

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

PRAKASAM -21/2010-11  
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad  
February-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

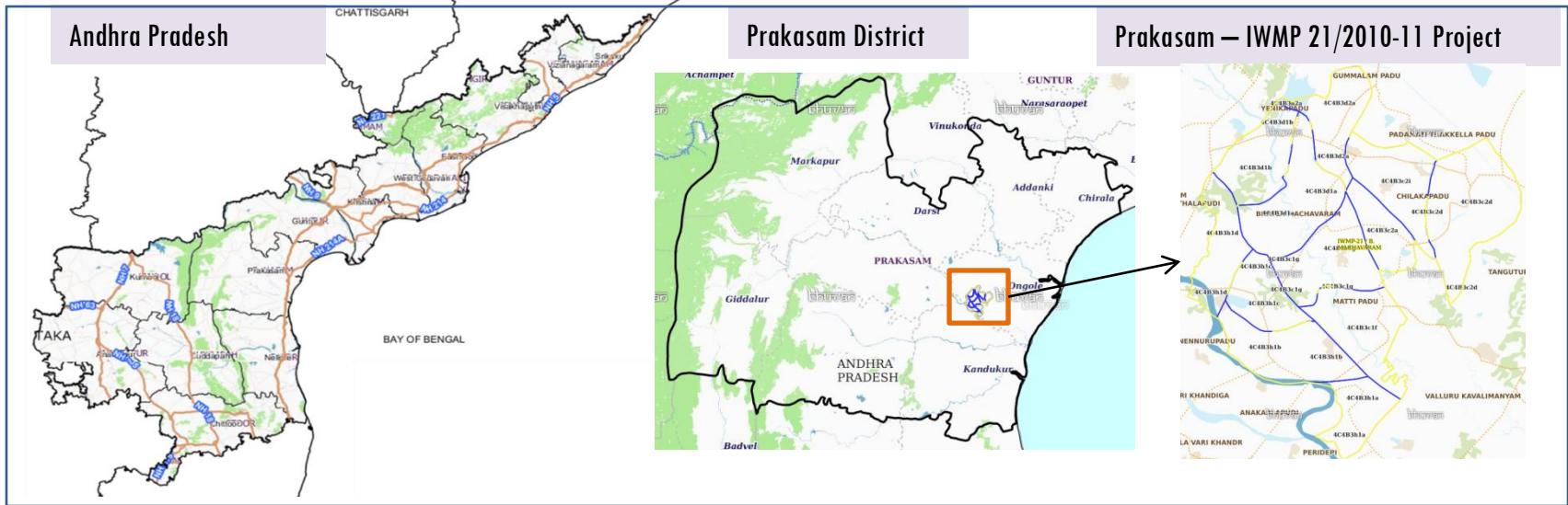
## **E X E C U T I V E   S U M M A R Y**

- 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-21/2010-11, Prakasam District of Andhra Pradesh. The total geographical area of the project is 8489.04 ha. It comprises of 14 micro watersheds.
- In the project area 125 Drishti photos were uploaded showing 18 Farm ponds/Percolation tanks, 2 afforestation and 105 others.
- Major percentage i.e. 59.21% is covered by the agriculture, 28.16% is covered by plantation, 5.49% is covered by scrub land, 4.52% by water body and remaining by other land use classes.

# PROJECT : PRAKASAM - IWMP-21/2010-11

## DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Santhanuthalapadu Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 8489.04 ha. It comprises of 14 micro watersheds. Location Map of the study area is shown in Figure below Analysis is done for 2010-11 (T0) period (*Batch -1*) projects taking 2018-19 (T5) period satellite images.



- Project area witnesses tropical wet and dry climate characterized by year round high temperatures. Prakasam has a record of reaching more than 46°C.
- The average annual rainfall of the district is 798.6 mm, monthly rainfall ranges from nil in March to 182.9 mm in October. October is the wettest month of the year. Southwest monsoon contributes significant rainfall in southern part of the district and Northeast monsoon contributes more than 70% of the rainfall.
- December is the coldest month with normal mean maximum temperature of about 27.1°C and mean minimum temperature of 19.2°C. Temperature begins to rise after February. May is the hottest month with mean daily maximum temperature of about 36.1°C and the mean daily minimum temperature of about 27.7°C. During May and early June the maximum temperature rises occasionally to 46°C and with the onset of SW monsoon by about second week of June, temperature begins to drop rapidly.

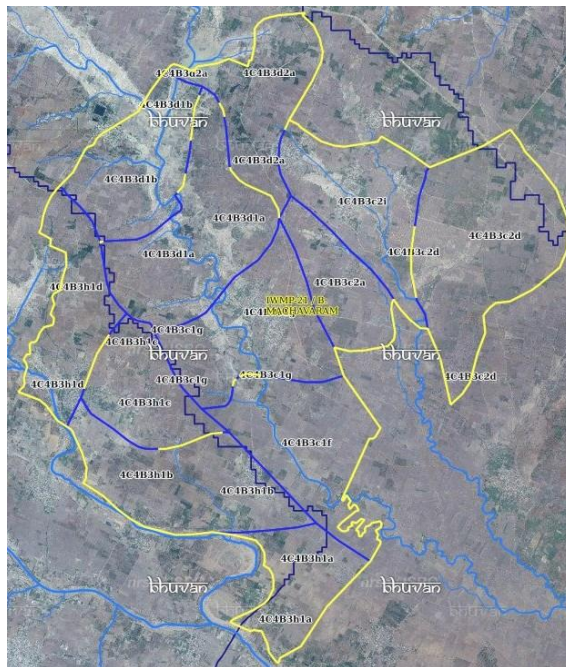
# Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			16-Apr-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			16-Apr-18
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	212
4	Detailed Project Report		

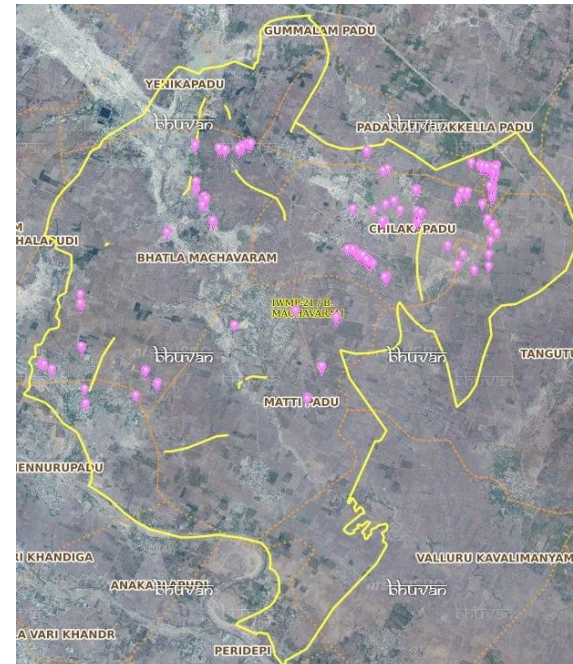
# Natural Color Composite overlaid with Project boundaries and high detail stream network



### 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	2	2
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	0	0
9	Gabion structure	0	0
10	Farm ponds	18	18
11	Check dams	0	0
12	Nallah Bunds	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	195	105
	<b>TOTAL</b>	<b>222</b>	<b>125</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.

