MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

KURNOOL -28/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
July-2021

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

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

- 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-28/2010-11, Kurnool District of   Andhra Pradesh.   The total geographical area of the project is 8,605.73 ha.   It comprises of 13 micro watersheds.

- In the project area 274 Drishti photos were uploaded showing 22 check dams/checks & plugins, 91 Farm ponds, 1 Livelihood measures and remaining showing others.

- Major percentage i.e. 89.98% is covered by the agriculture, 4.90 % is covered by scrubland, 2.02 % is covered by water body area and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-28/2010-11
DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Kodumur Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 8,605.73 ha. It comprises of 13 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (*Batch -2*) projects taking 2018-19 (T5) period satellite images
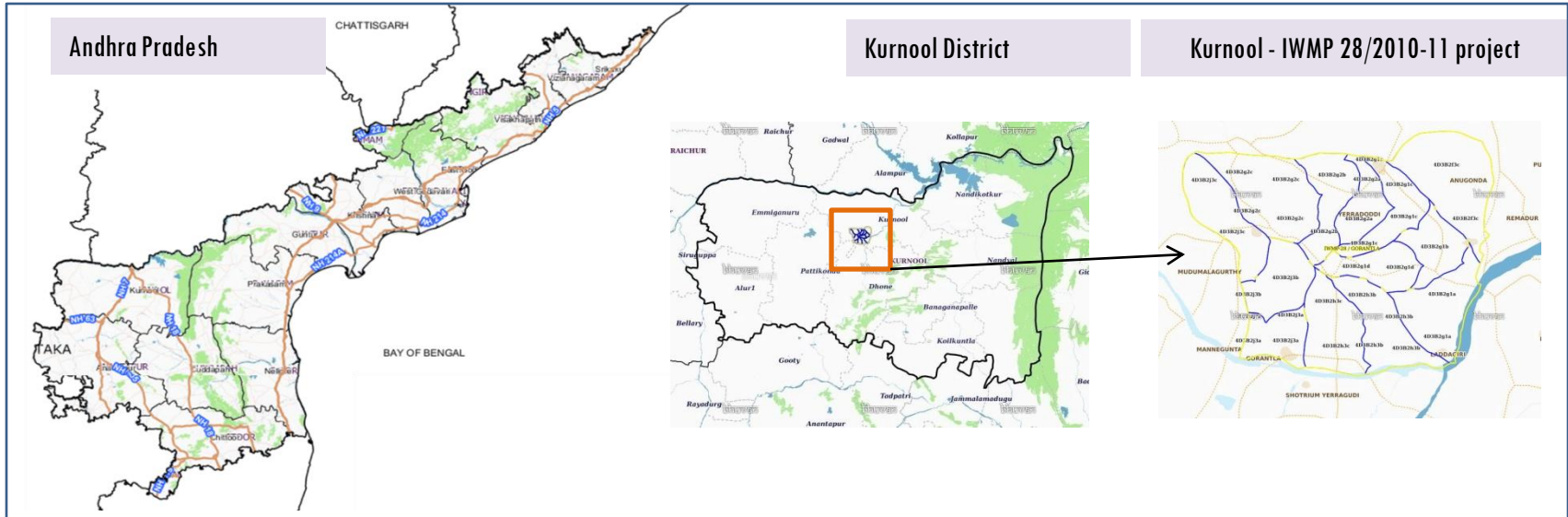
- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).

- The average annual rainfall of the district is 665.5mm, which ranges from nil rainfall in January and December to 139.6 mm in September. August and September are the wettest months. The mean seasonal rainfall distribution is 459.1mm in southwest monsoon (June September), 133.7mm in northeast monsoon (Oct-Dec), 1.9 mm rainfall in Winter (Jan Feb) and 70.8 mm in summer (March–May).

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Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			25-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			25-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	274
4	Detailed Project Report		

Natural Color Composite overlaid with Project boundaries and high detail stream network
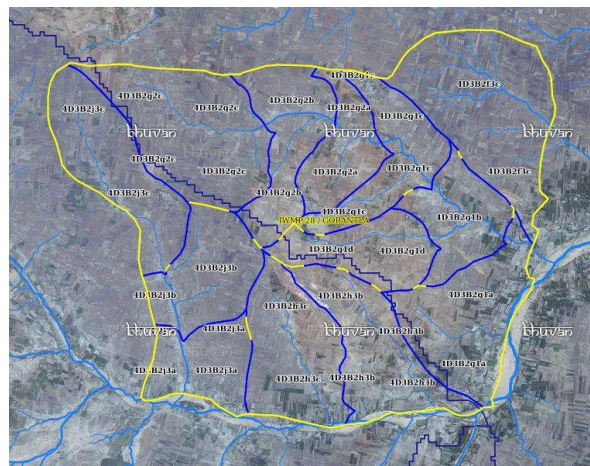
Legend
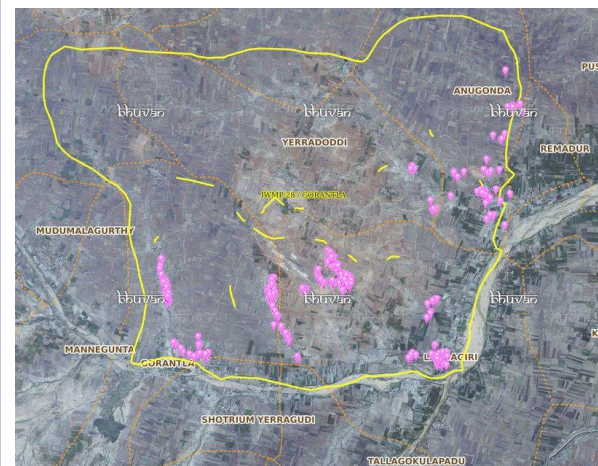
 Drainage (1:10000 Scale)

