

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -28/2010-11
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

C O N T E N T S

- **EXECUTIVE SUMMARY**

01. STUDY AREA

02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS

03. MONITORING IN THE PROJECT AREA : Site wise changes in the project

04. CONCLUSIONS

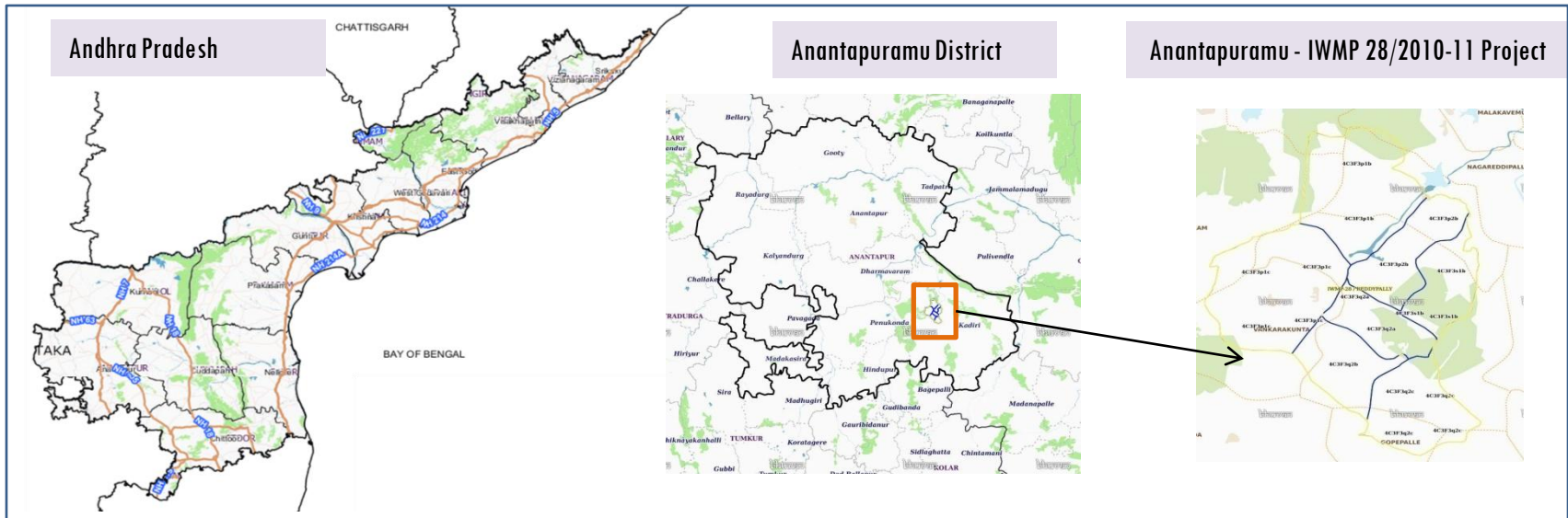
E X E C U T I V E S U M M A R Y

- 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-28/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 8,231 ha. It comprises of 7 micro watersheds.
- In the project area 531 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increase by 11.43 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 55.04 % is covered by the agriculture, 19.90 % is covered by Scrub land, 13.21 % is covered by forest and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-28/2010-11

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 8,231 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 -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	Drishiti Photographs		
		Total	531
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

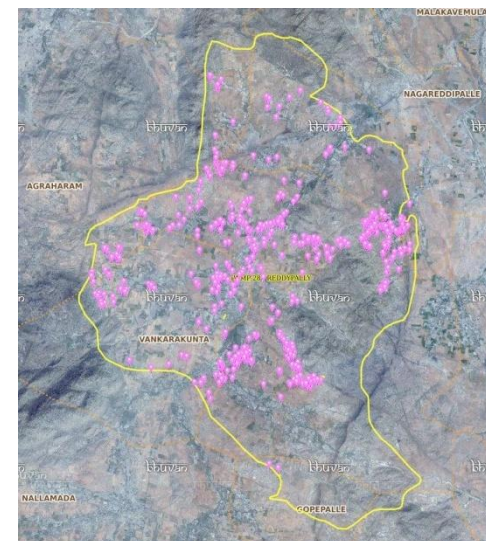


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	1	1
2	Agriculture/Horticulture	295	250
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	80	50
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	64	50
10	Civil work-Check dams/Rock fill dam	175	150
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	20	20
15	Capacity Building Activities	0	0
16	Entry Point Activity	18	10
17	Others	0	0
	TOTAL	662	531

