

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

**IWMP-Batch-IV**

YSR KADAPA -44/2012-13

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**

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

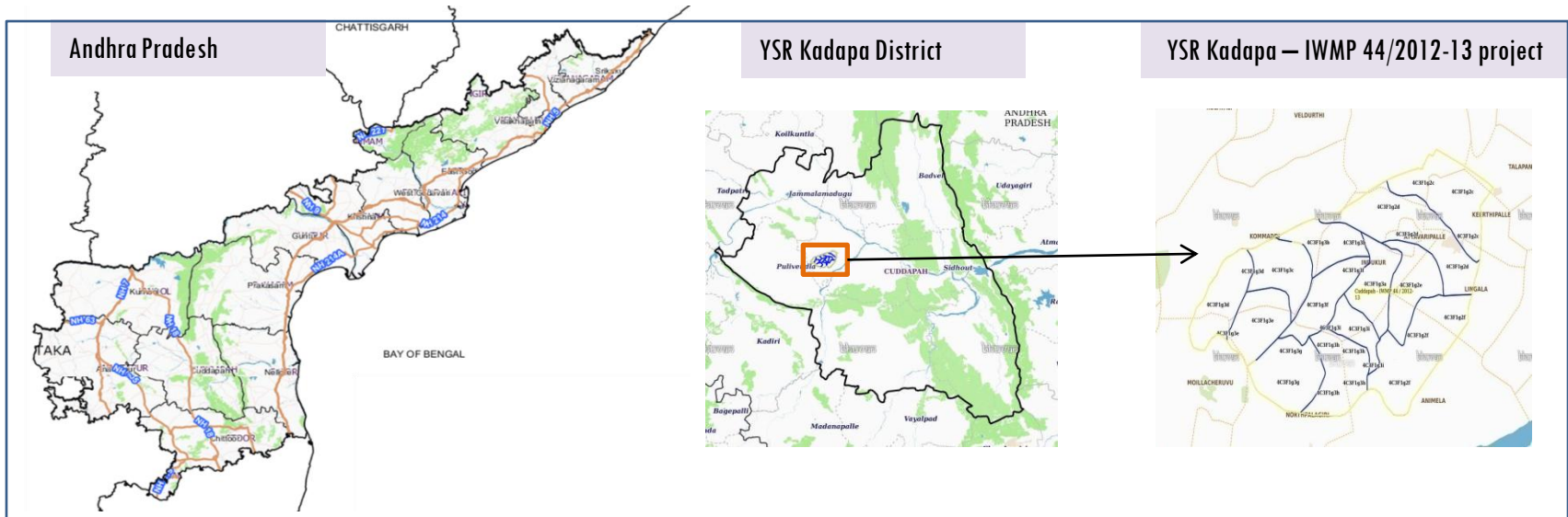
## **E X E C U T I V E   S U M M A R Y**

- 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-44/2012-13, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is **7,842** ha. It comprises of 13 micro watersheds.
- In the project area 457 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 656 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 70 % is covered by the agriculture, 14 % scrubland, 10.5 % is water body and remaining by other land use classes.

# PROJECT : YSR KADAPA - IWMP-44/2012-13

## DISTRICT : YSR KADAPA , STATE : ANDHRA PRADESH

- The study area falls in Veerapunayunipalle Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is 7,842 ha. It comprises of 13 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



- YSR Kadapa 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 38 °C range and it reaches around 44 °C to 45 °C .
- The average annual rainfall of the YSR Kadapa District is 710 mm, which ranges from nil rainfall in January to 137 mm in October. October is the wettest month of the year. The mean seasonal rainfall distribution is 402.4 mm in southwest monsoon (June - September), 239.1 mm in northeast monsoon (October - December), distribution of rainfall in season wise 56.7 % in south west monsoon, 33.7 % in north east monsoon period.

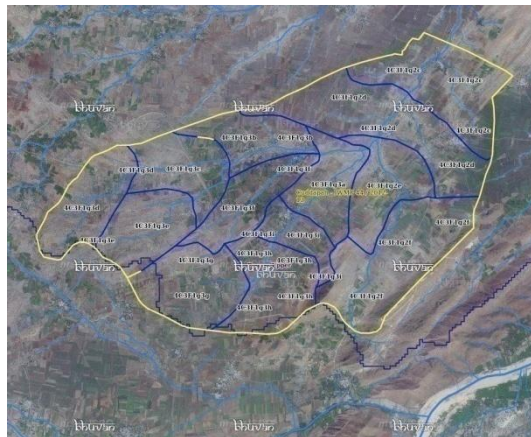
## Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	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	457
4	Detailed Project Report		

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



### Legend



Drainage (1:10000 Scale)

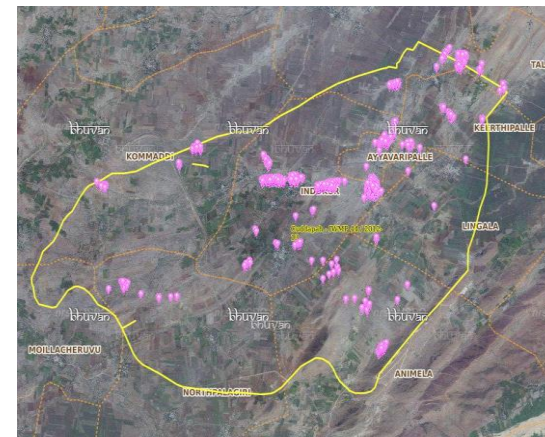


MWS Boundary



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	Agronomic measures	0	0
2	Afforestation	1	1
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	2	2
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	94	80
11	Civil work-Check dams /Rock fill dam	49	40
12	Drainage treatment /Nala Revetment, loose boulder structure, gully check	0	0
13	Land Developments (afforestation, horticulture and bund plantation of teak)	0	0
14	Lm (fodder development, varmi compost)	34	34
15	Soil moisture conservation	0	0
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity	0	0
18	Others	1429	300
	<b>TOTAL</b>	<b>1609</b>	<b>457</b>

