

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

Chittoor -53/2012-13
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
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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

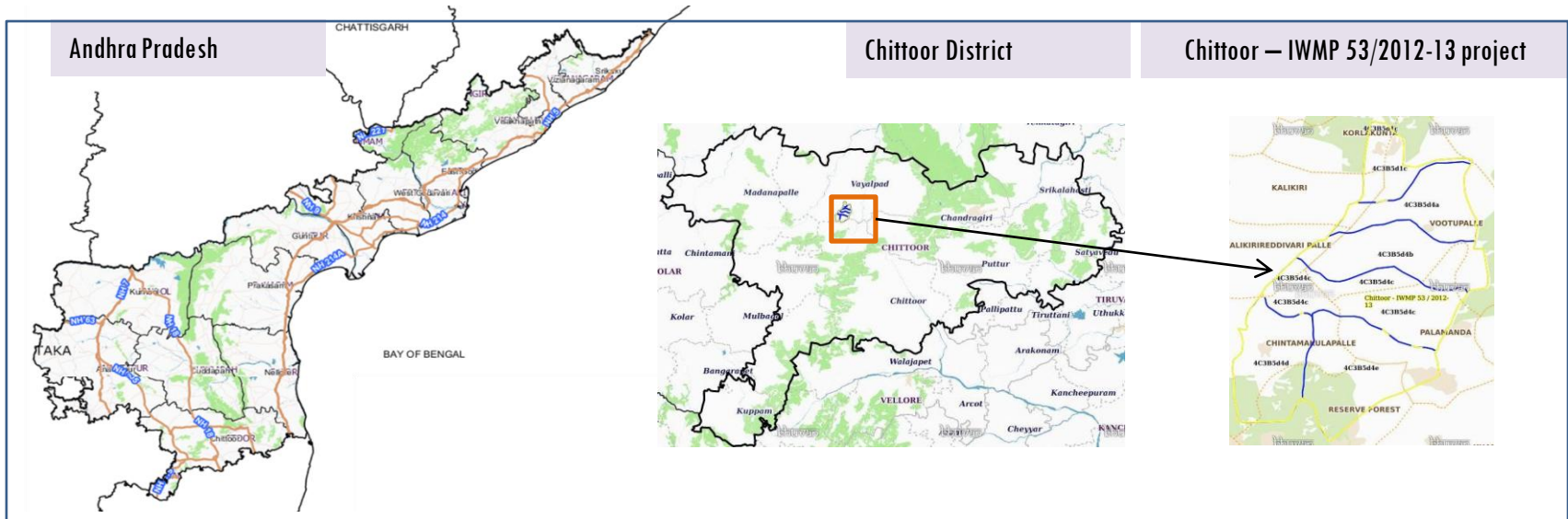
E X E C U T I V E S U M M A R Y

- 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-53/2012-13, Chittoor District of Andhra Pradesh. The total geographical area of the project is 4,223 ha. It comprises of 6 micro watersheds.
- In the project area 233 Drishti photos were uploaded showing all water harvesting structures of check dams/Rock fill dam, recharge pits etc,.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and check dams and drainage treatments .
- Water bodies have shown an increase by 22 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 50 % is covered by the agriculture, 22 % is covered by scrub land and 11 % is covered by forest and remaining by other land use classes.

PROJECT : CHITTOOR – IWMP-53/2012-13

DISTRICT : CHITTOOR , STATE : ANDHRA PRADESH

- The study area falls in Sodam Mandal of Chittoor district of Andhra Pradesh state. The total geographical area of the project is 4,223 ha. It comprises of 6 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.



- The climate of the district is dry and healthy. Out of 66 mandals in the district, 31 are upland mandals which are located in Madanapalle division and are comparatively cooler than the eastern mandals except Chittoor mandal where the climate is moderate. December and January are the coldest months when the mean maximum temperature will be around 26.40 °C, May is the hottest month with the mean daily maximum temperature rising above 40 °C.
- The district receive 83.62 percent of rainfall during South-West monsoon and North-West monsoon period, the rainfall is nominal in summer. On an average the district receives more than 50 percent of rainfall during North- East monsoon.

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	233
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

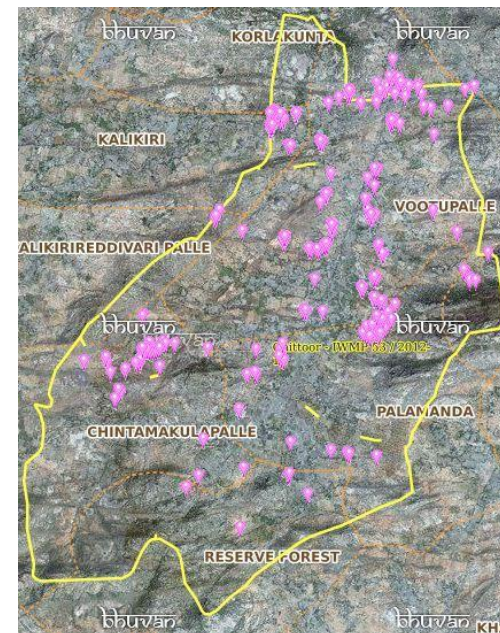


MWS Boundary



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	0	0
2	Bunding	0	0
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	1	1
7	Existing activity	0	0
8	Checks & Plugs	6	6
9	Entry point Activity	5	5
10	Farm ponds/Dug out pit	20	20
11	Civil work-Check dams /Rock fill dam	51	51
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	Livelihood Activities (Horticulture)	0	0
16	Production system and micro-enterprises	0	0
17	Others	187	150
	TOTAL	270	233

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)

Natural Color Composite-08th November 2012



Source:LISS-IV,NRSC

Natural Color Composite- 2016



Source:NCC,NRSC.