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-28/2010-11

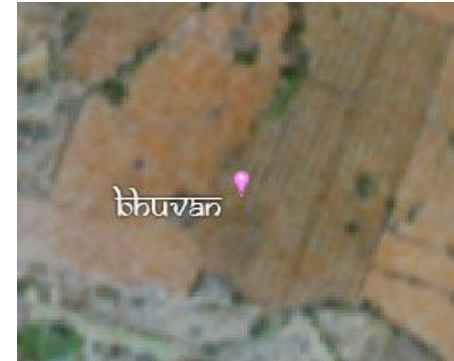
2009-10



Jan-2016



June-2017



Feb-2018



2019



Activity : Horticulture

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-28/2010-11



T0

T0:2010-11



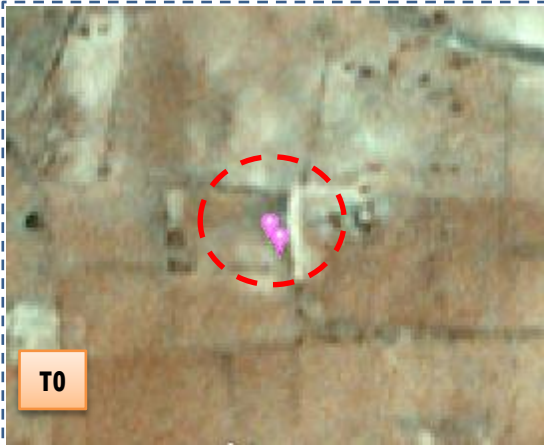
T1

T1: 19 May 2014



Drishti SI no. 588664 MWS : 4C3F3p1b

Farm pond



T0

T0:2010-11



T1

T1: 19 May 2014



Drishti SI no. 1098189 MWS : 4C3F3p1b

Farm pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-28/2010-11



T0

T0:2010-11



T1

T1: 19 May 2014



Drishti SI no. 1098157

MWS : 4C3F3P1c

Horticulture



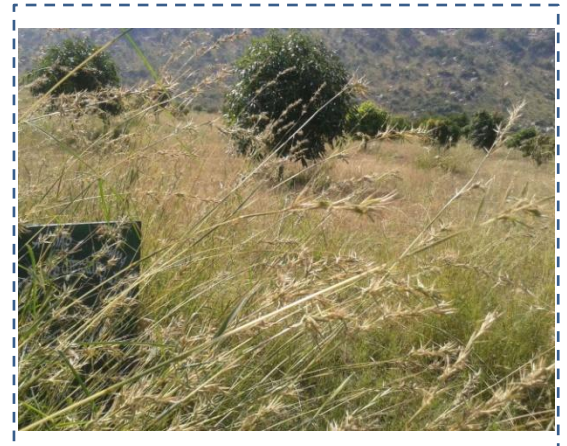
T0

T0:2010-11



T1

T1: 19 May 2014



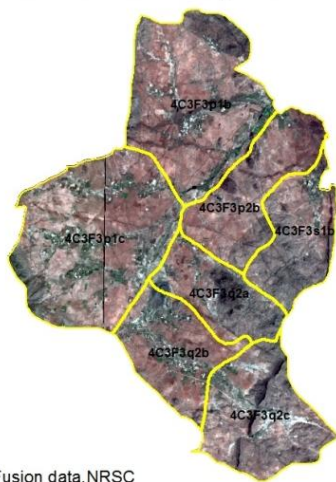
Drishti SI no. 341503

MWS :4C3F3P1c

Horticulture

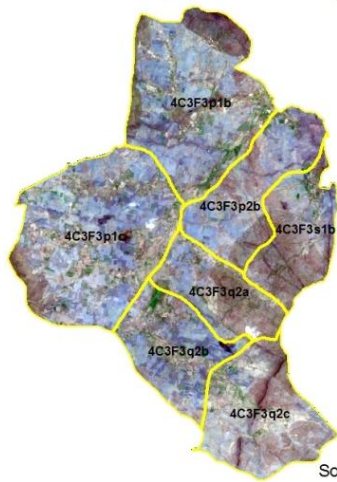
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2009 -10



Source:Fusion data,NRSC

Natural Color Composite- 19th May 2014



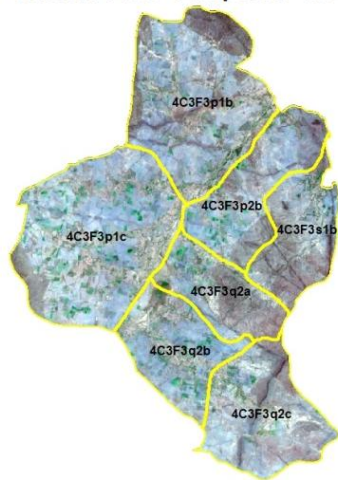
Source:NCC,NRSC

Natural Color Composite- 2016



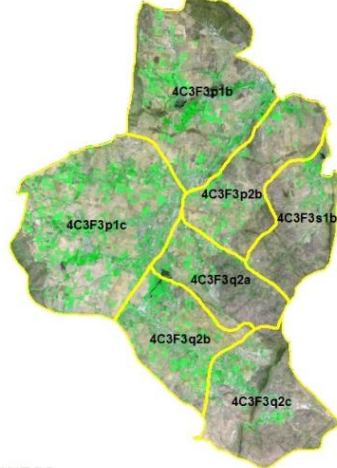
Source:Fusion data,NRSC

Natural Color Composite- 03 June 2017



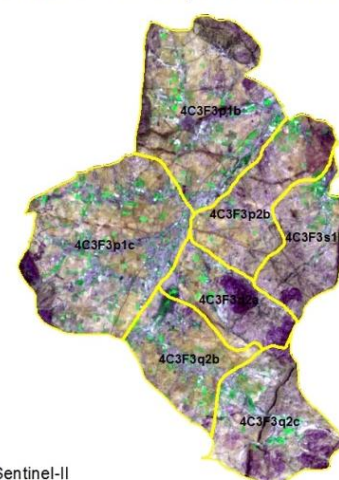
Source:NCC,NRSC

Natural Color Composite- 25th March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 25th March 2019



