MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -31/2010-11
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
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Remote Sensing Application Area,
National Remote Sensing Centre, ISRO

DEPARTMENT OF LAND RESOURCES
Ministry of Rural Development
Government of India

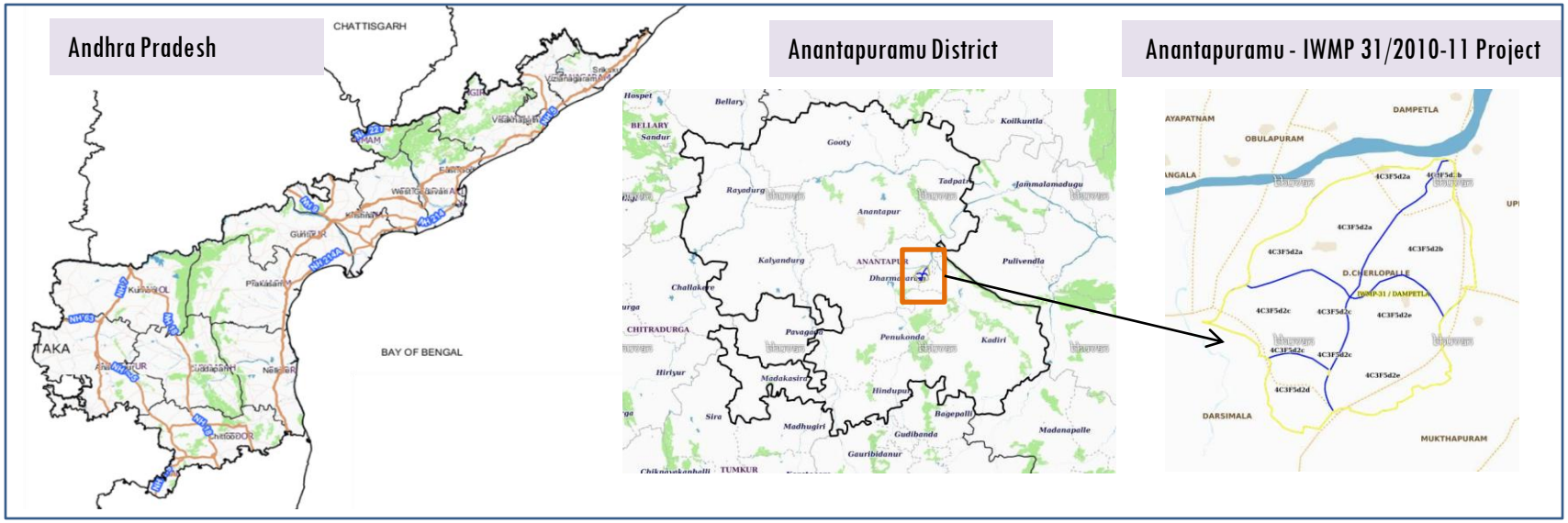
CONTENTS

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-31/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 4182.55 ha. It comprises of 5 micro watersheds.
- In the project area 200 Drishti photos were uploaded showing check dams, Farm ponds, Horticulture and remaining showing others.
- Water bodies have shown an increase by 9.61 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. . 67.70 % is covered by the agriculture, 23.11 % is covered by Scrub land, 2.86 % is covered by plantations and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-31/2010-11
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Bathalapalle Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 4182.55 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 -11***) 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.

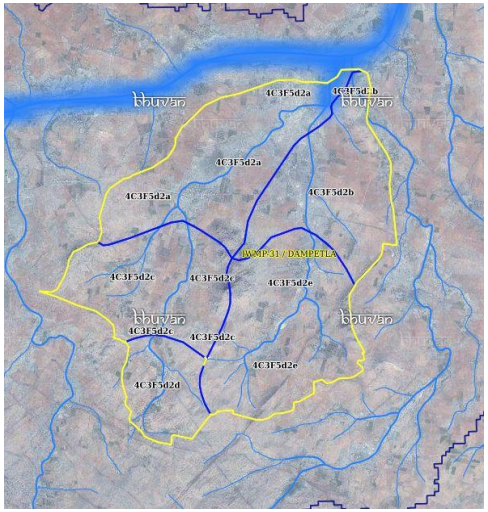
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			3-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			3-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	200
4	Detailed Project Report		

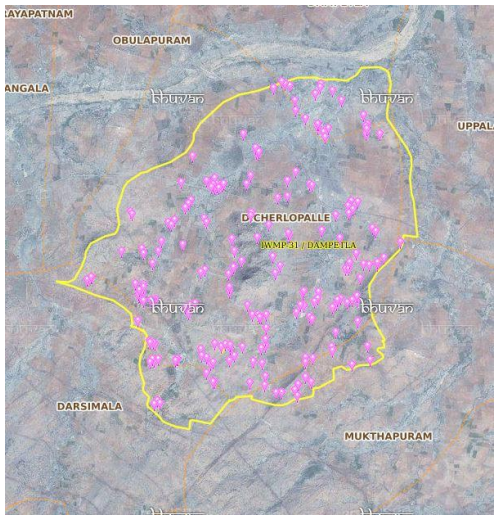
Natural Color Composite overlaid with Project boundaries and high detail stream network



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	26	26
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	40	35
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	106	90
10	Civil work-Check dams/Rock fill dam	4	4
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	26	25
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	22	20
	TOTAL	**224**	**200**

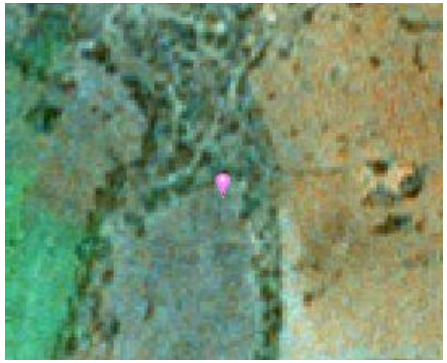
MONITORING IN THE PROJECT AREA

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-31/2010-11

2009-10



Jan-2015

Oct-2016

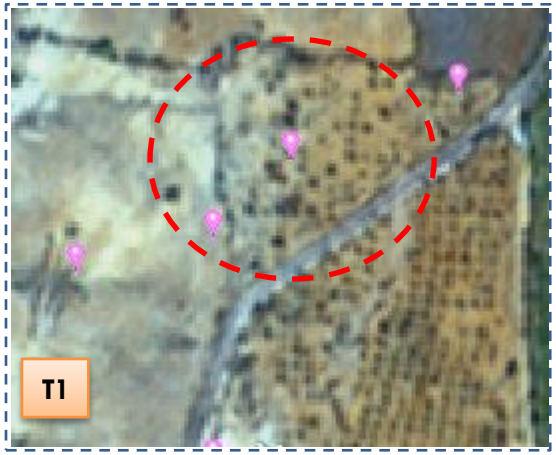
Feb-2017

2019

Activity : Dugout Pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-31/2010-11

