

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

ANANTAPURAMU -70/2011-12  
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad  
January-2022

**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**

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- 02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
- 03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
- 04. CONCLUSIONS

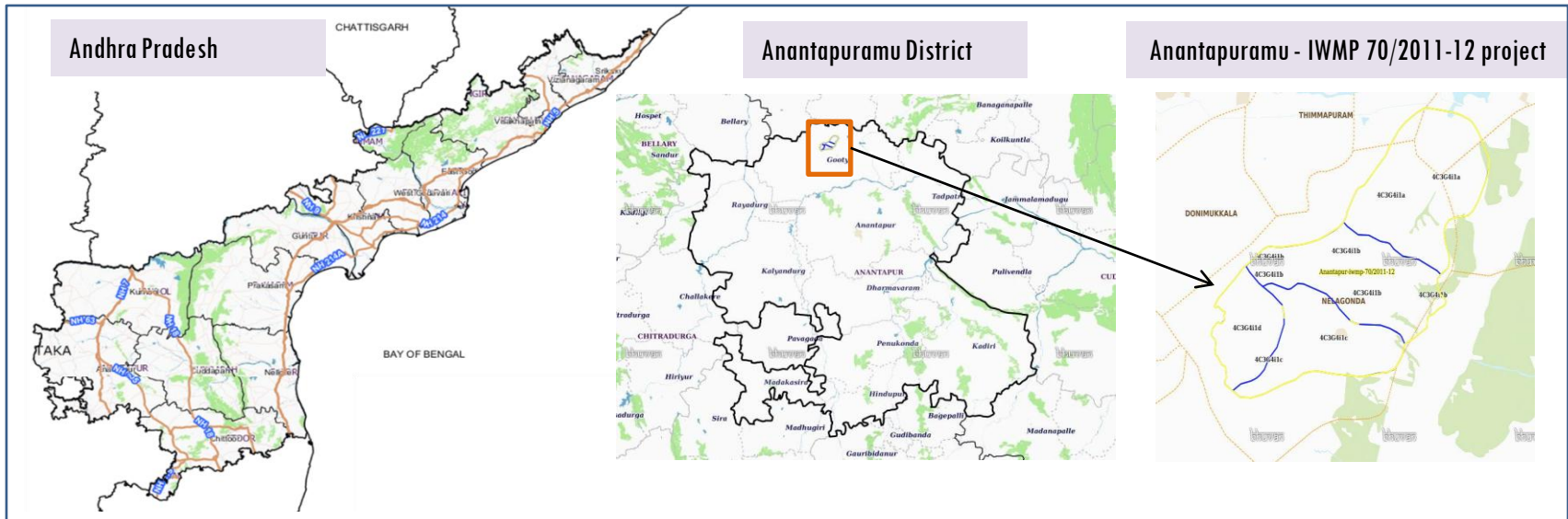
## EXECUTIVE SUMMARY

- 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-70/2011-12, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **4,071** ha. It comprises of 4 micro watersheds.
- In the project area 216 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 17 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 60.8 % is covered by the agriculture, 15 scrubland, 15 % is covered by forest, 3 % is covered by plantation and remaining by other land use classes.

# PROJECT : ANANTAPURAMU - IWMP-70/2011-12

## DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Guntakal Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **4,071** ha. It comprises of 4 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2011-12 (T0) period (*Batch -1*) projects taking 2019-20 (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.

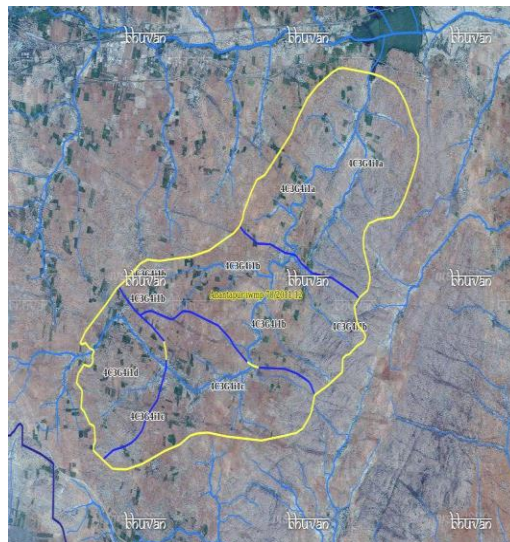
## Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2013-14	2019-20
LISS IV	2011-12		
SCENE 1			13-Dec-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			13-Dec-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	216
4	Detailed Project Report		

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



### Legend



Drainage (1:10000 Scale)

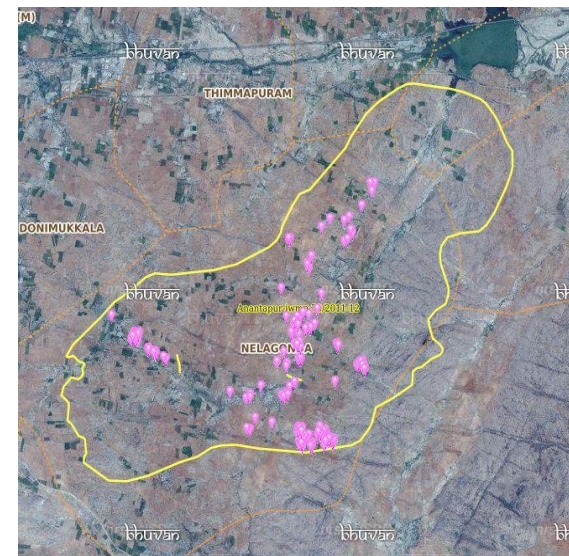


MWS Boundary



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	Horticulture	0	0
3	Agriculture	1	1
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	10	10
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	22	22
11	Civil work-Check dams/Rock fill dam	2	2
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-Plantation/Horticulture	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	186	181
	<b>TOTAL</b>	<b>221</b>	<b>216</b>

