

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

ANANTAPURAMU -26/2010-11

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

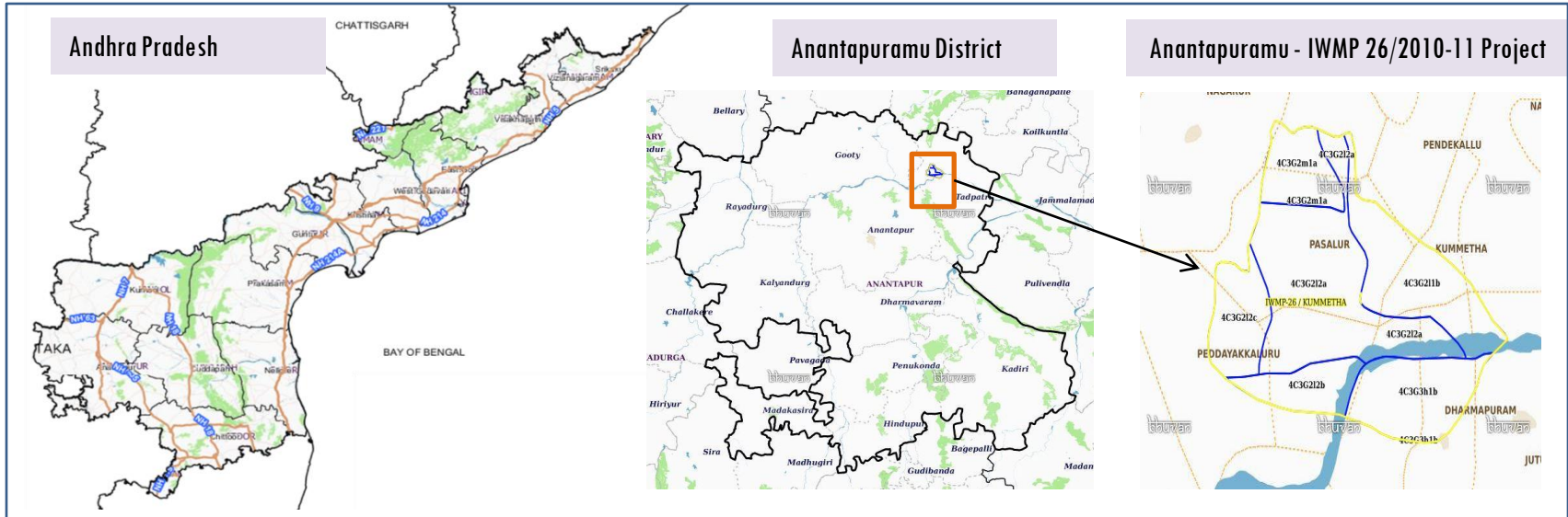
## **E X E C U T I V E   S U M M A R Y**

- 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-26/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 3,243 ha. It comprises of 6 micro watersheds.
- In the project area 4 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increase by 220.08 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 65.71 % is covered by the agriculture, 11.20 % is covered by Scrub land, 6.97 % plantation and remaining by other land use classes.

# PROJECT : ANANTAPURAMU – IWMP-26/2010-11

## DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Peddapappur Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 3,243 ha. It comprises of 6 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.

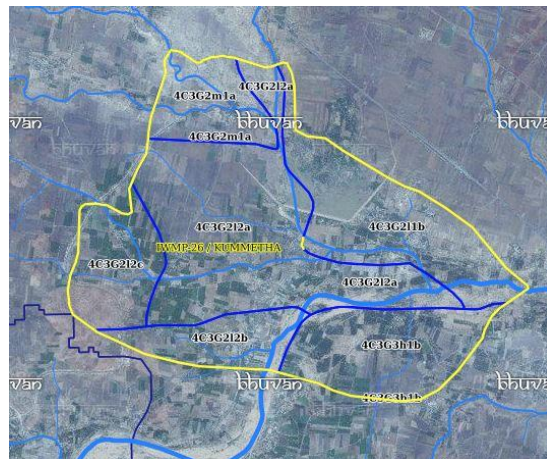
## Satellite Data and Ancillary Data

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	Drishhti Photographs		
		Total	4
4	Detailed Project Report		

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



### Legend



Drainage (1:10000 Scale)

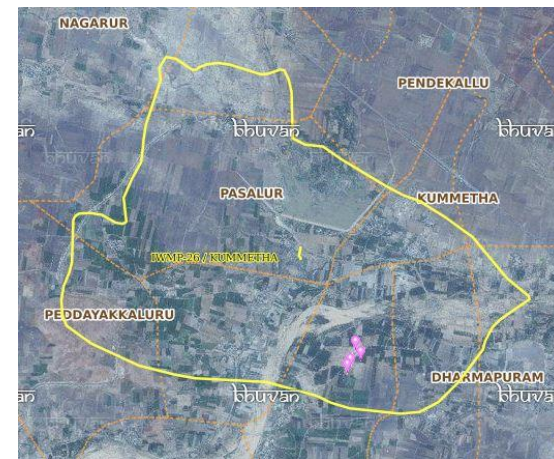


MWS Boundary



Project Boundary

## Natural Color Composite overlaid with Drishhti Points



### Drishhti Upload Status

## Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Agriculture/Horticulture	2	2
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	0	0
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	0	0
10	Civil work-Check dams/Rock fill dam	1	1
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	1	1
	<b>TOTAL</b>	<b>4</b>	<b>4</b>

