MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -35/2010-11
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

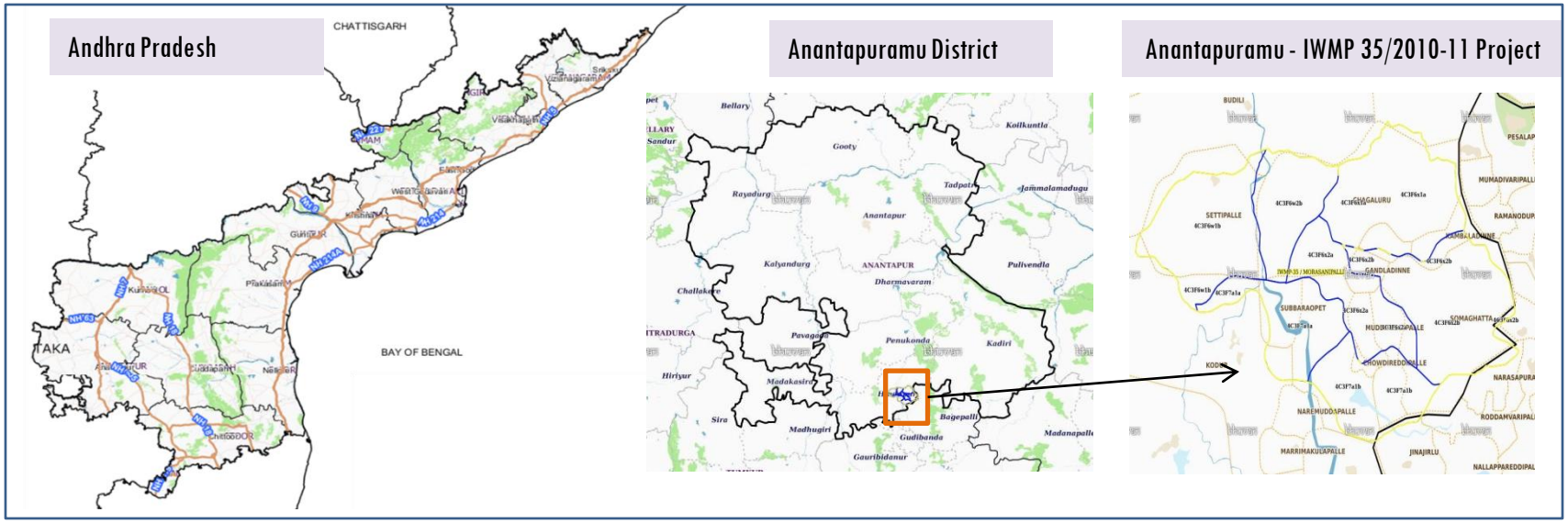
CONTENTS

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-35/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 8,881 ha. It comprises of 7 micro watersheds.
- In the project area 63 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an decrease by 12 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 72.46 % is covered by the agriculture, 16.60 % is covered by Scrub land and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-35/2010-11
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Chilamathur Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 8,881 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.

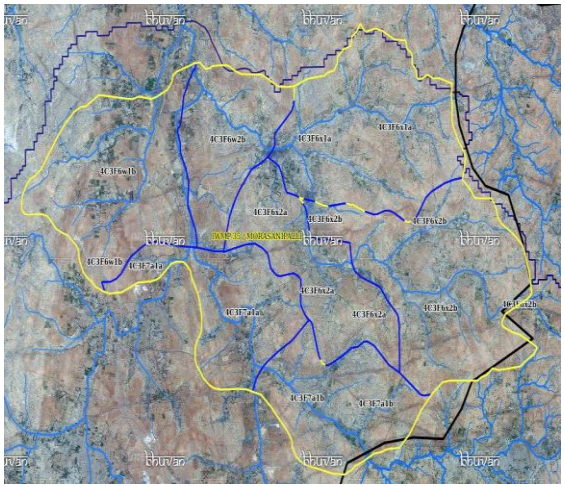
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			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	63
4	Detailed Project Report		

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



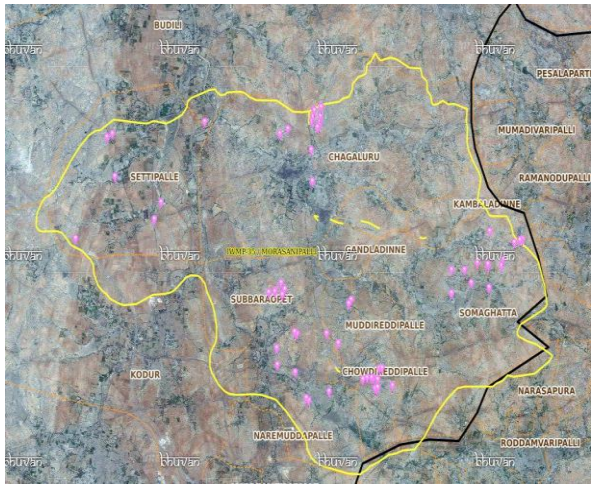
Legend

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	4	4
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	2	2
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	3	3
10	Civil work-Check dams/Rock fill dam	24	24
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	0	0
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	35	30
	TOTAL	**68**	**63**

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.

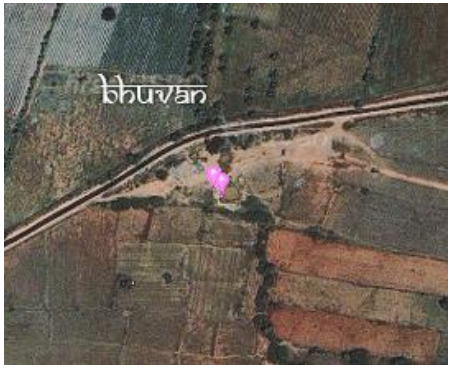
Anantapuramu–IWMP-35/2010-11

2010-11

Jan-2015

Feb-2016

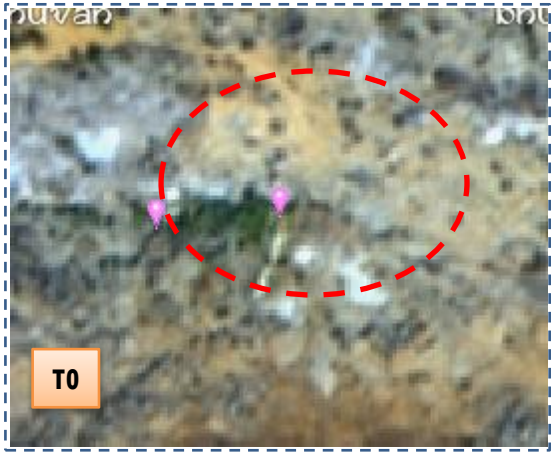
May-2018



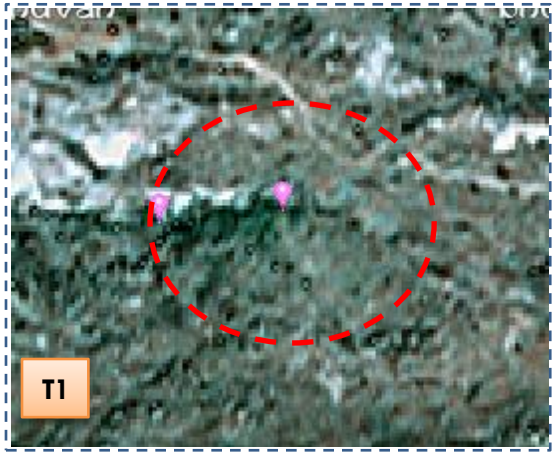
Feb-2021

Activity : Farm pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-35/2010-11