 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	0	0
2	Horticulture	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	101	91
8	Check dams (Civil work)	0	0
9	Checks & plugins	20	17
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	1	1
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	226	160
	TOTAL	**350**	**274**

MONITORING IN THE PROJECT AREA

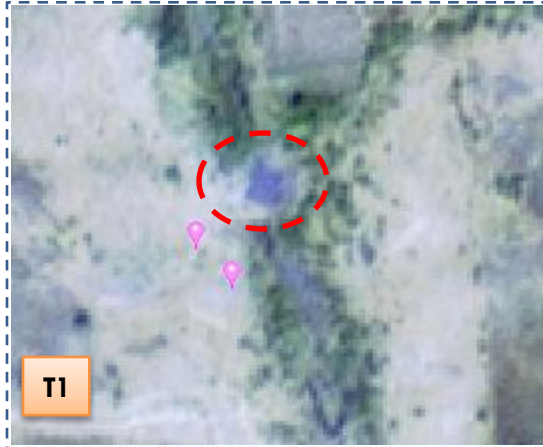<div style="border:1px solid blue; text-align:center;">

Site Wise Changes in the Project

</div>

- 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.

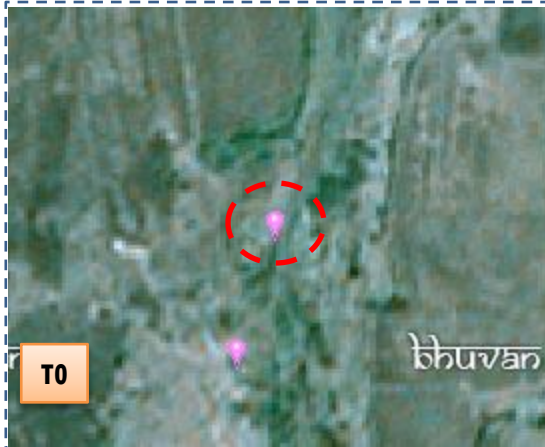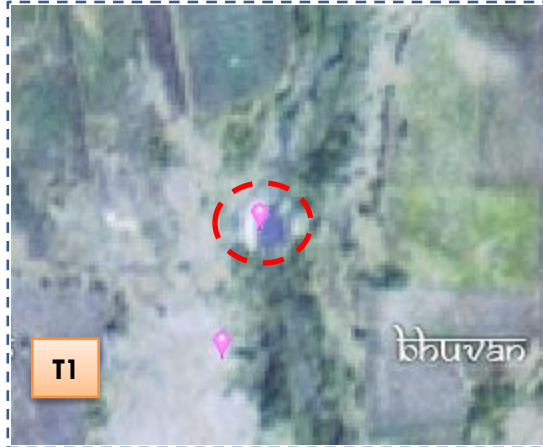# Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-28/2010-11
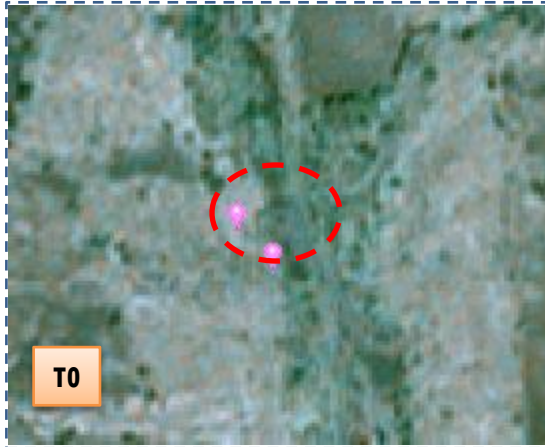
T0	T1	
T0:2010-11	T1: 02 May 2014	Drishti Sl no. 136964 MWS :4D3B2j3b

