

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

KURNOOL -15/2011-12  
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

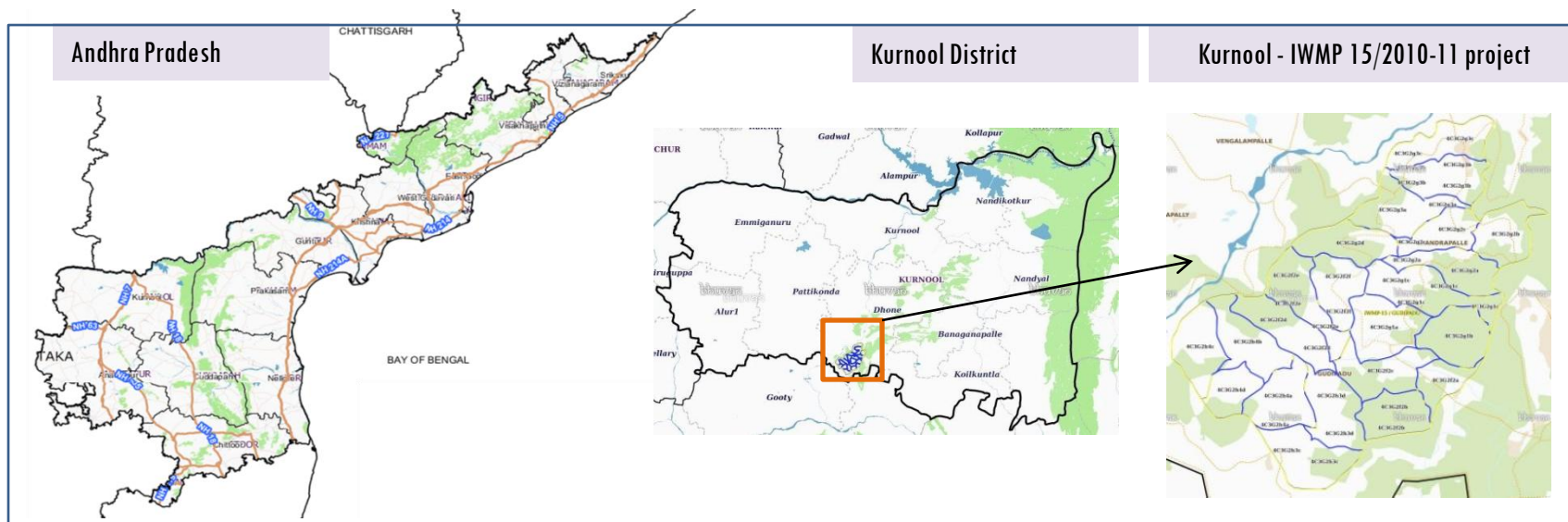
## **E X E C U T I V E   S U M M A R Y**

- 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-15/2010-11, Kurnool District of Andhra Pradesh. The total geographical area of the project is 10,359 ha. It comprises of 22 micro watersheds.
- In the project area 152 Drishti photos were uploaded showing 69 checks & plugins, 3 Field bunds and remaining showing others.
- Major percentage i.e. 40.9% is covered by the agriculture, 38.7 % is covered by forest, 15.9 % is covered by Scrub land and remaining by other land use classes.

# PROJECT : KURNOOL - IWMP-15/2010-11

## DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Peapally Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 10,359 ha. It comprises of 22 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (**Batch -II**) 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).

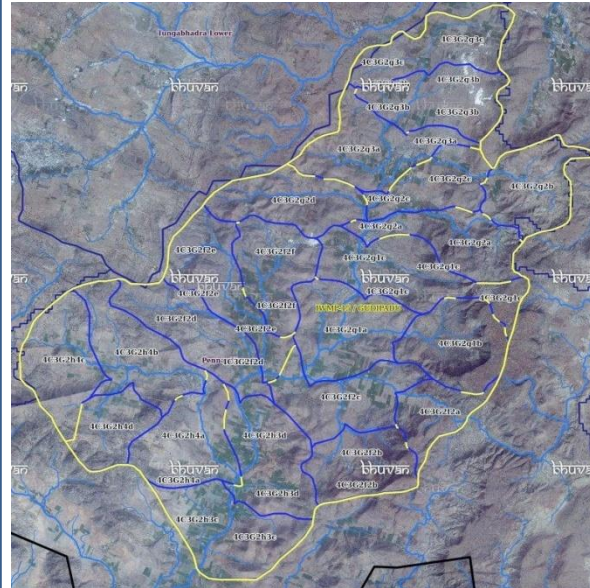
## Satellite Data and Ancillary Data

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)		
		DRAINAGE	YES
		SETTLEMENT	YES
		ROADS/RAILS	No
	LULC (1: 50 000)		
		2005-06	
		2008-09	
2	Activity Plan Maps		
3	Drishti Photographs		
		Total	152
4	Detailed Project Report		

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



### Legend



Drainage (1:10000 Scale)

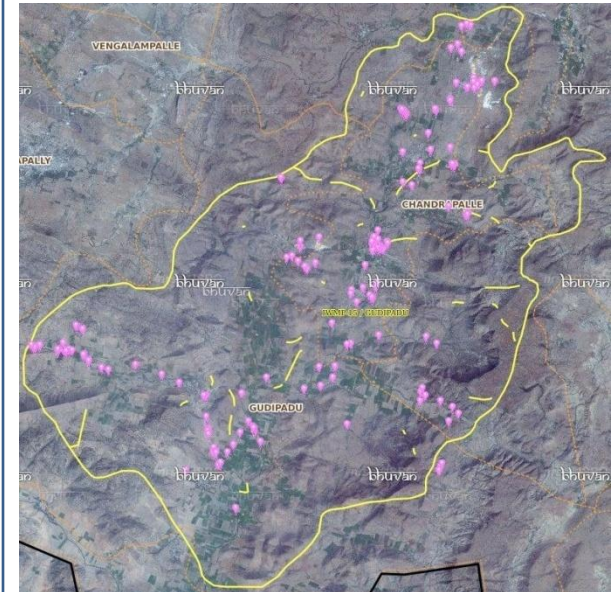


MWS Boundary



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	0	0
2	Checks & plugins	81	69
3	Agriculture	0	0
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	0	0
8	Check dams (Civil work)	0	0
9	Field bunds	3	3
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	113	80
	<b>TOTAL</b>	<b>194</b>	<b>152</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.



