

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -33/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
March-2021

T 0 - T 1 - T 2 - T 3 - T 4 - T 5



AGRICULTURE & SOIL
DIVISION
Andhra Pradesh Space
Applications Centre (APSAC)
ITE&C Department Govt. of
Andhra Pradesh



RURAL DEVELOPMENT AND
WATERSHED MONITORING
DIVISION
Land Resources and Land Use
Mapping and Monitoring Group,
Remote Sensing Application Area,
National Remote Sensing Centre, ISRO



DEPARTMENT OF LAND
RESOURCES
Ministry of Rural Development
Government of India

C O N T E N T S

- **EXECUTIVE SUMMARY**

01. STUDY AREA
02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
04. CONCLUSIONS

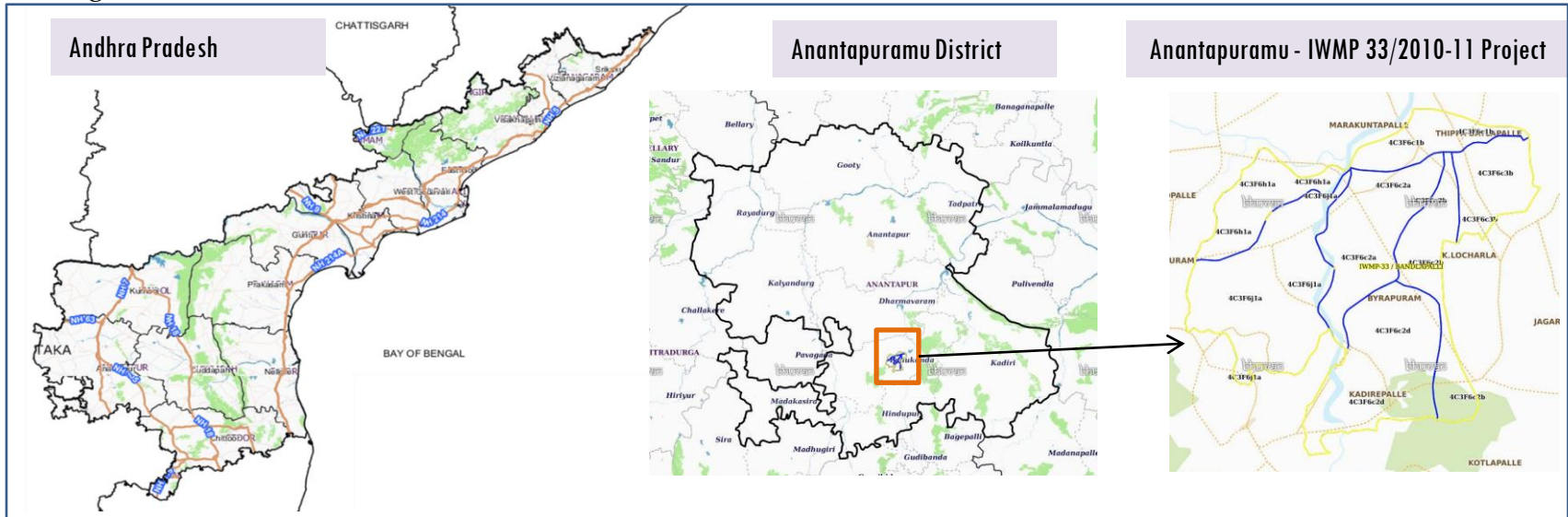
E X E C U T I V E S U M M A R Y

- Integrated Watersheds Management Project (IWMP) is a flagship programme of Department of Land Resources (DoLR), Ministry of Rural Development (MRD).
- National Remote Sensing Centre (NRSC), ISRO has designed and developed Bhuvan Geo-ICT Web portal tools namely - Srishti and Drishti for monitoring and evaluation of IWMP watersheds. It uses high spatial and temporal resolution sensors viz., Carto-1/2(2.5 m) , LISS-IV(5.8 m color).
- Current summary report gives details of Project - IWMP-33/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 6,406 ha. it comprises of 8 micro watersheds.
- In the project area 83 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an decreased by 26 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 70.57 % is covered by the agriculture, 12.20 % is covered by Scrub land, 5.16 % is covered by forest and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-33/2010-11

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Kothacheruvu Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 6,406 ha. It comprises of 8 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (*Batch -II*) projects taking 2018-19 (T5) period satellite images



- Anantapuram has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 37 °C range and it reaches around 44 °C to 45 °C .
- Anantapuram gets pre-monsoon showers starting as early as March, mainly through north-easterly winds blowing in from Kerala. Monsoon arrives in September and lasts until early November with about 250 mm (9.8 in) of precipitation. A dry and mild winter starts in late November and lasts until early February; with little humidity and average temperatures in the 22–23 °C (72–73 °F) range. Total annual rainfall is about 22 in (560 mm).
- Anantapuram district receives moderate to good rainfall from July to October month.

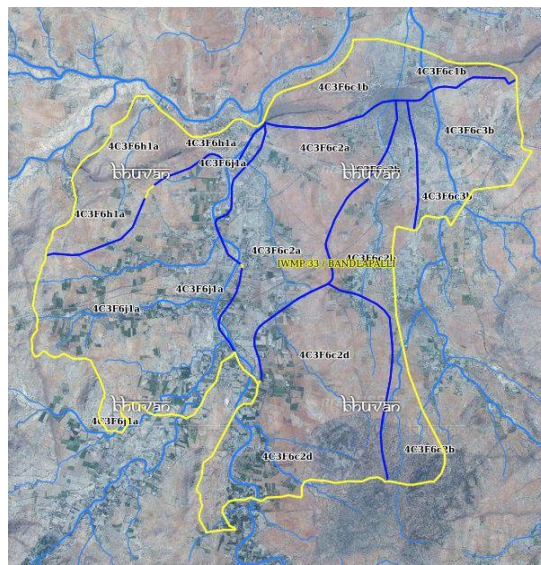
Satellite Data and Ancillary Data

| | | | |
|-----------------|---------|---------|----------|
| Satellite data* | T0-A** | T0-B** | T5 |
| | 2010-11 | 2011-12 | 2018-19 |
| LISS IV | 2010-11 | | |
| SCENE 1 | | | 5-Mar-19 |
| SCENE2 | | | |
| SCENE 3 | | | |
| SCENE 4 | | | |
| | | | |
| CARTO | 2010-11 | | |
| SCENE 1 | | | 5-Mar-19 |
| SCENE2 | | | |
| SCENE 3 | | | |
| SCENE 4 | | | |

Ancillary Data

| | Category | Sub category | Status |
|---|-------------------------|--------------|--------|
| 1 | Thematic maps | | |
| | LULC (1: 10 000) | | |
| | | DRAIANGE | YES |
| | | SETTLEMENT | YES |
| | | ROADS/RAILS | No |
| | LULC (1: 50 000) | | |
| | | 2005-06 | |
| | | 2008-09 | |
| 2 | Activity Plan Maps | | |
| 3 | Drishti Photographs | | |
| | | Total | 83 |
| 4 | Detailed Project Report | | |

Natural Color Composite overlaid with Project boundaries and high detail stream network



Legend



Drainage (1:10000 Scale)