T0:2010-11

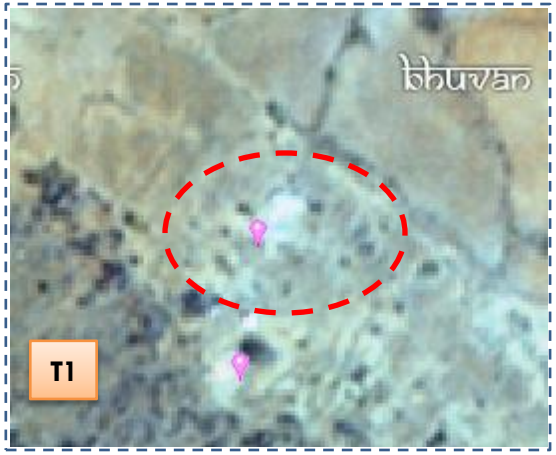


T1: 26 January 2015

Drishti SI no. 132905 MWS : 4C3F5d2c

Block planting

T0:2010-11

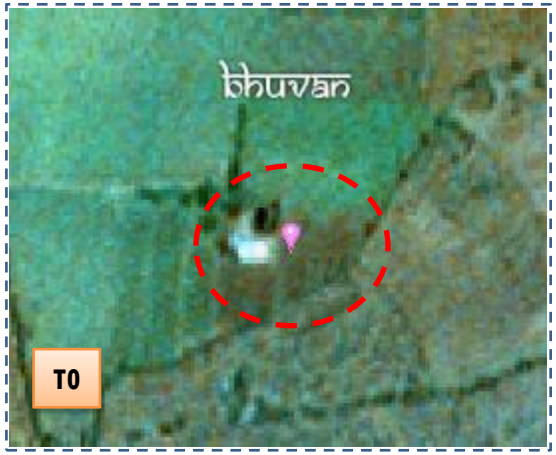


T1: 26 January 2015

Drishti SI no. 141755 MWS : 4C3F5d2a

Farm pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-31/2010-11



T0:2010-11

T1: 26 January 2015

Drishti SI no. 211476 MWS : 4C3F5d2a

Farm pond

T0:2010-11

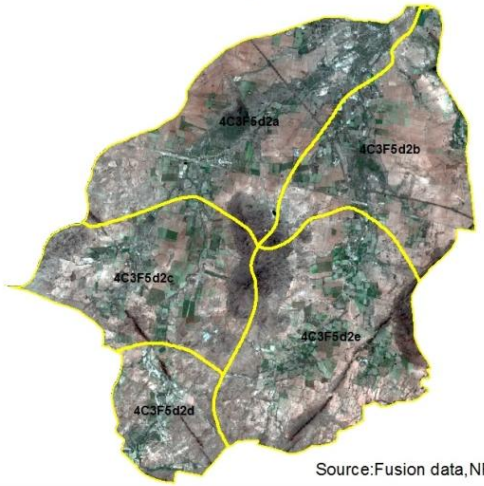
T1: 26 January 2015

Drishti SI no. 141761 MWS : 4C3F5d2a

Farm pond

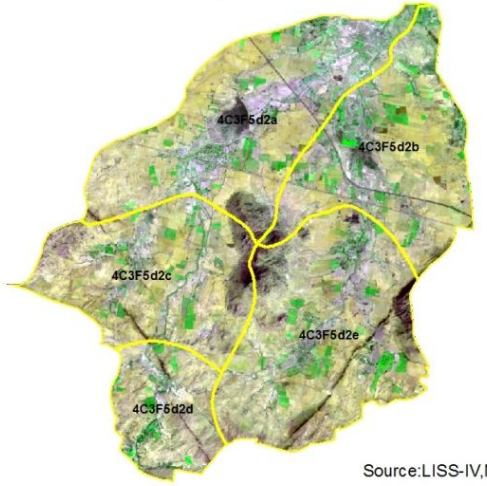
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2010-11



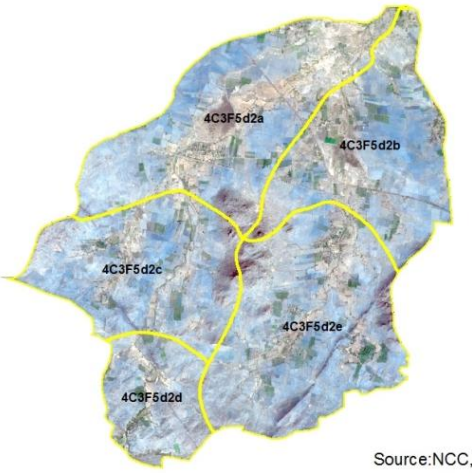
Source:Fusion data,NRSC

Natural Color Composite- 26th Jan 2015



Source:LISS-IV,NRSC

Natural Color Composite - 26 Jan 2016



Source:NCC,NRSC

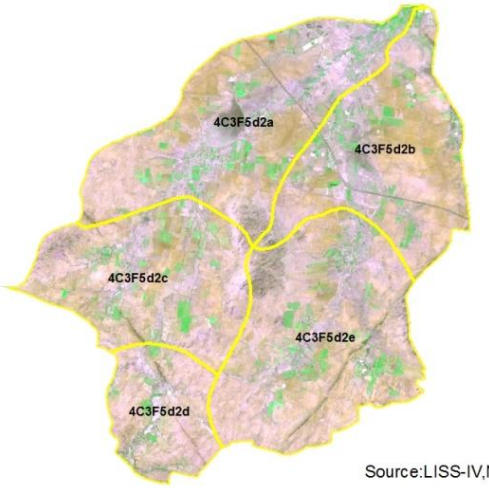
Natural Color Composite- 20th February 2017

