

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -30/2010-11

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

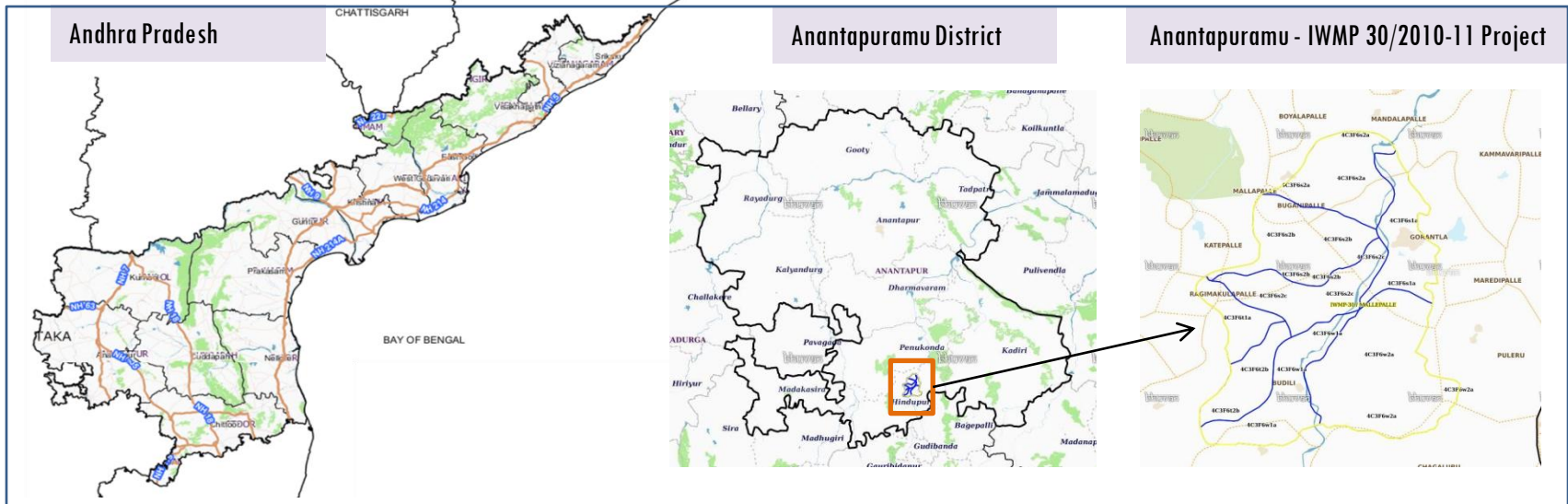
E X E C U T I V E S U M M A R Y

- 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-30/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 7,466 ha. It comprises of 8 micro watersheds.
- In the project area 150 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an decreased by 7.71 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 76.25 % is covered by the agriculture, 13.55 % is covered by Scrub land, 1.25 % is covered by plantation and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-30/2010-11

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Gorantla Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 7,466 ha. It comprises of 8 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.

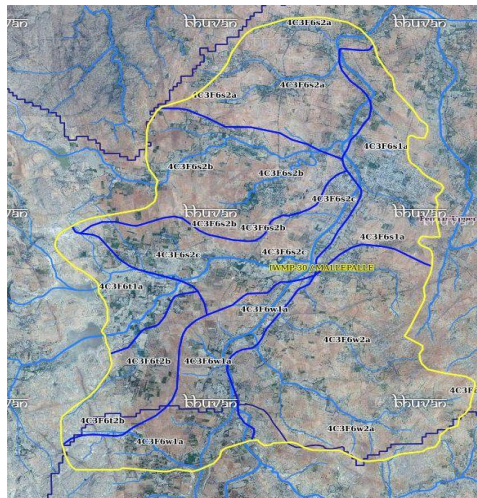
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			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	150
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

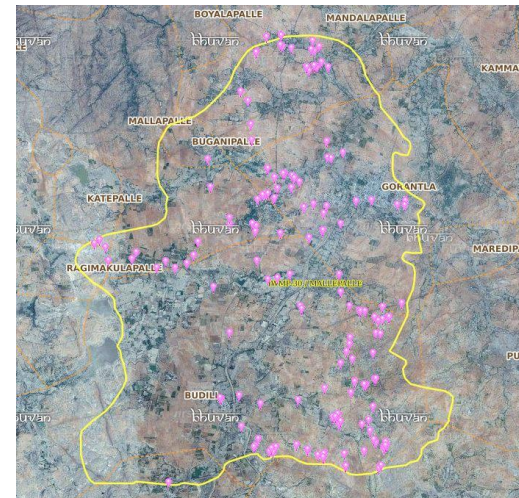


MWS Boundary



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	1	1
2	Agriculture/Horticulture	6	6
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	15	15
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	0	0
10	Civil work-Check dams/Rock fill dam	109	90
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	2	2
15	Capacity Building Activities	0	0
16	Entry Point Activity	1	1
17	Others	56	35
	TOTAL	190	150

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-30/2010-11

2009-10



Dec-2013



Jan-2015



Feb-2016



May-2018



Activity : Farm Pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-30/2010-11