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-21/2010-11



T1:2010-11



T2: 05 June 2015



Drishti Sl no. 847094 MWS :4C4B3c2i

Check dam



T1:2010-11



T2: 05 June 2015



Drishti Sl no. 7051930 MWS : 4C4B3c2a

Check dam



Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-21/2010-11



T0: 2010-11



T1: 05 June 2015



Drishti SI no. 7052347 MWS :4C4B3d1a

Check dam



T0: 2010-11



T2: 05 June 2015



Drishti SI no. 787566 MWS :4C4B3c2i

Horticulture

Prakasam-IWMP-21/2010-11

2009-10



June-2014



March-2017



March-2018



Feb-2019



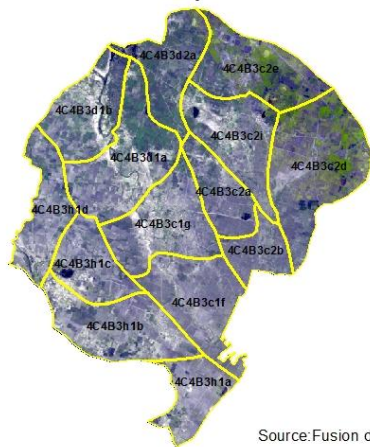
Drishiti Sl.No.: 7051930  
M.No.:  
Uuid:

