

Telangana State Remote Sensing Application Centre

Planning Department, Government of Telangana

Geo spatial Technologies for Development

MCR HRD Institute, 10, July,2019.

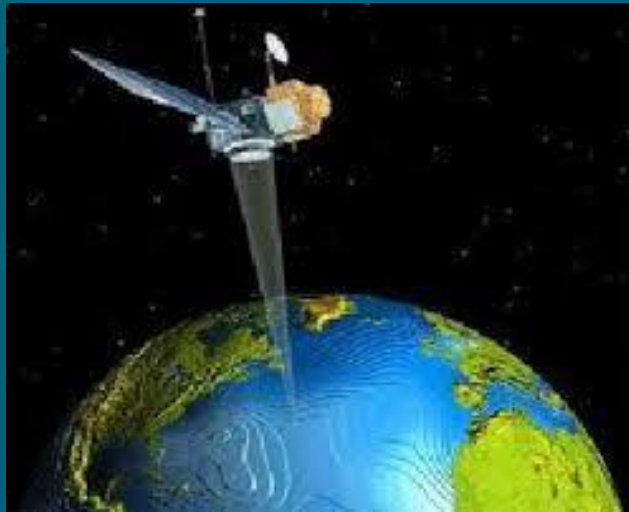
Dr J.Ramana Murthy

Tech Advisor



What is Remote Sensing ?

Remote Sensing is the sensing the Earth's surface from space by using Electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the management of earth resources.



It is a different way of “LOOKING”
consciously at earth’s surface:
“OBJECTS” with prior knowledge (?)

Observation with “artificial eyes”

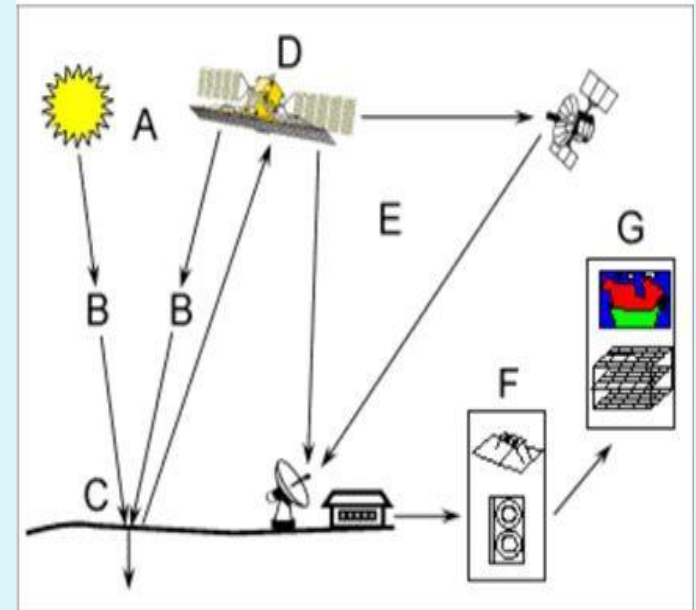
Remote Sensing Basic Processes

Data acquisition (Energy propagation, platforms)

- Processing (Conversion of energy to images)
- Analysis (Quantitative and qualitative characterisation)
- Accuracy assessment
- Information dissemination for Applications and monitoring

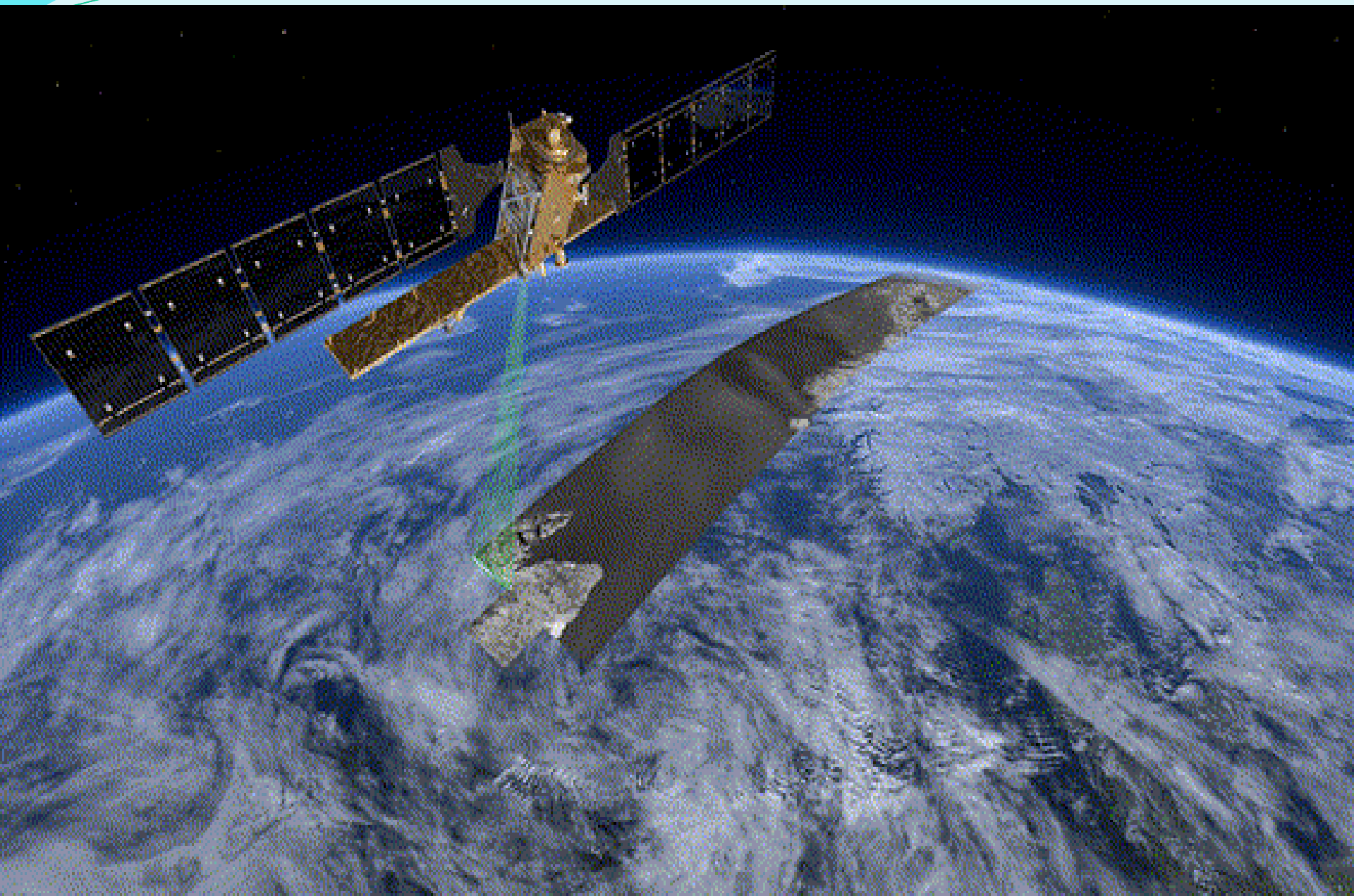
Remote Sensing Basic Process

- **Energy Source or Illumination (A)**
- **Radiation and the Atmosphere (B)**
- **Interaction with the Target (C)**
- **Recording of Energy by the Sensor (D)**
- **Transmission, Reception, and Processing (E)**
- **Interpretation and Analysis (F)**
- **Application (G)**

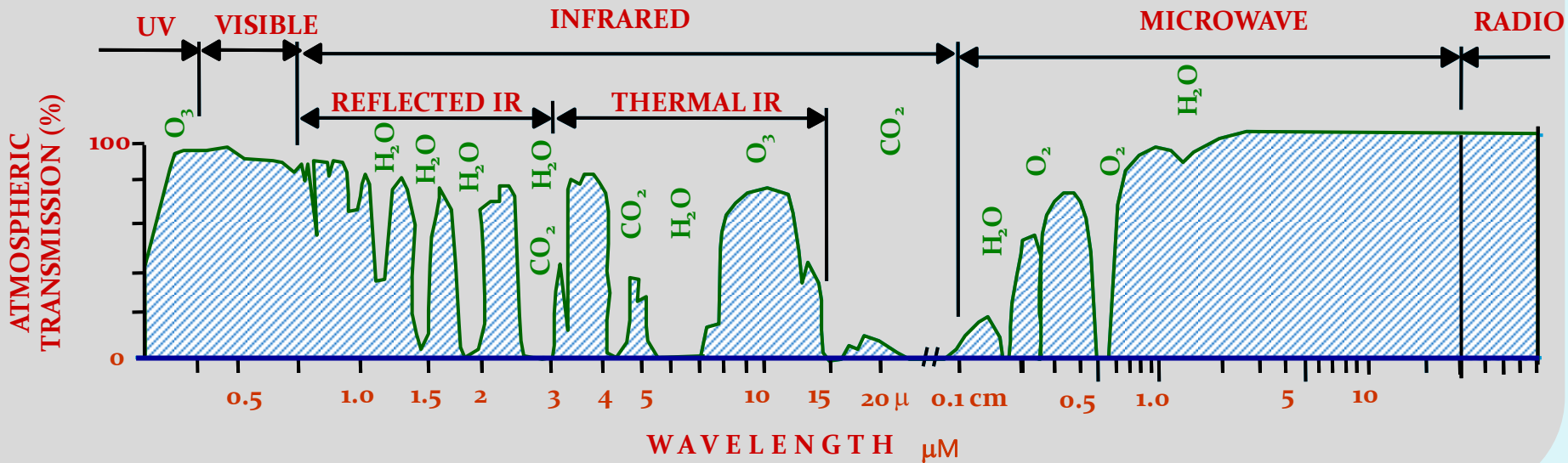


Source: Canadian Centre for Remote Sensing

Earth Observation Satellites



Energy Measured - Electro Magnetic Radiation



0.38 - 0.78 Microns (Visible)

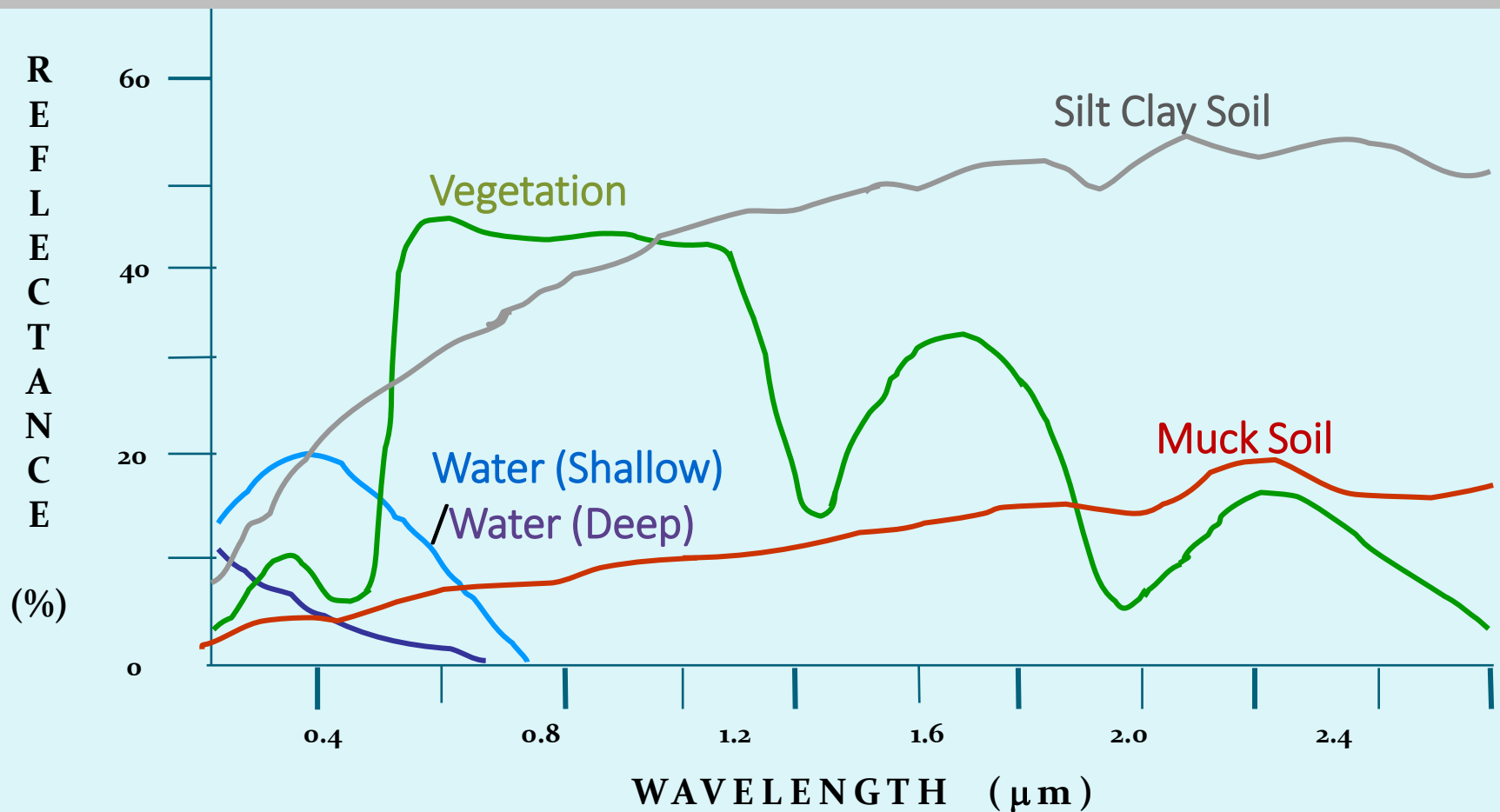
0.72 - 3.00 Microns (Middle IR, Near IR); 8.00 - 14.00 Microns (Thermal IR)

0.72 - 3.00 Microns (Middle IR, Near IR); 8.00 - 14.00 Microns (Thermal IR)

Signatures of Objects (Soils, Vegetation, Water, etc)

Incident EM energy interacts with 'Target' and resultant scattered wave contains the 'Finger print' of the target for its unique 'signature'.

Reflected or emitted EM energy from earth surface is observed in different wavelengths (bands) of the spectrum to understand the target signature.



Platforms and Sensors

PLATFORMS

Stage to mount camera or sensor to acquire information about a target under investigation. Based on its altitude above earth surface, platforms may be classified as i) Ground borne, ii) Air borne and iii) Space borne.

Ground-based platforms

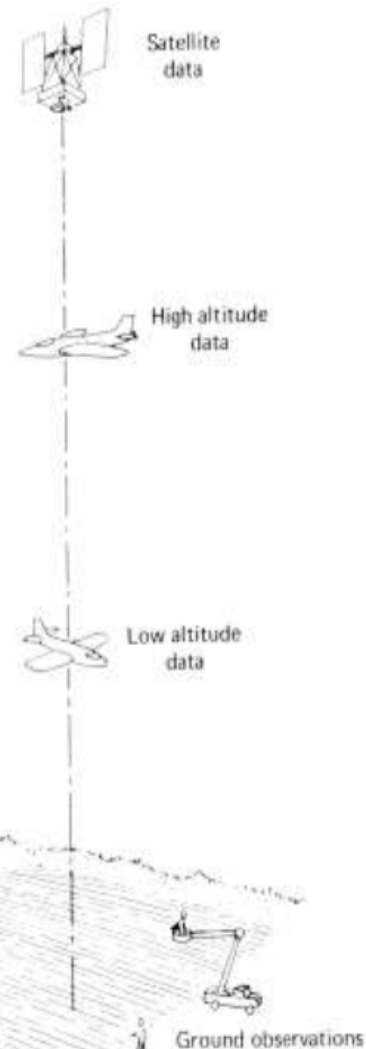
Mainly used for collecting ground truth or for laboratory simulation studies.

Air-borne platforms

Used to acquire aerial photographs for photo-interpretation and Photogrammetry purposes. Scanners are tested against their utility and performance from these platforms before these are flown onboard satellite missions.

Space-borne platforms

Platforms in space are not affected by the earth's atmosphere. These platforms are freely moving in their orbits around the earth, and entire earth or any part of the earth can be covered at specified intervals. The coverage mainly depends on the orbit of the satellite.



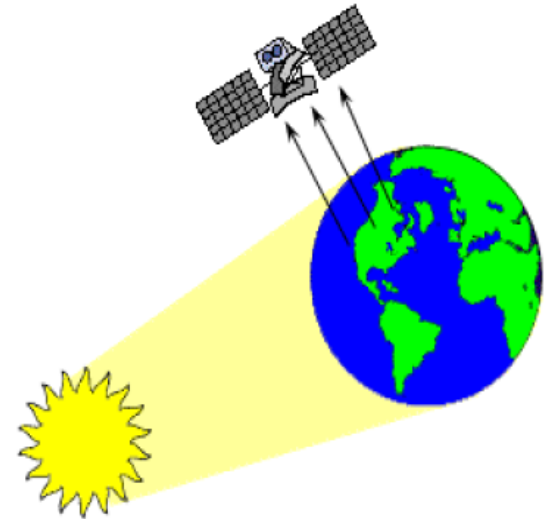
from <1 m

to 36,000 km height

Passive Vs. Active Remote Sensing

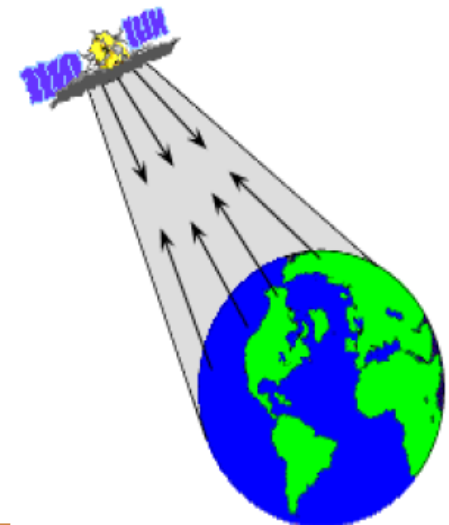
■ Most remote-sensing systems are **passive**

- They use energy provided by the sun, and Earth. e.g. Aerial photographs and most satellite systems
- Used for earth resources mapping and monitoring



■ Some systems are **active**

- They generate their own energy e.g. RADAR (radio detection and ranging), LIDAR (light detection and ranging) and SONAR(Sound navigation ranging)
- Used for altimetry and imaging.

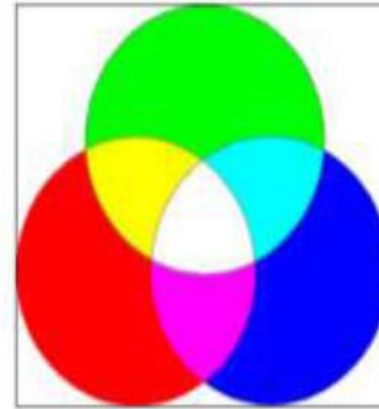


SOME ASPECTS OF SATELLITE REMO

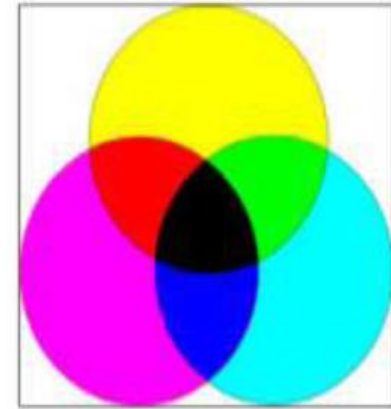
- Resolution (Spatial, Spectral, Radiometric and Tem
- Bands (Panchromatic/ Multispectral/ Hyperspectral)
- Date of Pass (Single/ Multi-date)
- Scale (local/regional perspective)
- Band Combination [False Colour Composite (FCC)
Composite (NCC)]
- Image Interpretation/ Classification (Supervis

REMOTE SENSING IMAGE & ITS DISPLAY

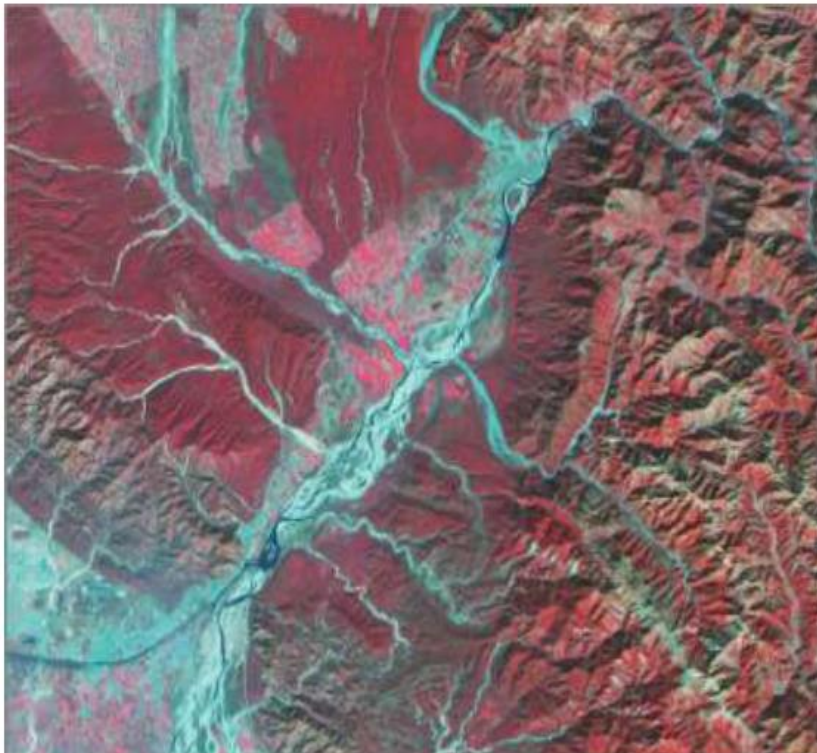
- Image is composed of 2-D array of picture element, or **pixels**.
- Intensity of each pixel is corresponding to average **Brightness Value (BV)** or **Digital Number (DN)** or radiance.



Additive Color



Subtractive Color



IRS LISS-III (RGB: NIR, RED, GREEN)
False Colour Composite (FCC)

		Columns (j)						
		1	2	3	4	5		
Lines or rows (i)	1	10	15	17	20	21		1
	2	15	16	18	21	23	90	2
	3	17	18	20	22	22	120	3
	4	18	20	22	24	25	103	4
					150	150		
		100	93	97	101	105	135	245
			103	90	70	120	133	220
						200		
		200	100	0	123	222	215	

Digital number of column 5, row 4 at band 2 is expressed as $BV_{5,4,2} = 105$

Band Combination- False Colour Composite (FCC)



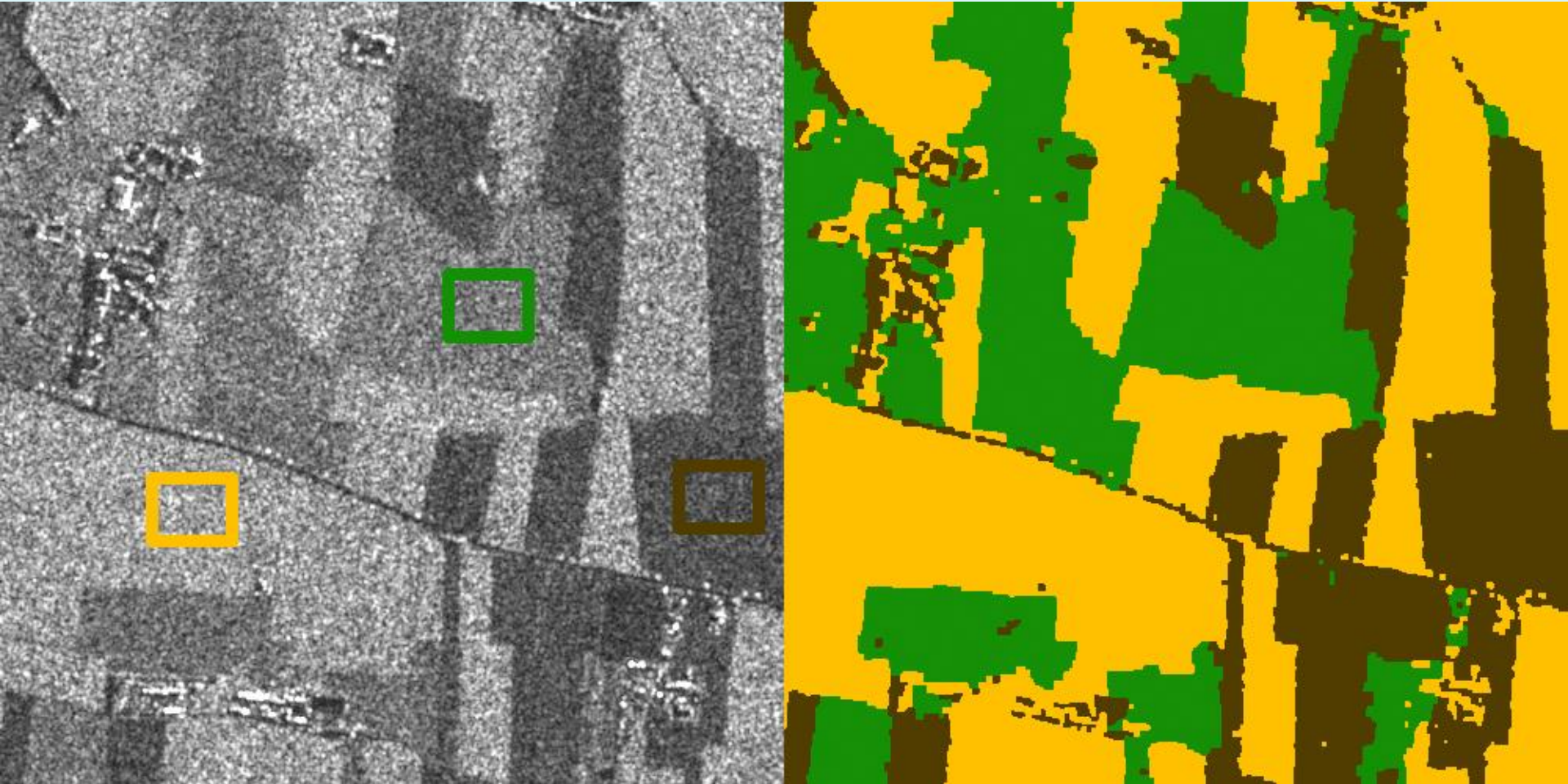
Superior interpretation quality...

