

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

PRAKASAM -35/2011-12

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**

01.           STUDY AREA

02.           SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS

03.           MONITORING IN THE PROJECT AREA : Site wise changes in the project

04.           CONCLUSIONS

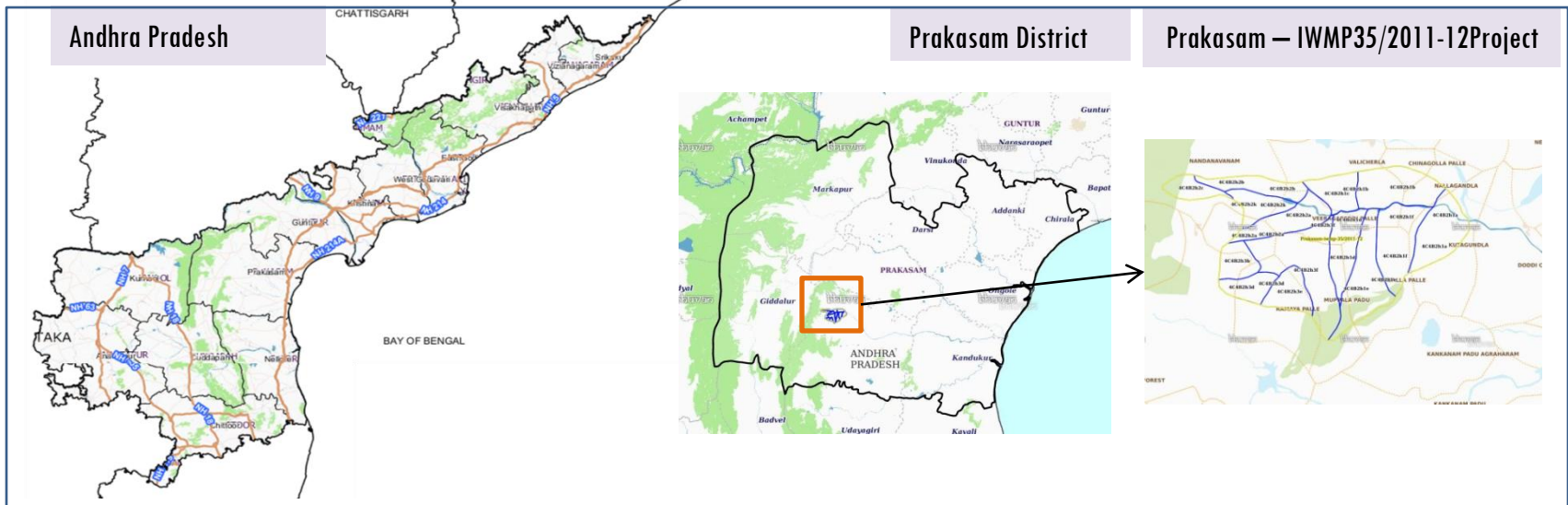
## EXECUTIVE SUMMARY

- 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-35/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is **5,511** ha. It comprises of 14 micro watersheds.
- In the project area 274 Drishti photos were uploaded showing 29 check dams, 16 Farm ponds/Percolation tanks, 43 livelihood activities, 33 checks and plugins and 113 others.
- Major percentage i.e. 68% is covered by the Agriculture, 16% is covered by Scrub, 10% covered by Plantation and remaining by other land use classes.

# PROJECT : PRAKASAM - IWMP-35/2011-12

## DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Hanumanthunipadu of Prakasam district of Andhra Pradesh state. The total geographical area of the project is **5511** ha. It comprises of 14 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 2015-16 (T1) 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.

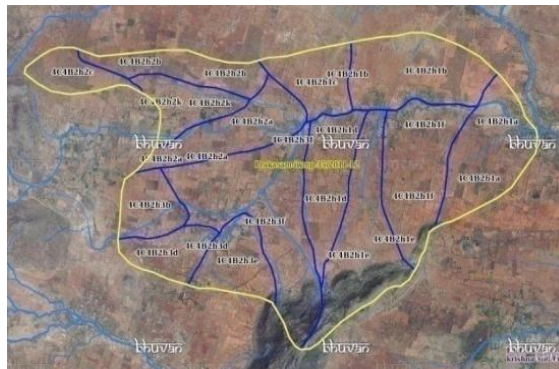
## Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			31-Mar-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		31-Mar-20
SCENE 1			
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	274
4	Detailed Project Report		

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



### Legend



Drainage (1:10000 Scale)