## 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-26/2010-11

2009-10



Feb-2015



Jan-2017



Oct-2018



2019



Activity : Block plantation



Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-26/2010-11



T0

T0:2010-11



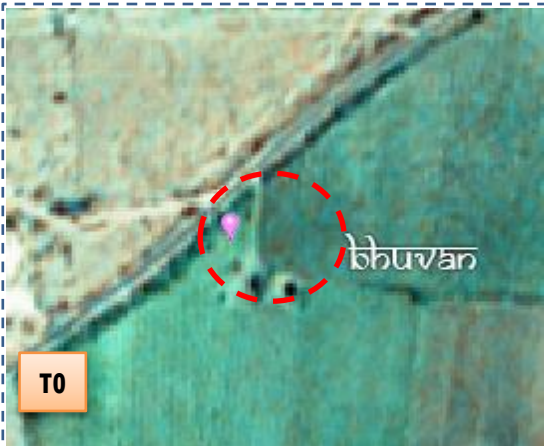
T1

T1: 18 February 2015



Drishti SI no. 350280 MWS : 4C3G3h1b

Block planting



T0

T0:2010-11



T1

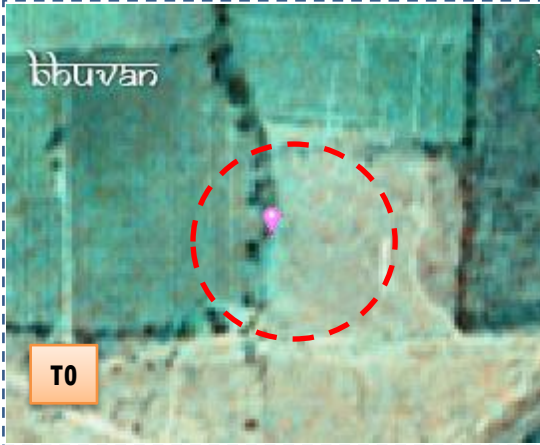
T1: 18 February 2015



Drishti SI no. 350281 MWS : 4C3G3h1b

