

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

**IWMP-Batch-IV**

ANANTAPURAMU -84/2012-13

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad

December-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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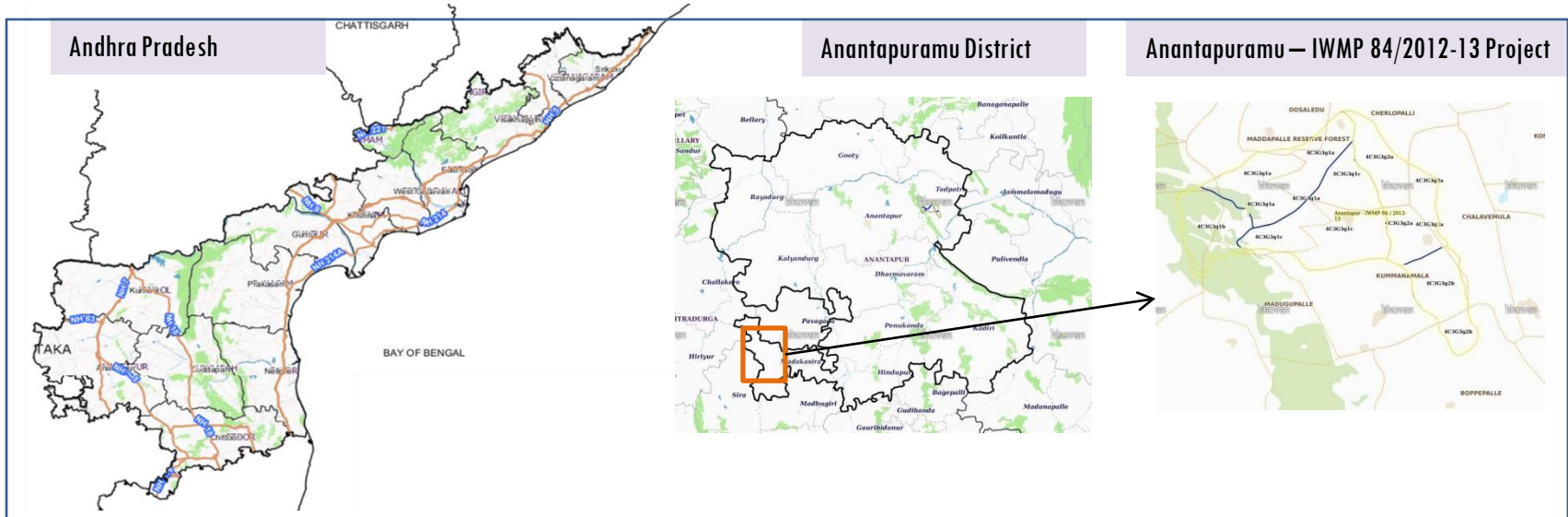
## EXECUTIVE SUMMARY

- 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-84/2012-13, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **4,797** ha. It comprises of 5 micro watersheds.
- In the project area 216 Drishti photos were uploaded showing check dams, Farm ponds, Horticulture and remaining showing others.
- Water bodies have shown an increase by 8.9 ha , which correspond to the other land use classes that have been converted into various water bodies in this period, project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 1 new farm ponds or dug out pits.
- Major percentage i.e. 66% is covered by the Agriculture, 10% is covered by Scrubland, 12% is covered by Forest remaining by other land use classes.

# PROJECT : ANANTAPURAMU - IWMP-84/2012-13

## DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Putlur Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **4,797** ha. It comprises of 5 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2012-13 (T0) period (*Batch -1*) projects taking 2020-21 (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.

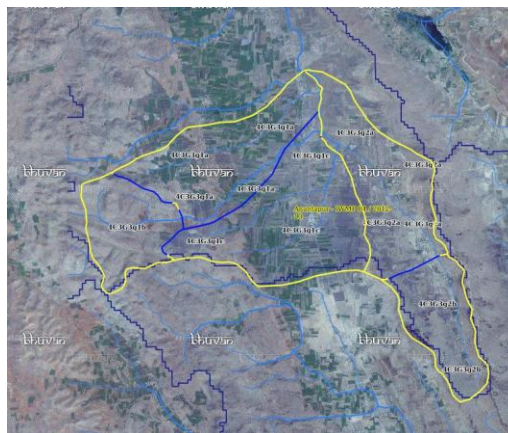
# Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2012-13	2020-21
LISS IV	2012-13		
SCENE 1			27-Feb-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			27-Feb-21
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	Drishiti Photographs		
		Total	216
4	Detailed Project Report		

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



### Legend



Drainage (1:10000 Scale)

