MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -20/2010-11
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

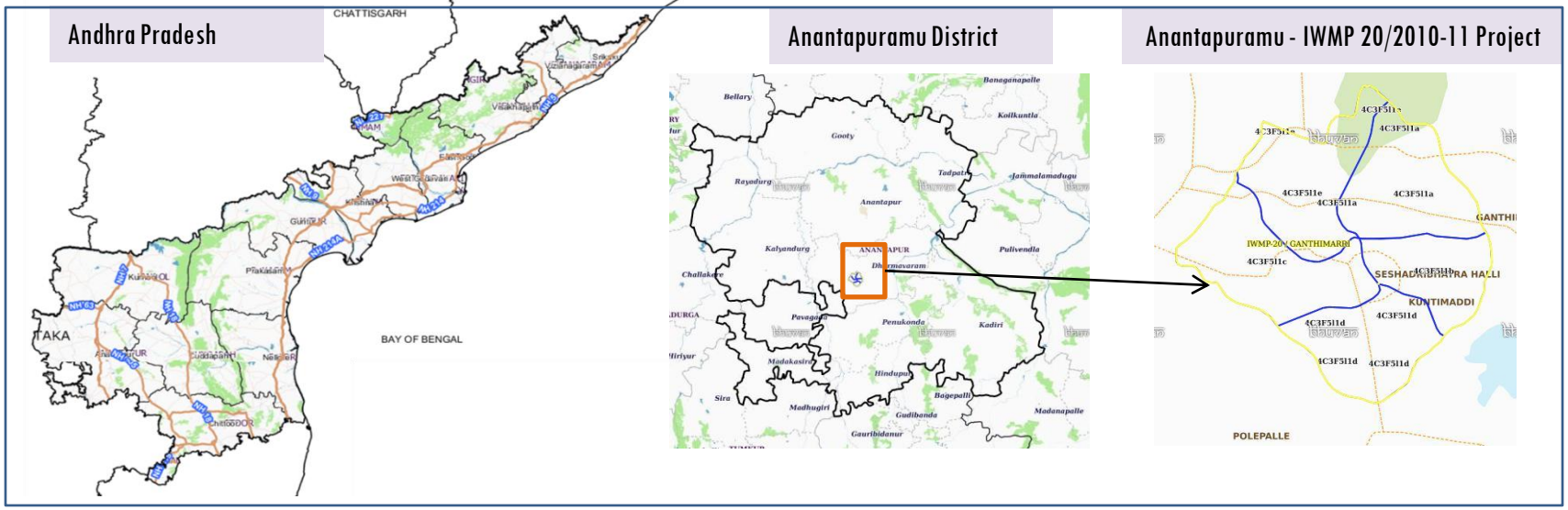
CONTENTS

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-20/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 3,583 ha. It comprises of 5 micro watersheds.
- In the project area 101 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increase by 56 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 58 % is covered by the agriculture, 27 % is covered by Scrub land, 6 % is covered by forest and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-20/2010-11
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Ramagiri Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 3,583 ha. It comprises of 5 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



- 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.

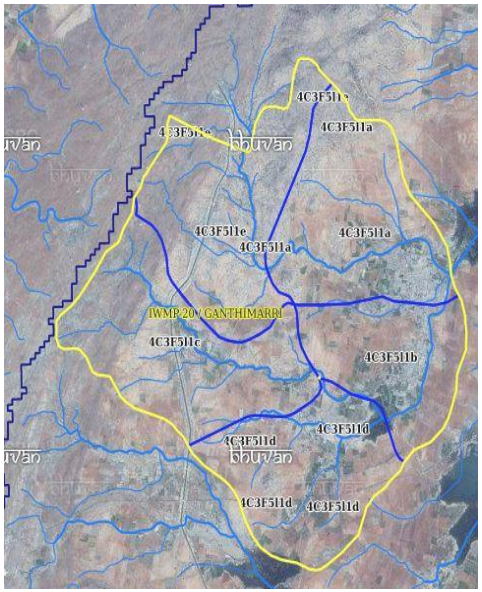
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			5-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			5-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	101
4	Detailed Project Report		

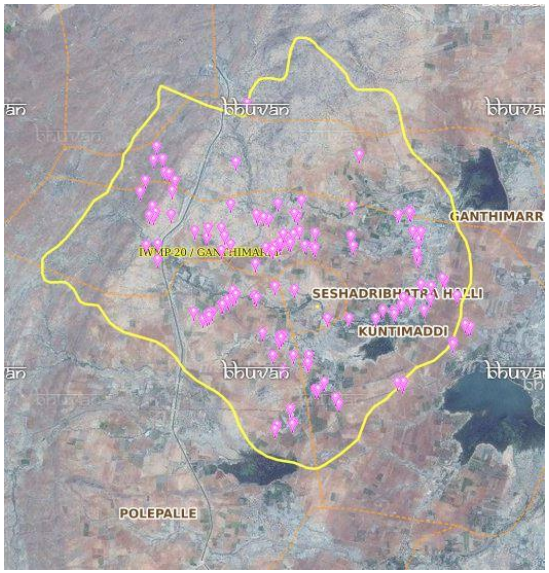
Natural Color Composite overlaid with Project boundaries and high detail stream network



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	Agriculture/Horticulture	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	36	36
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	20	20
10	Civil work-Check dams/Rock fill dam	3	3
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-Plantation/Horticulture	11	0
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	69	42
	TOTAL	**139**	**101**

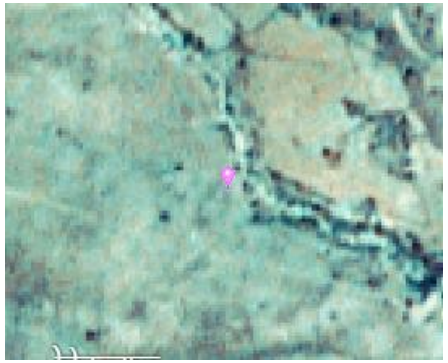
MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

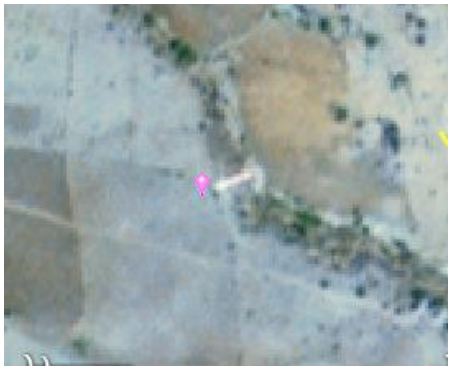
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2010-11) and T5 is 2018-19 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Anantapuramu–IWMP-20/2010-11

