

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -64/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-2022

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**

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04. CONCLUSIONS

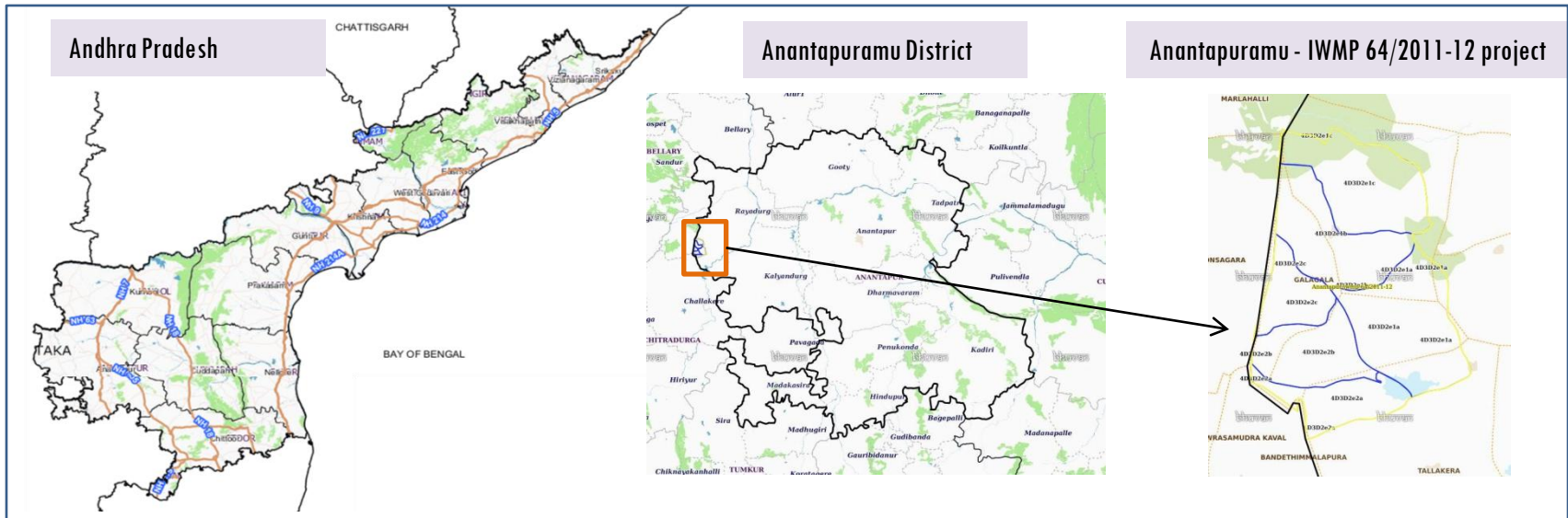
EXECUTIVE SUMMARY

- 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-64/2011-12, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **5,381** ha. It comprises of 6 micro watersheds.
- In the project area 278 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an decreased by 34 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. i.e. 75 % is covered by the agriculture, 11 % is covered by forest, 6 % is covered by scrubland and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-64/2011-12

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Gummagatta Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **5,381** ha. It comprises of 6 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2011-12 (T0) period (*Batch -1*) projects taking 2019-20 (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.

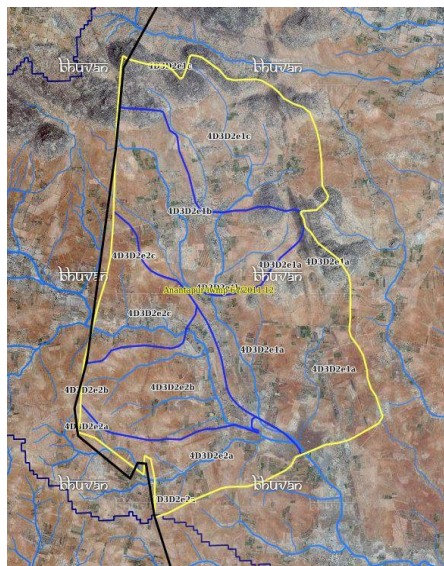
Satellite Data and Ancillary Data

| | | | |
|-----------------|---------|---------|----------|
| Satellite data* | T0-A** | T0-B** | T5 |
| | 2011-12 | 2013-14 | 2019-20 |
| LISS IV | 2011-12 | | |
| SCENE 1 | | | 2-Dec-20 |
| SCENE2 | | | |
| SCENE 3 | | | |
| SCENE 4 | | | |
| CARTO | 2011-12 | | |
| SCENE 1 | | | 2-Dec-20 |
| 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 | Drishiti Photographs | | |
| | | Total | 278 |
| 4 | Detailed Project Report | | |

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



Legend



Drainage (1:10000 Scale)