Block planting

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-26/2010-11



T0

T0:2010-11



T1

T1: 18 February 2015



Drishti SI no. 334959 MWS : 4C3G3h1b

Check dam



T0

T0:2010-11



T1

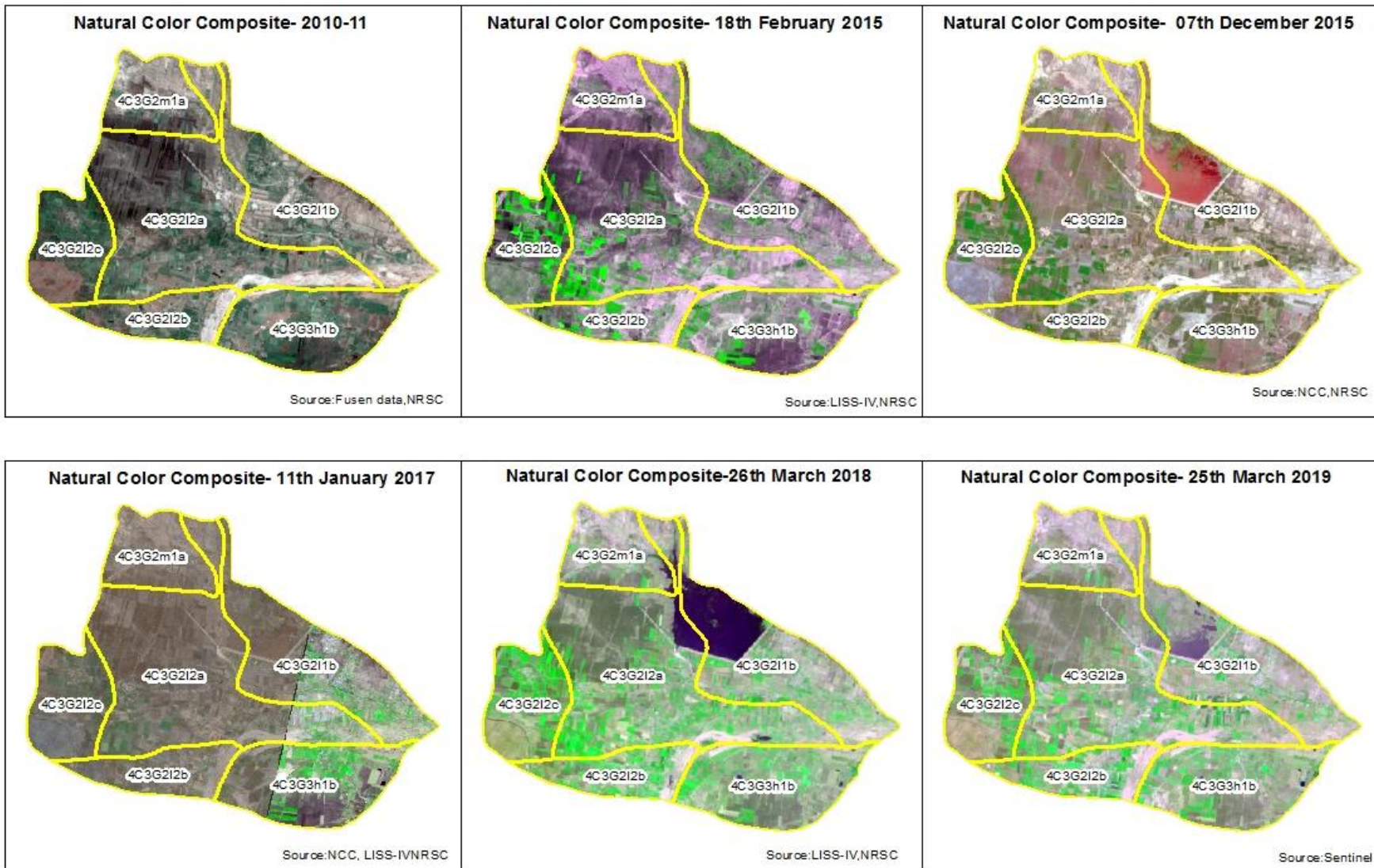
T1: 18 February 2015



Drishti SI no. 753593 MWS : 4C3G3h1b

Other

# Natural Color Composite – 2010-11 to 2018-19



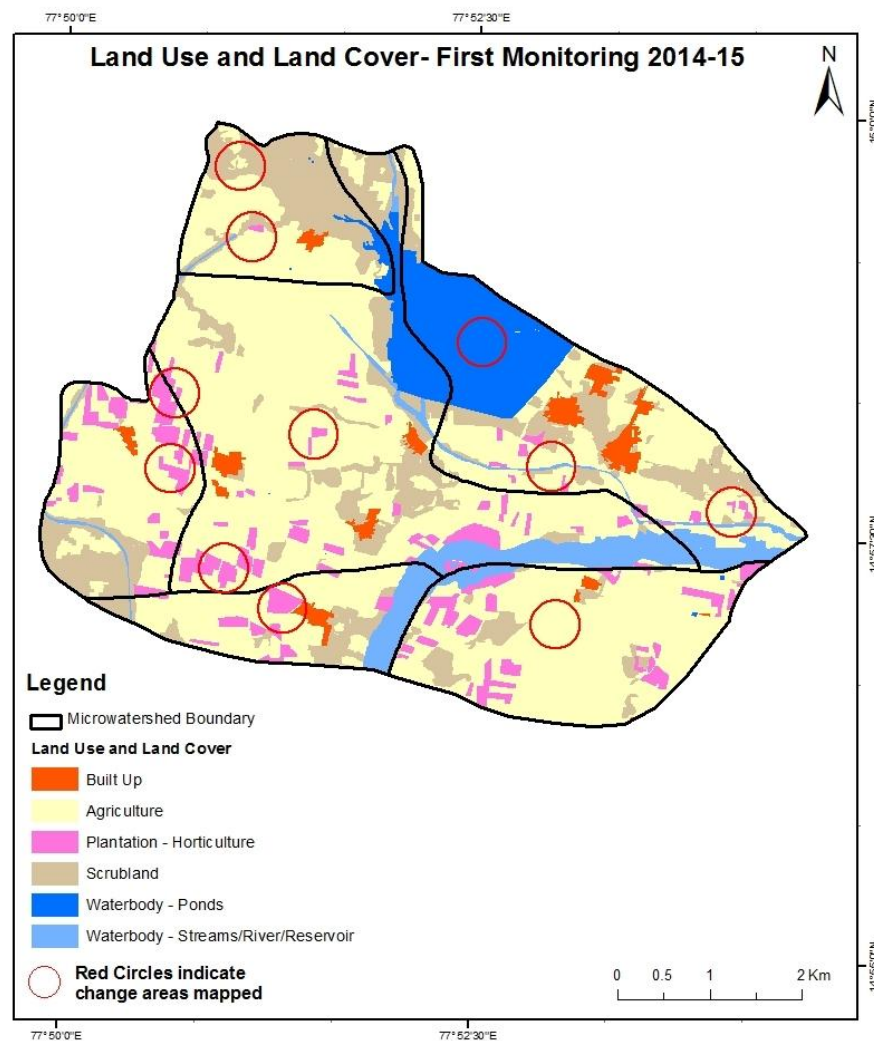
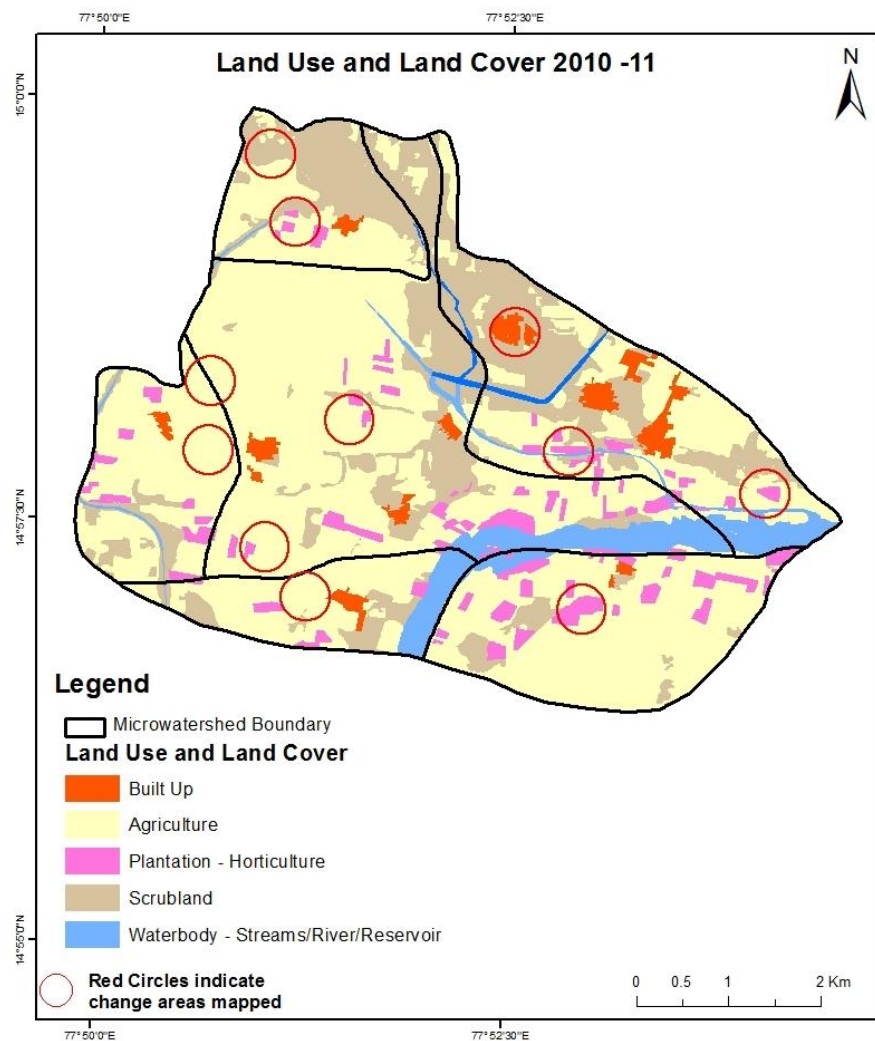
## MONITORING IN THE PROJECT AREA

