

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

KURNOOL -17/2010-11

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad

July-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

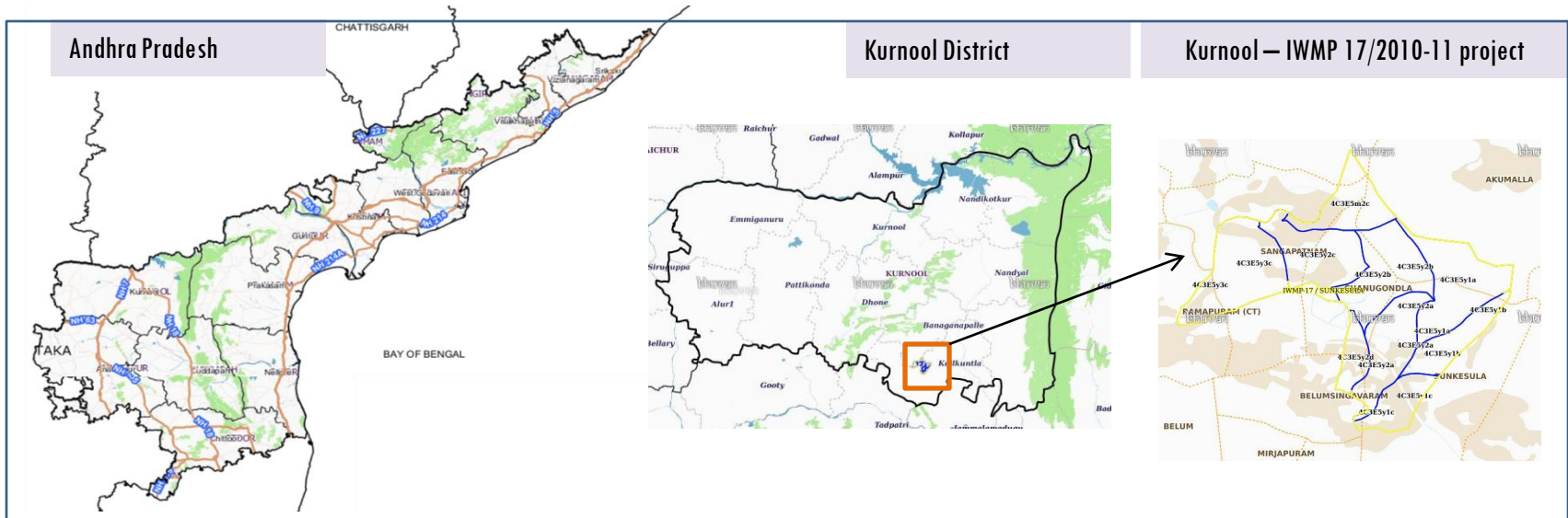
## **E X E C U T I V E   S U M M A R Y**

- 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-17/2010-11, Kurnool District of Andhra Pradesh. The total geographical area of the project is 3154 ha. It comprises of 09 micro watersheds.
- In the project area 228 Drishti photos were uploaded showing 88 check dams/checks & plugins, 35 Farm ponds, 1 afforestation and remaining showing others.
- Major percentage i.e. 63.61 % is covered by the agriculture, 20.03 % is covered by scrubland, 10.04 % is covered by mining/dump and remaining by other land use classes.

# PROJECT : KURNOOL - IWMP-17/2010-11

## DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Owk and Sanjamala Mandals of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 3154 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 -2*) projects taking 2018-19 (T5) period satellite images



- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).
- The average annual rainfall of the district is 665.5mm, which ranges from nil rainfall in January and December to 139.6 mm in September. August and September are the wettest months. The mean seasonal rainfall distribution is 459.1mm in southwest monsoon (June September), 133.7mm in northeast monsoon ( Oct-Dec), 1.9 mm rainfall in Winter (Jan Feb) and 70.8 mm in summer (March-May).

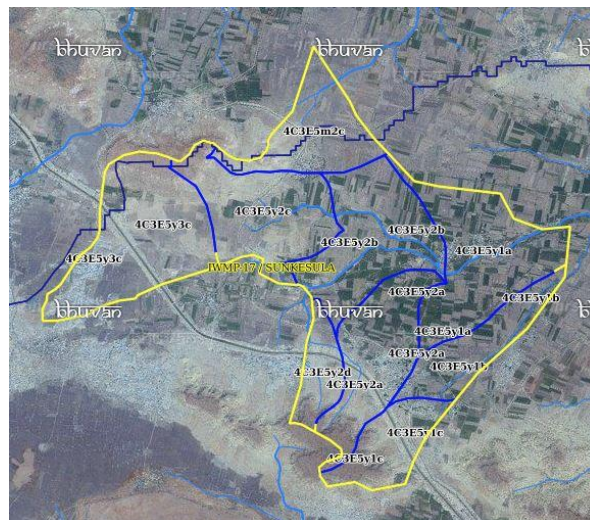
# Satellite Data and Ancillary Data

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	228
4	Detailed Project Report		

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



## Legend



Drainage (1:10000 Scale)

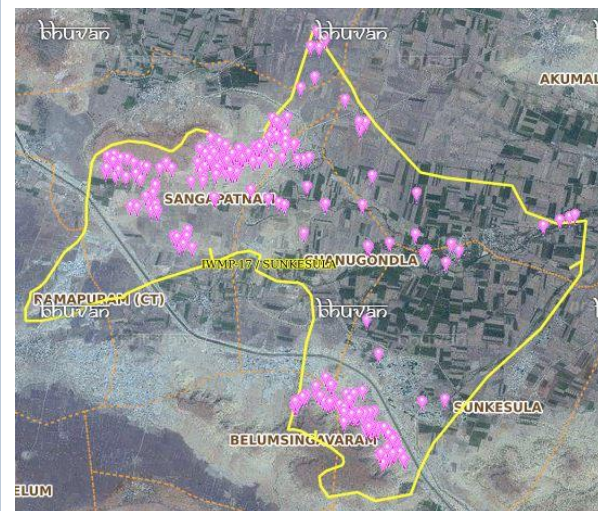


MWS Boundary



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	Checks & plugins	104	88
3	Agriculture	0	0
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	47	35
8	Check dams (Civil work)	0	0
9	New Activity	0	0
10	Om (Other measurement)	0	0
11	LM (Livelihood Measures)	0	0
12	Nallah Bunds/Drainage treatment	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	201	104
	<b>TOTAL</b>	<b>353</b>	<b>228</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 Kurnool Dt Andhra Pradesh. IWMP-17/2010-11