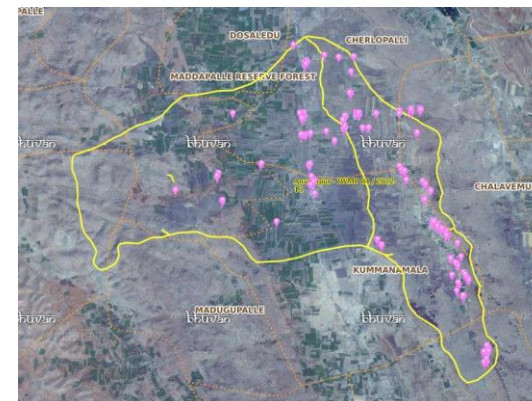


MWS Boundary



Project Boundary

## Natural Color Composite overlaid with Drishiti Points



### Drishiti Upload Status

## Classification of the Activities

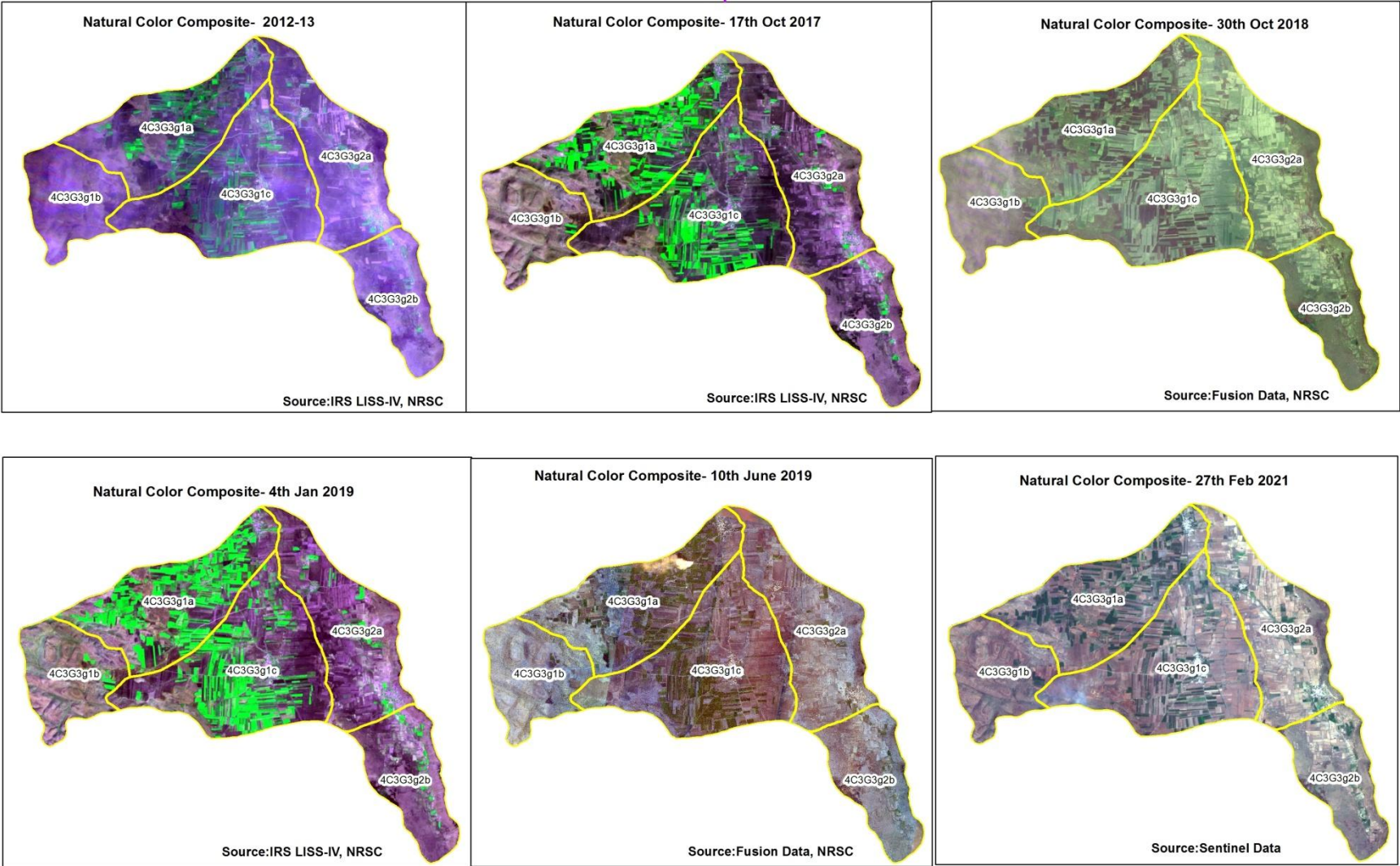
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	33	10
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	21	20
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	1	1
10	Civil work-Check dams/Rock fill dam	107	60
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	1	1
15	Capacity Building Activities	0	0
16	Entry Point Activity	4	4
17	Others	126	120
	<b>TOTAL</b>	<b>293</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 (2012-13) and T5 is 2020-21 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 Ananthapuram District Andhra Pradesh. IWMP-84/2012-13



