MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -16/2010-11
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

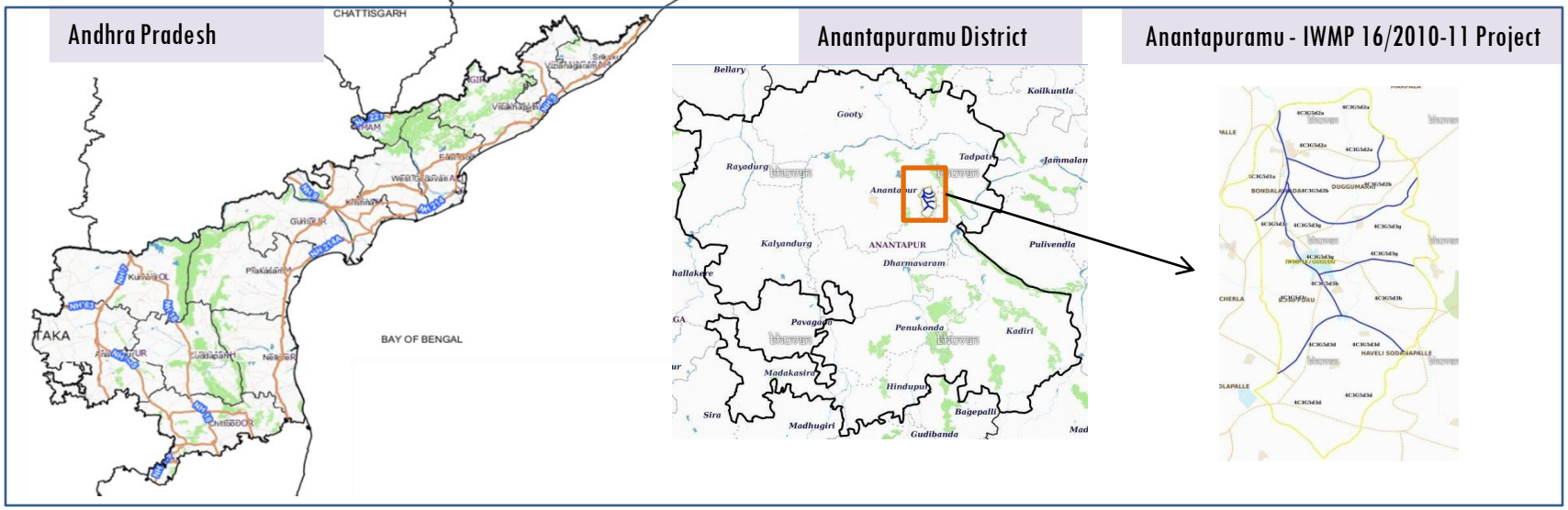
CONTENTS

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-16/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 7,580 ha. It comprises of 7 micro watersheds.
- In the project area 224 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increase by 53 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 73 % is covered by the agriculture, 16 % is covered by Scrub land, 3.4 % is covered by plantation and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-16/2010-11
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Narpala Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 7,580 ha. It comprises of 7 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.

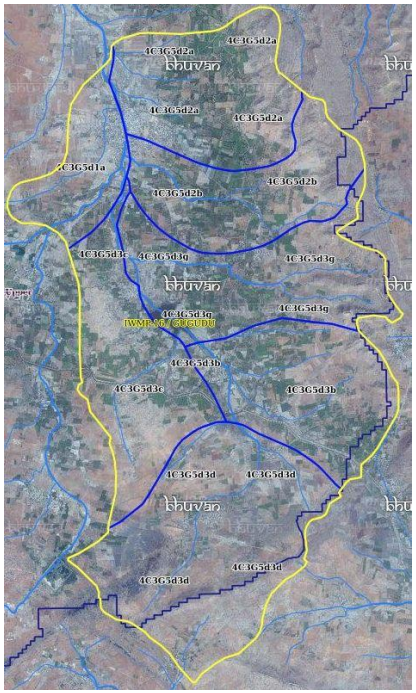
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			3-Oct-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			3-Oct-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	224
4	Detailed Project Report		

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



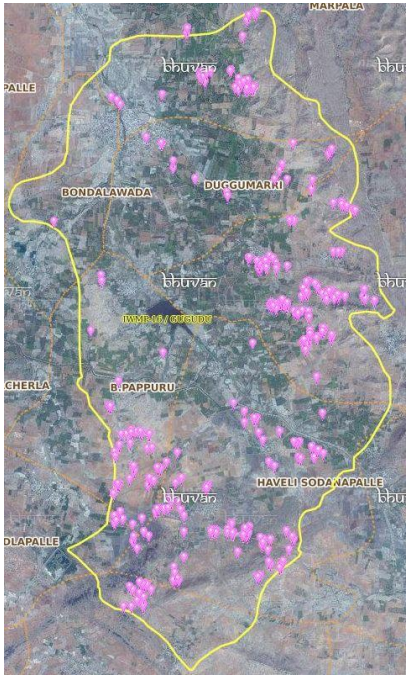
Legend

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	150	70
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	33	16
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	29	25
10	Civil work-Check dams/Rock fill dam	66	52
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	2	2
14	Livelihood Activities-Plantation/Horticulture	72	44
15	Capacity Building Activities	0	0
16	Entry Point Activity	5	3
17	Others	24	12
	TOTAL	**381**	**224**

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.

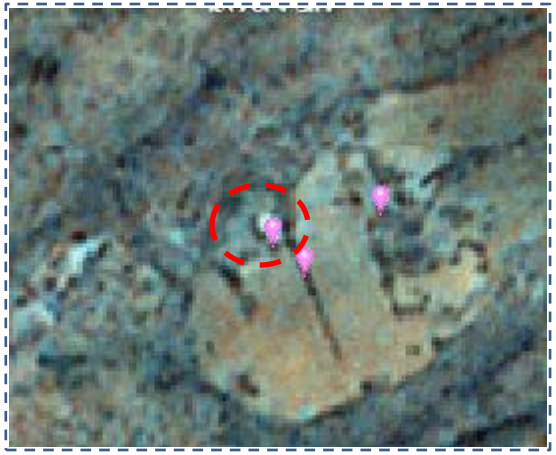
Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-16/2010-11