T0

bhuvan

T0:2010-11



T1

bhuvan

T1: 19 May 2014



Drishti Sl no. 132917 MWS : 4C3E5y1a

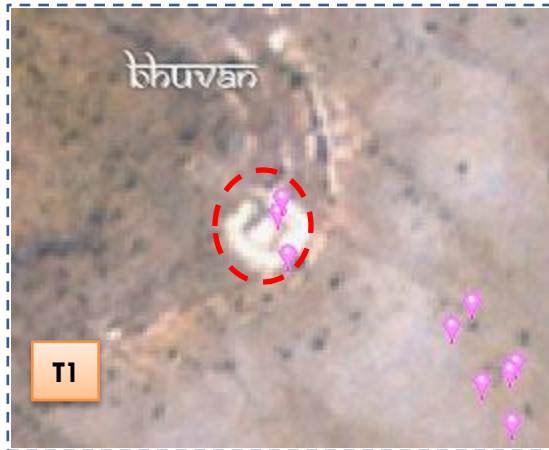
Farm pond



T0

bhuvan

T0:2010-11



T1

bhuvan

T1: 19 May 2014



Drishti Sl no. 146765 MWS : 4C3E5y2c

Farm pond



Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-17/2010-11



T0: 2010-11



T1: 19 May 2014



Drishti Sl no. 146780 MWS : 4D3B6q1c

Farm pond



T0: 2010-11



T1: 19 May 2014

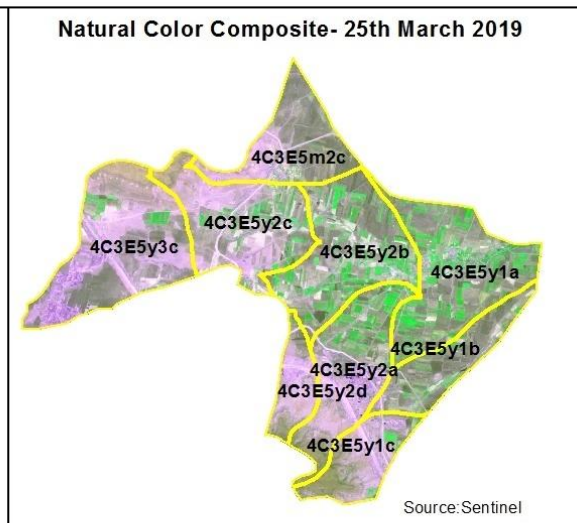
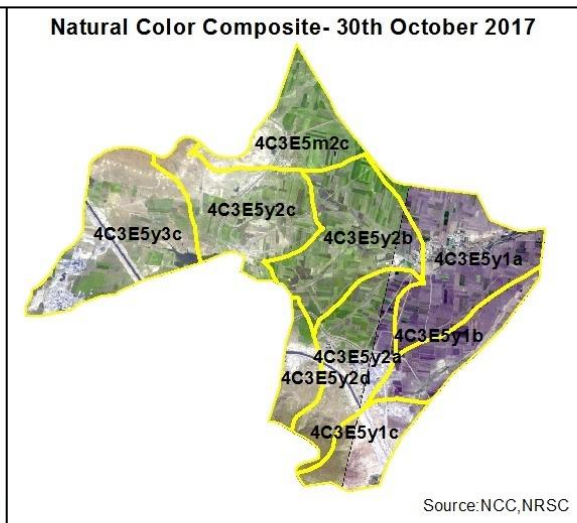
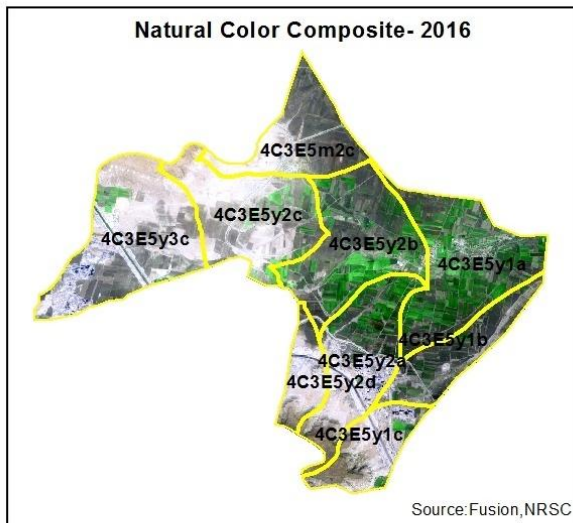
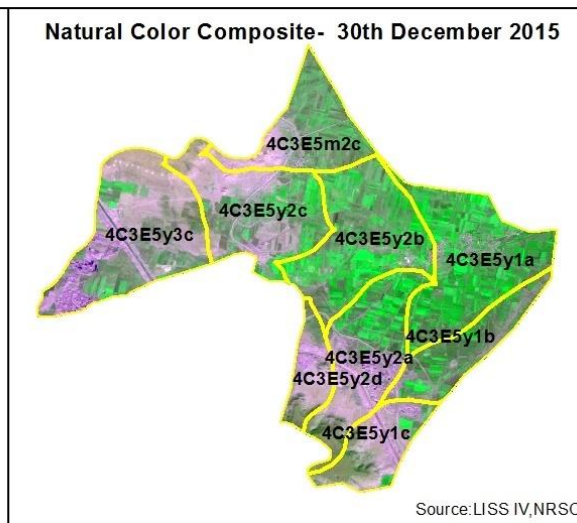
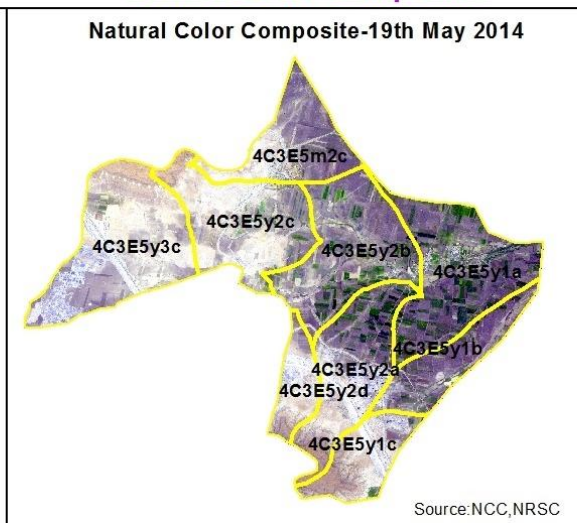
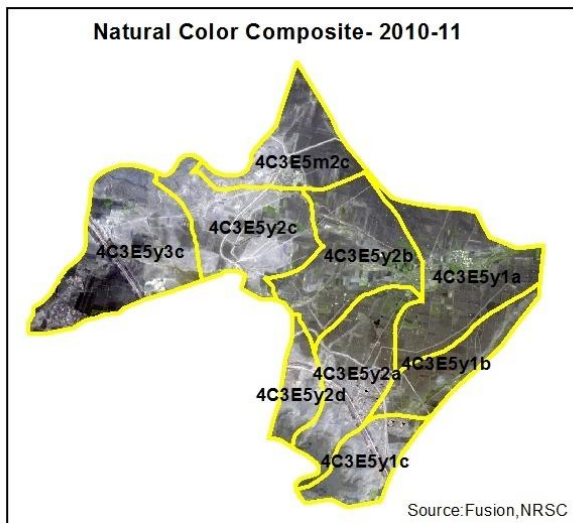


