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# Development of Village Information System Using EO Products & GIS

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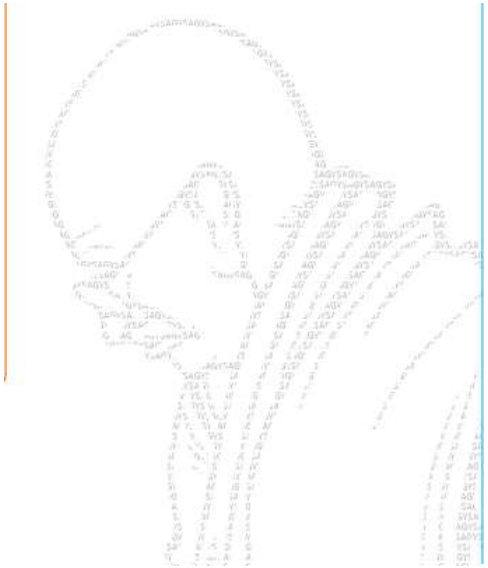
## Mahatma Gandhi's concept of rural development revolves around creating model villages for transforming 'swaraj' into 'su-raj'

### His vision of an ideal village, in his own words:

That village may be regarded as reformed...where the largest possible number of village industries are flourishing, in which nobody is illiterate, where the roads are clean, there is a fixed place for evacuation, the wells are clean, there is harmony among the different communities, and untouchability is completely absent, in which everybody gets cow's milk, ghee etc., in moderate quantities, in which nobody is without work, and which is free from quarrels and thefts... (Letter to Munnalal Shah, 4-4-1941; Vol. 73#: Pg. 421)



The task before every lover of the country is how to .. reconstruct the villages of India so that it may be as easy for any-one to live in them as it is supposed to be in the cities. Harijan, 7–3–1936

# VIS for Village Development : advantages

- This undertaking of VIS Project will ensure an engaging, empowering and inclusive environment for Villages and in turn Institutionalizing decentralised process of planning
- Bringing impetus to various village centric missions of the government

- To trigger processes which lead to holistic development of the identified Villages
- To substantially improve the standard of living and quality of life of all sections of the population through…

- To generate models of local level development and effective local governance

Mapping of the Central/State Schemes for Zilla Panchayat/Village Panchayat specifying what all schemes would be operational at each tier.

# Preparation of the draft Village Development Plan (VDP)

**Data model identified under VIS will enable towards :**

- Resource Mapping, Monitoring, Planning and Management
- Biodiversity, Agriculture forestry and other areas..
- improve basic amenities
- enhanced human development
- better livelihood opportunities
- reduced disparities
- access to rights and entitlements
- wider social mobilization
- Disaster preparedness

# Preparation of the draft Village Development Plan (VDP)

Resource mapping: helps understand the natural and physical resources at the command of the village and maps would show :

- ◊ Land use
- ◊ Water bodies
- ◊ Irrigation structures
- ◊ Physical layout of the land – showing slopes, undulations, drainage patterns etc.

- ❖The Resource Map would delineate the micro-watersheds and help identify the potential for agricultural development and natural resources management.
- ❖Needs matrix: to rationally assess the collective needs of the village and their priorities.
- ❖The data collected through the situation analysis should be captured on a GIS platform.

# Preparation of the draft Village Development Plan (VDP)

❖Resources of fully tied schemes –

❖Centrally sponsored and State schemes - such as IAY, PMGSY etc

❖Resources which are partially tied and permit flexibility of use like MGNREGS, RKVY, NRLM, NHM, etc.

❖Resources which are largely untied such as BRGF, MPLADS etc which permit a great deal of flexibility to fill in critical gaps as required.

•Local Area Development Schemes

## Deliverables :

Adoption and adaptation of technology and introduction of innovations are critical …….

- Mobile based technologies essentially: for monitoring the programmes through geo-tagging.
- Agriculture related technologies and innovations
- Water supply and sanitation related technologies –
- State Rural Livelihood Missions.
- Improving Public Distribution System (PDS)
- Organisation of grievance redressal camps with the participation of the District Collector and key district level officers particularly relating to civil supplies, social welfare, land revenue etc

Management, Planning , Monitoring of Resources

Human : Education , Health Nutrition and Social Security Good Governance

**Holistic Development through Village Information System**

Documentation of Socio-Cultural , Heritage

Economic : Social , Financial Inclusion Basic Amenities services, Skills, Livelihoods

## A Village Development Plan

This Perspective Plan will broadly reflect the areas like human development economic development, poverty reduction, service delivery, social development, ecological development ….

# VIS- VDP towards

Situation Analysis:

- A baseline survey, which has two purposes; firstly, to identify details of the existing scenario in different areas of development so that improvements could be suitably bench-marked to this.
- Secondly, to provide basic data on the deficiencies and gaps in infrastructure, amenities and services as well as the potential for future economic and human development

- Participatory Situation Analysis:

**towards supporting and strengthening the delivery of basic services-like water supply, sanitation, including septic management, sewerage, storm water drainage and solid waste management, street lighting, local body roads and footpaths, parks, playgrounds, burial and cremation ground.**

