MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

ANANTAPURAMU -82/2012-13
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
December-2022

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

APSAC

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

इसरो ISRO

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

सत्यमेव जयते

DEPARTMENT OF LAND
RESOURCES
Ministry of Rural Development
Government of India

C O N T E N T S

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

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-82/2012-13, Anantapuramu District of   Andhra Pradesh.   The total geographical area of the project is **9,747** ha.   It comprises of 7 micro watersheds.

- In the project area 217 Drishti photos were uploaded showing check dams, Farm ponds, Horticulture and remaining showing others.

- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 38 new farm ponds or dug out pits with 344 ha increase in the area.

- Major percentage i.e. 60 % is covered by the agriculture, 6.8% is covered by Scrubland , 18.2 % is covered by Plantation and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-82/2012-13
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Uravakonda Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **9,747** ha. It comprises of 9 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2012-13 (T0) period (**Batch -1**) projects taking 2020-21 (T5) period satellite images

Andhra Pradesh   Anantapuramu District   Anantapuramu – IWMP 82/2012-13 Project
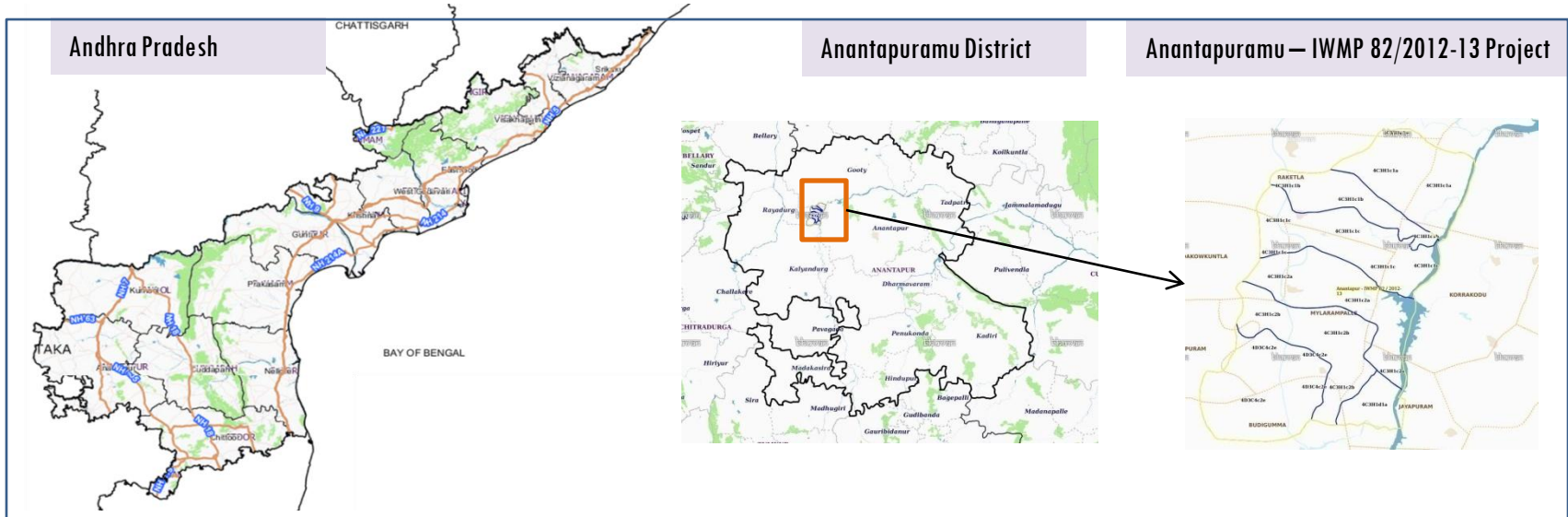
- Anantapuram has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 37 °C range and it reaches around 44 °C to 45 °C .

- 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
	2012-13	2012-13	2020-21
LISS IV	2012-13		
SCENE 1			2-Nov-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			2-Nov-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	Drishti Photographs		
		Total	217
4	Detailed Project Report		

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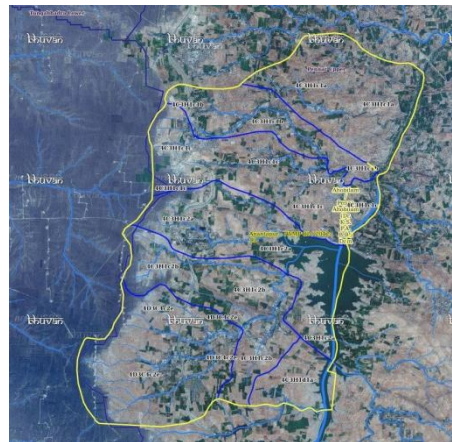
Legend

 Drainage (1:10000 Scale)

