

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-V

EAST GODAVARI -02/2013-14

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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WATERSHED MONITORING
DIVISION
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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

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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-02/2013-14, East Godavari District of Andhra Pradesh. The total geographical area of the project is **5,194 ha**. It comprises of 13 micro watersheds.
4. In the project area 40 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
5. Water bodies have shown an increased by 5.7 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
6. Major percentage i.e. 32 % is covered by the agriculture, 48 % is covered by forest, 10 % is covered by scrubland and remaining by other land use classes.

Table I. Satellite Data and Ancillary Data

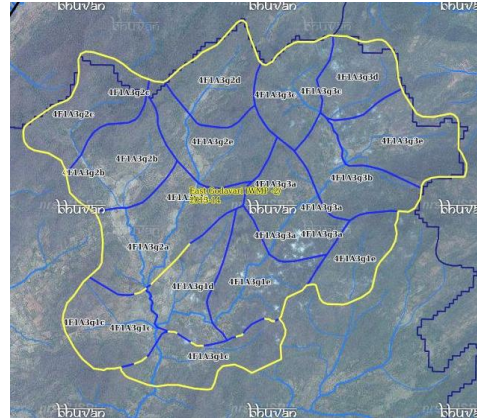
Satellite data*	T0-A**	T0-B**	T5
	2013-14	2011-12	2021-22
LISS IV	2013-14		
SCENE 1			5-Jan-00
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			5-Jan-00
SCENE2			
SCENE 3			
SCENE 4			

Linear Image Self Scanner (LISS)

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	Drishti Photographs		
		Total	40
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

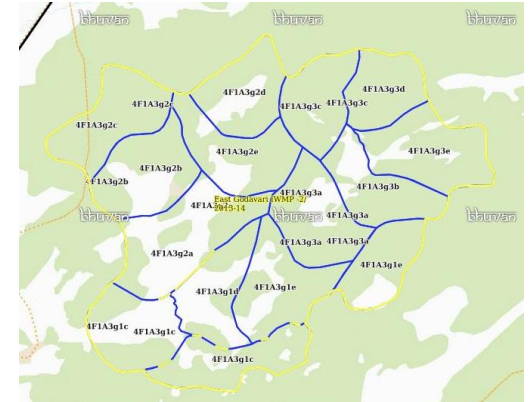


MWS Boundary



Project Boundary

Fig 3. Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Table 3. Classification of the Activities

Sr. No	Activity	Number of Photographs uploaded in Drishti Mobile Application	Visible on satellite in Srishti Geoportal
1	Afforestation	0	0
2	Horticulture	0	0
3	Agriculture	8	8
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	5	5
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	2	2
11	Civil work-Check dams/Rock fill dam	9	9
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	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	11	11
18	Others	5	5
	TOTAL	40	40

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.

Figure 4. Ducherthi Watershed (IWMP-02/2013-14) Natural Colour Composite (NCC)

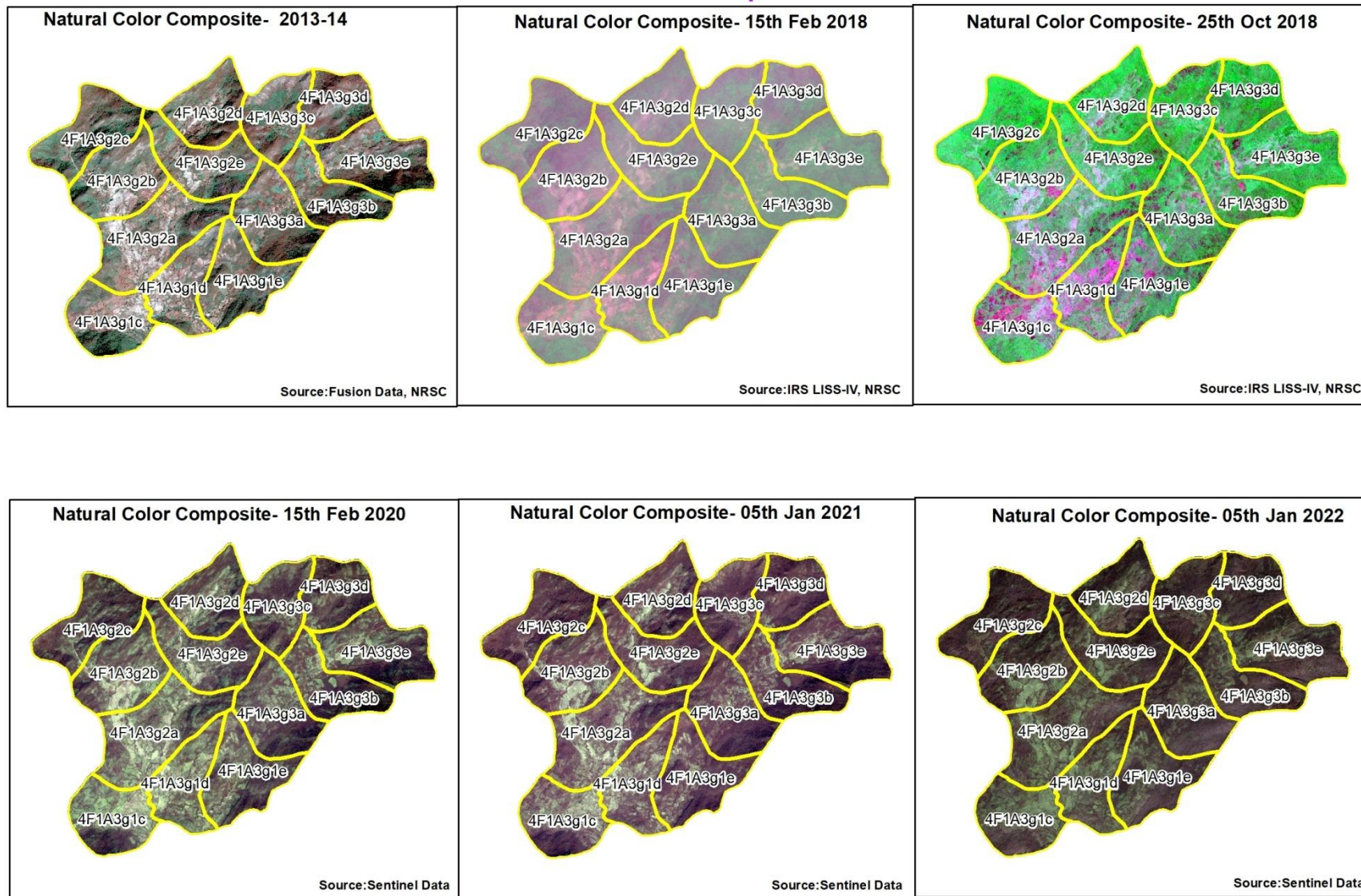
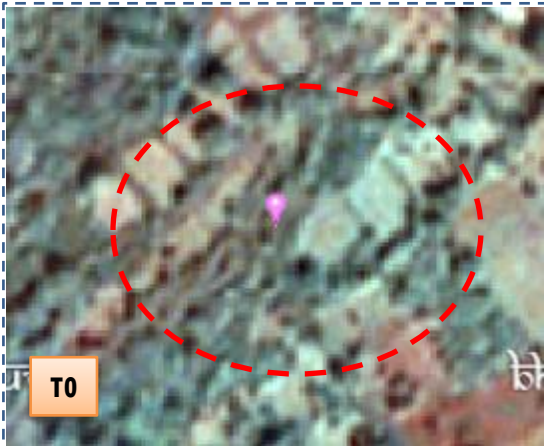