Dugout or Sunken Pond

T0	T1	
T0:2010-11	T1: 02 May 2014	Drishti Sl no. 136977 MWS :4D3B2j3b

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-28/2010-11

T0: 2010-11

T1: 30 November 2014

Drishti Sl no. 146785   MWS : 4D3B2h3b

Dugout or Sunken Pond

T0: 2010-11

T1: 30 November 2014

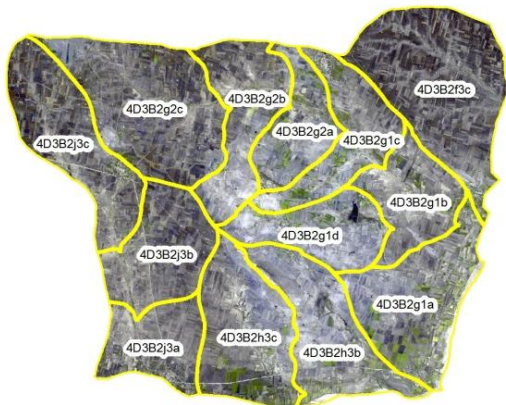Drishti Sl no. 166793   MWS : 4D3B2h3b

Dugout or Sunken Pond
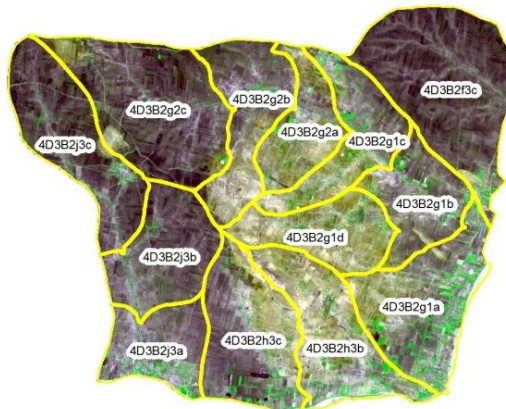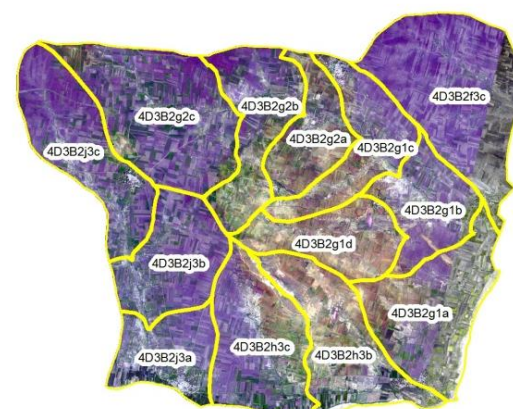
Natural Color Composite- 2010-11
Source:Fusen data,NRSC
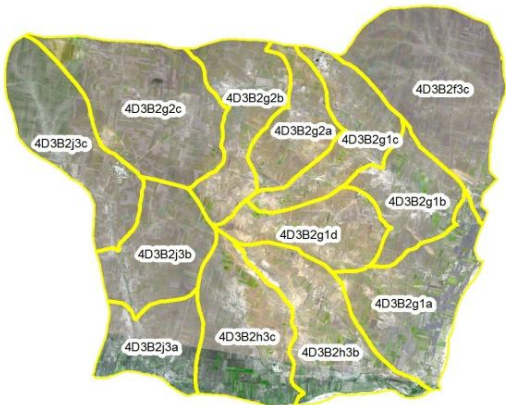
Natural Color Composite- 22nd April 2015
Source:LISS-IV,NRSC

Natural Color Composite- 28th October 2015
Source:NCC,NRSC

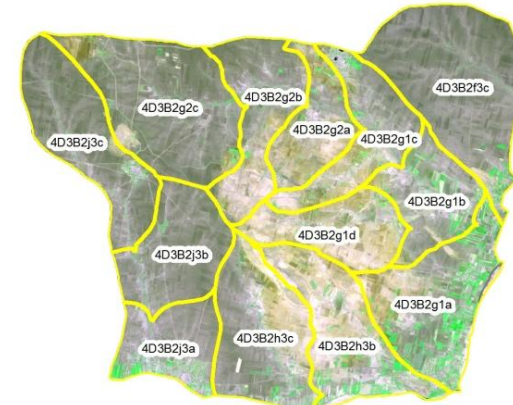**Natural Color Composite-17th October 2016**
Source:NCC,NRSC