Band Combination- Natural Colour Composite (NCC)



Product relevant for common users... but inferior interpretation quality...

Microwave Satellite Images



ELEMENTS OF IMAGE INTERPRETATION

- Tone or Colour
- Texture
- Pattern
- Size
- Shape
- Shadow
- Association..

Elements of Image Interpretation

TONE (HUE)



- Each wavelength/ band of EMR recorded by the sensor can be displayed in shades of grey from black to white
- These shades are called “tones” - dark, light, intermediate
- Human eye can see 40-50 tones

Digital Image Processing

High Resolution Satellite Image- Magnification



10 m resolution



30 m resolution



80 m resolution

A "High Resolution" image refers to one with a small resolution size. Fine details can be seen in a high resolution image. On the other hand, a "Low Resolution" image is one with a large resolution size, i.e. only coarse features can be observed in the image.

High Resolution Satellite Image- Magnification

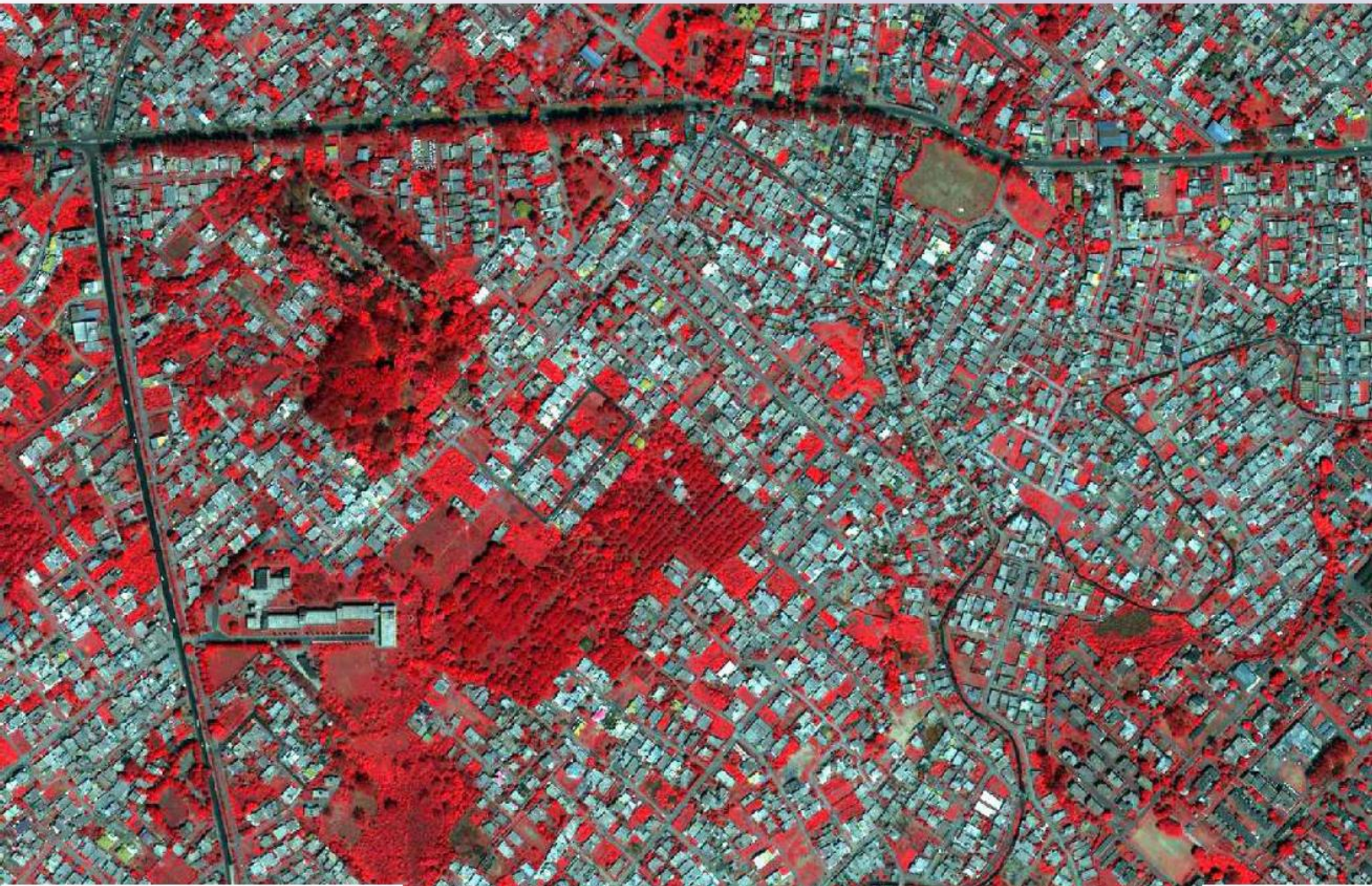


Image magnification

1:5,000

High Resolution Satellite Image- Magnification



Image magnification

1:2,500

High Resolution Satellite Image- Magnification



Image magnification

1:1,000

High Resolution Satellite Image- Temporal



5/4/2003



26/11/2010



23/02/2015

Temporal Images for Change Detection.. Stages of urbanization..

DIGITAL IMAGE PROCESSING

- Image quality and statistical evaluation
- Image geo-referencing
 - Radiometric correction
 - Geometric correction
- Image enhancement and sharpening
 - Contrast enhancement
 - Spatial filtering
 - Indices
- Image classification
 - Pixel based
 - Object-orientation based
 - Accuracy assessment
- Data merging using GIS
- Change detection

IMAGE RECTIFICATION

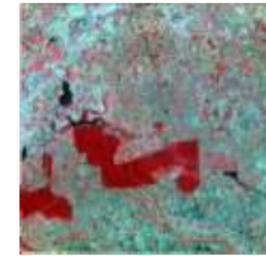
Remotely sensed data cannot be used directly for resource information due to inherent distortions.

- **Earth Rotation Effects**

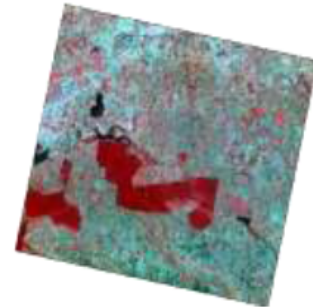
During frame acquisition, earth rotates from W to E while satellite passed from pole to pole.

- **Panoramic Distortion**

Remote sensing data is acquired using scanners having constant IFOV, which results in larger pixel size in extremes. It is generally found with satellites having large swath.



Raw



Corrected

- **Variation in platform altitude, attitude and velocity**

Changes in IFOV and field view is observed. Similarly, with change in velocity of satellite a scale change occurs.

Sources of Ground Control Points (GCPs)

- Key Board (Registration when coordinates are known)
- File (When GCPs are saved as a file)
- Digitizing Tablet (when GCPs given by Digitizing table)
- Map (Image to Map Registration)
- Image (Image to Image Registration)

Radiometric Correction

- Dark Pixel Subtraction Technique

This technique assumes that there is a high probability that there are at least a few pixel within an image which should be black (0% reflectance).

- Histogram Adjustment Technique

In this technique, the histogram of the each band is studied in combination to other and the offset is subtracted from the bands

- Regression Adjustment Technique

In this technique, the regression equation is derived and plotted. The offset on the x-axis is subtracted from the image.

IMAGE ENHANCEMENT

- To improve visual interpretability of an image by increasing apparent distinction between features
- To create new image from the original image in order to increase the amount of information that can be visually interpreted from the data
- Point operations:
 - modify the brightness value of each pixel independently
- Local operations:
 - modify the value of each pixel based on neighboring brightness values

Image Enhancement- Some Example

Raw Satellite Image

IRS-P6 LISS-III 19th APRIL 2010

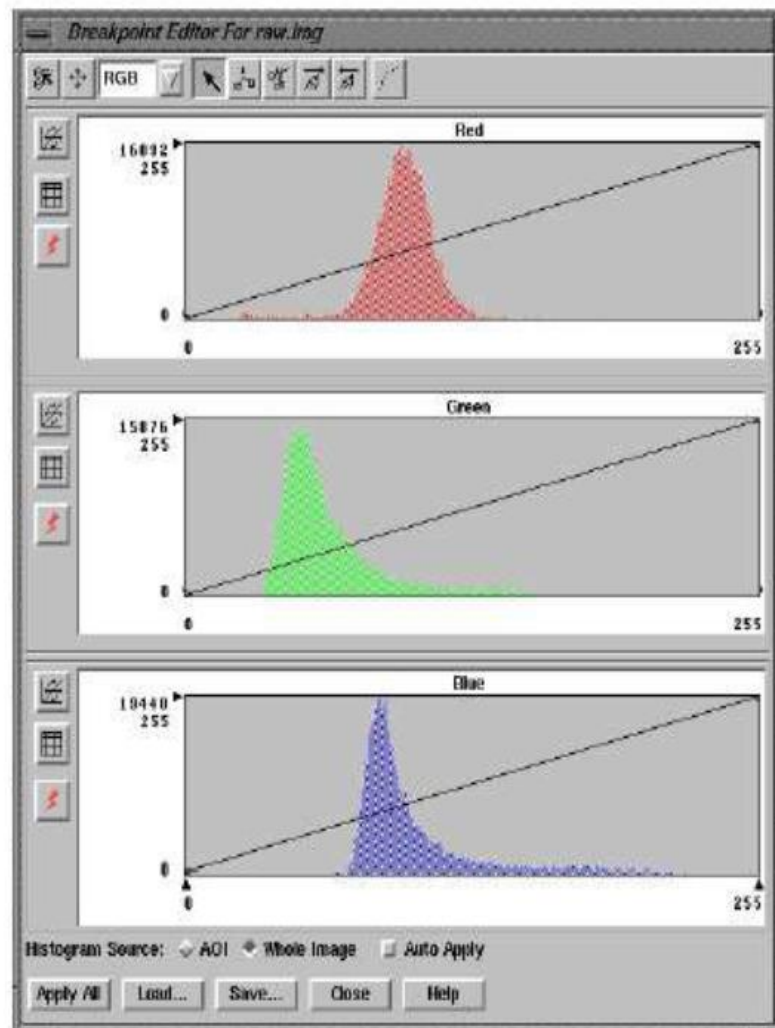
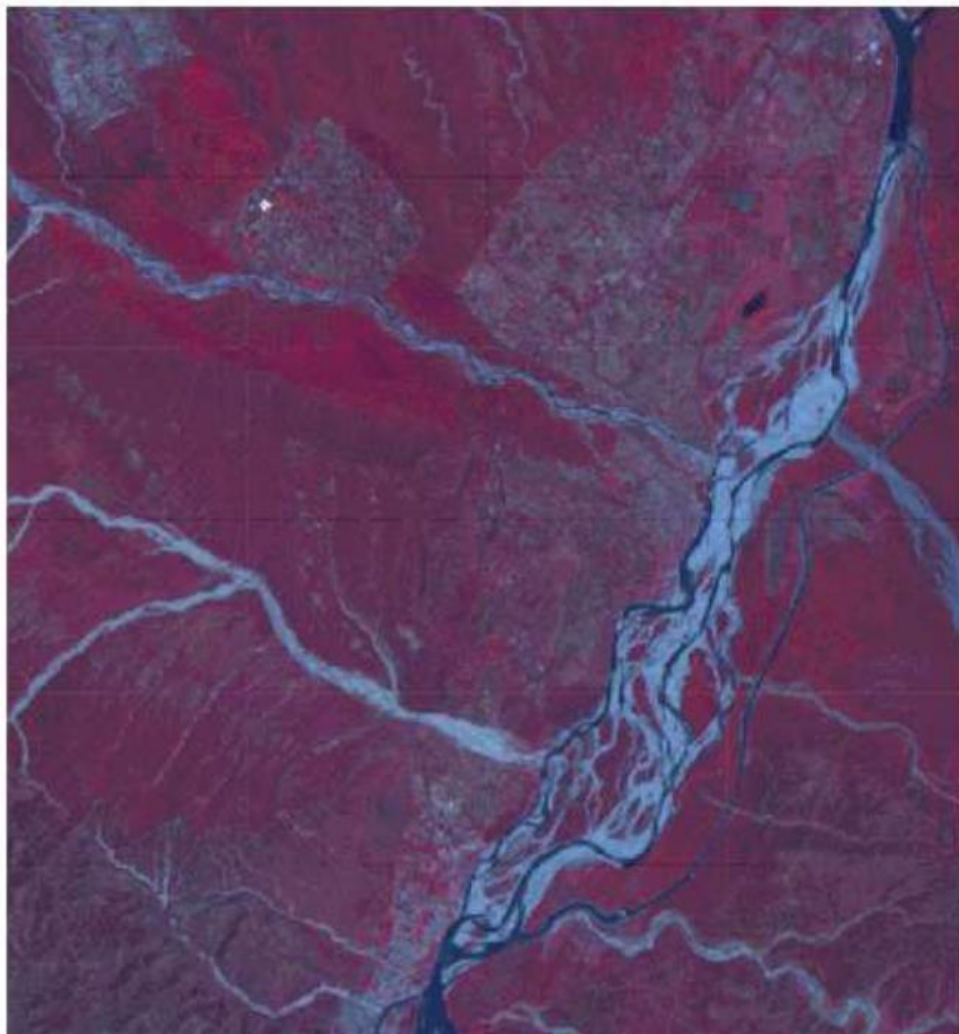


Image Enhancement- Some Example

Contrast Enhancement: Standard Deviation

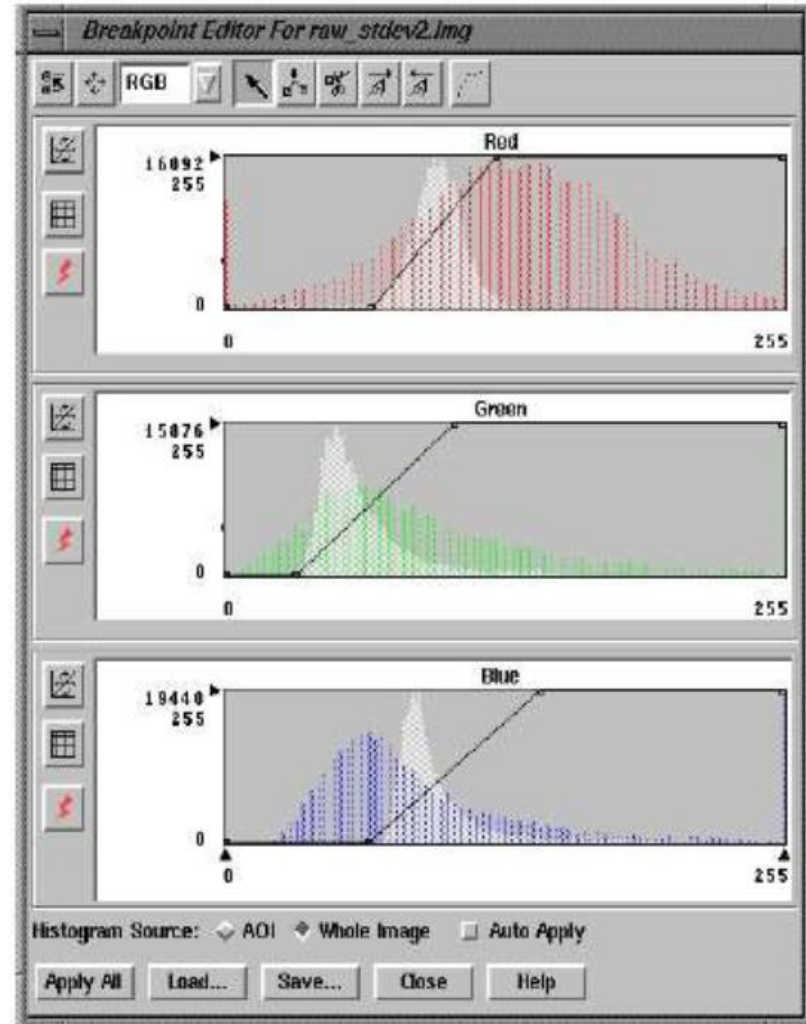
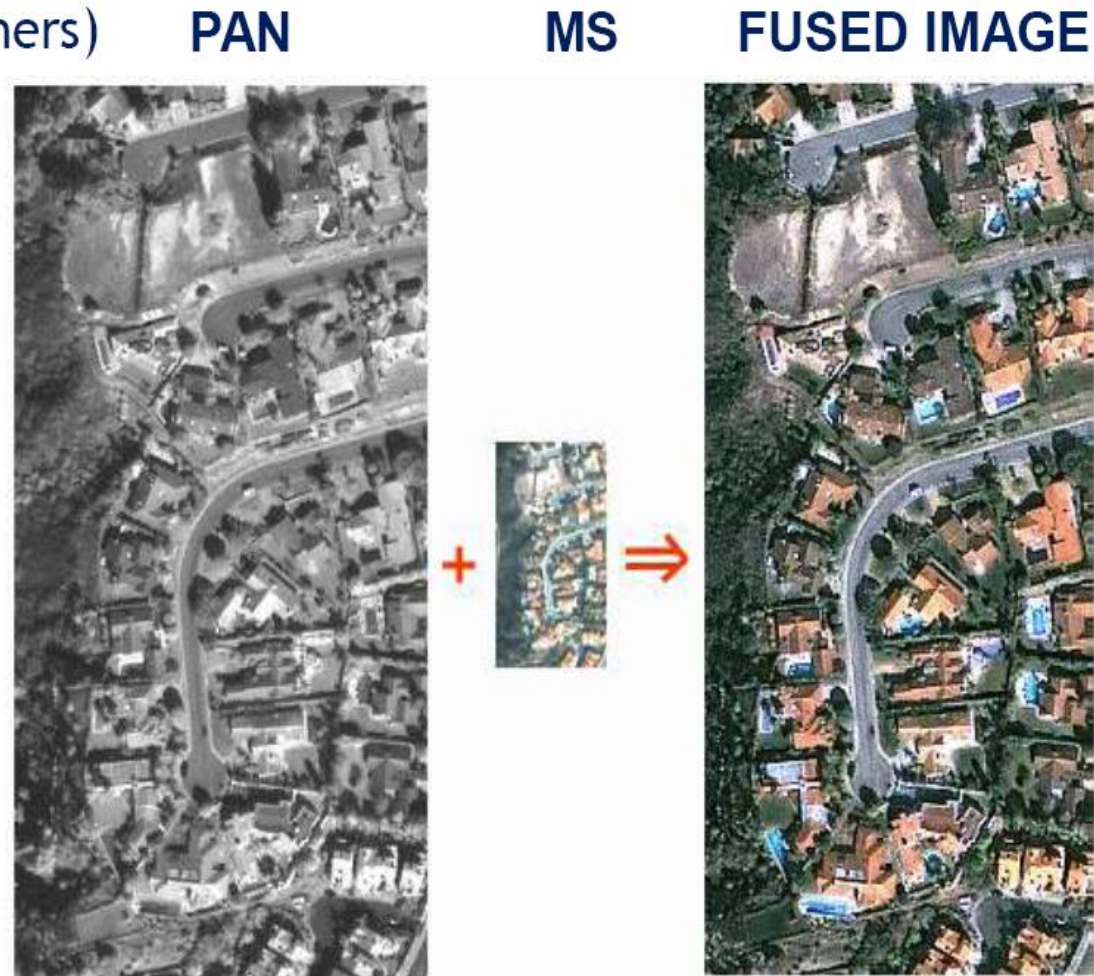


Image Fusion

Set of methods, tools and means of using data from two or more different images to improve the quality of information.

- Sharper image resolution (display)
- Improved classification (and others)

Combines higher spatial information in one band with higher spectral information in another dataset to create 'synthetic' higher resolution multispectral images.



Shadow in high resolution images



Shadows in QuickBird imagery



$$\tan (\text{Sun Elevation}) = \frac{\text{Height of Object}}{\text{Length of shadow}}$$

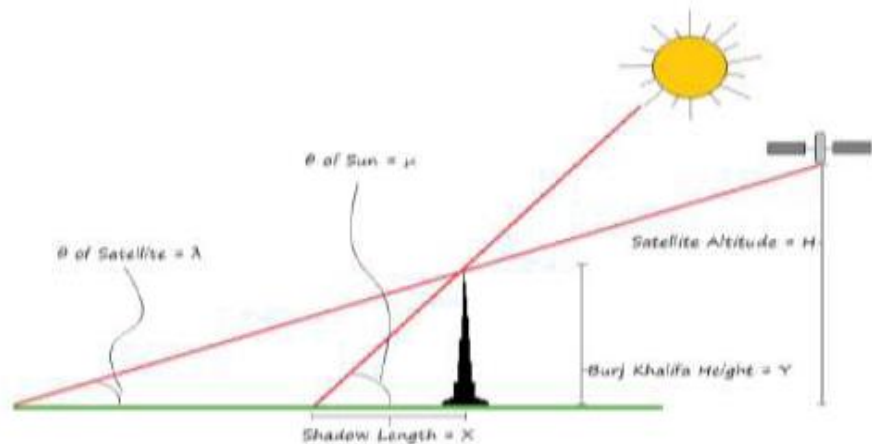


Image Classification

Place urban/ rural landscape into categories (classes)


- Forest, Agriculture, Water, Built-up, etc.

□ a) **Supervised Classification**

- Apriori knowledge is used to train the classifier
- Training sets are identified for the classes present
- Based on the statistics of the training sets the pixels are classified

□ b) **Unsupervised classification**

- Requires minimum input from the analyst
- The algorithm makes clusters of spectrally similar groups
- Usually helpful as a preprocess to supervised classification



Introduction to Geographical Information System (GIS)

Defining Geographical Information Systems (GIS)

- The *common ground* between information processing and the many fields using spatial analysis techniques. (Tomlinson, 1972)
- A powerful *set of tools* for collecting, storing, retrieving, transforming, and displaying spatial data from the real world. (Burroughs, 1986)
- A computerized *database management system* for the capture, storage, retrieval, analysis and display of spatial (locationally defined) data. (NCGIA, 1987)
- A *decision support system* involving the *integration* of spatially referenced data in a problem solving environment. (Cowen, 1988)

The Geographic Approach

The Geographic Approach - a new way of thinking and problem solving that integrates geographic information into how we understand and manage our planet.

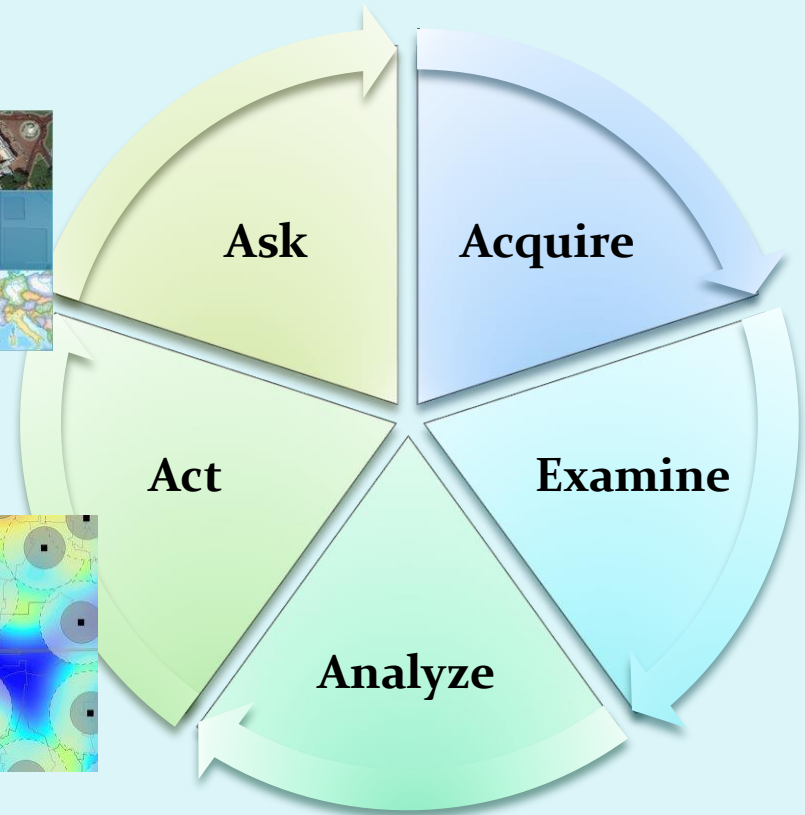
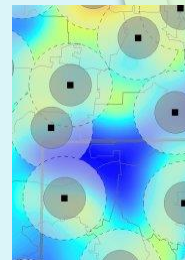
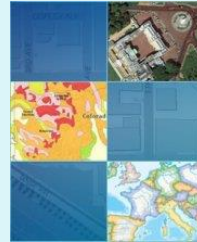
Step 1: Ask

Step 2: Acquire

Step 3: Examine

Step 4: Analyze

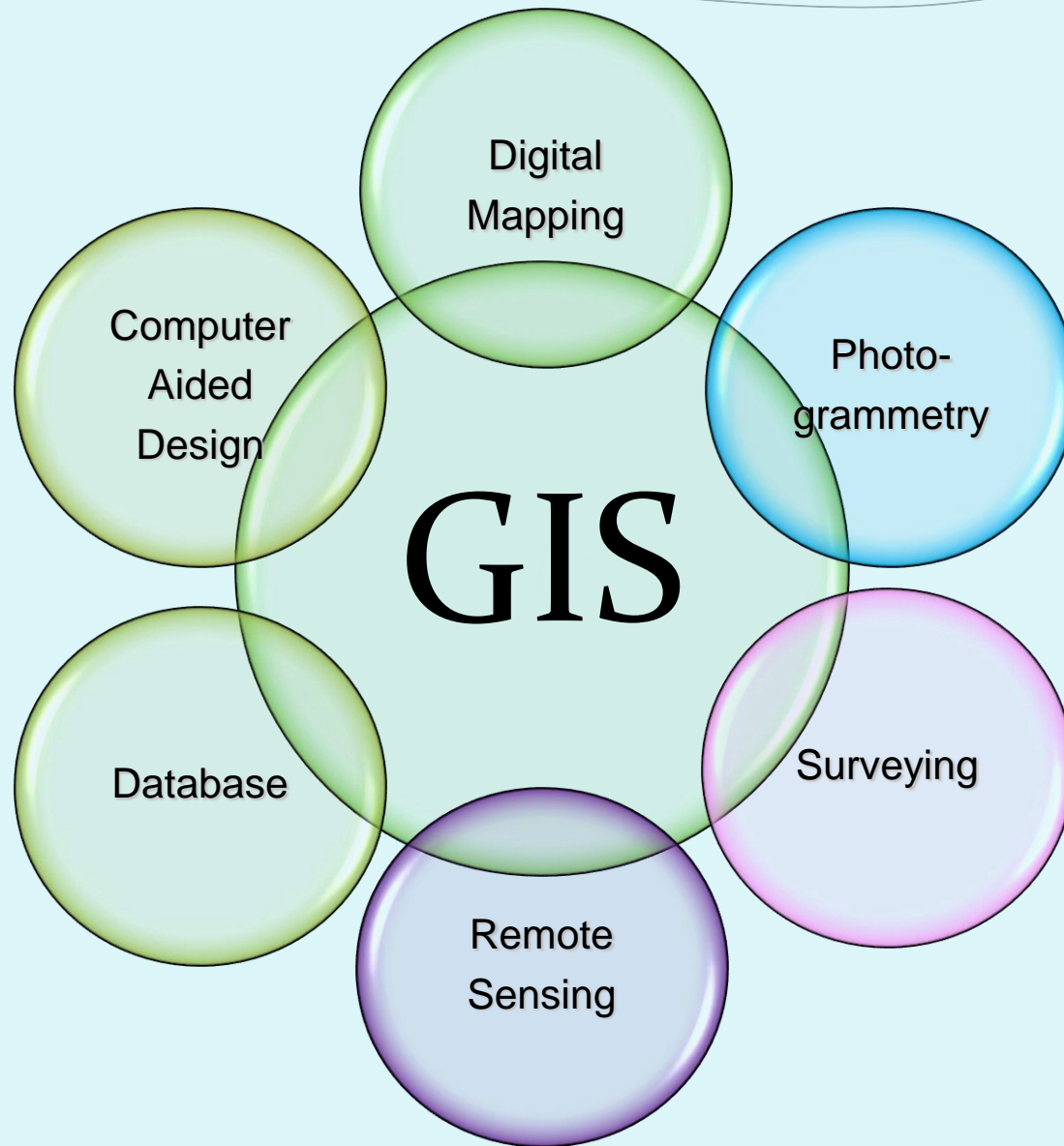
Step 5: Act



Why GIS?