# Case Study : Warangal , Telangana

# VIS Protocols/Data model:

| RESIDENTIAL | COMMERCIAL/ GOVERNMENT OFFICES | RELIGIOUS | UTILITY CENTRE | EDUCATIONAL | HEALTH | AGRICULTURE AMENITIES |
|---|---|---|---|---|---|---|
| Year of Construction | Year of establishment | Year of establishment | Year of establishment | Year of establishment | Year of establishment | Year of establishment |
| Plot Number | Plot Number | Plot Number | Plot Number | Plot Number | Plot Number | Plot Number |
| Owner Name | Owner Name | Owner Name | Owner Name | Owner Name | Owner Name | Owner Name |
| Dimension | Dimension | Dimension | Dimension | Dimension | Dimension | Dimension |
| Flooring type | Flooring type | Flooring type | Flooring type | Flooring type | Flooring type | Flooring type |
| Roof | Roof | Roof | Roof | Roof | Roof | Roof |
| Number of rooms | Category (Gen, OBC, SC/ST) | Telephone | Telephone | Telephone | Telephone | Telephone |
| Number of family Members | Sanitation | Bank Account | Bank Account | Bank Account | Bank Account | Bank Account |
| Category (Gen, OBC, SC/ST) | Telephone | Level 2 (see categories) | Level 2 (see categories) | Level 2 (see categories) | Level 2 (see categories) | Level 2 (see categories) |
| Annual Income | Bank Account | Level 3 (see categories) | | Level 3 (see categories) | Level 3 (see categories) | Level 3 (see categories) |
| Occupation | Water facility | | | | | |
| Vehicles Owned | Level 2 (see categories) | | | | | |
| Toilet | Level 3 (see categories) | | | | | |
| Telephone | | | | | | |
| Gas Connection | | | | | | |
| Literacy | | | | | | |
| Voters Id | | | | | | |
| Bank Account | | | | | | |
| Water facility | | | | | | |
| APL/BPL | | | | | | |
| Agricultural land | | | | | | |
| Number of Cattles | | | | | | |
| Number of Sheeps | | | | | | |
| Level 2 (see categories) | | | | | | |
| Level 3 (see categories) | | | | | | |

| WATER (Data collection format) | |
|---|---|
| **DRINKING WATER** | **WATER / IRRIGATION** |
| | |
| Year of Construction/installation | |
| Depth | Quality |
| Volume/yield (in ltrs.) | Scheme |
| Quality | Status |
| Scheme | Type |
| Status | Remarks |
| LandMark | Others |
| Type | Level 2 (see categories) |
| Remarks | |
| Others | |
| Level 2 (see categories) | |

| Categories under Water sector | | |
|---|---|---|
| | | |
| **DRINKING WATER (Level 1)** | | **WATER / IRRIGATION** |
| **Level 2** | | **Level 2** |
| **Dug wells/ open well** | | **MI tanks** |
| **Bore / Tube well** | | **Bore wells** |
| **Bore /Tube well with hand pump** | | **Canal** |
| **Bore /Tube well Electrified** | | **Tanks** |
| **MWS** | | **Barrages** |
| **PWS** | | **Lift irrigation** |
| **Cisterns** | | **Others** |
| **Overhead Tank** | | |
| **Others** | | |

| Other (Data collection format) | | | | | | |
|---|---|---|---|---|---|---|
| **Weather** | **Forestry** | **Natural Resources** | **Public assets** | **Communication** | **Transport** | **Energy** |
| | | | | | | |
| Rainfall | Nursery location | Mineral | Play ground | Mobile | Road type | Electricity |
| Temperature | Forestry check post | Hydro carbons | Parks | Landline | Road category | Solar |
| Other (pl mention) | Timber yards | Aqua farms | CA sites | Service Provider | Rail track | Wind |
| | Amenities | Building Materials | Other (pl mention) | Other (pl mention) | Rail category | Biofuel |
| | Other (pl mention) | Bricks | | | Level 2 (see categories) | Other (pl mention) |
| | | Stone quarrying | | | Others (pl mention) | |
| | | Sand Mining | | | | |
| | | Other (pl mention) | | | | |

| Categories of Transport (Level 1) | |
|---|---|
| **Level 2 (Road)** | |
| **Mud Road** | |
| **Metalled Road** | |
| **Asphalted Road** | |
| | |
| **Level 2 (Rail)** | |
| **single tarck** | |
| **double track** | |
| **Metre gauge** | |
| **Broad gauge** | |

