

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-V

EAST GODAVARI -06/2013-14
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
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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

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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-06/2013-14, East Godavari District of Andhra Pradesh. The total geographical area of the project is 4,661 ha. It comprises of 4 micro watersheds.
4. In the project area 89 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 7.8 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
6. Major percentage i.e. 41 % is covered by the agriculture, 41.8 % is covered by forest, 10 % is covered by forest-plantation and remaining by other land use classes.

Table I.Satellite Data and Ancillary Data

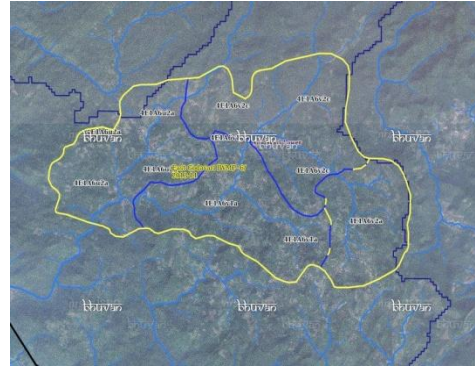
Satellite data	T0-A	T0-B	T5
	2013-14	2011-12	2021-22
LISS IV	2013-14		
SCENE 1			6-Mar-22
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			6-Mar-22
SCENE2			
SCENE 3			
SCENE 4			

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	89
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

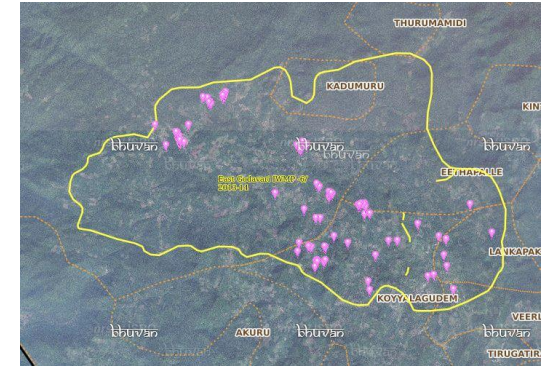


MWS Boundary



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	4	4
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	12	12
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	0	0
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	1	1
15	Livelihood Activities-Plantation/Horticulture	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	6	6
18	Others	66	66
	TOTAL	89	89

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.

Fig 4. Akuru Watershed (IWMP-06/2013-14) Natural Colour Composite-2013-14 to 2021-22