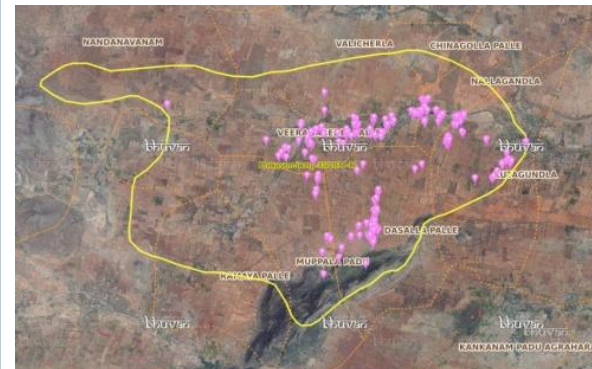


MWS Boundary



Project Boundary

## Natural Color Composite overlaid with Drishti Points



### Drishti Upload Status

## Classification of the Activities

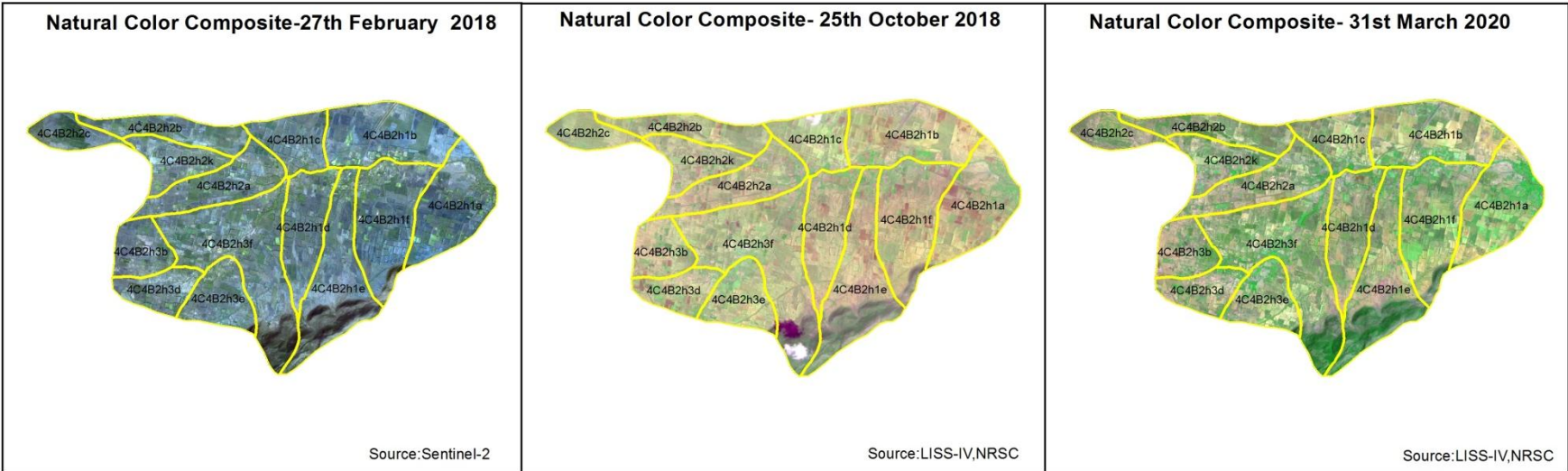
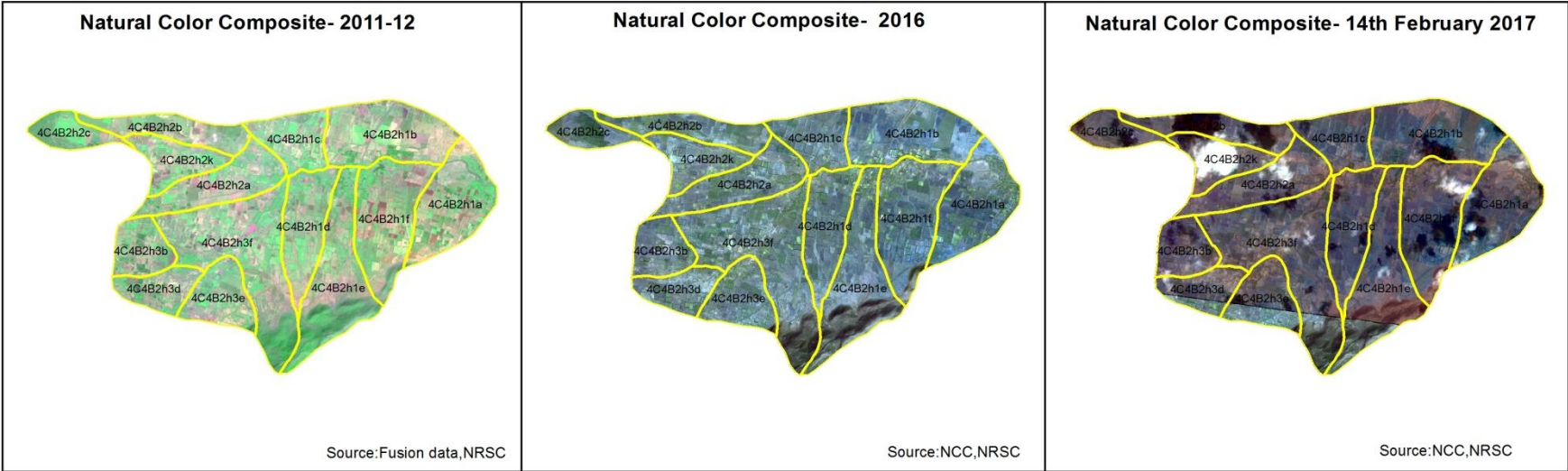
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	46	46
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	33	33
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	16	16
10	Civil work-Check dams/Rock fill dam	29	29
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	43	43
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	113	107
	<b>TOTAL</b>	<b>280</b>	<b>274</b>

## MONITORING IN THE PROJECT AREA

### Site Wise Changes in the Project

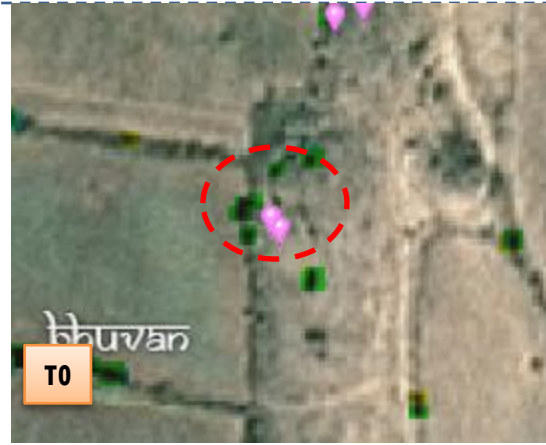
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T0 is the baseline period before implementation (2011-12) and T5 is 2019-20 period for monitoring
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