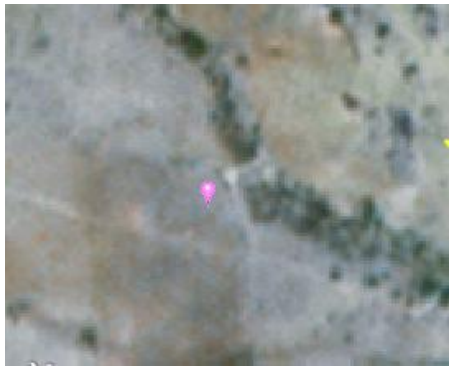
2009-10



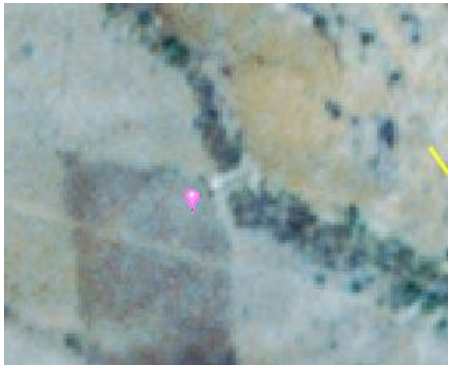
Feb-2015



October-2016



Jan-2017



June-2019

Activity : Check dam

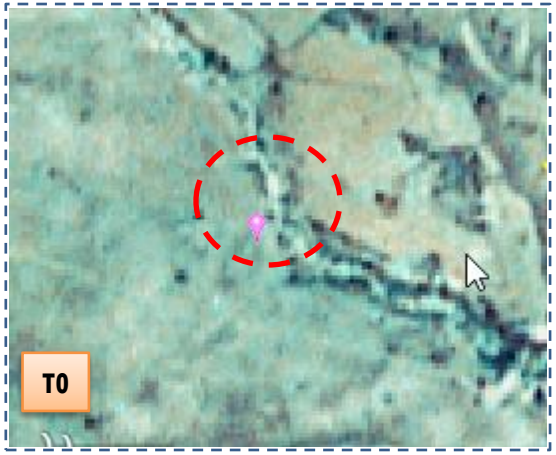
Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-20/2010-11