Source:Sentinel-II

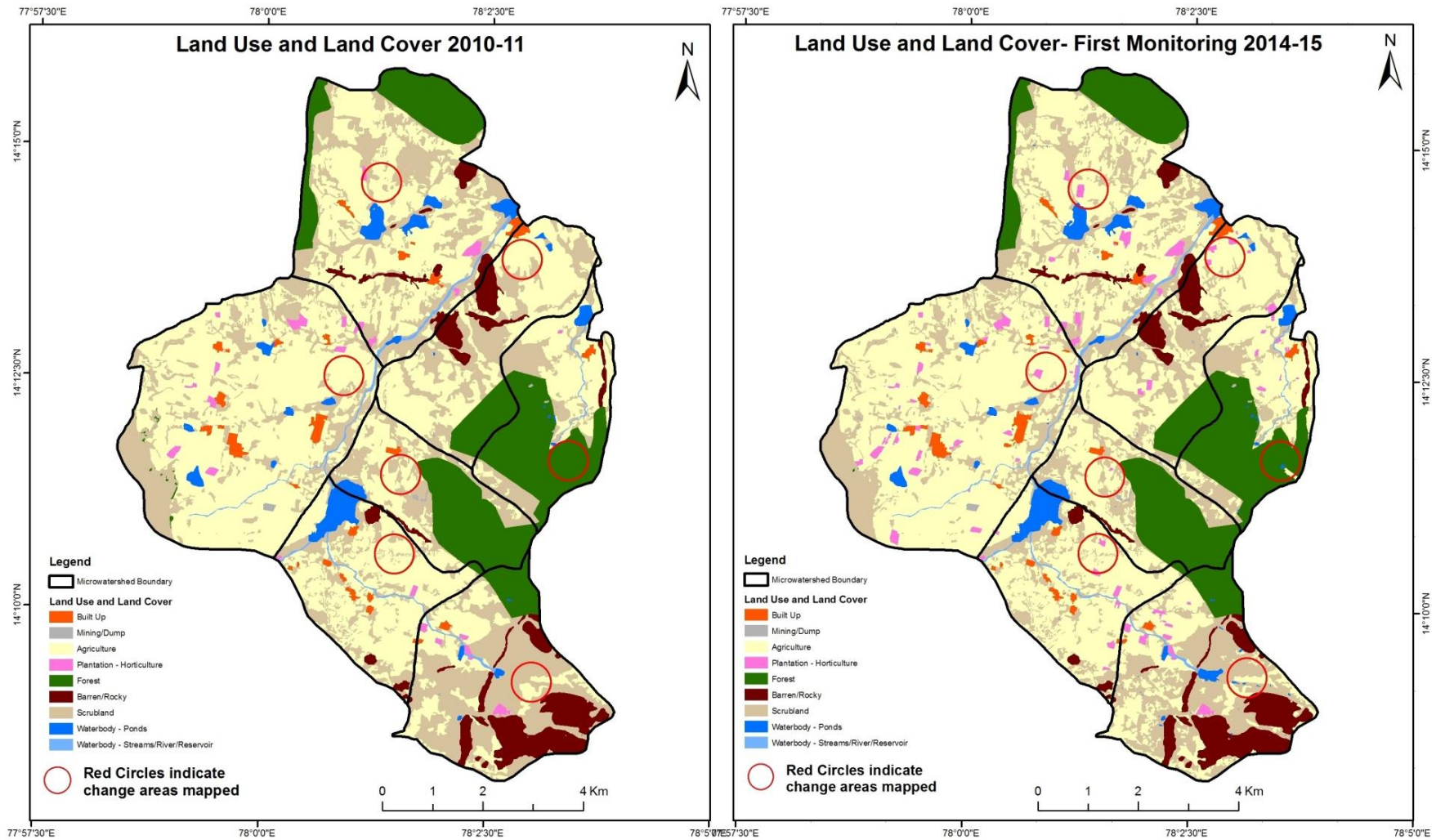
MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

- Change in land use and land cover from 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)