# Natural Color Composite





Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-35/2011-12



T0

T0:2011-12



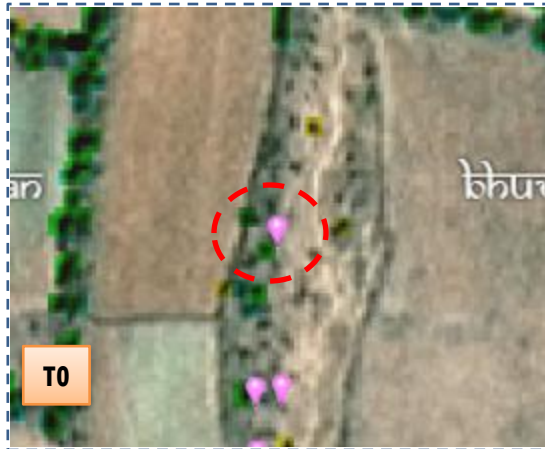
T1

T1: 02-February 2016



Drishti SI no. 1781594 MWS : 4C4B2h1d

Farm pond



T0

T0:2011-12



T1

T1: 02-February 2016



Drishti SI no. 1804058 MWS :4C4B2h1d

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-35/2011-12



T0

T0: 2011-12



T1

T1: 02-February 2016



Drishti SI no7024160

MWS :4C4B2h1e

Farm pond



T0

T0: 2011-12



T1

T1: 02-February 2016



Drishti SI no. 1807670

MWS :4C4B2h1e

Percolation tank

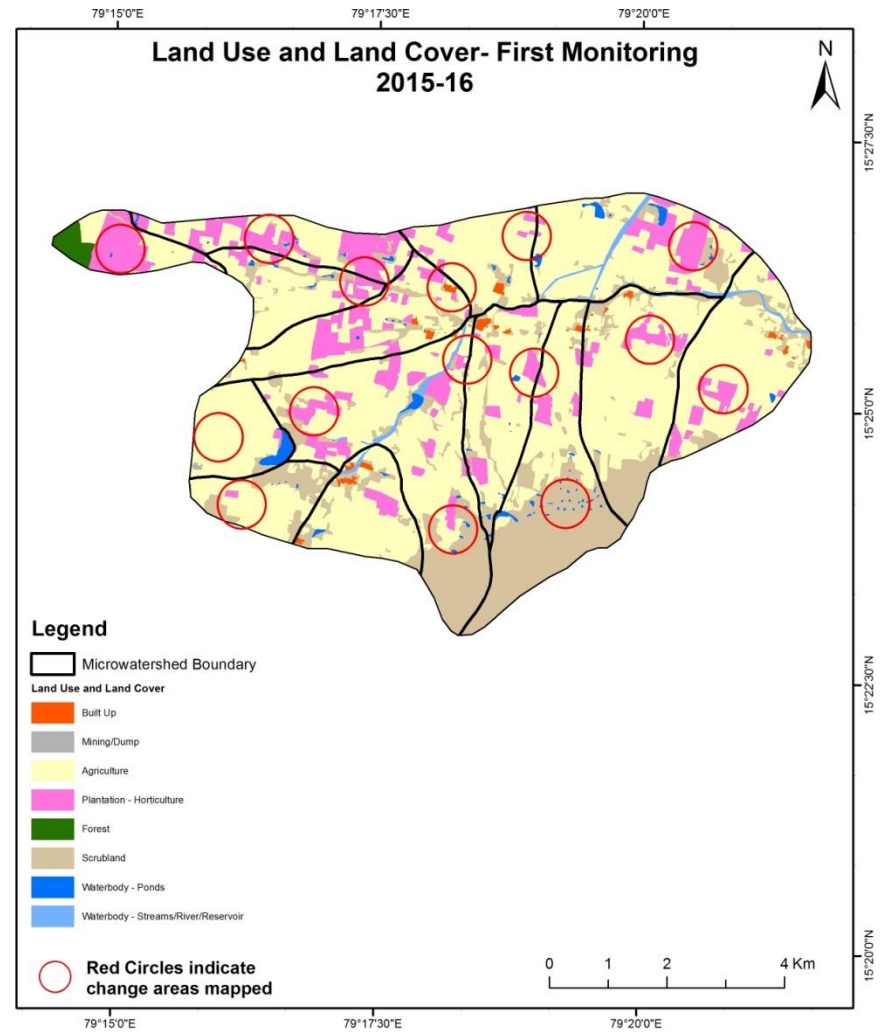
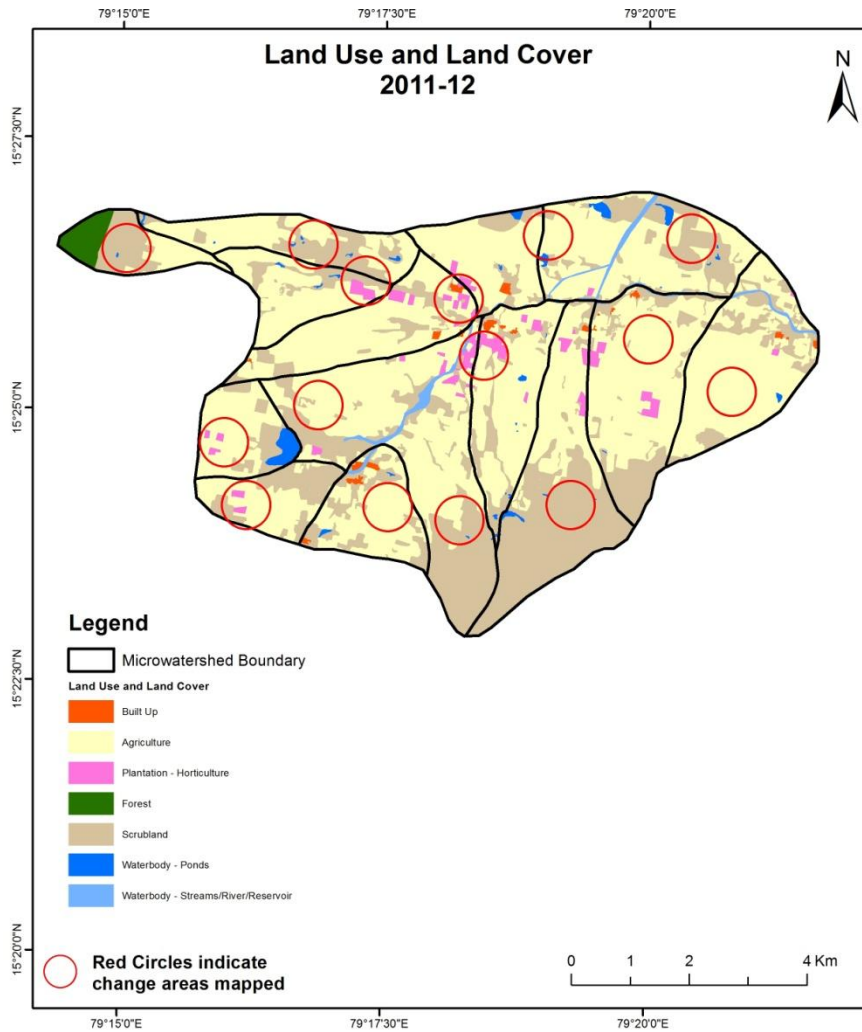
## MONITORING IN THE PROJECT AREA

### 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 (2011-12) and row represents the post implementation period as T5 (2019-20) .