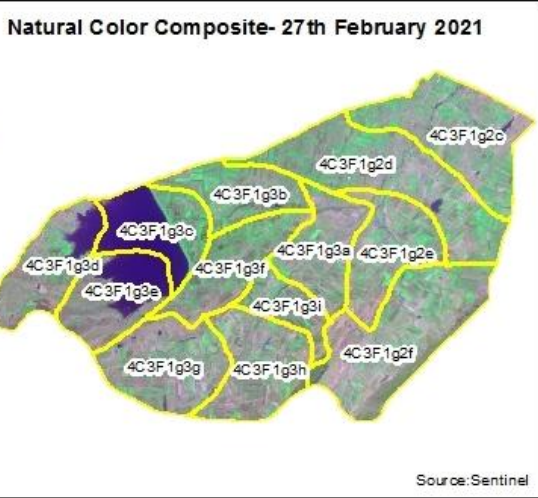
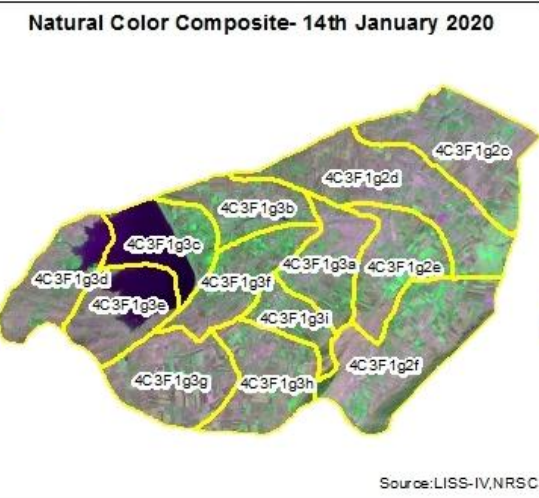
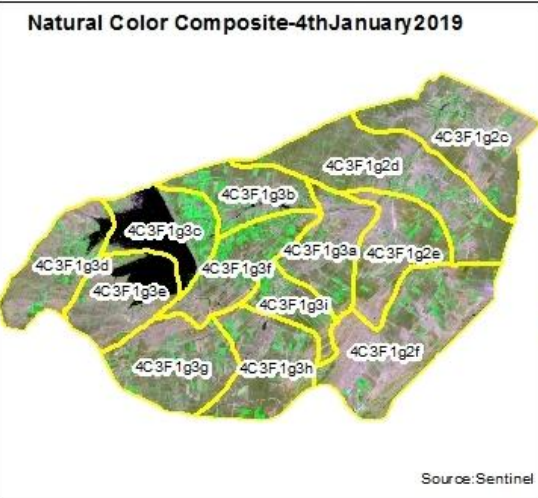
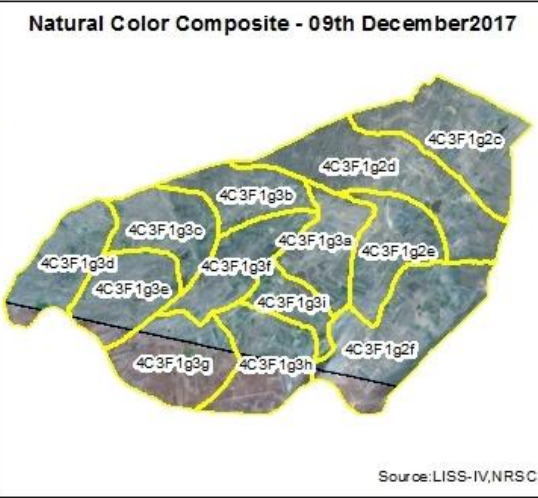
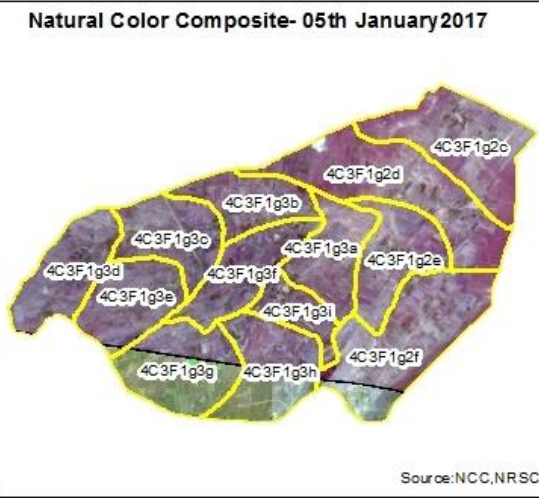
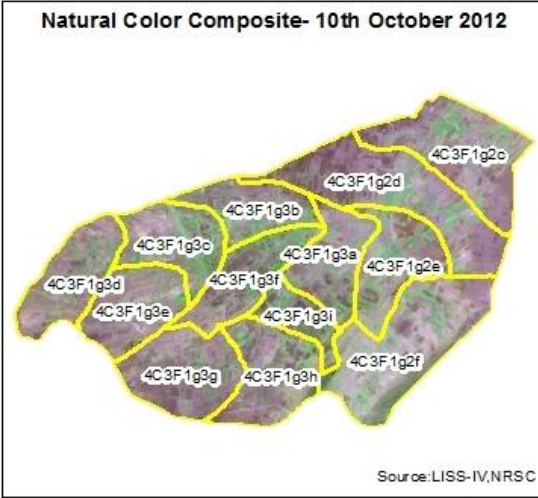
## MONITORING IN THE PROJECT AREA