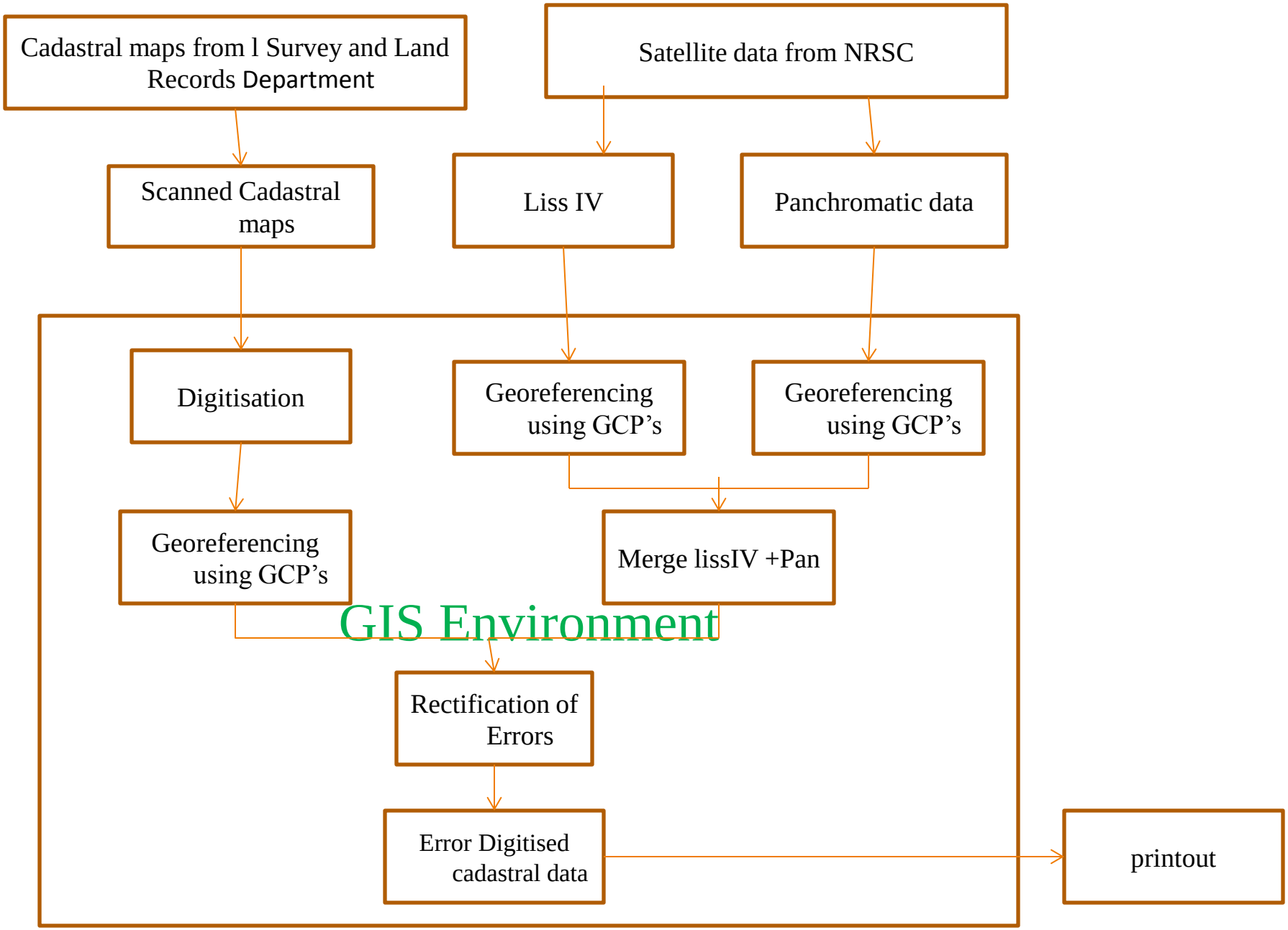
| CADASTRAL (Data collection format) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Survey No.** | | | | | | | |
| **Hissa No.** | | | | | | | |
| **Land Owner Name** | | | | | | | |
| **Address** | | | | | | | |
| **Khatha** | | | | | | | |
| **Total Land under Pahani** | | | | | | | |
| **Detail of Land Revenue** | | | | | | | |
| **Soil Type** | | | | | | | |
| **No. Of Trees** | | | | | | | |
| **Source of irrigation** | | | | | | | |
| **Area Irrigated** | | | | | | | |
| **Utilisation of Land** | | | | | | | |
| **Seasonwise Crop Details** | Khariff | | | | | | |
| | Rabi | | | | | | |
| | Summer | | | | | | |
| **Mixed Crop Details** | | | | | | | |
| **Remarks** | | | | | | | |

# Tools:

- Cadastral maps
- Hand held GPS or DGPS for field survey
- GIS package
- High resolution Satellite data (Liss IV+PAN)

# Study area:

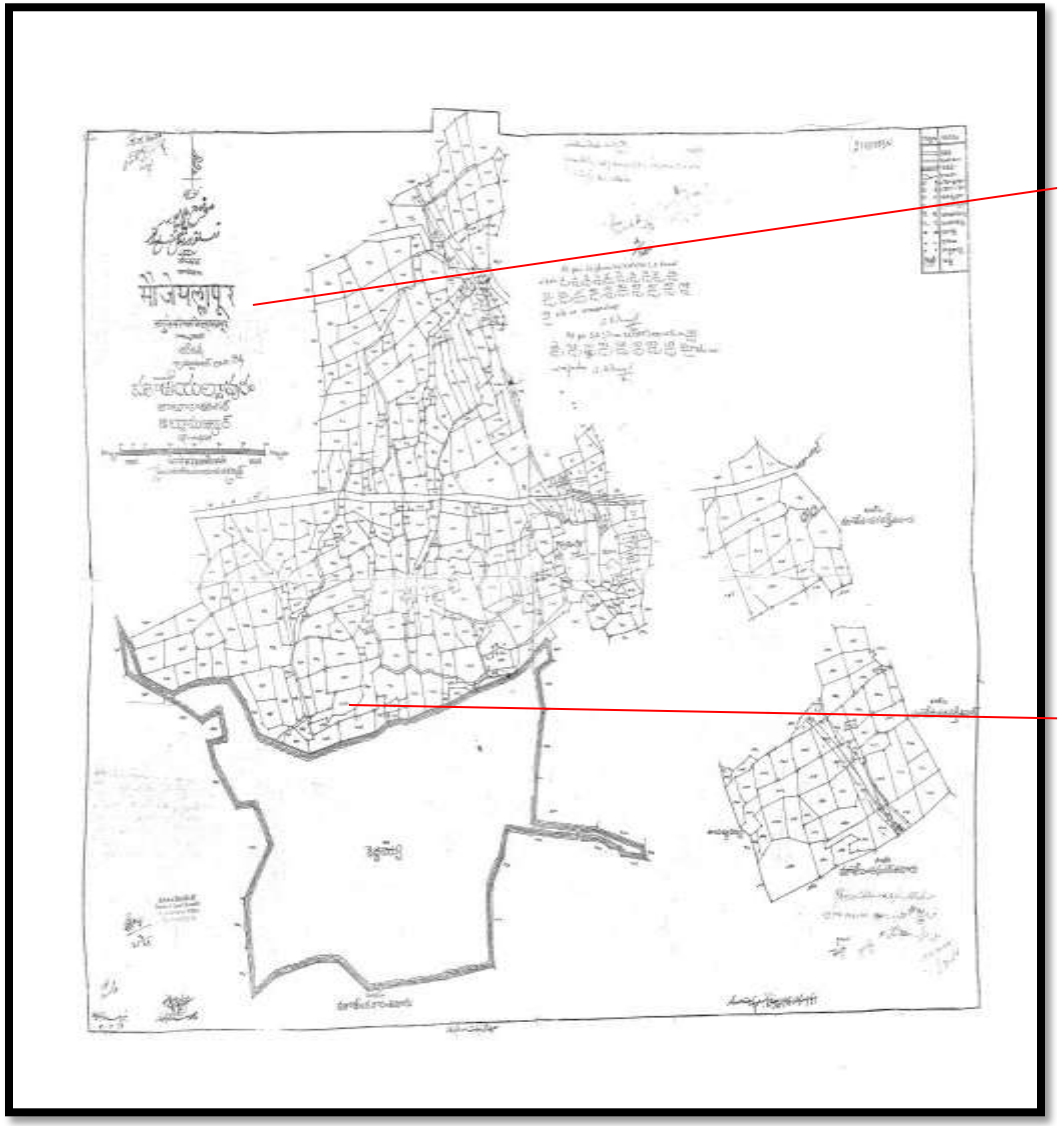
- The present study is carried out in two clusters each of five villages in Warangal District
- Cluster-I
  - Chinthagattu
  - Hasanparthy
  - Pembarthy
  - Nagaram
  - Yellapur
- Cluster-II
  - Thatikyala
  - Mallikudarla
  - Kyathampalli
  - Janakipur
  - chinnapendyala