T0 Satellite data 2013



T1 Satellite data 2015



T2 Satellite data 2016



T3 Satellite data 2017



T4 Satellite data 2018



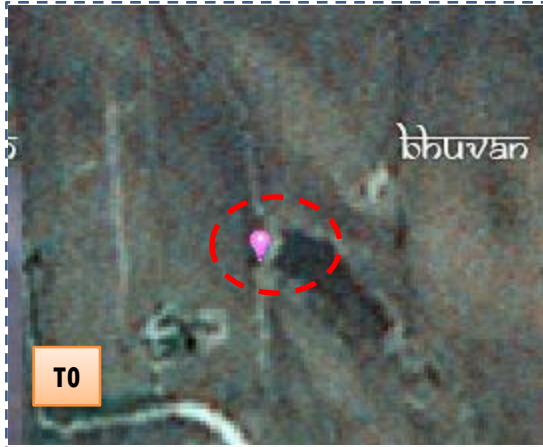
T5 Satellite data 2020



Drishti Id. 1748839

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-84/2012-13



T0

T0:2012-13



T1

T1: 17 October 2016



Drishti SI no 578988-- MWS :4C3G3g2a

Check dam



T0:2012-13



T1

T1: 17 October 2016



Drishti SI no2384550--MWS : 4C3G3g2b

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-84/2010-11