T0:2010-11

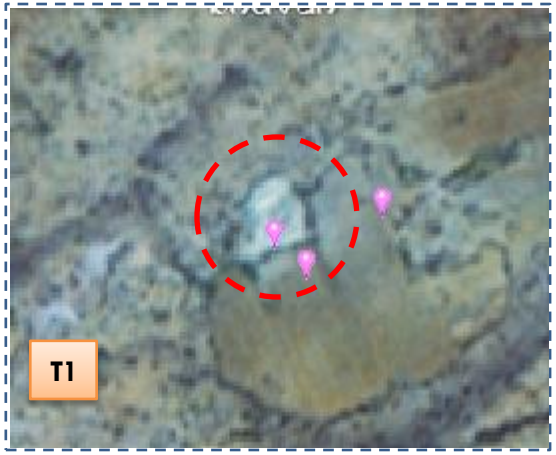
T1: 18 February 2015

Drishti Sl no. 316919 MWS : 4C3G5d3d

Dugout pit



T0:2010-11



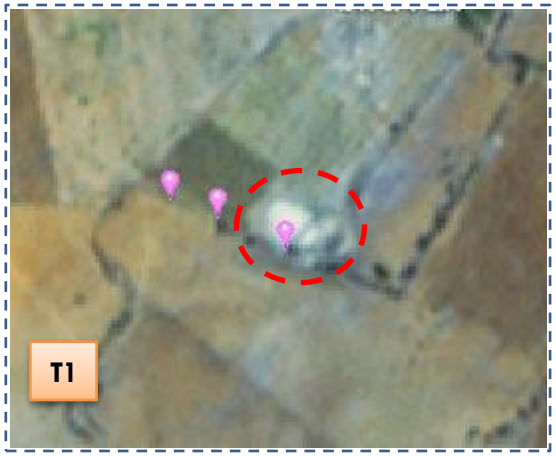
T1: 18 February 2015

Drishti Sl no. 317535 MWS : 4C3G5d3d

Dugout pit

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

T0:2010-11



T1: 18 February 2015

Drishti Sl no. 329123 MWS : 4C3G5d3d

Farm pond

T0:2010-11

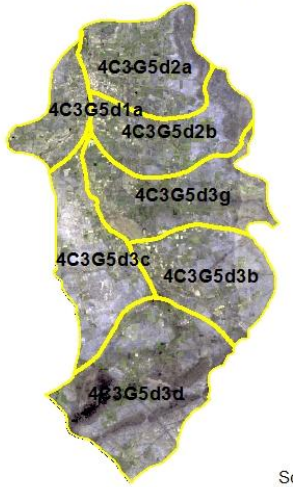
T1: 18 February 2015

Drishti Sl no. 316525 MWS : 4C3G5d3g

Horticulture

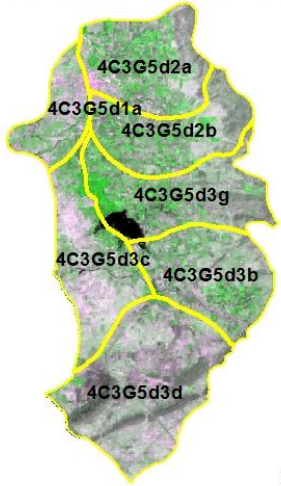
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2010-11



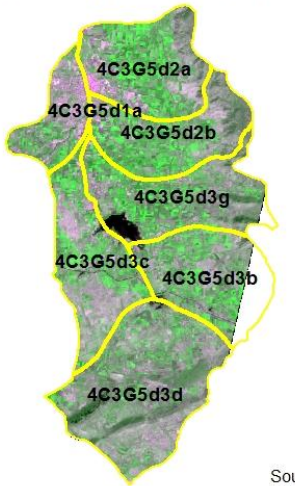
Source:NCC,NRSC

Natural Color Composite-18th Febrauary 2015



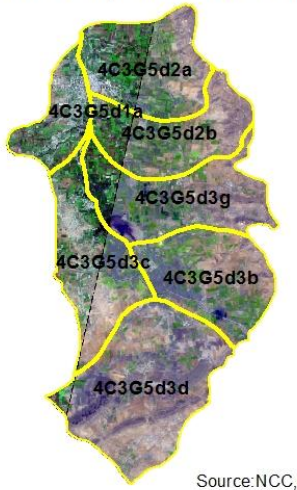
Source:LISS-IV,NRSC

Natural Color Composite- 7th December 2015



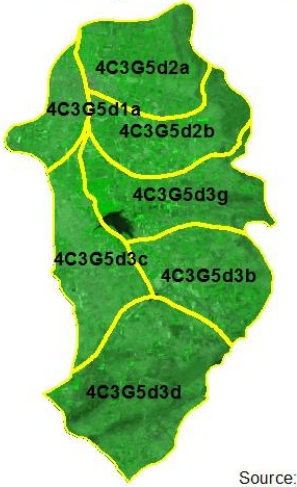
Source:NCC,NRSC

Natural Color Composite- 17th October 2016



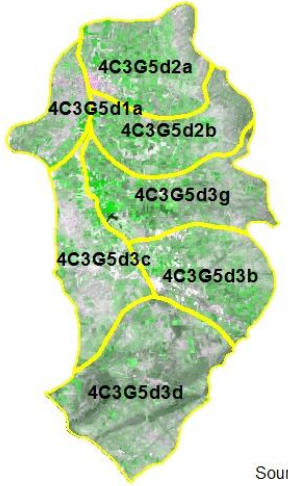
Source:NCC,NRSC

Natural Color Composite- 1st March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 03rd October 2019