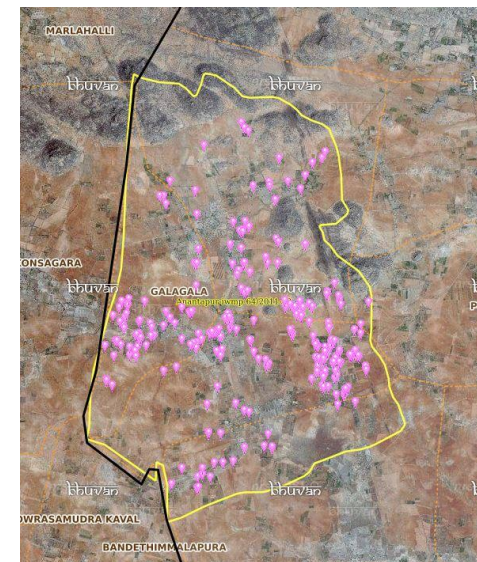


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

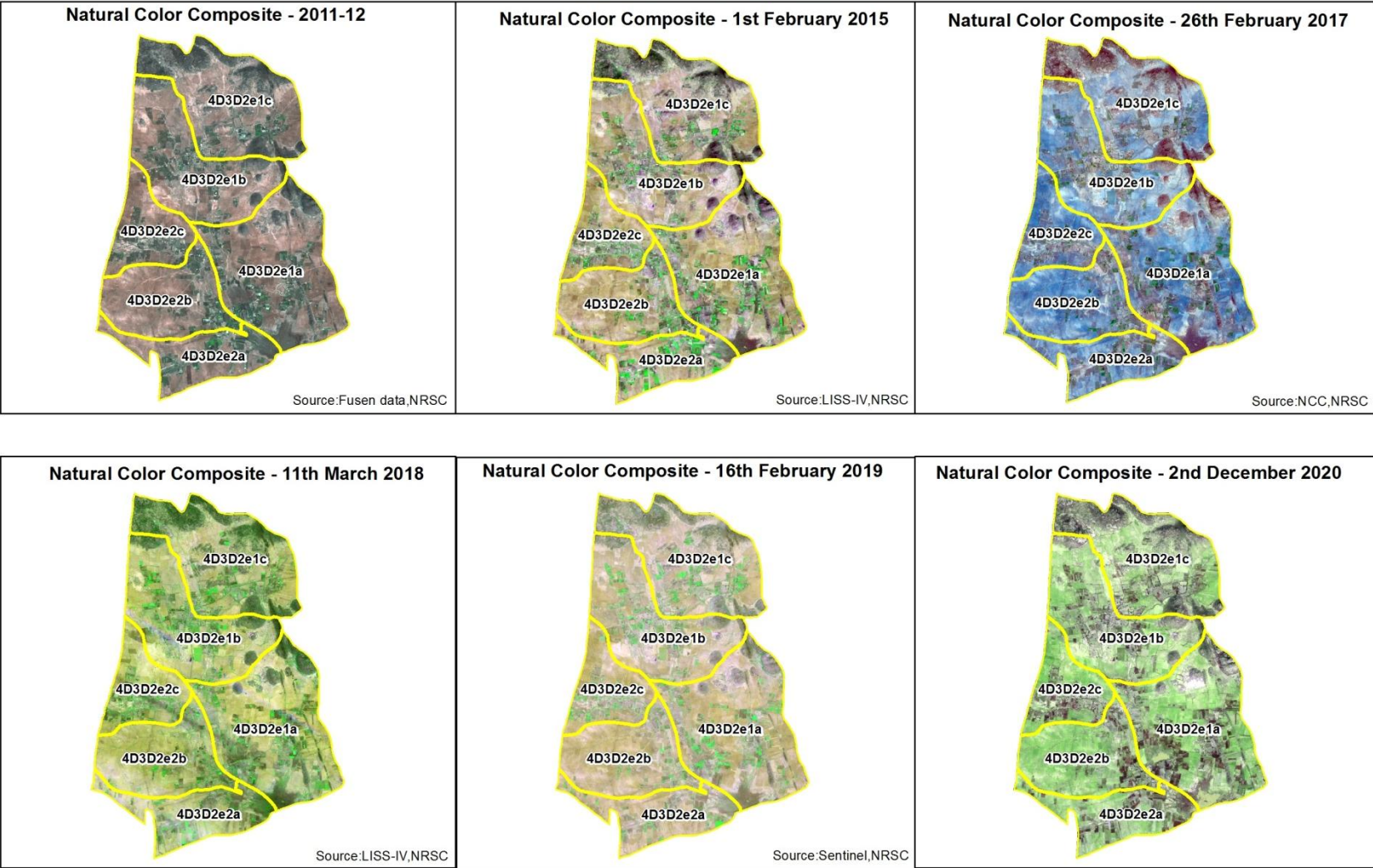
| Sr. No | Activity | Drishti Photo | Visible on satellite |
|--------|---|---------------|----------------------|
| 1 | Afforestation | 1 | 1 |
| 2 | Horticulture | 0 | 0 |
| 3 | Agriculture | 2 | 2 |
| 4 | Pasture | 0 | 0 |
| 5 | Trench | 0 | 0 |
| 6 | Field Bunds | 4 | 4 |
| 7 | Terrace | 0 | 0 |
| 8 | Checks & Plugs | 13 | 12 |
| 9 | Gabion structure | 0 | 0 |
| 10 | Farm ponds/Dug out pit | 7 | 7 |
| 11 | Civil work-Check dams/Rock fill dam | 19 | 19 |
| 12 | Nallah Bunds/Drainage treatment | 0 | 0 |
| 13 | Percolation tanks / Ground water recharge structure | 0 | 0 |
| 14 | Production System and Micro-Enterprises | 0 | 0 |
| 15 | Livelihood Activities-Plantation/Horticulture | 17 | 17 |
| 16 | Capacity Building Activities | 0 | 0 |
| 17 | Entry Point Activity | 1 | 1 |
| 18 | Others | 222 | 215 |
| | TOTAL | 286 | 278 |

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 (2011-12) and T1 is 2019-20 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.