T0:2010-11

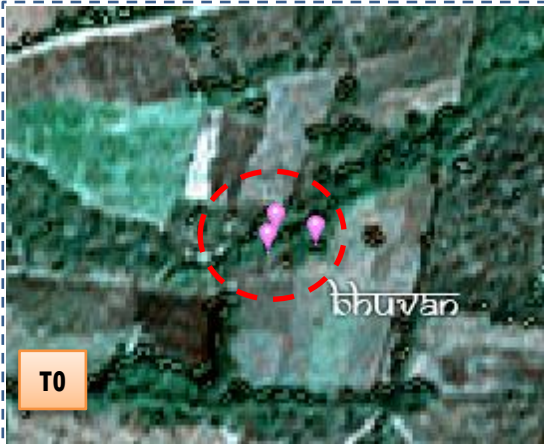


T1: 26 January 2015



Drishti Sl no. 2485029 MWS : 4C3F6w2a

Check dam



T0:2010-11



T1: 26 January 2015



Drishti Sl no. 2489825 MWS : 4C3F6s2b

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-30/2010-11



T0:2010-11

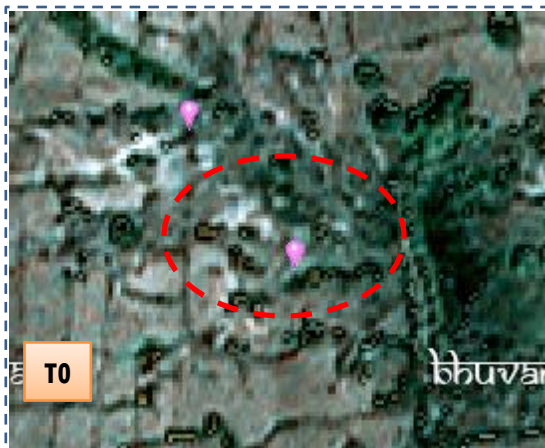


T1: 26 January 2015



Drishti Sl no. 619177 MWS : 4C3F6w2a

Dugout pit



T0:2010-11



T1: 26 January 2015

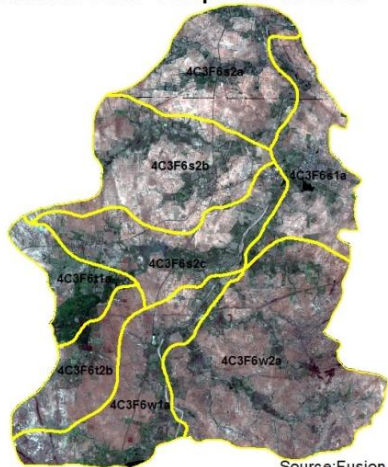


Drishti Sl no. 1619188 MWS : 4C3F6w2a

Dugout pit

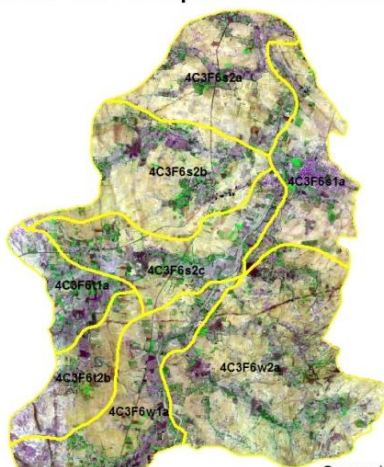
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2009-10



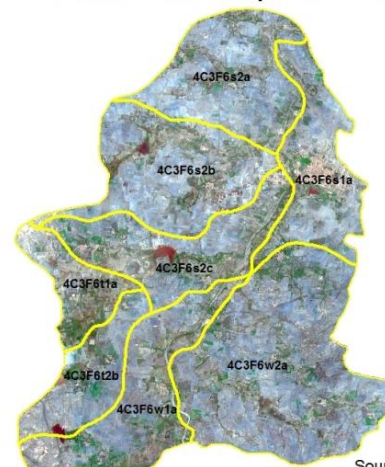
Source:Fusion data,NRSC

Natural Color Composite- 26th Jan 2015



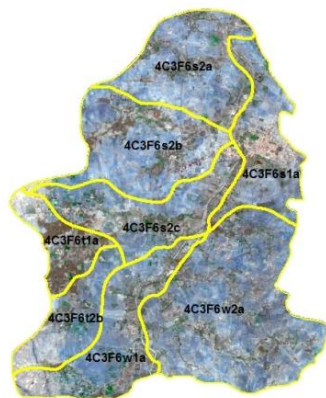
Source:LISS-IV,NRSC

Natural Color Composite- 08 th Feb 2016



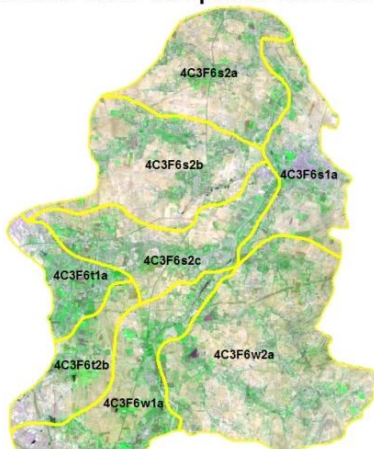
Source:Fusion data,NRSC

Natural Color Composite- 17th October 2016



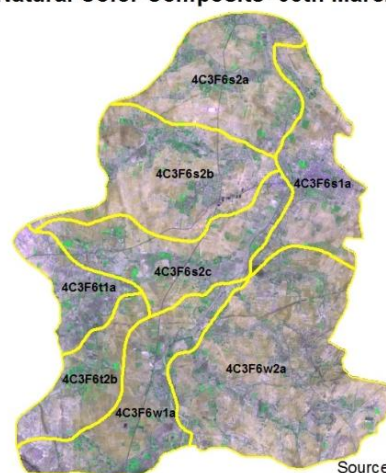
Source:NCC,NRSC

Natural Color Composite- 25th March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 05th March 2019