Drishti Sl no. 146788 MWS : 4C3E5y3c

Farm pond

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

## Natural Color Composite



## MONITORING IN THE PROJECT AREA

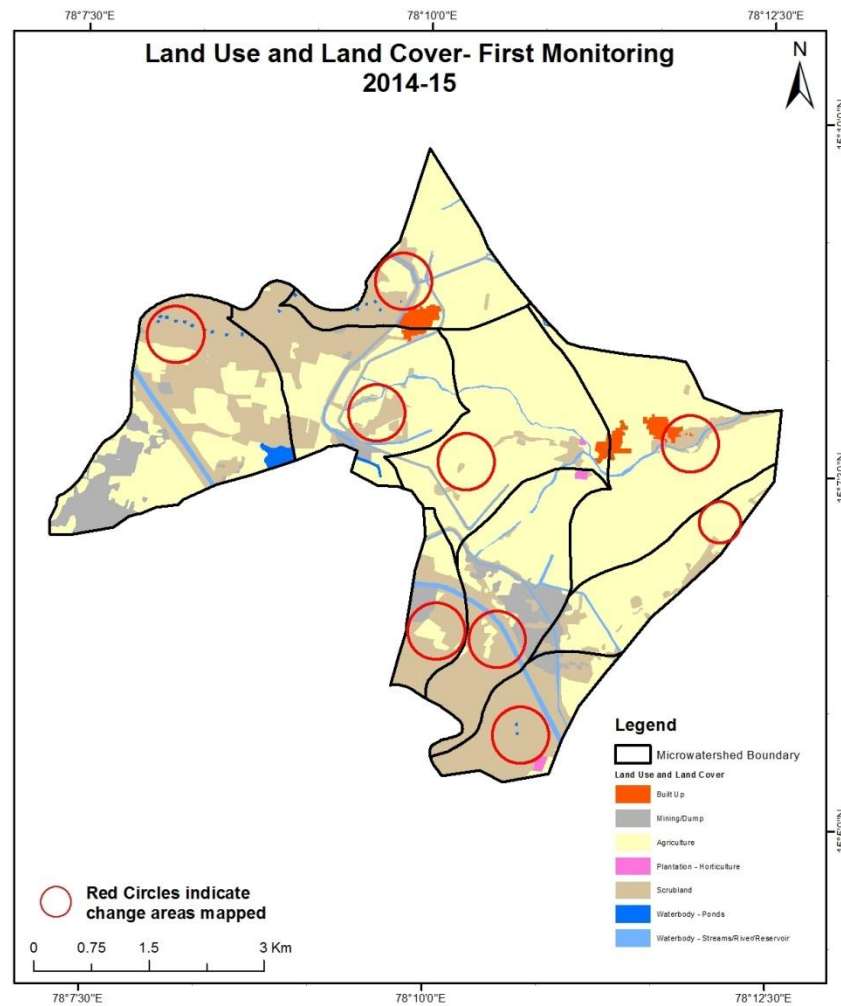
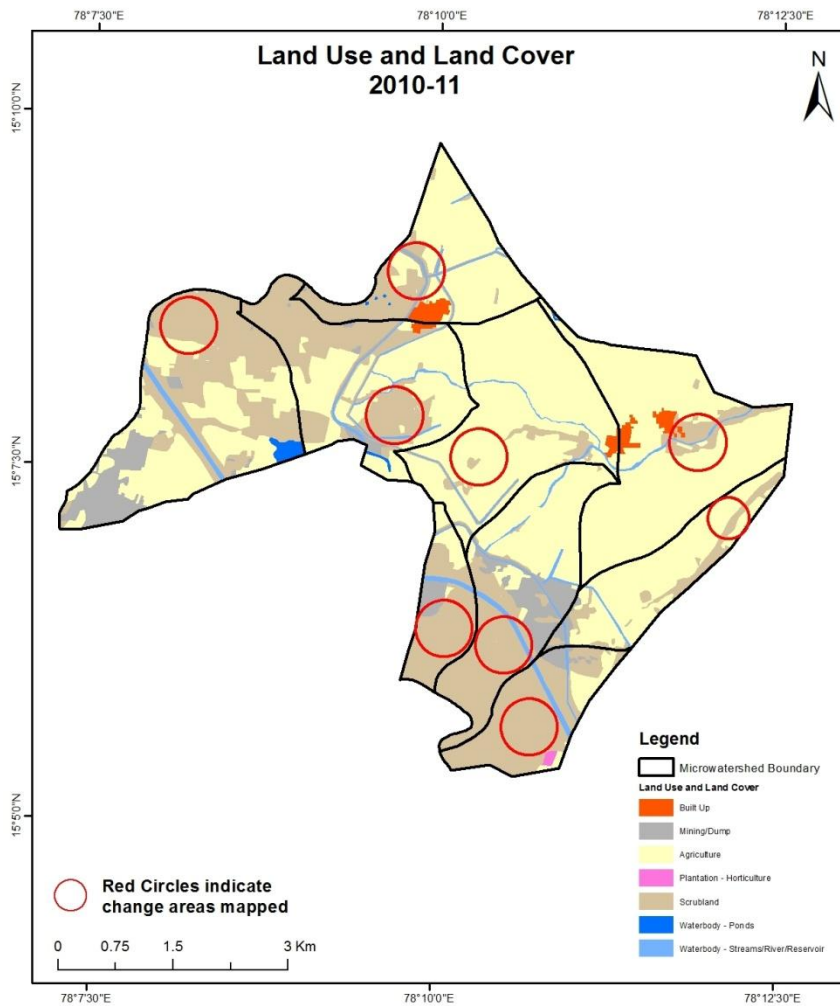
### Land use and Land cover Changes in the Project