T0:2010-11



T1: 26 January 2015

Drishti Sl no. 1699099 MWS : 4C3F7a1b

Check dam

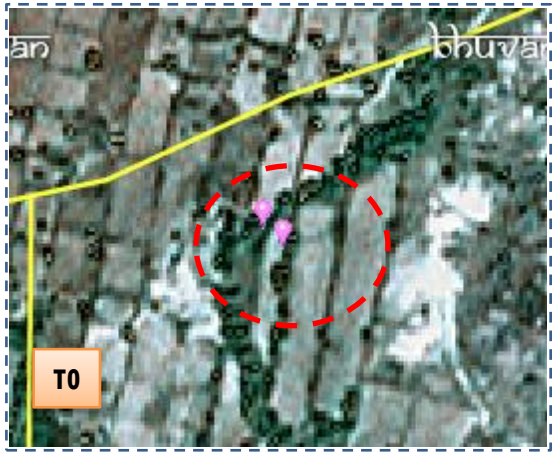
T0:2010-11

T1: 26 January 2015

Drishti Sl no. 2581712 MWS : 4C3F7a1b

Dugout pit

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-35/2010-11

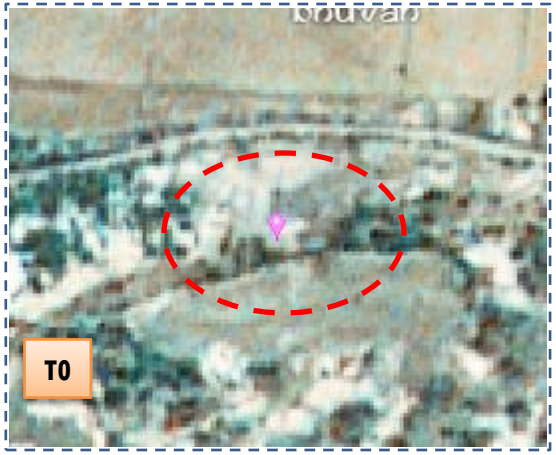


T0:2010-11

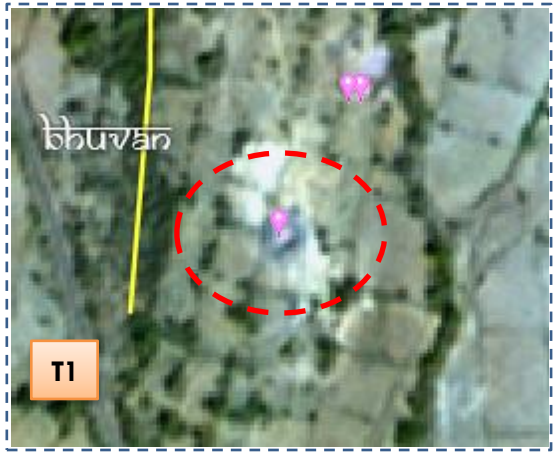
T1: 26 January 2015

Drishti Sl no. 2484972 MWS : 4C3F6x1a

Farm pond



T0:2010-11



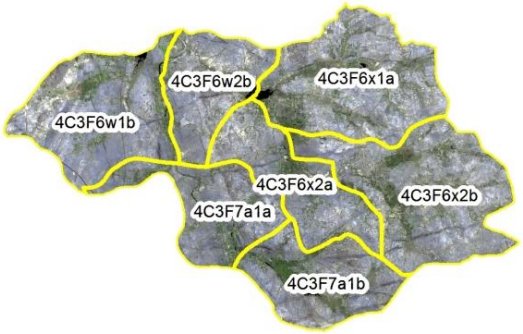
T1: 26 January 2015

Drishti Sl no. 1619122 MWS : 4C3F6x1a

Farm pond

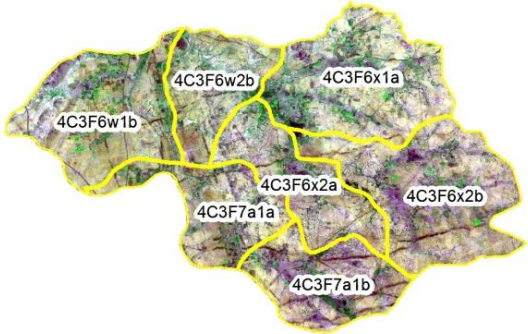
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2010-11



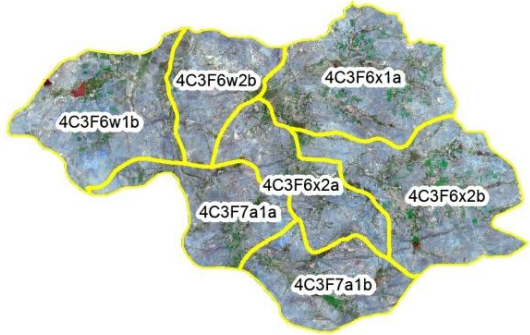
Source:Fusen data,NRSC

Natural Color Composite- 26th January 2015



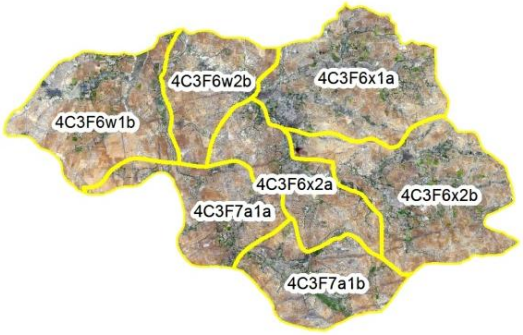
Source:LISS-IV,NRSC

Natural Color Composite- 08th February 2016



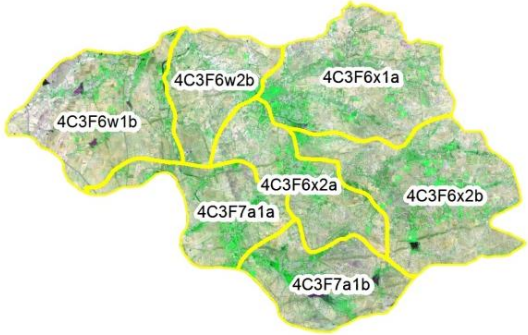
Source:NCC,NRSC

Natural Color Composite- 17th October 2017



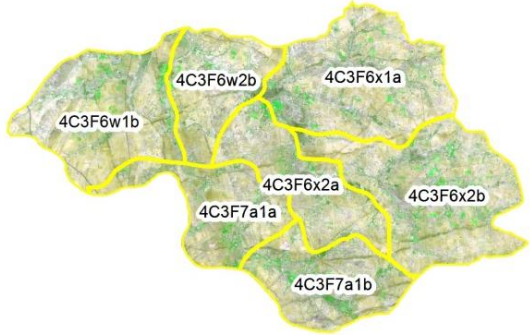
Source:NCC,NRSC

Natural Color Composite-25th March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 05th March 2019



