

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -24/2010-11

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
February-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

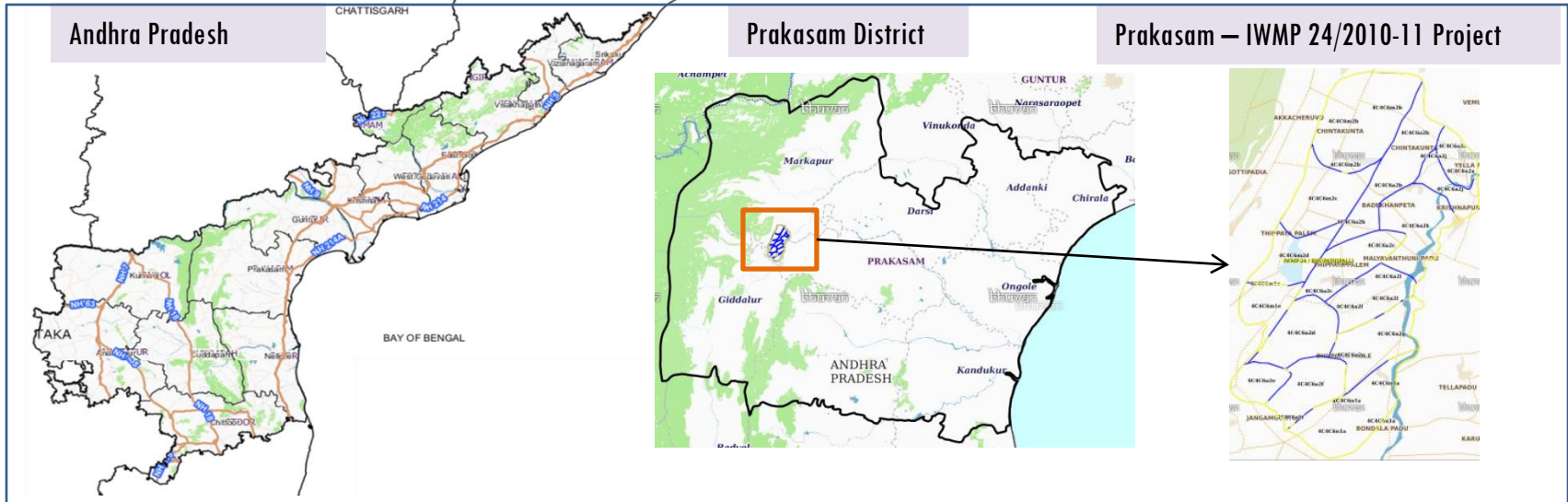
E X E C U T I V E S U M M A R Y

- 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-24/2010-11, Prakasam District of Andhra Pradesh. The total geographical area of the project is 8096.15 ha. It comprises of 15 micro watersheds.
- In the project area 271 Drishti photos were uploaded showing 155 check dams/Checks & plugins, 6 Farm ponds/Percolation tanks, 95 Horticulture and 15 others.
- Major percentage i.e. 73.15% is covered by the agriculture, 17.44% is covered by scrub land, 2.52% by plantation, 4.30 % by water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-24/2010-11

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Markapur Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 8096.15 ha. It comprises of 15 micro watersheds. Location Map of the study area is shown in Figure below Analysis is done for 2010-11 (T0) period (*Batch -1*) projects taking 2018-19 (T5) period satellite images.



- Project area witnesses tropical wet and dry climate characterized by year round high temperatures. Prakasam has a record of reaching more than 46°C.
- The average annual rainfall of the district is 798.6 mm, monthly rainfall ranges from nil in March to 182.9 mm in October. October is the wettest month of the year. Southwest monsoon contributes significant rainfall in southern part of the district and Northeast monsoon contributes more than 70% of the rainfall.
- December is the coldest month with normal mean maximum temperature of about 27.1°C and mean minimum temperature of 19.2°C. Temperature begins to rise after February. May is the hottest month with mean daily maximum temperature of about 36.1°C and the mean daily minimum temperature of about 27.7°C. During May and early June the maximum temperature rises occasionally to 46°C and with the onset of SW monsoon by about second week of June, temperature begins to drop rapidly.

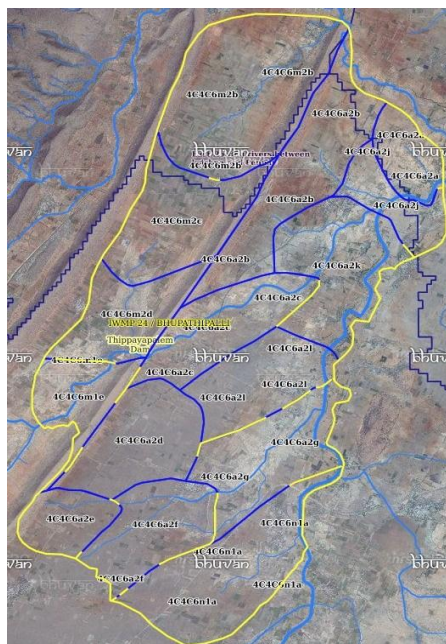
Satellite Data and Ancillary Data

| | | | |
|-----------------|---------|---------|----------|
| Satellite data* | T0-A** | T0-B** | T5 |
| | 2010-11 | 2011-12 | 2018-19 |
| LISS IV | 2010-11 | | |
| SCENE 1 | | | 2-Oct-18 |
| SCENE2 | | | |
| SCENE 3 | | | |
| SCENE 4 | | | |
| CARTO | 2013-14 | | |
| SCENE 1 | | | 2-Oct-18 |
| 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 | 271 |
| 4 | Detailed Project Report | | |

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



Legend



Drainage (1:10000 Scale)