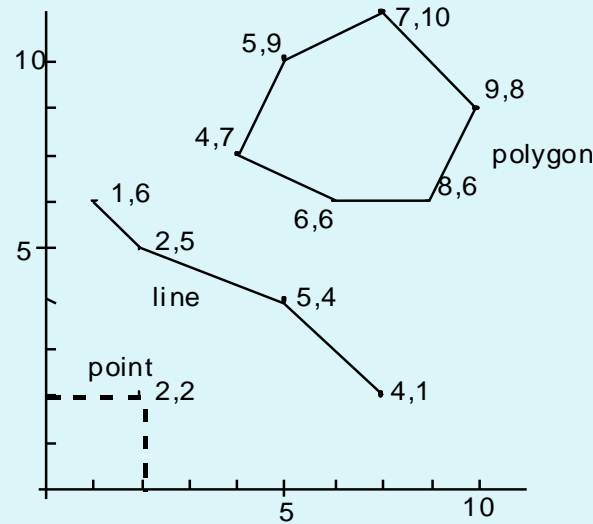
- ❑ A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.
- ❑ GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.
- ❑ GIS helps one to answer questions and solve problems by looking at data in a way that is quickly understood and easily shared.
- ❑ GIS technology can be integrated into any enterprise information system framework.

Multi-disciplinary nature of GIS



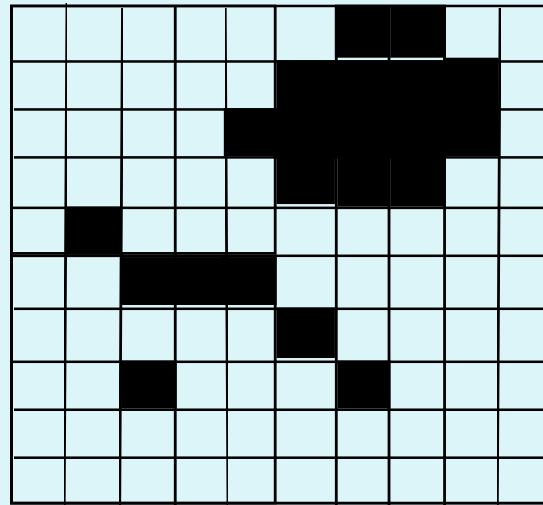
Spatial data storage

- Vector model



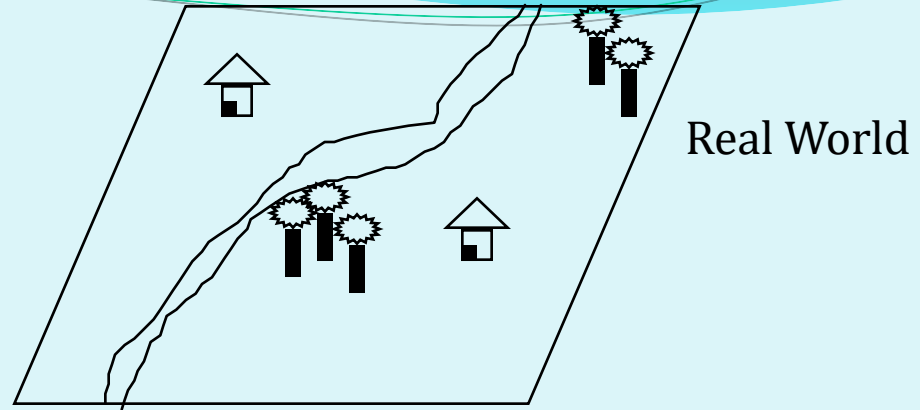
as geometric objects:
points, lines, polygons

- Raster model



as image files
composed of grid-cells
(pixels)

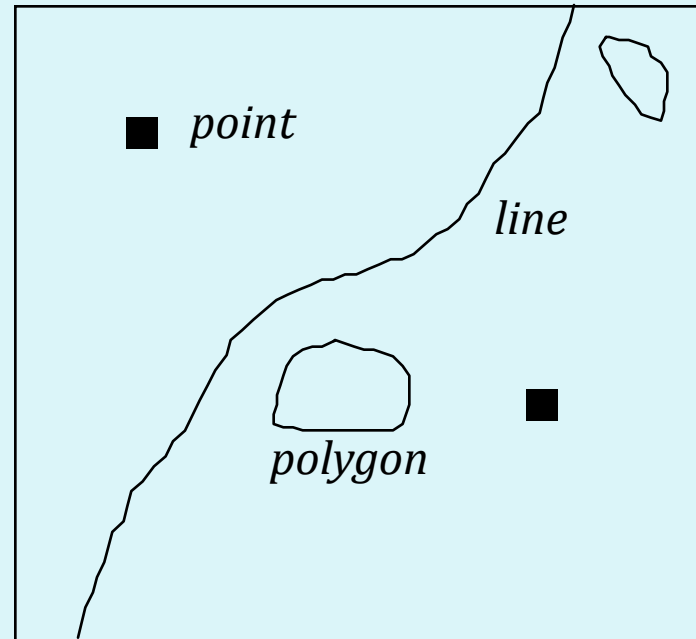
Concept of Vector and Raster Data



Raster Representation

	0	1	2	3	4	5	6	7	8	9
0								R	T	
1							R			T
2		H					R			
3							R			
4					R	R				
5				R						
6			R		T	T		H		
7			R		T	T				
8		R								
9		R								

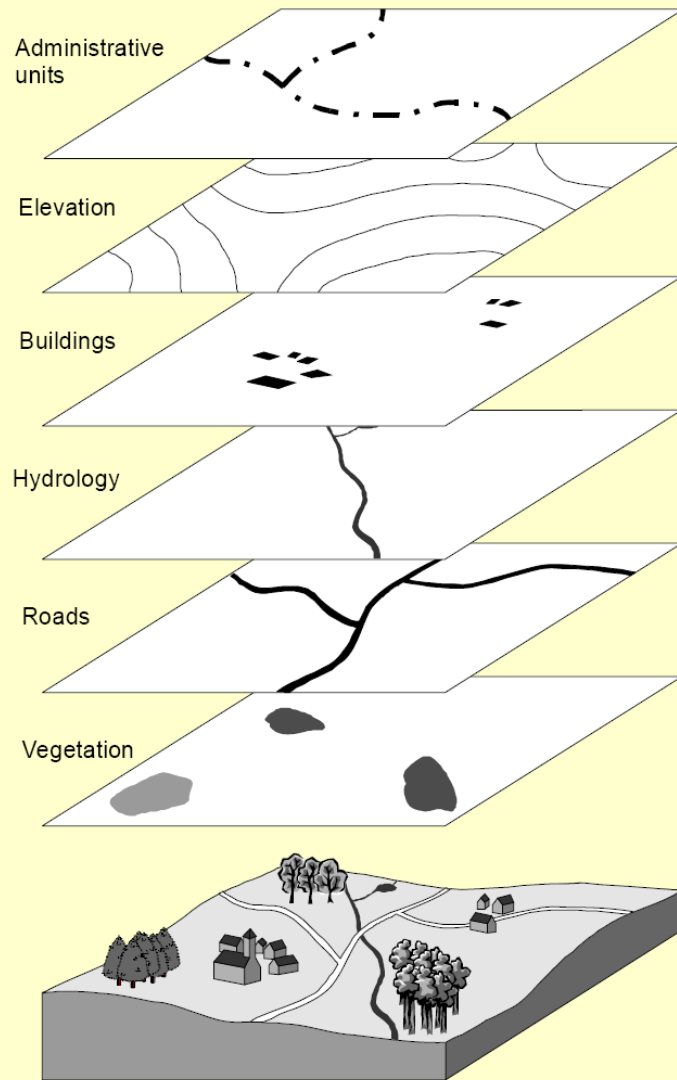
Vector Representation



Querying GIS data

- Attribute query
 - Select features using attribute data (e.g. using SQL)
 - Results can be mapped or presented in conventional database form
 - Can be used to produce maps of subsets of the data
- Spatial query
 - Clicking on features on the map to find out their attribute values
- Used in combination these are a powerful way of exploring spatial patterns in your data

Data integration: Overlay



Data integration

Geographic location provides the frame of reference:
“space as an indexing system”

Advantages of GIS

- Allows us to see our data and spatial relationships in new ways encourages us to explore the spatial aspects of the problem being addressed
- Exploring both geographical and thematic components of data in a holistic way
- Stresses geographical aspects of a research question
- Allows handling and exploration of large volumes of data
- Allows integration of data from widely disparate sources
- Allows analysis of data to explicitly incorporate location
- Allows a wide variety of forms of visualisation
- Allows us to simulate the impact of decisions prior to implementation

Introduction to TRAC

- Structure
- Management and Functionality
- Key Applications

Objectives / Functions of TRAC

- **Nodal agency for providing Space Technology Application Services in the state.**
- **Assisting the planners in providing latest and authentic information on natural resources for improved application and management.**
- **Assisting the line departments of the Government in formulation and execution of Geospatial Technology Application projects.**
- **Undertaking, aiding, promoting, guiding and coordinating research in the field of Remote Sensing and GIS.**
- **Carry out short & long term surveys using RS to map, monitor and manage natural resources in Telangana.**
- **Provide consultancy services to user departments and agencies.**
- **Train officials of Line Depts., of State on geo-spatial technologies & applications.**
- **Interact with ISRO & other organisations and develop efficient database and retrieve based on aerial photos and satellite imageries.**



DKIC

District Knowledge and
Innovation Centre

District Knowledge & Innovation Centres (DKICs)

*- an initiative to take GIS to the
grassroots*



AS VIEWED BY IRS-P6 SATELLITE
Resource Sat LISS-III



Land Resources

Activities in Agriculture Sector

S.No.	Projects
1	Integrated Seasonal Condition Monitoring System (ISMS)
2	Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL)
3	Applications of Remote Sensing and GIS in Sericulture Development - Phase II (
4	Geospatial Database Creation for Soil Health Card Scheme (2nd Cycle) of National Mission for Sustainable Agriculture (NMSA), Telangana State
5	Geo-Spatial Information System for Horticulture (Horti-GIS) in Telangana
6	Land Degradation (Second Cycle) - 2015-2016
7	Co-ordinated Programme on Horticulture Assessment and Management using Geo-informatics (CHAMAN)
8	SUFALAM (Space technology Utilization for Food Security, Agricultural Assessment and Monitoring) Programme
9	Technology development project (TDP), for Kharif Soybean

LU/LC Change Analysis in 1:50,000 scale (3rd Cycle)

Objectives

- Identification and depiction of major changes between 2005-06 to 2011-12 and 2015-16.
- Preparation of change statistics and identification of change spatial distribution.

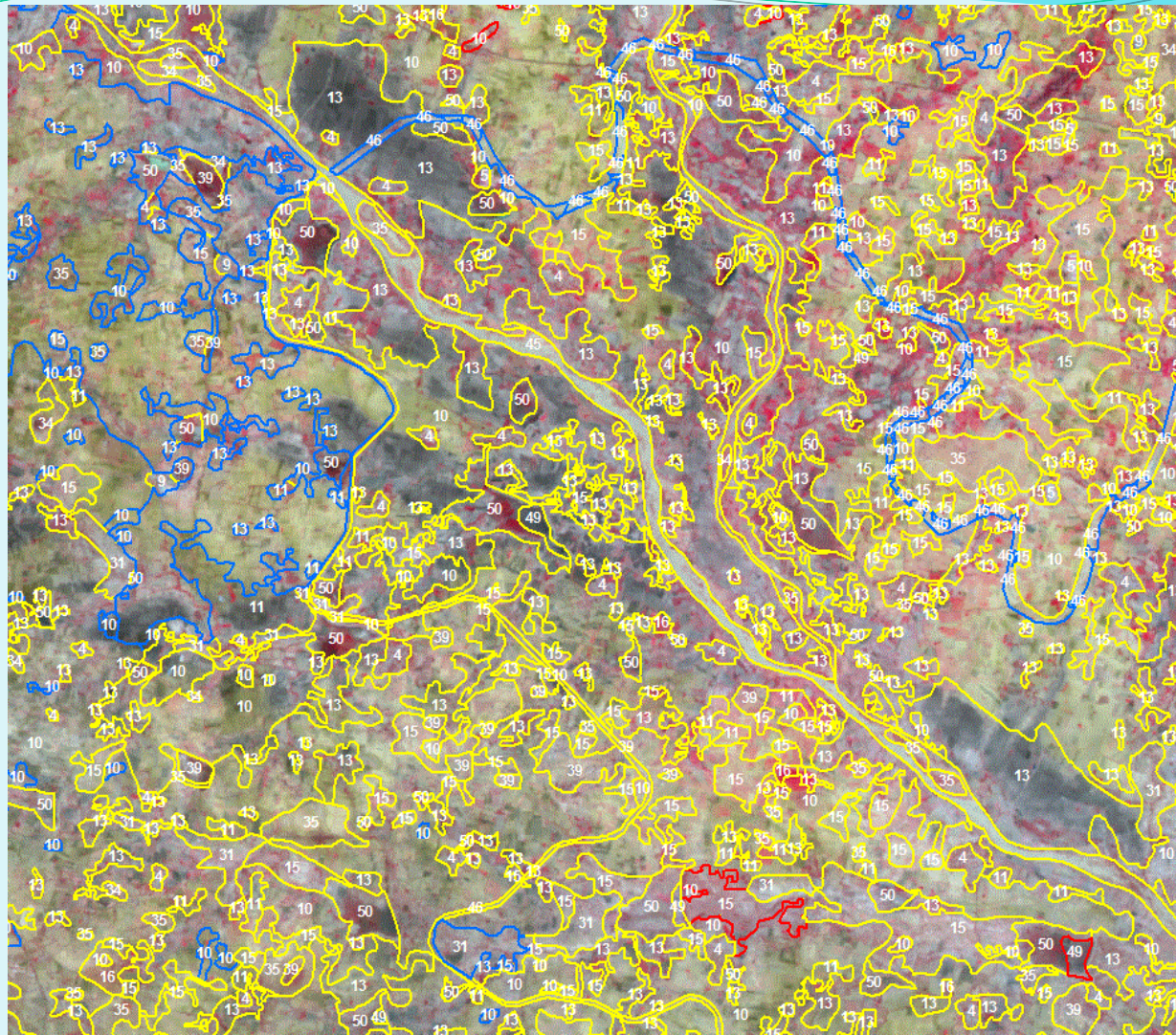
Scope

Identification of major changes in the entire state to assess and manage land use land cover pattern.




Deliverables

- Seamless LULC change layer of 2015-16 for entire state.
- LULC change map and statistics.

Updating Of 2011-12 LULC layer on 2015-16 Image

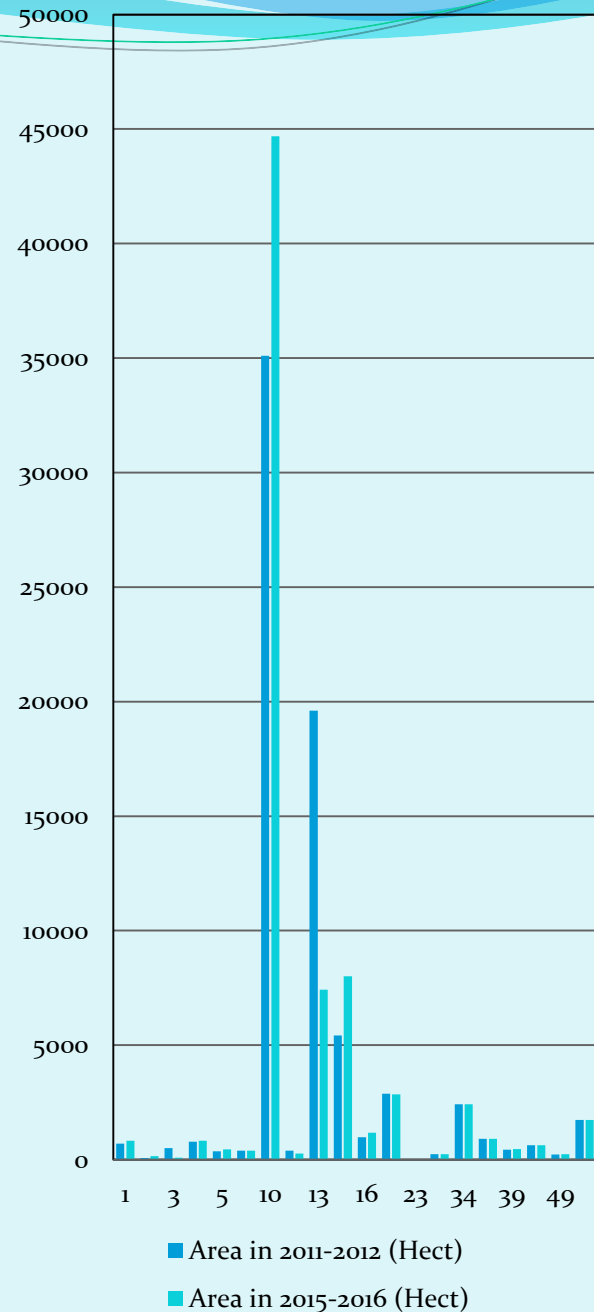


Legend

-  Category Change
-  Change due to Interpretation
-  No Change

LULC Change Statistics (1:50,000 scale)

Map Code	Description	2011-2012 Area (Hect)	2015-2016 Area (Hect)	Change Area (Hect)
1	Built up-Compact	696.23	826.67	130.44
2	Built up-Sparse	76.99	156.73	79.74
3	Urban Vegetated / Open Area	506.70	89.66	-417.04
4	Rural	788.79	823.53	34.74
5	Industrial area	362.00	451.54	89.54
9	Quarry area	389.72	389.72	0.00
10	Crop - Kharif	35100.32	44688.27	9587.95
11	Crop - Rabi	386.67	262.67	-123.99
13	Cropped in 2 seasons	19598.48	7417.08	-12181.41
15	Fallow land	5419.46	8008.75	2589.29
16	Agriculture Plantation	974.93	1181.20	206.26
20	Deciduous forest - Open	2879.04	2858.18	-20.86
23	Scrub Forest	28.93	28.93	0.00
31	Salt Affected Land	233.71	233.71	0.00
34	Scrubland - Closed	2423.63	2423.63	0.00
35	Scrubland - Open	916.74	916.74	0.00
39	Barren rocky	438.16	459.02	20.86
45	River - Non Perennial	625.85	625.85	0.00
49	Reservoir - Permanent	231.04	235.43	4.39
50	Reservoir - Seasonal	1737.08	1737.08	0.00

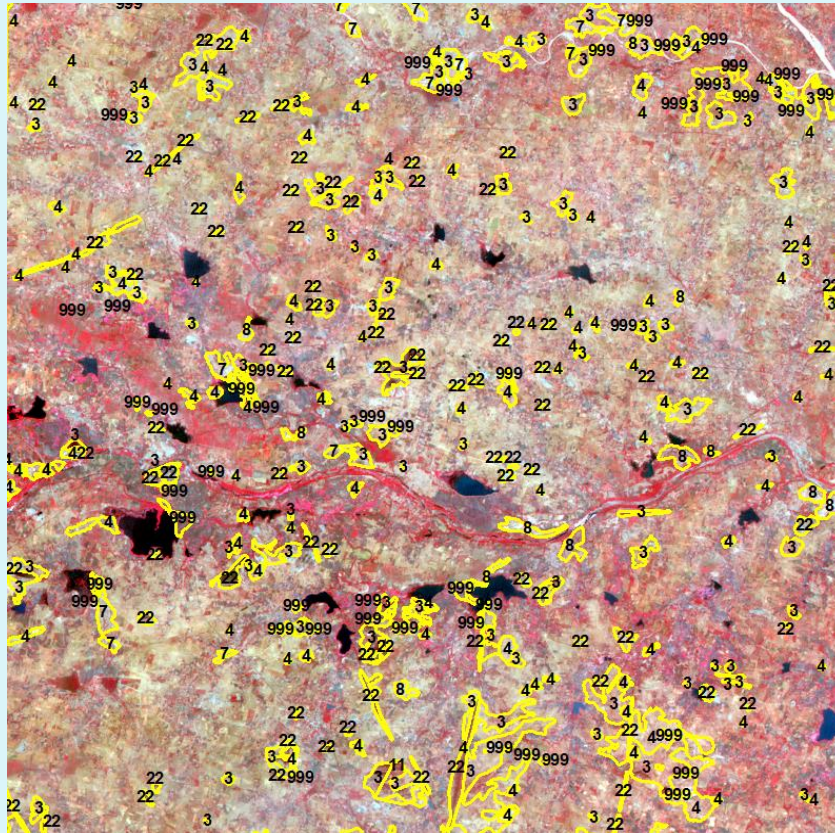


NATIONAL WASTE LAND CHANGE ANALYSIS

Objective

2015-16

- Identification of major change areas in waste lands between 2008-09 and 2015-16

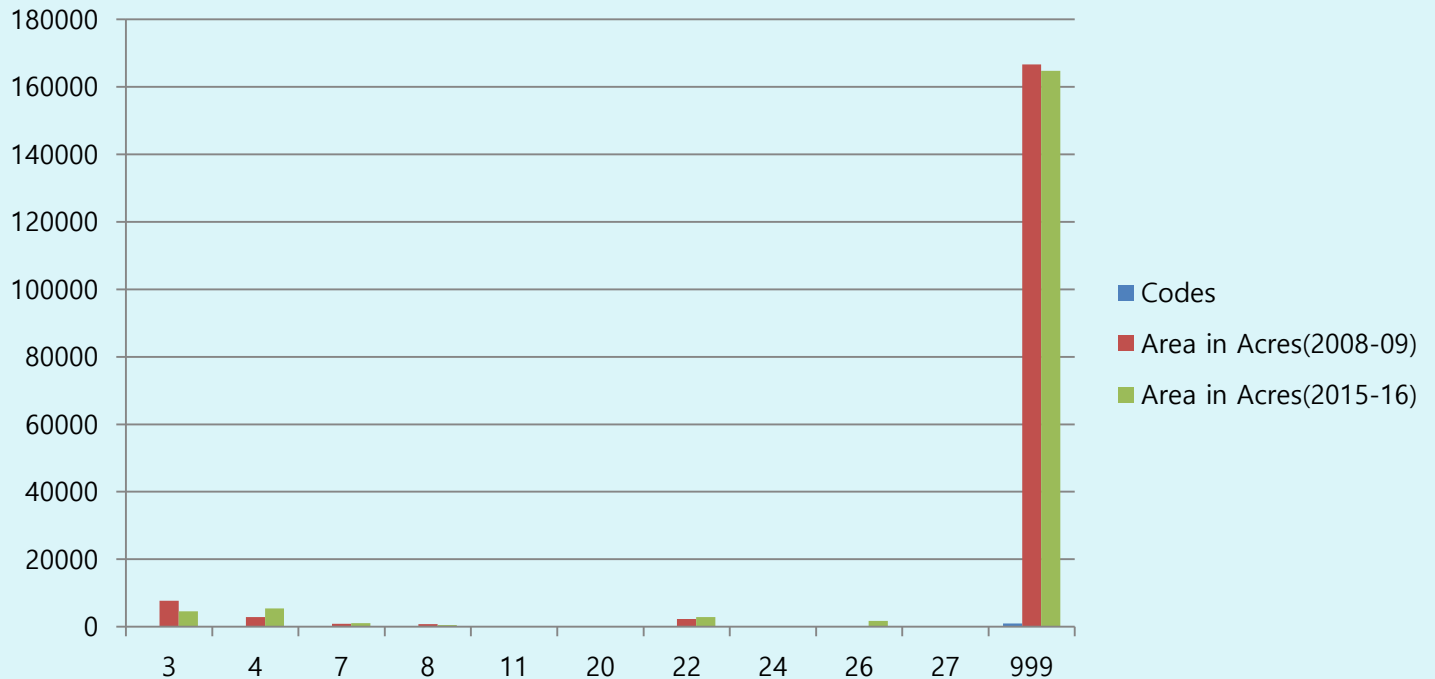


Codes (2008-09)	Waste Land Classes Description	Area (Acres)
22	Barren Rocky	2318.82
3	Land with Scrub - Dense	7709.20
4	Land with Scrub - Open	2865.28
999	Non Wasteland Area	166639.33
7	Salt affected - Moderate	847.27
8	Salt affected - Strong	806.43
11	Under utilised / Deg. Forest (Scrub domin.)	185.78