Activity : Check dam

# Natural Color Composite – 2009-10 to 2017-18

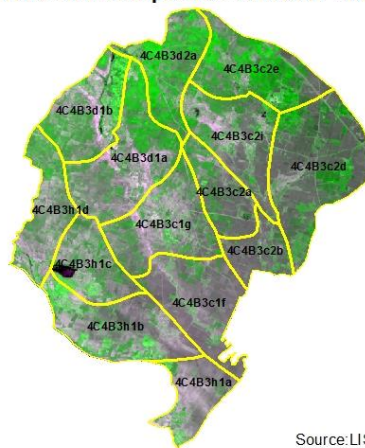
## Natural Color Composite

Natural Color Composite- 2010-11



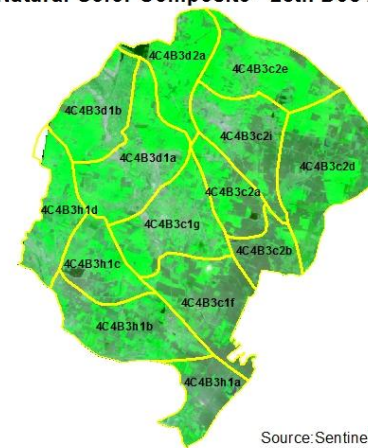
Source: Fusion data, NRSC

Natural Color Composite- 22nd Jun 2014



Source: LISS-IV, NRSC

Natural Color Composite- 28th Dec 2015



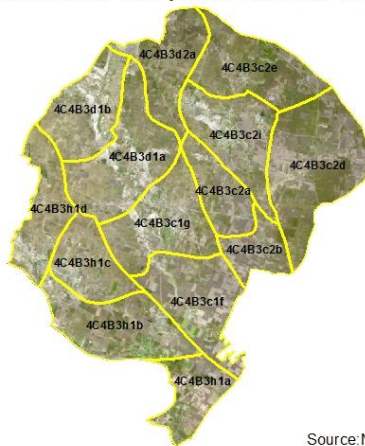
Source: Sentinel data, NRSC

Natural Color Composite- 03rd May 2016



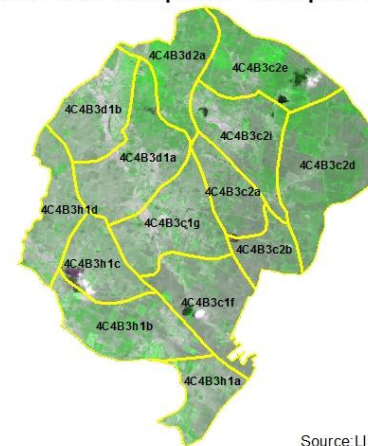
Source: LISS-IV, NRSC

Natural Color Composite- 03rd Mar 2017



Source: NCC, NRSC

Natural Color Composite- 16th April 2018



Source: LISS-IV, NRSC

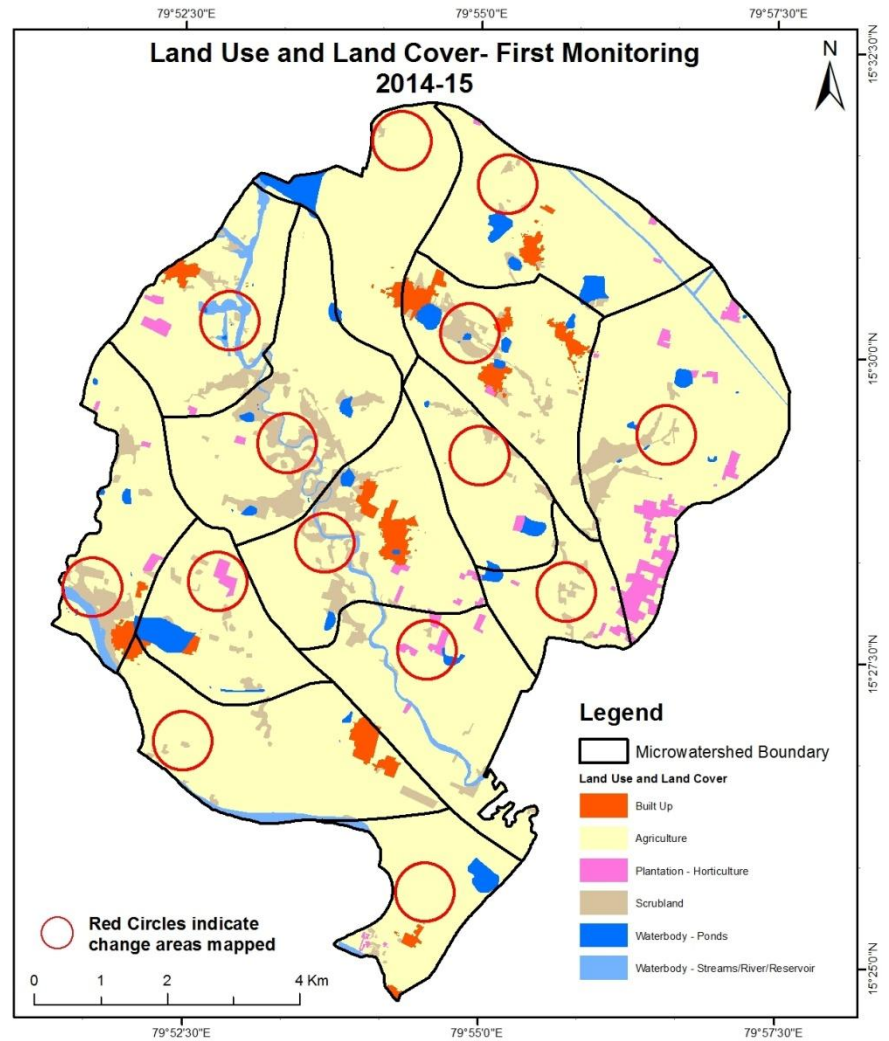
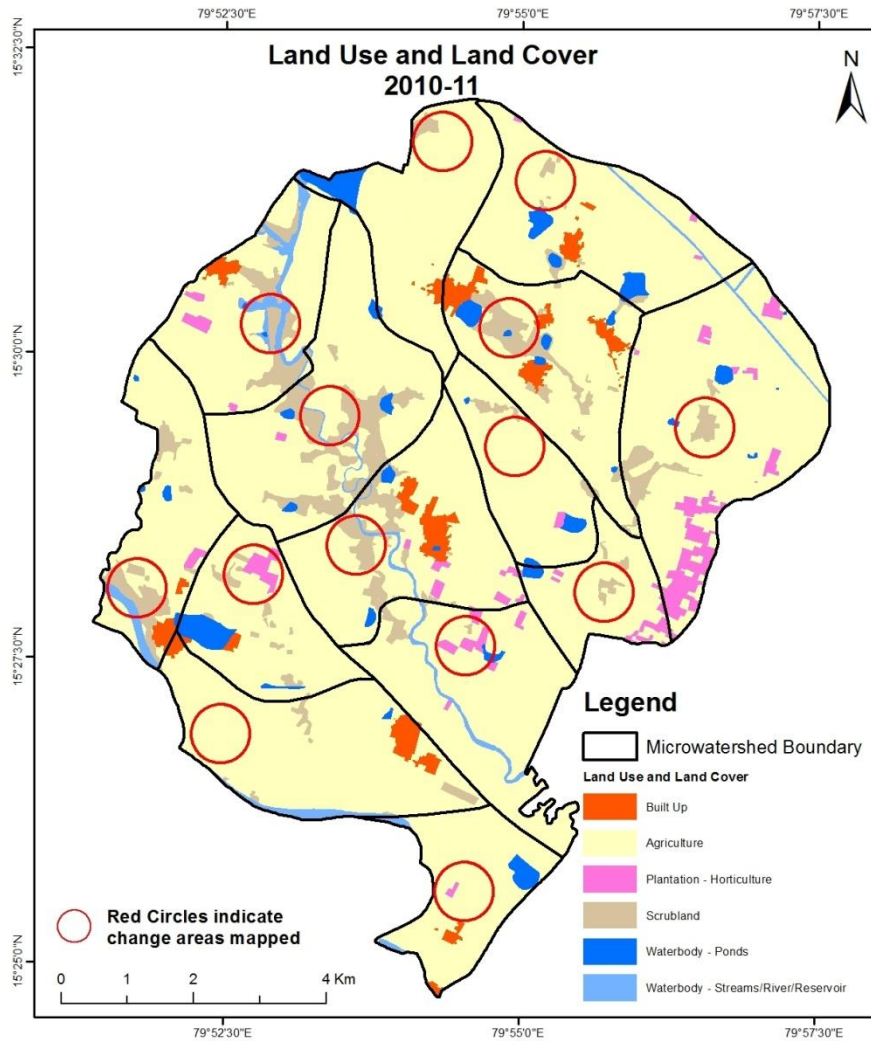
## MONITORING IN THE PROJECT AREA

### 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 pre implementation period as T0 (2010-11) and row represents the post implementation period as T5 (2018-19) .

