

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

PRAKASAM -40/2011-12

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

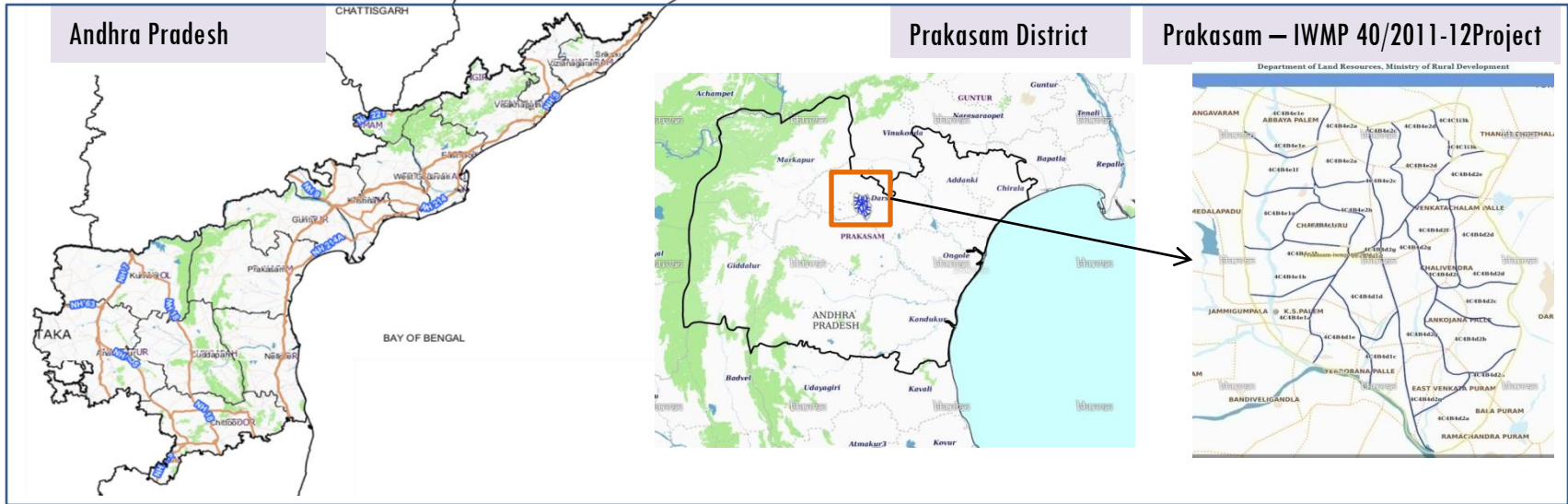
## EXECUTIVE SUMMARY

- 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-40/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is **9,318** ha. It comprises of 21 micro watersheds.
- In the project area 335 Drishti photos were uploaded showing 29 check dams, 4 Farm ponds/Percolation tanks, 15 afforestation, 54 agriculture/Horticulture, 2 livelihood activities, 2 checks & plugins and 230 others.
- Major percentage i.e. 75.43% is covered by the agriculture, 17.68% is covered by scrub land, 2.76 % by water body and remaining by other land use classes.

# PROJECT : PRAKASAM - IWMP-40/2011-12

## DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Darsi Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is **9,318** ha. It comprises of 21 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.



- 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.

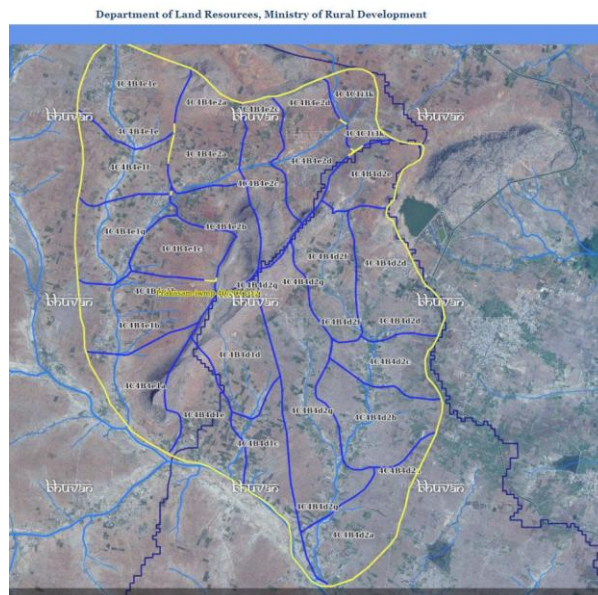
# Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			10-Nov-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			10-Nov-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	335
4	Detailed Project Report		

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



## Legend



Drainage (1:10000 Scale)