# Kurnool-IWMP-15/2010-11

2009-10



June-2014



Feb-2015



Jan-2017



Jan-2019



Activity : Percolation tank



## Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-15/2010-11



T0

T0:2010-11



T1

T1: 30 December 2015



Drishti Sl no. 7031315

MWS : 4C3G2g2a

Check dam



T0

T0:2010-11



T1

T1: 30 December 2015



Drishti Sl no. 7033042

MWS : 4C3G2f2f

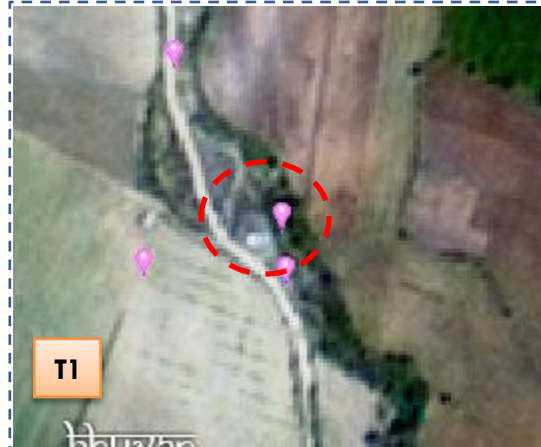
Check dam



## Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-15/2010-11



T0: 2010-11



T1: 05 February 2014



Drishti Sl no. 152568 MWS : 4C3G2g1a

Civil work



T0: 2010-11



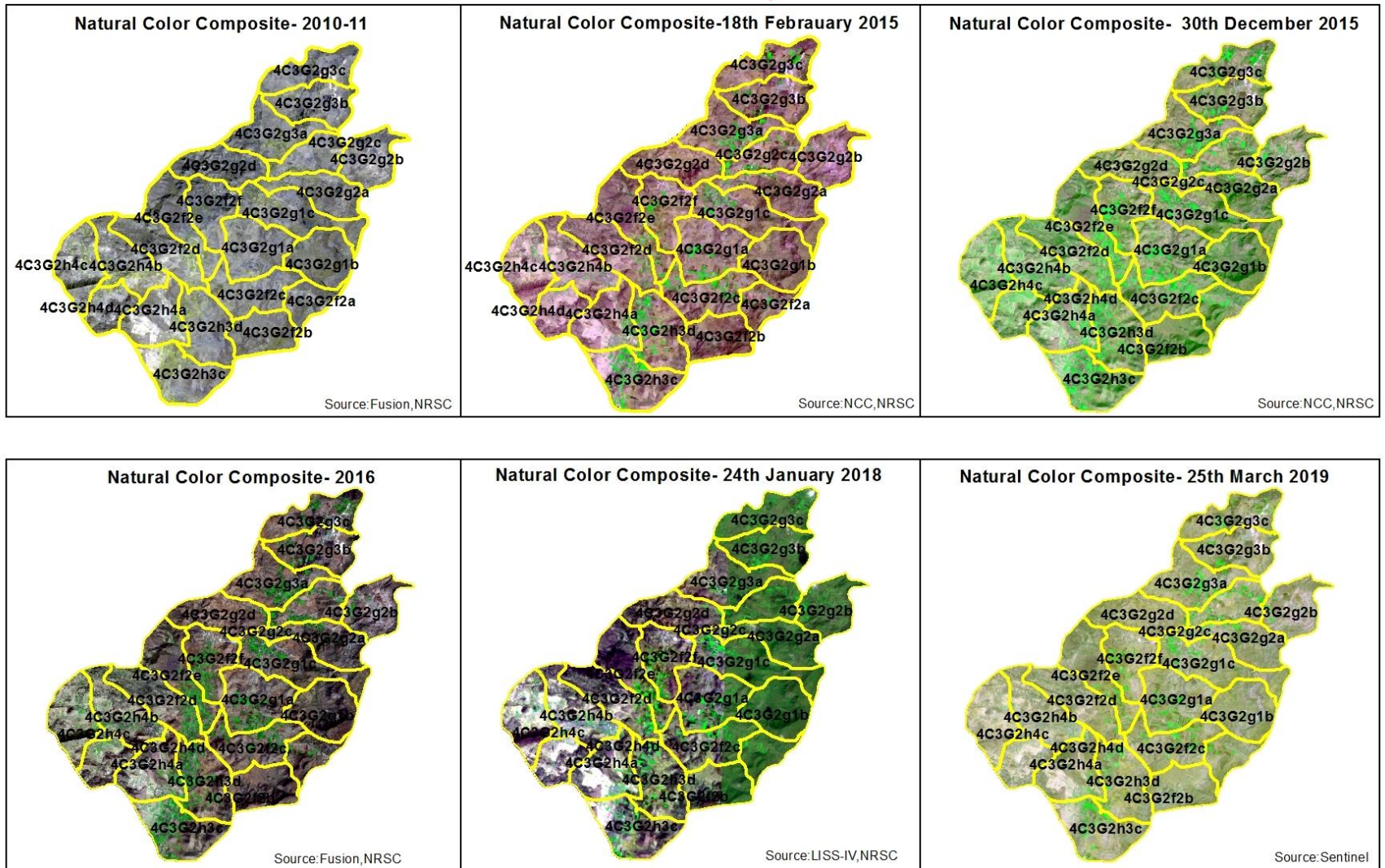
T1: 05 February 2014



Drishti Sl no. 149159 MWS : 4C3G2g1a

Rockfill dam

# Natural Color Composite



## MONITORING IN THE PROJECT AREA

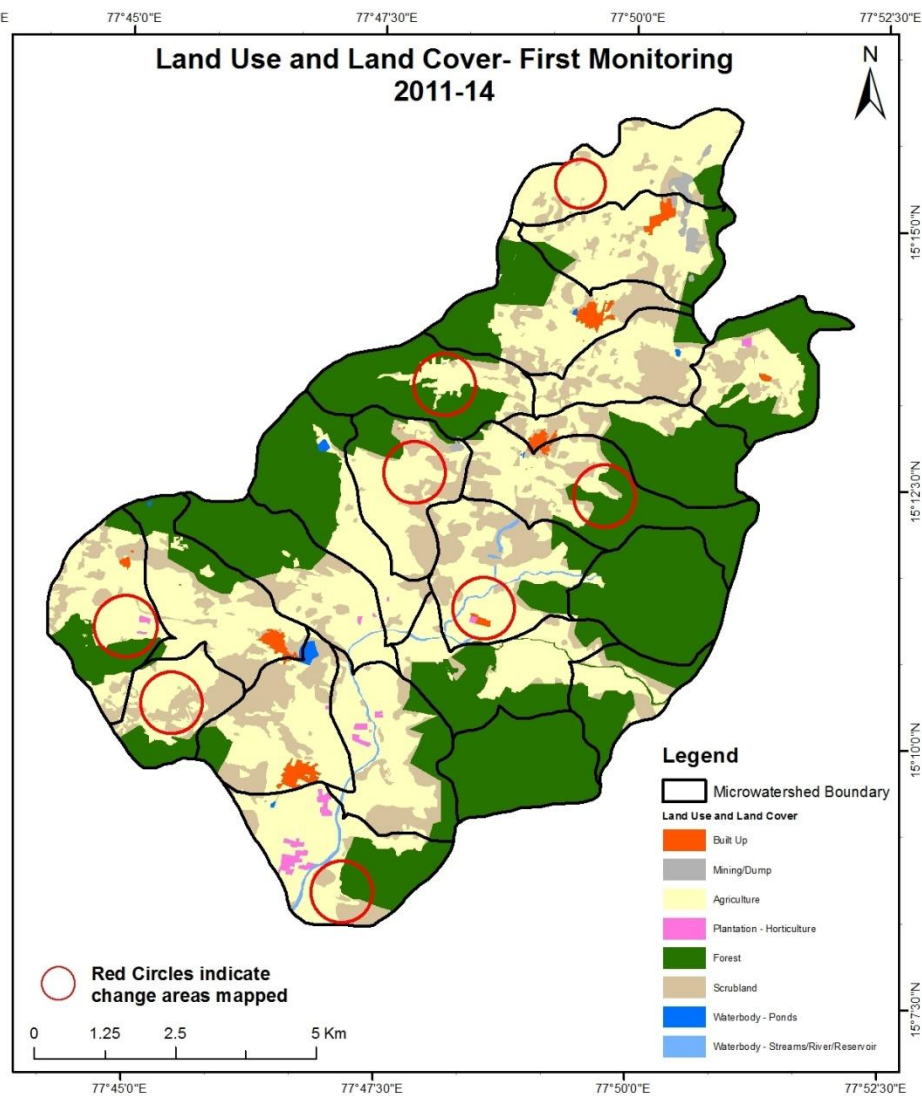
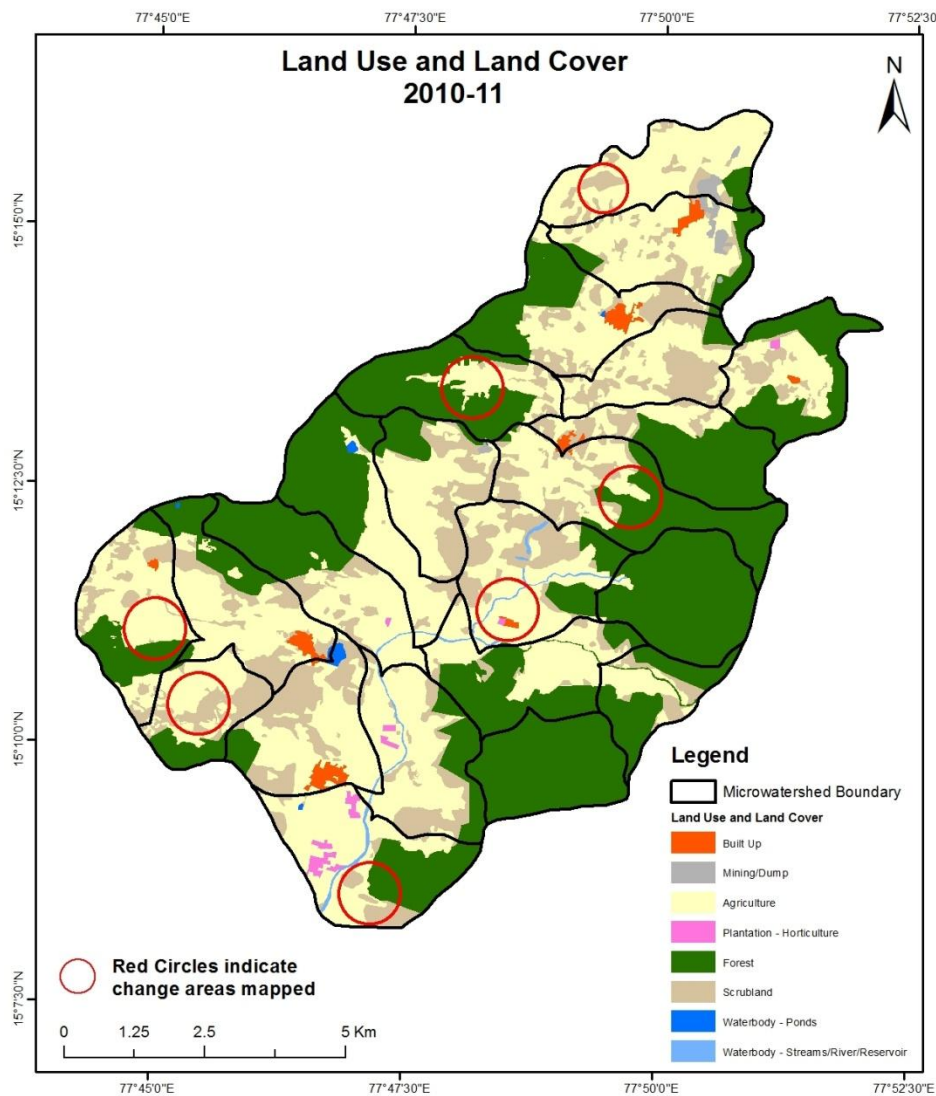
### Land use and Land cover Changes in the Project

- 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)