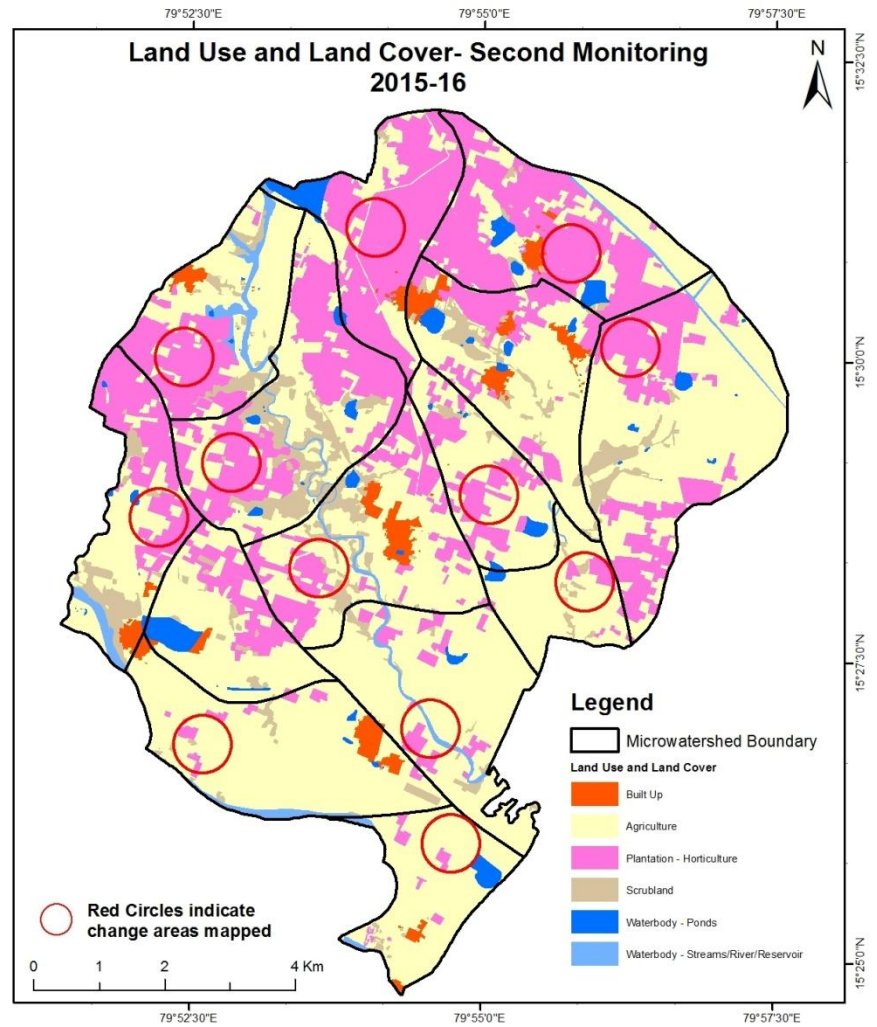
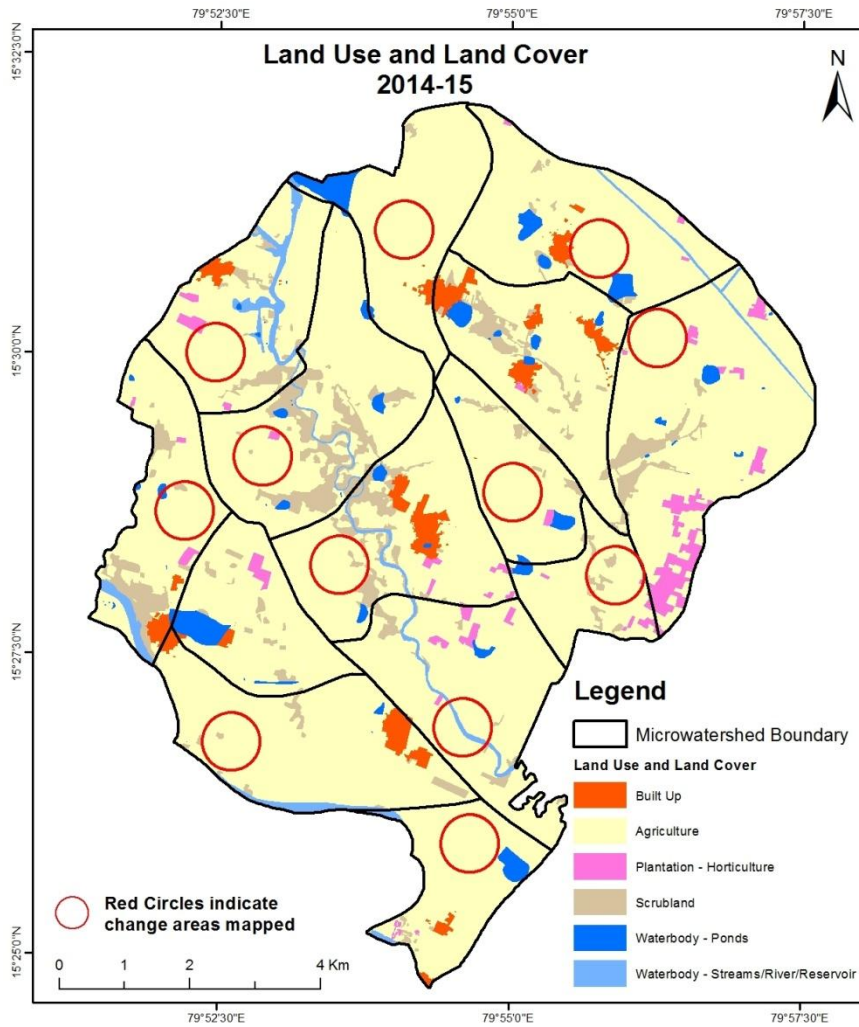
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