Visual Interpretation for Waste Land Classes on 2008-09 Imagery

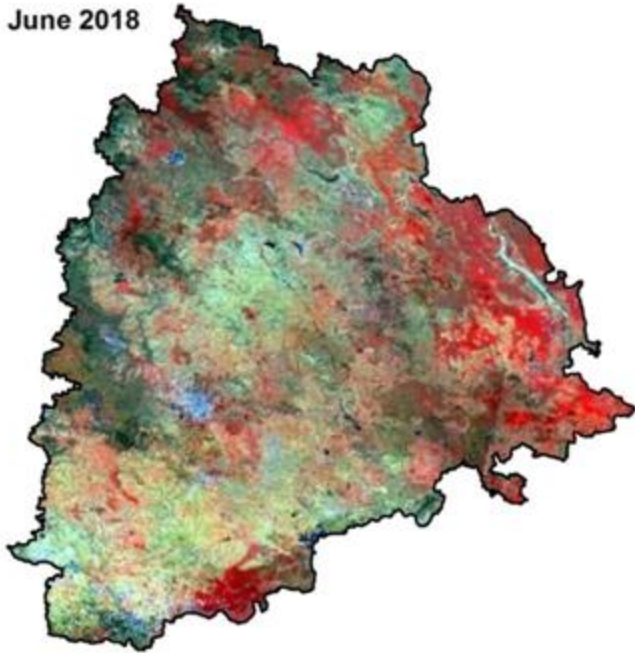
Waste lands Change Statistics

Codes	Waste Land Classes Description	2008-09 Area (Acres)	2015-16 Area (Acres)	Change (Acres)
3	Land with Scrub - Dense	7709.20	4594.25	-3114.95
4	Land with Scrub - Open	2865.28	5407.80	2542.52
7	Salt affected - Moderate	847.27	1075.80	228.53
8	Salt affected - Strong	806.43	531.17	-275.25
11	Under-utilised / deg. forest (Scrub domin.)	185.78	185.78	0.00
20	Mining Wastelands		105.92	105.92
22	Barren Rocky	2318.82	2840.95	522.13
24	Built - Up		15.17	15.17
26	Cropland		1753.20	1753.20
27	Fallow Land		78.28	78.28
999	Non Wasteland Area	166639.33	164783.72	-1855.61

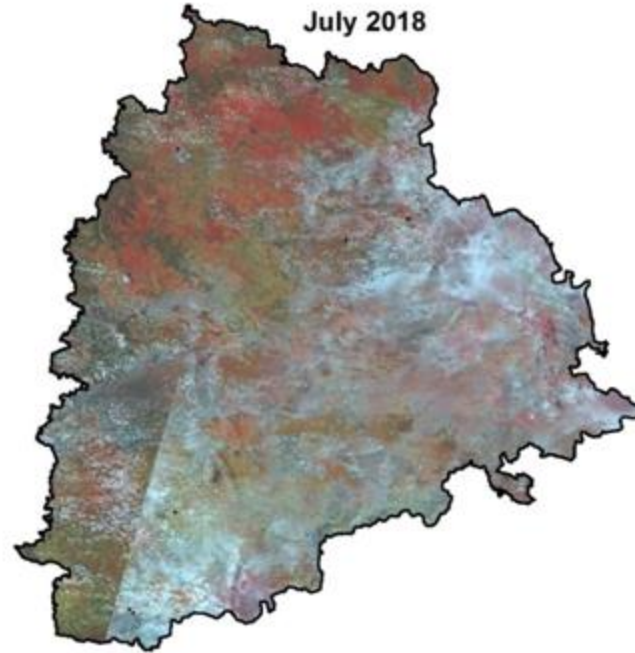


Agricultural Drought Assessment

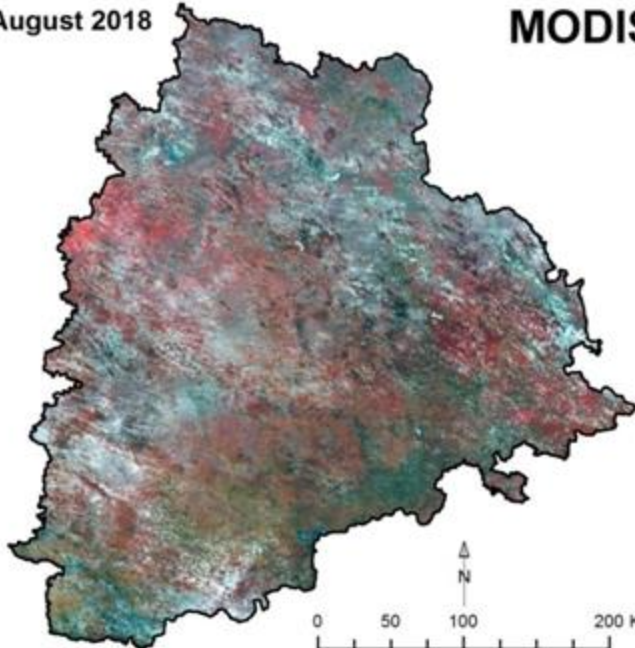
June 2018



July 2018

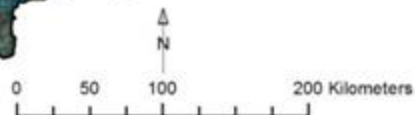
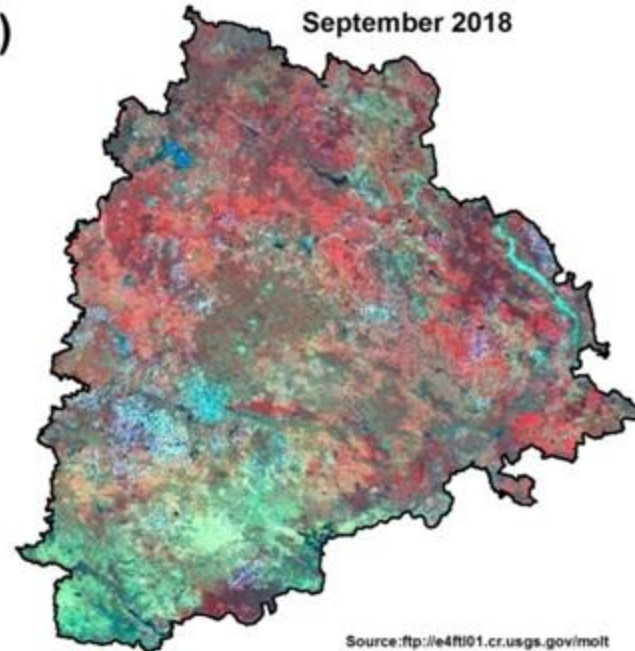


August 2018



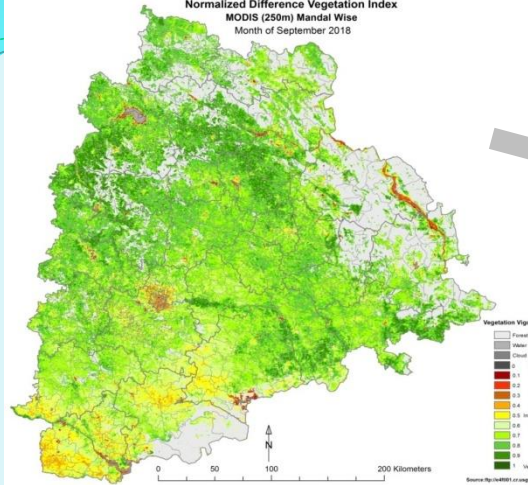
MODIS (250m)

September 2018



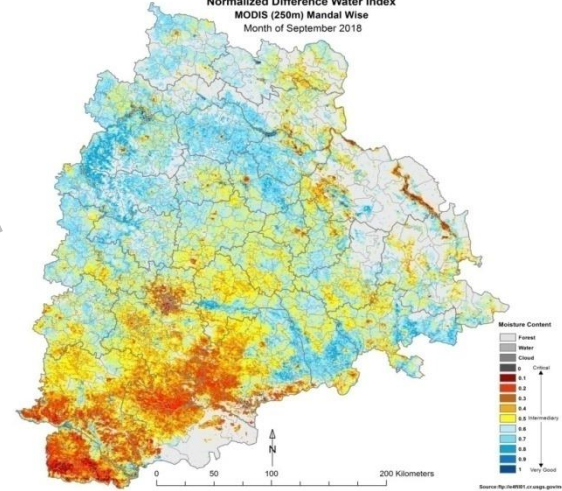
Government of Telangana
Integrated Seasonal Condition
Month of September 2018

Government of Telangana
Normalized Difference Vegetation Index
MODIS (250m) Mandal Wise
Month of September 2018



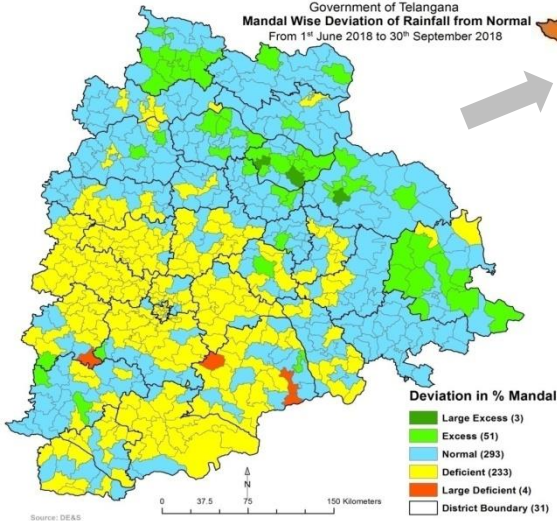
NDVI

Government of Telangana
Normalized Difference Water Index
MODIS (250m) Mandal Wise
Month of September 2018

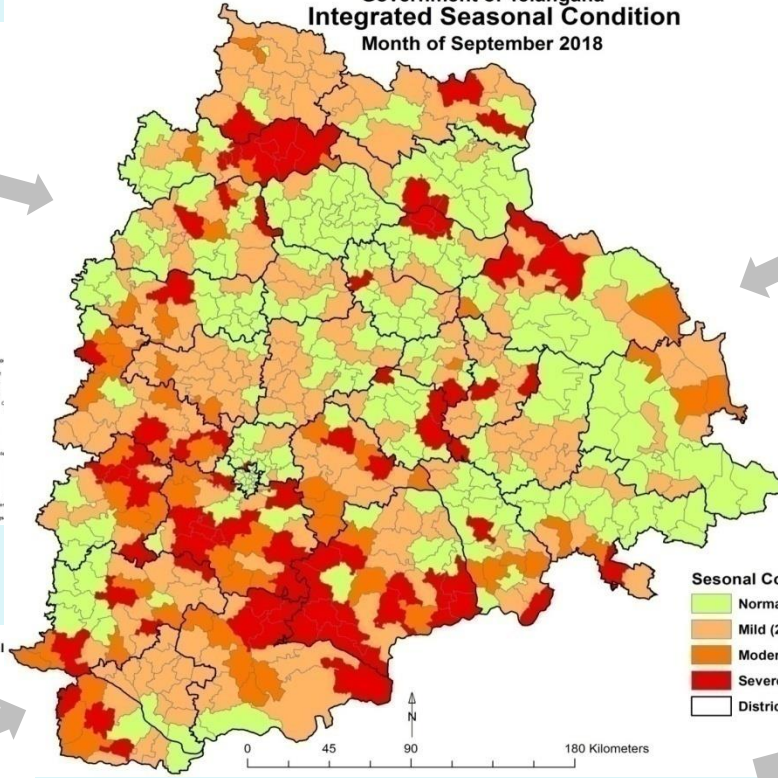


NDWI

Government of Telangana
Mandal Wise Deviation of Rainfall from Normal
From 1st June 2018 to 30th September 2018



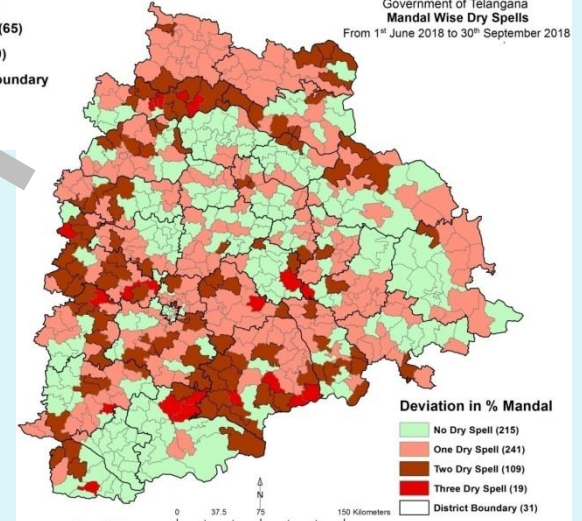
Rainfall Deviation



Seasonal Condition

- Normal (224)
- Mild (216)
- Moderate (65)
- Severe (79)
- District Boundary

Government of Telangana
Mandal Wise Dry Spells
From 1st June 2018 to 30th September 2018



Dry Spells



Ground Truth

NDVI/NDWI/VCI status as on 30-09-2018, Telangana

S.No.	District	NDVI Value	Average NDVI	VCI (NDVI)	NDWI Value	Average NDWI	VCI (NDWI)	VCI Condition
1	Adilabad	0.72	0.75	45.70	0.56	0.59	46.38	Mild
2	Bhadradi Kothagudem	0.65	0.66	47.07	0.51	0.54	47.68	Mild
3	Hyderabad	0.33	0.39	36.93	0.23	0.23	55.82	Mild
4	Jagtial	1.07	0.74	82.72	0.86	0.58	94.21	Normal
5	Jangaon	0.44	0.65	71.04	0.33	0.48	72.31	Normal
6	Jayashankar Bhupalpally	0.61	0.61	55.34	0.47	0.51	44.99	Mild
7	Jogulamba Gadwal	0.47	0.50	36.86	0.27	0.31	45.48	Mild
8	Kamareddy	0.77	0.72	90.25	0.62	0.57	89.02	Normal
9	Karimnagar	0.71	0.69	74.44	0.57	0.54	71.11	Normal
10	Khammam	0.71	0.69	65.88	0.54	0.53	68.96	Normal
11	Komarambheem Asifabad	0.68	0.66	59.57	0.53	0.53	60.85	Normal
12	Mahabubabad	0.70	0.69	62.89	0.52	0.52	63.97	Normal
13	Mahabubnagar	0.61	0.61	51.40	0.40	0.42	44.03	Mild
14	Mancherial	0.67	0.63	65.52	0.52	0.49	70.50	Normal
15	Medak	0.74	0.72	68.25	0.57	0.56	65.53	Normal
16	Medchal Malkajgiri	0.54	0.58	35.58	0.38	0.40	36.03	Moderate
17	Nagarkurnool	0.54	0.58	42.39	0.33	0.39	34.65	Mild
18	Nalgonda	0.62	0.61	57.78	0.43	0.45	54.96	Mild
19	Nirmal	0.69	0.68	54.93	0.57	0.56	64.33	Normal
20	Nizamabad	0.72	0.71	70.87	0.60	0.56	78.88	Normal
21	Peddapalli	0.72	0.69	70.56	0.57	0.54	80.35	Normal
22	Rajanna Sircilla	0.70	0.71	60.63	0.54	0.54	66.73	Normal
23	Rangareddy	0.58	0.63	31.45	0.41	0.45	39.14	Moderate
24	Sangareddy	0.70	0.67	70.63	0.54	0.52	68.52	Normal
25	Siddipet	0.70	0.68	62.41	0.52	0.52	59.50	Normal
26	Suryapet	0.70	0.66	76.05	0.56	0.51	84.83	Normal
27	Vikarabad	0.67	0.68	51.25	0.50	0.52	50.46	Mild
28	Wanaparthy	0.54	0.58	36.19	0.37	0.41	35.35	Moderate
29	Warangal Rural	0.70	0.71	55.08	0.54	0.56	59.16	Mild
30	Warangal Urban	0.67	0.67	58.65	0.51	0.51	61.84	Normal
31	Yadadri Bhuvanagiri	0.66	0.65	64.77	0.49	0.47	66.65	Normal

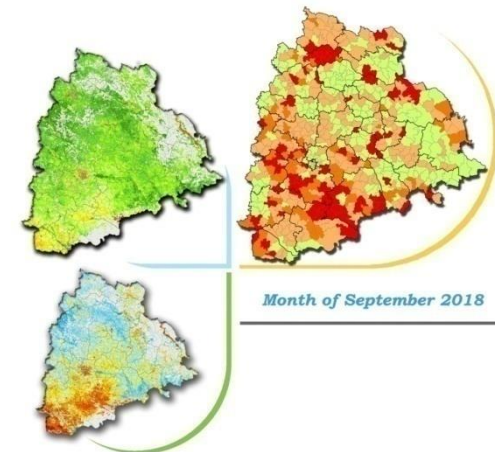
Conclusion

AWiFS and MODIS satellite data is more important for NDVI & NDWI in monitoring drought, because of advantages of spatial & temporal coverage of these products.

To develop monitoring and early warning system of drought management.

Final Report

FORTNIGHTLY REPORT OF SEASONAL CONDITION
Integrated Seasonal Condition Monitoring System



Month of September 2018



TELANGANA STATE REMOTE SENSING APPLICATIONS CENTRE
Planning Department, Government of Telangana

Dissemination of the Report

www.trac.telangana.gov.in

- Chief Ministers office
- PS to Hon'ble Minister for Revenue
- PS to Hon'ble Minister for Agriculture
- PS to Hon'ble Minister for Finance
- Chief Secretary
- Principal Secretary Planning
- Principal Finance Secretary
- Principal Secretary Agriculture
- TRAC web site
- Commissioner Disaster Management
- Commissioner Agriculture
- Director DES
- Director CRIDA
- Vice Chancellor ANGRAU
- Director NRSC
- Director MNCFC
- To all the District Collectors

**Geospatial Database Creation for Soil Health Card
National Mission for Sustainable Agriculture (NMSA)
User: Dept of Agri, Govt of Telangana .**

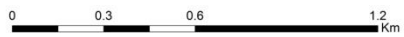
Objectives

- Mapping of village wise grids of size **2.5 ha** for irrigated and **10 ha** for rain-fed areas.
- Generation of centroids (mid-points) and latitude and longitude coordinates for all the grids mapped (for every **10 ha** in rain-fed areas and **2.5 ha** in irrigated areas).
- Tagging of attribute data (soil sample analysis data) to the centroid / appropriate grid based on Land Parcel Survey Number of main grid farmer, furnished by the Dept. of Agriculture.

Deliverables

- Map showing 2.5 ha size grids in **irrigated areas** and 10 ha size grids in **rain-fed areas**.
- Map showing soil sample locations/Centroid along with Latitude and Longitude coordinates in every grid of 2.5 ha size in **irrigated areas** and 10 ha size in **rain-fed areas**.

Soil Sample Collection Sites for Chitkul Village (Dry), Chilipched Mandal, Medak District

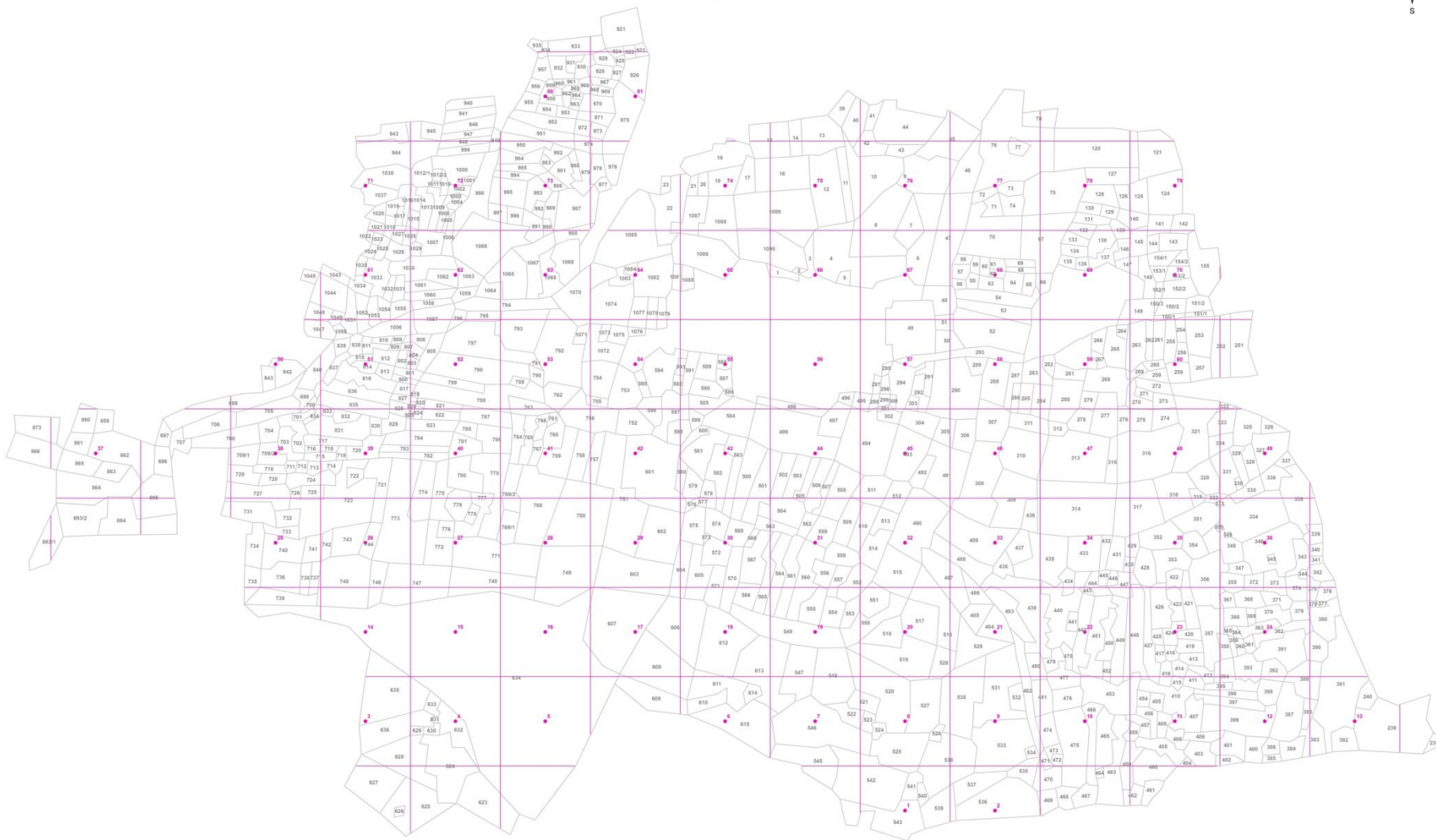


Legend

- Cadastral Dry Boundary
- 10 Ha Grid
- 10 Ha Centroid
- 2.5 Ha Grid
- 2.5 Ha Centroid



Soil Sample Collection Sites for Chitkul Village (Wet), Chilipched Mandal, Medak District



Legend

- Cadastral Wet Boundary
- 2.5 Ha Grid
- 2.5 Ha Centroid



Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL)

User: Ministry of Agriculture and Farmer's welfare, DAC

Objectives

- Kharif Rice: Acreage estimation of Kharif rice in major Rice growing districts of Telangana for National / State Forecast –NSF
- Kharif Cotton: Acreage estimation of Cotton in major cotton growing districts of Telangana for State/ District forecast- SDF
- Rabi Rice: Acreage estimation of Rabi Rice in districts of Telangana for National State Forecast and State District Forecast-NSF & SDF

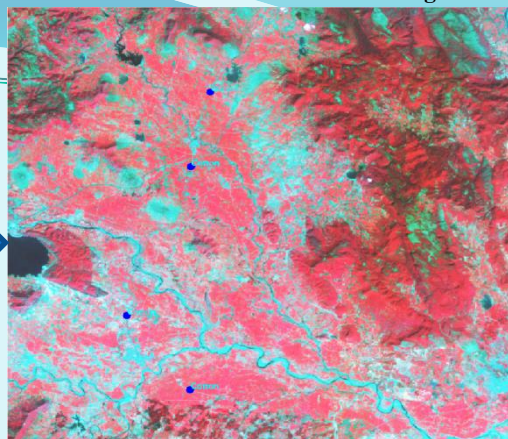
Deliverables

- Crop Acreage and Production at District level.