Natural Color Composite- 30th March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 24th January 2019



Source:Sentinel

Natural Color Composite- 29th February 2020



Source:LISS-IV,NRSC

Natural Color Composite-30th October 2020



Source:Sentinel

Monitoring of activities in Chittoor District Andhra Pradesh. IWMP-53/2012-13



T0 Satellite data 2010



T1 Satellite data 2013



T2 Satellite data 2016



T3 Satellite data 2018



T4 Satellite data 2019



T5 Satellite data 2020



Drishti Id. 813504

Sunken Pond

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-53/2012-13



T0:2012-13



T1: 02 February 2016



Drishti Sl no. 1652114 MWS : 4C3B5d4c

Check dam



T0:2012-13



T1: 02 February 2016



Drishti Sl no. 1658688 MWS :4C3B5d4c

Check dam

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-53/2010-11



T0

T0: 2012-13



T1

T1: 02 February 2016



Drishti SI no. 577598 MWS : 4C3B5d4c

Farm pond



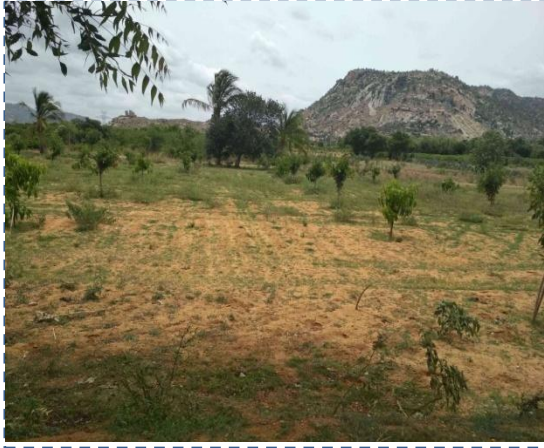
T0

T0: 2012-13



T1

T1: 02 February 2016



Drishti SI no. 7004028 MWS :4C3B5d4e

Horticulture

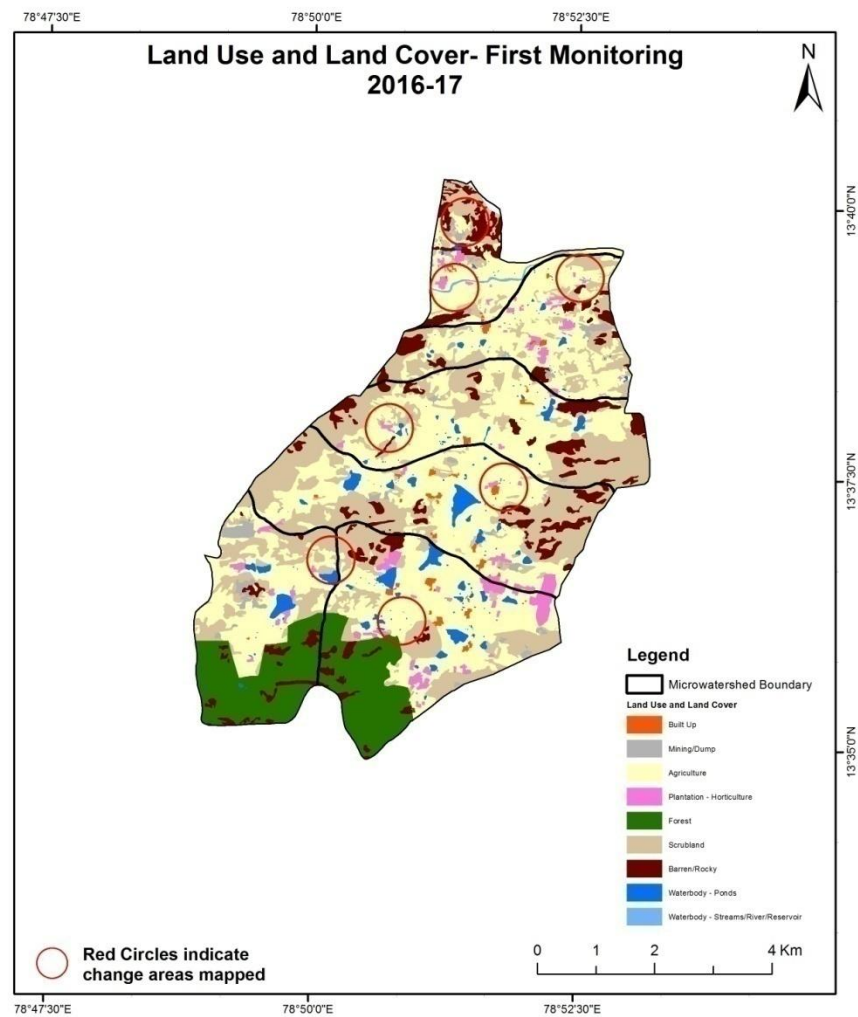
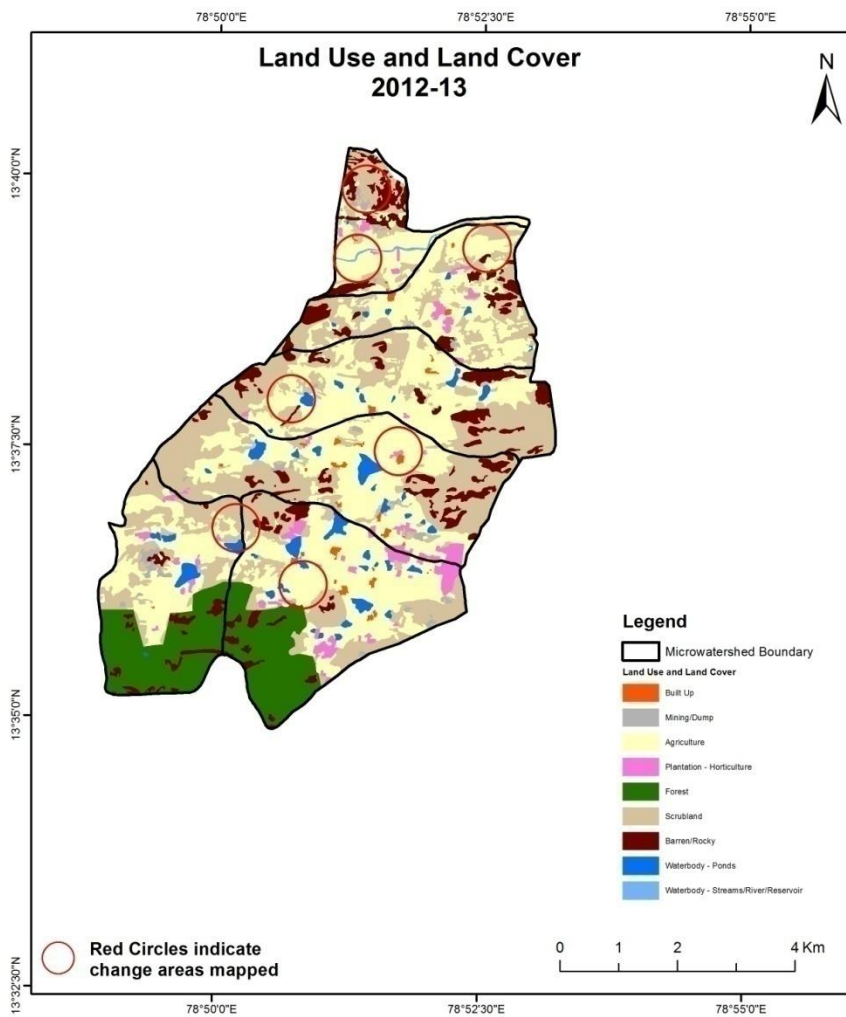
MONITORING IN THE PROJECT AREA