### 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 YSR Kadapa District Andhra Pradesh. IWMP-44/2012-13



T0 Satellite data 2010



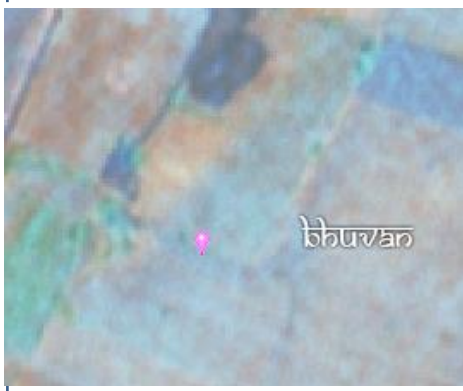
T1 Satellite data 2012



T2 Satellite data 2015



T3 Satellite data 2017



T4 Satellite data 2018



T5 Satellite data 2019



Drishiti Id. 949106

Horticulture

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-44/2012-13



T0: 2012-13

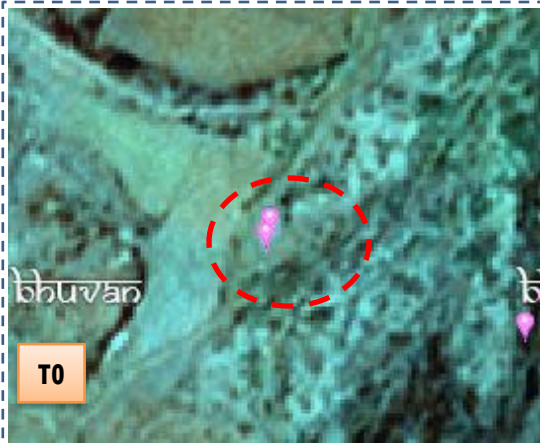


T1: 01 April 17

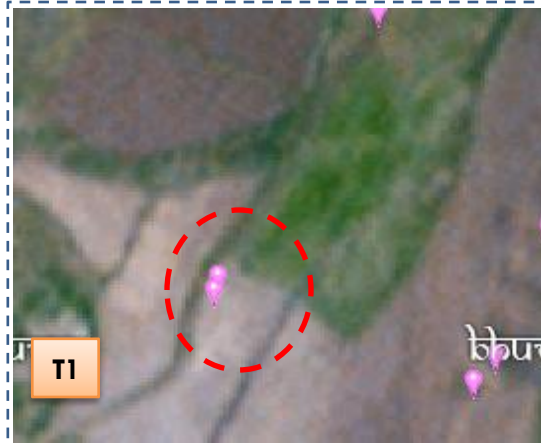


Drishti Sl no. 157322- MWS : 4C3F1g3b

Farm Pond



T0: 2012-13



