MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

KURNOOL -16/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
July-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

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-16/2010-11, Kurnool District of   Andhra Pradesh. The total geographical area of the project is 4,866.27 ha. It comprises of 11 micro watersheds.

- In the project area 195 Drishti photos were uploaded showing 81 checks & plugins, 3 Farm ponds, 1 Livelihood measures and remaining showing others.

- Major percentage i.e. 88.4% is covered by the agriculture, 3.8 % is covered by Scrub land, 5.1 % is covered by water body and remaining by other land use classes.

- The study area falls in Kallur Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 4,866.27 ha. It comprises of 11 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

| Andhra Pradesh | Kurnool District | Kurnool — IWMP 16/2010-11 project |
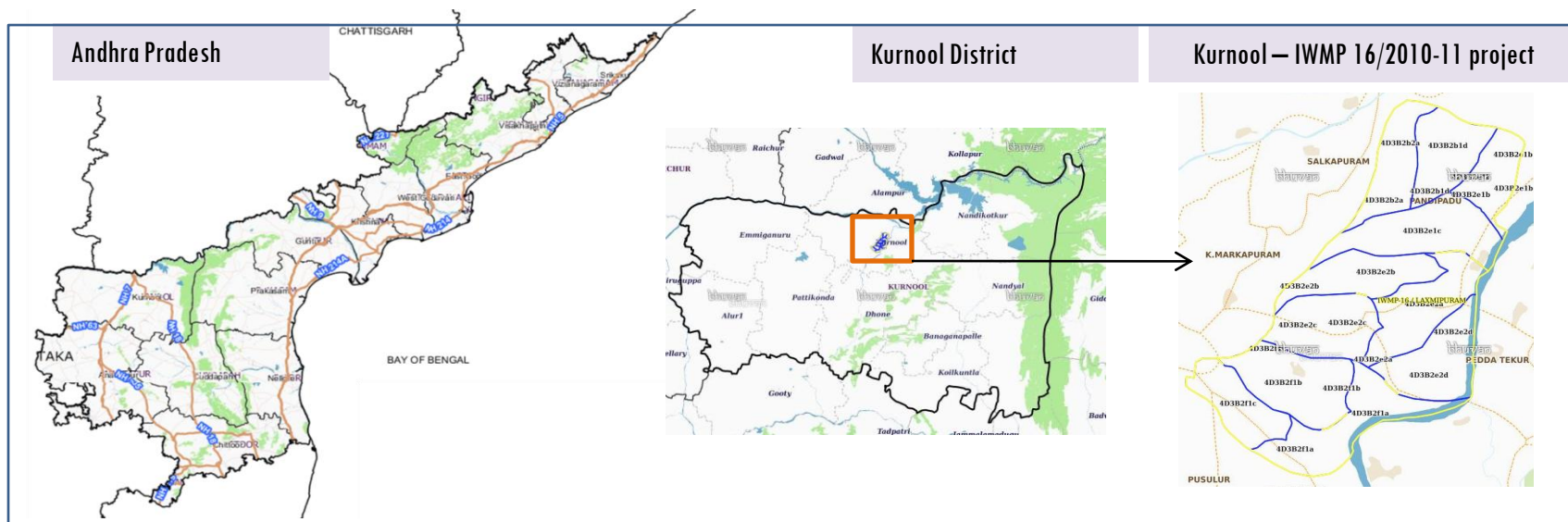
- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).

- 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).

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			26-Mar-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			26-Mar-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	195
4	Detailed Project Report		

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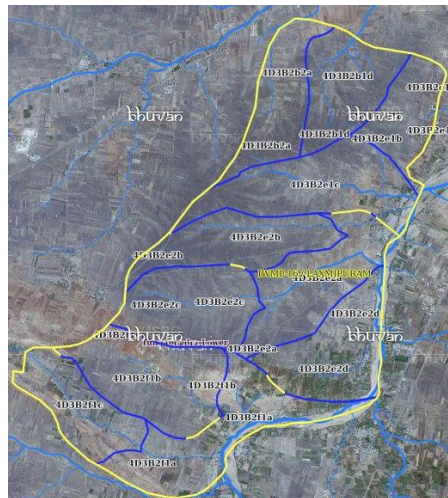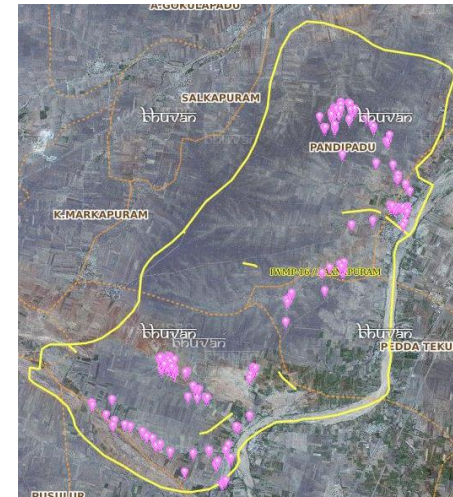

Legend

 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	Checks & plugins	81	81
3	Agriculture	0	0
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	1
7	Farm ponds/Dug out pit	3	3
8	Check dams (Civil work)	0	0
9	New Activity	0	0
10	Om (Other measurement)	0	0
11	LM (Livelihood Measures)	1	1
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	148	110
	TOTAL	**233**	**195**

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 Kurnool Dt Andhra Pradesh. IWMP-16/2010-11

T0:2010-11	T1: 18 February 2015	Drishti Sl no. 1687662 MWS : 4D3B2e2d

Check dam

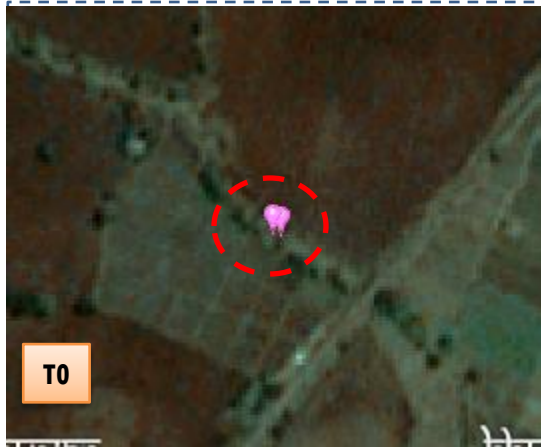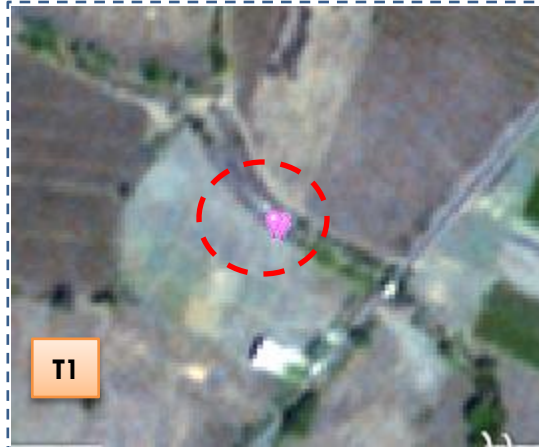| T0:2010-11	T1: 18 February 2015	Drishti Sl no. 2464200 MWS : 4D3B2e2a