Figure 5. Monitoring of activities in Ducherthi Watershed (IWMP-02/2013-14) East Godavari District Andhra Pradesh



T0:2013-14

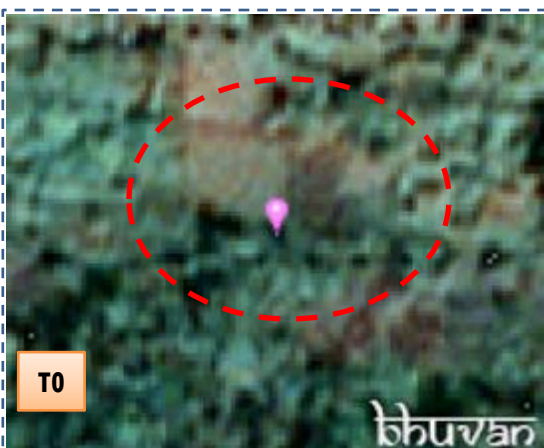


T1: 02 April 2018

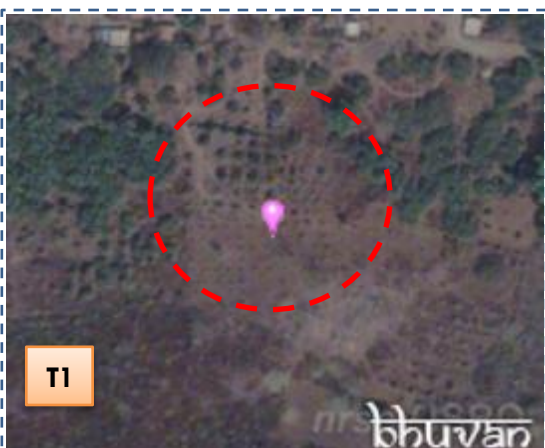


Drishti SI no. 1659882 MWS : 4F1A3g2a

Farm pond



T0:2013-14



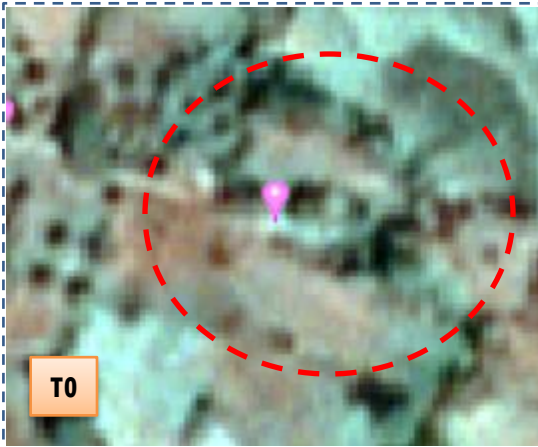
T1: 02 April 2018



Drishti SI no. 1771529 MWS : 4F1A3g1d

Horticulture

Figure 6. Monitoring of activities in Ducherthi Watershed (IWMP-02/2013-14) East Godavari District Andhra Pradesh



