

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

**KURNOOL -59/2012-13
Andhra Pradesh**

**Submitted to NRSC, Balanagar, Hyderabad
December-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**

01. STUDY AREA
02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
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-59/2012-13, Kurnool District of Andhra Pradesh. The total geographical area of the project is **4,467** ha. It comprises of 08 micro watersheds.
- In the project area 315 Drishti photos were uploaded showing checks & plugins, Field bunds and remaining showing others.
- Water bodies have shown an increase by 35 ha which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 93 % is covered by the agriculture, 1.6 % is covered by scrubland, 3.4 % is covered by water body and remaining by other land use classes.

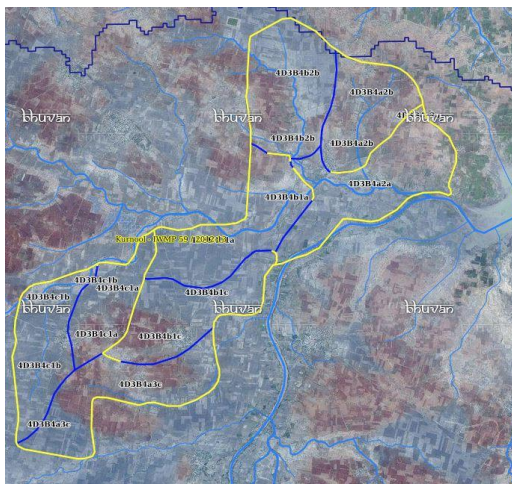
Satellite Data and Ancillary Data

| | | | |
|-----------------|---------|---------|-----------|
| Satellite data* | T0-A** | T0-B** | T5 |
| | 2012-13 | 2011-12 | 2020-21 |
| LISS IV | 2012-13 | | |
| SCENE 1 | | | 25-Feb-21 |
| SCENE2 | | | |
| SCENE 3 | | | |
| SCENE 4 | | | |
| CARTO | 2012-13 | | |
| SCENE 1 | | | 25-Feb-21 |
| 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 | 315 |
| 4 | Detailed Project Report | | |

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



Legend



Drainage (1:10000 Scale)

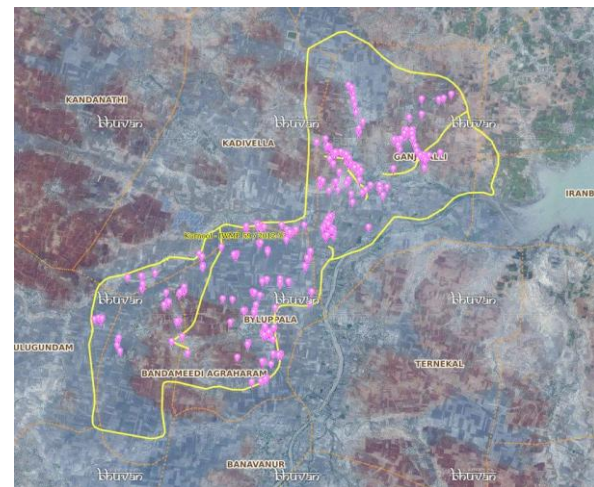


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

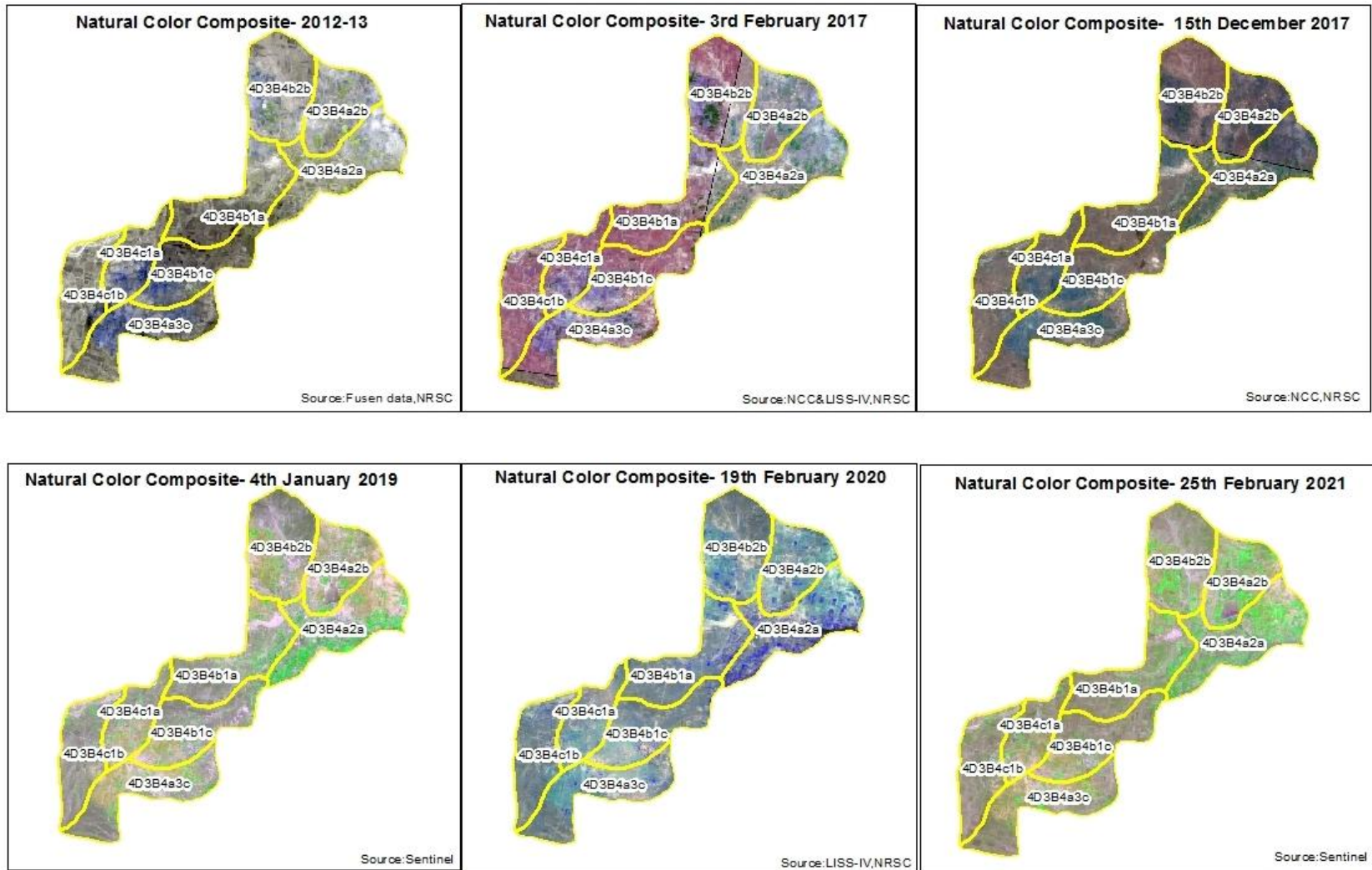
| Sr. No | Activity | Drishti Photo | Visible on satellite |
|--------|---|---------------|----------------------|
| 1 | Afforestation | 12 | 12 |
| 2 | Checks & plugins | 0 | 0 |
| 3 | Agriculture | 0 | 0 |
| 4 | Blockplanting | 0 | 0 |
| 5 | Bund planting | 0 | 0 |
| 6 | Drainage Treatment | 0 | 0 |
| 7 | Farm ponds/Dug out pit | 107 | 107 |
| 8 | Check dams (Civil work) | 16 | 16 |
| 9 | Field bunds | 0 | 0 |
| 10 | Om (Other measurement) | 0 | 0 |
| 11 | LM (Livelihood Measures) | 0 | 0 |
| 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 | 0 | 0 |
| 16 | Capacity Building Activities | 0 | 0 |
| 17 | Entry Point Activity | 0 | 0 |
| 18 | Others | 211 | 180 |
| | TOTAL | 346 | 315 |