Check dam

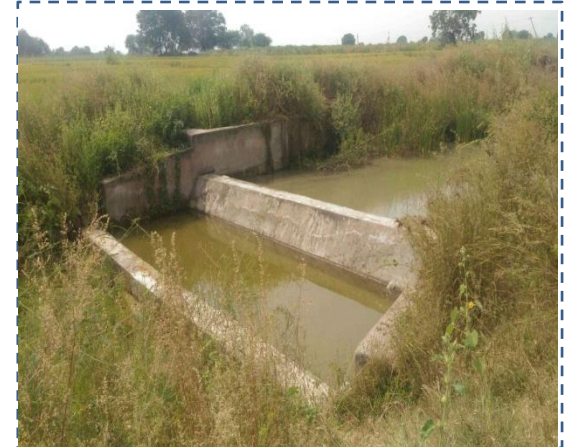# Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-16/2010-11

T0: 2010-11	T1: 18 February 2015	Drishti Sl no.146463 MWS : 4D3B2e2c

Check dam
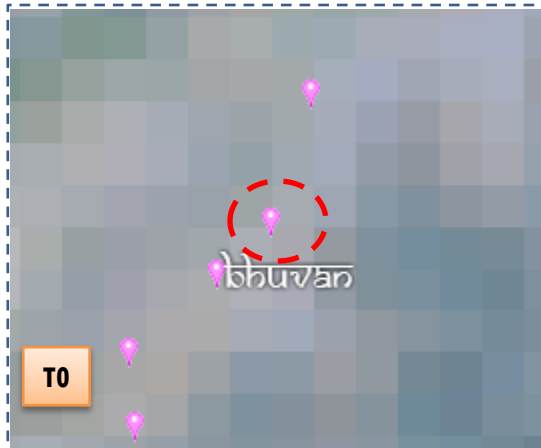
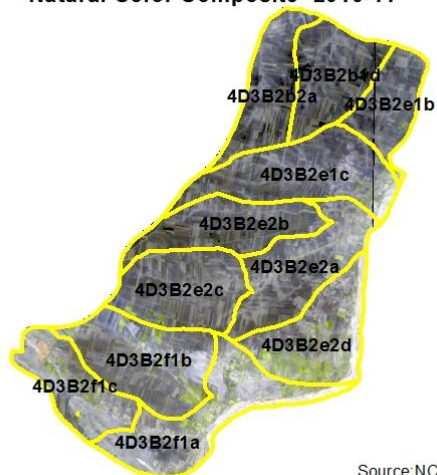|		
T0: 2010-11	T1: 18 February 2015	Drishti Sl no. 2485554 MWS : 4D3B2e2c

Rockfill dam

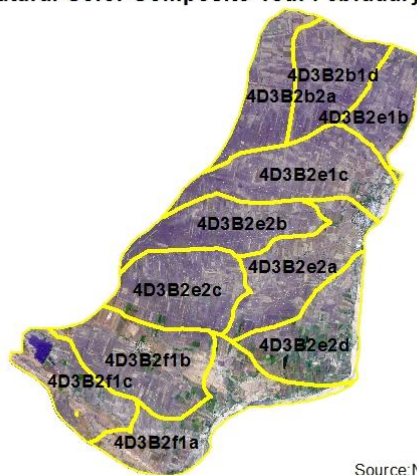# Natural Color Composite – 2010-11 to 2018-19
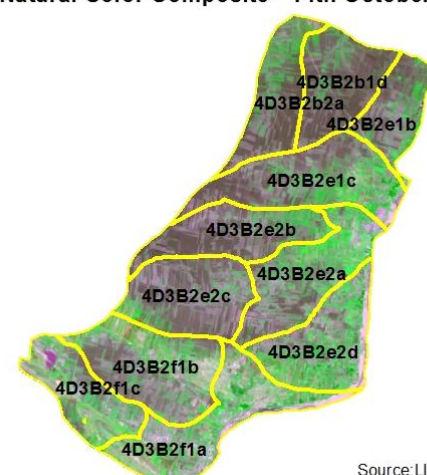

Natural Color Composite- 2010-11
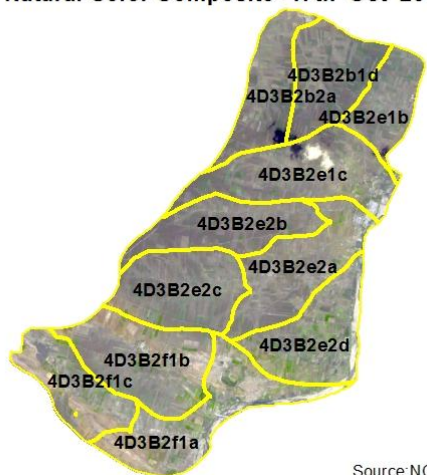Source:NCC,NRSC

Natural Color Composite-18th Febrauary 2015
Source:NCC,NRSC

Natural Color Composite- 14th October 2015
Source:LISS-IV,NRSC

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

Natural Color Composite- 22nd Nov 2017
Source:NCC,NRSC
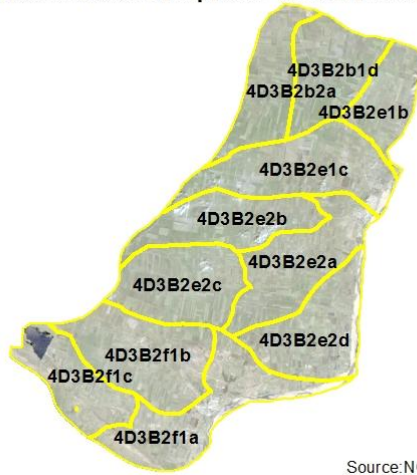
Natural Color Composite- 26th March 2018
Source:Sentinel

