

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

VIZIANAGARAM -03/2013-14

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad

February-2023

T 0 - T 1 - T 2 - T 3 - T 4 - T 5



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DEPARTMENT OF LAND
RESOURCES
Ministry of Rural Development
Government of India

C O N T E N T S

EXECUTIVE SUMMARY

		Page Number
01.	STUDY AREA	05
02.	SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS	06
03.	MONITORING IN THE PROJECT AREA	
	3.1 . Site wise changes in the project	08
	3.2. Land use and Land cover Changes in the Project	11
04.	CONCLUSIONS	26

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

1. Integrated Watersheds Management Project (IWMP) is a flagship programme of Department of Land Resources (DoLR), Ministry of Rural Development (MRD).
2. 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).
3. Current summary report gives details of Project - IWMP-03/2013-14, Vizianagaram District of Andhra Pradesh. The total geographical area of the project is **6,340 ha**.
4. In the project area 255 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
5. Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 18 new farm ponds or dug out pits and 4 check dams and drainage treatments with 46 ha increase in the area.
6. Major percentage i.e. 36 % is covered by the agriculture, 27 % is covered by forest, 21 % is covered by scrubland, 7 % is covered by plantation/horticulture and remaining by other land use classes.

STUDY AREA

PROJECT : UDAYAPURAM - IWMP-03/2013-14

DISTRICT : VIZIANAGARAM , STATE : ANDHRA PRADESH

- The study area falls in Kurupam, Gummalakshmiapuram Mandal of Vizianagaram district of Andhra Pradesh state. The total geographical area of the project is **6,340 ha**. Location Map of the study area is shown in Figure 1. Analysis is done for 2013-14 (T0) period (**Batch -1**) projects taking 2021-22 (T5) period satellite images, seen in Table 1 & 2, Fig 04.

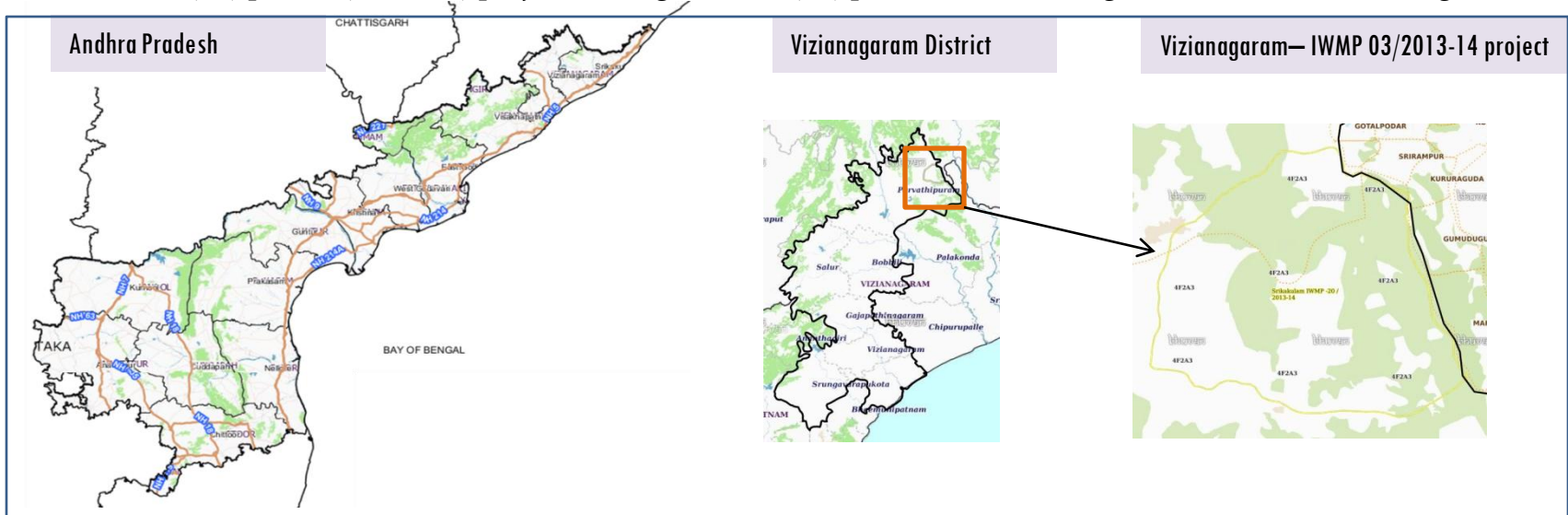


Fig.1. Location map of Udayapuram Watershed (IWMP-03/2013-14) in Vizianagaram, A.P

- 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).

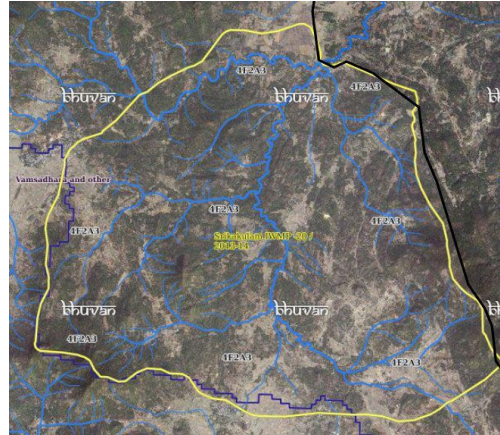
Table I. Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2013-14	2011-12	2021-22
LISS IV	2013-14		
SCENE 1			2-Apr-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			2-Apr-21
SCENE2			
SCENE 3			
SCENE 4			

Table 2. 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	255
4	Detailed Project Report		

Fig 2. Natural Color Composite overlaid with Project boundaries and high detail stream network



Legend



Drainage (1:10000 Scale)

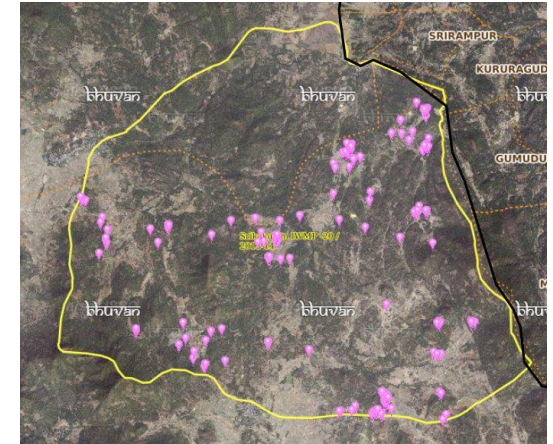


MWS Boundary



Project Boundary

Fig 3. Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Table 3. Classification of the Activities