Source:NCC,NRSC

Natural Color Composite- 25 th March 2018

Source:LISS-IV,NRSC

Natural Color Composite - 03 March 2019



Source:LISS-IV,NRSC

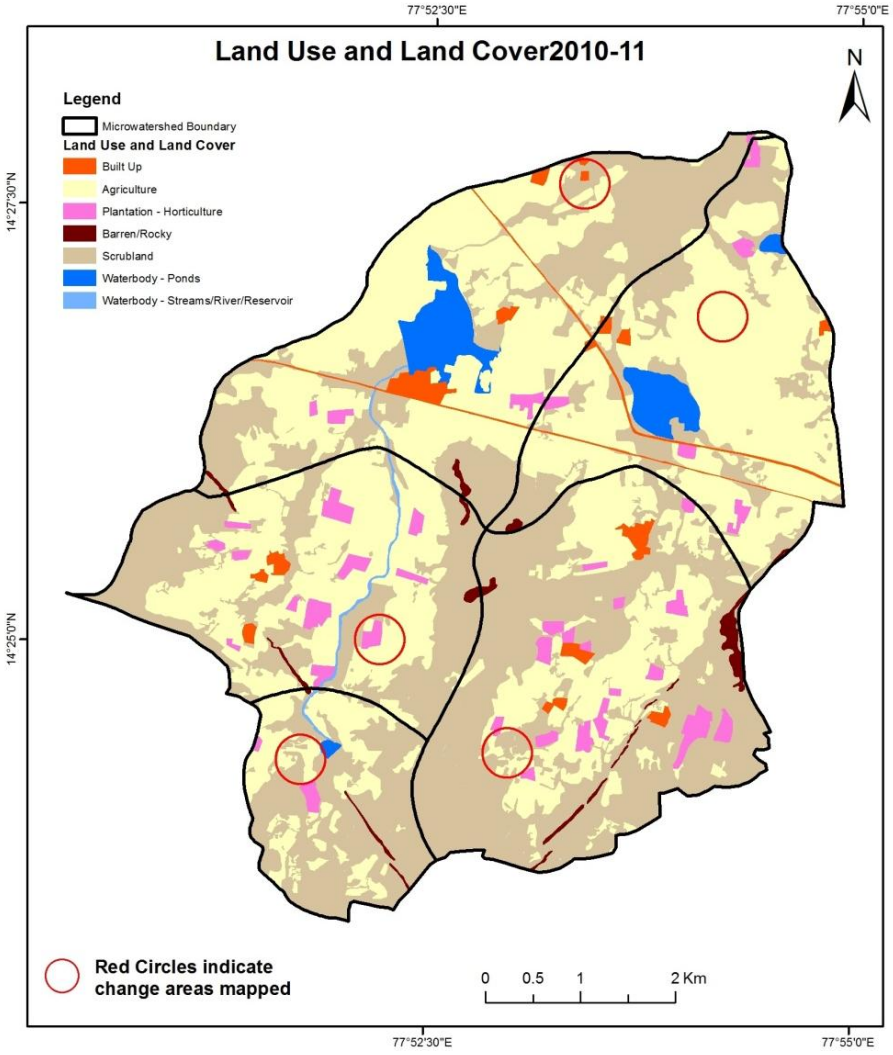
MONITORING IN THE PROJECT AREA

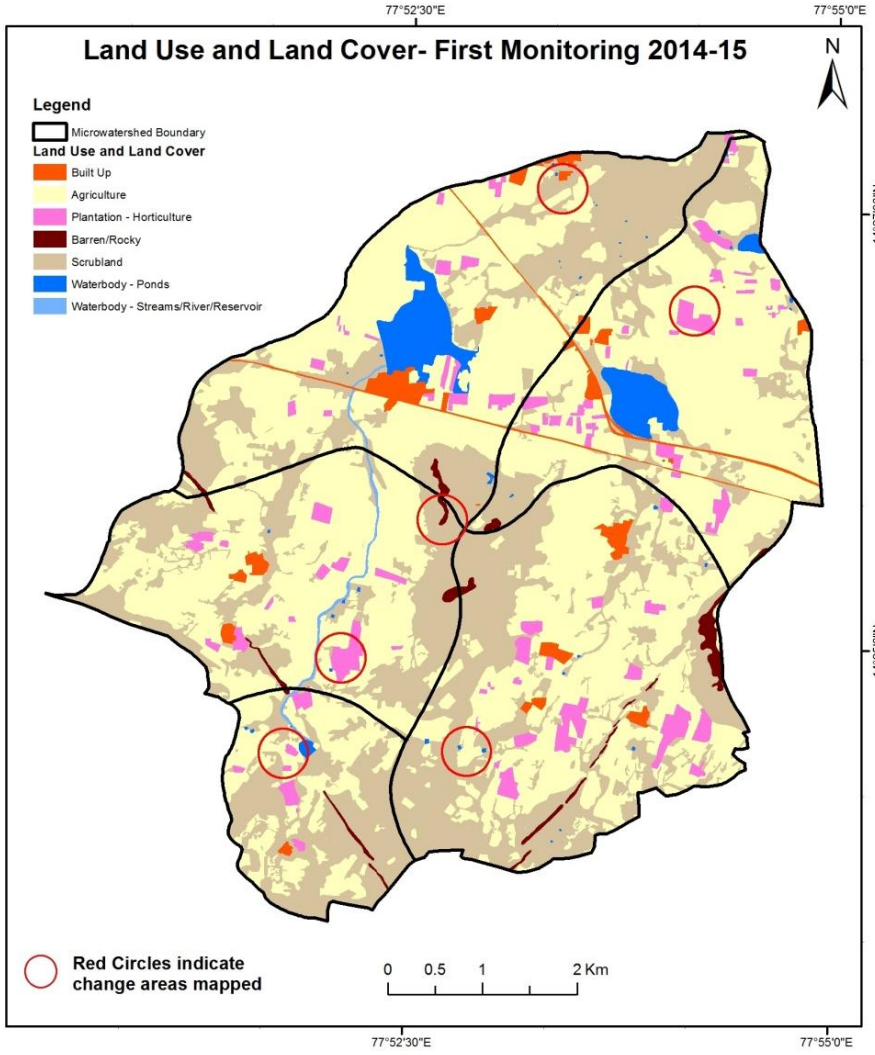
Land use and Land cover Changes in the Project