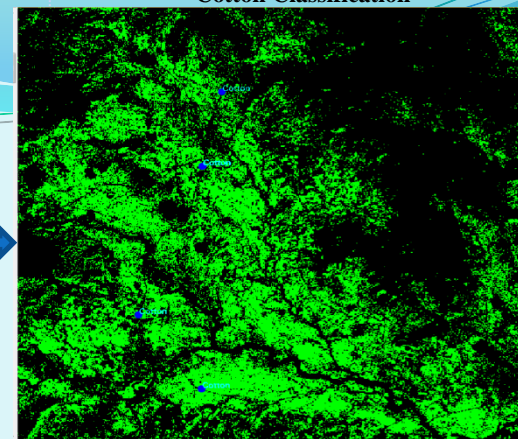
**Actual Ground Situation Image
in Adilabad District**



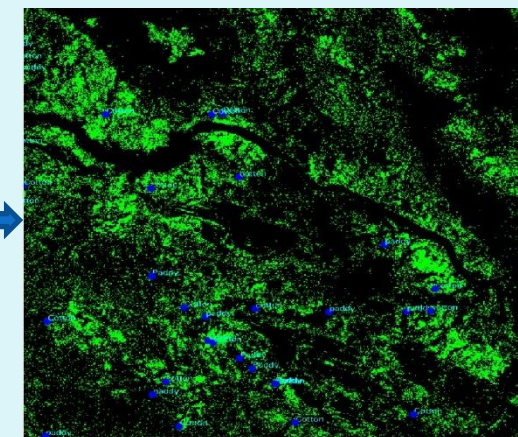
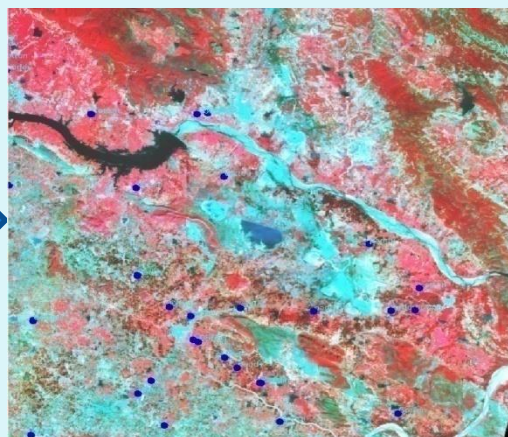
Ground Truth Site in Satellite image



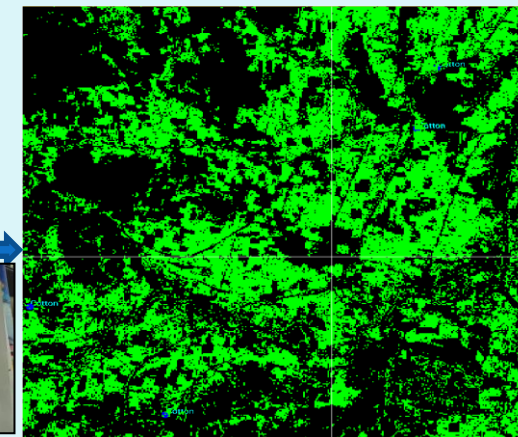
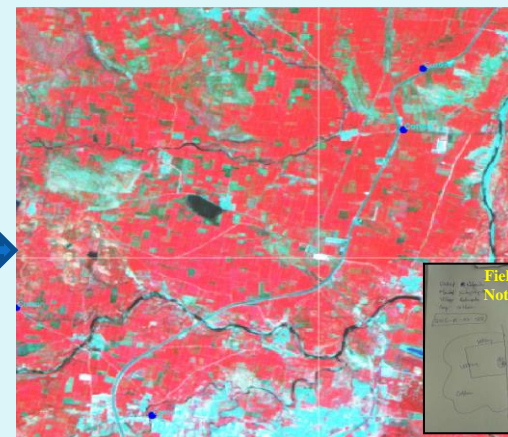
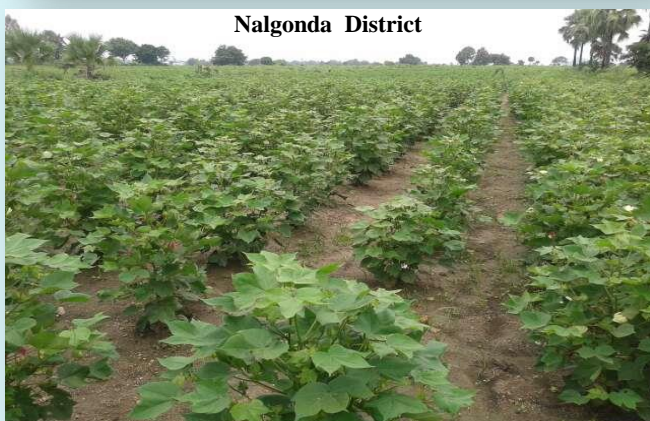
Cotton Classification



Karimnagar District



Nalgonda District

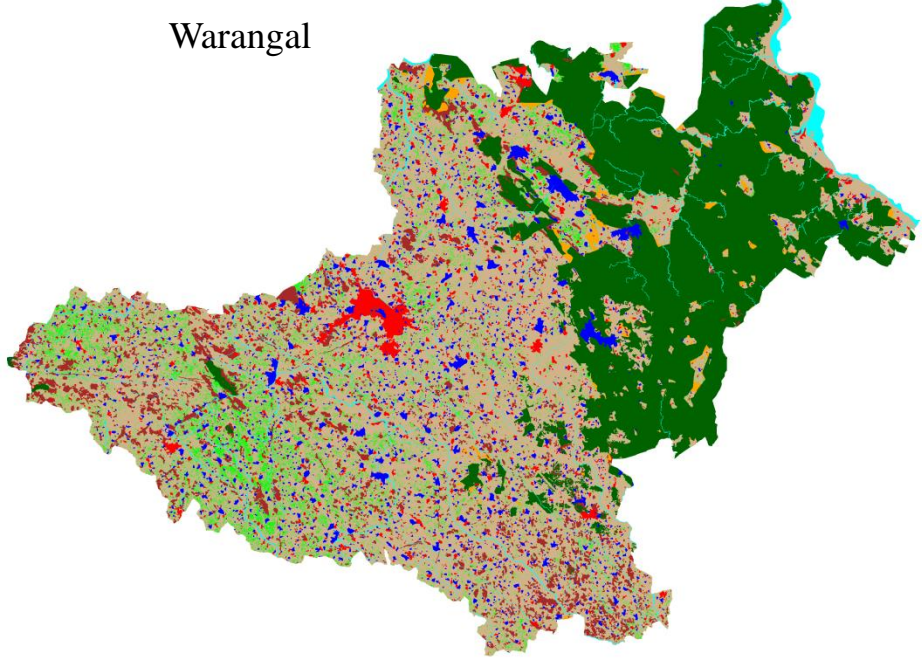
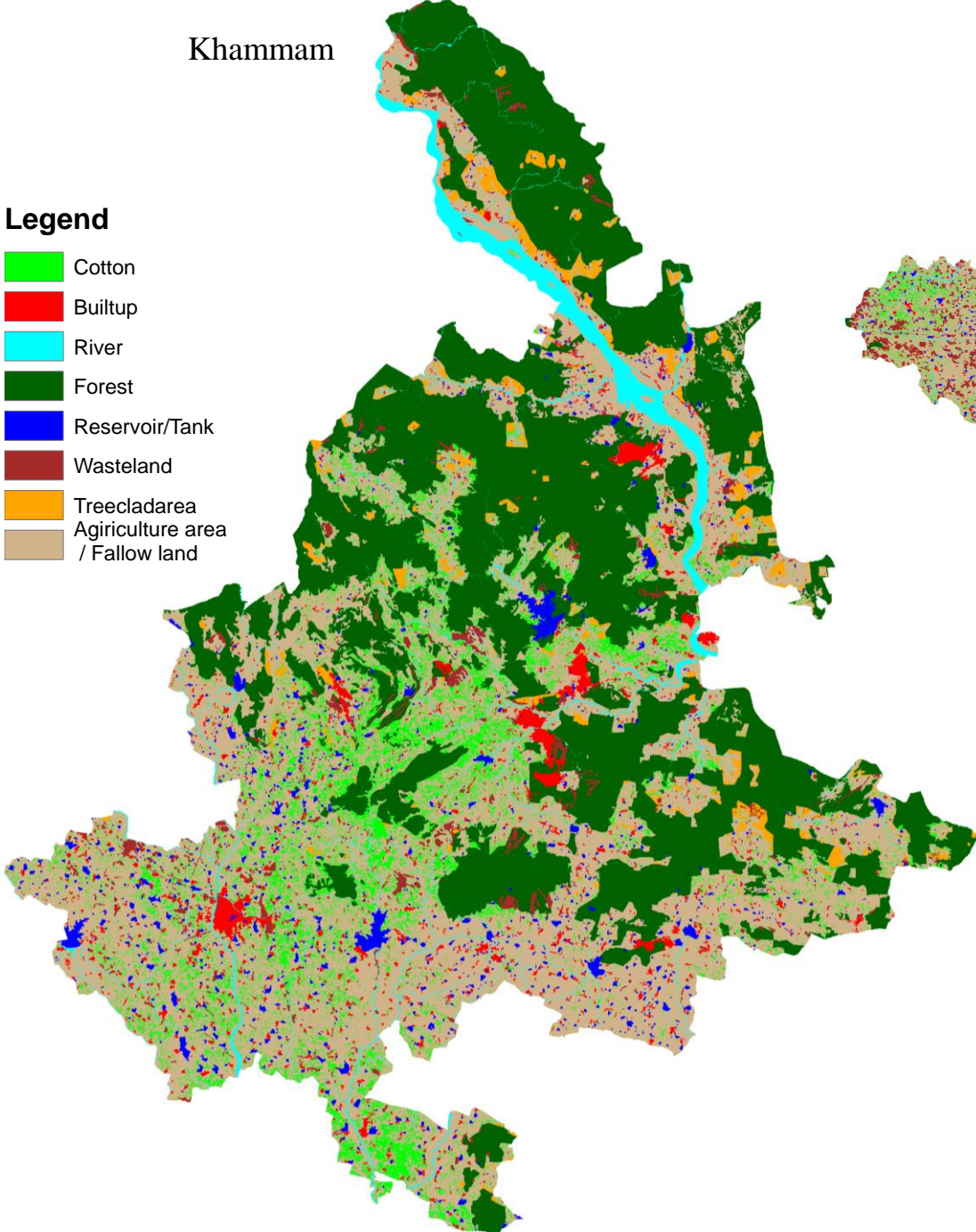


Khammam

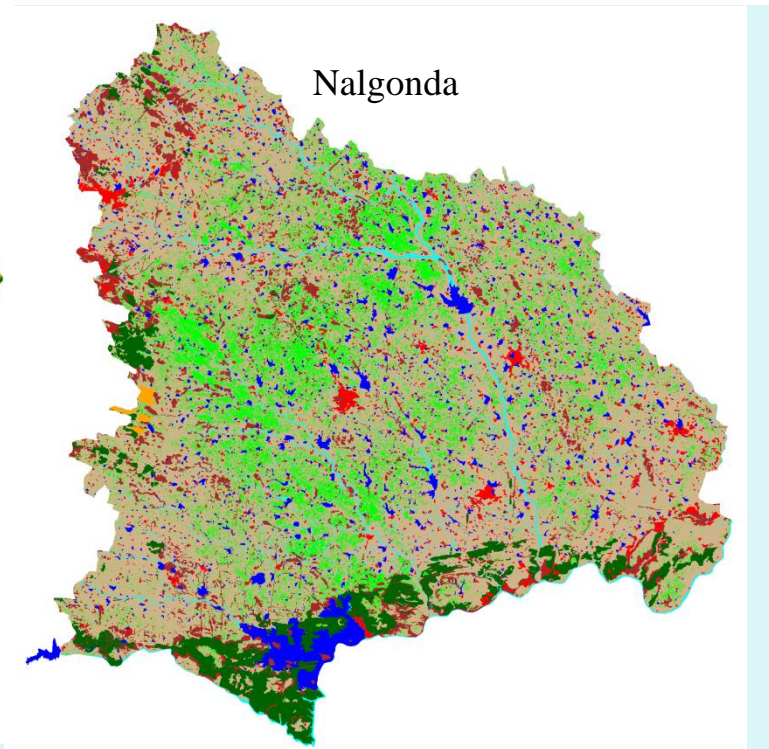
Warangal

Legend

- Cotton
- Builtup
- River
- Forest
- Reservoir/Tank
- Wasteland
- Treecladarea
- Agiriculture area / Fallow land



Nalgonda



Applications of RS and GIS in Sericulture Development

User: NESAC and Ministry of textiles.

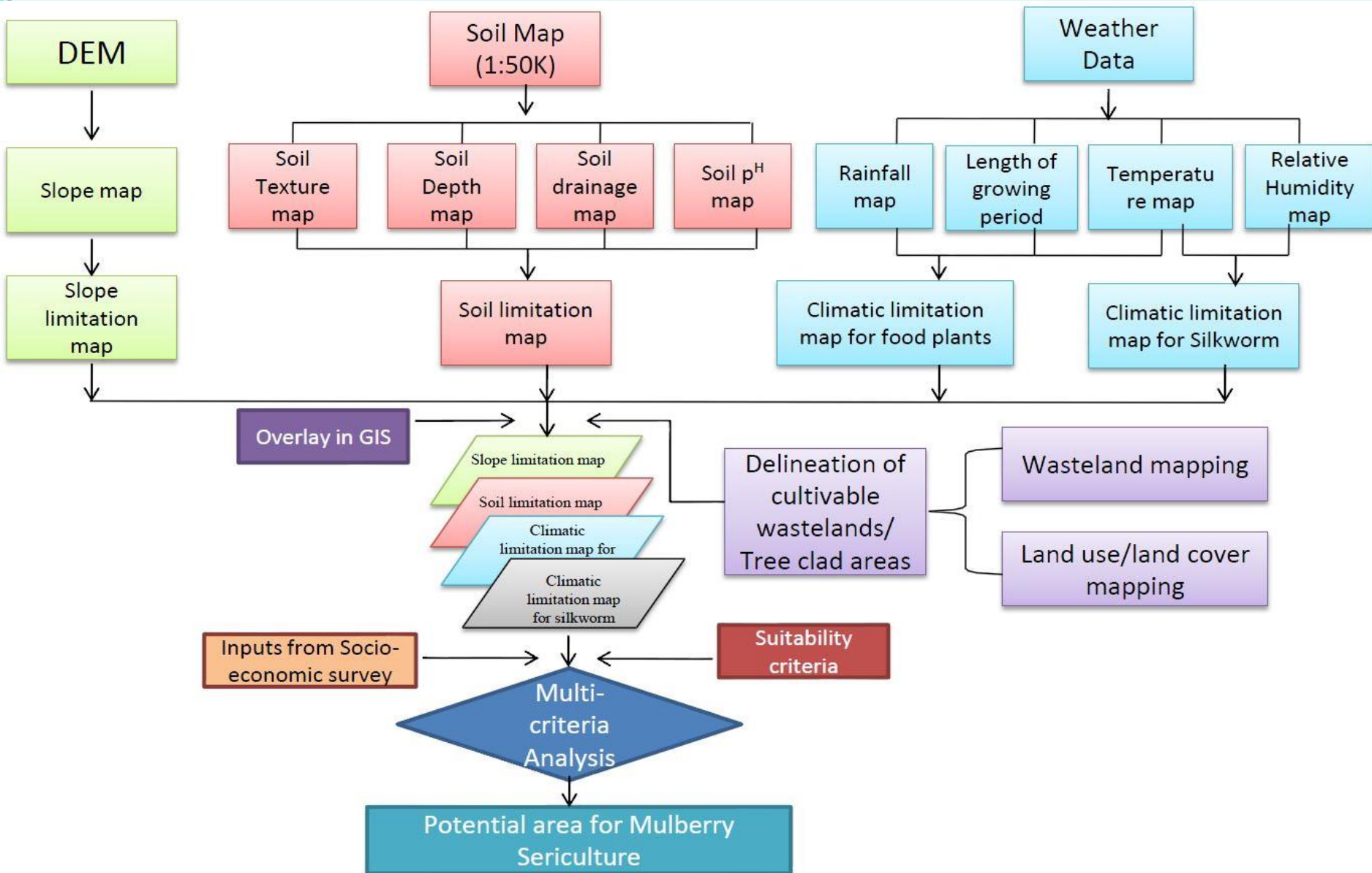
Objectives

- Identification of potential areas for sericulture development/ expansion in the Adilabad, Karimnagar, Mahbubnagar and Warangal districts.

Deliverables

- District/mandal wise estimates of area suitable for developing silkworm food plants and identifying, spatial location and extent of area suitable for sericulture.
- Reports summarizing the area estimates and names of group of villages under mandals suitable for sericulture in study district.

Methodology for delineating potential area for Mulberry Sericulture

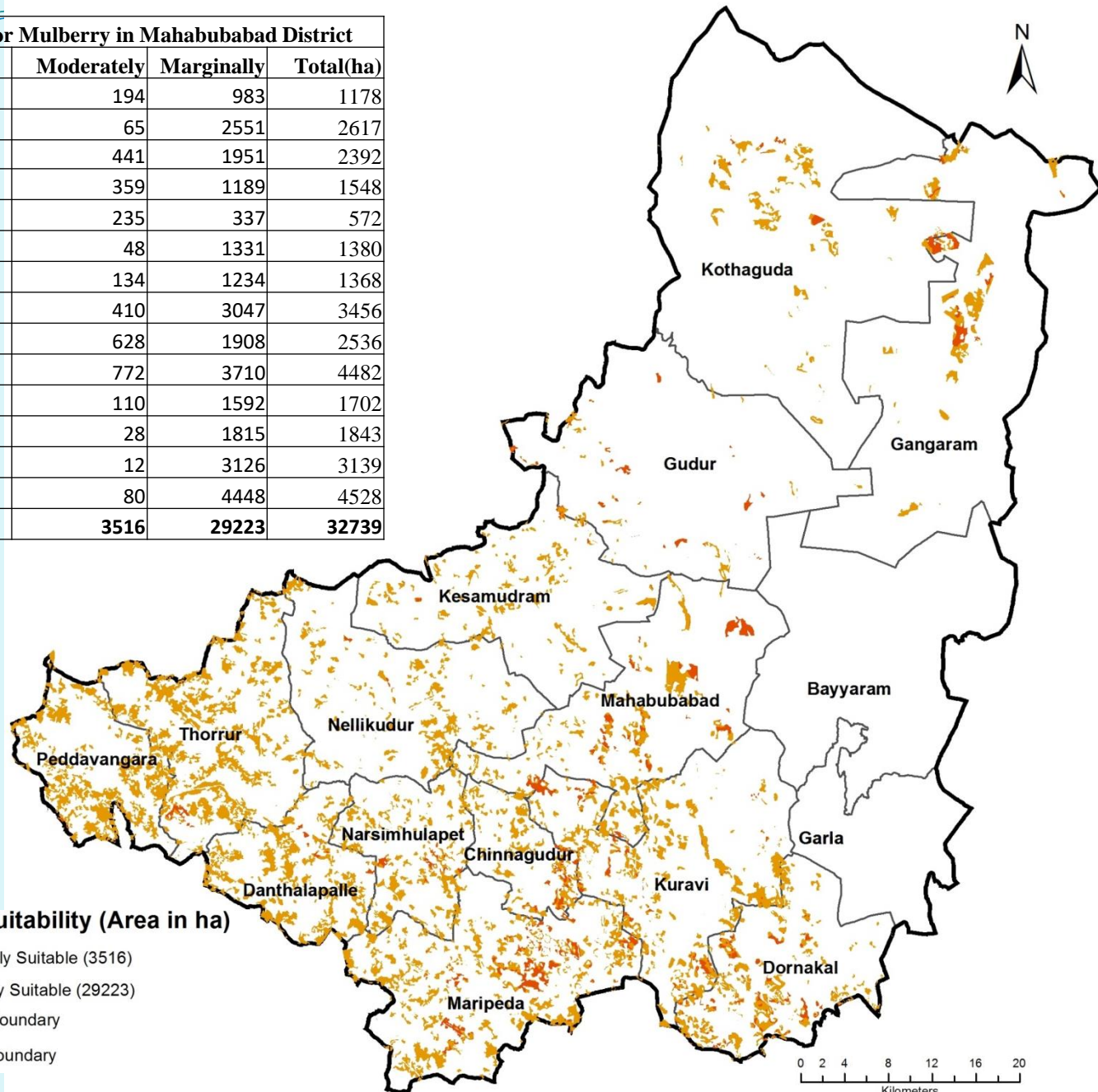


Soil Parameters, Limitations & Classes

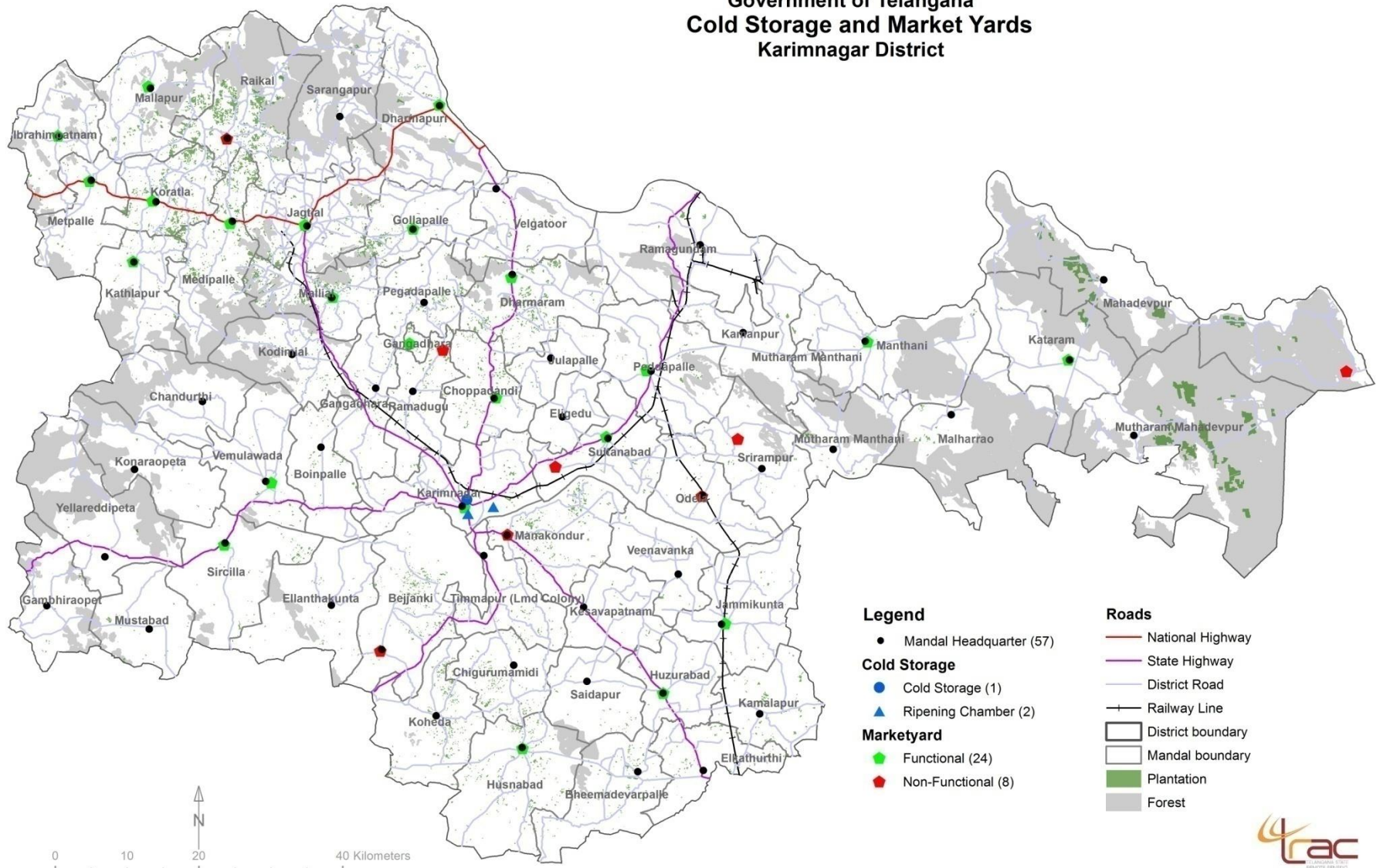
Degree of limitation	Texture	Depth	pH	Soil drainage
0(no)	Loam	Very deep (>150)	6.2-6.5	Well
1(slight)	Clay loam gravelly clay	Deep (100-150)	6.5-7.5	Well
2(moderate)	Fine loamy	Deep to mod. Deep (100-50)	5.5-6.5 7.5-8.5	Moderately well
3(severe)	Coarse loamy	Shallow (25-50)	4.5-5.5 8.5-9.5	Imperfect
4 (very severe)	Sandy fragmental	Very shallow (<25)	<4.5 >9.5	Poor/Excessive

Suitable areas for Mulberry in Mahabubabad District

Suitable areas for Mulberry in Mahabubabad District			
Mandal	Moderately	Marginally	Total(ha)
Chinnagudur	194	983	1178
Danthalapalle	65	2551	2617
Dornakal	441	1951	2392
Gangaram	359	1189	1548
Gudur	235	337	572
Kesamudram	48	1331	1380
Kothaguda	134	1234	1368
Kuravi	410	3047	3456
Mahabubabad	628	1908	2536
Maripeda	772	3710	4482
Narsimhulapet	110	1592	1702
Nellikudur	28	1815	1843
Peddavangara	12	3126	3139
Thorrur	80	4448	4528
Total	3516	29223	32739

