

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

YSR KADAPA -42/2012-13

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

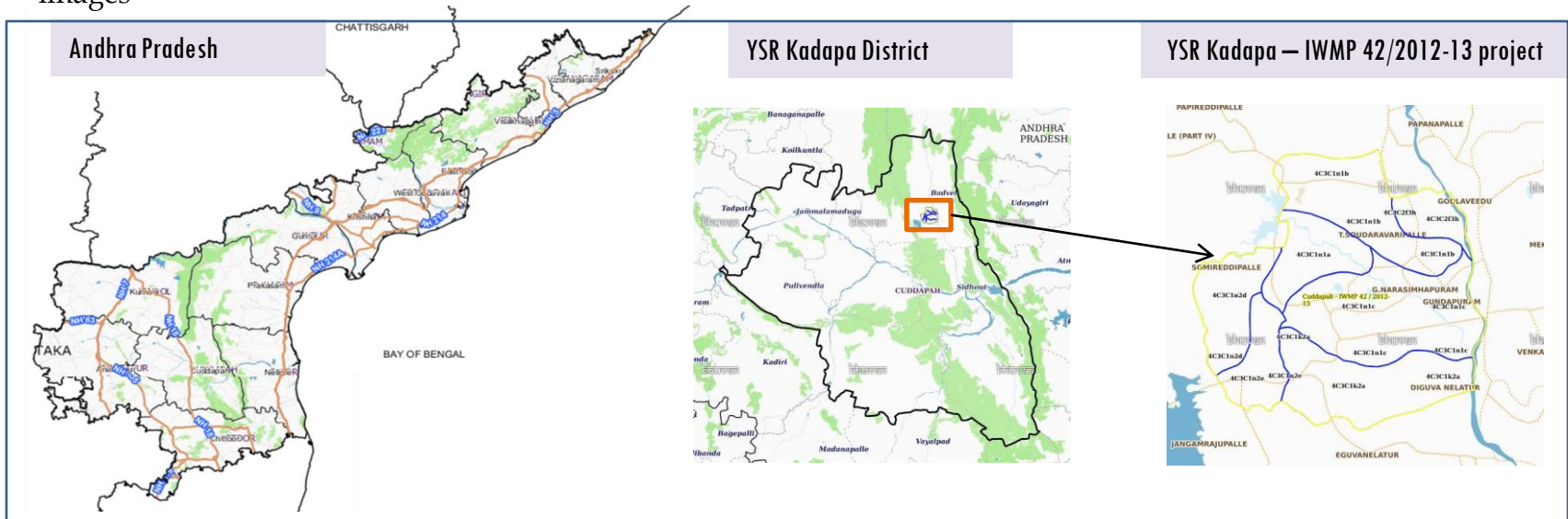
E X E C U T I V E S U M M A R Y

- 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-42/2012-13, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is 5,700 ha. It comprises of 07 micro watersheds.
- In the project area 829 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increase by 54 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 57 % is covered by the agriculture, 31 % is covered by scrubland, 4.01 % is covered by plantation area , 6.0 % is water body and remaining by other land use classes.

PROJECT : YSR KADAPA - IWMP-42/2012-13

DISTRICT : YSR KADAPA , STATE : ANDHRA PRADESH

- The study area falls in Brahmamgarimattam Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is 5,700 ha. It comprises of 07 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.

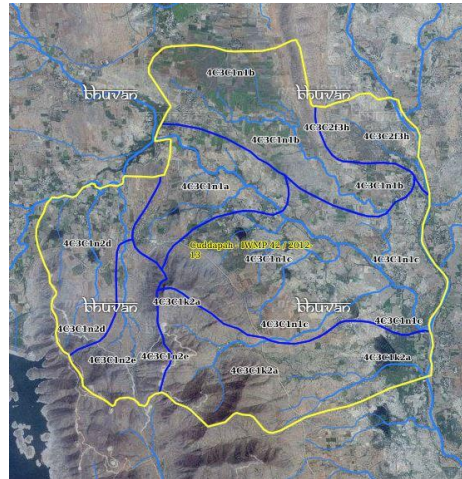
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			30-Oct-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			30-Oct-20
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	829
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