T1: 01 April 17

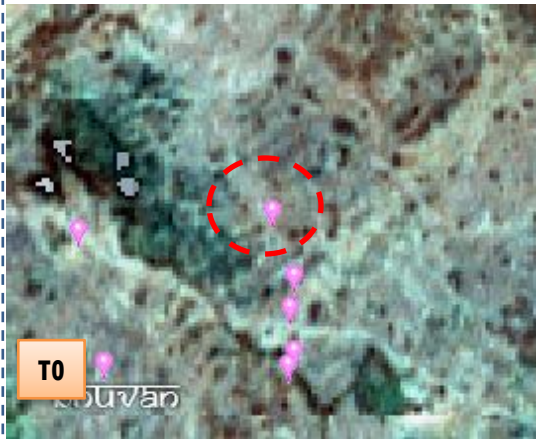


Drishti Sl no. 949321 MWS : 4C3F1g3b

Horticulture



Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-44/2012-13



T0

T0: 2012-13



T1

T1: 01 April 17



Drishti Sl no. 1896315 MWS : 4C3D2g1d

Farm Pond



T0

T0: 2012-13



T1

T1: 01 April 17



Drishti Sl no. 876785 MWS : 4C3F1g3c

Farm Pond

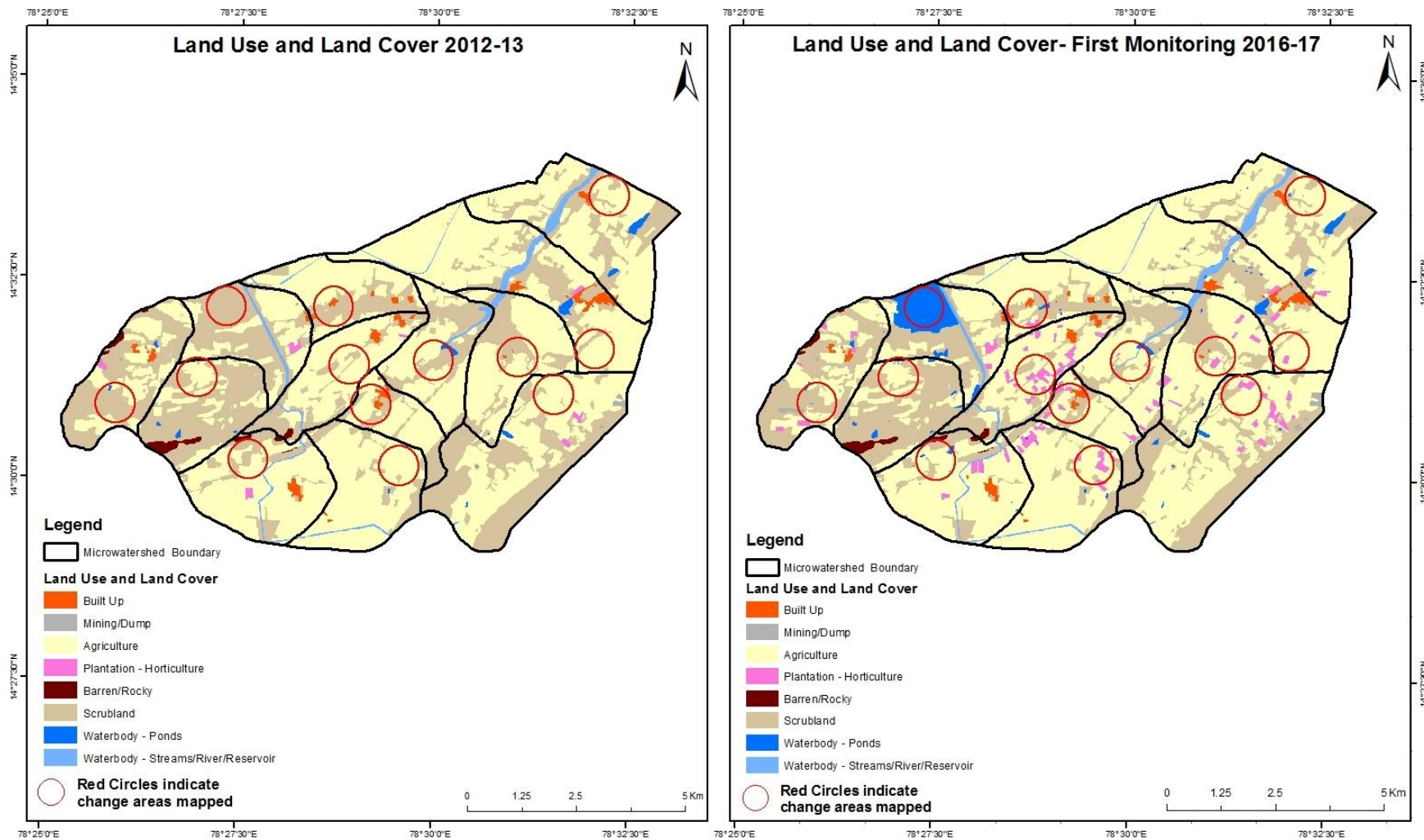
## MONITORING IN THE PROJECT AREA

### 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)

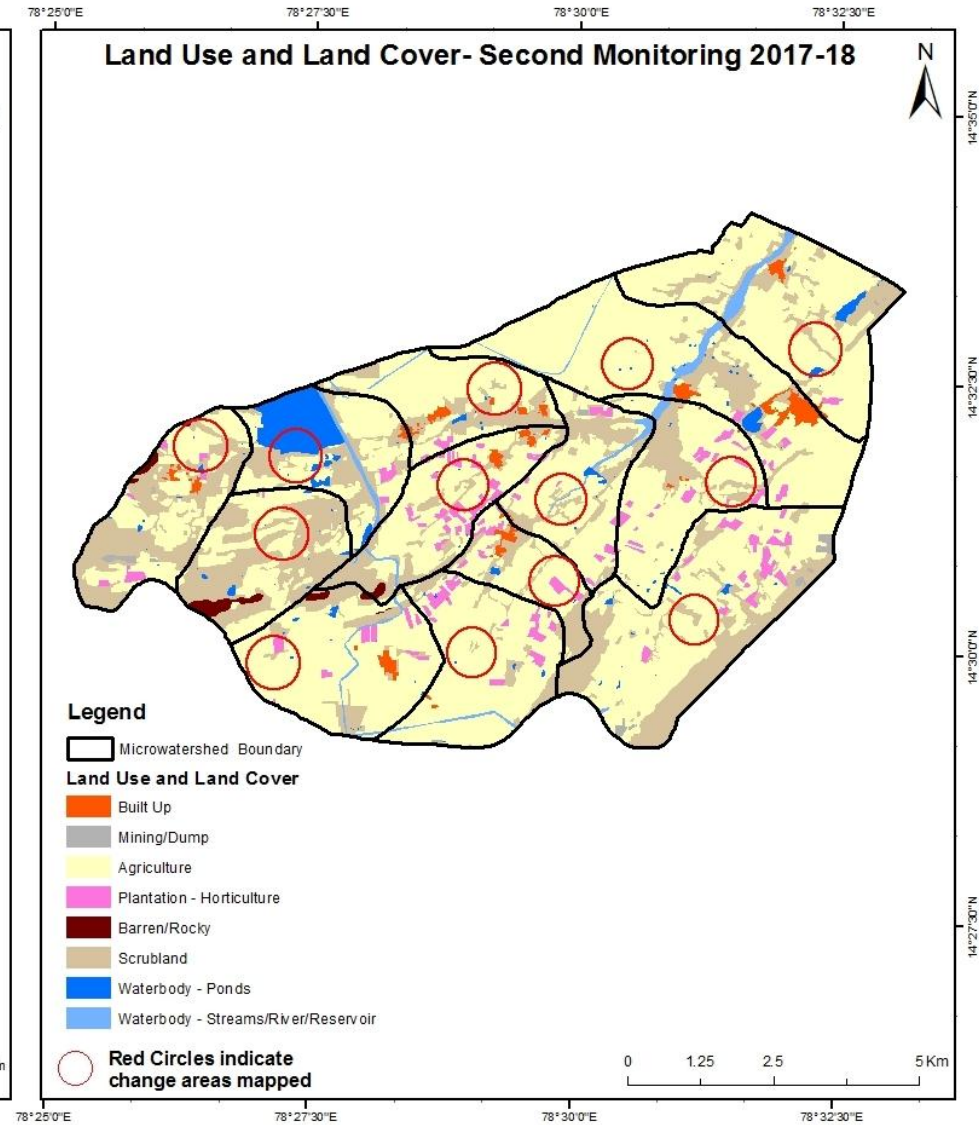
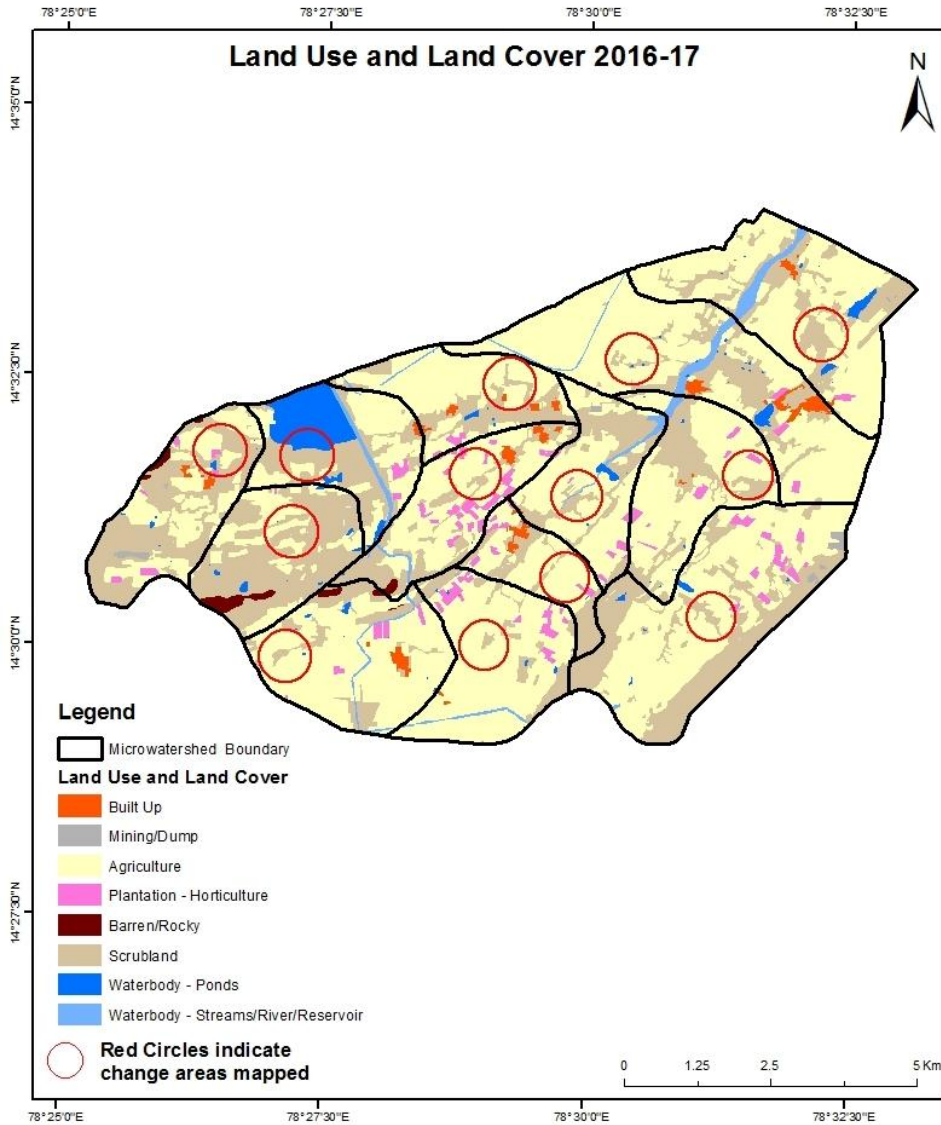
Scale: 1:10000