T0

T0: 2012-13



T1

T1: 17 October 2016



Drishti SI no2384575- MWS 4C3G3g2a

Check dam



T0

T0: 2012-13



T1

T1: 17 October 2016



Drishti SI no1828079-MWS :4C3G3g1c

Farm Pond

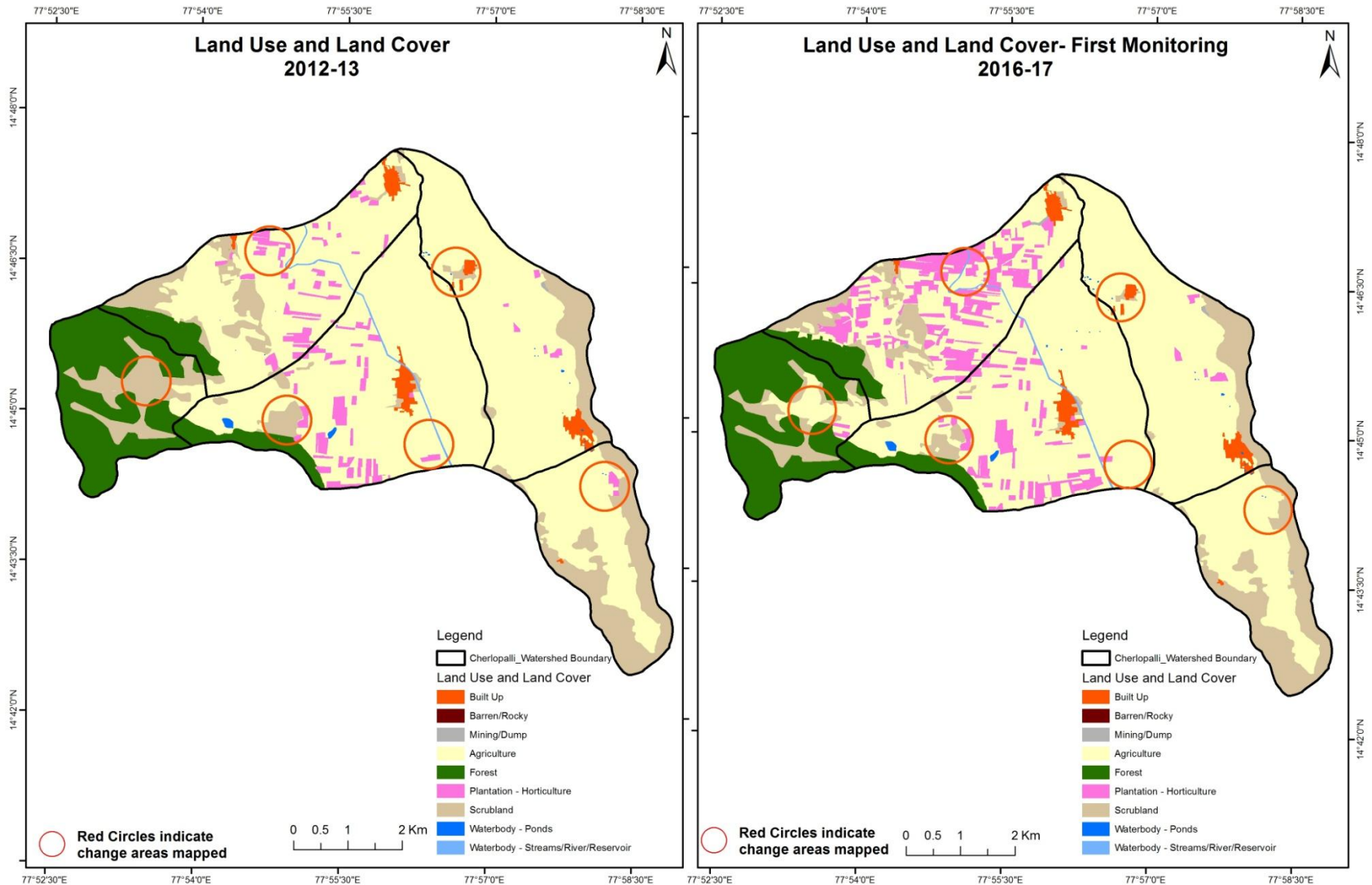
## MONITORING IN THE PROJECT AREA

### 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 (2012-13) and row represents the T5 (2020-21)

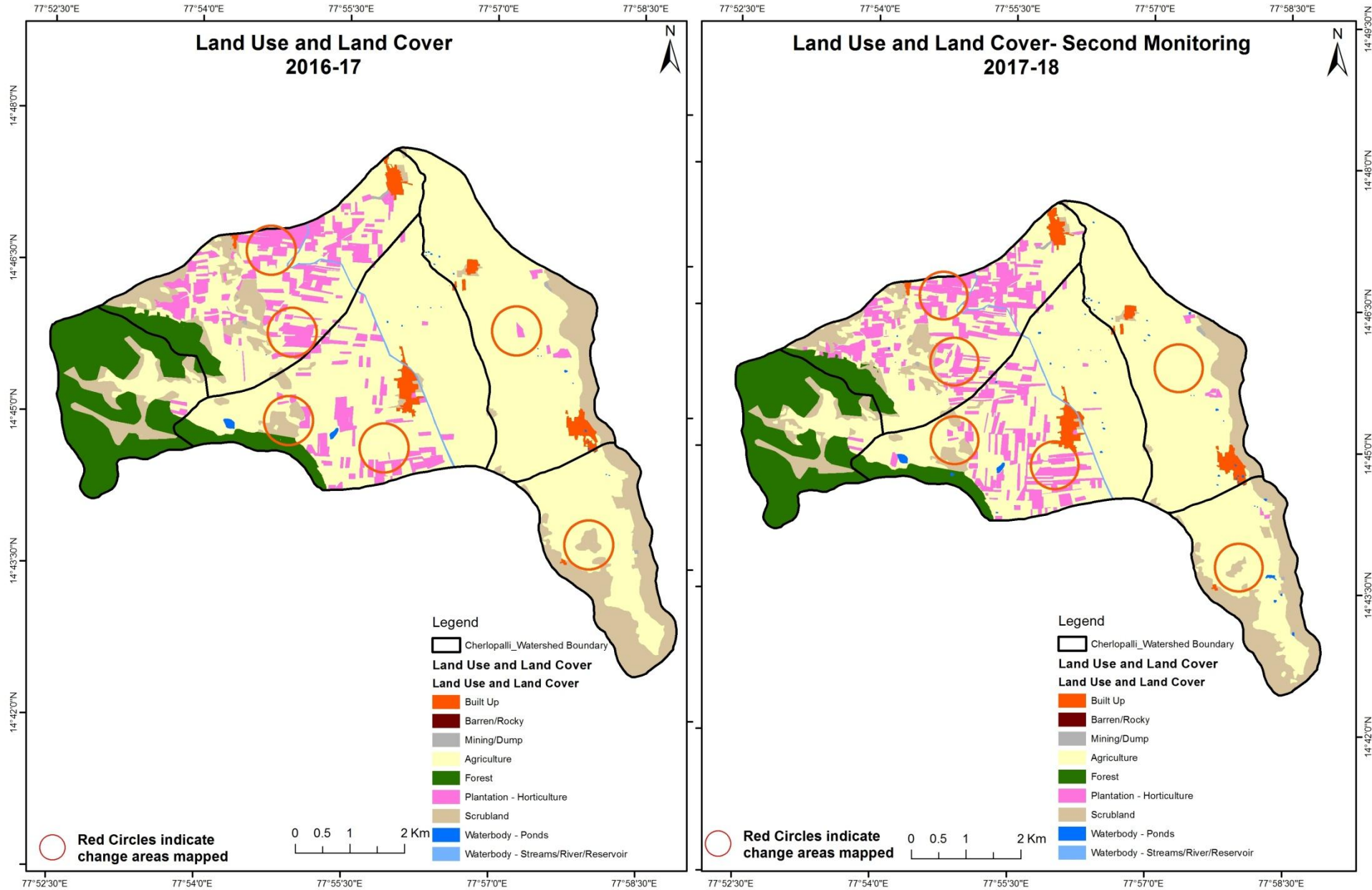
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