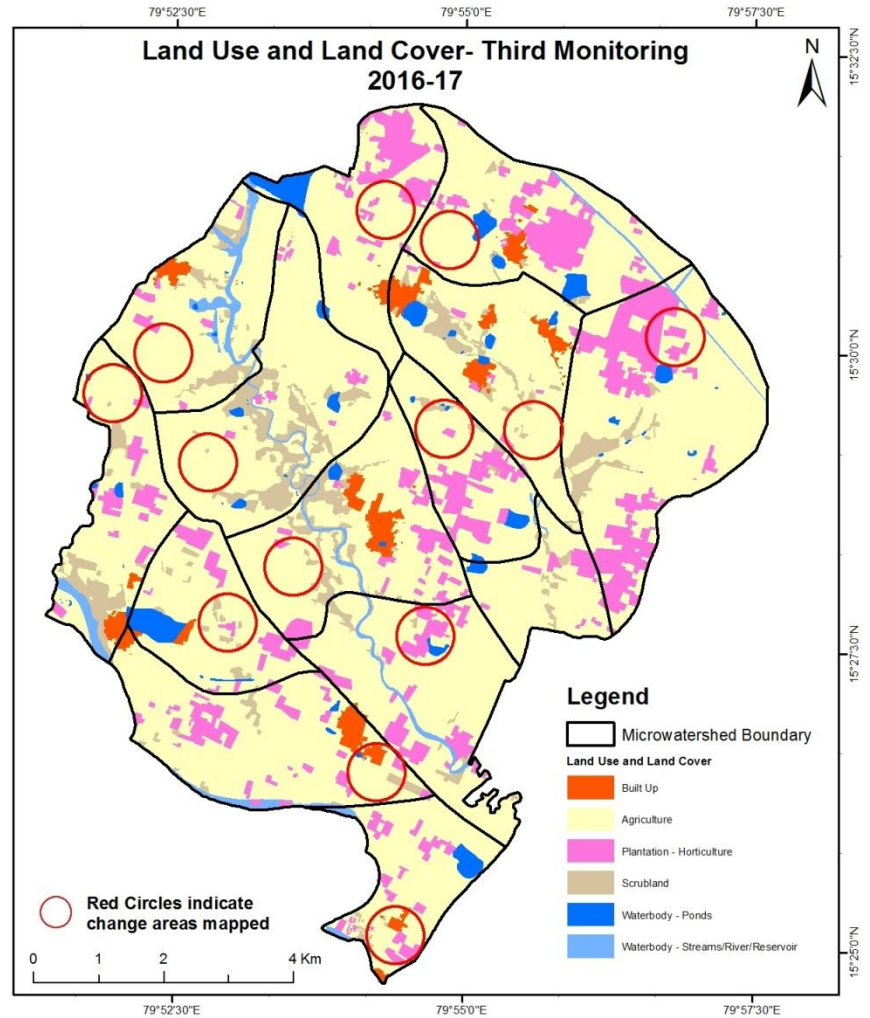
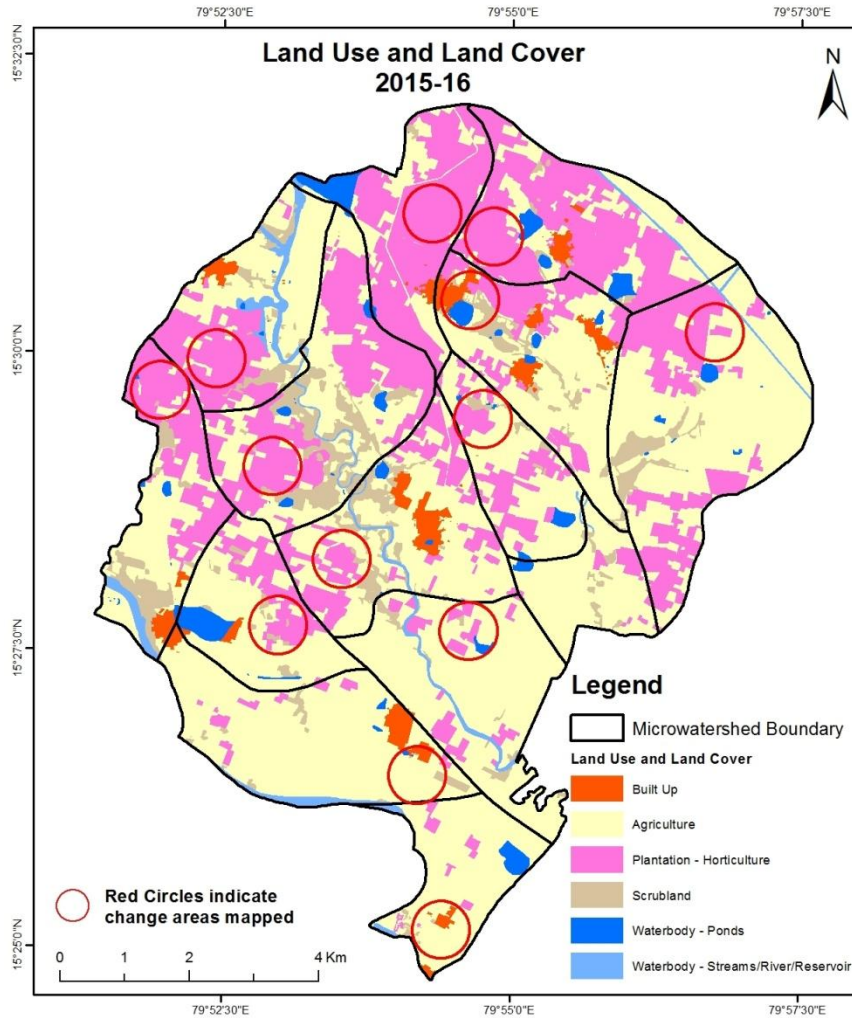
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