Natural Color Composite- 22nd November 2017
Source:NCC,NRSC

Natural Color Composite- 25th March 2019
Source: Sentinel_II, NRSC

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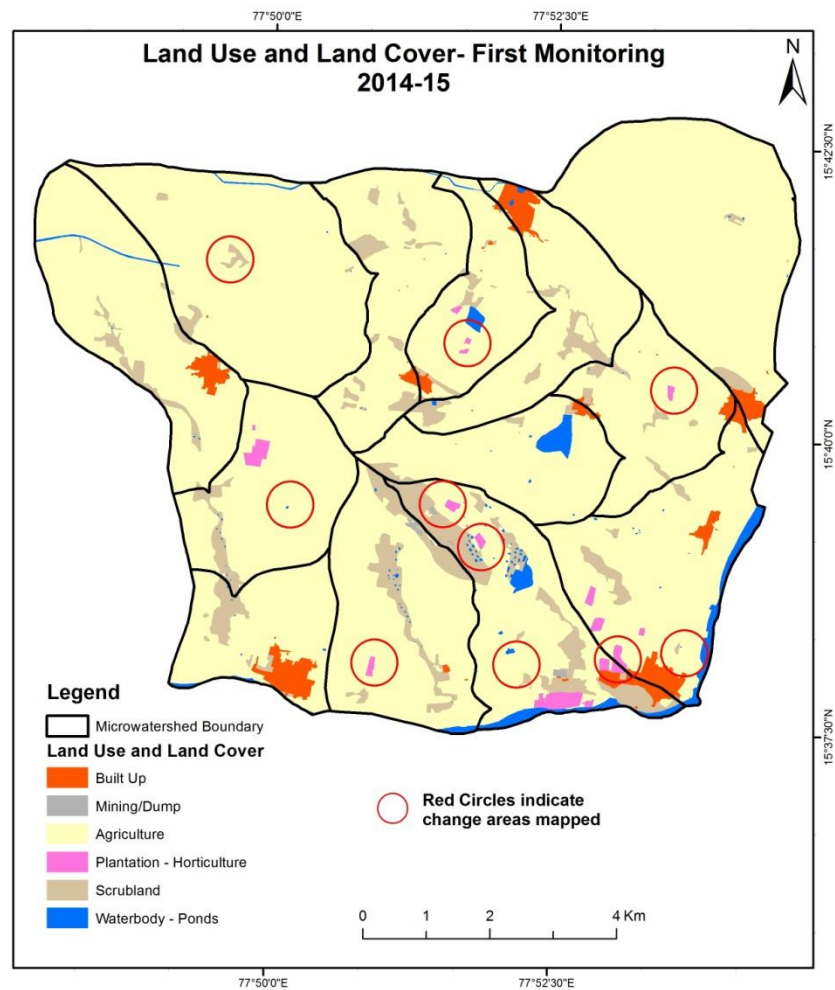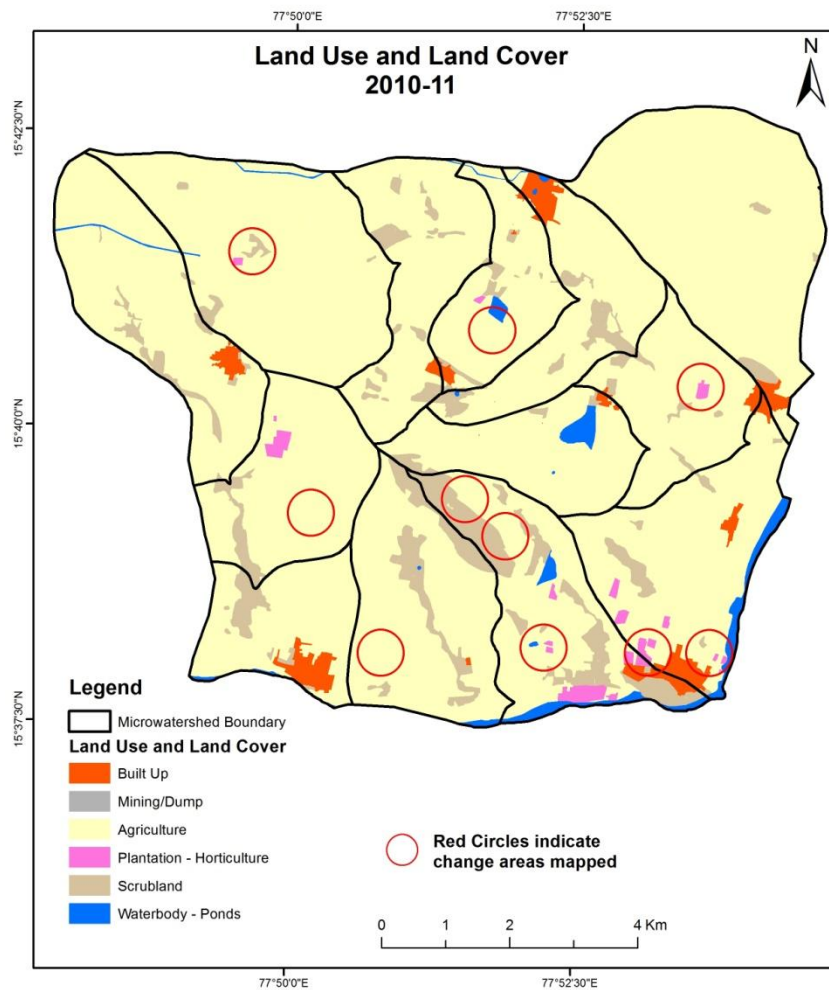
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000

Land Use and Land Cover 2014-15

Legend

- Microwatershed Boundary

Land Use and Land Cover

- Built Up
- Mining/Dump
- Agriculture
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds

○ Red Circles indicate change areas mapped

0   1   2   4 Km

Land Use and Land Cover- Second Monitoring 2015-16

Legend

- Microwatershed Boundary

Land Use and Land Cover

- Built Up
- Mining/Dump
- Agriculture
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds

○ Red Circles indicate change areas mapped

0   1   2   4 Km

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)
Scale: 1:10000
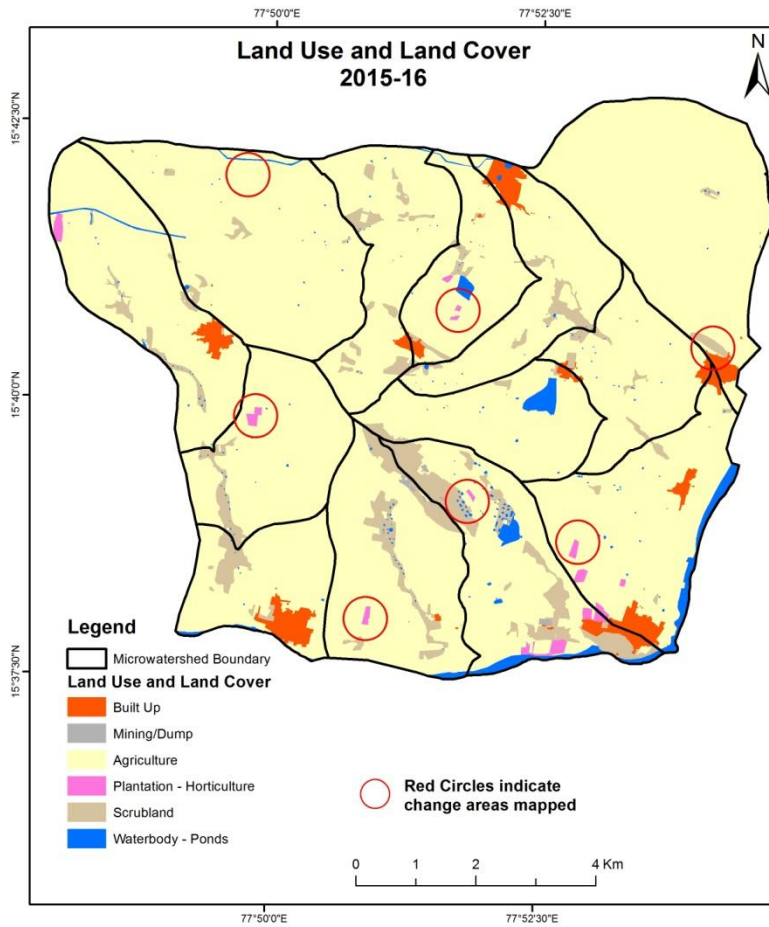
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)