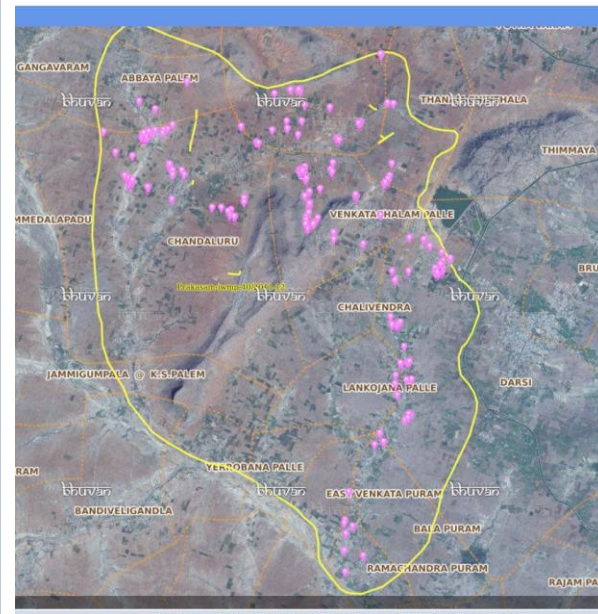


MWS Boundary



Project Boundary

# Natural Color Composite overlaid with Drishti Points



## Drishti Upload Status

## Classification of the Activities

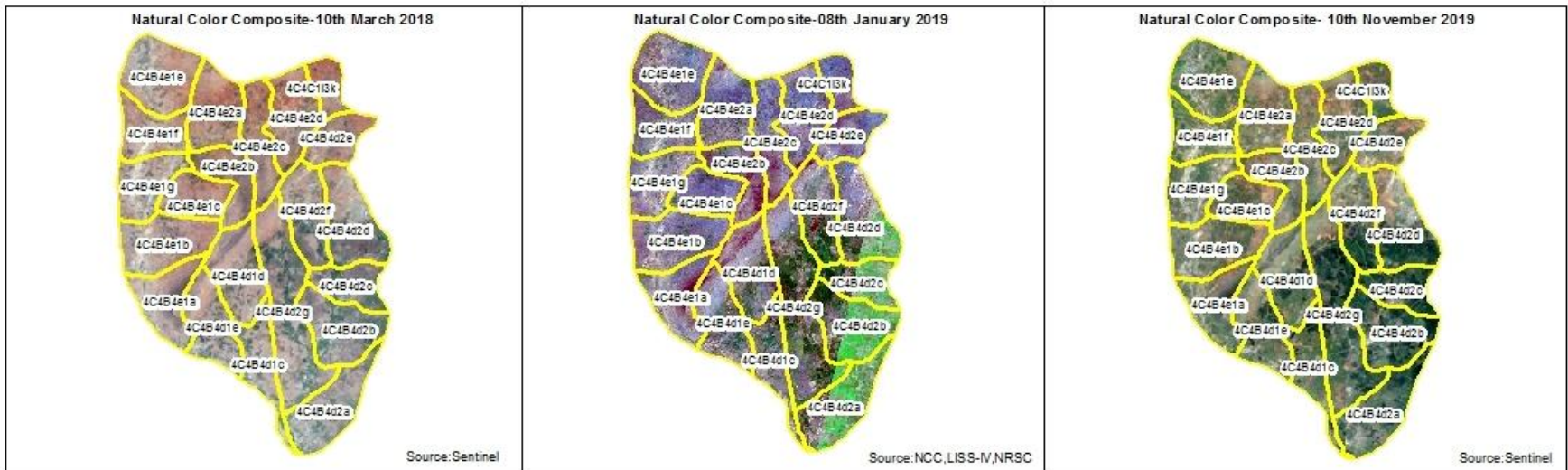
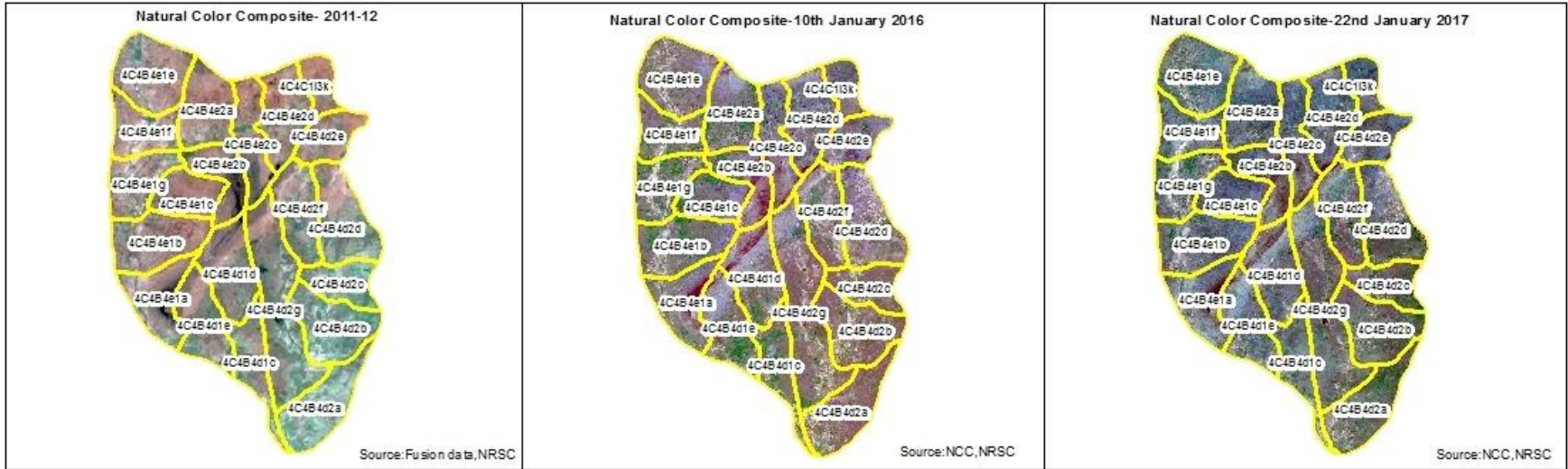
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	54	53
2	Afforestation	15	15
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	2	2
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	4	4
10	Civil work-Check dams/Rock fill dam	30	29
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	2	2
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	235	230
	<b>TOTAL</b>	<b>342</b>	<b>335</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-2011-12 to 2019-20





Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-40/2011-12



T0:2011-12



T1: 10 January 2016



Drishti SI no. 2468714 MWS :4C4B4d2b

Check dam



T0:2011-12



T1: 10 January 2016



Drishti SI no. 701327 MWS : 4C4B4e1e

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-40/2011-12



T0

T0: 2011-12



T1

T1: 10 January 2016



Drishti Sl no. 162626 MWS :4C4B4e1e

Percolation Tank



T0

T0: 2011-12



T1

T1: 10 January 2016



Drishti Sl no. 564720 MWS :4C4A3f3a

Percolation tank

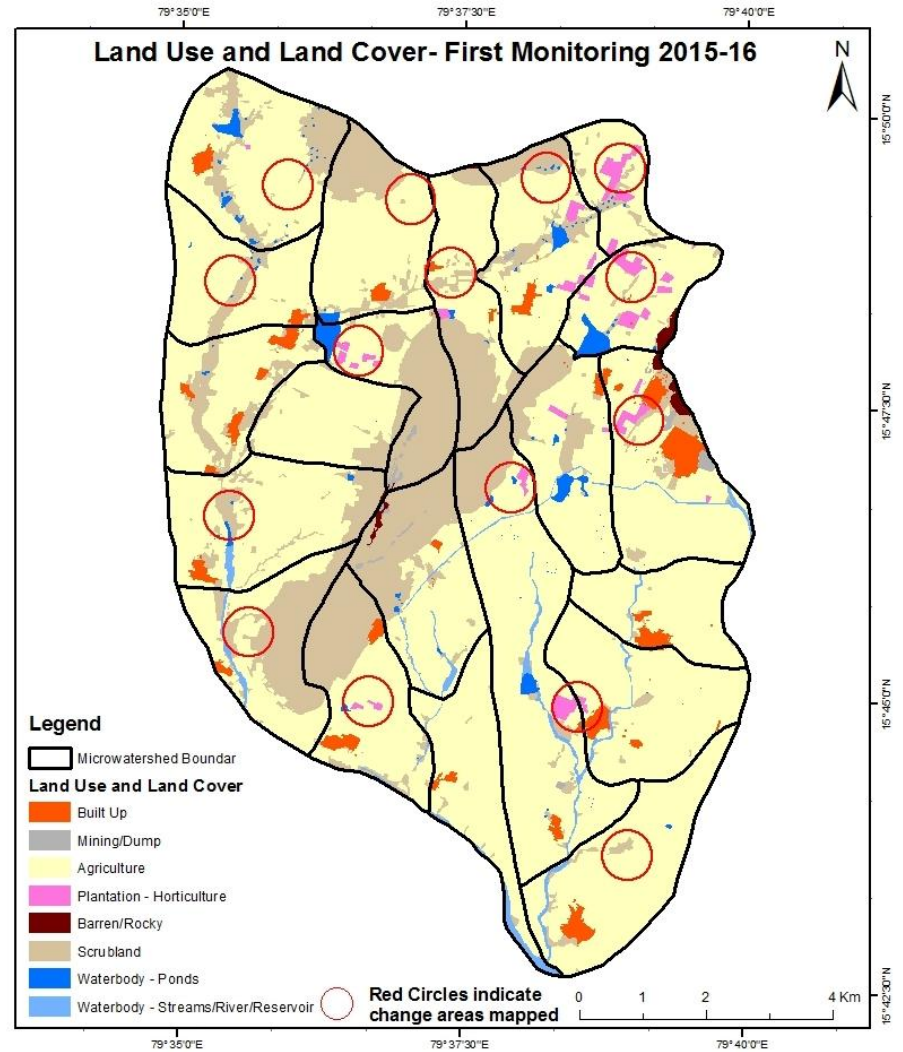
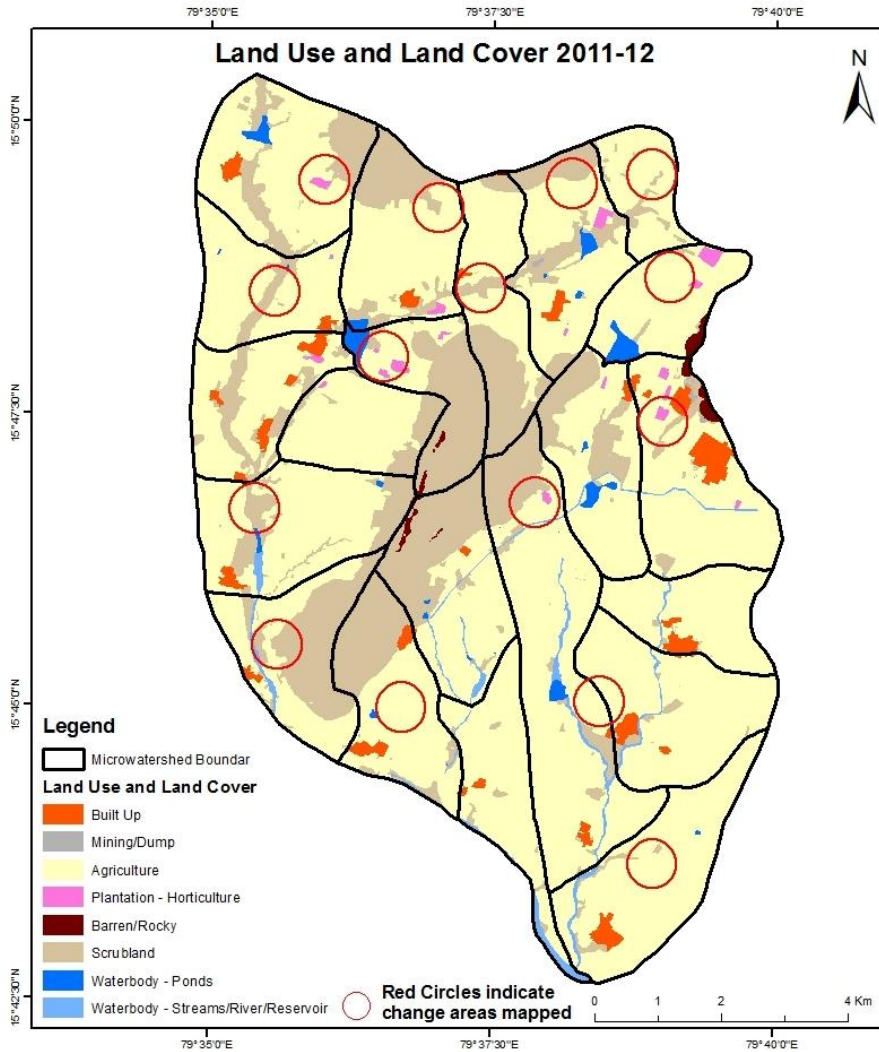
## MONITORING IN THE PROJECT AREA