- 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)



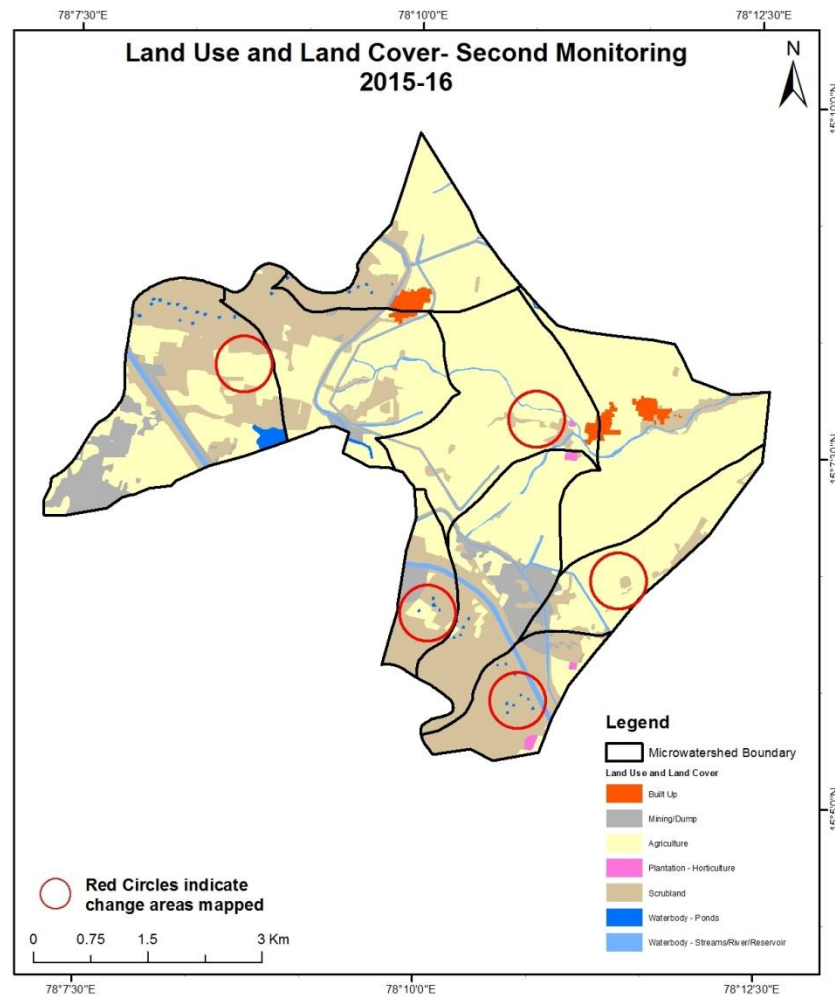
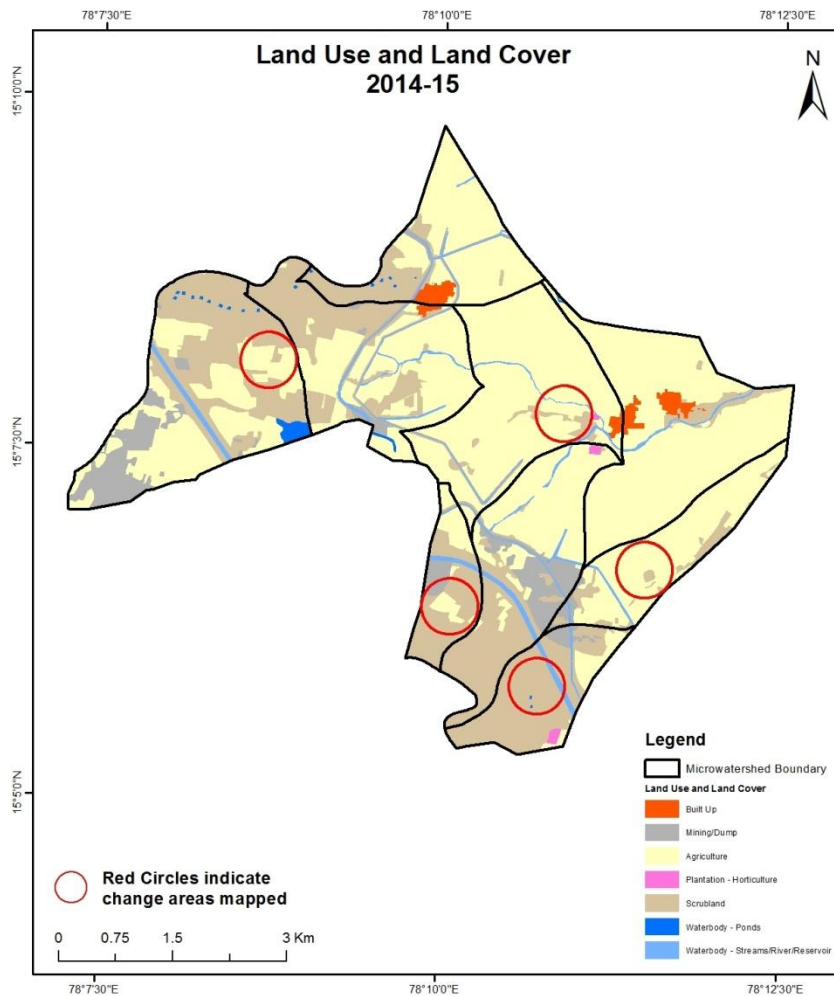
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