Source:LISS-IV,NRSC

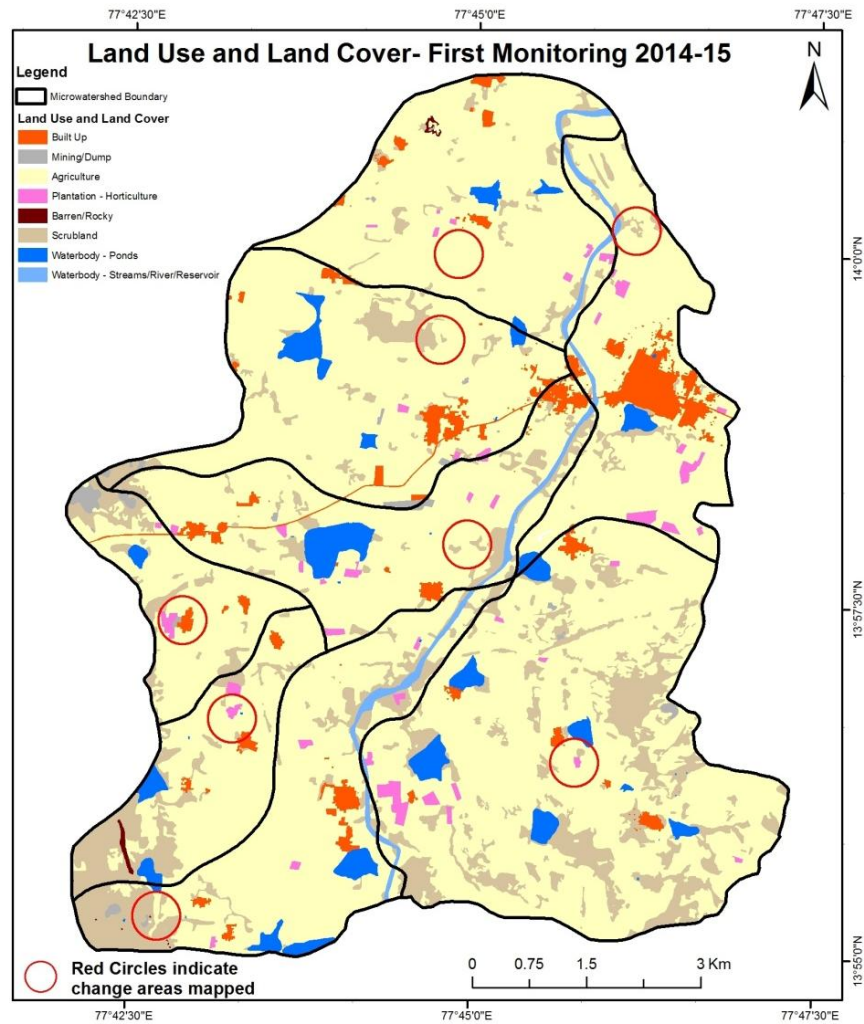
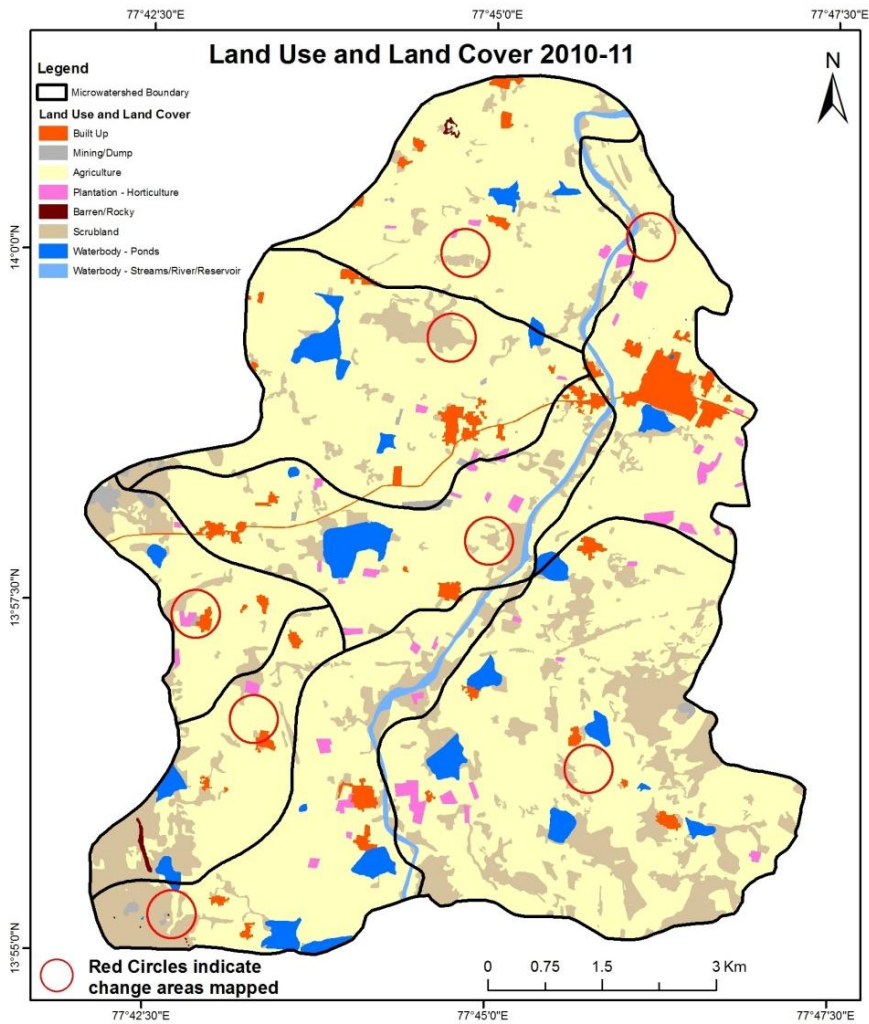
MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

- Change in land use and land cover 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)