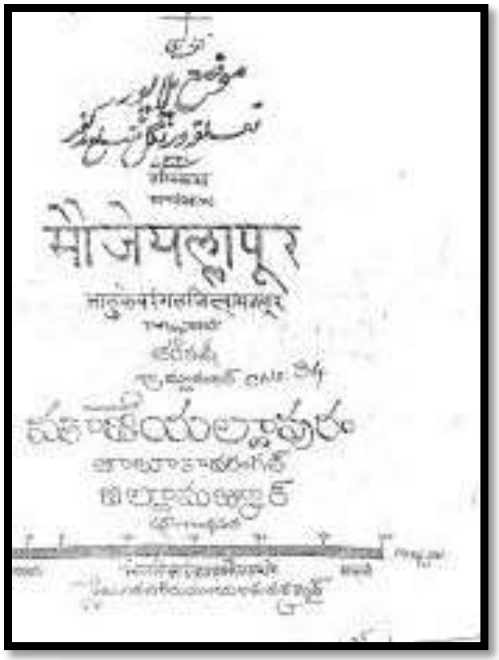

Cadastral maps from l Survey and Land Records Department
Satellite data from NRSC
Scanned Cadastral maps
Liss IV
Panchromatic data
Digitisation
Georeferencing using GCP's
Georeferencing using GCP's
Georeferencing using GCP's
Merge lissIV +Pan
GIS Environment
Rectification of Errors
Error Digitised cadastral data
printout

# Steps to convert cadastral map into Digital format

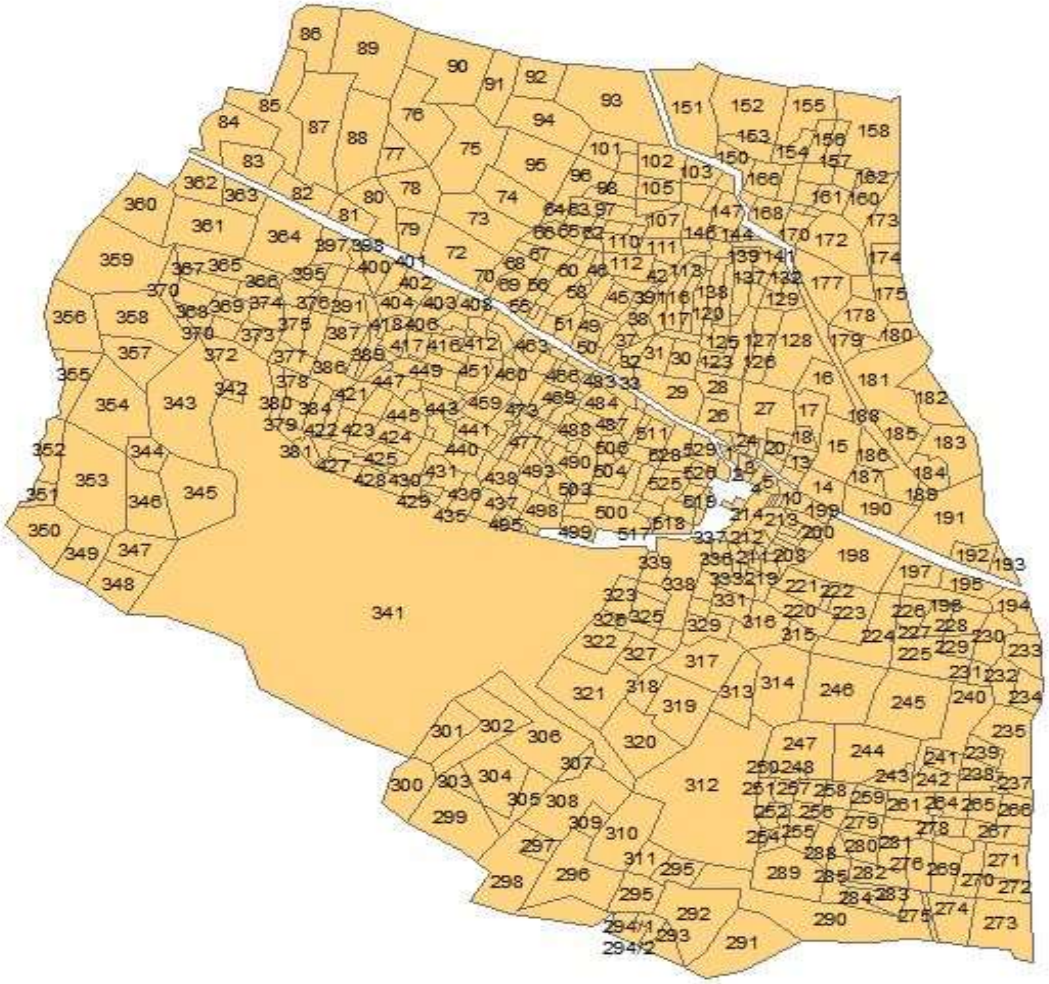
- Cadastral maps have to be procured from authorised agencies like Survey and Land Records Department the State Government
- Scan the cadastral map at higher resolution.
- Start digitizing the cadastral map using any GIS software and extract the features like village parcel/survey polygons, water bodies, road/rail network, water and soil information, drainage, settlements, plantation and corresponding attributes such as survey numbers available in the cadastral map.
- Assign projection to these digitized vector layers accordingly (WGS 84 datum and UTM projection)
- Using GPS/DGPS field survey identify Ground Control Points at junctions, village boundary stones and some common points available both on map and field.
- Georeference all the cadastral layers using GCP's.

