MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -57/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
February-2022

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

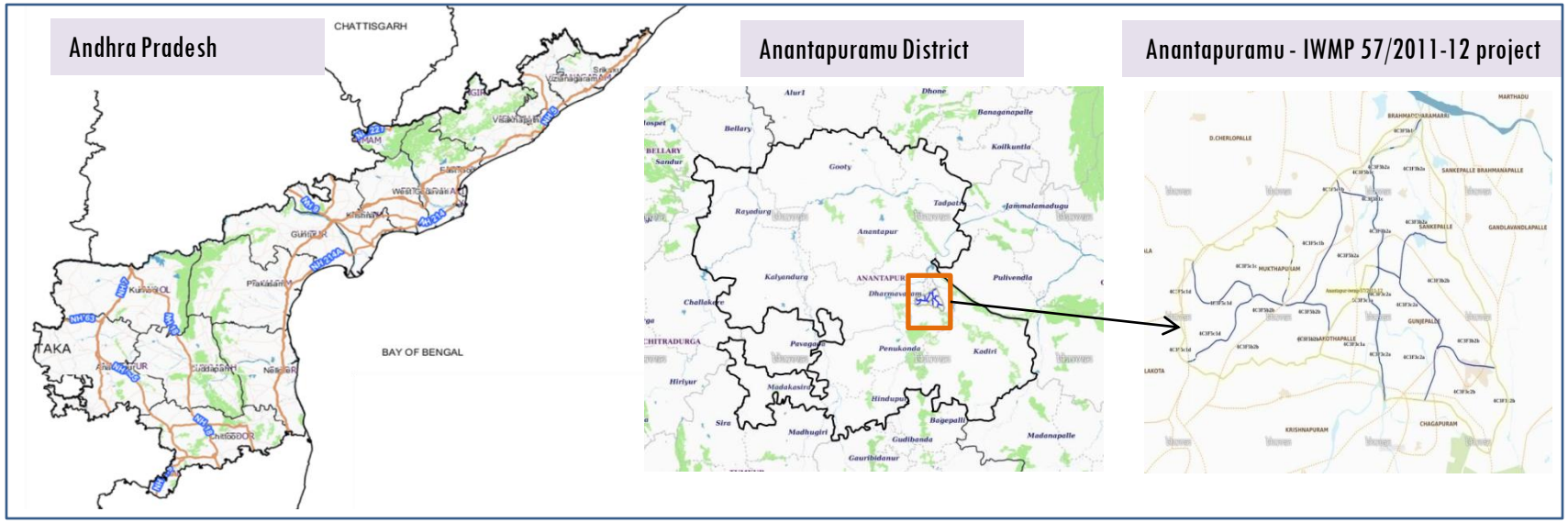
CONTENTS

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-57/2011-12, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **9,963** ha. It comprises of 11 micro watersheds.
- In the project area 117 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an decreased by 28 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 67 % is covered by the agriculture, 20 % is covered by Scrub land, 6 % is covered by plantation and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-57/2011-12
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Mudigubba Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **9,963** ha. It comprises of 11 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2011-12 (T0) period (***Batch -1***) projects taking 2019-20 (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.

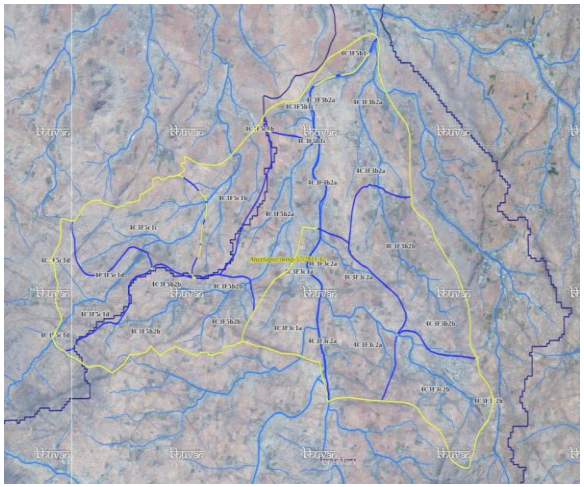
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2013-14	2019-20
LISS IV	2011-12		
SCENE 1			4-Jan-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			4-Jan-20
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	117
4	Detailed Project Report		

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



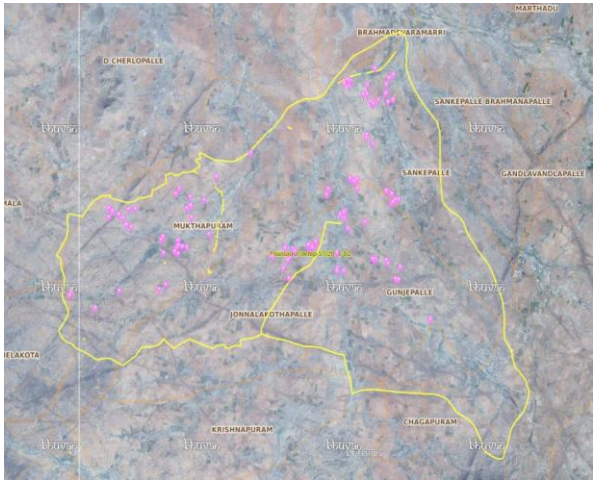
Legend

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	21	21
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	2	2
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	7	7
11	Civil work-Check dams/Rock fill dam	84	82
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-Plantation/Horticulture	1	1
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	4	4
	TOTAL	**119**	**117**

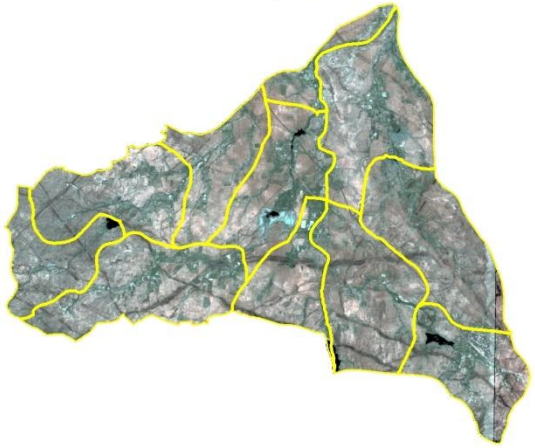
MONITORING IN THE PROJECT AREA

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 (2011-12) and T5 is 2019-20 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- 2011-12

