MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -24/2010-11
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

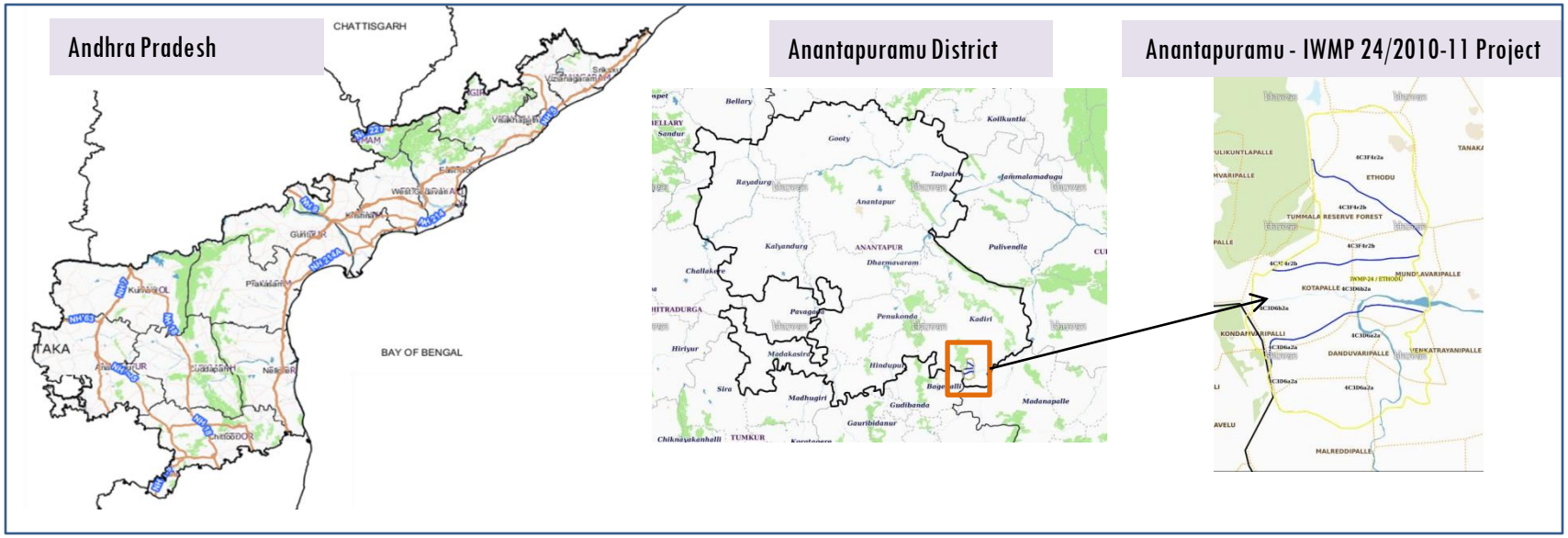
CONTENTS

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-24/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 5,585 ha. It comprises of 4 micro watersheds.
- In the project area 195 Drishti photos were uploaded showing 18 check dams, 53 Farm ponds, 24 Horticulture and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 53 new farm ponds or dug out pits with 34.96 ha increase in the area.
- Major percentage i.e. 61.37 % is covered by the agriculture, 30.76 % is covered by Scrub land, 0.03 % is covered by forest and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-24/2010-11
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Tanakal Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 5,585 ha. It comprises of 4 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.

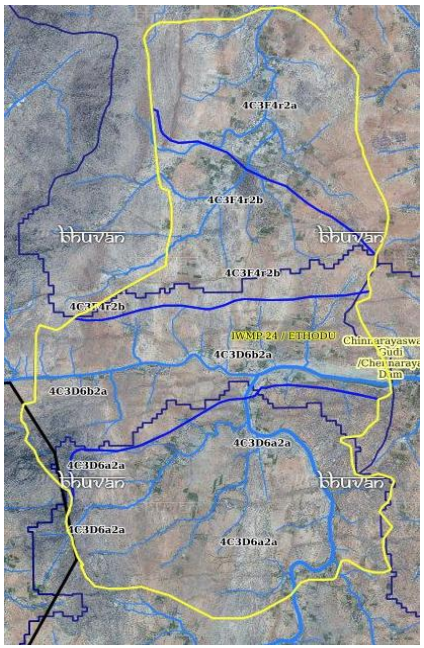
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			25-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			25-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	195
4	Detailed Project Report		

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



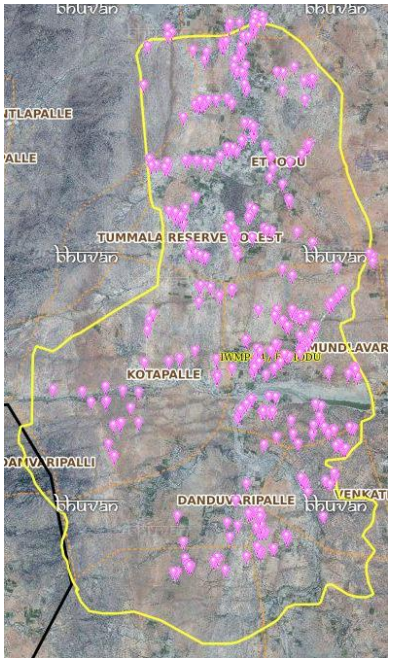
Legend

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	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	20	16
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	53	39
11	Civil work-Check dams/Rock fill dam	0	0
12	Nallah Bunds/Drainage treatment	7	6
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities-Plantation/Horticulture	23	18
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	91	70
	TOTAL	**194**	**149**