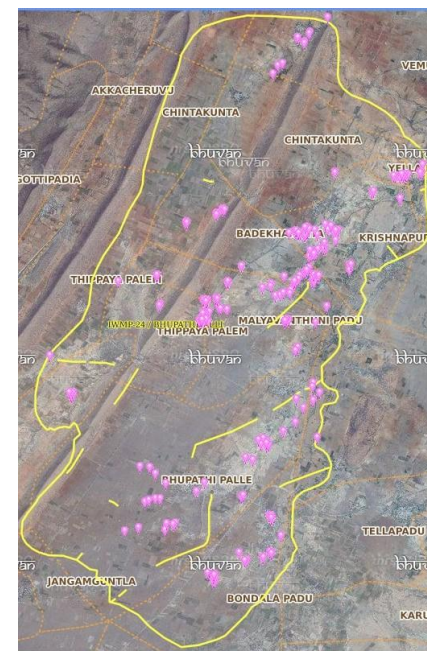


MWS Boundary



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 | 141 | 95 |
| 2 | Horticulture | | |
| 3 | Agriculture | 0 | 0 |
| 4 | Pasture | 0 | 0 |
| 5 | Trench | 0 | 0 |
| 6 | Field Bunds | 0 | 0 |
| 7 | Terrace | 0 | 0 |
| 8 | Checks & Plugs | 3 | 3 |
| 9 | Gabion structure | 0 | 0 |
| 10 | Farm ponds | 6 | 6 |
| 11 | Check dams | 166 | 152 |
| 12 | Nallah Bunds | 0 | 0 |
| 13 | Percolation tanks / Ground water recharge structure | 0 | 0 |
| 14 | Production System and Micro-Enterprises | 0 | 0 |
| 15 | Livelihood Activities | 0 | 0 |
| 16 | Capacity Building Activities | 0 | 0 |
| 17 | Entry Point Activity | 0 | 0 |
| 18 | Others | 17 | 15 |
| | TOTAL | 333 | 271 |

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.

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-24/2010-11



T1:2010-11

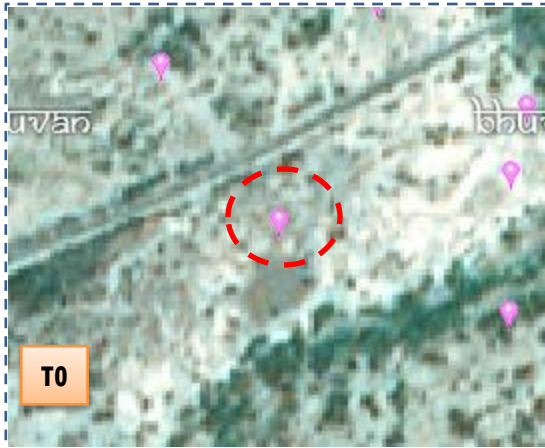


T2: 13 May 2014

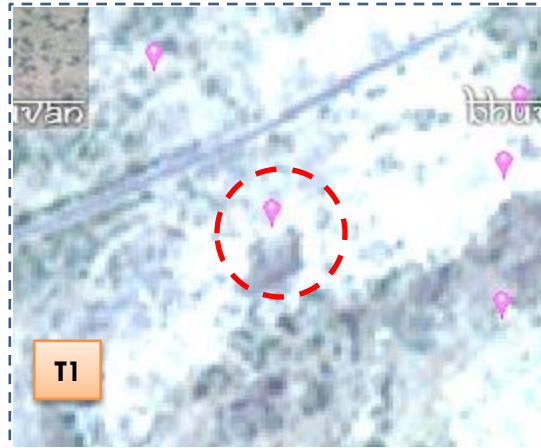


Drishti SI no. 689553 MWS :4C4C6a2g

Check dam



T1:2010-11



T2: 13 May 2014



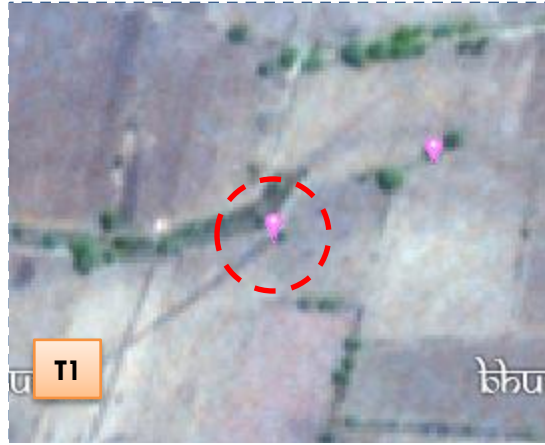
Drishti SI no. 2567175 MWS : 4C4C6a2g

Land Development

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-24/2010-11



T0: 2010-11



T1: 13 May 2014

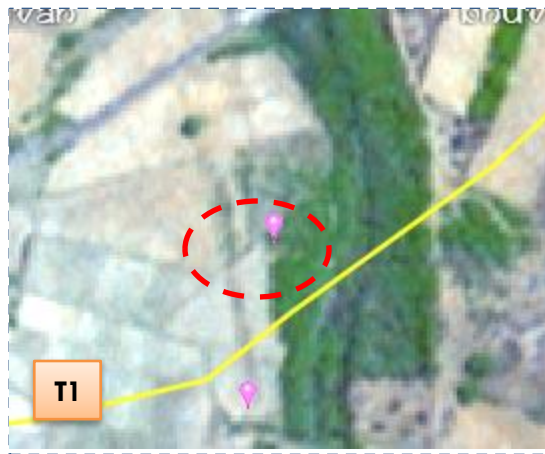


Drishti Sl no. 1418404 MWS :4C4C6a2f

Water harvesting structure



T0: 2010-11



T2: 13 May 2014



Drishti Sl no. 1712460 MWS :4C4C6a2i

Water harvesting structure

Prakasam-IWMP-24/2010-11

2009-10



June-2014



Feb-2017



Feb-2018



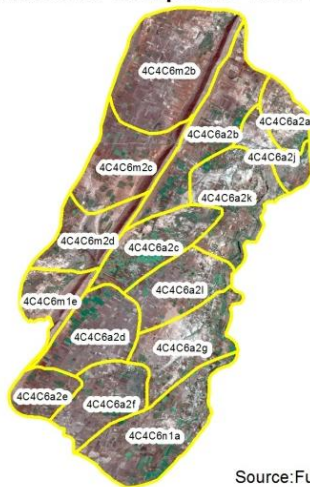
April-2019



Activity : Farm Pond

Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite- 2010-11



Source:Fusion data,NRSC

Natural Color Composite- 26th February 2015



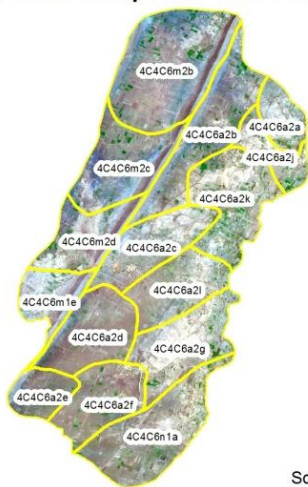
Source:NCC,NRSC

Natural Color Composite- 05th April 2016



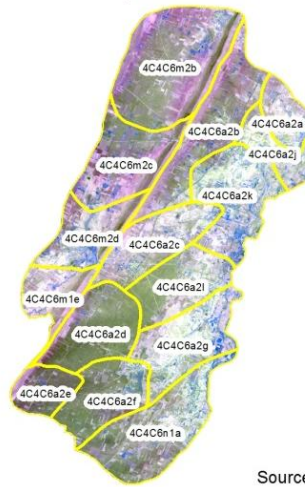
Source:Fusion data,NRSC

Natural Color Composite- 14th February 2017



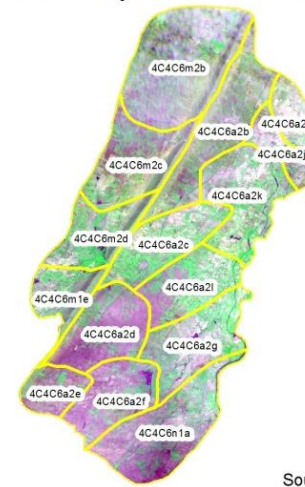
Source:NCC,NRSC

Natural Color Composite- 03rd March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 02nd October 2018