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)

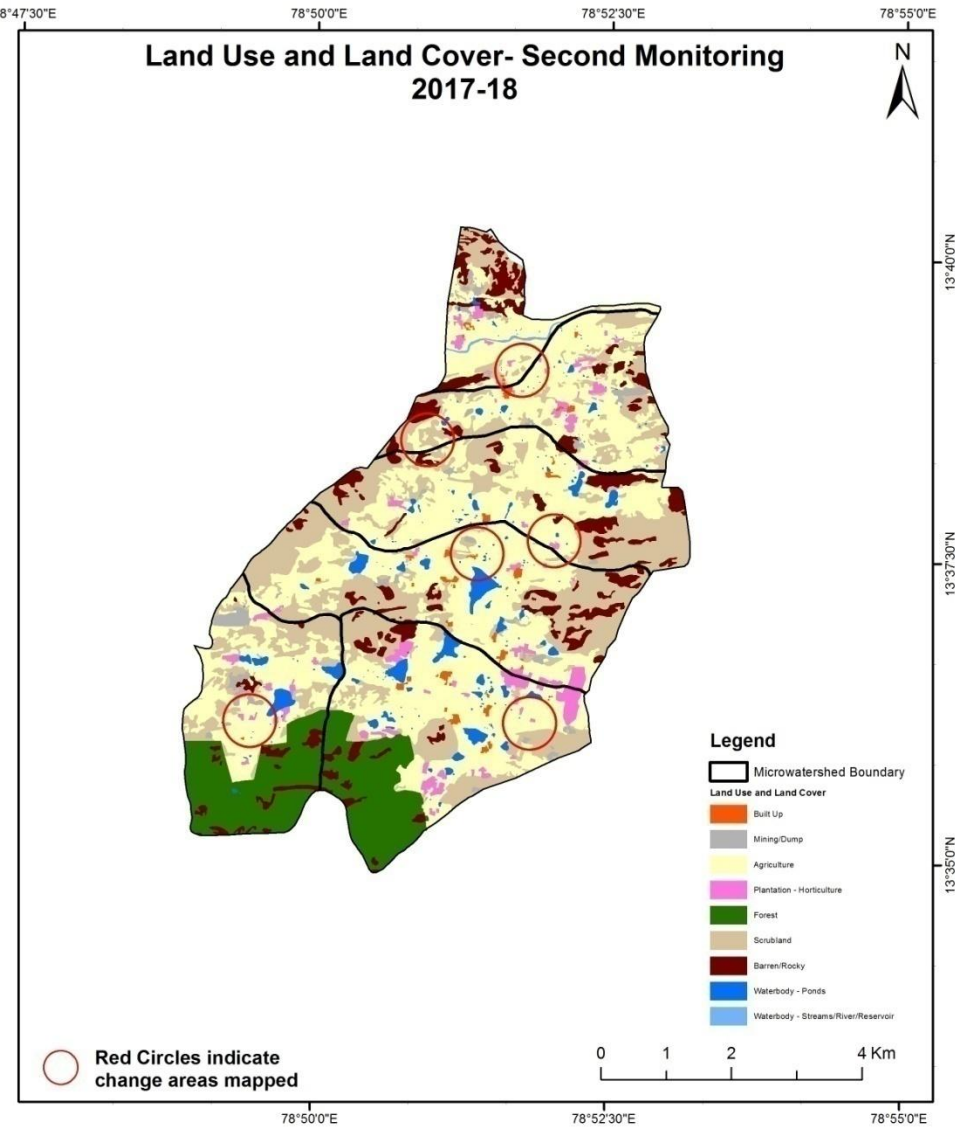
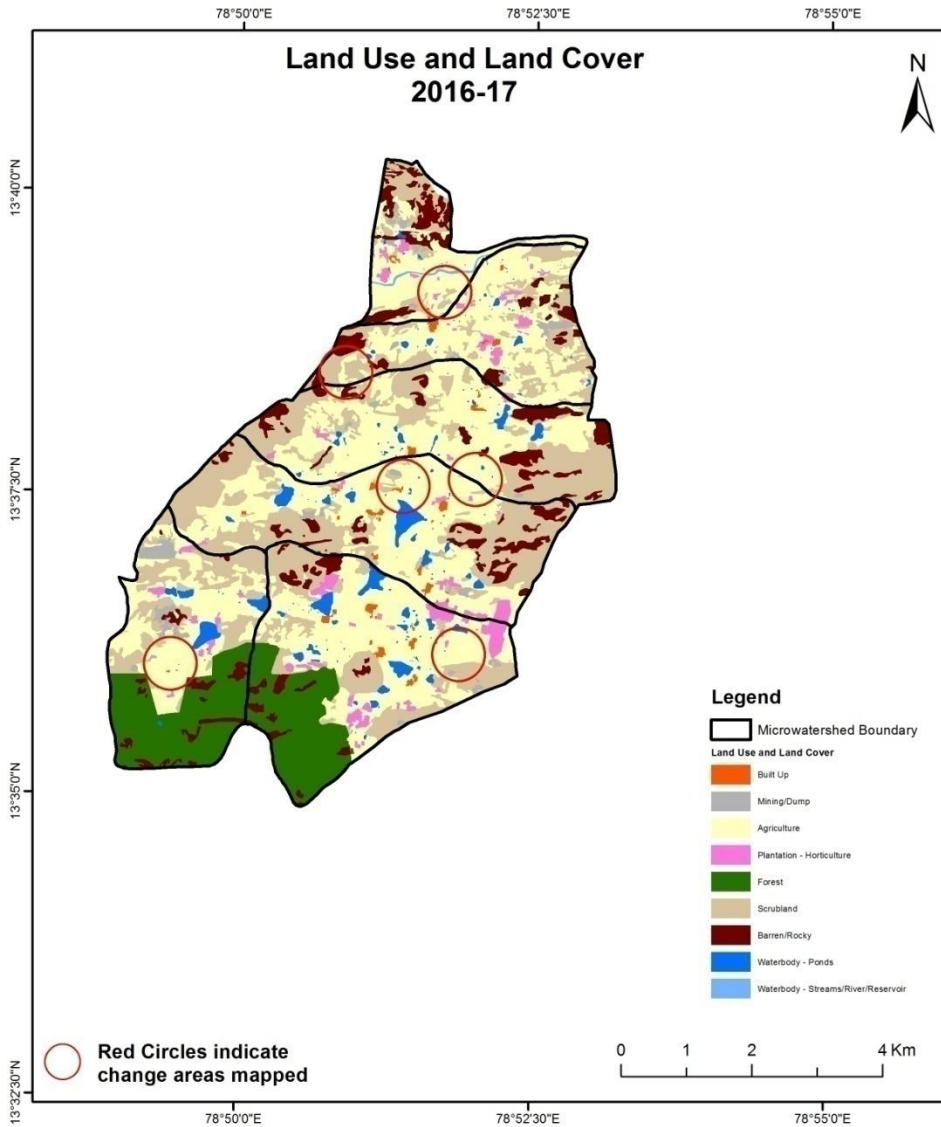
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