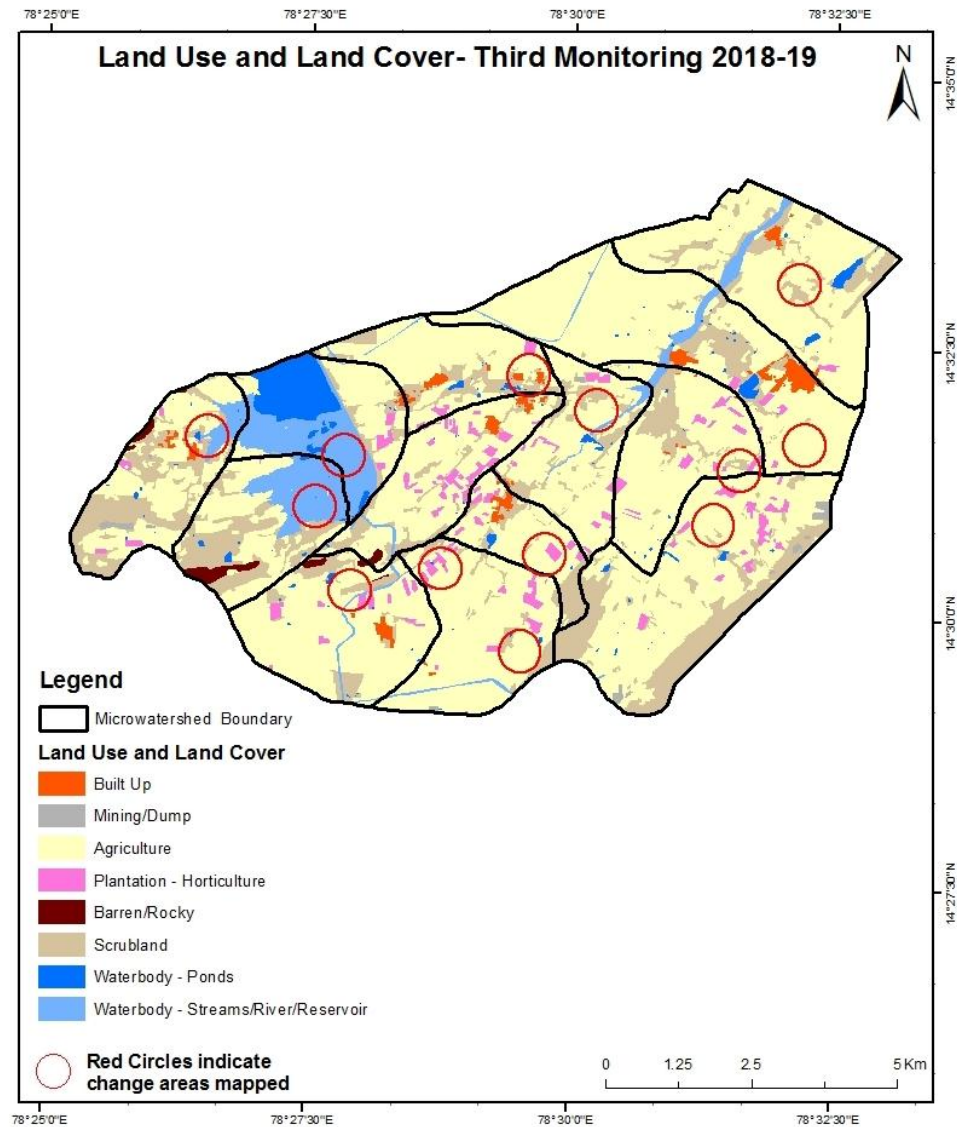
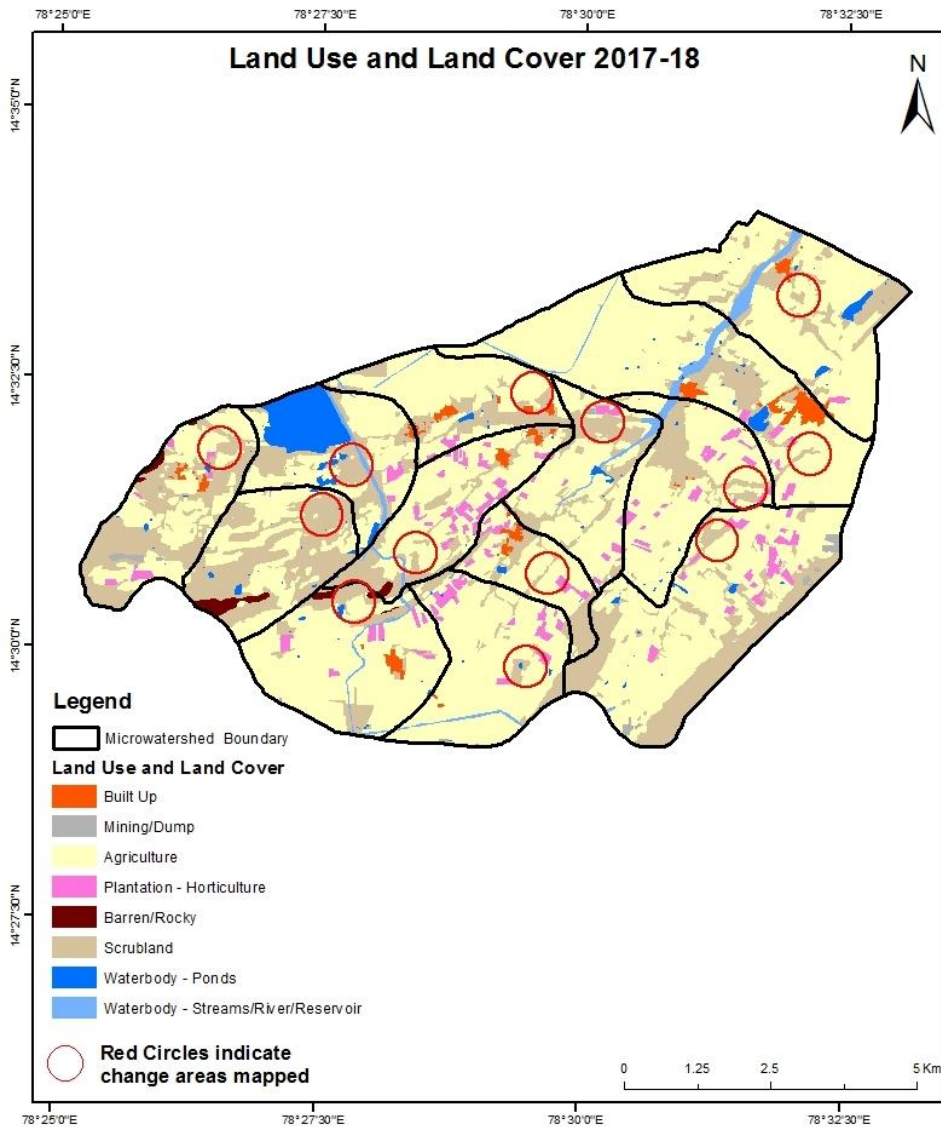
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



