

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-V

SRIKAKULAM -16/2013-14

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad

January-2023

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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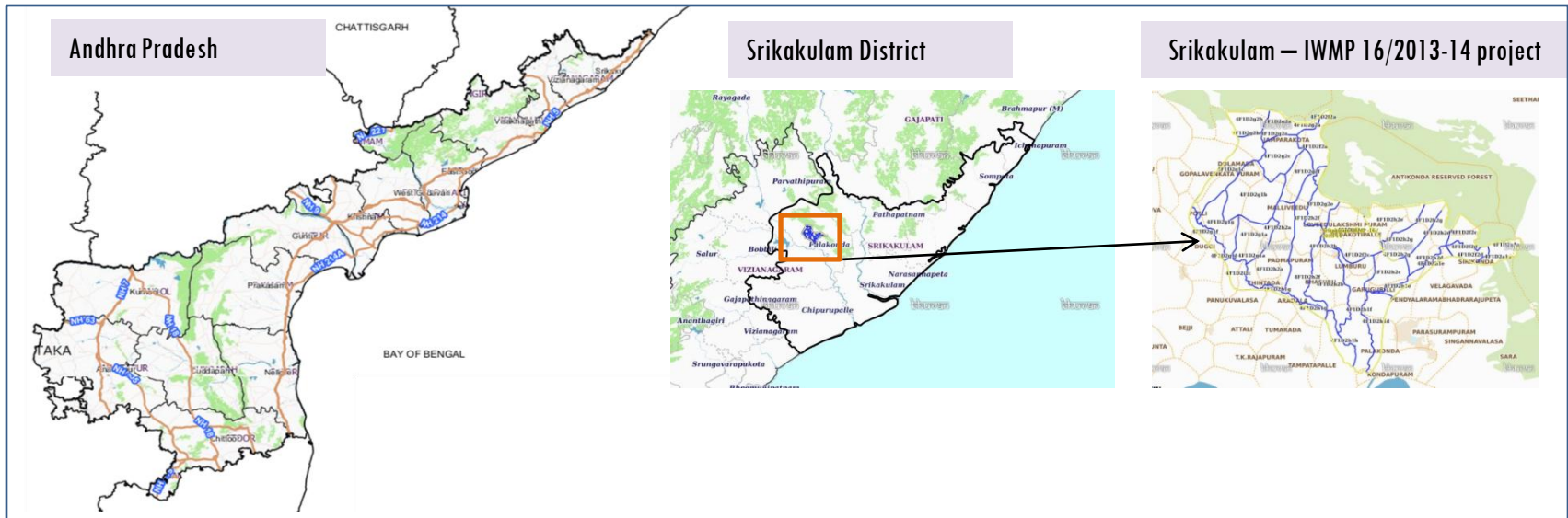
EXECUTIVE SUMMARY

- 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-16/2013-14, Srikakulam District of Andhra Pradesh. The total geographical area of the project is **5,437** ha. It comprises of 28 micro watersheds.
- In the project area 111 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increase by 10 ha , which correspond to the various water bodies that have been converted into other land use classes 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 and 2 check dams and drainage treatments .
- Major percentage i.e. 86 % is covered by the agriculture, 4.5 % is plantation, 4.7 % is covered by water body and remaining by other land use classes.

PROJECT : SRIKAKULAM - IWMP-16/2013-14

DISTRICT : SRIKAKULAM , STATE : ANDHRA PRADESH

- The study area falls in Palakonda Mandal of Srikakulam district of Andhra Pradesh state. The total geographical area of the project is **5,437** ha. It comprises of 28 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2013-14 (T0) period (*Batch -1*) projects taking 2021-22 (T5) period satellite images.



- The Climate of the district is moderate and characterized by high humidity all through the year along with oppressive summer and good seasonal rainfall.
- The mean daily maximum temperature in the district is about 34 C in May and the mean daily minimum temperature is about 17.5 C in December/ January.
- The average annual rainfall of the district is 1067 mm, which ranges from nil rainfall in January and November 208 mm in September and October. The mean seasonal rainfall distribution is 745 mm in southwest monsoon (June-September).

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2013-14	2011-12	2021-22
LISS IV	2013-14		
SCENE 1			2-Feb-22
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			2-Feb-22
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	111
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