Natural Colour Composite (NCC)



Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-64/2011-12



T0

T0:2011-12



T1

T1: 01 March 2017



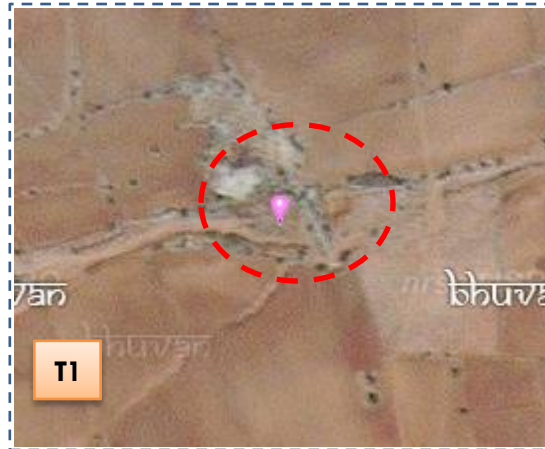
Drishti SI no. 7016487 MWS : 4D3D2e2c

Check dam



T0

T0:2011-12



T1

T1: 01 March 2017



Drishti SI no. 7040416 MWS : 4D3D2e2b

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-64/2011-12



T0:2011-12

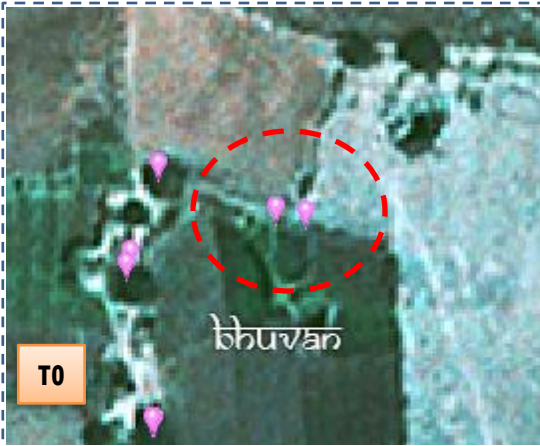


T1: 01 March 2017



Drishti Sl no. 7013761 MWS : 4D3D2e1b

Farm pond



T0:2011-12



T1: 01 March 2017



Drishti Sl no. 7017028 MWS : 4D3D2e1a

Surface storage pond

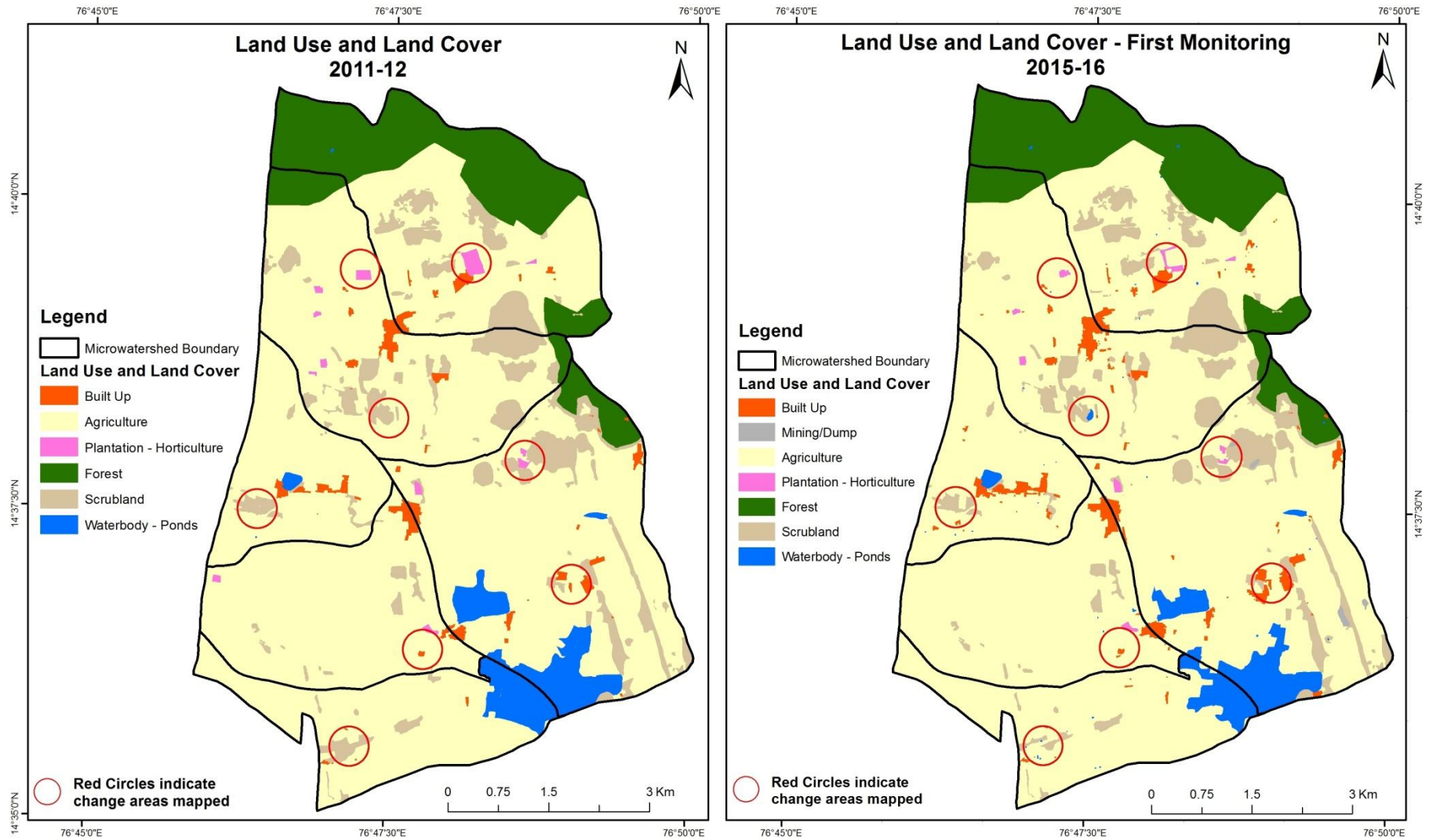
MONITORING IN THE PROJECT AREA

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 (2011-12) and row represents the T5 (2019-20)