Source:LISS-IV,NRSC

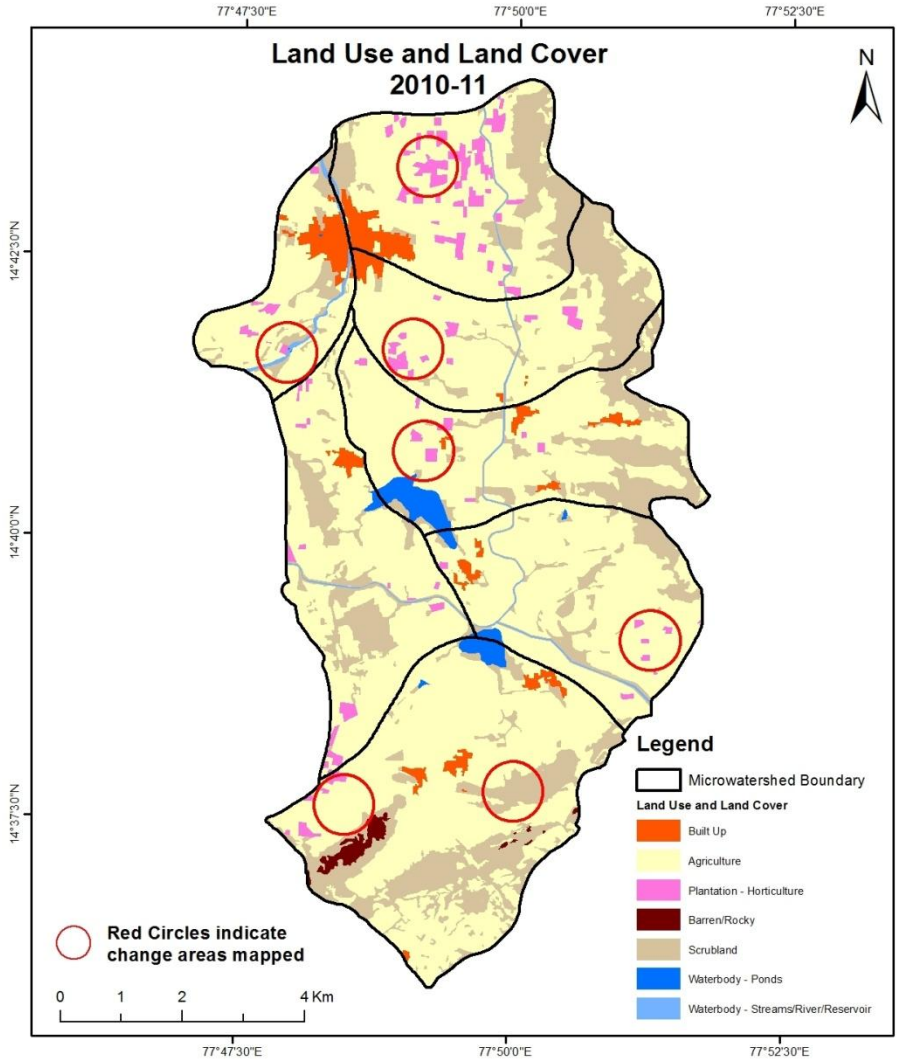
MONITORING IN THE PROJECT AREA

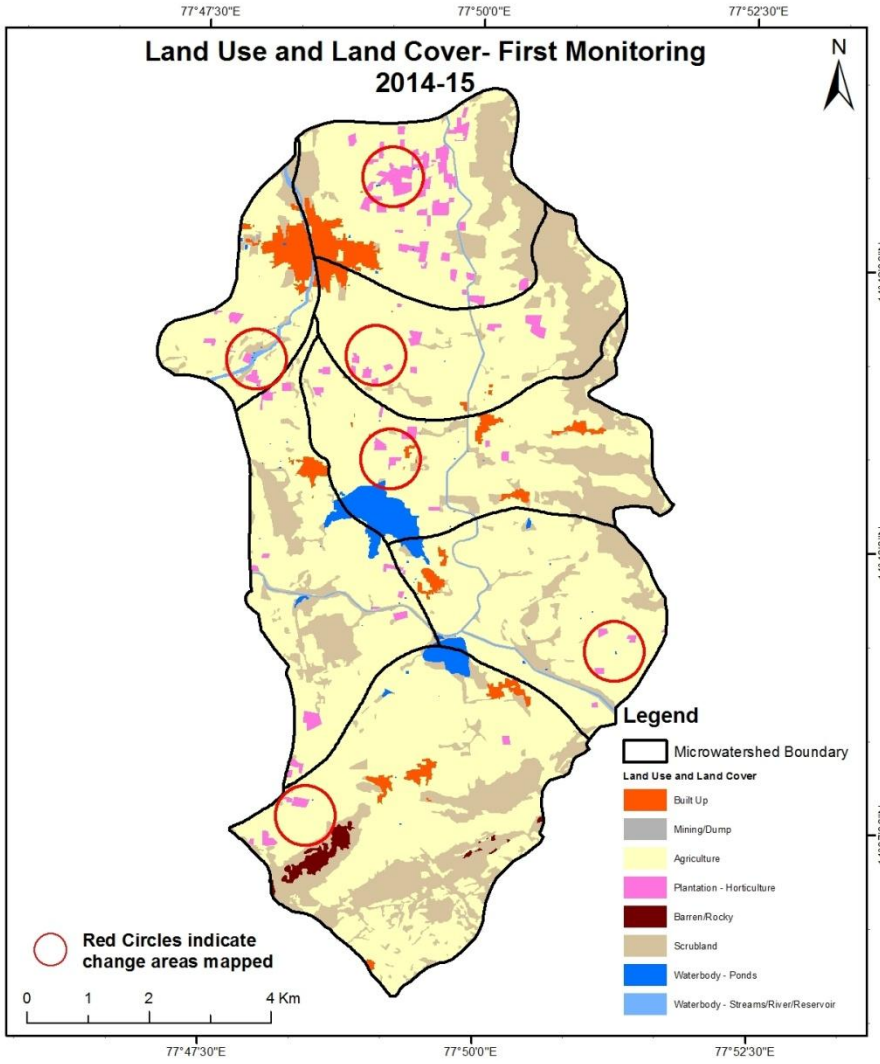
Land use and Land cover Changes in the Project

- 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)