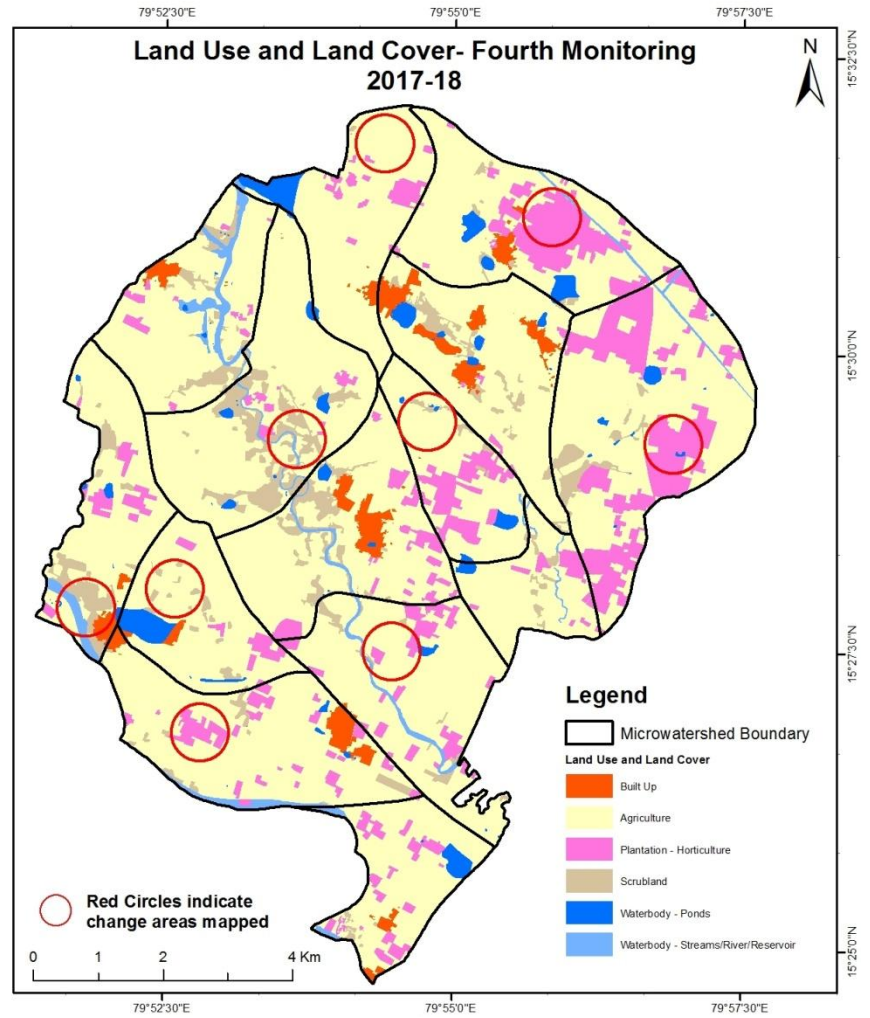
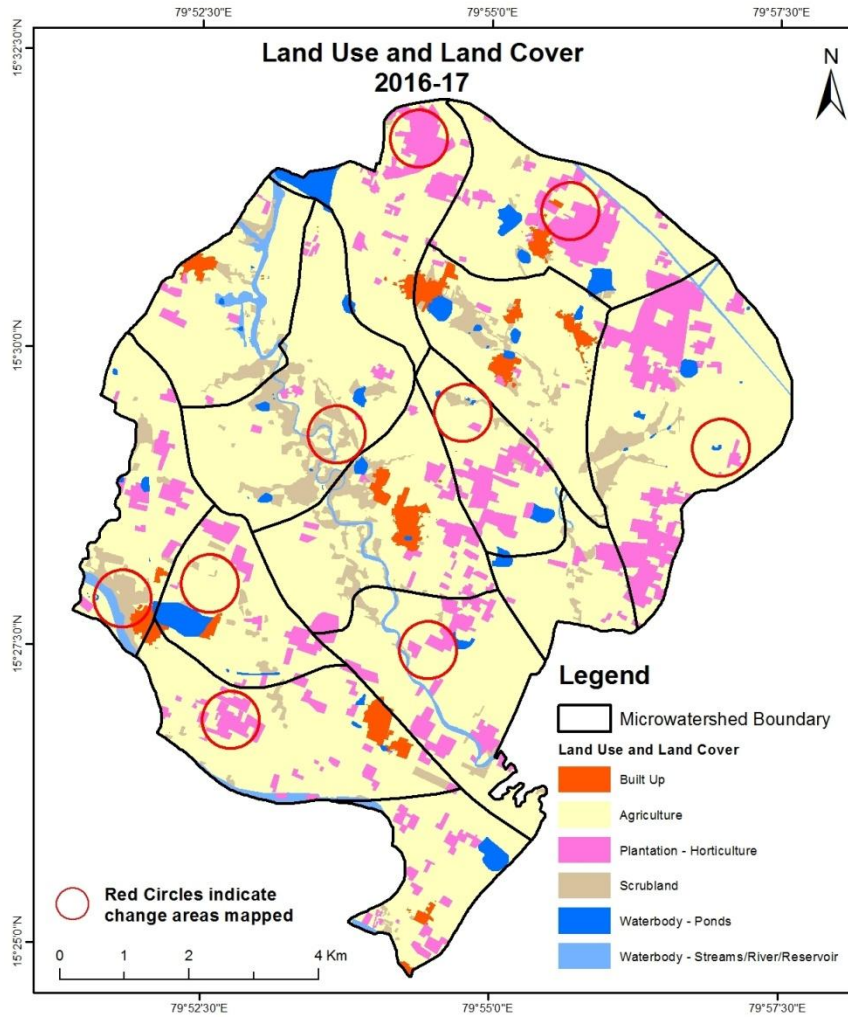
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