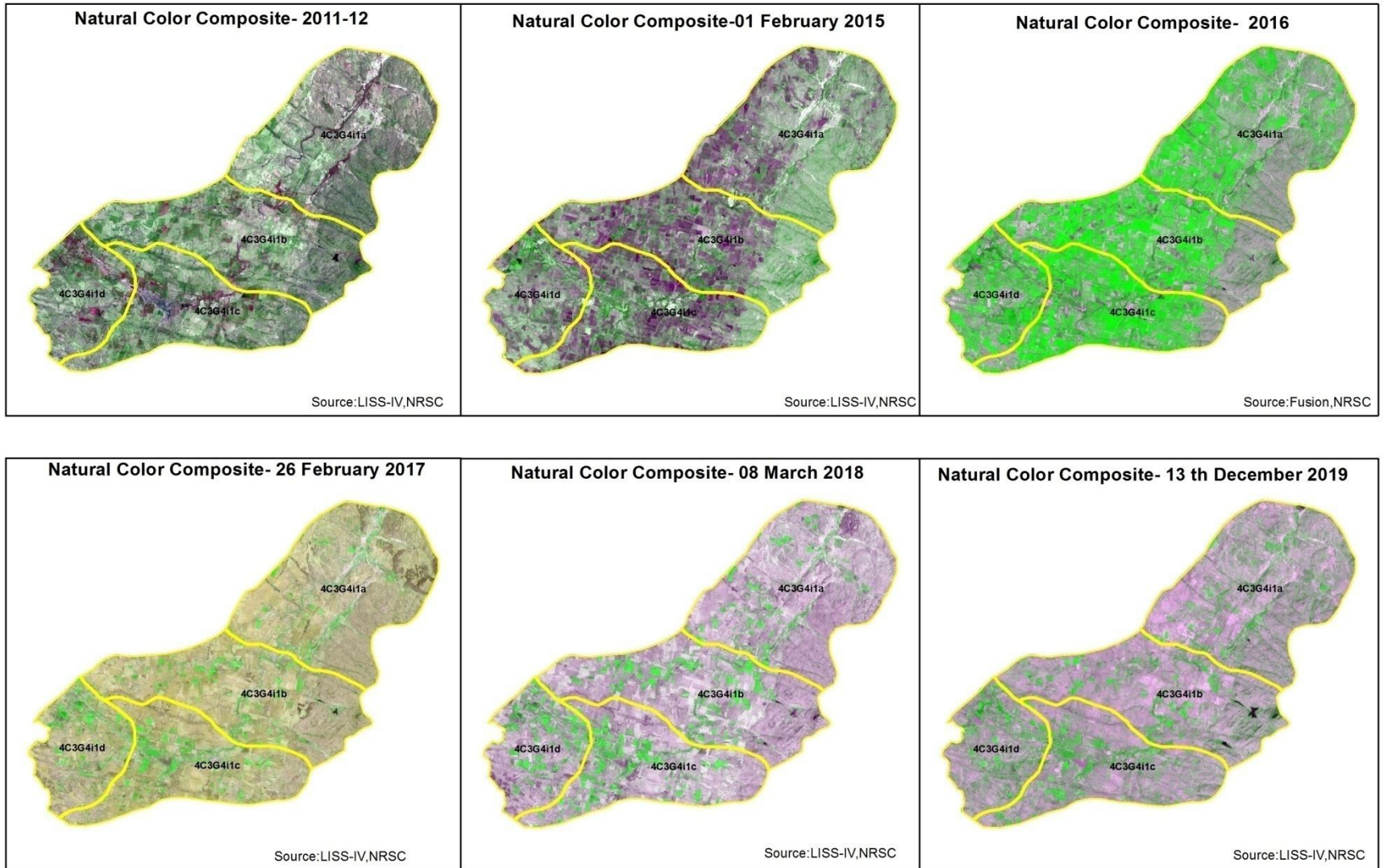
## MONITORING IN THE PROJECT AREA

### 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 (2011-12) and T5 is 2019-20 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.