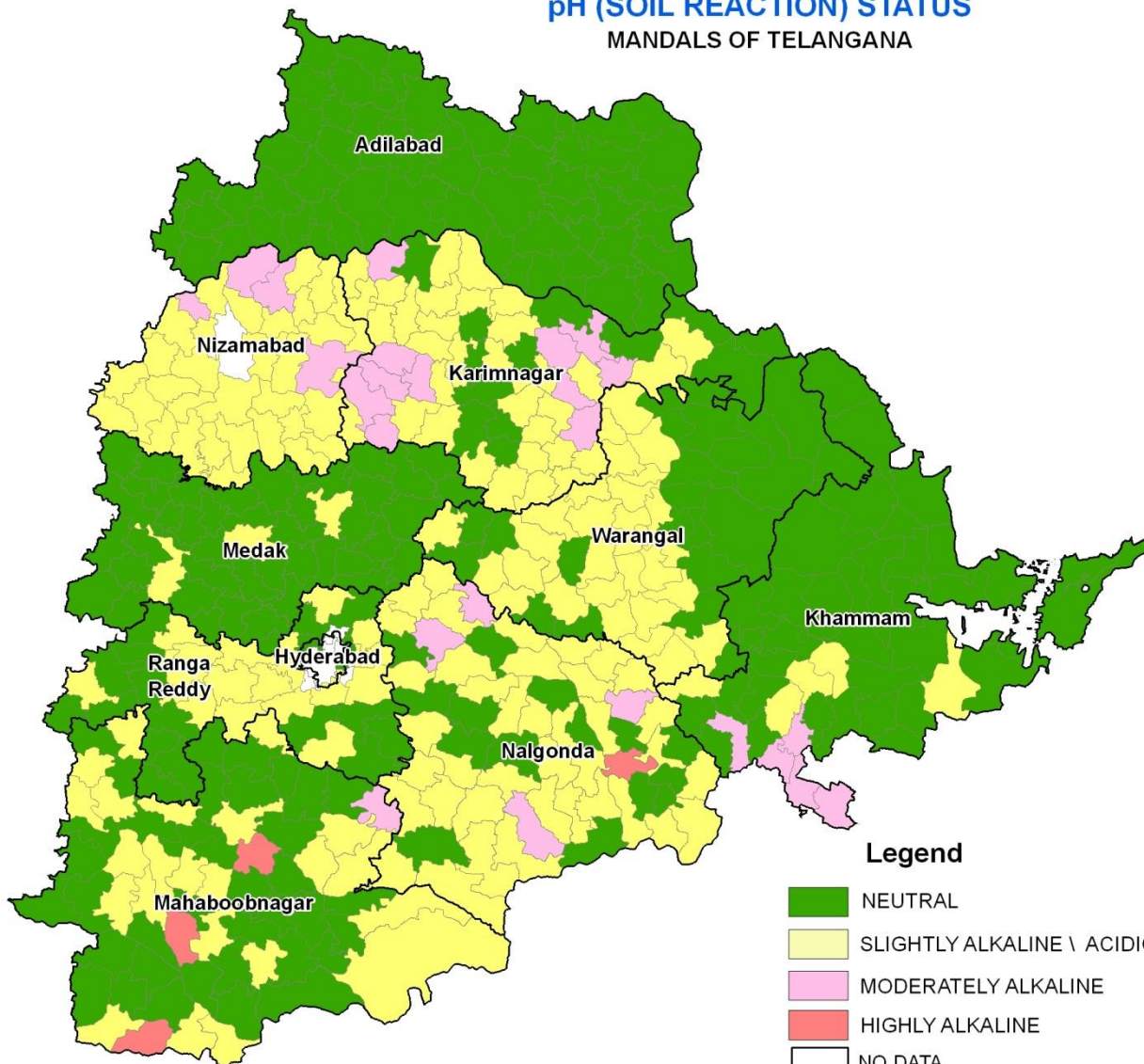


Government of Telangana Cold Storage and Market Yards Karimnagar District










Soil Fertility

pH (SOIL REACTION) STATUS MANDALS OF TELANGANA



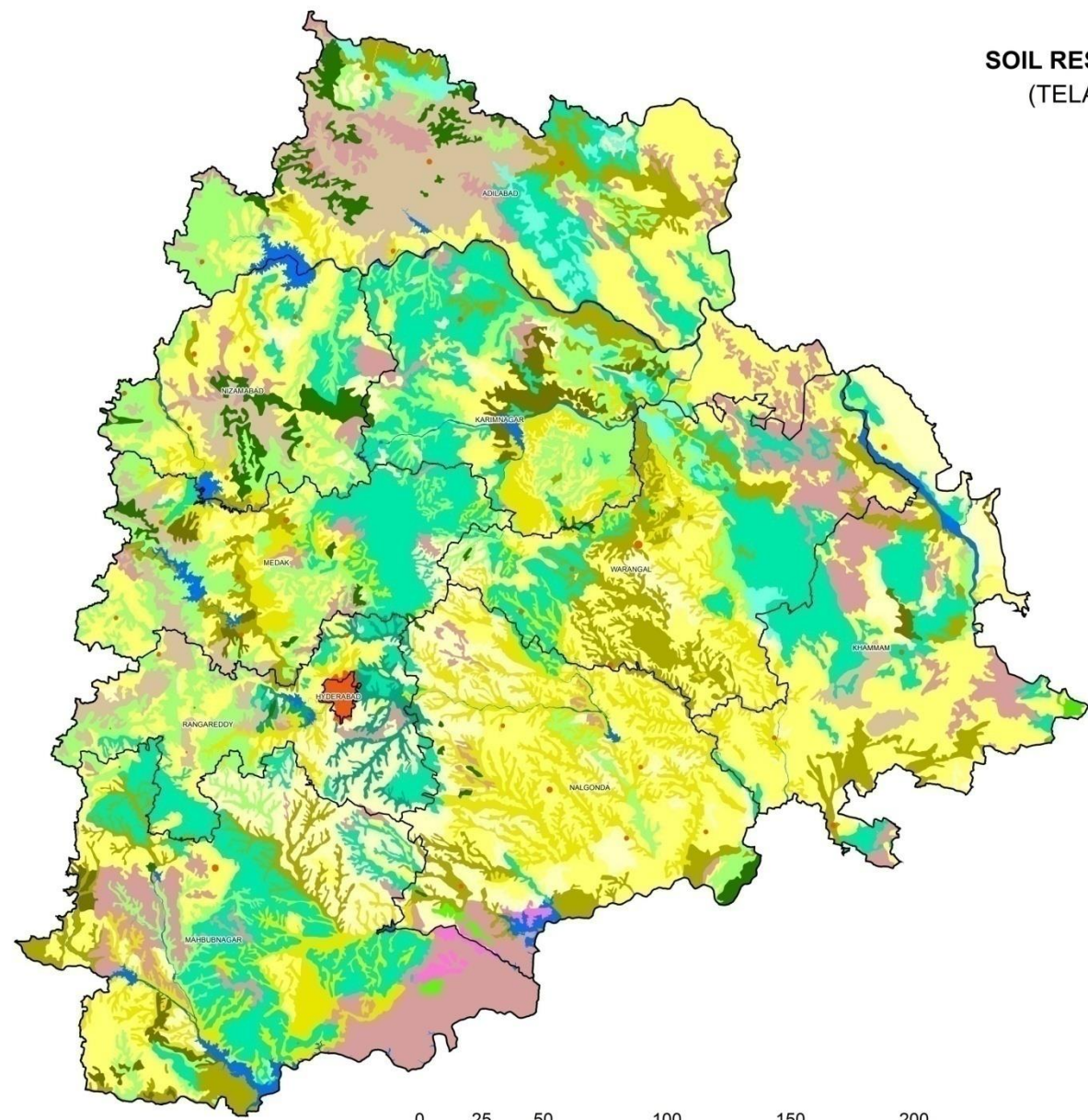
Legend

-  NEUTRAL
-  SLIGHTLY ALKALINE \ ACIDIC
-  MODERATELY ALKALINE
-  HIGHLY ALKALINE
-  NO DATA
-  MANDAL BOUNDARY
-  DISTRICT BOUNDARY

0 15 30 60 90 120 Kilometers



SOIL RESOURCE MAPPING (TELANGANA STATE)



Legend

-  Gravelly clayey moderately deep Redsoils
-  Gravelly clayey moderately deep desert soils
-  Gravelly clayey moderately deep grass land soils
-  Gravelly clayey shallow dark brown soils
-  Gravelly loamy dark brown moderately deep soils
-  Moderately Deep black clayey soils
-  Moderately deep calcareous black soils
-  Moderately deep calcareous moist clayey soils
-  Clayey moderately deep wet soils
-  Clayey to gravelly clayey moderately deep Dark brown soils
-  Loamy to clayey skeletal deep Reddish brown soils
-  Loamy to gravelly clay deep Dark reddish brown soils
-  Shallow gravelly Redsoils
-  Shallow loamy to gravelly clay Red soils
-  Deep black clayey soils
-  Fine loamy gravelly clayey shallow Reddish brown soils
-  Settlements
-  Water Bodies
-  District Boundary



PREPARED BY

TRAC

TELANGANA STATE REMOTE SENSING APPLICATIONS CENTRE
PLANNING DEPARTMENT, GOVT., OF T.S.
HYDERABAD - 500 038.



Preparation of Village-wise Rainwater Harvesting Plan for Ground water Recharge

Preparing village rain water harvesting plan for ground water recharge considering :

- Rainfall data
- Topography
- Hydro-geomorphology
- Cadastral data
- Existing waterbodies / Recharge Structures
- Location and type of Structure
- Reference data

Scope

- Estimation of rain water during rainy and drought years and analysis of its distribution
- Study and analysis of topography and hydrogeomorphology of terrain using Satellite data
- Delineation of micro watersheds where water harvesting is not being done



Site-specific Recharge Structures

(Watershed approach)

Yield Factor

Yield of the given watershed

Total Monsoonal / Episode-wise Rainfall, Losses

Conservation already made

Existing water bodies- their capacities, Structures made under different schemes

Balance yield available for conservation

Dependability factor

Form of Yield

Surface flow, 1st & 2nd order stream flow, Channel flow, Sub-surface / base flow

Geological Factor

Infiltration Capacity of the given location / zone

Rock type, Weathering, Fracturing, Landform / Slope, Top soil

Type of Structure

Yield Velocity checking structures, Infiltration improving structures, structures for increasing time for recharge

Criteria for selection of Recharge Structures

Surface Flow

Gentle to moderate slope, Shallow - Moderate weathering, high run-off velocity

Contour Trench

1st, 2nd Order stream flow

Gentle - moderate slope, Shallow basement / Moderate - Deep Weathering & Fracturing

Check Dam / Percolation tank

Channel flow

Gentle to moderate slope, High Velocity, Banks with loose sediments

Nala Bund

Sub-Surface Flow

Impervious strata at base, High Velocity

Sub-surface Dykes

Geological Conditions

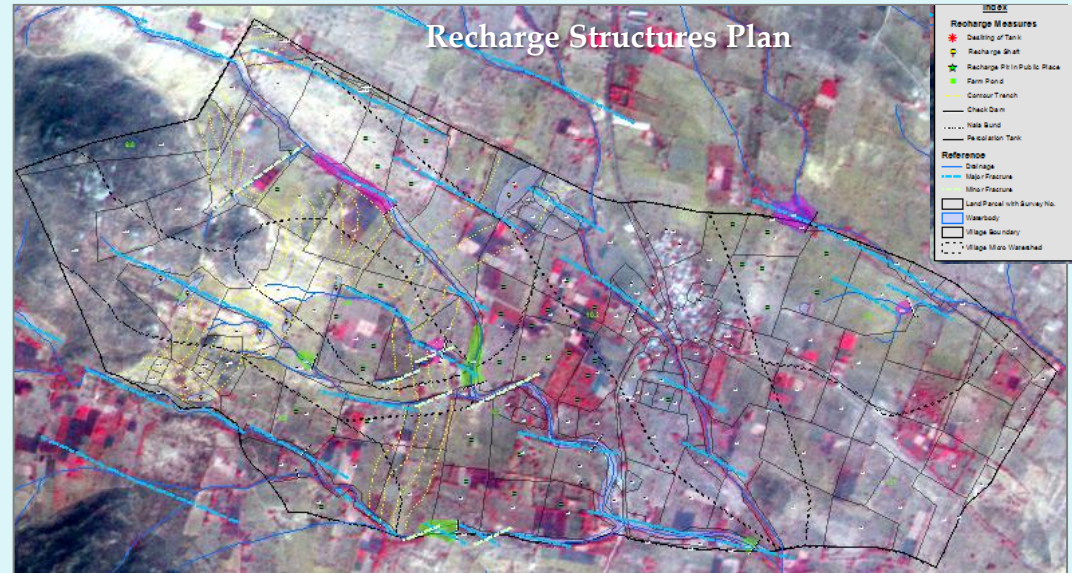
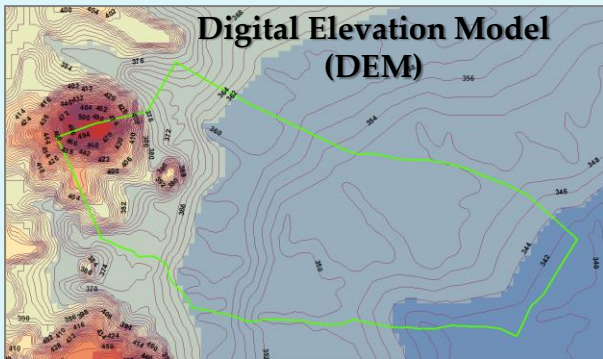
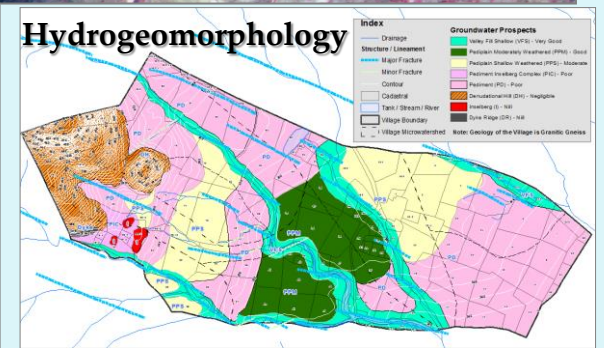
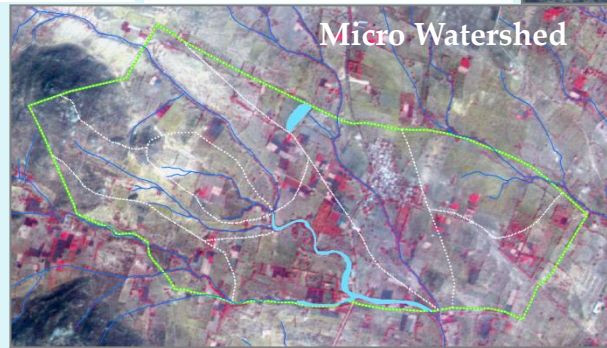
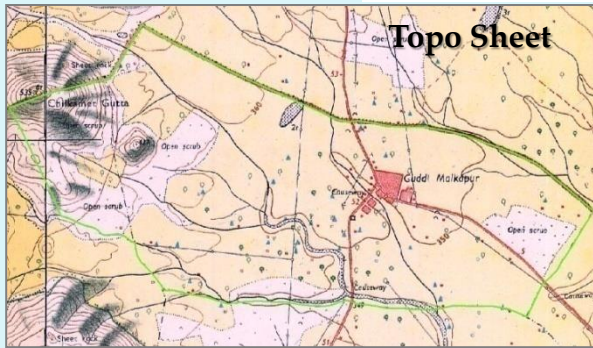
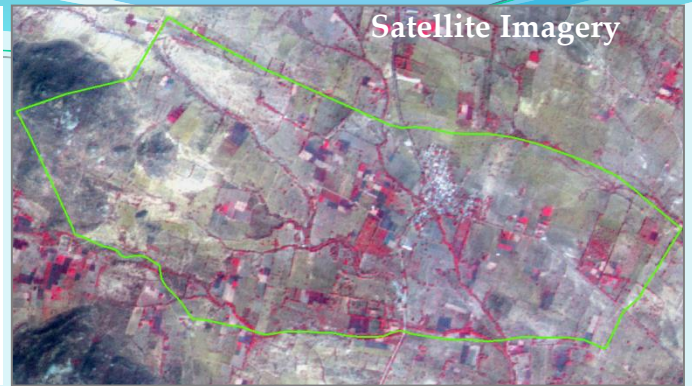
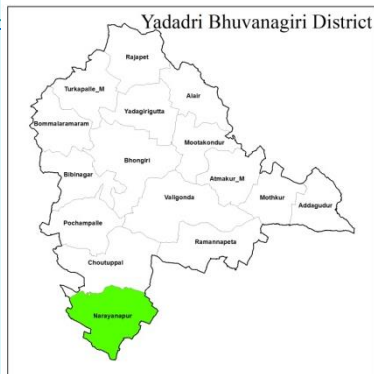
Drainage divide areas, Table land topography

Recharge Pit, Farm Pond

Overcoming Vertical variations in geological strata / transmissivity levels, Moderate - Deep Weathering, Significant improvement in Infiltration capacity

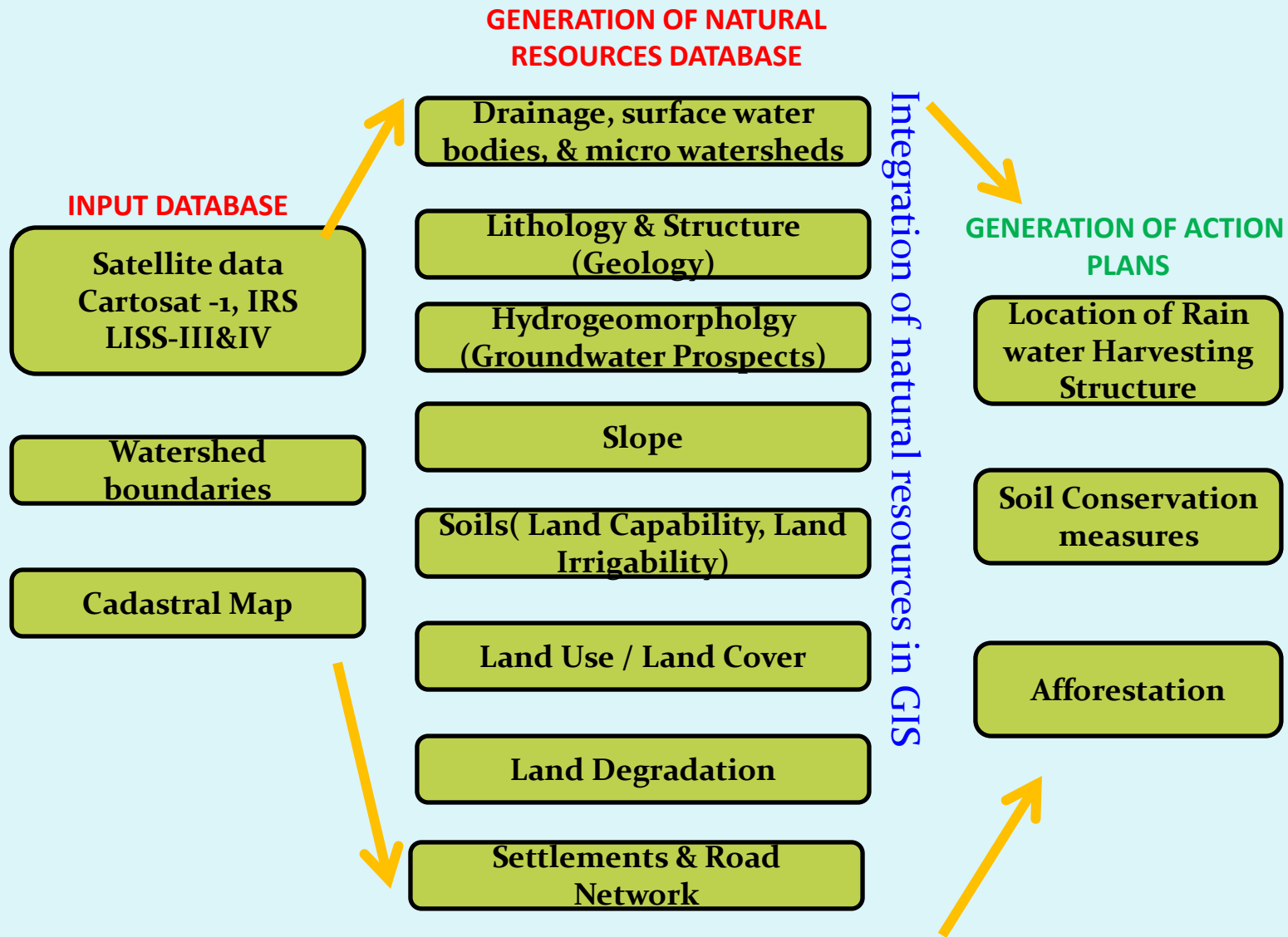
Tank Desilting, Recharge shaft / Invert well

Village wise Rain water Harvesting for Ground water Recharge – Recharge Structures Plan



INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP)

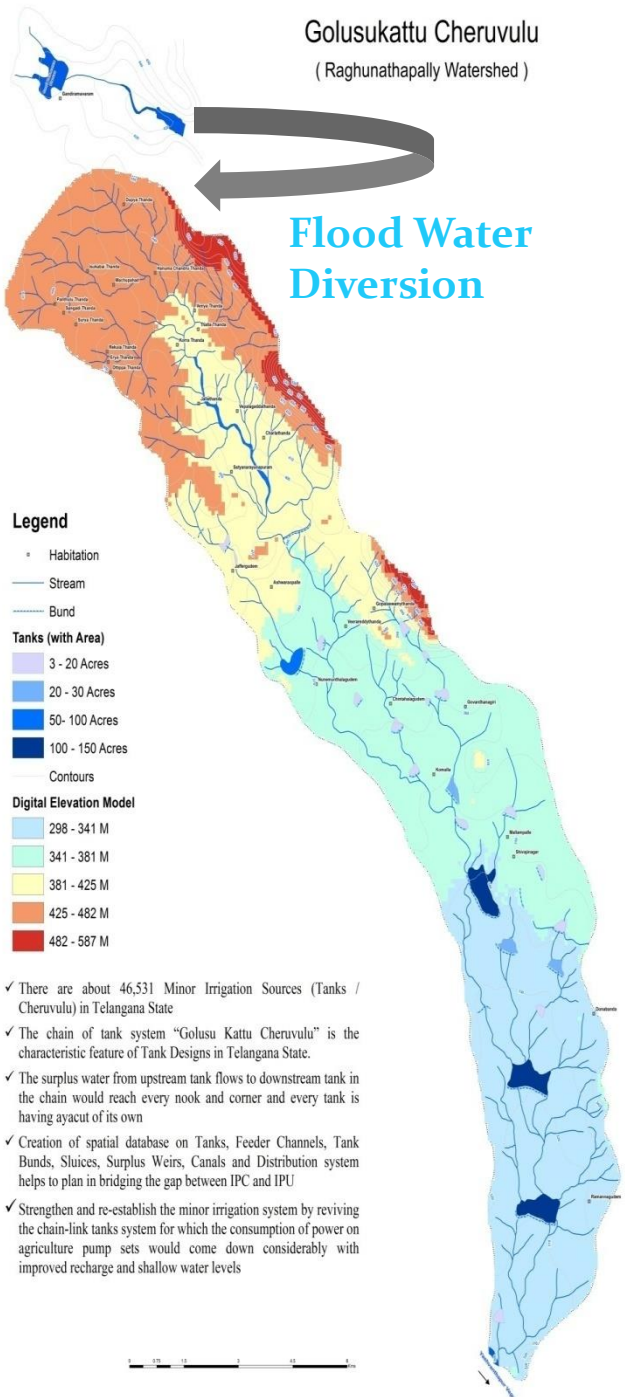
(FLOW CHART)



Golusukattu Chervulu (Raghunathapally Watershed)



**Flood Water
Diversion**



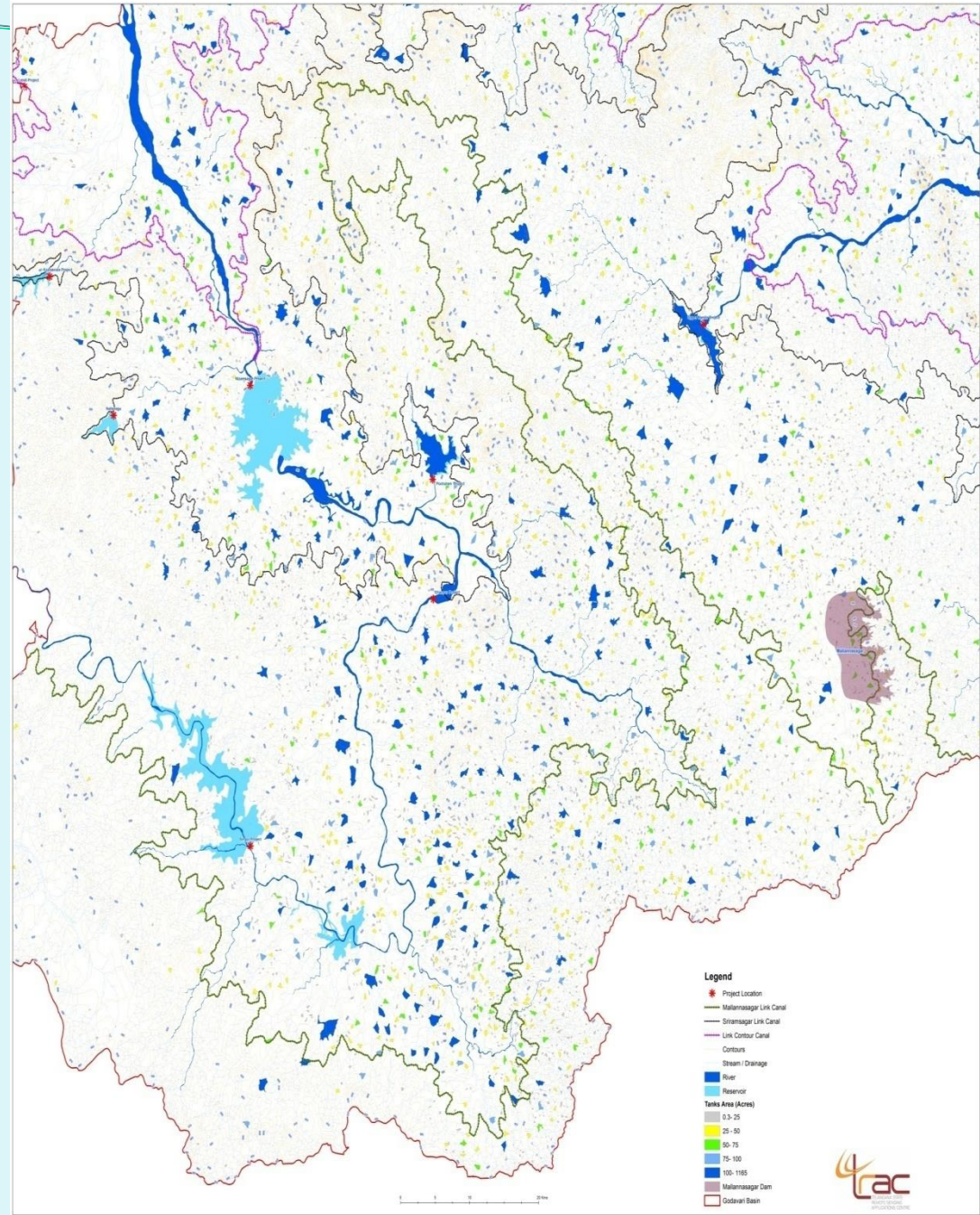
- Legend**
- Habitation
 - Stream
 - Bund
 - Tanks (with Area)**
 - 3 - 20 Acres
 - 20 - 30 Acres
 - 50- 100 Acres
 - 100 - 150 Acres
 - Contours
 - Digital Elevation Model**
 - 298 - 341 M
 - 341 - 381 M
 - 381 - 425 M
 - 425 - 482 M
 - 482 - 587 M

- ✓ There are about 46,531 Minor Irrigation Sources (Tanks / Chervulu) in Telangana State
- ✓ The chain of tank system “Golusu Kattu Chervulu” is the characteristic feature of Tank Designs in Telangana State.
- ✓ The surplus water from upstream tank flows to downstream tank in the chain would reach every nook and corner and every tank is having ayacut of its own
- ✓ Creation of spatial database on Tanks, Feeder Channels, Tank Bunds, Sluices, Surplus Weirs, Canals and Distribution system helps to plan in bridging the gap between IPC and IPU
- ✓ Strengthen and re-establish the minor irrigation system by reviving the chain-link tanks system for which the consumption of power on agriculture pump sets would come down considerably with improved recharge and shallow water levels

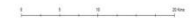


LINKING CONTOUR CANAL - GOLUSUKATTU CHERUVULU

(Godavari River Basin)



- Legend**
- Project Location
 - Mahannasagar Link Canal
 - Srinivasrao Link Canal
 - Link Contour Canal
 - Contour
 - Stream / Drainage
 - Blue River
 - Light Blue Reservoir
 - Tanks Area (Acres)**
 - 0.3- 25
 - 25 - 50
 - 50- 75
 - 75- 100
 - 100- 150
 - Mahannasagar Dam
 - Godavari Basin



Ground Water Prospects Mapping

National Rural Drinking Water Programme erstwhile RGNDWM (Phase I & III)

Objective

Preparation ground water prospect maps corresponding to Survey of India toposheet on 1: 50,000 scale covering all habitations. The map shows :

- 1) Prospective zones for ground water occurrence and
- 2) Tentative locations for constructing recharge structures.