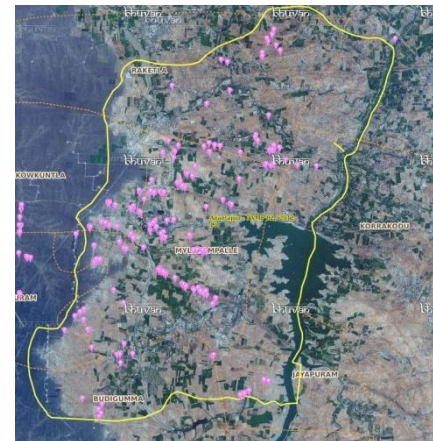 MWS Boundary

 Project Boundary

Natural Color Composite overlaid with Drishti Points

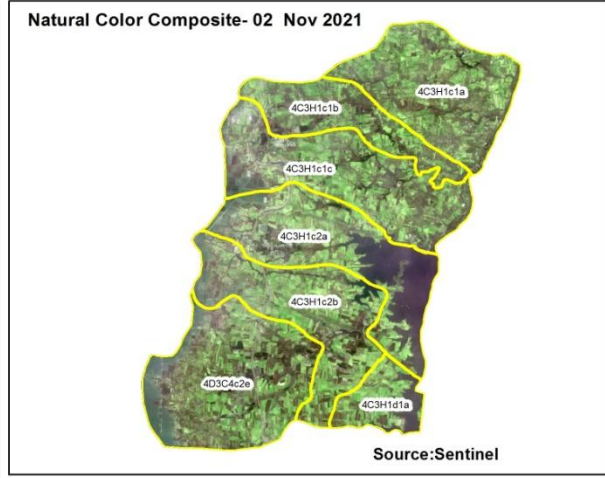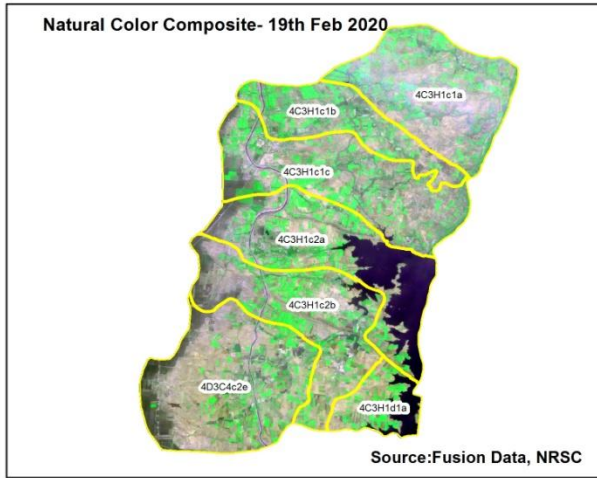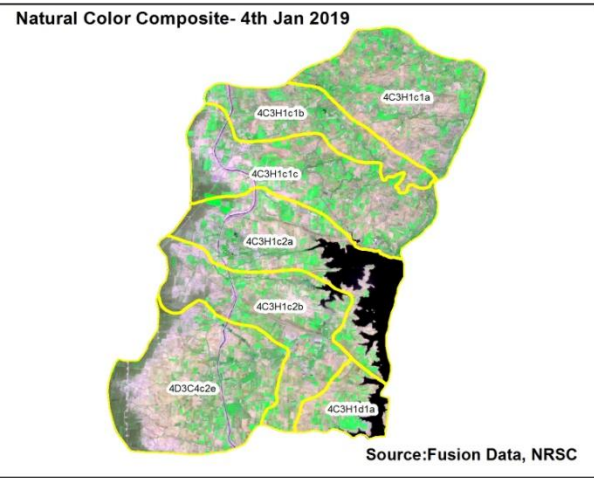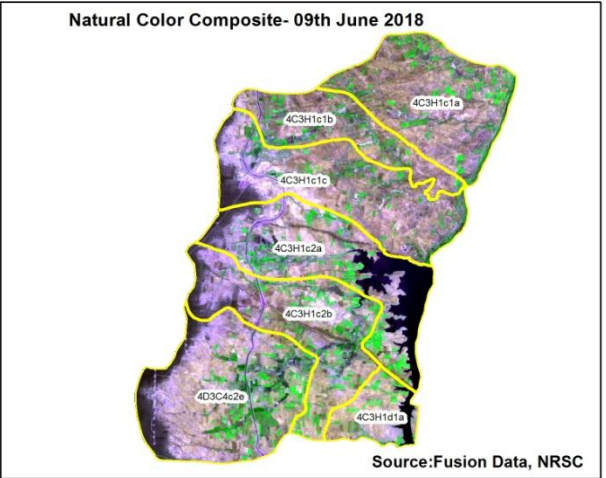

Drishti Upload Status

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	0	0
2	Afforestation	8	8
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	1	1
6	Terrace	0	0
7	Checks & Plugs	24	20
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	38	38
10	Civil work-Check dams/Rock fill dam	0	0
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	0	50
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	226	150
	TOTAL	**297**	**217**

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 (2012-13) 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 Colour Composite (NCC)
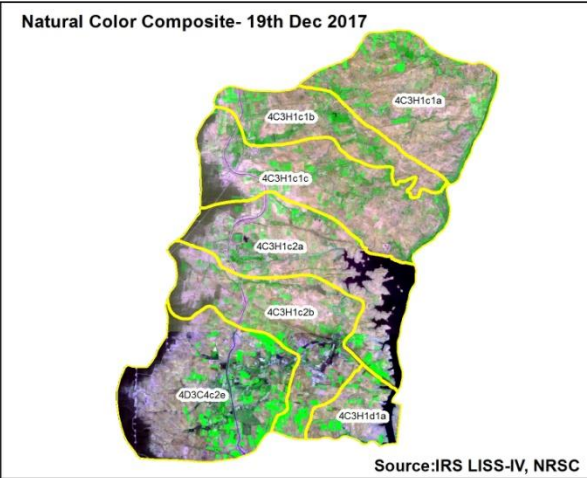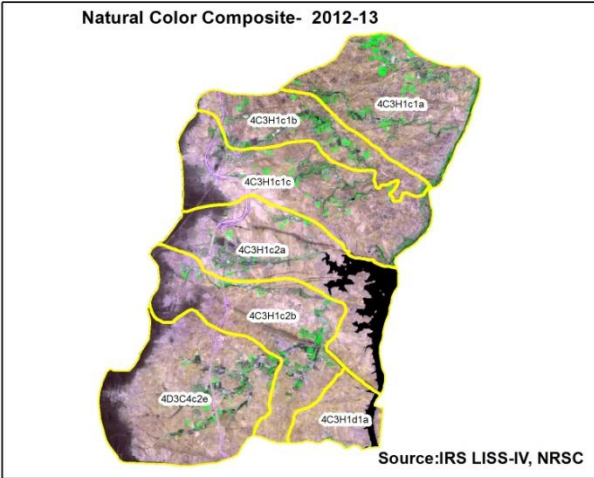
Natural Color Composite- 2012-13
Source:IRS LISS-IV, NRSC