# Natural Colour Composite (NCC)





## Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-70/2011-12



T0: 2011-12



T1: 08 February 2017



Drishti SI no. 137687 MWS : 4C3G4i1b

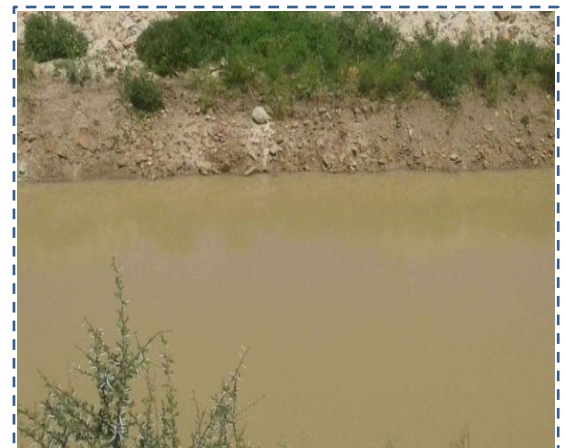
**Dug out Pit**



T0: 2011-12



T1: 08 February 2017



Drishti SI no. 140419 MWS : 4C3G4i1a

**Dug out Sunken pond**

## Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-70/2011-12



T0

T0: 2011-12



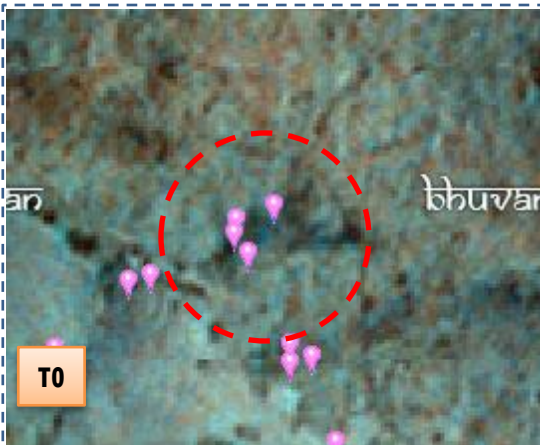
T1

T1: 08 February 2017



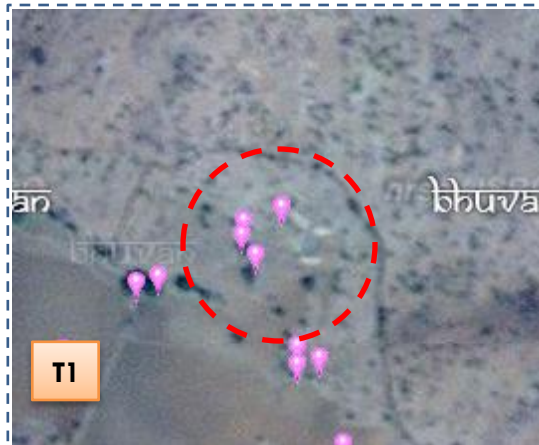
Drishti SI no. 137734 MWS : 4C3G4i1c

Farm pond



T0

T0: 2011-12



T1

T1: 08 February 2017



Drishti SI no. 7032843 MWS : 4C3G4i1b

Farm pond

## MONITORING IN THE PROJECT AREA

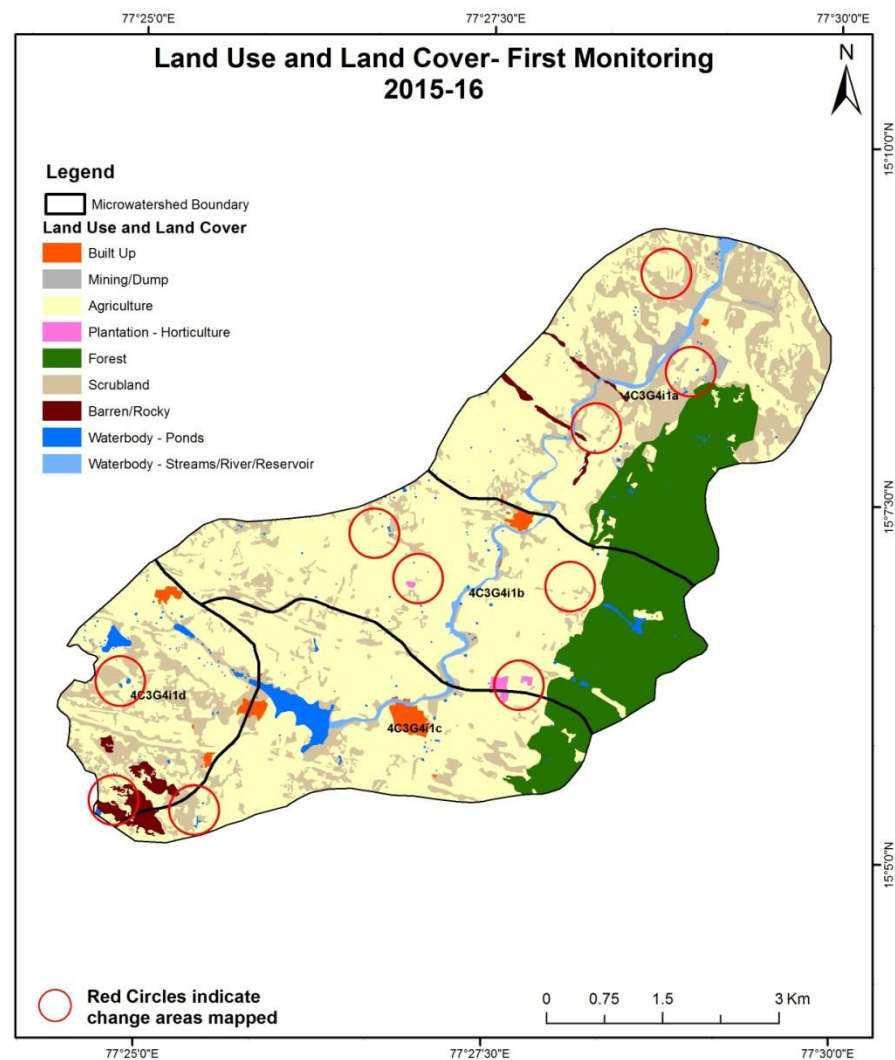
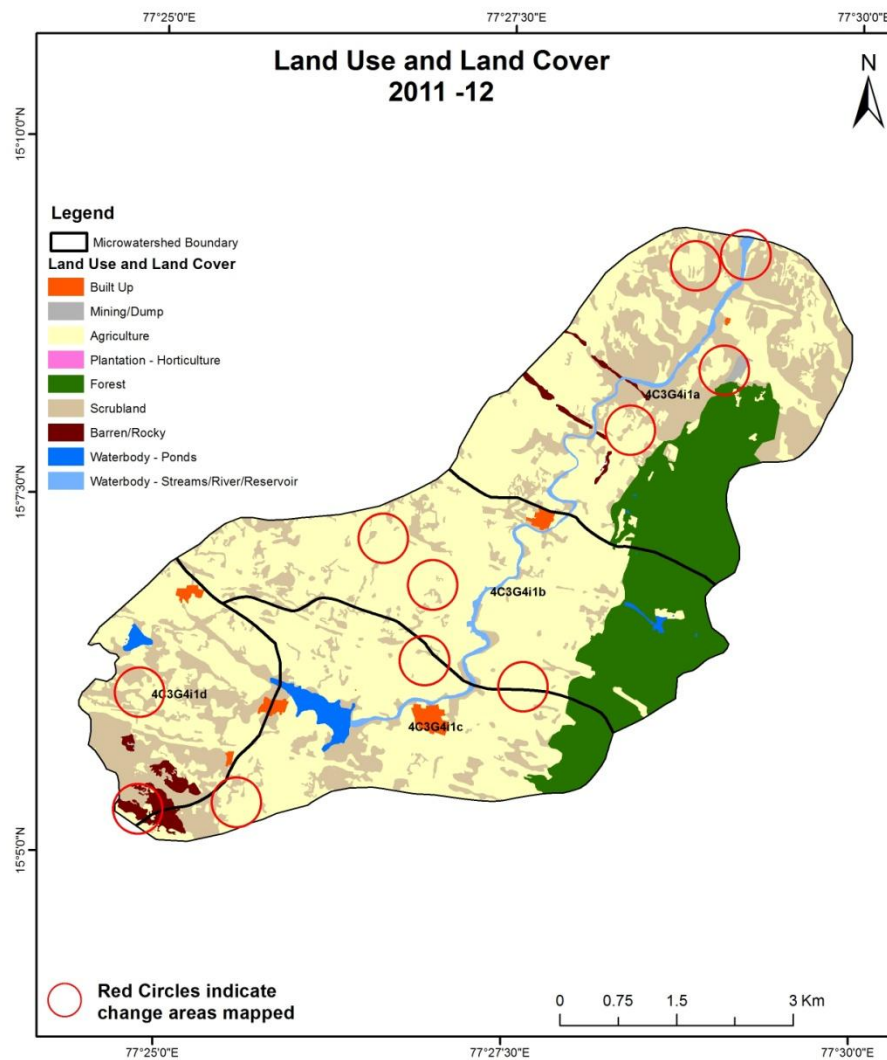
### Land use and Land cover Changes in the Project

- 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 (2011-12) and row represents the T5 (2019-20)