Source:LISS-IV,NRSC

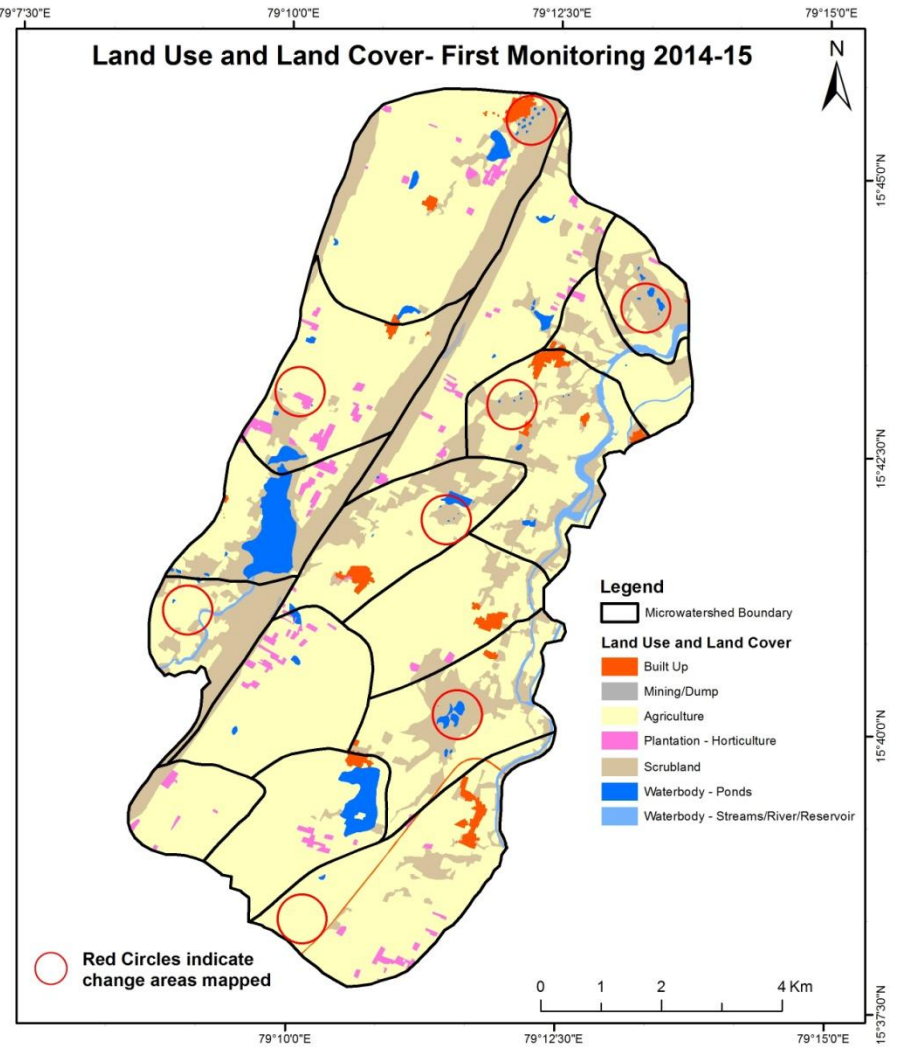
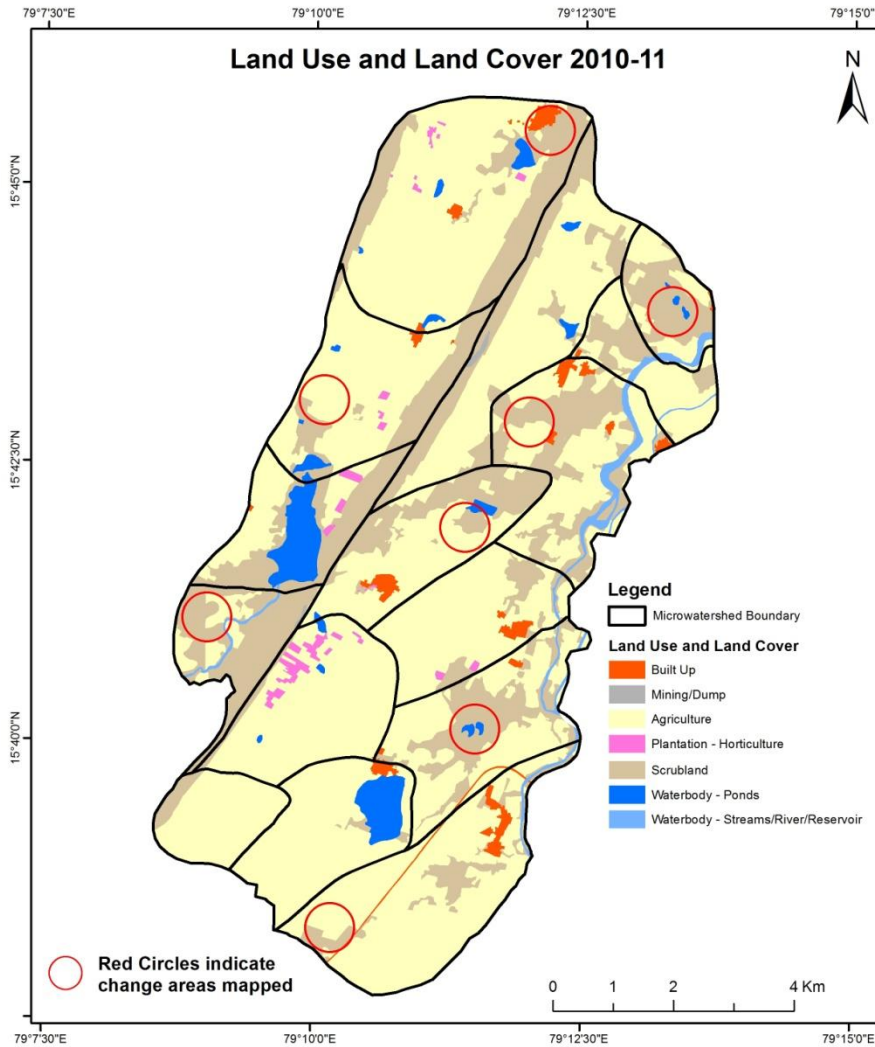
MONITORING IN THE PROJECT AREA

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 pre implementation period as T0 (2010-11) and row represents the post implementation period as T5 (2018-19).

