

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

CHITTOOR -15/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
March-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

- **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

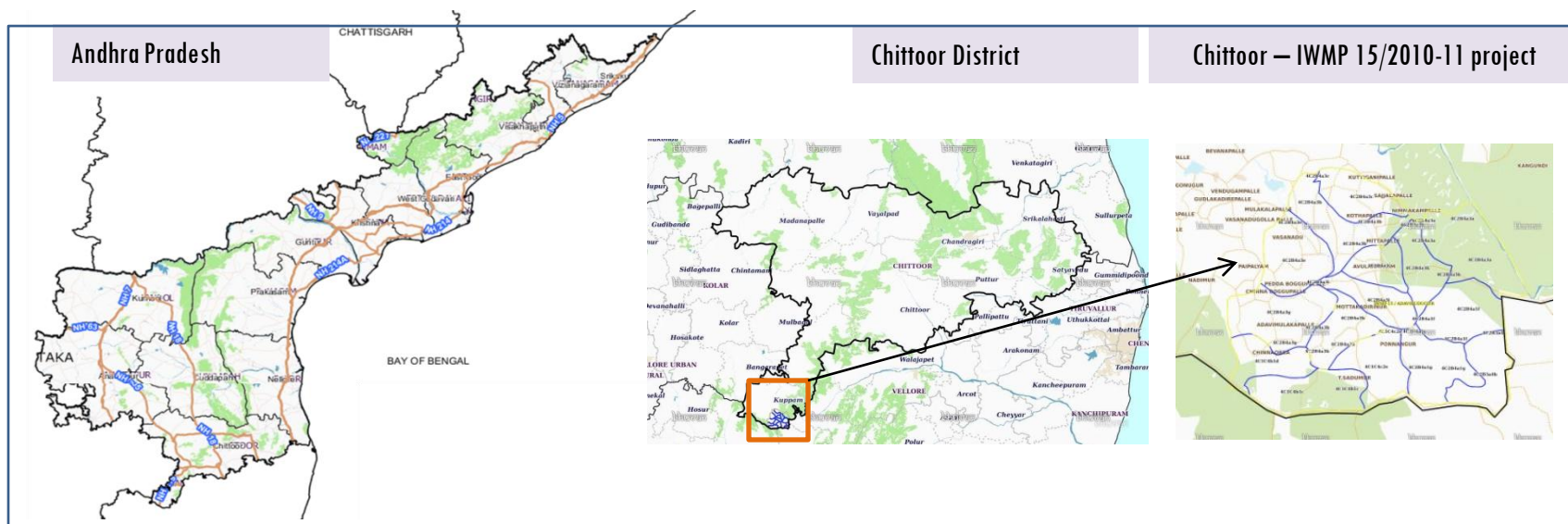
E X E C U T I V E S U M M A R Y

- 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-15/2010-11, Chittoor District of Andhra Pradesh. The total geographical area of the project is 11,249 ha. It comprises of 15 micro watersheds.
- In the project area 400 Drishti photos were uploaded showing all water harvesting structures of check dams/Rock fill dam, recharge pits etc.,.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and check dams and drainage treatments with 4.7 ha increase in the area.
- Major percentage i.e. 77.59 % is covered by the agriculture, 5.54 % is covered by plantation and 3.68 % is covered by forest and remaining by other land use classes.

PROJECT : CHITTOOR – IWMP-15/2010-11

DISTRICT : CHITTOOR , STATE : ANDHRA PRADESH

- The study area falls in Baireddipalle Mandal of Chittoor district of Andhra Pradesh state. The total geographical area of the project is 11,249 ha. It comprises of 15 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (**Batch -II**) projects taking 2018-19 (T5) period satellite images



- The climate of the district is dry and healthy. Out of 66 mandals in the district, 31 are upland mandals which are located in Madanapalle division and are comparatively cooler than the eastern mandals except Chittoor mandal where the climate is moderate. December and January are the coldest months when the mean maximum temperature will be around 26.40 °C, May is the hottest month with the mean daily maximum temperature rising above 40 °C.
- The district receive 83.62 percent of rainfall during South-West monsoon and North-West monsoon period, the rainfall is nominal in summer. On an average the district receives more than 50 percent of rainfall during North- East monsoon.

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	400
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

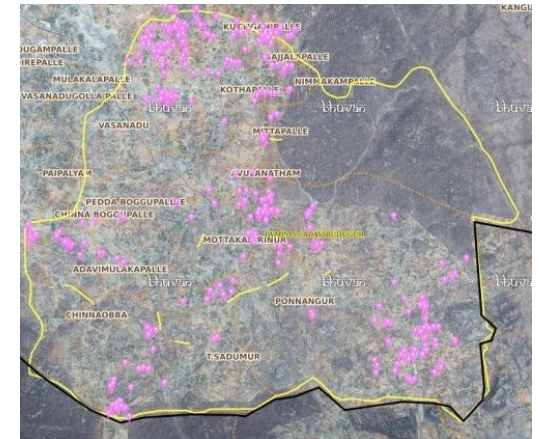


MWS Boundary



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	2	2
2	Bunding	0	0
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Existing activity	0	0
8	Checks & Plugs	4	4
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	1	1
11	Civil work-Check dams /Rock fill dam	10	8
12	Drainage treatment /Nala Revetment, loose boulder structure, gully check	0	0
13	Land Developments (afforestation, horticulture and bund plantation of teak)	0	0
14	Lm (fodder development, varmi compost)	0	0
15	Livelihood Activities (Horticulture)	7	3
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity (Cattle thought)	2	0
18	Others	0	0
	TOTAL	28	18

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.