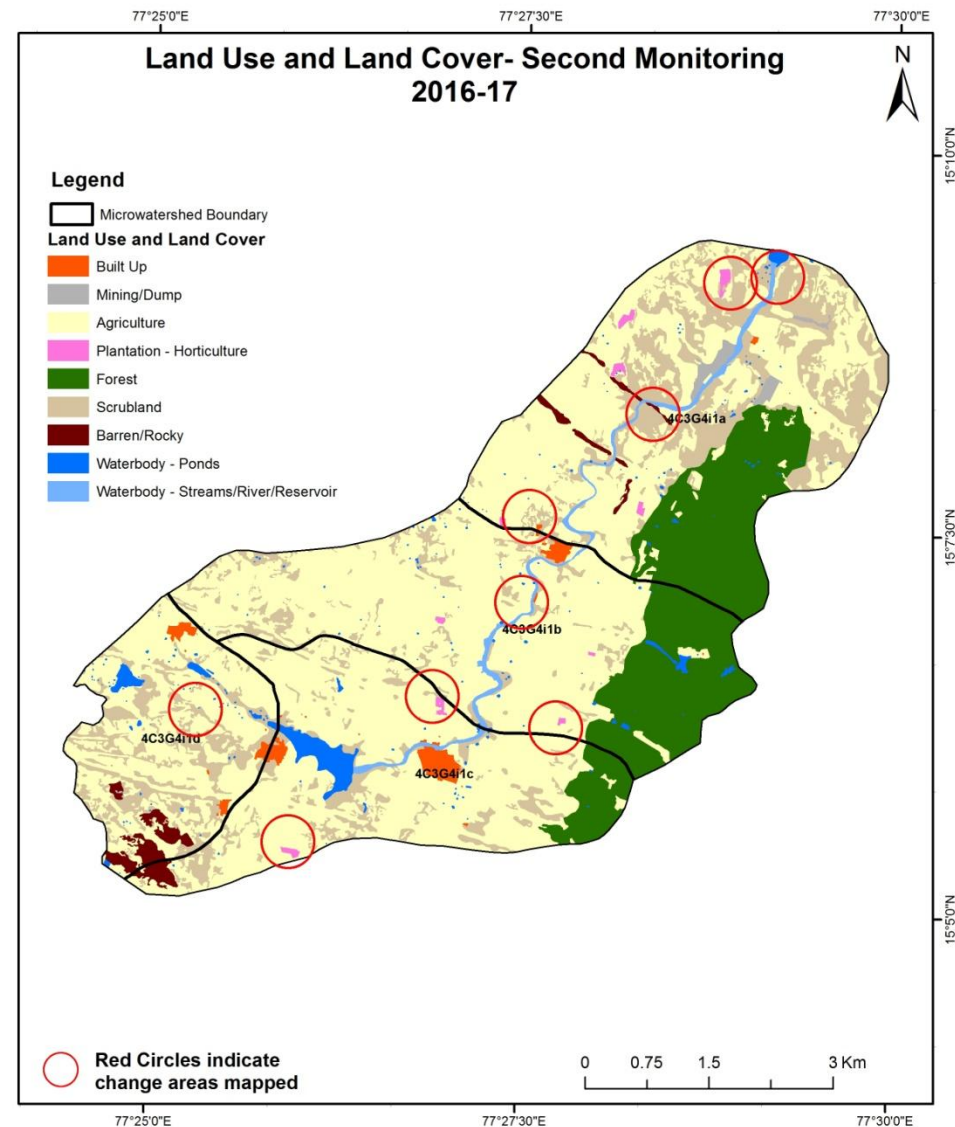
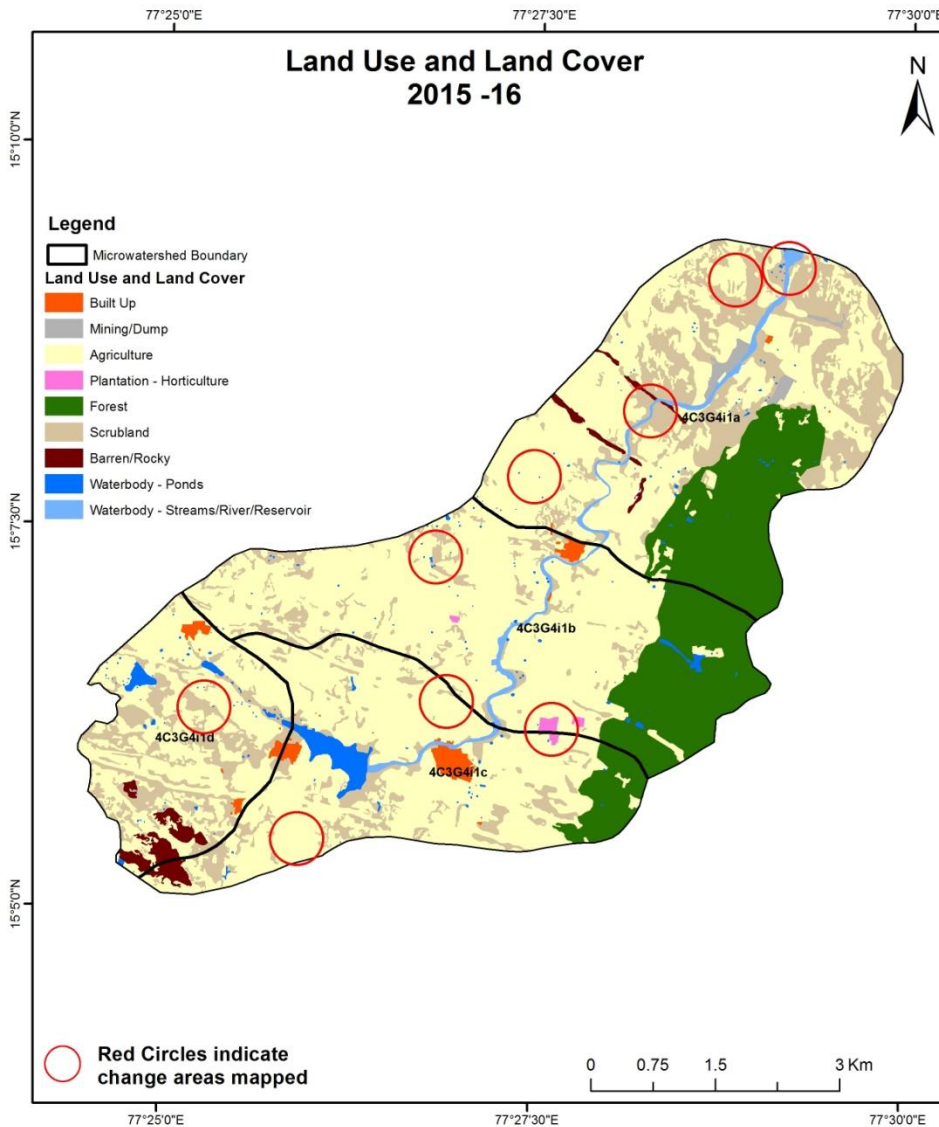
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