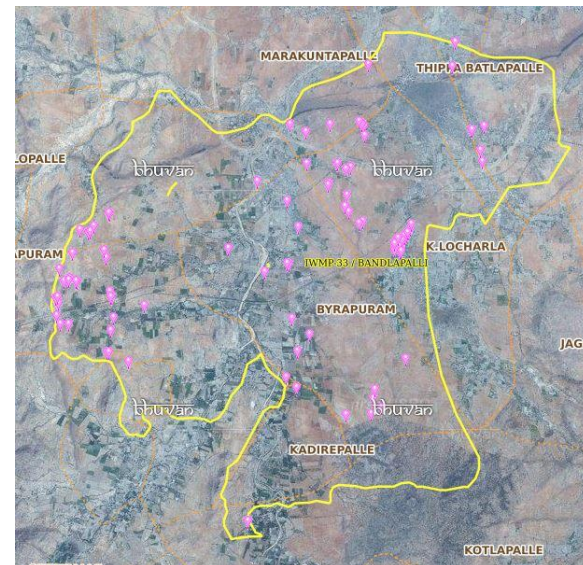


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

| Sr. No | Activity | Drishti Photo | Visible on satellite |
|--------|---|---------------|----------------------|
| 1 | Afforestation | 1 | 1 |
| 2 | Agriculture/Horticulture | 0 | 0 |
| 3 | Pasture | 0 | 0 |
| 4 | Trench | 0 | 0 |
| 5 | Field Bunds | 0 | 0 |
| 6 | Terrace | 0 | 0 |
| 7 | Checks & Plugs | 32 | 25 |
| 8 | Gabion structure | 0 | 0 |
| 9 | Farm ponds/Dug out pit | 5 | 5 |
| 10 | Civil work-Check dams/Rock fill dam | 17 | 15 |
| 11 | Nallah Bunds/Drainage treatment | 0 | 0 |
| 12 | Percolation tanks / Ground water recharge structure | 0 | 0 |
| 13 | Production System and Micro-Enterprises | 3 | 3 |
| 14 | Livelihood Activities-Plantation/Horticulture | 2 | 2 |
| 15 | Capacity Building Activities | 0 | 0 |
| 16 | Entry Point Activity | 2 | 2 |
| 17 | Others | 45 | 30 |
| | TOTAL | 107 | 83 |

MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2010-11) and T5 is 2018-19 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Anantapuramu-IWMP-33/2010-11