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 2020-21 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 Color Composite



Monitoring of activities in Kurnool District Andhra Pradesh. IWMP-59/2012-13



T0 Satellite data 2013



T1 Satellite data 2015



T2 Satellite data 2016



T3 Satellite data 2017



T4 Satellite data 2018



T5 Satellite data 2020



Drishti Id. 2437928

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-59/2012-13



T0

bhuvan

T0:2012-13



T1

bhuvan

T1: 09 November 2016



Drishti Sl no. 134452 MWS : 4D3B4b2b

Farm pond



T0

bhuvan

T0:2012-13



T1

bhuvan

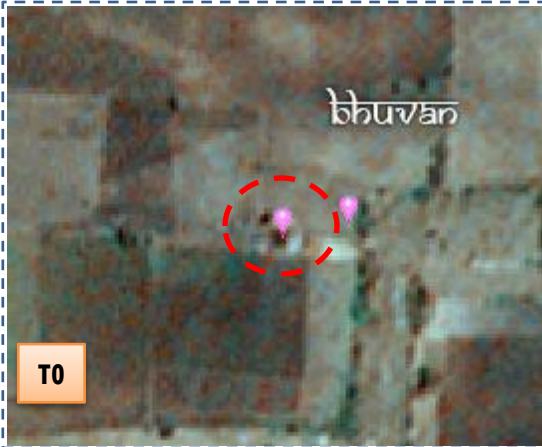
T1: 09 November 2016



Drishti Sl no. 1806732 MWS : 4D3B4b1c

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-59/2012-13



T0

T0: 2012-13



T1

T1: 09 November 2016



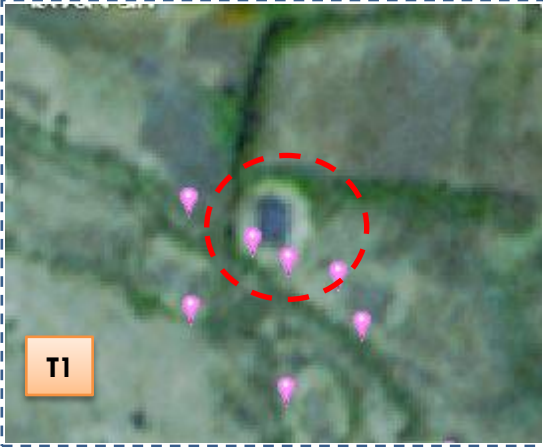
Drishti Sl no. 2437928- MWS : 4D3B4b1c

Farm pond



T0

T0: 2012-13



T1

T1: 09 November 2016



Drishti Sl no. 2564383 MWS : 4D3B4a2b

Farm pond

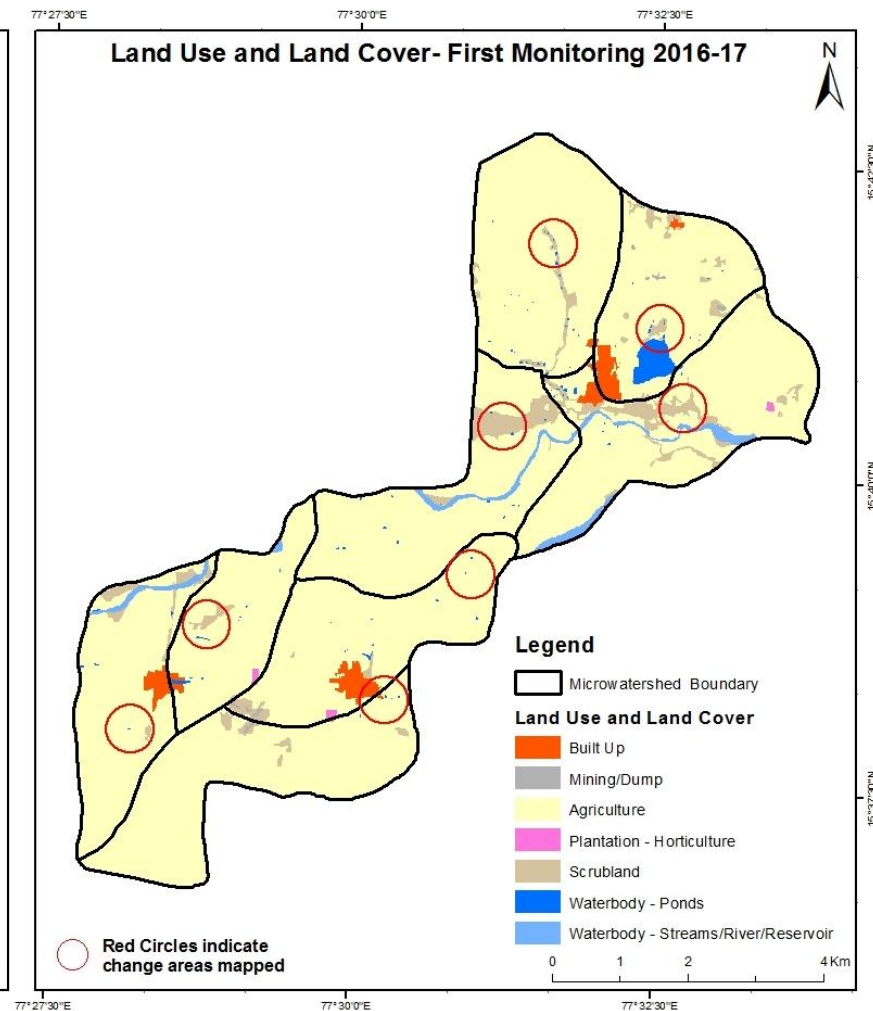
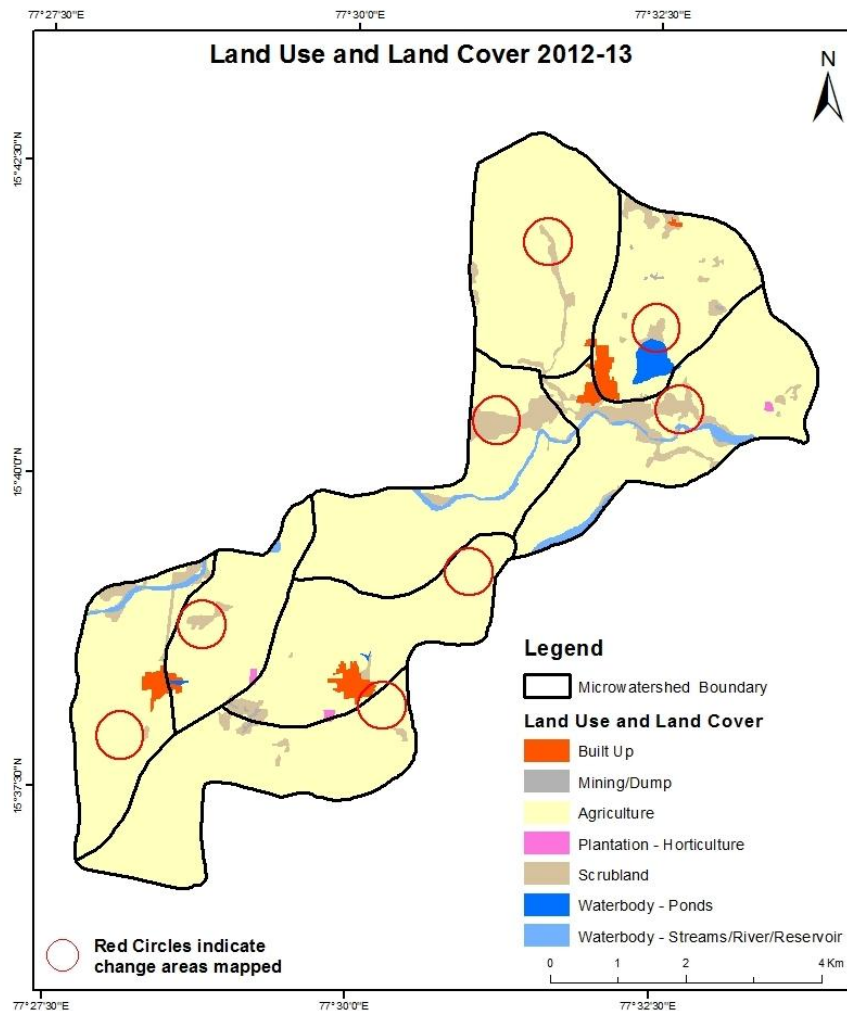
MONITORING IN THE PROJECT AREA