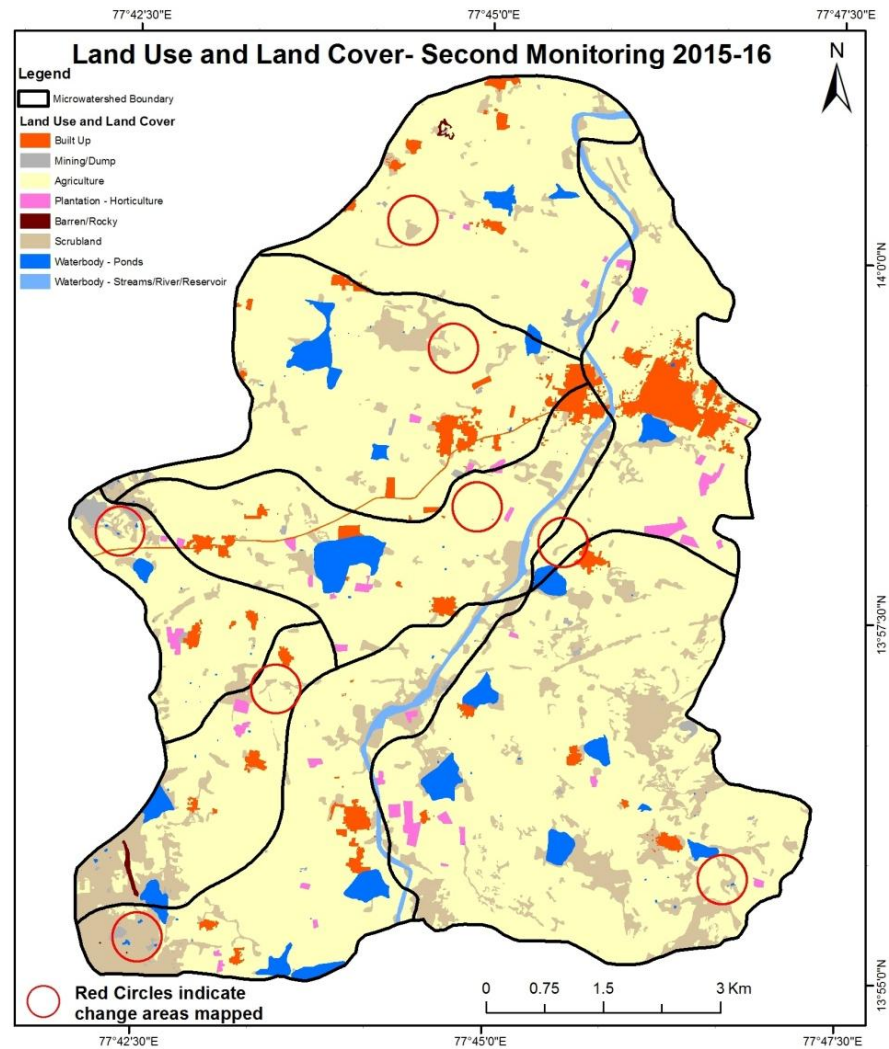
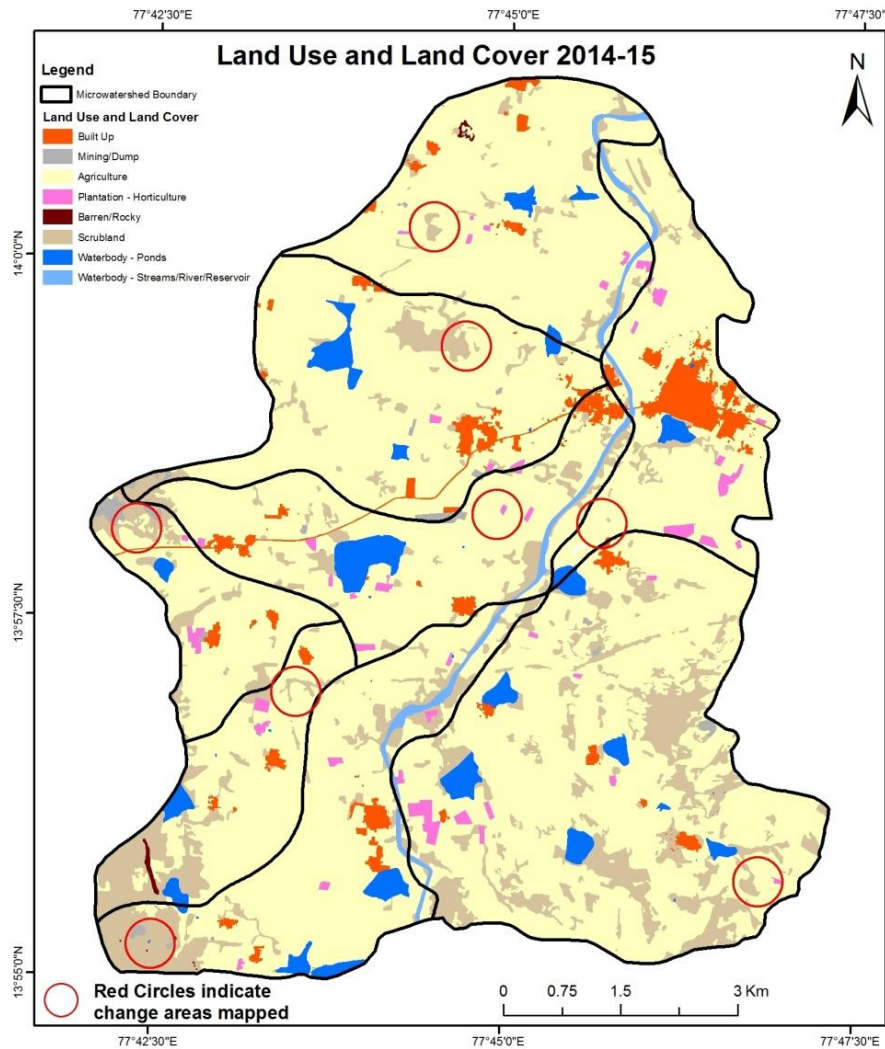
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