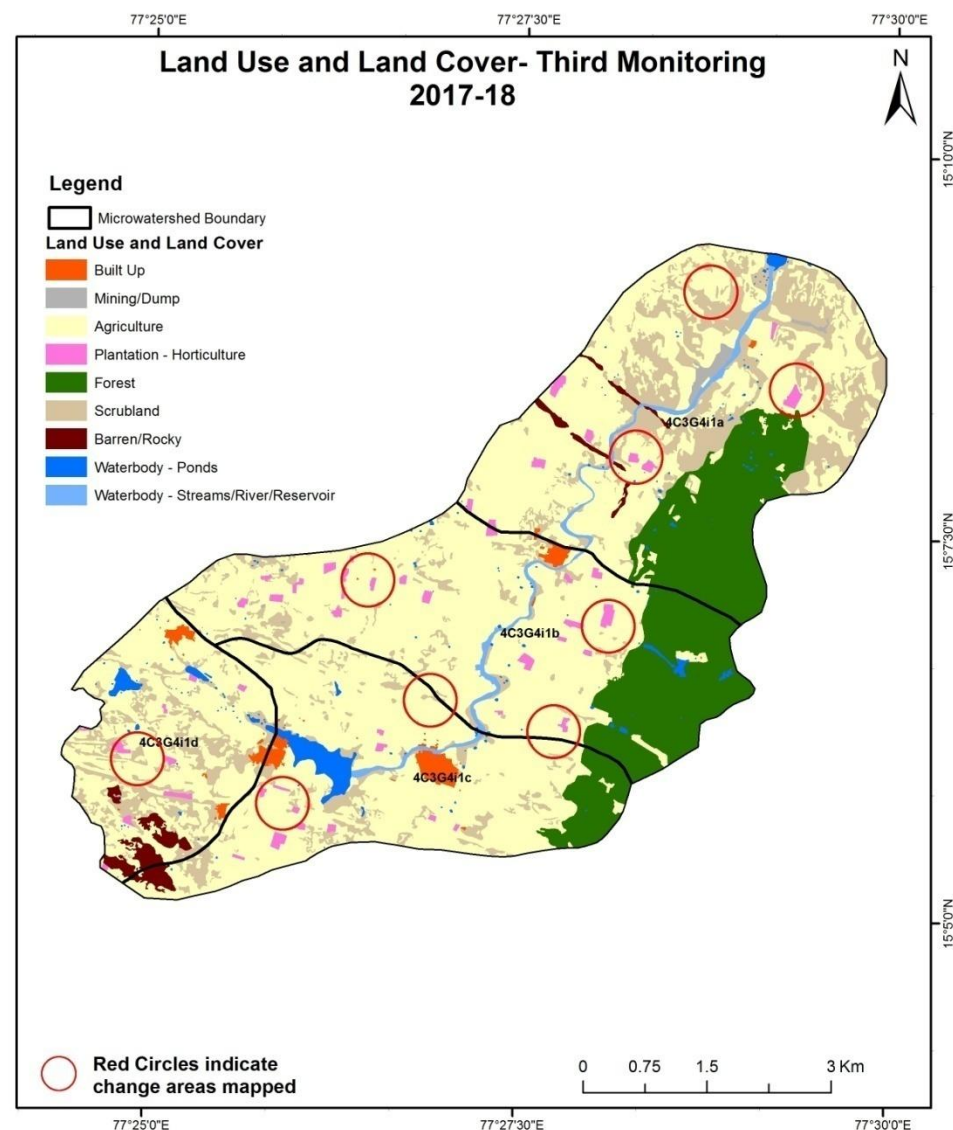
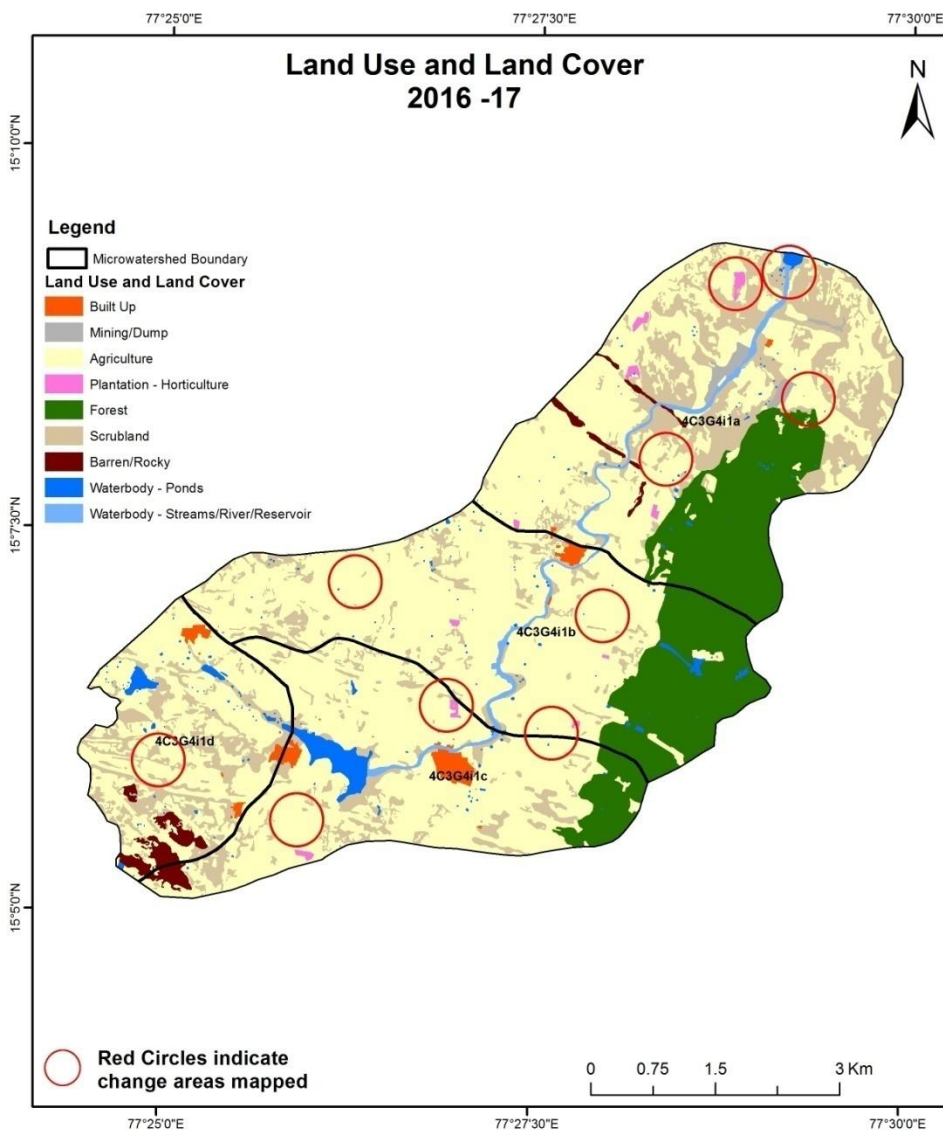
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