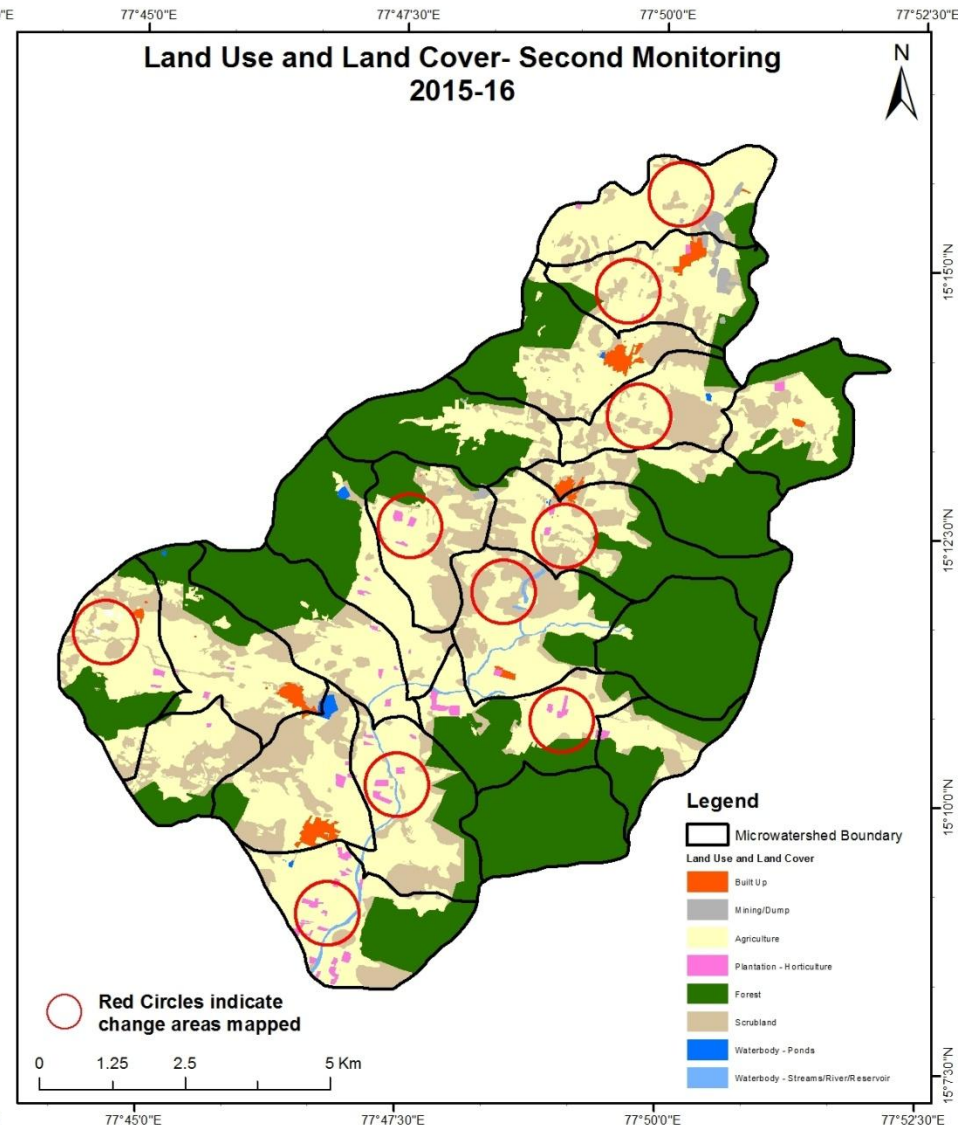
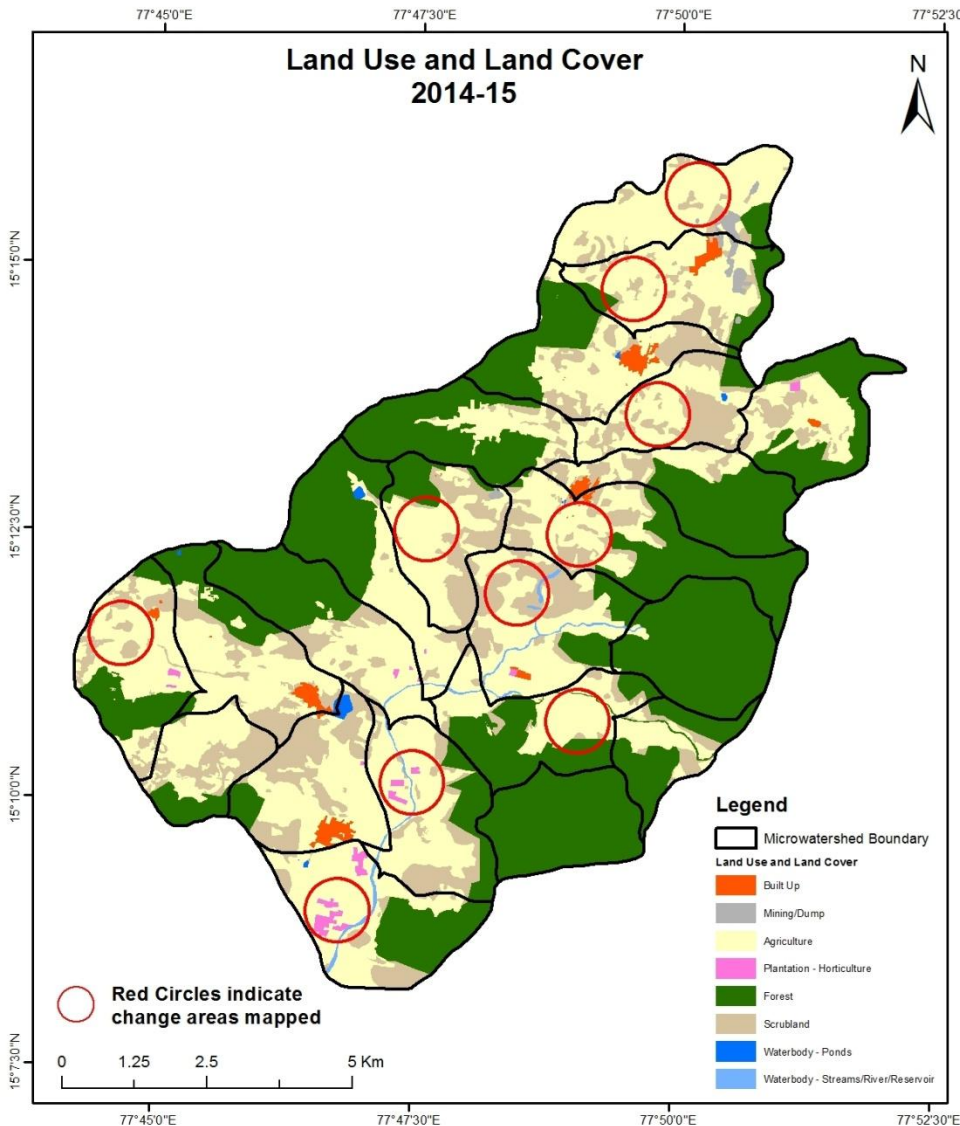
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