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 (2012-13) and row represents the T5 (2020-21)

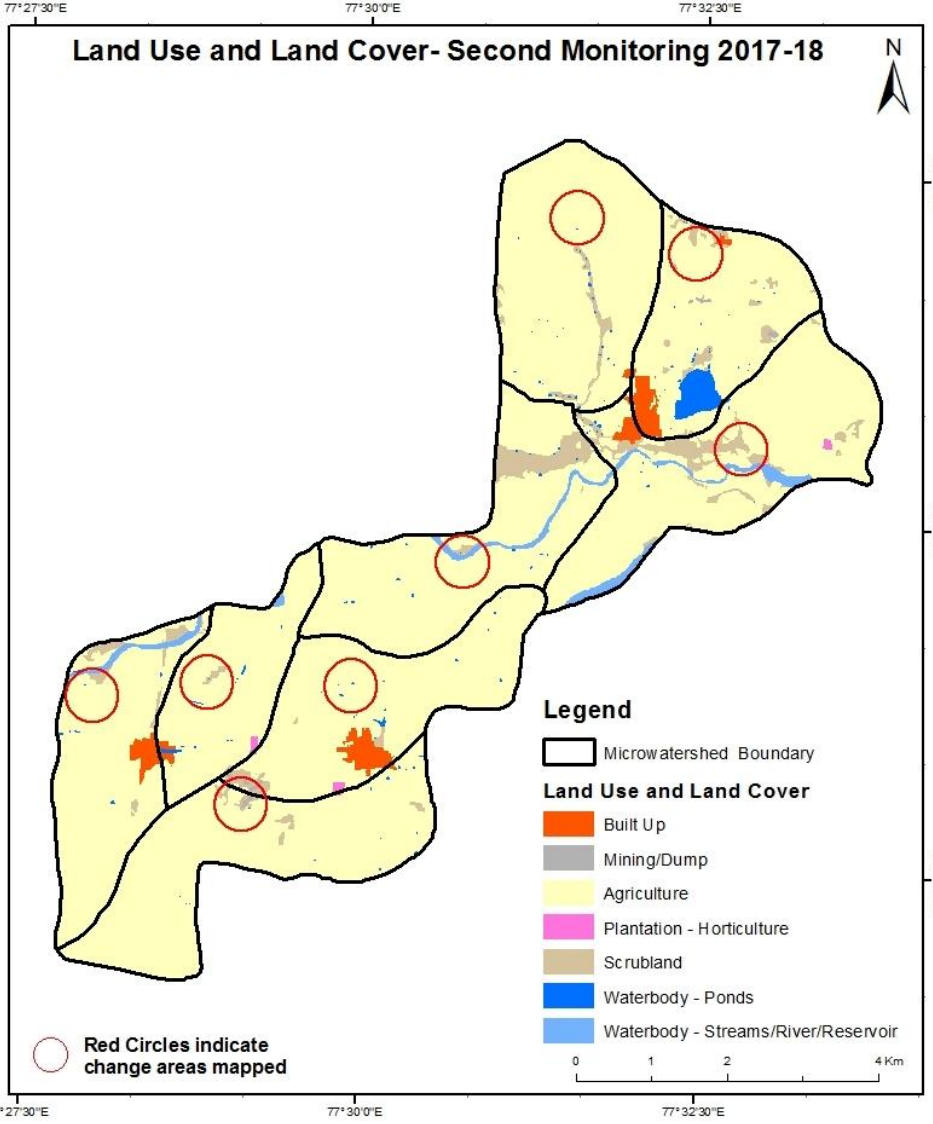
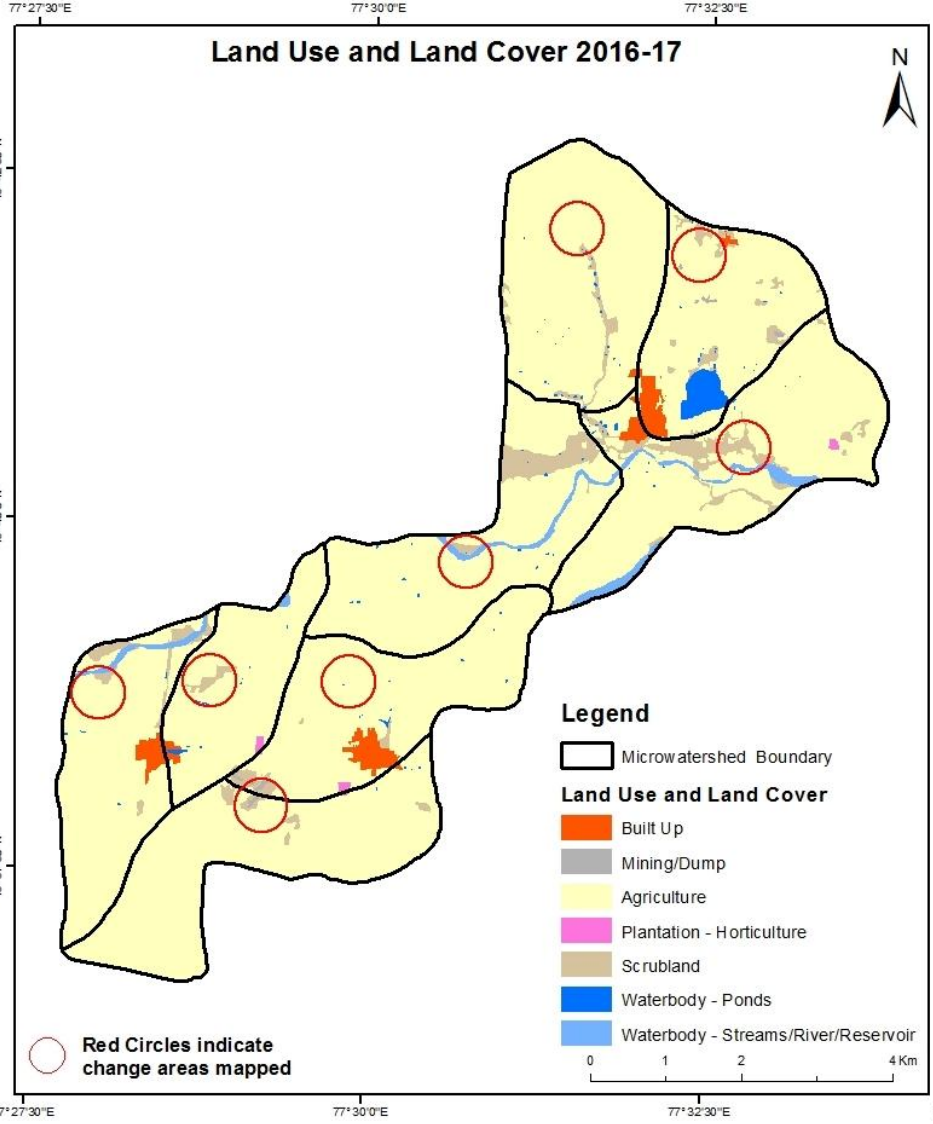
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