T0:2013-14

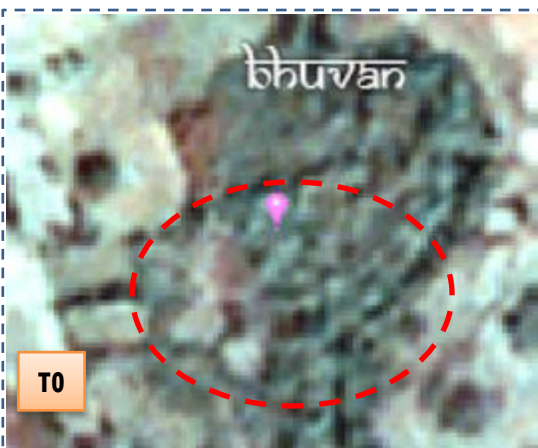


T1: 02 April 2018



Drishti SI no. 1801510 MWS : 4F1A3g2a

Horticulture



T0:2013-14



T1: 02 April 2018



Drishti SI no. 7032233 MWS : 4F1A3g3e

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)

Fig 7. Ducherthi Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2017-18)

Scale: 1:10000

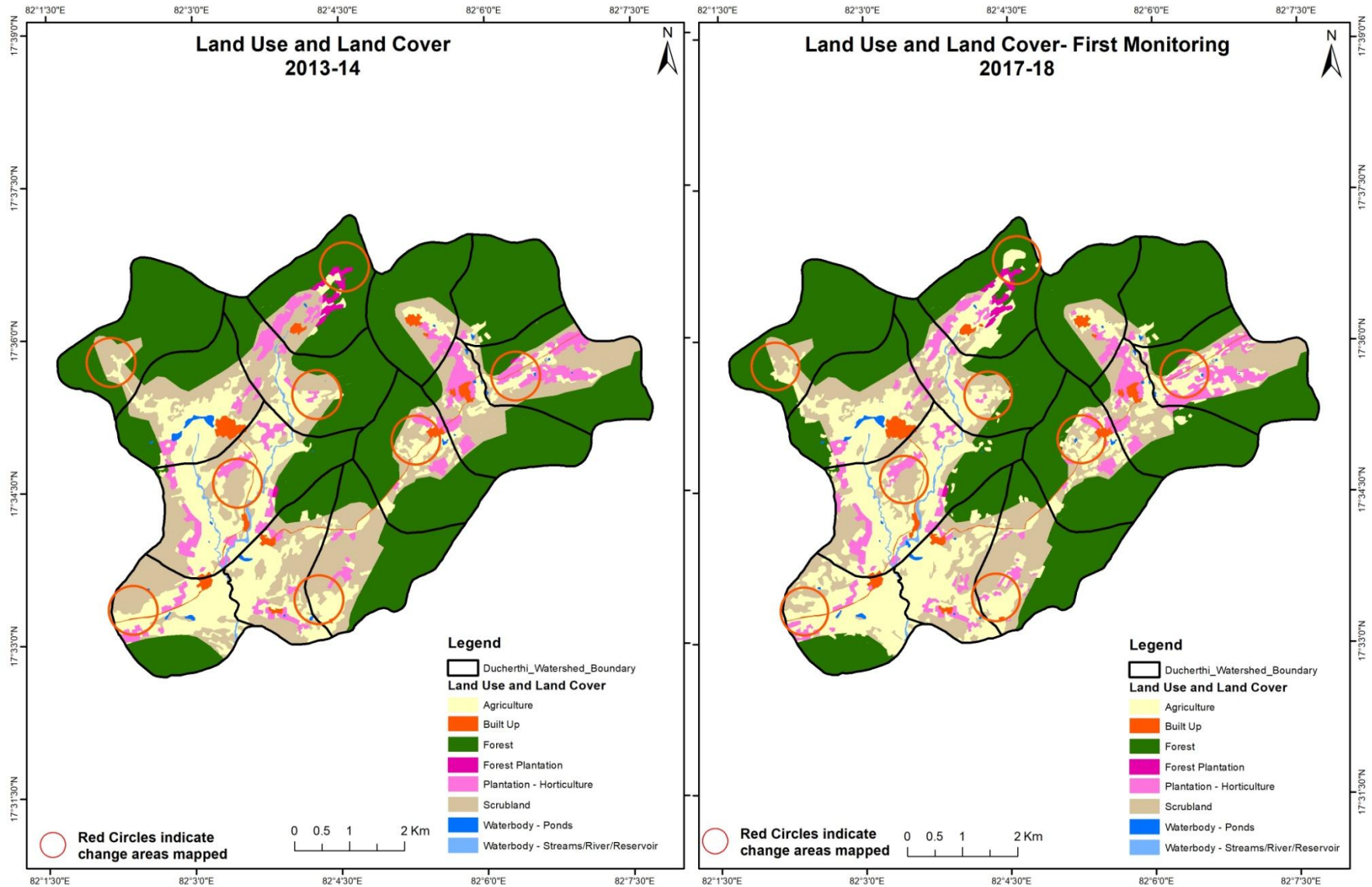


Fig 8. Ducherthi Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

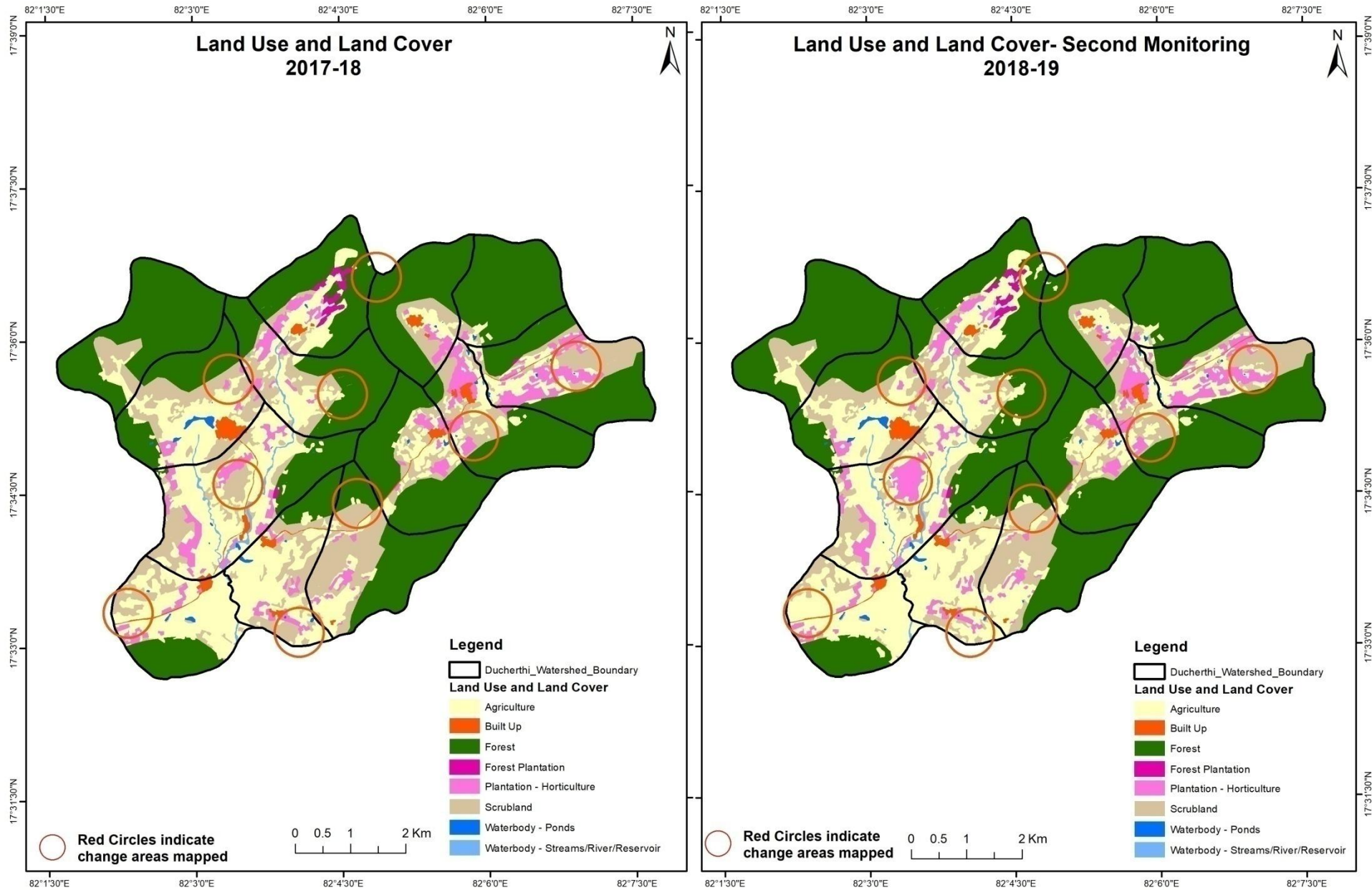


Fig 9. Ducherthi Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