Chittoor-IWMP-15/2010-11

2009-10



March-2013



Feb-2018



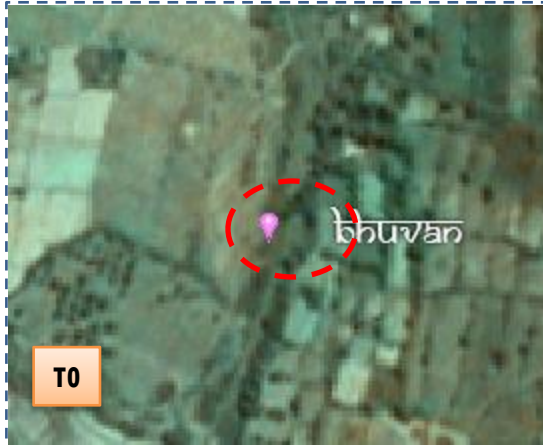
Feb-2019



Drishti Sl.No: 569158
M.No:9100986229
Uuid:2848f33c206450ae

Activity : Horticulture

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-15/2010-11



T0:2010-11



T1: 2 February 2015



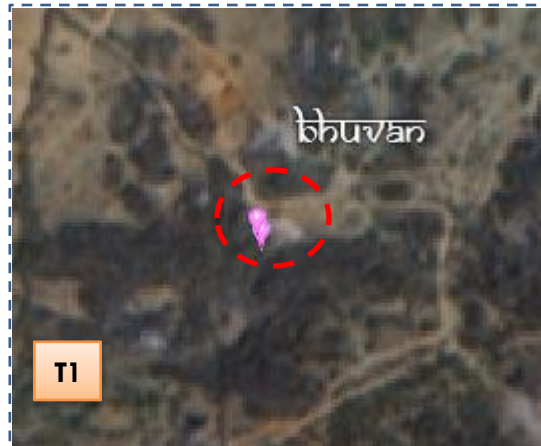
Drishti Sl no. 560927

MWS :4C2B4a3b

Check dam



T0:2010-11



T1: 2 February 2015



Drishti Sl no. 563094

MWS : 4C2B4a3b

Check dam

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-15/2010-11