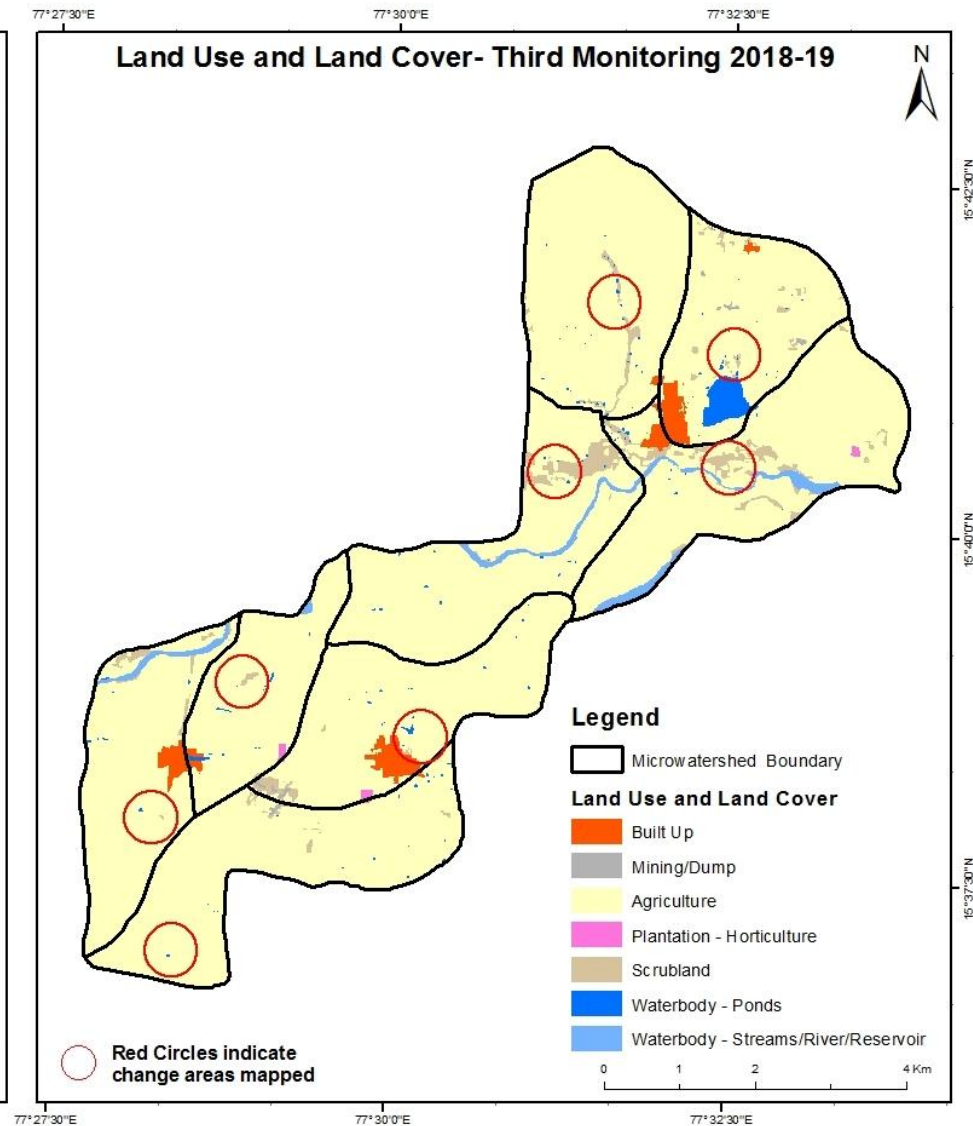
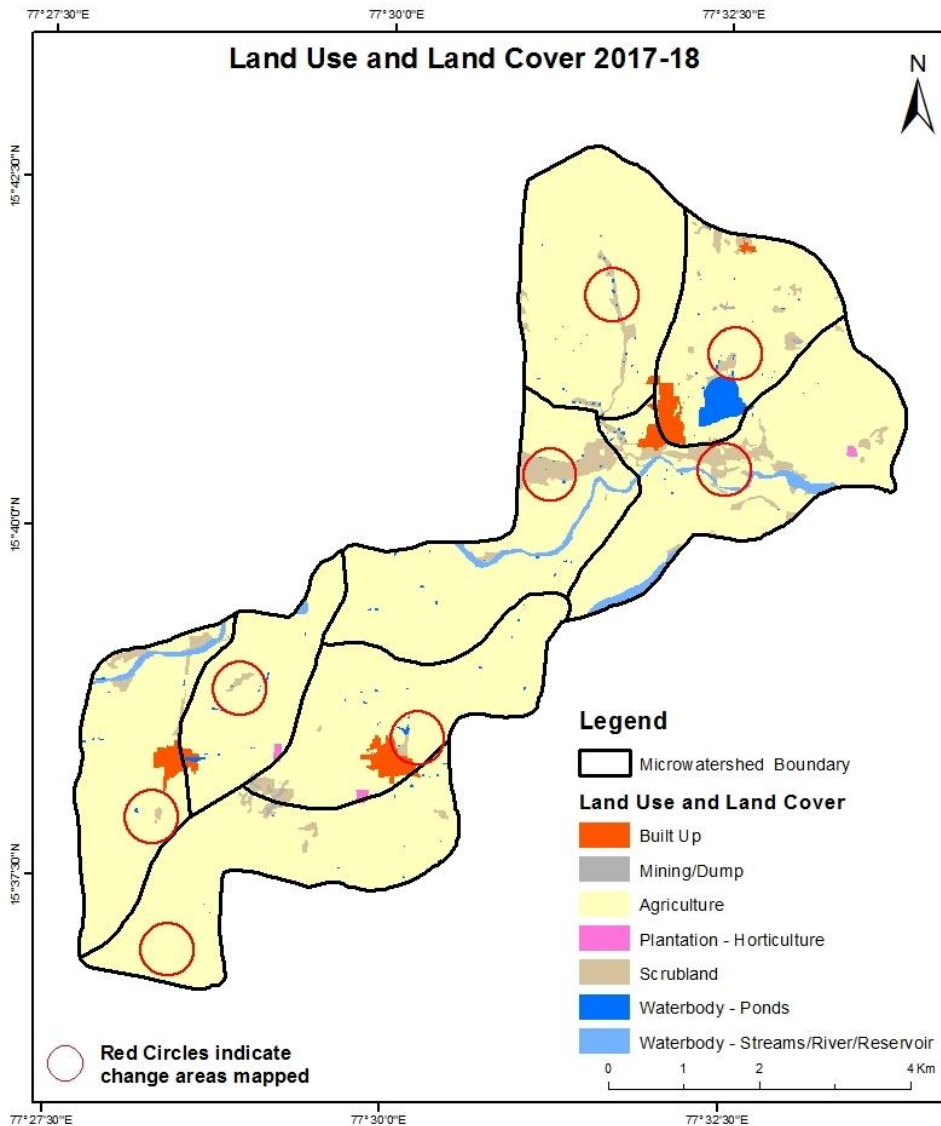
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