### 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) .

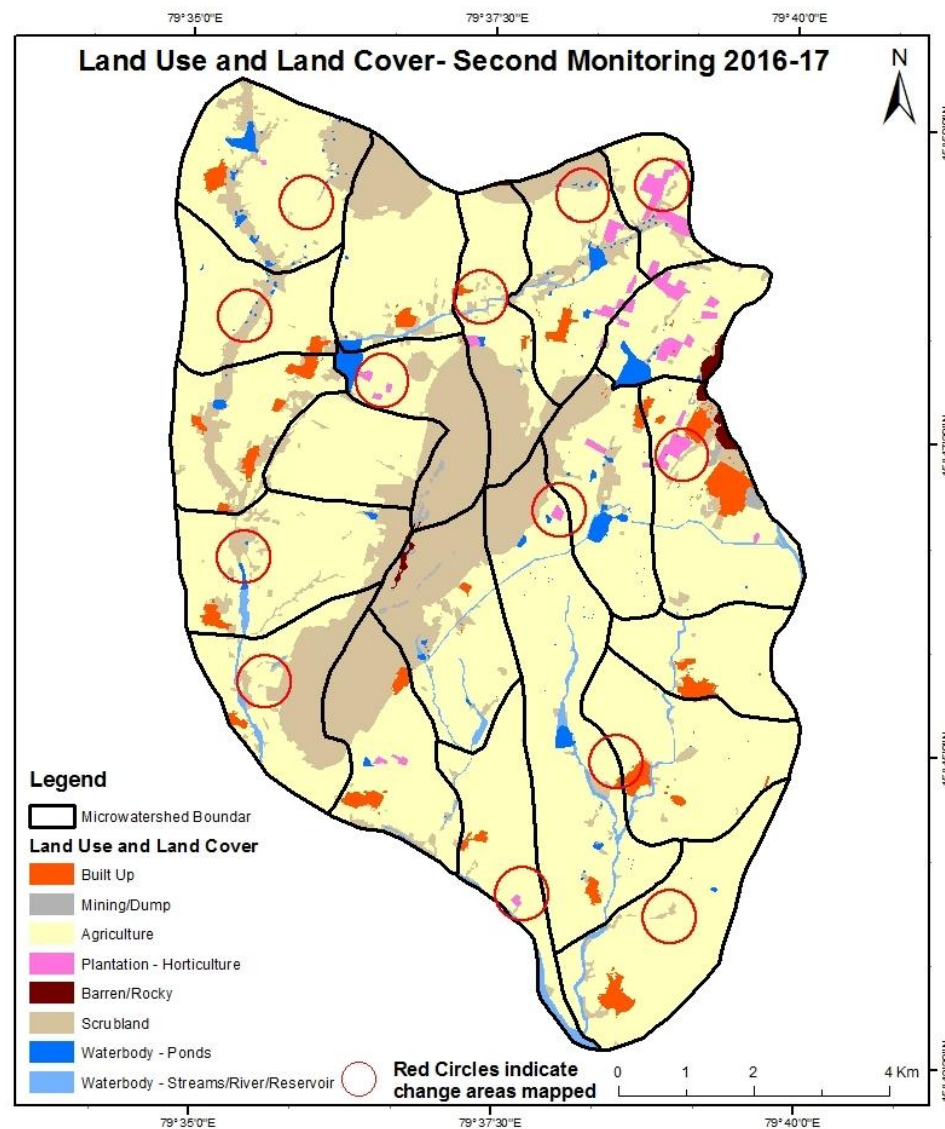
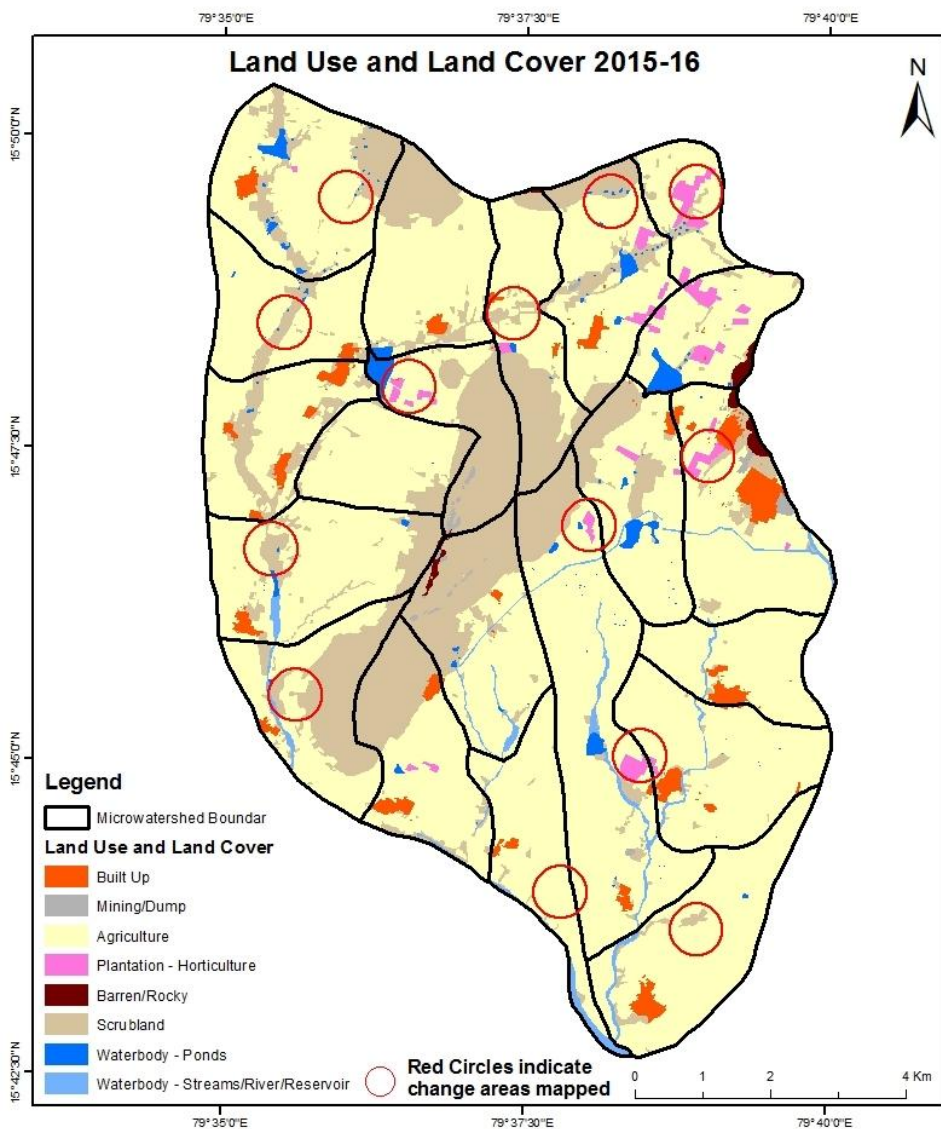
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