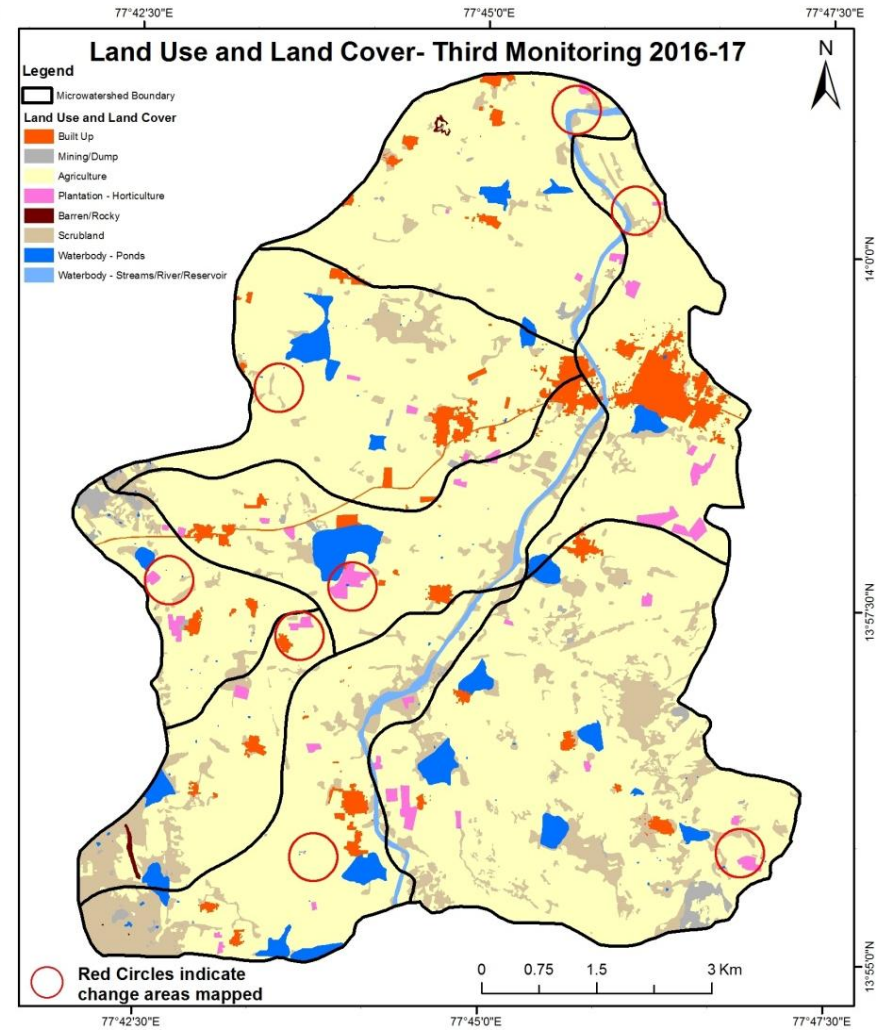
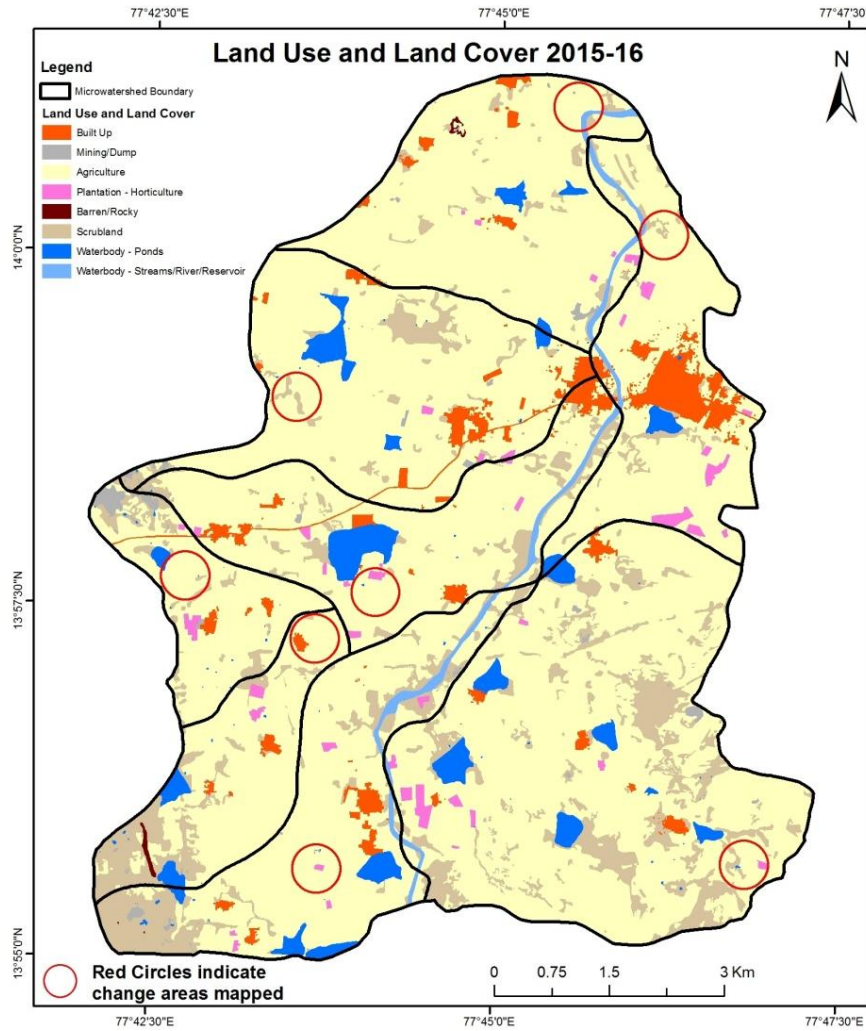
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