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

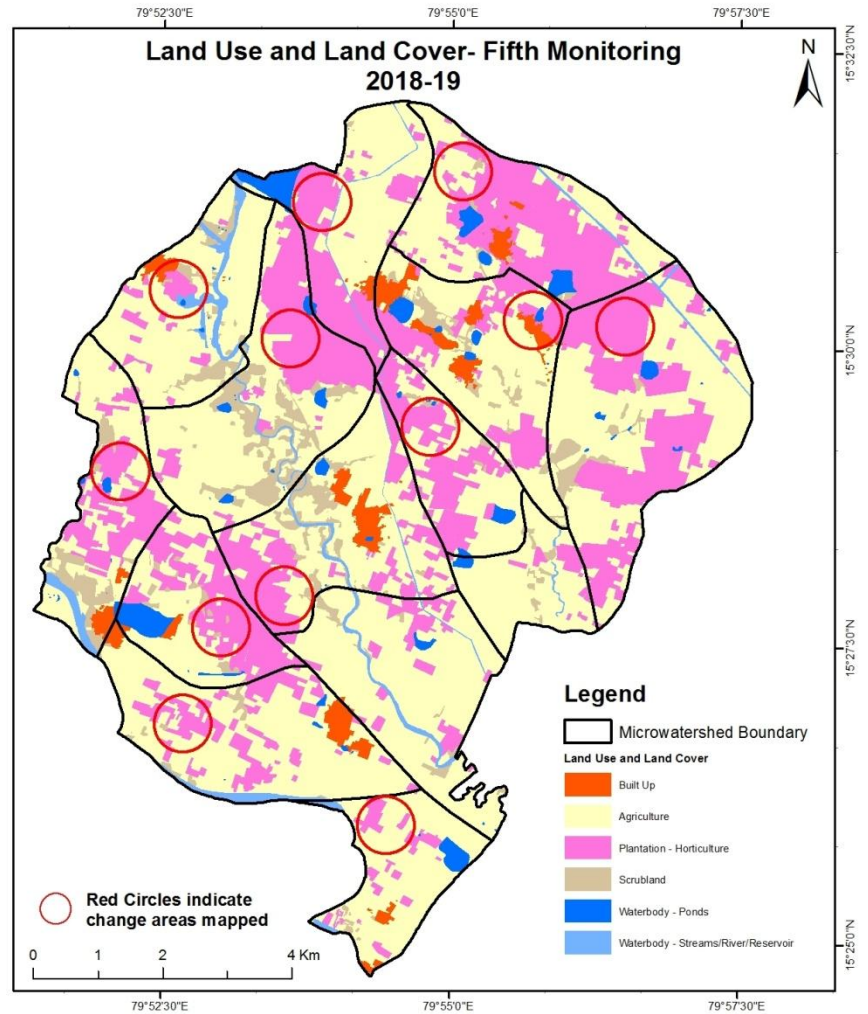
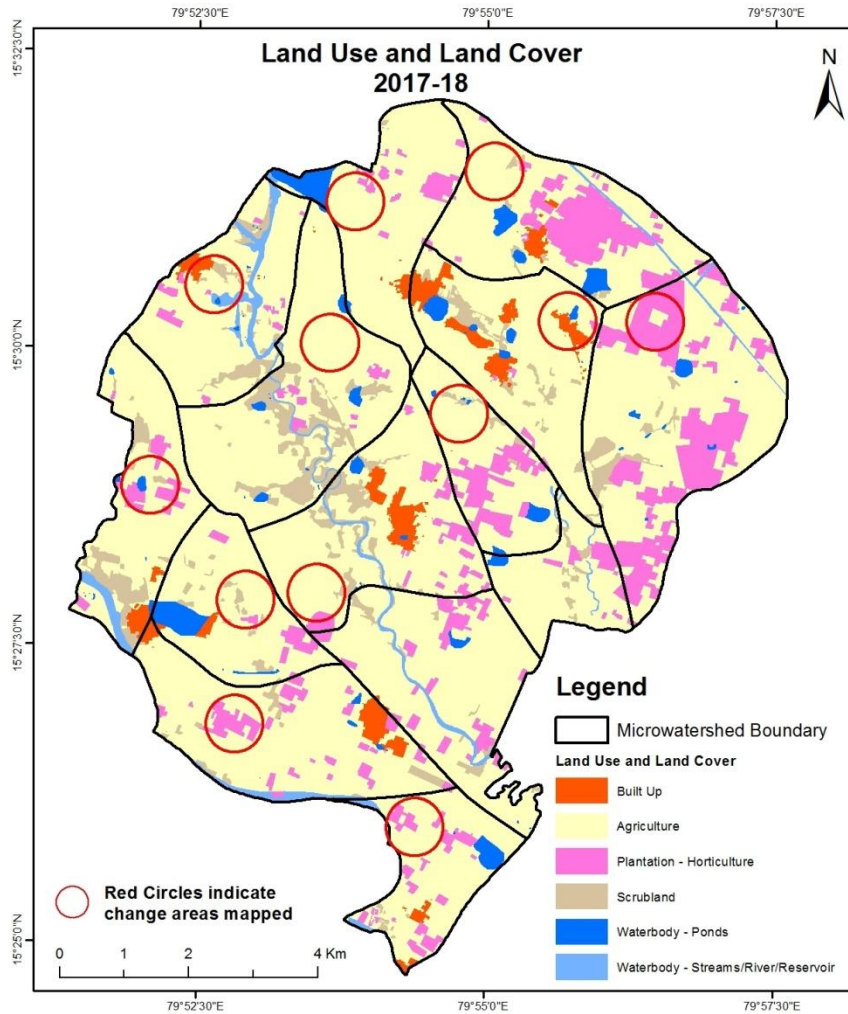
Scale: 1:10000