Source:LISS-IV,NRSC

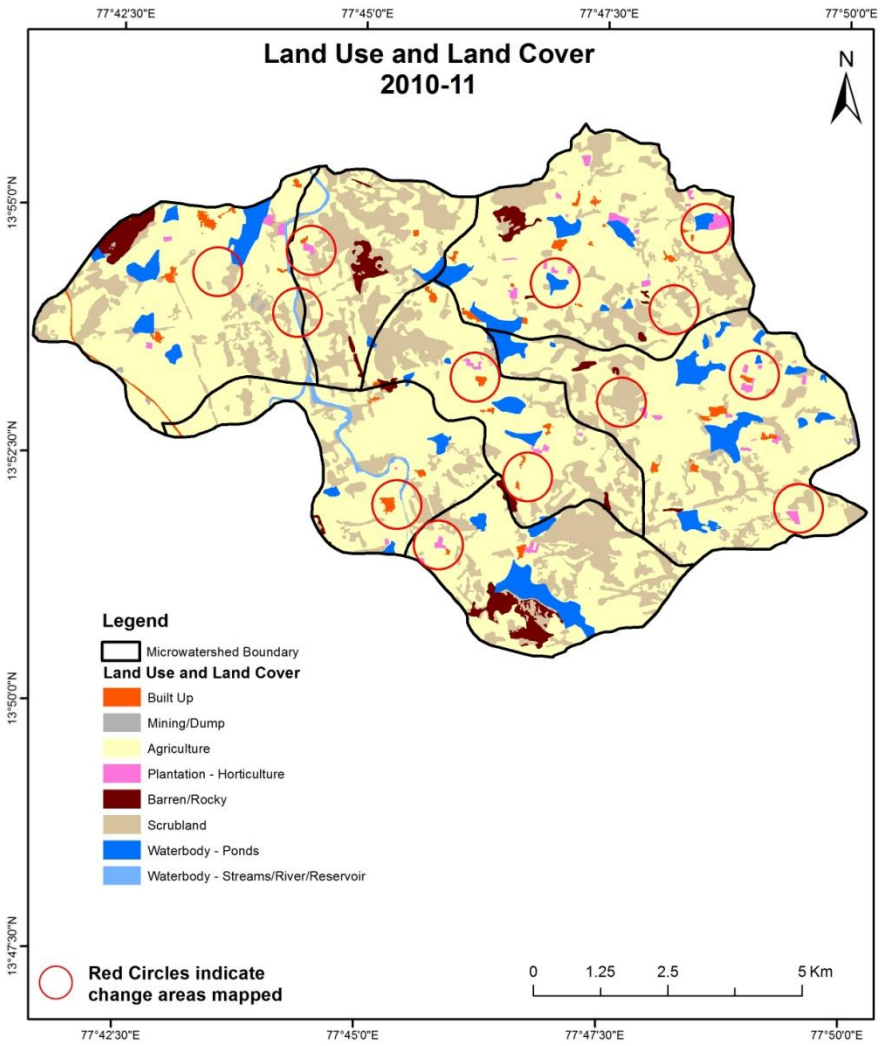
MONITORING IN THE PROJECT AREA

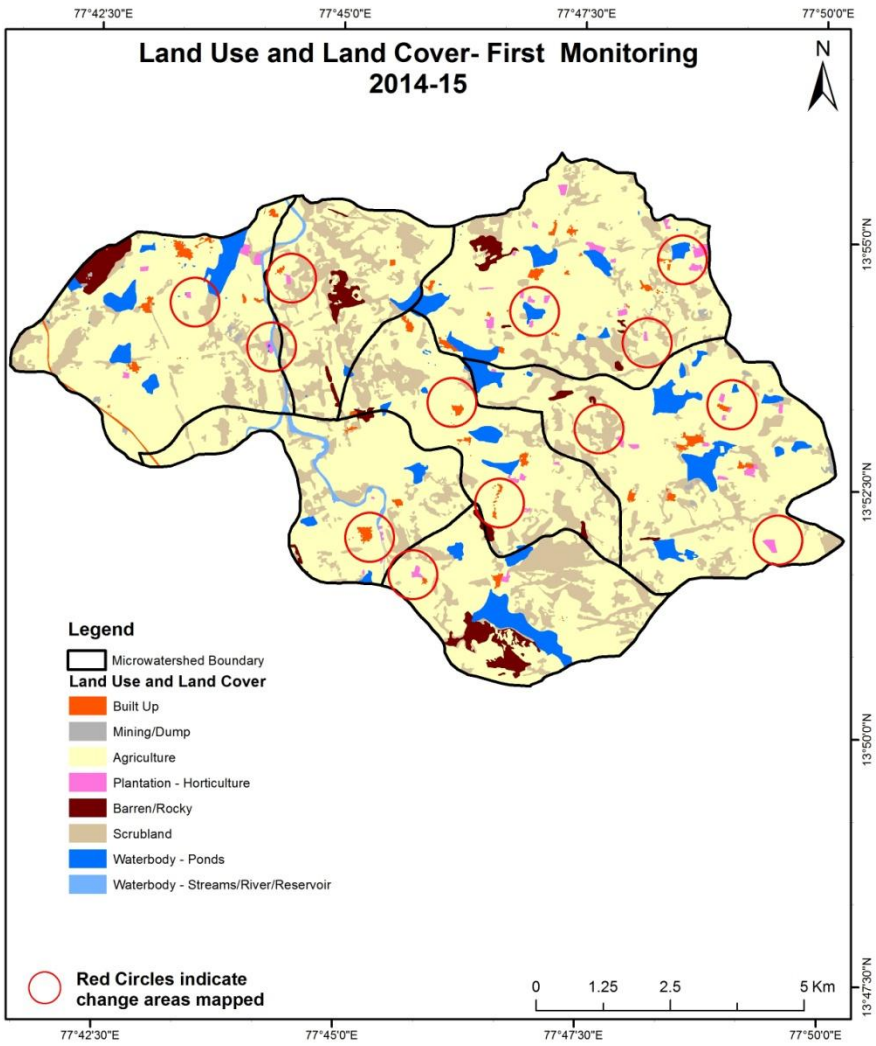
Land use and Land cover Changes in the Project

- 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)