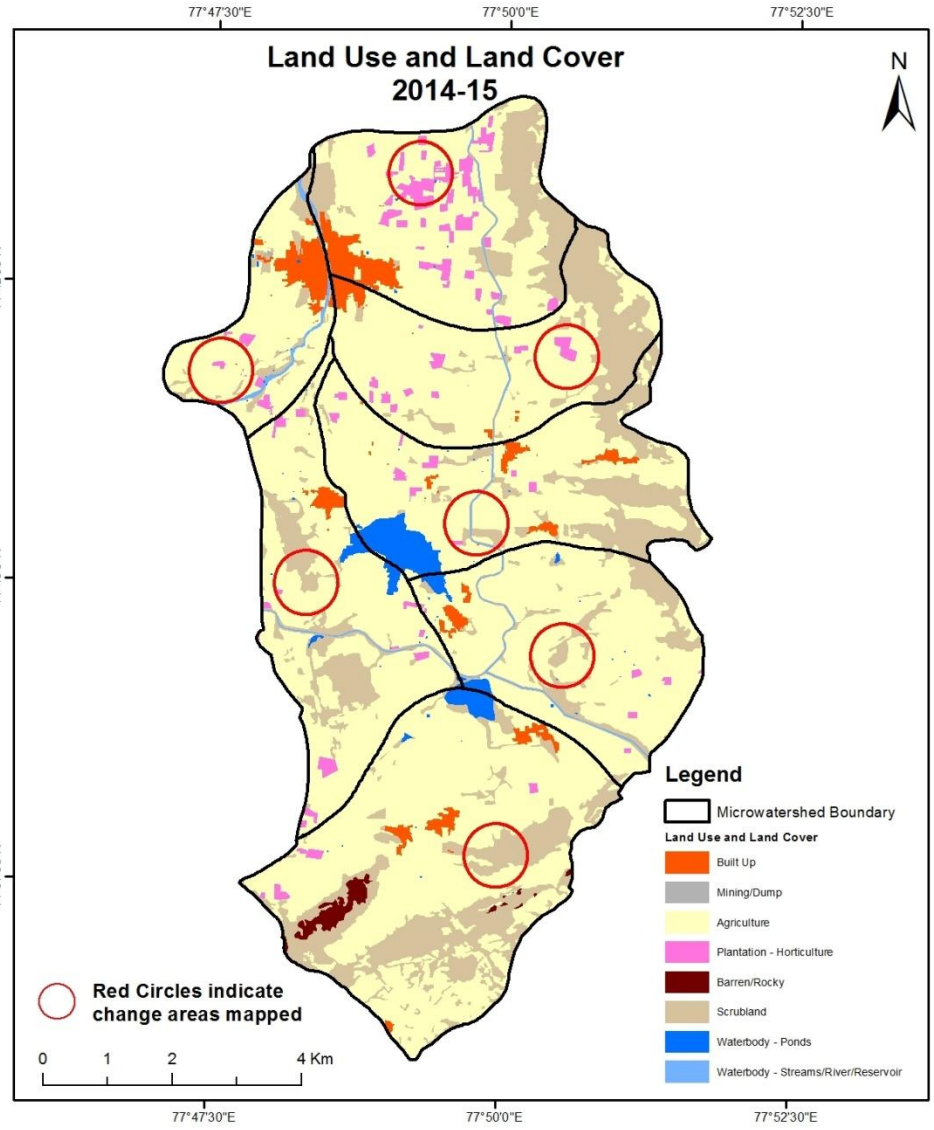
Scale: 1:10000

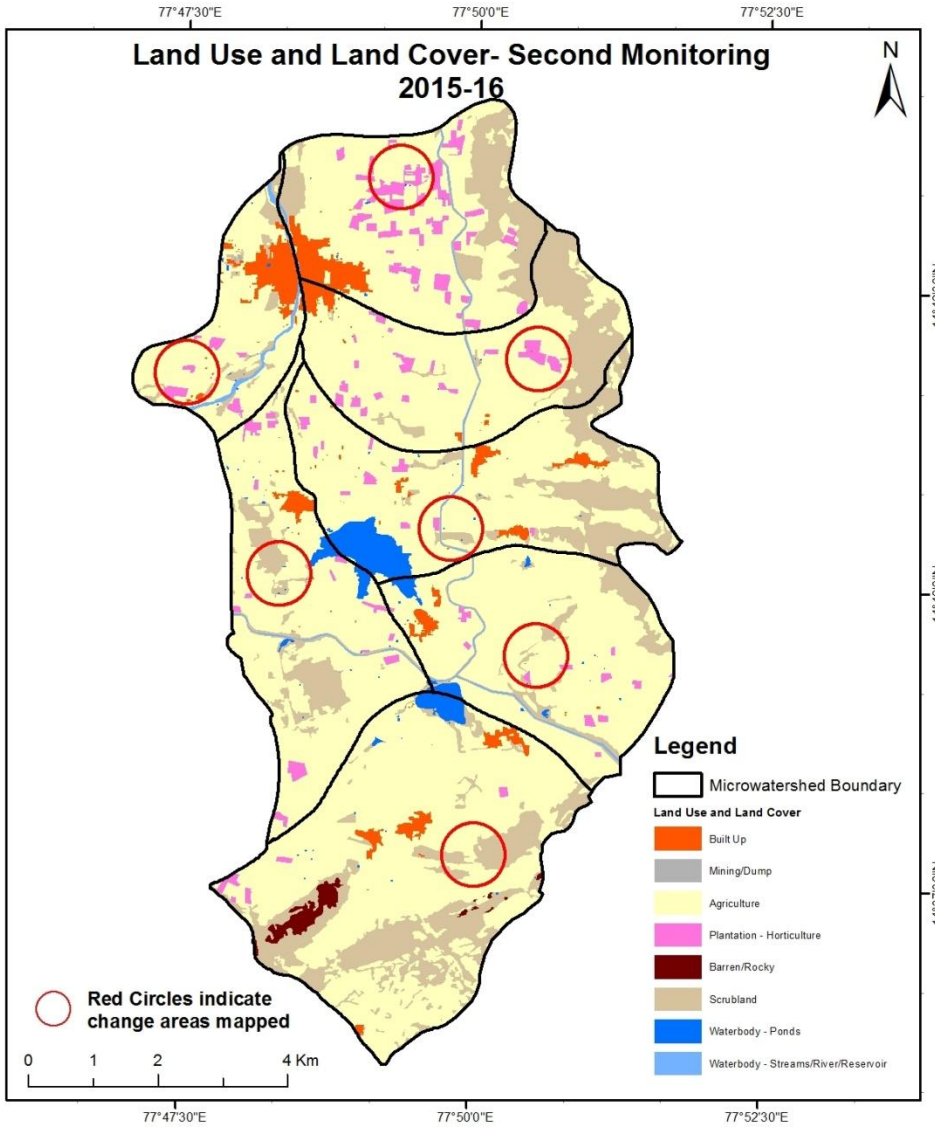




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

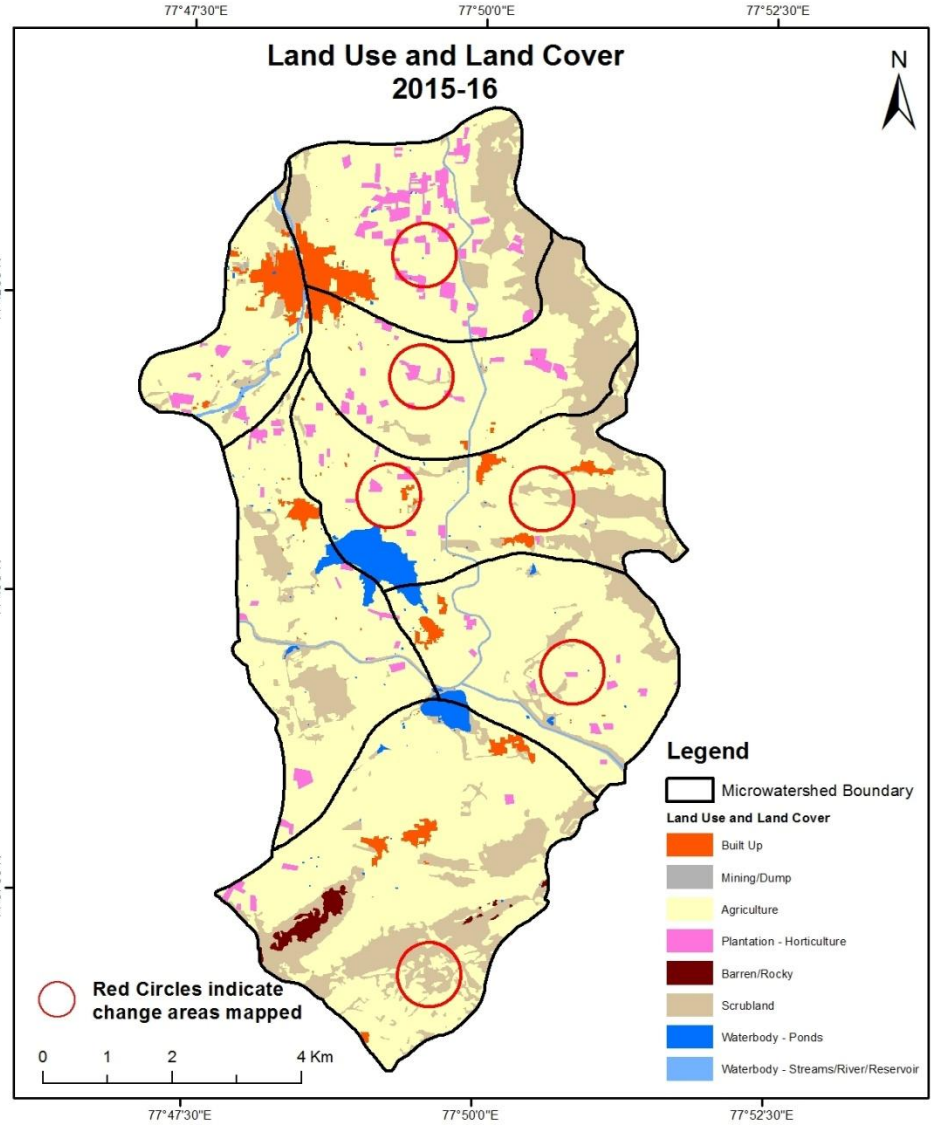
Scale: 1:10000

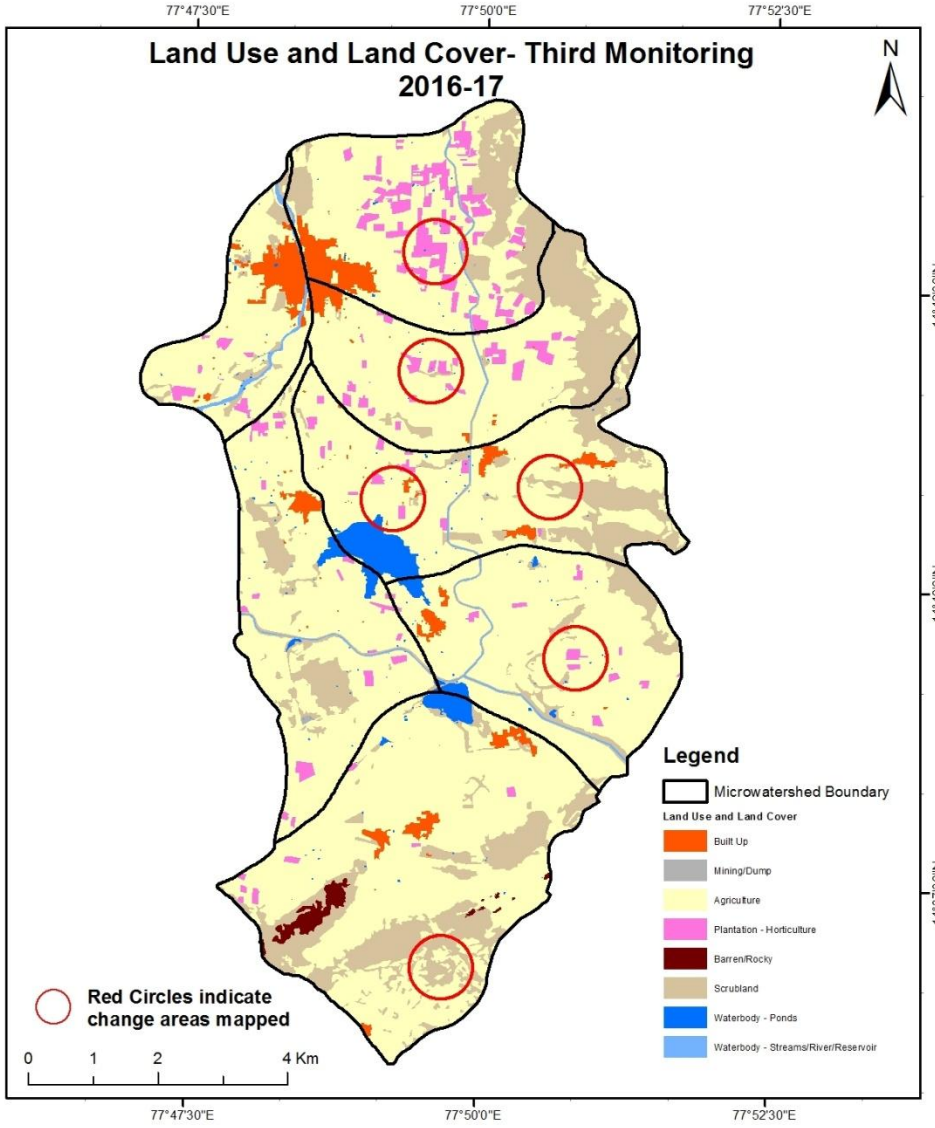




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

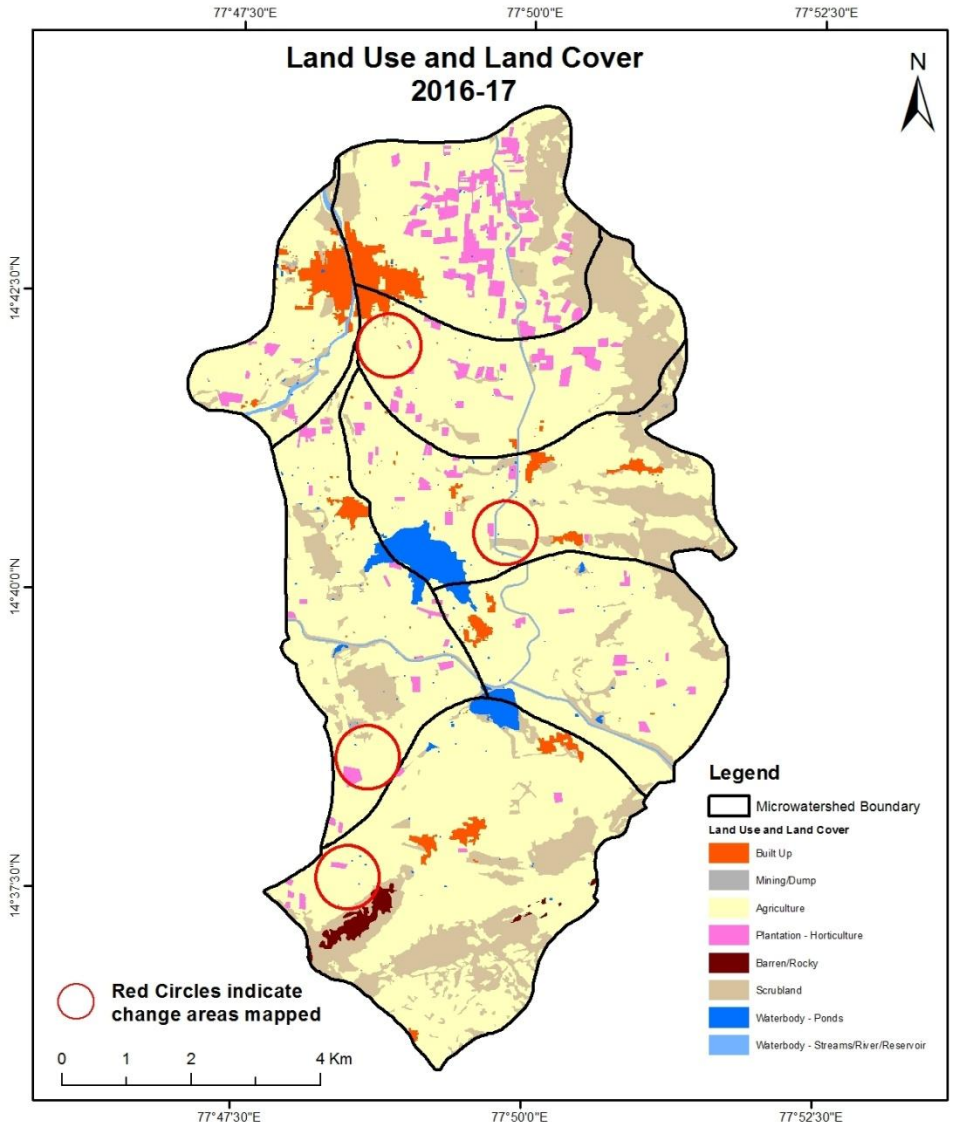