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

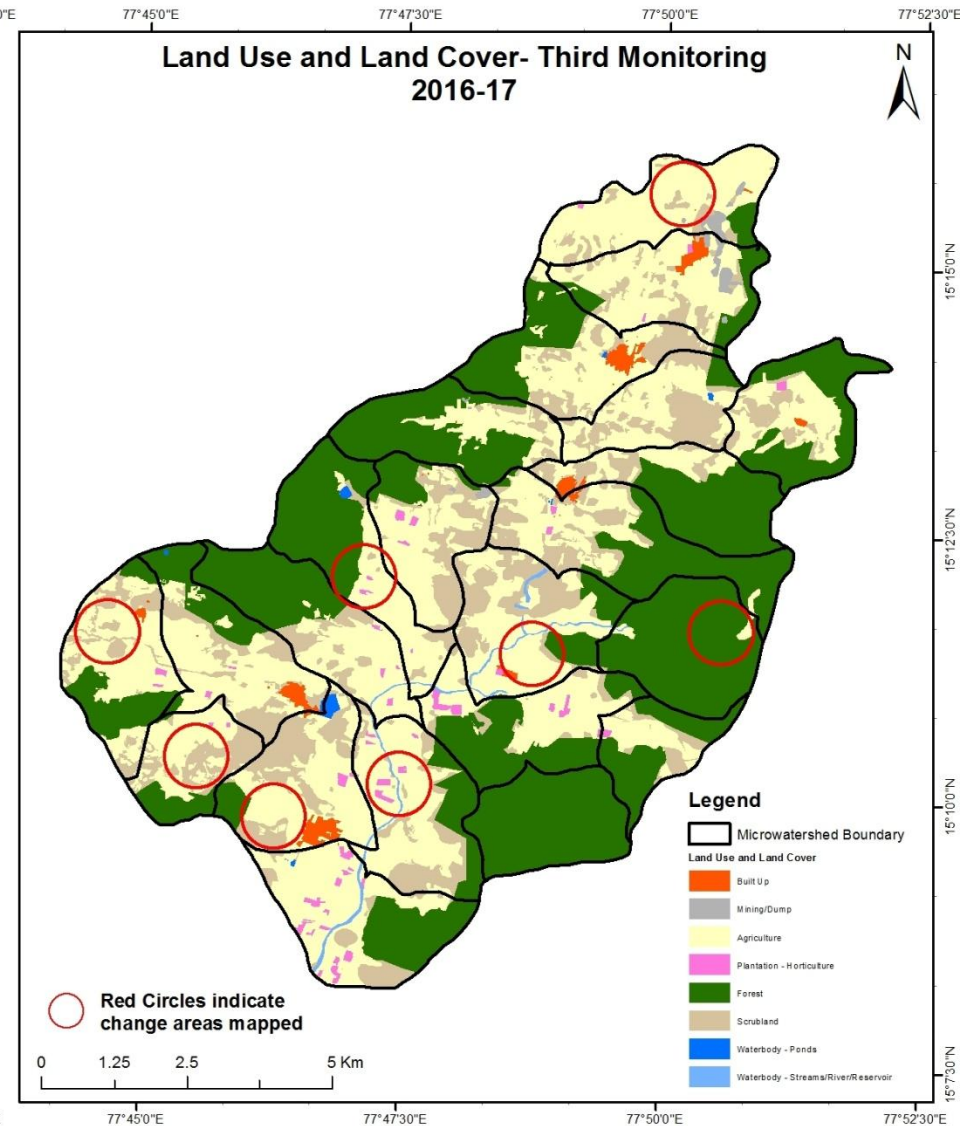
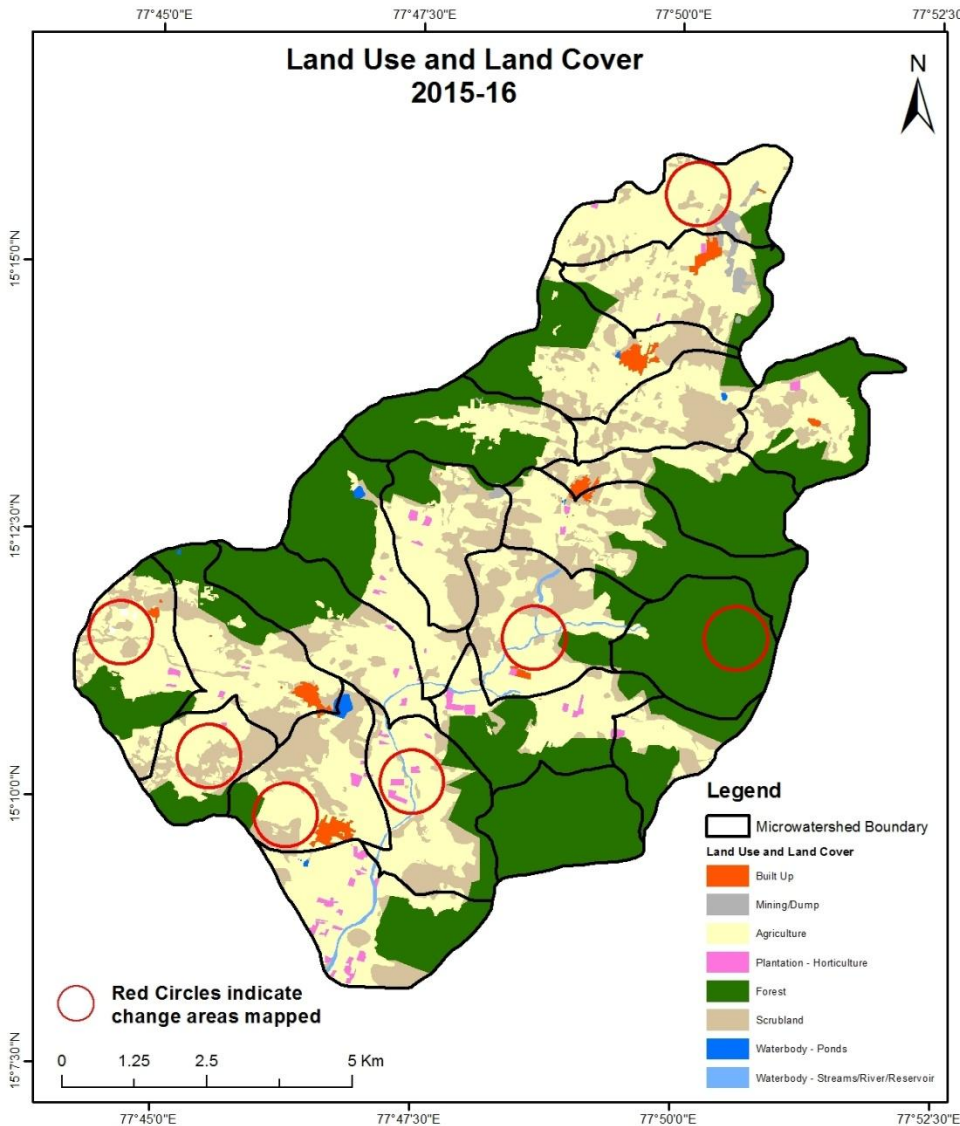
Scale: 1:10000