Natural Color Composite- 19th Dec 2017
Source:IRS LISS-IV, NRSC

Natural Color Composite- 09th June 2018
Source:Fusion Data, NRSC

Natural Color Composite- 4th Jan 2019
Source:Fusion Data, NRSC

Natural Color Composite- 19th Feb 2020
Source:Fusion Data, NRSC

Natural Color Composite- 02 Nov 2021
Source:Sentinel
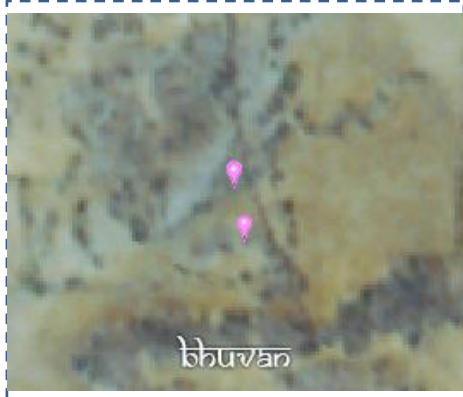
| T0 | Satellite data 2013 |

| T1 | Satellite data 2015 |

| T2 | Satellite data 2016 |

| T3 | Satellite data 2017 |

| T4 | Satellite data 2018 |

| T5 | Satellite data 2020 |

Drishti Id. 2424190

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-82/2012-13

T0:2012-13

T1: 09 November 2016

Drishti Sl no. 3064678---- MWS :4C3H1c2b

Boulder Removal

T0:2012-13

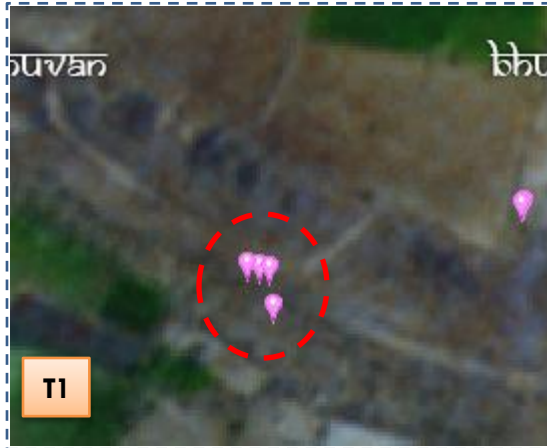T1: 09 November 2016

Drishti Sl no. 135660- MWS : 4D3C4c2e

Farm Pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-82/2010-11
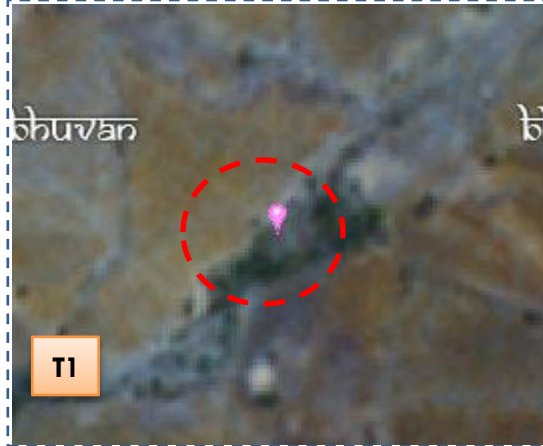
| T0: 2012-13 | T1: 09 November 2016 | Drishti Sl no. 135679-   MWS :4C3H1c2a |