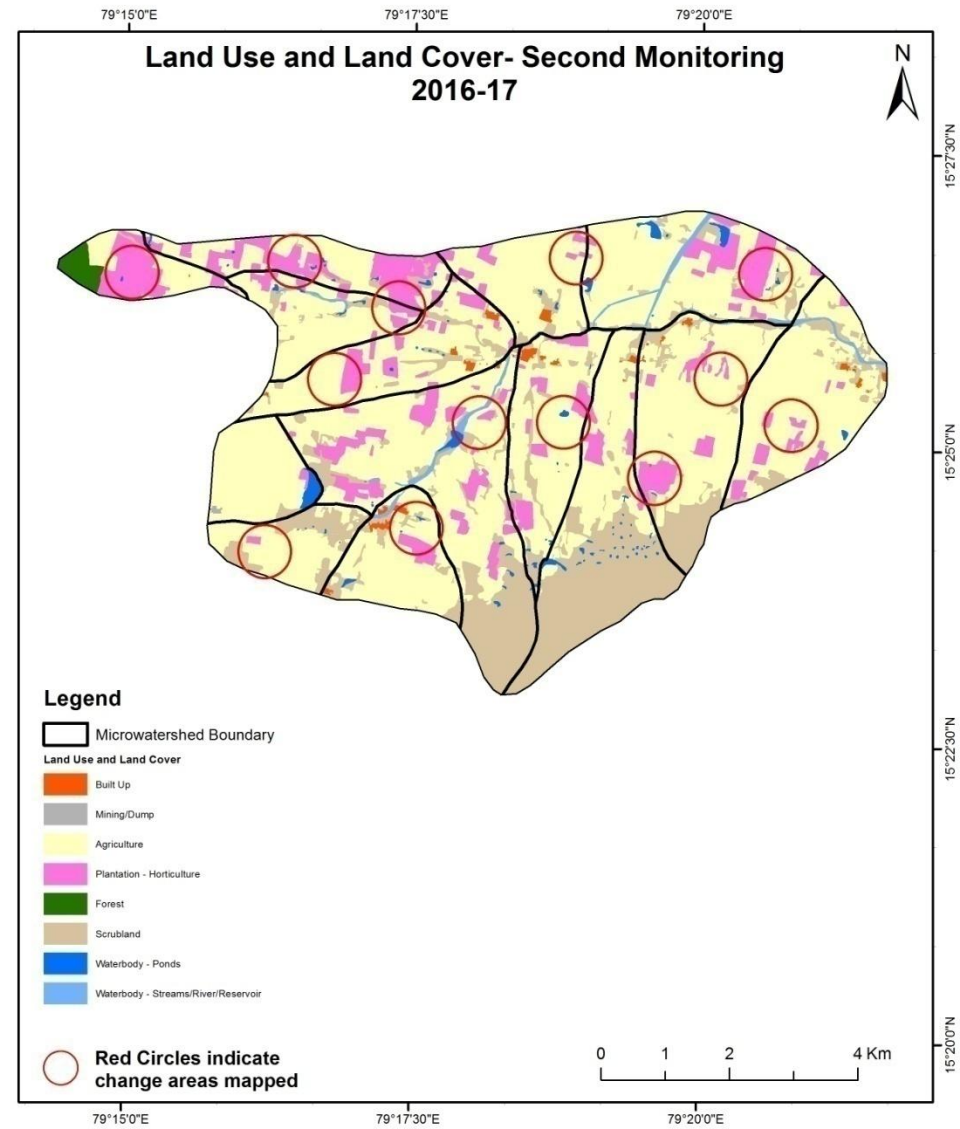
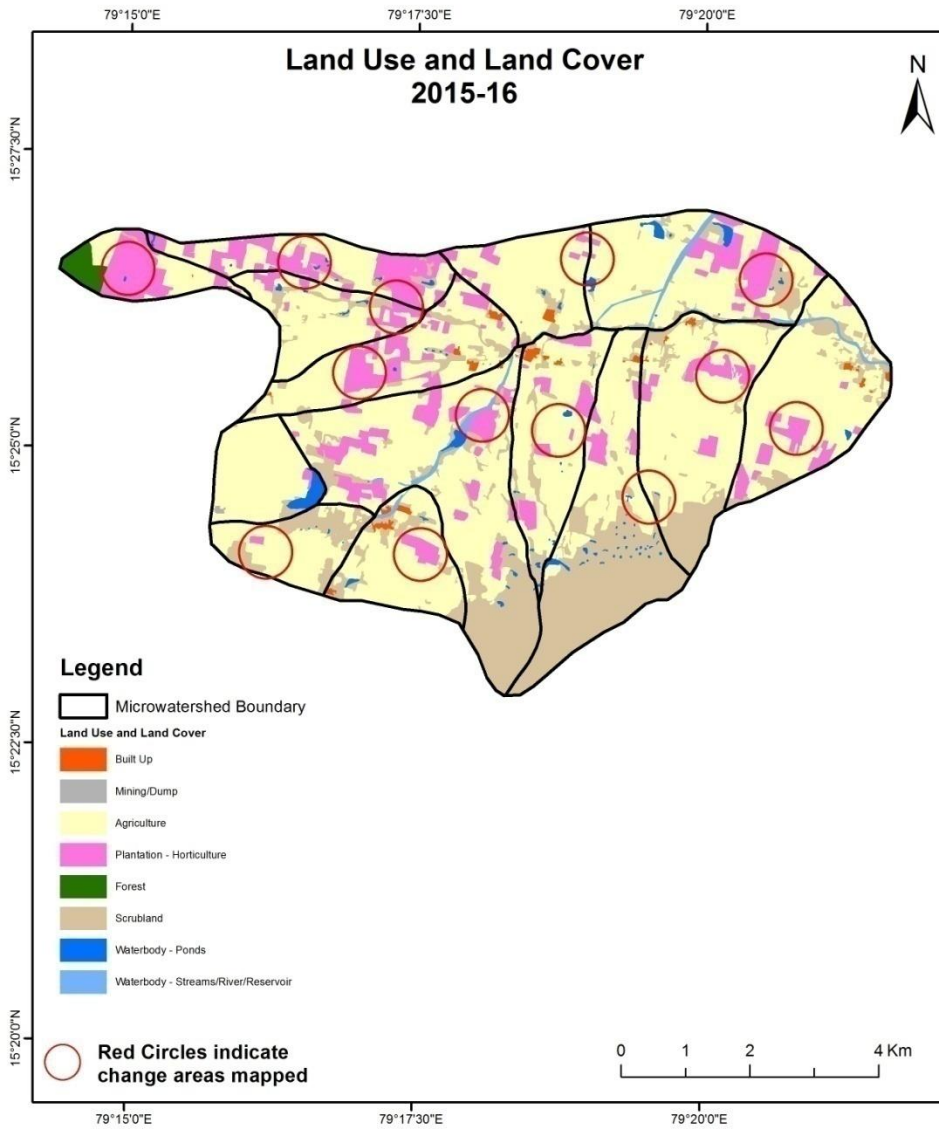
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