T0

T0: 2010-11



T1

T1: 2 February 2015



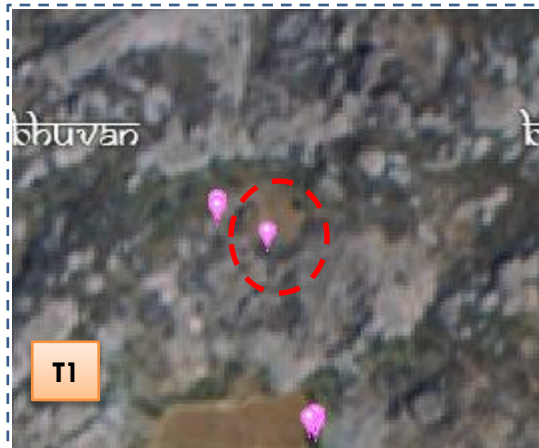
Drishti Sl no. 564165 MWS : 4C2B4a3e

Check dam



T0

T0: 2010-11



T1

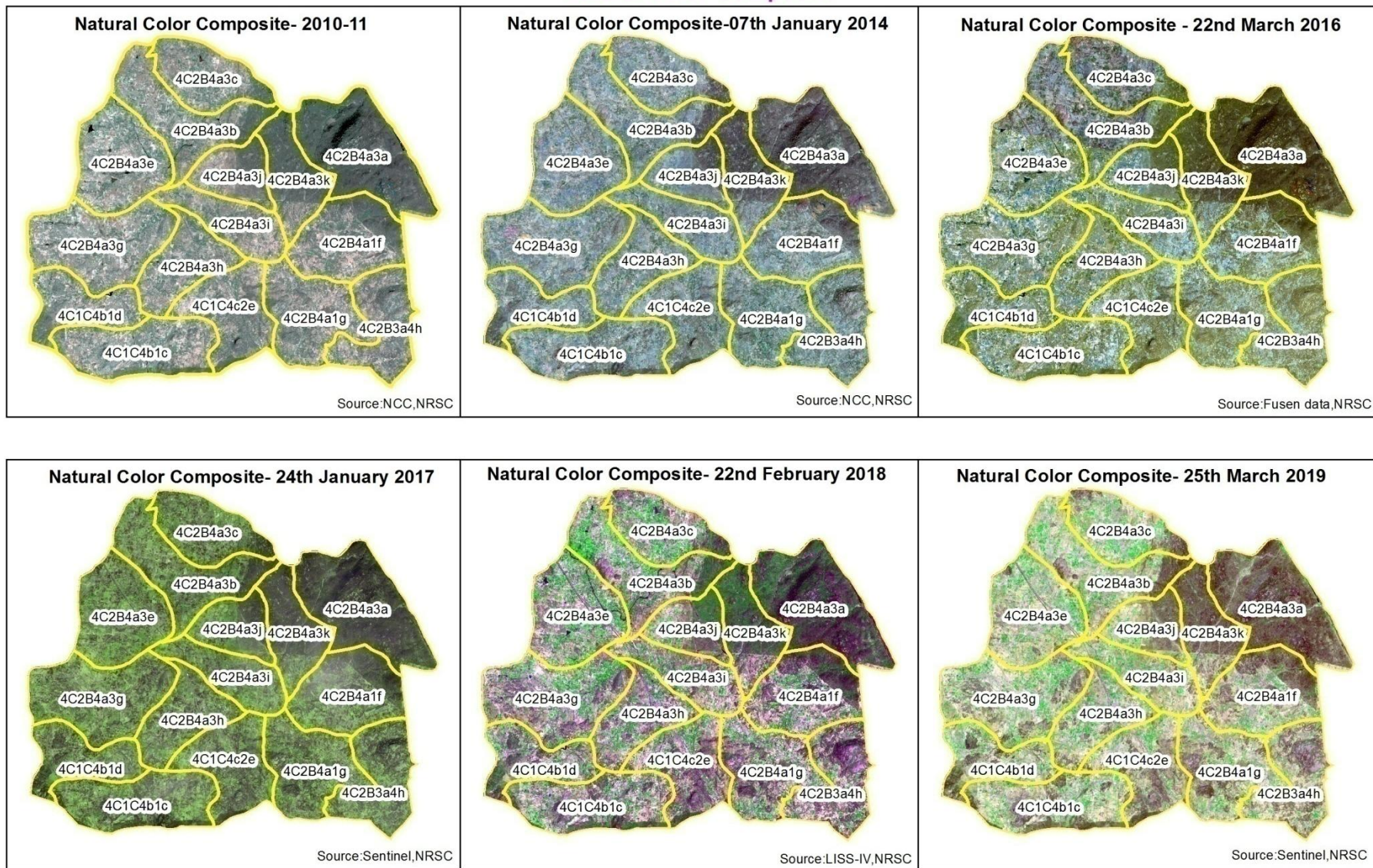
T1: 2 February 2015



Drishti Sl no. 1786645 MWS :4C2B4a3c

Farmpond

Natural Color Composite – 2010-11 to 2018-19



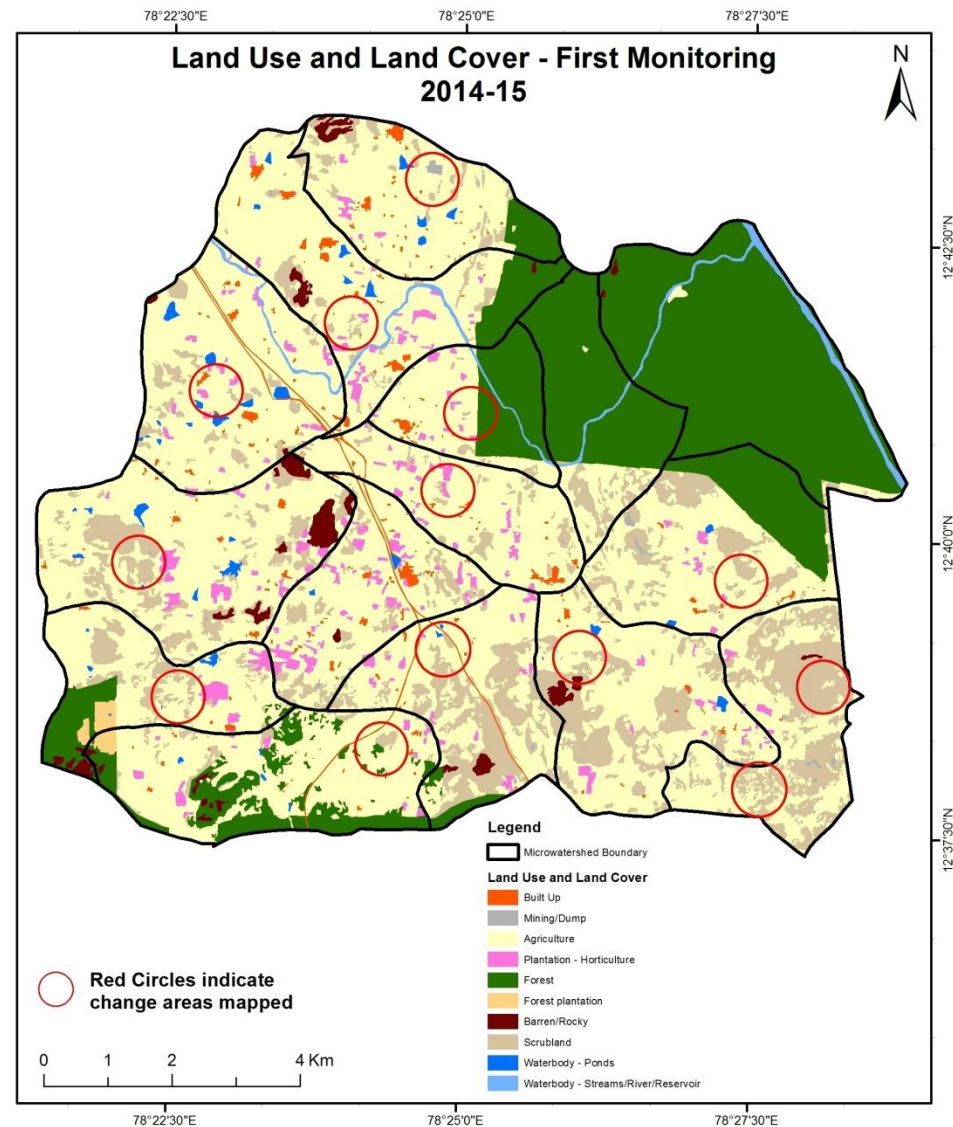
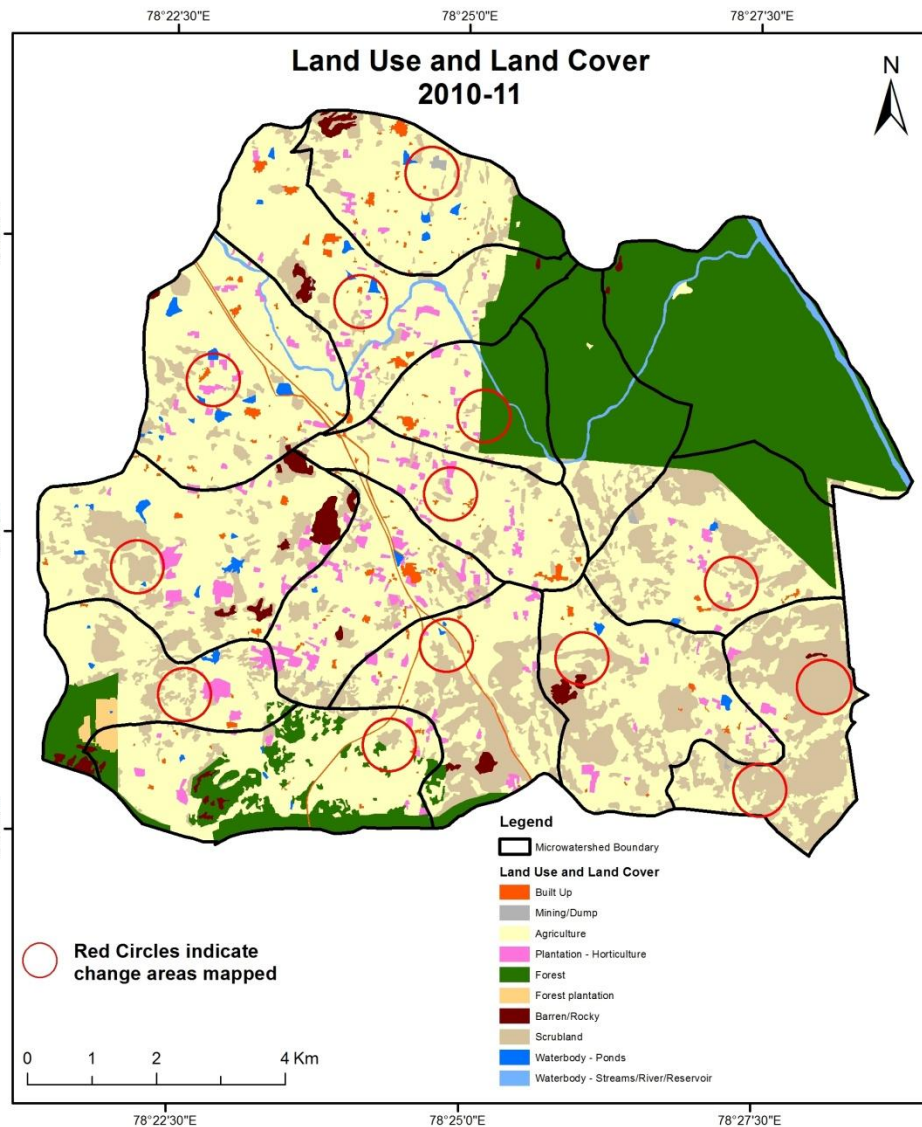
MONITORING IN THE PROJECT AREA

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 (2010-11) and row represents the T5 (2018-19)