Farm Pond

| T0: 2012-13 | T1: 09 November 2016 | Drishti Sl no. 2465834   MWS : |

Farm Pond

MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

- Change in land use and land cover form 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
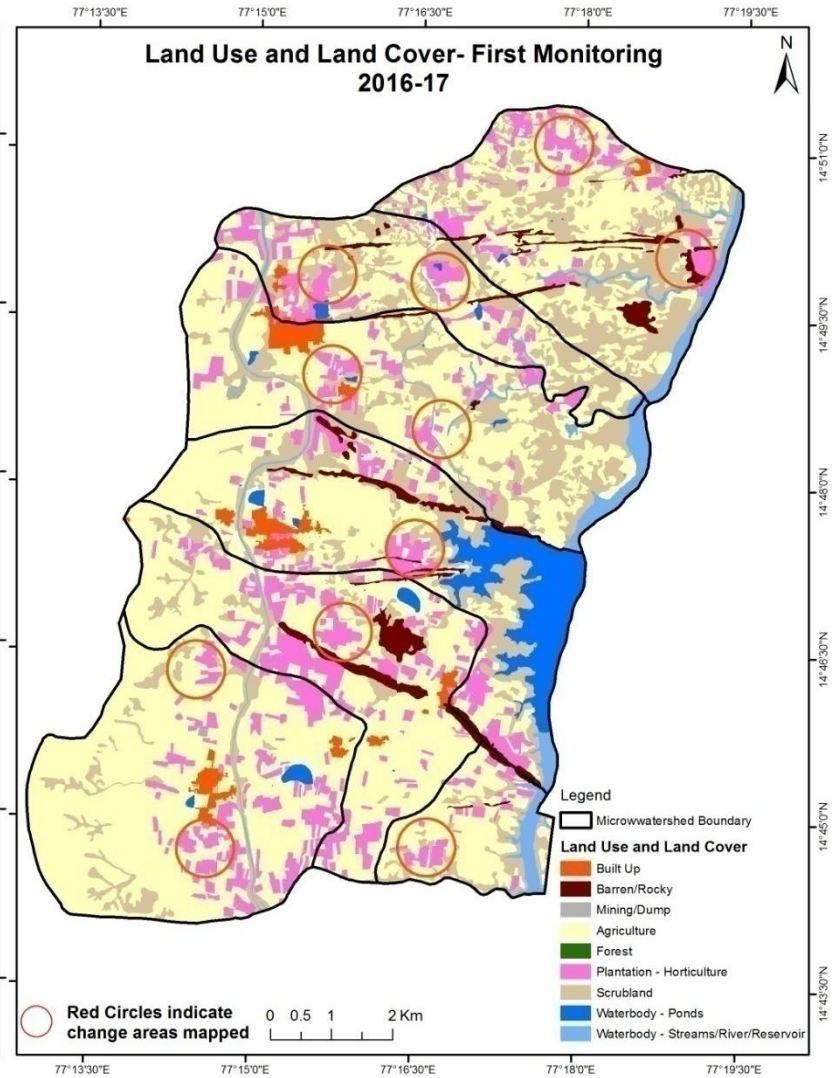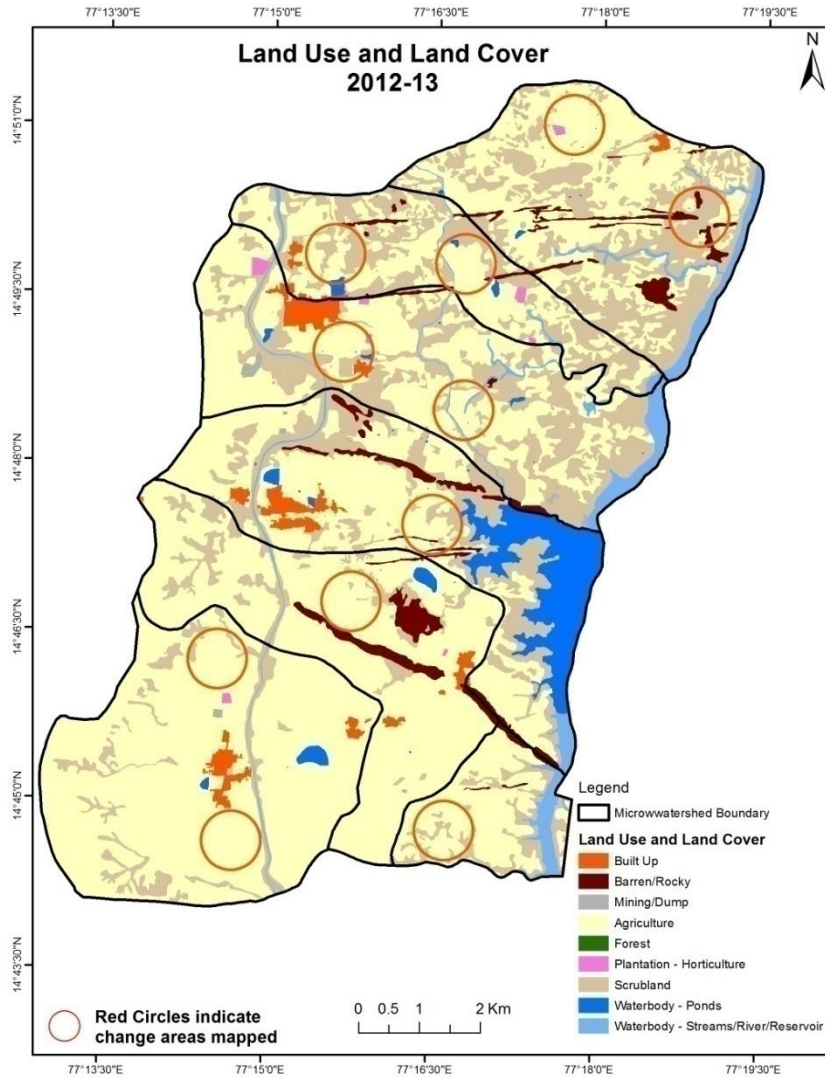
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000

Land Use and Land Cover 2016-17

N

Legend

☐ Microwwatershed Boundary

Land Use and Land Cover

- Built Up
- Barren/Rocky
- Mining/Dump
- Agriculture
- Forest
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

◯ **Red Circles indicate change areas mapped**

0 0.5 1   2 Km

Land Use and Land Cover- Second Monitoring 2017-18

N

Legend

☐ Microwwatershed Boundary

Land Use and Land Cover

- Built Up
- Barren/Rocky
- Mining/Dump
- Agriculture
- Forest
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

◯ **Red Circles indicate change areas mapped**

0 0.5 1   2 Km

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 2017-18

Land Use and Land Cover- Third Monitoring 2018-19

Legend

☐ Microwwatershed Boundary

Land Use and Land Cover
- Built Up
- Barren/Rocky
- Mining/Dump
- Agriculture
- Forest
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