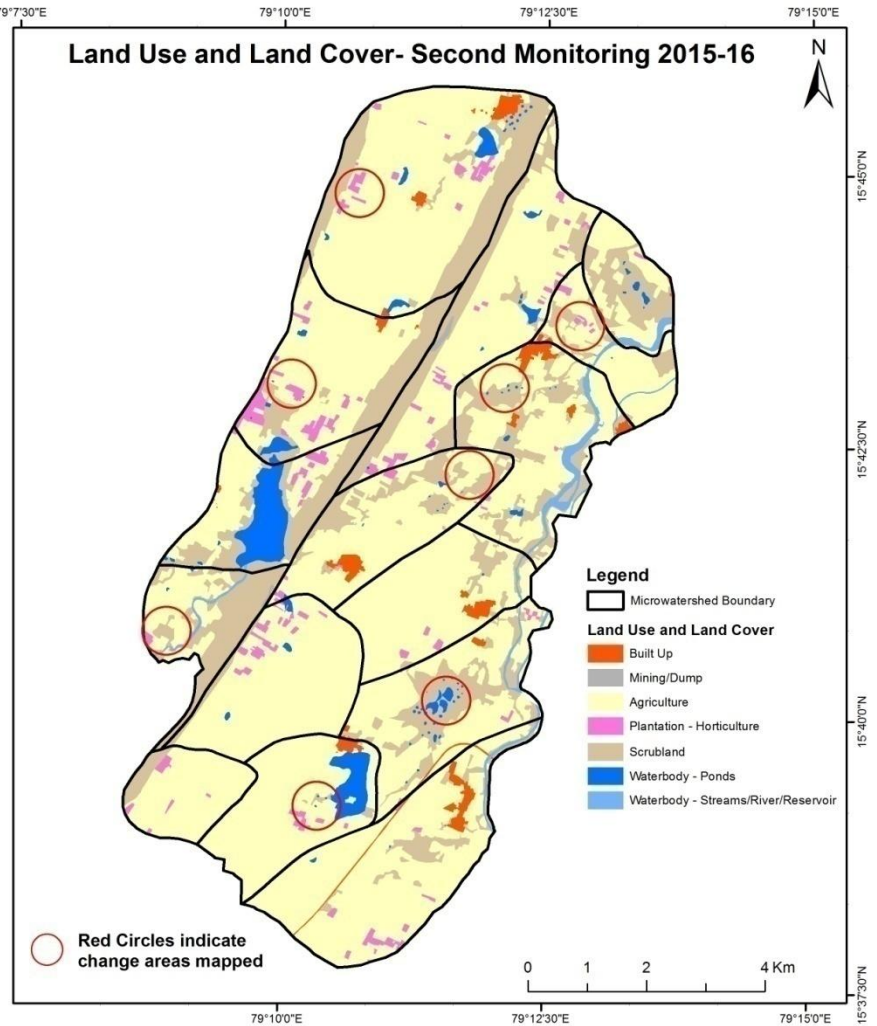
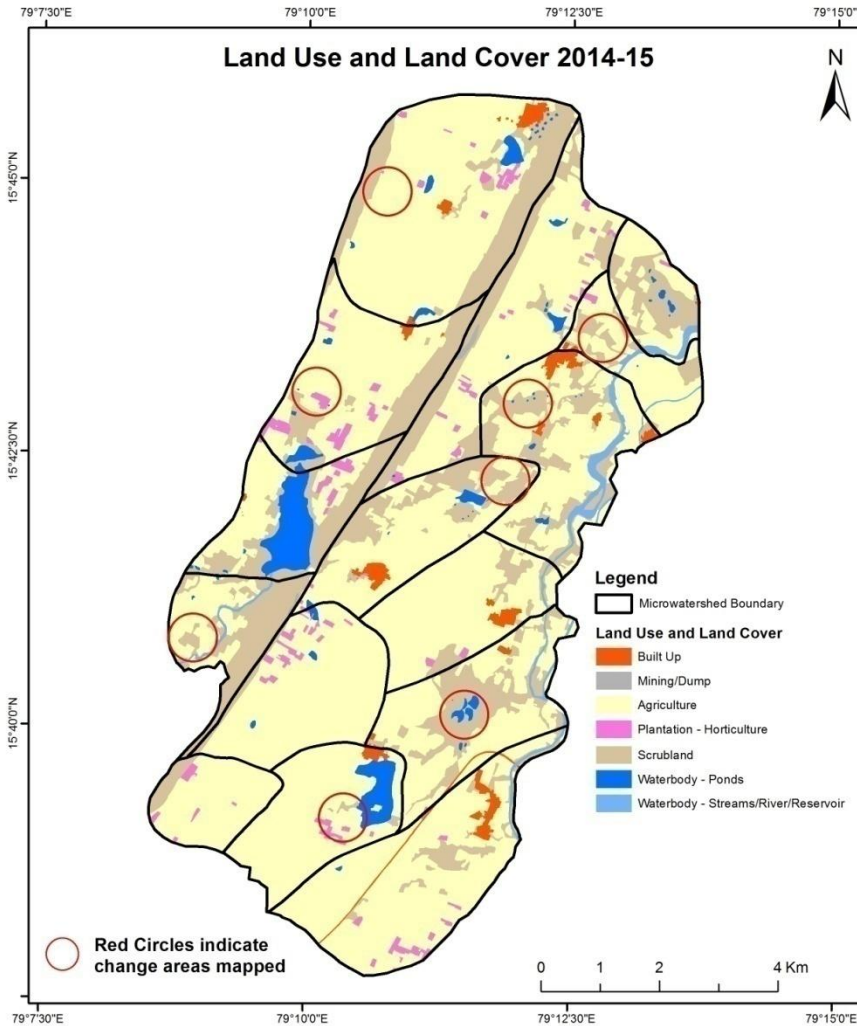
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