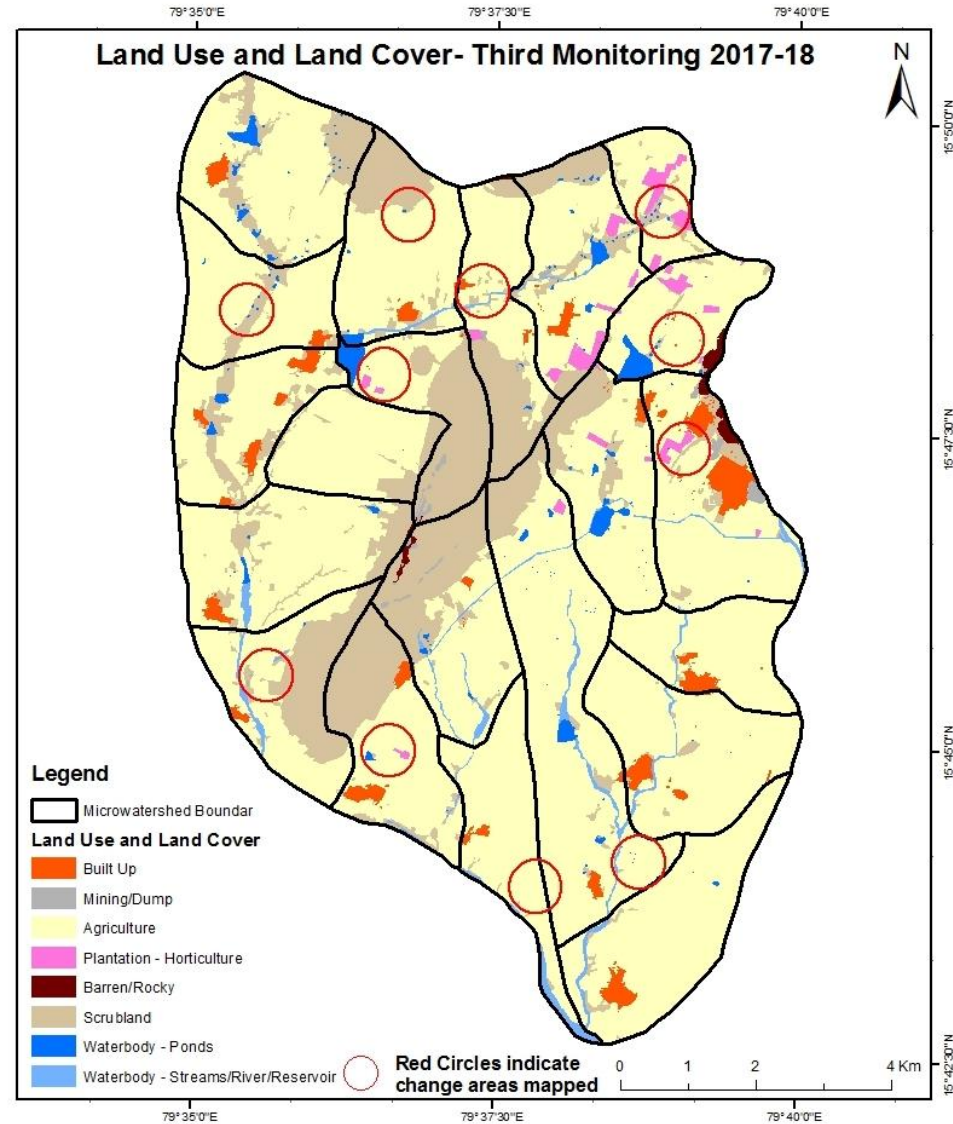
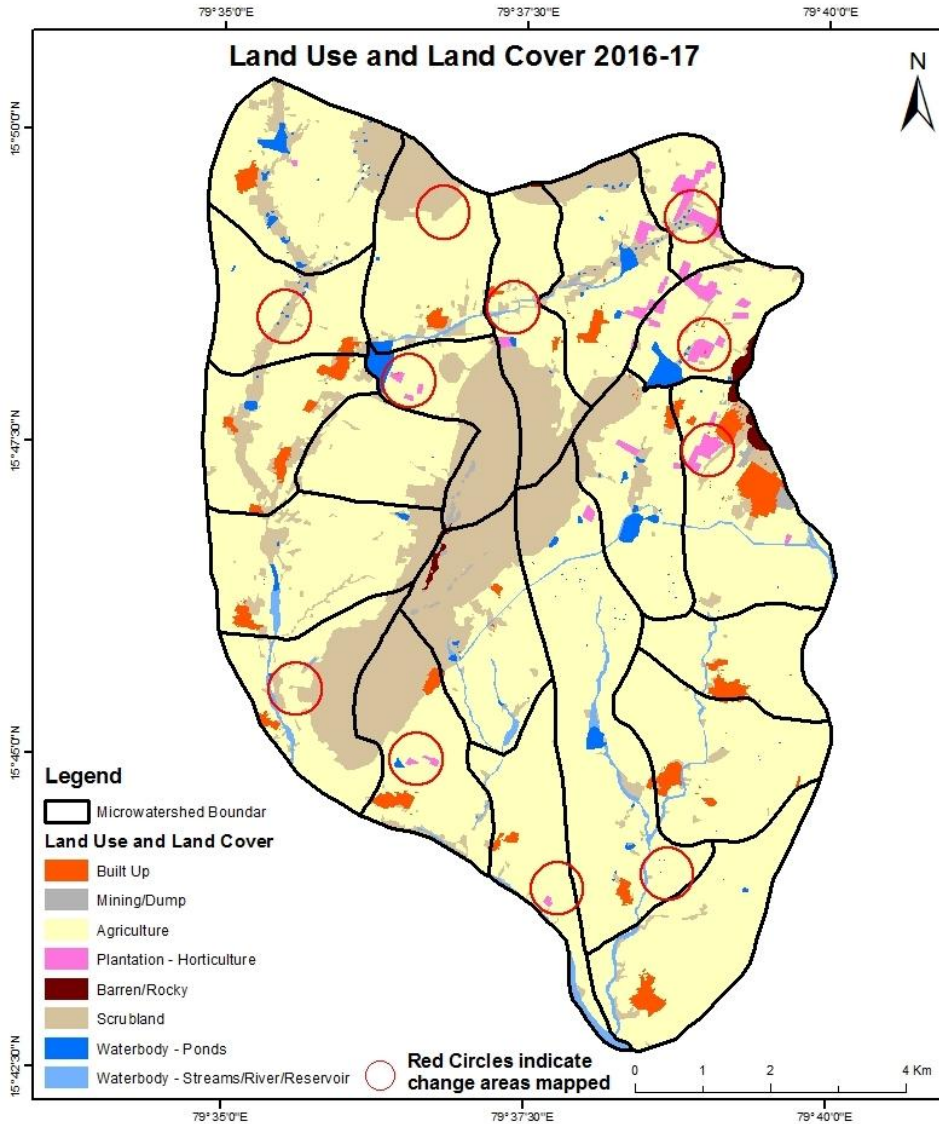
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



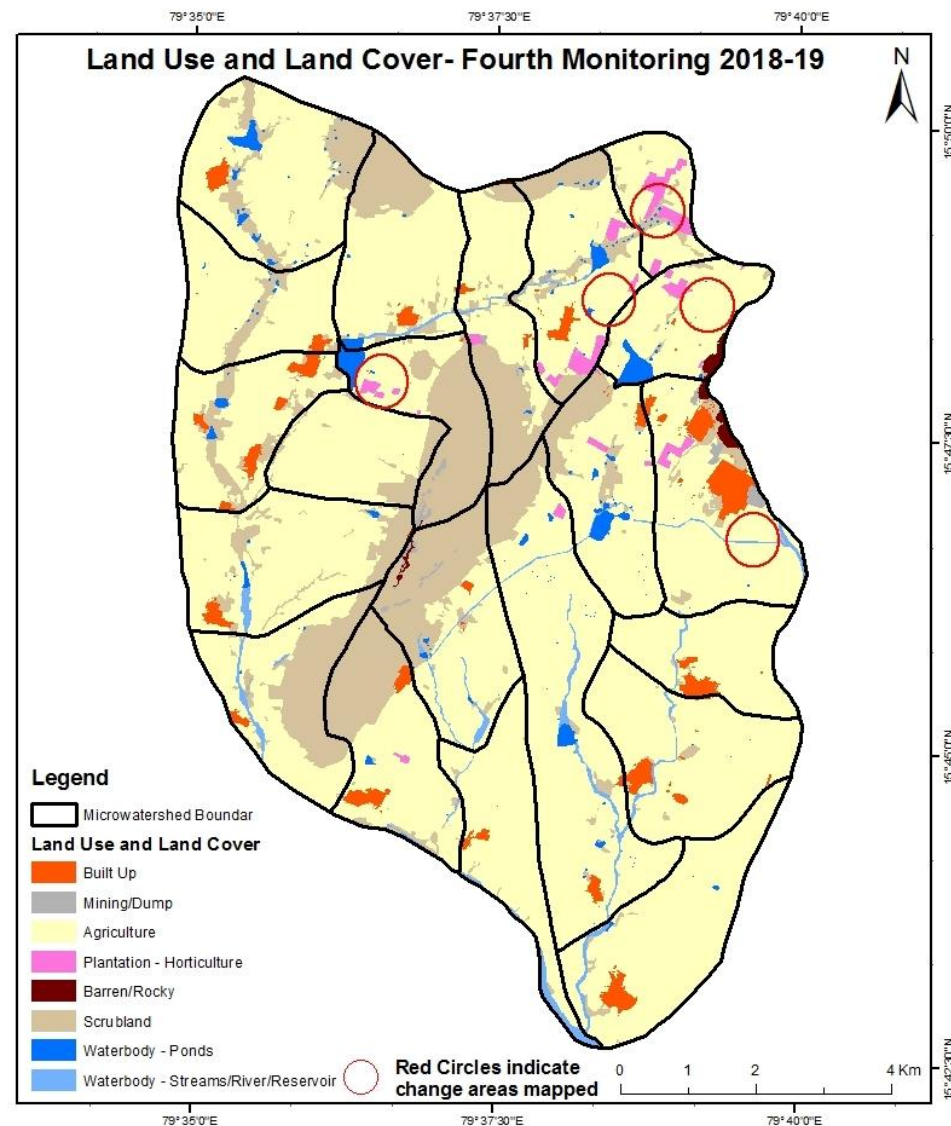
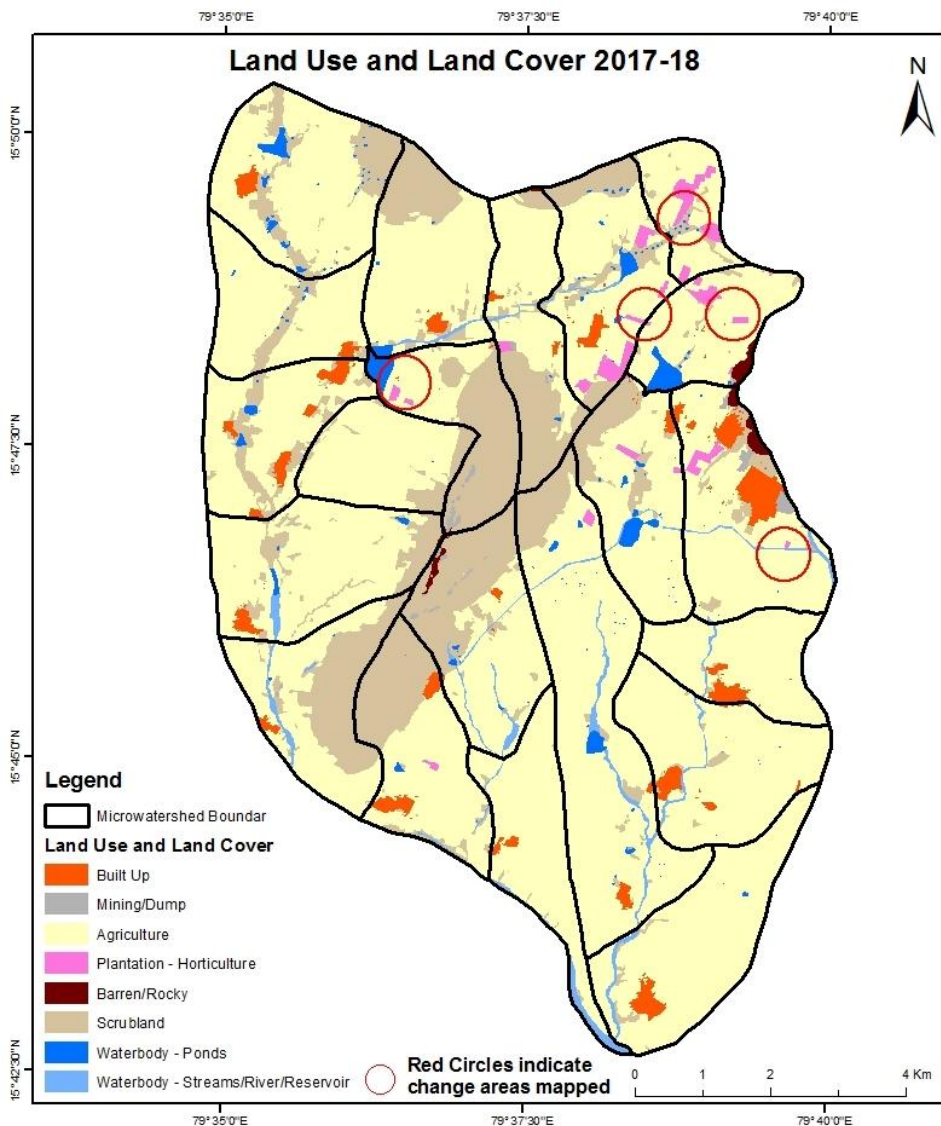
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