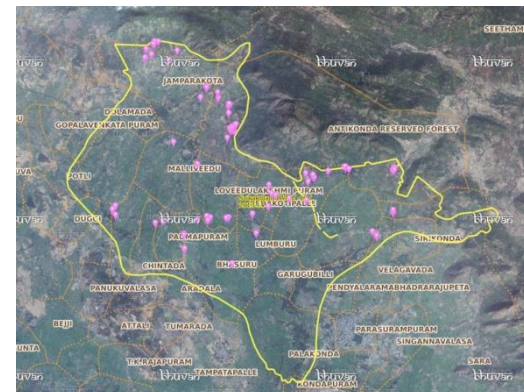


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

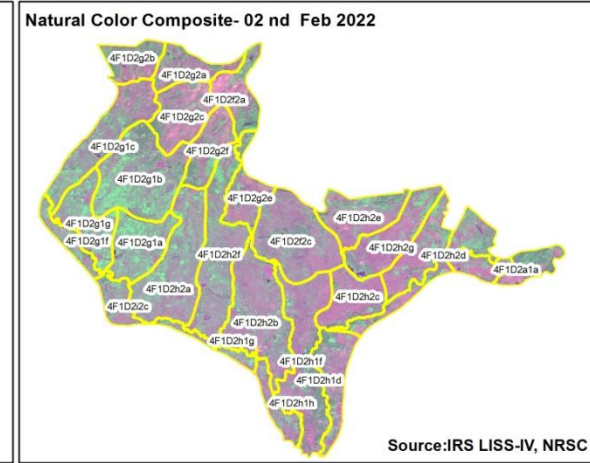
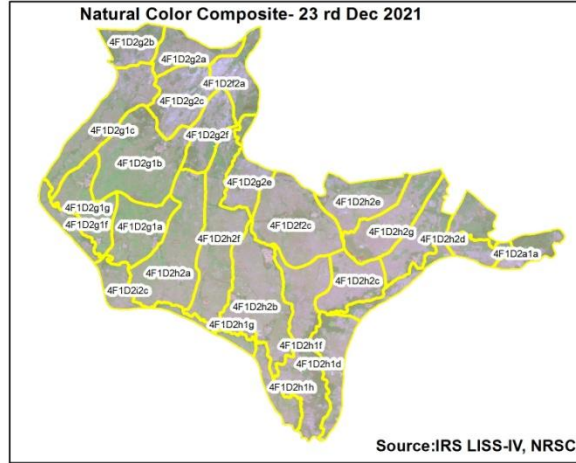
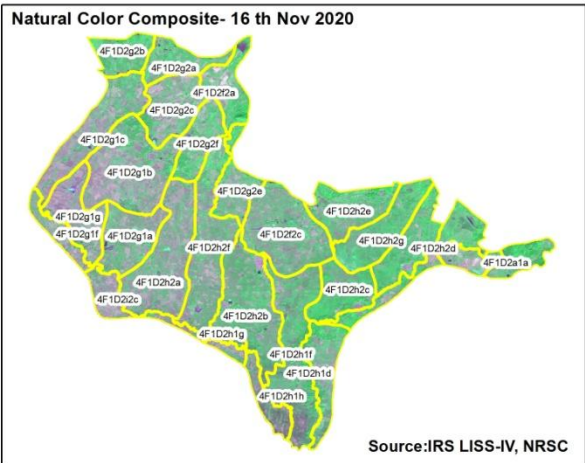
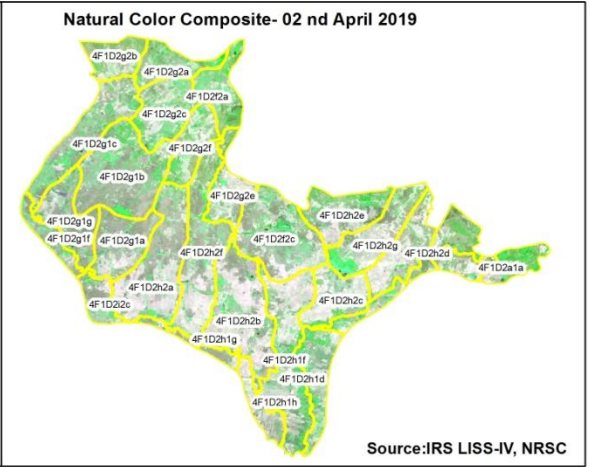
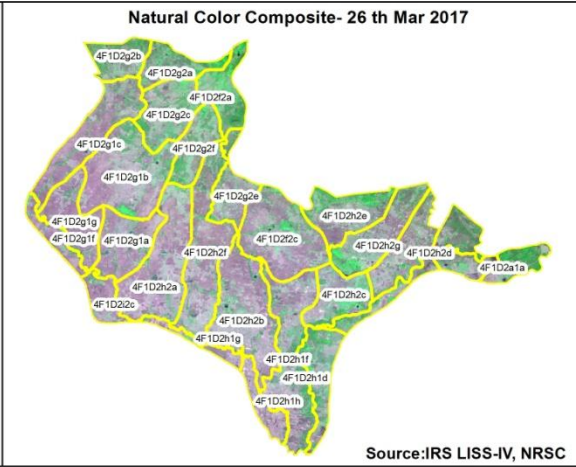
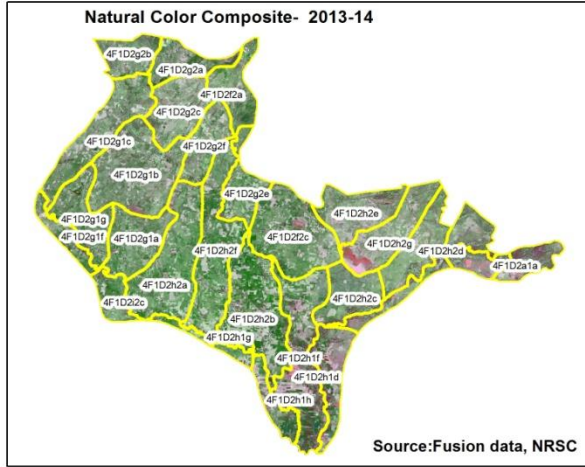
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	5	5
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	1	1
7	Terrace	0	0
8	Checks & Plugs	2	2
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	1	1
11	Civil work-Check dams/Rock fill dam	0	0
12	Nallah Bunds/Drainage treatment	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities-Plantation/Horticulture	13	13
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	93	93
	TOTAL	115	111

MONITORING IN THE PROJECT AREA

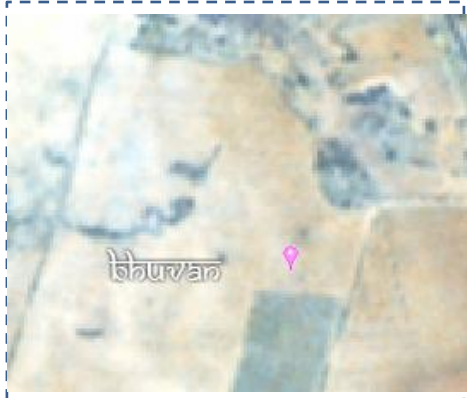
Site Wise Changes in the Project

- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2013-14) and T5 is 2021-22 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 Srikakulam District, Andhra Pradesh. IWMP-16/2013-14