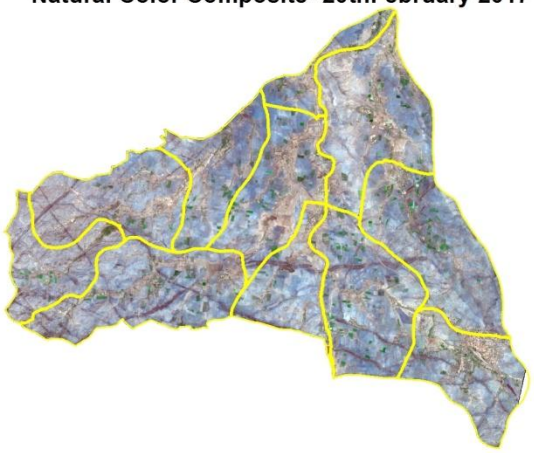


Source:Fusion data,NRSC

Natural Color Composite-26 th January 2015

Source:NCC,NRSC

Natural Color Composite- 20thFebruary 2017

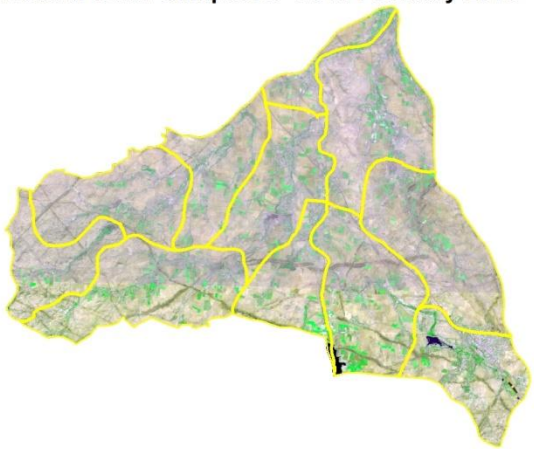


Source:NCC,NRSC

Natural Color Composite-25 th March 2018

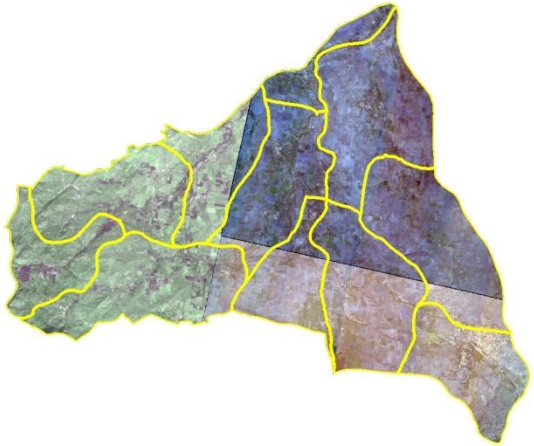
Source:LISS-IV,NRSC

Natural Color Composite- 23 rd February 2019



Source:Sentinel-2

Natural Color Composite- 04 th January 2020



Source:NCC,NRSC

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-57/2011-12

T0: 2011-12

T1: 07 January 2017

Drishti Sl no. 1794768 MWS : 4C3F5c1c

Check dam

T0: 2011-12

T1: 07 January 2017

Drishti Sl no. 1798737 MWS : 4C3F3c2a

Farm Pond

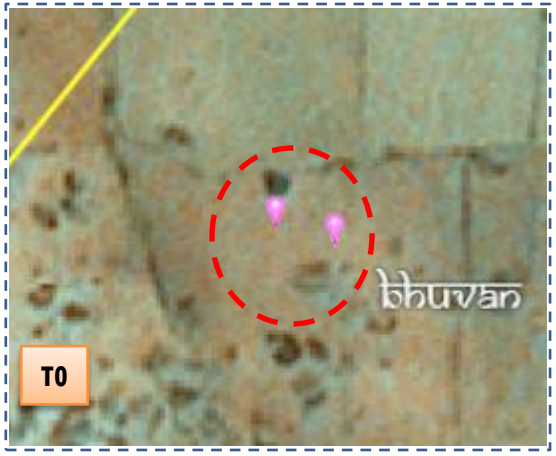
Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-57/2011-12