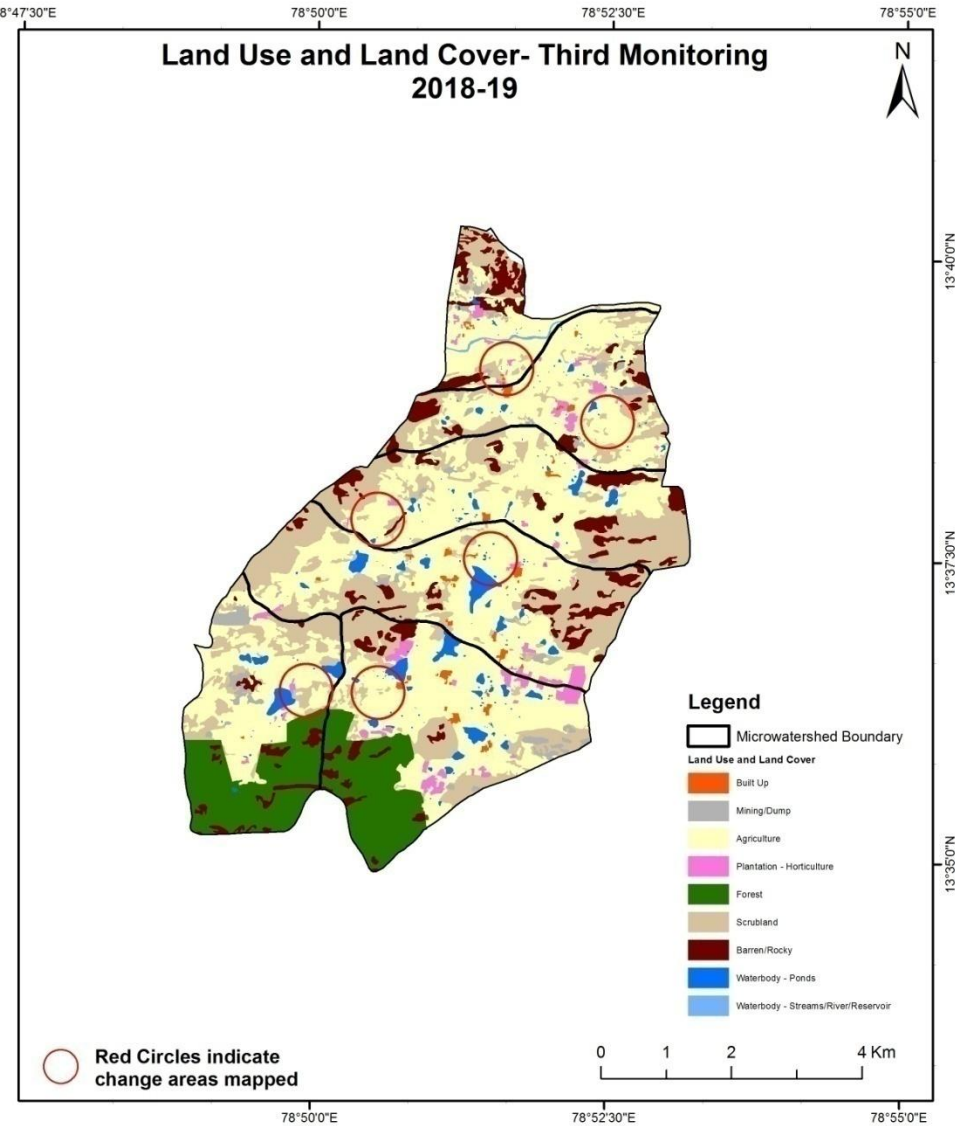
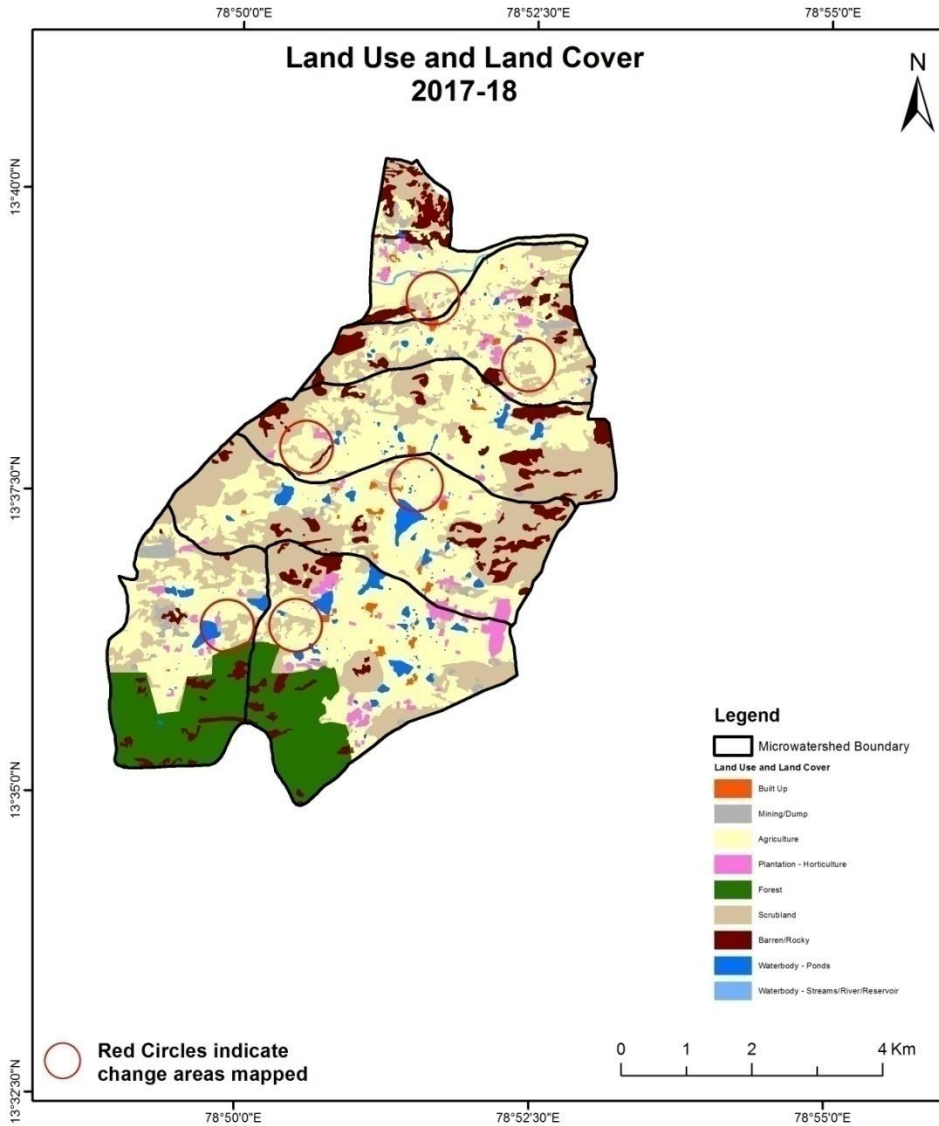
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