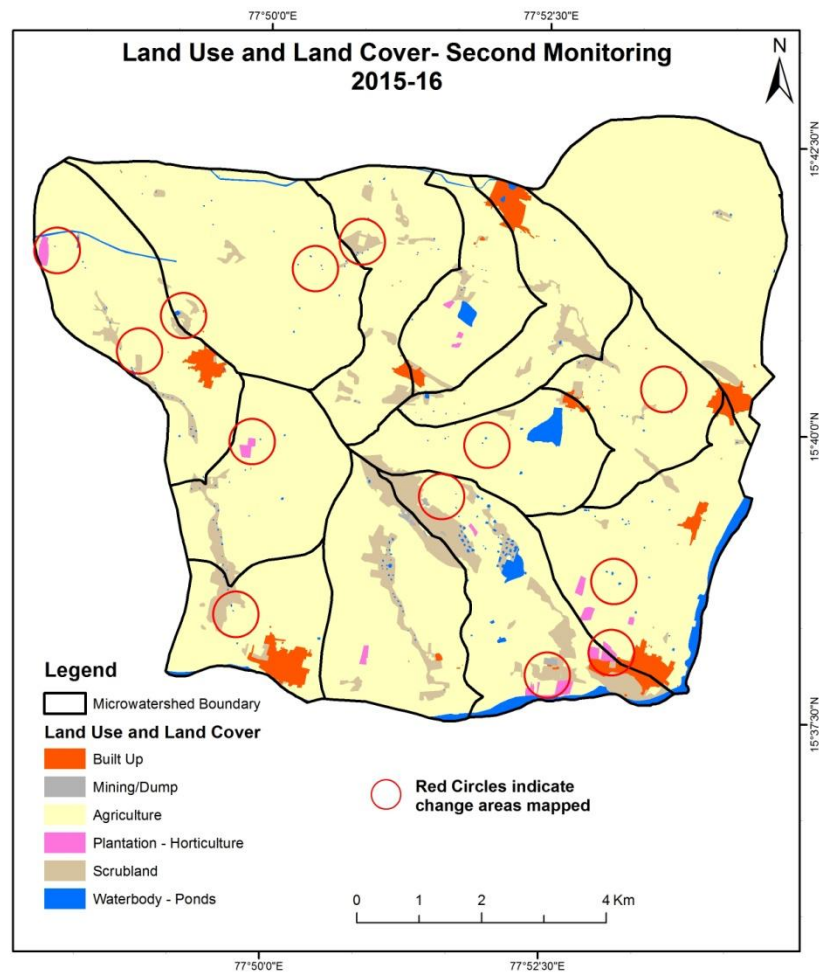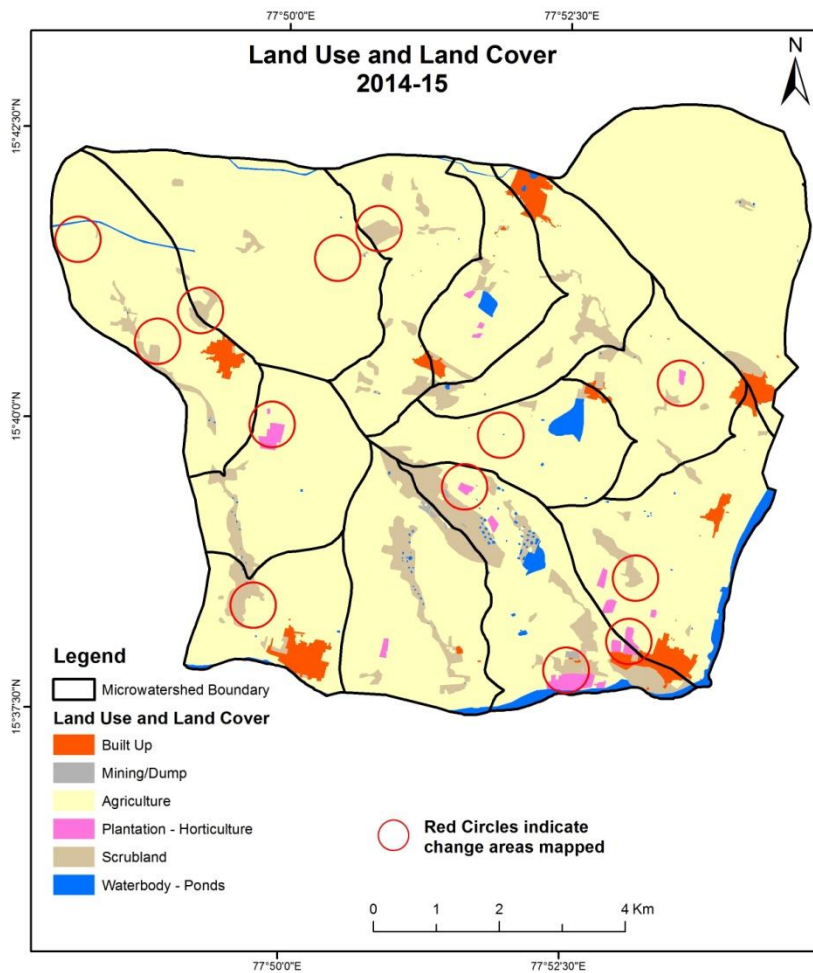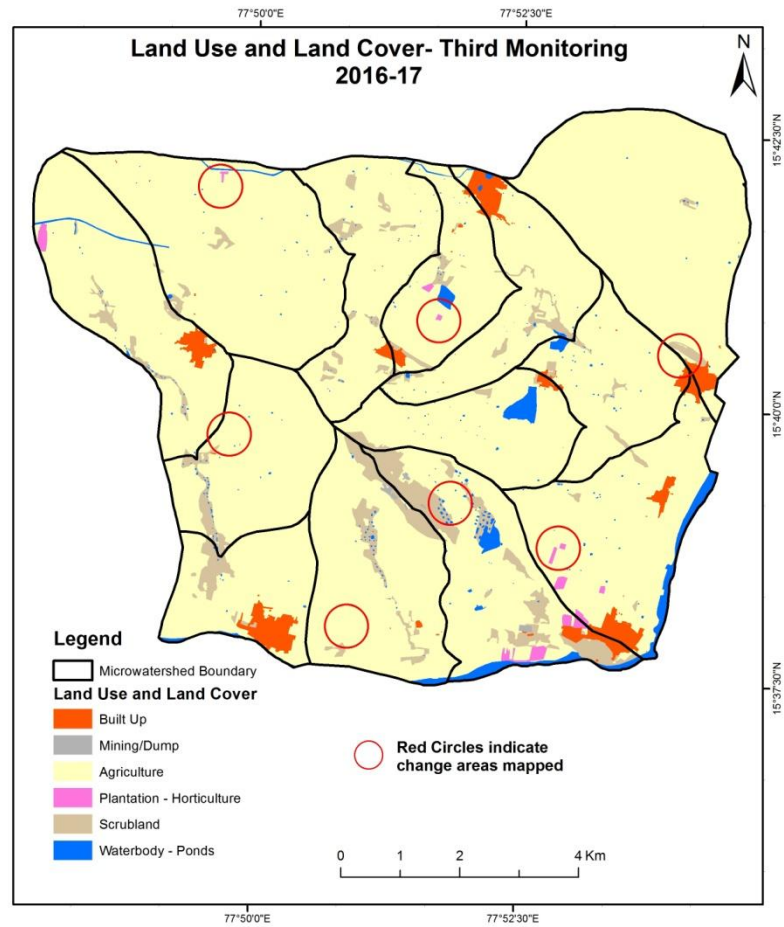## Scale: 1:10000
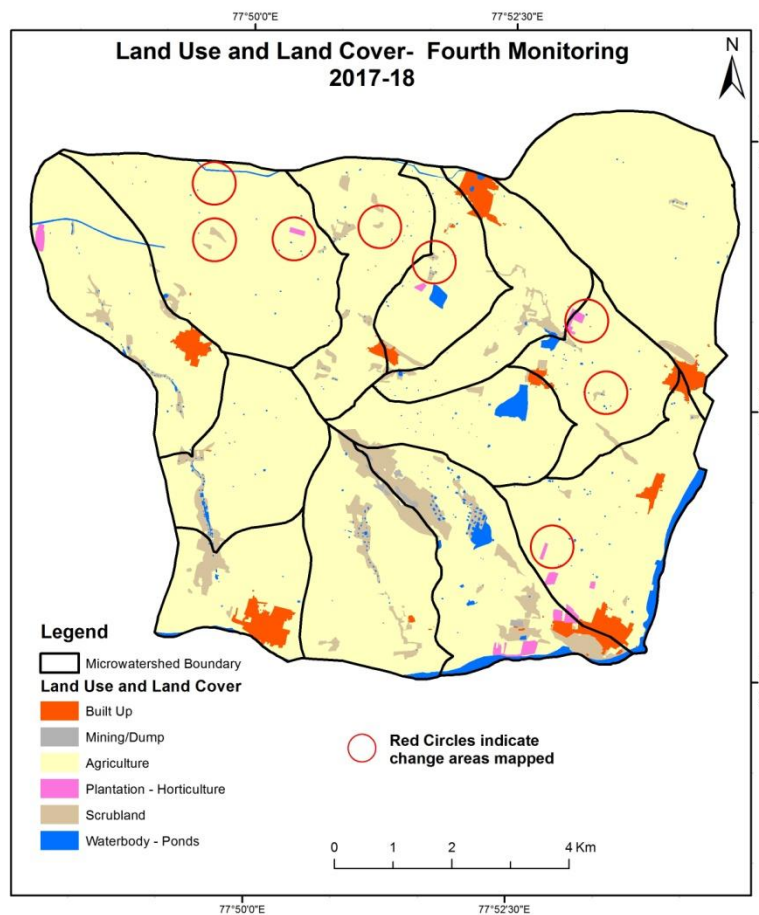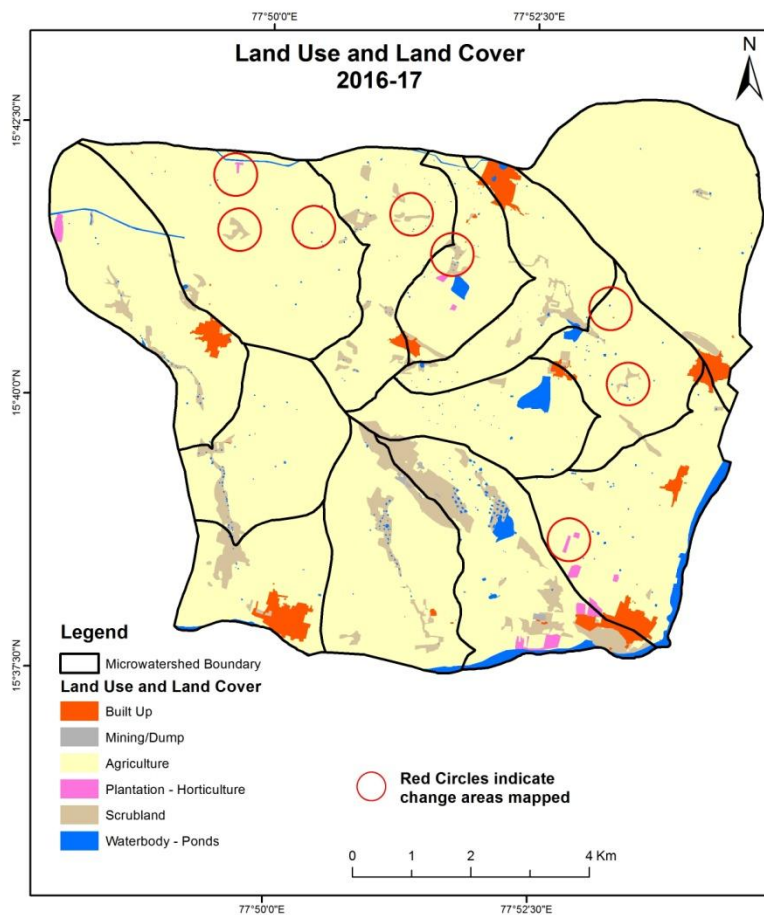