### 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)

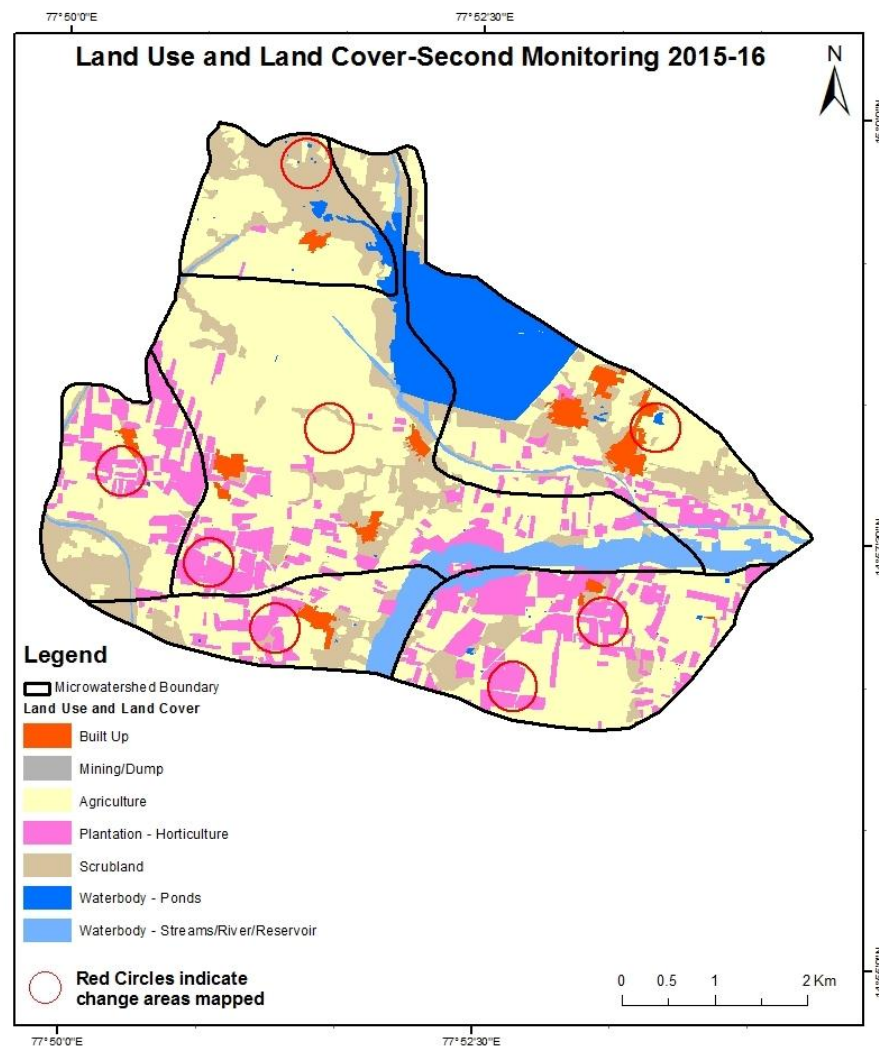
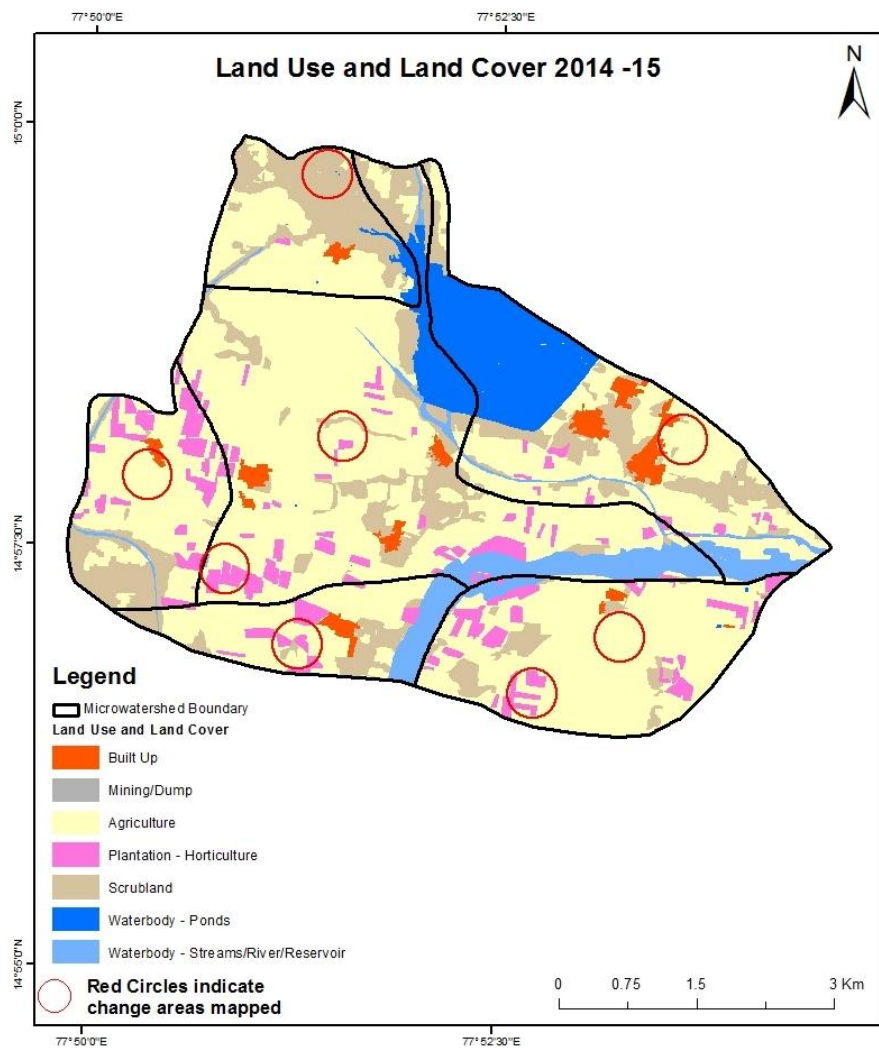
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