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

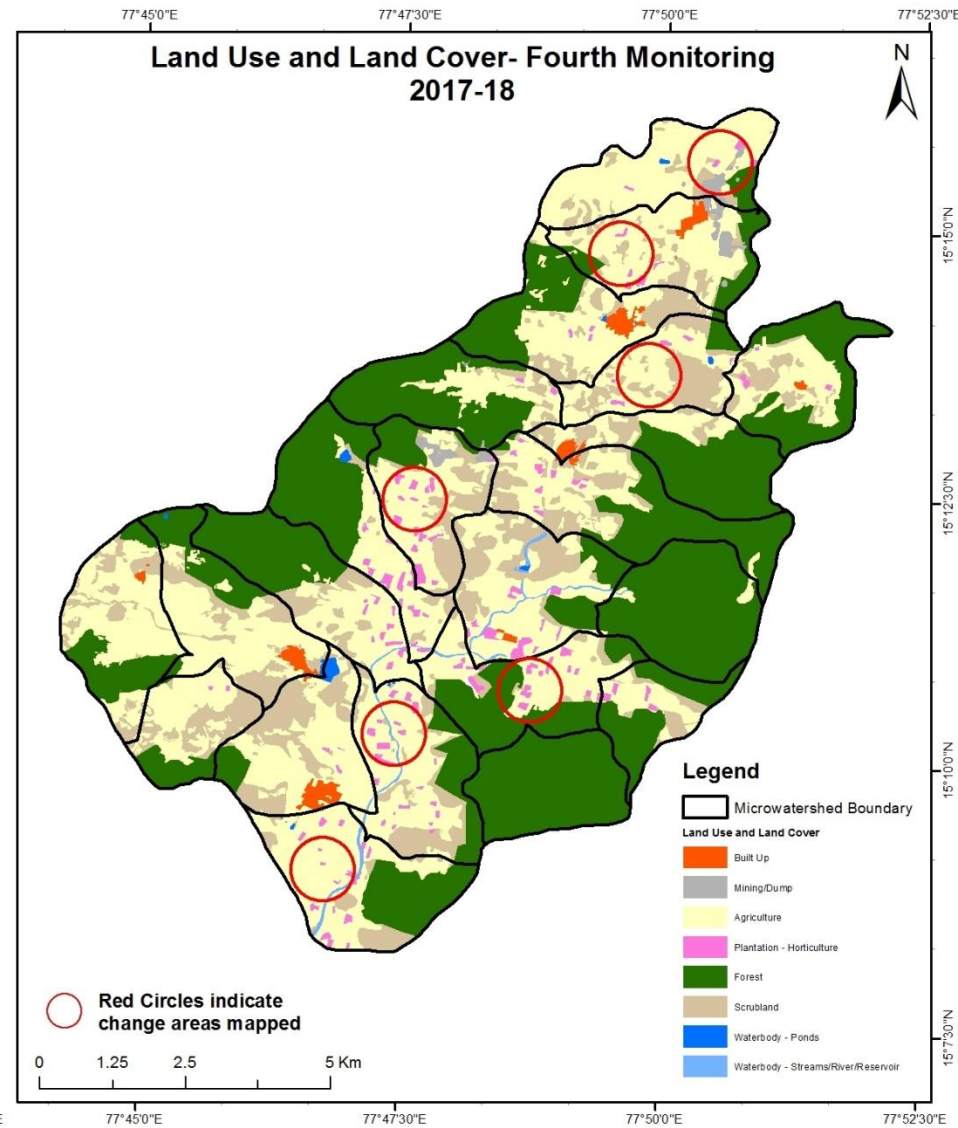
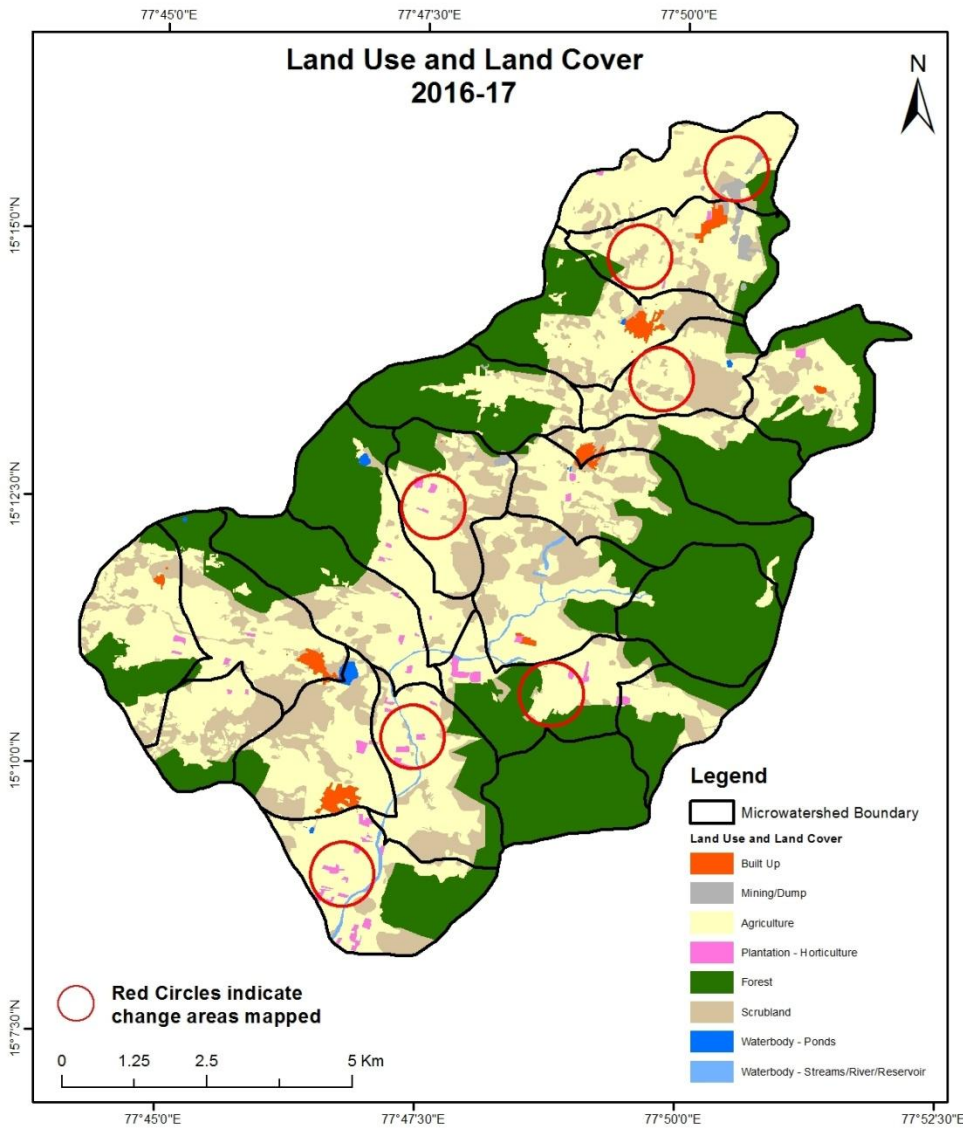
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