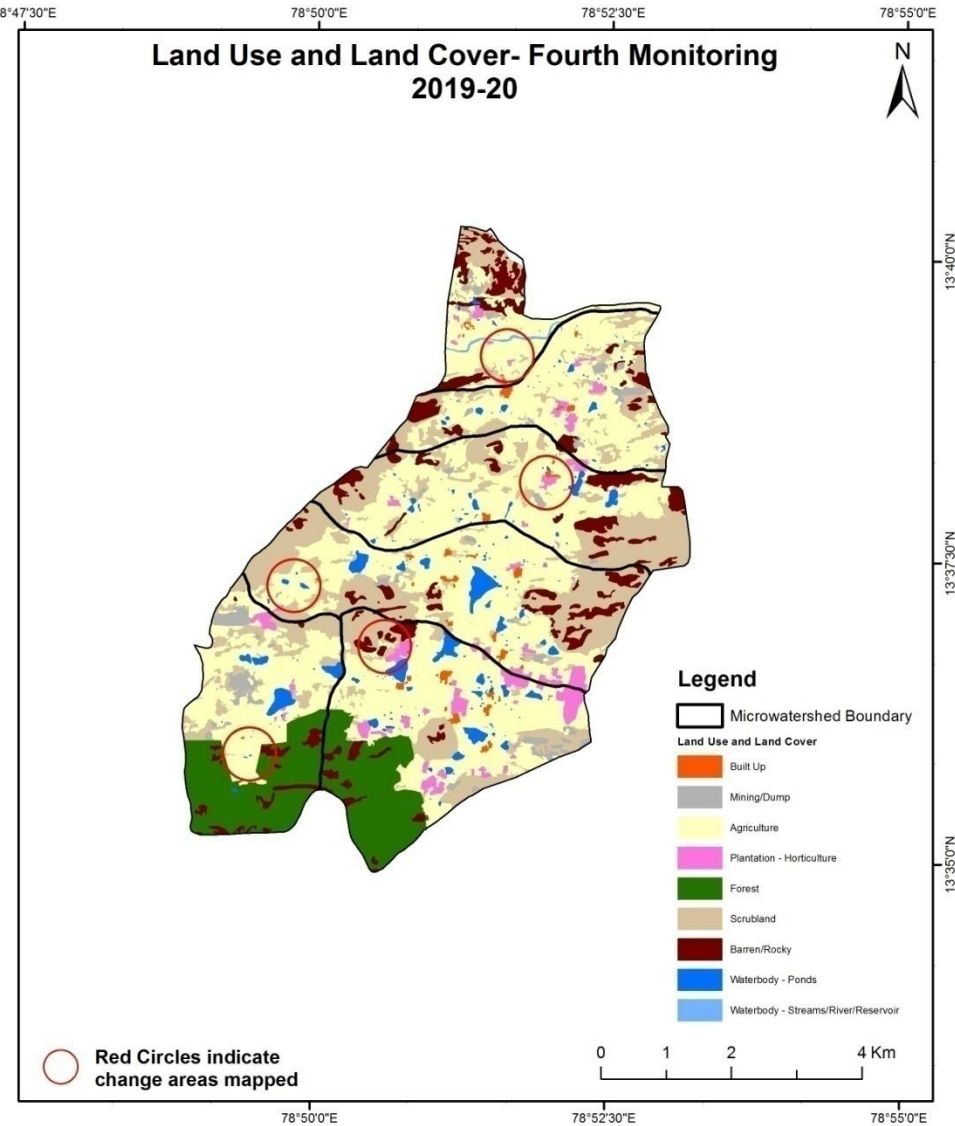
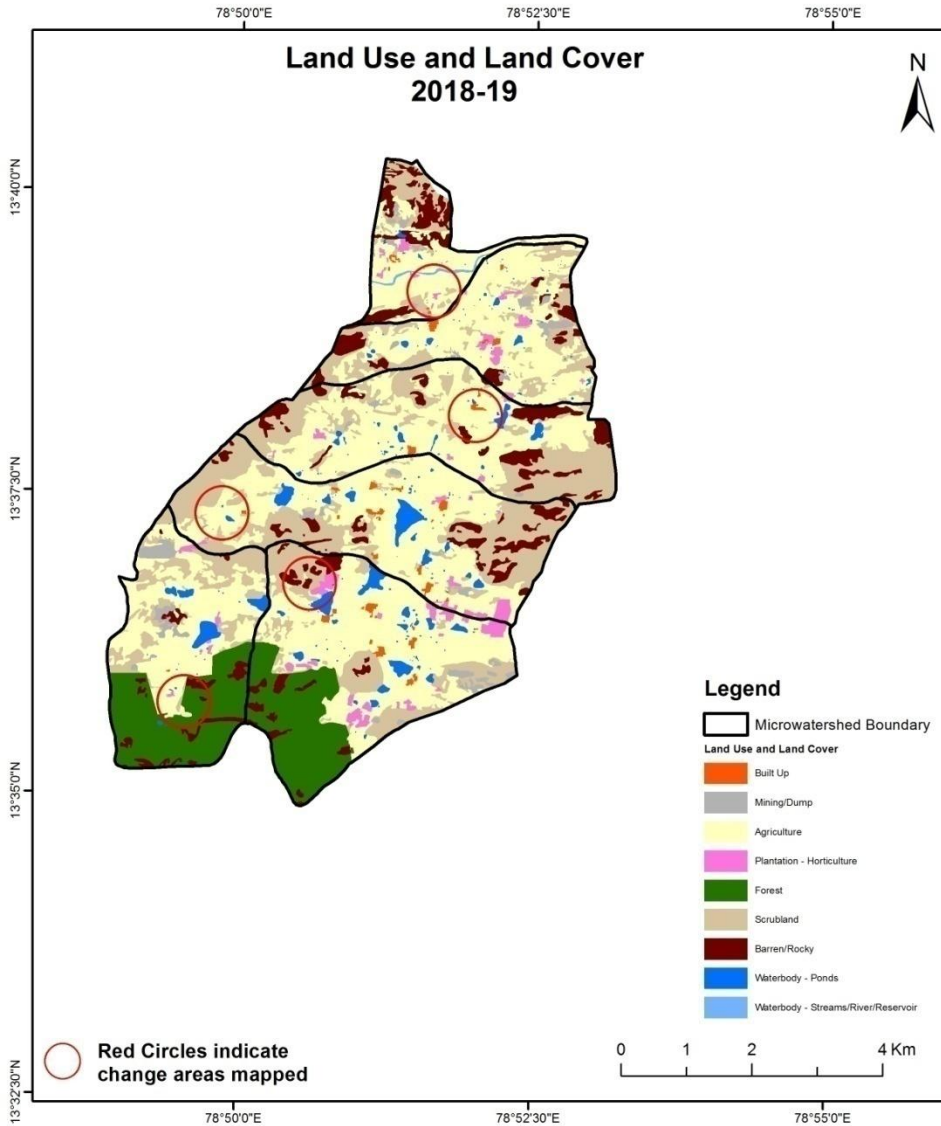
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