- 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)

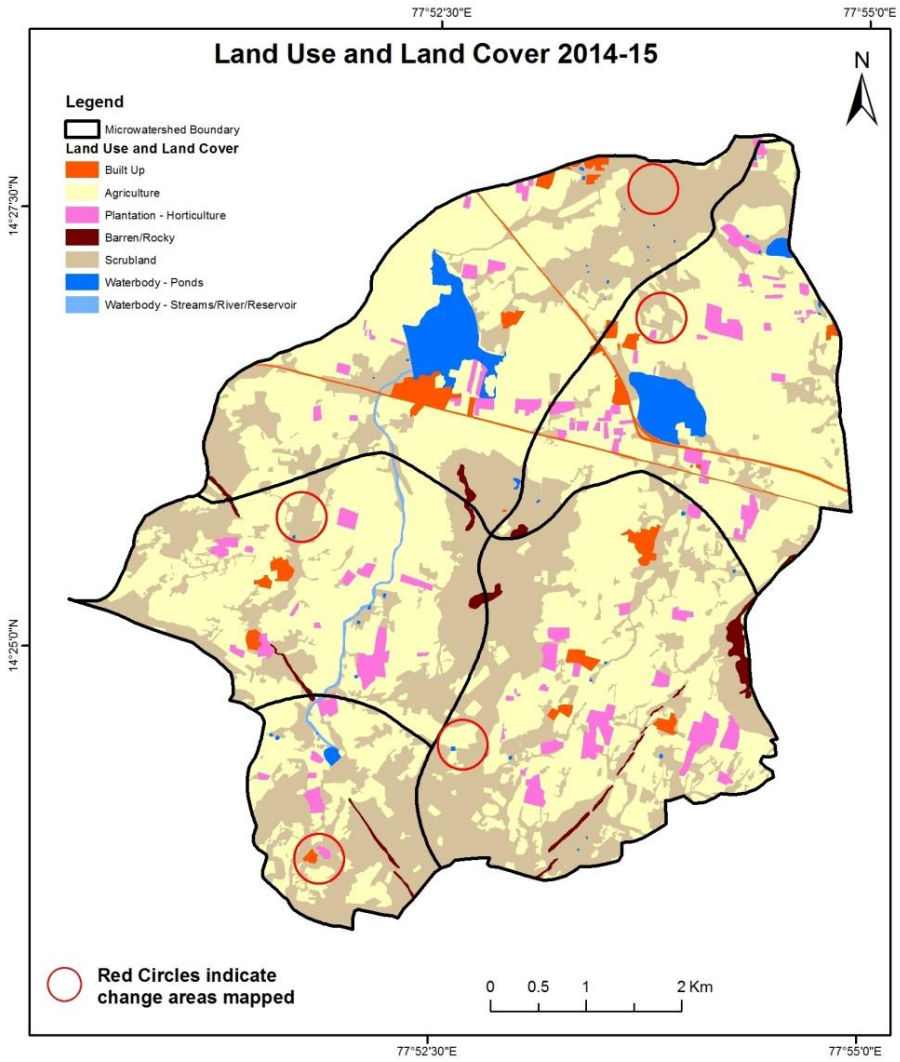
Scale: 1:10000

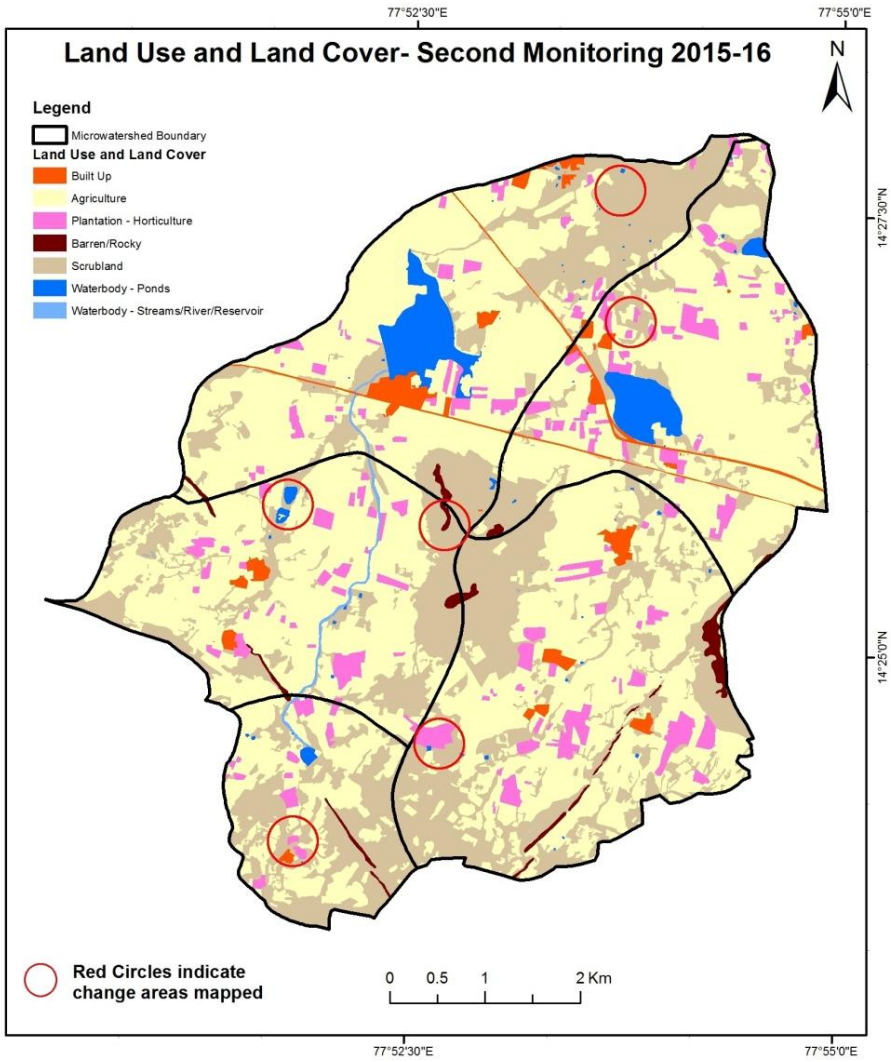




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