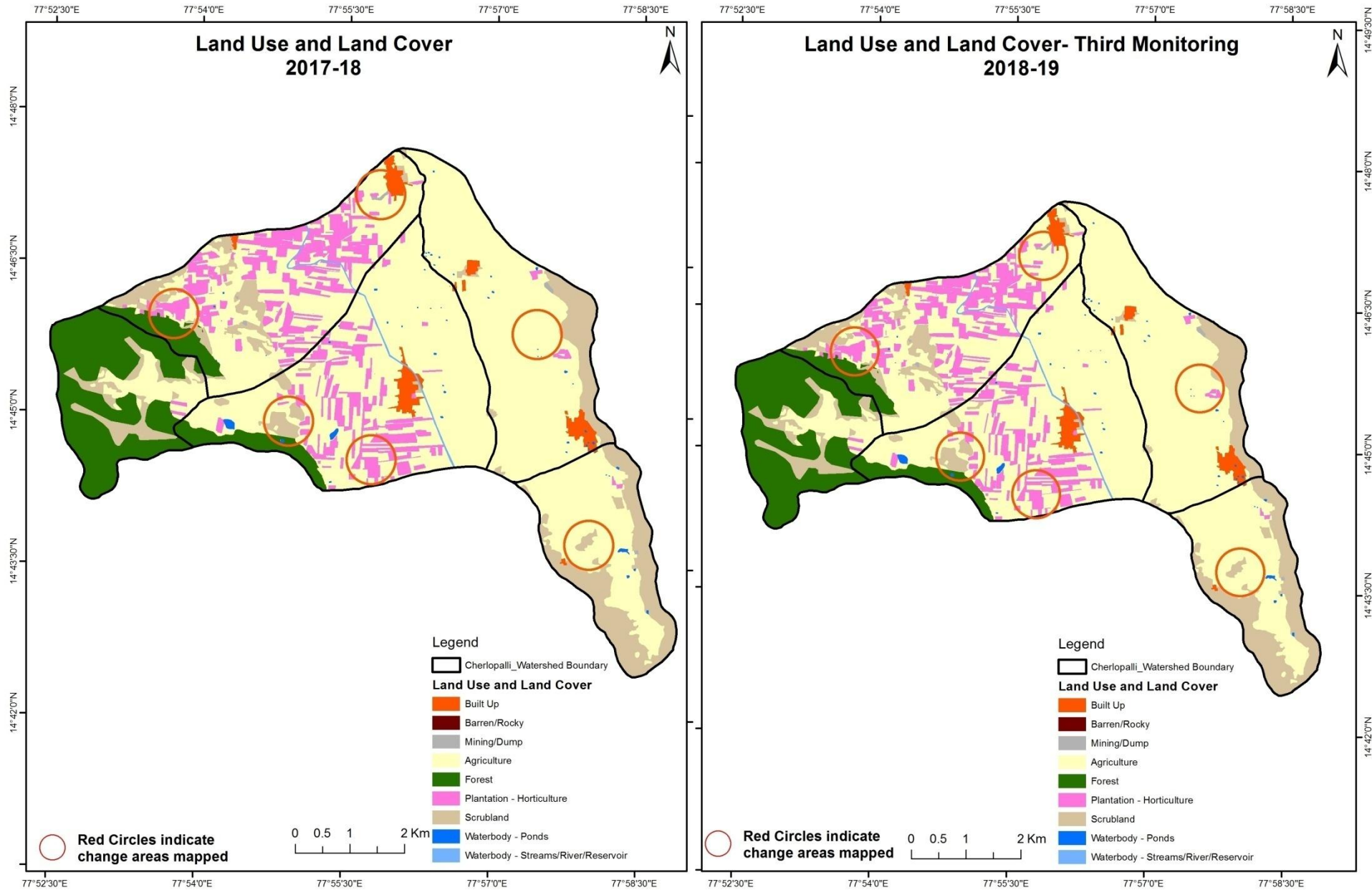
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



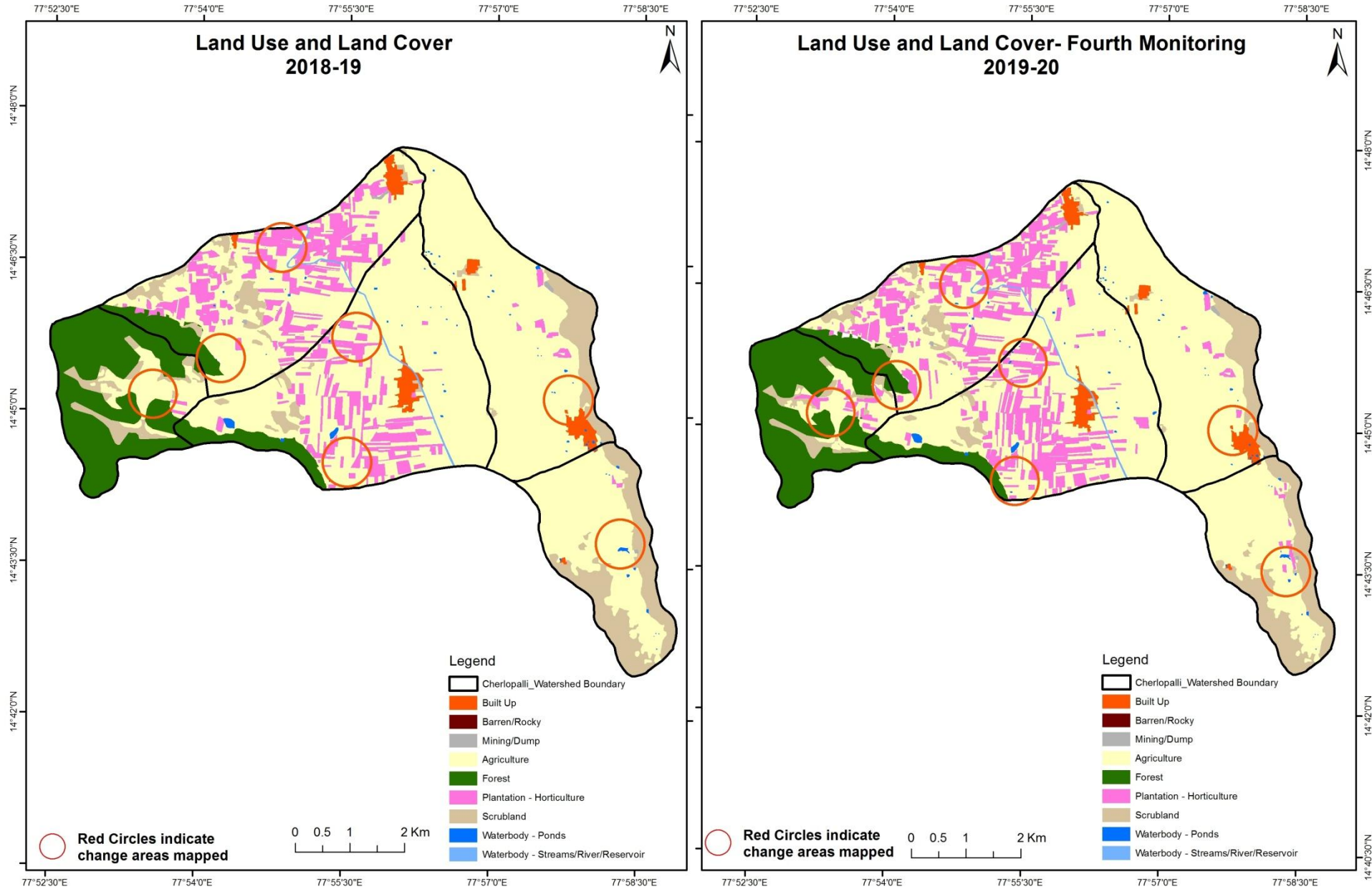
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