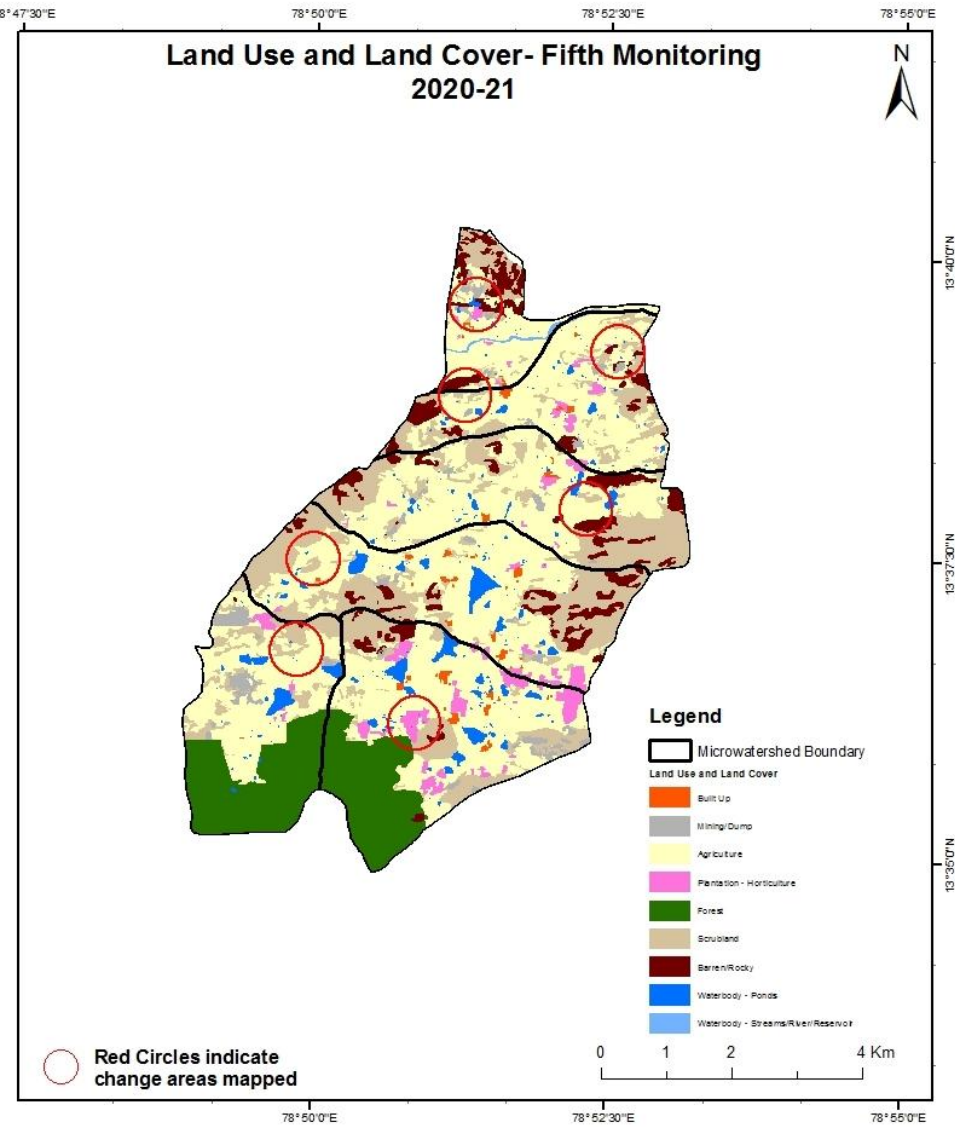
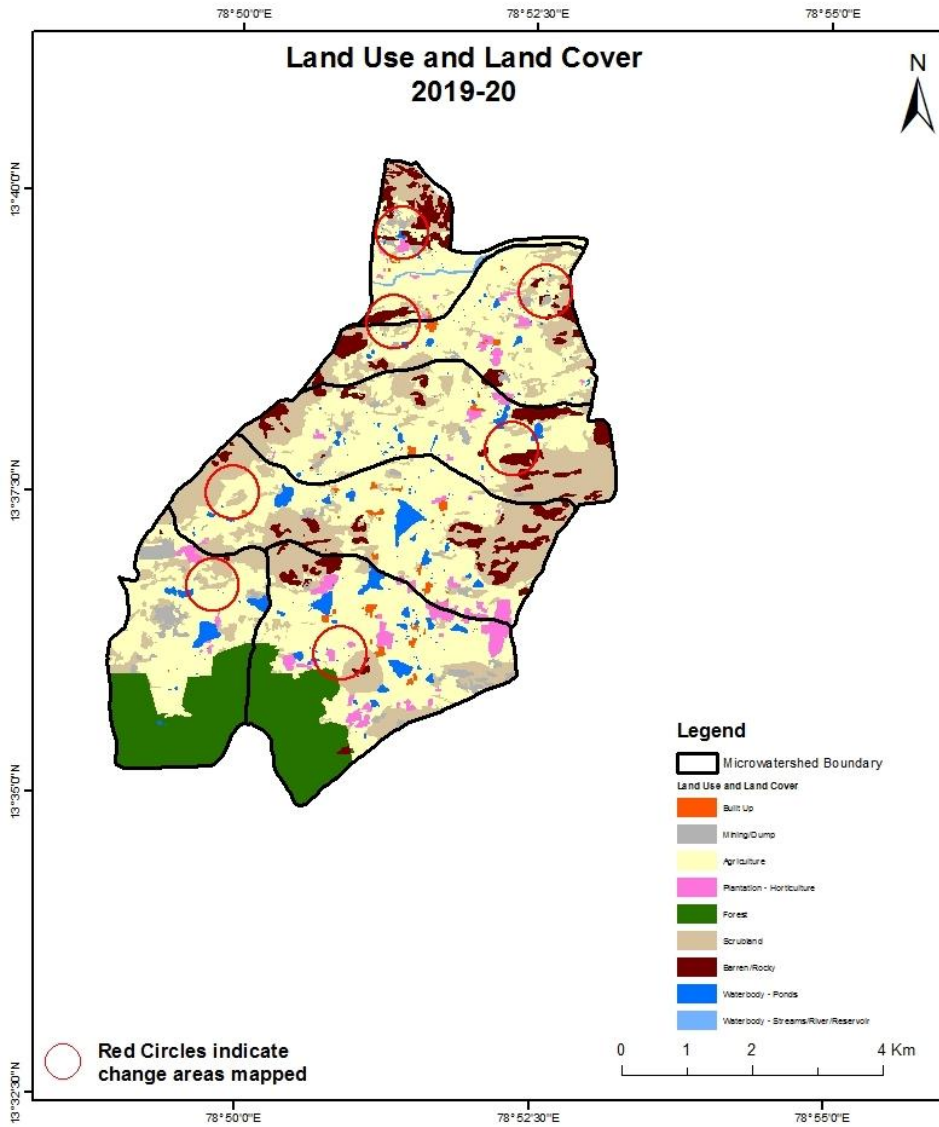
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