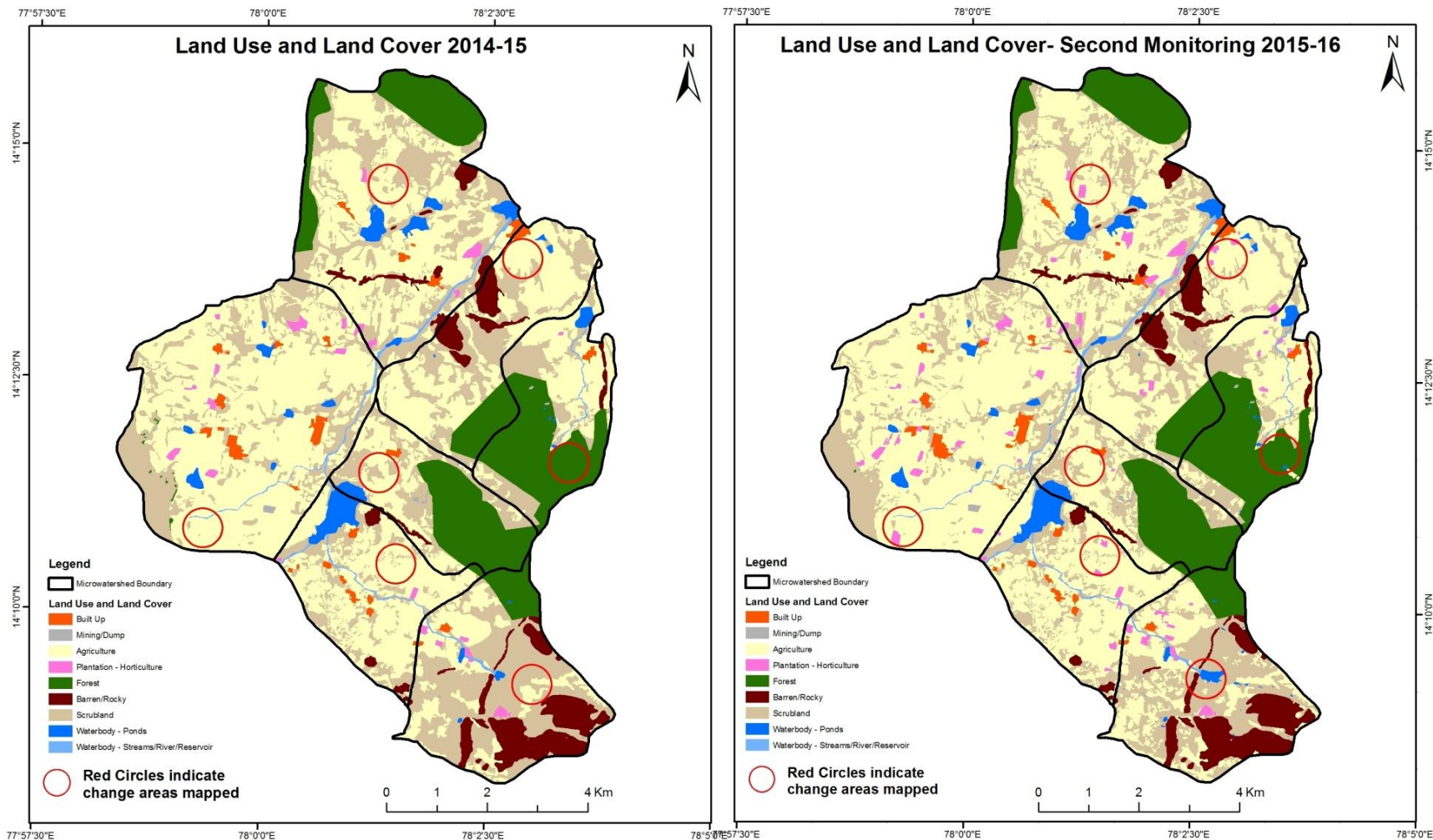
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



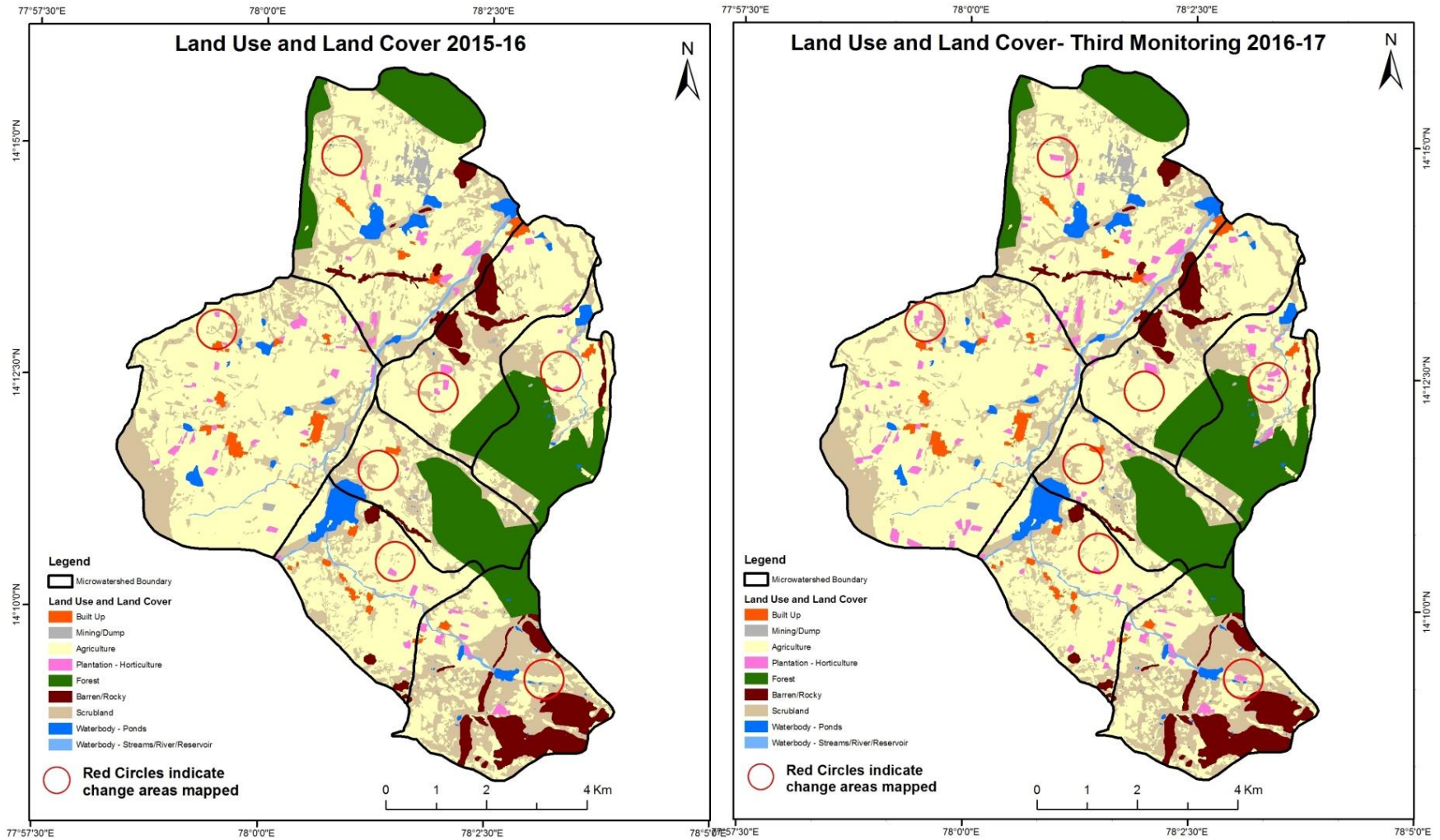
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