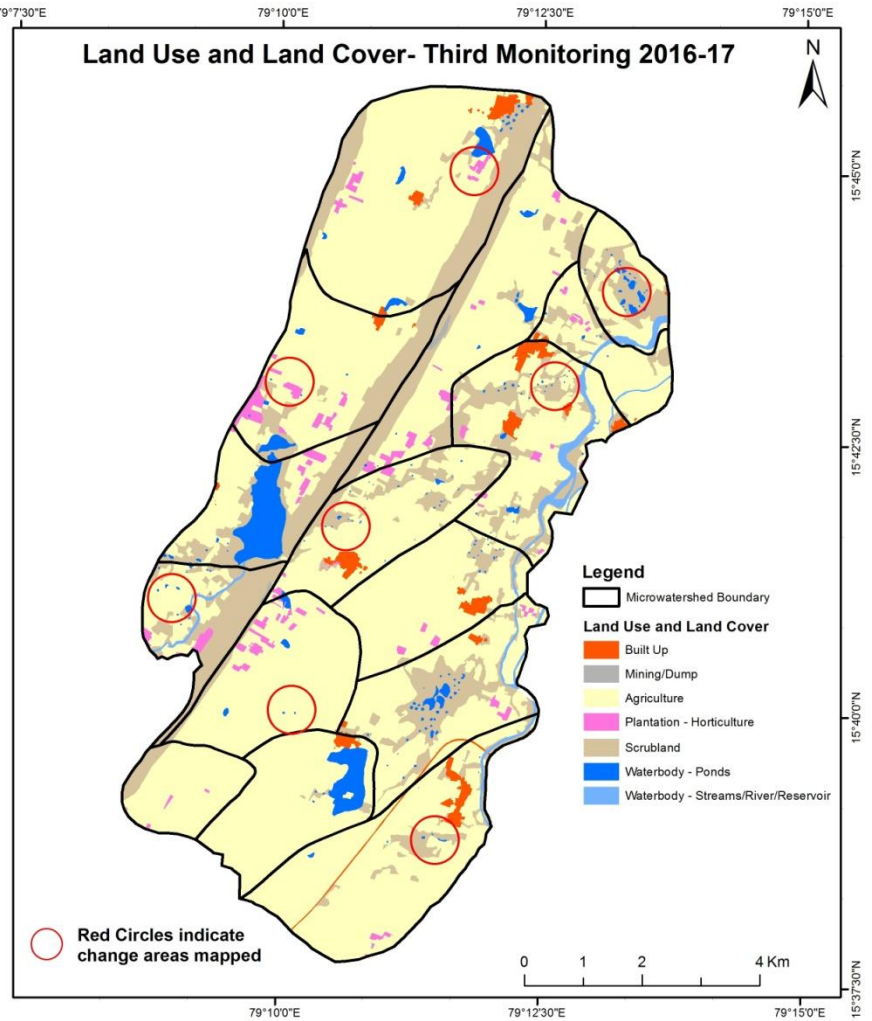
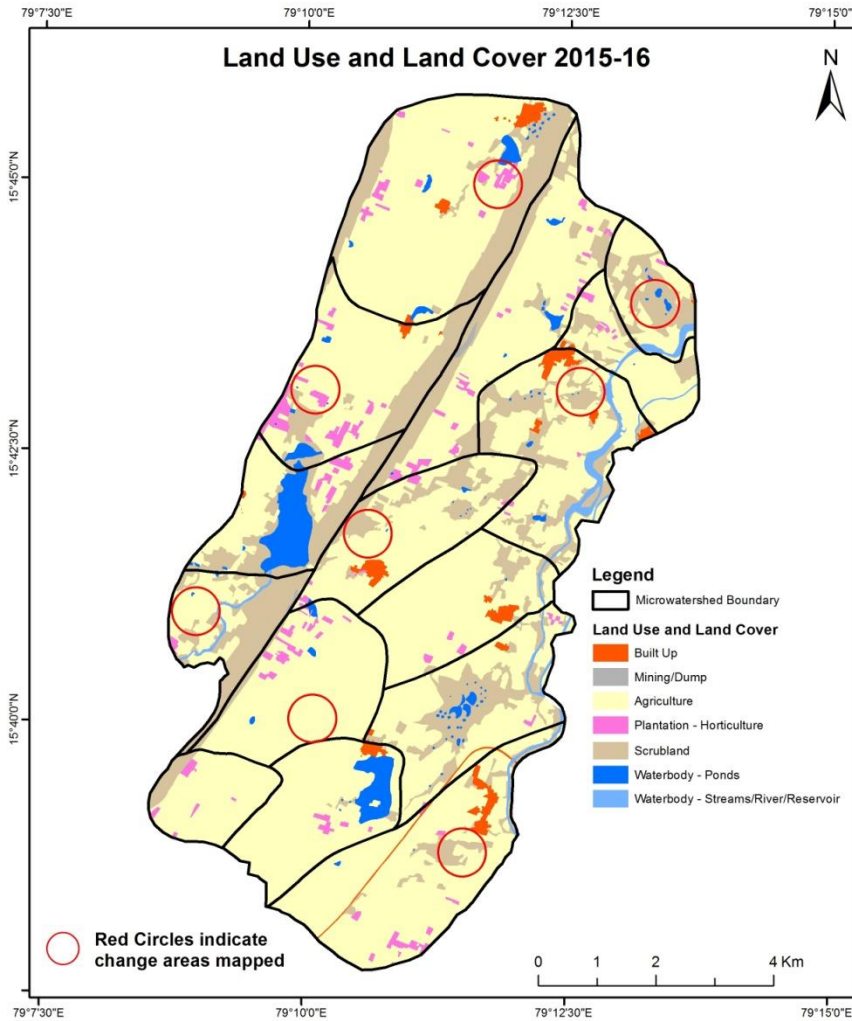
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