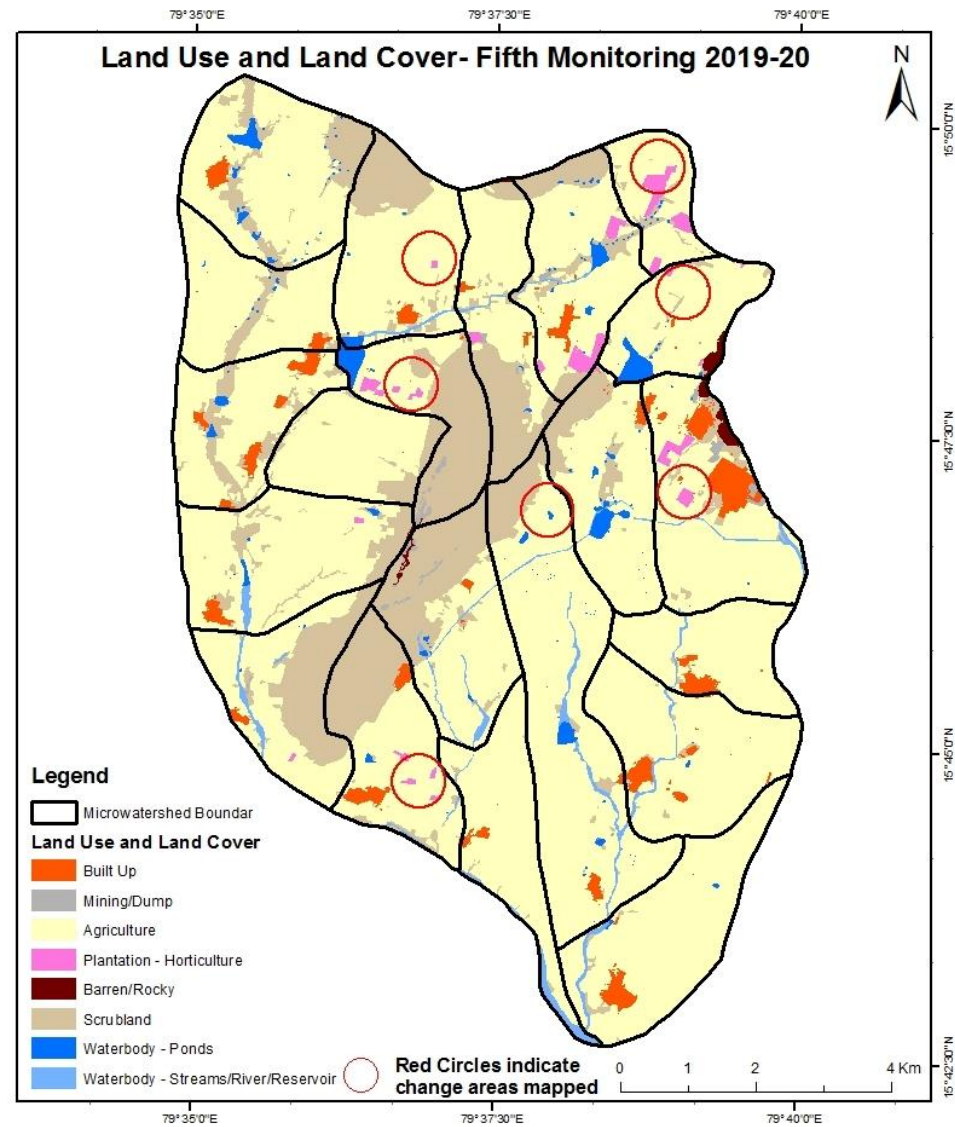
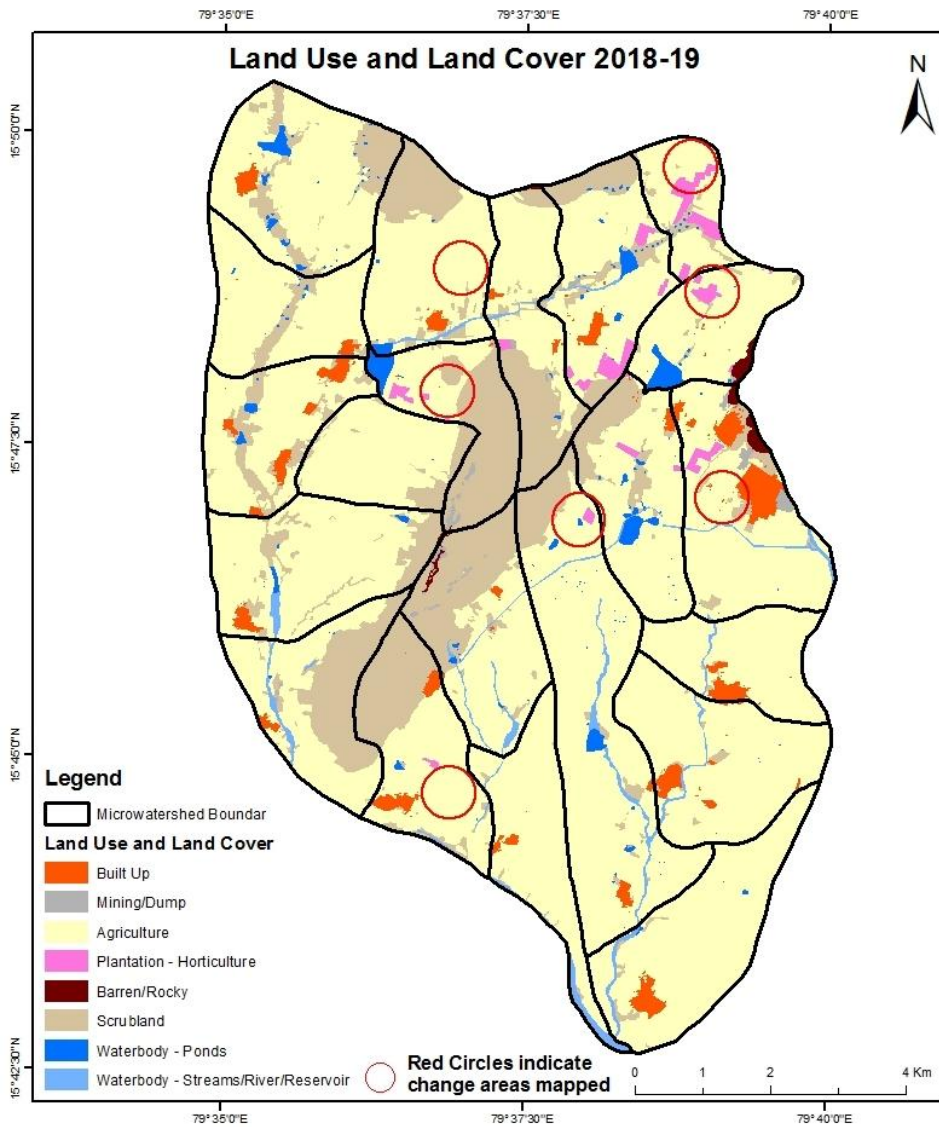
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