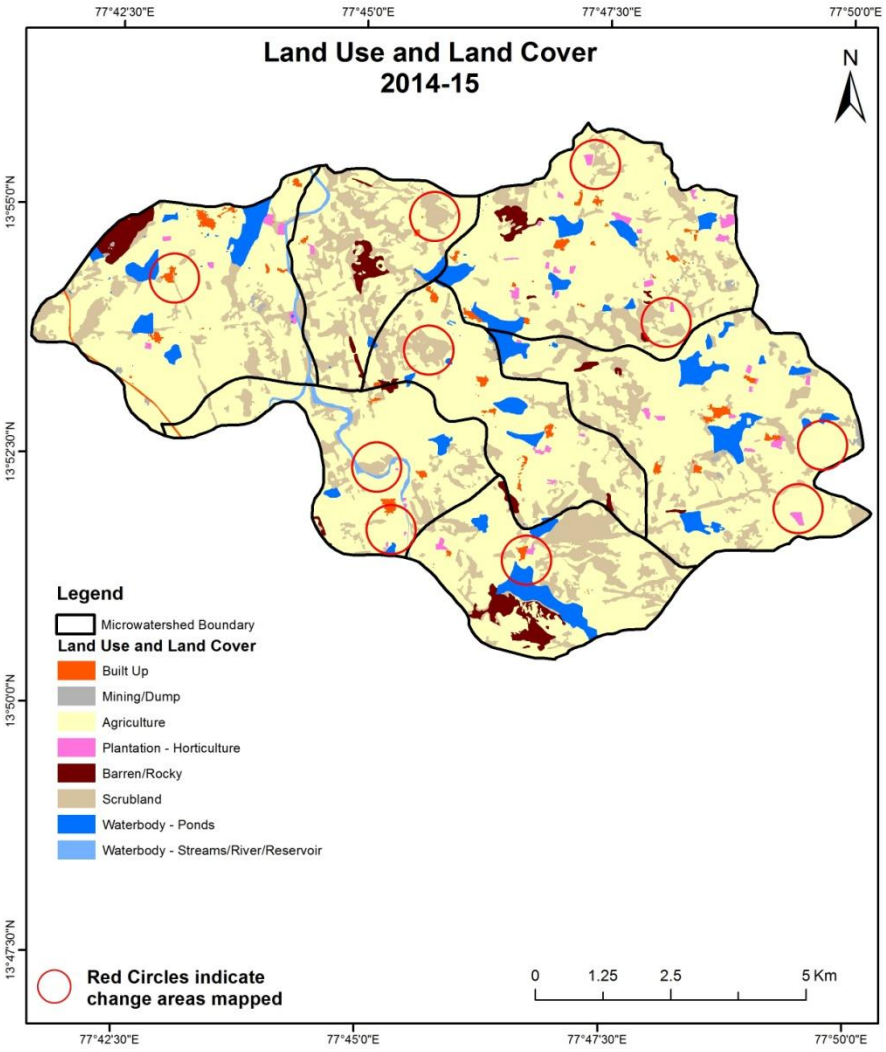
Scale: 1:10000

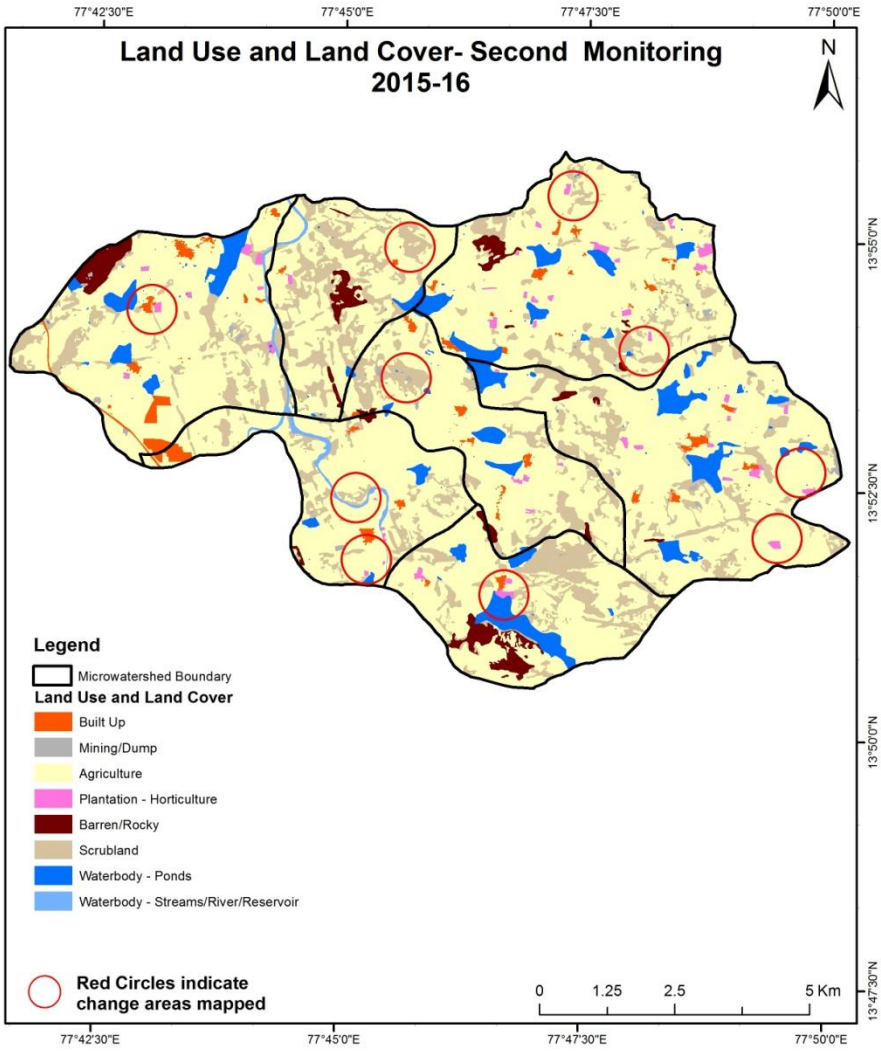




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

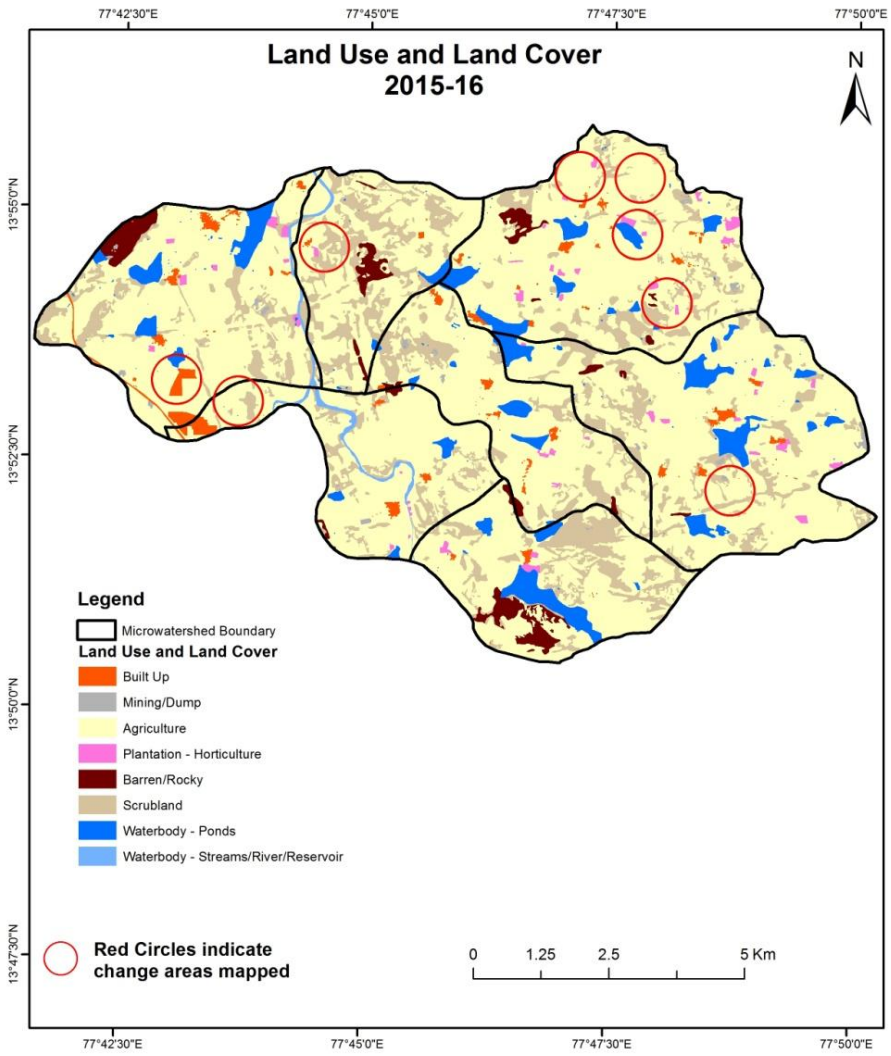
Scale: 1:10000

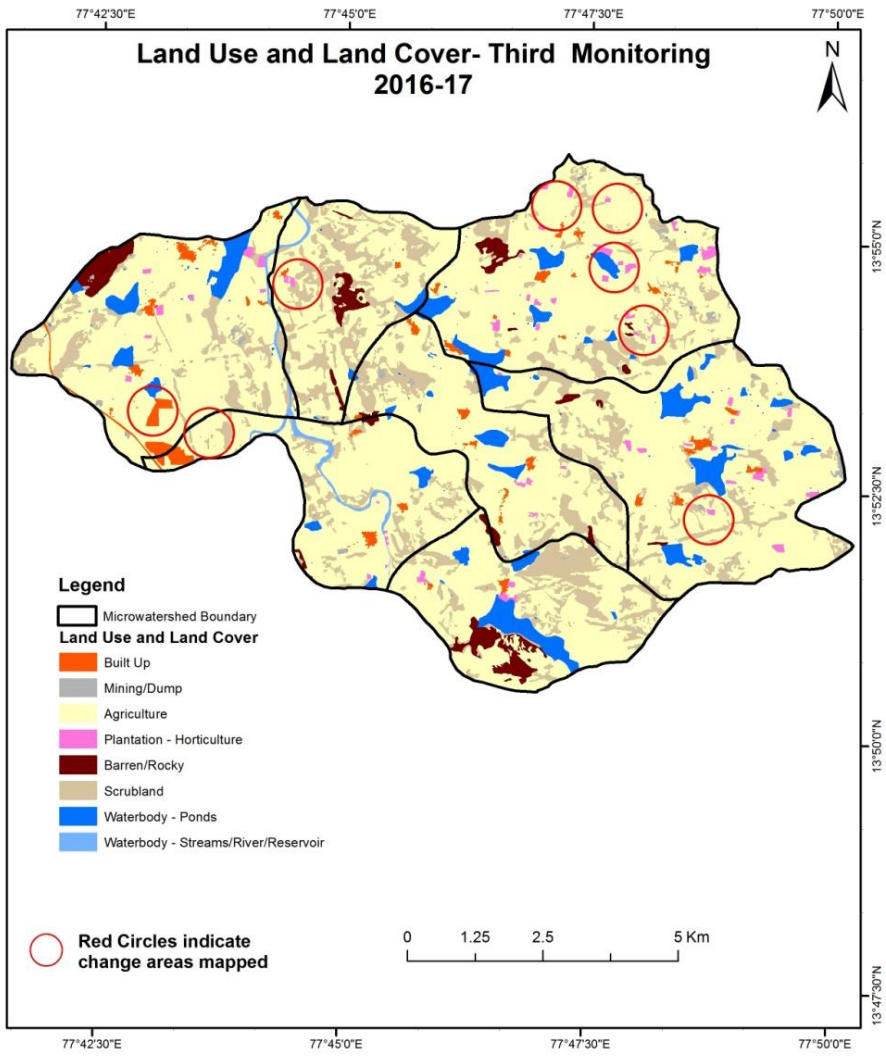




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