Methodology & Data Used

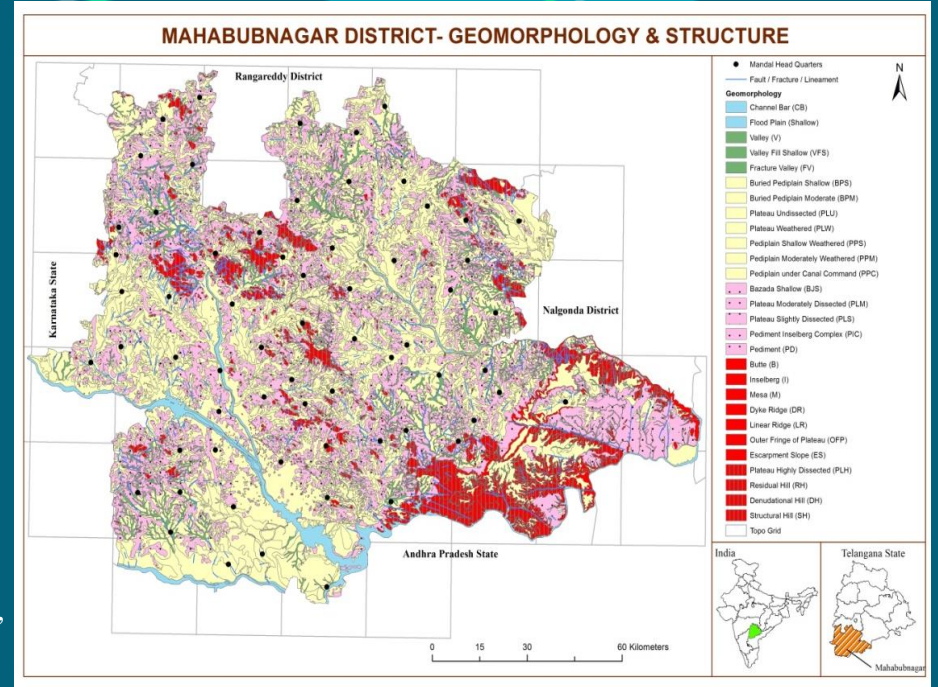
RGNDWM National standard methodology developed by NRSC & IRS-P6-LISS-III satellite data are used for interpretation

Outcome

Ground water prospects maps for Telangana State

Target Group

RWS&S, Ground Water Dept, Rural Development, MA&UD, I&CAD, PHED

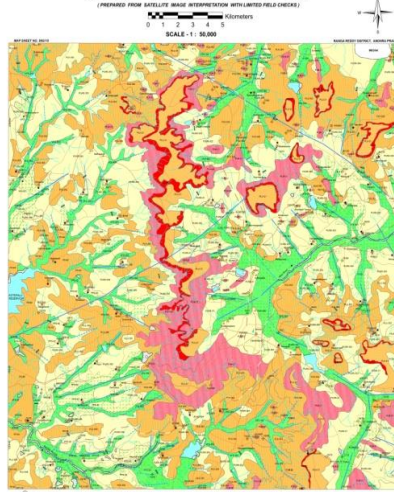


56 G/15

IRS P-6 LISS-III SATELLITE IMAGERY



GROUND WATER PROSPECTS MAP

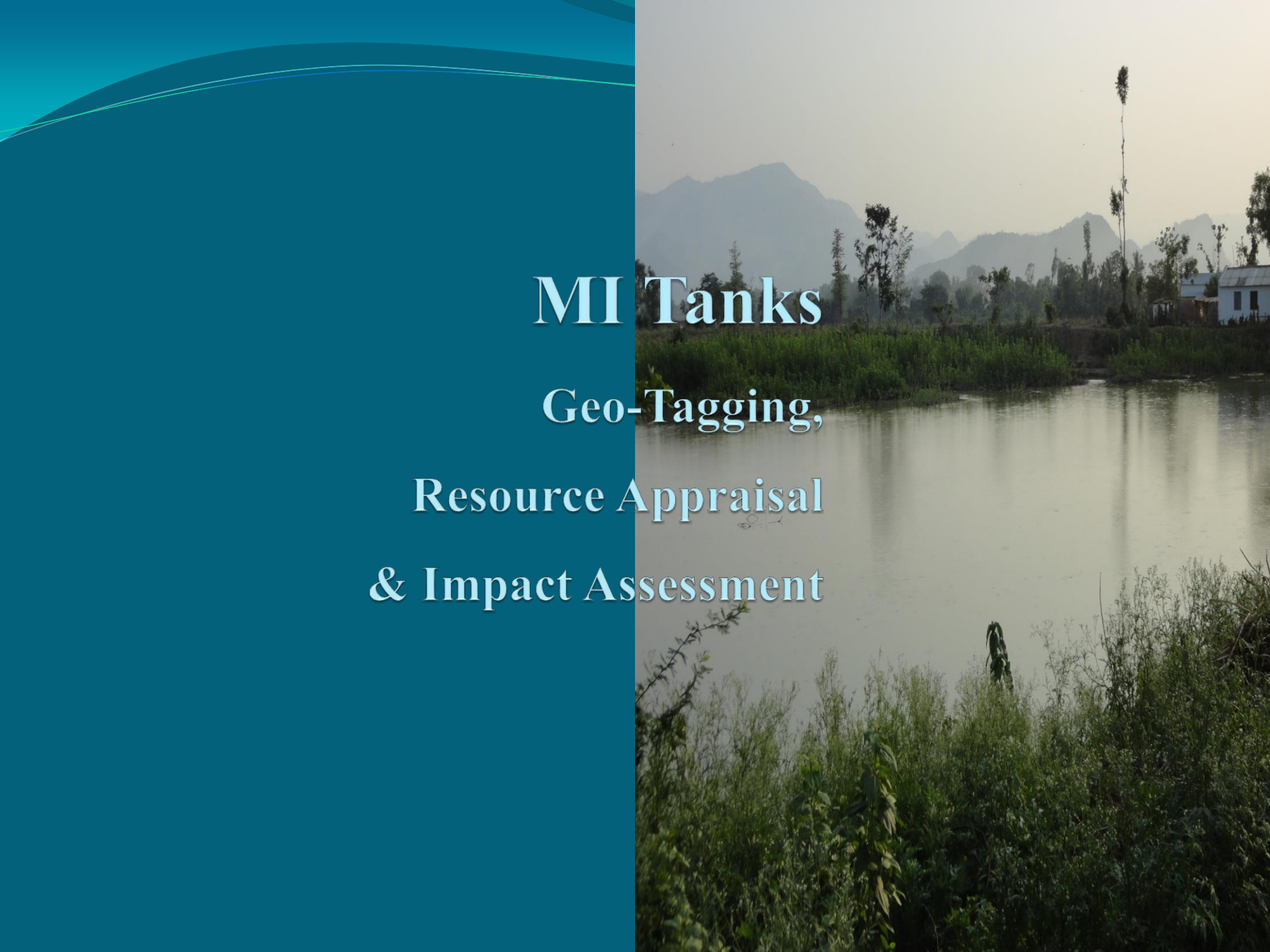


LEGEND

PROSPECTIVITY	YIELD RANGE OF WELLS	DEPTH RANGE OF WELLS
> 800 LPM	> 800 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
400 - 800 LPM	400 - 800 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
200 - 400 LPM	200 - 400 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
100 - 200 LPM	100 - 200 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
50 - 100 LPM	50 - 100 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
30 - 50 LPM	30 - 50 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
20 - 30 LPM	20 - 30 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
10 - 20 LPM	10 - 20 LPM	SHALLOW < 30 M, MODERATE 30-60 M, DEEP > 60 M
Prospects limited to valley portions only (Hills & Plateaus)		
Run off zones / Barriers (Linear ridges / Dyke ridges / Insebergs)		

GROUND WATER PROSPECTS INFORMATION

COLOUR	YIELD RANGE OF WELLS	DEPTH RANGE OF WELLS		
		SHALLOW < 30 M	MODERATE 30-60 M	DEEP > 60 M
[Purple]	> 800 LPM	[Pattern]	[Pattern]	[Pattern]
[Dark Blue]	400 - 800 LPM	[Pattern]	[Pattern]	[Pattern]
[Blue]	200 - 400 LPM	[Pattern]	[Pattern]	[Pattern]
[Green]	100 - 200 LPM	[Pattern]	[Pattern]	[Pattern]
[Yellow]	50 - 100 LPM	[Pattern]	[Pattern]	[Pattern]
[Orange]	30 - 50 LPM	[Pattern]	[Pattern]	[Pattern]
[Brown]	20 - 30 LPM	[Pattern]	[Pattern]	[Pattern]
[Pink]	10 - 20 LPM	[Pattern]	[Pattern]	[Pattern]
[Red]	Prospects limited to valley portions only (Hills & Plateaus)	[Pattern]	[Pattern]	[Pattern]
[Red]	Run off zones / Barriers (Linear ridges / Dyke ridges / Insebergs)	[Pattern]	[Pattern]	[Pattern]



MI Tanks
Geo-Tagging,
Resource Appraisal
& Impact Assessment

Geo-Tagging of MI Tanks

Objectives

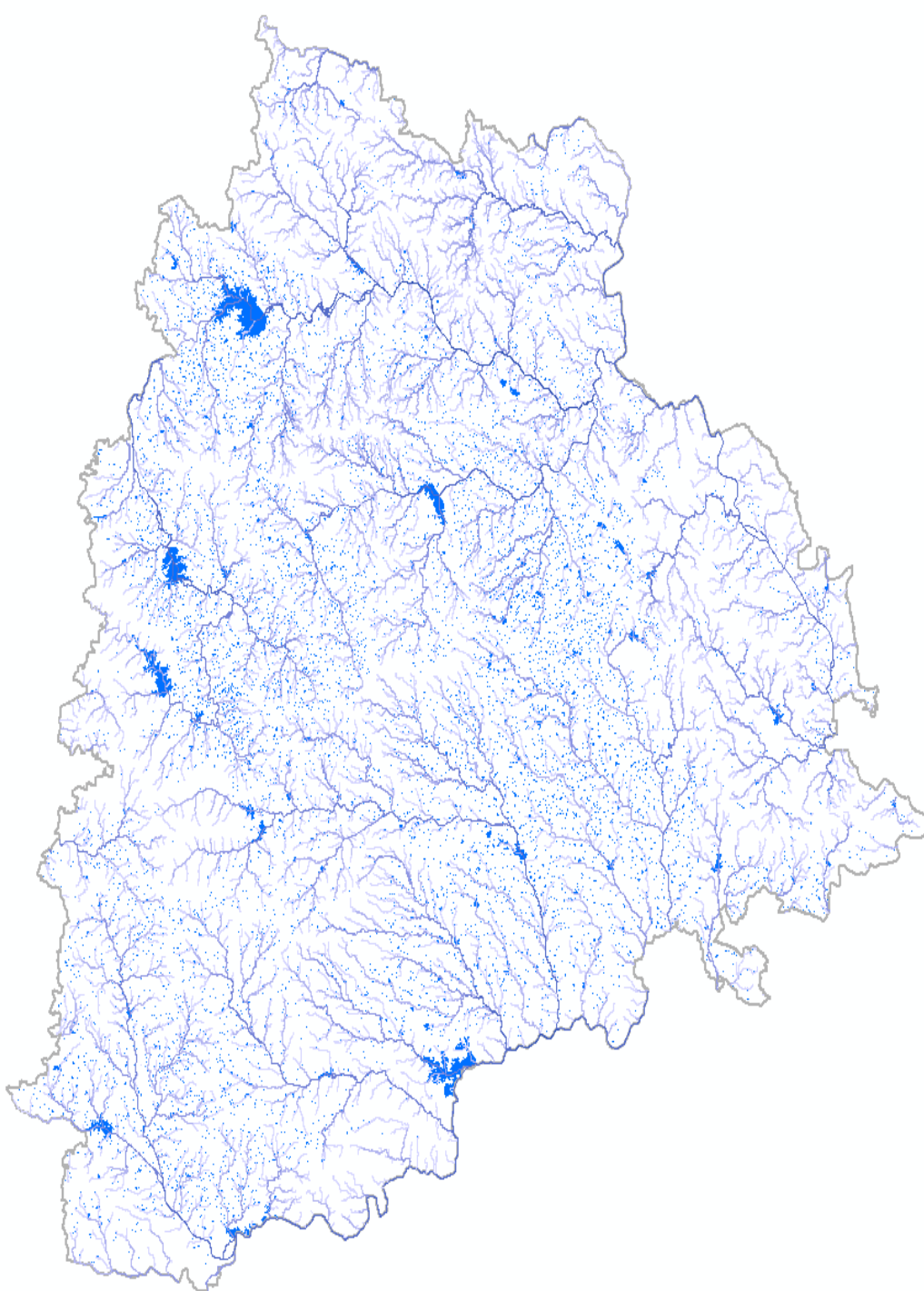
Geospatial inventory of Minor Irrigation tanks.

Deliverables

1. Classification of Water Bodies in MI tanks & Others.
2. FTL delineation & tank capacity estimation.
3. Classification of MI tanks into rejuvenated tanks & others.

Issues

1. Use of very high resolution satellite data.
2. Development of tank naming convention.
3. Development of simple user friendly MI tanks information for Telangana State.



- Telangana has 47,907 Tanks with an irrigation potential of 22,63,498 Acres. (I&CAD)
- 90% of the Tanks in Telangana are small Tanks with a command area of less than 100 Acres and they make only one third of the total tank irrigated area.
- A total of 3,864 large tanks account for 67% of the Tank



Tank Name
Tank Serial No
Tank_Code
Latitude
Longitude
Khasra number_Plot No_Survey No
Habitation Name
Habitation Code
Village
Village-Code
Mandal
Mandal-Code
District
District-Code
Tank_Type
Tank_Purpose
Sub_Basin
Sub_Basin_Code
Minor_Basin
Minor_Basin_Code
Major_Basin
Major_Basin_Code
Water Spread Area_Acres
Water_Distribution_Application_Method
Culturable Command Area - Ha
Whether_Scheme_in_Major Medium_Command
Irrigation Potential Created_Kharif Season_Ha
Irrigation Potential Created_Rabi Season_Ha
Irrigation Potential Created_Total_Ha
Irrigation Potential Utilized_Kharif Season_Ha
Irrigation Potential Utilized_Rabi Season_Ha
Irrigation Potential Utilized_Total_Ha
Whether_Scheme_Functioning_since_commissioning
Whether_under_Utilisation_of_Scheme
Filled_up_Storage
Status_50_Percent_Filling_in_5_Yrs
Number of Villages covered by the scheme

Empowering Panchayati Raj Institutions Spatially (EPRIS)

Objective

- Utilisation of Geospatial data for decentralised planning.
- Capacity Building, Asset Mapping and Activity Planning.

Scope

- Geo-tagging the scheme-wise assets.
- Creation of temporal Geo-database inventory of assets.
- Monitoring the assets being created.

Deliverables

- Integration of state and central government schemes with assets created

Empowering PR Institutions Spatially (EPRIS)



Space Based Information Support for Decentralized Planning (SISDP)



Assets-
Erravalle
Village, Siddipet
Dist

Mobile App v2.0 Welcome VIJAYA My Profile Logout Help Full View Select Language

SISDP | Area Selection | Area Profile Report | Asset Mapping | Activity Planning | Implementation & Monitoring Download Share Views

Navigation Measurements Personalization

- SATELLITE IMAGERY
 - IRS Imagery
 - Elevation Data
 - DEM Layer
 - Hill Shade View
- ADMINISTRATIVE BOUNDARIES
 - State
 - District
 - Block/ Tehsil/ Mandal
 - Panchayat
 - Village
 - Cadastral Maps
 - Constituencies
 - Schemes
- THEMATIC DATA
 - Drainage & Water Bodies
 - Land Use & Land Cover
 - Slope
 - Infrastructure
 - Hydrological Units
- ASSETS
 - Assets Mapped by PRIs
 - Assets Mapped by Citizens



Asset Mapping

Map Search Mapped Assets Identify Results

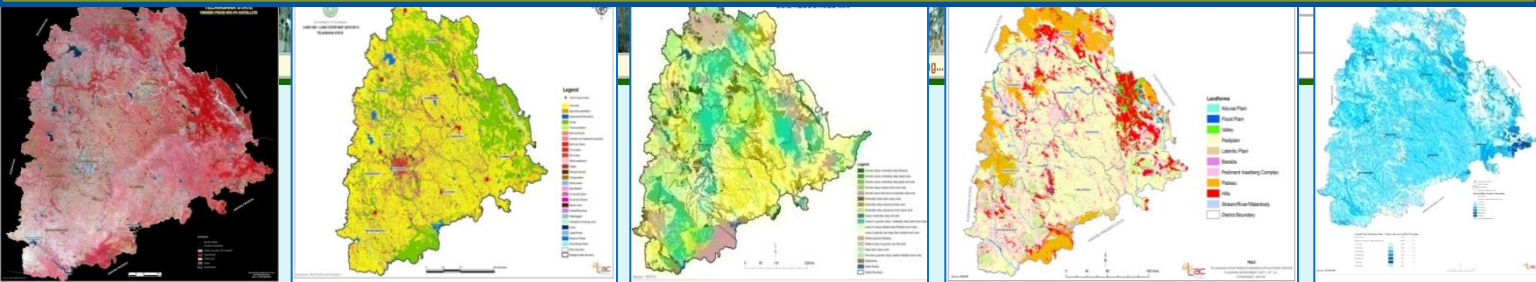
Search :

Assets

- ATM (1 Asset)
- Aanganwadi (1 Asset)
- Agriculture (1 Asset)
- Air Transport Facilities (4 Assets)
- Bank (1 Asset)
- College/University (10 Assets)
- Commercial (14 Assets)
- Credit Society (1 Asset)
- Dairy Unit (1 Asset)
- Data Collection Centre (3 Assets)
- Drainage and Hydrology (1 Asset)
- Drains or Naala (1 Asset)
- Electric Assets (5 Assets)
- Electricity and Usage (1 Asset)
- Fauna (1 Asset)



Natural Resources



Profile Logout Help

© National Remote Sensing Centre / ISRO 2014 NRSC

Asset Mapping			
Map	Search	Mapped Assets	Identify Results
. Marriage/Community Hall			
Category: Recreational Facilities			
Edit	Delete	Close	Validation
S.No.	Attribute	Value	
1	Name	SC community bhavan	
2	Ownership	Government	
3	Other Information		



Asset Mapping			
Map	Search	Mapped Assets	Identify Results
Edit	Delete	Close	Validation
No.	Attribute	Value	
1	No. of staff	2	
2	Electricity facility	No	
3	Drinking water facility	No	
4	Other facilities		
5	Other Information		



MADWAR GP

DHANWADA MANDAL

MAHABUBNAGAR DISTRICT

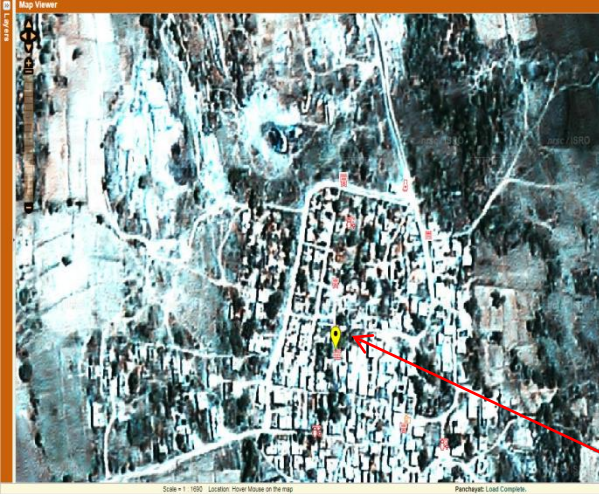


A total of **31 Assets**
captured in Madwar GP
of Dhanwada Mandal

Asset Mapping			
Map	Search	Mapped Assets	Identify Results
S.No.	Attribute	Value	
1	Name	Primary school	
2	Type	Co-Ed	
3	Run by	Government	
4	Building Ownership	Owned	
5	No. of students - Boys	94	
6	No. of students - Girls	116	
7	No. of teachers - Male	4	
8	No. of teachers - Female	1	
9	Medium of teaching	Telugu	
10	No. of rooms	6	
11	Toilet Facilities	Both	
12	Classroom furniture	No	
13	Drinking water	No	
14	Midday meal	Yes	
15	Electricity	Yes	
16	Internet	No	
17	Telephone	No	
18	Lab Facility	No	
19	Playground	No	
20	Other Facilities		
21	Other Information	Not in compound wall 1 room r...	