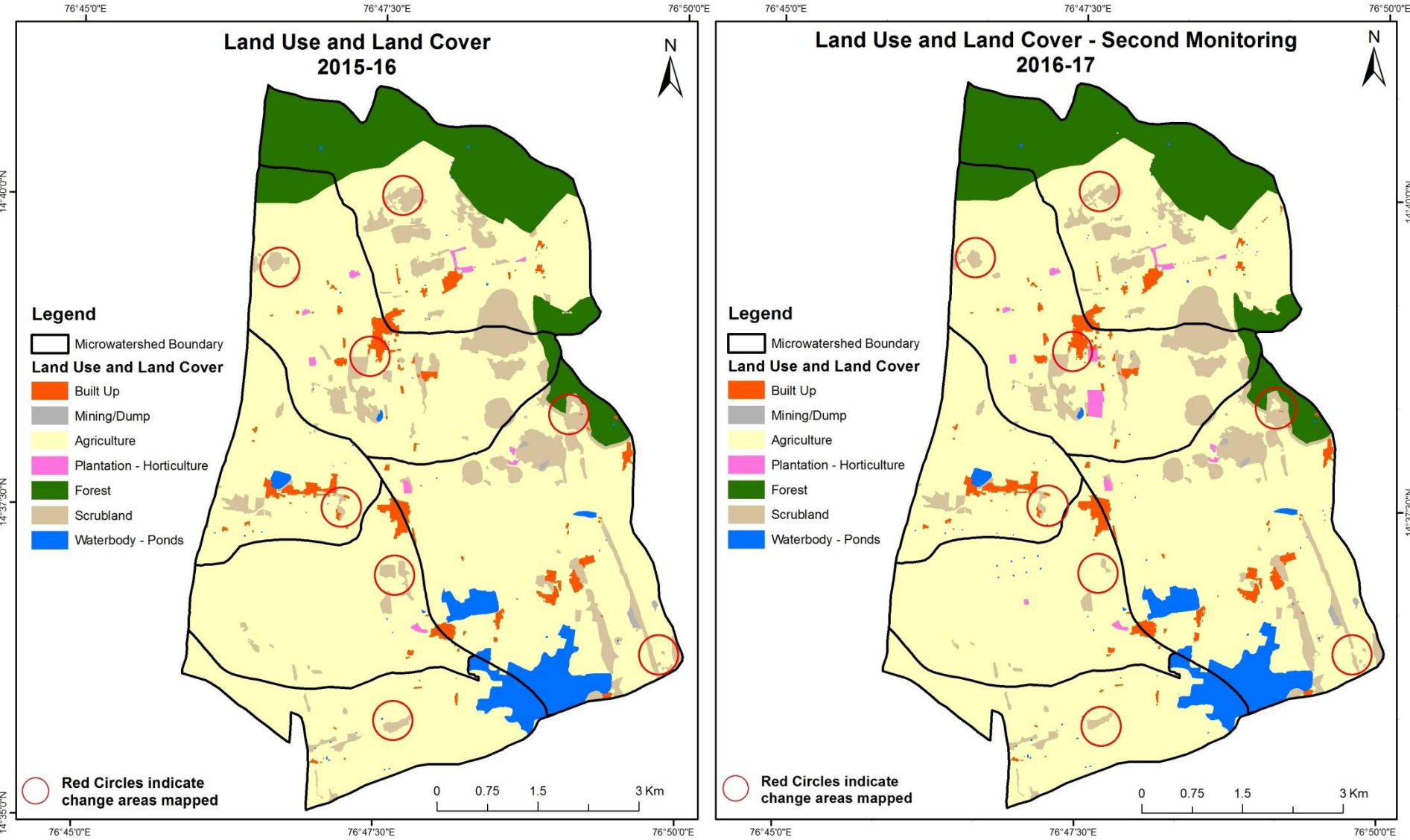
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