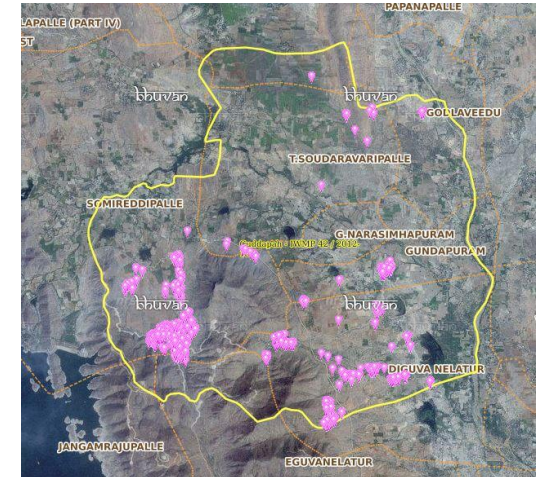


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

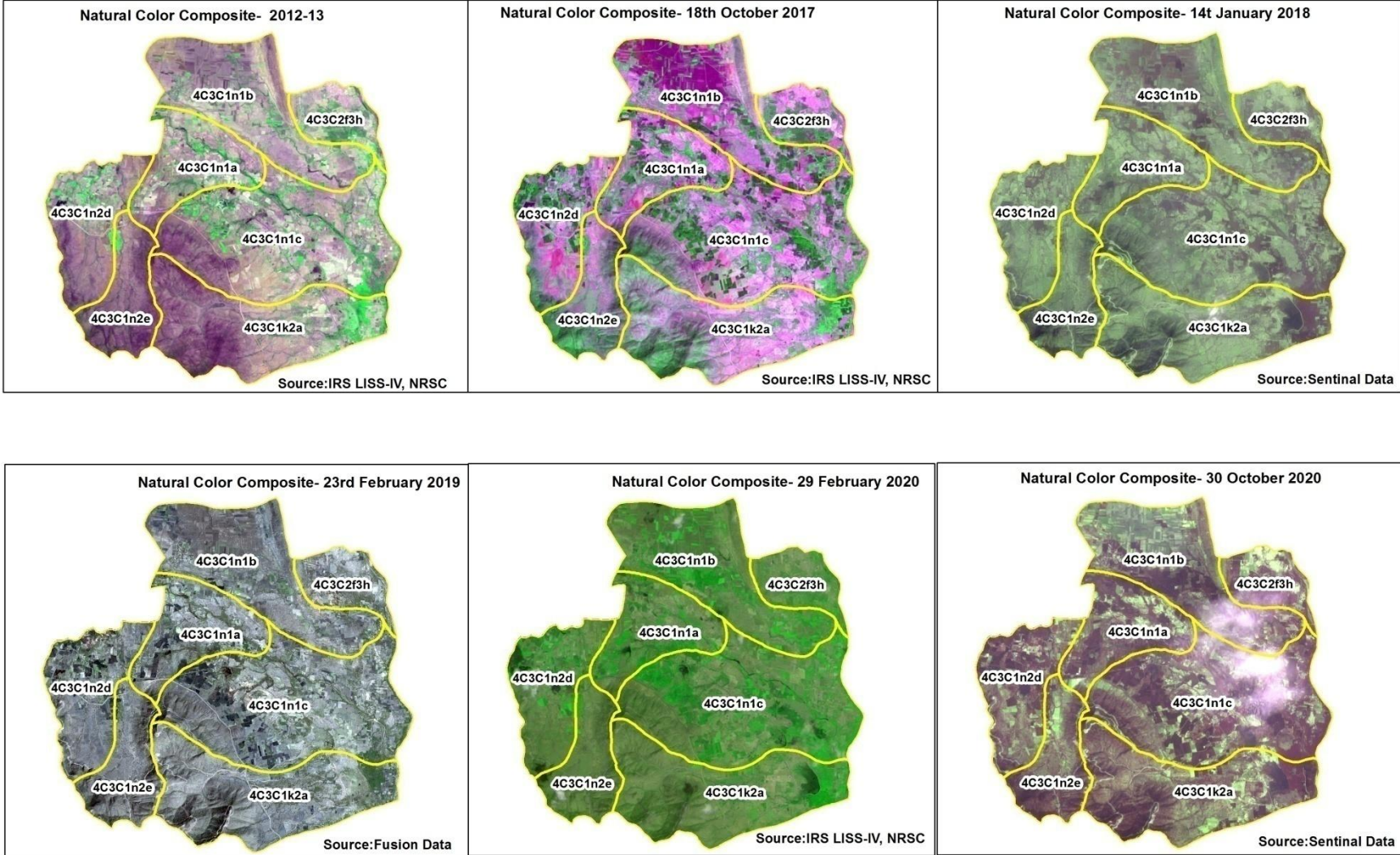
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agronomic measures	0	0
2	Afforestation	4	4
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	0	0
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	0	0
11	Civil work-Check dams /Rock fill dam	25	25
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)	0	0
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	1125	800
	TOTAL	1154	829

MONITORING IN THE PROJECT AREA

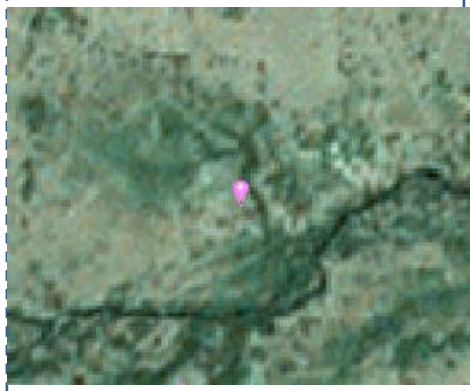
Site Wise Changes in the Project

- 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.

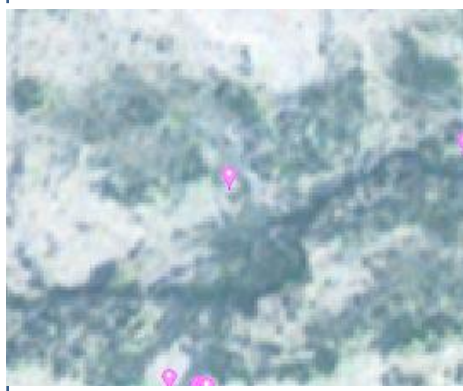
Natural Colour Composite (NCC)



Monitoring of activities in YSR Kadapa District Andhra Pradesh. IWMP-42/2012-13



T0 Satellite data 2010



T1 Satellite data 2013



T2 Satellite data 2016



T3 Satellite data 2018



T4 Satellite data 2019



T5 Satellite data 2020



Drishiti Id. 802445

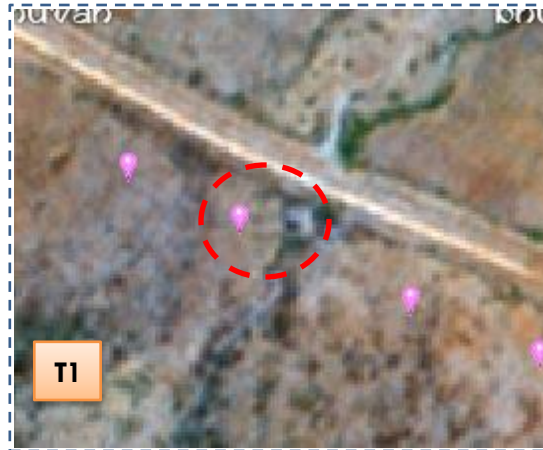
Form pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-42/2012-13