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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 (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

Land Use and Land Cover
2010-11

N

Red Circles indicate
change areas mapped

Legend
Microwatershed Boundary
Land Use and Land Cover
Built Up
Agriculture
Plantation - Horticulture
Scrubland
Waterbody - Ponds
Waterbody - Streams/River/Reservoir

0   0.75   1.5   3 Km

Land Use and Land Cover- First Monitoring
2011-14

N

Red Circles indicate
change areas mapped

Legend
Microwatershed Boundary
Land Use and Land Cover
Built Up
Agriculture
Plantation - Horticulture
Scrubland
Waterbody - Ponds
Waterbody - Streams/River/Reservoir

0   0.75   1.5   3 Km

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

Land Use and Land Cover- Second Monitoring 2015-16

Red Circles indicate change areas mapped

Legend
- Microwatershed Boundary

Land Use and Land Cover
- Built Up
- Agriculture
- Plantation - Horticulture
- Scrubland
- Waterbody - Ponds
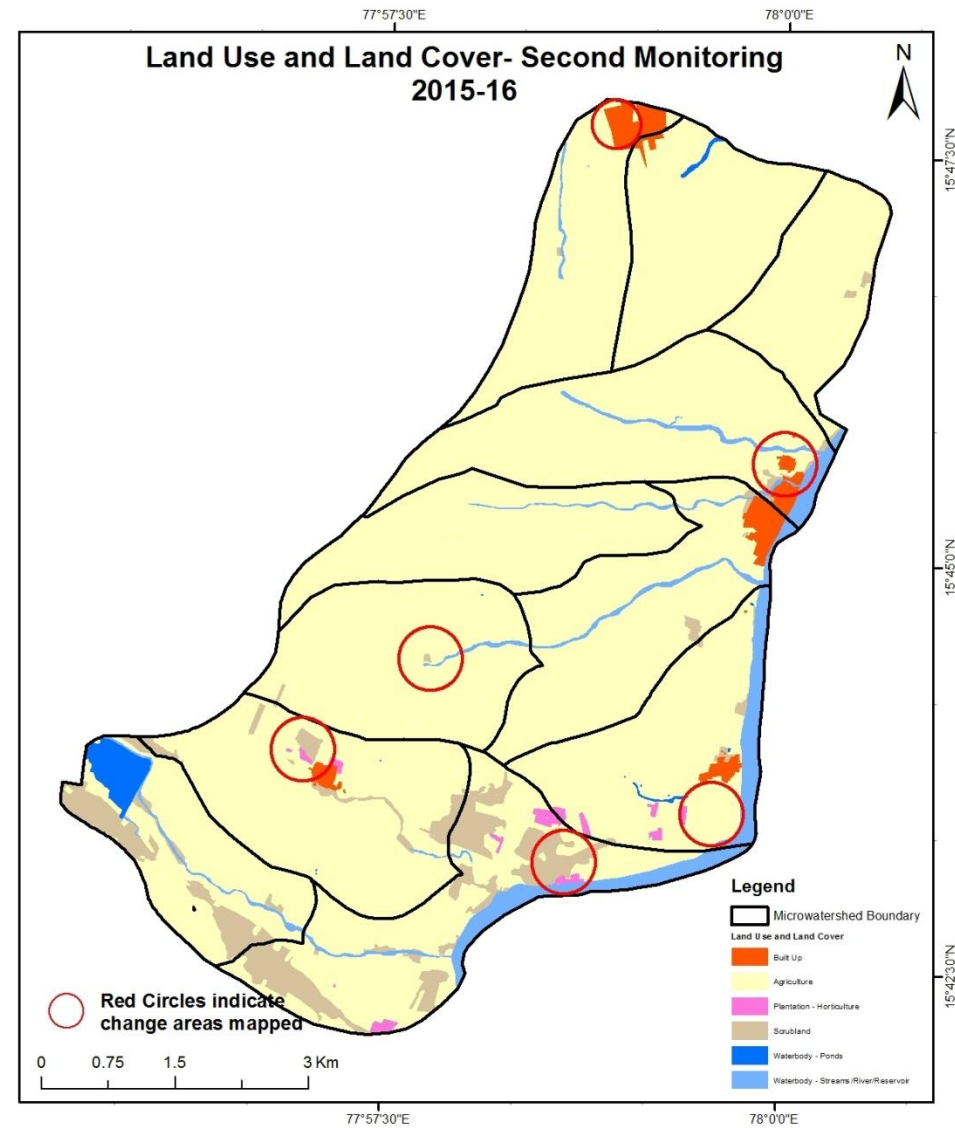- Waterbody - Streams/River/Reservoir

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

Scale: 1:10000

Land Use and Land Cover
2015-16

Land Use and Land Cover- Third Monitoring
2016-17

Red Circles indicate change areas mapped

Legend
Microwatershed Boundary
Land Use and Land Cover
Built Up
Agriculture
Plantation - Horticulture
Scrubland
Waterbody - Ponds
Waterbody - Streams/River/Reservoir