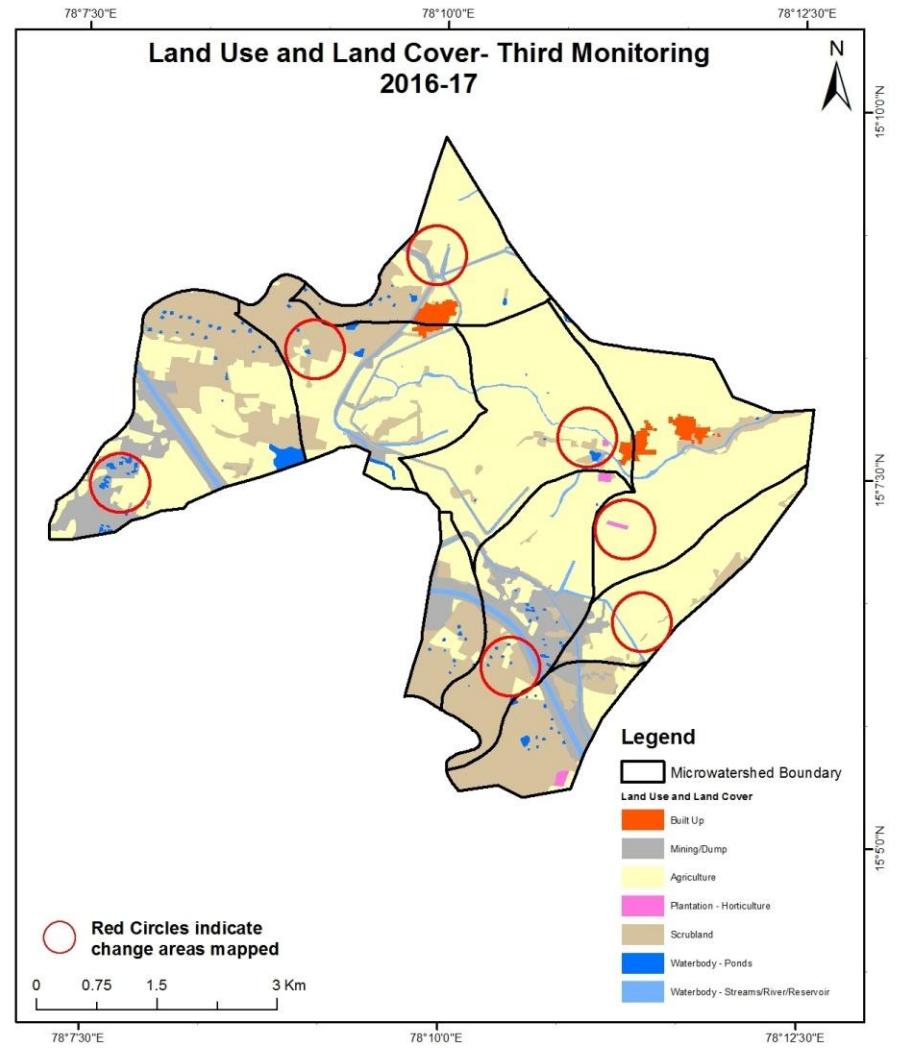
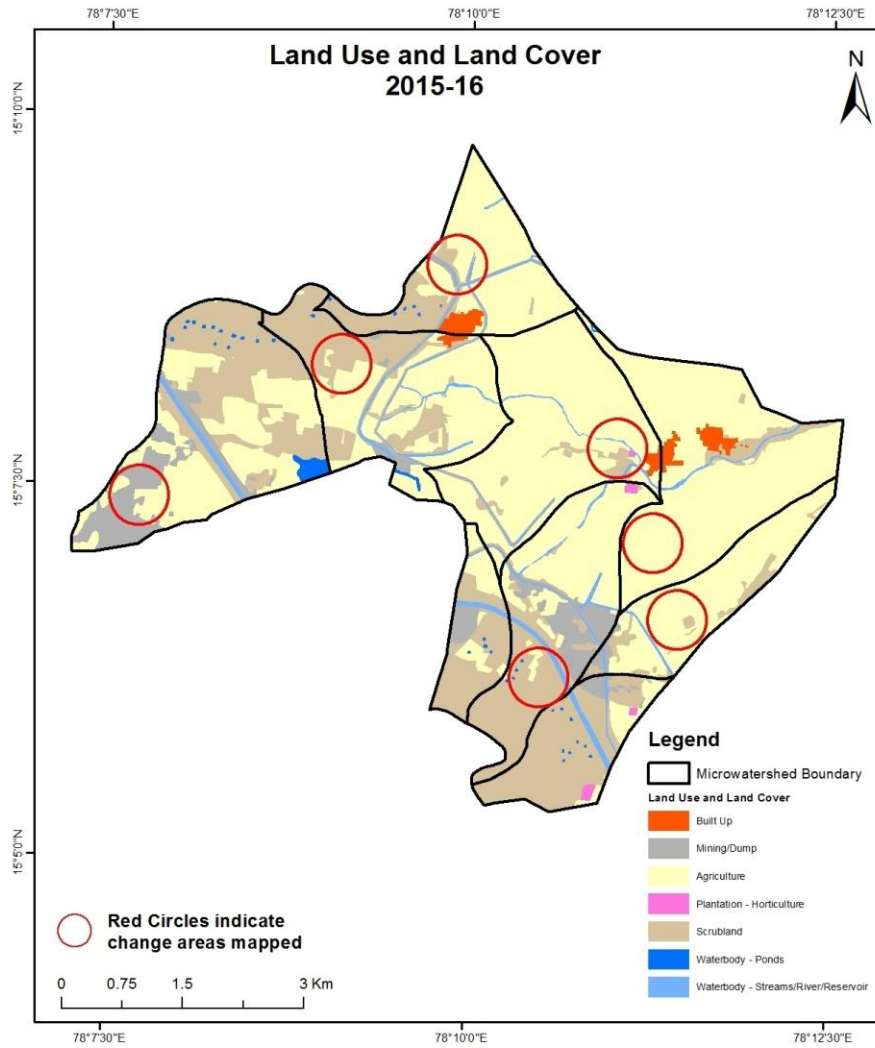
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