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

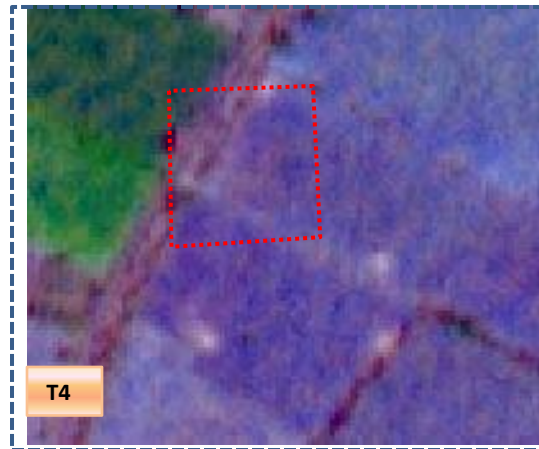


T4: 2018-19 (79°39'3.759"E 15°47'2.947"N )

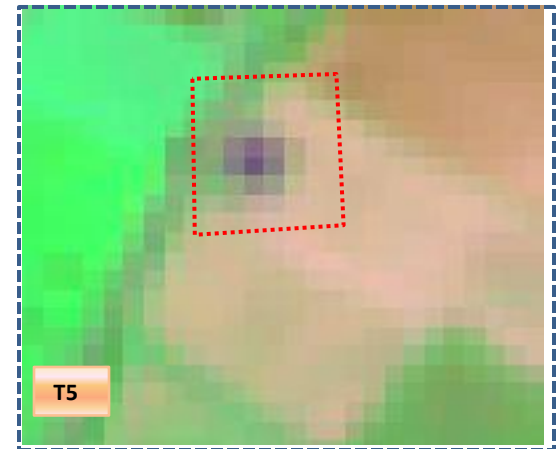


T5: 10 November 2019

### Agriculture to Waterbody



T4: 2018-19 (79°39'14.235"E 15°48'43.797"N )



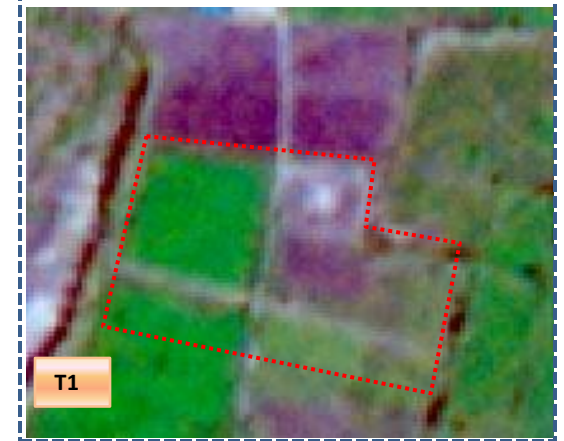
T5: 10 November 2019

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

### Scrub To Agriculture

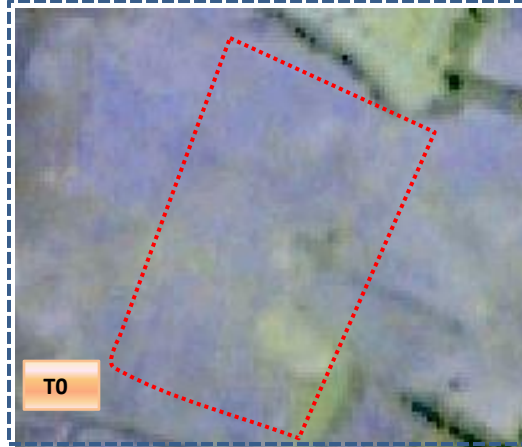


T0: 2011-12 (79°36'25.71"E 15°48'8.334"N )