T0: 2011-12

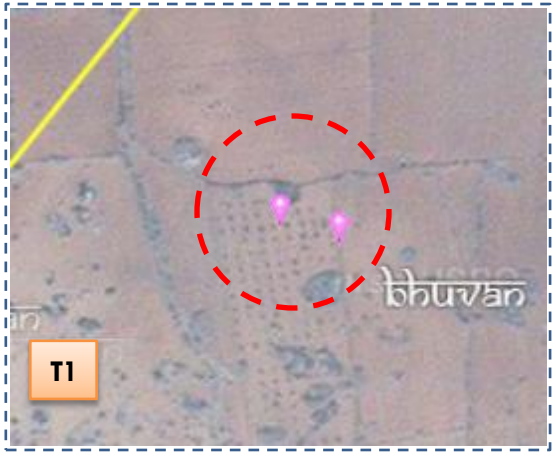
T1: 07 January 2017

Drishti Sl no. 1810977 MWS : 4C3F3b2a

Farm Pond



T0: 2011-12



T1: 07 January 2017

Drishti Sl no. 1811041 MWS : 4C3F3b2b

Horticulture

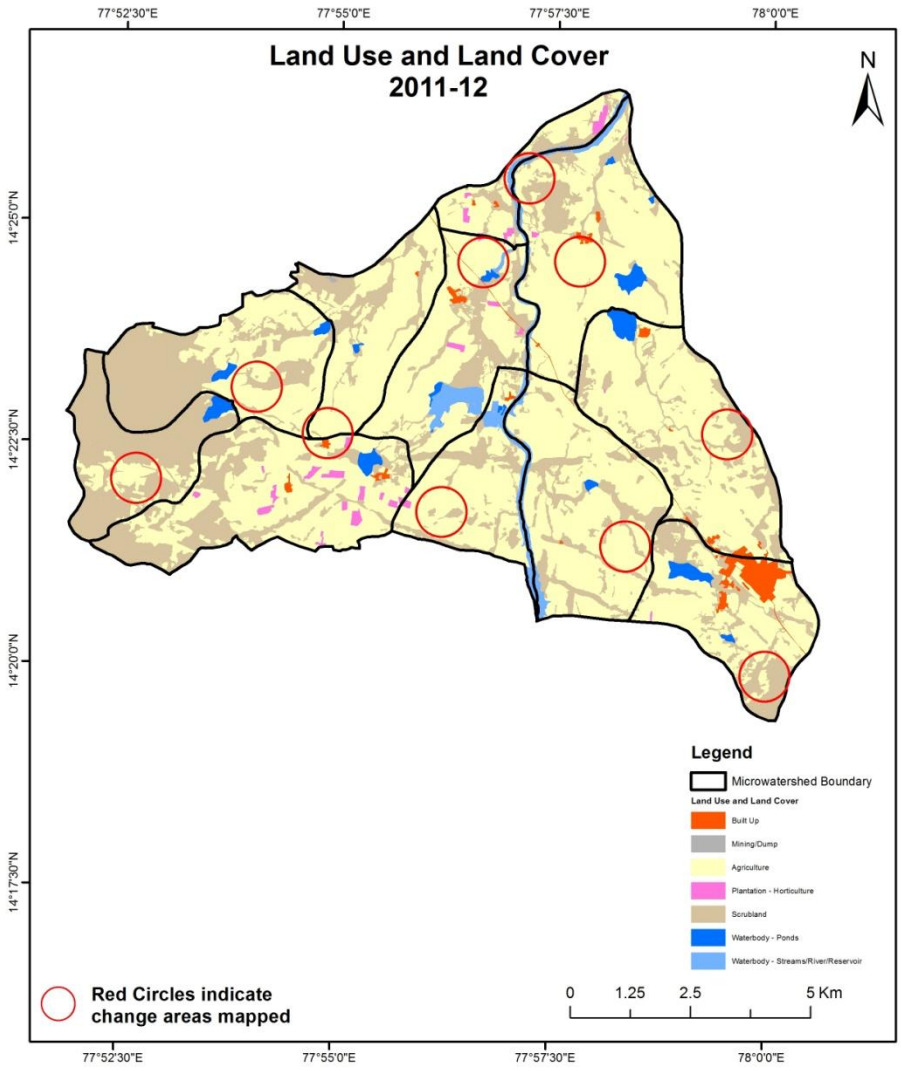
MONITORING IN THE PROJECT AREA

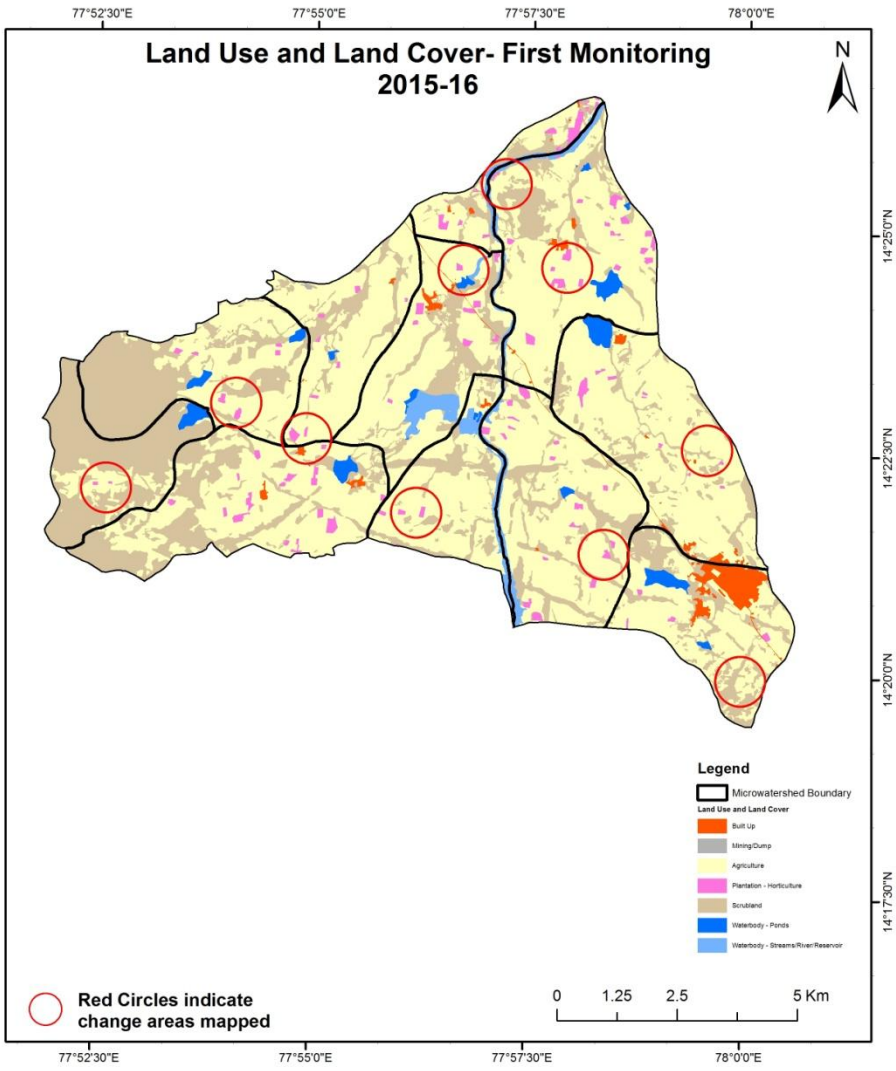
Land use and Land cover Changes in the Project

- 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 (2011-12) and row represents the T5 (2019-20)