2010-11



Feb-2015



Oct-2016



Nov-2017



2019



Drishti Sl.No.: 130612
M.No.: 9100986141
Uuid:6010945cc2dfe354

Activity : check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-33/2010-11



T0:2010-11



T1: 18 February 2015

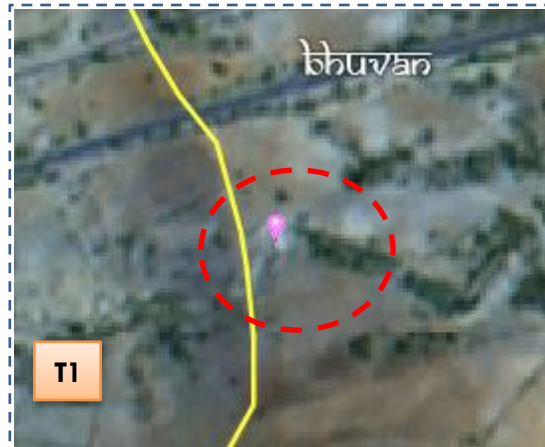


Drishti Sl no. 138818 MWS : 4C3F6c2d

Block planting



T0:2010-11



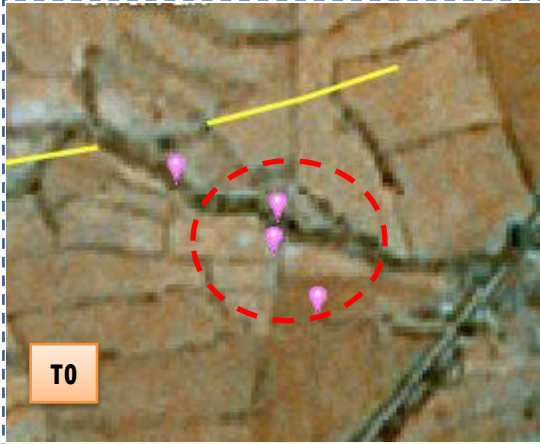
T1: 18 February 2015



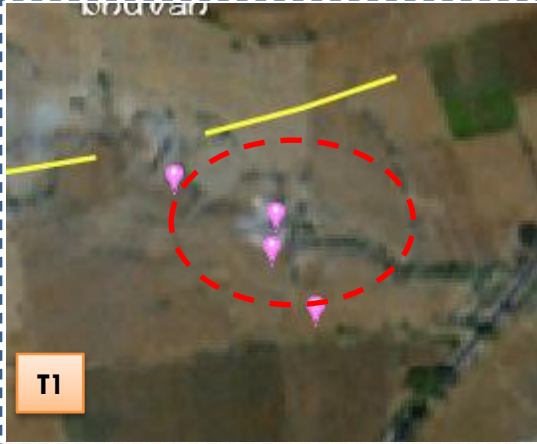
Drishti Sl no. 130612 MWS : 4C3F6c2d

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-33/2010-11



T0:2010-11



T1: 18 February 2015



Drishti SI no. 138825 MWS : 4C3F6c2d

Check dam



T0:2010-11



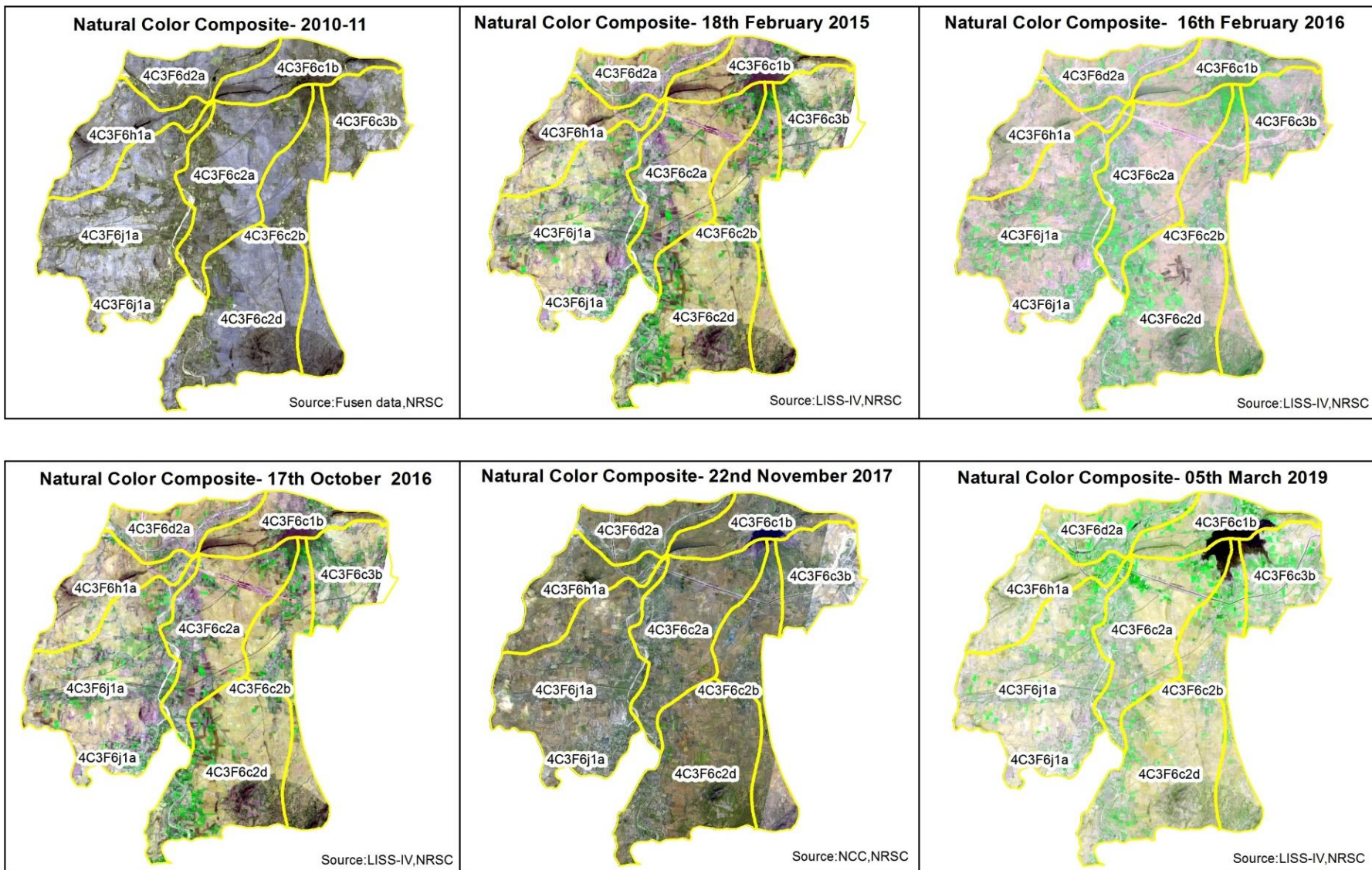
T1: 18 February 2015



Drishti SI no. 1635852 MWS : 4C3F6c2d

Check dam

Natural Color Composite – 2010-11 to 2018-19



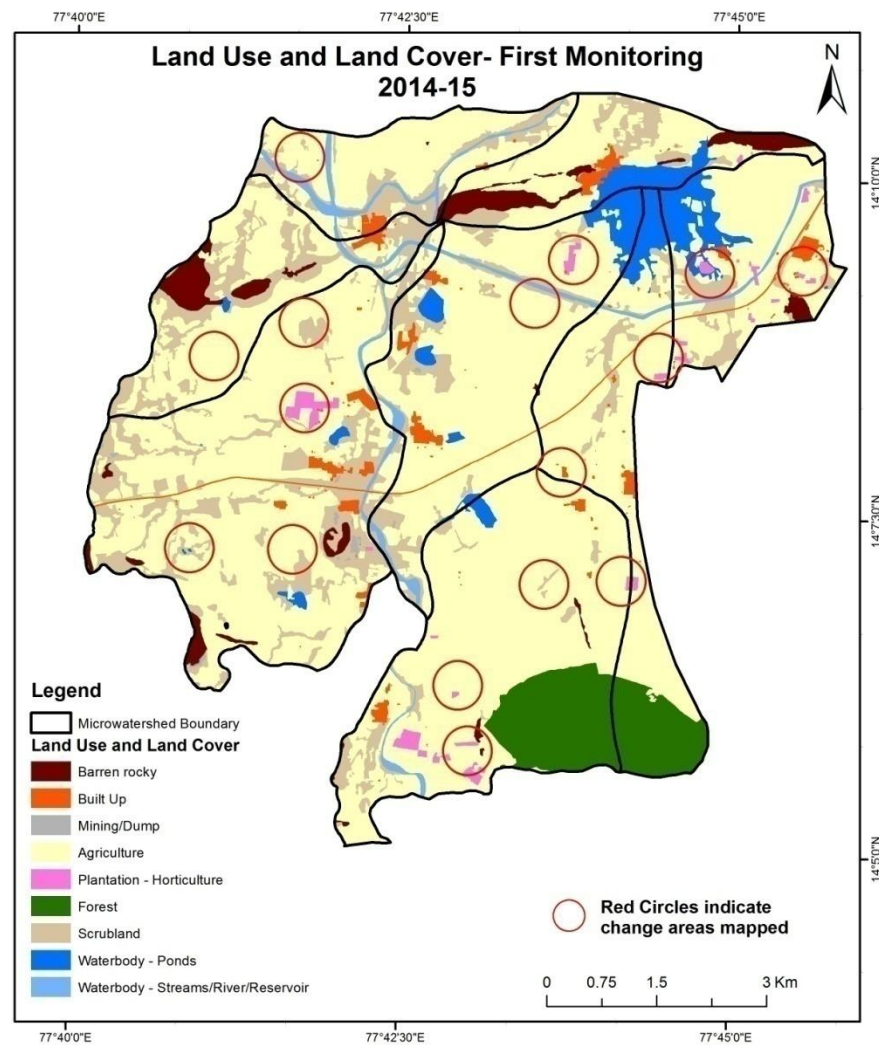
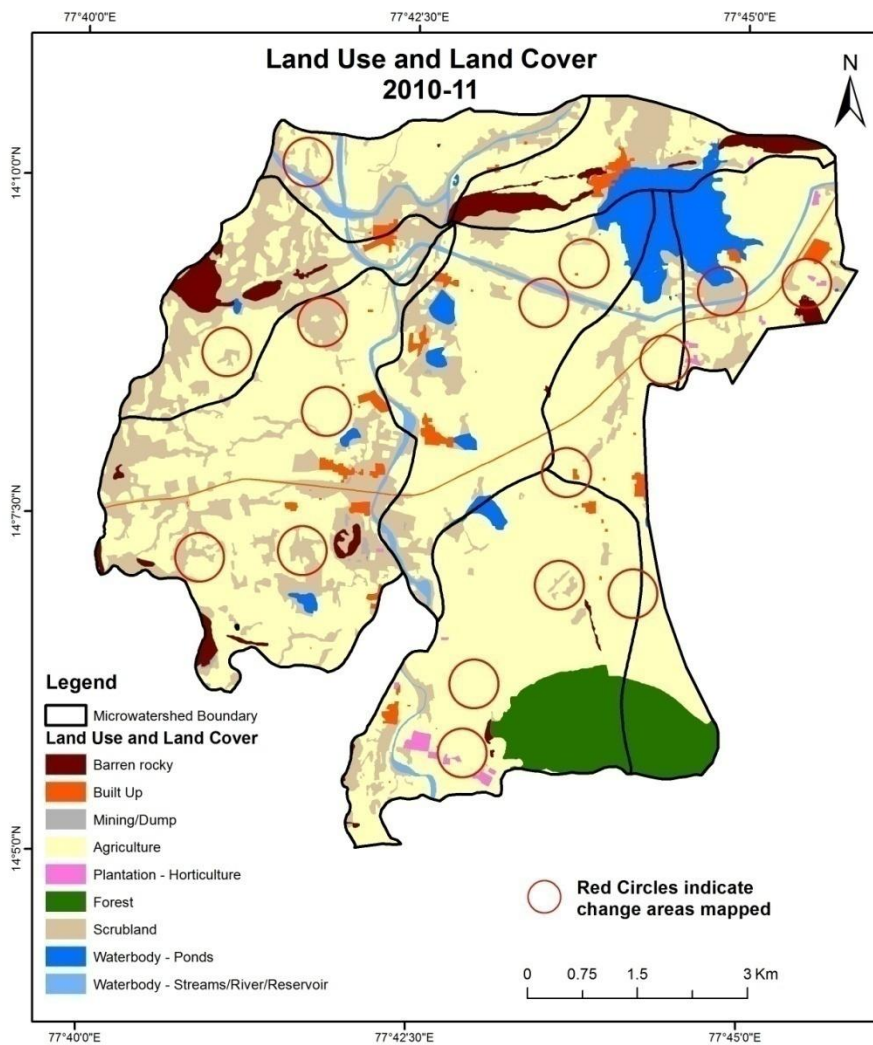
MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