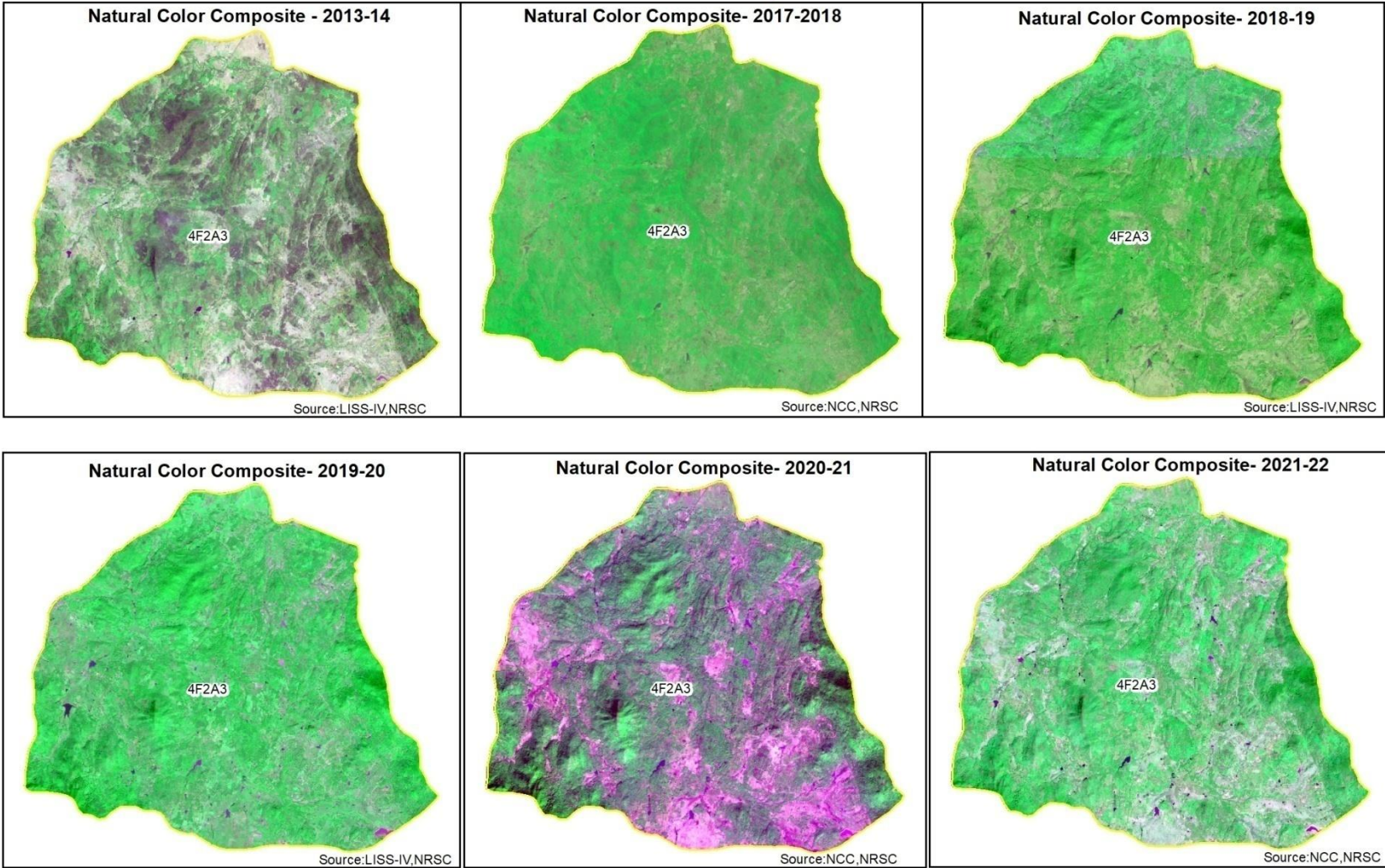
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	18	10
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	25	20
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	0	0
10	Civil work-Check dams/Rock fill dam	70	60
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	0	0
15	Capacity Building Activities	0	0
16	Entry Point Activity	16	15
17	Others	158	150
	TOTAL	287	255

03. MONITORING IN THE PROJECT AREA

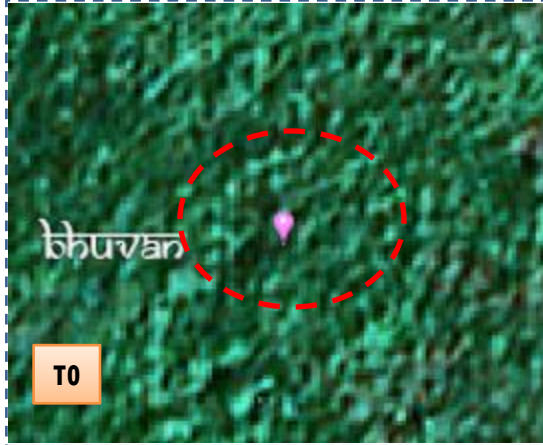
3.1 Site Wise Changes in the Project

- 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, figure 05 & 06.

Udayapuram Watershed (IWMP-03/2013-14) Natural Colour Composite



Monitoring of activities in Udayapuram Watershed (IWMP-03/2013-14) Vizianagaram District Andhra Pradesh



T0

T0:2009-10



T1

T1: 29 December 2017



Drishti Sl no. 7013271 MWS :4F2A3

Percolation Tank



T0:2009-10



T1

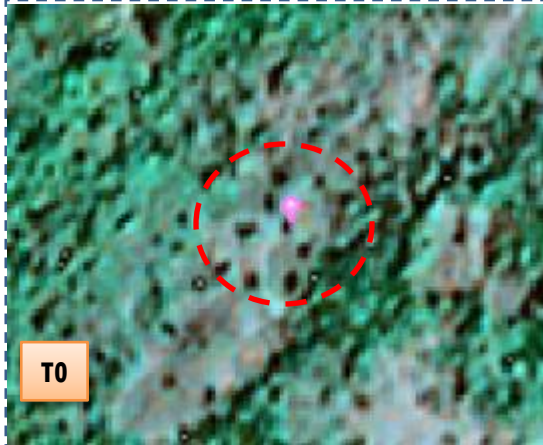
T1: 29 December 2017



Drishti Sl no. 7016576 MWS :4F2A3

Percolation Tank

Monitoring of activities in Udayapuram Watershed (IWMP-03/2013-14) Vizianagaram District Andhra Pradesh