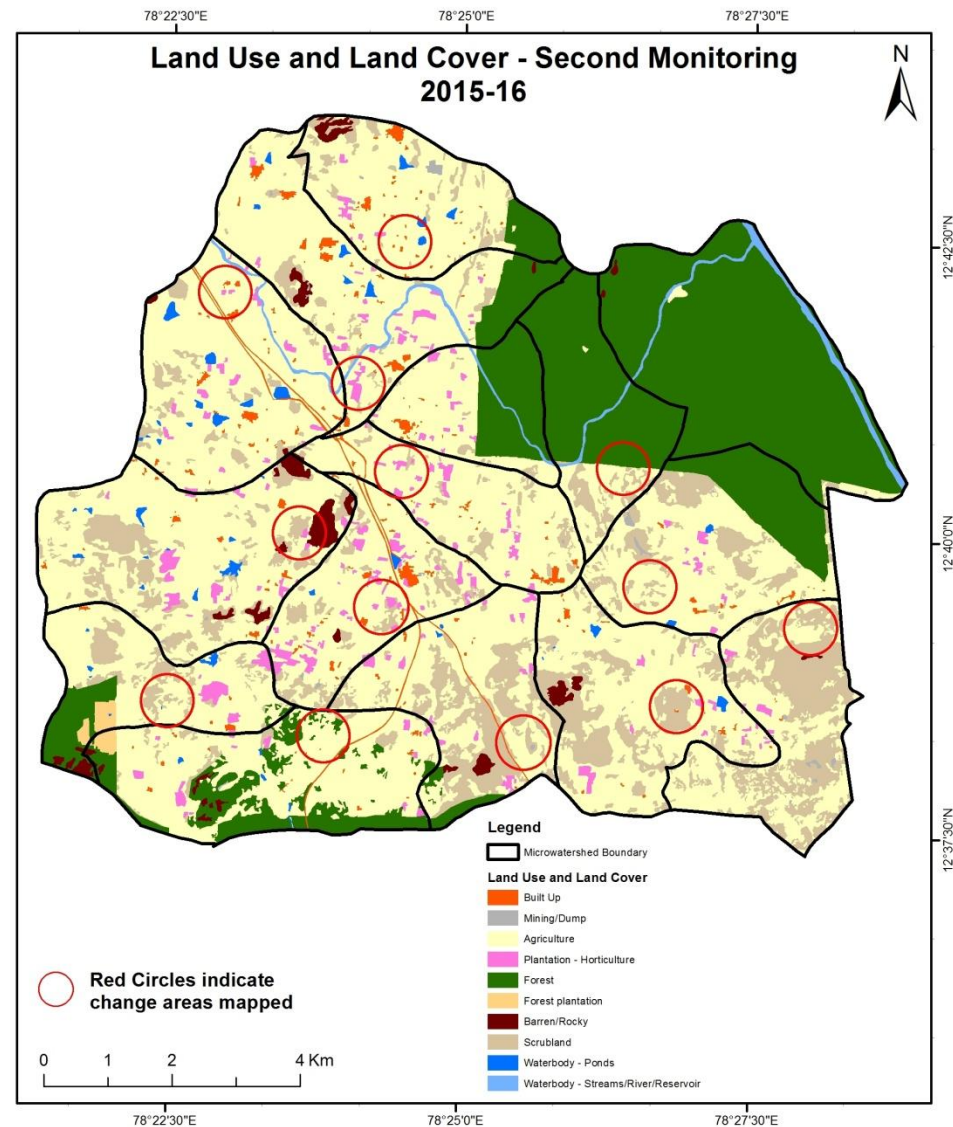
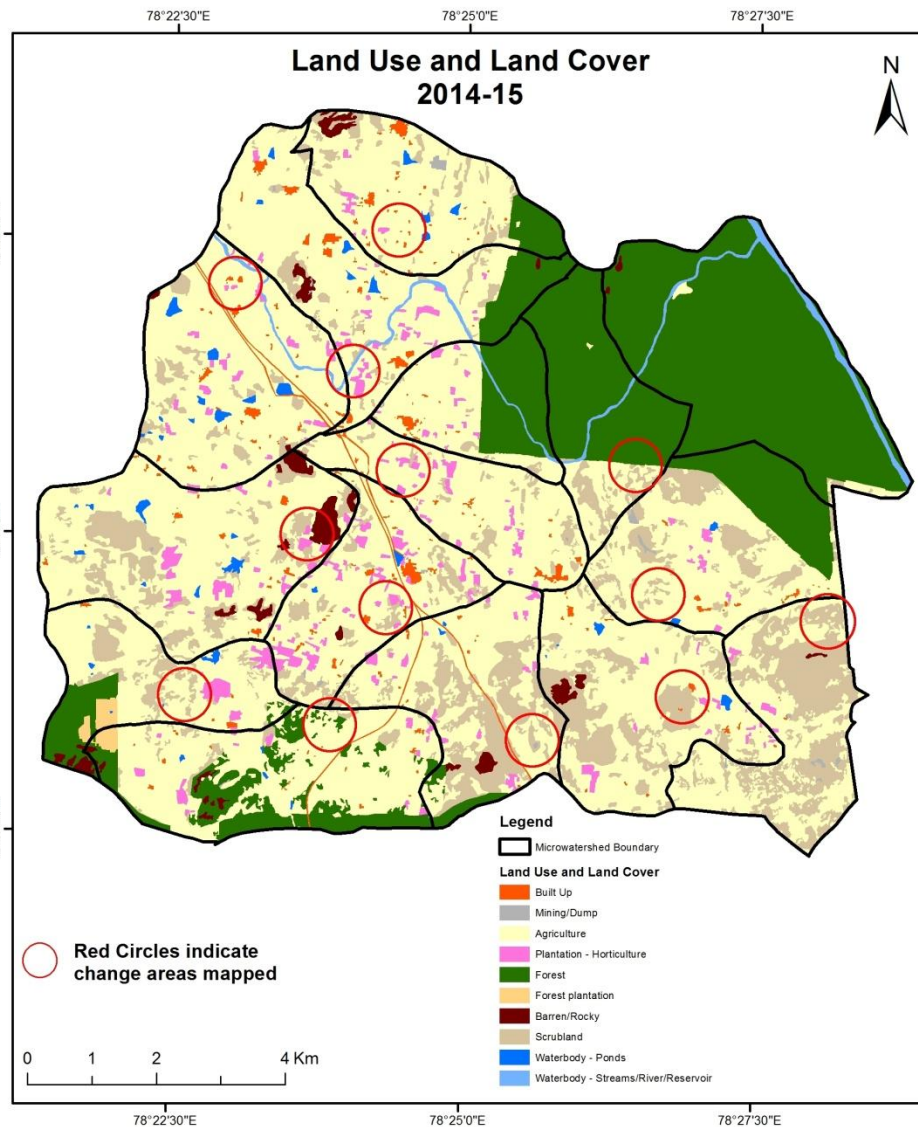
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