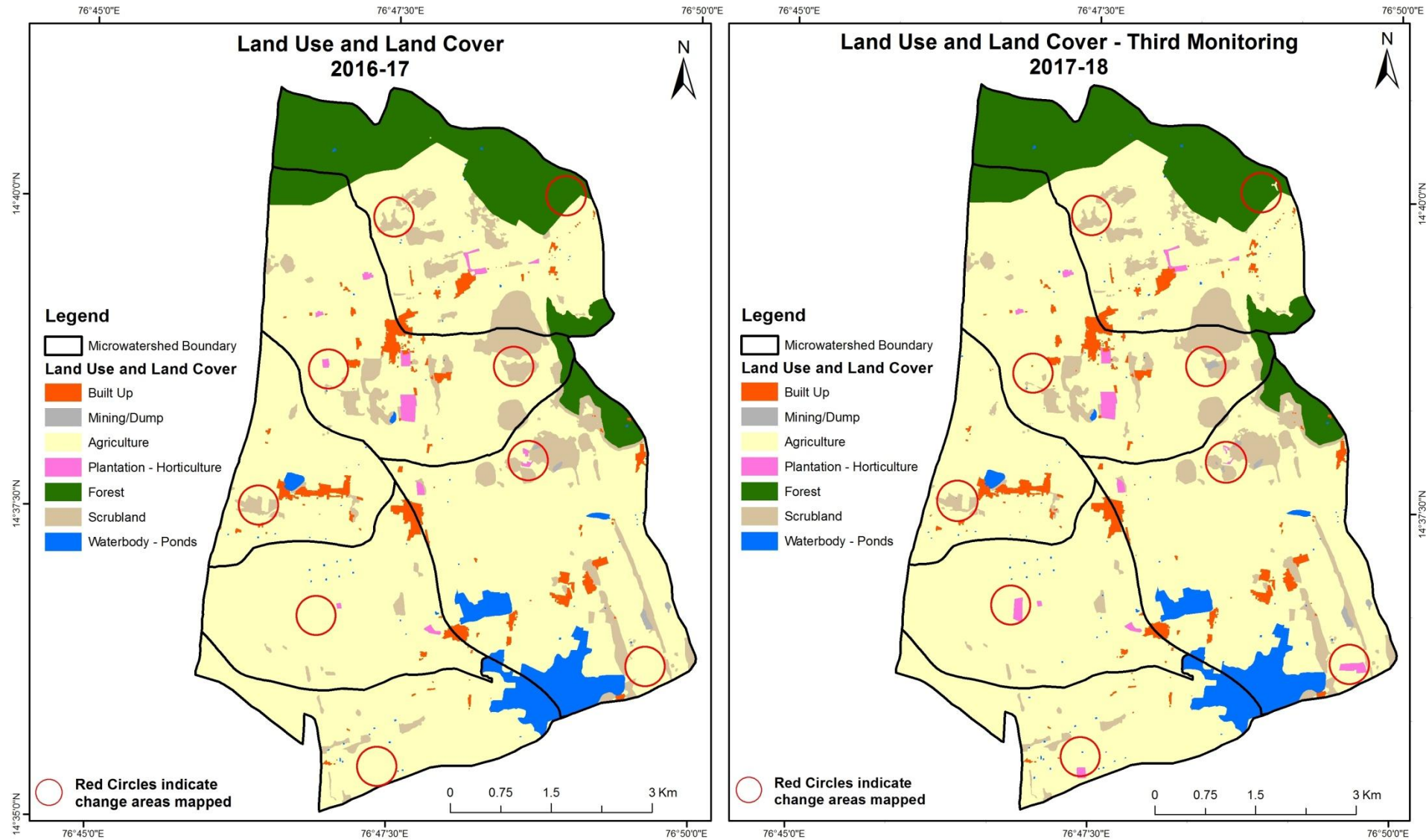
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



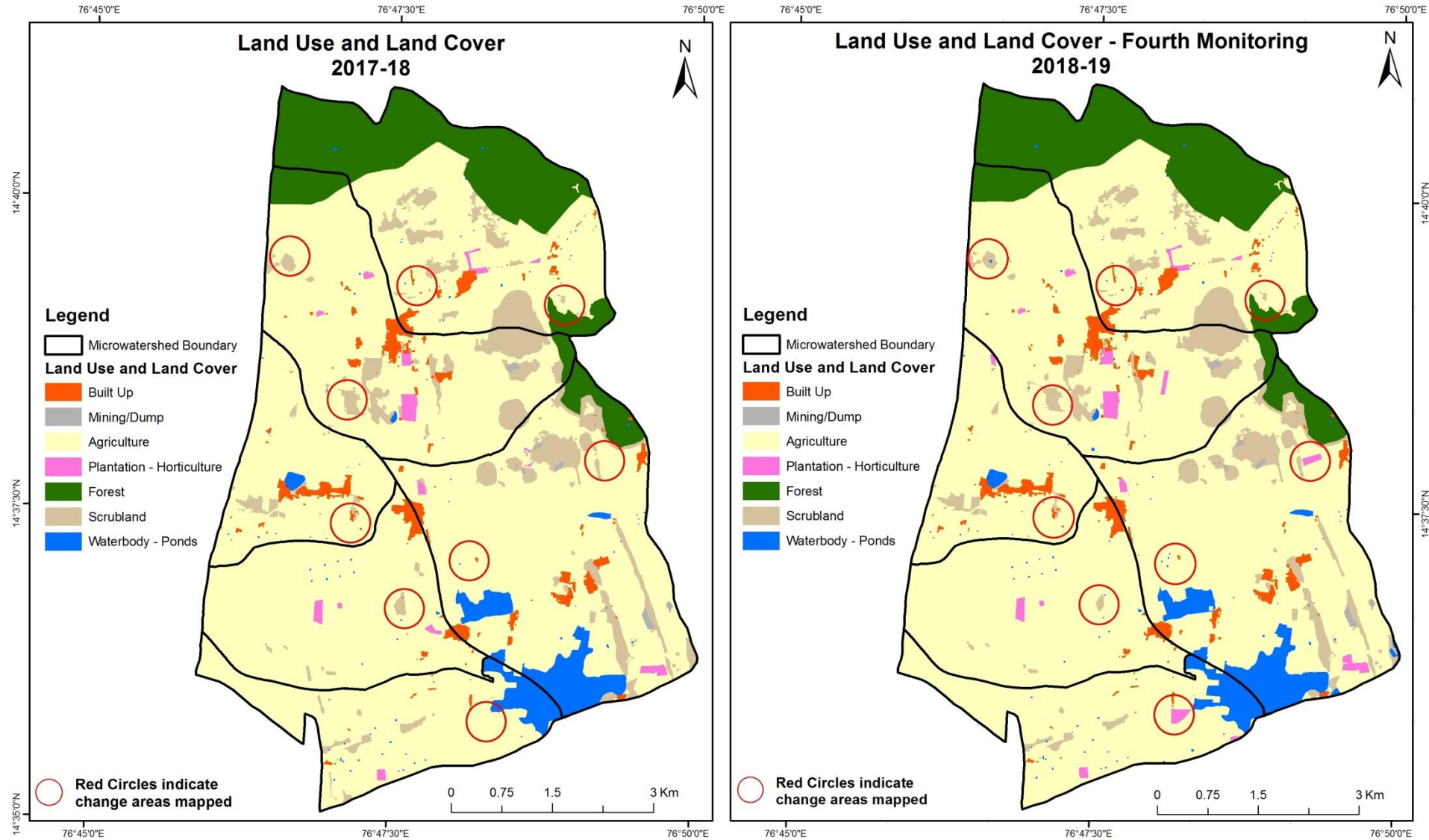
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