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. 1704995

Horticulture

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-16/2013-14



T0:2013-14

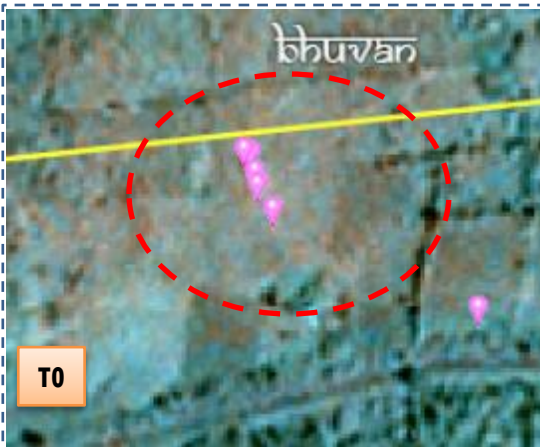


T1: 06 January 2017

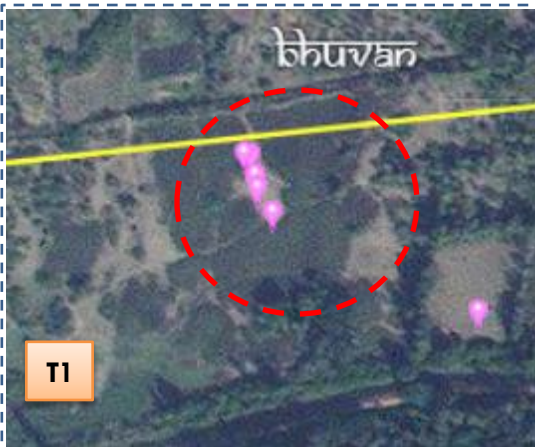


Drishti SI no. 7010404 MWS : 4F1D2h2e

Check dam



T0:2013-14



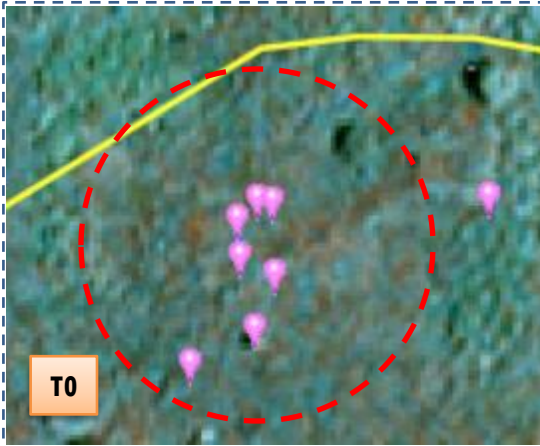
T1: 06 January 2017



Drishti SI no. 7013954 MWS : 4F1D2h2e

Horticulture

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-16/2013-14



T0:2013-14

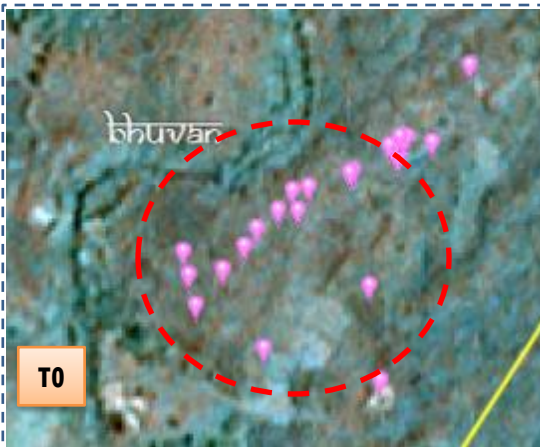


T1: 06 January 2017



Drishti Sl no. 7013988 MWS : 4F1D2g2b

Horticulture



T0:2013-14



T1: 06 January 2017



Drishti Sl no. 7015349 MWS : 4F1D2g2e

Percolation tank

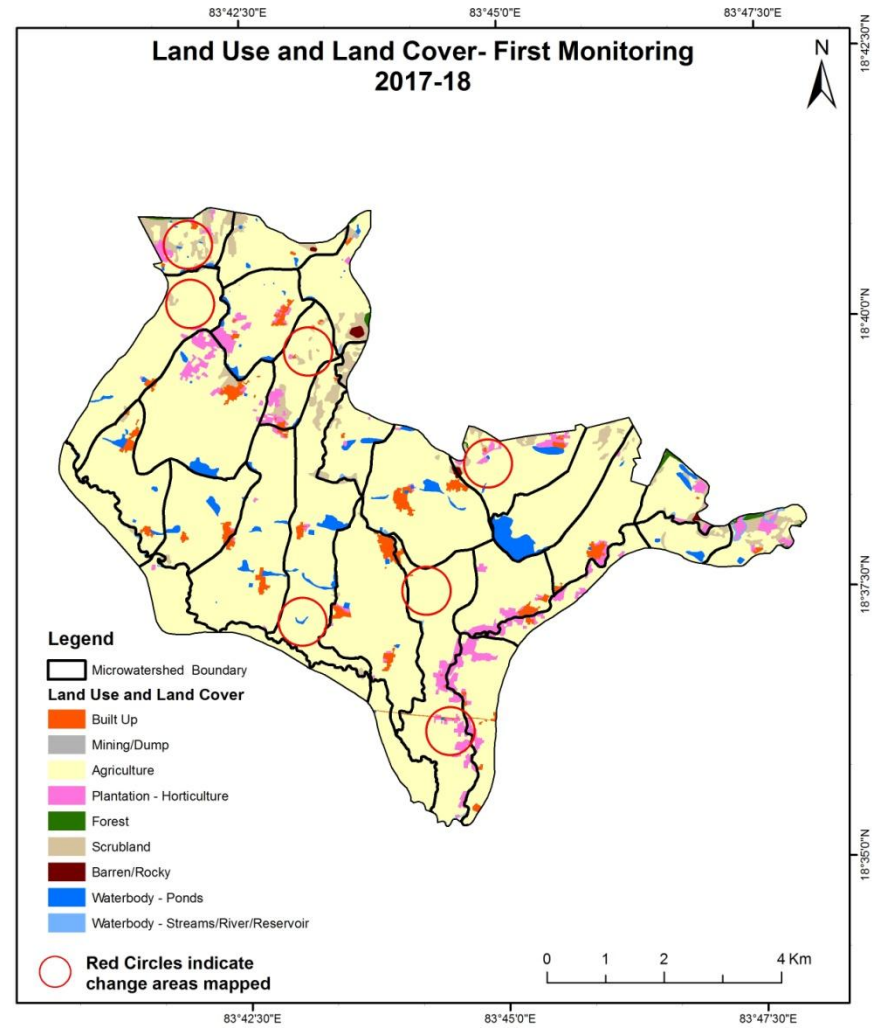
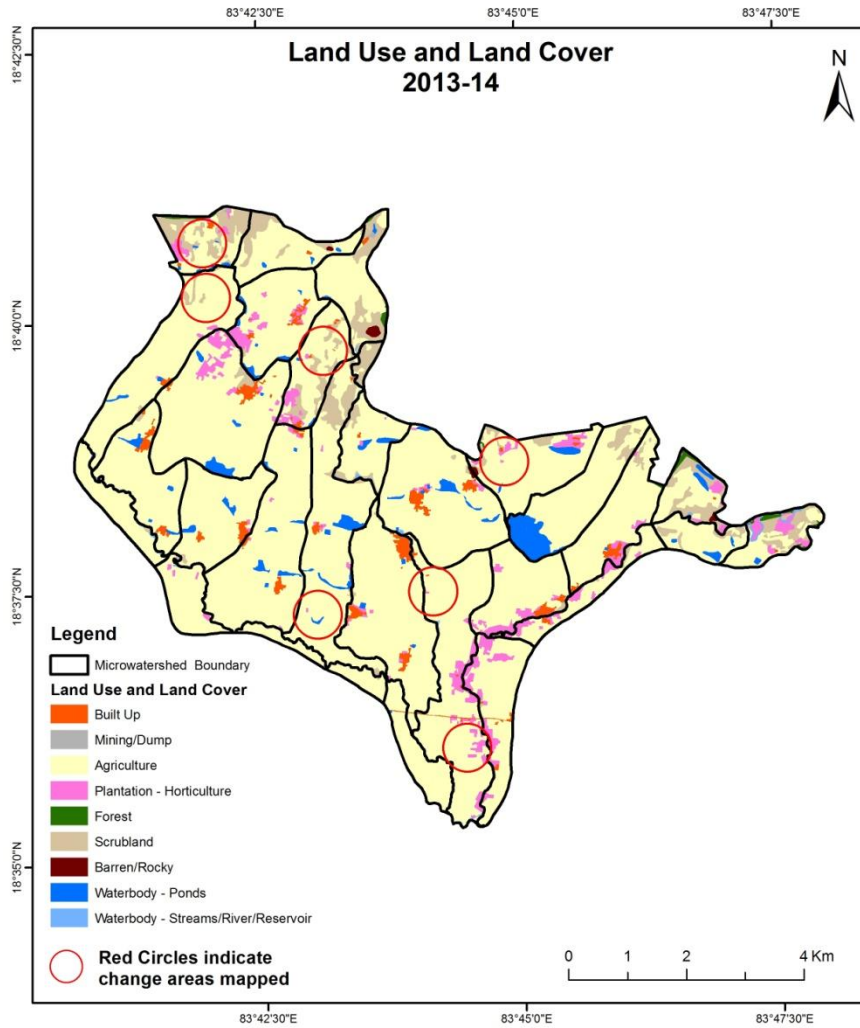
MONITORING IN THE PROJECT AREA

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 T0 (2013-14) and row represents the T5 (2021-22)