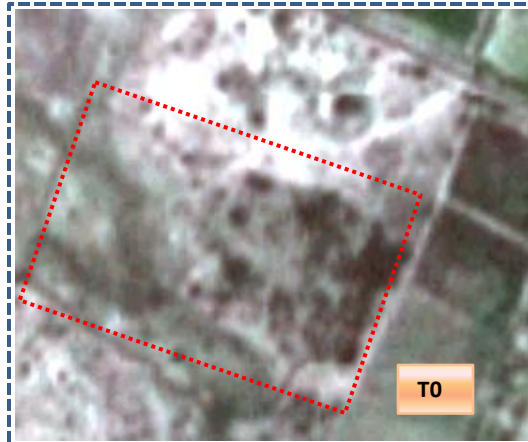
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



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

Scrub to Agriculture

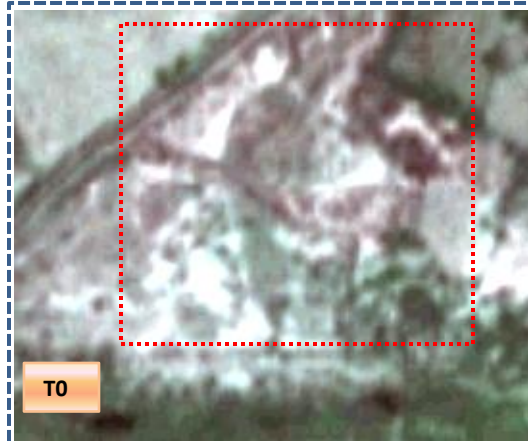


T1: 2010-11

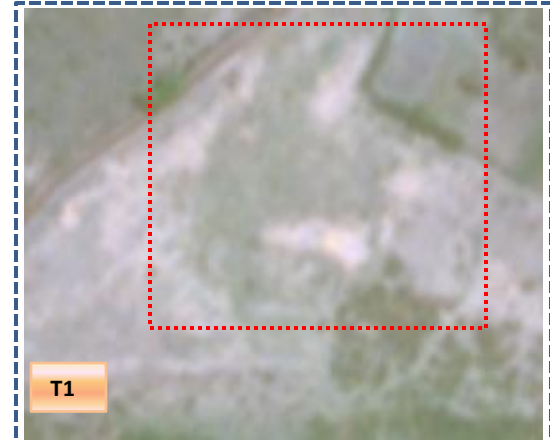


T2: 20 April 2014

Scrub to Agriculture



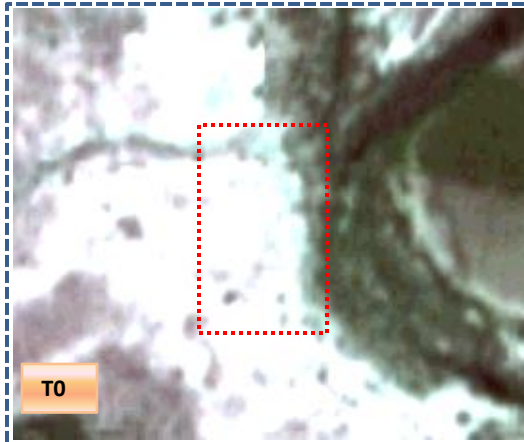
T1: 2010-11



T2: 20 April 2014

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

Scrub to Water body



T0

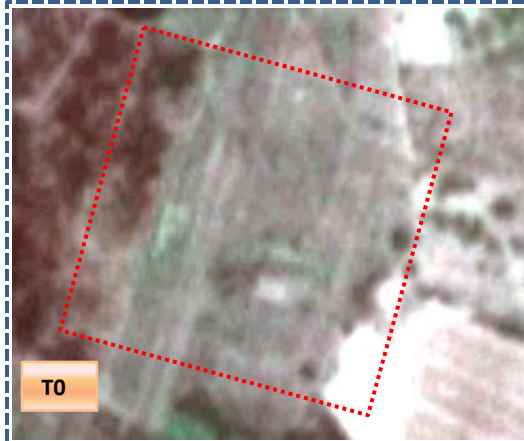
T0: 2010-11



T1

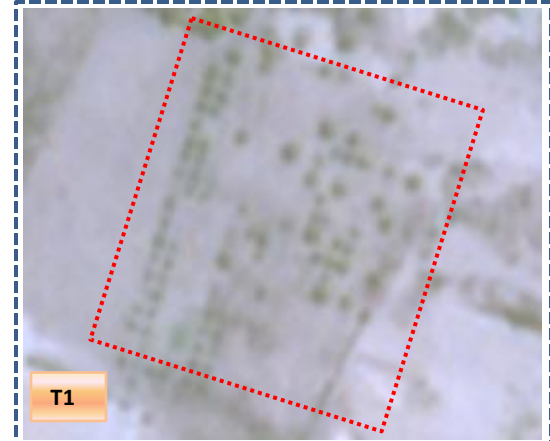
T2: 20 April 2014

Agriculture to Plantation



T0

T0: 2010-11



T1

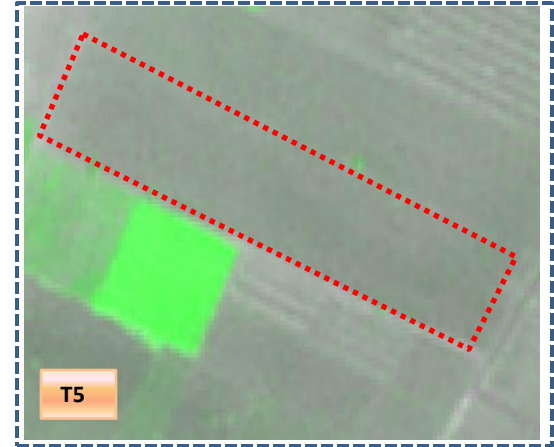
T2: 20 April 2014

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

### Scrub to Agriculture



T4: 2017-18 (79°54'28.118"E 15°26'23.901"N )

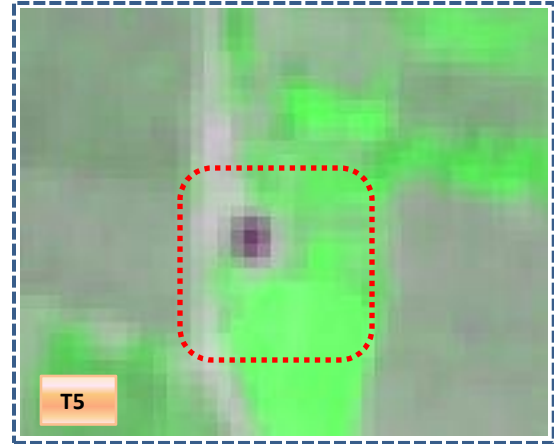


T5: 16 April October 2018

### Agriculture to Waterbody



T4: 2017-18 (79°52'22.475"E 15°30'27.433"N)



T5: 16 April October 2018

**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	
<b>Built up</b>	197.15										197.15
<b>Mining/dump</b>											
<b>Agriculture</b>	3.87		7031.79	3.42				101.67	0.70	1.84	7143.28
<b>Plantation Horticulture</b>			35.43	155.96							191.39
<b>Forest</b>											
<b>Forest Plantation</b>											
<b>Barren Rocky</b>											
<b>Scrub</b>	0.72		159.81	2.61				432.87		0.34	596.36
<b>Waterbody- Streams/River</b>									169.46		169.46
<b>Waterbody – Ponds</b>	0.31		2.43							188.66	191.39
<b>Grand Total</b>	<b>202.06</b>		<b>7229.46</b>	<b>161.98</b>				<b>534.54</b>	<b>170.16</b>	<b>190.84</b>	<b>8489.04</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 111.49 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T1.
- In T1 197.67 ha of agriculture are increased from plantation, scrubland and water body of T0. The additional agriculture are coming from waterbody 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>	202.06												202.06
<b>Mining/dump</b>													
<b>Agriculture</b>	2.52		4835.23	2374.08				12.48	2.99		2.17		7229.46
<b>Plantation Horticulture</b>			16.07	145.91									161.98
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>			16.51					517.17			0.86		534.54
<b>Waterbody- Streams/River</b>			0.65						169.50				170.16
<b>Waterbody – Ponds</b>			3.45								187.39		190.84
<b>Grand Total</b>	<b>204.58</b>		<b>4871.92</b>	<b>2520.00</b>				<b>529.64</b>	<b>172.49</b>		<b>190.42</b>		<b>8489.04</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 2394.23 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T2.
- In T2 36.68 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	204.58										204.58
Mining/dump											
Agriculture	1.26		4622.58	247.86						0.22	4871.92
Plantation Horticulture			1767.19	752.74						0.07	2520.00
Forest											
Forest Plantation											
Barren Rocky											
Scrub			10.24					518.88		0.52	529.64
Waterbody- Streams/River			1.04	3.49					167.96		172.49
Waterbody – Ponds										190.42	190.42
<b>Grand Total</b>	<b>205.83</b>		<b>6401.04</b>	<b>1004.09</b>				<b>518.88</b>	<b>167.96</b>	<b>191.22</b>	<b>8489.04</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 249.34 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.
- In T3 1778.47 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>	205.83										205.83	
<b>Mining/dump</b>												
<b>Agriculture</b>	1.92		6173.52	206.99				13.17	4.63	0.81	6401.04	
<b>Plantation Horticulture</b>	0.10		250.19	751.80					1.87	0.13	1004.09	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>	12.60		41.92	0.22				463.98		0.16	518.88	
<b>Waterbody- Streams/River</b>									167.96		167.96	
<b>Waterbody – Ponds</b>	0.16		0.22	0.07						190.78	191.22	
<b>Grand Total</b>	<b>220.62</b>		<b>6465.85</b>	<b>959.08</b>				<b>477.16</b>	<b>174.45</b>	<b>191.88</b>	<b>8489.04</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 227.52 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T4.
- In T4 292.33 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
<b>T4</b>												
<b>Built up</b>	220.62										220.62	
<b>Mining/dump</b>												
<b>Agriculture</b>	1.75		4931.59	1513.56				18.76	0.19		6465.85	
<b>Plantation Horticulture</b>			80.22	877.24				1.62			959.08	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>			11.14				466.00		0.02		477.16	
<b>Waterbody- Streams/River</b>			2.99					171.46			174.45	
<b>Waterbody – Ponds</b>			0.21	0.02					191.65		191.88	
<b>Grand Total</b>	<b>222.37</b>		<b>5026.14</b>	<b>2390.82</b>			<b>466.00</b>	<b>191.84</b>	<b>191.86</b>		<b>8489.04</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 1534.26 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T5.
- In T5 94.55 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 22.85 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 86.18, 1529.13 & 64.81 Hectares From T0 to T1, T2 to T3 & T3 to T4 and There is an increase of 2357.55 & 1439.71 Hectares From T1 to T2 & T4 to T5. The overall decrease of 2117.14 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 2199.43 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 130.36 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (18) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (18) verified from the portal.