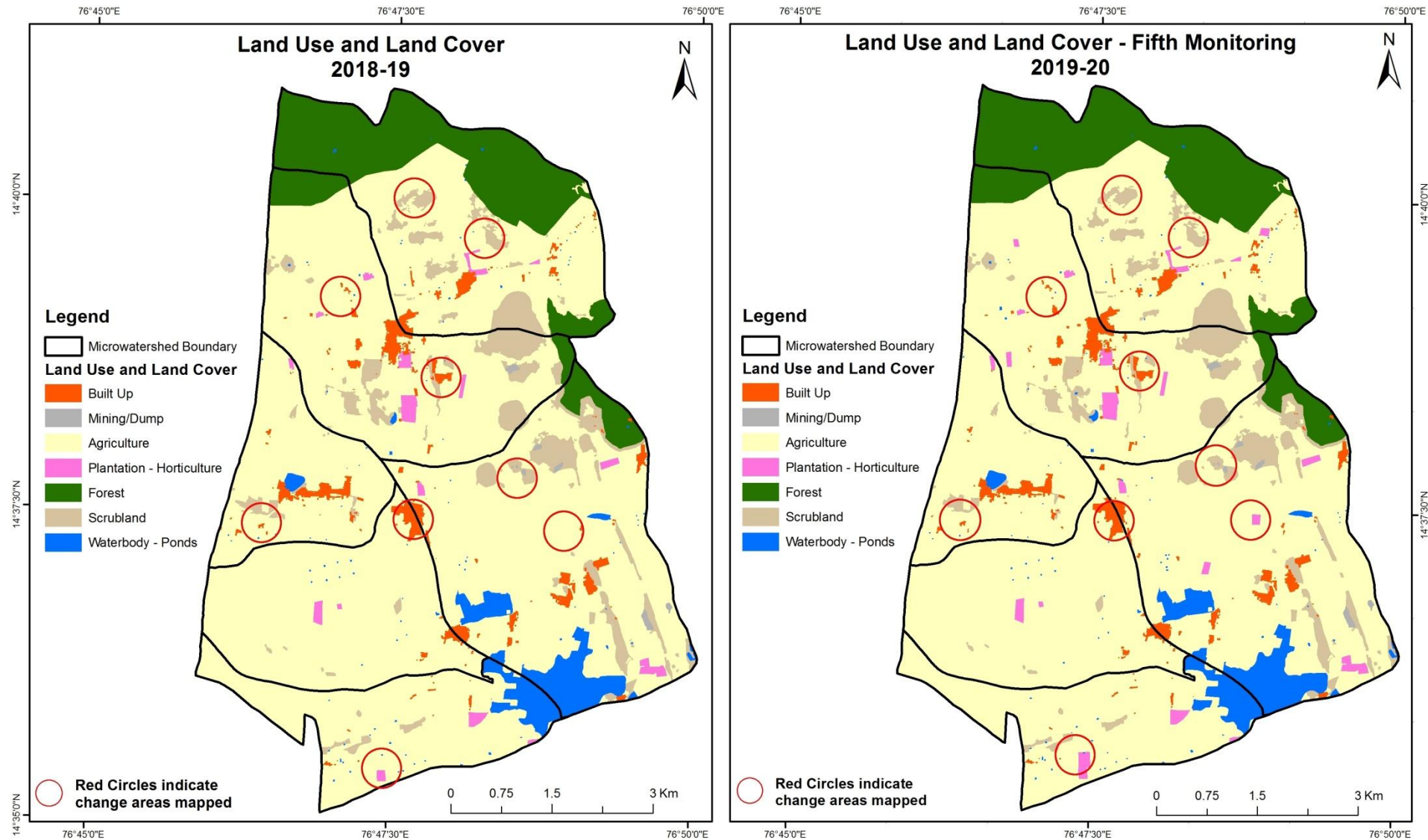
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



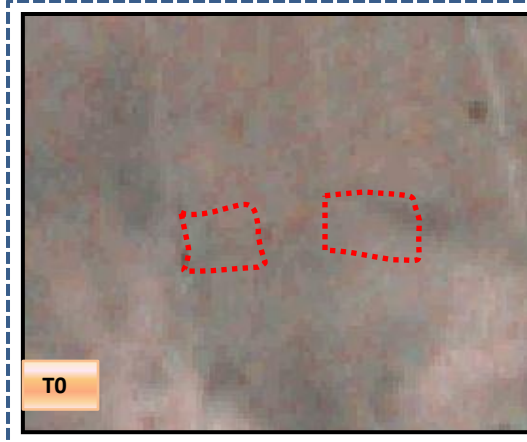
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