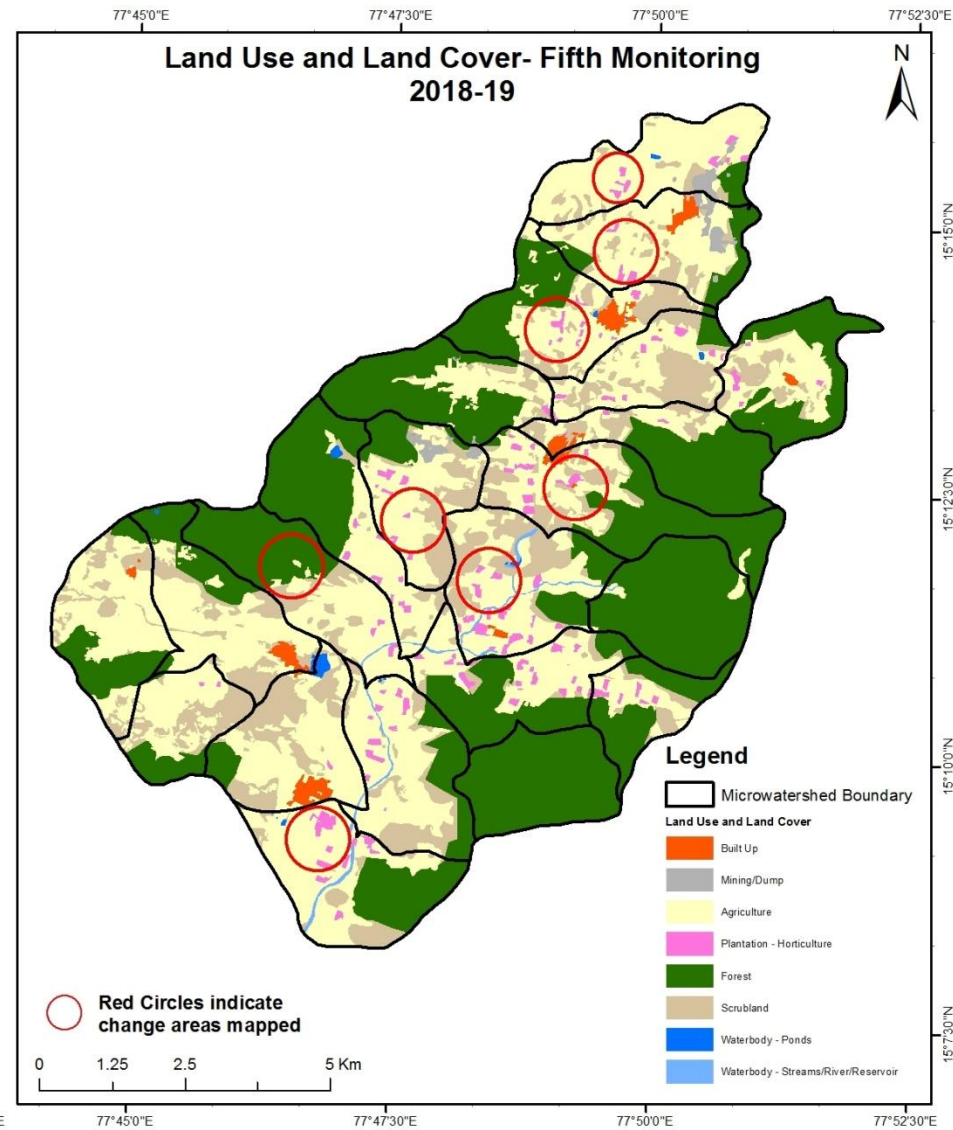
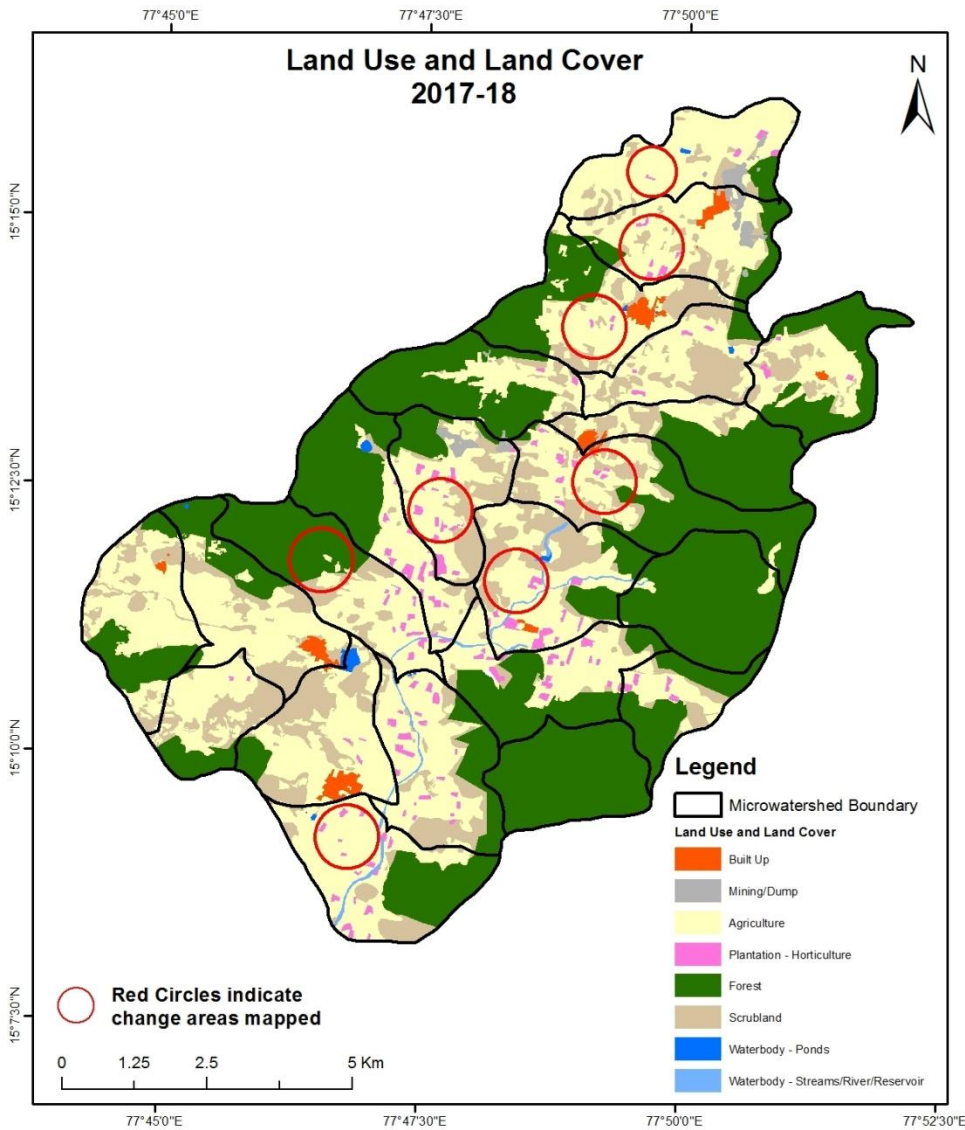
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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