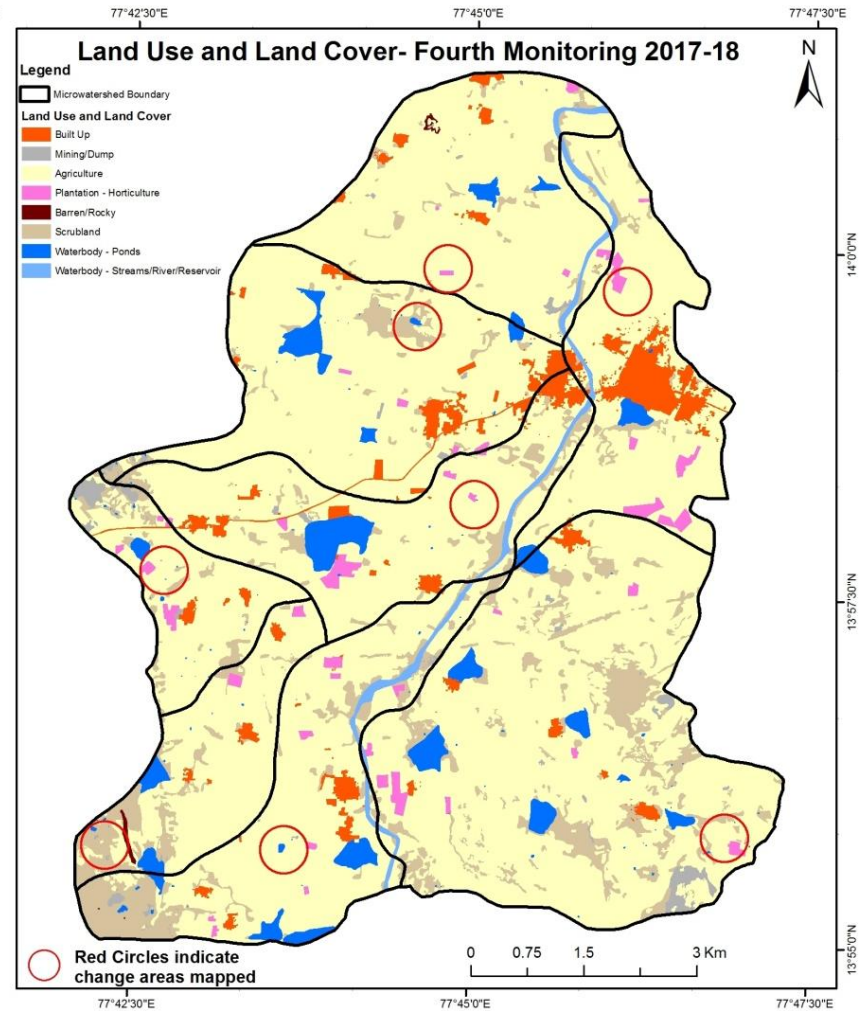
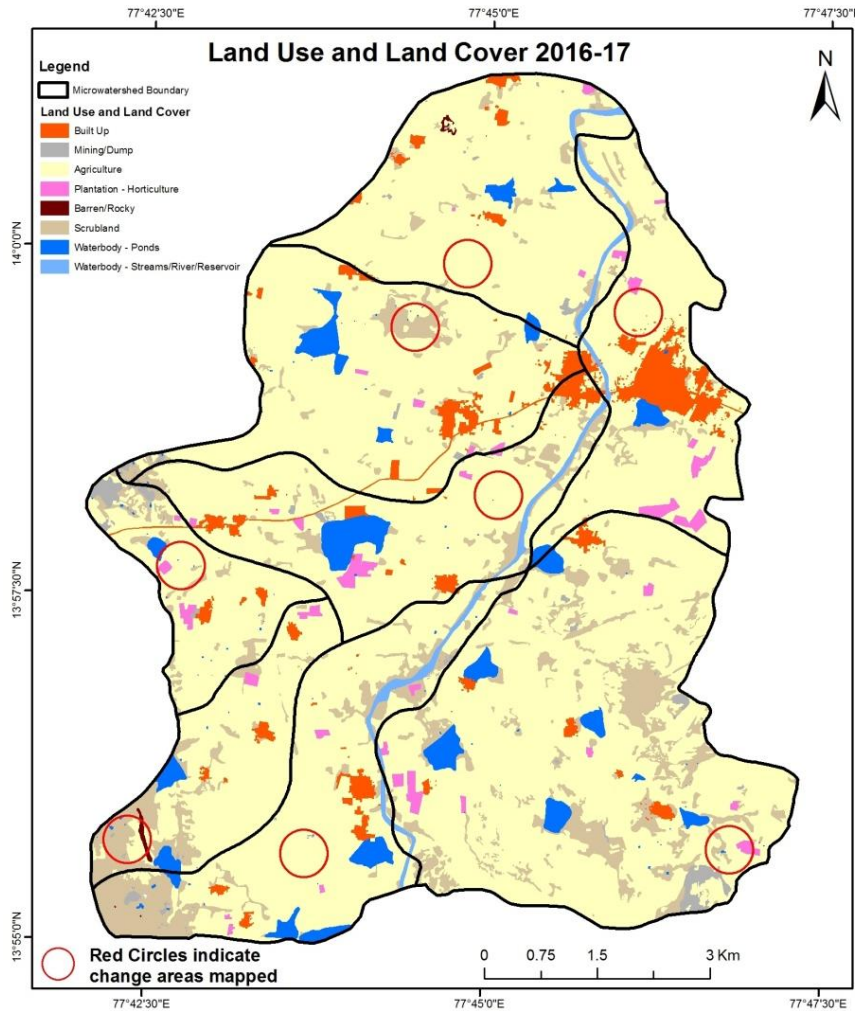
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