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

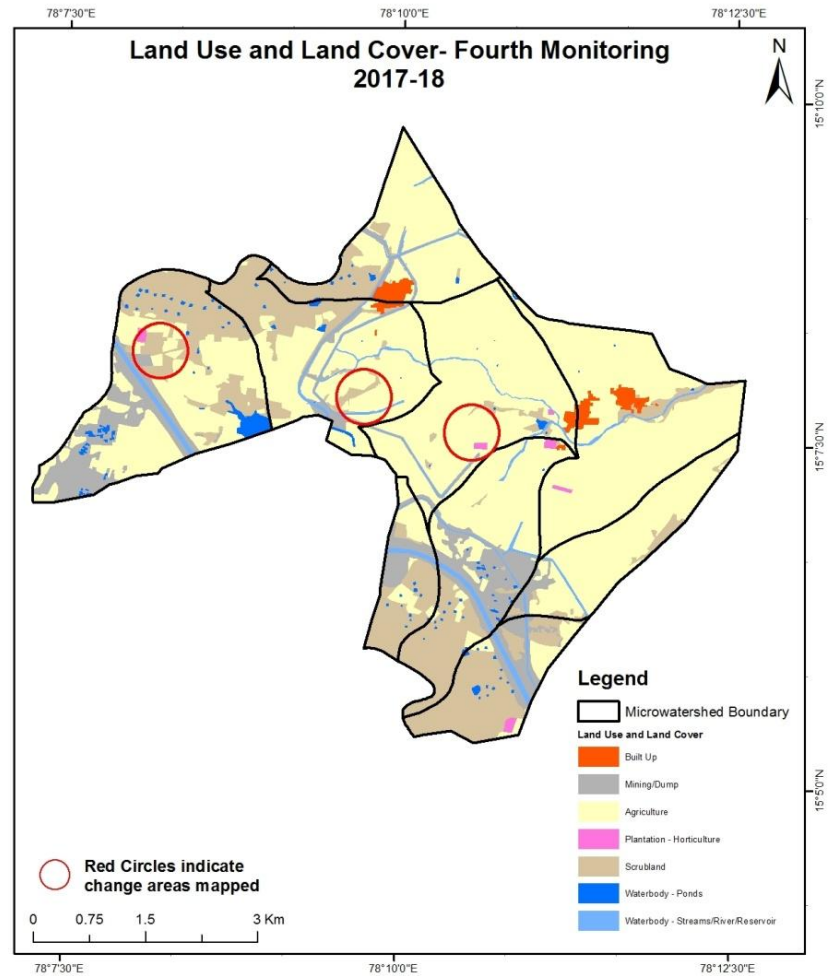
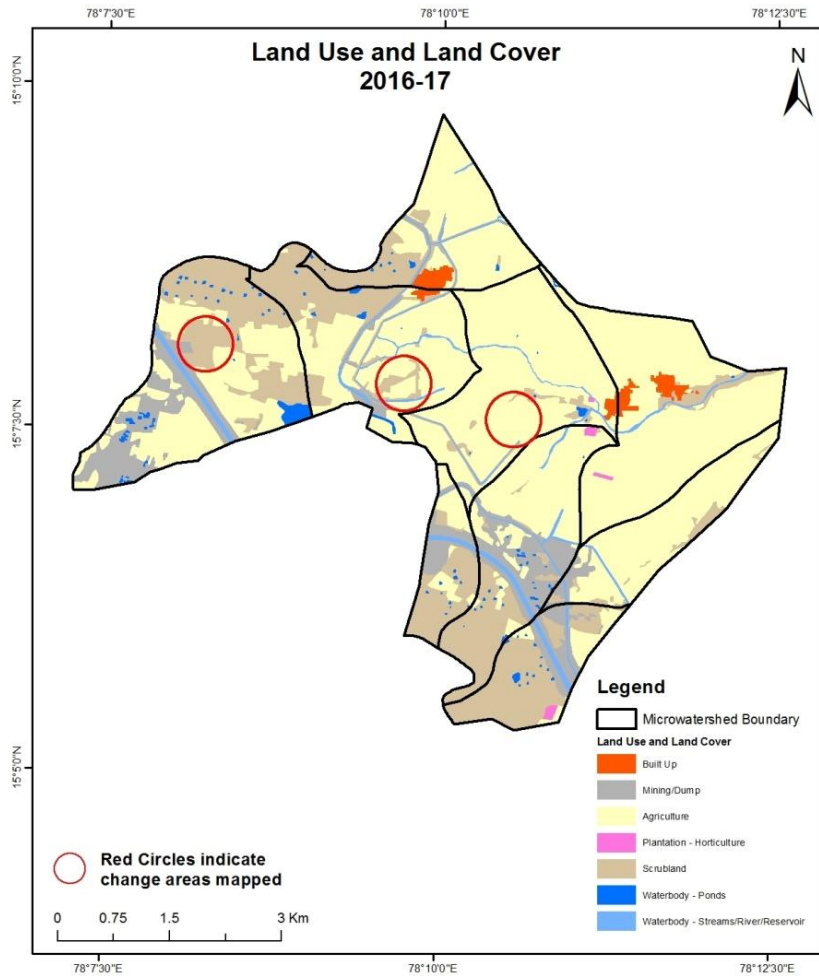
Scale: 1:10000