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

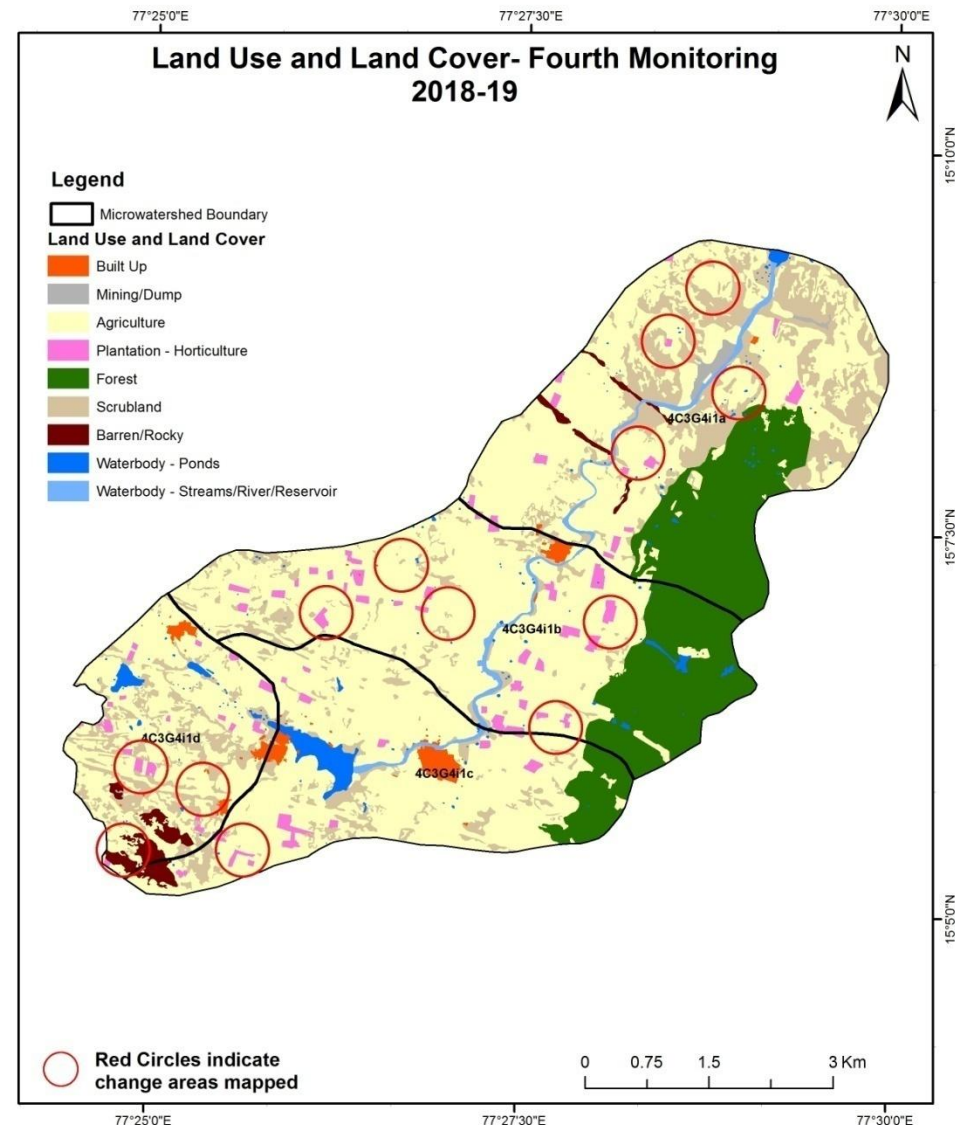
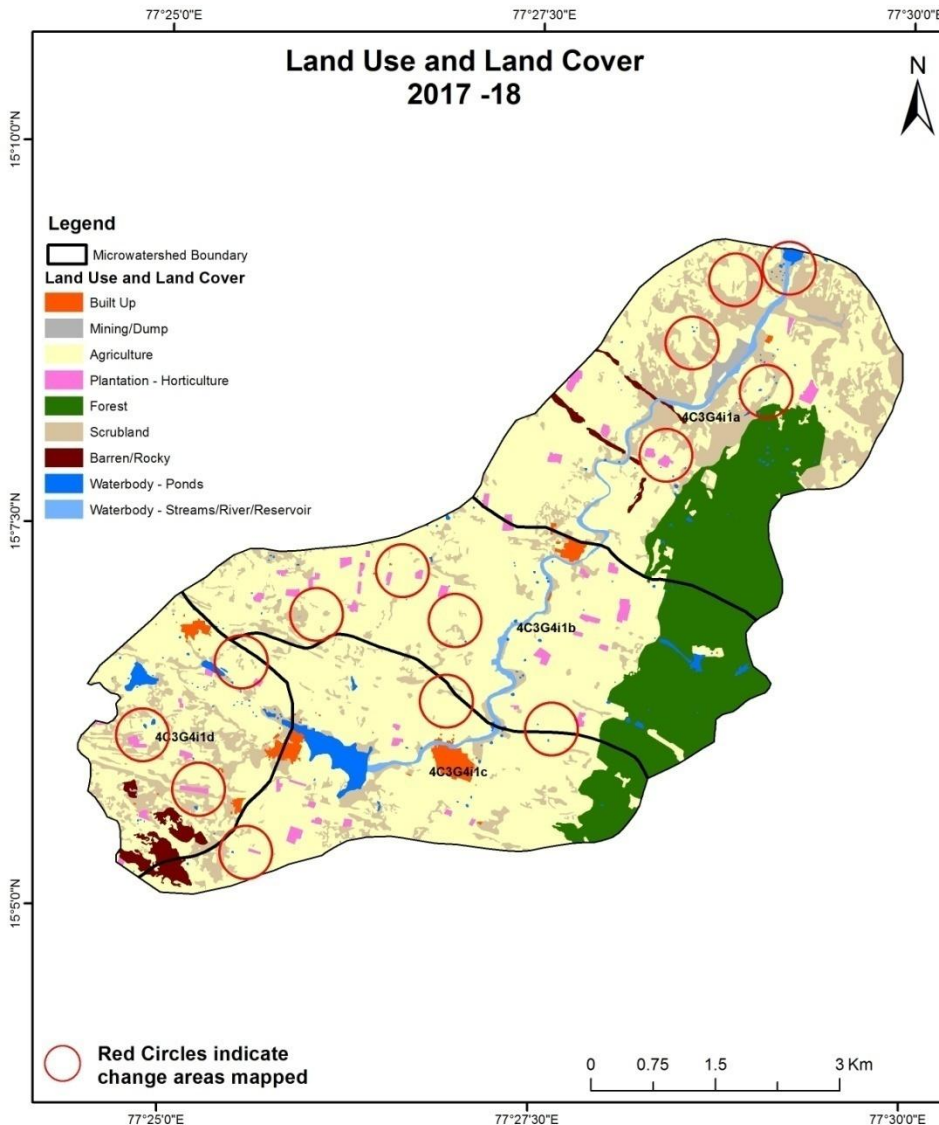
Scale: 1:10000