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-24/2010-11

2009-10

Jan-2016

April-2017

Dec-2018

2019

Activity : Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-24/2010-11

T0:2009-10

T1: 13 January 2014

Drishti Sl no. 568474 MWS :4C3G5e2a

Dug out pit

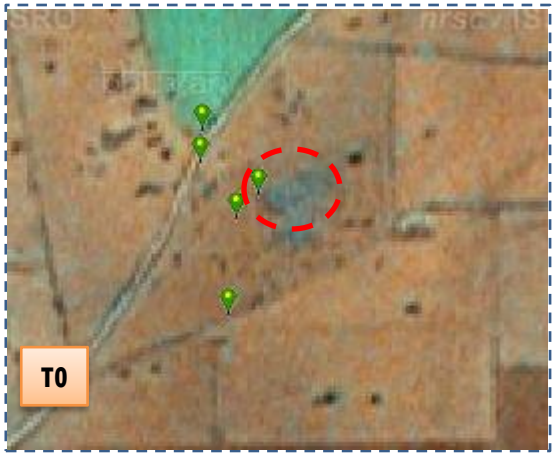
T0:2009-10

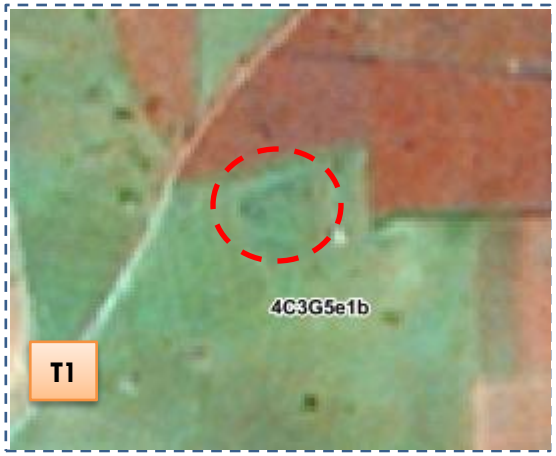
T1: 13 January 2014

Drishti Sl no.568702 MWS : 4C3G5e2a

Checkdam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-24/2010-11





T0: 2009-10

T1: 13 January 2014

Drishti Sl no. 564858 MWS :4C3G5e1b

Checkdam

T0: 2009-10

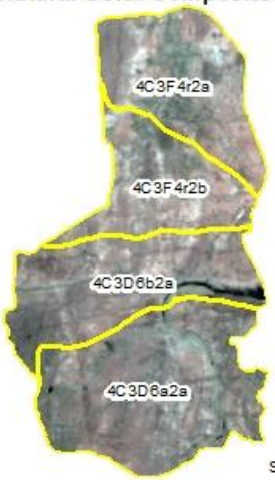
T1: 13 January 2014

Drishti Sl no. 568675 MWS :4C3G5e1c

Farm pond

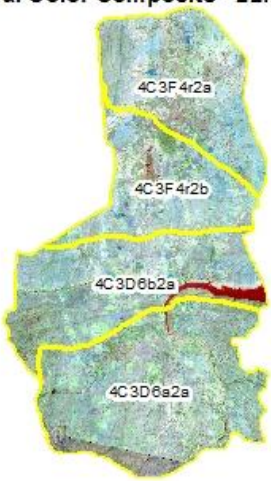
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite - 2010-11