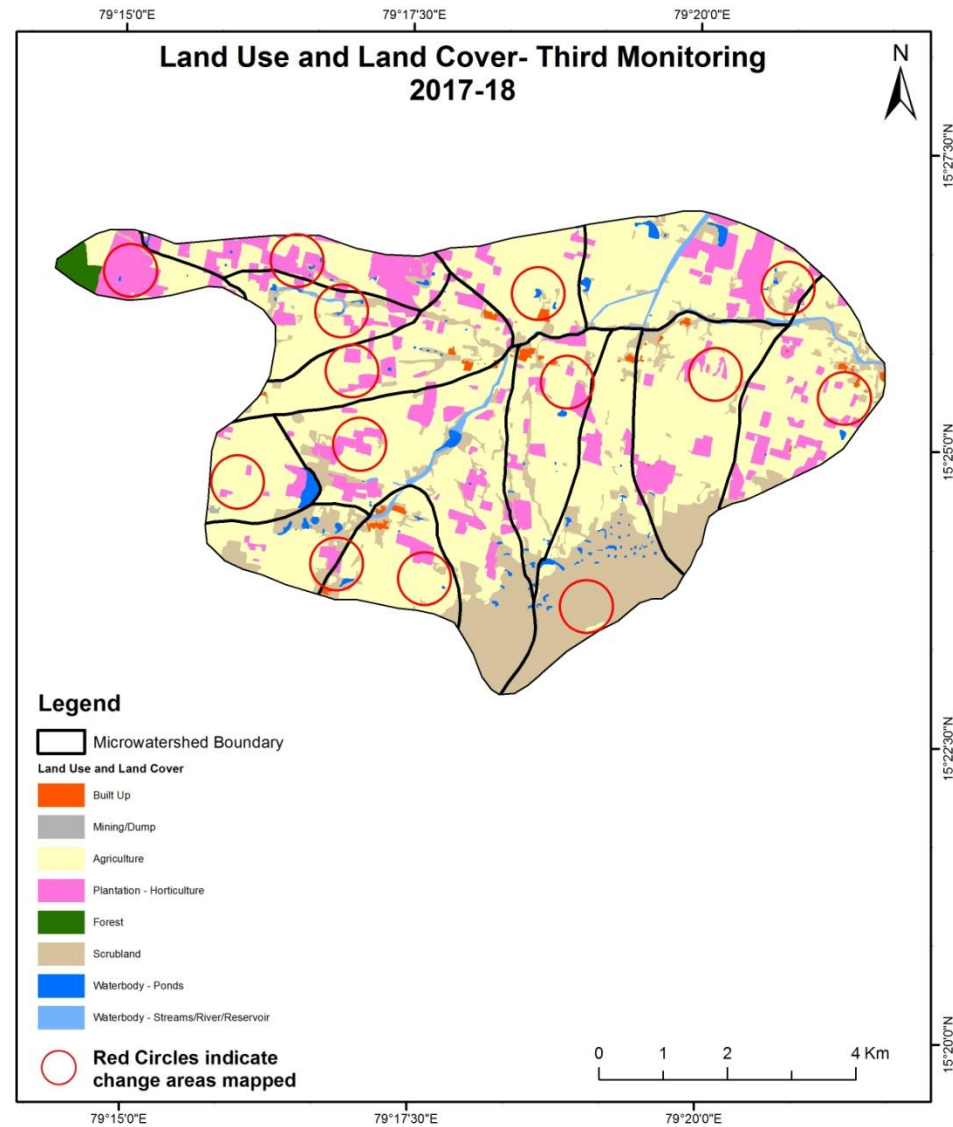
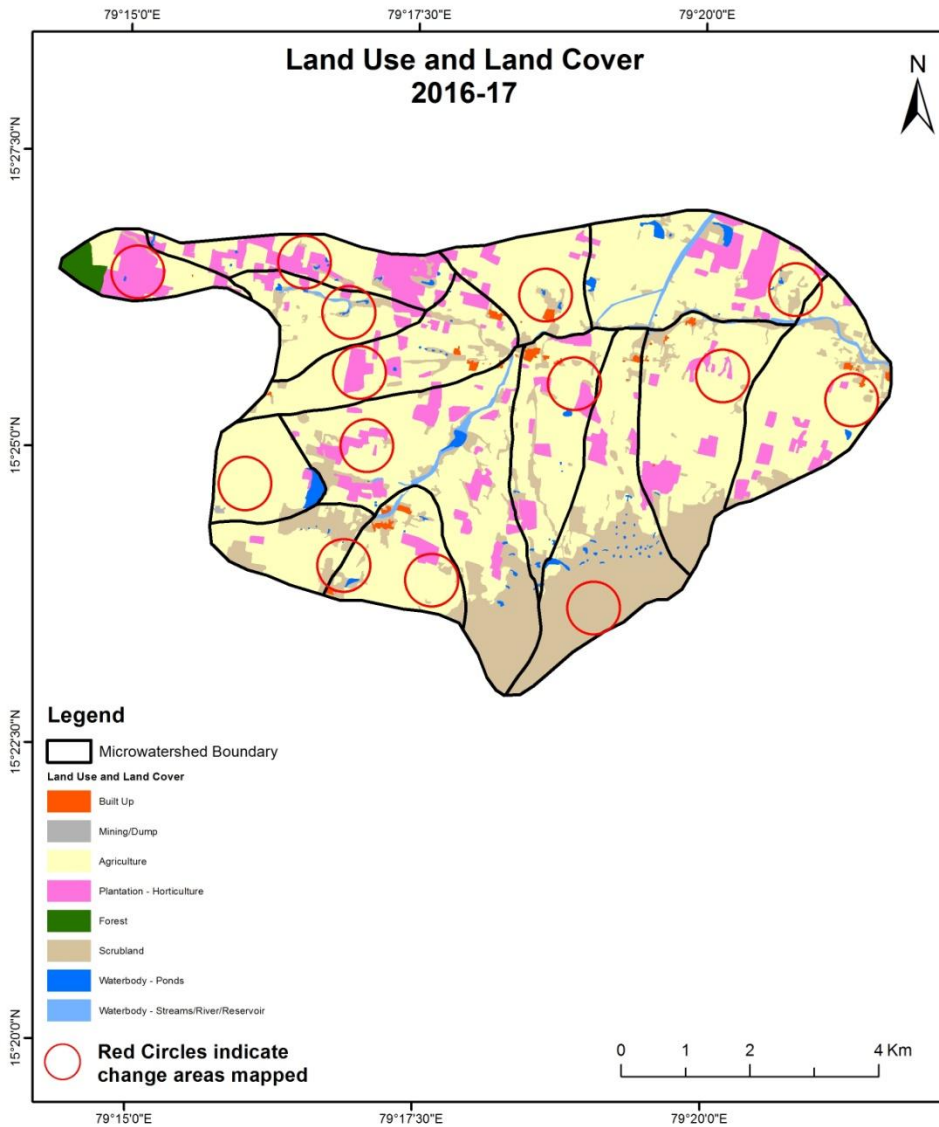
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