# Scanned cadastral map of Yellapur Village of Cluster-1

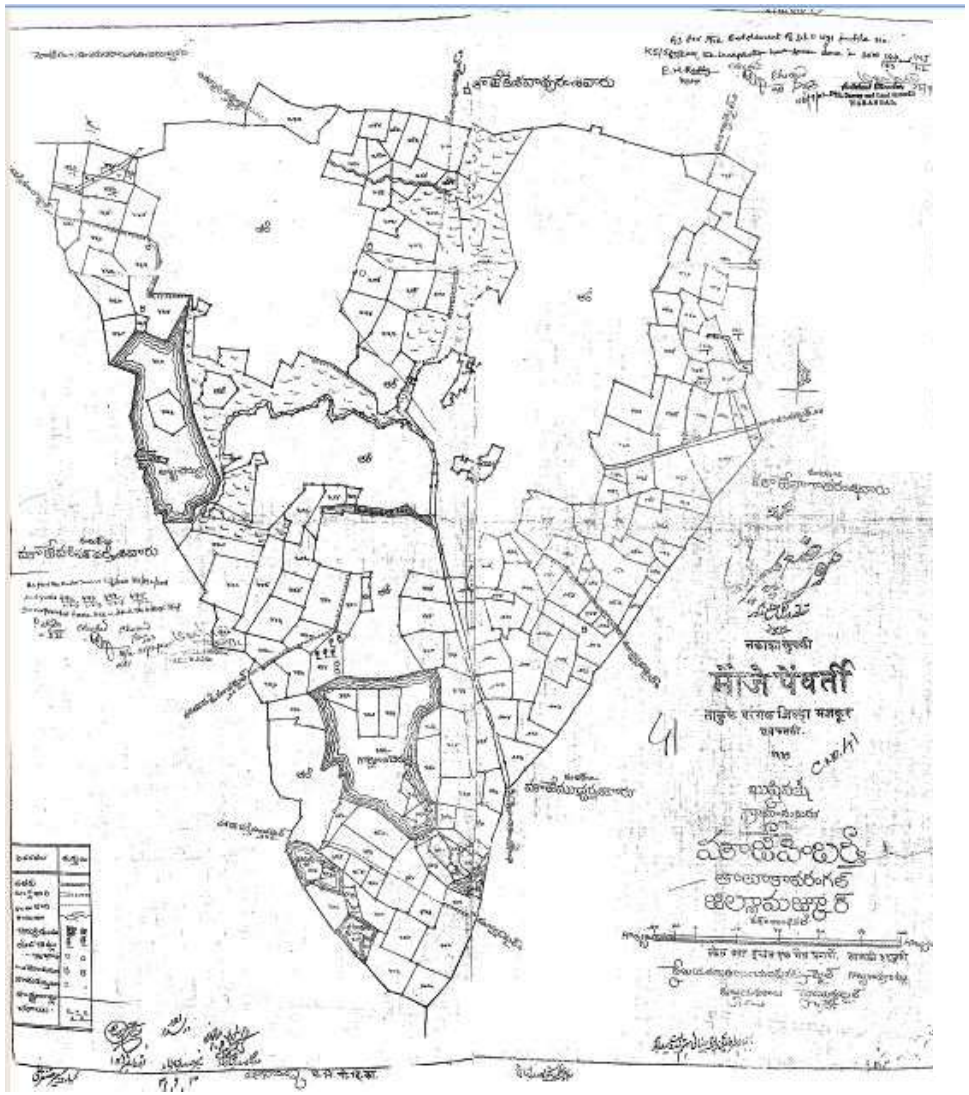


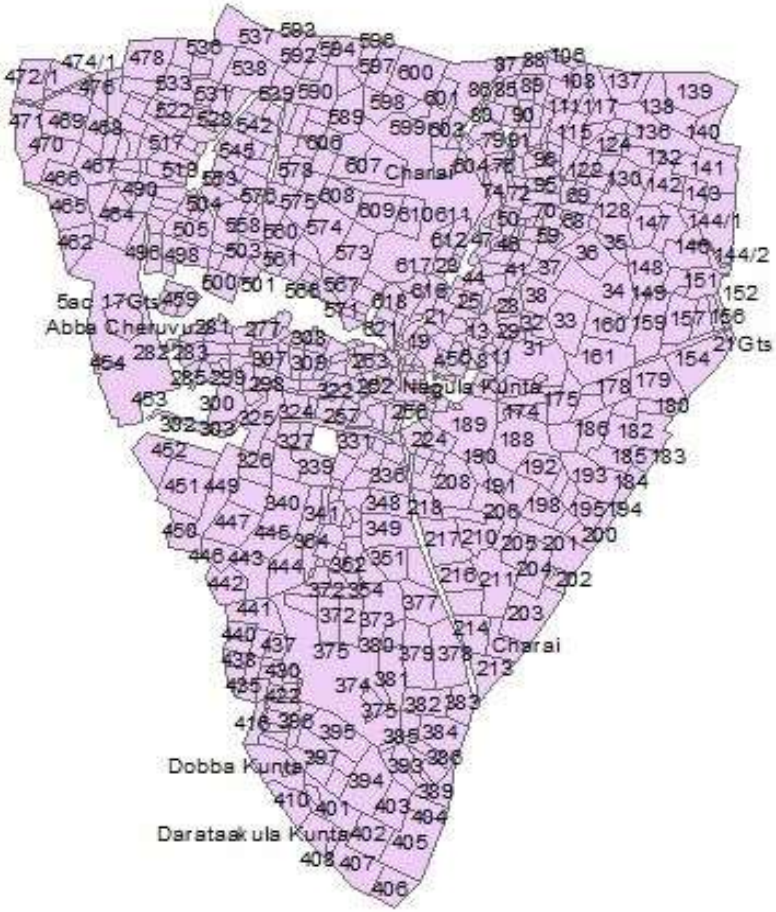
# Digitised Cadastral map of Yellapur of Cluster-1