T0

T0: 2012-13



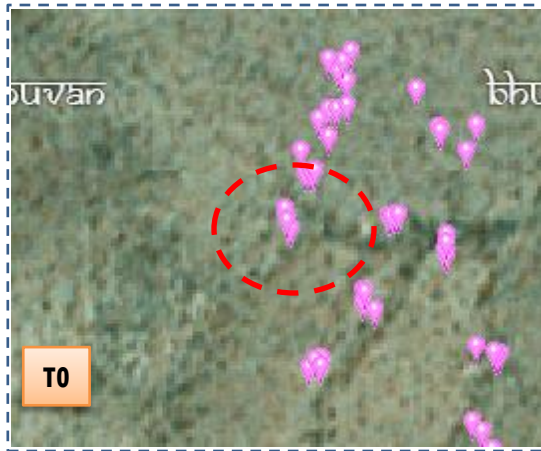
T1

T1: 17 October 2016



Drishti Sl no. 1826318 MWS : 4C3C1n1c

Farm Pond



T0

T0: 2012-13



T1

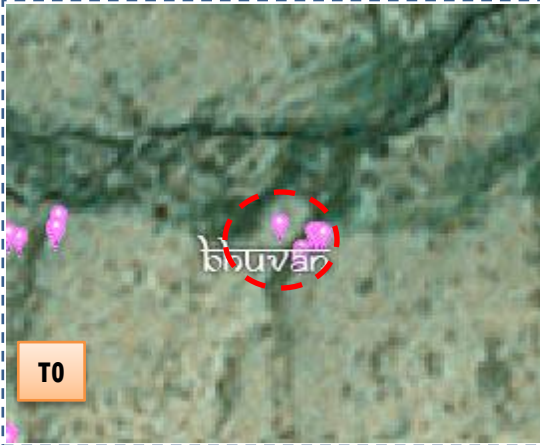
T1: 17 October 2016



Drishti Sl no. 2561157 MWS : 4C3C1k2a

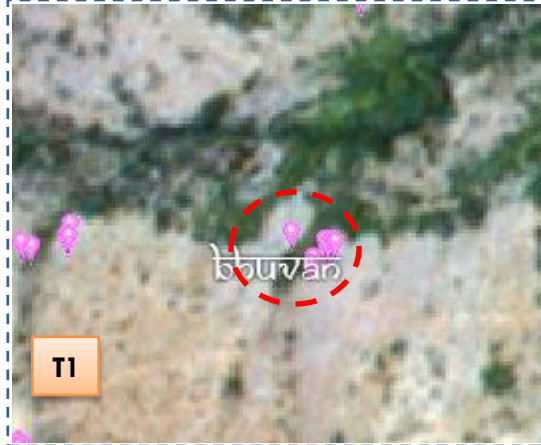
Farm Pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-42/2012-13