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

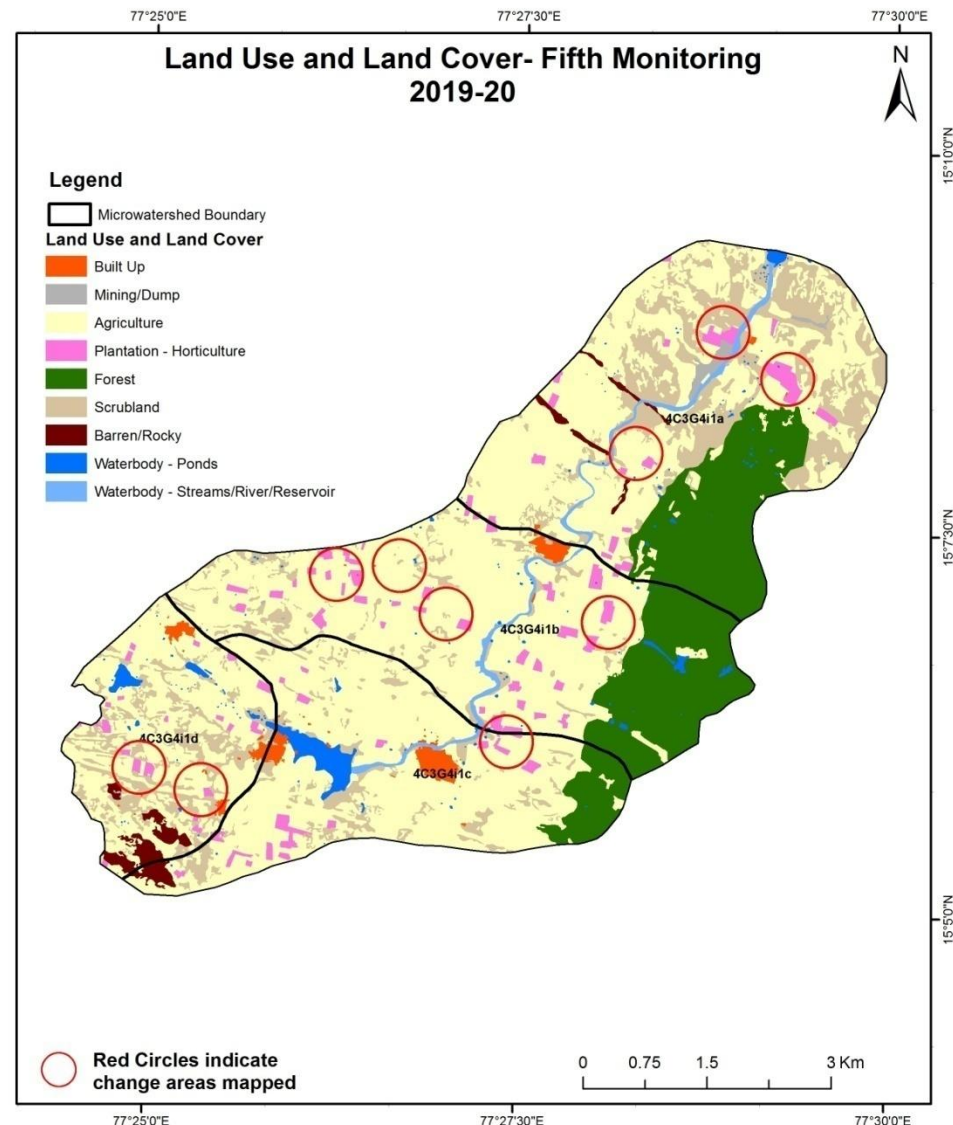
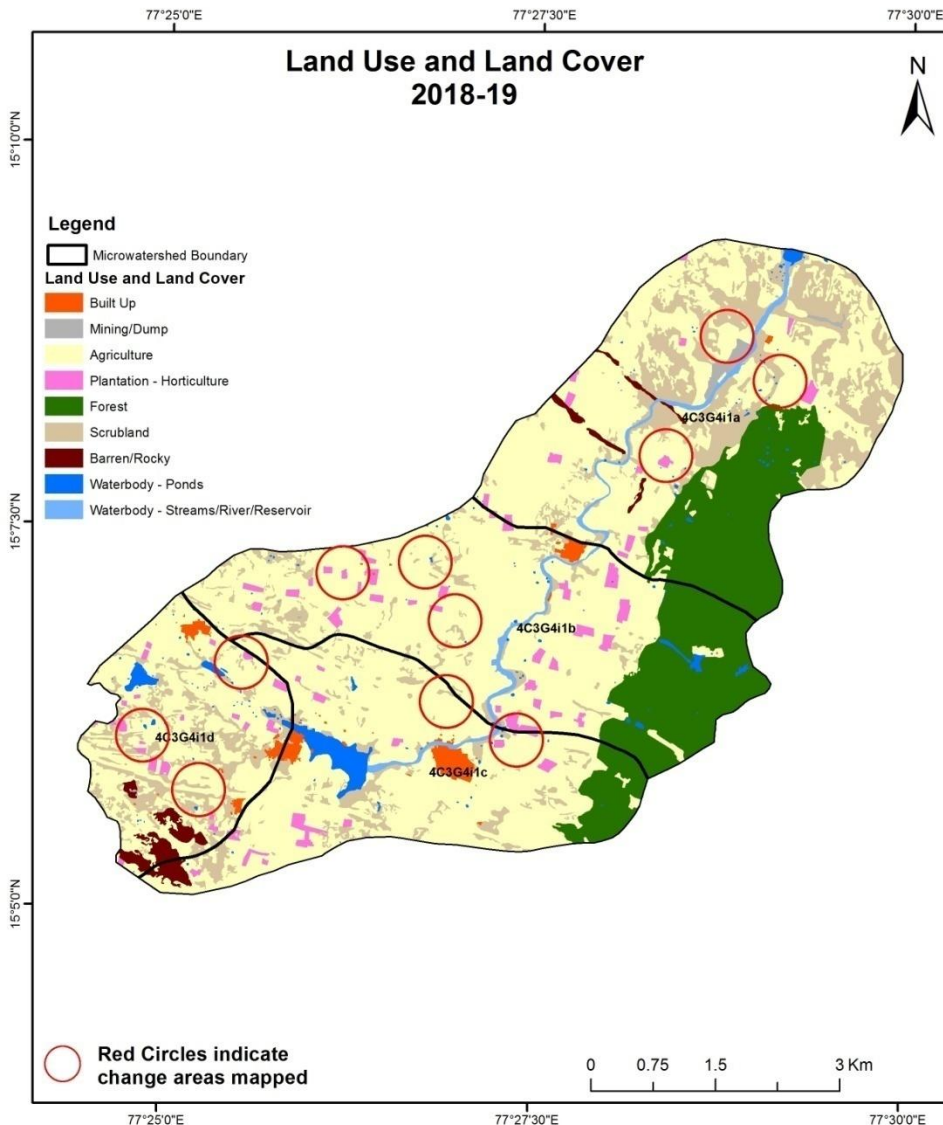
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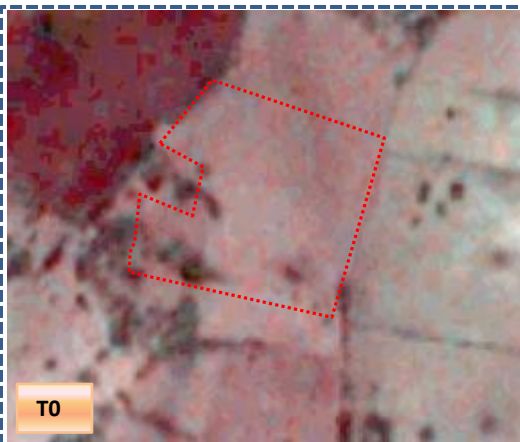
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

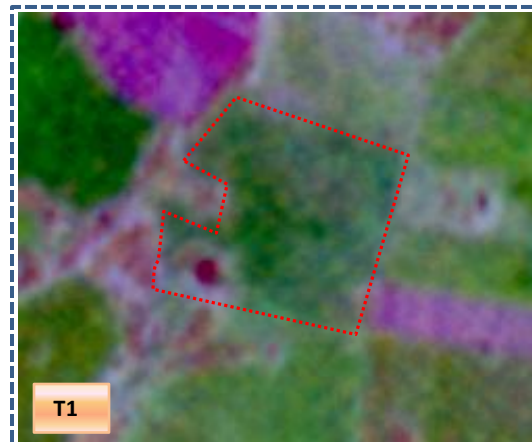


## Land Use and Land Cover changes for Pre and Post treatment dates

### Agriculture to Plantation

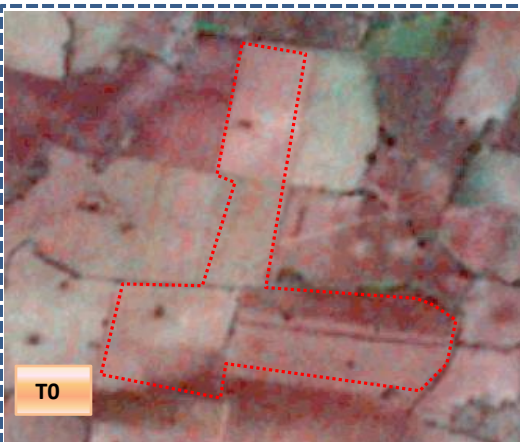


T0: 2011-12 (77°26'11.847"E 15°6'48.713"N)

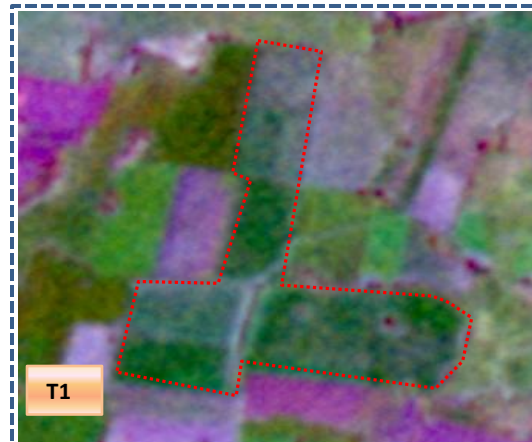


T1: 28 October 2015

### Agriculture to Plantation



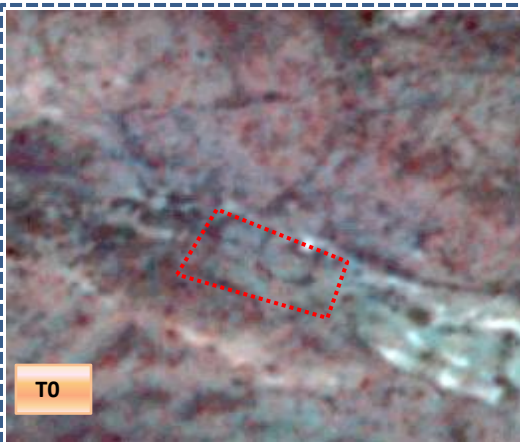
T0: 2011-12 (77°27'35.782"E 15°6'26.107"N)