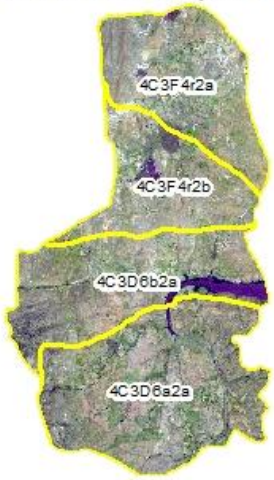
Source:Fusen data,NRSC

Natural Color Composite - 22nd February 2014



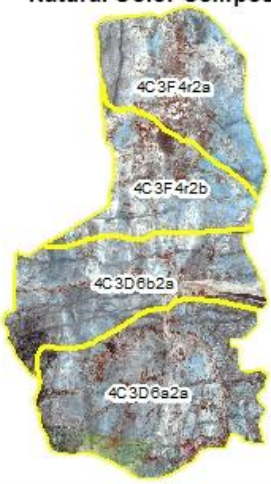
Source:NCC,NRSC

Natural Color Composite -16th January 2016



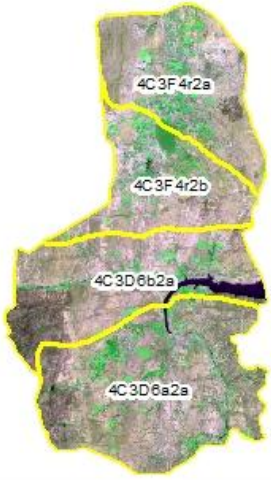
Source:NCC,NRSC

Natural Color Composite - 1st April 2017



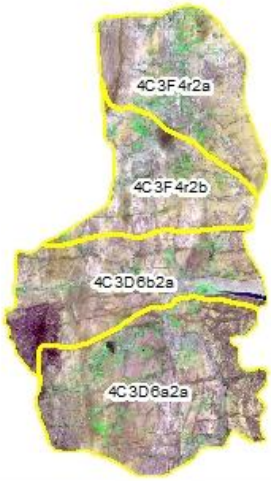
Source:NCC, LISS-IV,NRSC

Natural Color Composite - 1st March 2018



Source:LISS-IV,NRSC

Natural Color Composite - 25th March 2019



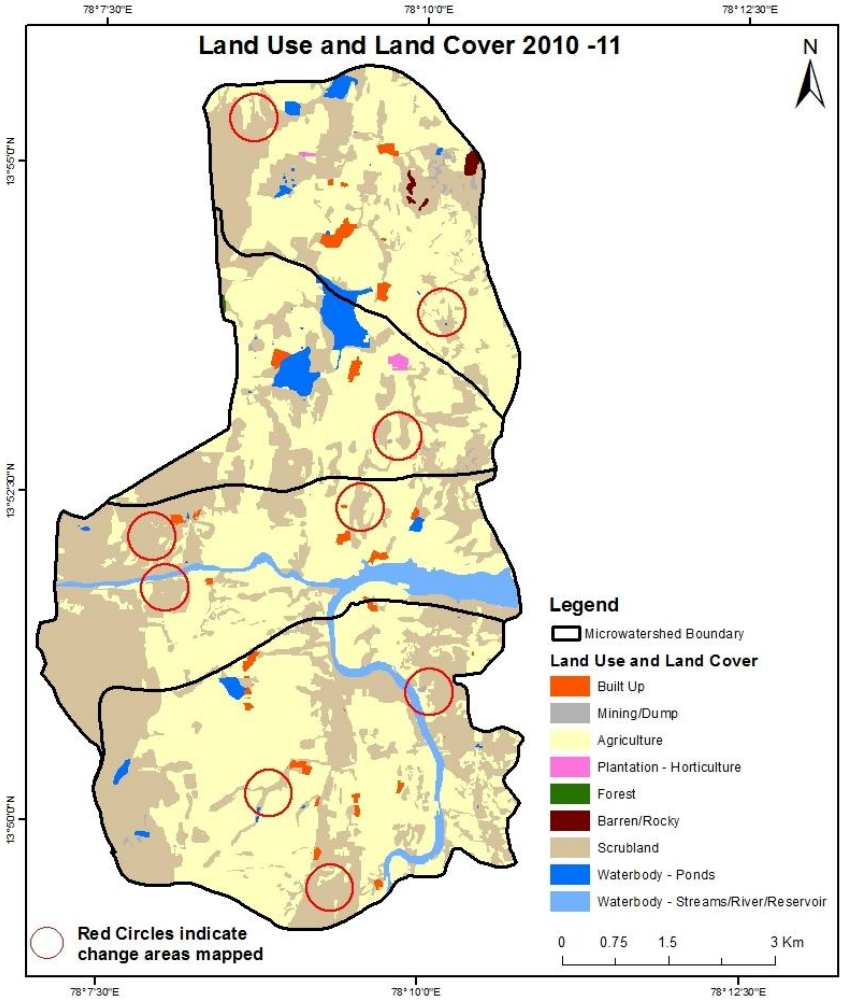
Source:Sentinel

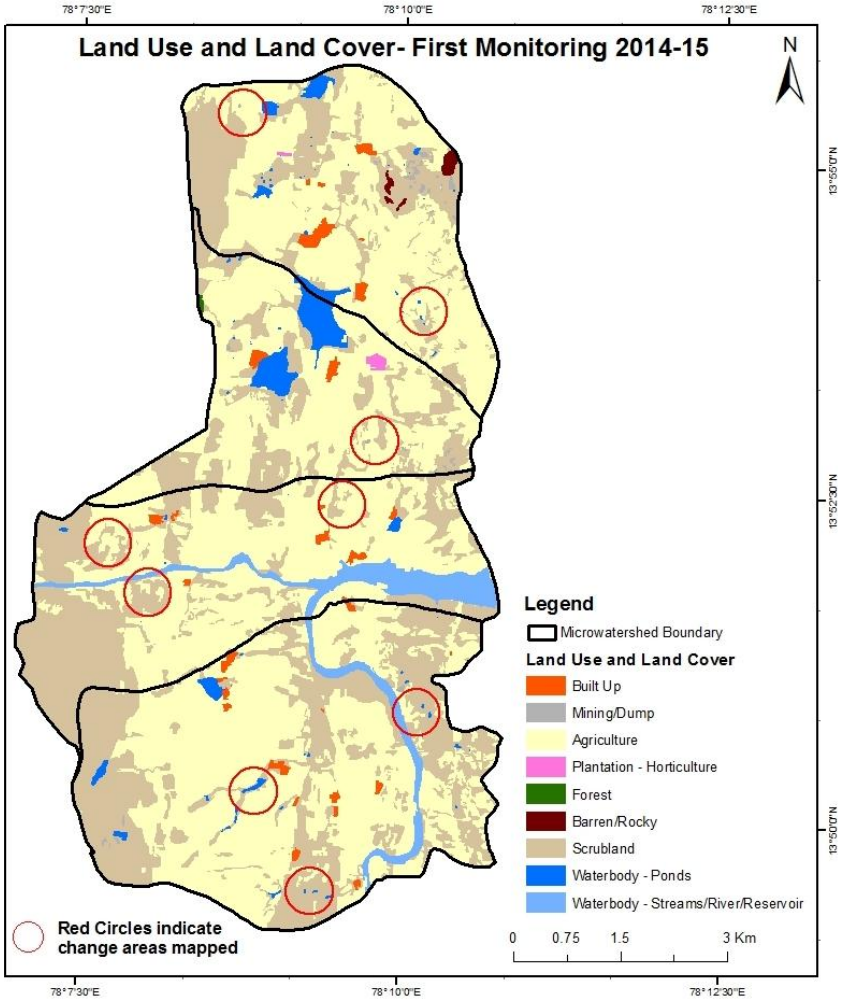
MONITORING IN THE PROJECT AREA

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)

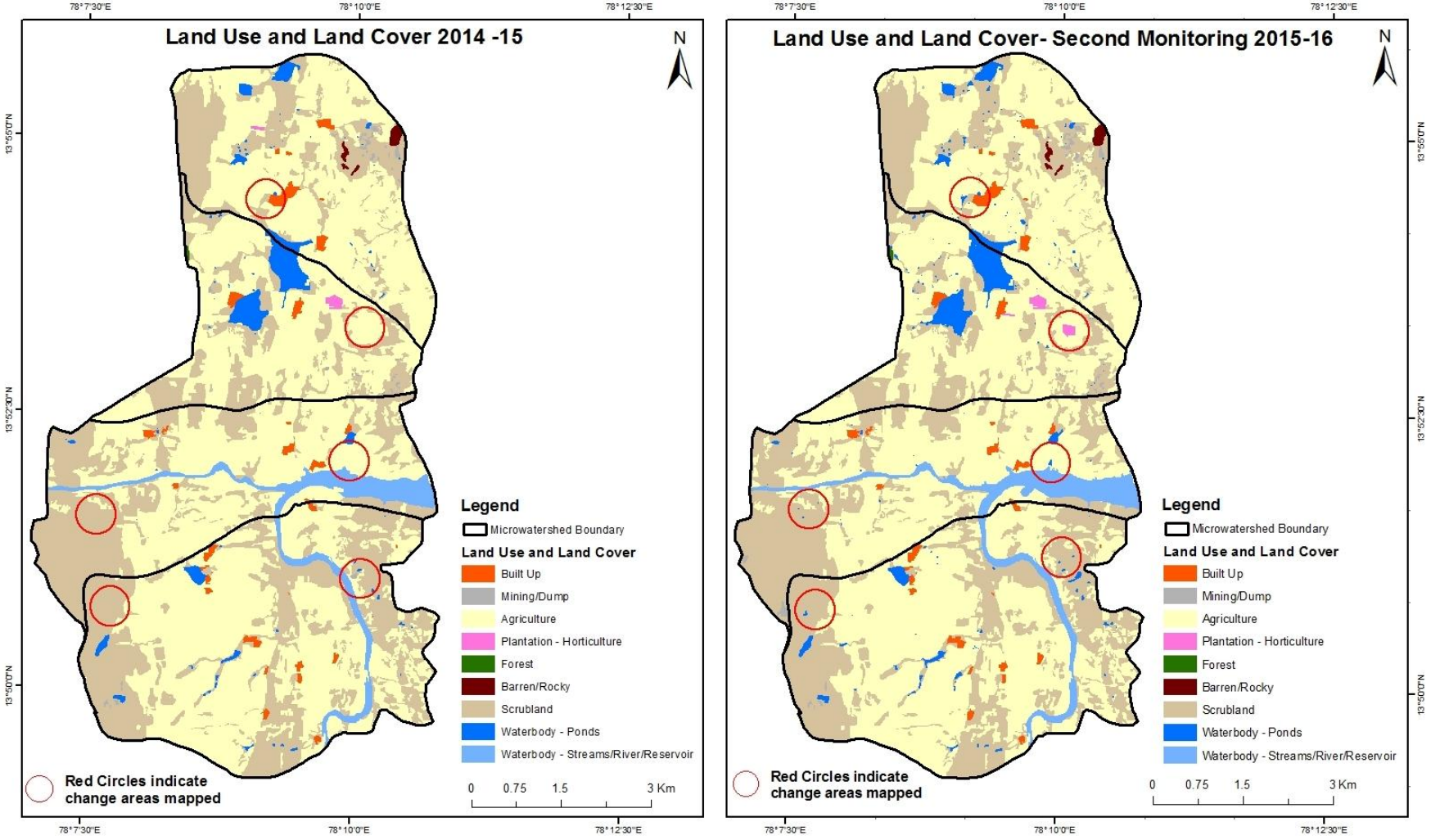
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)
Scale: 1:10000