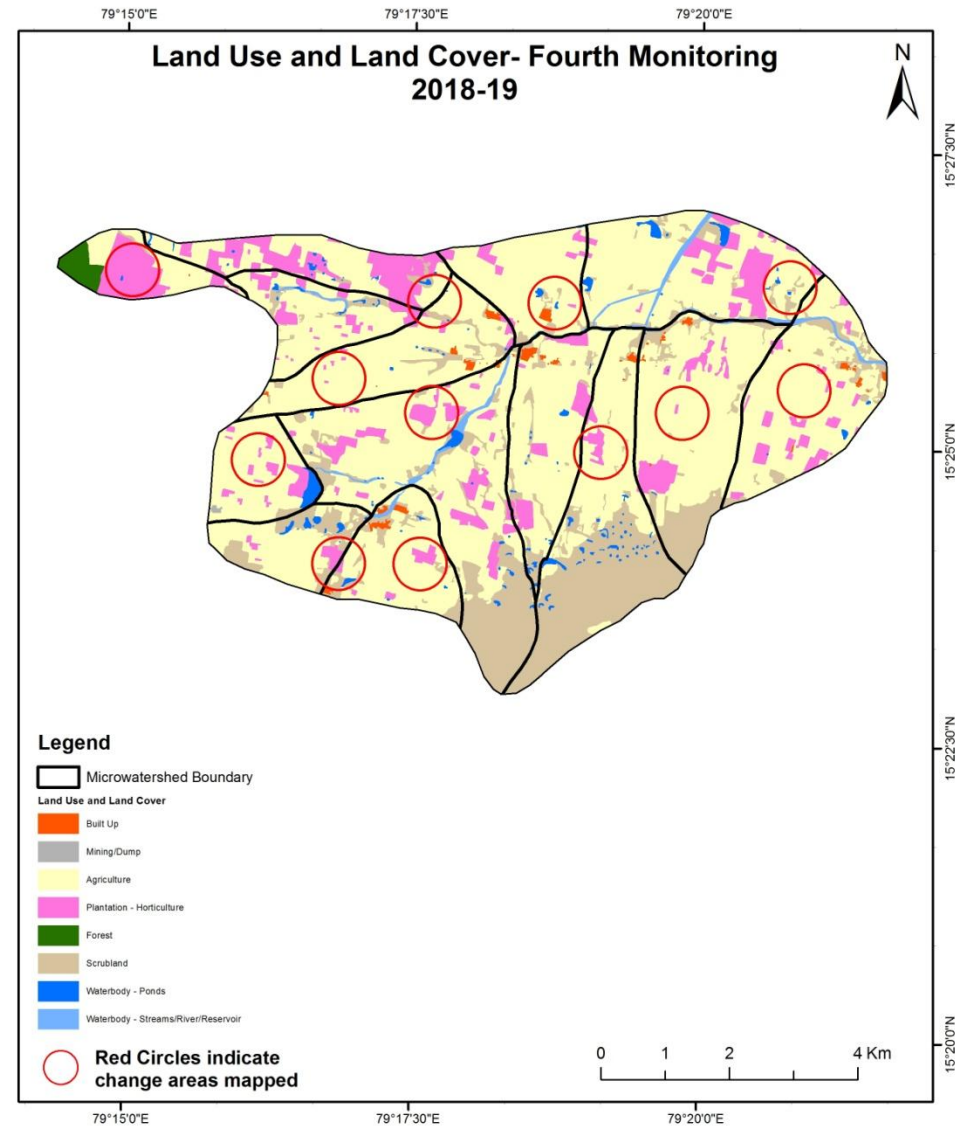
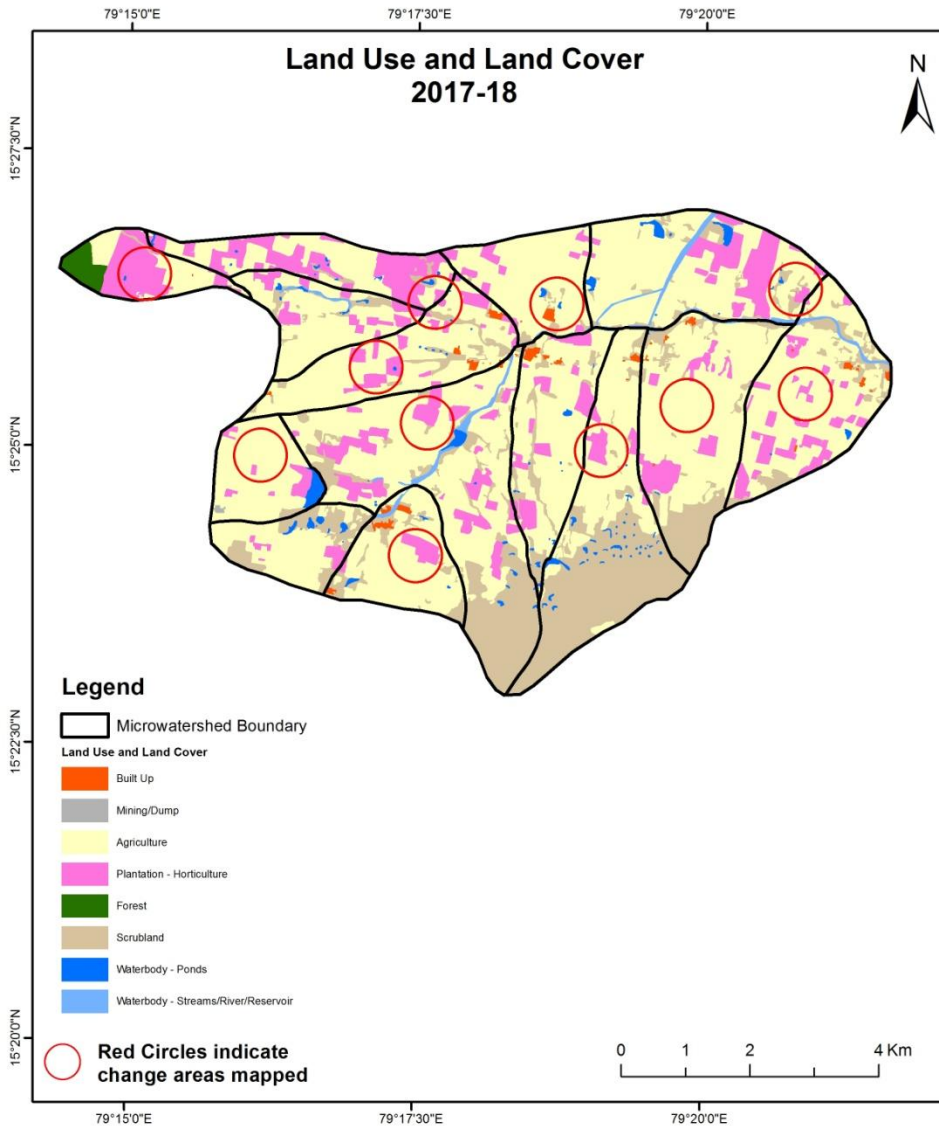
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