- Change in land use and land cover from T0 to T5 are analyzed in terms of built up, mining/dump, agriculture, plantation- horticulture, forest, barren rocky waterbody-streams/river/reservoir and waterbody -ponds.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.
- The result obtained for the period T0 to T5 are given in the change matrix table.
- In matrix table column represents the T0 (2010-11) and row represents the T5 (2018-19)

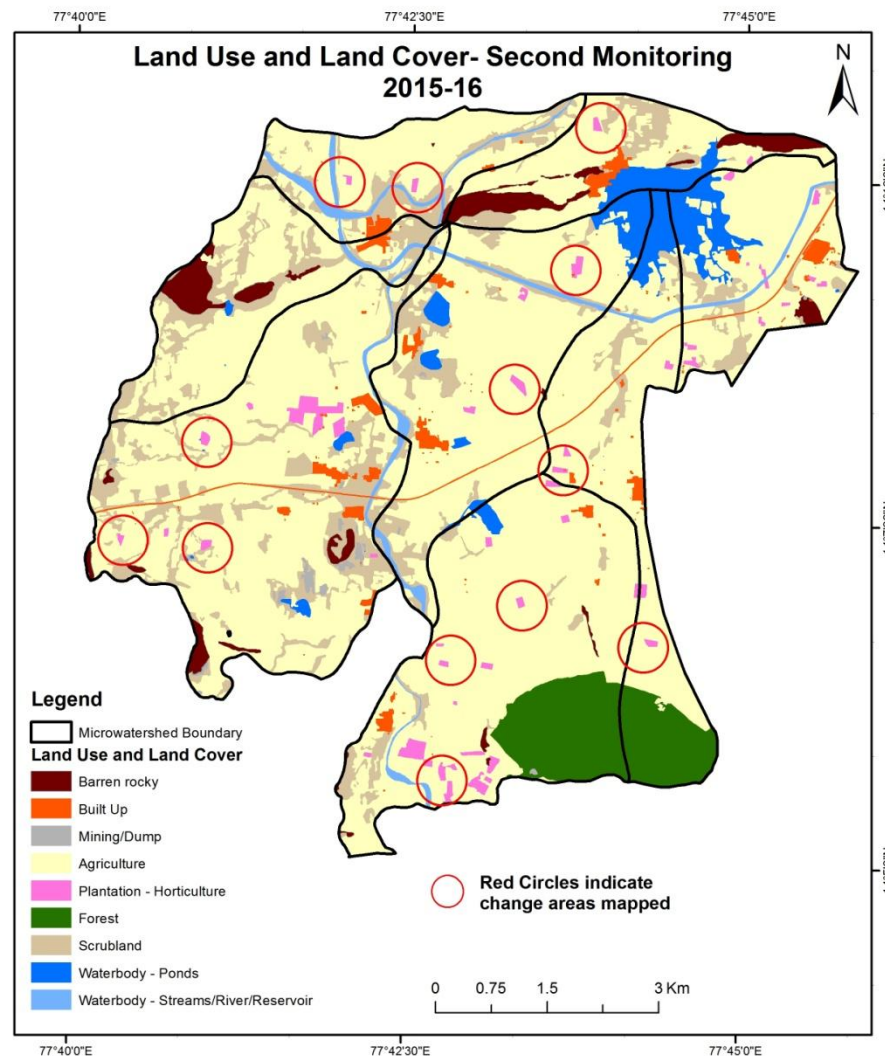
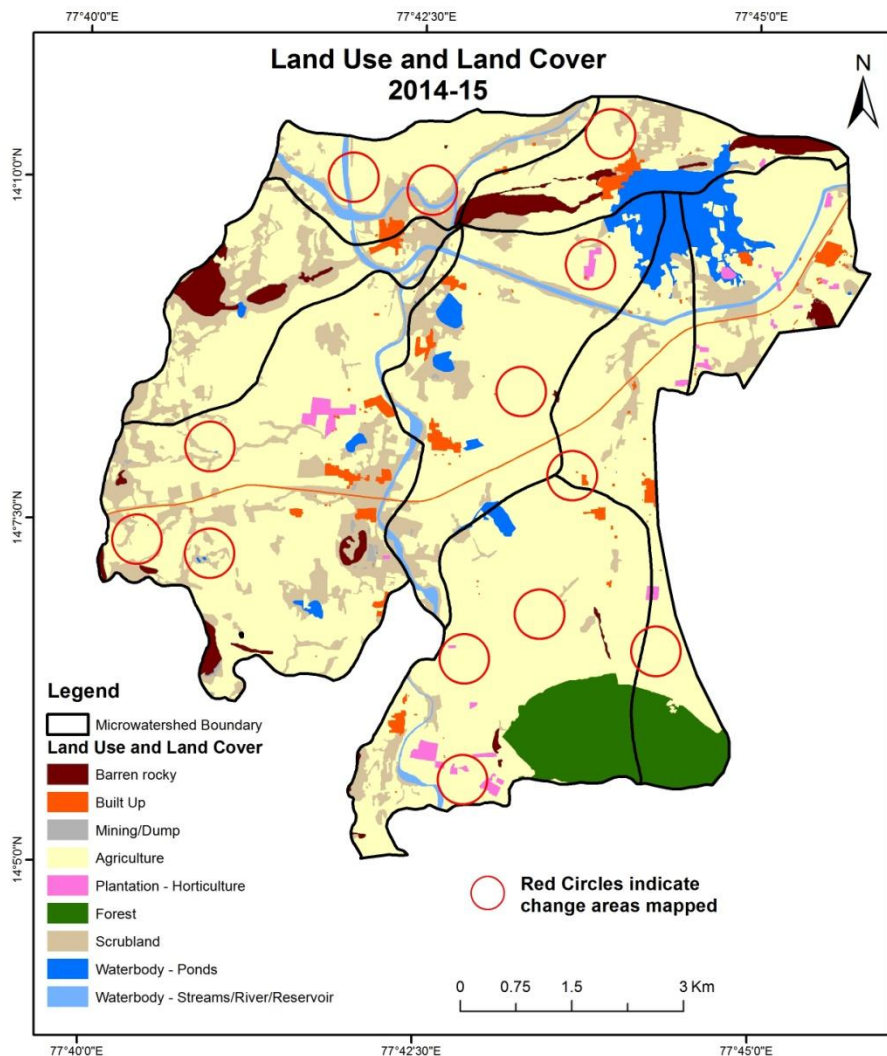
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