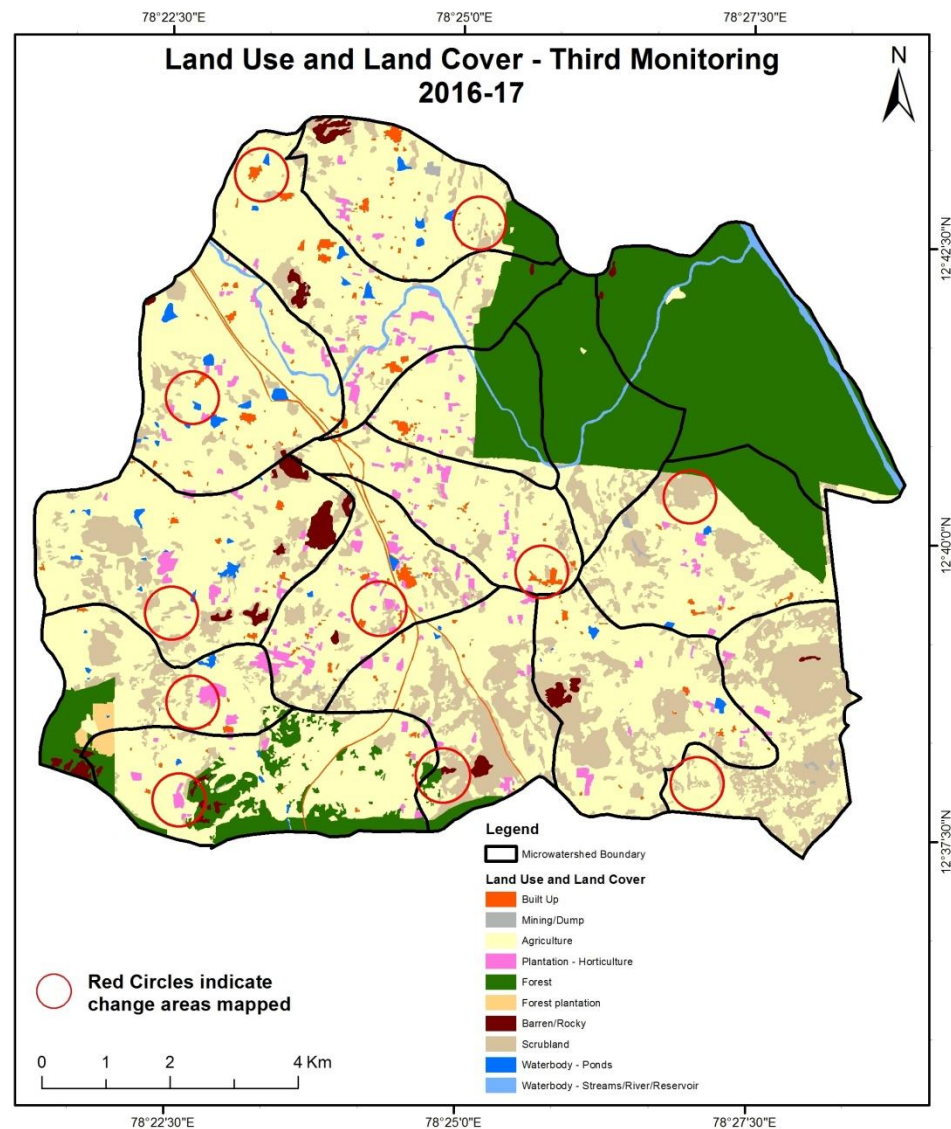
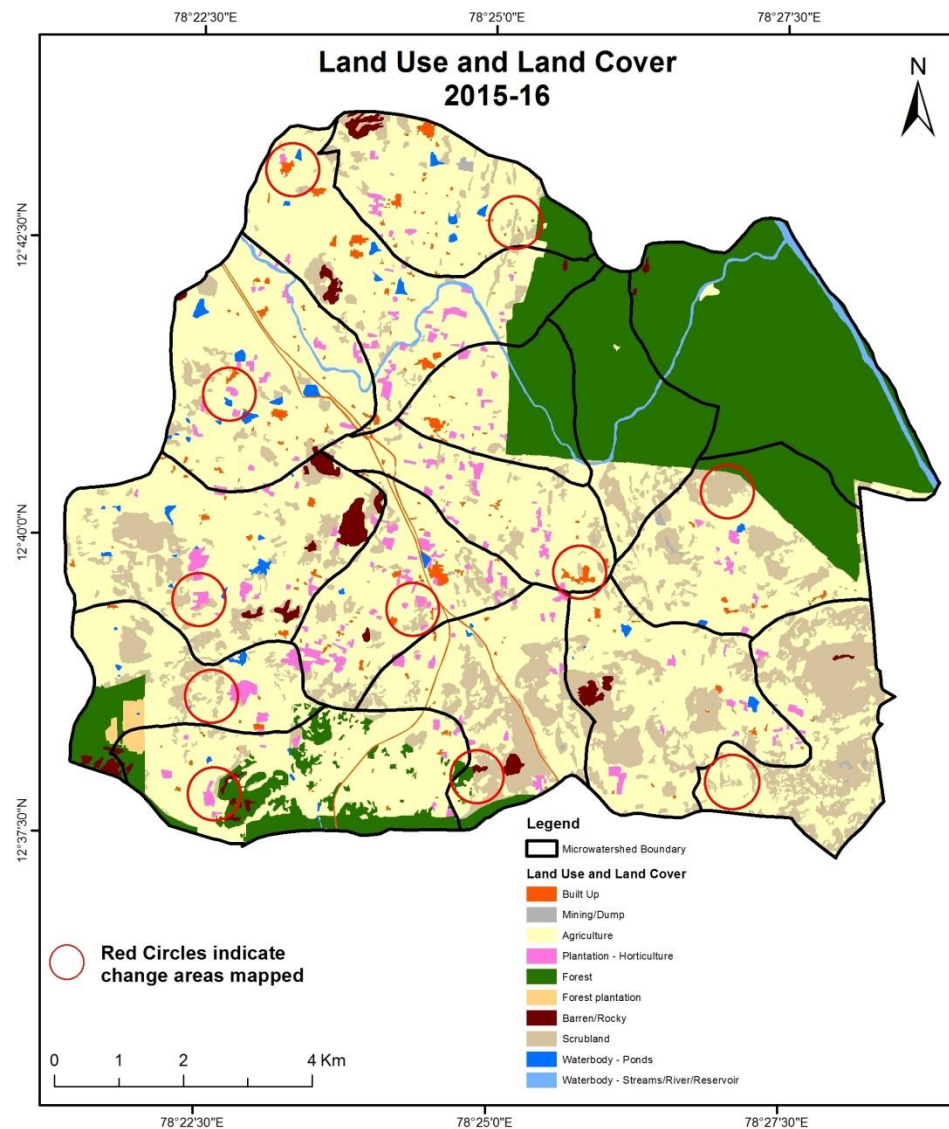
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