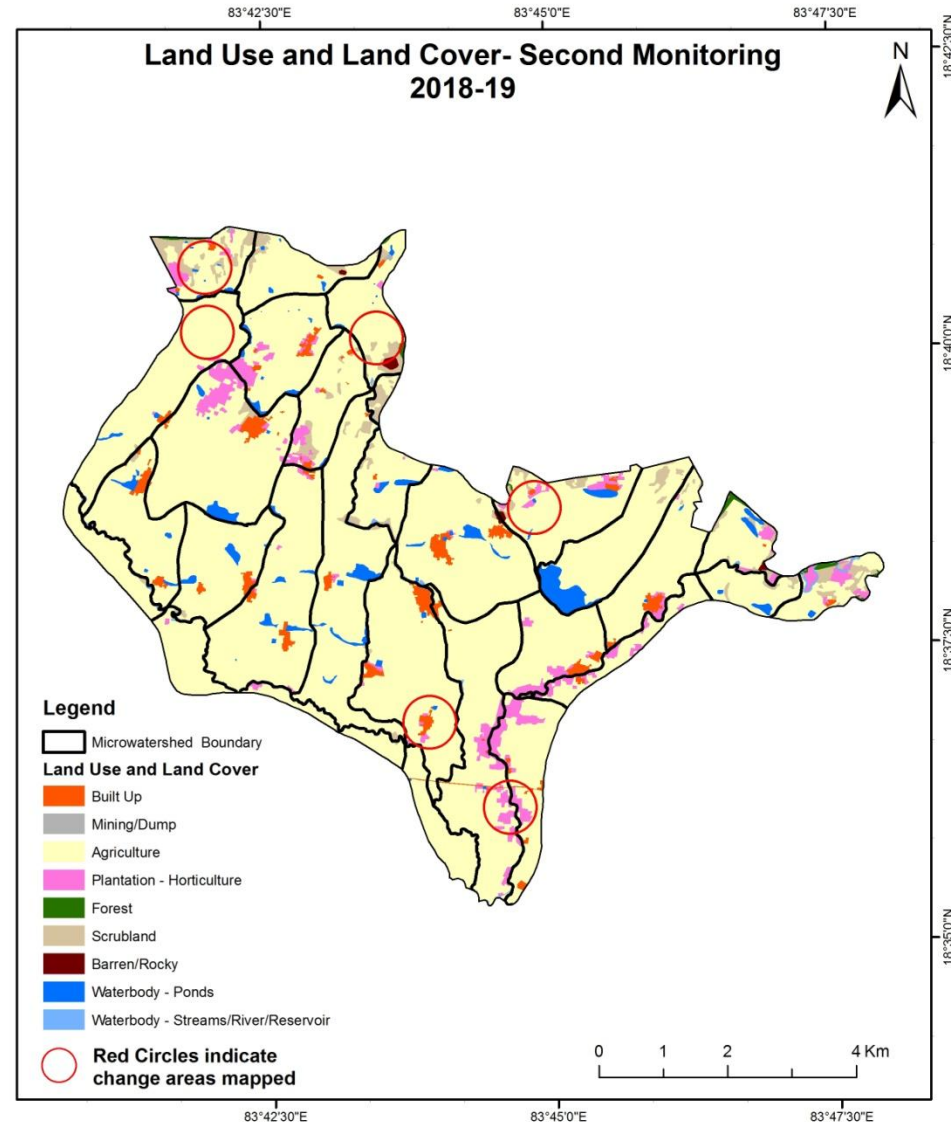
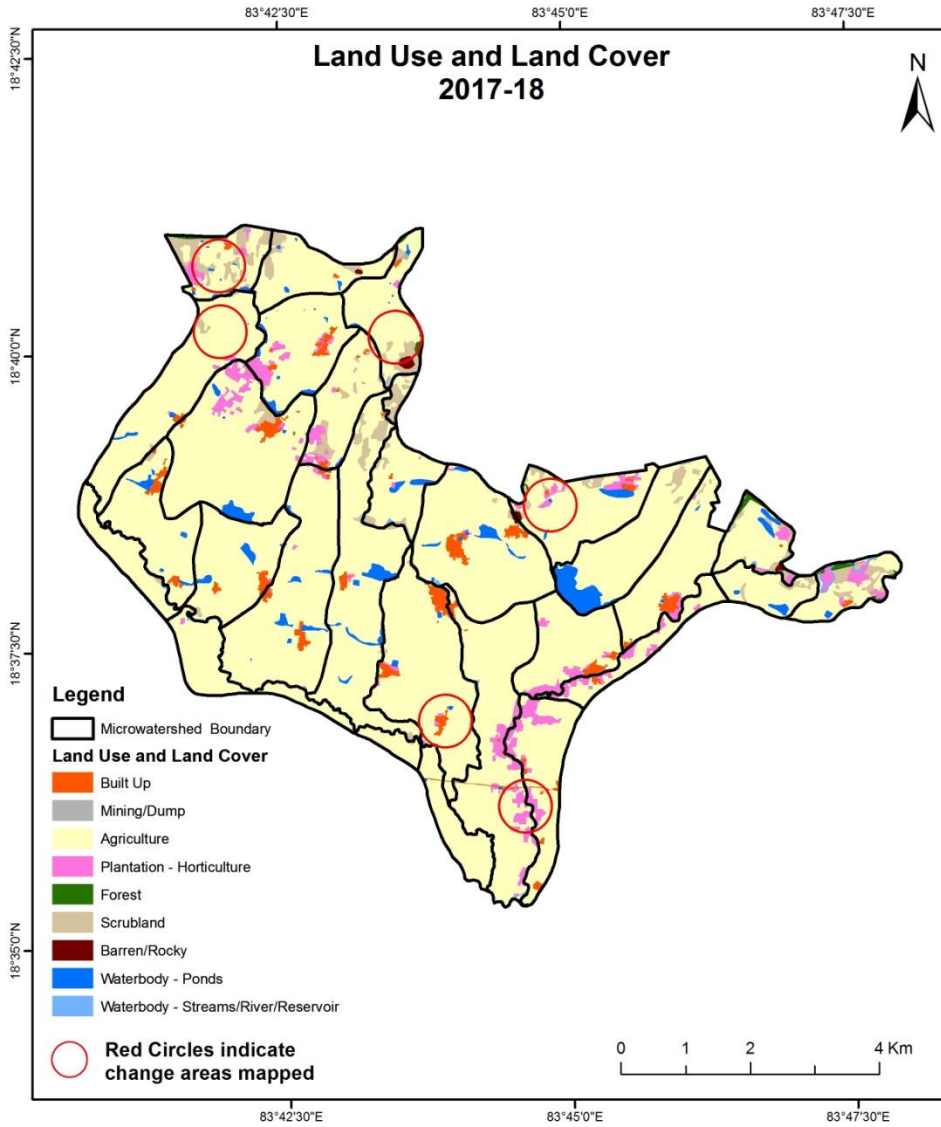
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2017-18)