T0:2010-11

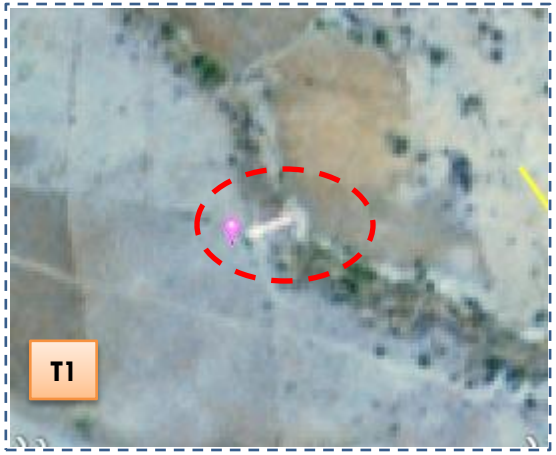
T1: 05 February 2015

Drishti Sl no. 29434 MWS : 4C3F5I1e

Check dam



T0:2010-11



T1: 05 February 2015

Drishti Sl no. 132281 MWS : 4C3F5I1c

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-20/2010-11

T0:2010-11

T1: 05 February 2015

Drishti Sl no. 132755 MWS : 4C3F5l1c

Check dam

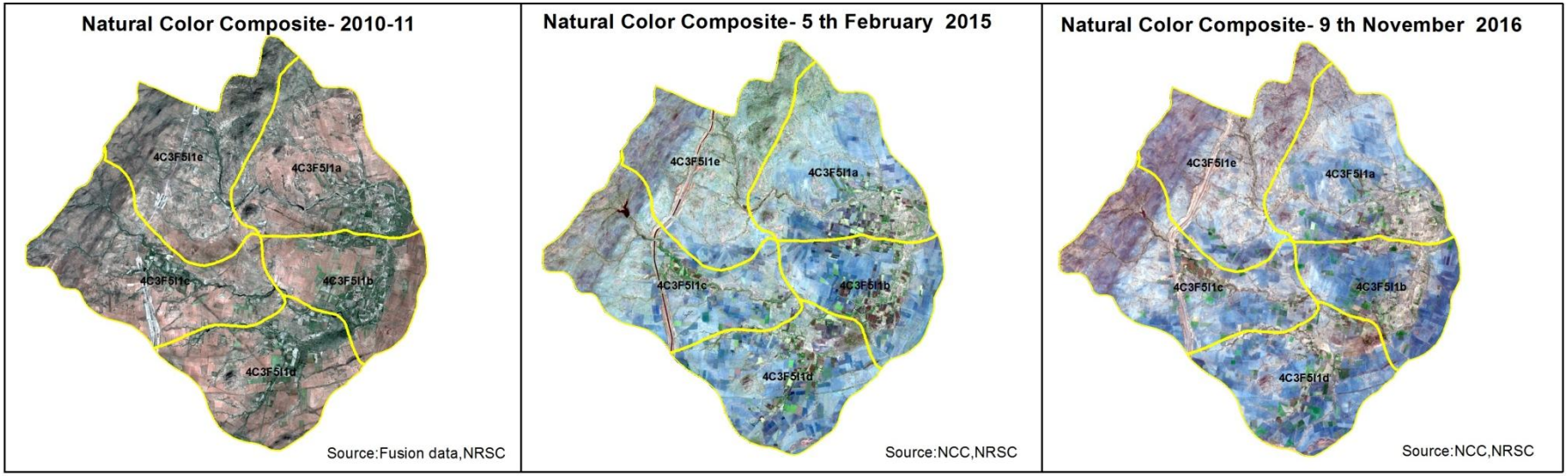
T0:2010-11

T1: 05 February 2015

Drishti Sl no. 1016710- MWS : 4C3F5l1d

Check dam

Natural Color Composite – 2010-11 to 2018-19



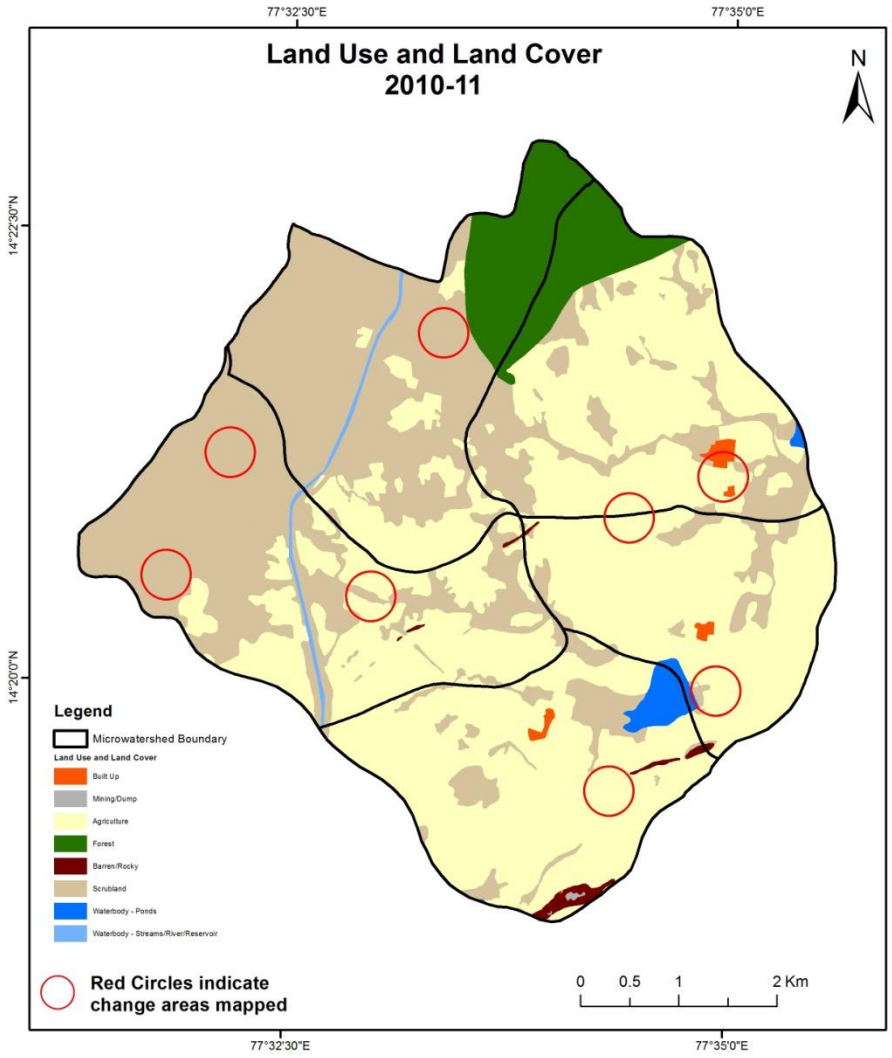
MONITORING IN THE PROJECT AREA

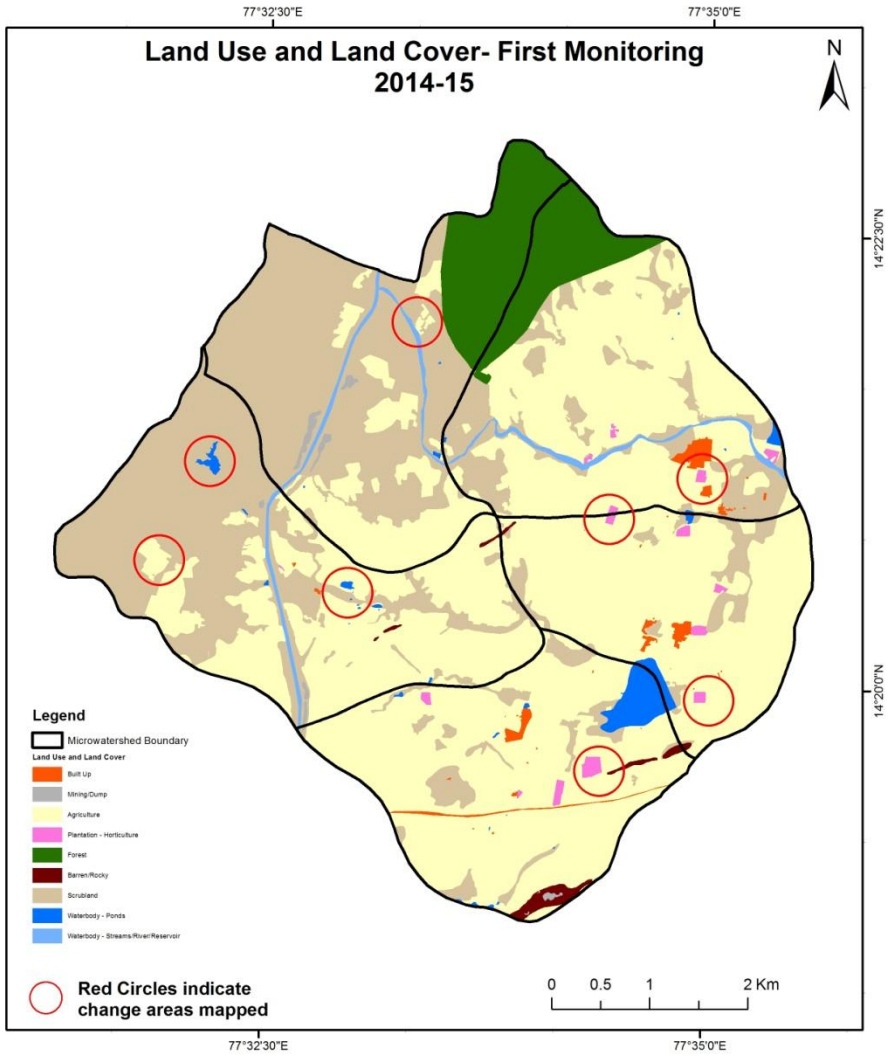
Land use and Land cover Changes in the Project

- Change in land use and land cover 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)