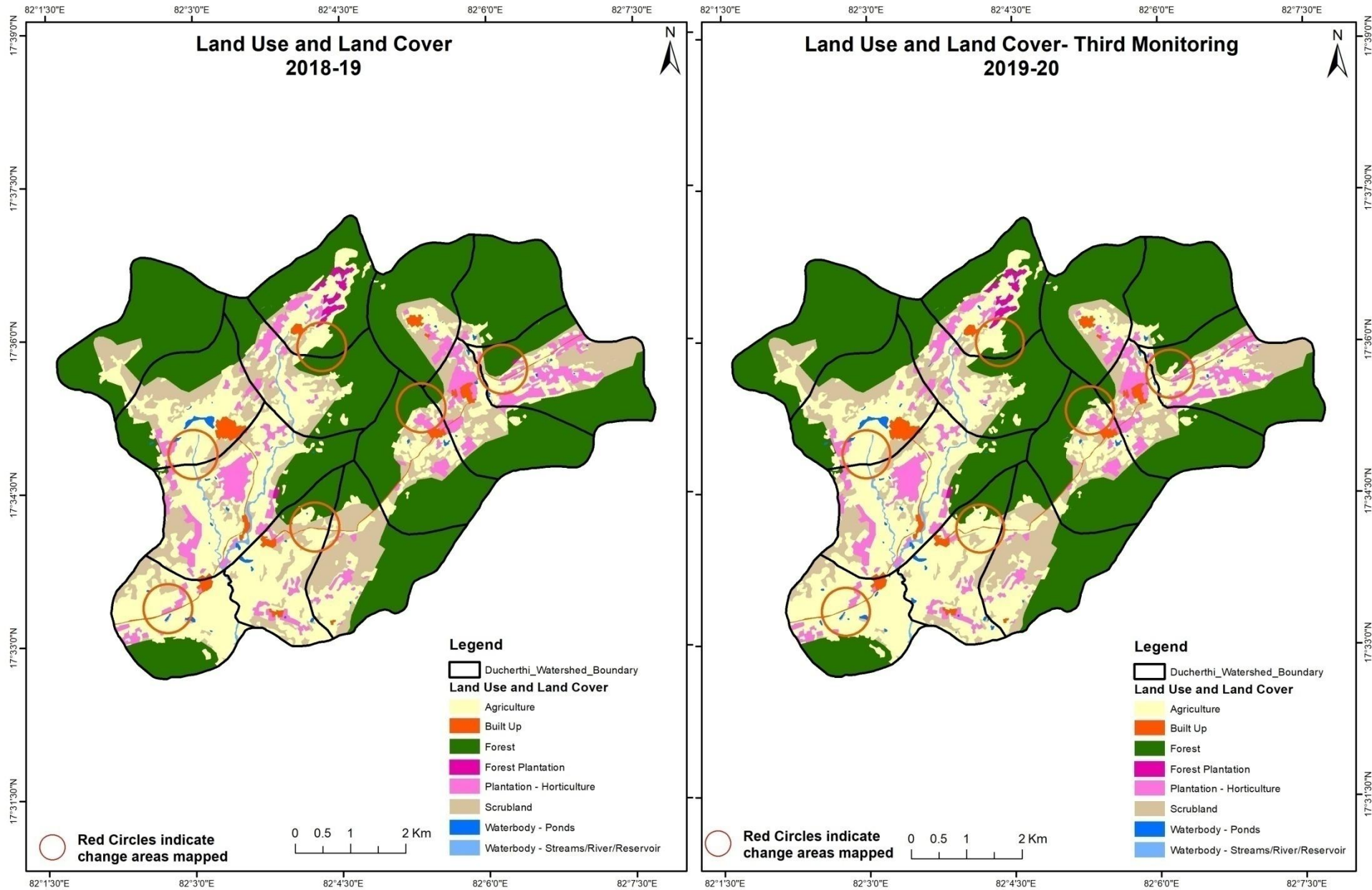


Fig 10. Ducherthi Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

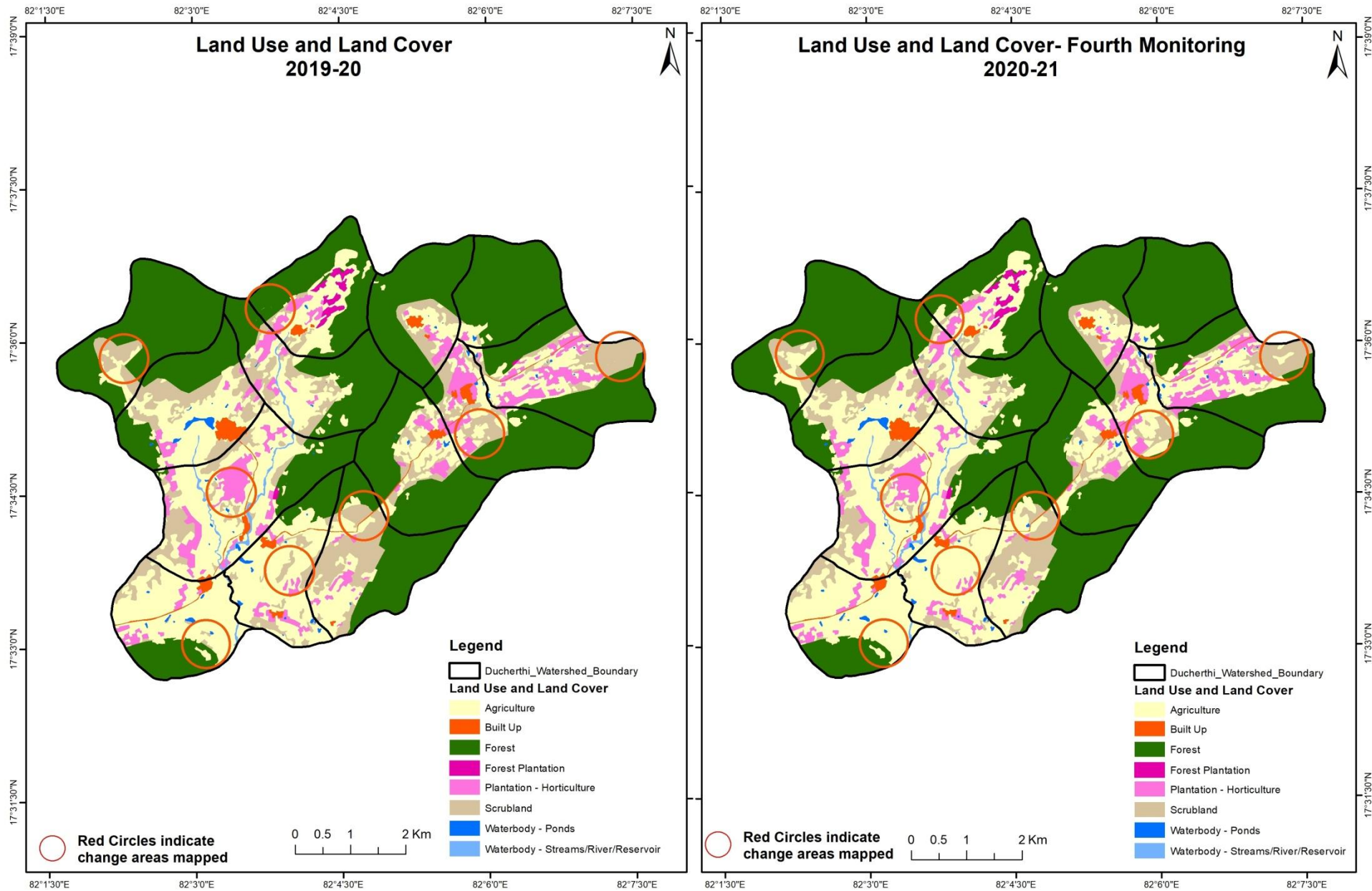


Fig 11. Ducherthi Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2020-21 to 2021-22)