Scale: 1:10000



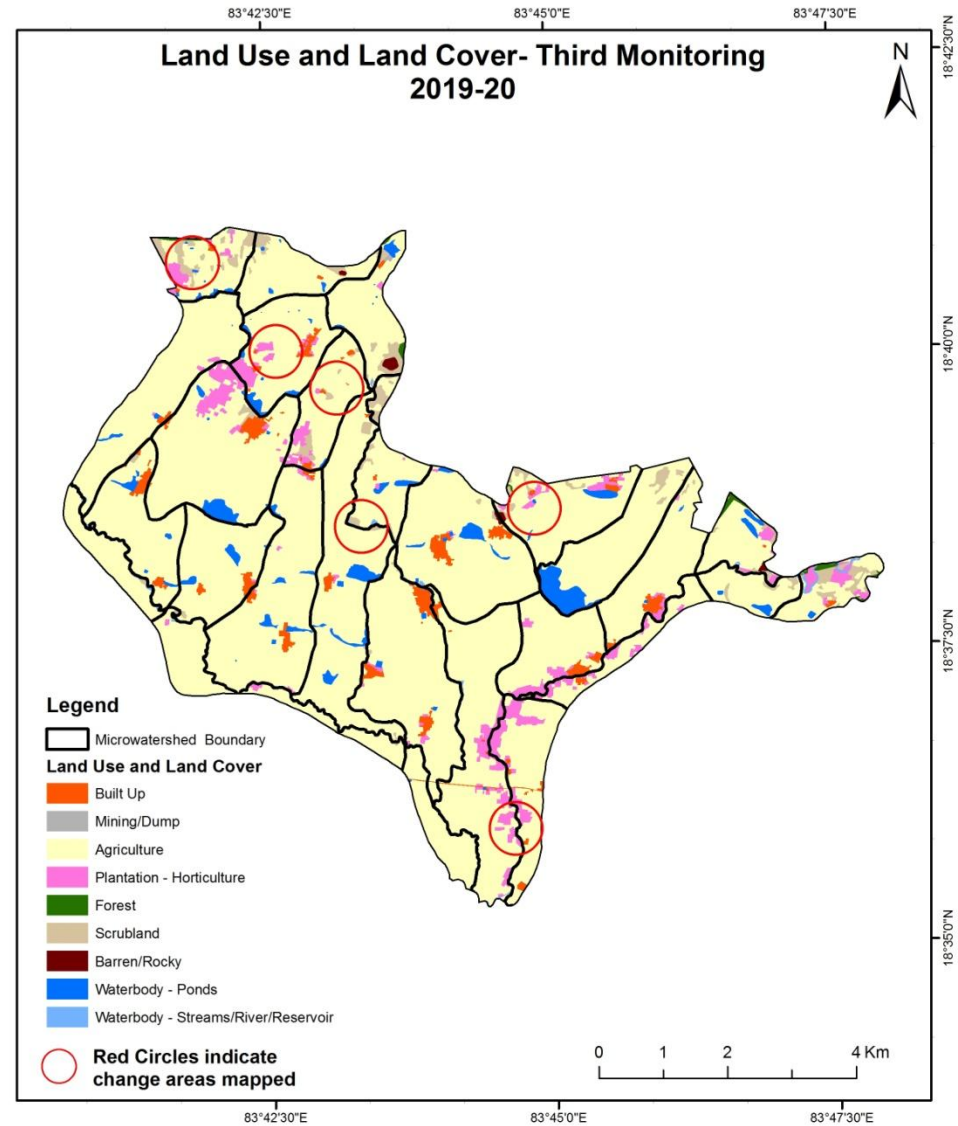
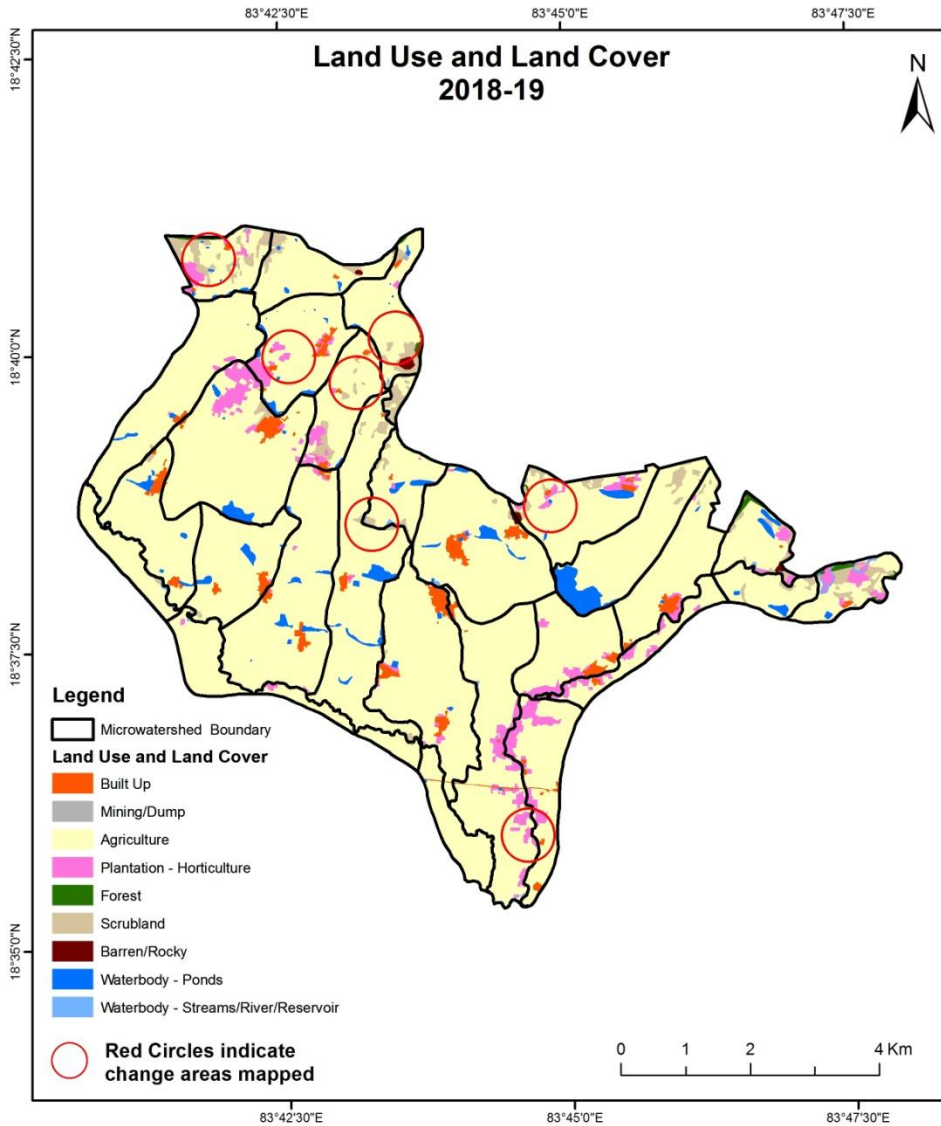
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