T0: 2009-10

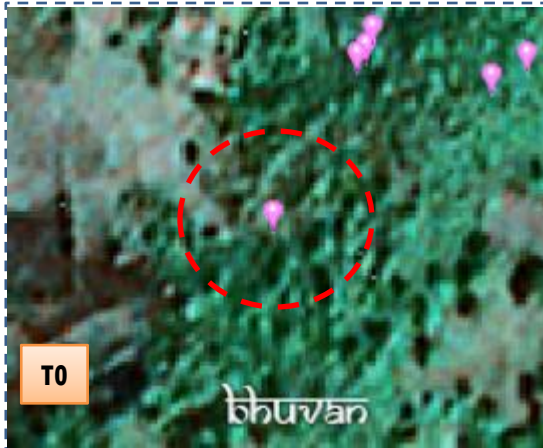


T1: 29 December 2017



Drishti Sl no. 7019054 MWS : 4F2A3

Percolation tank



T0: 2009-10



T1: 29 December 2017



Drishti Sl no. 7019056 MWS : 4F2A3

Percolation tank

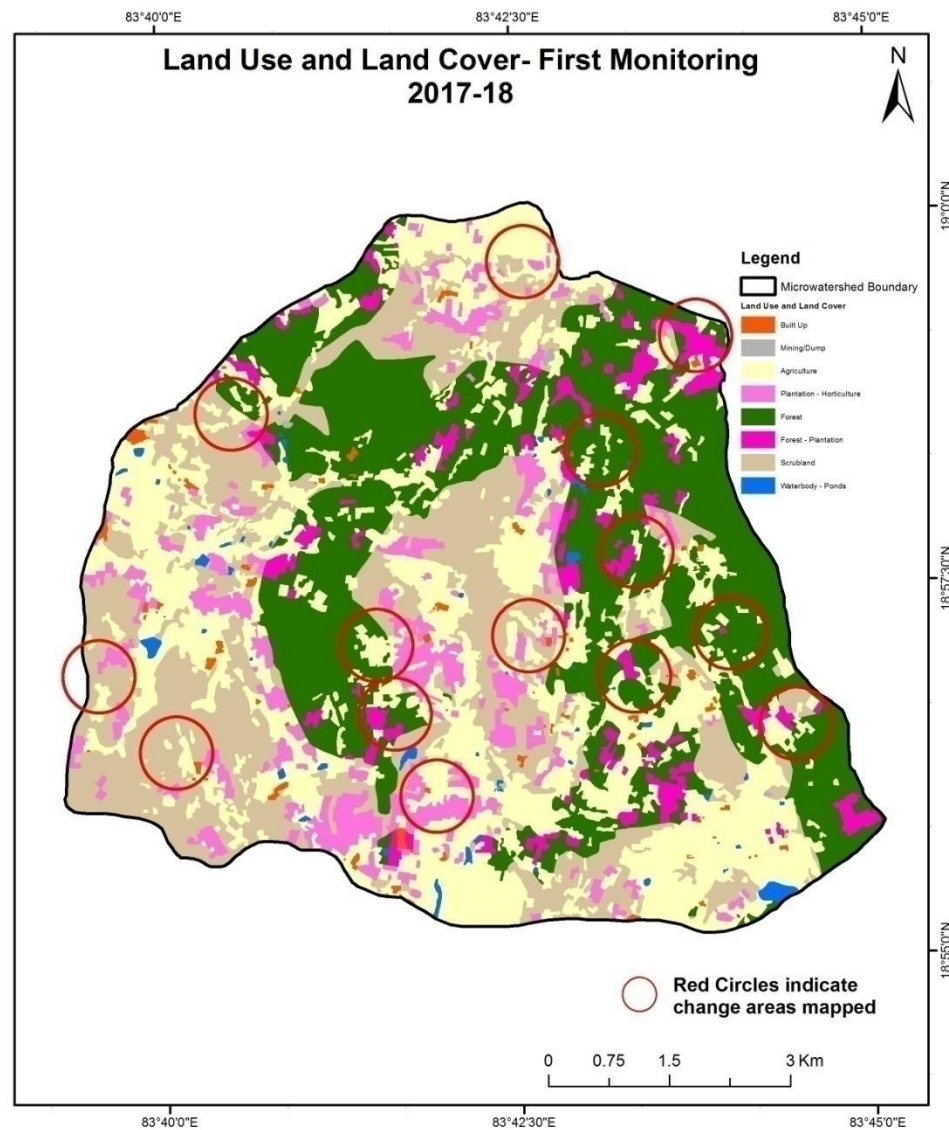
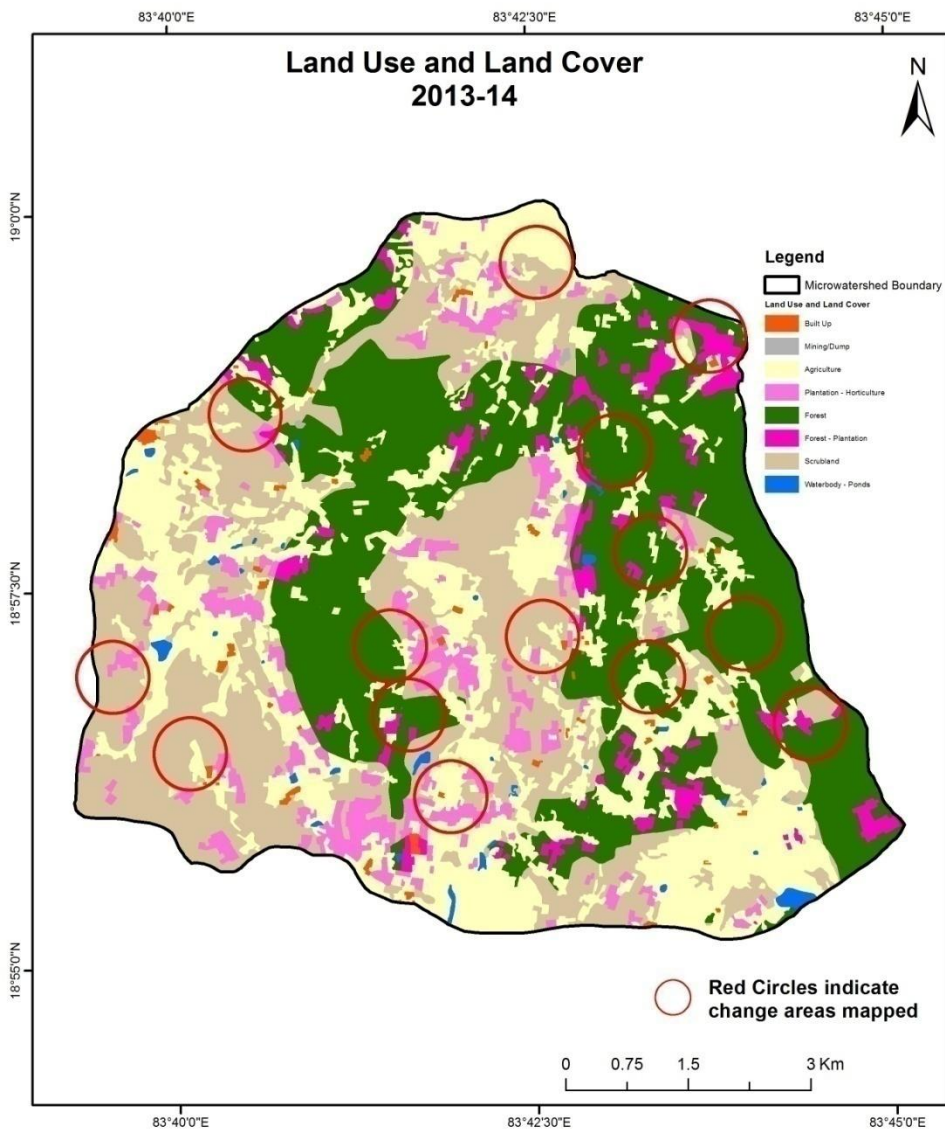
03. MONITORING IN THE PROJECT AREA

3.2 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, seen in fig 07 to fig 11.
- 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, seen in fig 12 & 13 .
- The result obtained for the period T0 to T5 are given in the change matrix table, seen in table 04 to table 08.
- In matrix table column represents the T0 (2013-14) and row represents the T5 (2021-22)