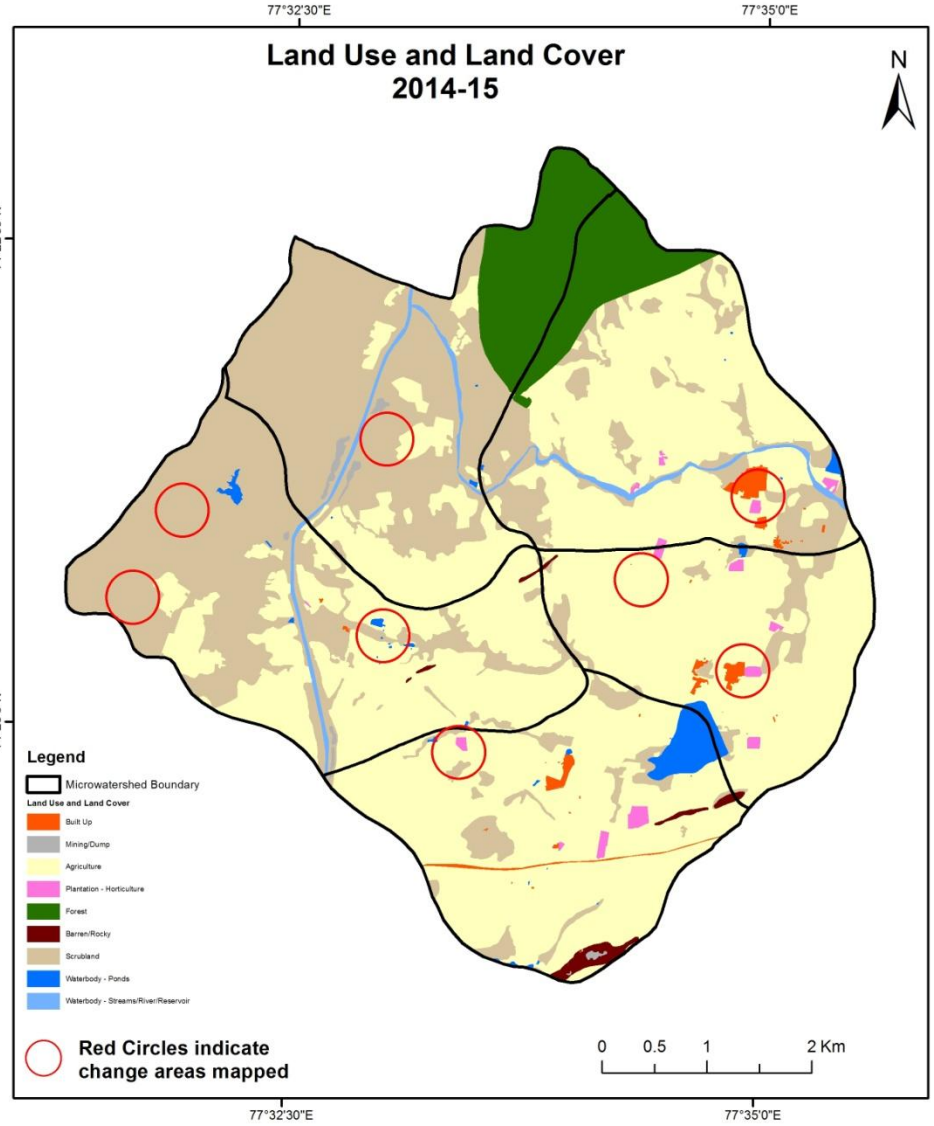
Scale: 1:10000

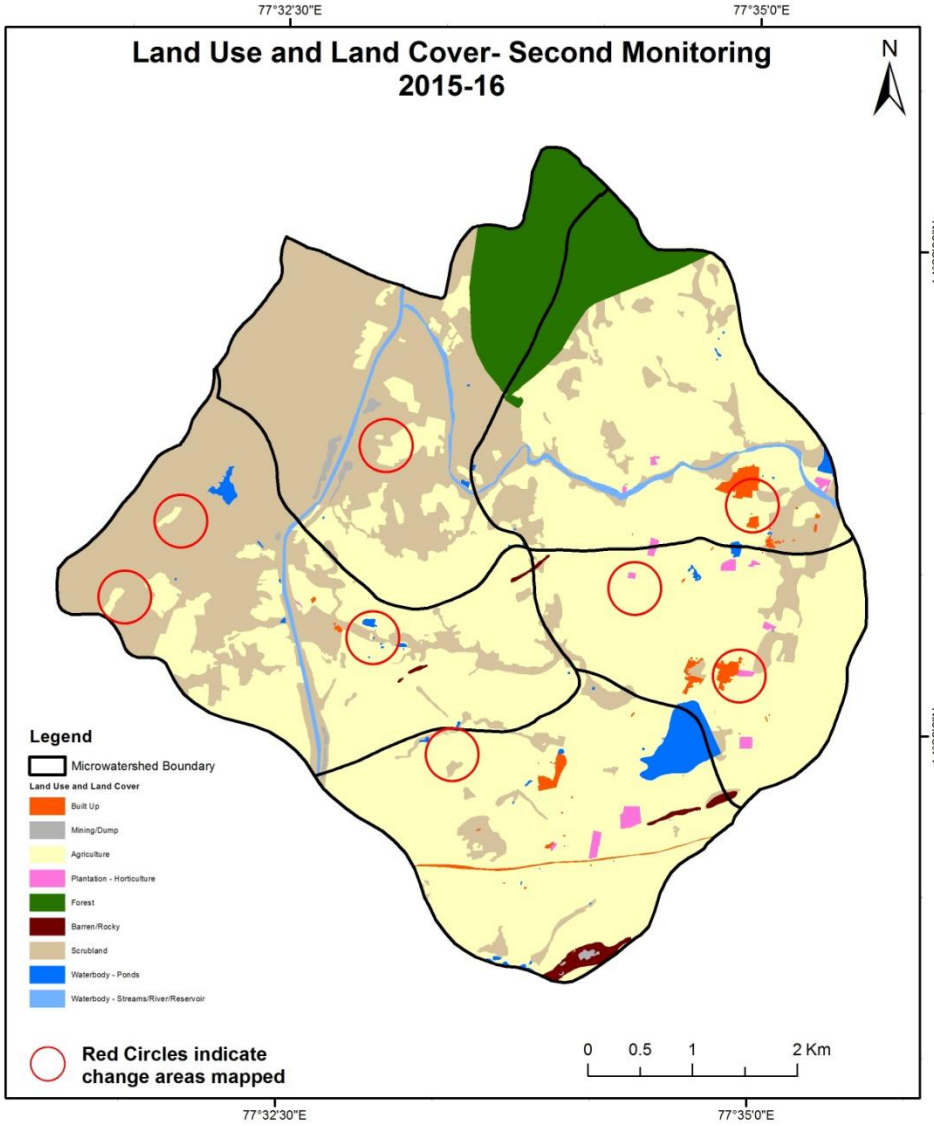




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

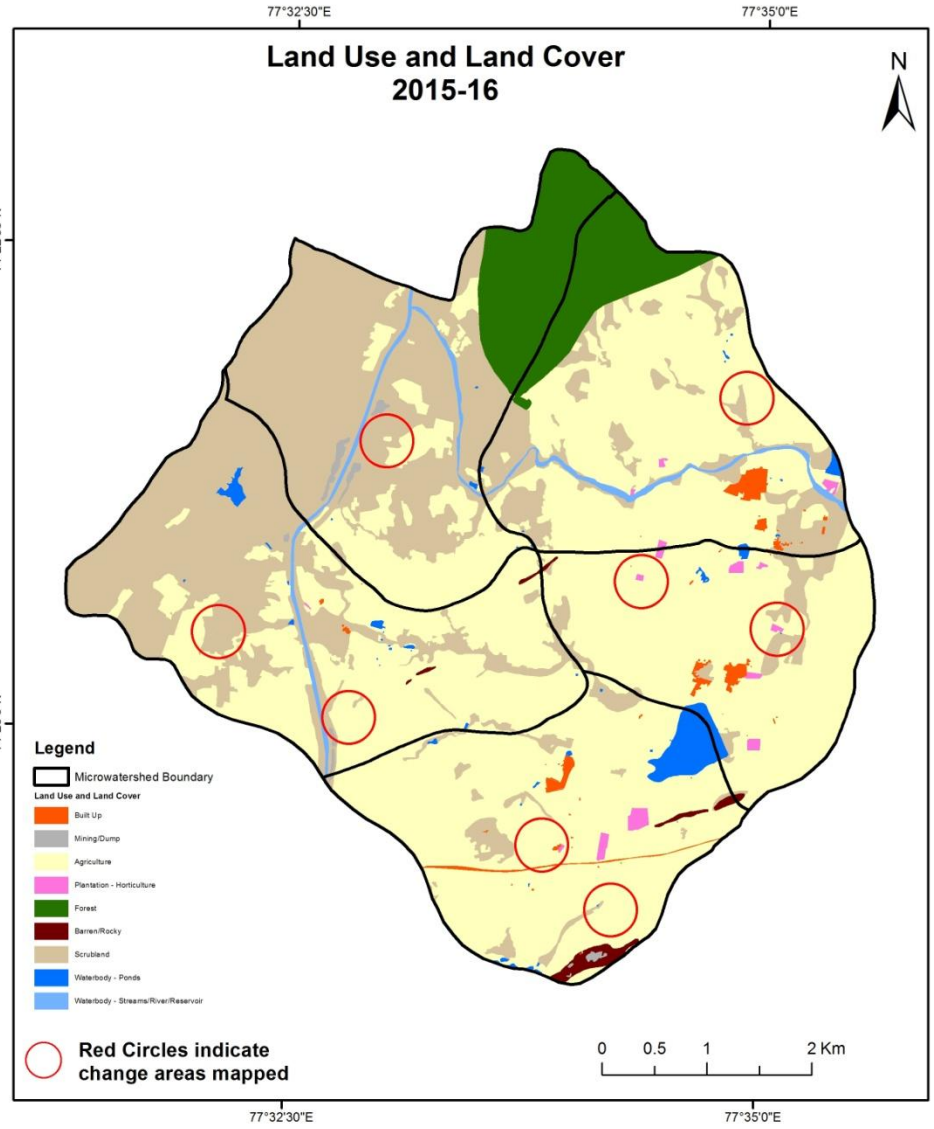
Scale: 1:10000