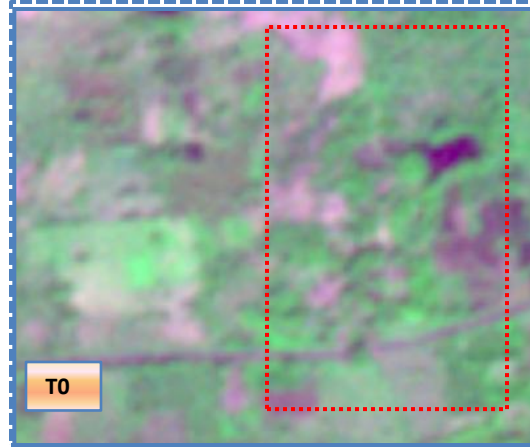
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

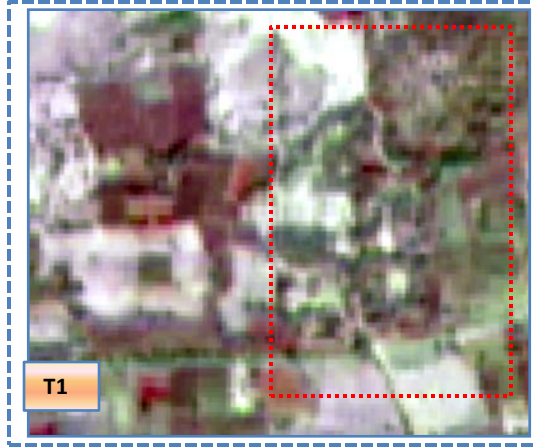


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

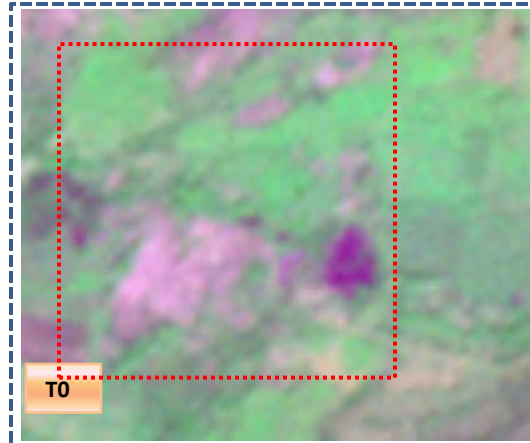


T0: 2012-13(78°51'13.233"E 13°39'29.213"N)

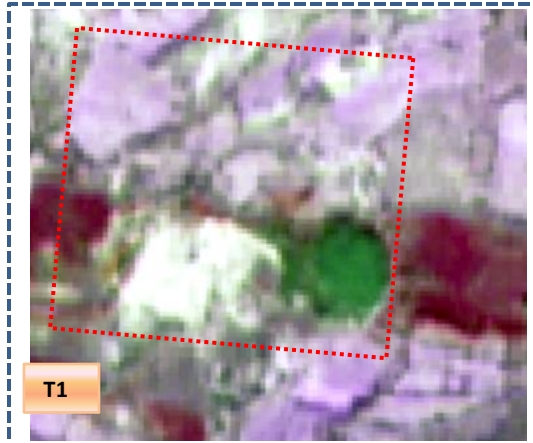


T1: 02 February 2016

Scrub to Agriculture



T0: 2012-13(78°51'18.669"E 13°38'48.064"N)