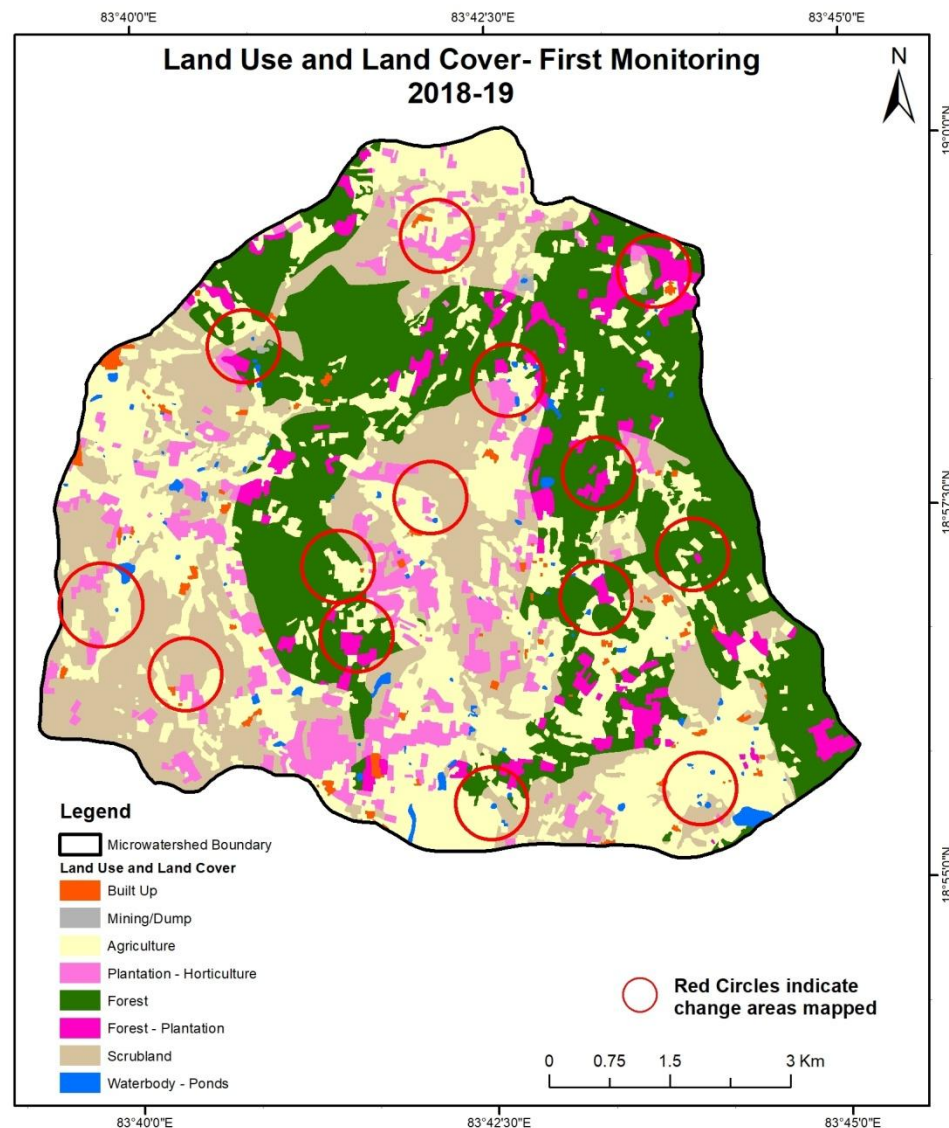
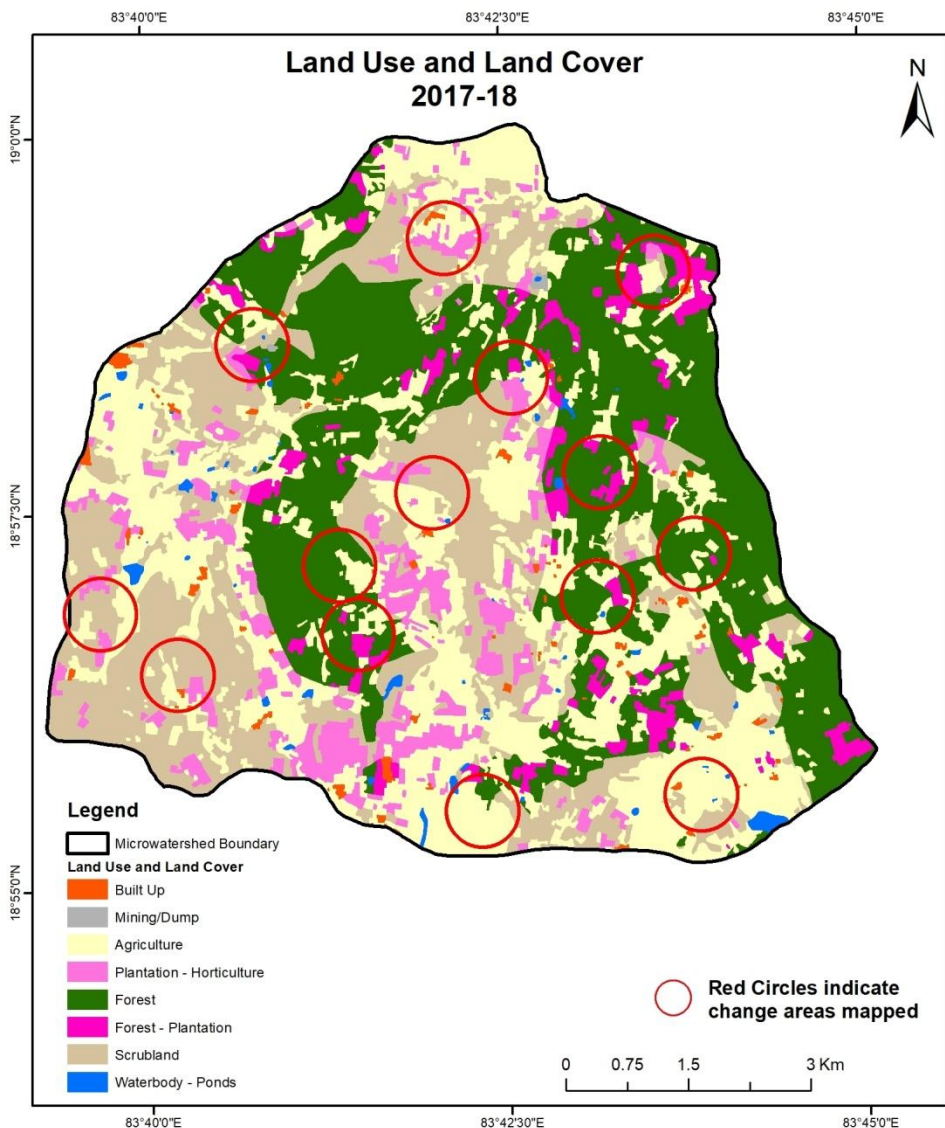
Udayapuram Watershed (IWMP-03/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2017-18)