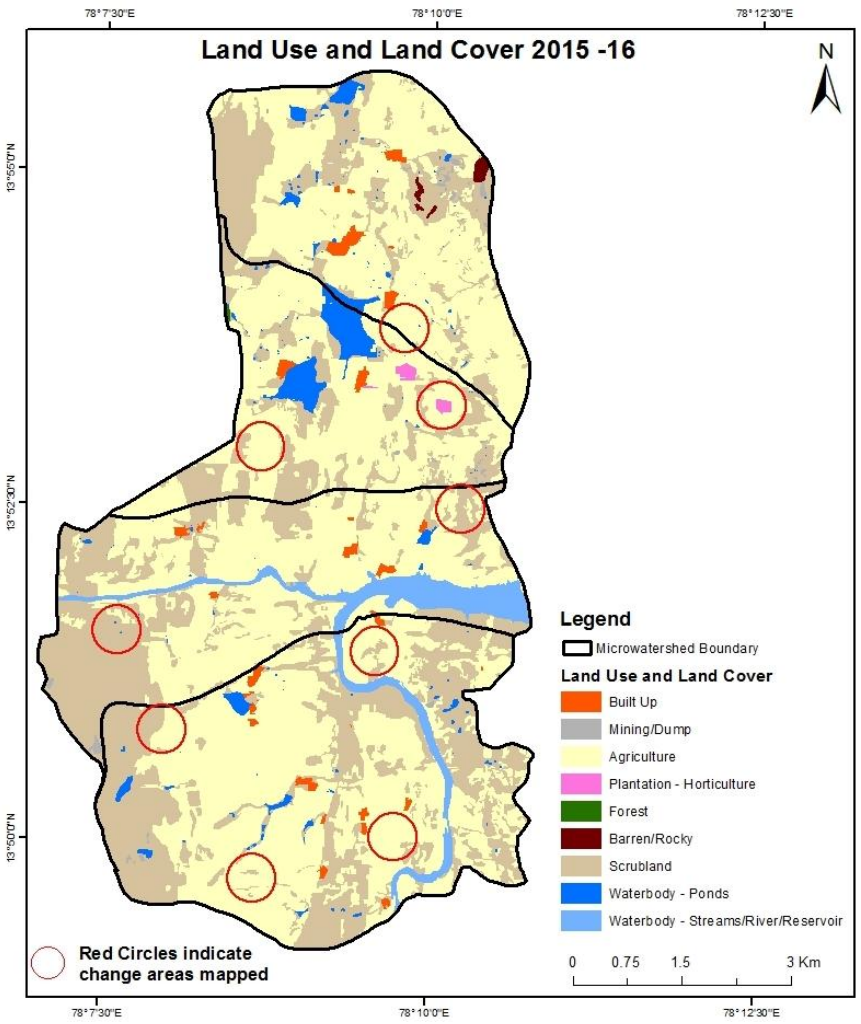
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