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)
Scale: 1:10000
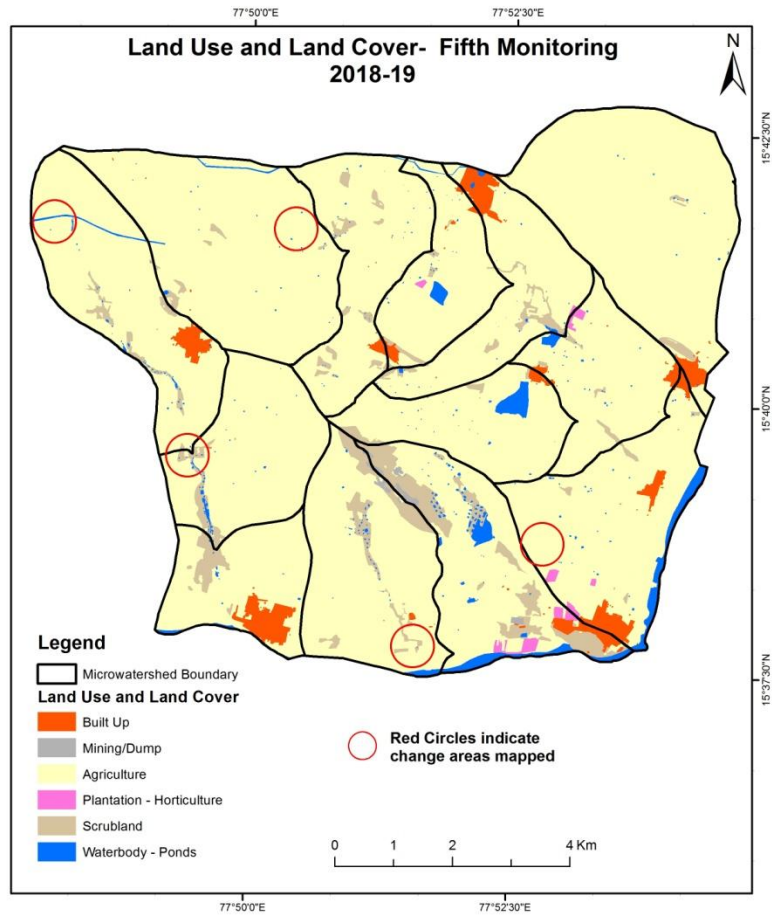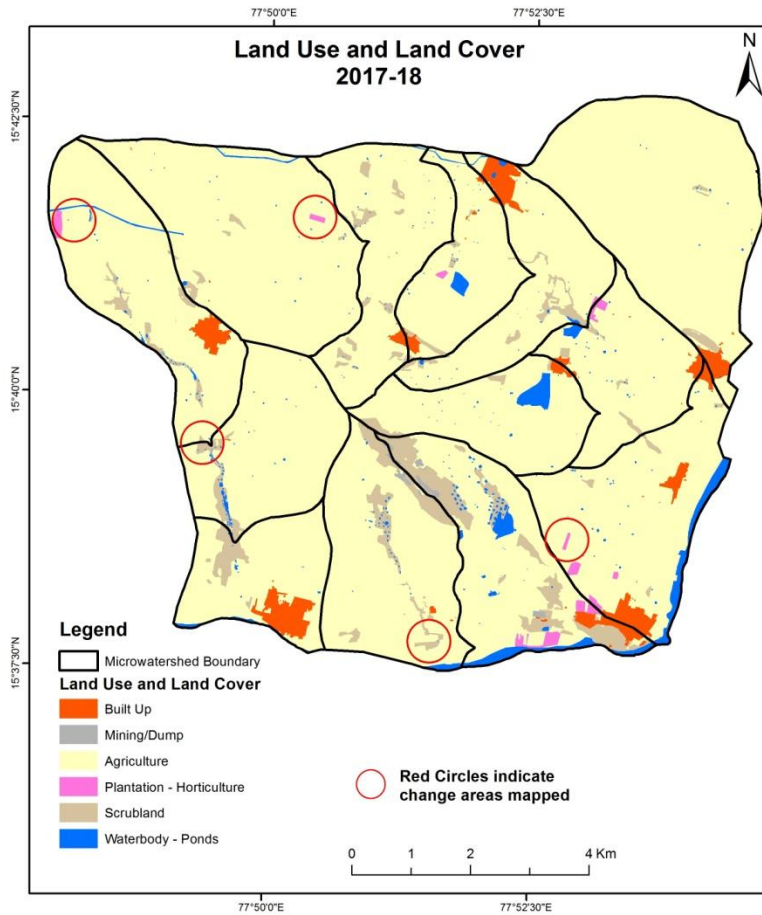
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Water body