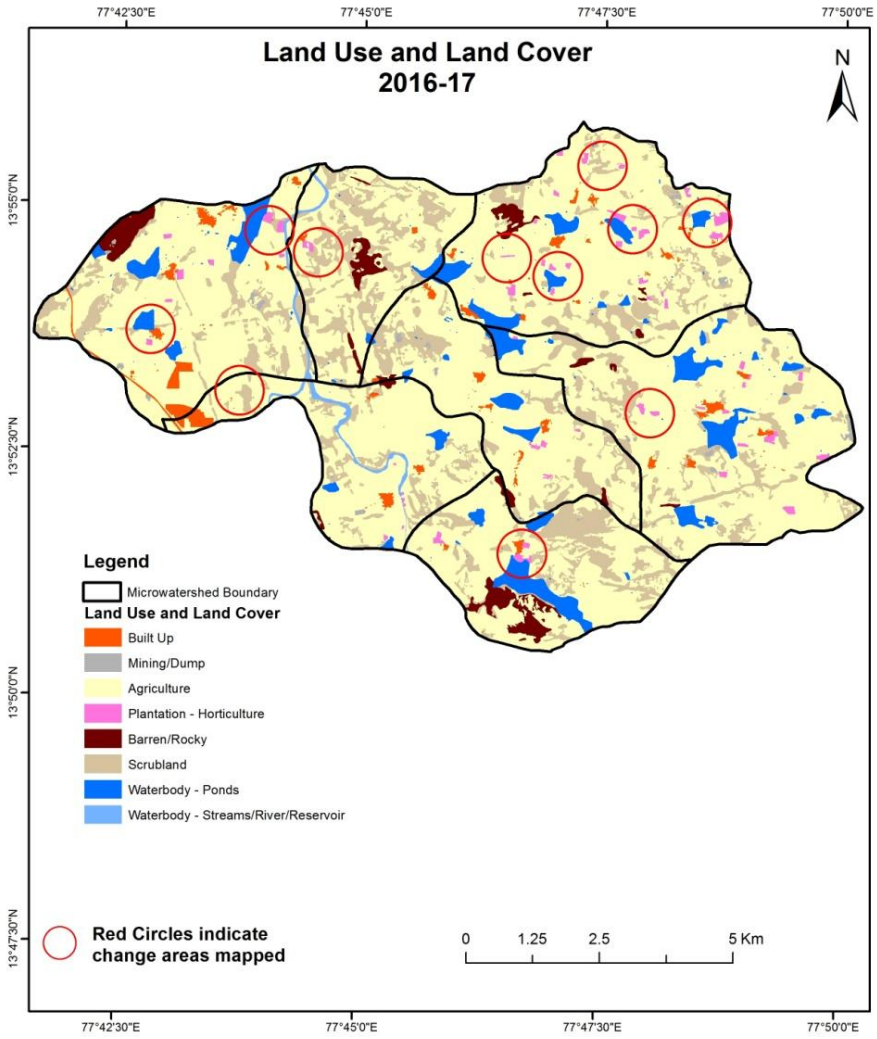
Scale: 1:10000

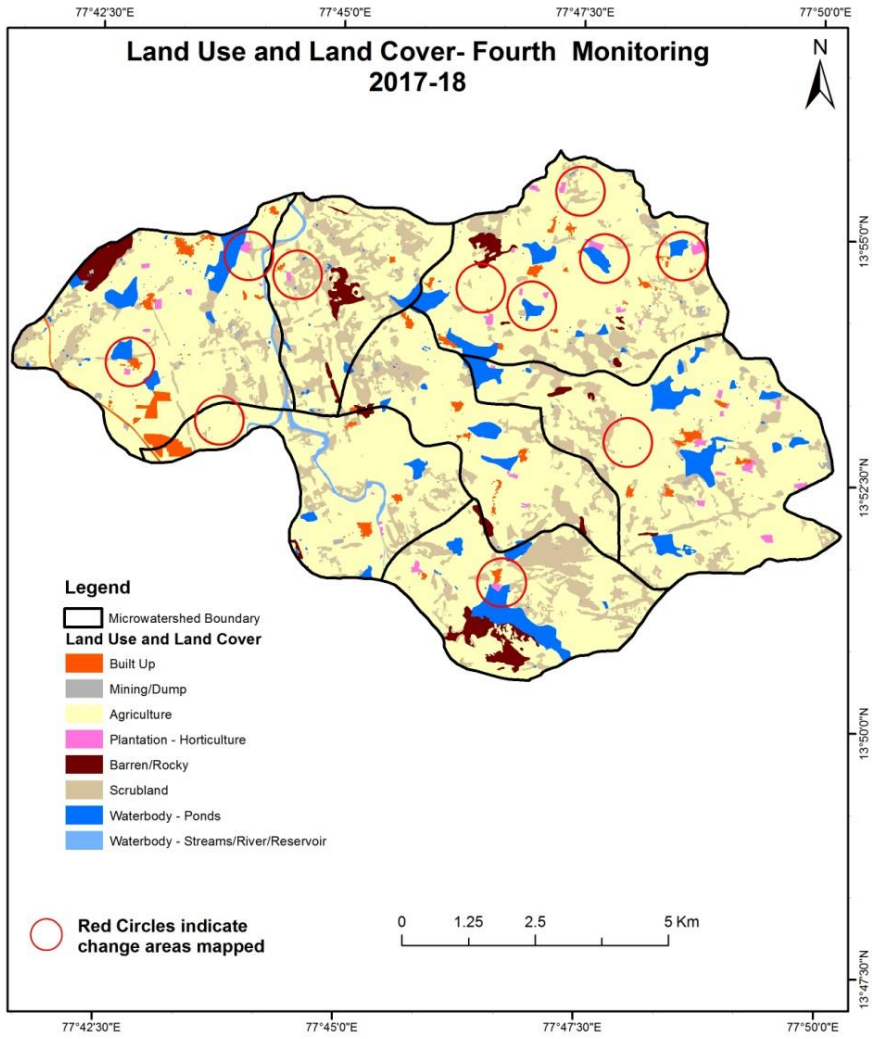




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

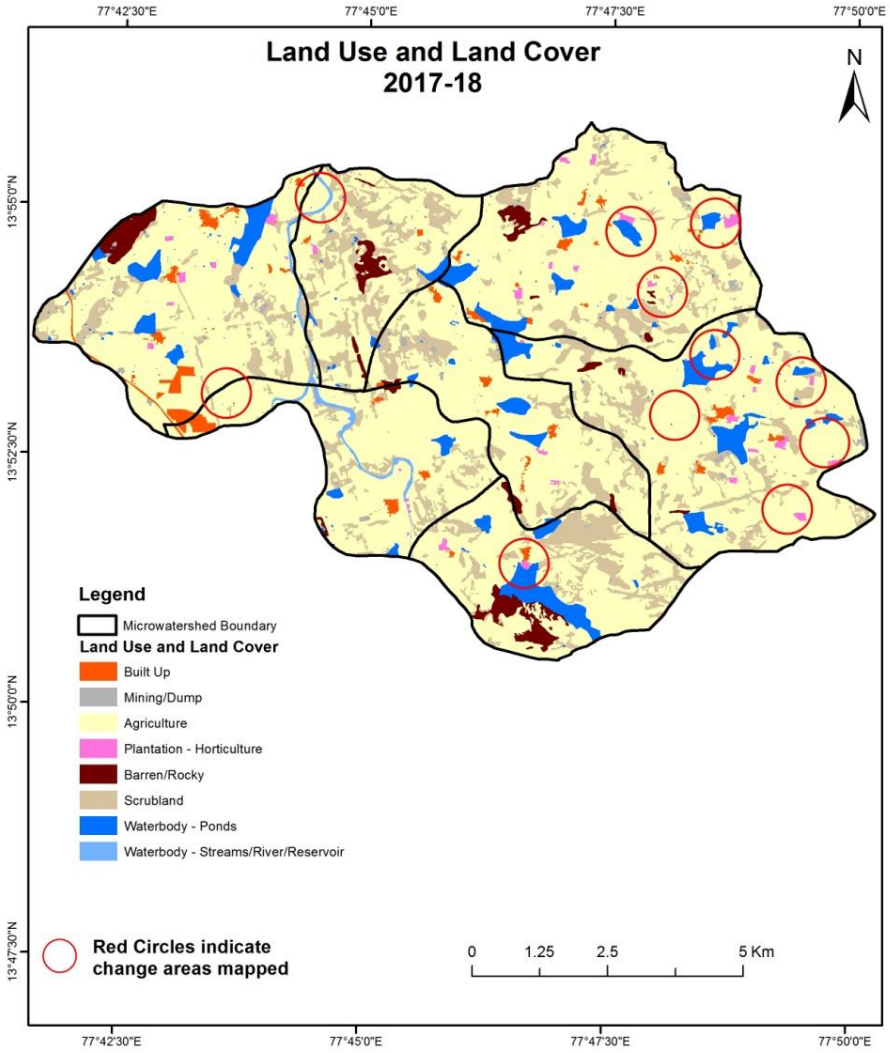
Scale: 1:10000

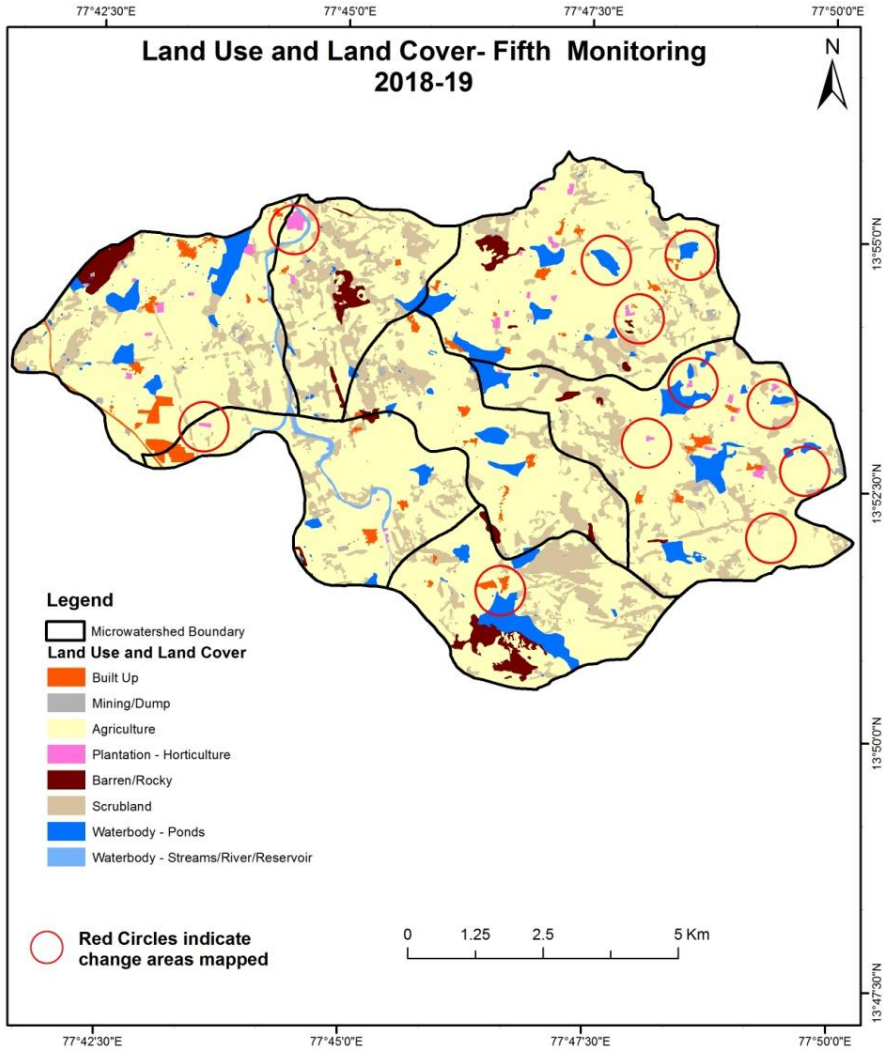




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