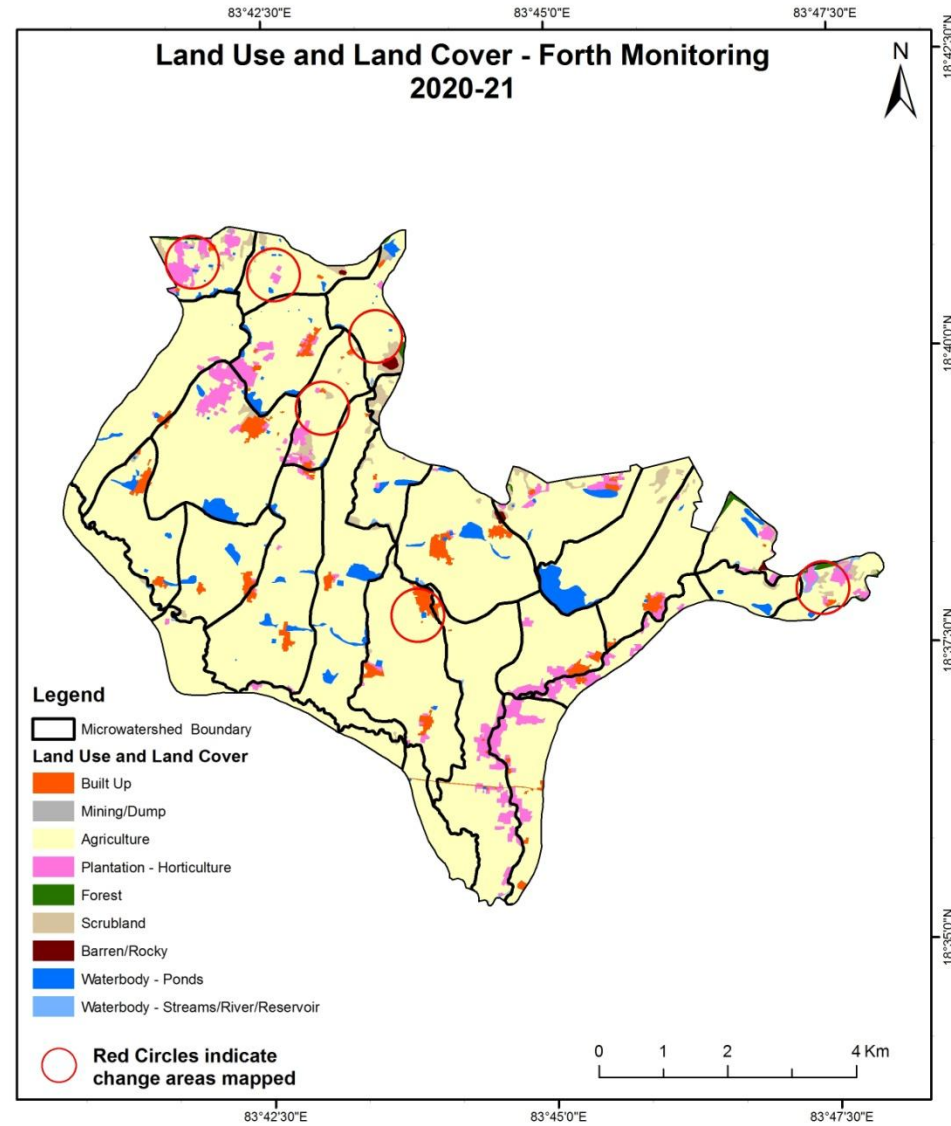
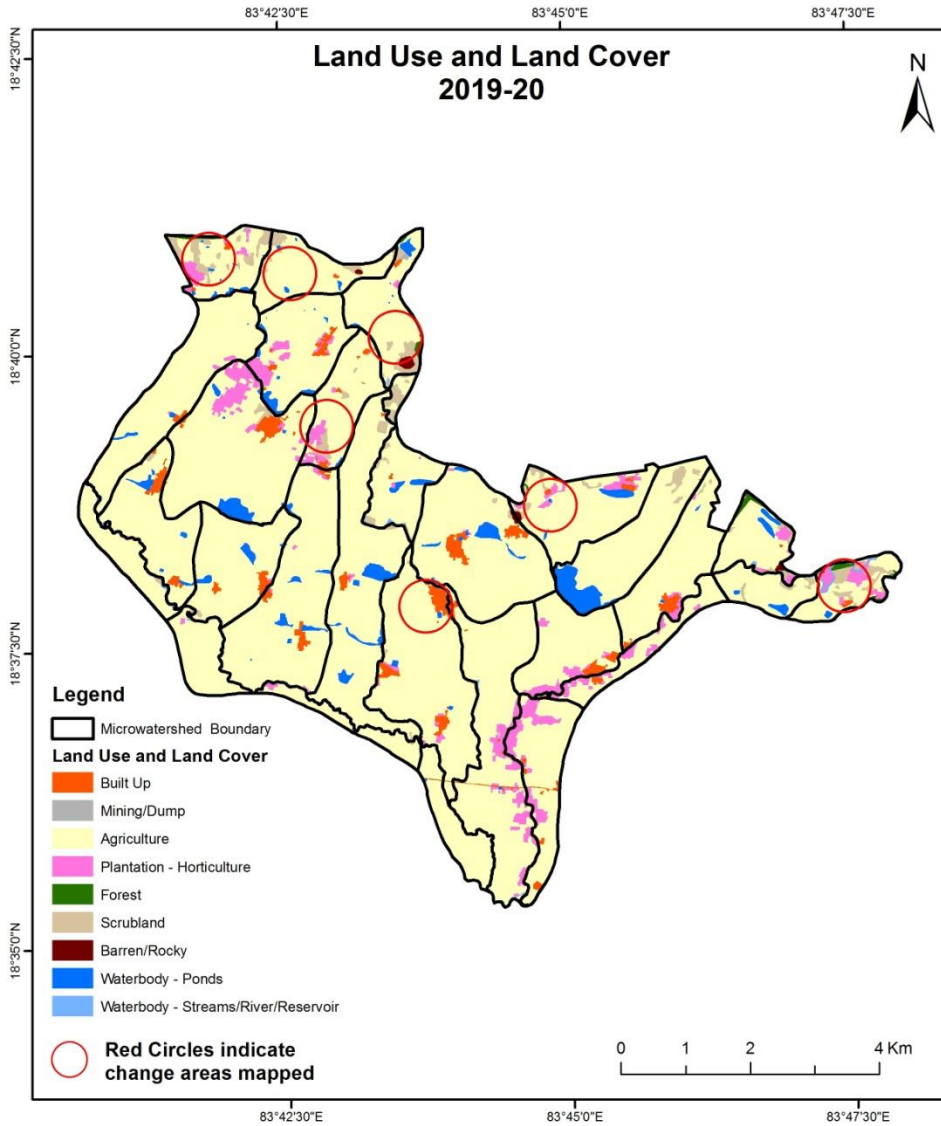
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