T3: 2016-17(77°47'30.809"E15°12'24.052"N)

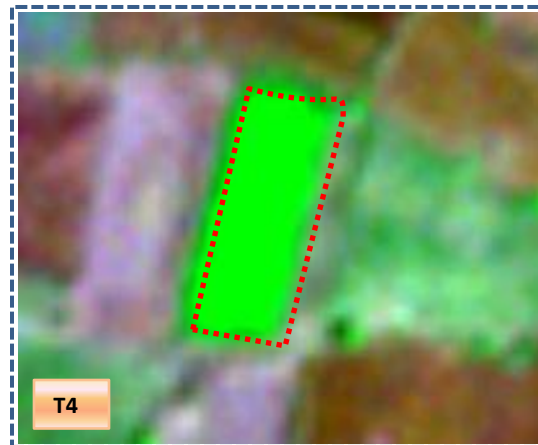


T4: 22 Nov 2017

### Agriculture to Plantation



T3: 2016-17 (77°47'2.118"E 15°8'17.074"N )



T4: 22 Nov 2017



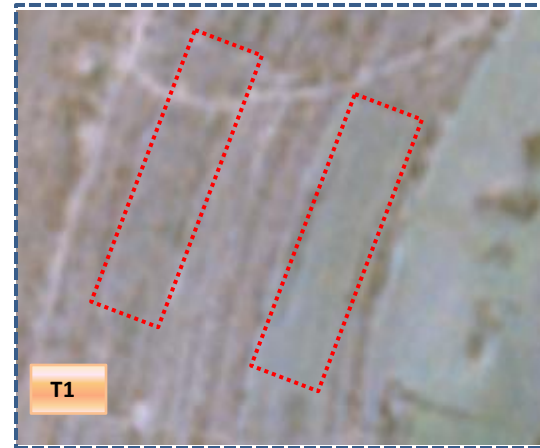
## Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