Legend
Microwatershed Boundary
Land Use and Land Cover
Built Up
Mining/Dump
Agriculture
Plantation - Horticulture
Scrubland
Waterbody - Ponds
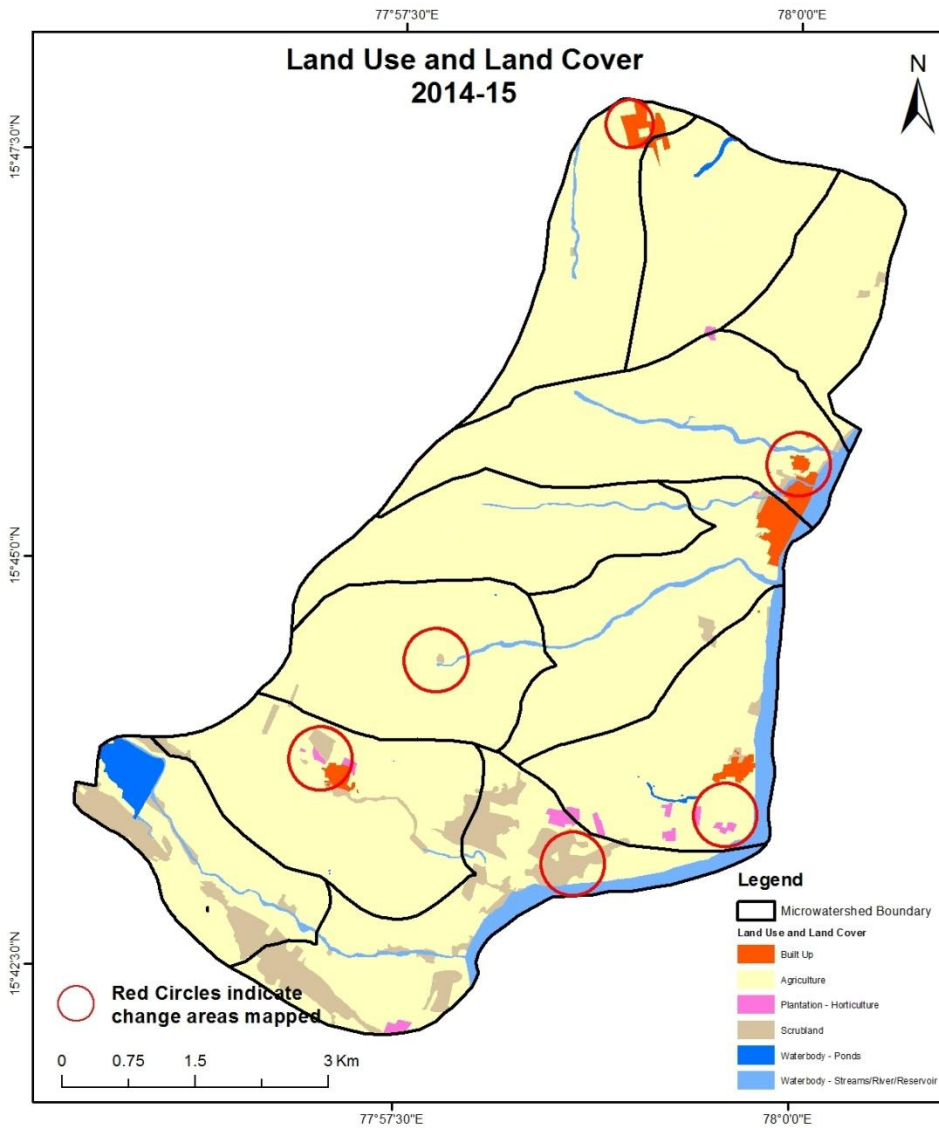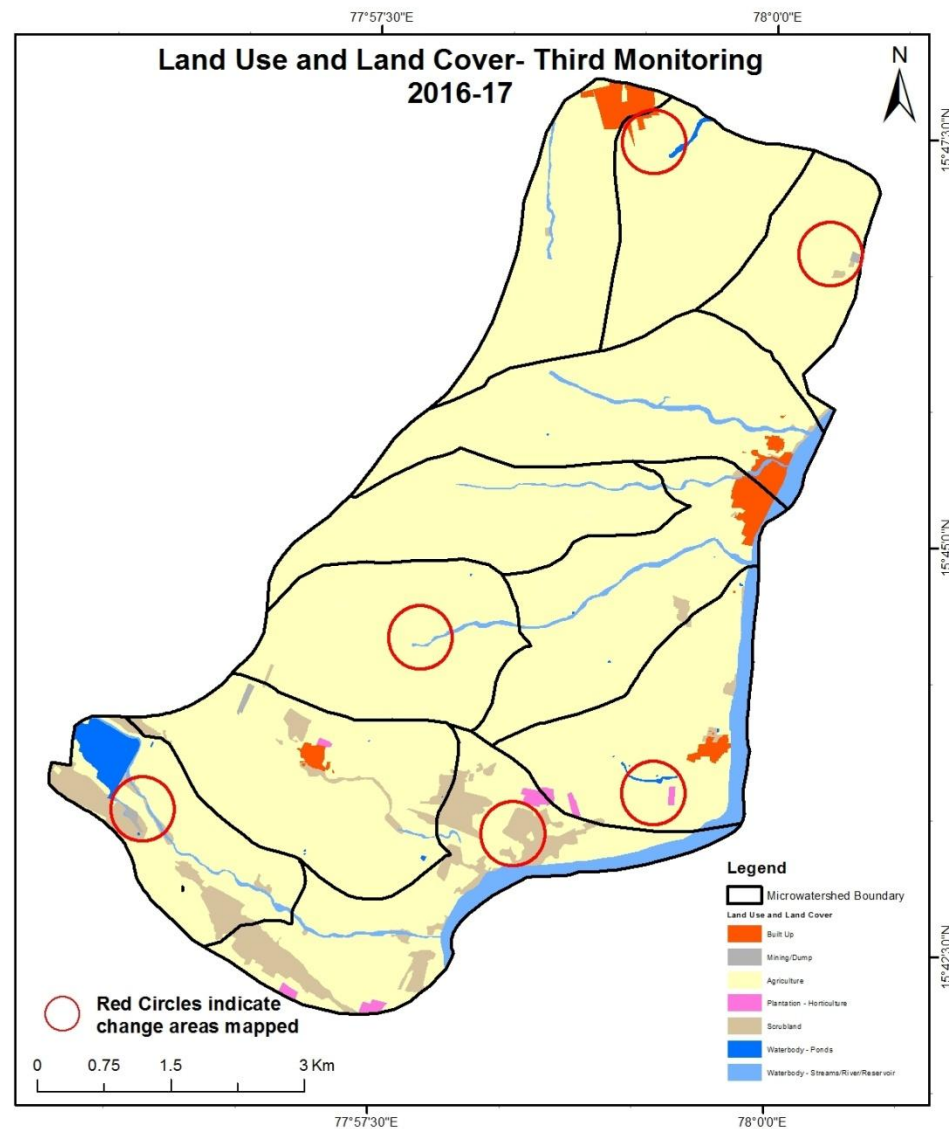Waterbody - Streams/River/Reservoir
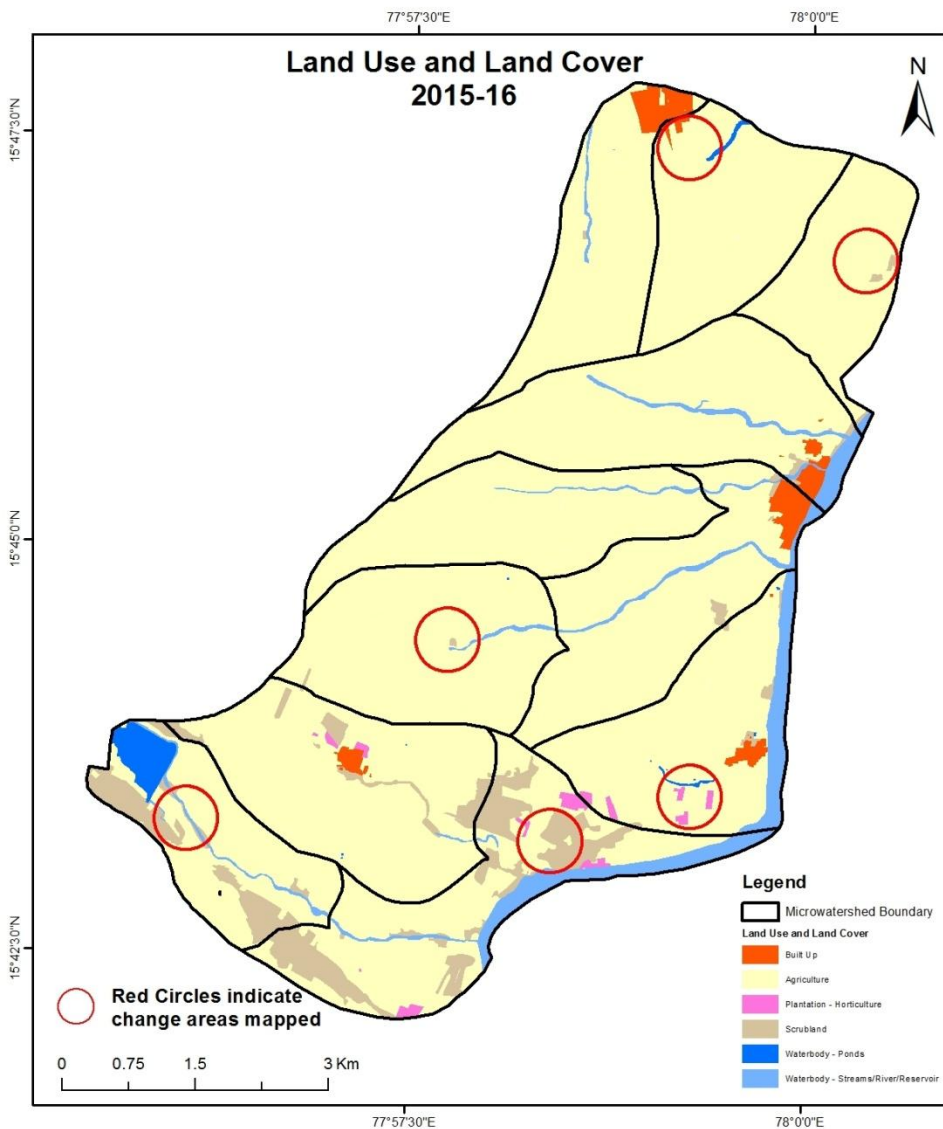
0   0.75   1.5   3 Km

