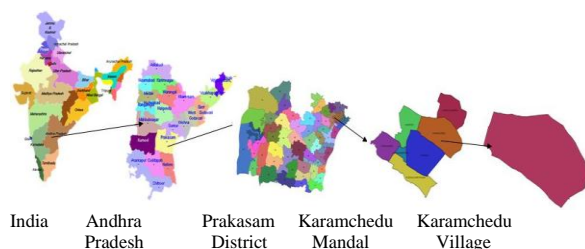


Fig 1 Showing the location map of the study area

#### V. PROPOSED ADMINISTRATION STRATEGIES FOR EXECUTION OF CADASTRAL LAND RECORDS MANAGEMENT

- Land Records legal data are in continuous service and hence to keep the updated records each and every data has to be modified, corrected or replaced by record basis. Therefore planned approach is very important in shifting from present system to GIS based System.
- Cadastral land records should be in GIS platform as the spatial data carries the major content information and everything else is and non-spatial data attached to spatial data.
- For every parcel / record (alphanumeric data); A GIS platform needs to be created.
- Preparation of base map for CIS (Cadastral Information System) requires cadastral level base map showing parcel boundaries. Computerization of the map requires the support of other users both financially and institutionally, [6].
- The cadastral Level Village Information System requires a base information map showing parcel boundaries with parcel numbers at very large scale.
- Traditionally base map which was prepared from Survey of India Toposheet on 1: 25,000 scales might not be useful for Cadastral Information System.

#### A. Cadastral map

Obtain cadastral maps hard copy from authoritative agencies like Central Survey Office Hyderabad and land records from Mandal Revenue Office. Cadastral map was scanned in jpeg or TIFF format with 300 dpi resolution or higher than that.

Digitization of the cadastral map using ArcGIS 10 software and extract the feature like survey polygon, parcel boundaries, road/rail network, water bodies, drainage, water and soil Information, drainage, settlements, plantations etc.

Identified the Ground Control Points through field survey. Georeferencing of the cadastral layers using edge matching and rubber sheeting tool in ArcGIS 10 software.

WGS 84 datum and UTM projection is assigned to these vector layers using spatial adjustment tool of ArcGIS 10 software is used to adjust spatially the digitized cadastral layers to adjust with corresponding features available on the high resolution satellite imagery in order to improve accuracy. Survey numbers as per the survey records are attached to these polygons.

#### B. High Resolution Satellite Imagery

Obtained very High Resolution satellite imagery IRS P6 LISS IV MX (5.8 X 5.8mt) from NRSC Balanagar. GCP Ground control points are recognized and collected earlier which is used for ortho-rectification Feature extraction of like Survey Polygons, water bodies road/rail network, water bodies, drainage, water and soil Information, drainage, settlements, plantations etc. For Extracting Information from High Resolution Satellite Imagery cadastral maps are used.

#### C. Field verification

Validation and Field Verification of survey numbers and parcel boundaries to identify and update the left over parcels. Linkage of Attribute information existing with the department to the vector digital layers. Thematic maps are prepared like Land use/ Land cover, by using the base map information.

#### VI. METHODOLOGY

The overall methodology is followed generally in order to achieve the present research objectives of the present study area and for the generation of output with the integration of spatial and non spatial data.

There are three different data products are used i.e.