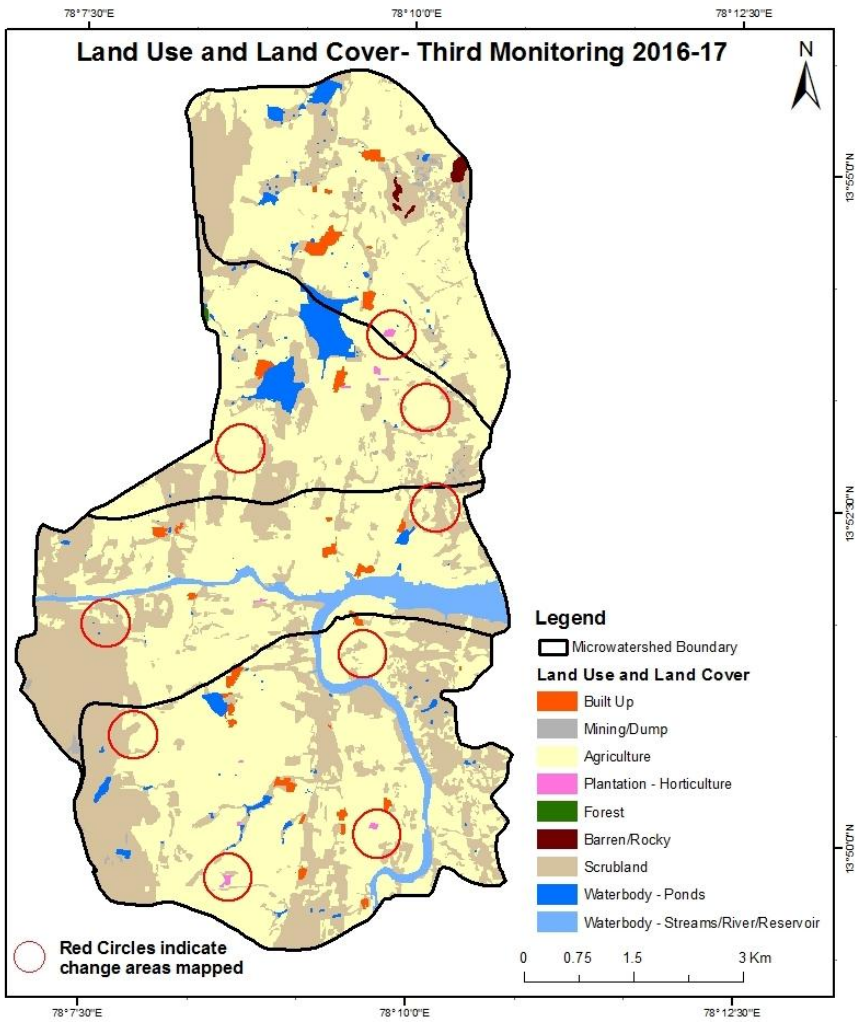
Scale: 1:10000



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

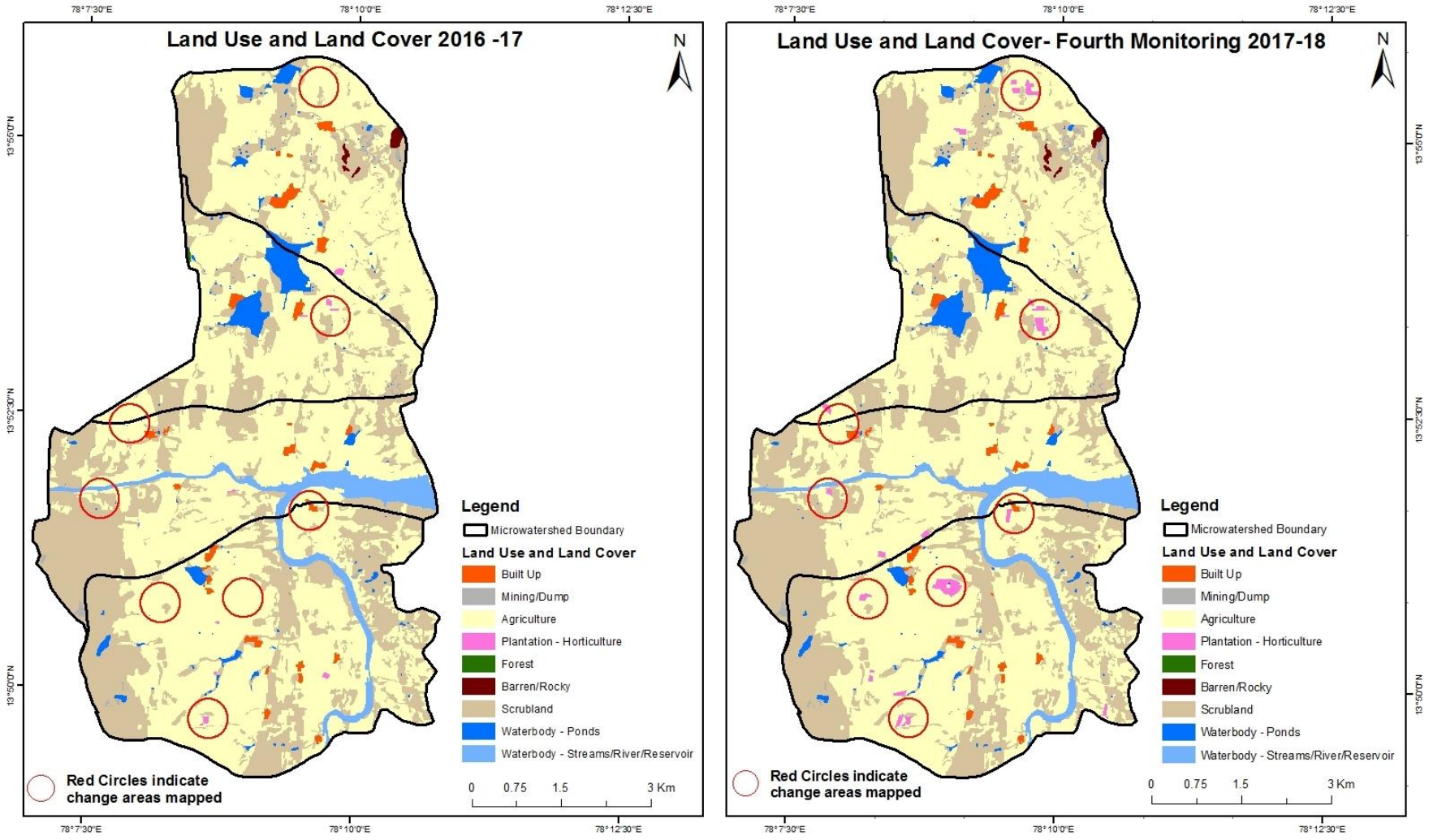
Scale: 1:10000





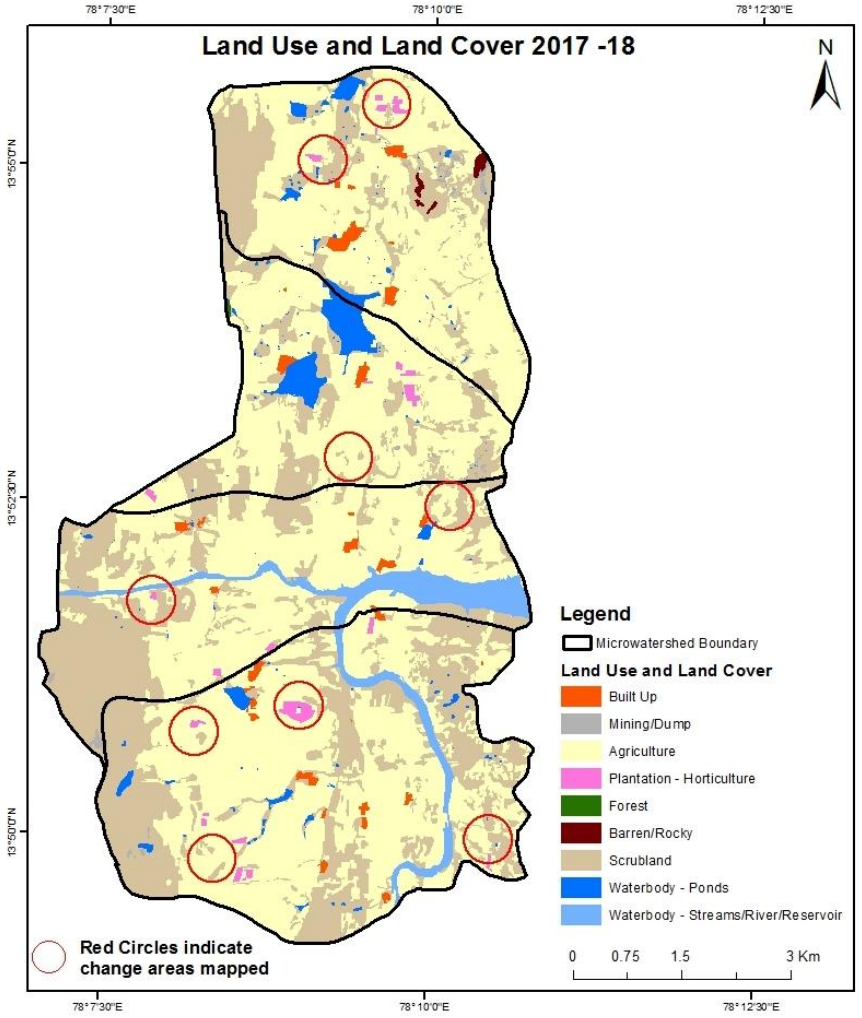
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