# Pembarthy village of Cluster-1



Cadastral Map




Digitised Cadastral Map

# Working with Satellite Data

- High Resolution Satellite Imagery obtained have to be georeferenced using the GCP's and ortho-rectified to improve accuracy.
- Now LissIV and panchromatic data have been merged to get a higher resolution color image.
- According to the need spatial adjustment has to be done fit with corresponding features seen on High Resolution Satellite Imagery with the help of tools available in GIS software.

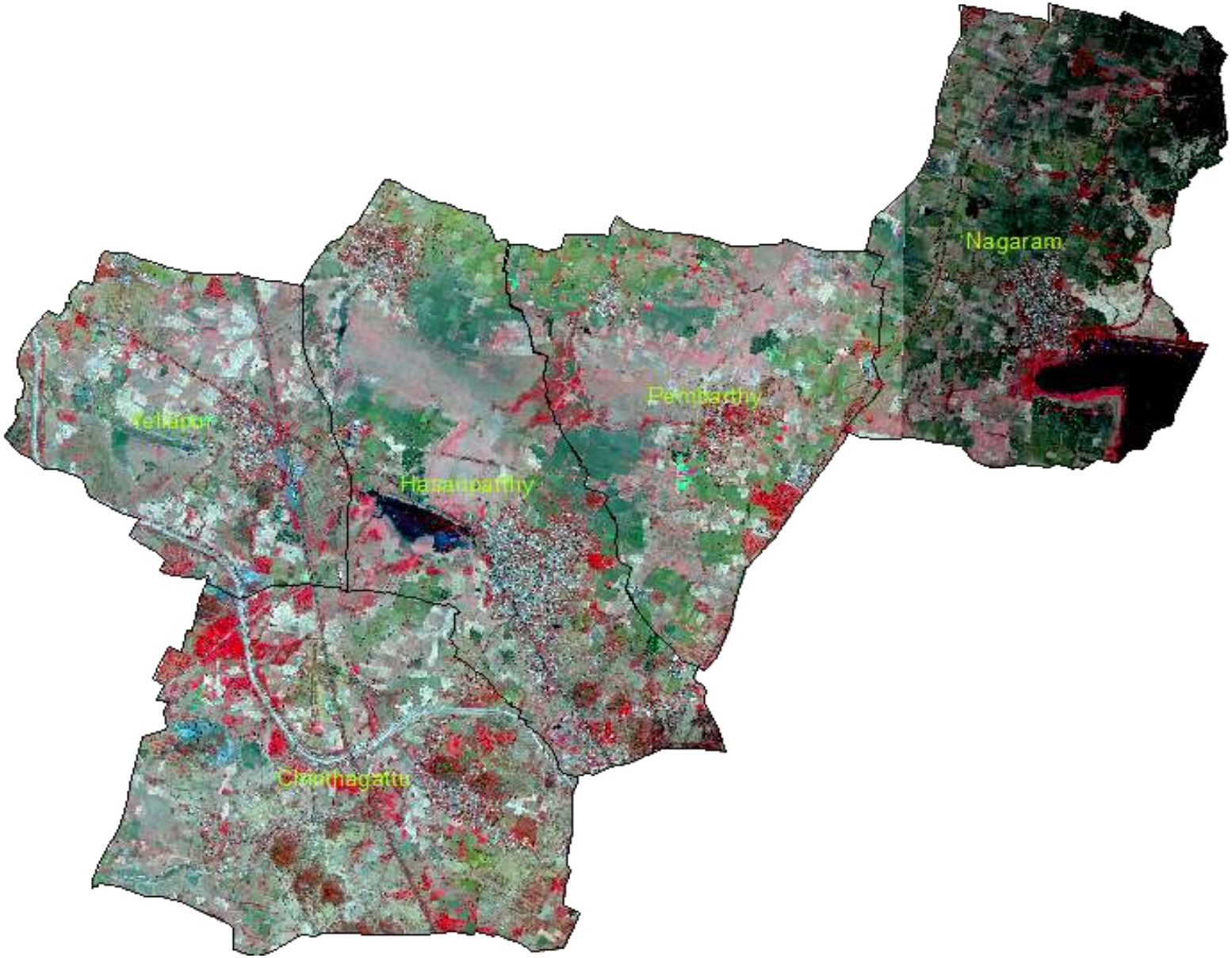
# Yellapur village of Cluster-1 Merge Data