○ **Red Circles indicate change areas mapped**

0   0.5   1   2 Km
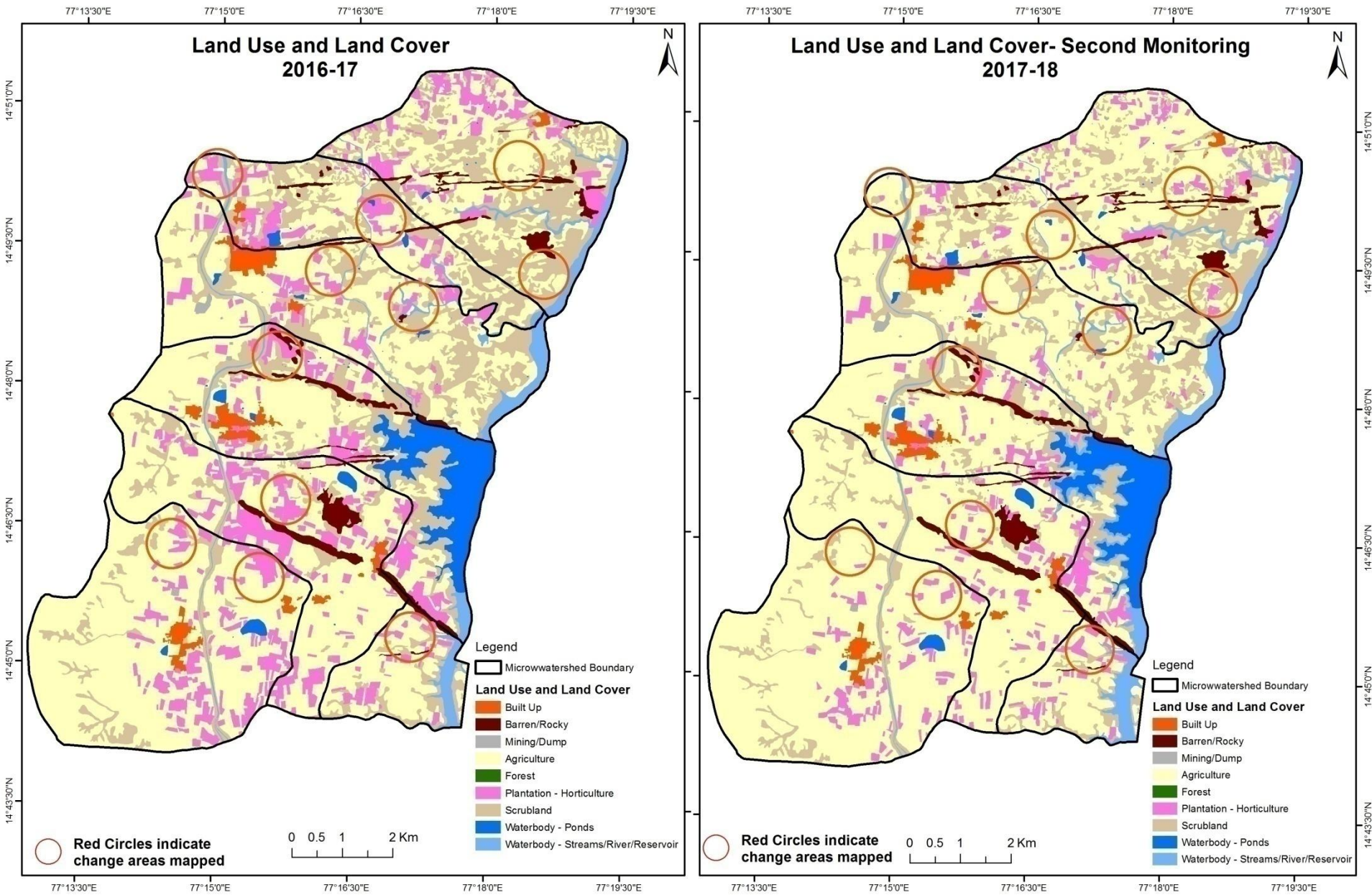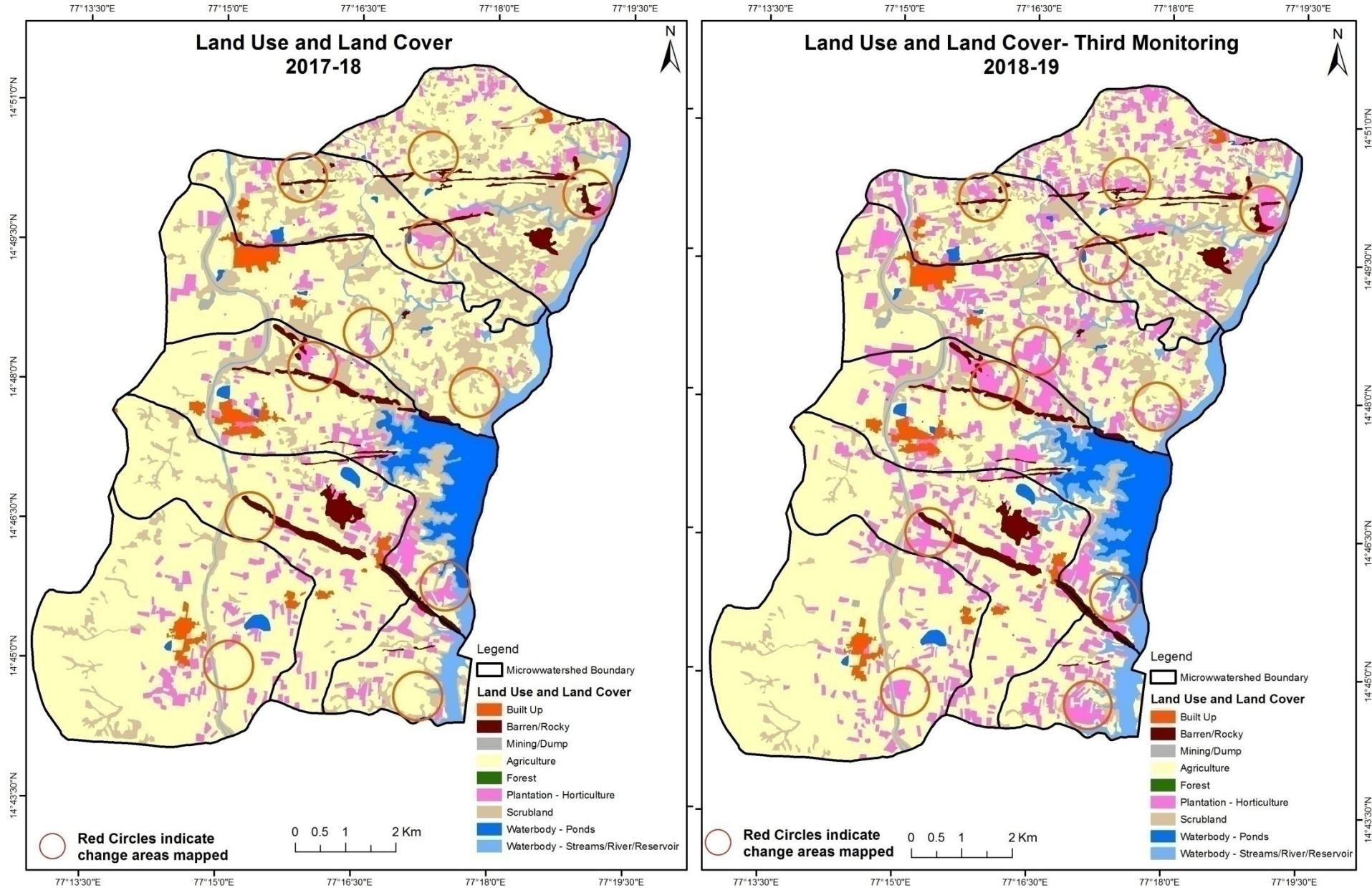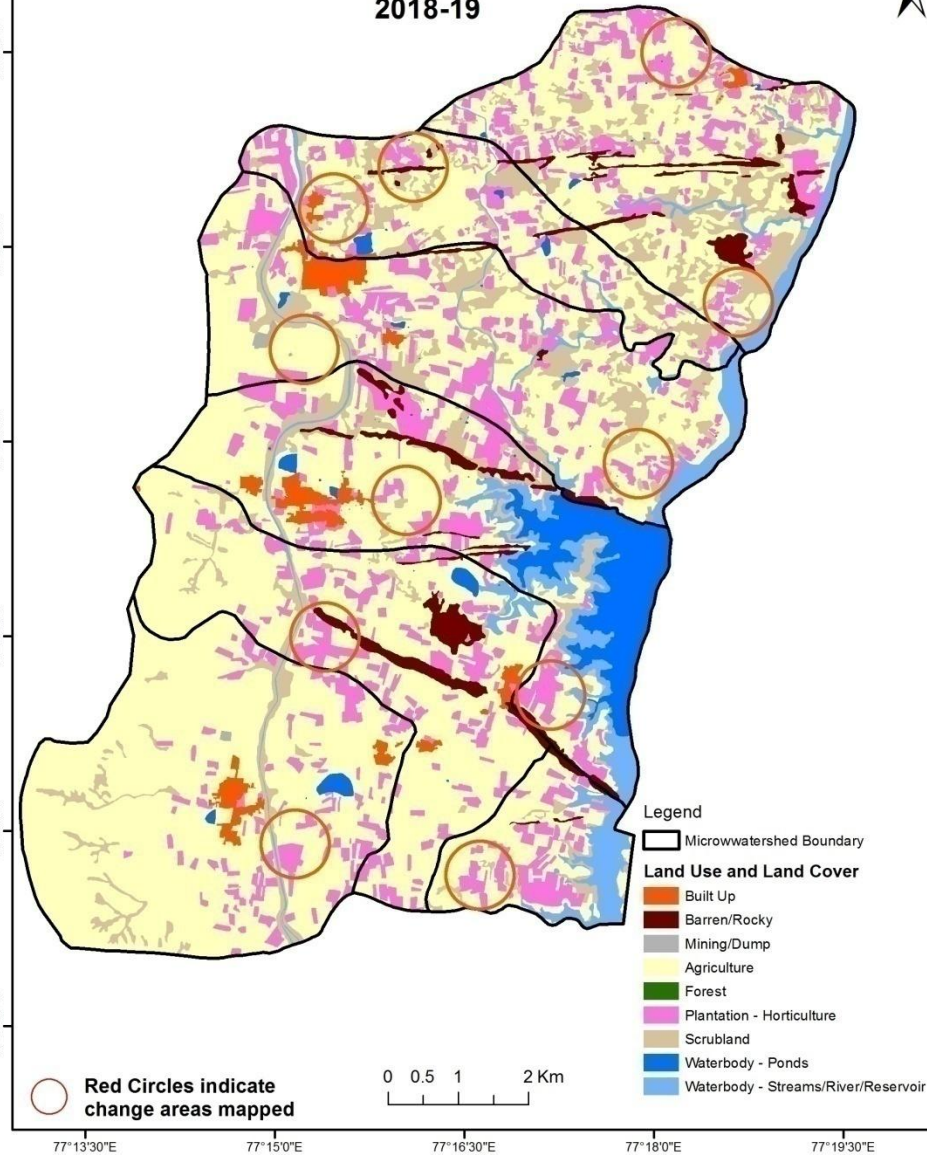
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