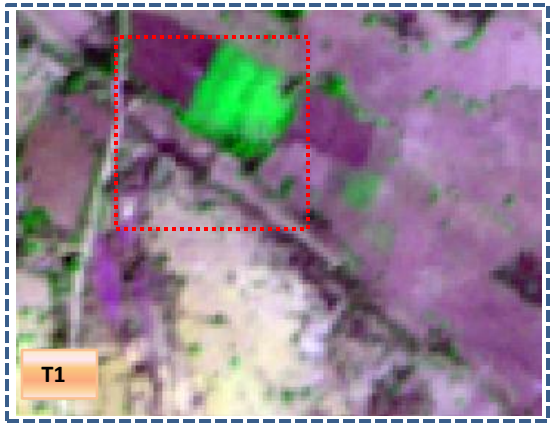
Scale: 1:10000





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

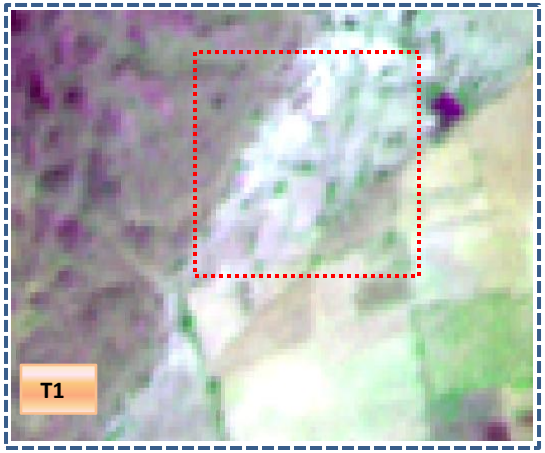
Agriculture
to Water body



T1: 2014-15 (77°46'1.672E 13°51'35.356N)

T2: 08 February 2016

Scrubland to Agriculture



T1: 2014-15 (77°42'39.681E 13°54'37.072N)

T2: 08 February 2016