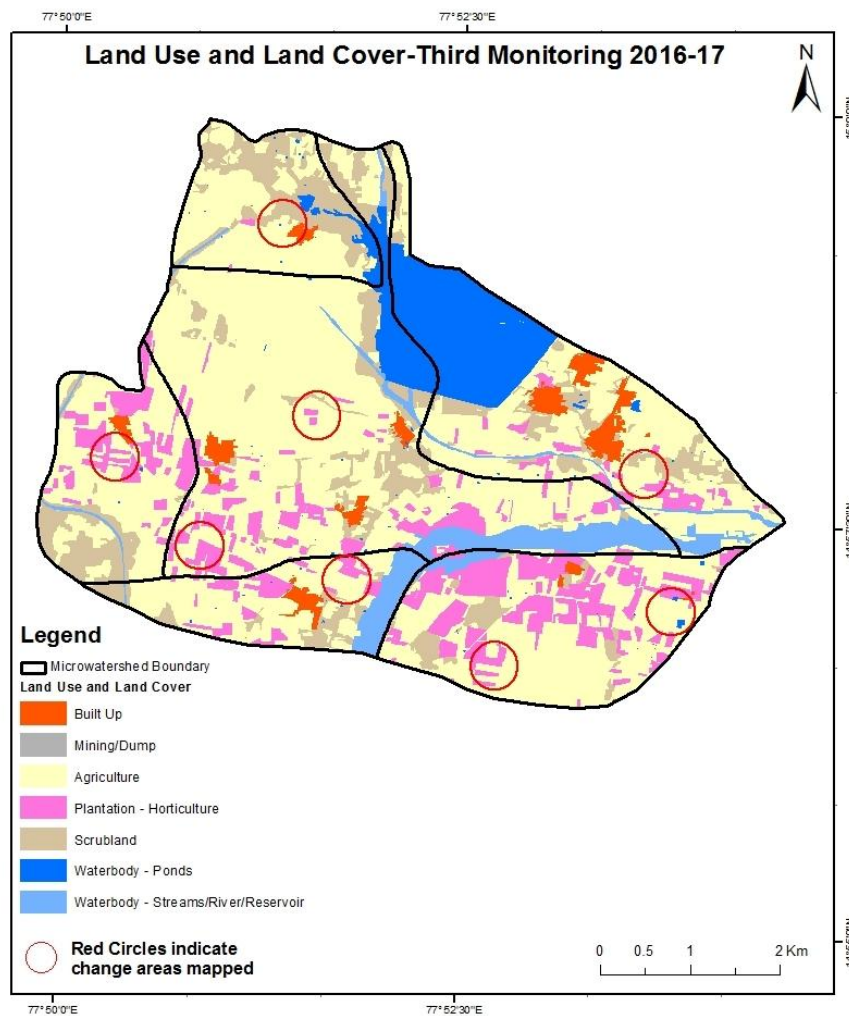
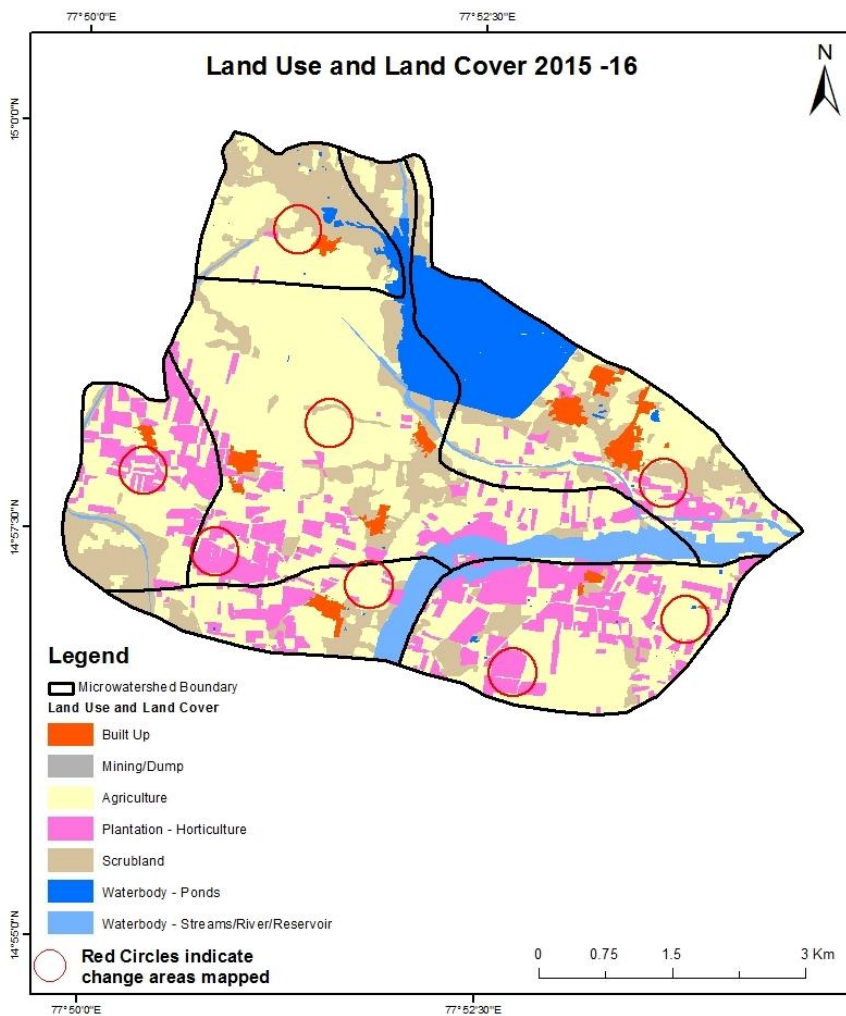
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