Land Use and Land Cover 2018-19

N

Land Use and Land Cover- Fourth Monitoring 2019-20

N

Legend

☐ Microwwatershed Boundary

Land Use and Land Cover

- Built Up
- Barren/Rocky
- Mining/Dump
- Agriculture
- Forest
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

○ **Red Circles indicate change areas mapped**

0 0.5 1 2 Km

Legend

☐ Microwwatershed Boundary

Land Use and Land Cover

- Built Up
- Barren/Rocky
- Mining/Dump
- Agriculture
- Forest
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

○ **Red Circles indicate change areas mapped**
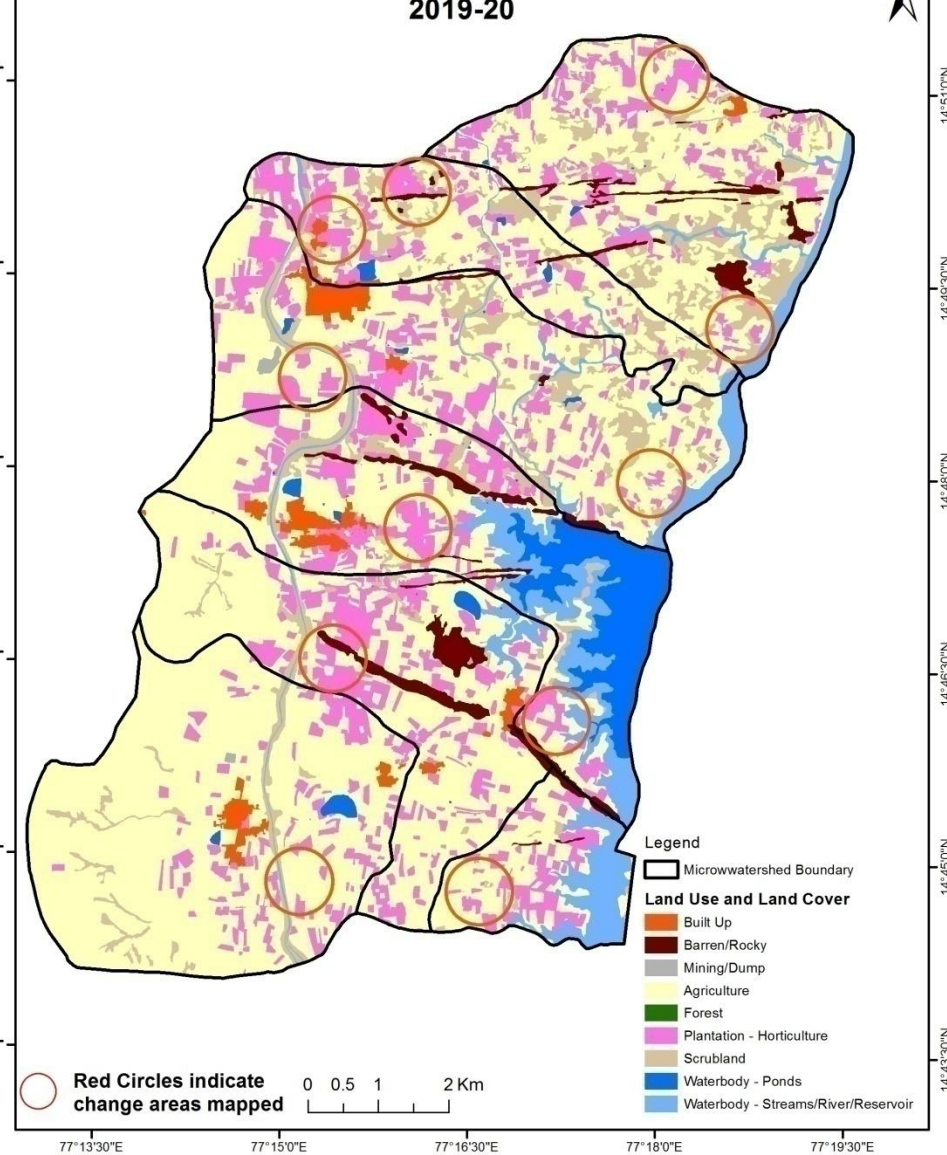
0 0.5 1 2 Km