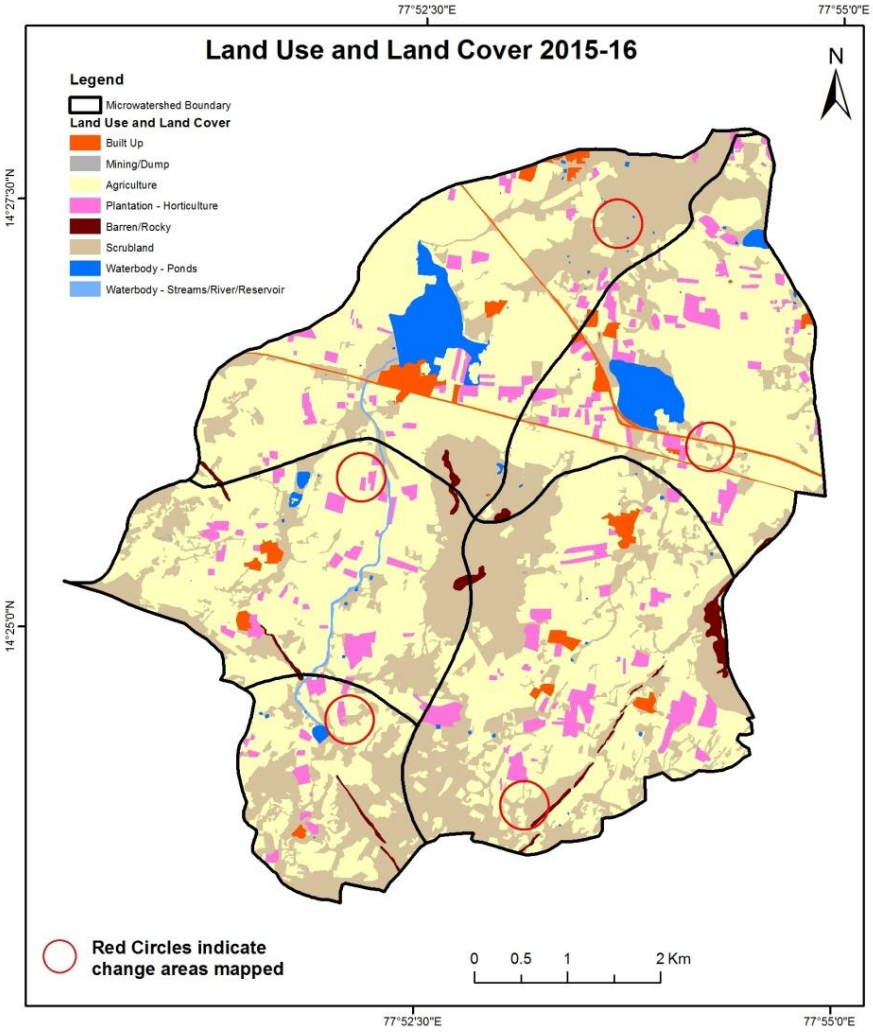
Scale: 1:10000

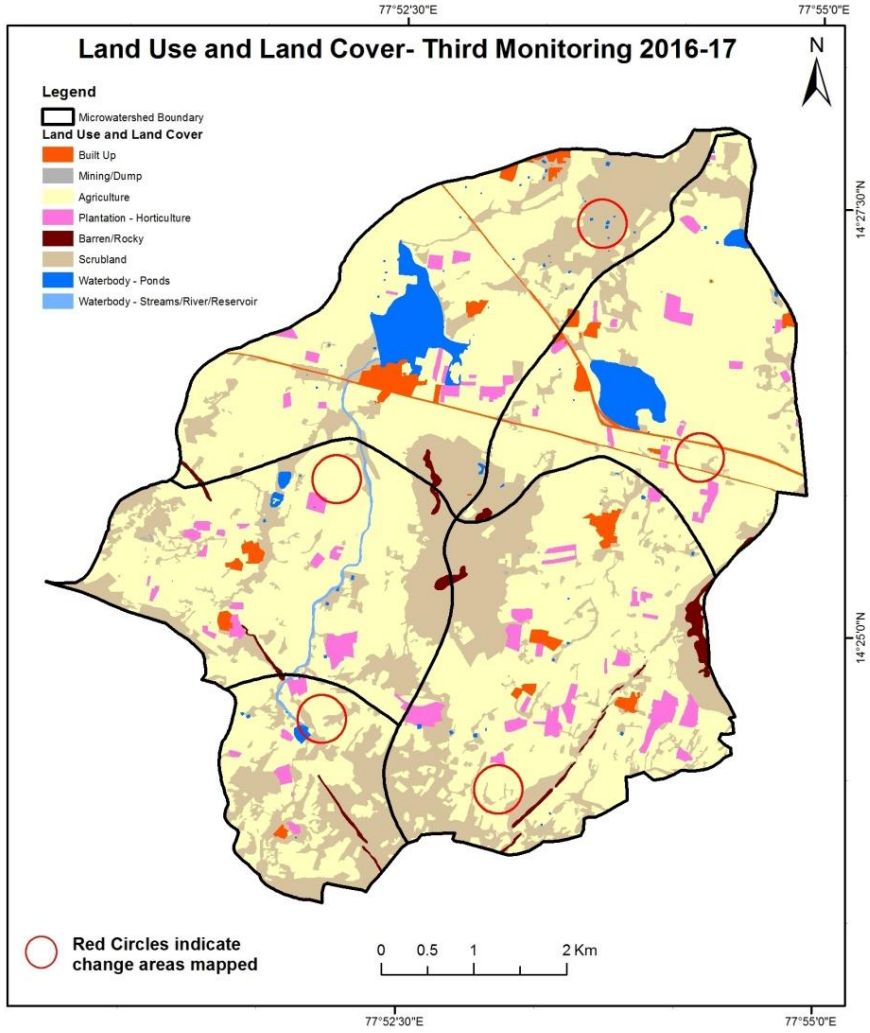




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

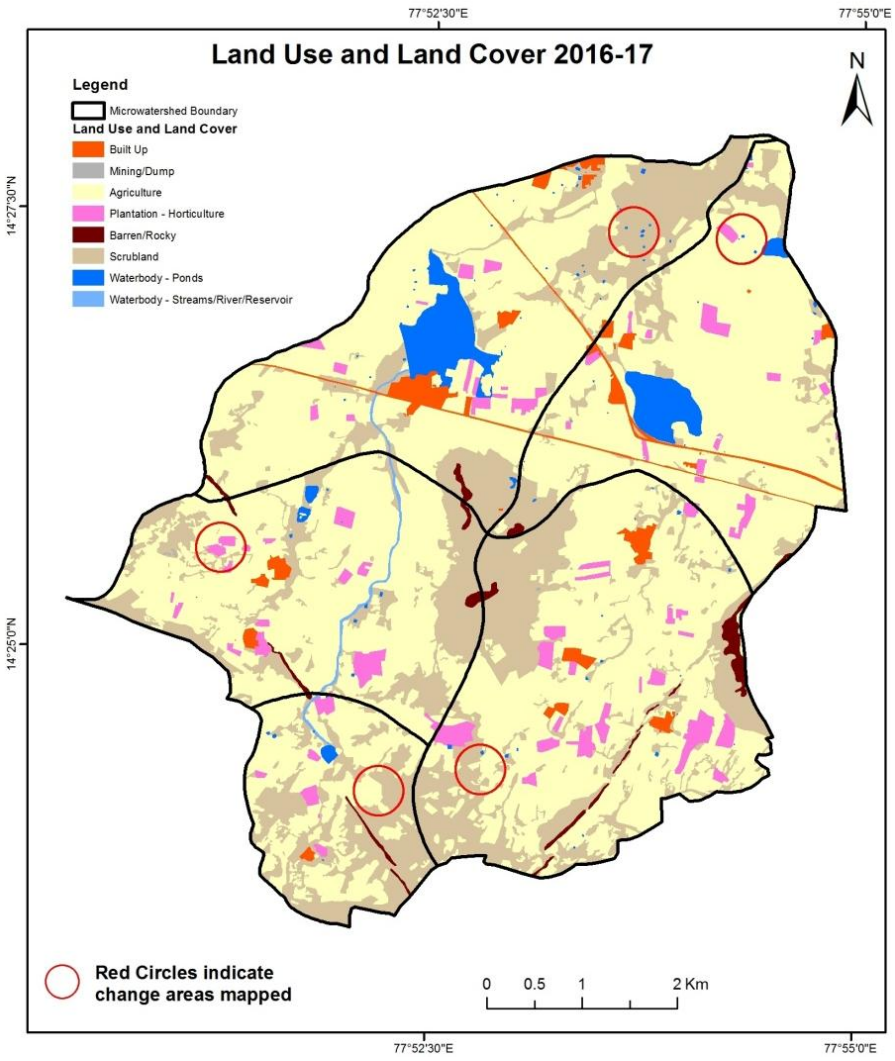
Scale: 1:10000