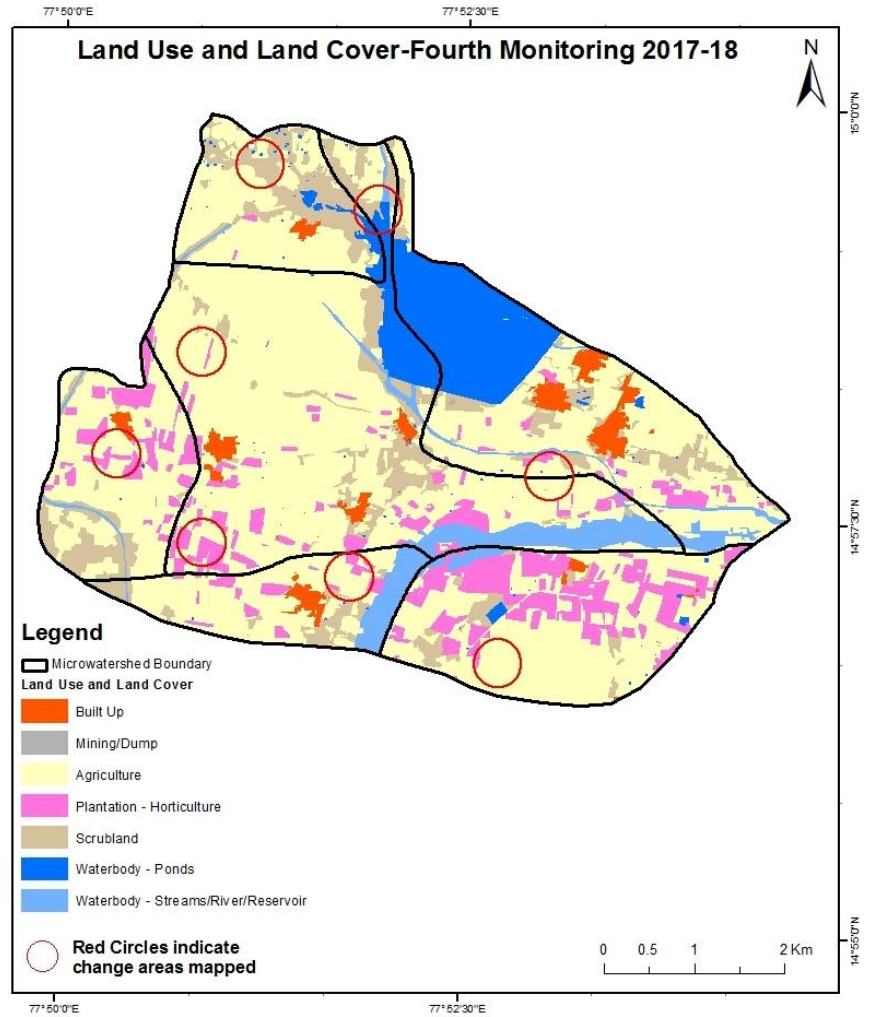
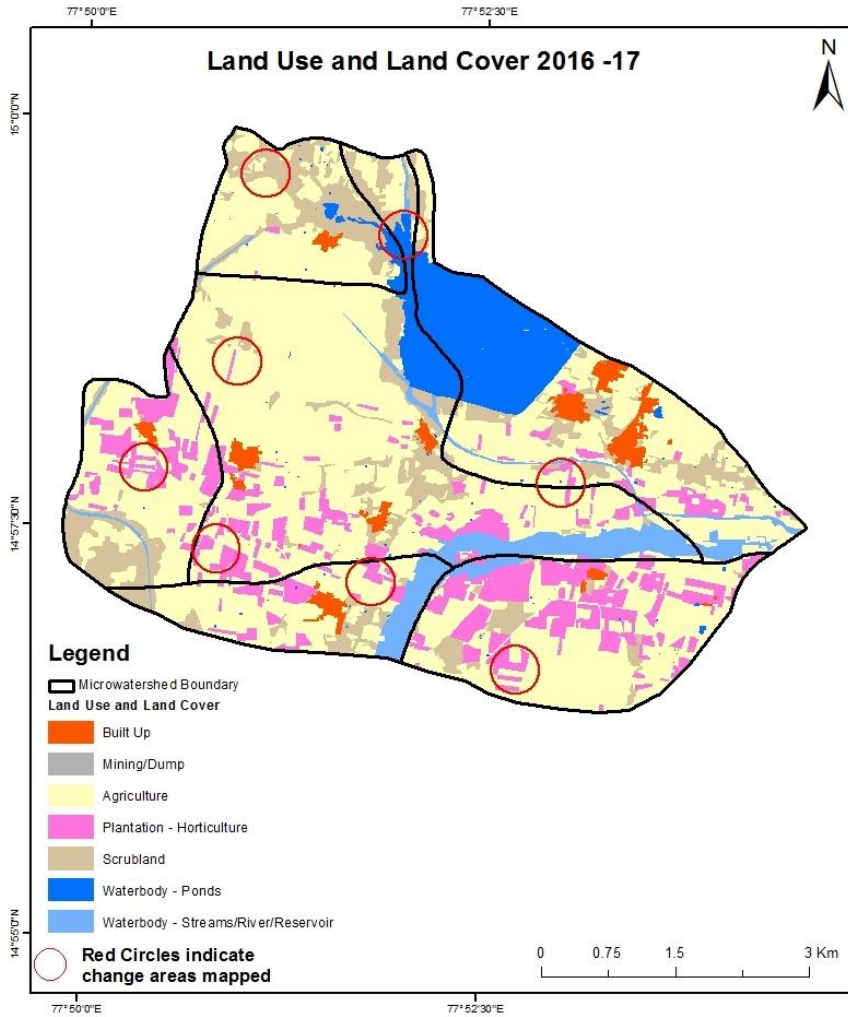
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