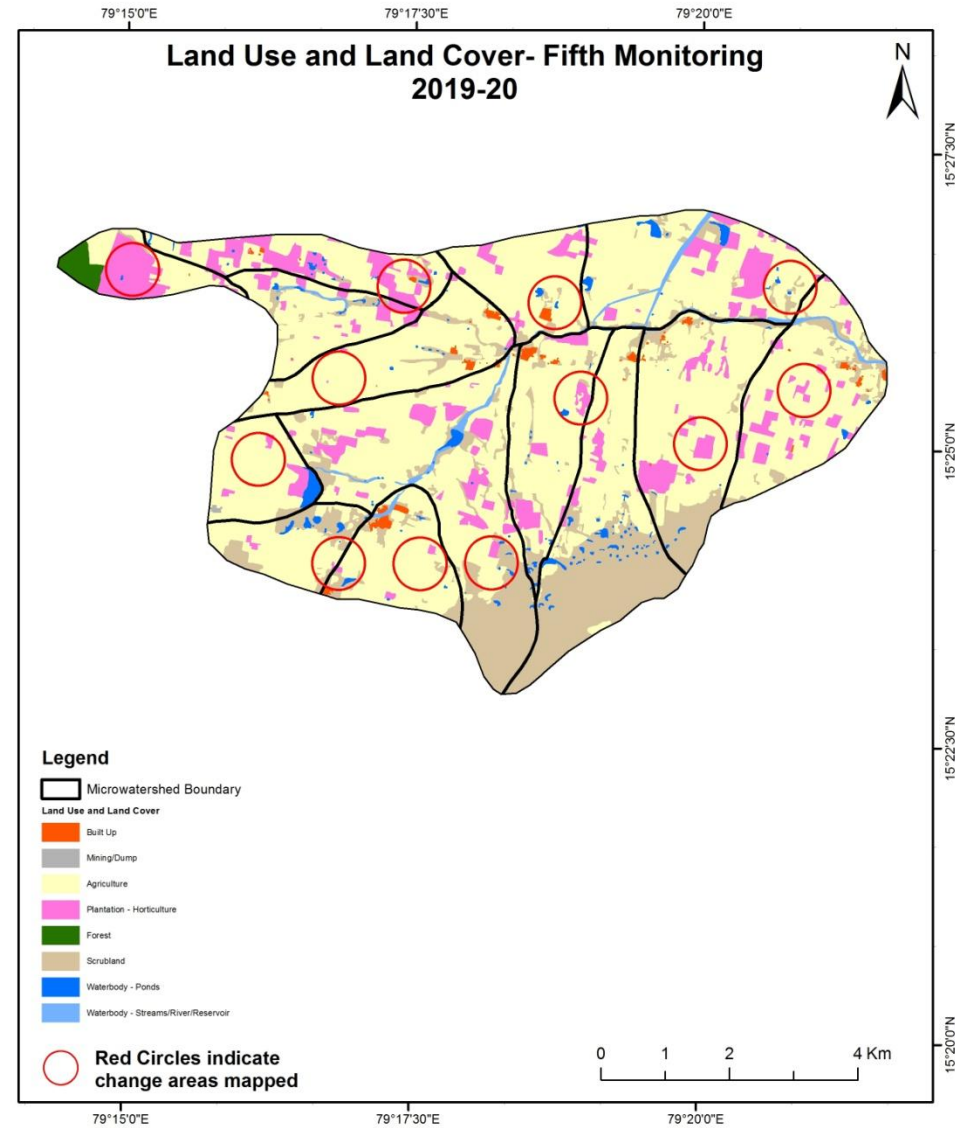
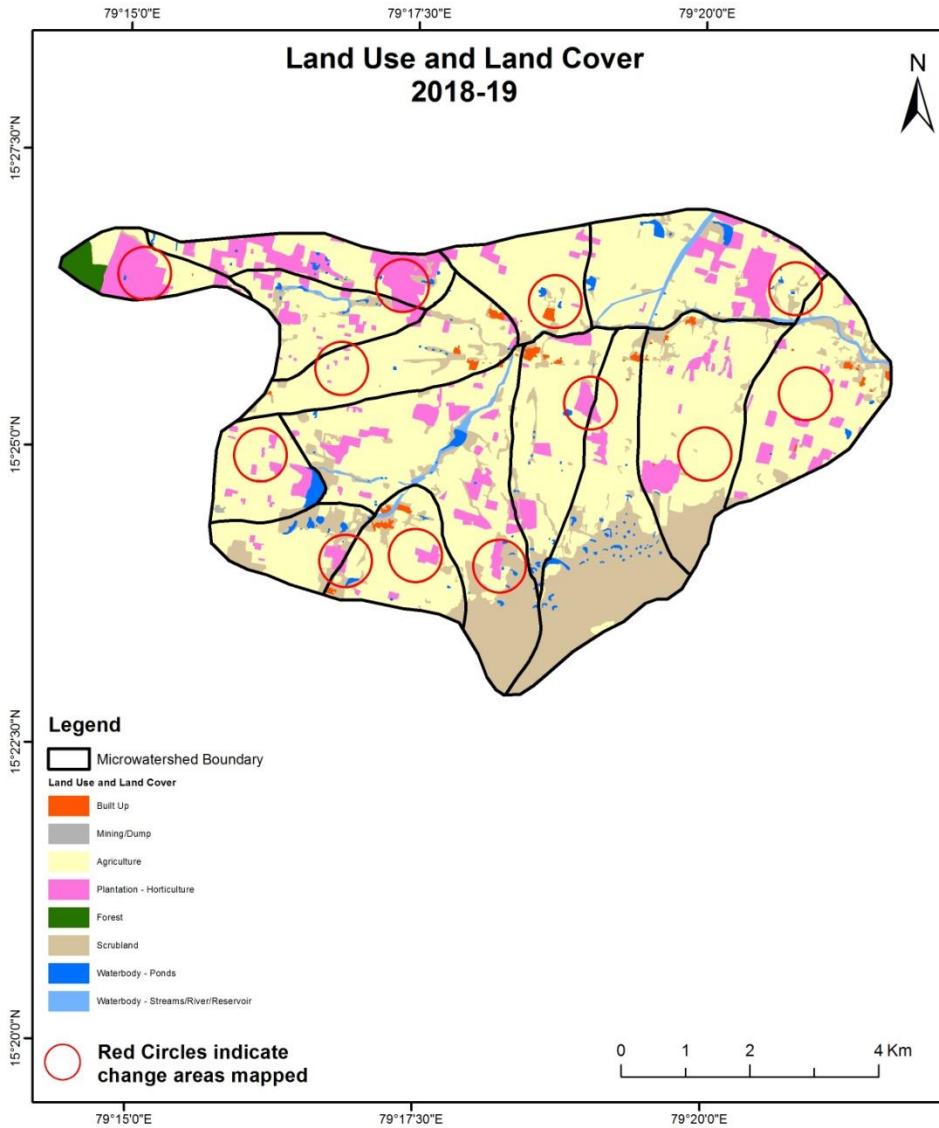
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



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

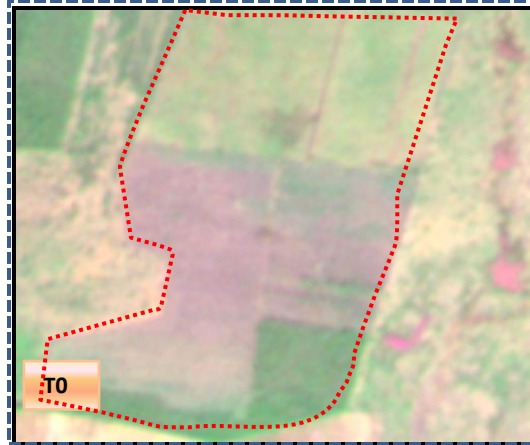
Scale: 1:10000





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

Agriculture to Plantation

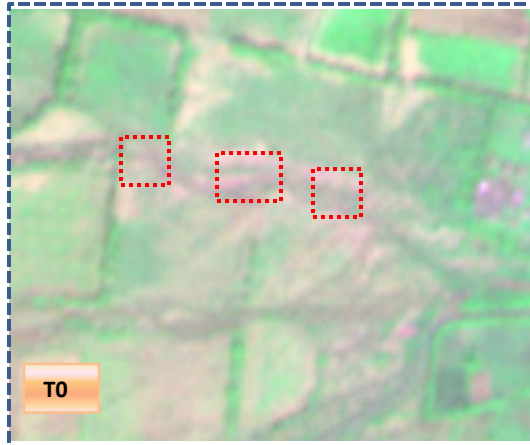


T0: 2011-12(79°20'29.333"E 15°26'31.087"N )



T1: 02-02-2016

Scrub to water body



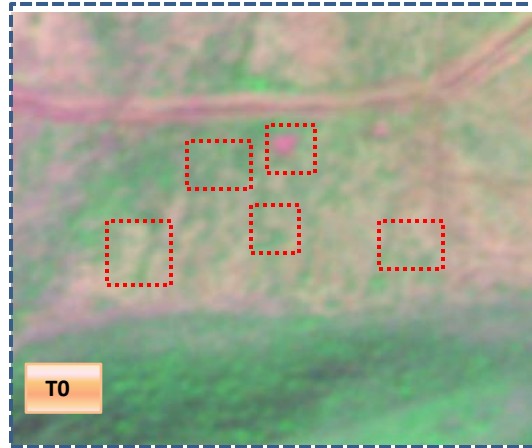
T0: 2011-12 (79°17'39.323"E 15°25'49.117"N )