T0

T0: 2012-13



T1

T1: 17 October 2016



Drishti SI no. 2541809 MWS : 4C3C1k2a

Check Dam



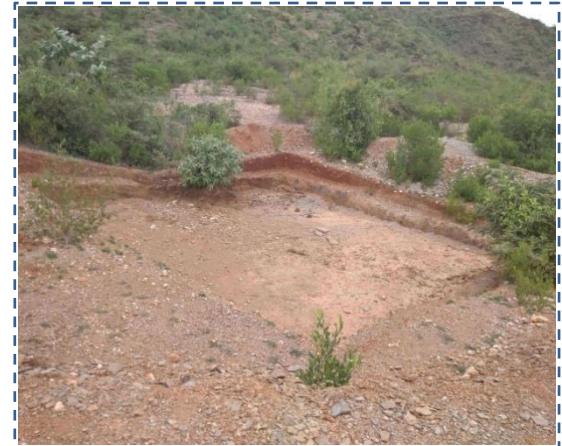
T0

T0: 2012-13



T1

T1: 17 October 2016



Drishti SI no. 1841772 MWS : 4C3C1n1a

Farm Pond

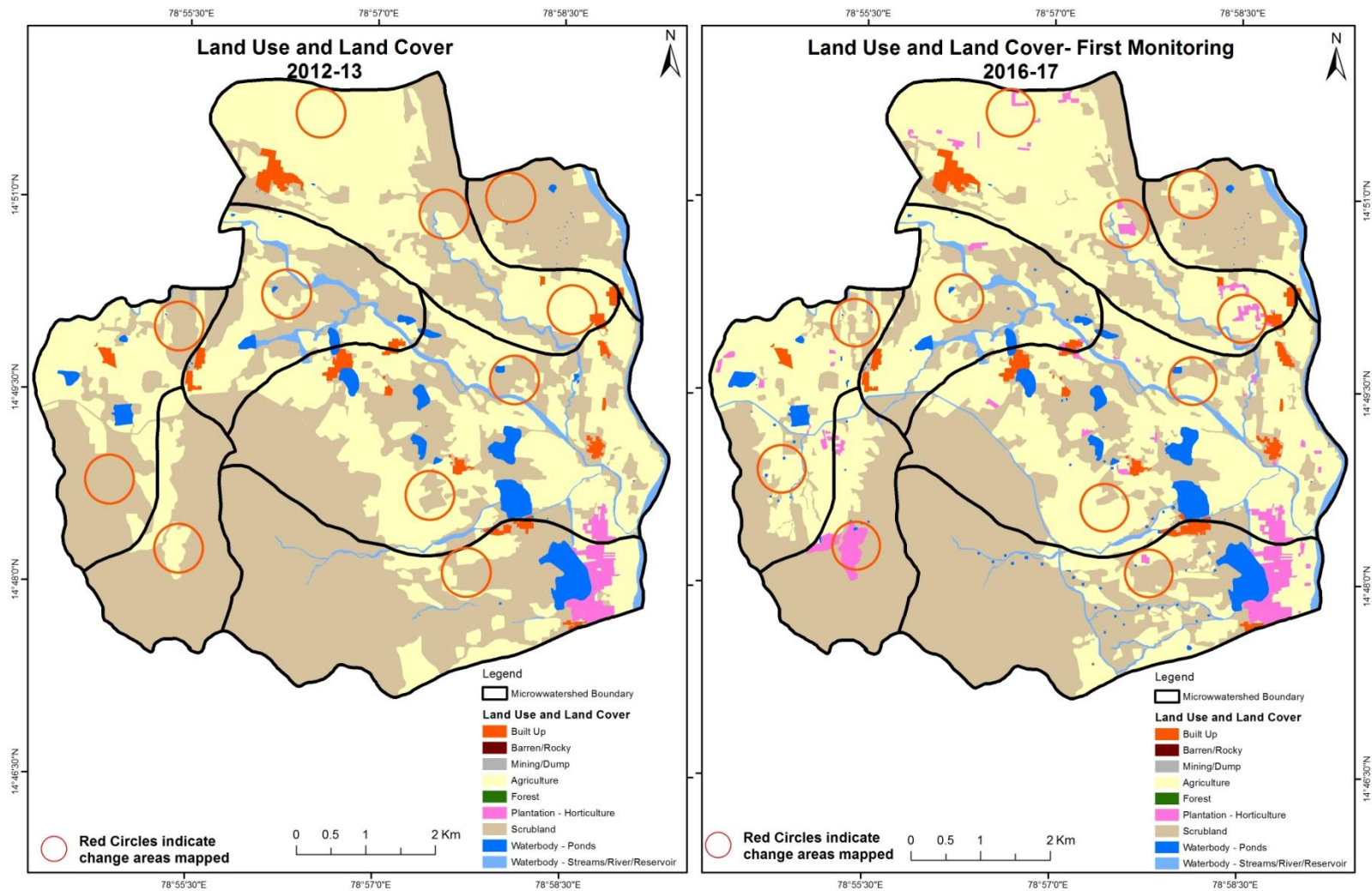
MONITORING IN THE PROJECT AREA

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)

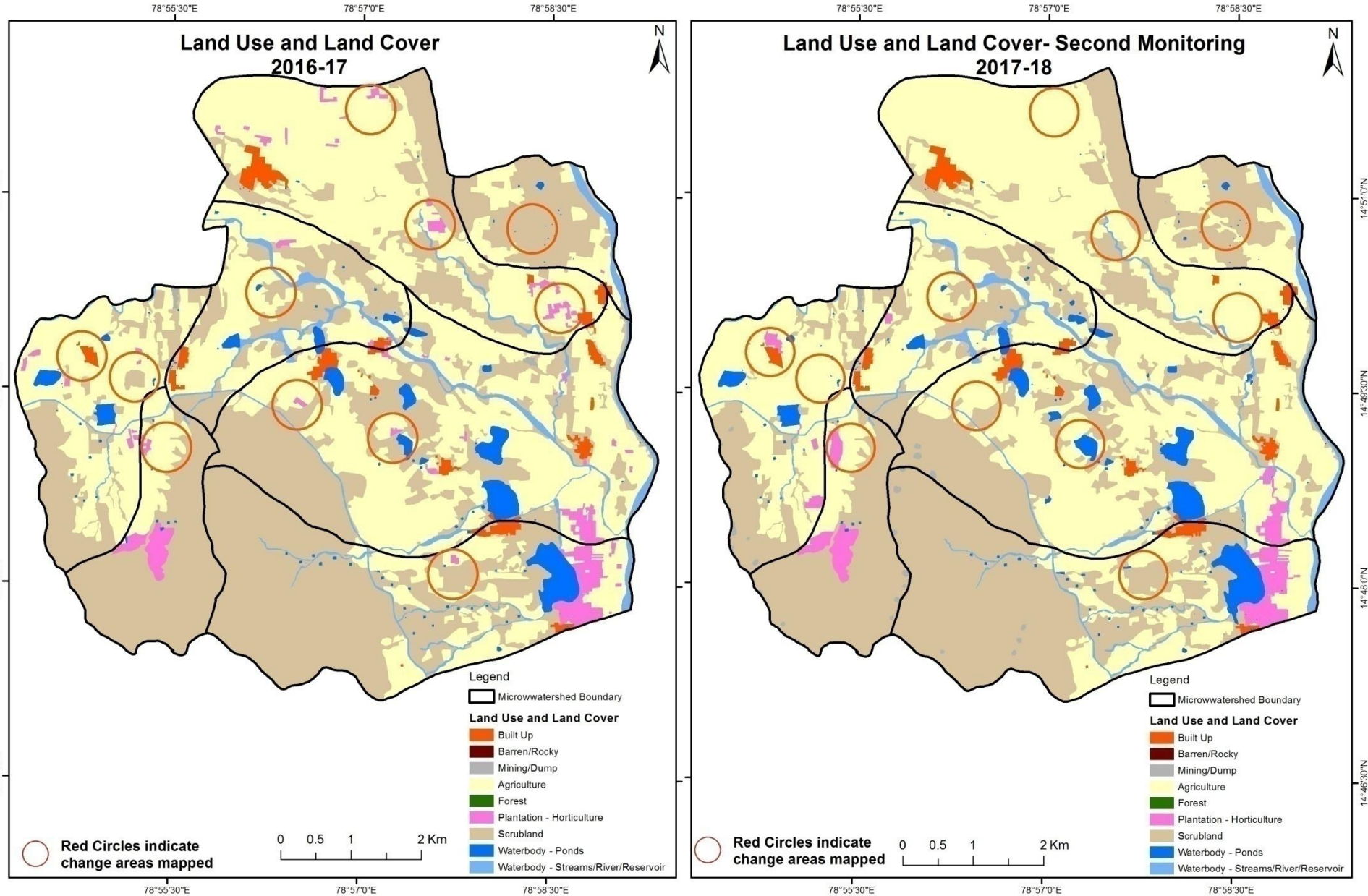
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

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)