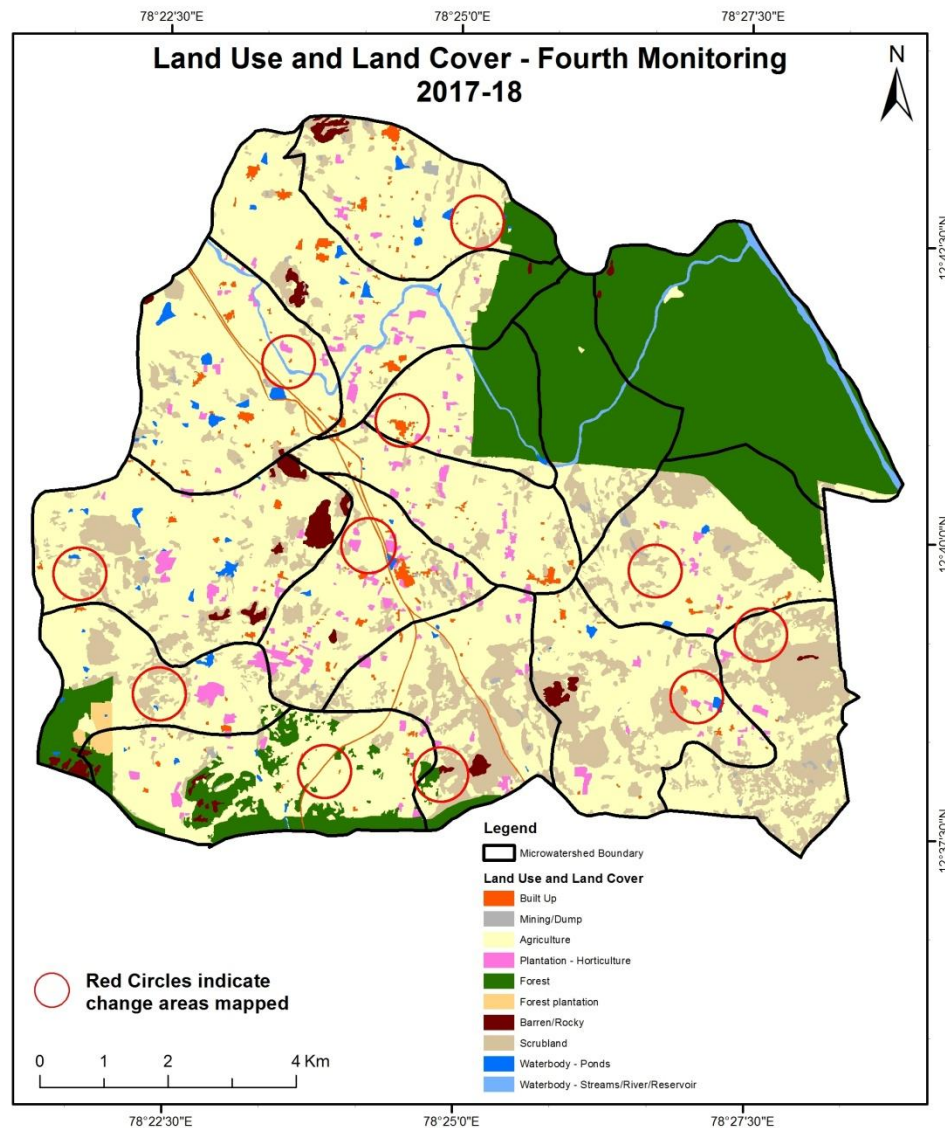
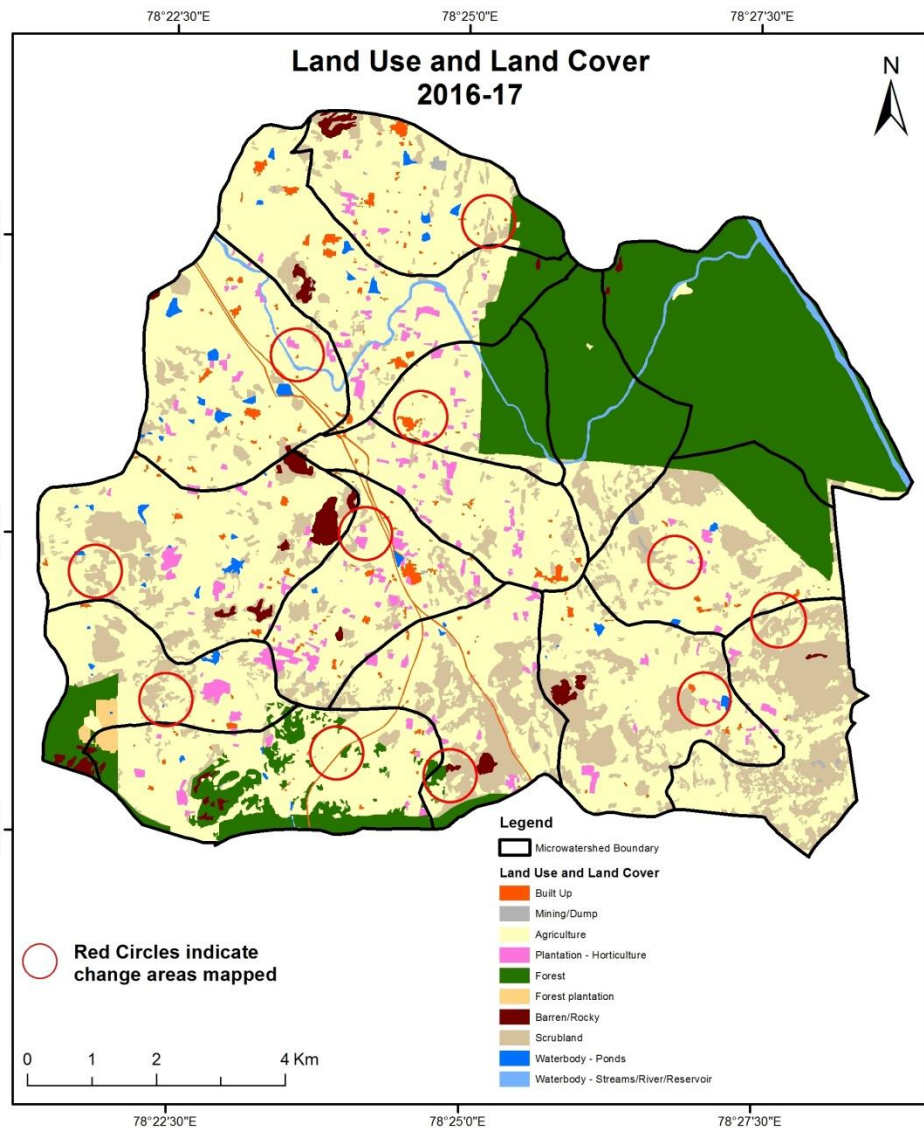
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