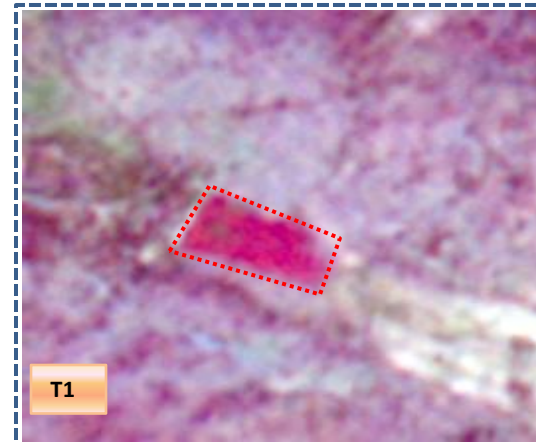
T1: 28 October 2015

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

### Agriculture to Water body

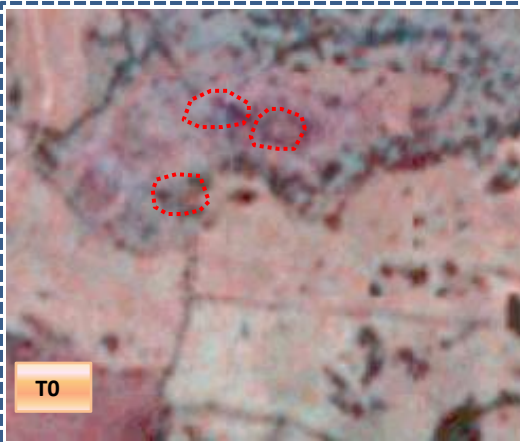


T0: 2011-12 (77°28'12.071"E 15°6'14.31"N)

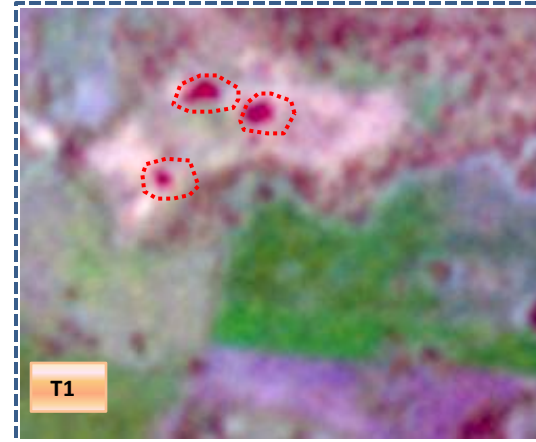


T1: 28 October 2015

### Scrub to Water body



T0: 2011-12 (77°25'42.786"E 15°7'17.821"N)



T1: 28 October 2015

**Table showing change matrix depicting Land cover transitions during study period-2011-12 to 2015-16**

Land cover	Monitoring period (T1)										Units in Hectares
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	32.61										32.61
Mining/dump		5.91									5.91
Agriculture	4.54	2.06	2307.00	7.75					1.21	7.98	2330.54
Plantation Horticulture											
Forest			3.97		612.59					1.97	618.54
Forest Plantation											
Barren Rocky							52.14				52.14
Scrub	0.99	11.19	149.91					769.45		7.82	939.36
Waterbody- Streams/River									51.60		51.60
Waterbody – Ponds			0.28							40.83	41.11
Grand Total	38.14	19.16	2461.16	7.75	612.59		52.14	768.91	52.81	58.60	4071.80

- 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 23 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 153 ha of the agriculture area has increased from forest, 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-2015-16 to 2016-17**

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	38.14										38.14
Mining/dump		19.16									19.16
Agriculture	0.48		2447.15	12.83						0.68	2461.16
Plantation Horticulture			6.27	1.48							7.75
Forest			0.15		611.53					0.91	612.59
Forest Plantation											
Barren Rocky							52.14				52.14
Scrub	0.79		49.09					718.90		0.67	768.91
Waterbody- Streams/River									49.32	3.49	52.81
Waterbody – Ponds			0.37							58.22	58.60
Grand Total	39.40	19.16	2503.03	14.32	611.53		52.14	718.90	49.32	63.97	4071.80

- 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 13 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.
- In T2 55 ha of the agriculture area has increased from plantations, forest, 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-2016-17 to 2017-18**

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	39.40										39.40
Mining/dump		13.56	5.60								19.16
Agriculture	1.75	0.31	2441.98	58.89						0.11	2503.03
Plantation Horticulture			14.03	0.29							14.32
Forest			0.25		610.83					0.44	611.53
Forest Plantation											
Barren Rocky							52.14				52.14
Scrub	2.42		76.61					639.75		0.12	718.90
Waterbody- Streams/River									49.32		49.32
Waterbody – Ponds	0.20		2.79	0.61						60.37	63.97
Grand Total	43.76	13.87	2541.29	59.78	610.83		52.14	639.75	49.32	61.04	4071.80

- 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 61 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T3.
- In T3 96 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-2017-18 to 2018-19**

Land cover	Monitoring period (T4)										Units in Hectares
T3	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	43.76										43.76
Mining/dump		13.87									13.87
Agriculture	0.60		2467.22	73.47							2541.29
Plantation Horticulture			31.98	27.80							59.78
Forest					610.83						610.83
Forest Plantation											
Barren Rocky							51.40	0.74			52.14
Scrub	0.09		11.18					628.48			639.75
Waterbody- Streams/River									49.32		49.32
Waterbody – Ponds	0.14									60.90	61.04
Grand Total	44.60	13.87	2510.38	101.27	610.83		51.40	629.22	49.32	60.90	4071.80

- 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 74 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T4.
- In T4 43 ha of the agriculture area has increased from plantations and 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-2018-19 to 2019-20**

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	44.60										44.60
Mining/dump		13.87									13.87
Agriculture	1.45		2477.61	31.20						0.11	2510.38
Plantation Horticulture				101.27							101.27
Forest					610.76					0.07	610.83
Forest Plantation											
Barren Rocky							50.20	1.20			51.40
Scrub	1.13		1.58					626.29		0.22	629.22
Waterbody- Streams/River									49.32		49.32
Waterbody – Ponds										60.90	60.90
Grand Total	47.18	13.87	2479.19	132.48	610.76		50.20	627.49	49.32	61.30	4071.80

- 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 32 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 1.5 ha of the agriculture area has increased from scrubland land area 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 17 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
4. There is an increase of 130, 41 & 38 Hectares from T0 to T1, T1-T2 & T2-T3 respectively and overall increase of 148 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 132 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 311 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (22) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (22) verified from the portal.