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)
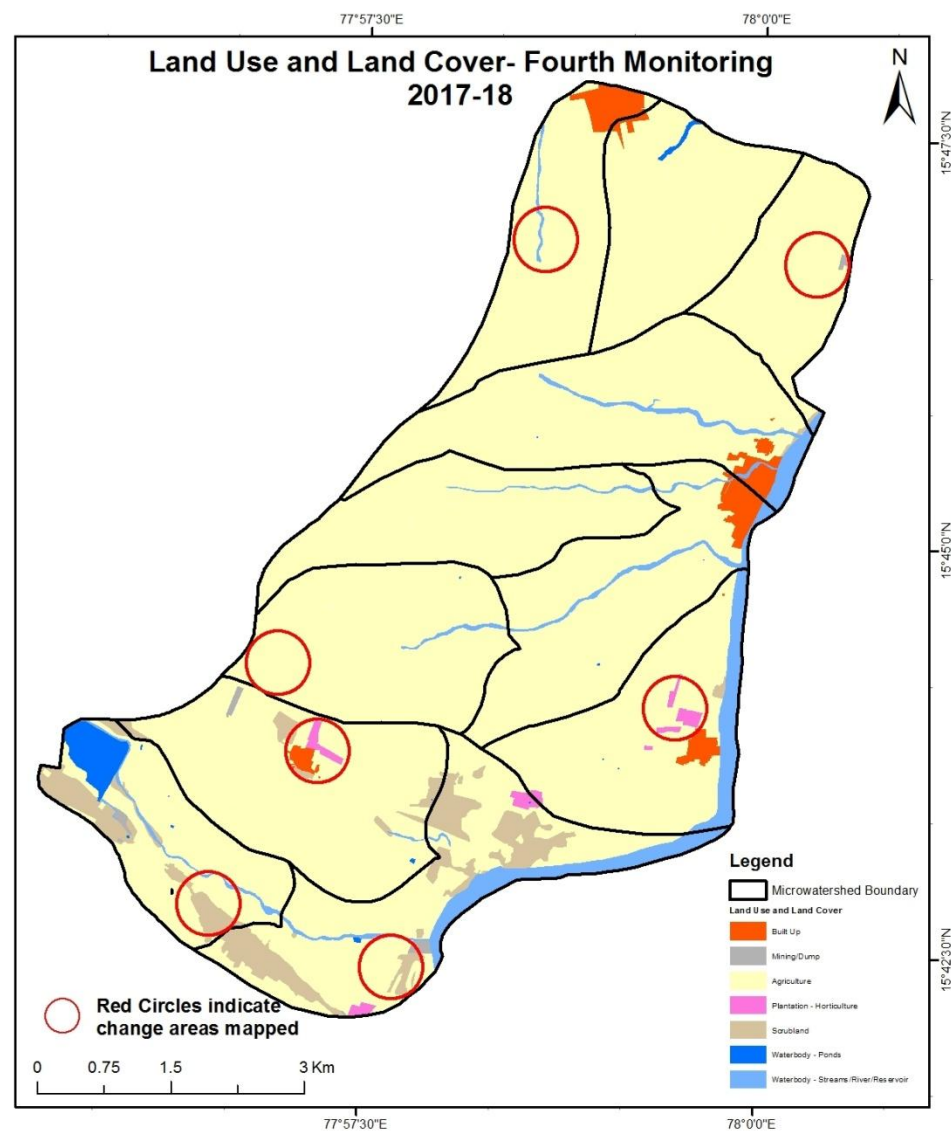## Scale: 1:10000