- Topographic data
- Collateral data
- Thematic data

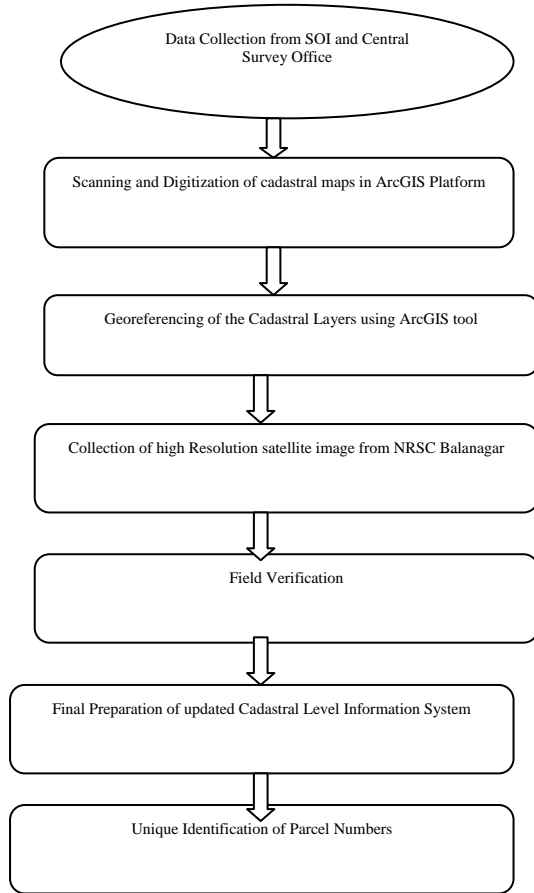


Fig 2. Showing the overall methodology of the study area

## VII. VILLAGE MAP

A Cadastral level village map consisting of land parcels and survey numbers sequentially. A parcel of land is an extent of ground which is available in the Government document record linked with set of right of ownership recognized officially. The physical parcel boundary is adjacent and it is uniquely defined in the executive record. The boundary which is depicted in 2D (two-dimensional) map is known as cadastral village map which shows the individual parcel of all government, public, free hold, encroachment and undesirable possessions. The village maps scale varies in different state. The parcel boundary is somewhat old for mapping and updating. For any developmental purposes it is very important to relate current natural resources information within the land parcels. From satellite based platform high-resolution satellite imagery has new possibility for updating the land parcel mapping of natural resources evaluation and its change analysis. The village level cadastral maps of the different villages are prepared by Land Records Department which are not georeferenced and cannot be overlaid directly on satellite imagery. Scanning and tracing the cadastral level village maps obtained from central survey office Hyderabad. And land records department.

### A. Karamchedu Village Cadastral Map

Village level cadastral maps at high resolution were obtained from Central survey office department Hyderabad. Karamchedu village is divided into 8 sheets as these maps are available at very large scale in the form of hard copy. Each sheet with regard to its physical condition, readability, content and clarity. The map should be cleaned properly before scanning to avoid dust particles, lines due to folding of maps occurring in the scanned output. The resolution and output format can be chosen as 300 dpi or better and TIFF format to avoid loss of information. These maps are collected and from central survey office Hyderabad; scanned with better resolution than 300 dpi, and saved in the TIFF format, and then these maps are inputted in ArcGIS software then digitization of cadastral maps are done one by one for all the 8 sheets. Further with the help of edge matching and rubbersheeting tool in the ArcGIS software the digitized maps were georeferenced with the help of toposheet as a base.