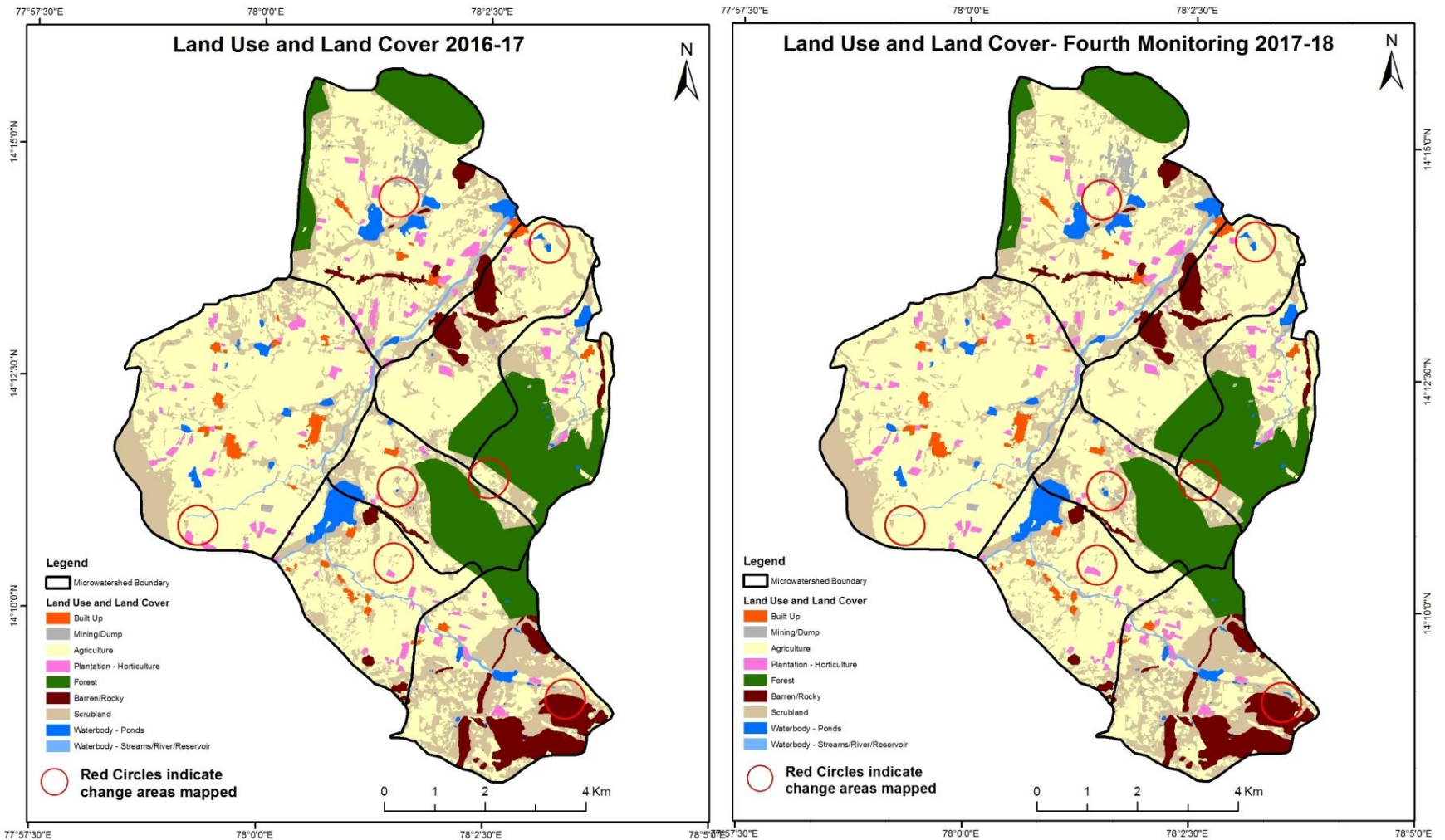
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