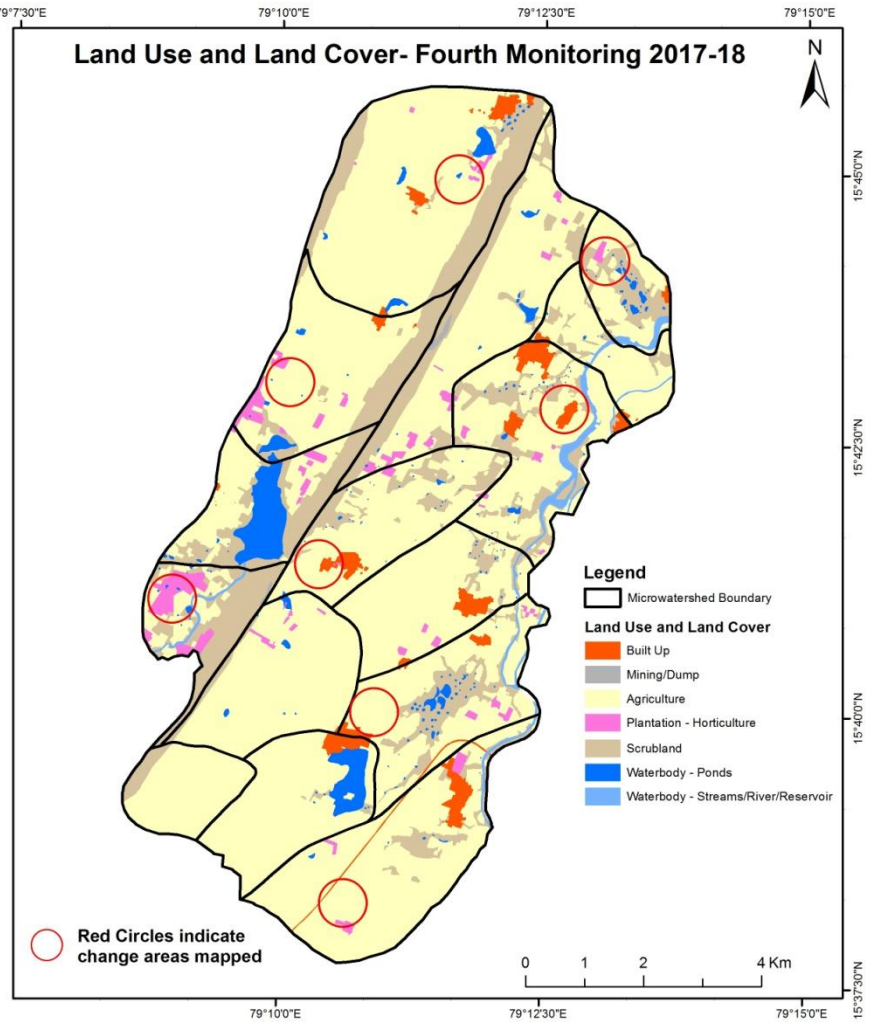
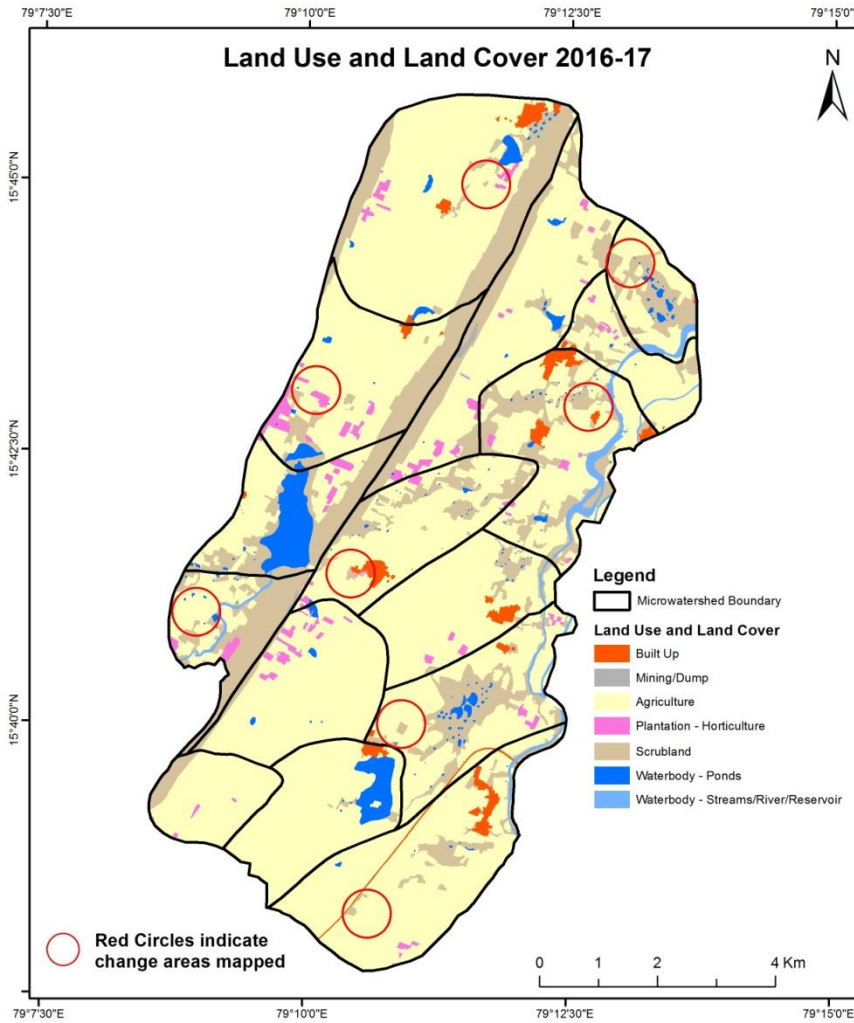
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