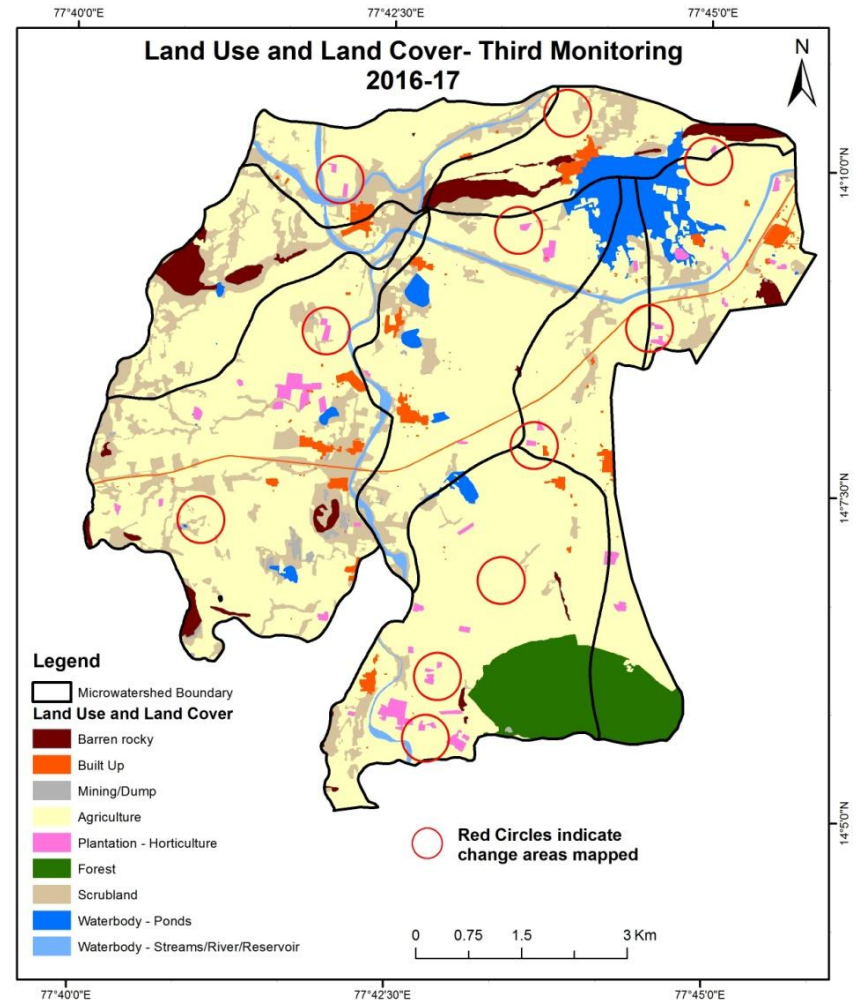
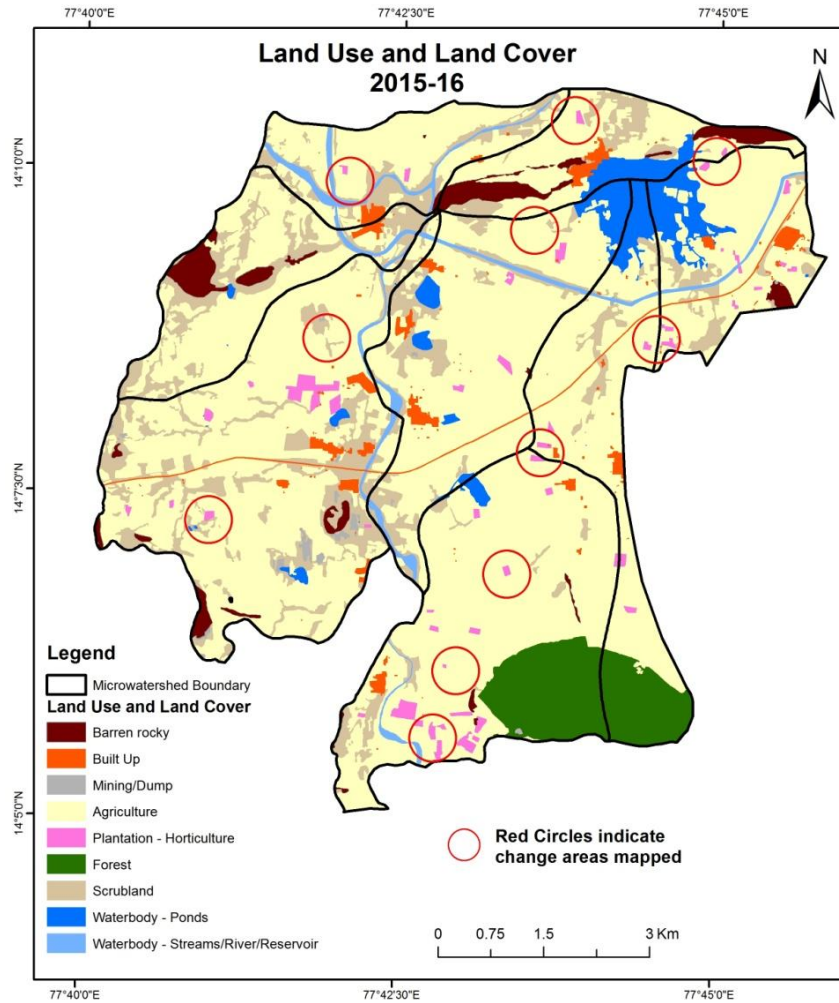
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