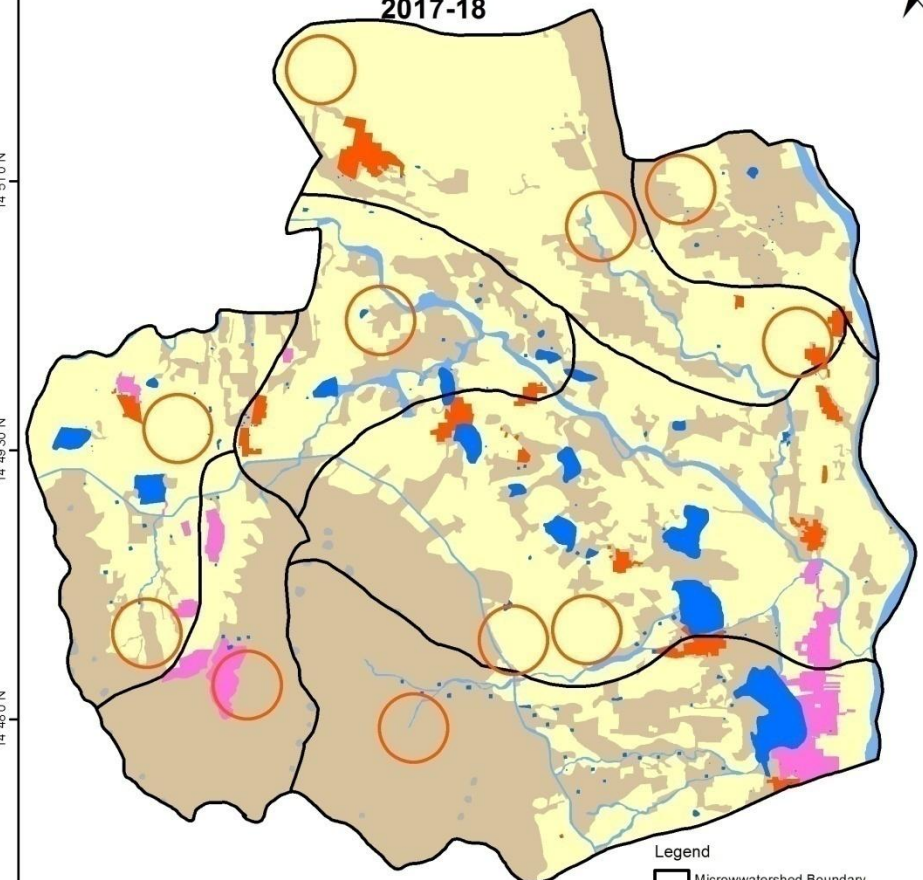
Scale: 1:10000

78°55'30"E

78°57'0"E

78°58'30"E

Land Use and Land Cover 2017-18



Legend

▭ Microwatershed Boundary

Land Use and Land Cover

- ▭ Built Up
- ▭ Barren/Rocky
- ▭ Mining/Dump
- ▭ Agriculture
- ▭ Forest
- ▭ Plantation - Horticulture
- ▭ Scrubland
- ▭ Waterbody - Ponds
- ▭ Waterbody - Streams/River/Reservoir

0 0.5 1 2 Km

○ Red Circles indicate
change areas mapped

78°55'30"E

78°57'0"E

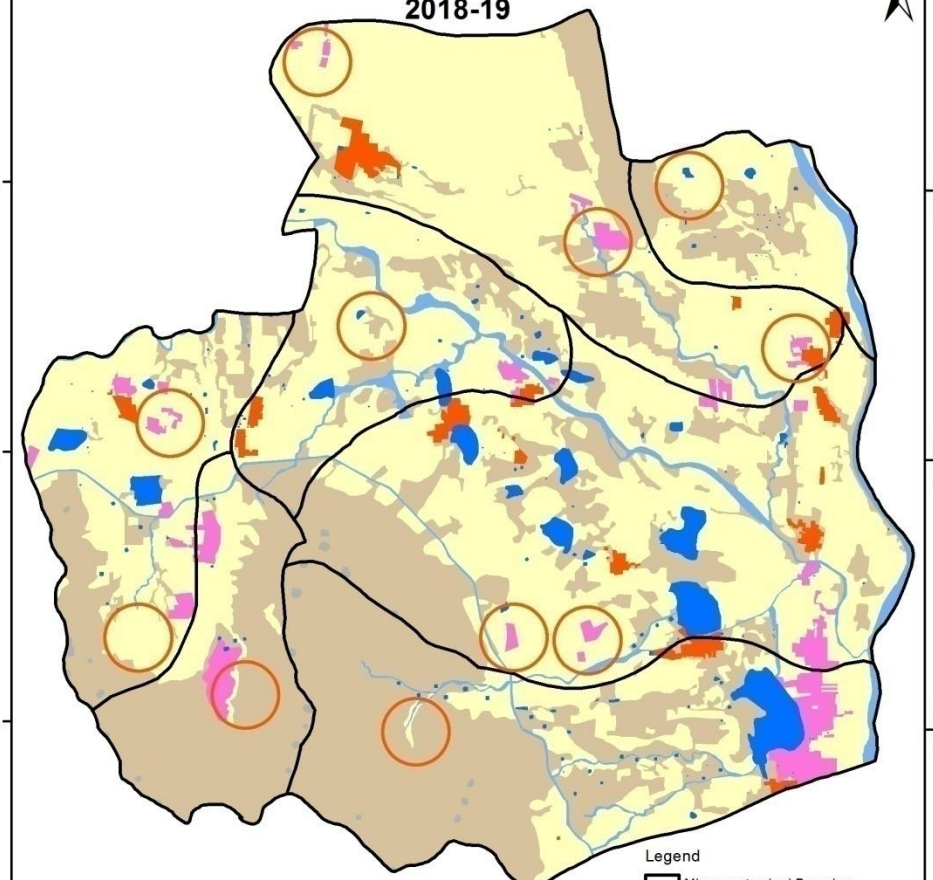
78°58'30"E

78°55'30"E

78°57'0"E

78°58'30"E

Land Use and Land Cover- Third Monitoring 2018-19



Legend

▭ Microwatershed Boundary

Land Use and Land Cover

- ▭ Built Up
- ▭ Barren/Rocky
- ▭ Mining/Dump
- ▭ Agriculture
- ▭ Forest
- ▭ Plantation - Horticulture
- ▭ Scrubland
- ▭ Waterbody - Ponds
- ▭ Waterbody - Streams/River/Reservoir