Scale: 1:10000



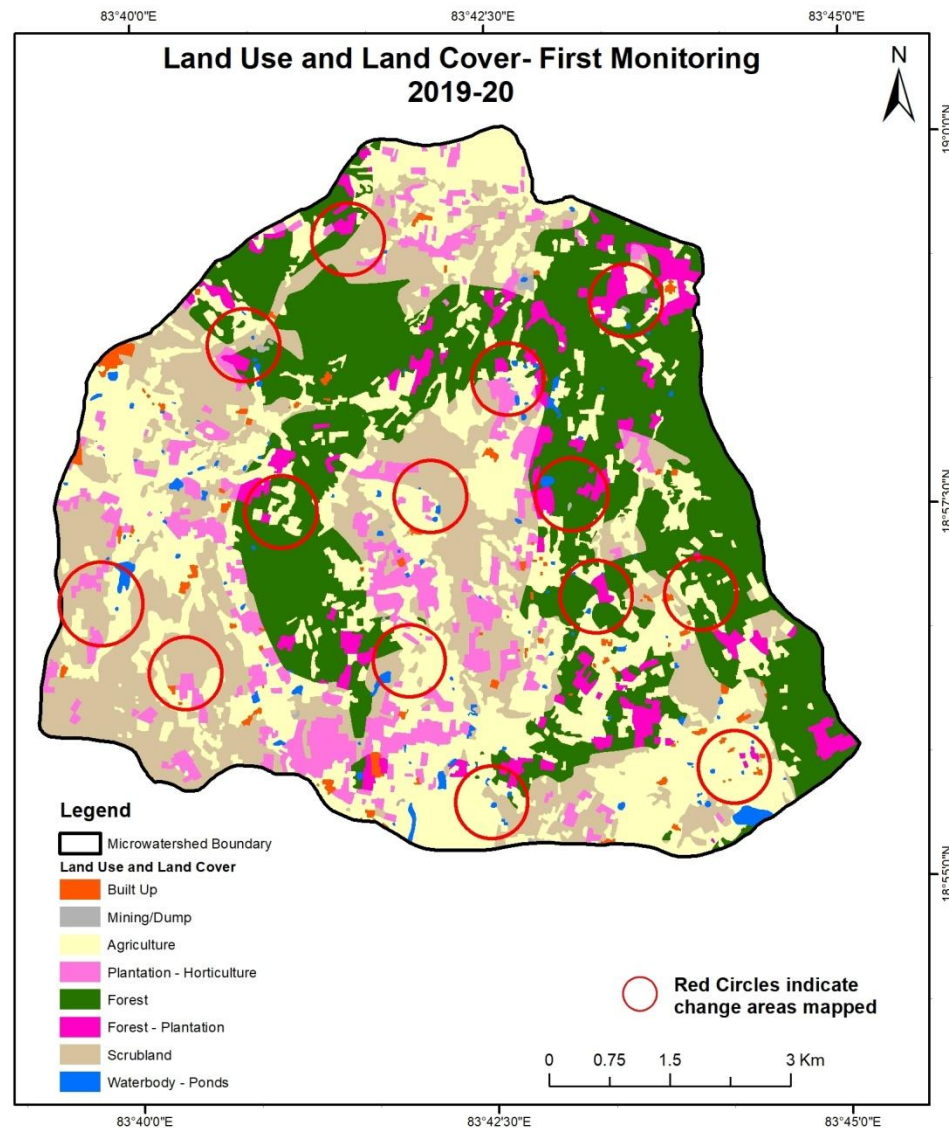
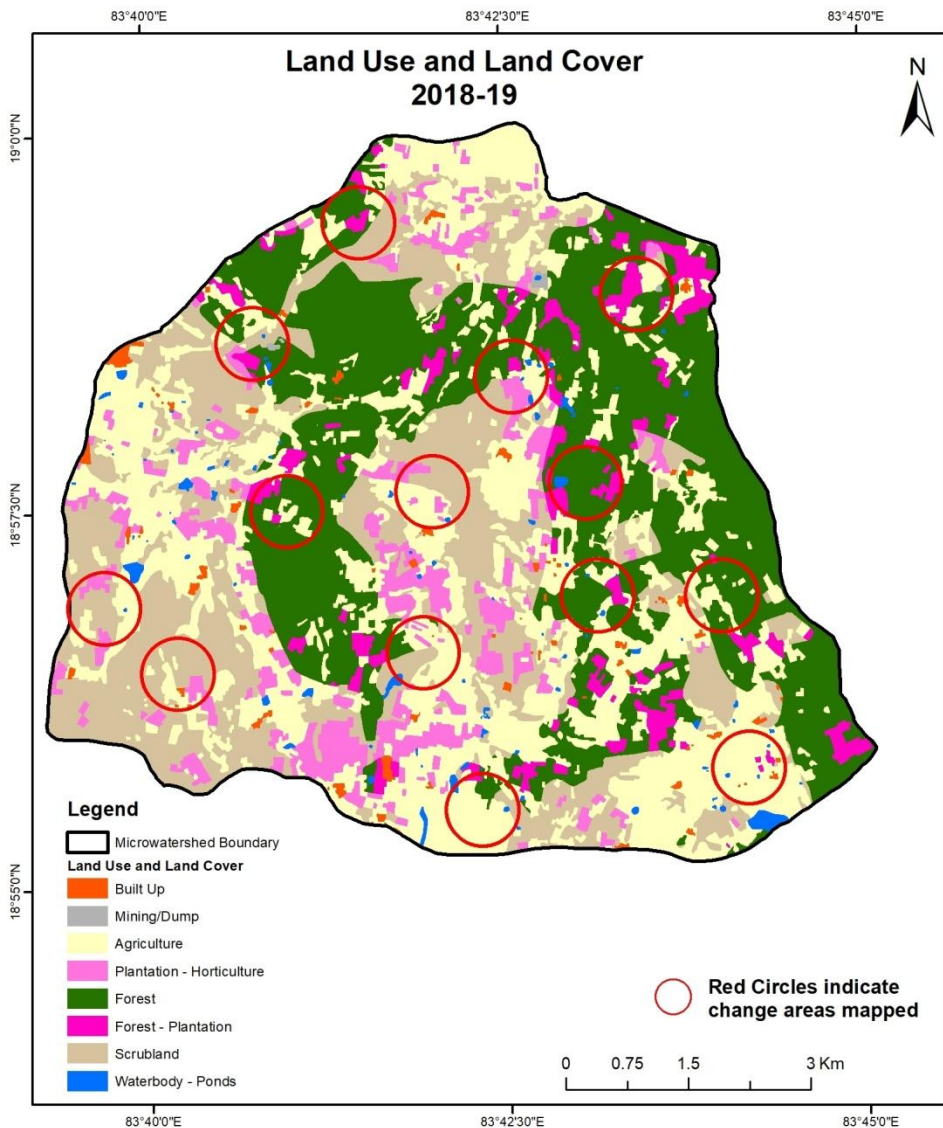
Udayapuram Watershed (IWMP-03/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