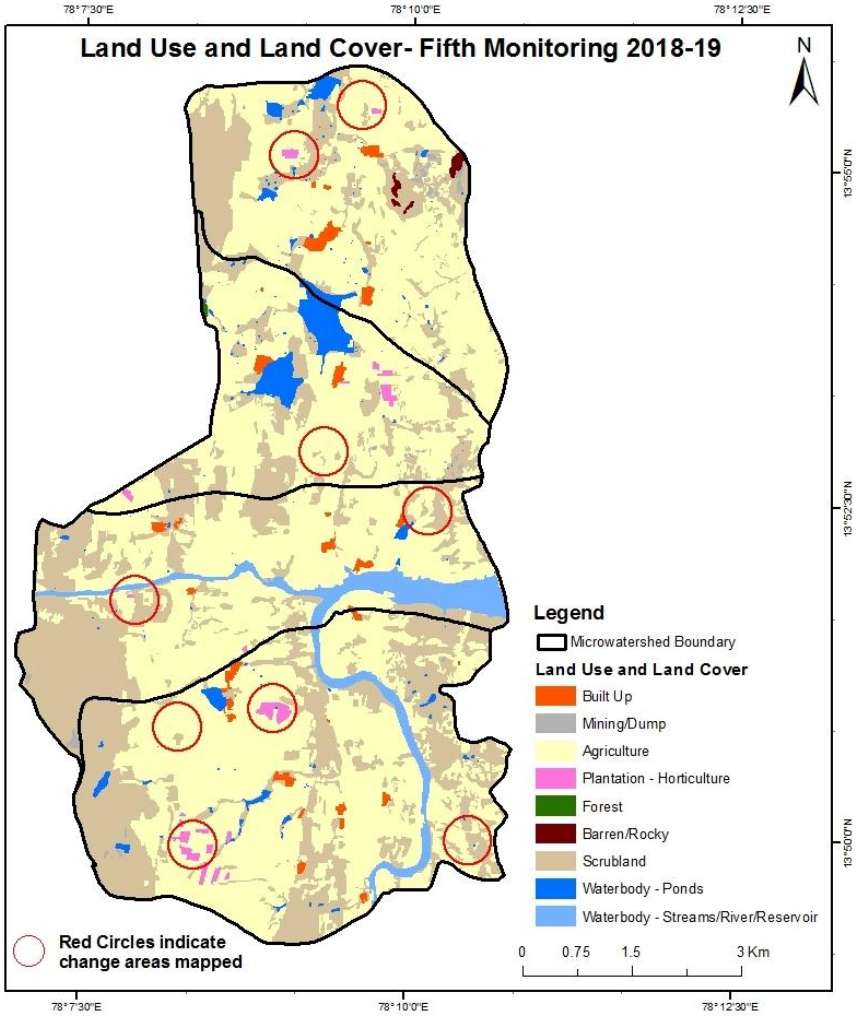
Scale: 1:10000



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

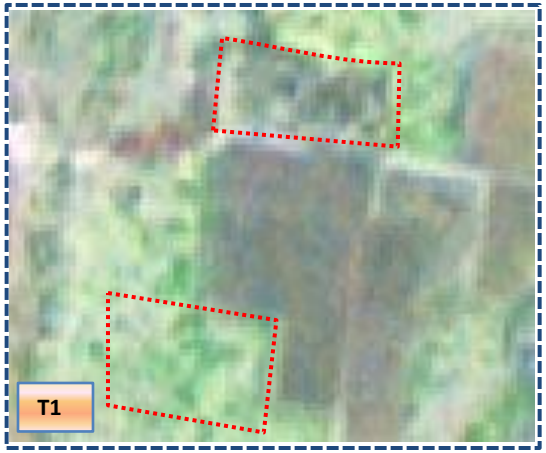
Scale: 1:10000



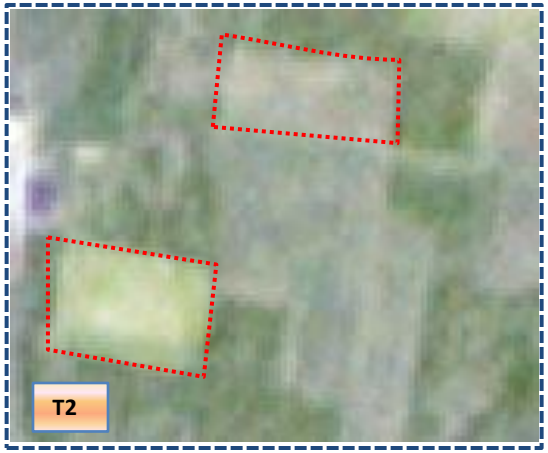


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture

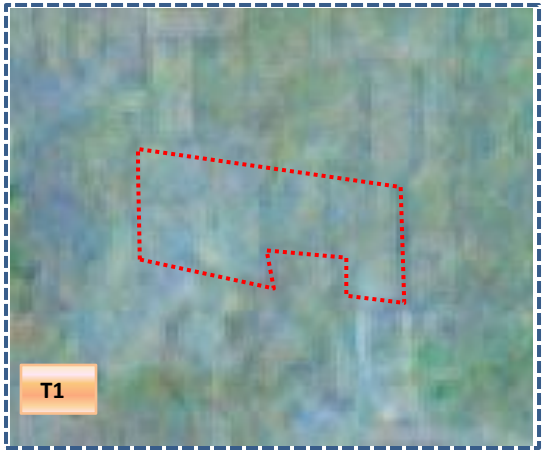


T1: 2014-15 (78°9'17.475"E 13°55'7.395"N)

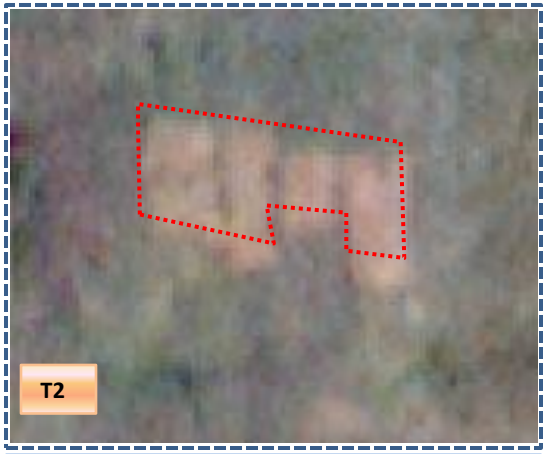


T2: 16 January 2016

Scrub to Agriculture



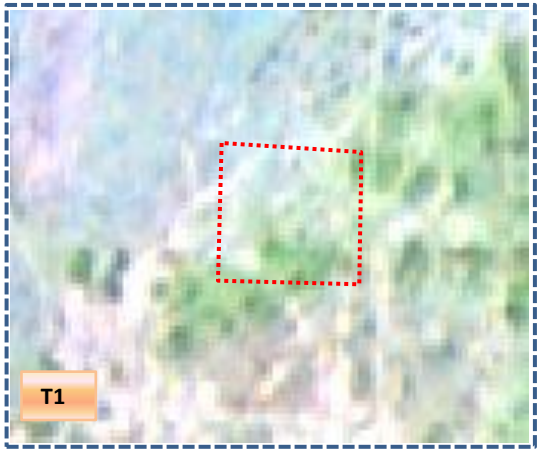
T1: 2014-15 (78°8'0.156"E 13°51'43.349"N)