Scale: 1:10000

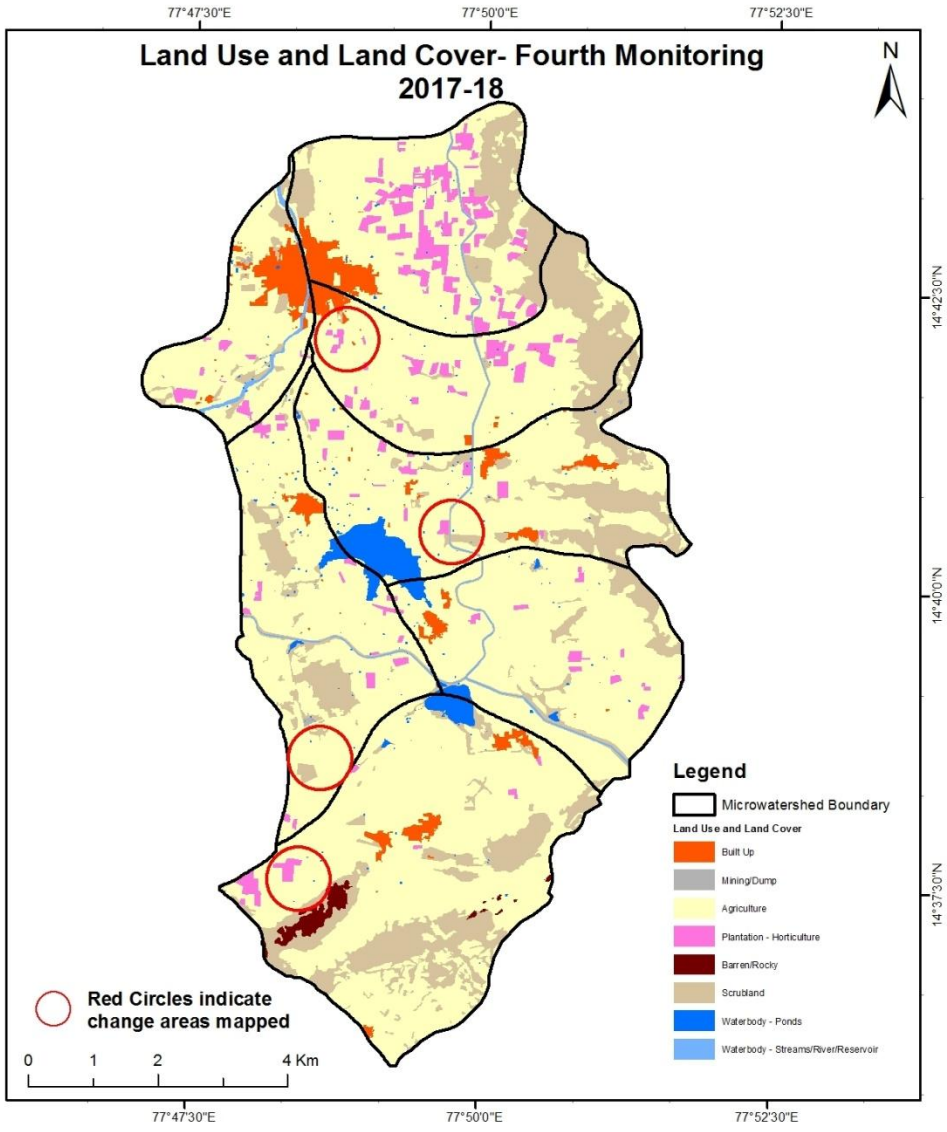




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

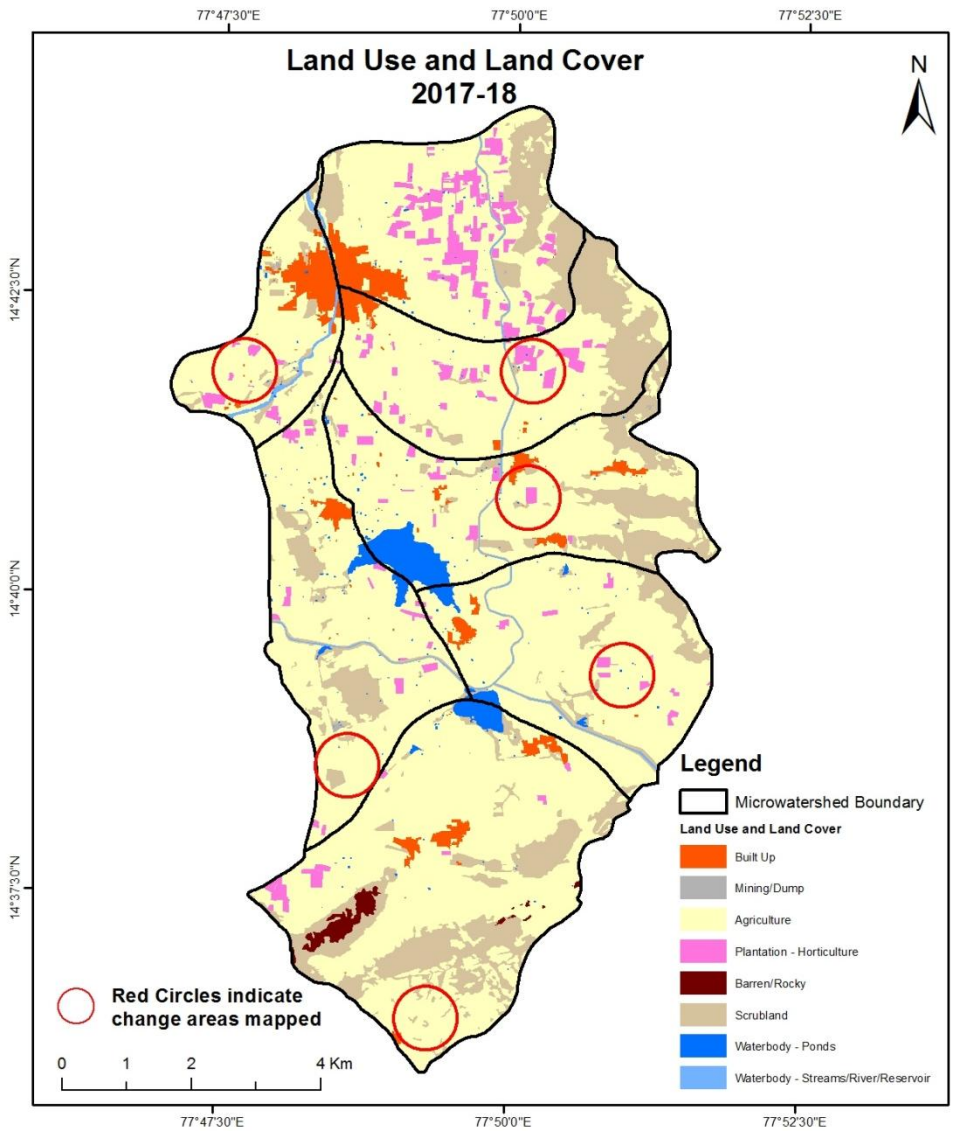
Scale: 1:10000

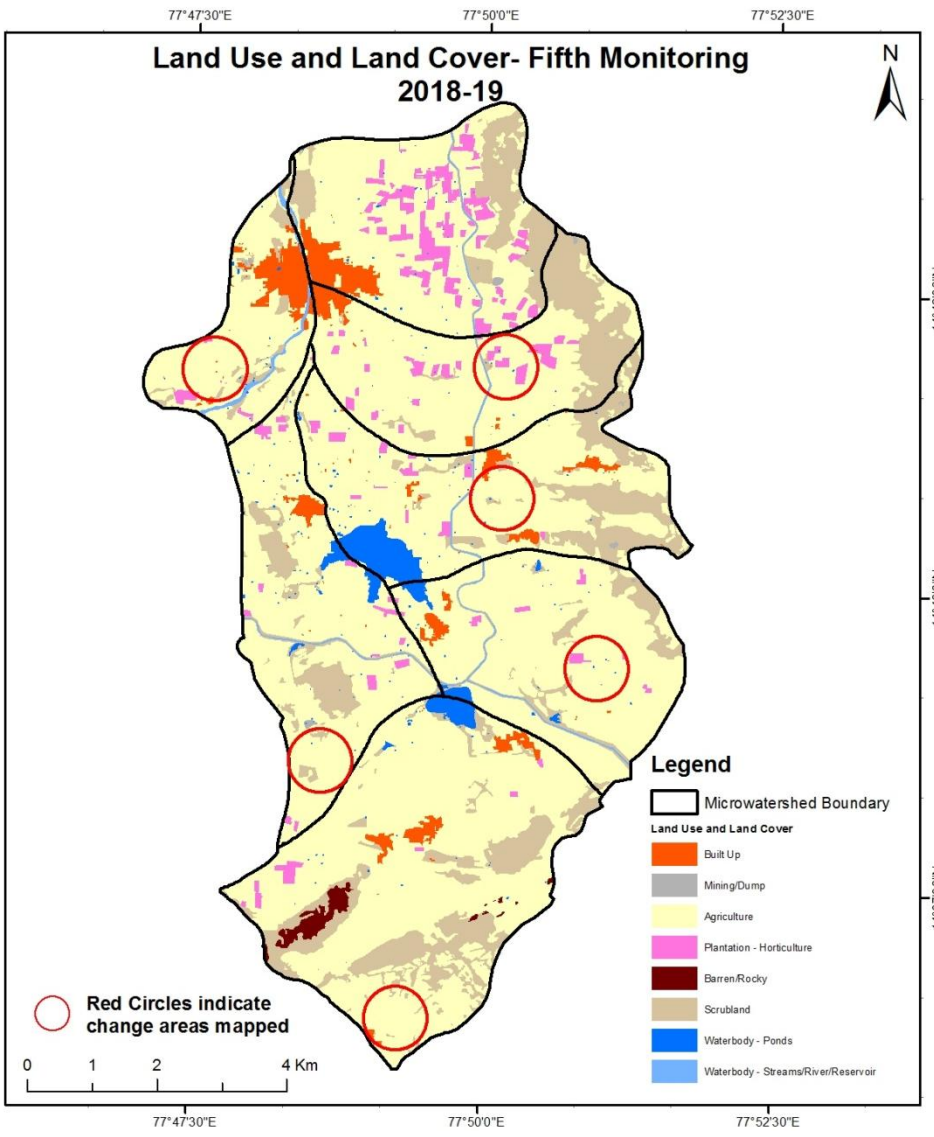




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

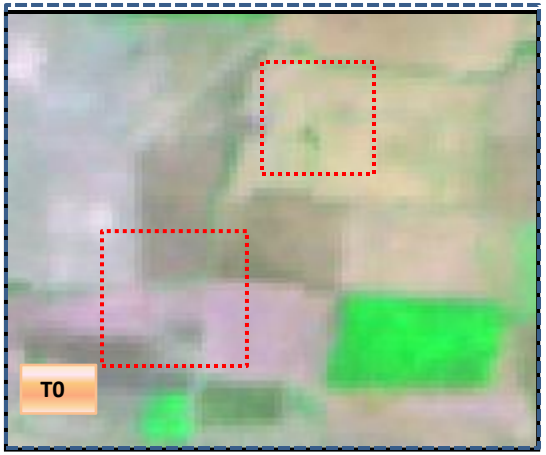
Scale: 1:10000



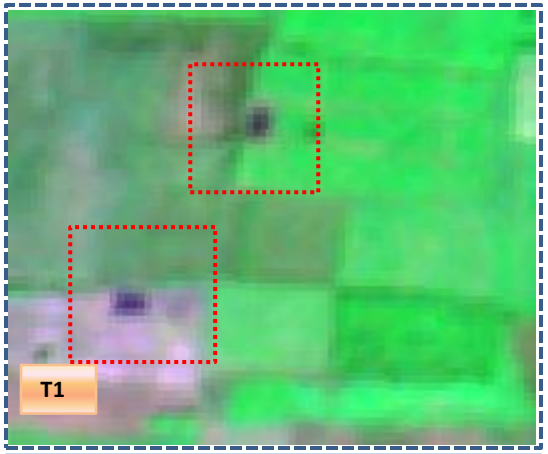