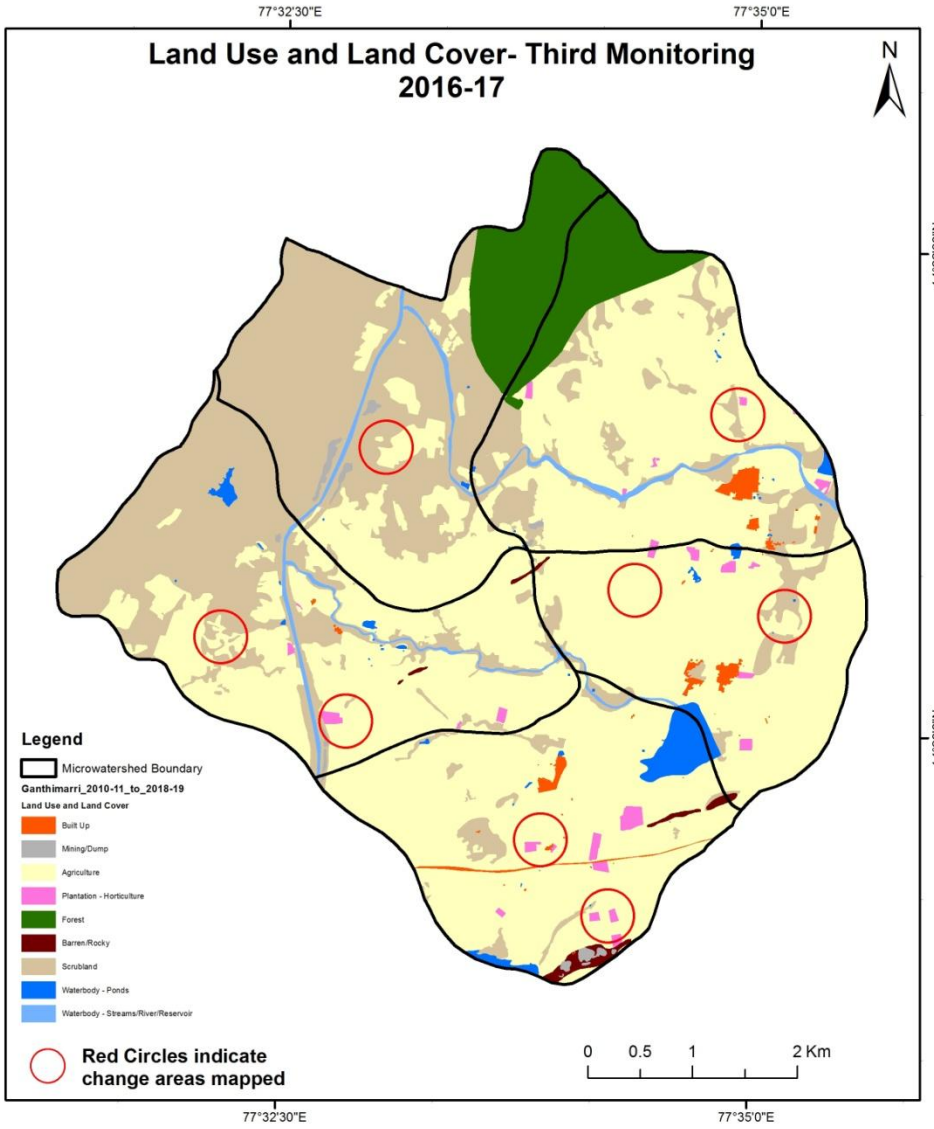




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

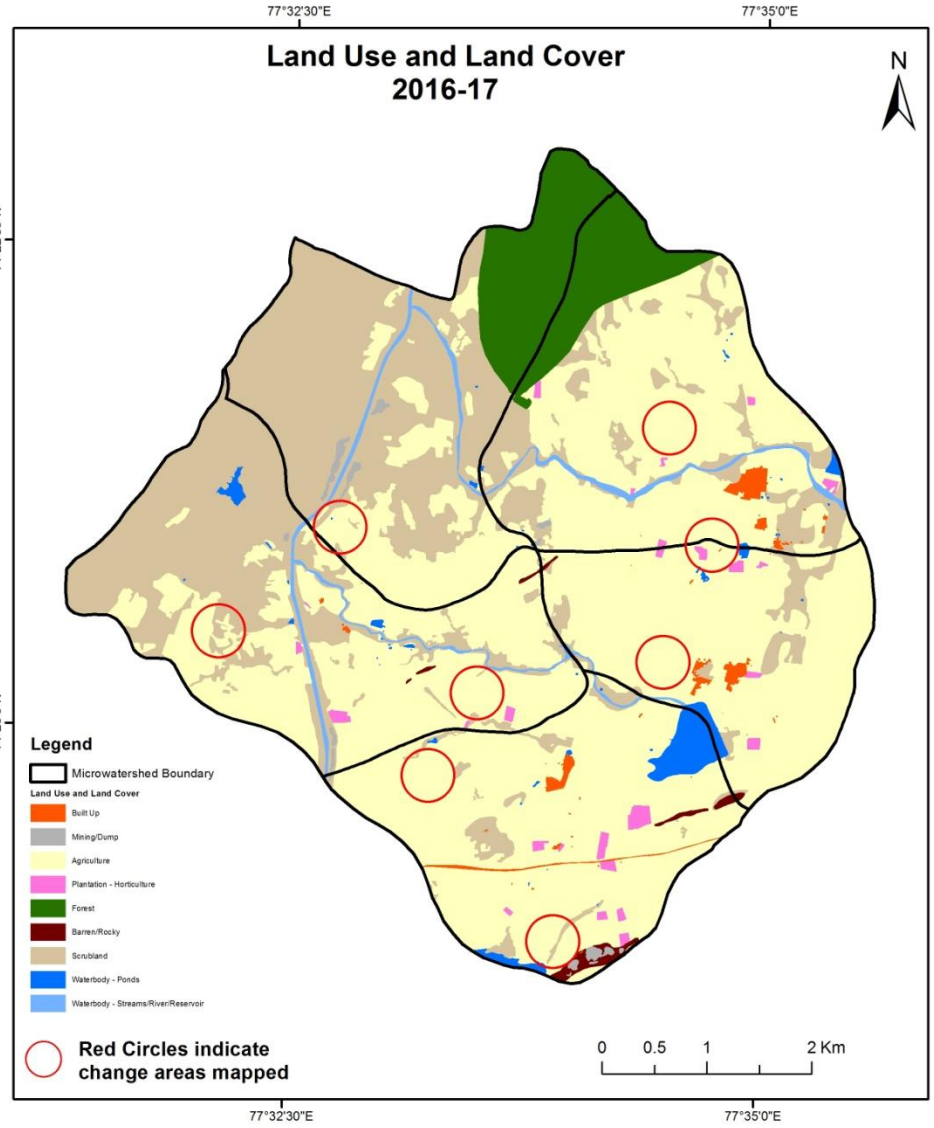
Scale: 1:10000

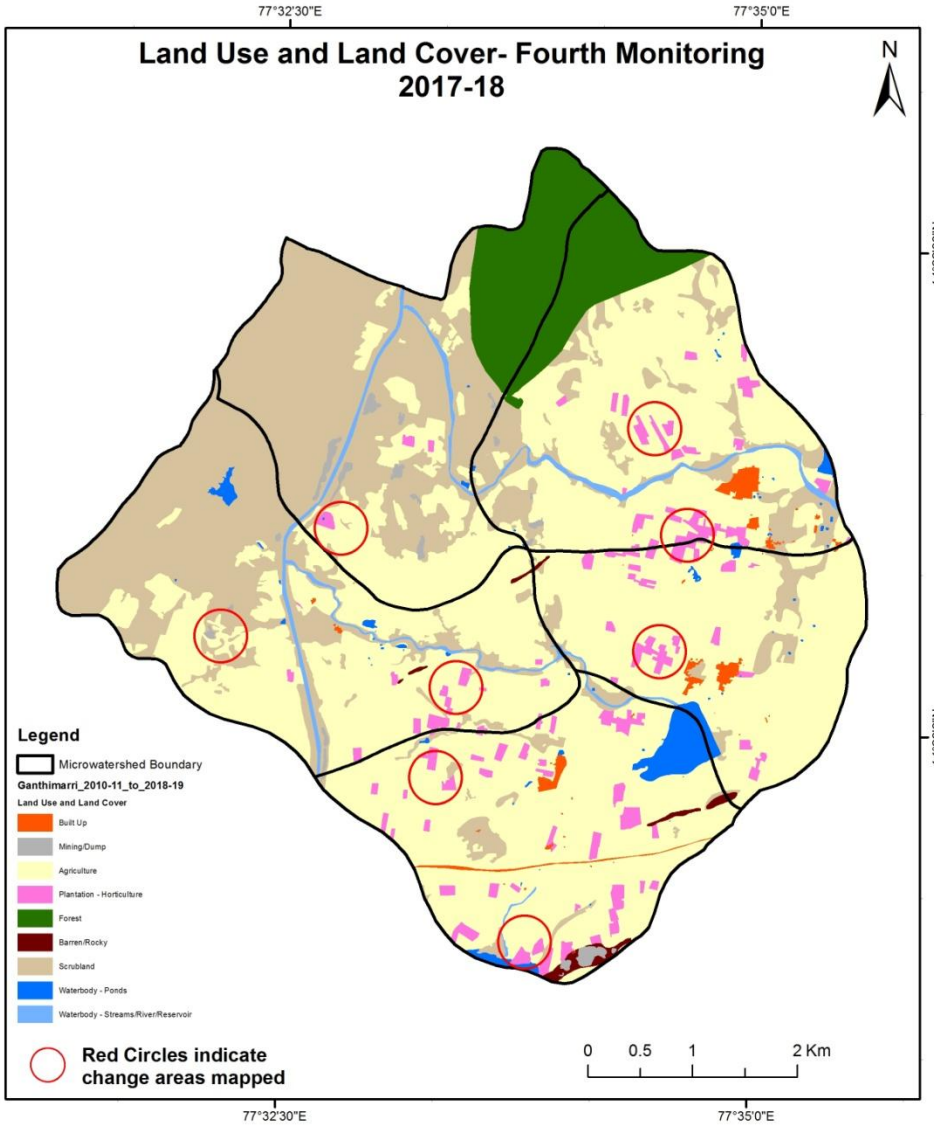




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