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

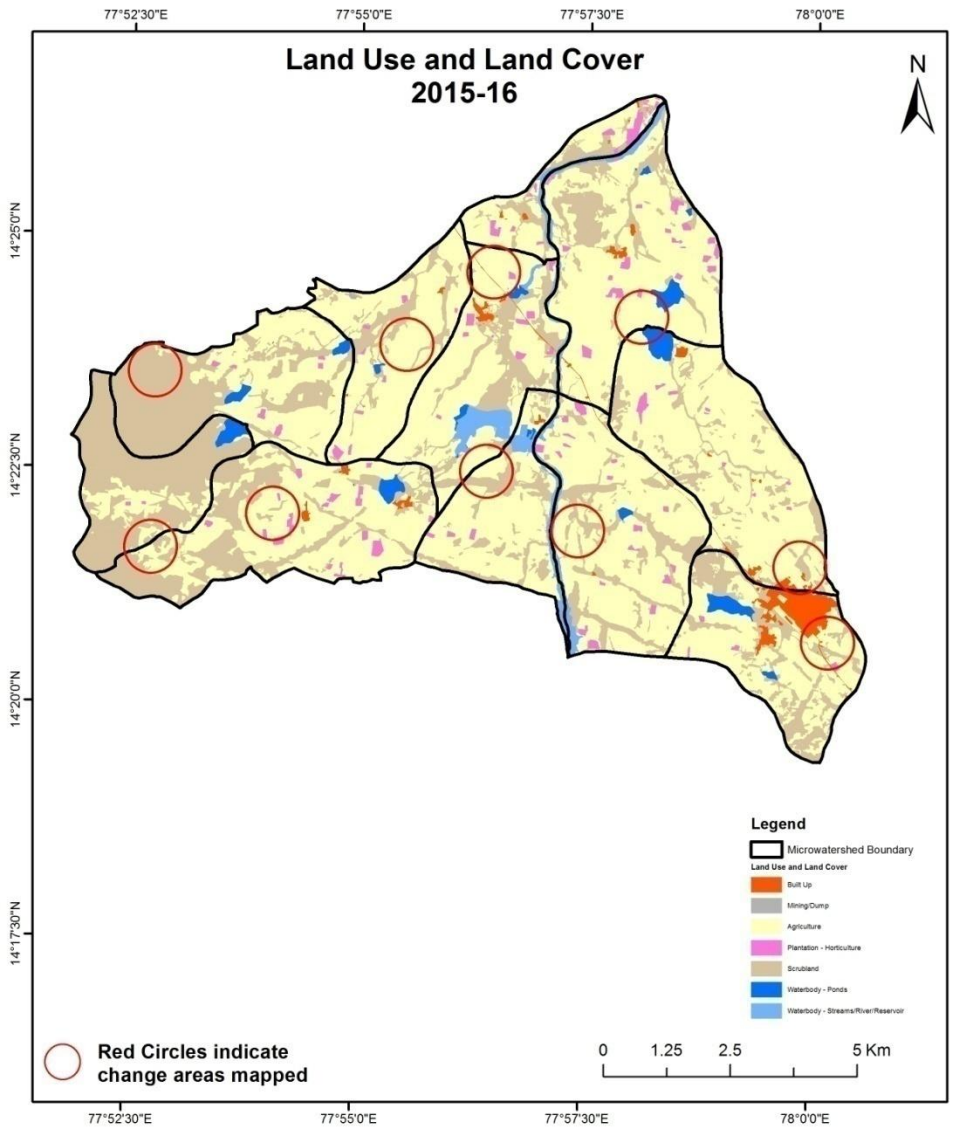
Scale: 1:10000

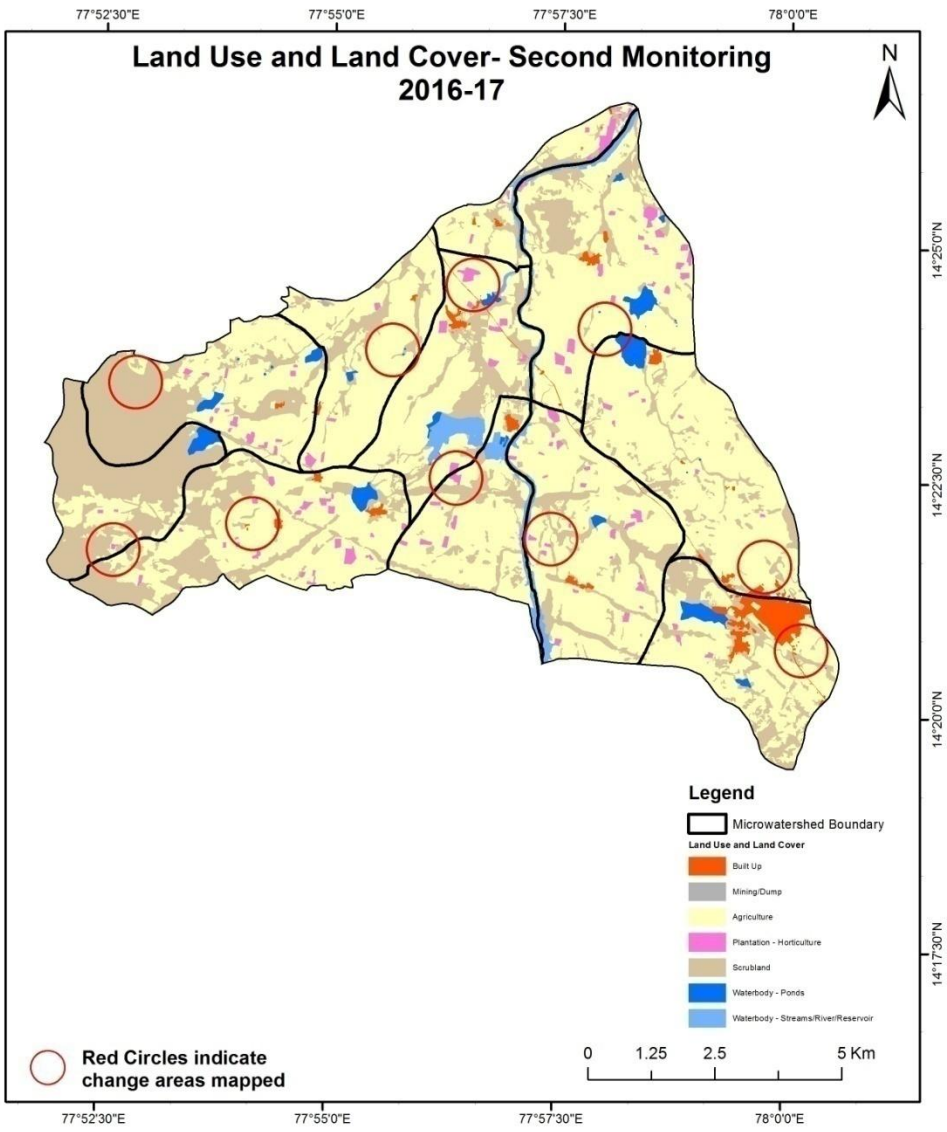




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

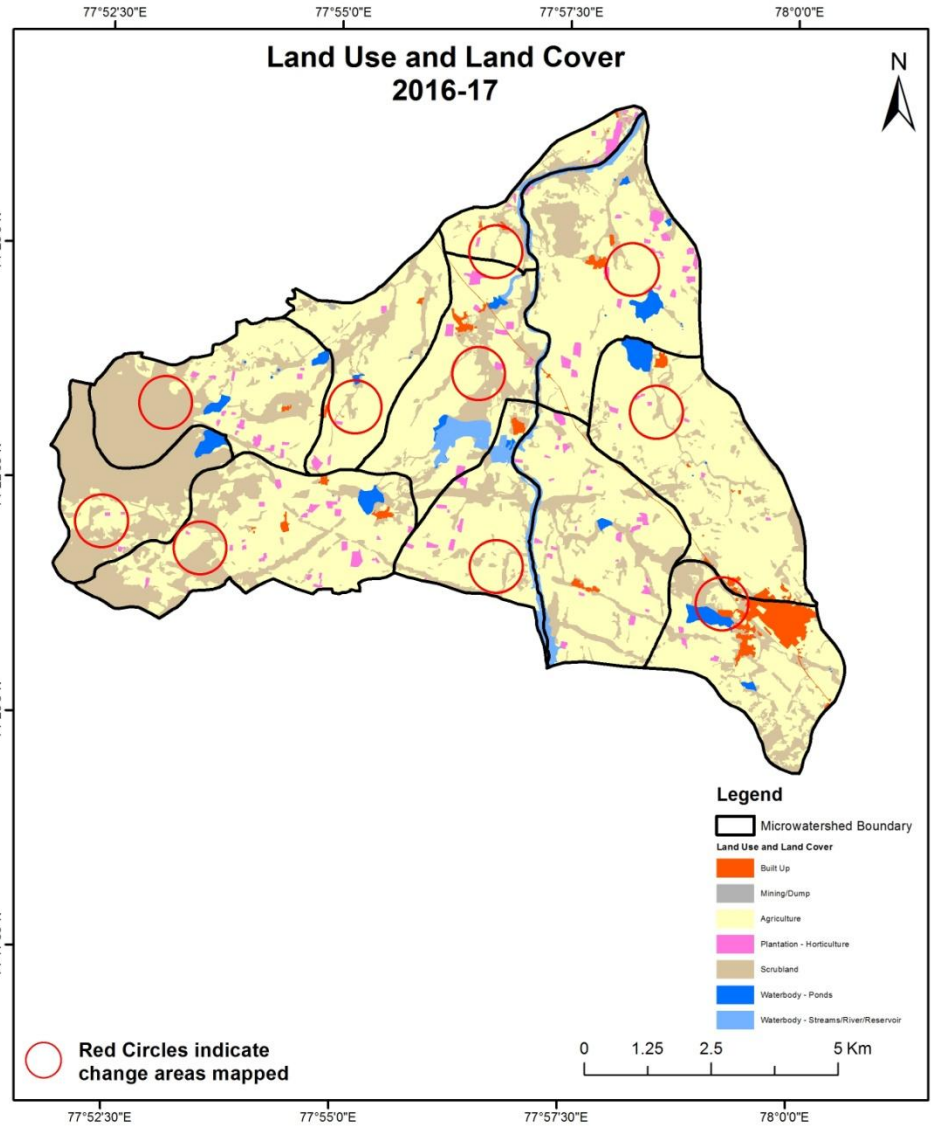
Scale: 1:10000

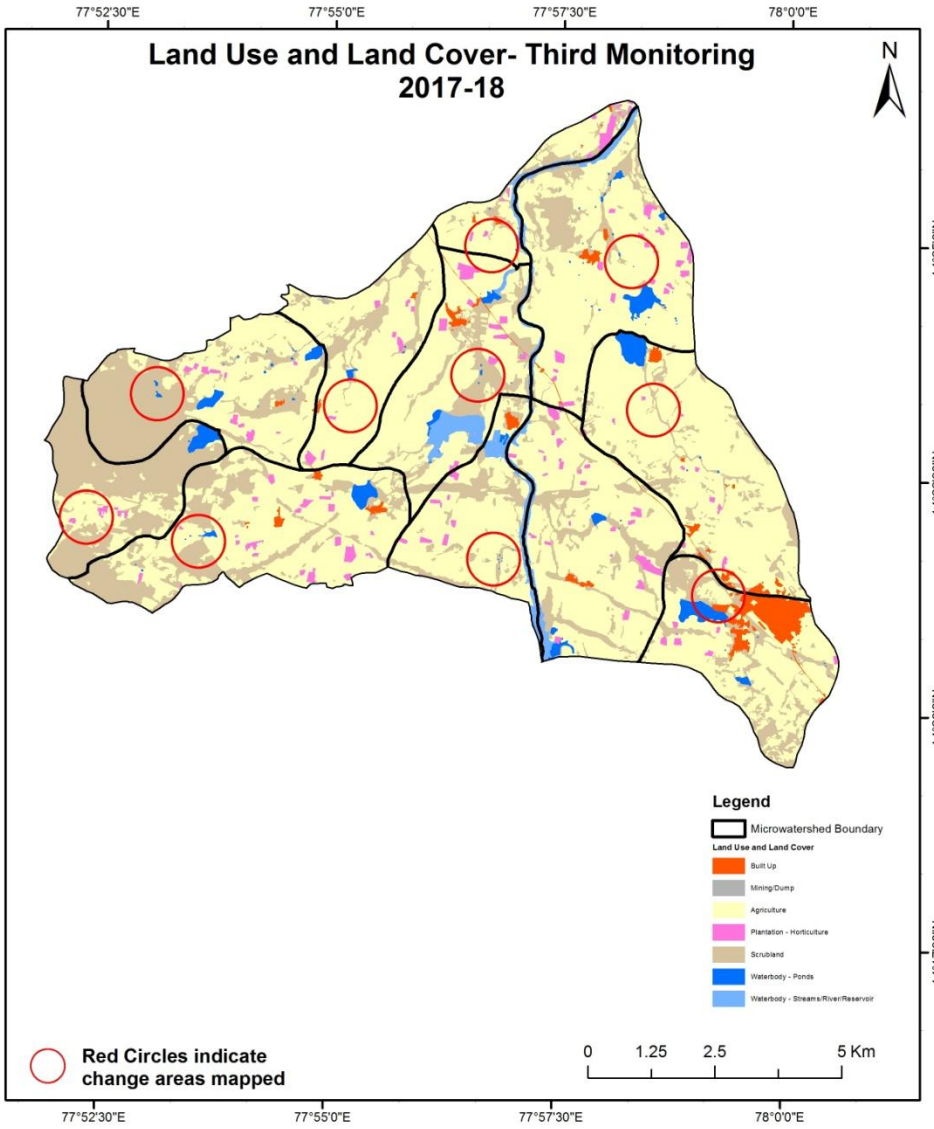




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

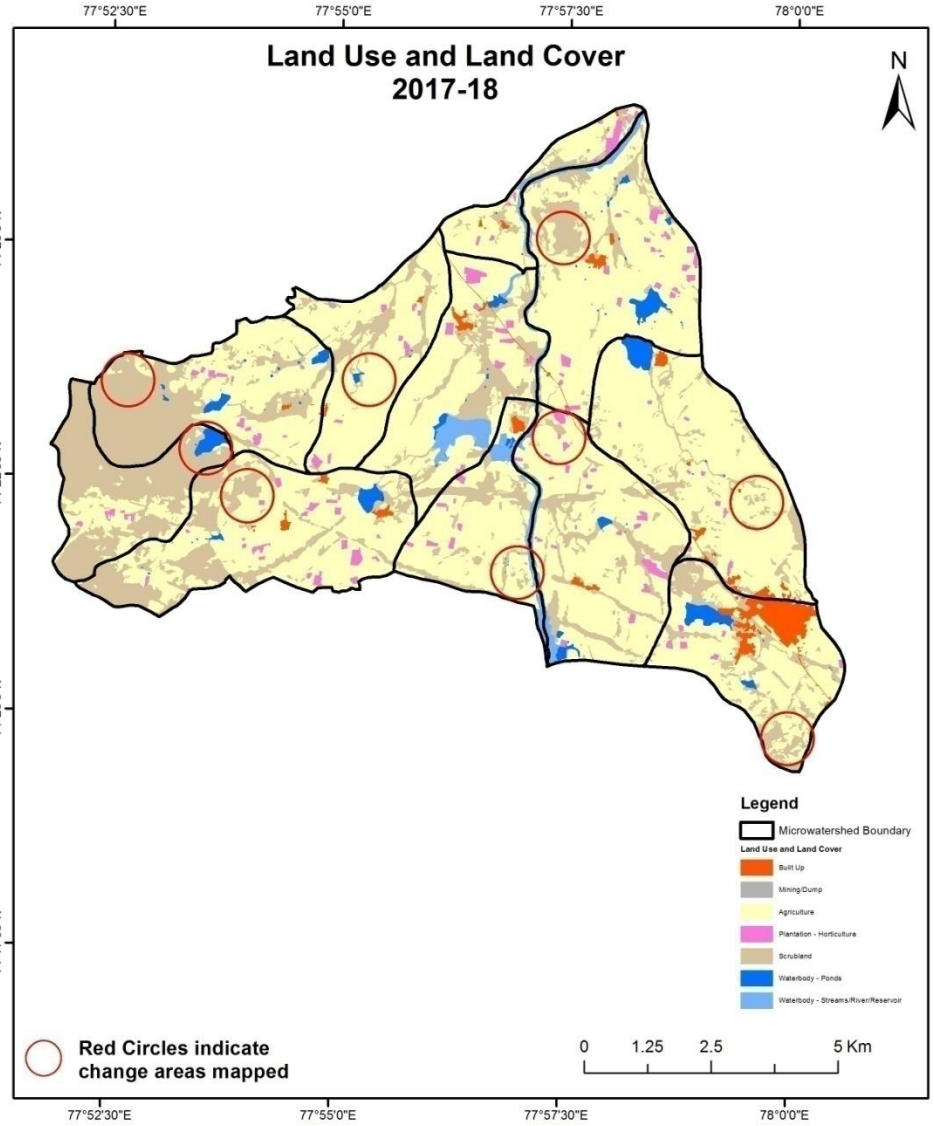
Scale: 1:10000

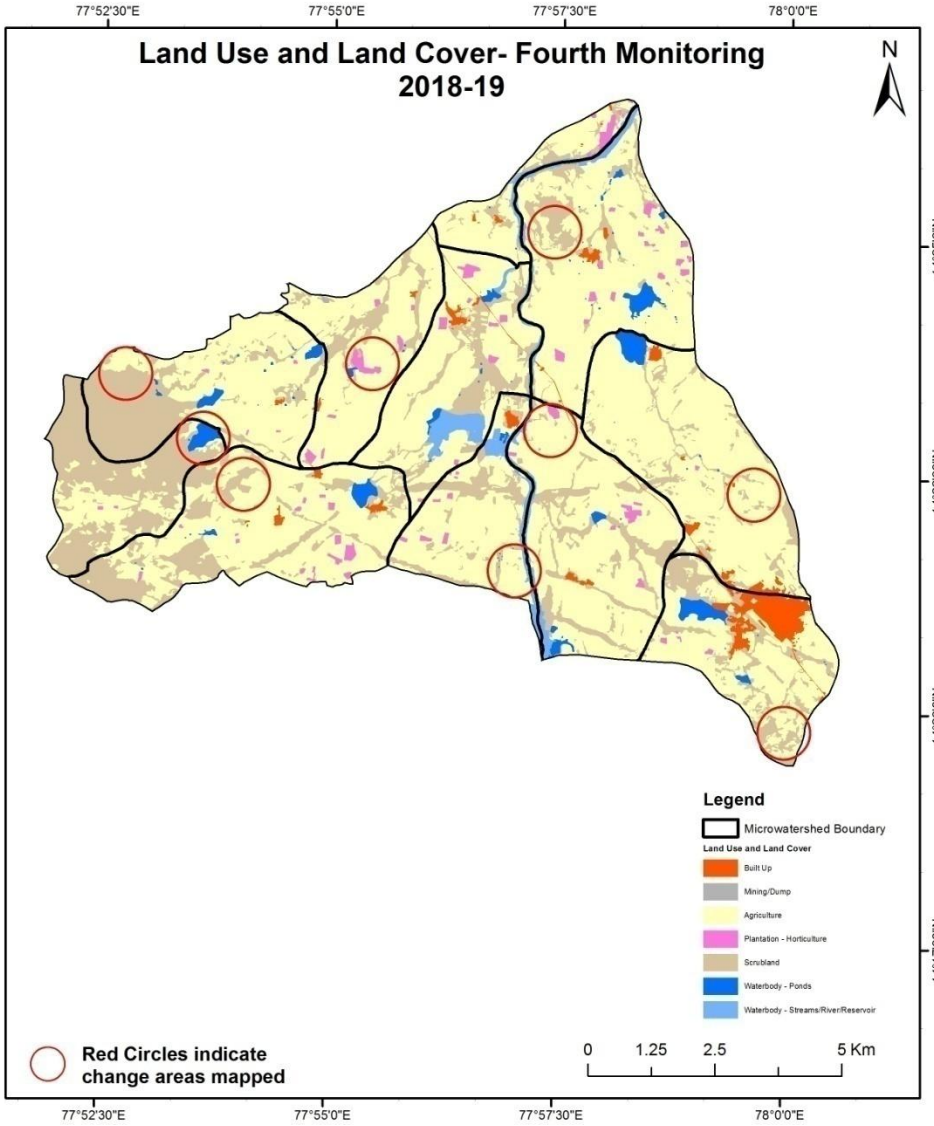




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

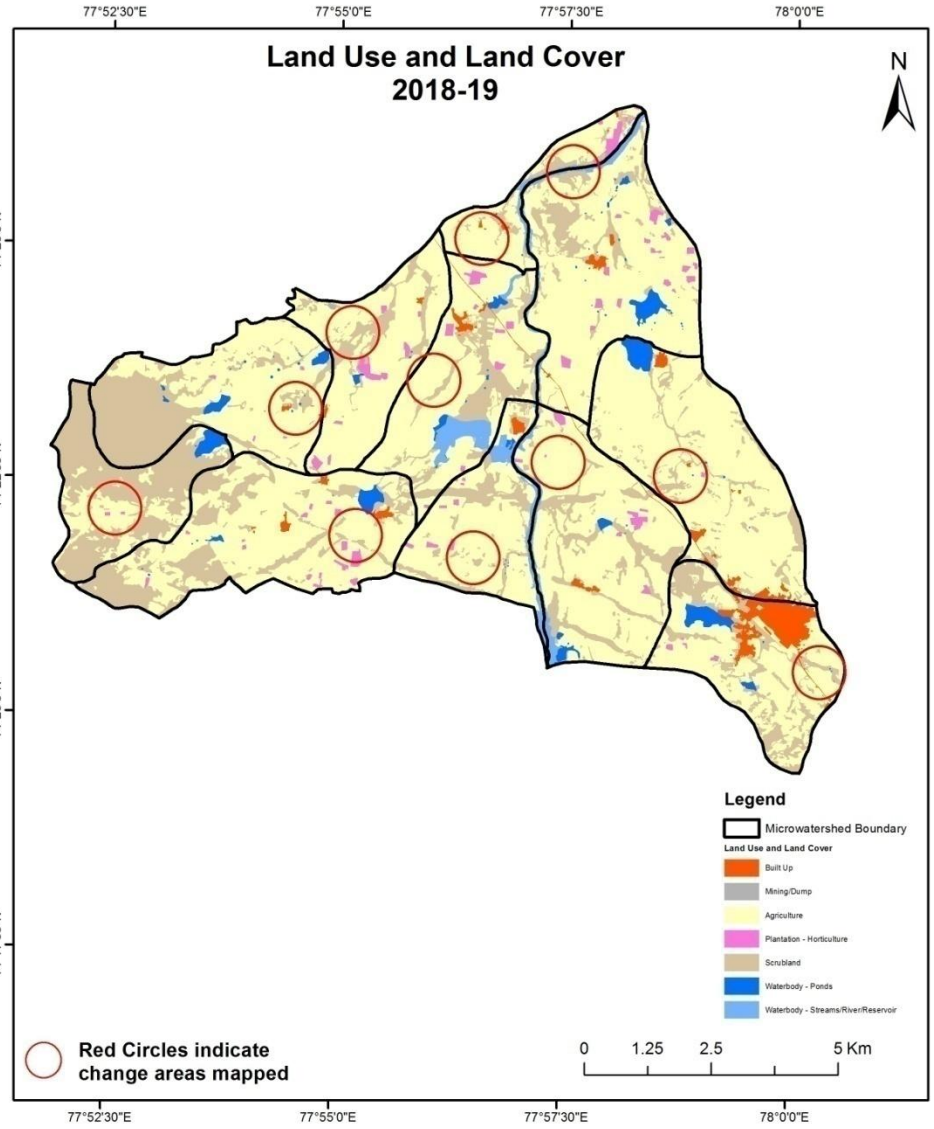
Scale: 1:10000

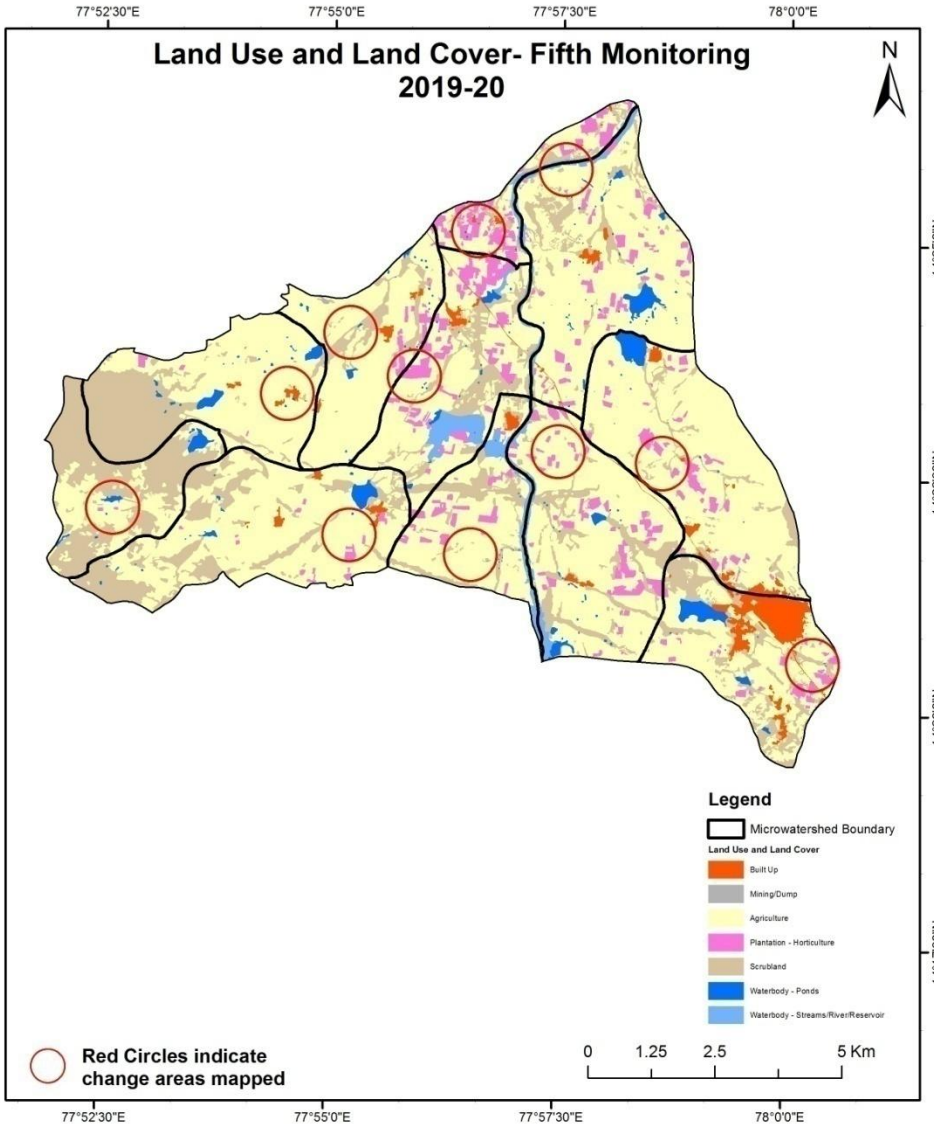




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

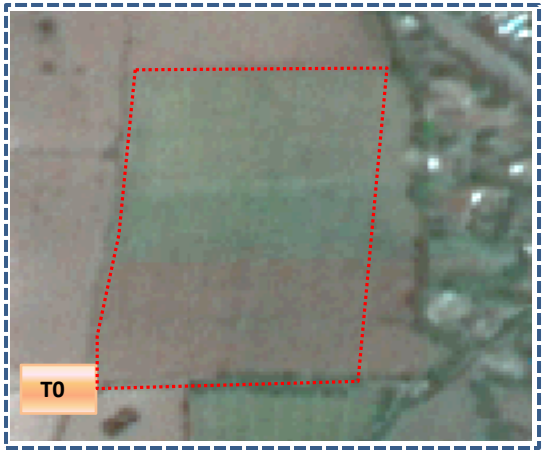
Scale: 1:10000





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

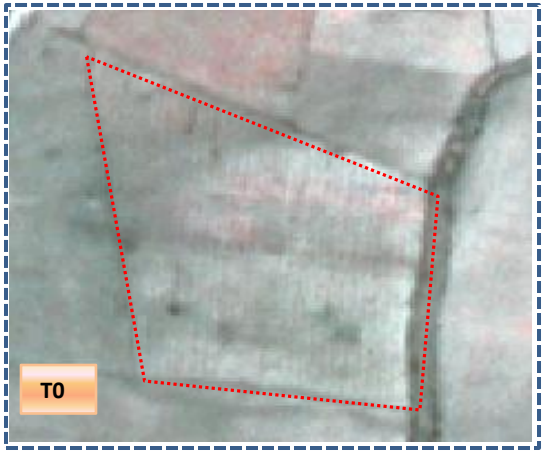
Agriculture to Plantation



T0: 2011-12 (77°56'13.017"E 14°24'7.452"N)

T1: 26 January 2015

Agriculture to Plantation



T0: 2011-12 (77°57'27.176"E 14°23'47.928"N)

T1: 26 January 2015

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