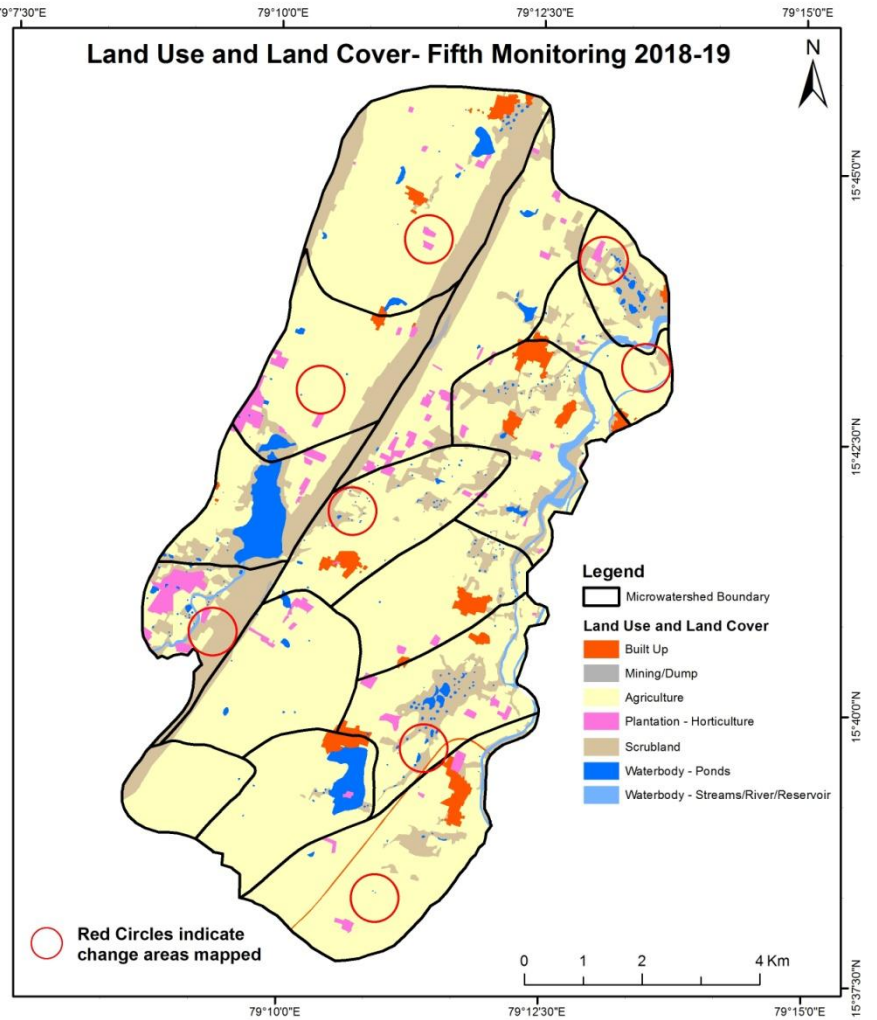
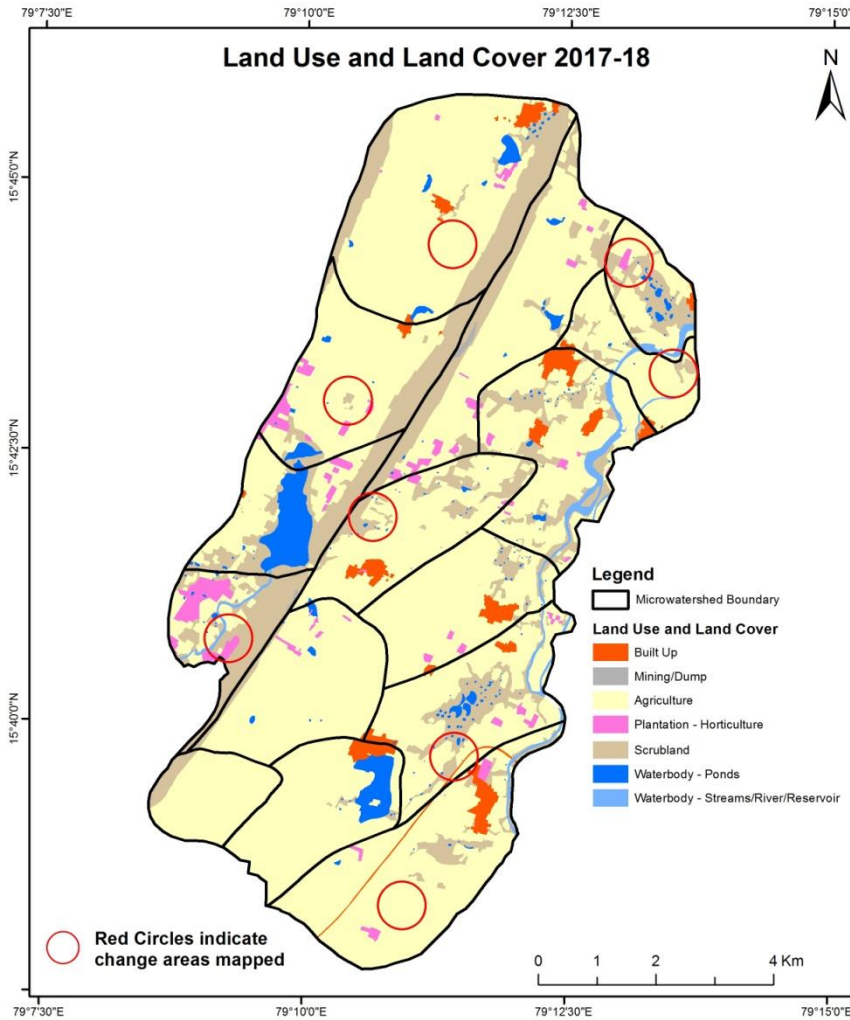
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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 Plantation



T1: 2010-11



T2: 13 May 2014

Agriculture to Plantation



T1: 2010-11



T2: 13 May 2014

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

Scrub to Built-up



T0

T0: 2010-11



T1

T2: 13 May 2014

Scrub to Agriculture



T0

T0: 2010-11

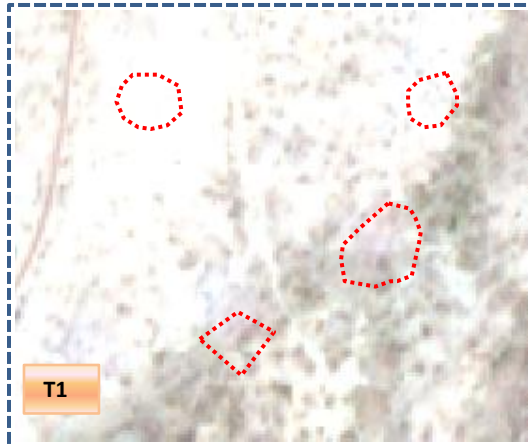


T1

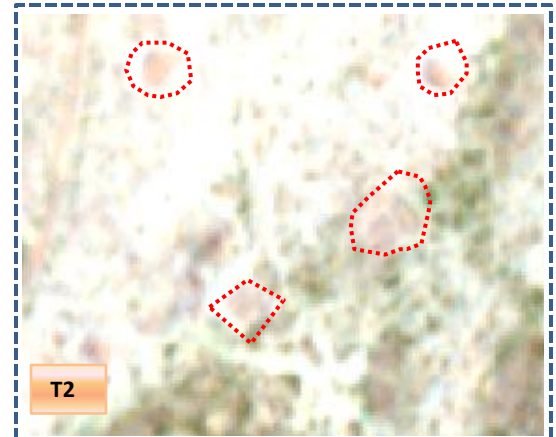
T2: 13 May 2014

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

Scrub to Water body



T1: 2014-15(79°11'25.143"E 15°39'54.684"N)



T2: 05 April 2016

Scrub to Agriculture



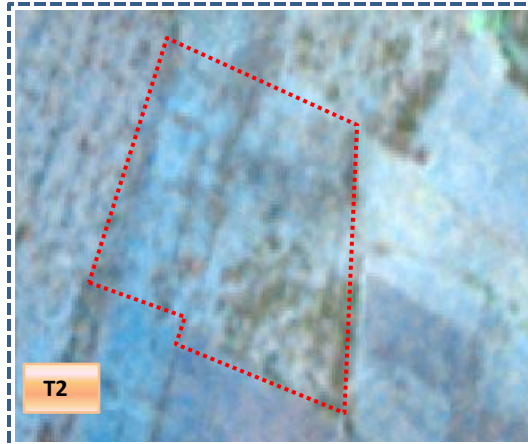
T1: 2014-15(79°12'24.367"E 15°41'33.074"N)