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

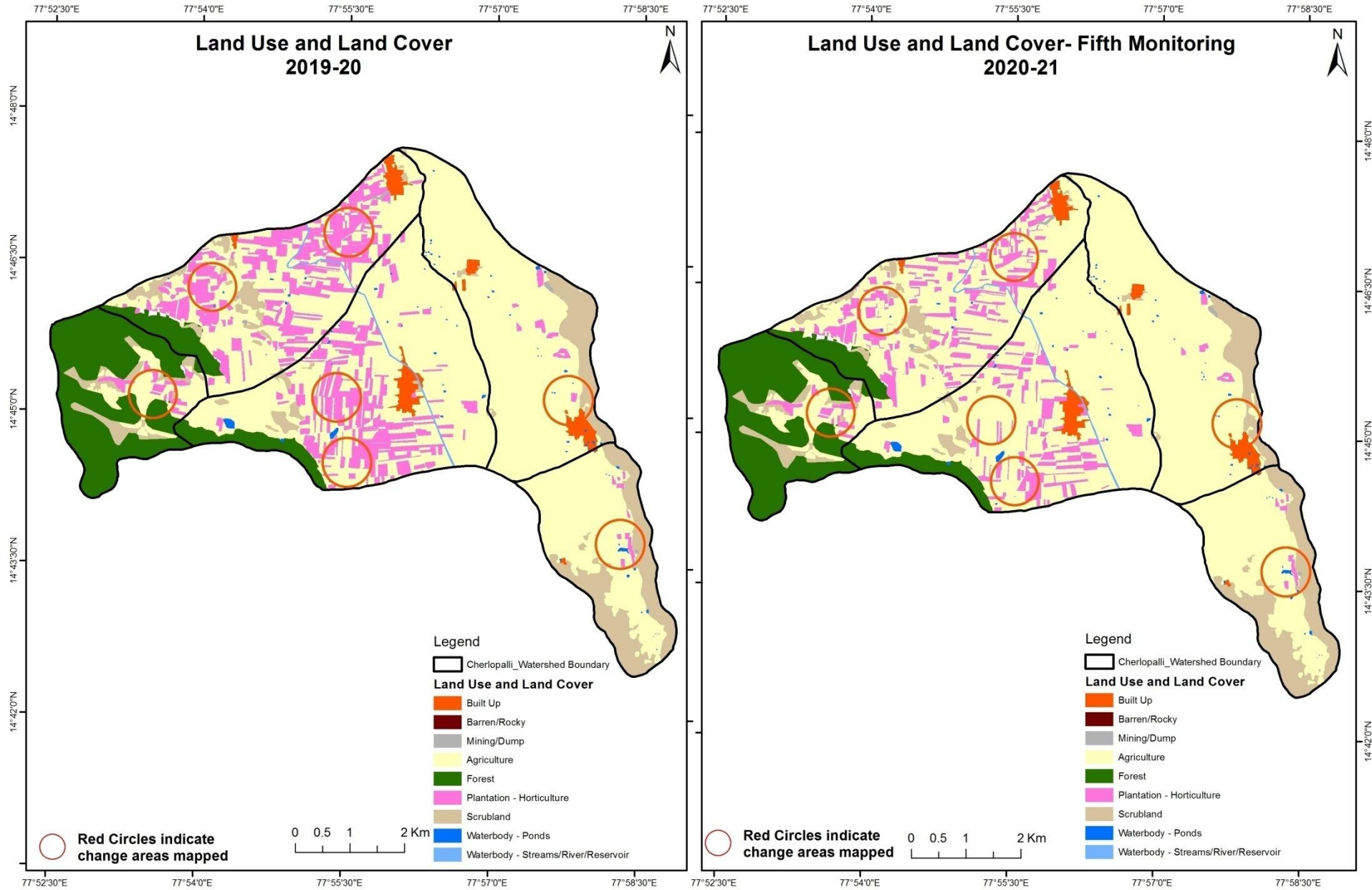
Scale: 1:10000





# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000



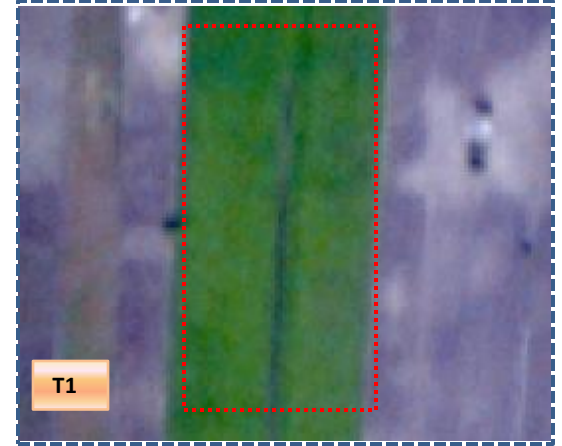
## Land Use and Land Cover changes for Pre and Post treatment dates

### Agriculture to Plantation



T0

T0: 2012-13(77°55'55.16"E 14°45'16.396"N )



T1

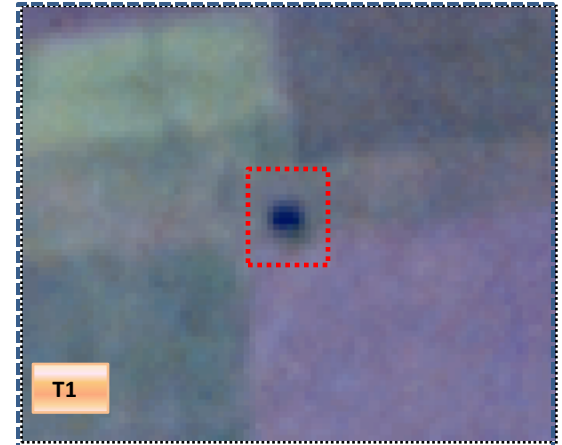
T1: 17 October 2016

### Agriculture to Water body



T0

T0: 2012-13 (77°56'21.09"E 14°46'3.377"N )



T1

T1: 17 October 2016

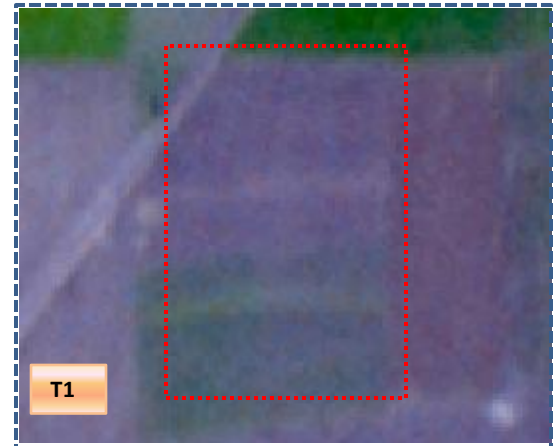
## Land Use and Land Cover changes for Pre and Post treatment dates

### Plantation to Agriculture



T0

T0: 2012-13(77°55'35.337"E 14°44'25.206"N )



T1

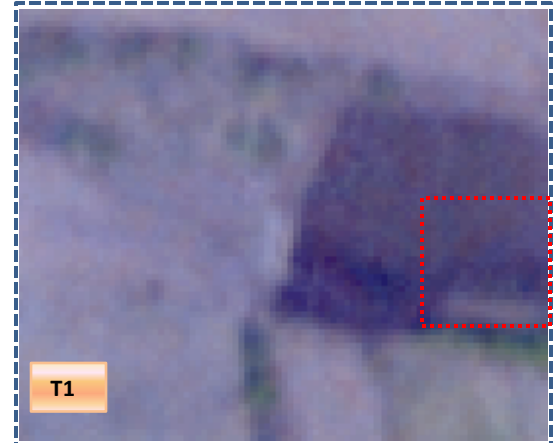
T1: 17 October 2016

### Scrubland to Agriculture



T0

T0: 2012-13(77°56'30.507"E 14°46'27.684"N )



T1

T1: 17 October 2016

**Table showing change matrix depicting Land cover transitions during study period-2012-13 to 2016-17**

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>	70.68												<b>70.68</b>
<b>Mining/dump</b>		1.20											<b>1.20</b>
<b>Agriculture</b>	2.49		2823.87	295.72							0.32		<b>3122.41</b>
<b>Plantation Horticulture</b>			64.74	114.79									<b>179.53</b>
<b>Forest</b>			3.77		606.00								<b>609.77</b>
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>	0.58	3.39	96.31	0.51				688.98					<b>789.78</b>
<b>Waterbody- Streams/River</b>									17.70				<b>17.70</b>
<b>Waterbody – Ponds</b>											6.28		<b>6.28</b>
<b>Grand Total</b>	<b>73.76</b>	<b>4.59</b>	<b>2988.69</b>	<b>411.03</b>	<b>606.00</b>			<b>688.98</b>	<b>17.70</b>		<b>6.60</b>		<b>4797.36</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 298 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T1.
- In T1 164 ha of the agriculture area has increased from plantations, forest and scrubland of T2. The additional agriculture are coming from waterbody in T1 represents seasonal agriculture.