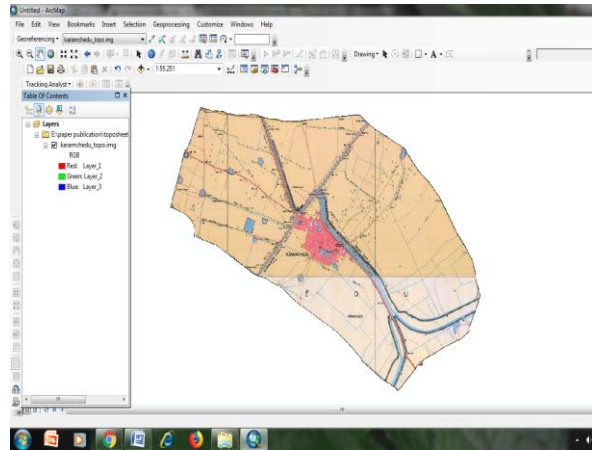


Fig. 3 Showing Karamchedu village toposheet

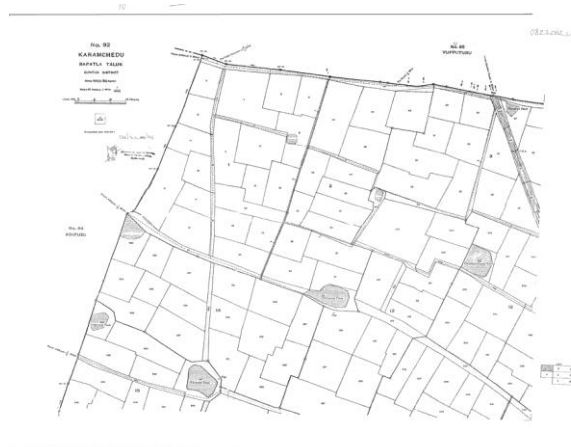


Fig 4 Showing part of raw Cadastral map of Karamchedu Village

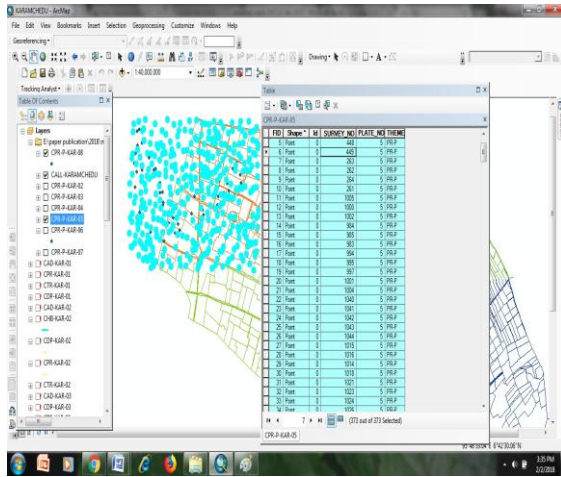


Fig 4 Showing survey numbers of karamchedu Cadastral map at ArcGIS platform

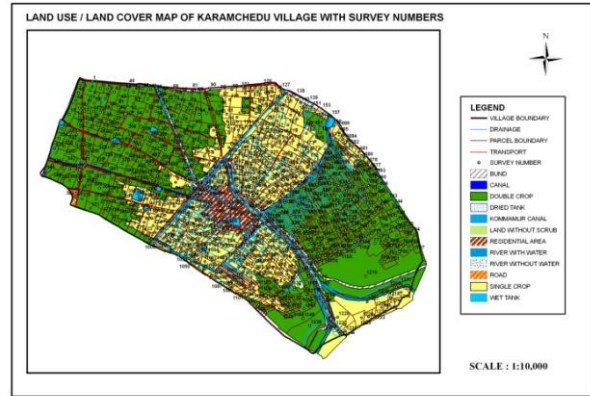


Fig 7. Land use /Land cover map of Karamchedu Village

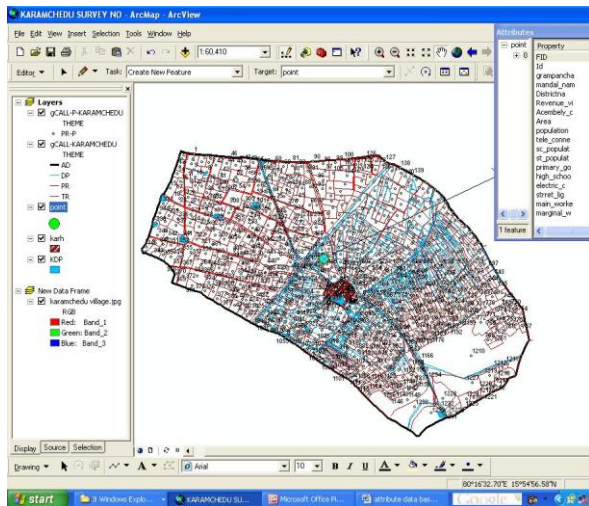


Fig 5 Showing Survey numbers linked with cadastral map at ArcGIS Platform

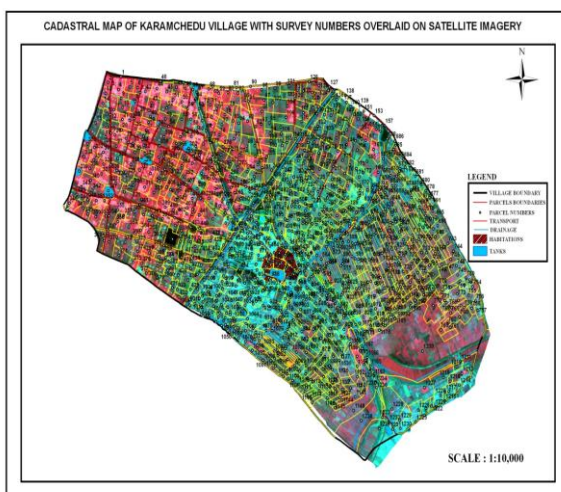


Fig 6. Showing Karamchedu Cadastral map overlaid on High resolution satellite imagery

### VIII. CONCLUDING REMARKS

GIS is the standard tool for management for Spatial and Non-Spatial data. GIS (Geographical Information System) The main conception of Cadastral level Information System and its necessity for the adopting of Geographic Information Systems technology for well-organized and effective land Information management. While it is emphasized that the primary cost of development of GIS based cadastral level information system is may be very expensive but at same time it give long termed benefit. Monitoring of land use pattern development activities are continuous exercises. Now a day's hardware computer is becoming voluntarily available and reasonable while GIS software's are day by day increasing in number.

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