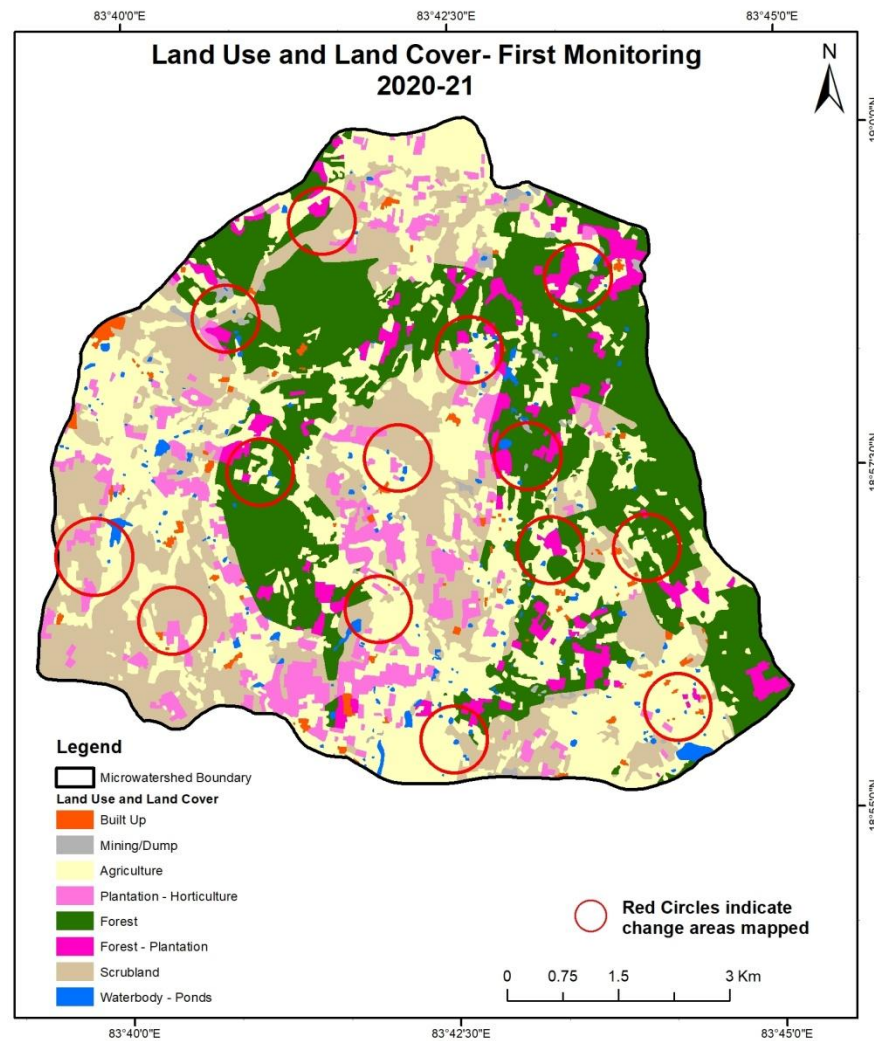
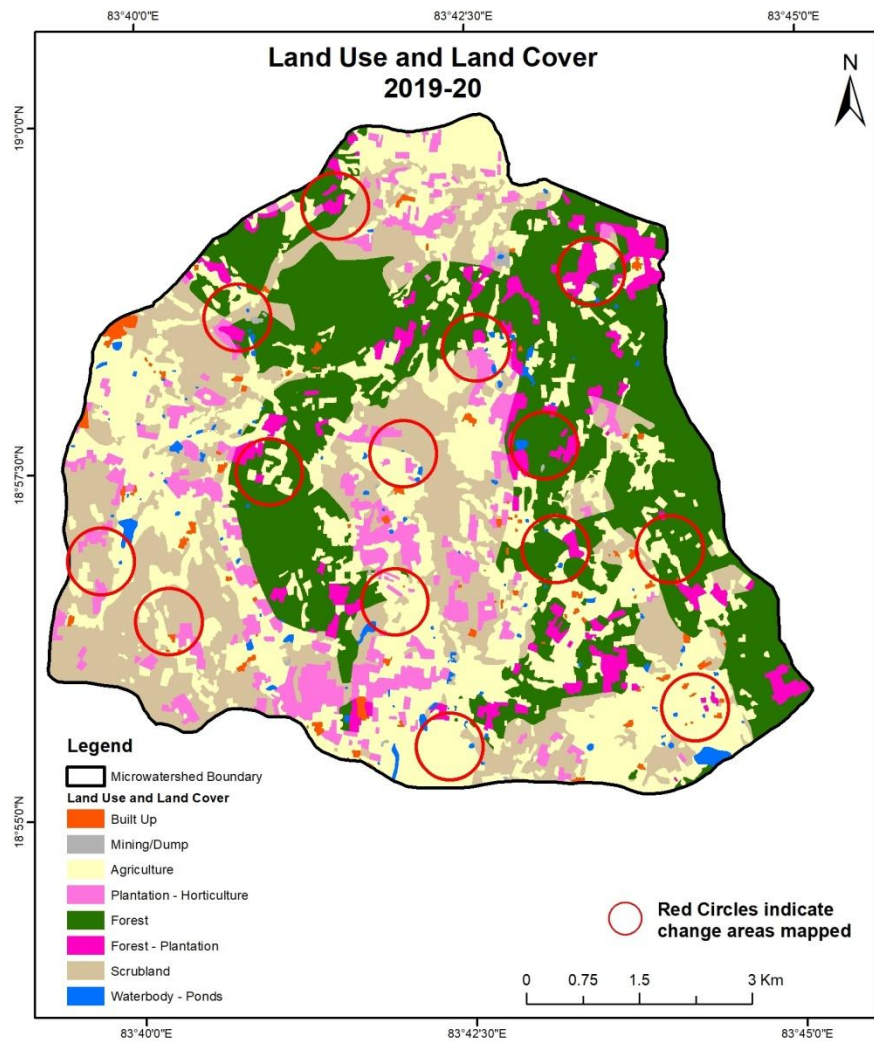
Udayapuram Watershed (IWMP-03/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