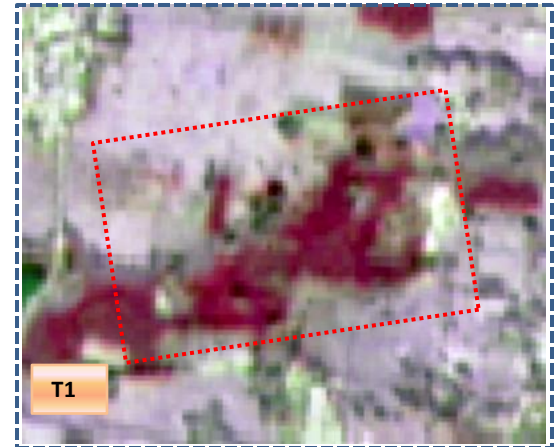
T1: 02 February 2016

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

Agriculture to Water body

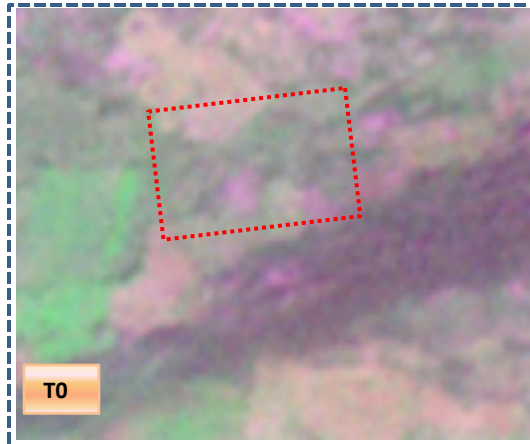


T0: 2012-13(78°51'13.233"E 13°39'29.213"N)

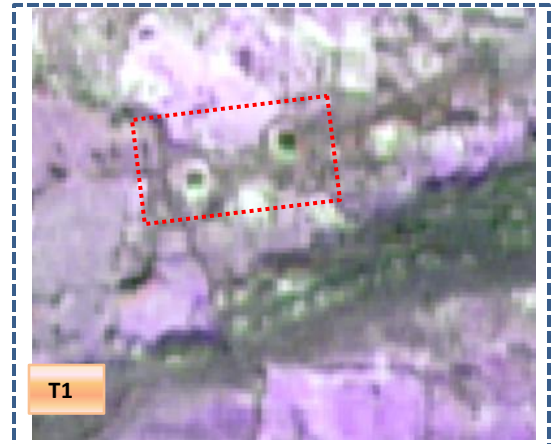


T1: 02 February 2016

Scrub to Water body



T0: 2012-13(78°52'46.764"E 13°38'37.049"N)



T1: 02 February 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	27.65										27.65	
Mining/dump		38.77									38.77	
Agriculture	1.22	12.02	1747.84	14.10						14.34	1789.51	
Plantation Horticulture	0.40		14.17	102.52						0.02	117.11	
Forest			1.19		454.44					0.05	455.69	
Forest Plantation												
Barren Rocky		8.26					328.33				336.59	
Scrub	0.51	2.67	155.46					1179.66		1.48	1339.78	
Waterbody- Streams/River									11.58		11.58	
Waterbody – Ponds			6.38							100.09	106.48	
Grand Total	29.78	61.72	1925.05	116.61	454.44		328.33	1179.66	11.58	115.99	4223.15	

- 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 41 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 177 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-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	29.78										29.78	
Mining/dump		61.66								0.06	61.72	
Agriculture	0.14		1918.76	5.25						0.91	1925.05	
Plantation Horticulture			1.26	115.24						0.12	116.61	
Forest					454.44						454.44	
Forest Plantation												
Barren Rocky							328.33				328.33	
Scrub			58.50					1121.16			1179.66	
Waterbody- Streams/River									11.58		11.58	
Waterbody – Ponds										115.99	115.99	
Grand Total	29.92	61.66	1978.51	120.49	454.44		328.33	1121.16	11.58	117.07	4223.15	

- 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 06 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T2.
- In T2 59 ha of the agriculture area has increased from plantations 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	
Built up	29.92										29.92	
Mining/dump		61.66									61.66	
Agriculture			1978.29							0.22	1978.51	
Plantation Horticulture			31.32	89.12						0.05	120.49	
Forest			3.01		451.43						454.44	
Forest Plantation												
Barren Rocky		4.50					323.83				328.33	
Scrub		10.24	71.44					1039.48			1121.16	
Waterbody- Streams/River									11.58		11.58	
Waterbody – Ponds			1.45							115.62	117.07	
Grand Total	29.92	76.41	2085.51	89.12	451.43		323.83	1039.48	11.58	115.89	4223.15	

- 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 0.2 ha of the agriculture area has decreased and it is converted into water body area in T3.
- In T3 107.2 ha of the agriculture area has increased from plantations, forest ,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	29.92											29.92
Mining/dump		76.41										76.41
Agriculture	1.63		2043.62	38.66						1.60		2085.51
Plantation Horticulture			2.01	86.79						0.32		89.12
Forest			2.16		449.27							451.43
Forest Plantation												
Barren Rocky		7.40					316.43					323.83
Scrub	0.20	5.14	74.86	0.31				958.88		0.09		1039.48
Waterbody- Streams/River									11.58			11.58
Waterbody – Ponds										115.89		115.89
Grand Total	31.75	88.95	2122.66	125.75	449.27		316.43	958.88	11.58	117.89		4223.15

- 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 41 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 79 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	
Built up	31.72										31.72	
Mining/dump		89.14									89.14	
Agriculture		0.81	2100.17	8.65						9	2118.63	
Plantation Horticulture			1.89	123.72						0.14	125.75	
Forest					497					0.36	497.36	
Forest Plantation												
Barren Rocky							269.51				269.51	
Scrub	0.19	0.33	2.58					953.69		0.89	957.68	
Waterbody- Streams/River									13.76		13.76	
Waterbody – Ponds										119.56	119.56	
Grand Total	31.91	90.28	2104.64	132.37	497		269.51	953.69	13.76	129.95	4223.11	

- 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 18 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 4.4 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 22 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 135, 53, 107 & 37 Hectares from T0 to T1, T1-T2, T2-T3 & T3-T4 respectively, there is a decrease of 13 Hectares from T4-T5 and overall increase of 318 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 15 ha of the Plantation/Horticulture** area has been increased between 2012-13 (T0) & 2020-21 (T5) years.
6. There is a decrease of 388 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (20) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (20) verified from the portal.