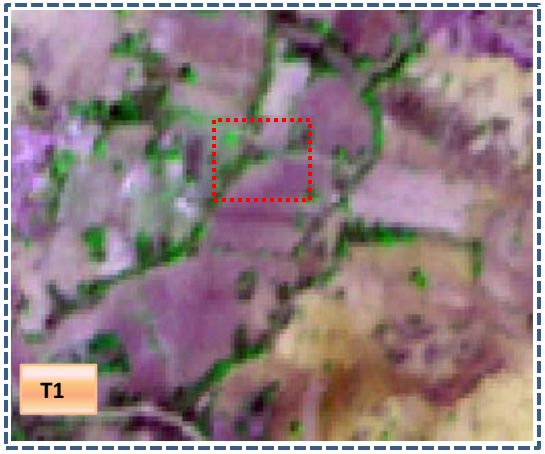
Land Use and Land Cover changes for Pre and Post treatment dates

Water body to Agriculture

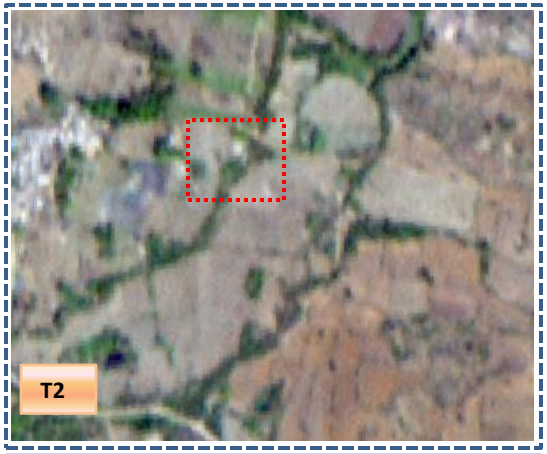
T1: 2014-15 (77°49'1.503E 13°52'55.407N)

T2: 08 February 2016

Agriculture to Built Up



T1: 2014-15 (77°49'1.503E 13°52'55.407N)