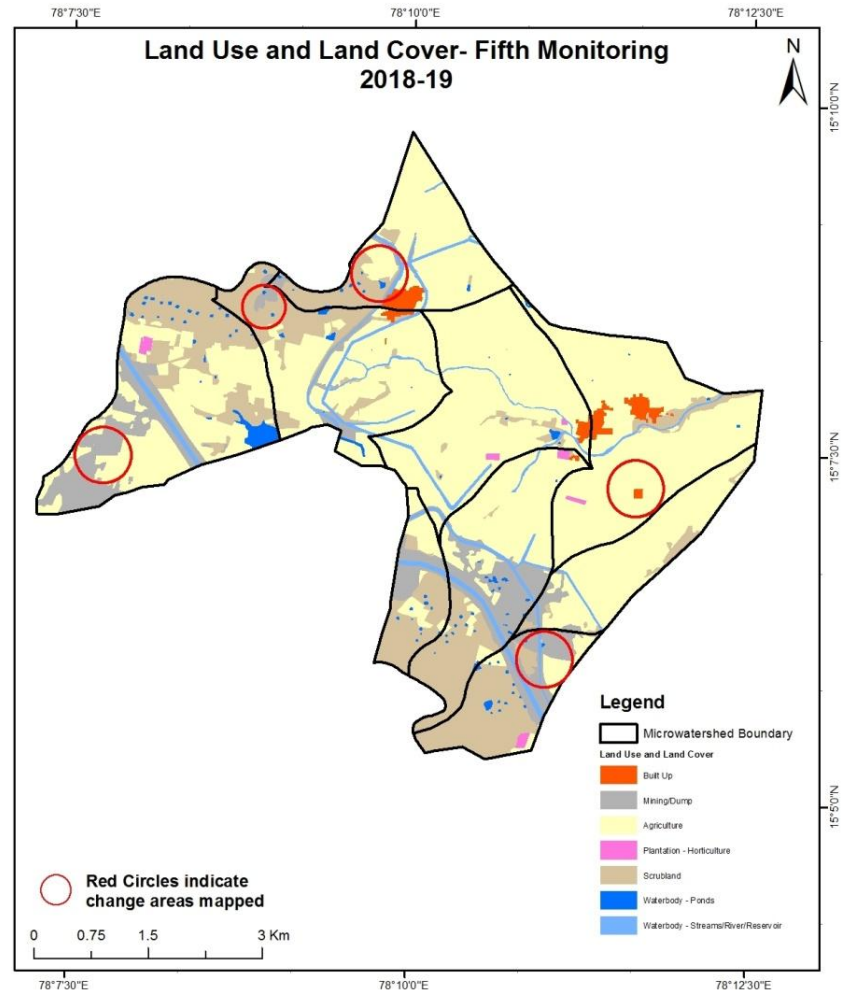
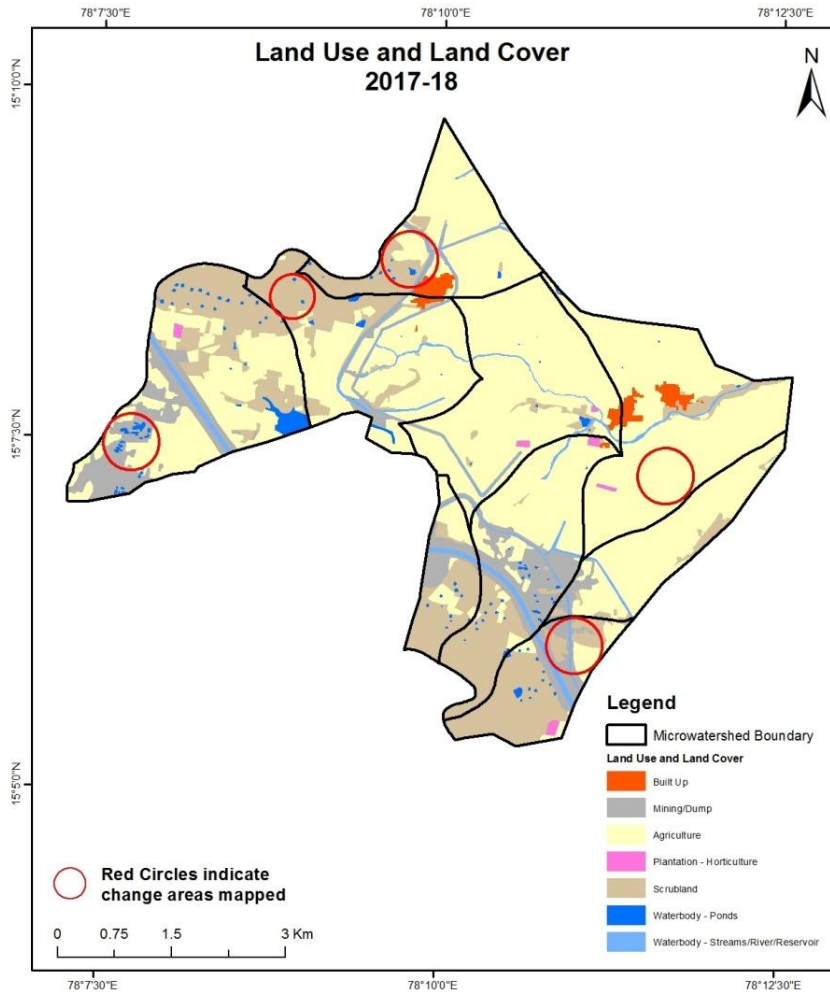
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



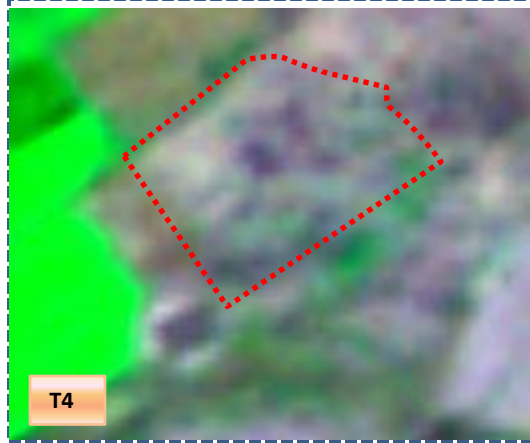
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



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

Strub to Agriculture

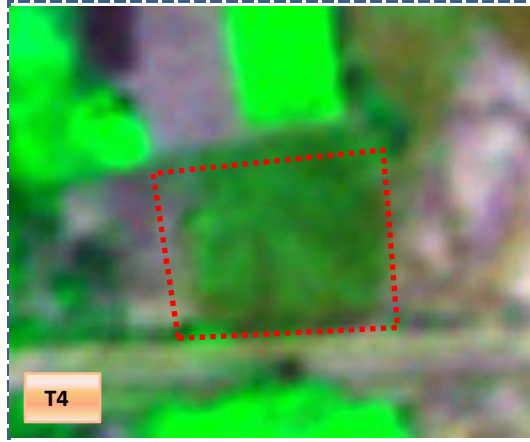


T4: 2017-18 (77°32'5.896"E 14°31'16.46"N )



T5: 25 March 2019

Plantation to Agriculture



T2: 2017-18 (77°33'49.104"E 14°30'42.273"N )