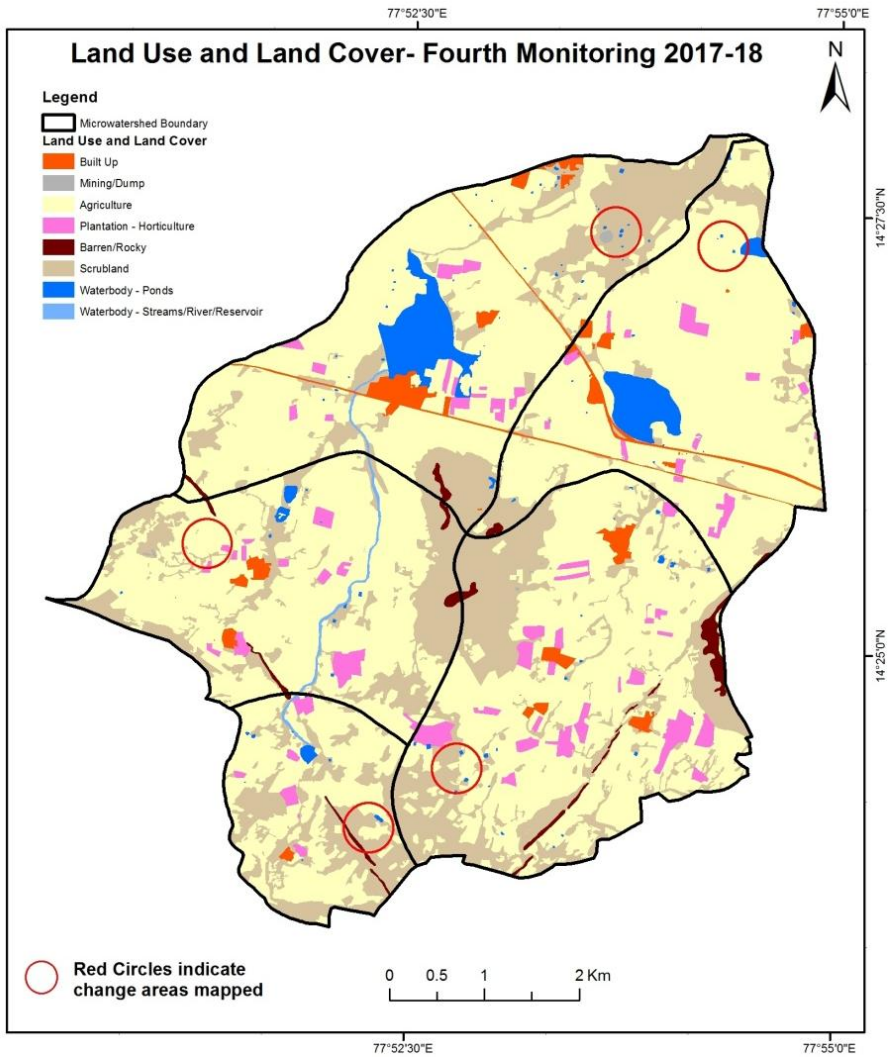




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

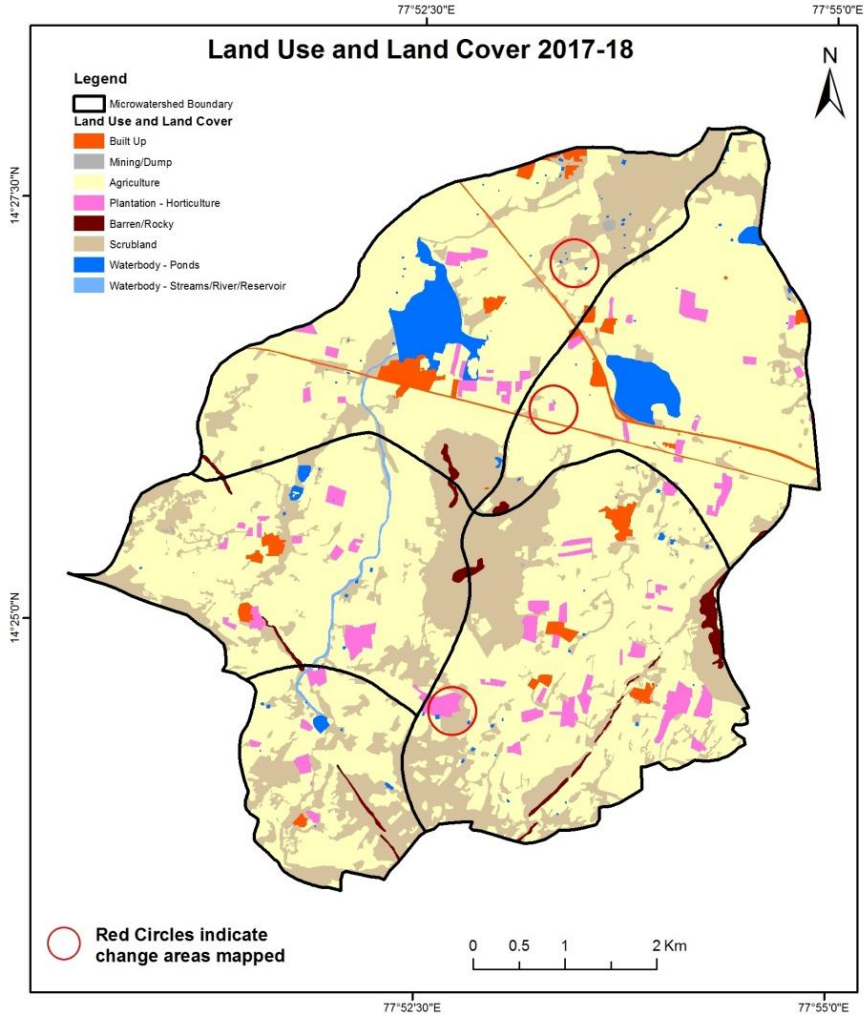
Scale: 1:10000

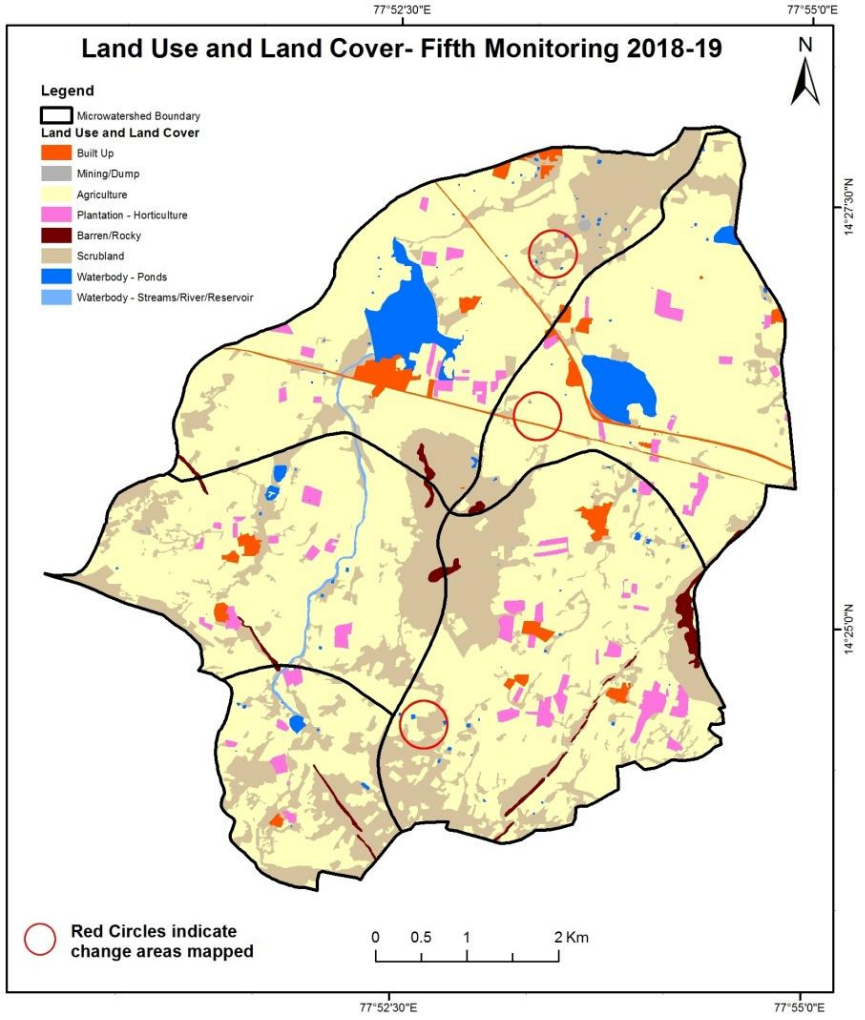




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000





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

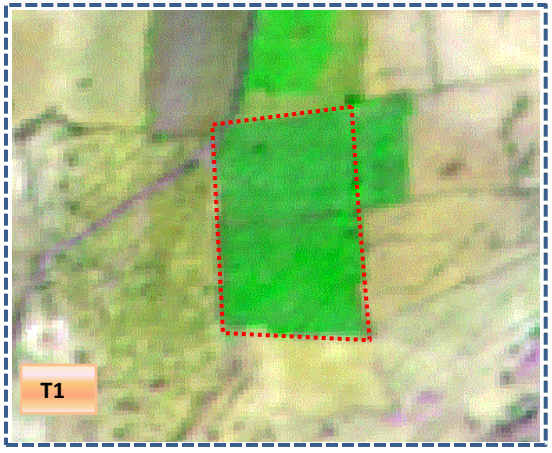
Agriculture to Plantation

T0: 2009-10(77°54'7.916"E 14°26'53.175"N)