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

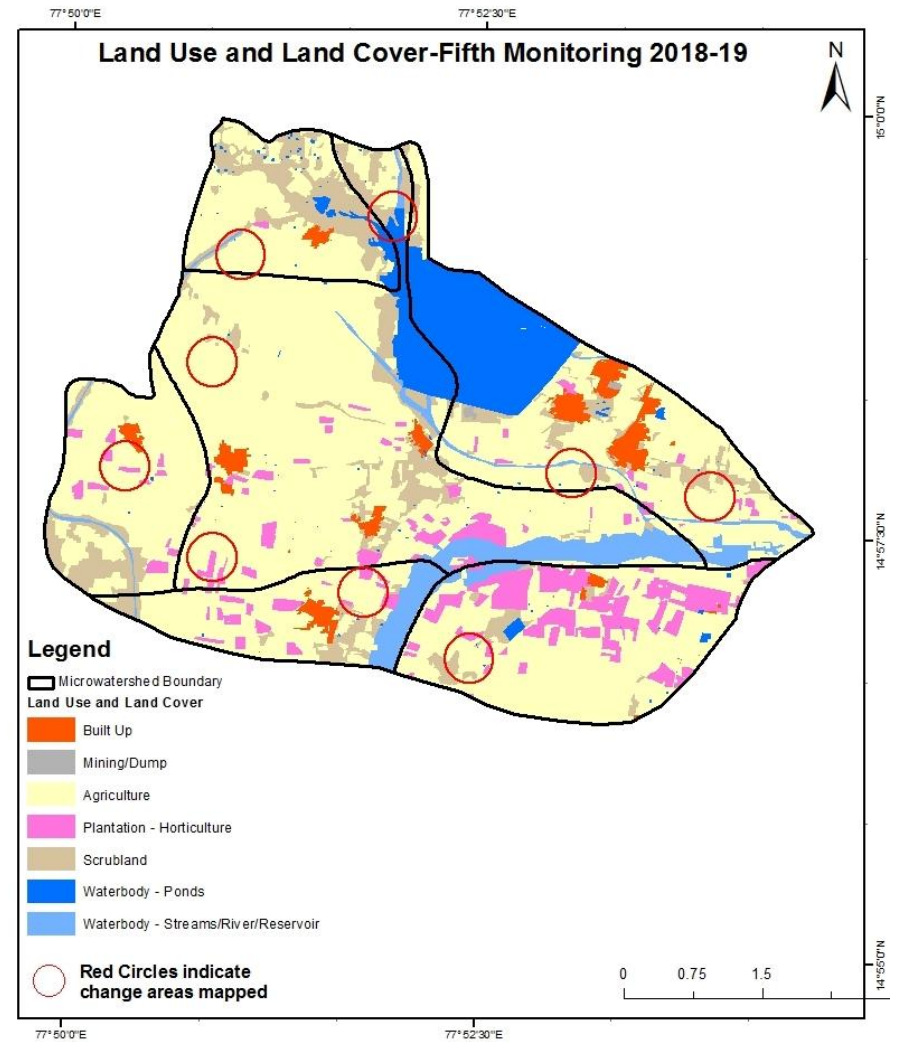
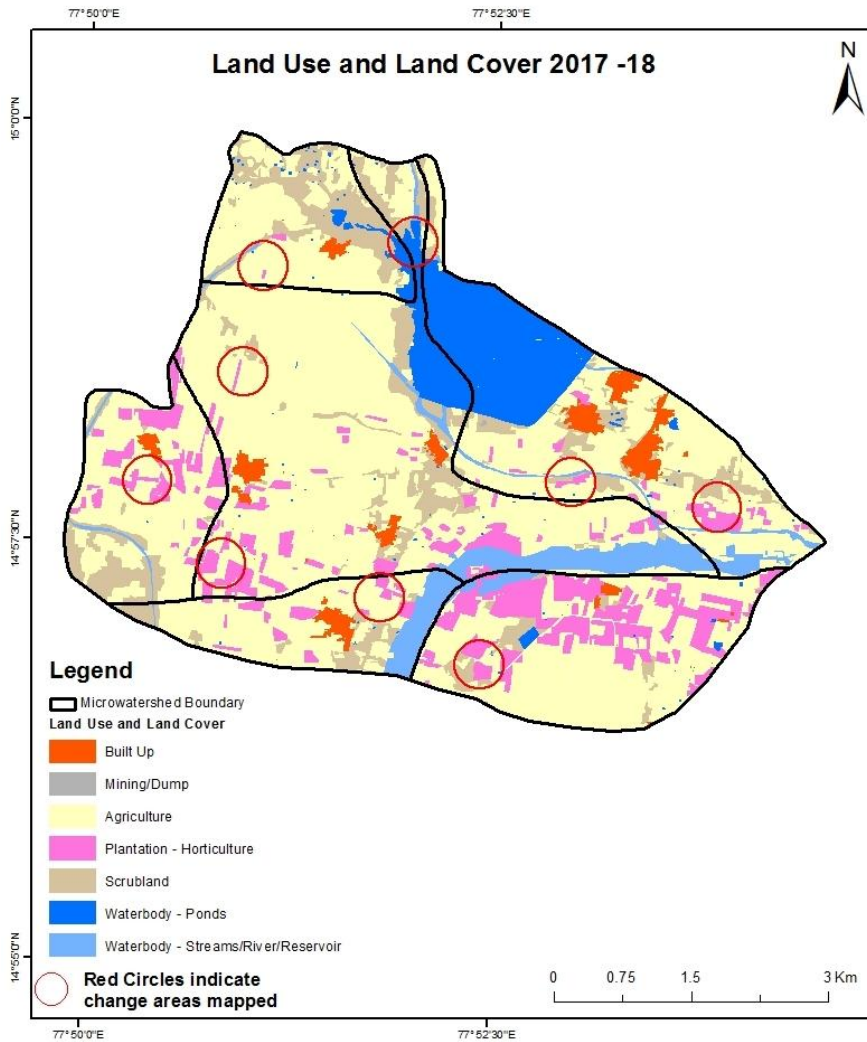
Scale: 1:10000





# 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

Plantation to Agriculture

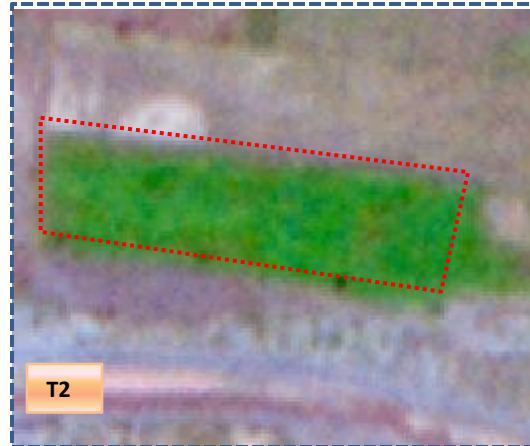


T2: 2015-16 (77°50'38.712"E 14°58'22.312"N)



T3: 11 January 2017

Plantation to Agriculture



T2: 2015-16 (77°50'5.909"E 14°57'37.299"N)



T3: 11 January 2017

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

Plantation to Agriculture

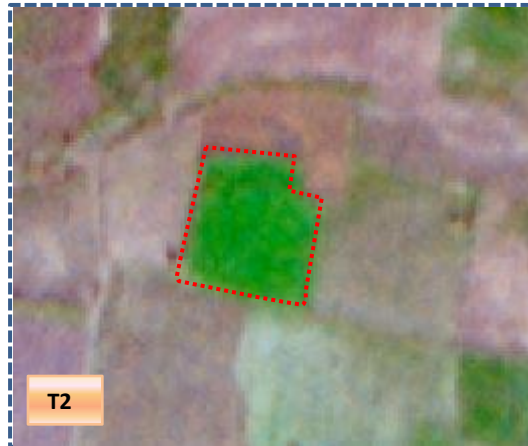


T2: 2015-16 (77°50'45.946"E 14°57'16.971"N)