Scale: 1:10000

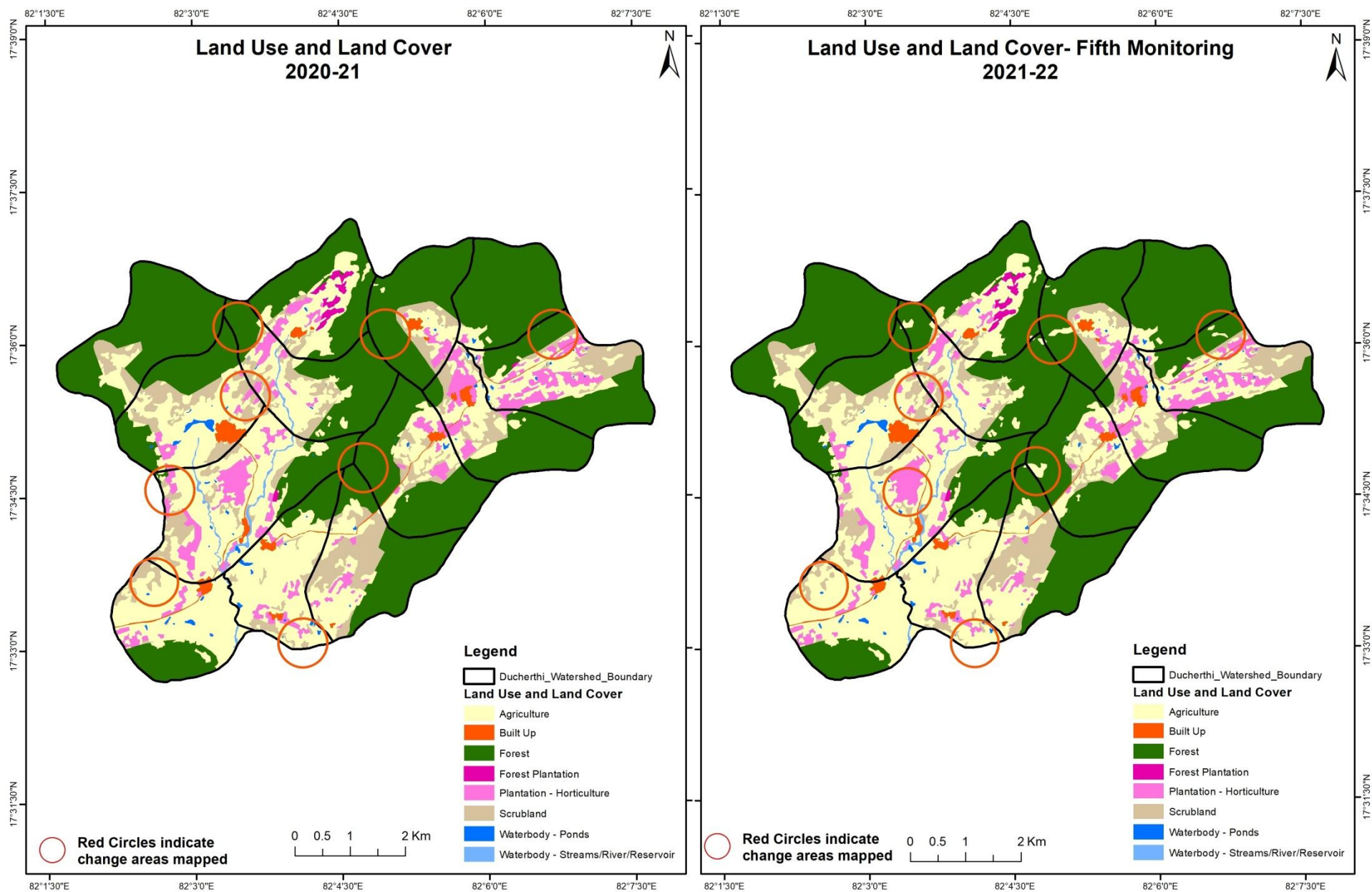
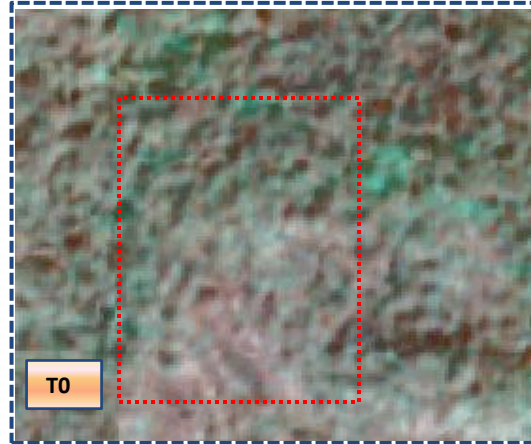
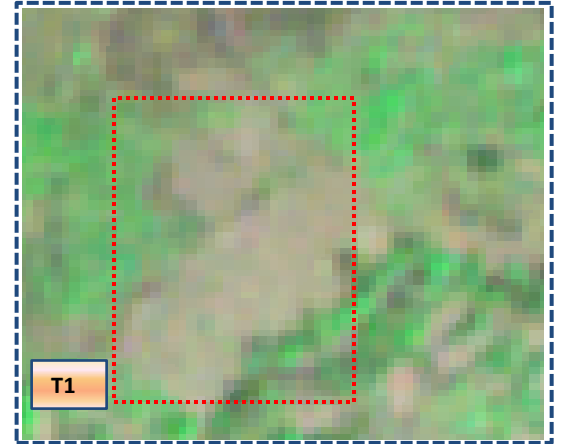