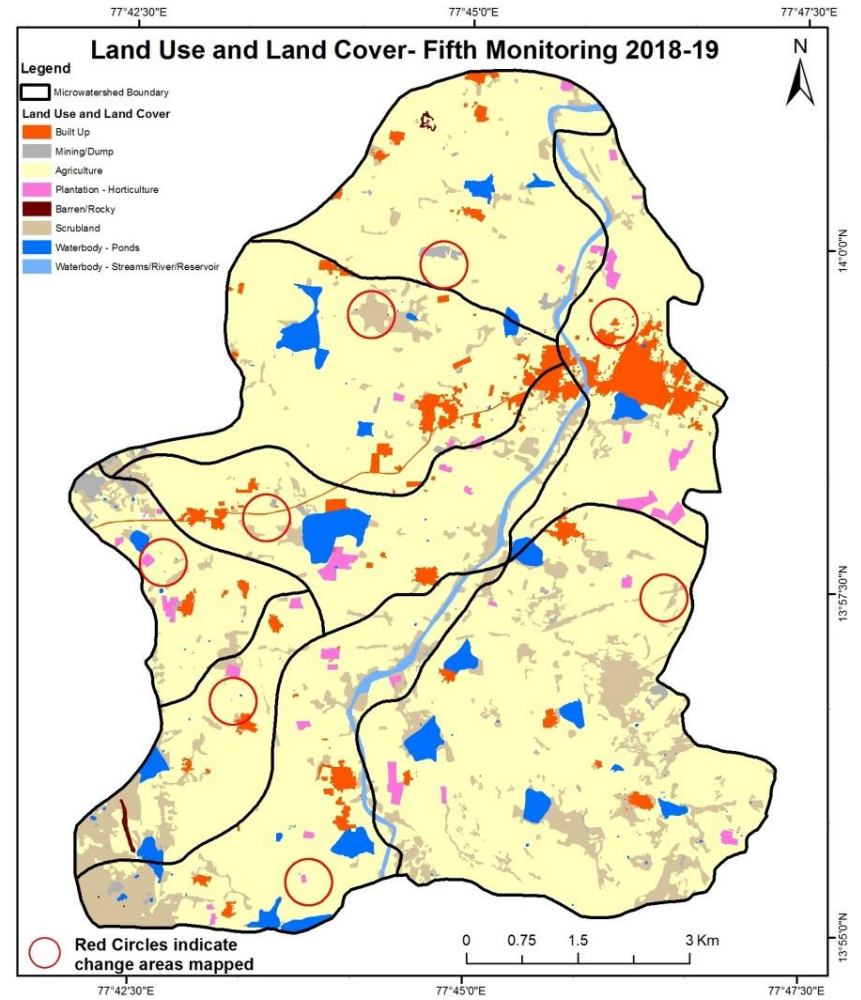
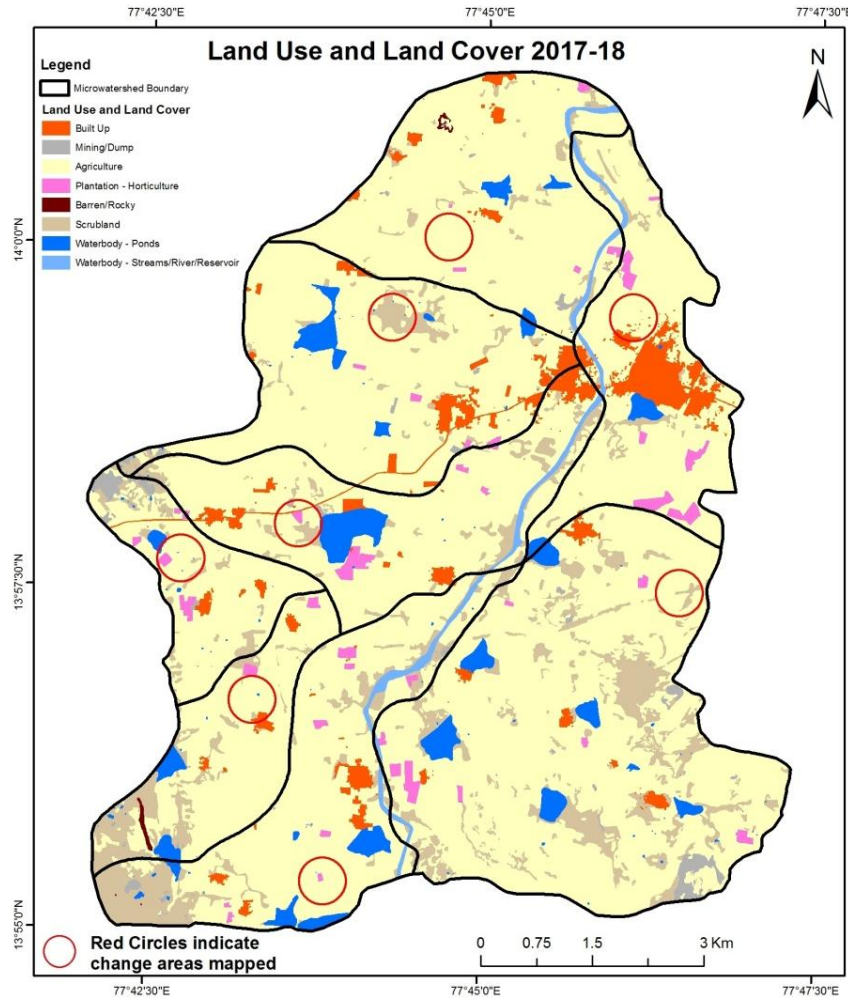
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



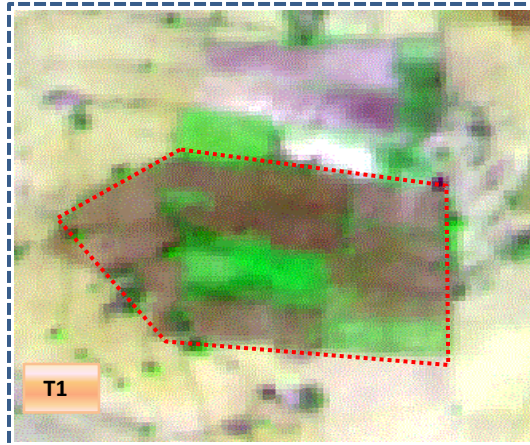
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

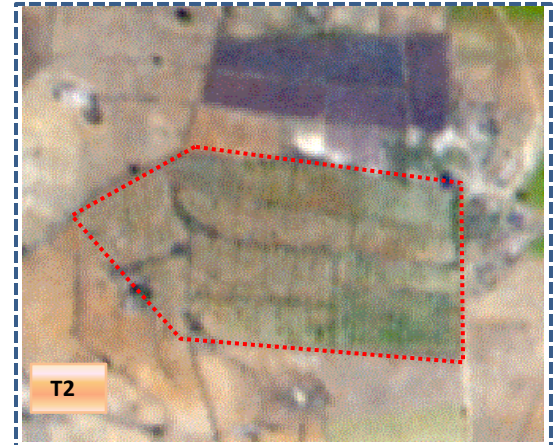


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

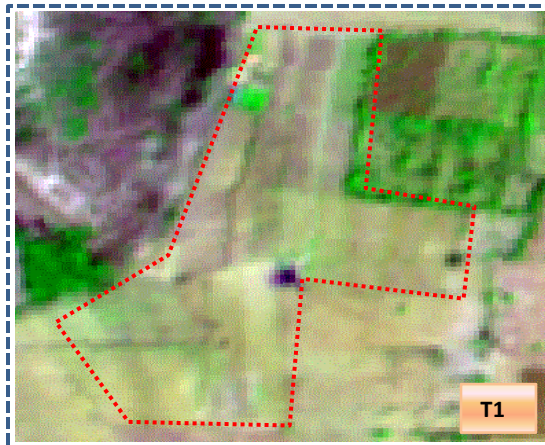


T1: 2014-15(77°46'58.045"E 13°55'44.781"N)

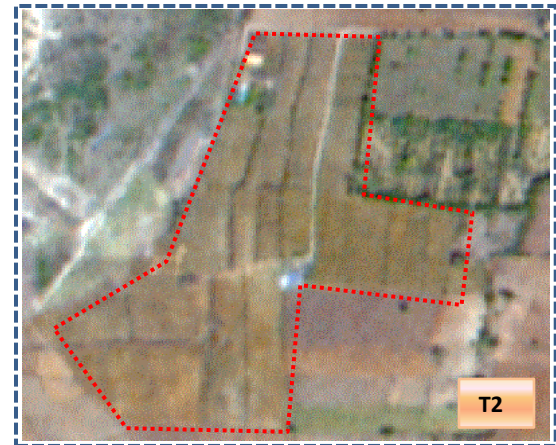


T2: 17 Oct 2016

Agriculture to Plantation



T1: 2014-15 (77°44'1.493"E 13°57'41.466"N)