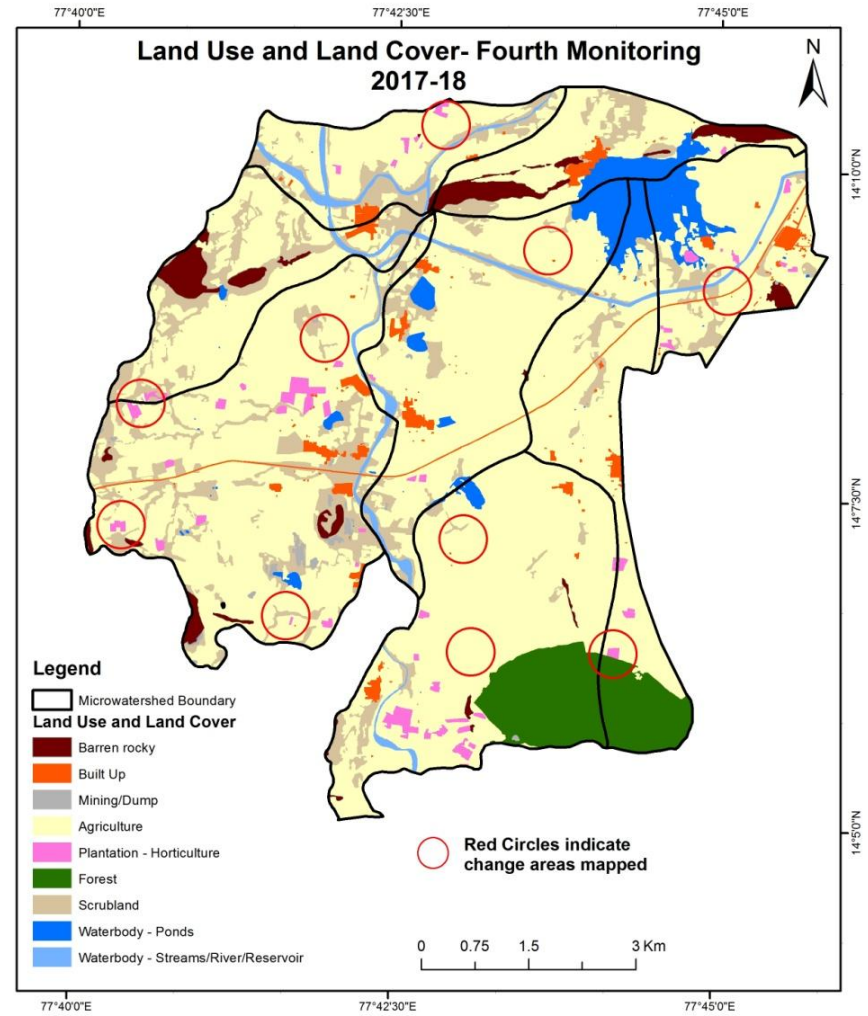
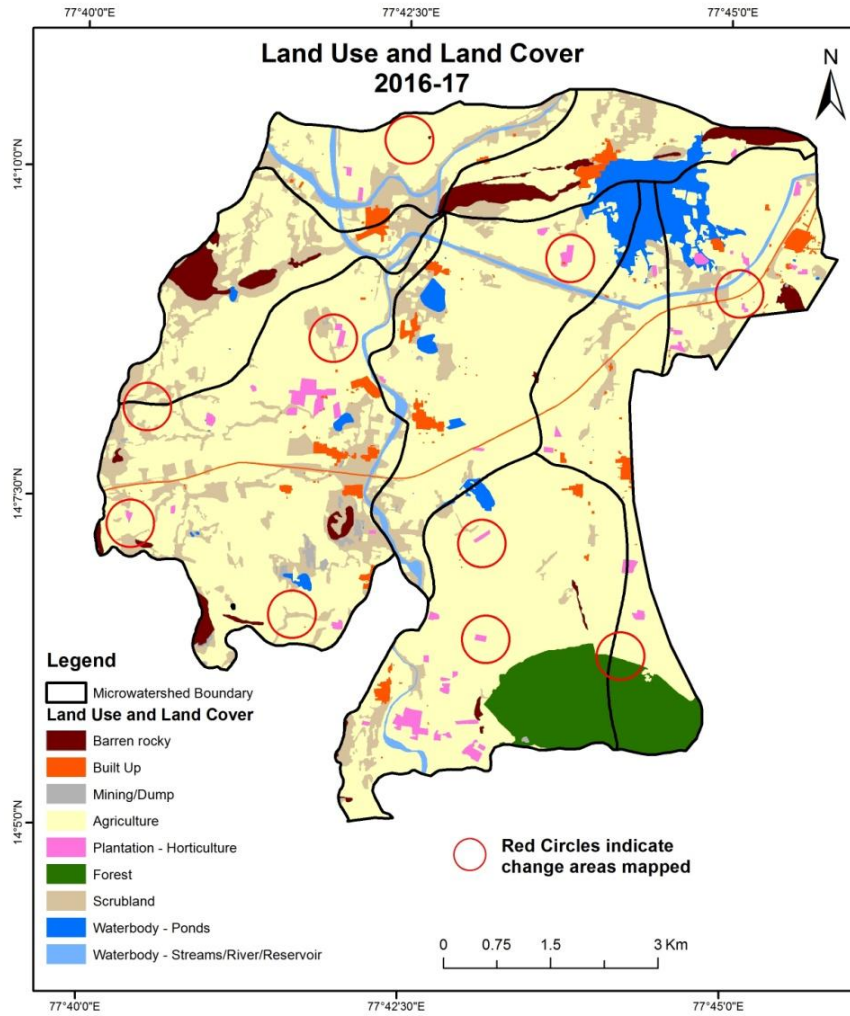
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



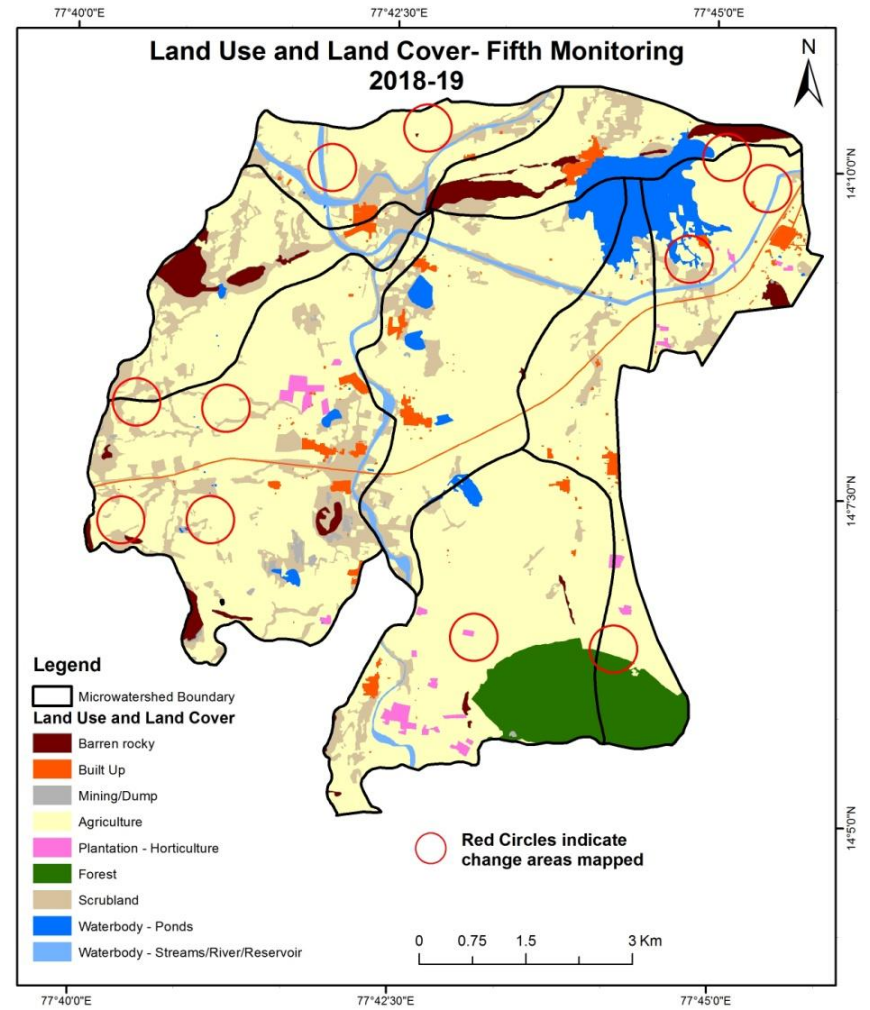
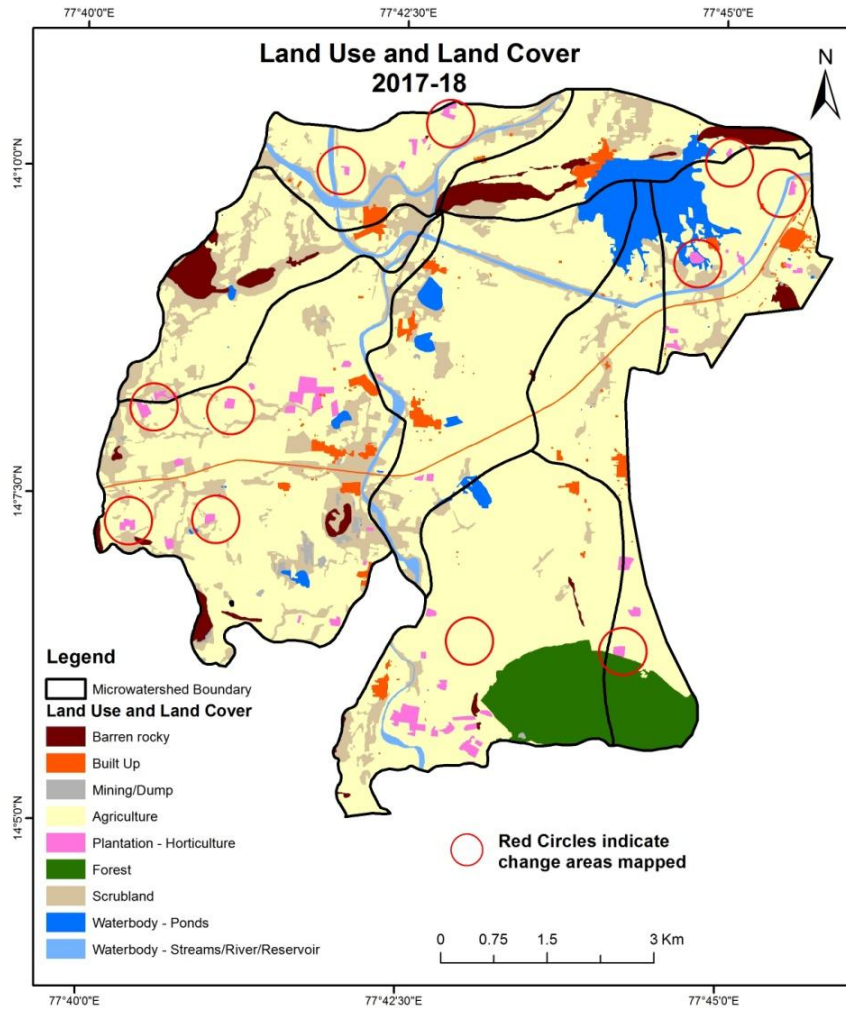
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Built Up