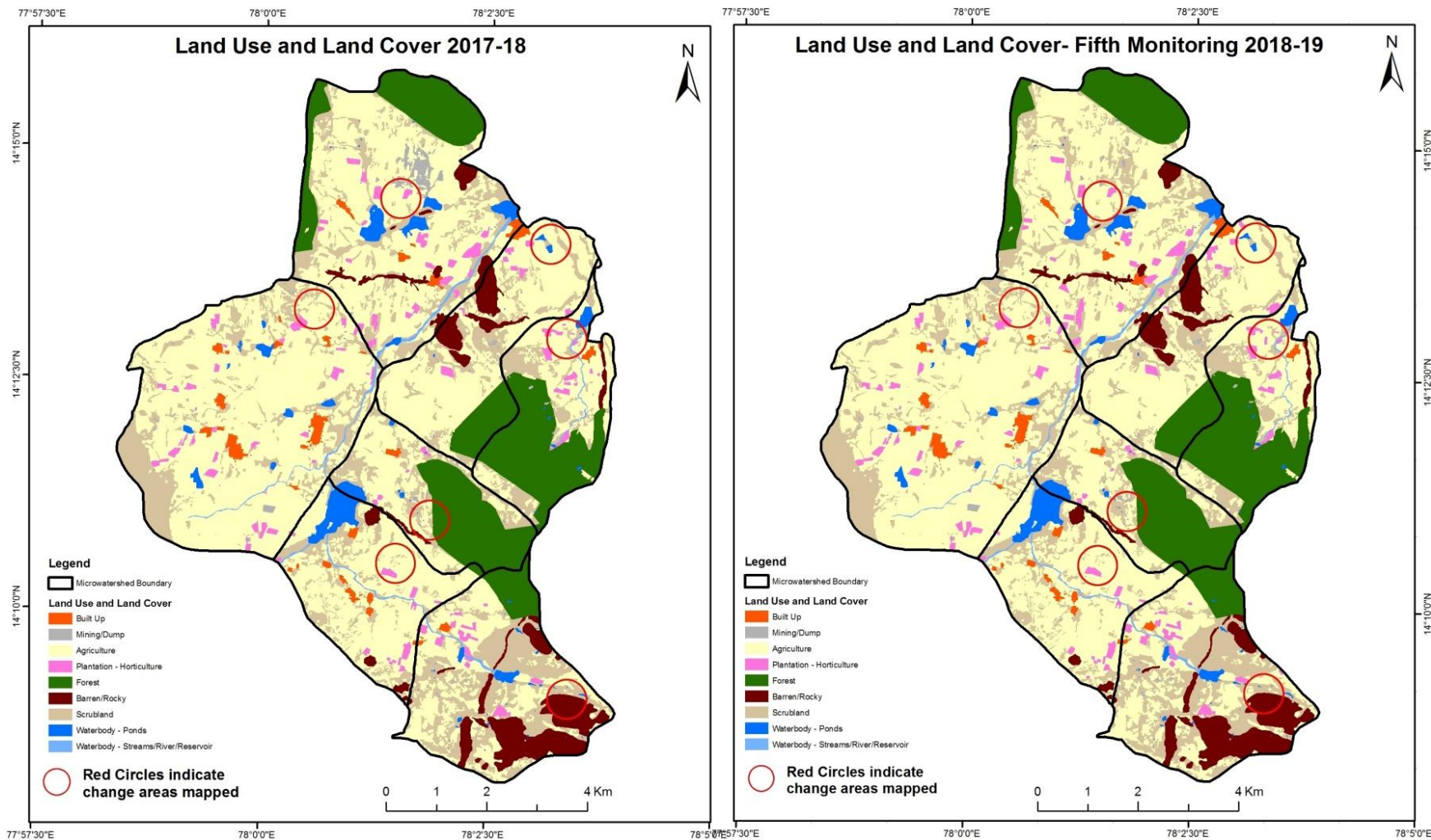
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



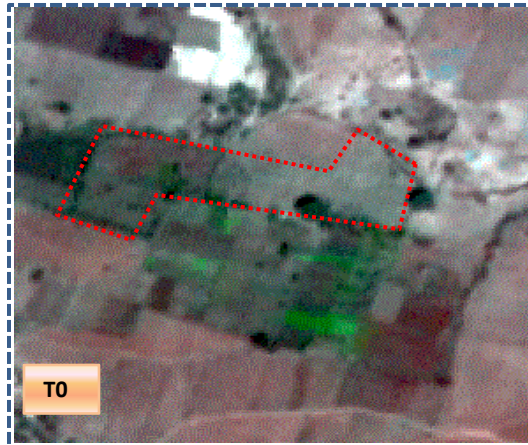
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