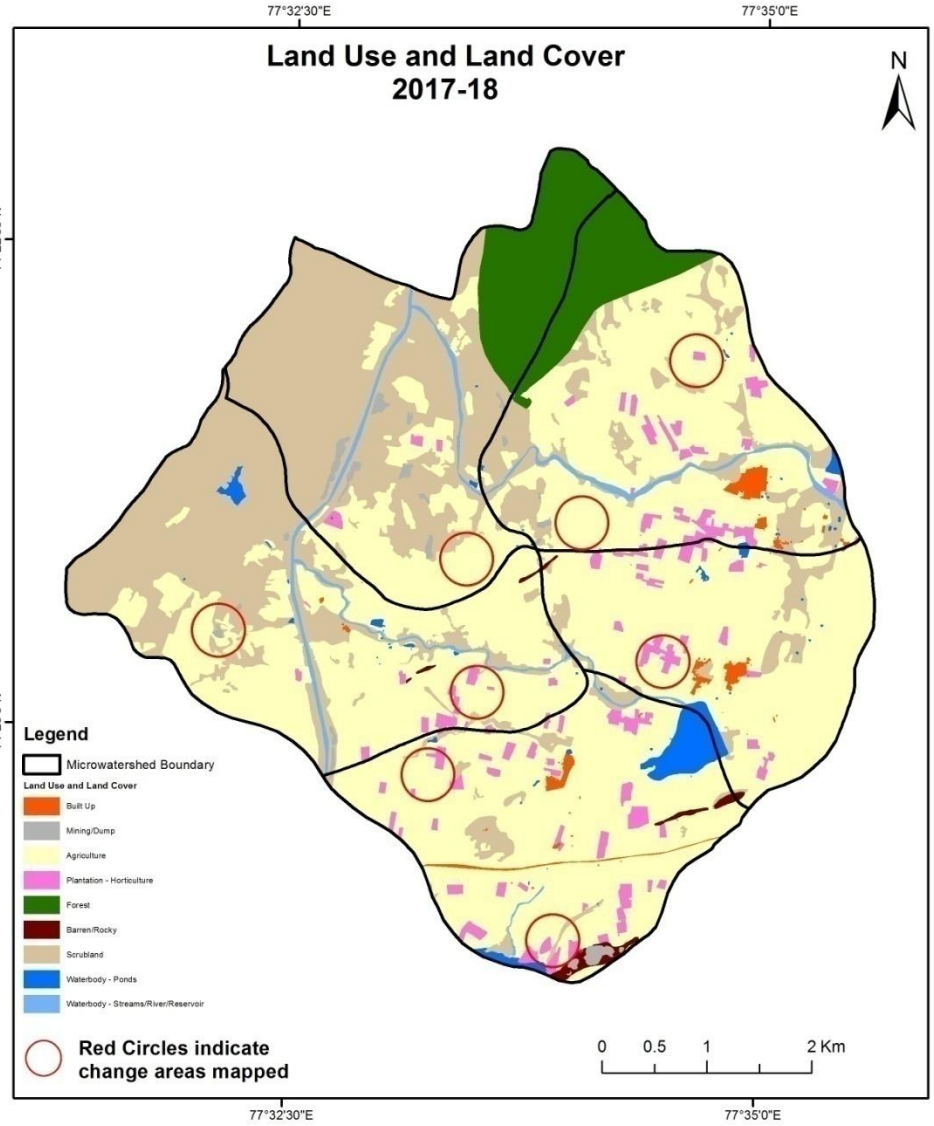
Scale: 1:10000

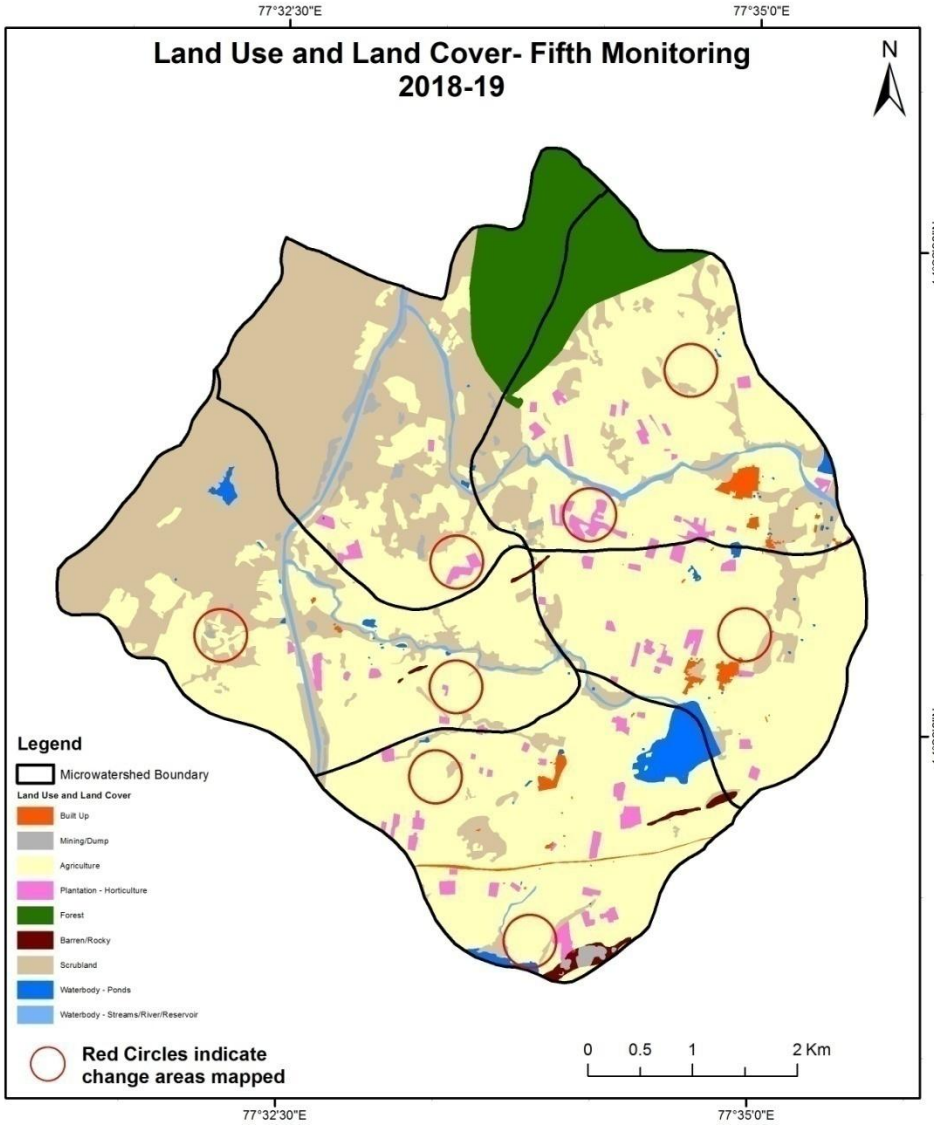




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

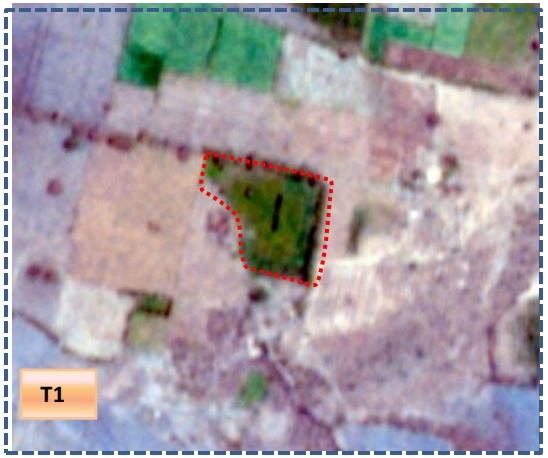




Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

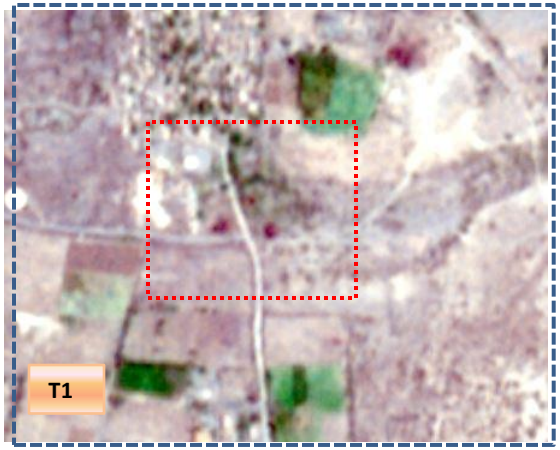
T0: 2015-16(77°34'38.4"E 14°20'56.28"N)



T1: 30th April 2017

Scrub to Water body

T0: 2015-16 (77°35'0.329"E 14°21'14.019"N)