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)
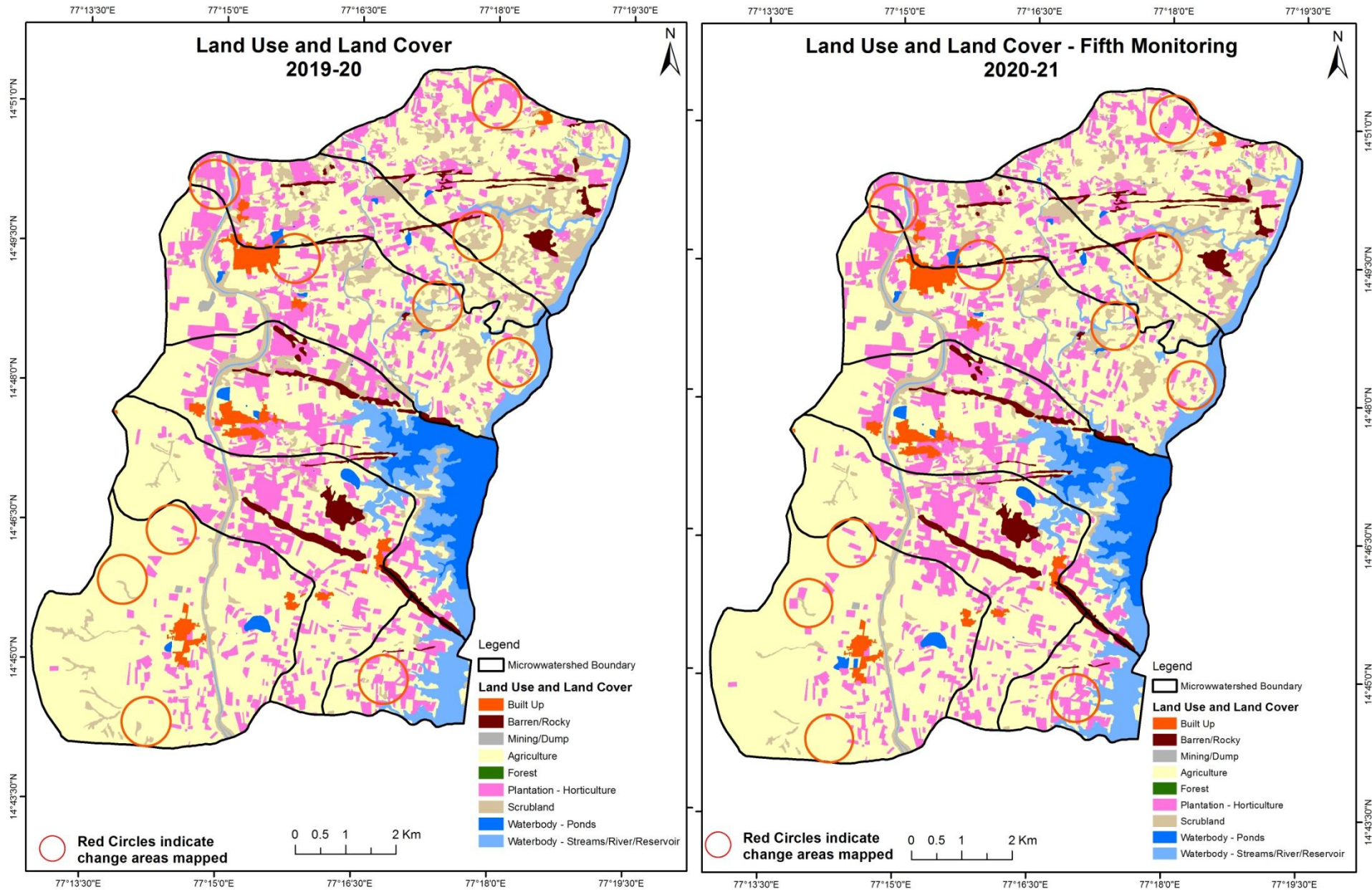
Scale: 1:10000