Asset Mapping			
Map	Search	Mapped Assets	Identify Results



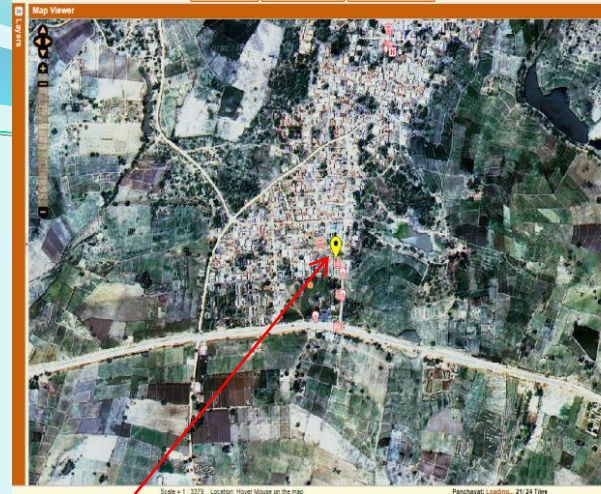


Attribute	Value
Type	Co-Ed
Run by	Government
Building Ownership	Owned
No. of students - Boys	72
No. of students - Girls	98
No. of teachers - Male	8
No. of teachers - Female	1
Medium of teaching	Telugu
No. of rooms	8
Toilet Facilities	Both
Classroom furniture	No
Drinking water	Yes
Midday meal	Yes
Electricity	Yes
Internet	No
Telephone	No
Lab Facility	No
Playground	No
Other Facilities	
Other information	We need playground

Asset Picture



MIDDLE SCHOOL



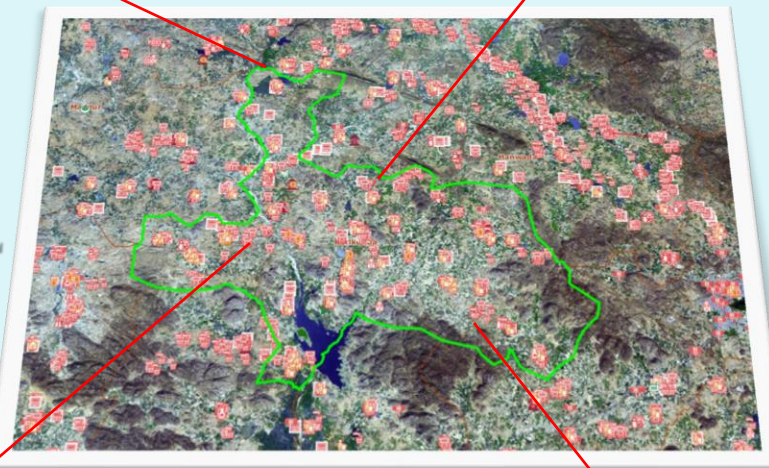
Attribute	Value
Name	Zila parishad High School
Type	Co-Ed
Run by	Government
Building Ownership	Owned
No. of students - Boys	113
No. of students - Girls	112
No. of teachers - Male	4
No. of teachers - Female	3
Medium of teaching	Telugu medium
No. of rooms	10
Toilet Facilities	Both
Classroom furniture	No
Drinking water	Yes
Midday meal	Yes
Electricity	Yes
Internet	No
Telephone	No
Lab Facility	Yes
Playground	Yes
Other Facilities	Required compound wall partly concrete
Other information	Required more space for playground

Asset Picture



HIGH SCHOOL

KOILKONDA MANDAL



A total of **611 Assets** captured in Koilkonda Mandal

PRIMARY HEALTH CENTRE

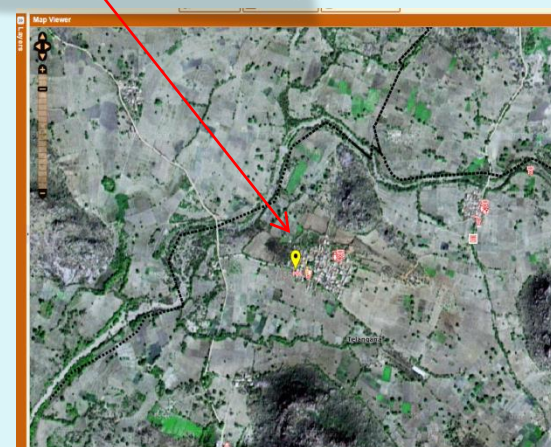


Attribute	Value
Name	Primary Health Centre mandalamba
Type Branch	Subcentric
No. of Doctors	1
No. of other staff	24
Pharmacy Facility	Yes
Trauma Centre Facility	No
Operation Theatre Facility	Yes
Diagnostic Lab Facility	Yes
Medical/Pharmacy Disp. Facility	No
No. of rooms	8
No. of beds	6
Sanitation Facility	No
Other Facilities	
Other information	

Asset Picture



RATION SHOP



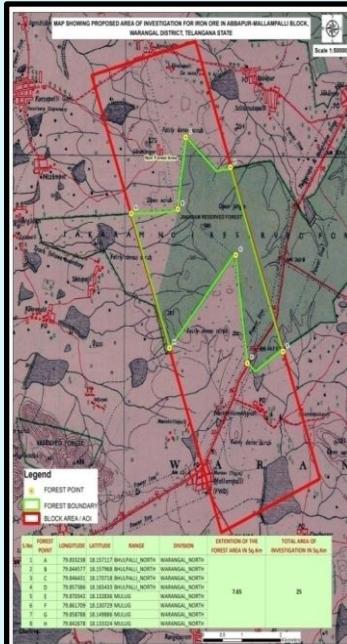
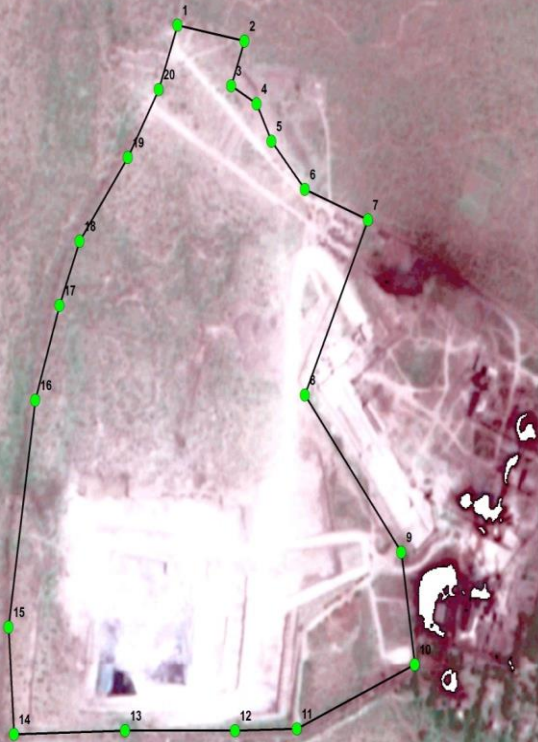
Attribute	Value
Name	Subcent shopPar Price Shop
Category	Public Distribution Shop
Type	Public shop
No. of beneficiaries listed	100
Committee available	Government
Other information	

Asset Picture



Demarcation of Mineral Blocks using DGPS /TS

MINING LEASE FOR LIMESTONE,
SAIDULANAMA RESERVE FOREST,
JANPAHAD SECTION
MIRAYALAGUDA RANGE,
NALGONDA DISTRICT, T.S.
M/S Deccan Cement Ltd.



- Delineation of precise Mining Lease / Prospective License Boundary on the Cadastral map
- Precise fixation of pillars of Mining Lease / Prospective License Boundary (In case of forest areas, the boundary pillars are fixed on ground with reference to at least three permanent ground features in and around Mining Lease / Prospective License).
- Generation of latitude-longitude value for each Boundary Pillar using DGPS (at least 2 hours observation)
- Integration of Mining Lease / Prospective License boundary with vectorised cadastral map by geo-referencing
- Integration of Mining Lease / Prospective License boundary with latest high-resolution satellite data (Carto+LISS IV) with a buffer of 500 m.
- Development of Mining Information System with Web GIS Portal developed

MODERNIZATION OF CADASTRAL MAP

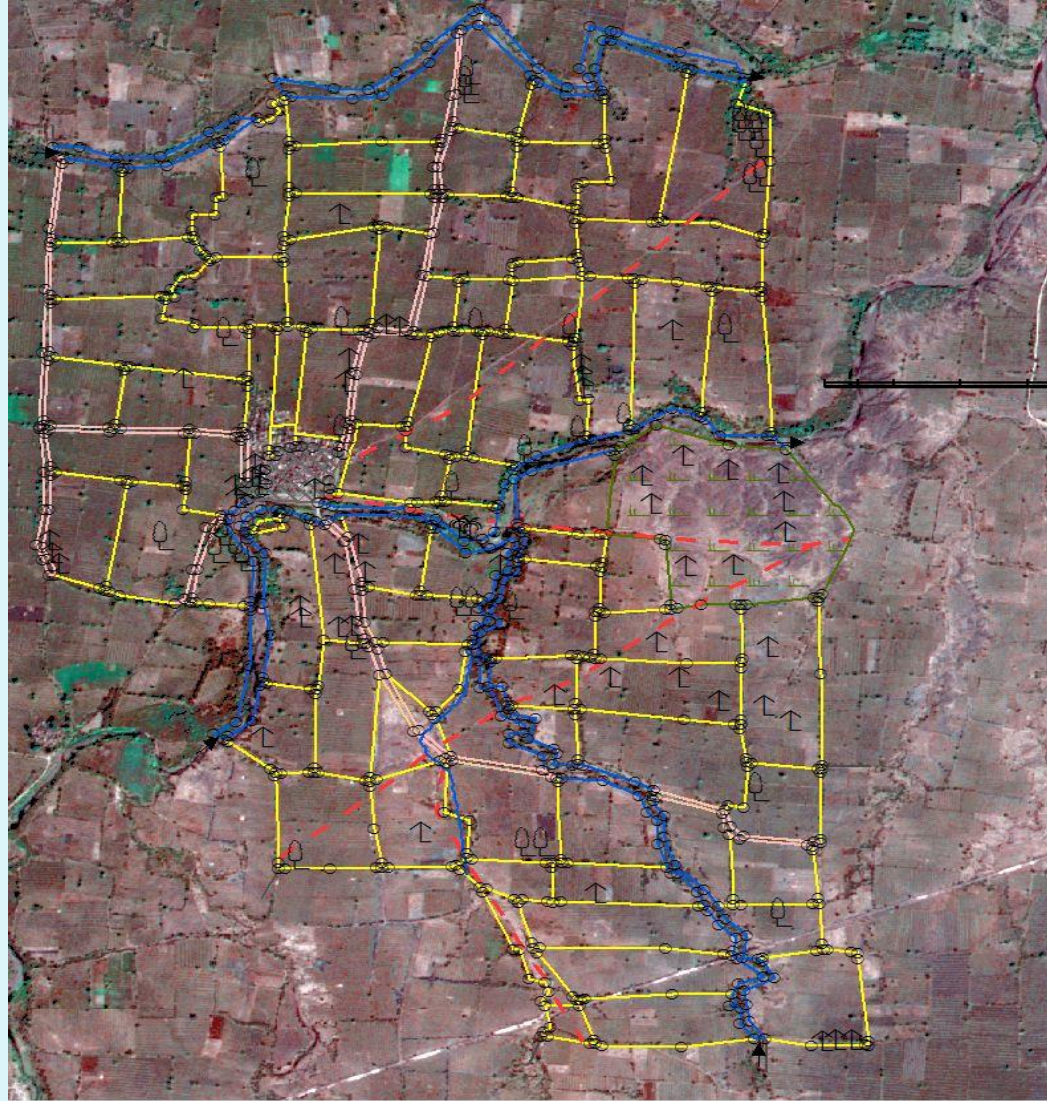
Objective

- The main thrust is the development of database for decentralized planning.

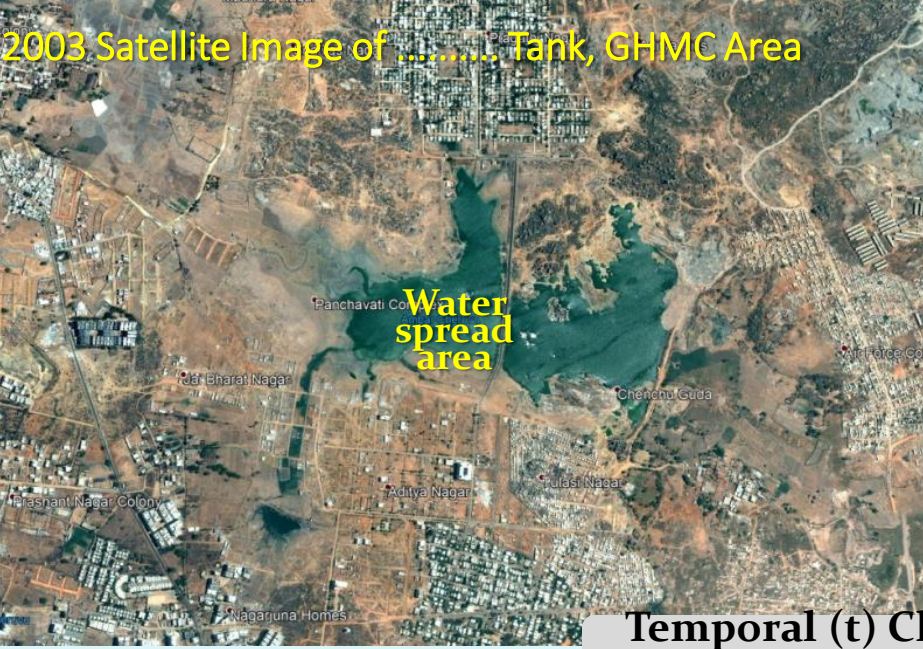
Scope

- Satellite image database preparation.
- Digitization (analog to digital conversion) of cadastral village maps.
- Geo-referencing of digitized GIS data with satellite image data.
- Metadata generation and achieving of the database for transactional use.

The digitised map is geo-referenced on High Resolution Cartosat – 1
Pan + LISSIV) Orthorectified Satellite Imagery.



Geospatial Technologies – Imaging & Measurement of Geo-space



Temporal (t) Changes of the tank



Geospatial Technology in Urban Development

A case study of Greater Hyderabad Municipal Corporation



Geospatial Technologies – Imaging & Measurement of Geo-space

30 cm Spatial Resolution Satellite Image of
RTC X Road Area of Hyderabad



RTC X
Road

X, Y -
Direction



Z -
Direction



RTC
Bhavan

Information on
Area, Height / Depth,
Volume

Unmanned Aerial Vehicle Technologies

Drone Specifications :

DJI Phantom 4 Pro

Weight: 1.35 kg

Endurance: 30 minutes (Effective time for each mission 20 min.)

Camera: 20 MP

Batteries: Sufficient backup

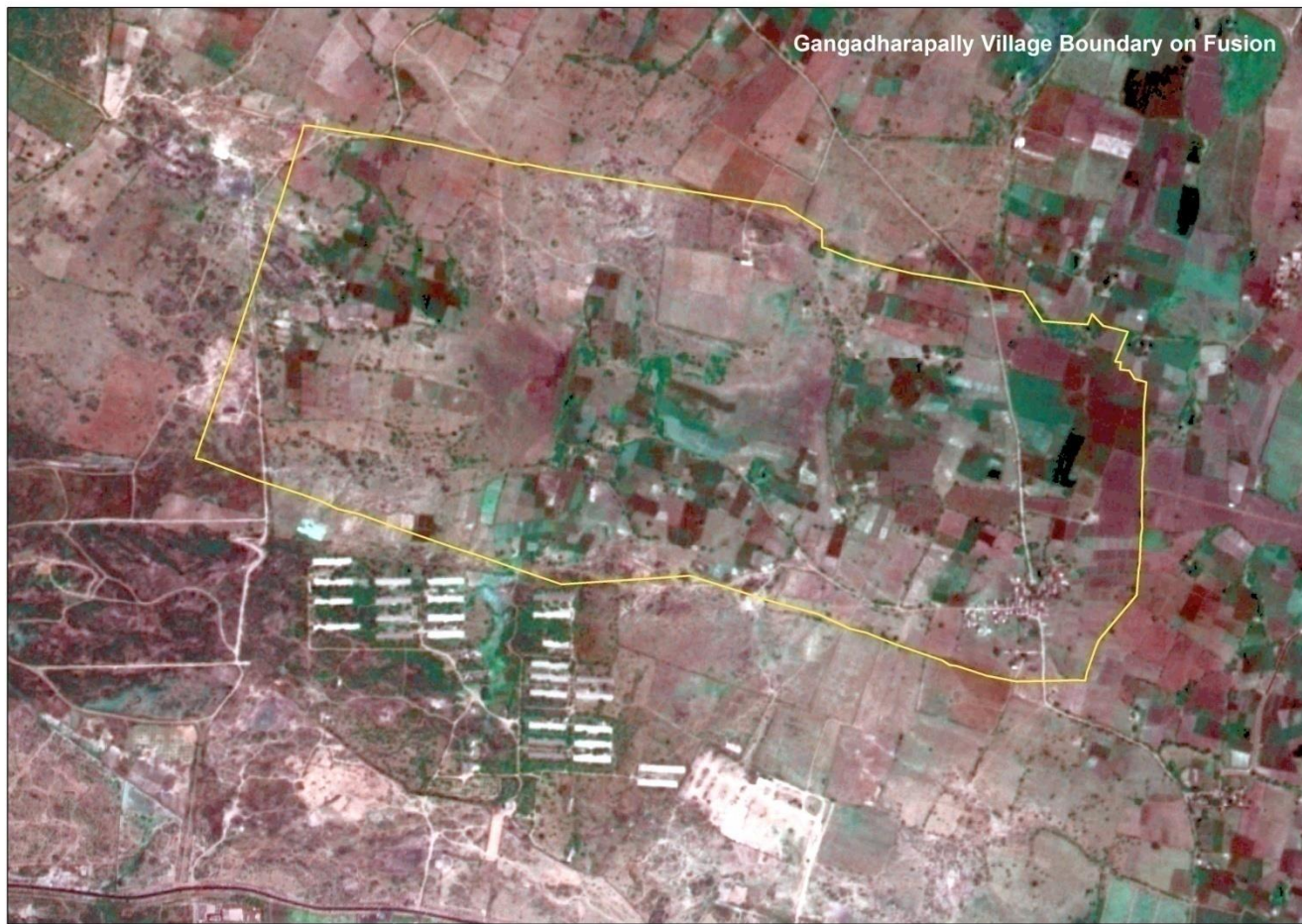






A typical Village view using the Drone survey for village assets and cadastral boundary updation

VILLAGE BOUNDARY AS PER TIFF



VILLAGE BOUNDARY AS PER DGPS POINTS

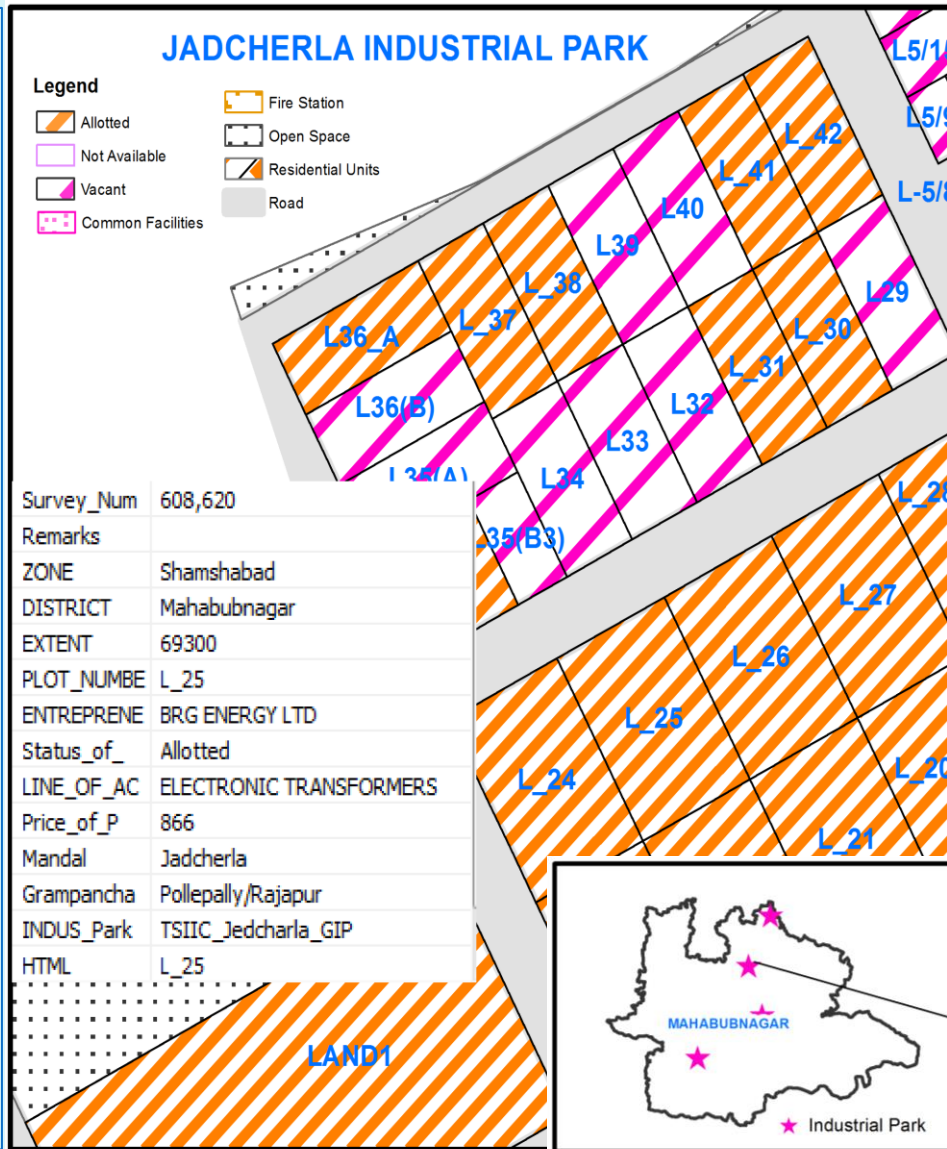


Web GIS

- What is web GIS?
 - Web GIS is a type of distributed information system, comprising of a
 - Server - GIS server
 - Client - web browser , desktop application, or mobile application
- Web GIS advantage
 - Delivery of location based information via the internet
 - Strong visualization of information
 - Dynamic retrieval of information
 - Large amounts of information stored/delivered
 - Interactive
- Technologies used at TRAC
 - Arcgis Server, ArcGIS JavaScript API, DotNet Framework 4, ASP.NET

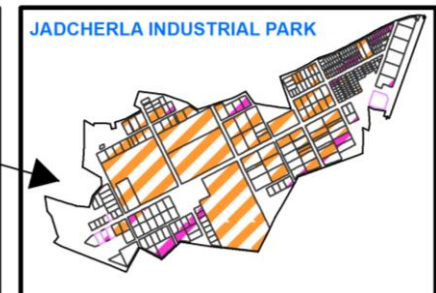
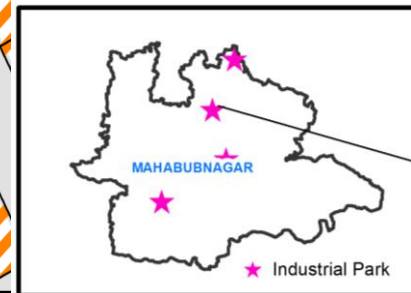
GIS Application for Ease of Doing Business

TRAC facilitates the prestigious program of Telangana State on Ease of doing Business to the Prospective Entrepreneur in collaboration with TSIIC



A GIS web application for 107 Industrial parks, with detailed Spatial information on vacant plots and Infrastructure is developed.

All the amenities are visible for prospective entrepreneur to select the plot & apply and pay online.



GIS Application for Ease of Doing Business

Not secure | tracgis.telangana.gov.in/TIS/TISNEW/tsiic/Default.aspx

Telangana State Remote Sensing Applications Centre

GIS MIS Data

Layers / Summary

Layers Summary Submit Query

Fields	Values
Zone	Shamshabad
District	Ranga Reddy
Mandal	Ibrahimpatnam
Gram Panchayat	Adibatla
Industrial Park	Aerospace_SEZ_Adibatla
Type of Industrial Park	Aerospace & Precision Engineering
Pollution Category of Industrial Park	Red
Allowed Industrial Categories	White and Green and Orange and Red
Total Extent (in Sq. Mt.)	1149005
Total No. of Plots	13
Average Size of Plots	88385
Plots Already Allocated	8
Total No. of Vacant Plots	4
Vacant Plots Extent (in Sq. Mt.)	169974
Distance from Airport (Km)	24
Road Connectivity	5 Kms ORR
Sub Station (Name with Distance)	33/11 KV Sub-station 1 Kms
Gas pipeline connection (Km)	--
Water Connection (Yes/No)	No
Classification	Precision Engineering
Total No. of Plants	1200

Vacant Plots

Maximize / Minimize

- Query by Admin Boundary
- Query by District
- Query by Industrial Park
 - Aerospace_SEZ_Adil
- Query Plots

Details of P_2/2 Plot Number

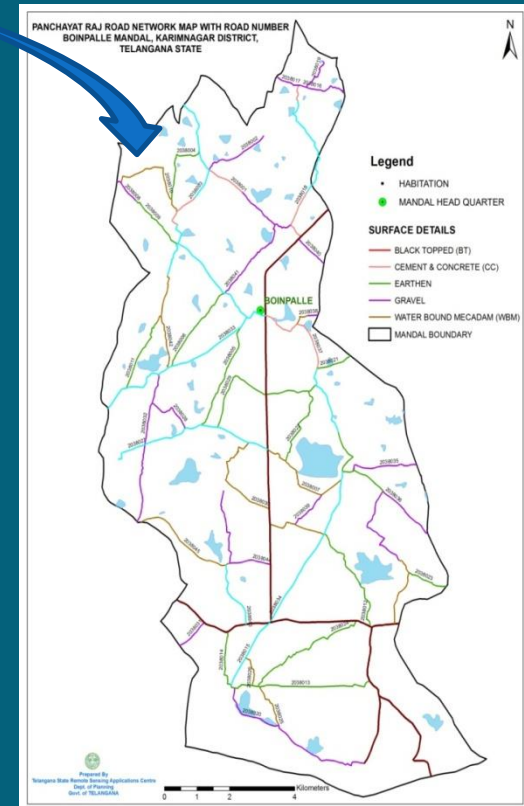
Fields	Values
Survey Number	656
Plot No.	P_2/2
Enteprenur	
Extent (Sq. MT.)	54634.5
Price of Plot (in Lakhs)	1561.45401
Status of Plot	Vacant
Line of Activity	
Industrial Park	Aerospace_SEZ_Adibatla

Apply

Edit Plot Details

Road Information System

Panchayat Raj roads extracted from HR satellite data, Cartosat - 1. The surface type details were linked to the road information and Geodatabase was hosted in the Bhuvan Portal web server.



Road Information System – Web Application

tracgis.telangana.gov.in/tsris_new/ris/default.aspx

Trac **Telangana Road Information System**

GIS Layers / Analytics / Query

Layers Analytics Query Edit Road Details

GP Connectivity

Bar Diagram
Gram Panchayat Connectivity Status, Telangana State

No of GPs

15k
10k
5k
0

12 751
11 202
832

● Connected
● Un connected - Proposed
● Un connected - On Going

Road Connectivity Status

Connected	11202
Un Connected - Proposed	832
Un Connected - On Going	717
Total	12751

Show District Level - Gram Panchayat Connectivity Status

Bar Diagram
Gram Panchayat Category Telangana State

No of GPs

15k

12 751

● Plain
● SCP

Navigation
Measure Distance

Analytics

GP Connectivity Existing R & B Roads Existing PR Roads All Roads Proposed Roads

--- ALL --- Mandal --- Download Data **GP Connectivity** Total: 12751 Connected: 11202 Proposed : 832 On Going : 717

GP Code	GP Name	Mandal	District	GP Category	GP Type	Road Connectivity Status	GIS
...	Ananthapur	Bazarathnoolur	Adilabad	TSP	New	Connected	Zoom
...	Hasnapur	Tamsi	Adilabad	Plain	Old	Connected	Zoom
...	Gimma K	Jainad	Adilabad	Plain	Old	Connected	Zoom



Thank You