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to water body

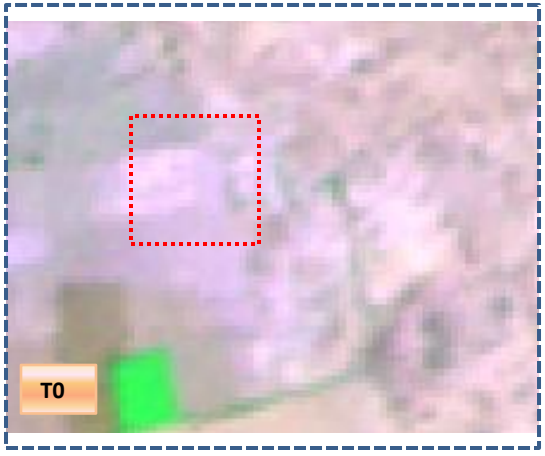


T0: 2014-15 (77°48'0.021E 14°41'0.332N)

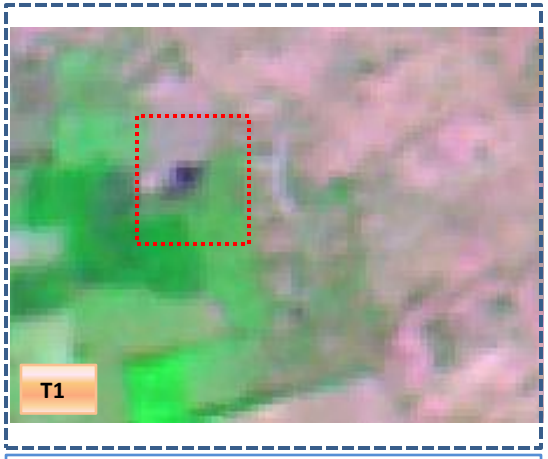


T1: 7 December 2015

Agriculture to water body



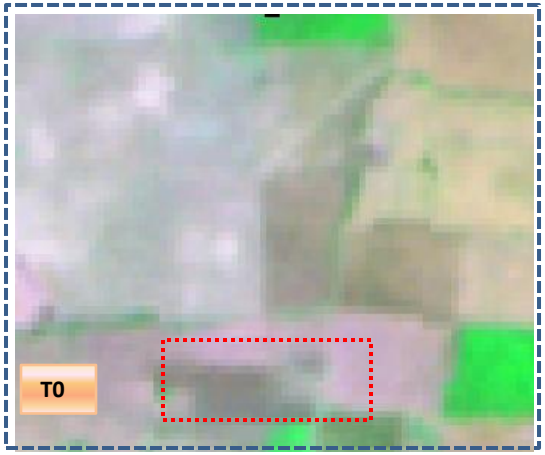
T0: 2014-15 (77°48'32.393E 14°39'10.659N)