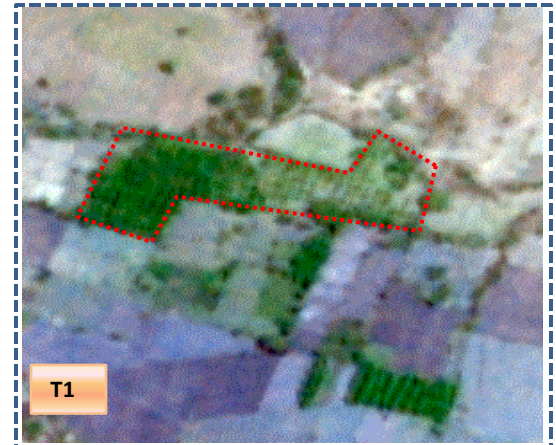


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

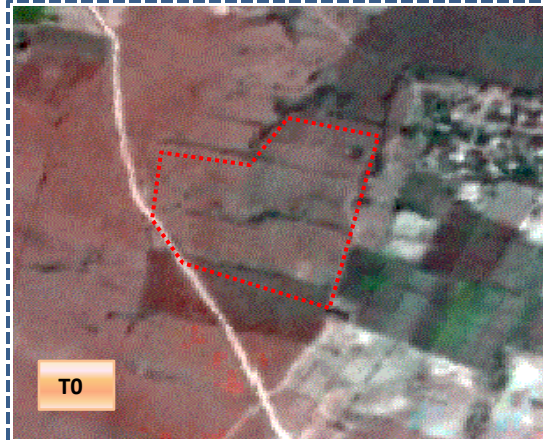


T0: 2009-10(78°2'10.799"E 14°9'59.317"N)

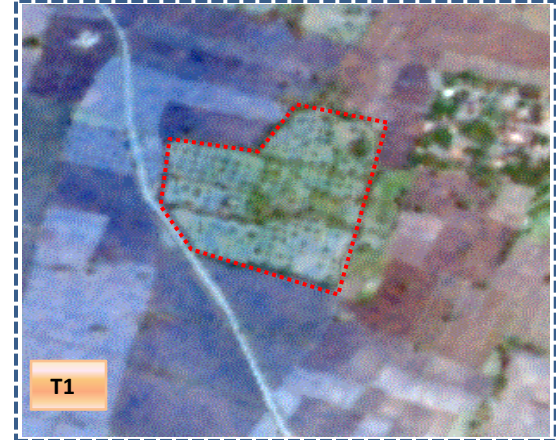


T1: 19 May 2014

Agriculture to Plantation



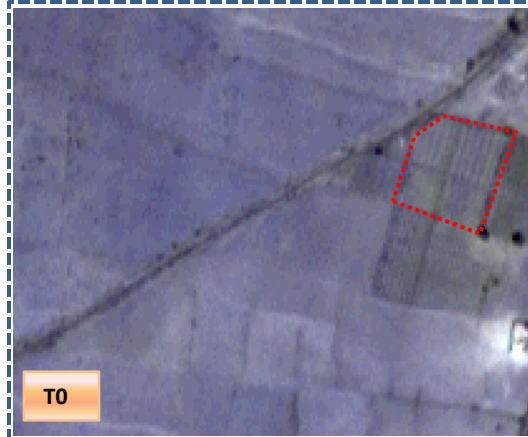
T0: 2009-10 (78°1'38.462"E 14°9'37.627"N)



T1: 19 May 2014

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

Agriculture to Plantation



T0

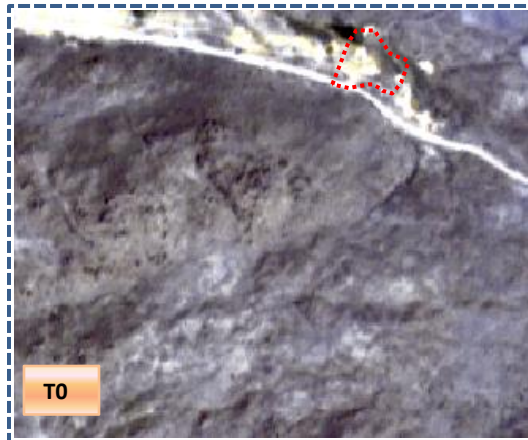
T0: 2010-11(78°0'22.201E 14°11'54.934N)



T1

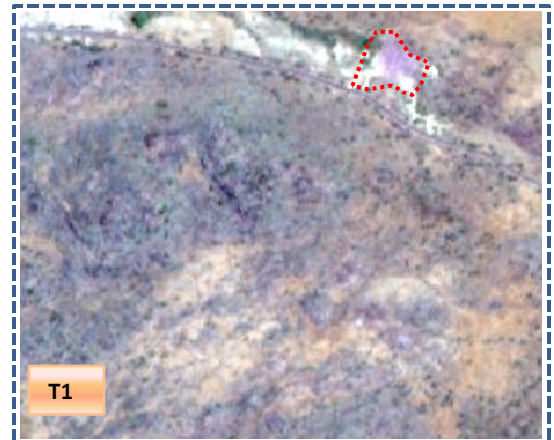
T1: 19 May 2014

Scrub to Water body



T0

T0: 2010-11(78°3'31.059E 14°9'0.565N)