**Table showing change matrix depicting Land cover transitions during study period-2016-17 to 2017-18**

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>	64.71												<b>64.71</b>
<b>Mining/dump</b>		4.59						2.24					<b>6.84</b>
<b>Agriculture</b>	4.48		2757.76	234.02							3.19		<b>2999.45</b>
<b>Plantation Horticulture</b>			138.81	272.07							0.17		<b>411.05</b>
<b>Forest</b>			7.22	0.43	591.96			4.10			0.43		<b>604.14</b>
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>	4.74	0.55	45.26	0.66				635.69			0.57		<b>687.47</b>
<b>Waterbody- Streams/River</b>									17.69				<b>17.69</b>
<b>Waterbody – Ponds</b>											5.04		<b>5.04</b>
<b>Grand Total</b>	<b>73.93</b>	<b>5.14</b>	<b>2949.05</b>	<b>507.18</b>	<b>591.96</b>			<b>642.03</b>	<b>17.69</b>		<b>9.40</b>		<b>4796.38</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 241 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T2.
- In T2 191 ha of the agriculture area has increased from plantations, forest and 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-2017-18 to 2018-19**

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>	73.93										<b>73.93</b>	
<b>Mining/dump</b>		5.14									<b>5.14</b>	
<b>Agriculture</b>	0.33		2922.48	25.98						0.26	<b>2949.05</b>	
<b>Plantation Horticulture</b>			8.04	499.14							<b>507.18</b>	
<b>Forest</b>			19.37		572.60						<b>591.96</b>	
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>	0.13		165.70					476.20			<b>642.03</b>	
<b>Waterbody- Streams/River</b>									17.69		<b>17.69</b>	
<b>Waterbody – Ponds</b>										9.40	<b>9.40</b>	
<b>Grand Total</b>	<b>74.39</b>	<b>5.14</b>	<b>3115.58</b>	<b>525.12</b>	<b>572.60</b>			<b>476.20</b>	<b>17.69</b>	<b>9.66</b>	<b>4796.38</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 26 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T3.
- In T3 193 ha of the agriculture area has increased from plantations, forest 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-2018-19 to 2019-20**

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	
<b>Built up</b>	74.39											<b>74.39</b>
<b>Mining/dump</b>		5.14										<b>5.14</b>
<b>Agriculture</b>			2919.70	195.79						0.09		<b>3115.58</b>
<b>Plantation Horticulture</b>	0.01		25.93	499.16						0.02		<b>525.12</b>
<b>Forest</b>			5.83	0.66	566.11							<b>572.60</b>
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>			14.00	0.66				461.47		0.07		<b>476.20</b>
<b>Waterbody- Streams/River</b>									17.69			<b>17.69</b>
<b>Waterbody – Ponds</b>										9.66		<b>9.66</b>
<b>Grand Total</b>	<b>74.40</b>	<b>5.14</b>	<b>2965.46</b>	<b>696.27</b>	<b>566.11</b>			<b>461.47</b>	<b>17.69</b>	<b>9.84</b>		<b>4796.38</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 195 ha of the agriculture area has decreased and it is converted into plantations and water body in T4.
- In T4 45 ha of the agriculture area has increased from plantations, forest 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-2019-20 to 2020-21**

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>	83.32												<b>83.32</b>
<b>Mining/dump</b>		5.14											<b>5.14</b>
<b>Agriculture</b>			2801.27	79.10		0.64					0.23		<b>2881.24</b>
<b>Plantation Horticulture</b>			352.55	342.00							0.03		<b>694.57</b>
<b>Forest</b>					591.72								<b>591.72</b>
<b>Forest Plantation</b>						4.35							<b>4.35</b>
<b>Barren Rocky</b>													
<b>Scrub</b>			19.59	1.53				483.23					<b>504.35</b>
<b>Waterbody- Streams/River</b>									17.70				<b>17.70</b>
<b>Waterbody – Ponds</b>											14.97		<b>14.97</b>
<b>Grand Total</b>	<b>83.32</b>	<b>5.14</b>	<b>3173.41</b>	<b>422.63</b>	<b>591.72</b>	<b>5.00</b>		<b>483.23</b>	<b>17.70</b>		<b>15.22</b>		<b>4797.36</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 79 ha of the agriculture area has decreased and it is converted into plantations and water body in T5.
- In T5 372 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 8.9 Hectares in Reservoir/Tanks area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
4. There is an increase of 166 & 292 Hectares from T2-T3 & T4-T5 and there is a decrease of 133, 50 & 150 Hectares from T0-T1, T1-T2 & T3-T4 respectively and overall increase of 51 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. There is an **increase of 243 Hectares in plantation/horticulture** area from 2012-13 (T0) to 2020-21 years.
6. There is a decrease of 306 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (1) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.