T2: 16 January 2016

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

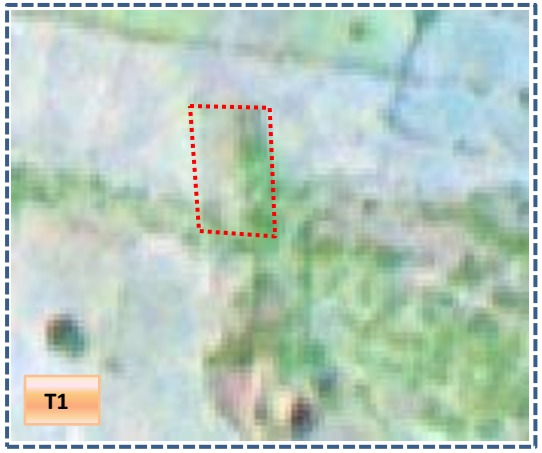
Agriculture to Water body



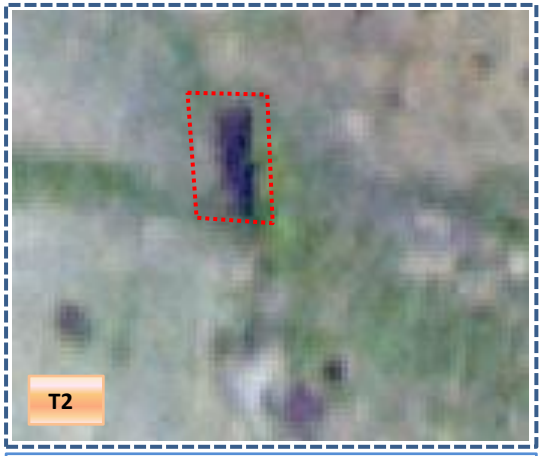
T1: 2014-15 (78°8'57.206"E 13°54'57.608"N)

T2: 16 January 2016

Agriculture to Water body



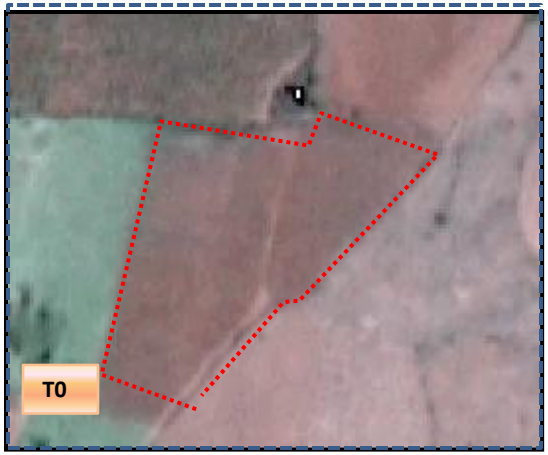
T1: 2014-15(78°8'53.162"E 13°55'29.263"N)



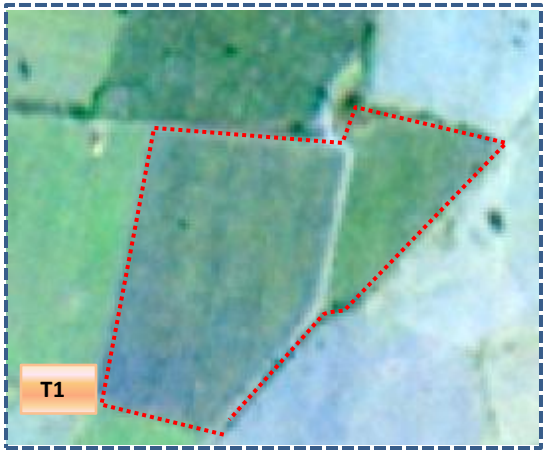
T2: 16 January 2016

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

Agriculture to Plantation

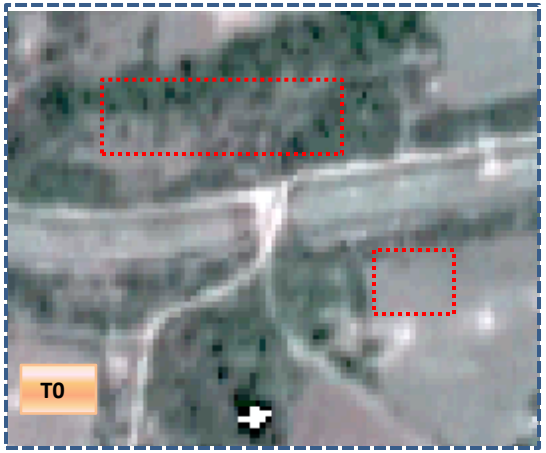


T0: 2010-11(Lat longs)

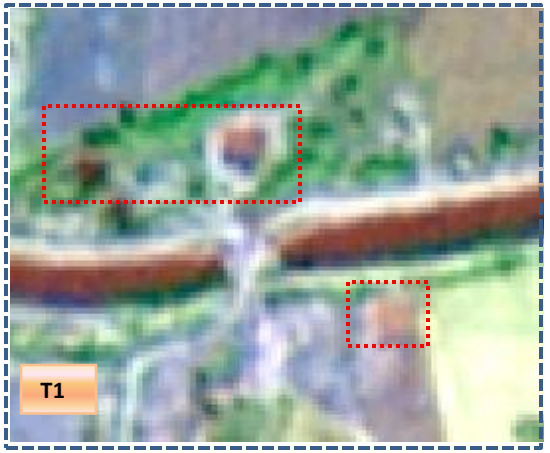


T1: 13 January 2014

Scrub to water body



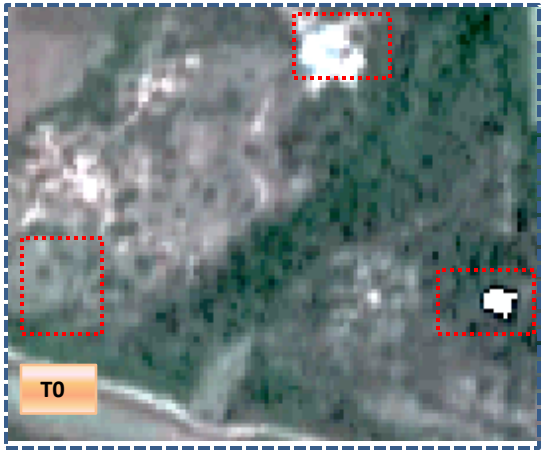
T0: 2010-11 (Lat longs)



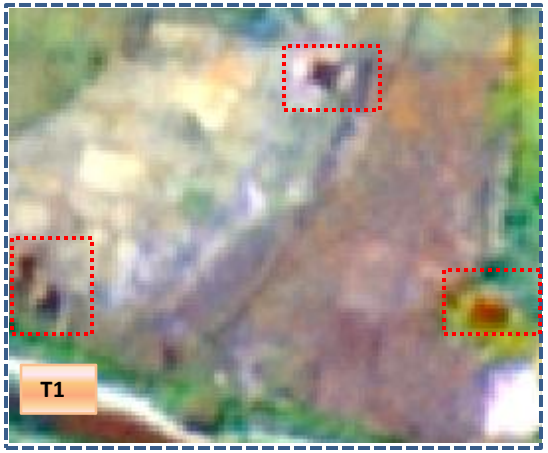
T1: 13 January 2014

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

Scrub to Water body



T0: 2010-11(Lat longs)