T0: 2010-11

T1: 30 November 2014

Scrub to water body & Plantation

T0: 2010-11

T1: 30 November 2014

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

Scrub to Water body

T0

T1

T0: 2010-11

T1: 30 November 2014

Scrub to Agriculture

T0

T1
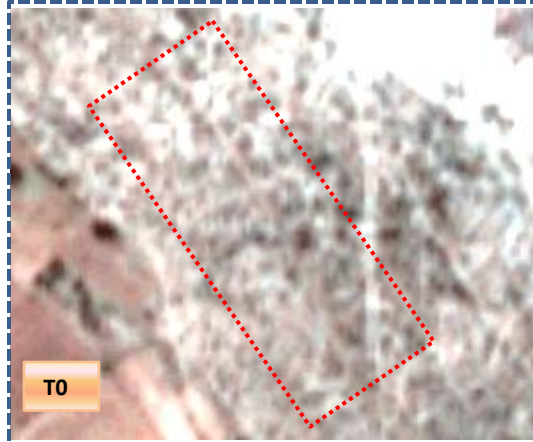
T0: 2010-11

T1: 30 November 2014

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

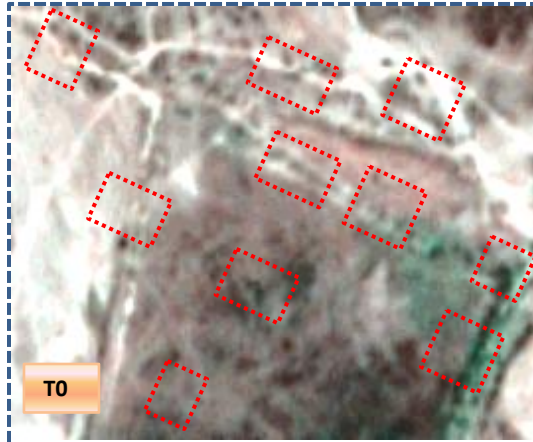| Land cover T0	Monitoring period (T1) Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total (Units in Hectares)
Built up	181.49										181.49
Mining/dump											
Agriculture	18.12	4.14	7525.65	12.02						6.01	7565.94
Plantation Horticulture			14.59	50.68							65.27
Forest											
Forest Plantation											
Barren Rocky											
Scrub	4.37	2.76	37.88					604.49		6.62	656.12
Waterbody-Streams/River											
Waterbody – Ponds	0.21		1.77							134.94	136.92
Grand Total	**204.19**	**6.90**	**7579.88**	**62.70**				**604.49**		**147.57**	**8605.73**

• 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 40.29 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.

• In T1 54.23 ha of the agriculture area has 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
T1	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	204.19										204.19
Mining/dump		6.90									6.90
Agriculture	0.39		7568.23	6.39						4.88	7579.88
Plantation Horticulture	0.02		23.86	38.76						0.06	62.70
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.24		63.35					537.78		3.11	604.49
Waterbody-Streams/River											
Waterbody – Ponds			1.81							145.76	147.57
Grand Total	204.84	6.90	7657.25	45.15				537.78		153.82	8605.73

• 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 11.66 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.

• In T2 89.02 ha of the agriculture area has 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	
T2	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	204.84										204.84
Mining/dump		6.90									6.90
Agriculture	0.48		7650.56	2.64						3.58	7657.25
Plantation Horticulture			12.18	32.97							45.15
Forest											
Forest Plantation											
Barren Rocky											
Scrub	2.04		55.49					471.83		8.43	537.78
Waterbody-Streams/River											
Waterbody – Ponds										153.82	153.82
Grand Total	207.36	6.90	7718.22	35.60				471.83		165.82	8605.73

- 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 6.69 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T3.
- In T3 67.67 ha of the agriculture area has 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

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	207.36										207.36
Mining/dump		6.90									6.90
Agriculture	7.82	0.59	7698.28	8.43						3.10	7718.22
Plantation Horticulture			2.74	32.86							35.60
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.79	6.05	28.54					431.09		4.36	471.83
Waterbody-Streams/River											
Waterbody – Ponds										165.82	165.82
Grand Total	**216.97**	**13.54**	**7729.56**	**41.29**				**431.09**		**173.29**	**8605.73**

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 19.95 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T4.
- In T4 31.28 ha of the agriculture area has 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

T4	Monitoring period (T5) Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	216.97										216.97
Mining/dump		13.54									13.54
Agriculture	2.11	0.27	7726.83							0.34	7729.56
Plantation Horticulture			10.38	30.91							41.29
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.07	2.66	6.09					422.06		0.22	431.09
Waterbody-Streams/River											
Waterbody – Ponds			0.31							172.97	173.29
Grand Total	219.15	16.47	7743.61	30.91				422.06		173.53	8605.73

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 T4 2.73 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and water body in T5.

• In T5 16.78 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 36.62 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 13.94, 77.36, 60.97, 11.34 & 14.05 Hectares From T0 to T1, T1 to T2, T2-T3, T3-T4 & T4-T5. The overall increase of 177.67 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.

5. There is a decrease of 34.36 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.

6. Farm ponds (101) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (91) verified from the portal.