Fig 12. Ducherthi Watershed (IWMP-02/2013-14), Land Use and Land Cover changes for Pre and Post treatment dates

Scrubland to Agriculture

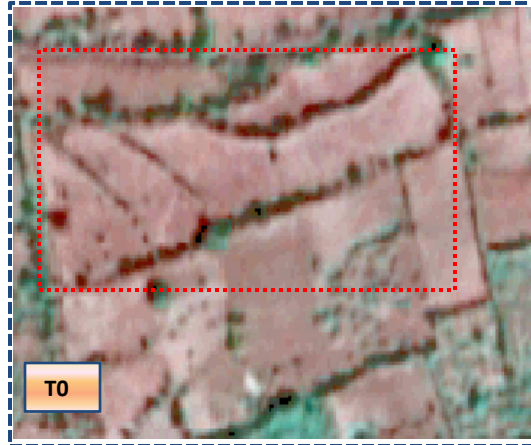


T0: 2013-14 (82°2'28.661"E 17°33'37.148"N)



T1: 28 March 2018

Agriculture to Plantation



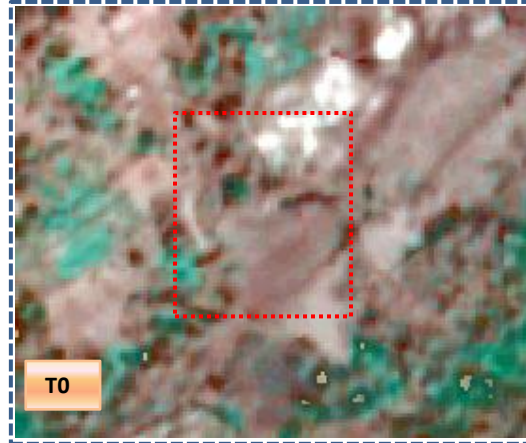
T0: 2013-14 (82°2'16.69"E 17°33'11.911"N)



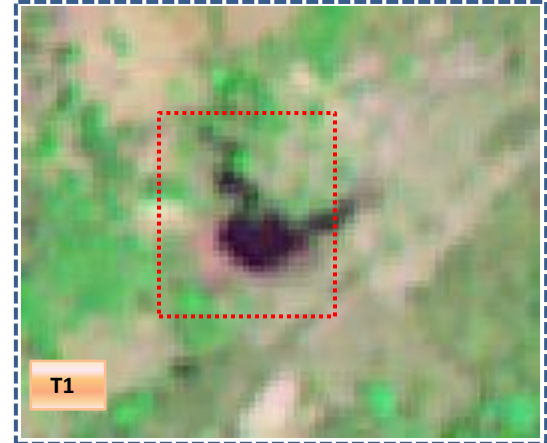
T1: 28 March 2018

Fig 13. Ducherthi Watershed (IWMP-02/2013-14), Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body

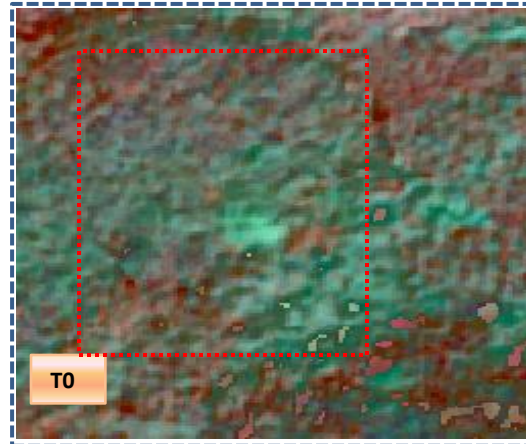


T0: 2013-14(82°2'0.32"E 17°30'34.449"N)

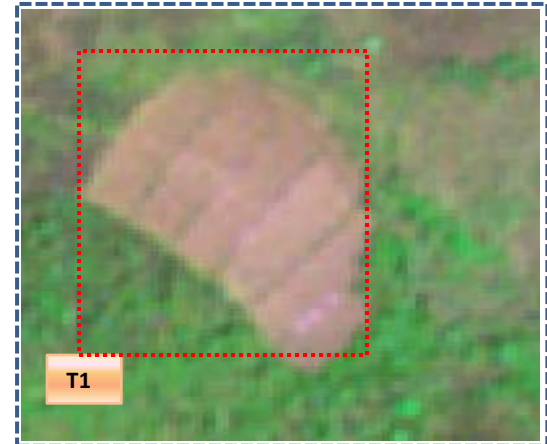


T1: 28 March 2018

Scrubland to Agriculture



T0: 2013-14 (82°6'9.021"E 17°35'9.888"N)



T1: 28 March 2018

Table 4. showing change matrix depicting Land cover transitions for Ducherthi Watershed (IWMP-02/2013-14) during study period-2013-14 to 2017-18