T5: 25 March 2019

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

Agriculture to Built-up



T0

T0: 2010-11



T1

T1: 19 May 2014

Scrub to water body



T0

T0: 2010-11



T1

T1: 19 May 2014

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

Scrub to Water body



T0

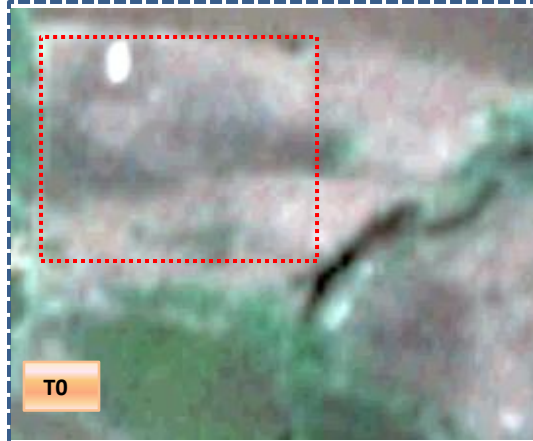
T0: 2010-11



T1

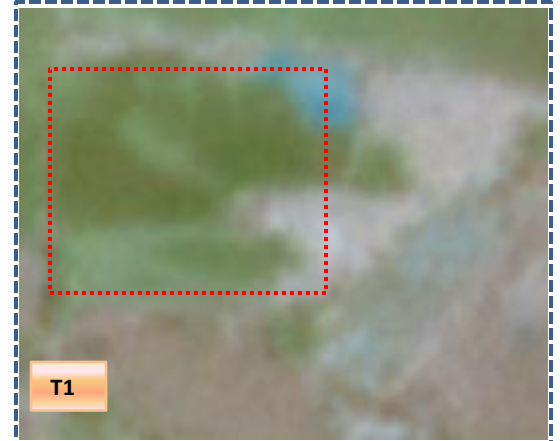
T1: 19 May 2014

Scrub to Agriculture



T0

T0: 2010-11



T1

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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
<b>Built up</b>	34.06												34.06
<b>Mining/dump</b>		169.93										0.63	170.56
<b>Agriculture</b>	0.60	5.49	1832.20	2.52				0.07					1840.88
<b>Plantation Horticulture</b>				2.56									2.56
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>	3.04	3.56	102.01					871.60				1.84	982.05
<b>Waterbody- Streams/River</b>									111.59				111.59
<b>Waterbody – Ponds</b>												12.32	12.32
<b>Grand Total</b>	<b>37.70</b>	<b>178.98</b>	<b>1934.20</b>	<b>5.08</b>				<b>871.68</b>	<b>111.59</b>			<b>14.78</b>	<b>3154.01</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 8.68 ha of the agriculture area has decreased and it is converted into Built-up, mining/ump, plantation and scrubland in T1.
- In T1 102.01 ha of the agriculture area has increased from scrubland 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>	37.70												37.70
<b>Mining/dump</b>		178.98											178.98
<b>Agriculture</b>	0.27	0.38	1932.40	1.01							0.14		1934.20
<b>Plantation Horticulture</b>				5.08									5.08
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>		14.53	7.61					847.03			2.51		871.68
<b>Waterbody- Streams/River</b>									111.59				111.59
<b>Waterbody – Ponds</b>											14.78		14.78
<b>Grand Total</b>	<b>37.97</b>	<b>193.88</b>	<b>1940.01</b>	<b>6.09</b>				<b>847.03</b>	<b>111.59</b>		<b>17.44</b>		<b>3154.01</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 1.80 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T2.
- In T2 7.61 ha of the agriculture area has increased from 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	37.969												37.969
Mining/dump		185.197	0.465									8.220	193.882
Agriculture	0.167	6.794	1931.357	1.359								0.333	1940.010
Plantation Horticulture			1.015	5.079									6.094
Forest													
Forest Plantation													
Barren Rocky													
Scrub		89.919	48.524					701.239				7.350	847.032
Waterbody- Streams/River			1.620						109.971				111.592
Waterbody – Ponds												17.436	17.436
<b>Grand Total</b>	<b>38.136</b>	<b>281.910</b>	<b>1982.981</b>	<b>6.438</b>				<b>701.239</b>	<b>109.971</b>			<b>33.339</b>	<b>3154.015</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 8.65 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T3.
- In T3 51.62 ha of the agriculture area has increased from mining/dump, plantations, 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>	38.14										38.14	
<b>Mining/dump</b>		281.10								0.81	281.91	
<b>Agriculture</b>	1.76	0.64	1975.30	3.57						1.71	1982.98	
<b>Plantation Horticulture</b>				6.44							6.44	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>		2.83	31.83					663.05	1.43	2.10	701.24	
<b>Waterbody- Streams/River</b>									109.97		109.97	
<b>Waterbody – Ponds</b>										33.34	33.34	
<b>Grand Total</b>	<b>39.89</b>	<b>284.57</b>	<b>2007.13</b>	<b>10.00</b>				<b>663.05</b>	<b>111.40</b>	<b>37.96</b>	<b>3154.01</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 7.68 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T4.
- In T4 31.83 ha of the agriculture area has increased from 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		
<b>Built up</b>	39.89												39.89
<b>Mining/dump</b>		283.81										0.76	284.57
<b>Agriculture</b>	2.14		2003.84	0.99								0.15	2007.13
<b>Plantation Horticulture</b>				10.00									10.00
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>		28.57	2.50					631.76				0.22	663.05
<b>Waterbody- Streams/River</b>									111.40				111.40
<b>Waterbody – Ponds</b>		4.15										33.81	37.96
<b>Grand Total</b>	<b>42.04</b>	<b>316.53</b>	<b>2006.35</b>	<b>11.00</b>				<b>631.76</b>	<b>111.40</b>			<b>34.95</b>	<b>3154.01</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 3.29 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T5.
- In T5 2.50 ha of the agriculture area has increased from scrubland 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 22.45 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 93.33, 5.81, 42.97 & 24.15 Hectares From T0 to T1, T1 to T2 , T2-T3 & T3 to T4 and there is an decrease of 0.78 Hectares From T4-T5. The overall increase of 165.47 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is a decrease of 350.29 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
6. Farm ponds (35) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (47) verified from the portal.