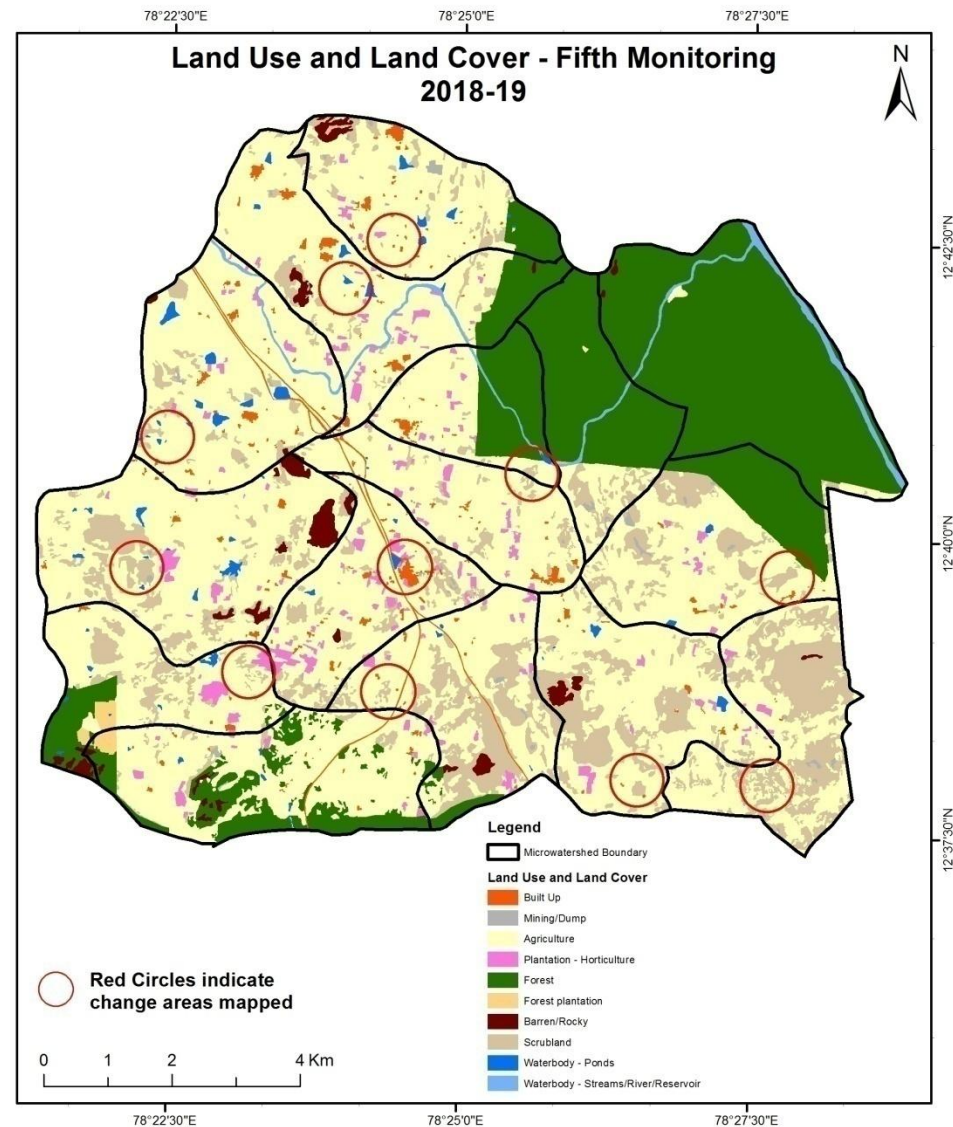
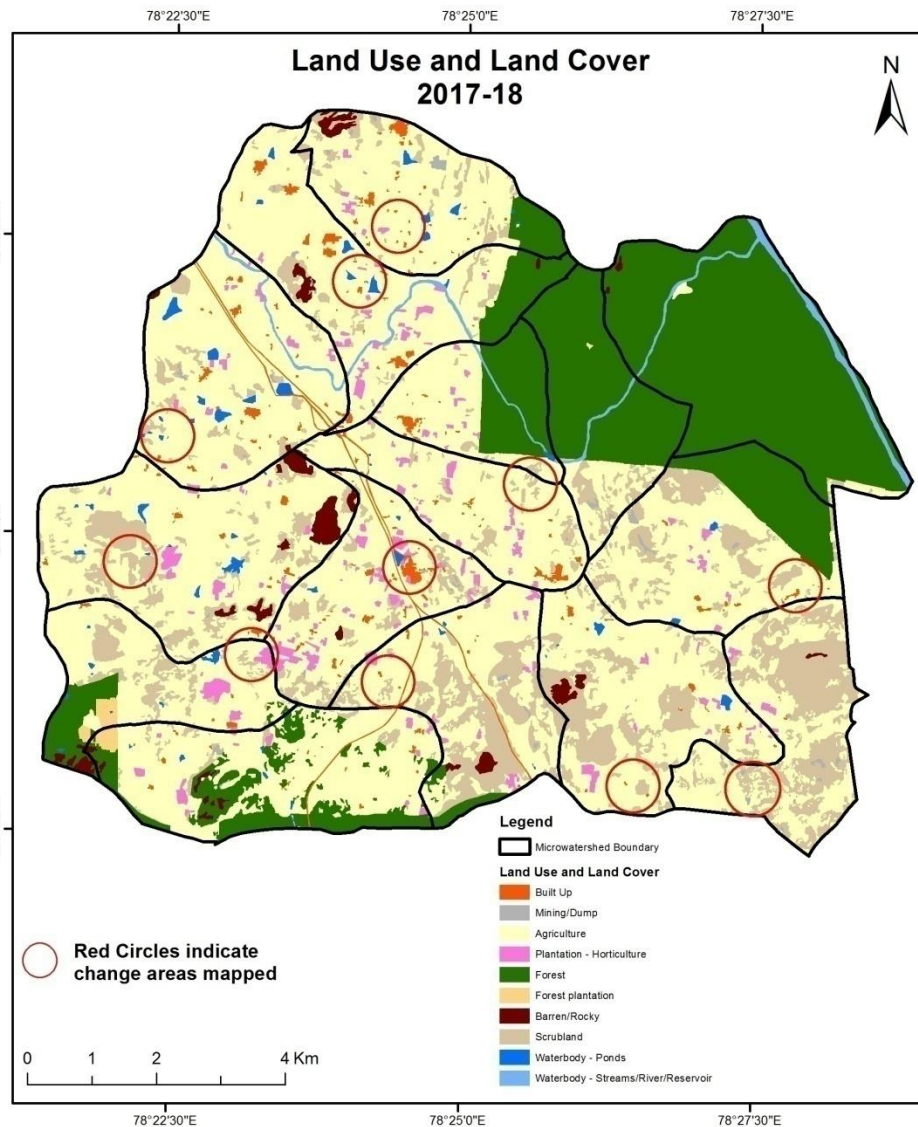
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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

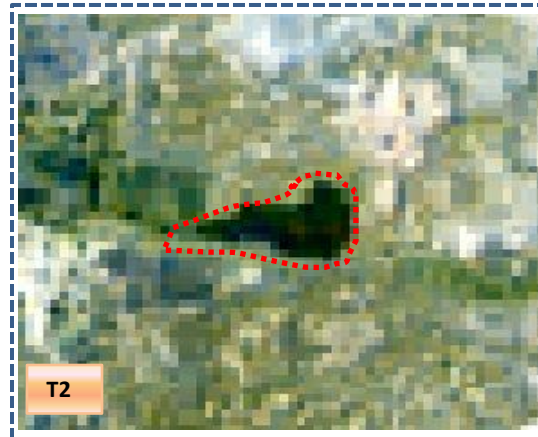


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body



T1: 2014-15 (78°22'17.643"E 12°39'49.408"N)



T2: 18th January 2016

Scrubland to Agriculture



T2: 2015-16 (78°23'23.183"E 12°38'21.593"N)



T3: 20th November 2016

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

Scrubland to Agriculture

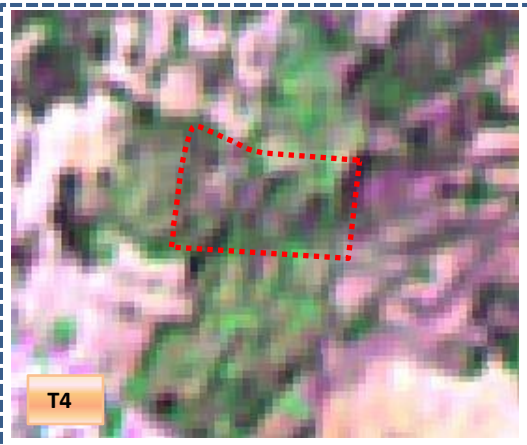


T3: 2016-17 ($78^{\circ}22'15.657''\text{E}$ $12^{\circ}39'31.409''\text{N}$)

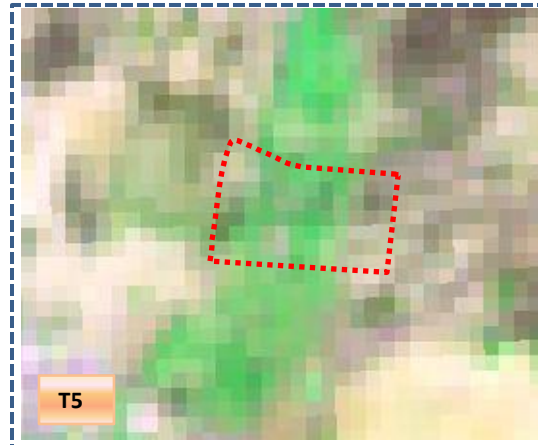


T4: 22nd February 2018

Scrubland to Plantation



T4: 2014-15 ($78^{\circ}24'45.043''\text{E}$ $12^{\circ}38'26.149''\text{N}$)



T5: 3rd October 2019

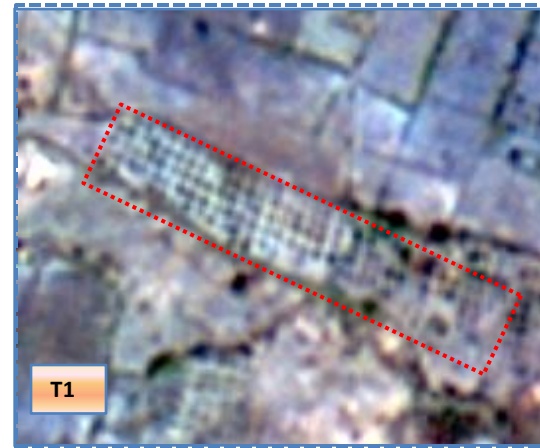
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0