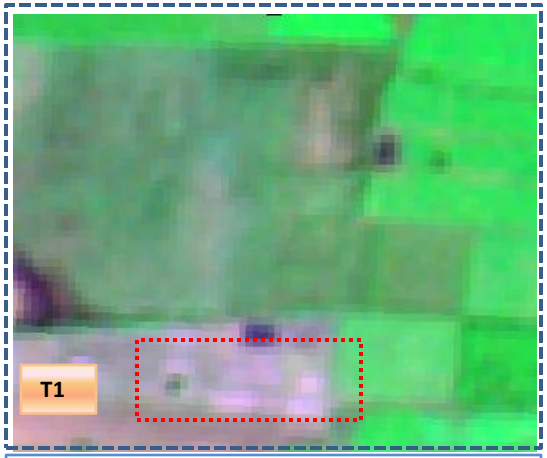
T1: 7 December 2015

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

Agriculture to Built Up

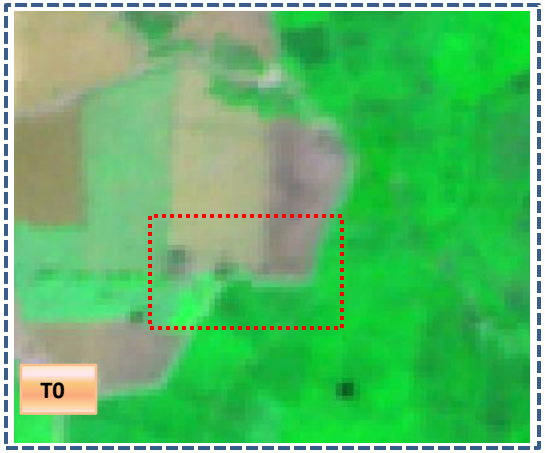


T0: 2014-15 (77°47'56.232E 14°40'57.612N)

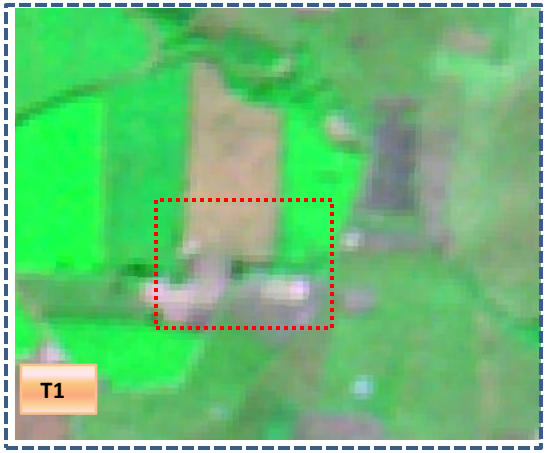


T1: 7 December 2015

Agriculture to Built Up



T0: 2014-15 (77°48'18.217E 14°40'57.364N)