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

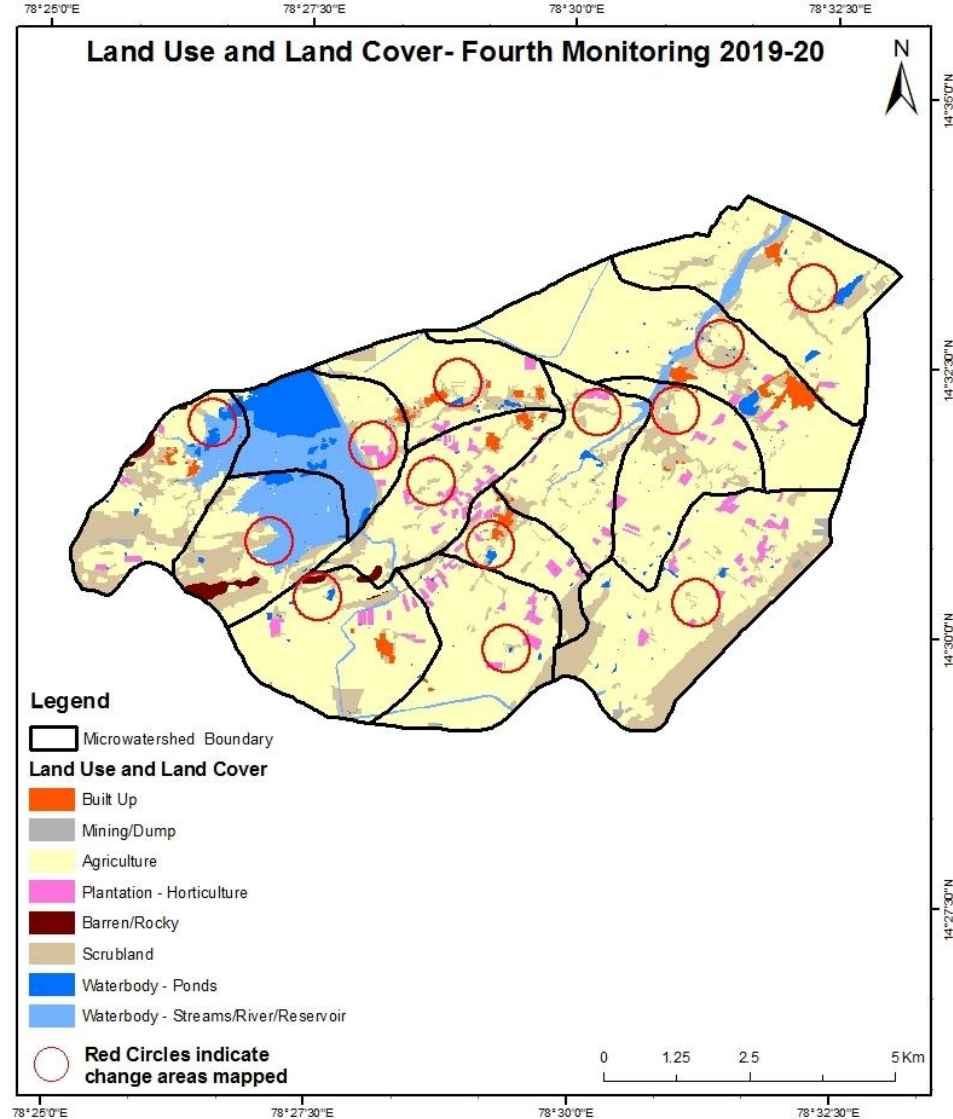
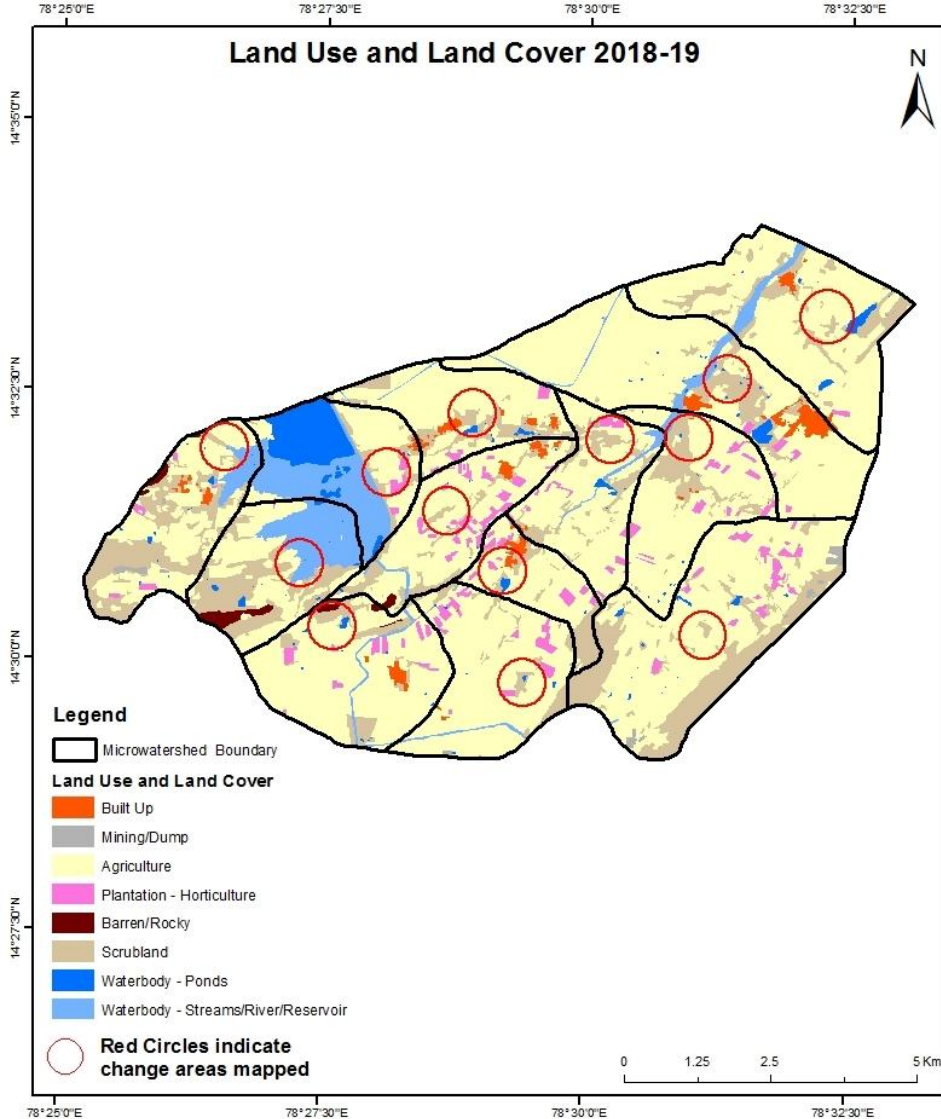
Scale: 1:10000