T1

T1: 19 May 2014

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

Agriculture to Farm pond



T0: 2010-11(78°0'8.889E 14°10'47.367N)

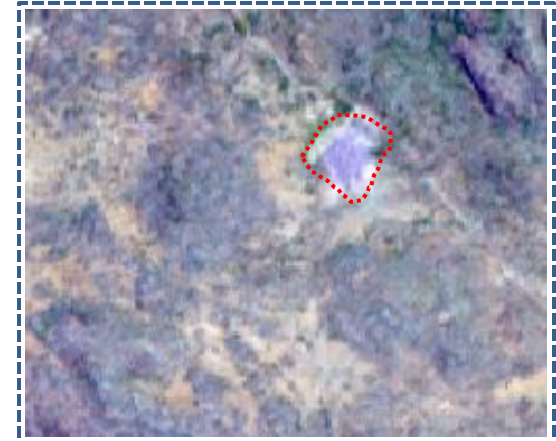


T1: 19 May 2014

Scrub to Water body



T0: 2010-11(78°2'59.345E 14°9'33.723N)



T1: 19 May 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										Grand Total
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	
Built up	93.57										93.57
Mining/dump		8.43									8.43
Agriculture	6.40		3887.60	69.61						1.79	3965.40
Plantation Horticulture			5.20	54.61							59.82
Forest		0.41	10.79		1088.78					0.68	1100.66
Forest Plantation											
Barren Rocky		0.12					415.05				415.16
Scrub	0.29	1.16	346.21	2.30				2001.20		9.49	2360.66
Waterbody- Streams/River									57.15		57.15
Waterbody – Ponds			0.67							170.19	170.86
Grand Total	100.27	10.12	4250.48	126.52	1088.78		415.05	2001.20	57.15	182.15	8231.72

- 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 77.80 ha of agriculture are decreased and it is converted into built up, plantation and water body of T1.
- In T1 362.88 ha of agriculture are increased from plantation, forest, 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	100.27												100.27
Mining/dump		10.12											10.12
Agriculture	1.33	0.09	4244.28	4.53							0.25		4250.48
Plantation Horticulture			15.41	111.11									126.52
Forest		0.10	1.19		1087.49								1088.78
Forest Plantation													
Barren Rocky							415.05						415.05
Scrub	0.08	41.42	236.58					1720.46			2.66		2001.20
Waterbody- Streams/River									57.15				57.15
Waterbody – Ponds			2.65								179.50		182.15
Grand Total	101.68	51.72	4500.11	115.64	1087.49		415.05	1720.46	57.15		182.41		8231.72

- 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 6.20 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 255.83 ha of agriculture are increased from plantation, forest, 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	101.68										101.68	
Mining/dump		51.63								0.09	51.72	
Agriculture	0.15	0.60	4409.77	89.40						0.19	4500.11	
Plantation Horticulture	0.05		6.71	108.88							115.64	
Forest			0.56		1086.86					0.08	1087.49	
Forest Plantation												
Barren Rocky		0.34					414.70				415.05	
Scrub	0.64	2.03	86.48					1629.17		2.13	1720.46	
Waterbody- Streams/River									57.15		57.15	
Waterbody – Ponds			4.07		0.38					177.96	182.41	
Grand Total	102.52	54.61	4507.59	198.29	1087.23		414.70	1629.17	57.15	180.46	8231.72	

- 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 90.35 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T3.
- In T3 97.83 ha of agriculture are increased from plantation, forest, 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
T3												
Built up	102.52										102.52	
Mining/dump		54.41								0.19	54.61	
Agriculture	0.46		4497.60	9.53							4507.59	
Plantation Horticulture			19.38	178.90							198.29	
Forest					1087.23						1087.23	
Forest Plantation												
Barren Rocky							414.70				414.70	
Scrub	0.19		24.53					1602.86		1.60	1629.17	
Waterbody- Streams/River									57.15		57.15	
Waterbody – Ponds										180.46	180.46	
Grand Total	103.17	54.41	4541.51	188.43	1087.23		414.70	1602.86	57.15	182.25	8231.72	

- 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 9.99 ha of agriculture are decreased and it is converted into built up, plantation and water body of T4.
- In T4 43.91 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	103.17										103.17	
Mining/dump		19.43						34.99			54.41	
Agriculture	0.07		4525.82	15.57						0.04	4541.51	
Plantation Horticulture			4.71	183.72							188.43	
Forest					1087.23						1087.23	
Forest Plantation												
Barren Rocky							414.70				414.70	
Scrub								1602.86			1602.86	
Waterbody- Streams/River									57.15		57.15	
Waterbody – Ponds										182.25	182.25	
Grand Total	103.25	19.43	4530.53	199.30	1087.23		414.70	1637.84	57.15	182.29	8231.72	

- 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 15.69 ha of agriculture are decreased and it is converted into built up, plantation and water body of T5.
- In T5 4.71 ha of agriculture are increased from plantation 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 11.43 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 285.08, 249.63, 7.48 & 33.91 Hectares From T0 to T1, T1 to T2, T2 to T3, T3 to T4 and there is an increase of 10.98 Hectares From T4 to T5. The overall increase of 565.13 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 139.48 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 722.81 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (64) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (50) verified from the portal.