T0: 2010-11



T1

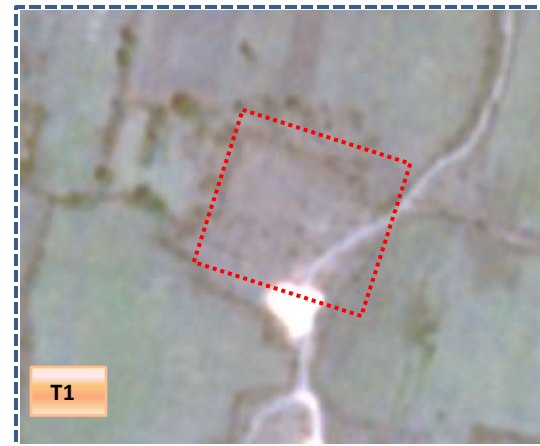
T1: 05 February 2014

Scrub to Agriculture



T0

T0: 2010-11

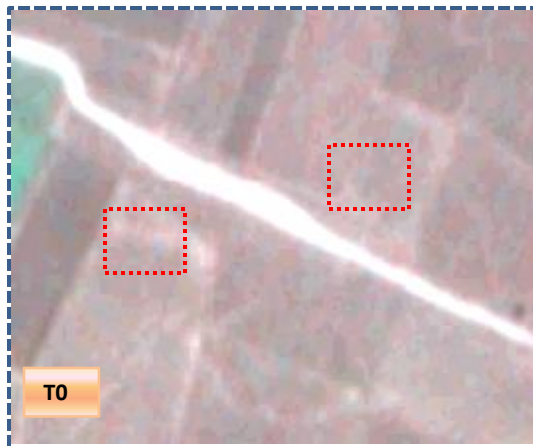


T1

T1: 05 February 2014

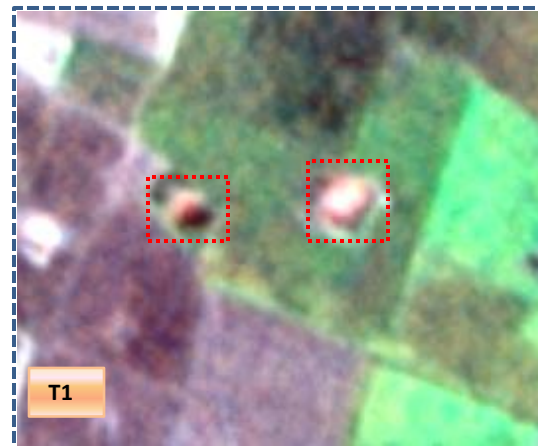
## Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Water body



T0

T0: 2010-11



T1

T1: 05 February 2014

Increased water spread area



T0

T0: 2010-11



T1

T1: 05 February 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T0	Built up		Agriculture								
Built up	91.65		0.18								91.82
Mining/dump		39.51	2.89								42.40
Agriculture	3.25	0.74	4237.56	5.78				17.33		1.70	4266.36
Plantation Horticulture	0.04			36.23							36.26
Forest			5.64		4075.30						4080.95
Forest Plantation											
Barren Rocky											
Scrub	3.47	0.77	41.62					1733.75			1779.62
Waterbody- Streams/River									46.33		46.33
Waterbody – Ponds										15.87	15.87
Grand Total	98.41	41.02	4287.89	42.01	4075.30			1751.08	46.33	17.57	10359.61

- 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 28 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrubland and water body in T1.
- In T1 44 ha of the agriculture area has increased from built-up, mining/dump, forest and scrubland of T0 and overall 21 ha of the agriculture area has been increased.
- 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T1	Built up		Agriculture								
Built up	98.41										98.41
Mining/dump		41.02									41.02
Agriculture	1.59	2.44	4155.47	55.08	0.07			73.04		0.20	4287.89
Plantation Horticulture			12.99	29.02							42.01
Forest		1.04	18.59		4055.68						4075.30
Forest Plantation											
Barren Rocky											
Scrub		0.93	43.86	0.46				1705.82			1751.08
Waterbody- Streams/River									46.33		46.33
Waterbody – Ponds										17.57	17.57
Grand Total	99.99	45.44	4230.90	84.56	4055.75			1778.86	46.33	17.77	10359.61

- 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 132 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrubland and water body in T2.
- In T2 75 ha of the agriculture area has increased from plantation, forest and scrubland of T1 and overall 56 ha of the agriculture area has decreased.
- 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	99.99										99.99
Mining/dump		45.44									45.44
Agriculture	1.30		4229.07	0.53							4230.90
Plantation Horticulture			5.58	78.98							84.56
Forest			23.50		4032.25						4055.75
Forest Plantation											
Barren Rocky											
Scrub	0.84	0.28	22.84		0.27			1754.63			1778.86
Waterbody- Streams/River									46.33		46.33
Waterbody – Ponds										17.77	17.77
Grand Total	102.14	45.72	4281.00	79.52	4032.51			1754.63	46.33	17.77	10359.61

- 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 1.8 ha of the agriculture area has decreased and it is converted into Built-up and plantation area in T3.
- In T3 51 ha of the agriculture area has increased from plantation, forest and scrubland of T2 and overall 50 ha of the agriculture area has increased.
- 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T3	Built up		Agriculture								
Built up	99.28		2.86								102.14
Mining/dump		45.03	0.69								45.72
Agriculture	0.38	3.77	4121.27	152.53						3.04	4281.00
Plantation Horticulture			57.08	21.97				0.46			79.52
Forest		1.57	3.48	3.30	4022.87	1.30					4032.51
Forest Plantation											
Barren Rocky											
Scrub	0.18	14.76	59.71	0.14				1679.21		0.62	1754.63
Waterbody- Streams/River									46.33		46.33
Waterbody – Ponds			0.80							16.97	17.77
Grand Total	99.84	65.13	4245.90	177.95	4022.87	1.30		1679.67	46.33	20.63	10359.61

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
- In T3 159 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T4.
- In T4 124 ha of the agriculture area has increased from built-up, mining/dump, plantation, forest and scrubland of T3 and overall 35 ha of the agriculture area has decreased. 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
		Mining/ dump		Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T4	Built up		Agriculture								
Built up	99.84										99.84
Mining/dump		64.94								0.19	65.13
Agriculture	4.57	1.29	4128.47	102.73				8.83			4245.90
Plantation Horticulture			81.88	96.07							177.95
Forest	0.07	0.11	9.70		4012.99						4022.87
Forest Plantation						1.30					1.30
Barren Rocky											
Scrub	5.04	0.28	26.37					1647.99			1679.67
Waterbody- Streams/River									46.33		46.33
Waterbody – Ponds										20.63	20.63
Grand Total	109.51	66.61	4246.42	198.80	4012.99	1.30		1656.83	46.33	20.82	10359.61

- 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 117 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrubland and water body in T5.
- In T5 117.9 ha of the agriculture area has increased from plantation, forest and scrubland of T4 and overall 0.52 ha of the agriculture area has increased. 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 4 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 21 & 0.52 Hectares From T0 to T1 & T4-T5 respectively and there is an decrease of 56, 05, 35 Ha from T1-T2, T2 – T3 & T3-T4 and overall decrease of 19 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is an increase of 162 ha of the Plantation/Horticulture area has been increased between 2010-11 (t0) & 2018-19 (T5) years.
6. There is a decrease of 122 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.