0 0.5 1 2 Km

○ Red Circles indicate
change areas mapped

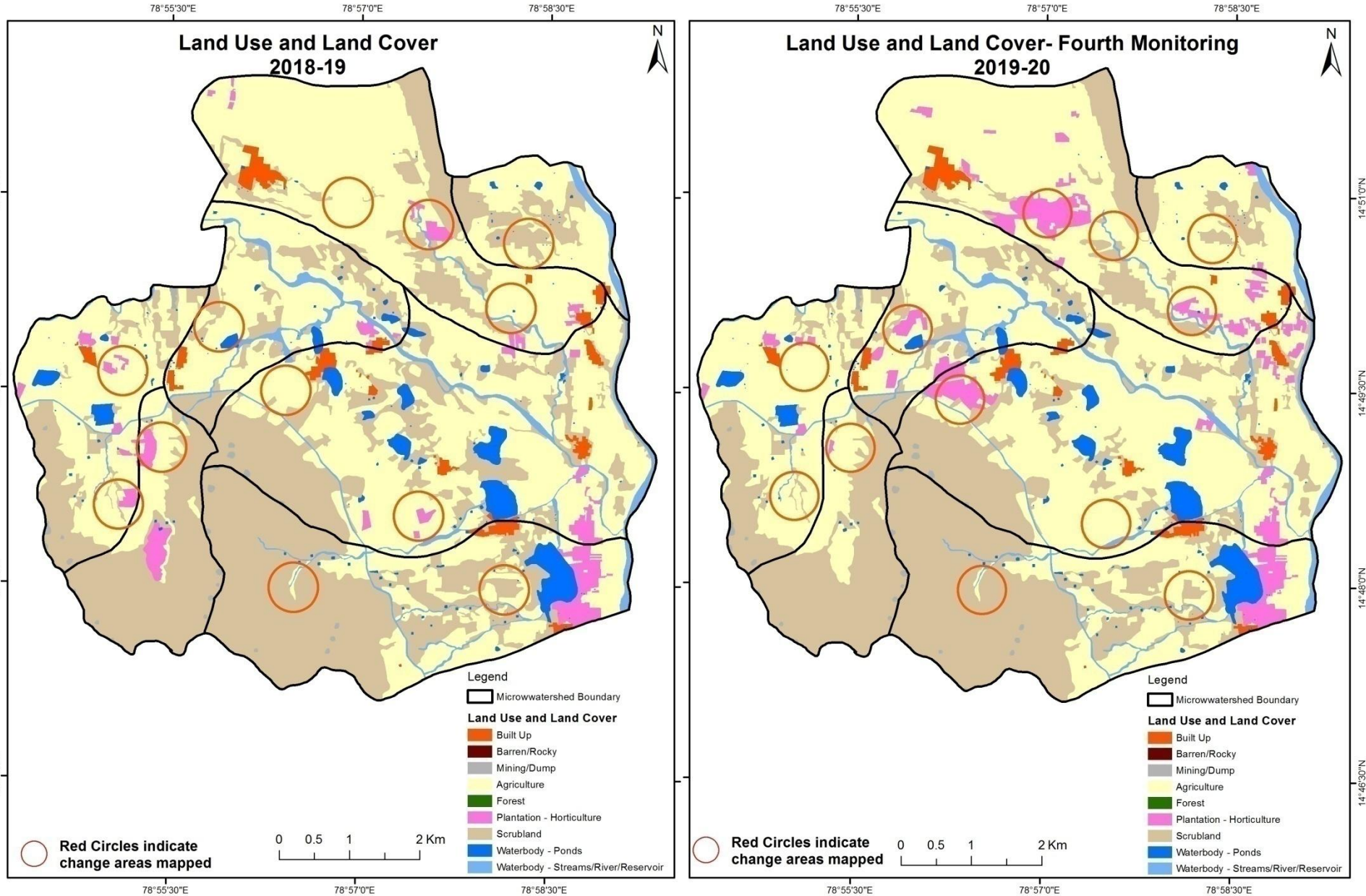
78°55'30"E

78°57'0"E

78°58'30"E

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

Scale: 1:10000

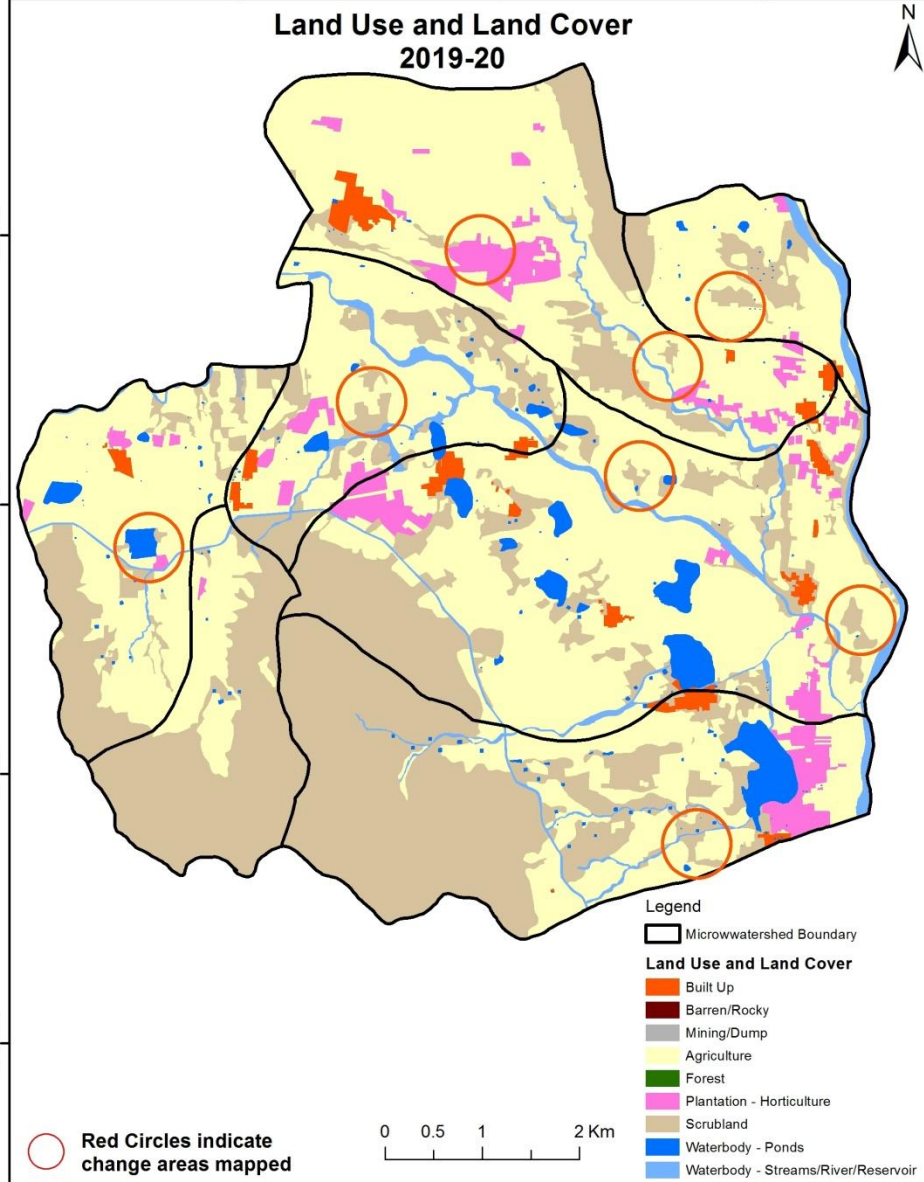


Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

78°55'30"E 78°57'0"E 78°58'30"E

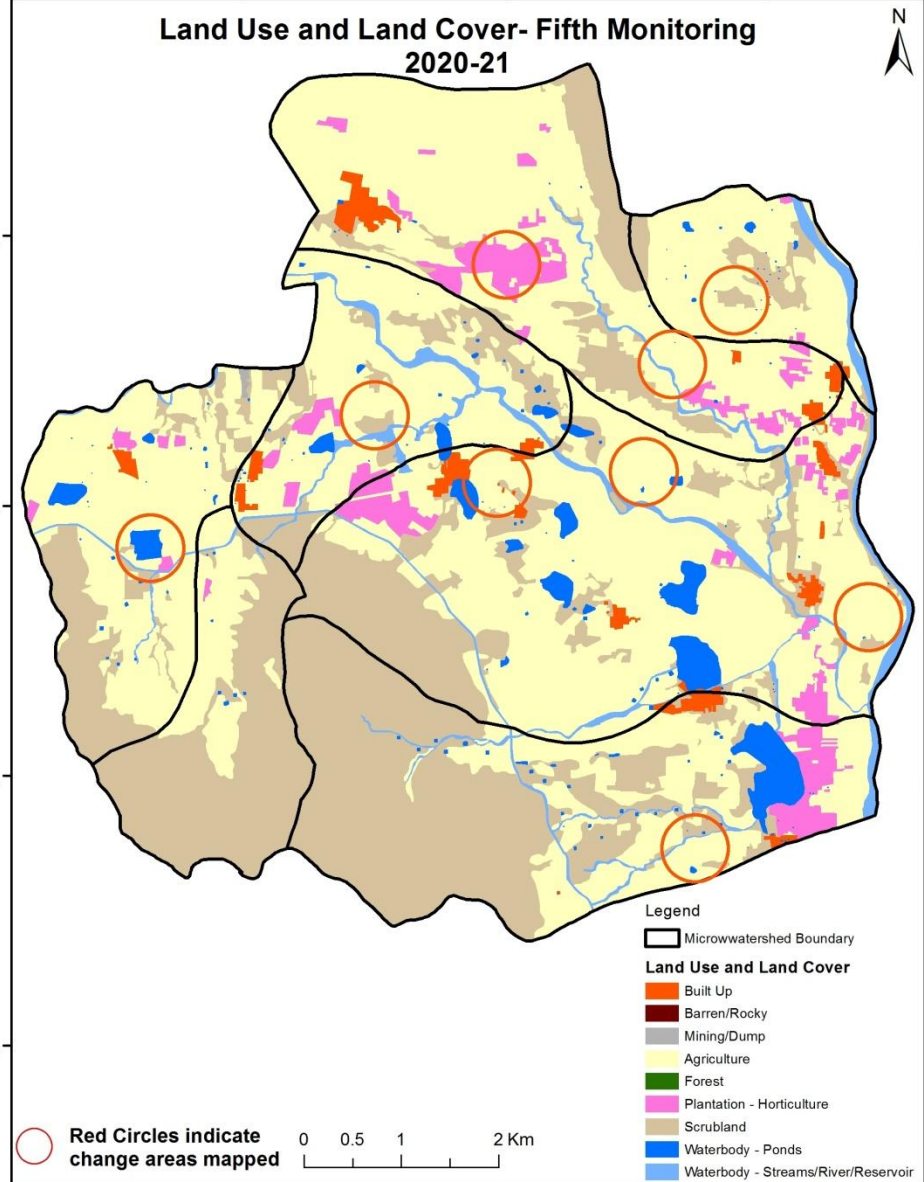
Land Use and Land Cover 2019-20



78°55'30"E 78°57'0"E 78°58'30"E

78°55'30"E 78°57'0"E 78°58'30"E

Land Use and Land Cover- Fifth Monitoring 2020-21



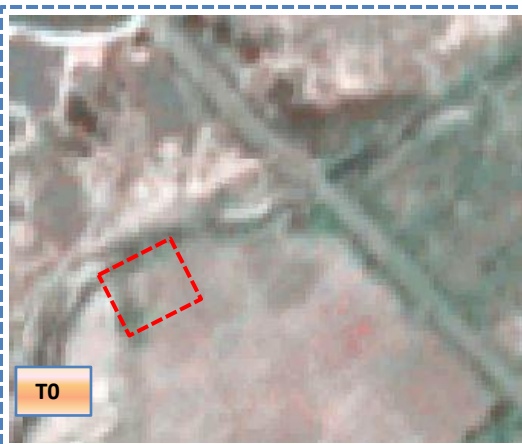
78°55'30"E 78°57'0"E 78°58'30"E

Red Circles indicate
change areas mapped

Red Circles indicate
change areas mapped

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

Agriculture to Farm Pond



T0: 2012-213 (78°57'53.665"E 14°48'34.079"N)