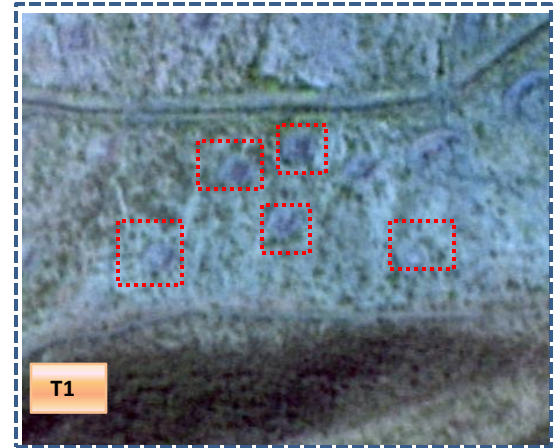
T1: 02-02-2016

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

Scrub to water body

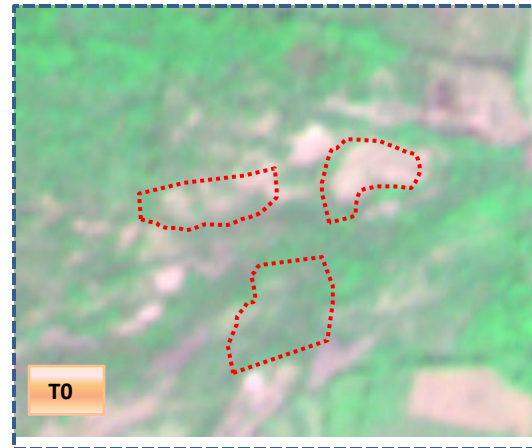


T0: 2011-12(79°19'25.093"E 15°24'9.685"N )

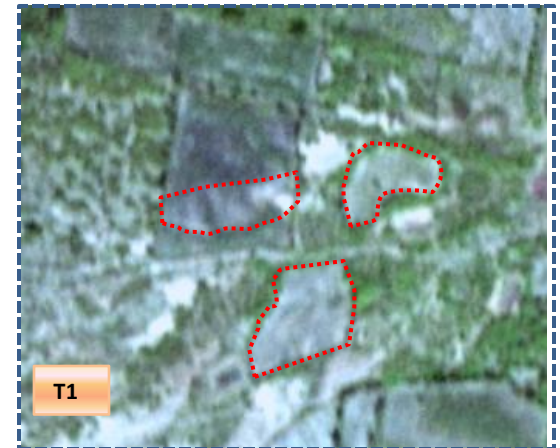


T1: 02-02-2016

Scrub to Agriculture



T0: 2011-12(79°16'56.294"E 15°24'23.205"N )



T1: 02-02-2016

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

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	26.53							0.67			27.20
Mining/dump											
Agriculture	2.15	1.58	3010.00	484.37						0.55	3498.65
Plantation Horticulture	0.11		54.20	56.10							110.41
Forest			18.89		31.32						50.20
Forest Plantation											
Barren Rocky											
Scrub	2.91		426.51	186.49				1071.10	2.78	9.09	1698.88
Waterbody- Streams/River			2.61						66.96	5.21	74.78
Waterbody – Ponds			6.69	2.82						41.90	51.41
<b>Grand Total</b>	<b>31.70</b>	<b>1.58</b>	<b>3518.90</b>	<b>729.78</b>	<b>31.32</b>			<b>1071.77</b>	<b>69.74</b>	<b>56.75</b>	<b>5511.54</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 488 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 483 ha of the agriculture area has increased from plantations, 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		
	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>	31.70												<b>31.70</b>
<b>Mining/dump</b>		1.58											<b>1.58</b>
<b>Agriculture</b>	0.13		3468.74	49.24							0.79		<b>3518.90</b>
<b>Plantation Horticulture</b>			107.66	621.97							0.15		<b>729.78</b>
<b>Forest</b>					31.32								<b>31.32</b>
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>			41.00					1026.08	4.49		0.20		<b>1071.77</b>
<b>Waterbody- Streams/River</b>									69.74				<b>69.74</b>
<b>Waterbody – Ponds</b>			3.81								52.93		<b>56.75</b>
<b>Grand Total</b>	<b>31.83</b>	<b>1.58</b>	<b>3621.22</b>	<b>671.21</b>	<b>31.32</b>			<b>1026.08</b>	<b>74.23</b>		<b>54.07</b>		<b>5511.54</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 50 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.
- In T2 148 ha of the agriculture area has increased from plantations, scrubland and water body of T1. The additional agriculture are is 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	
	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>	31.83										<b>31.83</b>	
<b>Mining/dump</b>		1.58									<b>1.58</b>	
<b>Agriculture</b>	0.56		3477.59	142.58						0.49	<b>3621.22</b>	
<b>Plantation Horticulture</b>	0.05		22.32	648.54						0.30	<b>671.21</b>	
<b>Forest</b>					31.32						<b>31.32</b>	
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>	0.30		18.49	1.38				995.85		10.07	<b>1026.08</b>	
<b>Waterbody- Streams/River</b>									74.23		<b>74.23</b>	
<b>Waterbody – Ponds</b>										54.07	<b>54.07</b>	
<b>Grand Total</b>	<b>32.74</b>	<b>1.58</b>	<b>3518.40</b>	<b>792.50</b>	<b>31.32</b>			<b>995.85</b>	<b>74.23</b>	<b>64.93</b>	<b>5511.54</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 143 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T3.
- In T3 40 ha of the agriculture area has increased from plantations and scrubland 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		
	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>	32.74												<b>32.74</b>
<b>Mining/dump</b>		1.58											<b>1.58</b>
<b>Agriculture</b>	0.09		3475.04	40.81							2.45		<b>3518.40</b>
<b>Plantation Horticulture</b>	0.20		215.28	576.77							0.25		<b>792.50</b>
<b>Forest</b>					31.32								<b>31.32</b>
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>	0.27		34.83					954.39	2.72		3.63		<b>995.85</b>
<b>Waterbody- Streams/River</b>			0.28						73.66		0.28		<b>74.23</b>
<b>Waterbody – Ponds</b>											64.93		<b>64.93</b>
<b>Grand Total</b>	<b>33.30</b>	<b>1.58</b>	<b>3725.44</b>	<b>617.58</b>	<b>31.32</b>			<b>954.39</b>	<b>76.39</b>		<b>71.55</b>		<b>5511.54</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 43 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 250 ha of the agriculture area has increased from plantations, 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-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	33.30											33.30
Mining/dump		1.58										1.58
Agriculture	1.00		3634.76	89.58						0.09		3725.44
Plantation Horticulture	0.71		122.41	494.45								617.58
Forest					31.32							31.32
Forest Plantation												
Barren Rocky												
Scrub	3.47	0.56	11.76					935.61		3.00		954.39
Waterbody- Streams/River									76.39			76.39
Waterbody – Ponds										71.55		71.55
<b>Grand Total</b>	<b>38.48</b>	<b>2.14</b>	<b>3768.94</b>	<b>584.03</b>	<b>31.32</b>			<b>935.61</b>	<b>76.39</b>	<b>74.63</b>		<b>5511.54</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 90 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 134 ha of the agriculture area has increased from plantations and 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 24.8 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 20, 102, 207 & 43 Hectares From T0 to T1, T1-T2, T3-T4 & T4-T5 respectively and there is a decrease of 102 ha from T2 to T3 and overall about 270 Hectares of the Crop land area has been increased as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 473 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 763 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.