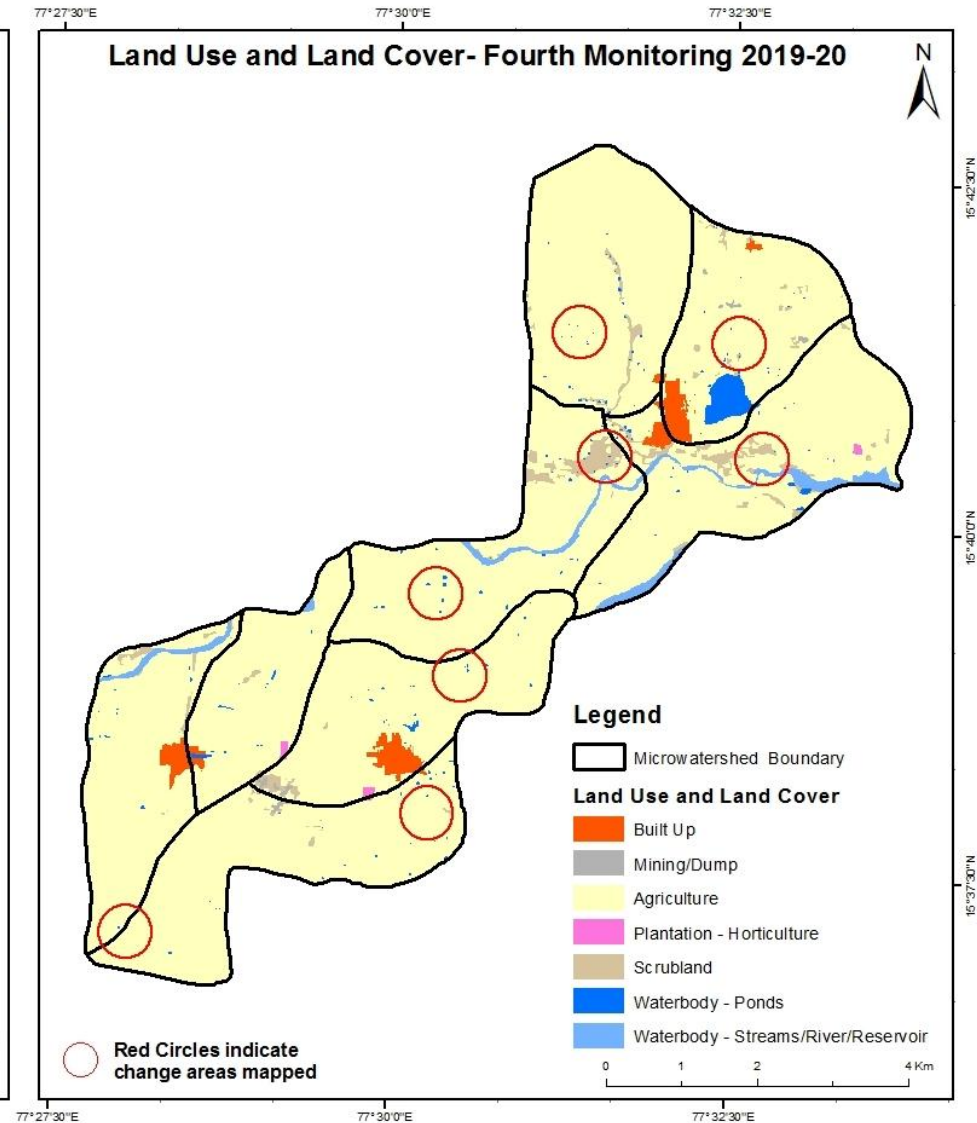
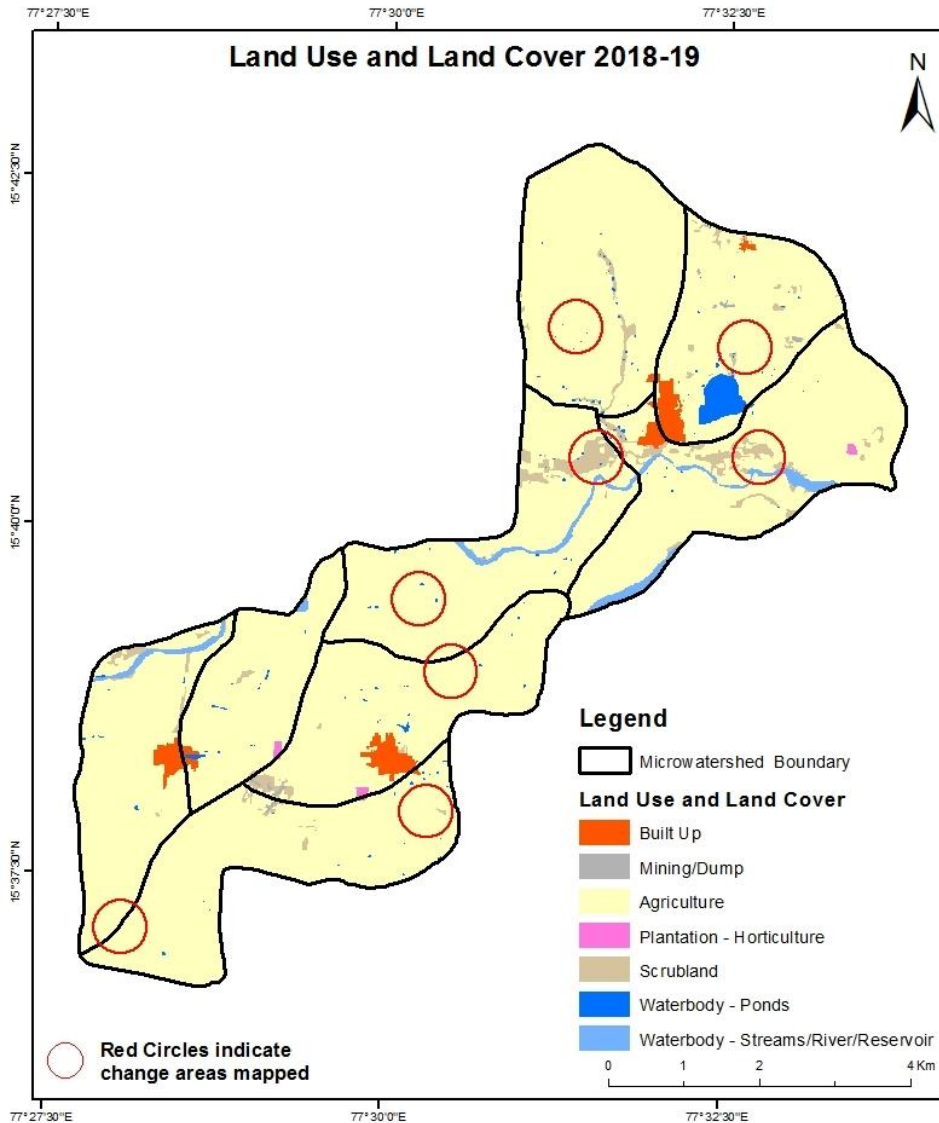
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