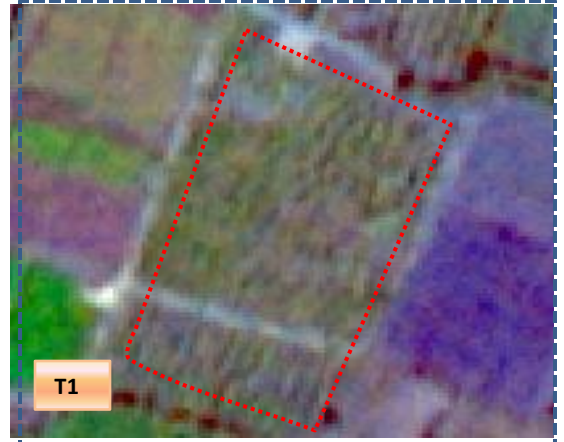


T1: 10 January 2016

### Agriculture to Plantation



T0: 2011-12 (79°36'24.64"E 15°47'55.715"N )



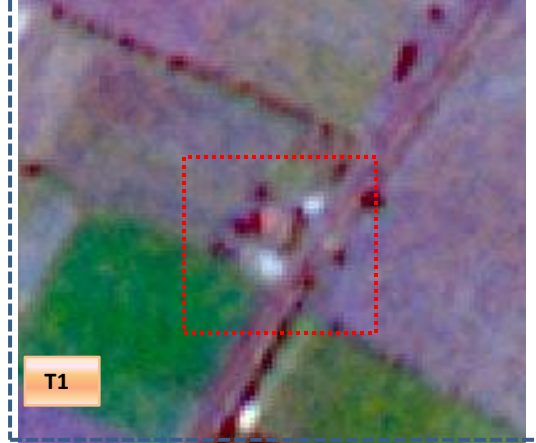
T1: 10 January 2016

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

Agriculture to Water body



T0: 2011-12(79°39'13.142"E 15°48'47.36"N )



T2: 10 January 2016

Scrub to Water body



T0: 2011-12(79°35'20.656"E 15°49'19.312"N )



T1: 10 January 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
<b>T0</b>													
<b>Built up</b>	208.20												<b>208.20</b>
<b>Mining/dump</b>	2.18	2.40											<b>4.58</b>
<b>Agriculture</b>	10.10	10.02	6567.91	102.86				113.21	5.35		4.85		<b>6814.31</b>
<b>Plantation Horticulture</b>	0.04		29.68	16.23				1.79					<b>47.73</b>
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>		5.67						31.12					<b>36.79</b>
<b>Scrub</b>	3.14	9.51	211.23					1763.77	0.45		15.65		<b>2003.75</b>
<b>Waterbody- Streams/River</b>									118.59				<b>118.59</b>
<b>Waterbody – Ponds</b>											84.96		<b>84.96</b>
<b>Grand Total</b>	<b>223.66</b>	<b>27.61</b>	<b>6808.82</b>	<b>119.09</b>				<b>31.12</b>	<b>1878.77</b>	<b>124.38</b>	<b>105.46</b>		<b>9318.91</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 127 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 240 ha of the agriculture area has increased from plantations and 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-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>	223.66										<b>223.66</b>	
<b>Mining/dump</b>	0.01	26.52								1.07	<b>27.61</b>	
<b>Agriculture</b>	1.71		6790.12	14.12				0.10		2.76	<b>6808.82</b>	
<b>Plantation Horticulture</b>			21.20	97.86						0.03	<b>119.09</b>	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>							31.12				<b>31.12</b>	
<b>Scrub</b>	0.62		84.33					1774.69	13.68	5.45	<b>1878.77</b>	
<b>Waterbody- Streams/River</b>									124.38		<b>124.38</b>	
<b>Waterbody – Ponds</b>			1.10							104.36	<b>105.46</b>	
<b>Grand Total</b>	<b>226.00</b>	<b>26.52</b>	<b>6896.75</b>	<b>111.98</b>			<b>31.12</b>	<b>1774.79</b>	<b>138.07</b>	<b>113.68</b>	<b>9318.91</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 18 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T2.
- In T2 105 ha of the agriculture area has increased from plantations, 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	
	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>	226.00										<b>226.00</b>	
<b>Mining/dump</b>		26.52									<b>26.52</b>	
<b>Agriculture</b>	1.55	1.69	6866.26	22.16				5.00		0.08	<b>6896.75</b>	
<b>Plantation Horticulture</b>	0.02		37.70	74.26							<b>111.98</b>	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>		0.27					30.85				<b>31.12</b>	
<b>Scrub</b>	1.58	1.58	66.88					1702.03		2.73	<b>1774.79</b>	
<b>Waterbody- Streams/River</b>									138.07		<b>138.07</b>	
<b>Waterbody – Ponds</b>		1.14	0.03							112.50	<b>113.68</b>	
<b>Grand Total</b>	<b>229.16</b>	<b>31.20</b>	<b>6970.88</b>	<b>96.42</b>			<b>30.85</b>	<b>1707.02</b>	<b>138.07</b>	<b>115.31</b>	<b>9318.91</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 25 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations, scrubland and water body in T3.
- In T3 104 ha of the agriculture area has increased from 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		
	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>	229.16												<b>229.16</b>
<b>Mining/dump</b>		31.20											<b>31.20</b>
<b>Agriculture</b>	1.54	0.37	6957.35	9.40				0.58			1.63		<b>6970.88</b>
<b>Plantation Horticulture</b>			6.56	89.87									<b>96.42</b>
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>		1.81					29.03						<b>30.85</b>
<b>Scrub</b>	0.80	1.10	28.35					1675.56			1.21		<b>1707.02</b>
<b>Waterbody- Streams/River</b>			0.10						137.96				<b>138.07</b>
<b>Waterbody – Ponds</b>											115.31		<b>115.31</b>
<b>Grand Total</b>	<b>231.49</b>	<b>34.49</b>	<b>6992.36</b>	<b>99.27</b>			<b>29.03</b>	<b>1676.15</b>	<b>137.96</b>		<b>118.16</b>		<b>9318.91</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 12 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations, scrubland and water body in T4.
- In T4 34 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	231.49											231.49
Mining/dump	2.48	31.76								0.24		34.49
Agriculture	2.20		6976.92	12.52						0.71		6992.36
Plantation Horticulture			26.88	72.38								99.27
Forest												
Forest Plantation												
Barren Rocky							29.03					29.03
Scrub	2.14		25.79					1648.04		0.19		1676.15
Waterbody- Streams/River									137.96			137.96
Waterbody – Ponds										118.16		118.16
<b>Grand Total</b>	<b>238.32</b>	<b>31.76</b>	<b>7029.59</b>	<b>84.91</b>			<b>29.03</b>	<b>1648.04</b>	<b>137.96</b>	<b>119.30</b>		<b>9318.91</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 15 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 52 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 53 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 15, 02, 74,21 & 37 Hectares From T0 to T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 215 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 37 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 355 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.