T1: 26 Jan 2015

Agriculture to Plantation

T0: 2009-10 (77°52'10.377"E 14°24'54.655"N)



T1: 26 Jan 2015

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

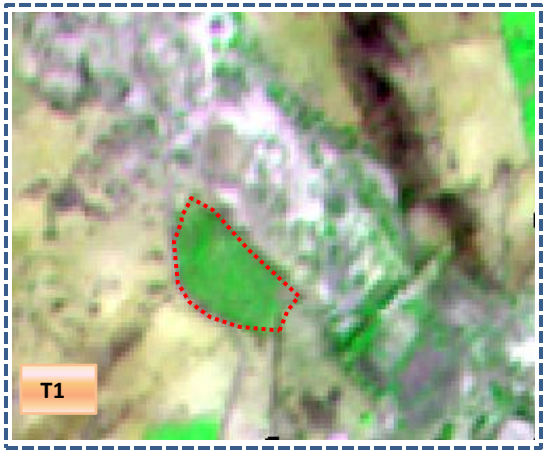
Agriculture to Plantation

T0: 2010-11(77°51'30.734E 14°25'0.415N)

T1: 26 January 2015

Agriculture to Plantation

T0: 2010-11(77°51'50.394E 14°24'26.374N)



T1: 26 January 2015

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

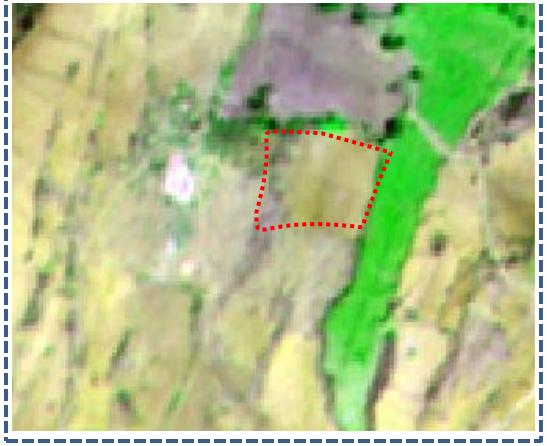
Agriculture to Farm pond

T0: 2010-11(77°53'35.064E 14°24'50.118N)

T1: 26 January 2015

Scrub to Agriculture

T0: 2010-11(77°53'53.182E 14°24'24.812N)



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	78.93										**78.93**
Mining/dump											
Agriculture	3.57		1868.04	83.61							**1955.22**
Plantation Horticulture			44.58	82.22							**126.80**
Forest											
Forest Plantation											
Barren Rocky							36.74				**36.74**
Scrub	8.95		403.98	0.50				1443.86		4.48	**1861.77**
Waterbody-Streams/River									12.51		**12.51**
Waterbody – Ponds			0.37							110.21	**110.58**
Grand Total	**91.45**		**2316.97**	**166.33**			**36.74**	**1443.86**	**12.51**	**114.69**	**4182.55**

- 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 87.18 ha of agriculture are decreased and it is converted into built up and plantation of T1.
- In T1 448.93 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	91.45										**91.45**
Mining/dump											
Agriculture	0.74		2235.04	80.85						0.34	**2316.97**
Plantation Horticulture	0.04		5.31	160.96						0.02	**166.33**
Forest											
Forest Plantation											
Barren Rocky							36.74				**36.74**
Scrub	0.27	0.76	198.73					1239.80		4.29	**1443.86**
Waterbody-Streams/River									12.51		**12.51**
Waterbody – Ponds										114.69	**114.69**
Grand Total	**92.49**	**0.76**	**2439.09**	**241.81**			**36.74**	**1239.80**	**12.51**	**119.34**	**4182.55**

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

• In T2 204.05 ha of agriculture are 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	92.49										**92.49**
Mining/dump		0.76									**0.76**
Agriculture	0.26		2435.09	3.26						0.48	**2439.09**
Plantation Horticulture			102.71	139.08						0.02	**241.81**
Forest											
Forest Plantation											
Barren Rocky							36.74				**36.74**
Scrub	0.22		195.25					1043.70		0.62	**1239.80**
Waterbody-Streams/River									12.51		**12.51**
Waterbody – Ponds			0.63							118.71	**119.34**
Grand Total	**92.98**	**0.76**	**2733.69**	**142.34**			**36.74**	**1043.70**	**12.51**	**119.82**	**4182.55**

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

• In T3 298.60 ha of agriculture are increased from plantation, scrubland and water body 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	92.98										**92.98**
Mining/dump		0.76									**0.76**
Agriculture			2726.40	7.17						0.12	**2733.69**
Plantation Horticulture			9.95	132.38							**142.34**
Forest											
Forest Plantation											
Barren Rocky							36.74				**36.74**
Scrub	0.16	1.46	67.09					973.03		1.97	**1043.70**
Waterbody-Streams/River									12.51		**12.51**
Waterbody – Ponds			1.85							117.97	**119.82**
Grand Total	**93.14**	**2.22**	**2805.30**	**139.56**			**36.74**	**973.03**	**12.51**	**120.05**	**4182.55**

- 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 7.29 ha of agriculture are decreased and it is converted into plantation and water body of T4.
- In T4 78.90 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	93.14										**93.14**
Mining/dump		2.22									**2.22**
Agriculture			2804.23	1.06							**2805.30**
Plantation Horticulture			21.18	118.38							**139.56**
Forest											
Forest Plantation											
Barren Rocky							36.74				**36.74**
Scrub			6.25					966.64		0.14	**973.03**
Waterbody-Streams/River									12.51		**12.51**
Waterbody – Ponds										120.05	**120.05**
Grand Total	**93.14**	**2.22**	**2831.67**	**119.44**			**36.74**	**966.64**	**12.51**	**120.19**	**4182.55**

- 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 1.06 ha of agriculture are decreased and it is converted into plantation of T5.
- In T5 27.43 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 9.61 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 361.75, 122.12, 294.60, 71.61 & 26.37 Hectares From T0 to T1, T1 to T2, T2 to T3, T3 to T4 & T4 toT5 and overall increase of 876.45 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is decrease of 7.35 ha of the Plantation/Horticulture area has been decreased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 895.13 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (106) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (90) verified from the portal.