# Pembarthy village of Cluster-1 on Merge Satellite Data(LissIV+PAN)

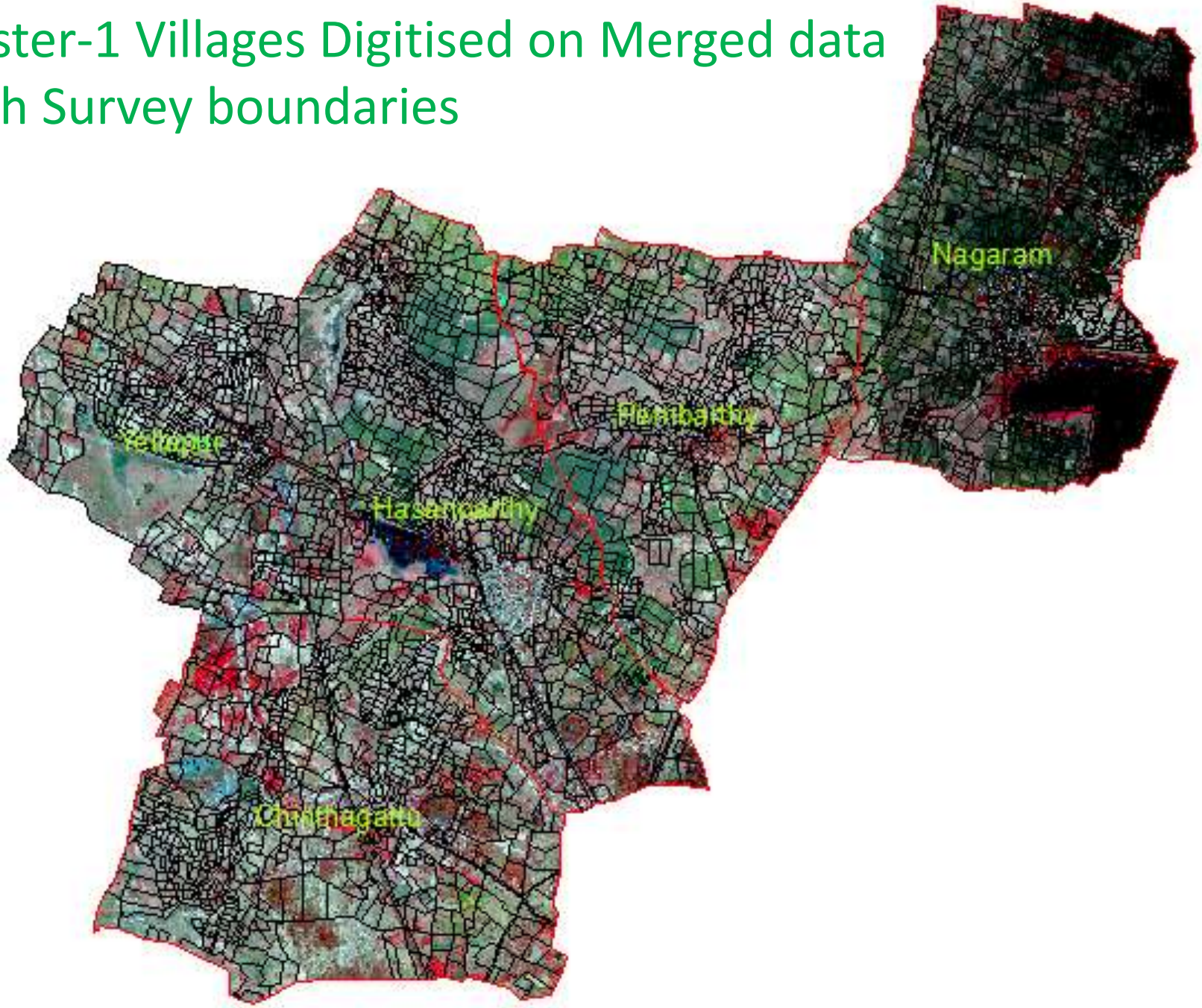
# Field studies

- Field verification is done to check the accuracy as well as to identify the unknown values present in the data and update.
- Try to identify junctions such as tri-junction, bi-junction and boundary of the village to fix the legal boundary.
- Identification of the land parcels on the ground also fixes its location on the ground, its boundary polygon and its place in the village with reference to a spatial standard reference point already established and accepted by the Govt.
- With the surveyed boundary edit the digitised boundary accordingly.
- For quality assessment of parcel mapping and to check the area with respect to records available with revenue department.
- Attribute data has to be collected and linked with the related vector layer.