T2: 08 February 2016

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

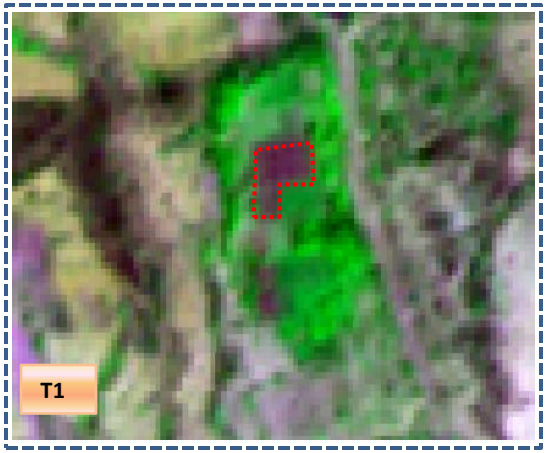
Agriculture to Plantation

T0: 2010-11(77°43'23.142E 13°54'23.504N)

T1: 26 January 2015

Scrub to Agriculture

T0: 2010-11(77°44'16.337E 13°53'52.924N)

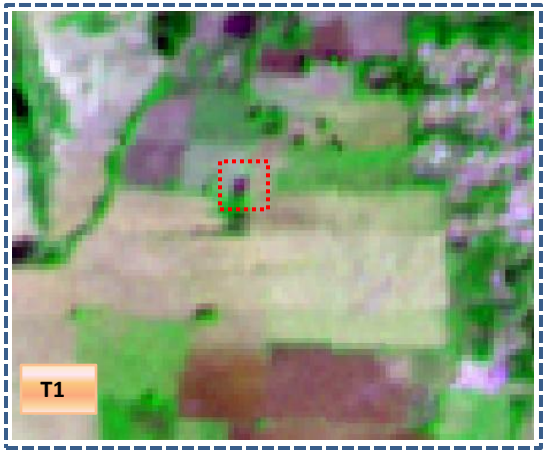


T1: 26 January 2015

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

Agriculture to Farm pond

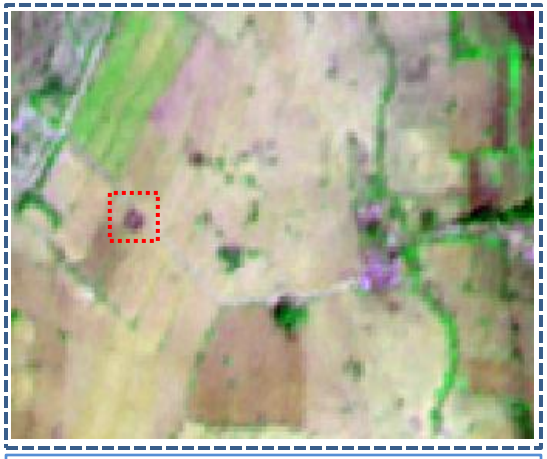
T0: 2010-11(77°43'12.786E 13°54'51.455N)



T1: 26 January 2015

Agriculture to Farm pond

T0: 2010-11(77°43'54.31E 13°54'23.697N)



T1: 26 January 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	92.90										**92.90**
Mining/dump		15.76									**15.76**
Agriculture	8.41	0.14	5831.13	12.59						3.01	**5855.27**
Plantation Horticulture	0.07		16.46	56.77							**73.30**
Forest											
Forest Plantation											
Barren Rocky							198.15				**198.15**
Scrub	0.98	3.01	474.22					1642.77		0.71	**2121.70**
Waterbody-Streams/River									55.59		**55.59**
Waterbody – Ponds			10.81							458.40	**469.22**
Grand Total	**102.36**	**18.91**	**6332.62**	**69.36**			**198.15**	**1642.77**	**55.59**	**462.12**	**8881.89**

• 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 24.15 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T1.

• In T1 501.50 ha of agriculture are increased from plantation, scrubland and water body of T0. The additional agriculture are coming from water body 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	102.36										**102.36**
Mining/dump		18.91									**18.91**
Agriculture	41.22	2.67	6273.35	9.65						5.74	**6332.62**
Plantation Horticulture	0.21		3.21	65.95							**69.36**
Forest											
Forest Plantation											
Barren Rocky							198.15				**198.15**
Scrub	0.38	8.38	96.37					1535.49		2.16	**1642.77**
Waterbody-Streams/River			1.59						54.00		**55.59**
Waterbody – Ponds			5.88							456.24	**462.12**
Grand Total	**144.16**	**29.96**	**6380.40**	**75.59**			**198.15**	**1535.49**	**54.00**	**464.14**	**8881.89**

• 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 59.27 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.

• In T2 107.05 ha of agriculture are increased from plantation, 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-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	144.16										**144.16**
Mining/dump		29.96									**29.96**
Agriculture	1.33		6367.97	10.61						0.49	**6380.40**
Plantation Horticulture			2.96	72.63							**75.59**
Forest											
Forest Plantation											
Barren Rocky							198.15				**198.15**
Scrub	0.06		0.42	0.46				1534.42		0.14	**1535.49**
Waterbody-Streams/River									54.00		**54.00**
Waterbody – Ponds	0.06									464.08	**464.14**
Grand Total	**145.61**	**29.96**	**6371.35**	**83.70**			**198.15**	**1534.42**	**54.00**	**464.71**	**8881.89**

• 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 12.43 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.

• In T3 3.37 ha of agriculture are 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	145.61										**145.61**
Mining/dump		29.73								0.22	**29.96**
Agriculture	4.05		6358.78	3.79						4.72	**6371.35**
Plantation Horticulture			28.04	54.49						1.16	**83.70**
Forest											
Forest Plantation											
Barren Rocky							198.15				**198.15**
Scrub	0.04		29.70					1492.15	0.44	12.09	**1534.42**
Waterbody-Streams/River									54.00		**54.00**
Waterbody – Ponds			0.42							464.28	**464.71**
Grand Total	**149.70**	**29.73**	**6416.95**	**58.29**			**198.15**	**1492.15**	**54.44**	**482.48**	**8881.89**

• 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 12.56 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T4.

• In T4 58.17 ha of agriculture are increased from plantation, scrubland and water body 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	149.70										**149.70**
Mining/dump		29.73									**29.73**
Agriculture	2.32	0.47	6395.00	19.16							**6416.95**
Plantation Horticulture	0.22	2.44	27.09	28.53							**58.29**
Forest											
Forest Plantation											
Barren Rocky							198.15				**198.15**
Scrub	4.21		13.89					1474.00		0.05	**1492.15**
Waterbody-Streams/River									54.44		**54.44**
Waterbody – Ponds										482.48	**482.48**
Grand Total	**156.45**	**32.65**	**6435.99**	**47.69**			**198.15**	**1474.00**	**54.44**	**482.53**	**8881.89**

• 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 21.95 ha of agriculture are decreased and it is converted into built-up, mining/dump and plantation of T5.

• In T5 40.99 ha of agriculture are 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 12.17 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 477.35, 47.78, 45.60 & 19.04 Hectares From T0 to T1, T1 to T2, T3 to T4 & T4 toT5 and There is an decrease of 9.06 Hectares From T2 to T3. The overall increase of 580.71 Hectares in cropland area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is decrease of 25.62 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 647.70 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (3) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (3) verified from the portal.