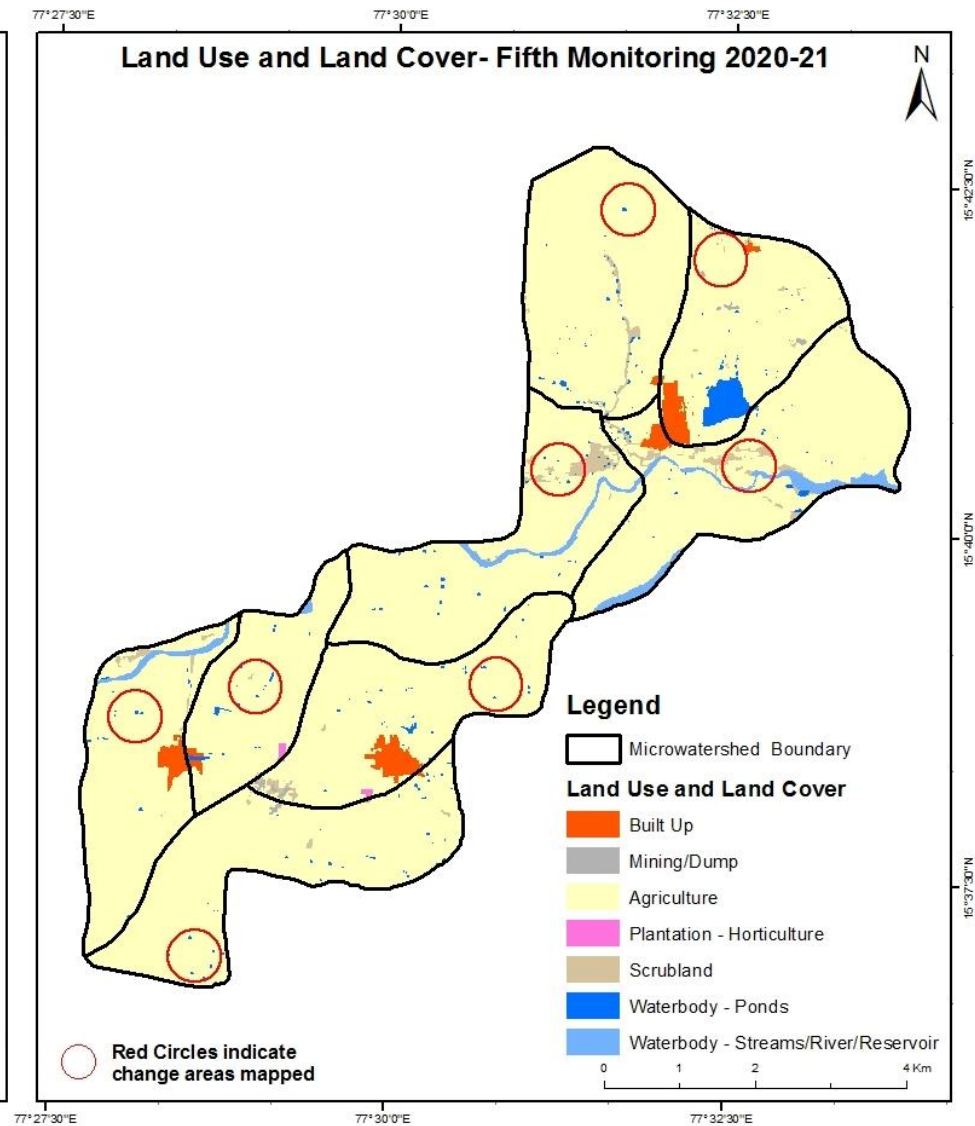
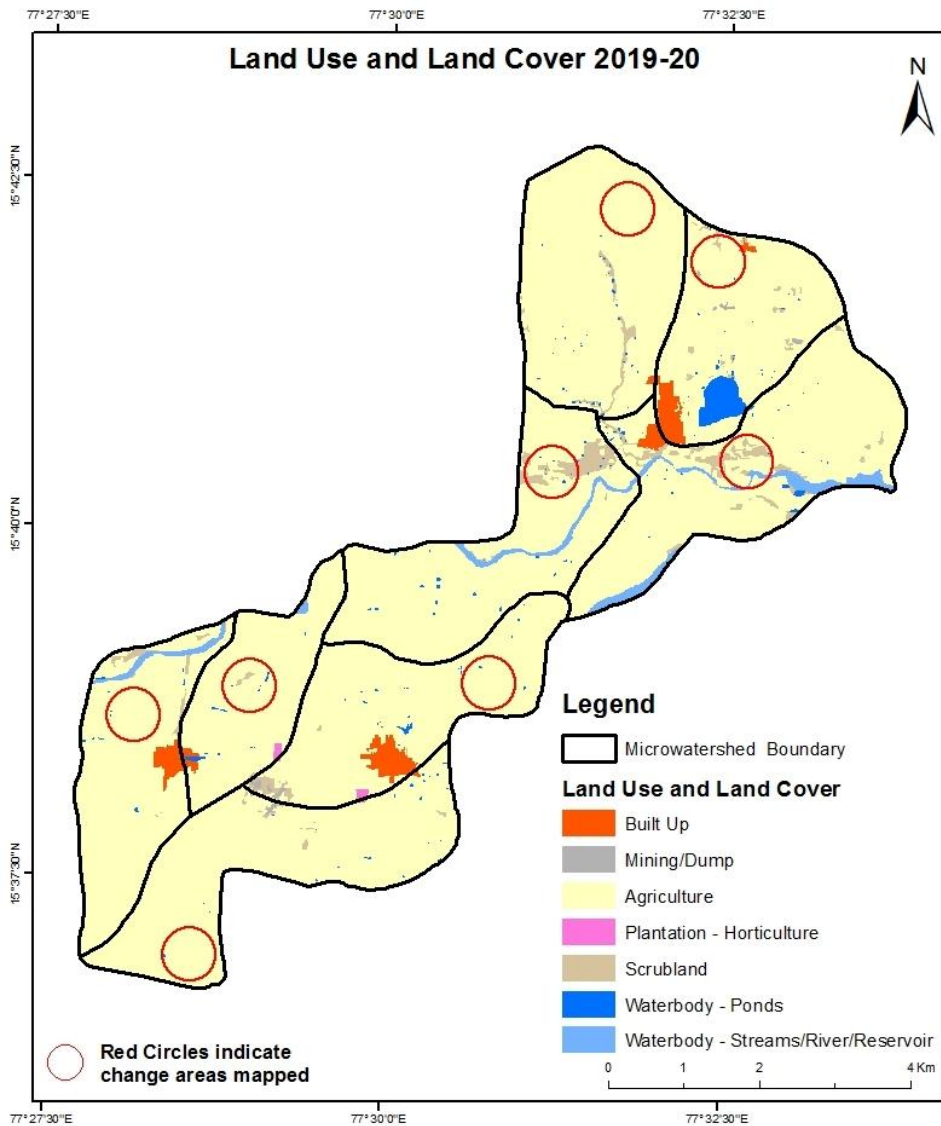
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