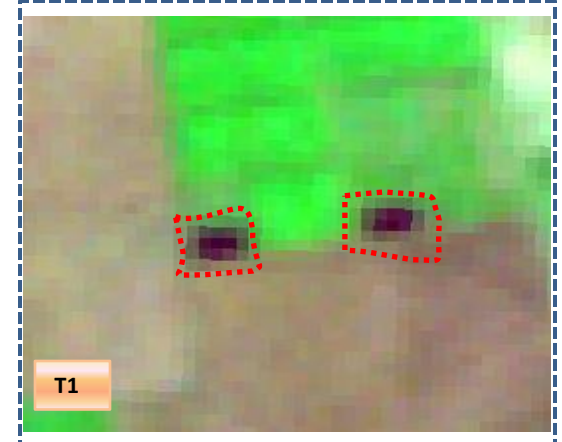


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body

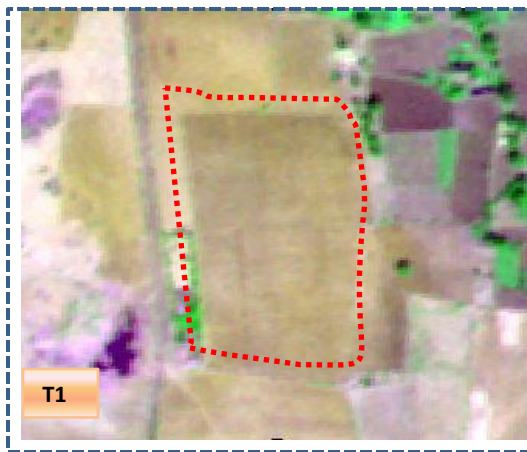


T0: 2011-12 (76°47'35.871"E
14°35'24.484"N)

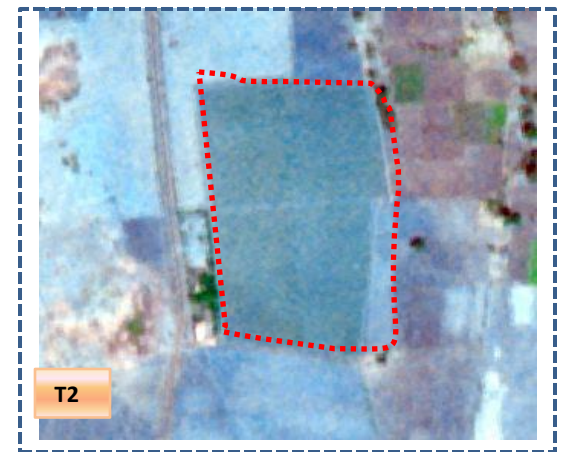


T1: 1st February 2015

Agriculture to Plantation



T1: 2015-16 (76°47'37.71"E
14°38'22.242"N)



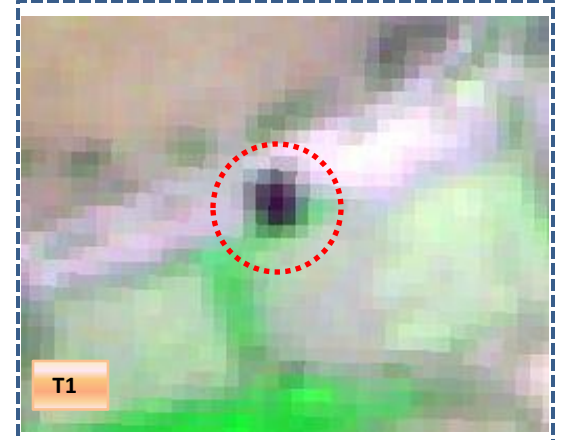
T2: 26th February 2017

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

Scrub to Water body

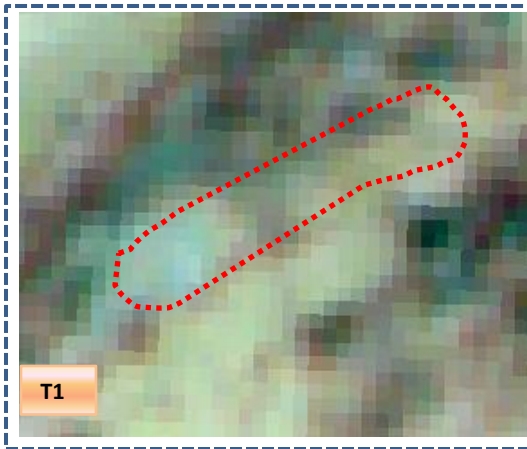


T0: 2011-12(76°47'8.696"E
14°35'37.217"N)

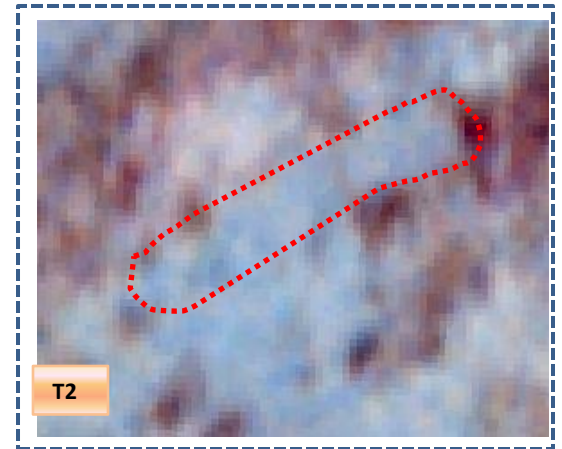


T1: 1st February 2015

Scrub to Agriculture



T1: 2015-16 (76°47'2.315"E
14°38'45.977"N)



T2: 26th February 2017

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

Agriculture to Water body



T0: 2011-12(76°47'42.272"E 14°36'28.009"N)



T1: 30 March 2016

Scrub to Agriculture



T0: 2011-12 (76°47'8.868"E 14°35'34.721"N)