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

Scale: 1:10000

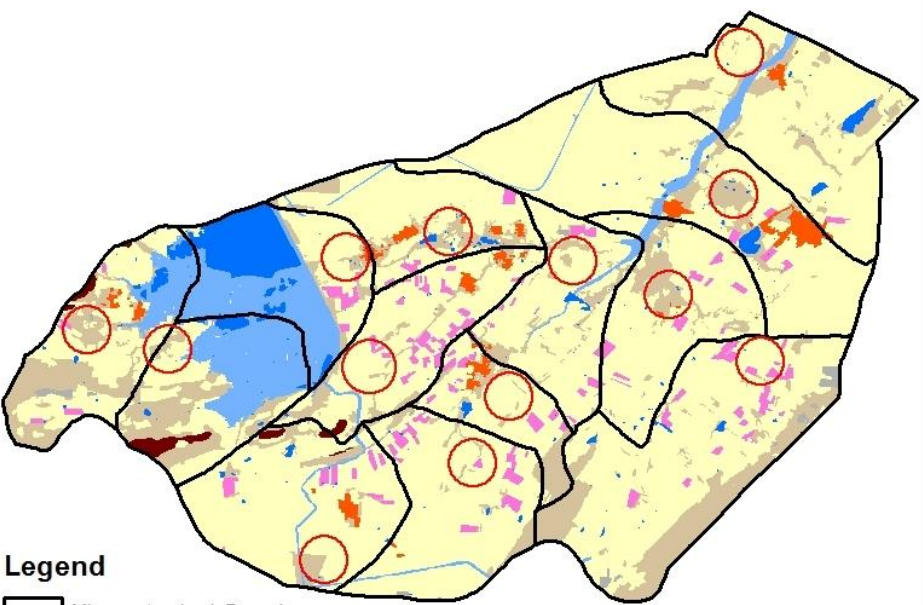


# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

78°27'30"E 78°30'0"E 78°32'30"E

## Land Use and Land Cover 2019-20

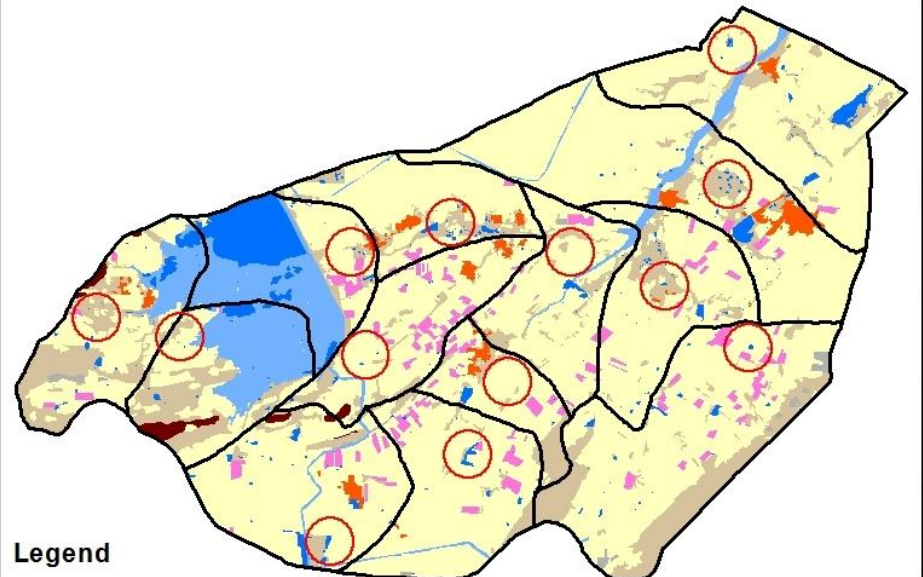


- Legend**
- Microwatershed Boundary
  - Land Use and Land Cover**
  - Built Up
  - Mining/Dump
  - Agriculture
  - Plantation - Horticulture
  - Barren/Rocky
  - Scrubland
  - Waterbody - Ponds
  - Waterbody - Streams/River/Reservoir
- Red Circles indicate change areas mapped
- 0 1 2 4 Km

78°27'30"E 78°30'0"E 78°32'30"E

78°27'30"E 78°30'0"E 78°32'30"E

## Land Use and Land Cover- Fifth Monitoring 2020-21



- Legend**
- Microwatershed Boundary
  - Land Use and Land Cover**
  - Built Up
  - Mining/Dump
  - Agriculture
  - Plantation - Horticulture
  - Barren/Rocky
  - Scrubland
  - Waterbody - Ponds
  - Waterbody - Streams/River/Reservoir
- Red Circles indicate change areas mapped
- 0 1 2 4 Km

78°27'30"E 78°30'0"E 78°32'30"E

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

Agriculture to Plantation

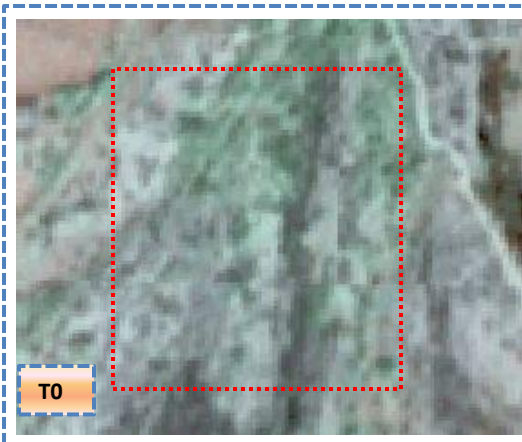


TO: 2012-213 (78°31'35.009"E 14°31'46.49"N)



TO: 05 January 17

Scrub to Agriculture



TO: 2012-13 (78°30'47.599"E 14°30'19.253"N)