T2: 17 Oct 2016

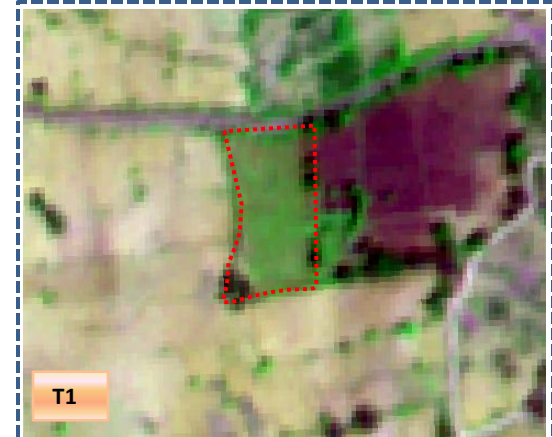
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0

T0: 2010-11(77°45'45.556E 13°56'25.52N)



T1

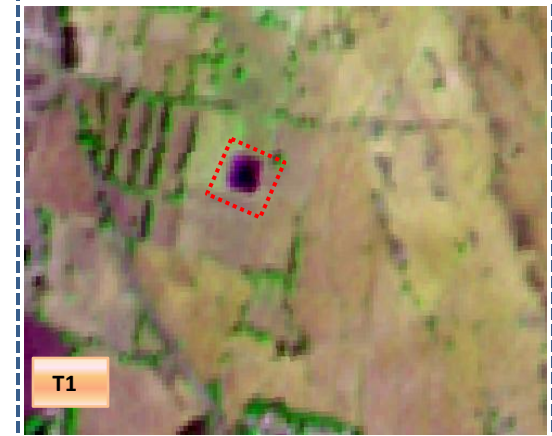
T1: 26 January 2015

Agriculture to Farm pond



T0

T0: 2010-11(77°43'22.332E 13°56'39.953N)



T1

T1: 26 January 2015

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

Agriculture to Farm pond



T0: 2010-11(77°44'37.282E 13°57'13.657N)



T1: 26 January 2015

Scrub to Agriculture



T0: 2010-11(77°44'16.521E 13°56'39.482N)



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										Grand Total
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	
Built up	215.97										215.97
Mining/dump		35.99									35.99
Agriculture	29.84	0.09	5566.42	11.19				0.36		0.77	5608.66
Plantation Horticulture	0.02		19.50	70.80							90.33
Forest											
Forest Plantation											
Barren Rocky							6.39				6.39
Scrub	0.76	1.59	165.77	0.23				1011.71		0.18	1180.24
Waterbody- Streams/River									83.13		83.13
Waterbody – Ponds	0.11		13.82							232.12	246.05
Grand Total	246.69	37.67	5765.51	82.22			6.39	1012.07	83.13	233.07	7466.76

- 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 42.25 ha of agriculture are decreased and it is converted into built up, mining/dump, plantation, scrubland and water body of T1.
- In T1 199.10 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
T1													
Built up	247.01												247.01
Mining/dump		30.49	6.86										37.35
Agriculture	26.27	0.75	5730.47	4.05						3.98			5765.51
Plantation Horticulture			10.99	71.22							0.02		82.22
Forest													
Forest Plantation													
Barren Rocky		0.29					6.10						6.39
Scrub								1012.07					1012.07
Waterbody- Streams/River									83.13				83.13
Waterbody – Ponds											233.07		233.07
Grand Total	273.28	31.53	5748.31	75.27			6.10	1012.07	83.13		237.07		7466.76

- 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 35.05 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 17.84 ha of agriculture are increased from mining/dump and plantation 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	273.28										273.28
Mining/dump		31.41								0.11	31.53
Agriculture	4.66	1.69	5710.83	30.92						0.21	5748.31
Plantation Horticulture			13.01	62.27							75.27
Forest											
Forest Plantation											
Barren Rocky							6.10				6.10
Scrub								1012.07			1012.07
Waterbody- Streams/River									83.13		83.13
Waterbody – Ponds			0.31							236.75	237.07
Grand Total	277.94	33.11	5724.15	93.19			6.10	1012.07	83.13	237.07	7466.76

- 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 37.48 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T3.
- In T3 13.32 ha of agriculture are increased from plantation 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	277.94										277.94	
Mining/dump		33.11									33.11	
Agriculture	7.96	0.49	5699.75	14.68						1.27	5724.15	
Plantation Horticulture			6.20	86.99							93.19	
Forest												
Forest Plantation												
Barren Rocky							6.10				6.10	
Scrub								1012.07			1012.07	
Waterbody- Streams/River									83.13		83.13	
Waterbody – Ponds										237.07	237.07	
Grand Total	285.90	33.60	5705.95	101.67			6.10	1012.07	83.13	238.34	7466.76	

- 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 24.40 ha of agriculture are decreased and it is converted into built up, mining/dump, plantation and water body of T4.
- In T4 6.20 ha of agriculture are increased from plantation 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	285.90										285.90	
Mining/dump		33.60									33.60	
Agriculture	14.60	6.61	5683.43	1.31							5705.95	
Plantation Horticulture			9.79	91.88							101.67	
Forest												
Forest Plantation												
Barren Rocky							6.10				6.10	
Scrub								1012.07			1012.07	
Waterbody- Streams/River									83.13		83.13	
Waterbody – Ponds										238.34	238.34	
Grand Total	300.50	40.21	5693.21	93.19			6.10	1012.07	83.13	238.34	7466.76	

- 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 22.52 ha of agriculture are decreased and it is converted into built up, mining/dump and plantation of T5.
- In T5 9.79 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 decrease of 7.71 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 156.85 Hectares From T0 to T1 and there is an increase of 17.20, 24.16, 18.20 & 12.74 Hectares From T1 to T2, T2 to T3, T3 to T4 & T4 to T5 and The overall increase of 84.55 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is decrease of 2.86 ha of the Plantation/Horticulture area has been decreased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 168.17 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (0) verified from the portal.