T0: 17 Oct 2016

Scrub to Agriculture



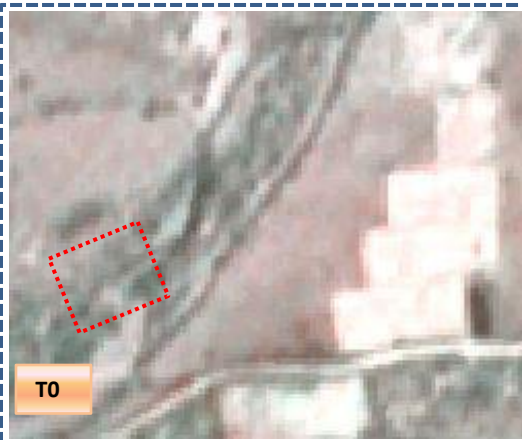
T0: 2012-13 (78°58'37.926"E 14°48'28.057"N)



T0: 17 Oct 2016

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

Scrub to Farm Pond

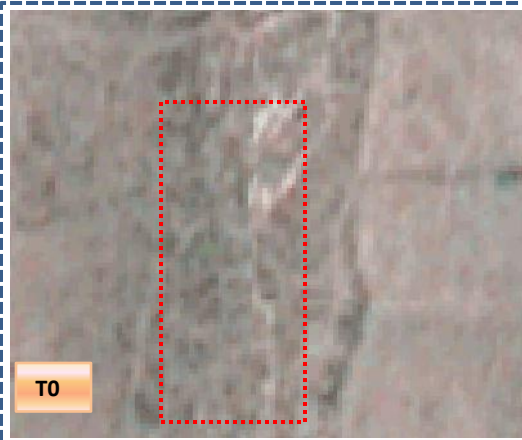


T0: 2012-13(78°57'46.148"E 14°48'27.06"N)



T1: 17 Oct 2016

Scrub to Mining



T0: 2012-13 (78°55'31.034"E 14°50'10.306"N)



T1: 17 Oct 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		
Built up	81.18												81.18
Mining/dump		2.44											2.44
Agriculture	0.75		2273.56	74.54				2.48			5.17		2356.50
Plantation Horticulture				54.40									54.40
Forest													
Forest Plantation													
Barren Rocky													
Scrub	7.44	1.90	430.35	6.48				2441.78	32.90		6.14		2926.99
Waterbody- Streams/River									151.90				151.90
Waterbody – Ponds				0.76							125.86		126.63
Grand Total	89.38	4.34	2703.91	136.19				2444.26	184.80		137.17		5700.05

- 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 80 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrub and water body in T1.
- In T1 430 ha of the agriculture area has increased from plantations, scrubland and water body 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		
T1													
Built up	89.38												89.38
Mining/dump		2.44	1.90										4.34
Agriculture			2675.44	25.37				1.58			1.52		2703.91
Plantation Horticulture			50.95	83.61				0.86			0.76		136.19
Forest													
Forest Plantation													
Barren Rocky													
Scrub		13.62	161.55	1.74				2259.04			8.31		2444.26
Waterbody- Streams/River									184.80				184.80
Waterbody – Ponds				0.28							136.90		137.17
Grand Total	89.38	16.06	2889.83	111.00				2261.49	184.80		147.49		5700.05

- 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 26 ha of the agriculture area has decreased and it is converted into plantations , scrubland and water body in T2.
- In T2 212 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	
Built up	89.38										89.38	
Mining/dump		16.06									16.06	
Agriculture			2835.23	52.12				0.96		1.53	2889.83	
Plantation Horticulture			17.99	93.01							111.00	
Forest												
Forest Plantation												
Barren Rocky												
Scrub			204.57					2056.52		0.40	2261.49	
Waterbody- Streams/River									184.80		184.80	
Waterbody – Ponds										147.49	147.49	
Grand Total	89.38	16.06	3057.78	145.13				2057.47	184.80	149.43	5700.05	

- 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 53 ha of the agriculture area has decreased and it is converted into plantations, scrubland and water body in T3.
- In T3 222 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-2018-19 to 2019-20

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	
Built up	89.38										89.38	
Mining/dump		16.06									16.06	
Agriculture			2899.25	158.53							3057.78	
Plantation Horticulture			74.04	71.08							145.13	
Forest												
Forest Plantation												
Barren Rocky												
Scrub			186.21					1871.26		0.01	2057.47	
Waterbody- Streams/River									184.80		184.80	
Waterbody – Ponds										149.43	149.43	
Grand Total	89.38	16.06	3159.51	229.61				1871.26	184.80	149.44	5700.05	

- 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 158 ha of the agriculture area has decreased and it is converted into plantations in T4.
- In T4 260 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-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		
T4													
Built up	89.50												89.50
Mining/dump		2.59											2.59
Agriculture			3159.92										3159.92
Plantation Horticulture			1.09	228.53									229.61
Forest													
Forest Plantation													
Barren Rocky													
Scrub			87.63					1793.94					1881.57
Waterbody- Streams/River									187.49				187.49
Waterbody – Ponds											149.36		149.36
Grand Total	89.50	2.59	3248.64	228.53				1793.94	187.49		149.36		5700.05

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T5 88 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 54 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
4. There is an increase 348, 185, 167, 101 & 88 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 891 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. About **174 Hectares of the plantation/horticulture area has been increased** in during the monitoring period of 2012-13 (T0) to 2020-21 (T5) years.
6. There is a decrease of 1,129 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (0) verified from the portal.