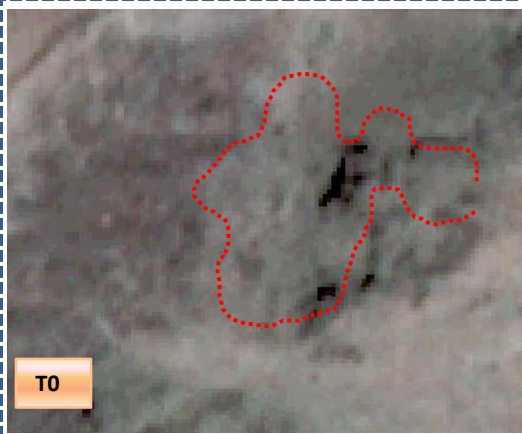


TO: 05 January 17



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

Scrub to Mining

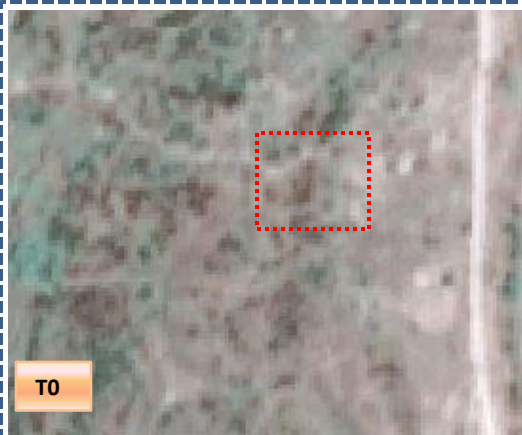


T0: 2012-13 (78°32'7.892"E 14°30'40.199"N)



T1: 05 January 17

Scrub To Water body



T0: 2012-13 (78°30'53.352"E 14°32'7.11"N)



T1: 05 January 17

**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>	82.32												<b>82.32</b>
<b>Mining/dump</b>		6.41											<b>6.41</b>
<b>Agriculture</b>	1.24	4.48	4617.94	159.1						21.47			<b>4804.23</b>
<b>Plantation Horticulture</b>			5.65	19.88									<b>25.53</b>
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>							41.59						<b>41.59</b>
<b>Scrub</b>	2.15	10.89	210.57	3				2359.55	2.26	125.56			<b>2713.98</b>
<b>Waterbody- Streams/River</b>									133.06	0.38			<b>133.44</b>
<b>Waterbody – Ponds</b>										35.18			<b>35.18</b>
<b>Grand Total</b>	<b>85.71</b>	<b>21.78</b>	<b>4834.16</b>	<b>181.98</b>			<b>41.59</b>	<b>2359.55</b>	<b>135.32</b>	<b>182.59</b>			<b>7842.68</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 186 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 216 ha of the agriculture area has increased from plantations 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>	85.71												<b>85.71</b>
<b>Mining/dump</b>		21.78											<b>21.78</b>
<b>Agriculture</b>	0.76	6.21	4747.38	77.34						2.47			<b>4834.16</b>
<b>Plantation Horticulture</b>			4.83	177.15									<b>181.98</b>
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>							41.59						<b>41.59</b>
<b>Scrub</b>	21.47	1.99	442.6	0.31				1881.07		12.11			<b>2359.55</b>
<b>Waterbody- Streams/River</b>			1.61						133.71				<b>135.32</b>
<b>Waterbody – Ponds</b>			3.61							178.98			<b>182.59</b>
<b>Grand Total</b>	<b>107.94</b>	<b>29.98</b>	<b>5200.03</b>	<b>254.8</b>			<b>41.59</b>	<b>1881.07</b>	<b>133.71</b>	<b>193.56</b>			<b>7842.68</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 86 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T2.
- In T2 452 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-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>	107.94										<b>107.94</b>	
<b>Mining/dump</b>		29.98									<b>29.98</b>	
<b>Agriculture</b>			5027.68	24.34					147.18	0.83	<b>5200.03</b>	
<b>Plantation Horticulture</b>			43.91	210.85						0.04	<b>254.8</b>	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>							41.59				<b>41.59</b>	
<b>Scrub</b>	2.58	0.38	350.76	0.69				1326.36	196.88	3.42	<b>1881.07</b>	
<b>Waterbody- Streams/River</b>									133.71		<b>133.71</b>	
<b>Waterbody – Ponds</b>			0.14						0.1	193.32	<b>193.56</b>	
<b>Grand Total</b>	<b>110.52</b>	<b>30.36</b>	<b>5422.49</b>	<b>235.88</b>			<b>41.59</b>	<b>1326.36</b>	<b>477.87</b>	<b>197.61</b>	<b>7842.68</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 172 ha of the agriculture area has decreased and it is converted into plantations and water body in T3.
- In T3 394 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-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		
Built up	110.52												110.52
Mining/dump		30.36											30.36
Agriculture			5313.04	15.33					59.17	34.95			5422.49
Plantation Horticulture			28.33	206.83					0.55	0.17			235.88
Forest													
Forest Plantation													
Barren Rocky							41.59						41.59
Scrub			149.65					1131.62	43.12	1.97			1326.36
Waterbody- Streams/River									477.87				477.87
Waterbody – Ponds			1.95								195.66		197.61
<b>Grand Total</b>	<b>110.52</b>	<b>30.36</b>	<b>5492.97</b>	<b>222.16</b>			<b>41.59</b>	<b>1131.62</b>	<b>580.71</b>	<b>232.75</b>			<b>7842.68</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 109 ha of the agriculture area has decreased and it is converted into plantations and water body in T4.
- In T4 179 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-2019-20 to 2020-21**

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	110.52											110.52
Mining/dump		30.36										30.36
Agriculture	0.44	0.21	5479.34	9.16						3.82		5492.97
Plantation Horticulture				222.16								222.16
Forest												
Forest Plantation												
Barren Rocky							41.59					41.59
Scrub		1.41	21.39					1100.62		8.2		1131.62
Waterbody- Streams/River									580.71			580.71
Waterbody – Ponds										232.75		232.75
<b>Grand Total</b>	<b>110.96</b>	<b>31.98</b>	<b>5500.73</b>	<b>231.32</b>			<b>41.59</b>	<b>1100.62</b>	<b>580.71</b>	<b>244.77</b>		<b>7842.68</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 13 ha of the agriculture area has decreased and it is converted into built-up, mining/dump, plantations and water body in T5.
- In T5 21 ha of the agriculture area has increased from scrubland 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 656 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 29, 365, 222 & 70 Hectares from T0-T1, T1-T2, T2-T3 & T3-T4 respectively and overall increase of 696 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years. .
5. About **205 Hectares of the plantation/horticulture area has been increased** in during the monitoring period 2012-13 (T0) to 2020-21 (T5) years.
6. There is a decrease of 1,613 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (80) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (94) verified from the portal.