Scrub to Water body

T0: 2011-12 (77°57'59.636"E 14°25'45.065"N)

T1: 26 January 2015

Scrub to Agriculture

T0: 2011-12 (77°55'56.567"E 14°23'21.62"N)

T1: 26 January 2015

Table showing change matrix depicting Land cover transitions during study period-2011-12 to 2015-16

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	136.92										136.92
Mining/dump		1.97									1.97
Agriculture	24.90		6180.34	129.09							6334.33
Plantation Horticulture			27.17	49.78							76.95
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.34		163.45	7.86				2826.86		0.16	2999.68
Waterbody-Streams/River			8.70	0.46					249.11		258.27
Waterbody – Ponds			0.91							154.54	155.46
Grand Total	163.16	1.97	6380.58	187.20				2826.86	249.11	154.71	9963.58

- 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 153 ha of the agriculture area has decreased and it is converted into Built-up and plantation in T1.
- In T1 191 ha of the agriculture area has increased from plantations, 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-2015-16 to 2016-17

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	163.16										163.16
Mining/dump		1.97									1.97
Agriculture	15.08		6300.69	64.17						0.63	6380.58
Plantation Horticulture			62.05	125.09						0.05	187.20
Forest											
Forest Plantation											
Barren Rocky											
Scrub	13.23		162.09					2650.29		1.25	2826.86
Waterbody-Streams/River			0.50						248.61		249.11
Waterbody – Ponds										154.71	154.71
Grand Total	191.48	1.97	6525.33	189.27				2650.29	248.61	156.65	9963.58

- 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 79 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.
- In T2 224 ha of the agriculture area has increased from plantations, 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-2016-17 to 2017-18

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	191.48										191.48
Mining/dump		1.97									1.97
Agriculture	6.77		6441.87	59.68						17.00	6525.33
Plantation Horticulture	0.05		38.69	150.53							189.27
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.54	0.27	167.10					2475.00		7.38	2650.29
Waterbody-Streams/River									248.61		248.61