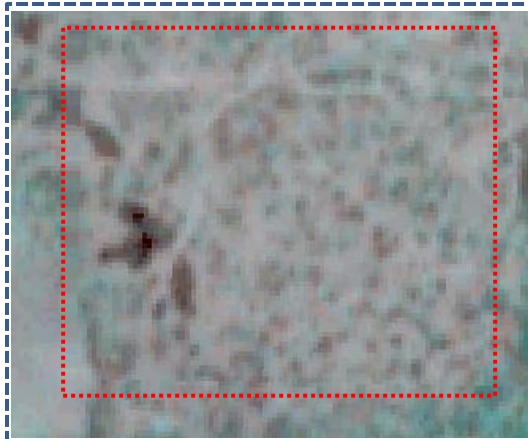
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

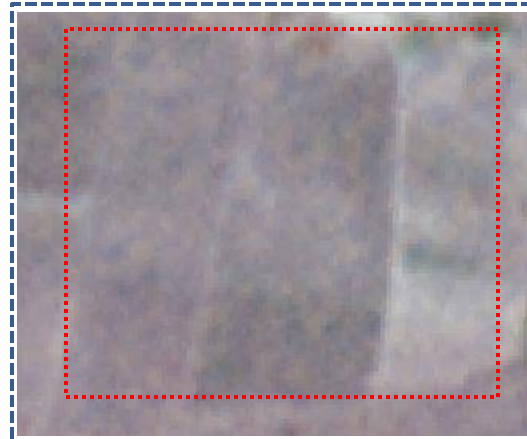


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0: 2012-13(77°32'10.527"E 15°40'21.844"N)



T1: 09 November 2016

Scrub to Farm pond



T0: 2012-13(77°31'30.008"E 15°40'55.556"N)



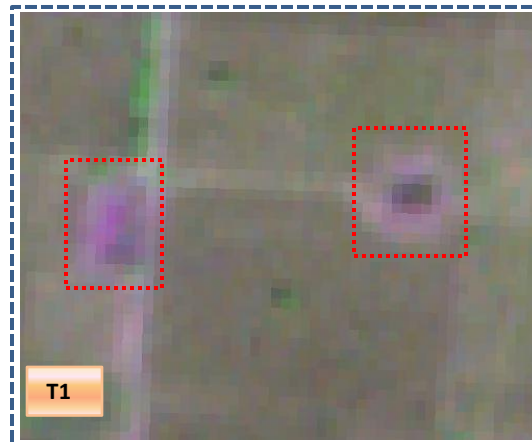
T1: 09 November 2016

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

Agriculture to Farm pond

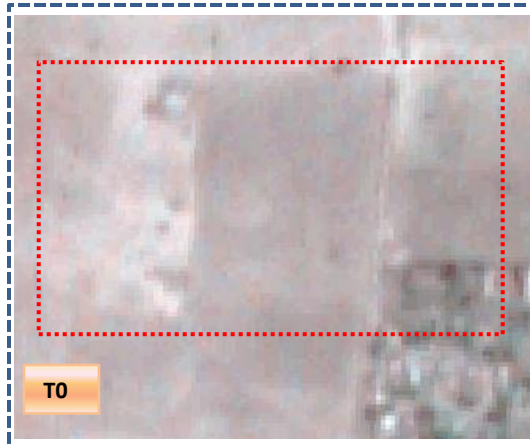


T0: 2012-13(77°30'22.582"E 15°39'2.682"N)