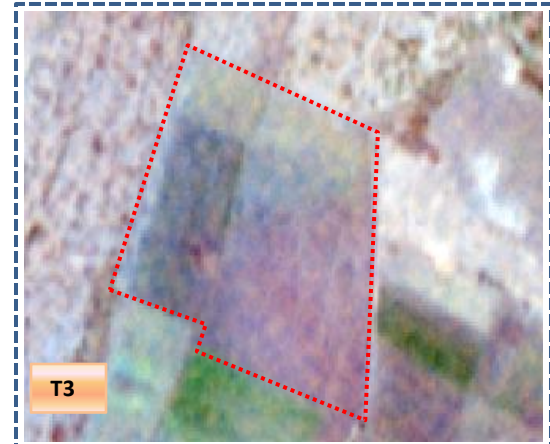
T2: 05 April 2016

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

Scrub to Agriculture



T2: 2015-16(79°12'23.787"E 15°45'5.25"N)



T3: 14 February 2017

Scrub to Agriculture



T2: 2015-16(79°11'58.488"E 15°40'17.903"N)



T3: 14 February 2017

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 | 122.09 | | | | | | | | | | | | 122.09 |
| Mining/dump | | 7.46 | | | | | | | | | | | 7.46 |
| Agriculture | 4.80 | | 5295.92 | 113.95 | | | | 2.67 | | | 2.50 | | 5419.85 |
| Plantation Horticulture | | | 22.37 | 34.17 | | | | | | | | | 56.55 |
| Forest | | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | | |
| Scrub | | | 370.21 | 4.24 | | | | 1768.55 | | | 12.82 | | 2155.82 |
| Waterbody- Streams/River | | | 4.17 | | | | | | 102.18 | | | | 106.35 |
| Waterbody – Ponds | | | 18.68 | 0.21 | | | | | | | 209.15 | | 228.04 |
| Grand Total | 126.89 | 7.46 | 5711.34 | 152.57 | | | | 1771.23 | 102.18 | | 224.48 | | 8096.15 |

- 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 123.93 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T1.
- In T1 415.43 ha of agriculture are increased from plantation, scrubland and water body of T0. The additional agriculture are coming from waterbody in T1 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 | |
| T1 | | | | | | | | | | | | |
| Built up | 126.89 | | | | | | | | | | 126.89 | |
| Mining/dump | | 7.46 | | | | | | | | | 7.46 | |
| Agriculture | 0.58 | | 5657.87 | 47.45 | | | | 5.26 | | 0.19 | 5711.34 | |
| Plantation Horticulture | | | 7.20 | 145.37 | | | | | | | 152.57 | |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 0.08 | | 84.94 | 0.45 | | | | 1681.42 | | 4.35 | 1771.23 | |
| Waterbody- Streams/River | | | 0.88 | | | | | | 101.30 | | 102.18 | |
| Waterbody – Ponds | | | 7.20 | 0.54 | | | | | | 216.74 | 224.48 | |
| Grand Total | 127.54 | 7.46 | 5758.08 | 193.81 | | | | 1686.68 | 101.30 | 221.27 | 8096.15 | |

- 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 53.47 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T2.
- In T2 100.21 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 | 127.54 | | | | | | | | | | 127.54 | |
| Mining/dump | | 7.46 | | | | | | | | | 7.46 | |
| Agriculture | 1.02 | | 5732.62 | 21.14 | | | | | | 3.29 | 5758.08 | |
| Plantation Horticulture | | | 64.61 | 129.20 | | | | | | | 193.81 | |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 9.15 | | 64.57 | 5.09 | | | | 1597.87 | | 10.01 | 1686.68 | |
| Waterbody- Streams/River | | | | | | | | | 101.30 | | 101.30 | |
| Waterbody – Ponds | | | | | | | | | | 221.27 | 221.27 | |
| Grand Total | 137.72 | 7.46 | 5861.80 | 155.43 | | | | 1597.87 | 101.30 | 234.57 | 8096.15 | |

- 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 25.46 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.
- In T3 129.18 ha of agriculture are increased from plantation and scrubland 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 | 137.72 | | | | | | | | | | 137.72 | |
| Mining/dump | | 7.46 | | | | | | | | | 7.46 | |
| Agriculture | 37.80 | | 5755.81 | 67.88 | | | | | | 0.31 | 5861.80 | |
| Plantation Horticulture | 0.31 | | 48.18 | 106.94 | | | | | | | 155.43 | |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 25.32 | | 119.69 | | | | | 1450.51 | | 2.35 | 1597.87 | |
| Waterbody- Streams/River | | | 0.37 | | | | | | 100.93 | | 101.30 | |
| Waterbody – Ponds | | | | | | | | | | 234.57 | 234.57 | |
| Grand Total | 201.14 | 7.46 | 5924.05 | 174.83 | | | | 1450.51 | 100.93 | 237.23 | 8096.15 | |

- 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 105.99 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T4.
- In T4 168.24 ha of agriculture are increased from plantation, scrubland and water body 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 | 201.14 | | | | | | | | | | 201.14 | |
| Mining/dump | | 7.46 | | | | | | | | | 7.46 | |
| Agriculture | 1.45 | | 5860.12 | 47.71 | | | | 10.86 | | 3.91 | 5924.05 | |
| Plantation Horticulture | | | 19.48 | 155.06 | | | | | | 0.29 | 174.83 | |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | | | 42.48 | 0.91 | | | | 1401.41 | | 5.71 | 1450.51 | |
| Waterbody- Streams/River | | | | | | | | | 100.93 | | 100.93 | |
| Waterbody – Ponds | | | 0.15 | | | | | | | 237.07 | 237.23 | |
| Grand Total | 202.60 | 7.46 | 5922.23 | 203.68 | | | | 1412.27 | 100.93 | 246.98 | 8096.15 | |

- 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 63.93 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T5.
- In T5 62.12 ha of agriculture are increased from plantation, scrubland and water body 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 increase of 13.53 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 291.50, 46.74, 103.72 & 62.25 Hectares From T0 to T1, T1 to T2, T2 to T3 & T3 to T4 and there is a decrease of 1.81 Hectares From T4 to T5. The overall increase of 502.39 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is an increase of 147.13 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 743.55 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (333) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (271) verified from the portal.