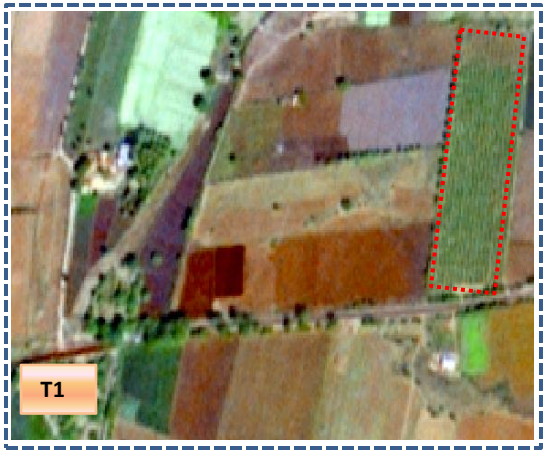


T1: 30th April 2017

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

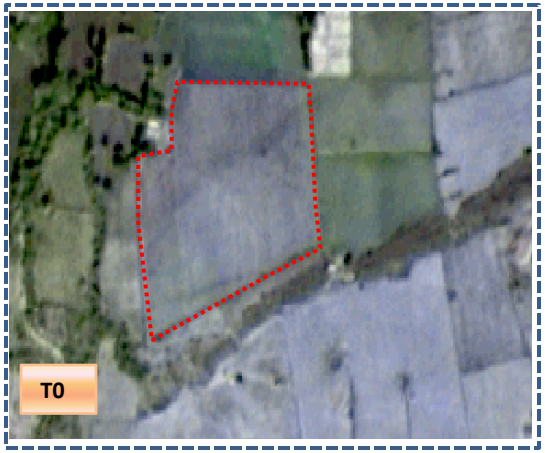
Agriculture to Plantation

T0: 2010-11(77°34'6.463E 14°19'23.99N)



T1: 05 February 2015

Agriculture to Plantation



T0: 2010-11(77°34'23.744E 14°19'34.988N)

T1: 05 February 2015

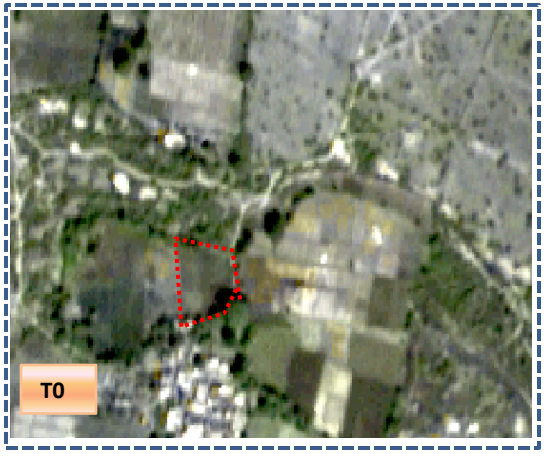
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body

T0: 2010-11(77°35'4.129E 14°21'1.831N)

T1: 05 February 2015

Agriculture to Water body



T0: 2010-11(77°34'0.778E 14°19'57.953N)

T1: 05 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	14.15										**14.15**
Mining/dump		1.11									**1.11**
Agriculture	8.52		1898.89	16.86						2.95	**1927.22**
Plantation Horticulture											
Forest			0.41		247.73						**248.14**
Forest Plantation											
Barren Rocky							16.75				**16.75**
Scrub	2.21	8.64	131.22	0.57				1154.00	23.04	5.13	**1324.82**
Waterbody-Streams/River									17.23		**17.23**
Waterbody – Ponds			0.27							33.60	**33.87**
Grand Total	**24.88**	**9.75**	**2030.78**	**17.43**	**247.73**		**16.75**	**1154.00**	**40.27**	**41.69**	**3583.29**

- 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 28 ha of the agriculture area has decreased and it is converted into built up, plantation and water body in T1.
- In T1 131 ha of the agriculture area has increased from forest, 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	24.88										24.88
Mining/dump		9.75									9.75
Agriculture	1.55		2028.09	0.79						0.36	2030.78
Plantation Horticulture	0.18		3.91	13.34							17.43
Forest					247.73						247.73
Forest Plantation											
Barren Rocky		0.35					16.40				16.75
Scrub	0.16		62.57					1088.44		2.84	1154.00
Waterbody-Streams/River									40.27		40.27
Waterbody – Ponds	0.03									41.66	41.69
Grand Total	**26.79**	**10.10**	**2094.57**	**14.13**	**247.73**		**16.40**	**1088.44**	**40.27**	**44.86**	**3583.29**

- 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 ha of the agriculture area has decreased and it is converted into built up, plantation and water body in T2.
- In T2 66 ha of the agriculture area has increased from plantation 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-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	26.79										26.79
Mining/dump		10.10									10.10
Agriculture			2077.16	12.66					1.02	3.73	2094.57
Plantation Horticulture			1.16	12.96							14.13
Forest					247.73						247.73
Forest Plantation											
Barren Rocky		2.24					14.15				16.40
Scrub	0.03	1.17	54.14					1022.25	10.68	0.17	1088.44
Waterbody-Streams/River									40.27		40.27
Waterbody – Ponds				0.18						44.68	44.86
Grand Total	**26.82**	**13.52**	**2132.47**	**25.81**	**247.73**		**14.15**	**1022.25**	**51.96**	**48.58**	**3583.29**

- 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 16 ha of the agriculture area has decreased and it is converted into plantation and water body in T3.
- In T3 55 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

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	26.82										**26.82**
Mining/dump		13.52									**13.52**
Agriculture	0.45		2028.48	101.62					0.87	1.04	**2132.47**
Plantation Horticulture			11.98	13.82						0.01	**25.81**
Forest					247.73						**247.73**
Forest Plantation											
Barren Rocky		1.14					13.01				**14.15**
Scrub		6.65	9.01					1005.61	0.54	0.44	**1022.25**
Waterbody-Streams/River									51.96		**51.96**
Waterbody – Ponds										48.58	**48.58**
Grand Total	**27.28**	**21.32**	**2049.47**	**115.44**	**247.73**		**13.01**	**1005.61**	**53.37**	**50.07**	**3583.29**

- 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 103 ha of the agriculture area has decreased and it is converted into built up, plantation and water body in T4.
- In T4 20 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

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	27.28										27.28
Mining/dump		21.32									21.32
Agriculture			2006.10	39.28						4.09	2049.47
Plantation Horticulture			67.92	47.52							115.44
Forest					247.73						247.73
Forest Plantation											
Barren Rocky		0.49					12.51				13.01
Scrub		8.14	6.44					991.03			1005.61
Waterbody-Streams/River									53.37		53.37
Waterbody – Ponds										50.07	50.07
Grand Total	27.28	29.95	2080.45	86.80	247.73		12.51	991.03	53.37	54.16	3583.29

- 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 43 ha of the agriculture area has decreased and it is converted into plantation and water body in T5.
- In T5 74 ha of the agriculture area has increased from plantation 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 56 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 103, 63, 37 & 30 Hectares From T0 to T1, T1-T2, T2 to T3 & T4-T5 respectively and overall increase of 153 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is an increase of 86 ha of the Plantation/Horticulture area has been increased between 2010-11 (t0) & 2018-19 (T5) years.
6. There is a decrease of 333 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (20) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (20) verified from the portal.