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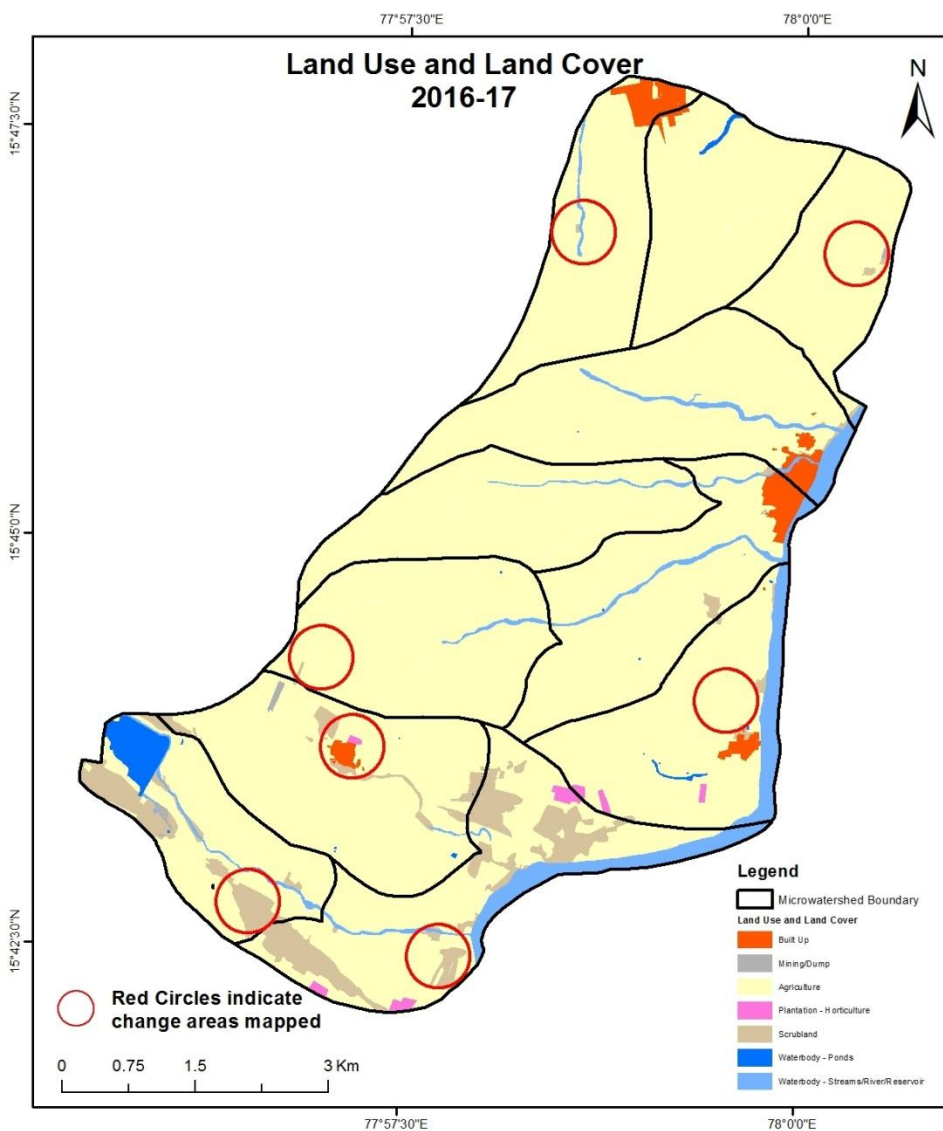## Scale: 1:10000
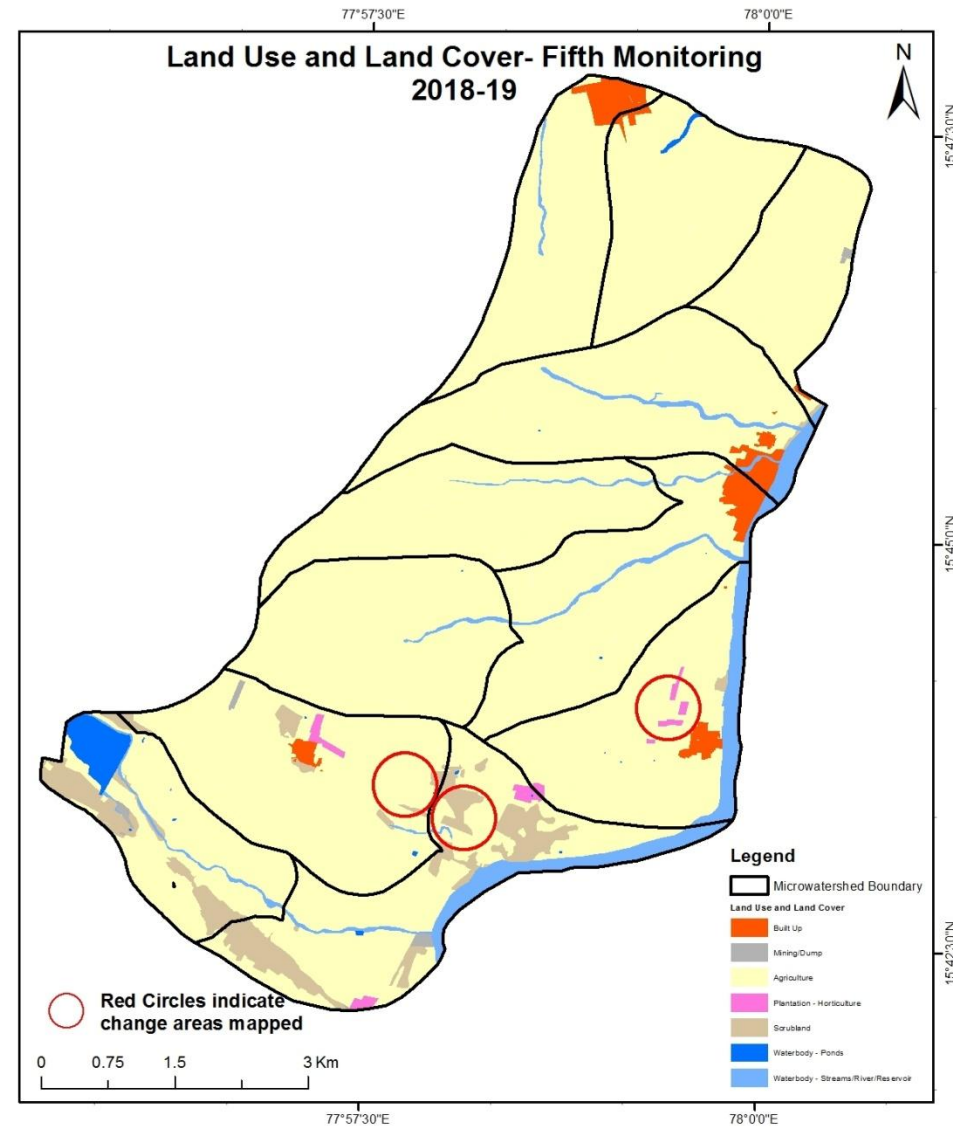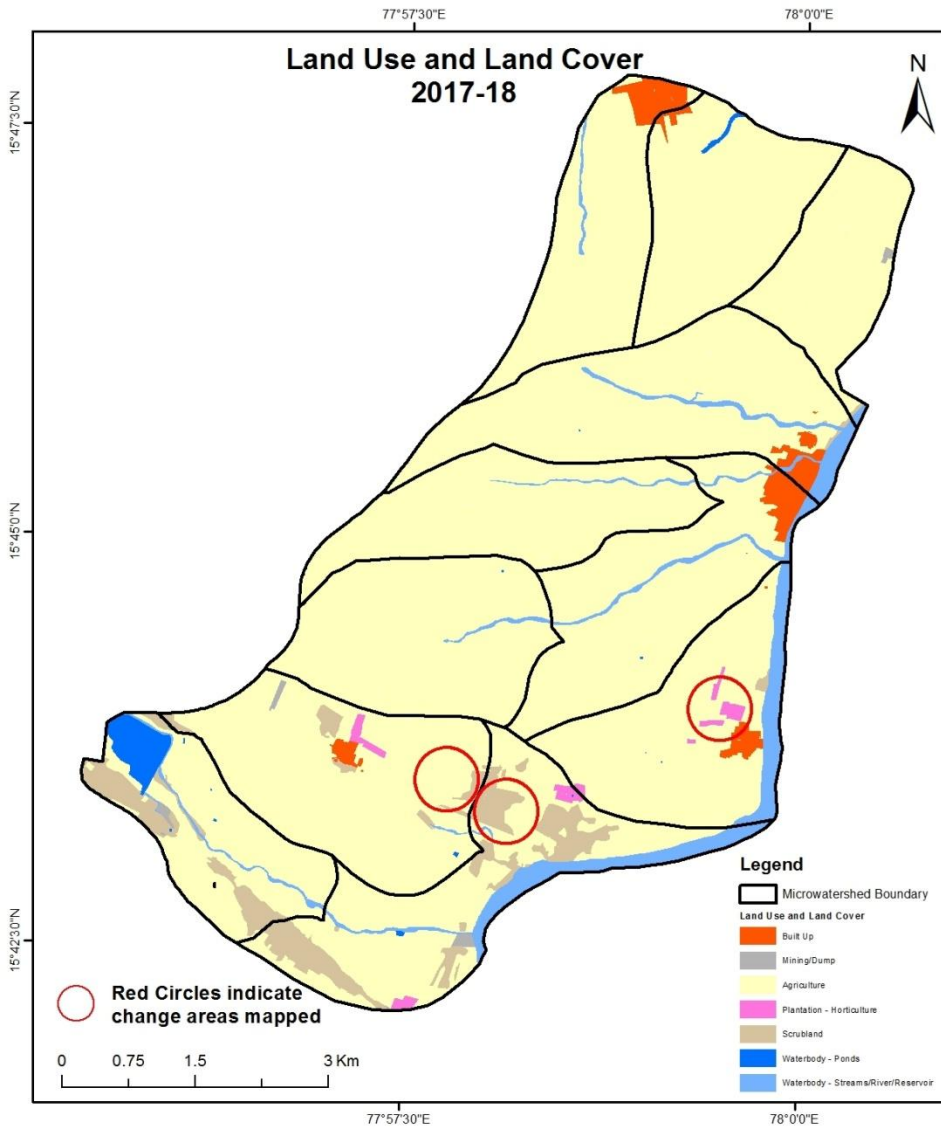
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body