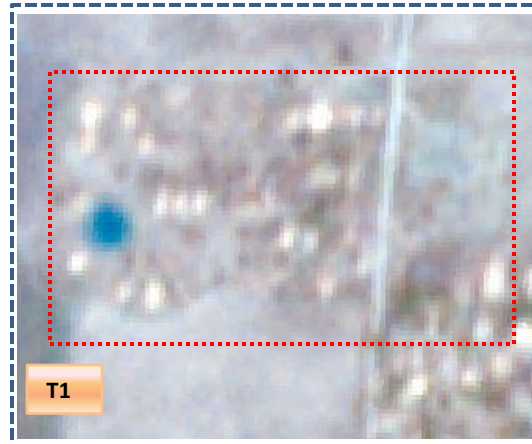


T1: 09 November 2016

Agriculture to Built up



T0: 2012-13(77°31'58.068"E 15°41'5.891"N)



T1: 09 November 2016

Table showing change matrix depicting Land cover transitions during study period-2012-13 to 2016-17

| 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 | 73.85 | | | | | | | | | | | | 73.85 |
| Mining/dump | | 5.51 | | | | | | | | | | | 5.51 |
| Agriculture | 3.13 | | 4001.49 | | | | | 3.82 | | 7.34 | | | 4015.78 |
| Plantation Horticulture | | | | 6.23 | | | | | | | | | 6.23 |
| Forest | | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | | |
| Scrub | 0.32 | | 53.64 | | | | | 208.20 | | 2.97 | | | 265.13 |
| Waterbody- Streams/River | | | | | | | | | 71.46 | | | | 71.46 |
| Waterbody – Ponds | | | | | | | | | | 29.15 | | | 29.15 |
| Grand Total | 77.30 | 5.51 | 4055.12 | 6.23 | | | | 212.02 | 71.46 | 39.46 | | | 4467.11 |

- 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 10 ha of the agriculture area has decreased and it is converted into Built-up, scrub and water body in T1.
- In T1 53 ha of the agriculture area has increased from scrubland of T2. The additional agriculture are coming from waterbody in T1 represents seasonal agriculture.

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

| 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 | 77.30 | | | | | | | | | | 77.30 | |
| Mining/dump | | 5.51 | | | | | | | | | 5.51 | |
| Agriculture | 0.20 | | 4051.67 | | | | | 0.96 | | 2.29 | 4055.12 | |
| Plantation Horticulture | | | | 6.23 | | | | | | | 6.23 | |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 0.11 | | 20.97 | | | | | 190.43 | | 0.51 | 212.02 | |
| Waterbody- Streams/River | | | 0.25 | | | | | | 71.21 | | 71.46 | |
| Waterbody – Ponds | | | 0.48 | | | | | | | 38.98 | 39.46 | |
| Grand Total | 77.61 | 5.51 | 4073.37 | 6.23 | | | | 191.40 | 71.21 | 41.78 | 4467.11 | |

- 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 2.4 ha of the agriculture area has decreased and it is converted into Built-up , scrubland and water body in T2.
- In T2 21.7 ha of the agriculture area has increased from plantations and scrubland 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-2017-18 to 2018-19

| 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 | 77.61 | | | | | | | | | | 77.61 | |
| Mining/dump | | 5.51 | | | | | | | | | 5.51 | |
| Agriculture | 0.45 | | 4072.13 | | | | | | | 0.80 | 4073.37 | |
| Plantation Horticulture | | | | 6.23 | | | | | | | 6.23 | |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | | | 65.93 | | | | | 125.36 | | 0.11 | 191.40 | |
| Waterbody- Streams/River | | | | | | | | | 71.21 | | 71.21 | |
| Waterbody – Ponds | | | | | | | | | | 41.78 | 41.78 | |
| Grand Total | 78.06 | 5.51 | 4138.06 | 6.23 | | | | 125.36 | 71.21 | 42.69 | 4467.11 | |

- 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 1.2 ha of the agriculture area has decreased and it is converted into Built-up and water body in T3.
- In T3 65.9 ha of the agriculture area has increased from 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-2018-19 to 2019-20

| 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 | | |
| Built up | 78.06 | | | | | | | | | | | | 78.06 |
| Mining/dump | | 5.51 | | | | | | | | | | | 5.51 |
| Agriculture | 0.62 | | 4122.35 | | | | | | 10.28 | 4.81 | | | 4138.06 |
| Plantation Horticulture | | | | 6.23 | | | | | | | | | 6.23 |
| Forest | | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | | |
| Scrub | 0.74 | 0.68 | 14.25 | | | | | 109.36 | | 0.33 | | | 125.36 |
| Waterbody- Streams/River | | | | | | | | | 71.21 | | | | 71.21 |
| Waterbody – Ponds | | | | | | | | | | 42.69 | | | 42.69 |
| Grand Total | 79.42 | 6.19 | 4136.60 | 6.23 | | | | 109.36 | 81.49 | 47.82 | | | 4467.11 |

- 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 15 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.
- In T4 14 ha of the agriculture area has increased from 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-2019-20 to 2020-21

| Land cover | Monitoring period (T5) | | | | | | | | | | Units in Hectares | |
|-----------------------------|------------------------|-----------------|----------------|----------------------------|--------|----------------------|-----------------|--------------|-----------------------------|---------------------|-------------------|----------------|
| T4 | Built up | Mining/ dump | Agriculture | Plantation Horticulture | Forest | Forest Plantation | Barren Rocky | Scrub | Waterbody- Streams/River | Water body Ponds | Grand Total | |
| Built up | 78.30 | | | | | | | | | | | 78.30 |
| Mining/dump | | 6.19 | | | | | | | | | | 6.19 |
| Agriculture | 1.38 | | 4130.88 | | | | | | | 7.36 | | 4139.62 |
| Plantation Horticulture | | | 0.40 | 4.26 | | | | | | | | 4.66 |
| Forest | | | | | | | | | | | | |
| Forest Plantation | | | | | | | | | | | | |
| Barren Rocky | | | | | | | | | | | | |
| Scrub | 0.40 | | 33.14 | | | | | 75.11 | | 0.71 | | 109.36 |
| Waterbody- Streams/River | | | | | | | | | 81.49 | | | 81.49 |
| Waterbody – Ponds | | | 1.12 | | | | | | | 46.44 | | 47.57 |
| Grand Total | 80.09 | 6.19 | 4165.55 | 4.26 | | | | 75.11 | 81.49 | 54.51 | | 4467.19 |

- 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 8.7 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.
- In T5 34.6 ha of the agriculture area has 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 35 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
4. There is an increase of 39, 18, 64 & 25 Hectares from T0 to T1, T1-T2, T2-T3 & T4-T5 respectively and overall increase of 148 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. There is a decrease of 190 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
6. Farm ponds (107) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (107) verified from the portal.