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

Agriculture to Built-up

T0: 2012-13(77°14'39.485"E 14°45'34.062"N)
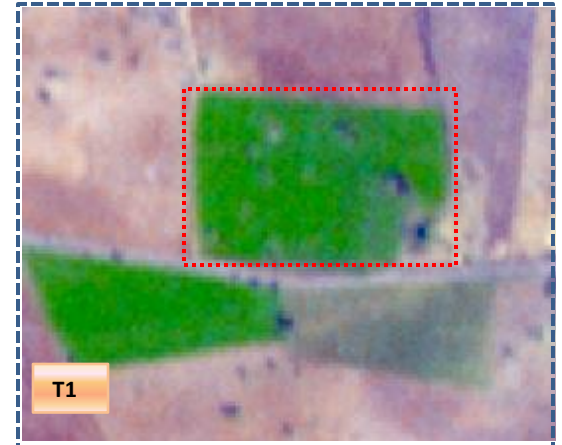
T1: 09 November 2016

Agriculture to Plantation
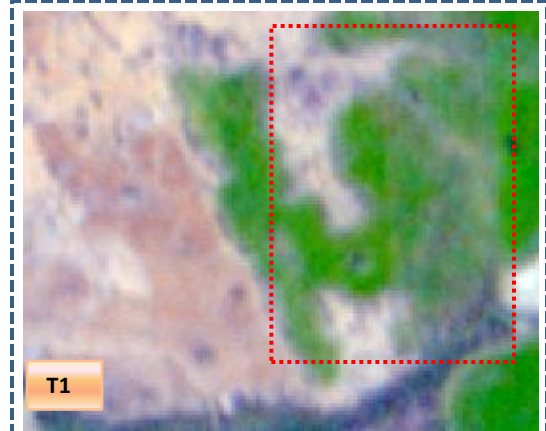

T0: 2012-13 (77°17'38.431"E 14°51'4.179"N)

T1: 09 November 2016

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

Scrubland to Plantation

T0: 2012-13(77°49'24.401"E 14°0'21.436"N)

T1: 09 November 2016

Scrubland to Water body

T0: 2012-13(77°16'26.007"E 14°48'12.183"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	
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	175.37										175.37
Mining/dump		16.51									16.51
Agriculture			5009.18	1193.48						0.61	6203.28
Plantation Horticulture			8.57	13.08							21.65
Forest											
Forest Plantation											
Barren Rocky							263.59				263.59
Scrub			314.86	105.59				1991.60		5.45	2417.50
Waterbody- Streams/River									307.19		307.19
Waterbody – Ponds										342.76	342.76
Grand Total	175.37	16.51	5332.61	1312.16			263.59	1991.60	307.19	348.83	9747.86

- 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 1,194 ha of the agriculture area has decreased and it is converted into plantation and water body in T1.
- In T1 323 ha of the agriculture area has increased from plantations and 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	
T1	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	175.37										175.37
Mining/dump		16.51									16.51
Agriculture			5093.72	238.27				0.62			5332.60
Plantation Horticulture			846.57	463.07				1.31	1.21		1312.16
Forest											
Forest Plantation											
Barren Rocky							263.59				263.59
Scrub			319.85	28.97				1564.70	78.06		1991.58
Waterbody-Streams/River									307.19		307.19
Waterbody – Ponds									4.38	344.45	348.83
Grand Total	175.37	16.51	6260.14	730.30			263.59	1566.63	390.84	344.45	9747.83

• 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 238 ha of the agriculture area has decreased and it is converted into plantations and scrubland in T2.

• In T2 1,166 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	
T2	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	175.37										175.37
Mining/dump		16.51									16.51
Agriculture			5026.02	1187.93					46.18		6260.14
Plantation Horticulture			412.20	309.06				0.27	8.77		730.30
Forest											
Forest Plantation											
Barren Rocky							263.59				263.59
Scrub			307.22	76.88				1086.50	95.11	0.91	1566.63
Waterbody-Streams/River									390.84		390.84
Waterbody – Ponds									1.68	342.76	344.45
Grand Total	175.37	16.51	5745.45	1573.87			263.59	1086.77	542.59	343.68	9747.83

- 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 1,234 ha of the agriculture area has decreased and it is converted into plantations and water bodies in T3.

- In T3 719 ha of the agriculture area has increased from plantations 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-2018-19 to 2019-20

T3	Monitoring period (T4) Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	175.37										175.37
Mining/dump		16.05	0.37	0.09							16.51
Agriculture			4866.61	821.12					57.72		5745.45
Plantation Horticulture			625.39	947.06					1.42		1573.87
Forest											
Forest Plantation											
Barren Rocky							263.59				263.59
Scrub			214.84	12.28				815.08	44.57		1086.77
Waterbody-Streams/River									542.59		542.59
Waterbody – Ponds			0.91							342.76	343.68
Grand Total	175.37	16.05	5708.11	1780.57			263.59	815.08	646.30	342.76	9747.83

Units in Hectares

• 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 878 ha of the agriculture area has decreased and it is converted into plantations and water body in T4.

•In T4 841 ha of the agriculture area has increased from plantations, 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-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	175.37										175.37
Mining/dump		16.05									16.05
Agriculture	0.98		5674.03	28.06						5.05	5708.12
Plantation Horticulture	1.23		3.03	1776.30							1780.57
Forest											
Forest Plantation											
Barren Rocky							263.59				263.59
Scrub			149.46					665.64			815.10
Waterbody-Streams/River									646.30		646.30
Waterbody – Ponds										342.76	342.76
Grand Total	177.58	16.05	5826.52	1804.37			263.59	665.64	646.30	347.81	9747.86

• 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 34 ha of the agriculture area has decreased and it is converted into built-up, plantations and water body in T5.

•In T5 152 ha of the agriculture area has increased from plantations 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 increase of 344 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 927 & 118 Hectares from T1 to T2 & T4-T5 respectively and there is a decrease of 870, 514 & 37 Hectares from T0-T1, T1-T2 & T2-T3 and overall decrease of 376 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.

5.   **There is an increase of 1782 Hectares in plantation/horticulture area** from 2012-13 (T0) & 2020-21 (T5) years.

6.   There is a decrease of 1,751 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.

7.   Farm ponds (38) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (38) verified from the portal.