T0

T1

T0: 2010-11

T1: 30 November 2014

Scrub to Built-up

T0

T1

T0: 2010-11

T1: 30 November 2014

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 Agriculture

T0: 2010-11

T1: 30 November 2014

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

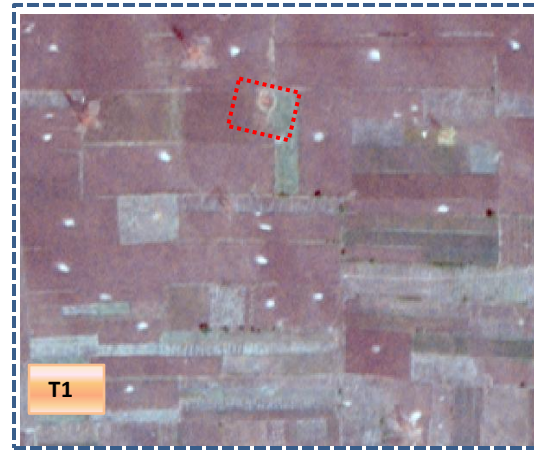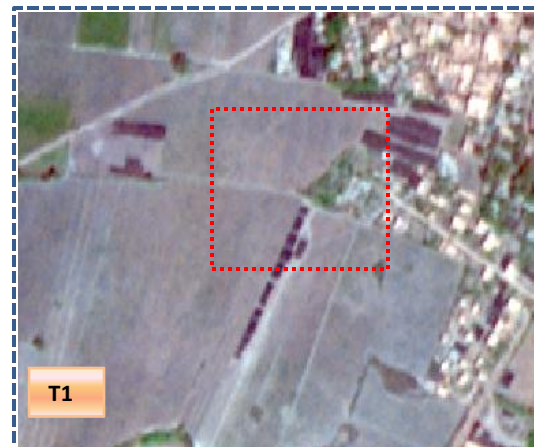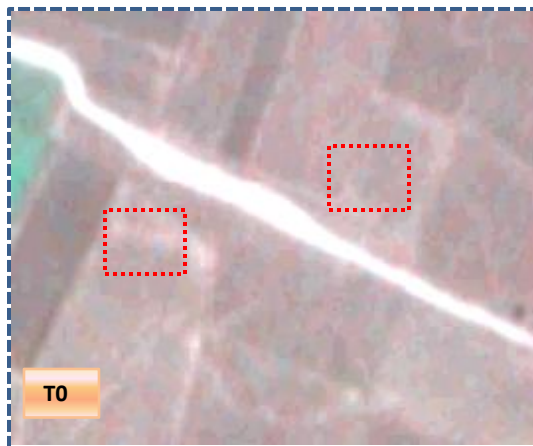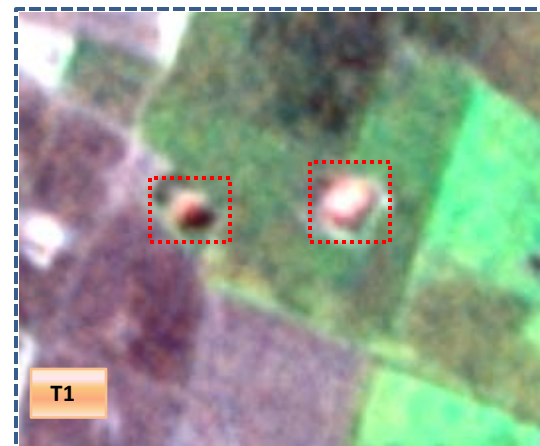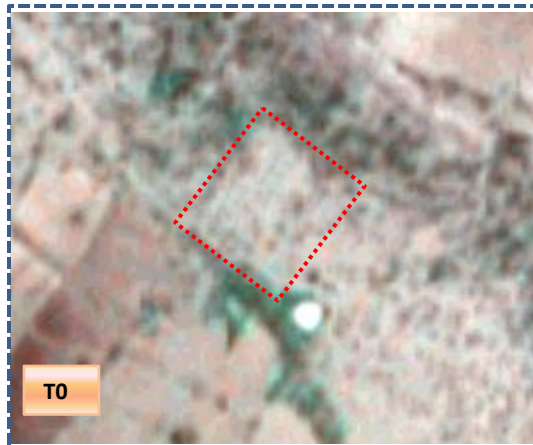| Land cover	Monitoring period (T1)									Units in Hectares	
T0	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	55.17										55.17
Mining/dump											
Agriculture	13.00		4223.06	9.38						0.27	4245.71
Plantation Horticulture			24.27	13.50							37.77
Forest											
Forest Plantation											
Barren Rocky											
Scrub			18.04					257.90		5.72	281.67
Waterbody-Streams/River									211.13		211.13
Waterbody – Ponds			0.30							34.52	34.83
Grand Total	68.17		4265.68	22.88				257.90	211.13	40.51	4866.27

- 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 22.6 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T1.

- In T1 42.6 ha of the agriculture area has increased from plantations and scrubland of T0, and overall 19 ha of the agriculture area has been increased.

- 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	68.15		0.02								68.17
Mining/dump											
Agriculture	10.66		4251.22	3.55					0.03	0.22	4265.68
Plantation Horticulture			3.63	19.25							22.88
Forest											
Forest Plantation											
Barren Rocky											
Scrub			1.22					256.68			257.90
Waterbody-Streams/River									211.13		211.13
Waterbody – Ponds										40.51	40.51
Grand Total	78.81		4256.10	22.79				256.68	211.16	40.73	4866.27

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

- In T2 4.8 ha of the agriculture area has increased from built-up, plantations and scrubland of T1, and overall 9.5 ha of the agriculture has decreased during this period.

- 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	78.81										78.81
Mining/dump											
Agriculture	1.49	2.29	4249.33	2.39						0.60	4256.10
Plantation Horticulture			7.42	14.47				0.90			22.79
Forest											
Forest Plantation											
Barren Rocky											
Scrub	3.90	4.07	20.84					227.76		0.11	256.68
Waterbody- Streams/River			0.03						211.13		211.16
Waterbody – Ponds										40.73	40.73
Grand Total	84.20	6.36	4277.61	16.87				228.67	211.13	41.44	4866.27

- 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 6.7 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T3.

- In T3 28.2 ha of the agriculture area has increased from plantations and scrubland of T1, and overall 21.5 ha of the agriculture area has been increased.

- 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	
T3	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	83.81		0.39								84.20
Mining/dump		6.36									6.36
Agriculture	5.46	3.21	4254.72	12.91						1.31	4277.61
Plantation Horticulture			6.07	10.74						0.05	16.87
Forest											
Forest Plantation											
Barren Rocky											
Scrub	2.25	0.36	28.04					198.02			228.67
Waterbody-Streams/River									211.13		211.13
Waterbody – Ponds			2.40							39.04	41.44
Grand Total	91.52	9.92	4291.62	23.65				198.02	211.13	40.41	4866.27

• 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 22.8 ha of the agriculture area has decreased and it is converted into Built-up, mining, plantation and water body in T4.

• In T4 36.9 ha of the agriculture area has increased from plantation, scrubland and water body of T3, and overall 14 ha of the agriculture area has been increased.

• 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
T4	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	91.52										91.52
Mining/dump		9.92									9.92
Agriculture	1.53		4289.91							0.19	4291.62
Plantation Horticulture			3.11	20.55							23.65
Forest											
Forest Plantation											
Barren Rocky											
Scrub			9.72					188.12		0.18	198.02
Waterbody-Streams/River			0.58						210.55		211.13
Waterbody – Ponds										40.41	40.41
Grand Total	93.04	9.92	4303.32	20.55				188.12	210.55	40.77	4866.27

• 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 1.7 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.

• In T5 12.8 ha of the agriculture area has increased from scrubland of T4, and overall 11 ha of the agriculture area has been increased.

• 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 5.1 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 19, 21, 14 & 11 Hectares From T0 to T1, T2-T3, T3 -T4 & T4 toT5 respectively and overall increase of 57 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 93 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.

6. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.