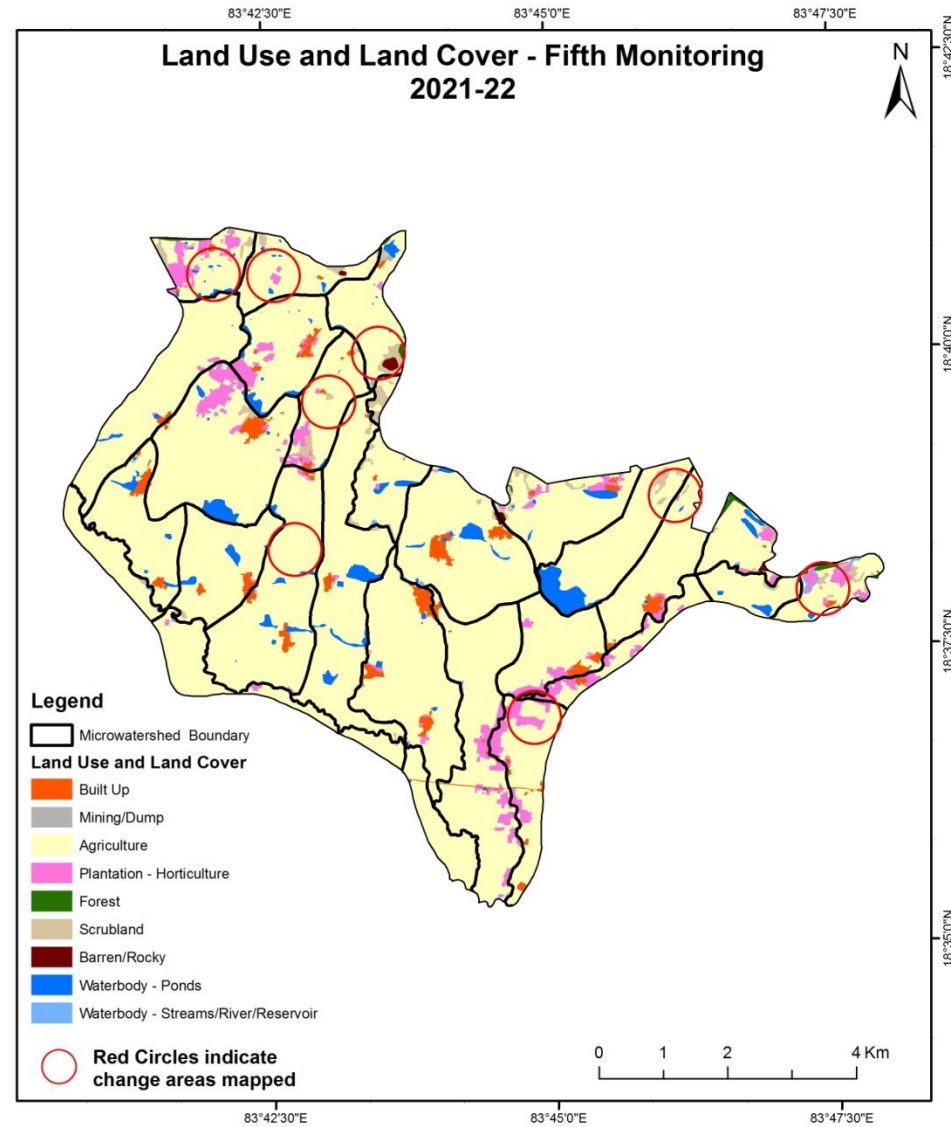
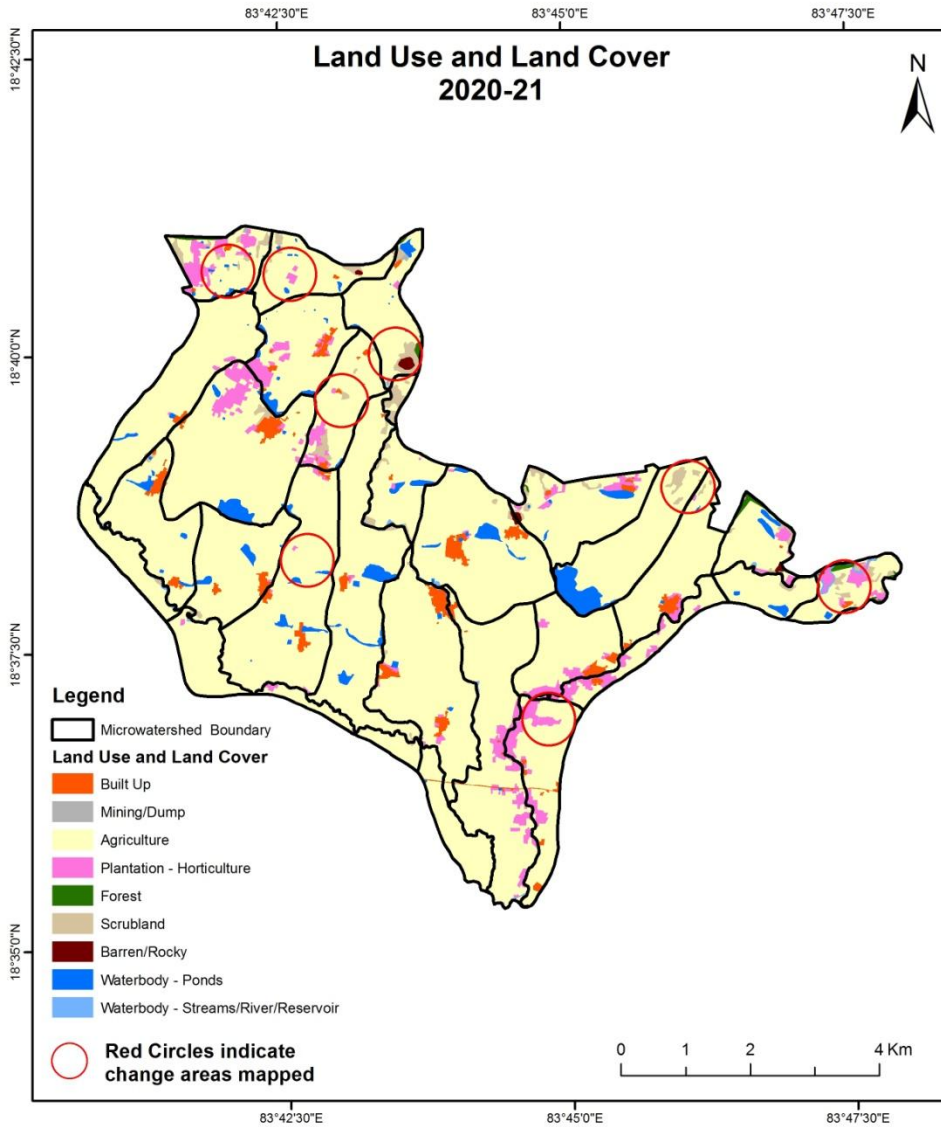
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000



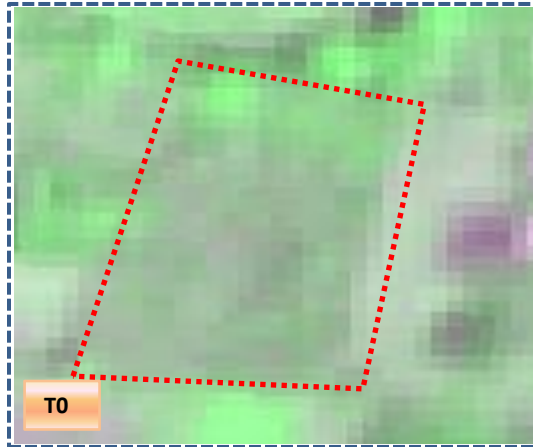
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2020-21 to 2021-22)

Scale: 1:10000

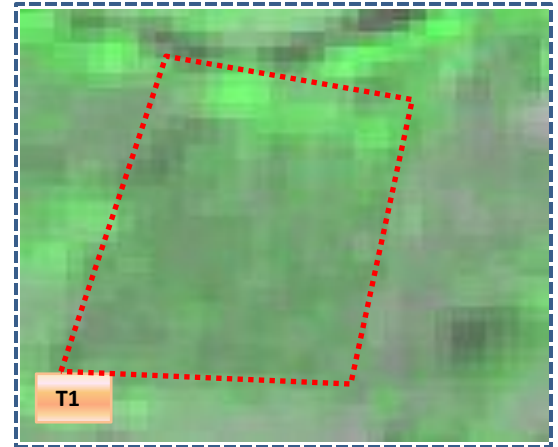


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub To Agriculture

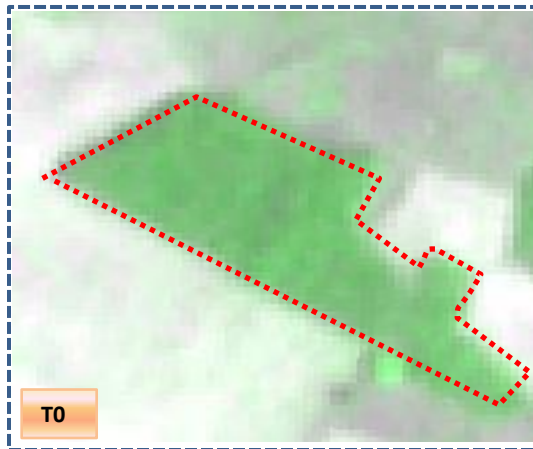


T0: 2013-14 (83°45'9.319"E 18°37'11.736"N)

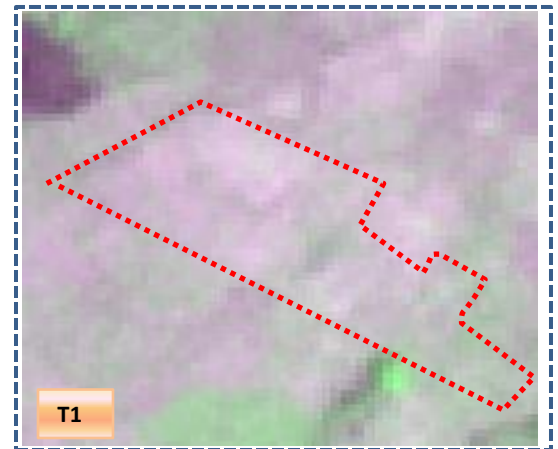


T1: 26 March 2017

Plantation to Agriculture



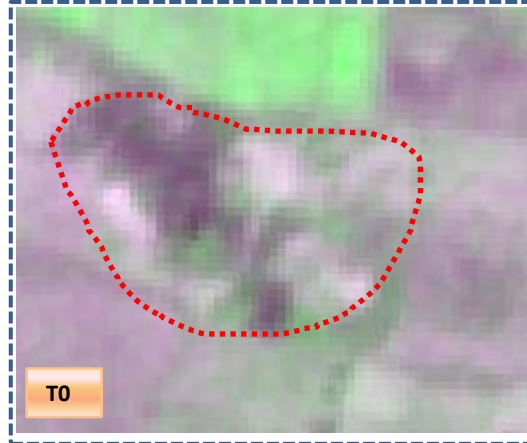
T0: 2013-14 (83°44'29.839"E 18°37'12.408"N)