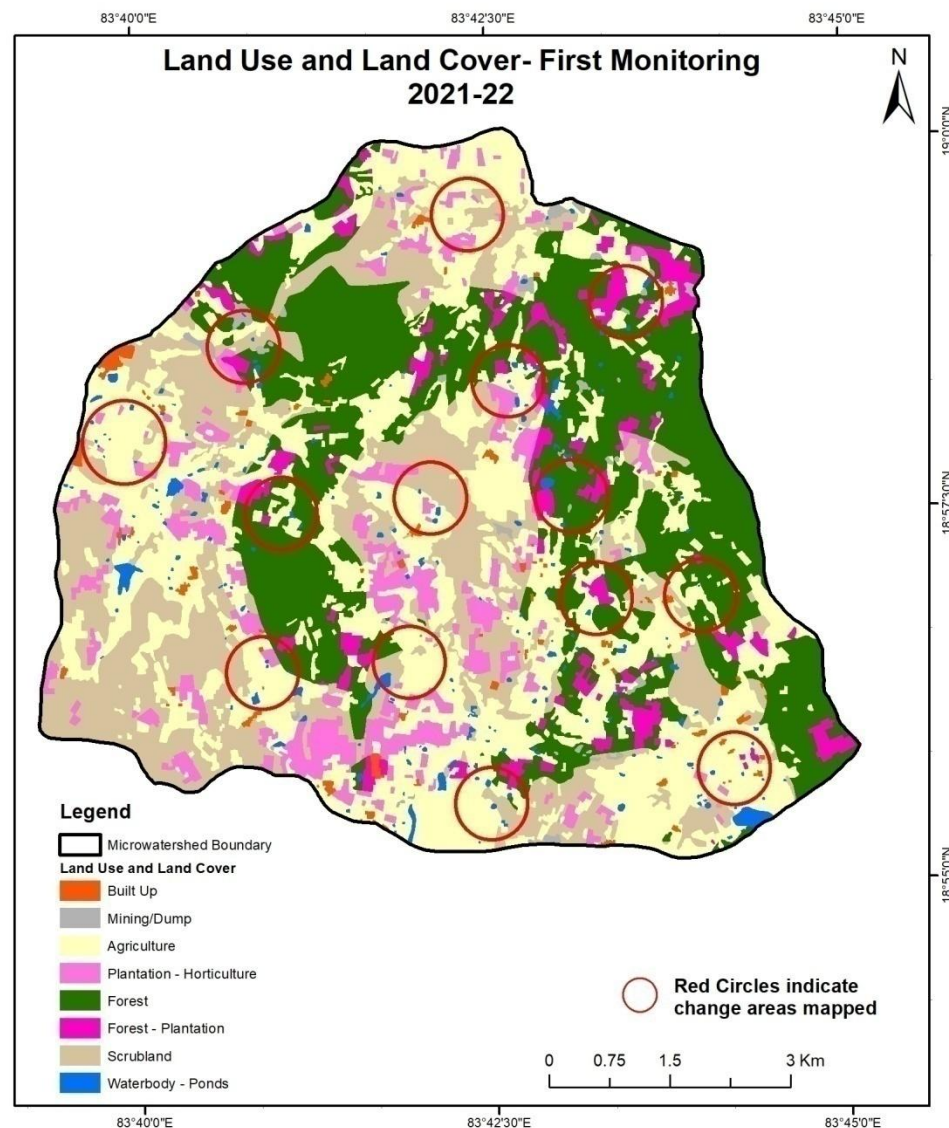
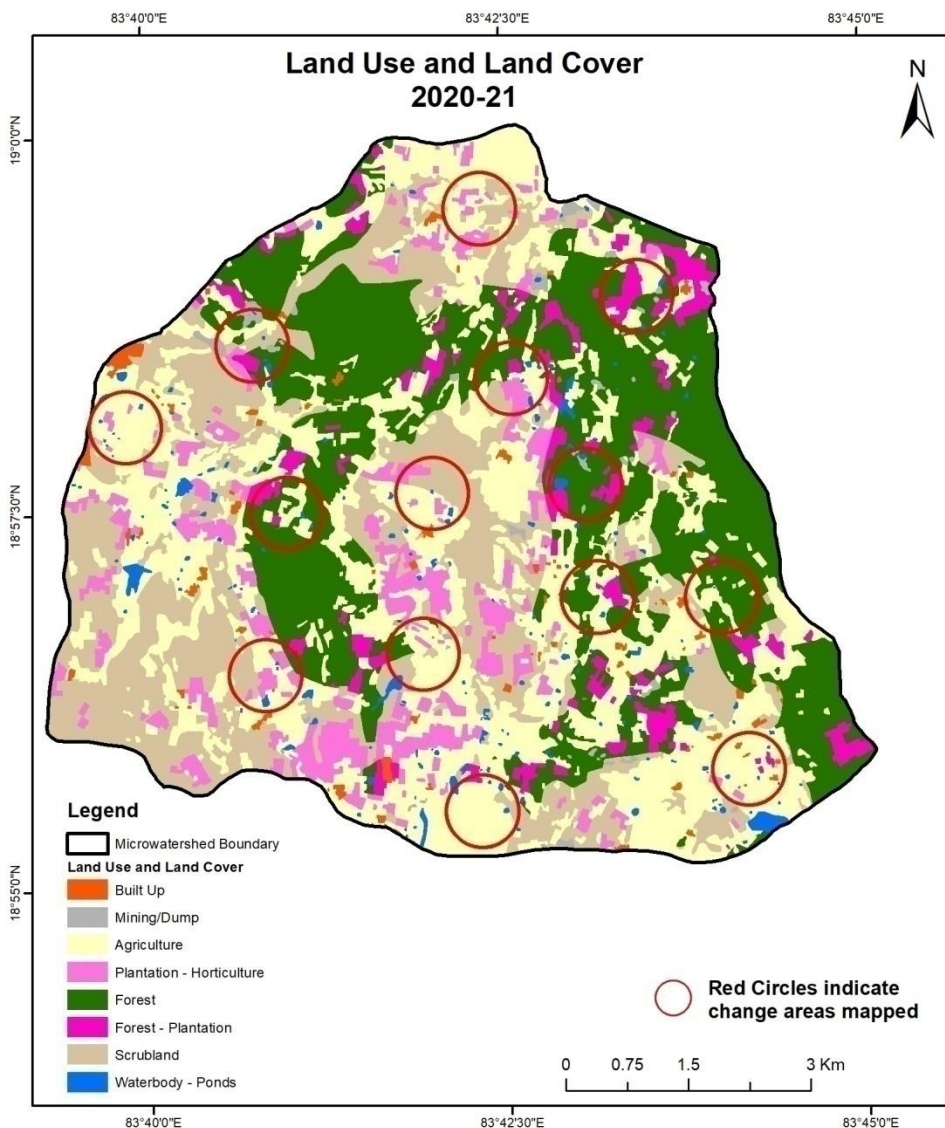
Udayapuram Watershed (IWMP-03/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000



Udayapuram Watershed (IWP-03/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWP implementation (2020-21 to 2021-22)

Scale: 1:10000



Udayapuram Watershed (IWMP-03/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0: 2013-14(83°42'14.616"E 18°59'48.966"N)

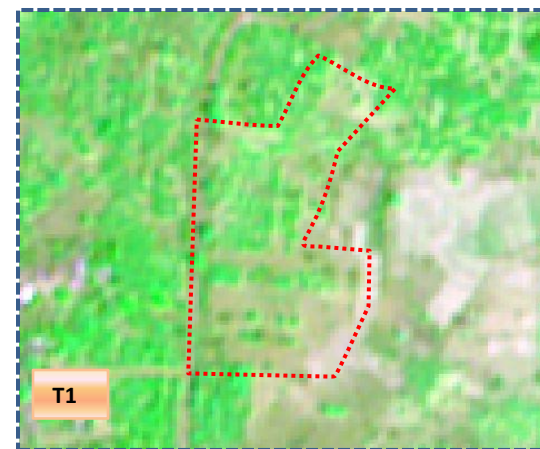


T1: 02 April 2018

Agriculture to Plantation



T0: 2013-14 (83°41'47.973"E 18°55'53.383"N)



T1: 02 April 2018

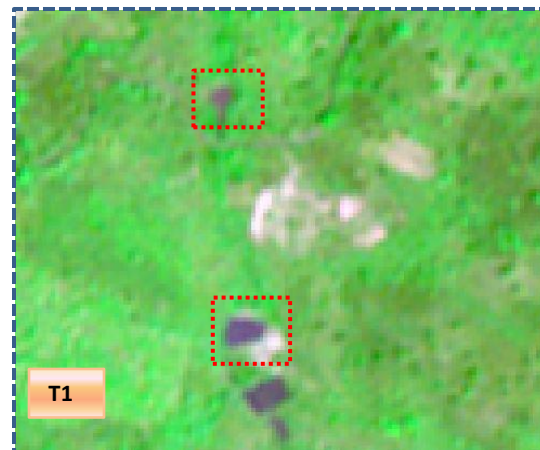
Udayapuram Watershed (IWMP-03/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to water body



T0

T0: 2013-14 (83°40'50.79"E 18°58'31.492"N)