Land cover	Monitoring period (T1)										
										Units in Hectares	
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	68.48										68.48
Mining/dump											
Agriculture			875.71	17.74						0.95	894.4
Plantation Horticulture	0.39		39.9	255.71							296
Forest			53.61		2644.42						2698.03
Forest Plantation						20.7					20.7
Barren Rocky											
Scrub	1.94	0.47	233.68	34.82				901.61		0.39	1172.91
Waterbody- Streams/River									28		28
Waterbody – Ponds			1.43							14.42	15.85
Grand Total	70.81	0.47	1204.33	308.27	2644.42	20.7		901.61	28	15.76	5194.37

Interpretation: The example of “Agriculture” Land cover for the period 2013-14 to 2021-22

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 18.6 ha of the agriculture area has decreased and it is converted into Built-up (17.7 ha) and water body (0.9 ha) in T1.
3. In T1 328 ha of the agriculture area has increased from plantation/horticulture (39.9 ha), forest (53.6 ha) and scrubland (233.6 ha) of T0.

Table 5. showing change matrix depicting Land cover transitions for Ducherthi Watershed (IWMP-02/2013-14) 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	70.81												70.81
Mining/dump		0.47											0.47
Agriculture			1201.69	1.16							1.48		1204.33
Plantation Horticulture			6.59	301.61							0.07		308.27
Forest			42.7		2601.72								2644.42
Forest Plantation						20.7							20.7
Barren Rocky													
Scrub			119.59	25.04				756.83			0.15		901.61
Waterbody- Streams/River									28				28
Waterbody – Ponds											15.76		15.76
Grand Total	70.81	0.47	1370.57	327.81	2601.72	20.7		756.83	28		17.46		5194.37

4. In T1 2.6 ha of the agriculture area has decreased and it is converted into plantation/horticulture (1.1 ha) and water body (1.4 ha) in T2.

5. In T2 168.8 ha of the agriculture area has increased from plantation/horticulture (6.5 ha), forest (42.7 ha) and scrubland (119.5 ha) of T1.

Table 6. showing change matrix depicting Land cover transitions for Ducherthi Watershed (IWMP-02/2013-14) 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	70.81												70.81
Mining/dump		0.47											0.47
Agriculture			1366.45	0.97							3.15		1370.57
Plantation Horticulture			5.08	322.73									327.81
Forest			11.66		2590.01						0.05		2601.72
Forest Plantation						20.7							20.7
Barren Rocky													
Scrub			77.7	4.41				674.5			0.22		756.83
Waterbody- Streams/River									28				28
Waterbody – Ponds											17.46		17.46
Grand Total	70.81	0.47	1460.89	328.11	2590.01	20.7		674.5	28		20.88		5194.37

6. In T2 4.1. ha of the agriculture area has decreased and it is converted into plantation/horticulture (0.9 ha) and water body (3.1 ha) in T3.

7. In T3 94.4 ha of the agriculture area has increased from plantations (5.0 ha) , forest (11.6 ha) and scrubland (77.7 ha) of T2.

Table 7. showing change matrix depicting Land cover transitions for Ducherthi Watershed (IWMP-02/2013-14) 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	70.81												70.81
Mining/dump		0.47											0.47
Agriculture			1449.29	11.25							0.35		1460.89
Plantation Horticulture			5.93	322.09							0.09		328.11
Forest			38.38		2551.63								2590.01
Forest Plantation						20.7							20.7
Barren Rocky													
Scrub			103.65					570.53			0.32		674.5
Waterbody- Streams/River									28				28
Waterbody – Ponds											20.88		20.88
Grand Total	70.81	0.47	1597.25	333.34	2551.63	20.7		570.53	28		21.64		5194.37

8. In T3 11.6 ha of the agriculture area has decreased and it is converted into plantations/horticulture (11 ha) and water body (0.3 ha) in T4.

9. In T4 147ha of the agriculture area has increased from plantations/horticulture (5.9 ha), forest (38.3 ha) and scrubland (103.6 ha) of T3.

Table 7. showing change matrix depicting Land cover transitions for Ducherthi Watershed (IWMP-02/2013-14) 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	70.81												70.81
Mining/dump		0.47											0.47
Agriculture			1595.68	1.57									1597.25
Plantation Horticulture			15.71	317.63									333.34
Forest			19.63		2532								2551.63
Forest Plantation						20.7							20.7
Barren Rocky													
Scrub			32.91					537.62					570.53
Waterbody- Streams/River									28				28
Waterbody – Ponds											21.64		21.64
Grand Total	70.81	0.47	1663.93	319.2	2532	20.7		537.62	28		21.64		5194.37

10. In T3 1.5 ha of the agriculture area has decreased and it is converted into plantations/horticulture (1.5 ha) in T4.

11. In T4 68 ha of the agriculture area has increased from plantations/horticulture (15.7 ha), forest (19.6 ha) and scrubland (32.9 ha) of T3.

Conclusion

1. DPR of the project is uploaded on to Bhuvan Portal.
2. The Land Use/Land Cover 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 5.7 Hectares in Reservoir / Tanks area as compared between baseline Land Use/Land Cover data 2013-14 (T0) & 2021-22 (T5) years.
4. There is an increase of 309, 166, 90, 136 & 66 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 769 Hectares in Crop land area as compared between baseline Land Use/Land Cover data 2013-14 (T0) & 2021-22 (T5) years.
5. About **23 ha of the plantation/horticulture area has been increased** in during the monitoring period of 2013-14 (T0) to 2019-20 (T4) years.
6. There is a decrease of 635 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
7. Farm ponds (02) is visible on IWMP (Integrated Watershed Management Programme) Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (02) 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