Waterbody – Ponds										156.65	156.65
Grand Total	198.84	2.24	6647.66	210.21				2475.00	248.61	181.03	9963.58

- 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 83 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T3.
- In T3 205 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-2017-18 to 2018-19

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	198.84										198.84
Mining/dump		2.24									2.24
Agriculture	6.66		6616.14	24.85							6647.66
Plantation Horticulture			94.55	115.24						0.42	210.21
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.48		199.67					2273.67		0.17	2475.00
Waterbody-Streams/River									248.61		248.61
Waterbody – Ponds			0.03							181.00	181.03
Grand Total	206.99	2.24	6910.40	140.09				2273.67	248.61	181.59	9963.58

- 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 31 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T4.
- In T4 294 ha of the agriculture area has increased from plantations 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-2018-19 to 2019-20

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	206.99										206.99
Mining/dump		2.24									2.24
Agriculture	29.79	0.06	6360.84	497.73						21.98	6910.40
Plantation Horticulture			52.12	87.97							140.09
Forest											
Forest Plantation											
Barren Rocky											
Scrub	6.97		253.48	1.19				2003.78		8.26	2273.67
Waterbody-Streams/River			0.47	3.44					244.71		248.61
Waterbody – Ponds			13.40	0.71						167.48	181.59
Grand Total	243.74	2.29	6680.32	591.04				2003.78	244.71	197.71	9963.58

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

•In T5 319 ha of the agriculture area has increased from plantations, 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 decrease of 28 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
4. There is an increase of 46, 144, 122 & 262 Hectares from T0-T1, T1-T2, T2-T3 & T3-T4 respectively, there is a decrease of 230 hectares from T4-T5 and overall increase of 345 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 514 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 995 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.