T1

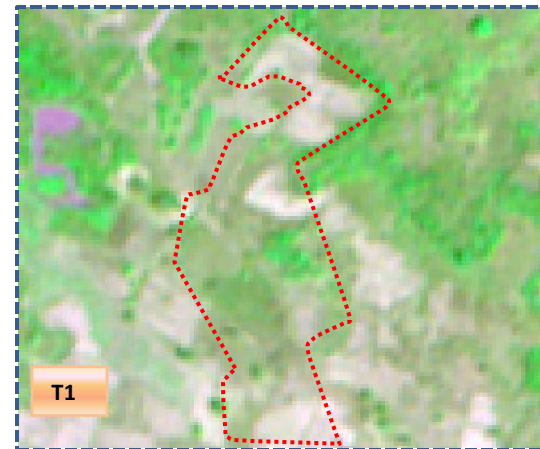
T1: 02 April 2018

Scrub to Agriculture



T0

T0: 2013-14 (83°42'32.446"E 18°56'10.753"N)



T1

T1: 02 April 2018

Table showing change matrix depicting Land cover transitions for Udayapuram Watershed (IWMP-03/2013-14) 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		
Built up	47.86												47.86
Mining/dump		2.54											2.54
Agriculture	6.67	0.06	1745.25	39.53		23.62				1.83			1816.96
Plantation Horticulture			1.59	418.38						0.03			420.00
Forest	1.59	0.59	152.06	3.19	1910.04	18.29				1.01			2086.77
Forest Plantation						234.64							234.64
Barren Rocky													
Scrub	2.63	1.73	153.75	25.69		0.82		1505.11		1.93			1691.66
Waterbody- Streams/River													
Waterbody – Ponds										39.98			39.98
Grand Total	58.76	4.91	2052.64	486.79	1910.04	277.38		1505.11		44.78			6340.42

Interpretation: The example of “Agriculture” Land cover for the period 2013-14 to 2017-18

1. In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
2. In T0 48 ha of the agriculture area has decreased and it is converted into Built-up (6 ha), plantation/horticulture (39 ha), forest plantation (23 ha) and water body (1.8 ha) in T1.
3. In T1 307 ha of the agriculture area has increased from plantations (1.5 ha), forest (3 ha) and scrubland(153 ha) of T0.

Table showing change matrix depicting Land cover transitions Udayapuram Watershed (IWMP-03/2013-14) 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	
Built up	58.29									0.47	58.76	
Mining/dump		4.91									4.91	
Agriculture	1.14		2044.00	1.68						5.83	2052.64	
Plantation Horticulture			7.14	479.52						0.13	486.79	
Forest		0.49			1907.21	1.21				1.14	1910.04	
Forest Plantation						277.38					277.38	
Barren Rocky												
Scrub			15.14	4.02				1483.93		2.01	1505.11	
Waterbody- Streams/River												
Waterbody – Ponds			0.16							44.62	44.78	
Grand Total	59.43	5.40	2066.43	485.22	1907.21	278.59		1483.93		54.21	6340.42	

4. In T1 8 ha of the agriculture area has decreased and it is converted into Built-up (1.4 ha), plantation/horticulture (1.6 ha) and water body (5.8 ha) in T2.

5. In T2 22 ha of the agriculture area has increased from plantation/horticulture (7 ha) and scrubland (15 ha) of T1.

Table showing change matrix depicting Land cover transitions for Udayapuram Watershed (IWMP-03/2013-14) 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	59.43												59.43
Mining/dump		5.40											5.40
Agriculture	5.71	1.39	2051.31	4.54						3.48			2066.43
Plantation Horticulture			2.03	483.19									485.22
Forest	0.16	1.05	32.49		1869.87	1.28				2.35			1907.21
Forest Plantation			2.72			275.87							278.59
Barren Rocky													
Scrub		1.35	61.76					1418.54		2.29			1483.93
Waterbody- Streams/River													
Waterbody – Ponds										54.21			54.21
Grand Total	65.30	9.18	2150.31	487.73	1869.87	277.15		1418.54		62.33			6340.42

6. In T2 153ha of the agriculture area has decreased and it is converted into Built-up (5.7 ha), mining/dump (1.3 ha), plantation/horticulture (4.5 ha) and water body (3 ha) in T3.

7. In T3 96 ha of the agriculture area has increased from plantation/horticulture (2 ha), forest (32 ha), forest plantation (2.7 ha) scrubland (61 ha) of T2.

Table showing change matrix depicting Land cover transitions for Udayapuram Watershed (IWMP-03/2013-14) 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	65.30										65.30	
Mining/dump		9.18									9.18	
Agriculture	1.70	24.83	2104.03	6.43					13.32		2150.31	
Plantation Horticulture			7.73	480.00							487.73	
Forest		7.02	101.96		1751.87	4.01				5.02	1869.87	
Forest Plantation			0.11			276.80				0.24	277.15	
Barren Rocky												
Scrub	0.13	6.89	34.67	0.82				1371.47		4.57	1418.54	
Waterbody- Streams/River												
Waterbody – Ponds										62.33	62.33	
Grand Total	67.13	47.91	2248.51	487.25	1751.87	280.80		1371.47		85.48	6340.42	

8. In T3 46 ha of the agriculture area has decreased and it is converted into built-up (1.7 ha), mining/dump (24 ha), plantations/horticulture (6.4 ha) and water body (13 ha) in T4.

9. In T4 144 ha of the agriculture area has increased from plantation/horticulture (7.7 ha), forest (101 ha) and scrubland(34 ha) of T3.

Table showing change matrix depicting Land cover transitions for Udayapuram Watershed (IWMP-03/2013-14) 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	67.13												67.13
Mining/dump		47.91											47.91
Agriculture		0.54	2243.16	2.16	1.96						0.69		2248.51
Plantation Horticulture			26.52	460.73									487.25
Forest			5.53		1746.33								1751.87
Forest Plantation		0.39	3.57			276.85							280.80
Barren Rocky													
Scrub			39.00					1332.47					1371.47
Waterbody- Streams/River													
Waterbody – Ponds											85.48		85.48
Grand Total	67.13	48.84	2317.78	462.88	1748.29	276.85		1332.47			86.17		6340.42

10. In T4 3.3 ha of the agriculture area has decreased and it is converted into plantations/horticulture (2 ha), forest (1.9 ha) and water body (0.6 ha) in T5.

11. In T5 71 ha of the agriculture area has increased from plantation/horticulture (26.5 ha), forest (5 ha), forest plantation (3.5 ha) and scrubland (39 ha) of T4.

Conclusion

1. 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.
2. There is an increase of 46 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2013-14 (T0) & 2021-22 (T5) years.
3. There is an increase of 235, 13, 83, 98 & 69 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 500 Hectares in Crop land area as compared between baseline LU/LC data 2013-14 (T0) & 2021-22 (T5) years.
4. About 42 ha of the plantation/horticulture area has been increased in during the monitoring period of 2013-14 (T0) to 2021-22 (T5) years.
5. There is a decrease of 359 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
6. Farm ponds (09) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (09) verified from the portal.

Abbreviations

- IWMP -Integrated Watershed Management Programme
- LU/LC-Land Use/Land Cover
- DRISHTI- a mobile based android application
- SHRISTI- a web GIS interface on Bhuvan
- LISS – Linear Image Self Scanner
- PAN - Panchromatic Image
- FCC – False Colour Composite
- NCC – Natural Colour Composite
- NRSC – National Remote Sensing Centre
- DoLR – Department of Land Records