T1: 2014-15 (77°42'38.36E 14°7'55.96N)

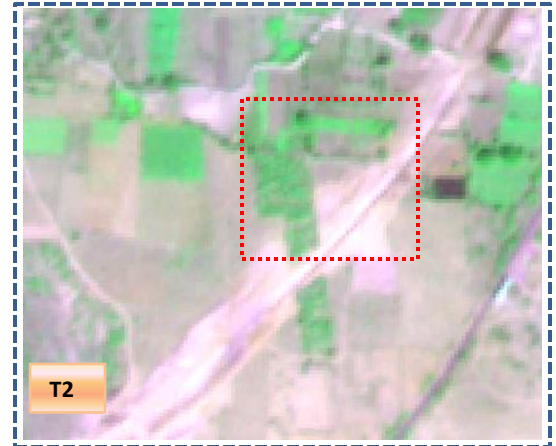


T2: 16 February 2016

Plantation – Horticulture
to Agriculture



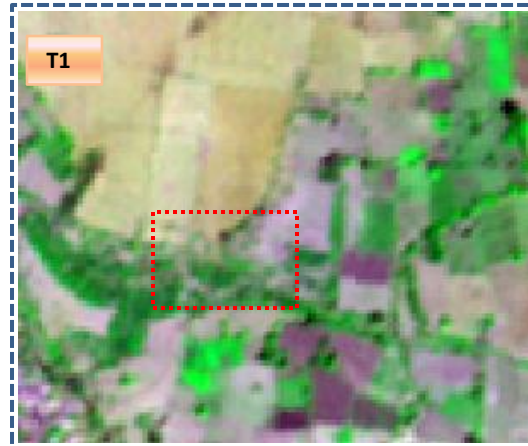
T1: 2014-15 (77°45'10.047E 14°9'22.069N)



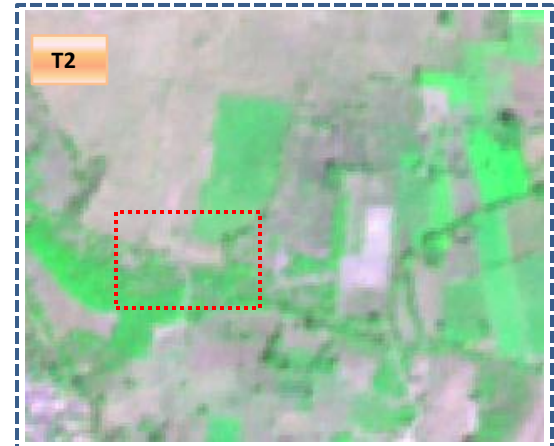
T2: 16 February 2016

Land Use and Land Cover changes for Pre and Post treatment dates

Water body to Agriculture

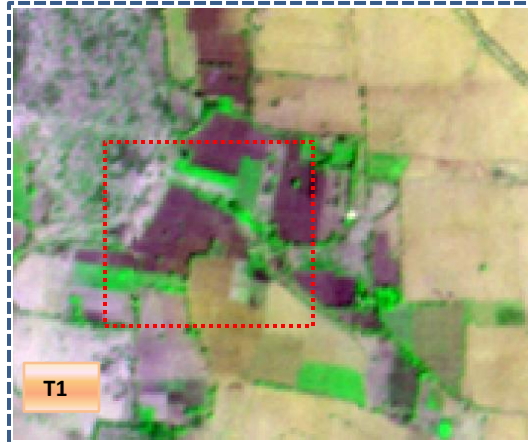


T1: 2014-15 (77°45'1.31E 14°9'35.504N)



T2: 16 February 2016

Agriculture to Built Up



T1: 2014-15 (77°42'50.445E 14°8'26.255N)



T2: 16 February 2016

Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0: 2010-11(77°42'57.67E 14°5'50.307N)



T1: 18 February 2015

Agriculture to Plantation



T0: 2010-11(77°44'7.848E 14°7'2.906N)



T1: 18 February 2015

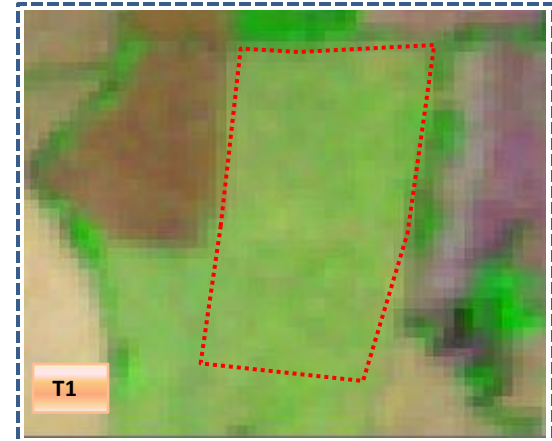
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0

T0: 2010-11(77°43'45.818"E 14°9'24.976"N)



T1

T1: 18 February 2015

Agriculture to Canal



T0

T0: 2010-11(77°42'46.374"E 14°9'27.417"N)