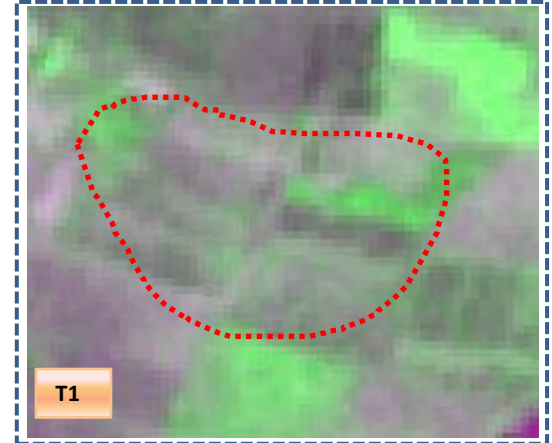
T1: 26 March 2017

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

Scrub to Agriculture

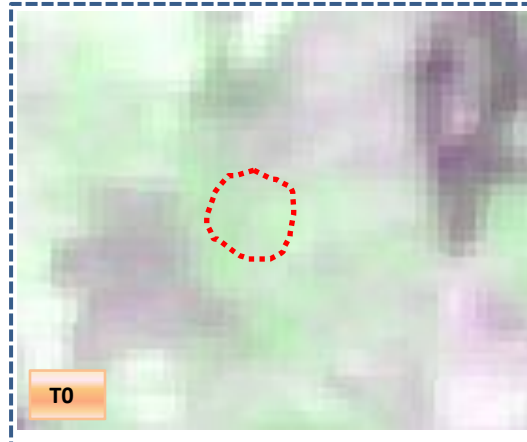


T0: 2013-14 (83°46'23.737"E 18°38'0.947"N)

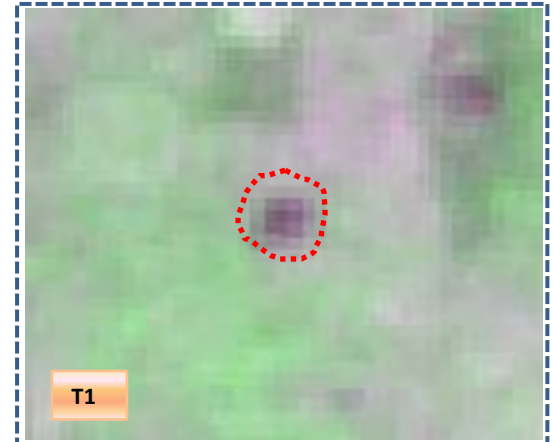


T1: 26 March 2017

Agriculture to Waterbody



T0: 2013-14 (83°41'58.366"E 18°40'37.221"N)



T1: 26 March 2017

Table showing change matrix depicting Land cover transitions during study period-2013-14 to 2017-18

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	
T0												
Built up	96.97										96.97	
Mining/dump		1.39									1.39	
Agriculture	9.63		4471.58	11.22						4.12	4496.55	
Plantation Horticulture	8.53		18.79	191.79							219.11	
Forest			2.55		21.06						23.61	
Forest Plantation												
Barren Rocky							8.44				8.44	
Scrub	0.34		140.12	0.56				202.62		1.13	344.77	
Waterbody- Streams/River									104.1		104.1	
Waterbody – Ponds			13.08							129.37	142.45	
Grand Total	115.47	1.39	4646.12	203.57	21.06		8.44	202.62	104.1	134.62	5437.39	

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
- In T0 24 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T1.
- In T1 174 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-2017-18 to 2018-19

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	115.47												115.47
Mining/dump		1.39											1.39
Agriculture	3.11		4628.62	14.39									4646.12
Plantation Horticulture	0.39			203.18									203.57
Forest					21.06								21.06
Forest Plantation													
Barren Rocky							8.44						8.44
Scrub	3.32		31.73	0.56				167.01					202.62
Waterbody- Streams/River									104.1				104.1
Waterbody – Ponds											134.62		134.62
Grand Total	122.29	1.39	4660.35	218.13	21.06		8.44	167.01	104.1		134.62		5437.39

- 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 17 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T2.
- In T2 31 ha of the agriculture area has increased from 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-2018-19 to 2019-20

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	122.29												122.29
Mining/dump		1.39											1.39
Agriculture			4642.03	1.22							17.1		4660.35
Plantation Horticulture	0.44			217.69									218.13
Forest					21.06								21.06
Forest Plantation													
Barren Rocky							8.44						8.44
Scrub	0.09		29.6	0.65				136.67					167.01
Waterbody- Streams/River									104.1				104.1
Waterbody – Ponds											134.62		134.62
Grand Total	122.82	1.39	4671.63	219.56	21.06		8.44	136.67	104.1		151.72		5437.39

- 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 18 ha of the agriculture area has decreased and it is converted into plantations and water body in T3.
- In T3 29 ha of the agriculture area has increased from 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-2019-20 to 2020-21

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	122.82										122.82	
Mining/dump		1.39									1.39	
Agriculture	0.6		4652.8	17.38						0.85	4671.63	
Plantation Horticulture			1.78	217.78							219.56	
Forest					21.06						21.06	
Forest Plantation												
Barren Rocky							8.44				8.44	
Scrub			23.22	8.39				104.52		0.54	136.67	
Waterbody- Streams/River									104.1		104.1	
Waterbody – Ponds										151.72	151.72	
Grand Total	123.42	1.39	4677.8	243.55	21.06		8.44	104.52	104.1	153.11	5437.39	

- 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 18.8 ha of the agriculture area has decreased and it is converted into built-up, plantations and water body in T4.
- In T4 25 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-2020-21 to 2021-22

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	
Built up	123.42										123.42	
Mining/dump		1.39									1.39	
Agriculture			4673.12	4.68							4677.8	
Plantation Horticulture			0.98	242.57							243.55	
Forest					21.06						21.06	
Forest Plantation												
Barren Rocky							8.44				8.44	
Scrub			7					97.52			104.52	
Waterbody- Streams/River									104.1		104.1	
Waterbody – Ponds										153.11	153.11	
Grand Total	123.42	1.39	4681.1	247.25	21.06		8.44	97.52	104.1	153.11	5437.39	

- 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 4.6 ha of the agriculture area has decreased and it is converted into plantations in T5.
- In T5 80 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 10.6 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2013-14 (T0) & 2021-22 (T5) years.
4. There is an increase of 149, 14, 11, 06 & 3.3 Hectares from T0-T1, T1-T2, T2-T3, T3-T4& T4-T5 respectively and overall increase of 184 Hectares in Crop land area as compared between baseline LU/LC data 2013-14 (T0) & 2021-22 (T5) years.
5. About **28 ha of the plantation/horticulture area has been increased** in during the monitoring period of 2013-14 (T0) to 2021-22 (T5) years.
6. There is a decrease of 247 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
7. Farm ponds (01) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (01) verified from the portal.