T0: 2010-11



T1

T1: 26 February 2015

Agriculture to Plantation



T0

T0: 2010-11

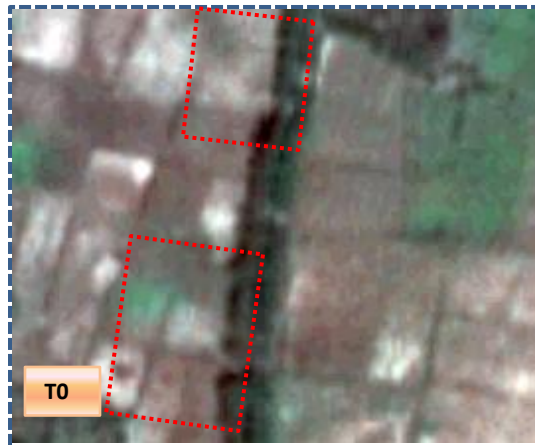


T1

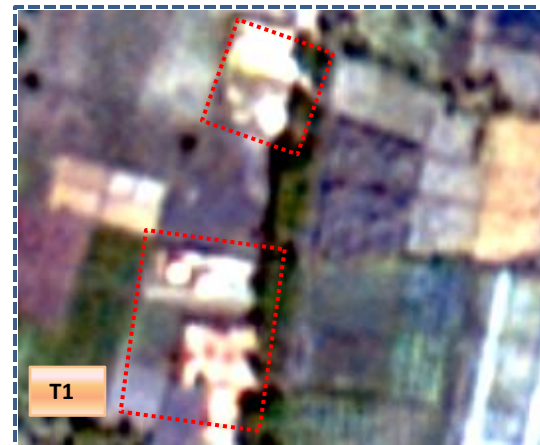
T1: 26 February 2015

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

Agriculture to Built-up



T0: 2010-11

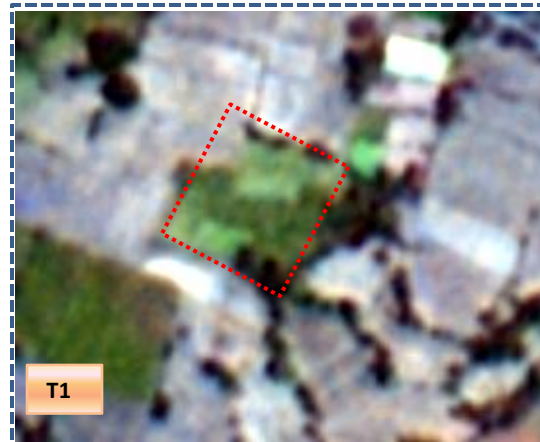


T1: 26 February 2015

Agriculture to Plantation



T0: 2010-11



T1: 26 February 2015

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	132.58										132.58
Mining/dump		9.90	0.98								10.88
Agriculture	11.22	0.53	6135.29	3.29						0.33	6150.66
Plantation Horticulture			18.47	274.52							292.98
Forest	0.13		25.00		2398.75						2423.88
Forest Plantation						32.56					32.56
Barren Rocky							127.68				127.68
Scrub	0.35	6.43	312.63	0.27				1592.31		0.07	1912.05
Waterbody- Streams/River									102.11		102.11
Waterbody – Ponds										63.84	63.84
Grand Total	144.29	16.86	6492.36	278.07	2398.75	32.56	127.68	1592.31	102.11	64.23	11249.22

- 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 15 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 356 ha of the agriculture area has increased from plantation, forest and scrubland of T0, overall 341 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T1	Built up		Agriculture								
Built up	144.29										144.29
Mining/dump		16.66	0.19								16.86
Agriculture	0.45	1.45	6489.25							1.20	6492.36
Plantation Horticulture			24.12	253.96							278.07
Forest			0.27		2398.48						2398.75
Forest Plantation						32.56					32.56
Barren Rocky							127.68				127.68
Scrub			7.36					1584.95			1592.31
Waterbody- Streams/River									102.11		102.11
Waterbody – Ponds			1.40							62.83	64.23
Grand Total	144.74	18.12	6522.59	253.96	2398.48	32.56	127.68	1584.95	102.11	64.03	11249.22

- 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 03 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and water body in T2.
- In T2 33 ha of the agriculture area has increased from plantation, forest and scrubland of T1, overall 30 ha of the agriculture area has been increased. 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	144.74										144.74
Mining/dump		18.12									18.12
Agriculture	0.77		6521.82								6522.59
Plantation Horticulture			16.85	237.10							253.96
Forest			3.30		2395.18						2398.48
Forest Plantation			3.17			29.39					32.56
Barren Rocky							127.68				127.68
Scrub			3.41					1581.54			1584.95
Waterbody- Streams/River									102.11		102.11
Waterbody – Ponds										64.03	64.03
Grand Total	145.52	18.12	6548.54	237.10	2395.18	29.39	127.68	1581.54	102.11	64.03	11249.22

- 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 0.7 ha of the agriculture area has decreased and it is converted into Built-up area in T3.
- In T3 23 ha of the agriculture area has increased from plantation, forest and scrubland of T2, overall 25 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T3	Built up		Agriculture								
Built up	145.52										145.52
Mining/dump		18.12									18.12
Agriculture	5.41	1.19	6538.99							2.95	6548.54
Plantation Horticulture	0.11		17.71	219.28							237.10
Forest			2.34		2391.25					1.59	2395.18
Forest Plantation			0.20			29.19					29.39
Barren Rocky							127.68				127.68
Scrub	0.18	16.61	42.32					1522.43			1581.54
Waterbody- Streams/River									101.09	1.02	102.11
Waterbody – Ponds										64.03	64.03
Grand Total	151.22	35.92	6601.56	219.28	2391.25	29.19	127.68	1522.43	101.09	69.59	11249.22

- 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 09 ha of the agriculture area has decreased and it is converted into Built-up, mining and water body area in T4.
- In T4 62 ha of the agriculture area has increased from plantation, forest and scrubland of T3, overall 53 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T4	Built up		Agriculture								
Built up	151.22										151.22
Mining/dump		35.92									35.92
Agriculture	0.37		6601.19								6601.56
Plantation Horticulture			4.49	214.80							219.28
Forest			3.49		2387.77						2391.25
Forest Plantation						29.19					29.19
Barren Rocky							127.68				127.68
Scrub	0.12	0.94	39.59	1.32				1480.46			1522.43
Waterbody- Streams/River									101.09		101.09
Waterbody – Ponds										69.59	69.59
Grand Total	151.72	36.85	6648.75	216.12	2387.77	29.19	127.68	1480.46	101.09	69.59	11249.22

- 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 0.3 ha of the agriculture area has decreased and it is converted into Built-up, mining and water body area in T5.
- In T5 47 ha of the agriculture area has increased from plantation, forest and scrubland of T4, overall 47 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 4.7 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 341, 30, 25, 53 & 47 Hectares From T0 to T1, T2-T3, T3 to T4 & T4-T5 respectively and overall decrease of 498 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 431 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.