T1: 13 January 2014

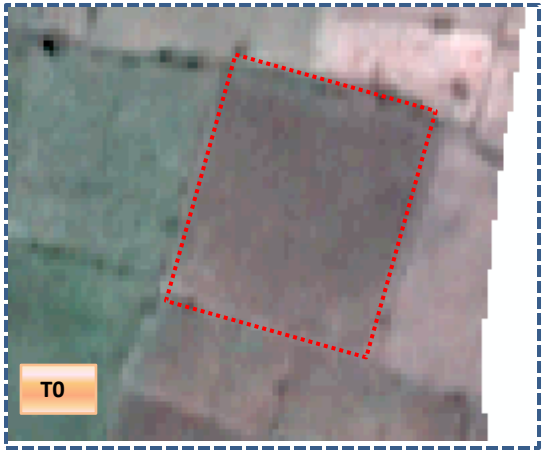
Scrub to Agriculture

T0: 2010-11(Lat longs)

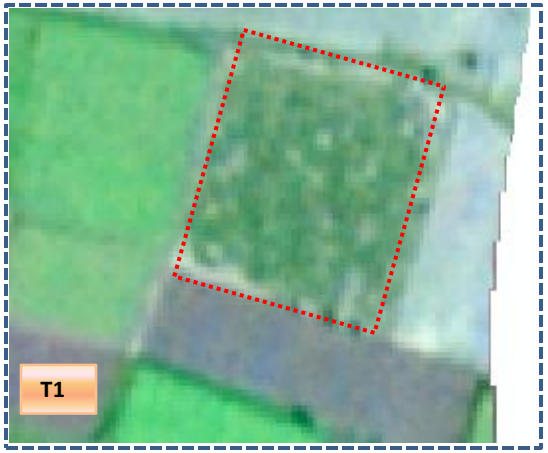
T1: 13 January 2014

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

Agriculture to Plantation

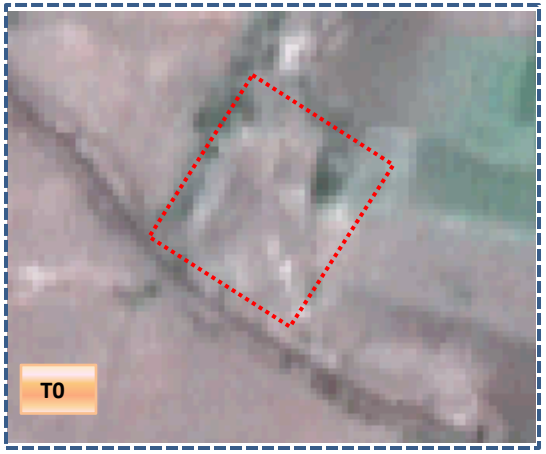


T0: 2010-11(Lat longs)



T1: 13 January 2014

Scrub to Agriculture



T0: 2010-11(Lat longs)

T1: 13 January 2014

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	57.28										**57.28**
Mining/dump		13.15									**13.15**
Agriculture	0.66		3090.85					2.74		0.09	**3094.34**
Plantation Horticulture				6.06							**6.06**
Forest					1.93						**1.93**
Forest Plantation											
Barren Rocky							10.06				**10.06**
Scrub	0.71	0.50	224.24					1889.09		8.27	**2122.82**
Waterbody-Streams/River									174.05		**174.05**
Waterbody – Ponds										106.06	**106.06**
Grand Total	**58.65**	**13.65**	**3315.10**	**6.06**	**1.93**		**10.06**	**1891.84**	**174.05**	**114.43**	**5585.75**

- 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 3.49 ha of agriculture are decreased and it is converted into built up, scrubland and water body of T1.
- In T1 224.24 ha of agriculture are increased from scrubland 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	58.65										**58.65**
Mining/dump		13.57								0.08	**13.65**
Agriculture	0.42	0.27	3291.55	4.00				1.86	11.83	5.18	**3315.10**
Plantation Horticulture			1.08	4.98							**6.06**
Forest					1.74					0.19	**1.93**
Forest Plantation											
Barren Rocky							10.06				**10.06**
Scrub	0.26	3.39	35.15					1836.53	1.91	14.59	**1891.84**
Waterbody-Streams/River									174.05		**174.05**
Waterbody – Ponds	0.04									114.38	**114.43**
Grand Total	**59.37**	**17.23**	**3327.78**	**8.97**	**1.74**		**10.06**	**1838.39**	**187.78**	**134.42**	**5585.75**

- 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 23.55 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation, scrubland and water body of T2.
- In T2 36.23 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	59.37										**59.37**
Mining/dump		17.04	0.20								**17.23**
Agriculture	0.65		3318.24	5.02				3.45		0.41	**3327.78**
Plantation Horticulture			7.48	1.49							**8.97**
Forest					1.74						**1.74**
Forest Plantation											
Barren Rocky							10.06				**10.06**
Scrub			90.89					1747.28		0.23	**1838.39**
Waterbody-Streams/River			6.05						181.73		**187.78**
Waterbody – Ponds			2.06							132.36	**134.42**
Grand Total	**60.02**	**17.04**	**3424.92**	**6.51**	**1.74**		**10.06**	**1750.73**	**181.73**	**133.00**	**5585.75**

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

• In T3 106.68 ha of agriculture are increased from mining/dump, 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	60.02										**60.02**
Mining/dump		17.04									**17.04**
Agriculture	0.18		3384.71	34.27				2.06	3.55	0.16	**3424.92**
Plantation Horticulture			3.64	2.87							**6.51**
Forest					1.74						**1.74**
Forest Plantation											
Barren Rocky		1.48					8.58				**10.06**
Scrub		0.32	16.52					1733.59		0.30	**1750.73**
Waterbody-Streams/River									181.73		**181.73**
Waterbody – Ponds										133.00	**133.00**
Grand Total	**60.20**	**18.84**	**3404.87**	**37.14**	**1.74**		**8.58**	**1735.65**	**185.28**	**133.45**	**5585.75**

- 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 40.22 ha of agriculture are decreased and it is converted into built up, plantation, scrubland and water body of T4.
- In T4 20.16 ha of agriculture are 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	60.20										**60.20**
Mining/dump		18.84									**18.84**
Agriculture	0.18		3393.19	11.50							**3404.87**
Plantation Horticulture			14.43	22.71							**37.14**
Forest					1.74						**1.74**
Forest Plantation											
Barren Rocky							8.58				**8.58**
Scrub			16.47	0.81				1718.37			**1735.65**
Waterbody-Streams/River			3.55						181.73		**185.28**
Waterbody – Ponds			0.12							133.34	**133.45**
Grand Total	**60.38**	**18.84**	**3427.75**	**35.02**	**1.74**		**8.58**	**1718.37**	**181.73**	**133.34**	**5585.75**

- 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 11.68 ha of agriculture are decreased and it is converted into built up and plantation of T5.
- In T5 34.57 ha of agriculture are increased from plantation, 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 increase of 34.96 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 220.75, 12.68, 97.15 & 22.89 Hectares From T0 to T1, T1 to T2, T2 to T3 & T4 toT5 and there is an increase of 20.06 Hectares From T3 to T4 . The overall increase of 333.41 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 28.97 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 404.45 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (53) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (39) verified from the portal.