T3: 11 January 2017

Plantation to Agriculture



T2: 2015-16(77°51'31.853"E 14°57'42.377"N)



T3: 11 January 2017

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

Scrub to Water body



T0: 2010-11(77°53'44.326E 14°57'11.029N)

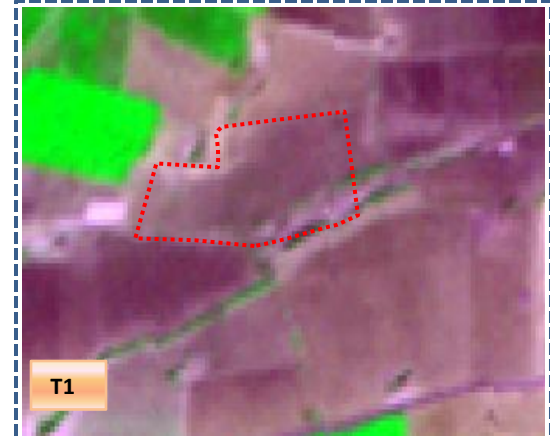


T1: 18 February 2015

Scrub to Agriculture



T0: 2010-11(77°51'12.068E 14°57'40.204N)



T1: 18 February 2015

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

Agriculture to Plantation



T0: 2010-11(77°50'54.201E 14°57'16.976N)



T1: 18 February 2015

Agriculture to Plantation



T0: 2010-11(77°51'18.958E 14°57'4.705N)



T1: 18 February 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	71.39									11.02	82.41
Mining/dump											
Agriculture	3.23		1794.83	126.55				102.10		38.06	2064.76
Plantation Horticulture			82.57	93.68							176.25
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.45		56.58					461.43	2.85	185.47	706.77
Waterbody- Streams/River			10.41	0.41					184.77		195.59
Waterbody – Ponds										17.91	17.91
<b>Grand Total</b>	<b>75.06</b>		<b>1944.39</b>	<b>220.64</b>				<b>563.53</b>	<b>187.62</b>	<b>252.47</b>	<b>3243.71</b>

- 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 269.93 ha of agriculture are decreased and it is converted into built up, plantation, scrubland and water body of T1.
- In T1 149.56 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	
<b>T1</b>												
<b>Built up</b>	75.06										<b>75.06</b>	
<b>Mining/dump</b>												
<b>Agriculture</b>	2.25	0.06	1596.95	337.08				5.61		2.44	<b>1944.39</b>	
<b>Plantation Horticulture</b>	0.02		29.36	191.25						0.01	<b>220.64</b>	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>	0.13		13.00					546.11		4.29	<b>563.53</b>	
<b>Waterbody- Streams/River</b>			6.96	1.17					179.50		<b>187.62</b>	
<b>Waterbody – Ponds</b>										252.47	<b>252.47</b>	
<b>Grand Total</b>	<b>77.46</b>	<b>0.06</b>	<b>1646.27</b>	<b>529.50</b>				<b>551.72</b>	<b>179.50</b>	<b>259.21</b>	<b>3243.71</b>	

- 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 347.44 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation, scrubland and water body of T2.
- In T2 49.32 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	77.46										77.46
Mining/dump		0.06									0.06
Agriculture	3.95		1578.37	61.28				0.85		1.83	1646.27
Plantation Horticulture			171.46	357.95						0.09	529.50
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.90		121.49					427.90		0.43	551.72
Waterbody- Streams/River			12.69						166.81		179.50
Waterbody – Ponds			0.42							258.79	259.21
<b>Grand Total</b>	<b>83.30</b>	<b>0.06</b>	<b>1884.42</b>	<b>419.22</b>				<b>428.75</b>	<b>166.81</b>	<b>261.14</b>	<b>3243.71</b>

- 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 67.90 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T3.
- In T3 306.05 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
<b>T3</b>												
<b>Built up</b>	83.30										<b>83.30</b>	
<b>Mining/dump</b>		0.06									<b>0.06</b>	
<b>Agriculture</b>	1.93		1856.05	23.29				1.10	1.41	0.64	<b>1884.42</b>	
<b>Plantation Horticulture</b>			94.20	324.97						0.05	<b>419.22</b>	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>		0.37	48.31					375.21	0.22	4.65	<b>428.75</b>	
<b>Waterbody- Streams/River</b>				0.61					166.20		<b>166.81</b>	
<b>Waterbody – Ponds</b>			0.33							260.80	<b>261.14</b>	
<b>Grand Total</b>	<b>85.24</b>	<b>0.43</b>	<b>1998.90</b>	<b>348.87</b>				<b>376.31</b>	<b>167.84</b>	<b>266.14</b>	<b>3243.71</b>	

- 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 28.37 ha of agriculture are decreased and it is converted into built up, plantation, scrubland and water body of T4.
- In T4 142.85 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	85.24										85.24
Mining/dump		0.43									0.43
Agriculture	1.36	1.12	1969.01	25.62				1.79			1998.90
Plantation Horticulture			148.41	200.33						0.12	348.87
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.23	1.07	13.53					361.44		0.04	376.31
Waterbody- Streams/River			0.55						167.28		167.84
Waterbody – Ponds										266.14	266.14
<b>Grand Total</b>	<b>86.83</b>	<b>2.62</b>	<b>2131.51</b>	<b>225.95</b>				<b>363.23</b>	<b>167.28</b>	<b>266.30</b>	<b>3243.71</b>

- 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 29.89 ha of agriculture are decreased and it is converted into built up, mining/dump, plantation and scrubland of T5.
- In T5 162.50 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 220.08 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 238.15, 114.47 & 132.61 Hectares From T2 to T3, T3 to T4 & T4 to T5 and There is an increase of 120.37 & 298.12 Hectares From T0 to T1 & T1 to T2. The 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 increase of 49.70 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 343.55 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.