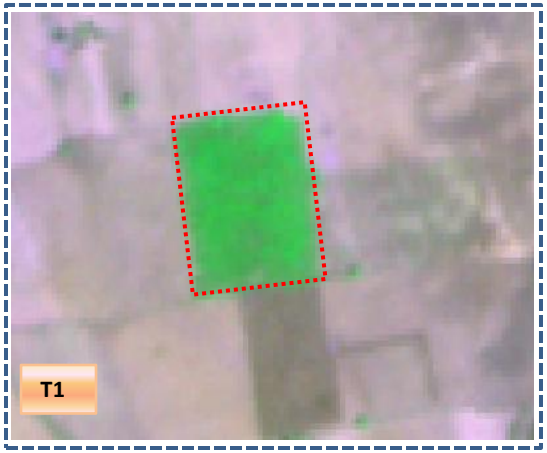


T1: 7 December 2015

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

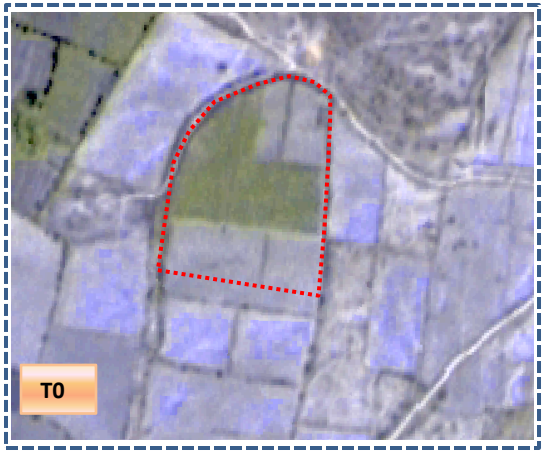
Agriculture to Plantation

T0: 2010-11(77°50'13.935E 14°38'18.542N)



T1: 18 February 2015

Agriculture to Plantation



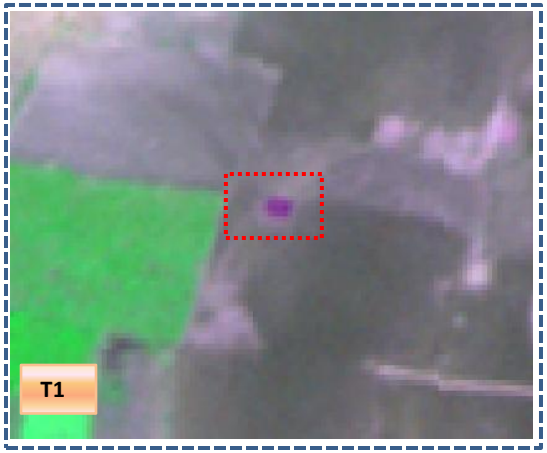
T0: 2010-11 (77°50'26.766E 14°42'20.129N)

T1: 18 February 2015

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

Agriculture to Water body

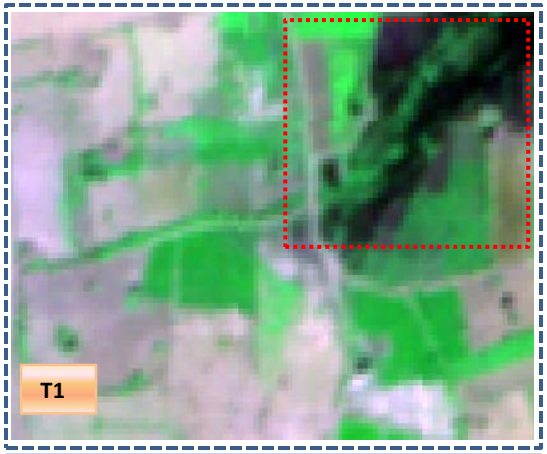
T0: 2010-11(77°48'32.958E 14°37'47.77N)



T1: 18 February 2015

Agriculture to Water body

T0: 2010-11(77°48'34.19E 14°40'13.296N)



T1: 18 February 2015

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

Land cover	Monitoring period (T1)										Area 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	212.99										**212.99**
Mining/dump											
Agriculture	9.65	0.57	5301.36	27.41				2.48		11.86	**5353.32**
Plantation Horticulture			51.39	161.56						0.08	**213.04**
Forest											
Forest Plantation											
Barren Rocky							39.39				**39.39**
Scrub	4.41	0.34	27.27					1545.72		28.23	**1605.97**
Waterbody-Streams/River									57.10		**57.10**
Waterbody – Ponds										98.91	**98.91**
Grand Total	**227.05**	**0.91**	**5380.02**	**188.97**			**39.39**	**1548.20**	**57.10**	**139.08**	**7580.72**

- 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 51 ha of the agriculture area has decreased and it is converted into built up , mining, plantation, scrubland and water body in T1.
- In T1 78 ha of the agriculture area has increased from plantations and scrubland of T0 and overall 26 ha of the cropland 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)										Area 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	227.05										**227.05**
Mining/dump		0.91									**0.91**
Agriculture	11.06		5298.05	69.52						1.40	**5380.02**
Plantation Horticulture	0.08		21.49	167.38						0.02	**188.97**
Forest											
Forest Plantation											
Barren Rocky							39.39				**39.39**
Scrub	1.18		202.68					1341.87		2.47	**1548.20**
Waterbody-Streams/River									57.10		**57.10**
Waterbody – Ponds										139.08	**139.08**
Grand Total	**239.37**	**0.91**	**5522.22**	**236.90**			**39.39**	**1341.87**	**57.10**	**142.96**	**7580.72**

• 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 81 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 and scrubland of T1 and overall 142 ha of the cropland 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)										Area 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	239.37										**239.37**
Mining/dump		0.91									**0.91**
Agriculture	2.09		5418.38	95.40				3.84		2.50	**5522.22**
Plantation Horticulture			24.55	212.29						0.06	**236.90**
Forest											
Forest Plantation											
Barren Rocky							39.39				**39.39**
Scrub	0.08	2.87	34.44					1303.50		0.99	**1341.87**
Waterbody-Streams/River									57.10		**57.10**
Waterbody – Ponds										142.96	**142.96**
Grand Total	**241.55**	**3.78**	**5477.37**	**307.69**			**39.39**	**1307.34**	**57.10**	**146.51**	**7580.72**

- 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 103 ha of the agriculture area has decreased and it is converted into built up , plantation, scrub and water body in T3.
- In T3 58 ha of the agriculture area has increased from plantations and scrubland of T2 and overall 44 ha of the cropland area has been decreased. 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)										Area 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	241.55										**241.55**
Mining/dump		3.78									**3.78**
Agriculture	9.42		5423.38	36.78				3.98		3.81	**5477.37**
Plantation Horticulture			20.18	280.64				6.73		0.13	**307.69**
Forest											
Forest Plantation											
Barren Rocky							39.39				**39.39**
Scrub			43.35					1262.72		1.28	**1307.34**
Waterbody-Streams/River									57.10		**57.10**
Waterbody – Ponds										146.51	**146.51**
Grand Total	**250.97**	**3.78**	**5486.91**	**317.43**			**39.39**	**1273.42**	**57.10**	**151.72**	**7580.72**

- 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 53 ha of the agriculture area has decreased and it is converted into built up , plantation, scrub and water body in T4.
- In T4 63 ha of the agriculture area has increased from plantations and scrubland of T3 and overall 9 ha of the cropland 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)										Area 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	250.97										**250.97**
Mining/dump		3.78									**3.78**
Agriculture	0.86	1.82	5483.65							0.58	**5486.91**
Plantation Horticulture			54.30	263.13							**317.43**
Forest											
Forest Plantation											
Barren Rocky							39.39				**39.39**
Scrub		2.11	50.63					1220.63		0.05	**1273.42**
Waterbody-Streams/River									57.10		**57.10**
Waterbody – Ponds										151.72	**151.72**
Grand Total	**251.83**	**7.71**	**5588.59**	**263.13**			**39.39**	**1220.63**	**57.10**	**152.35**	**7580.72**

- 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 03 ha of the agriculture area has decreased and it is converted into built up , mining and water body in T5.
- In T5 104 ha of the agriculture area has increased from plantations and scrubland of T4 and overall 101 ha of the cropland 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 53 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 26, 142, 09 & 101 Hectares From T0 to T1, T1-T2, T3-T4 & T4-T5 respectively and overall increase of 235 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 50 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 385 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (25) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (29) verified from the portal.