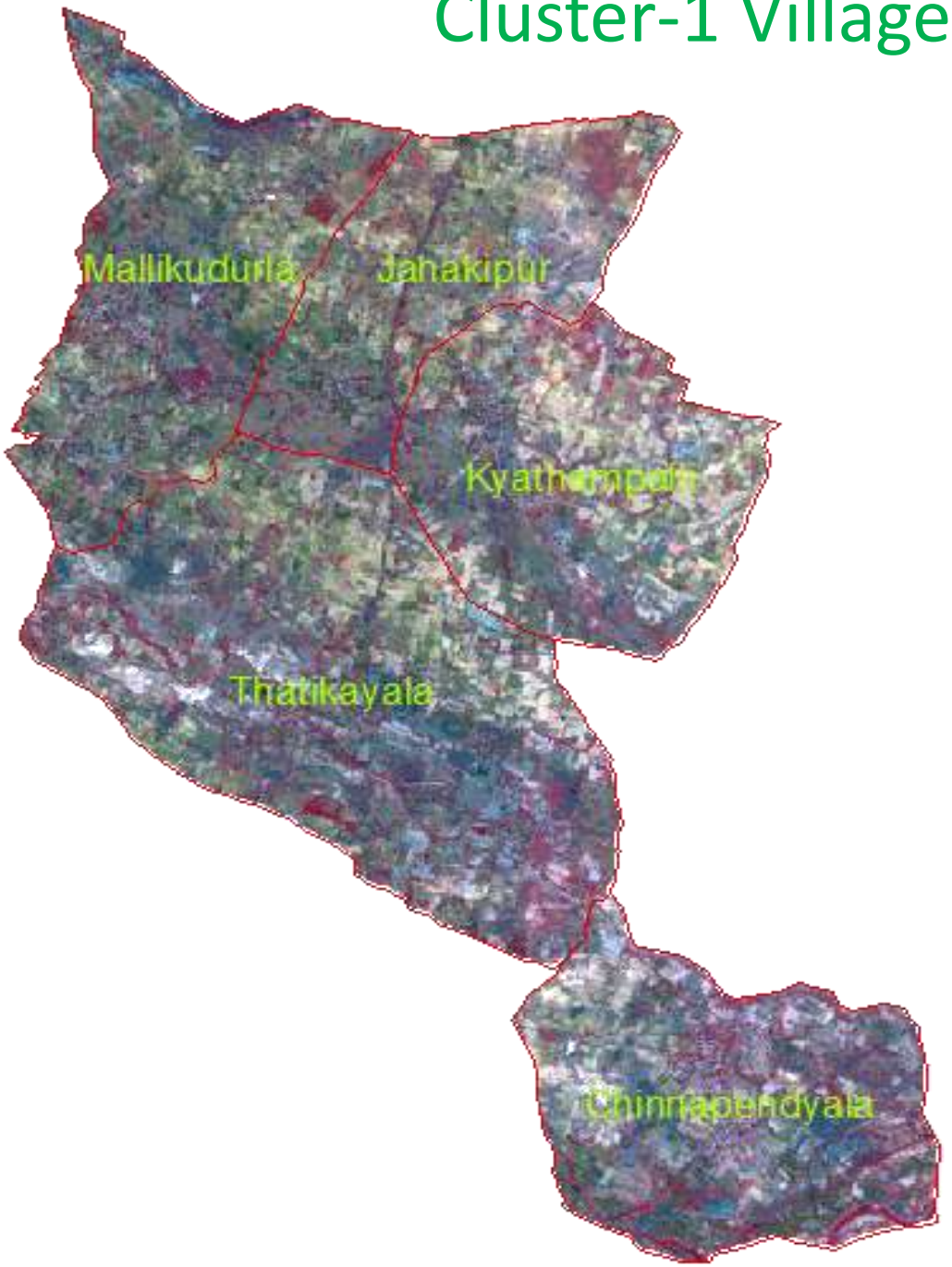
# Cluster-1 Villages on Merged data



# Cluster-1 Villages Digitised on Merged data With Survey boundaries



# Cluster-1 Villages on Merged data



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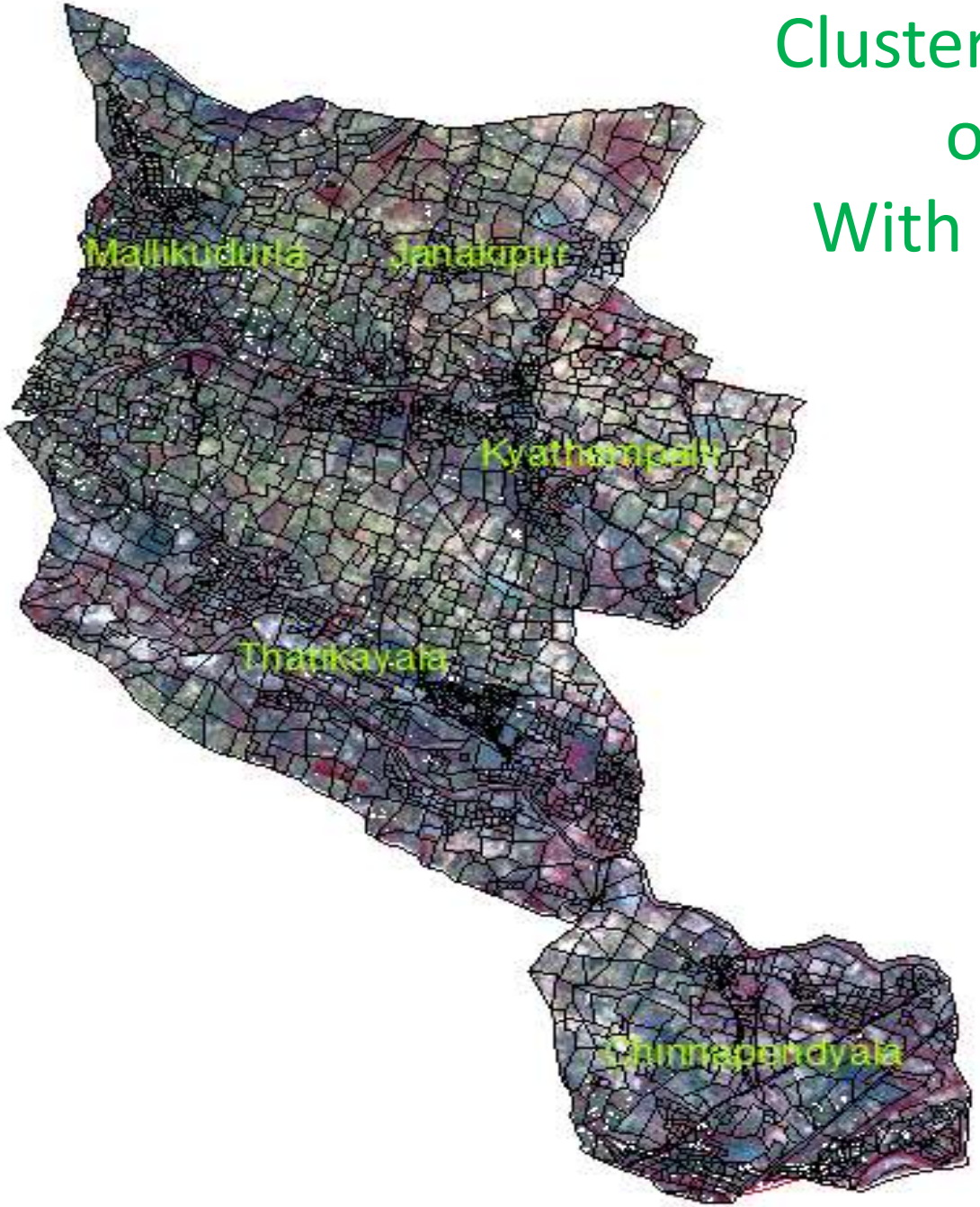

Thank You