T1: 18 February 2015

Table showing change matrix depicting Land cover transitions during study period-2010-11 to 2014-15

| Land cover | Monitoring period (T1) | | | | | | | | | | Units in Hectares | | |
|-------------------------------------|------------------------|-----------------|----------------|----------------------------|---------------|----------------------|-----------------|---------------|-----------------------------|---------------------|-------------------|--|----------------|
| | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | | |
| Built up | 123.51 | | | | | | | | | | | | 123.51 |
| Mining/dump | | 7.26 | | | | | | | | | | | 7.26 |
| Agriculture | 5.03 | 0.14 | 4115.41 | 29.28 | | | | | | | 0.20 | | 4150.06 |
| Plantation Horticulture | | | 0.57 | 21.84 | | | | | | | | | 22.41 |
| Forest | | | 7.87 | | 331.29 | | | | | | | | 339.16 |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | | | | | | 175.74 | | | | | | 175.74 |
| Scrub | 3.57 | 1.47 | 252.12 | 0.99 | | | | 920.83 | | | 0.60 | | 1179.57 |
| Waterbody- Streams/River | | | | | | | | | 123.91 | | | | 123.91 |
| Waterbody – Ponds | 0.40 | | 44.37 | 2.61 | | | | | | | 237.50 | | 284.88 |
| Grand Total | 132.50 | 8.86 | 4420.34 | 54.72 | 331.29 | | 175.74 | 920.83 | 123.91 | | 238.30 | | 6406.48 |

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T0 34.65 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T1.
- In T1 304.93 ha of agriculture are increased from plantation, forest, scrubland and water body of T0. The additional agriculture are coming from water body in T5 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2014-15 to 2015-16

| Land cover | Monitoring period (T2) | | | | | | | | | | Units in Hectares | | |
|-------------------------------------|------------------------|-----------------|----------------|----------------------------|---------------|----------------------|-----------------|---------------|-----------------------------|---------------------|-------------------|------|----------------|
| | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | | |
| Built up | 132.50 | | | | | | | | | | | | 132.50 |
| Mining/dump | | 8.84 | | | | | | | | | | 0.02 | 8.86 |
| Agriculture | 1.93 | 0.45 | 4379.07 | 38.81 | | | | | | | | 0.08 | 4420.34 |
| Plantation Horticulture | 0.04 | | 6.67 | 48.01 | | | | | | | | | 54.72 |
| Forest | | 0.69 | | | 330.60 | | | | | | | | 331.29 |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | 0.20 | | | | | 175.54 | | | | | | 175.74 |
| Scrub | 0.29 | 10.55 | 60.14 | | | | | 849.84 | | | | | 920.83 |
| Waterbody- Streams/River | | | | | | | | | 123.91 | | | | 123.91 |
| Waterbody – Ponds | | | 3.94 | | | | | | | | 234.36 | | 238.30 |
| Grand Total | 134.77 | 20.74 | 4449.82 | 86.81 | 330.60 | | 175.54 | 849.84 | 123.91 | | 234.46 | | 6406.48 |

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T1 41.27 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 70.75 ha of agriculture are increased from plantation, scrubland and water body of T1. The additional agriculture are coming from waterbody in T2 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2015-16 to 2016-17

| Land cover | Monitoring period (T3) | | | | | | | | | | Units in Hectares | |
|-------------------------------------|------------------------|-----------------|----------------|----------------------------|---------------|----------------------|-----------------|---------------|-----------------------------|---------------------|-------------------|--|
| | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | |
| Built up | 134.77 | | | | | | | | | | 134.77 | |
| Mining/dump | | 20.74 | | | | | | | | | 20.74 | |
| Agriculture | 3.16 | | 4423.48 | 22.83 | | | | | | 0.36 | 4449.82 | |
| Plantation Horticulture | | | 28.74 | 58.07 | | | | | | | 86.81 | |
| Forest | | | | | 330.60 | | | | | | 330.60 | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | 175.54 | | | | 175.54 | |
| Scrub | 1.35 | | 39.66 | | | | | 808.83 | | | 849.84 | |
| Waterbody- Streams/River | | | | | | | | | 123.91 | | 123.91 | |
| Waterbody – Ponds | 0.13 | | 5.88 | | | | | | | 228.45 | 234.46 | |
| Grand Total | 139.41 | 20.74 | 4497.76 | 80.90 | 330.60 | | 175.54 | 808.83 | 123.91 | 228.80 | 6406.48 | |

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T2 26.34 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.
- In T3 74.28 ha of agriculture are increased from plantation, scrubland and water body of T2. The additional agriculture are coming from waterbody in T3 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2016-17 to 2017-18

| Land cover | Monitoring period (T4) | | | | | | | | | | Units in Hectares | |
|-------------------------------------|------------------------|-----------------|----------------|----------------------------|---------------|----------------------|-----------------|---------------|-----------------------------|---------------------|-------------------|--|
| | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | |
| T3 | | | | | | | | | | | | |
| Built up | 139.41 | | | | | | | | | | 139.41 | |
| Mining/dump | | 20.74 | | | | | | | | | 20.74 | |
| Agriculture | 0.83 | 0.74 | 4447.99 | 30.35 | | | | | | 17.85 | 4497.76 | |
| Plantation Horticulture | | | 21.46 | 59.44 | | | | | | | 80.90 | |
| Forest | | | | | 330.60 | | | | | | 330.60 | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | 175.54 | | | | 175.54 | |
| Scrub | 0.05 | | 13.73 | | | | | 794.37 | | 0.68 | 808.83 | |
| Waterbody- Streams/River | | | | | | | | | 123.91 | | 123.91 | |
| Waterbody – Ponds | | | | | | | | | | 228.80 | 228.80 | |
| Grand Total | 140.29 | 21.47 | 4483.18 | 89.79 | 330.60 | | 175.54 | 794.37 | 123.91 | 247.33 | 6406.48 | |

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T3 49.77 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T4.
- In T4 35.19 ha of agriculture are increased from plantation and scrubland of T3. The additional agriculture are coming from waterbody in T4 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2017-18 to 2018-19

| Land cover | Monitoring period (T5) | | | | | | | | | | Units in Hectares | |
|-------------------------------------|------------------------|-----------------|----------------|----------------------------|---------------|----------------------|-----------------|---------------|-----------------------------|---------------------|-------------------|--|
| | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | |
| Built up | 140.29 | | | | | | | | | | 140.29 | |
| Mining/dump | | 21.32 | | | | | | | | 0.15 | 21.47 | |
| Agriculture | 1.32 | | 4469.68 | 1.26 | | | | | | 10.93 | 4483.18 | |
| Plantation Horticulture | | | 38.79 | 50.95 | | | | | | 0.04 | 89.79 | |
| Forest | | | | | 330.60 | | | | | | 330.60 | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | 175.54 | | | | 175.54 | |
| Scrub | 0.07 | | 12.60 | | | | | 781.53 | | 0.17 | 794.37 | |
| Waterbody- Streams/River | | | | | | | | | 123.91 | | 123.91 | |
| Waterbody – Ponds | | | | | | | | | | 247.33 | 247.33 | |
| Grand Total | 141.67 | 21.32 | 4521.07 | 52.22 | 330.60 | | 175.54 | 781.53 | 123.91 | 258.62 | 6406.48 | |

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T4 13.51 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T5.
- In T5 51.39 ha of agriculture are increased from plantation and scrubland of T4. The additional agriculture are coming from waterbody in T5 represents seasonal agriculture.

Conclusion

1. DPR of the project is uploaded on to Bhuvan Portal.
2. The LULC shows that there is an increase in Crop land, Built up area, Reservoir / Tanks & decrease in Scrubland as presented in the change matrix for different years.
3. There is an decrease of 26.25 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
4. There is an increase of 270.28, 29.48, 47.94 & 37.88 Hectares From T0 to T1, T1 to T2, T2 to T3 & T4 to T5 and There is an decrease of 14.58 Hectares From T3 to T4. The overall increase of 371.01 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 29.81 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 398.03 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (5) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (5) verified from the portal.