T1: 30 March 2016

Table showing change matrix depicting Land cover transitions during study period-2011-12 to 2015-16

| 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 | 76.39 | | | | | | | | | | 76.39 | |
| Mining/dump | | | | | | | | | | | | |
| Agriculture | 29.19 | | 3960.74 | | | | | | 1.53 | | 3991.47 | |
| Plantation Horticulture | | | 11.00 | 12.95 | | | | | | | 23.95 | |
| Forest | | | 1.14 | | 603.43 | | | | | 0.26 | 604.84 | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 0.36 | 5.70 | 37.03 | | | | | 428.01 | | 1.47 | 472.57 | |
| Waterbody- Streams/River | | | | | | | | | | | | |
| Waterbody – Ponds | | | 39.84 | | | | | | | 172.26 | 212.10 | |
| Grand Total | 105.94 | 5.70 | 4049.75 | 12.95 | 603.43 | | | 428.01 | | 175.53 | 5381.31 | |

- 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 30 ha of the agriculture area has decreased and it is converted into Built-up and water body in T1.
- In T1 49 ha of the agriculture area has increased from plantations, forest, 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-2015-16 to 2016-17

| 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 | 105.94 | | | | | | | | | | | | 105.94 |
| Mining/dump | | 5.70 | | | | | | | | | | | 5.70 |
| Agriculture | 5.50 | | 4030.83 | 12.17 | | | | | | 1.25 | | | 4049.75 |
| Plantation Horticulture | | | | 12.95 | | | | | | | | | 12.95 |
| Forest | | | 5.81 | | 597.62 | | | | | | | | 603.43 |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | | |
| Scrub | 0.25 | | 38.20 | | | | | 389.49 | | 0.07 | | | 428.01 |
| Waterbody- Streams/River | | | | | | | | | | | | | |
| Waterbody – Ponds | 0.04 | | 0.54 | | | | | | | 174.95 | | | 175.53 |
| Grand Total | 111.73 | 5.70 | 4075.37 | 25.12 | 597.62 | | | 389.49 | | 176.28 | | | 5381.31 |

- 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 18 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.
- In T2 44 ha of the agriculture area has increased from forest, 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-2016-17 to 2017-18

| Land cover | Monitoring period (T3) | | | | | | | | | | Units in Hectares | | |
|-----------------------------|------------------------|-----------------|----------------|----------------------------|---------------|----------------------|-----------------|---------------|-----------------------------|---------------------|-------------------|--|----------------|
| T2 | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | | |
| Built up | 111.73 | | | | | | | | | | | | 111.73 |
| Mining/dump | | 5.70 | | | | | | | | | | | 5.70 |
| Agriculture | 4.47 | | 4058.82 | 10.98 | | | | | | | 1.11 | | 4075.37 |
| Plantation Horticulture | | | 2.13 | 22.98 | | | | | | | | | 25.12 |
| Forest | | | 0.76 | | 596.86 | | | | | | | | 597.62 |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | | |
| Scrub | 0.19 | 2.31 | 12.86 | | | | | 374.08 | | | 0.05 | | 389.49 |
| Waterbody- Streams/River | | | | | | | | | | | | | |
| Waterbody – Ponds | 0.10 | | 0.77 | | | | | | | | 175.40 | | 176.28 |
| Grand Total | 116.49 | 8.01 | 4075.35 | 33.96 | 596.86 | | | 374.08 | | | 176.56 | | 5381.31 |

- 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 16 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T3.
- In T3 16 ha of the agriculture area has increased from plantations, forest, 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-2017-18 to 2018-19

| 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 | 116.49 | | | | | | | | | | 116.49 | |
| Mining/dump | | 8.01 | | | | | | | | | 8.01 | |
| Agriculture | 2.18 | | 4058.41 | 14.04 | | | | | | 0.72 | 4075.35 | |
| Plantation Horticulture | | | 2.54 | 31.43 | | | | | | | 33.96 | |
| Forest | | | 1.47 | | 595.39 | | | | | | 596.86 | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 1.58 | 0.25 | 24.77 | | | | | 344.77 | | 2.70 | 374.08 | |
| Waterbody- Streams/River | | | | | | | | | | | | |
| Waterbody – Ponds | | | 2.71 | | | | | | | 173.84 | 176.56 | |
| Grand Total | 120.25 | 8.26 | 4089.90 | 45.47 | 595.39 | | | 344.77 | | 177.26 | 5381.31 | |

- 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 16 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 31 ha of the agriculture area has increased from plantations, forest, 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-2018-19 to 2019-20

| 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 | |
| T4 | | | | | | | | | | | | |
| Built up | 120.25 | | | | | | | | | | 120.25 | |
| Mining/dump | | 8.26 | | | | | | | | | 8.26 | |
| Agriculture | 2.09 | | 4075.13 | 12.16 | | | | | | 0.53 | 4089.90 | |
| Plantation Horticulture | | | | 45.47 | | | | | | | 45.47 | |
| Forest | | | | | 595.39 | | | | | | 595.39 | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | | | 6.35 | | | | | 338.02 | | 0.40 | 344.77 | |
| Waterbody- Streams/River | | | | | | | | | | | | |
| Waterbody – Ponds | | | 0.65 | | | | | | | 176.61 | 177.26 | |
| Grand Total | 122.33 | 8.26 | 4082.14 | 57.63 | 595.39 | | | 338.02 | | 177.54 | 5381.31 | |

- 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 14 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 07 ha of the agriculture area has increased from 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 decrease of 34 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
4. There is an increase of 58, 58 & 14 Hectares From T0 to T1, T1-T2 & T3-T4 respectively and overall increase of 90 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 33 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 134 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.