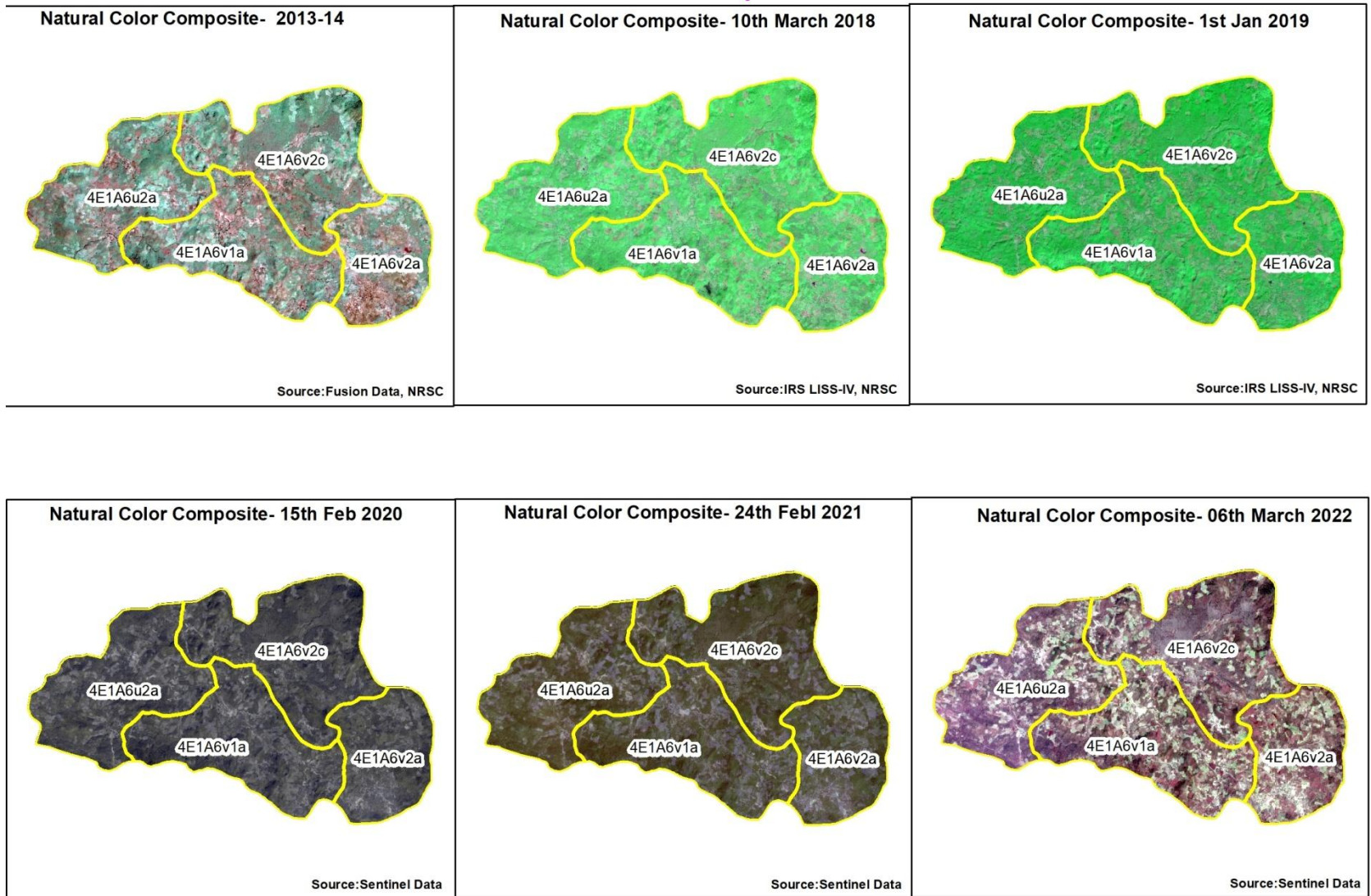


Fig 5. Akuru Watershed (IWMP-06/2013-14) Monitoring of activities in East Godavari Dt Andhra Pradesh



T0

T0:2013-14



T1

T1: 29 November 2018



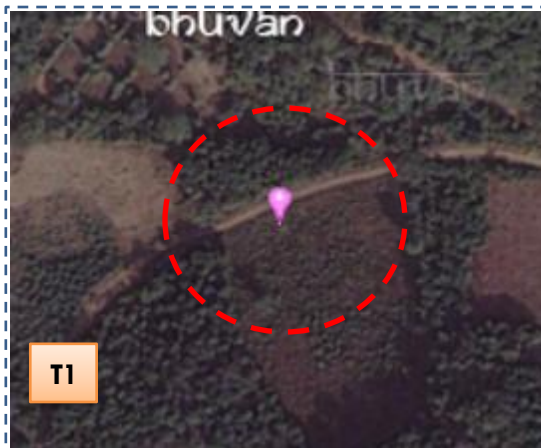
Drishti SI no. 3099790 MWS : 4E1A6v2a

Check dam



T0

T0:2013-14



T1

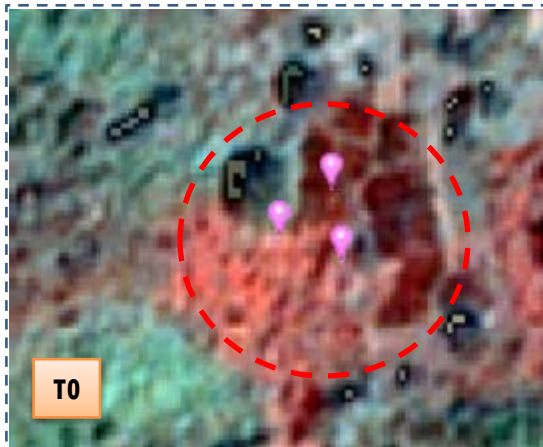
T1: 29 November 2018



Drishti SI no. 7022592 MWS : 4E1A6v1a

Horticulture

Fig 6. Akuru Watershed (IWMP-06/2013-14) Monitoring of activities in East Godavari Dt Andhra Pradesh



T0:2013-14



T1: 29 November 2018

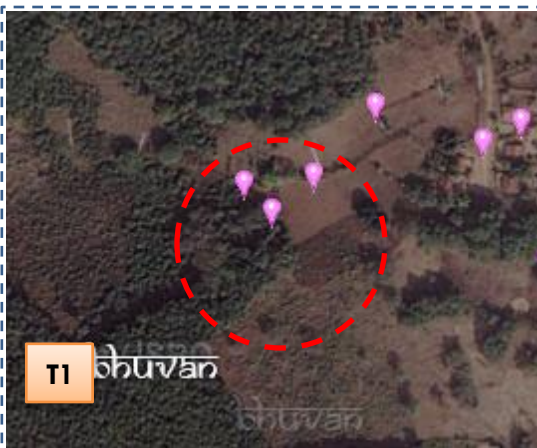


Drishti SI no. 7022620 MWS : 4E1A6v1a

Horticulture



T0:2013-14



T1: 29 November 2018



Drishti SI no. 7040760 MWS : 4E1A6v2c

Horticulture

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. Akuru Watershed (IWMP-06/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2017-18)

Scale: 1:10000

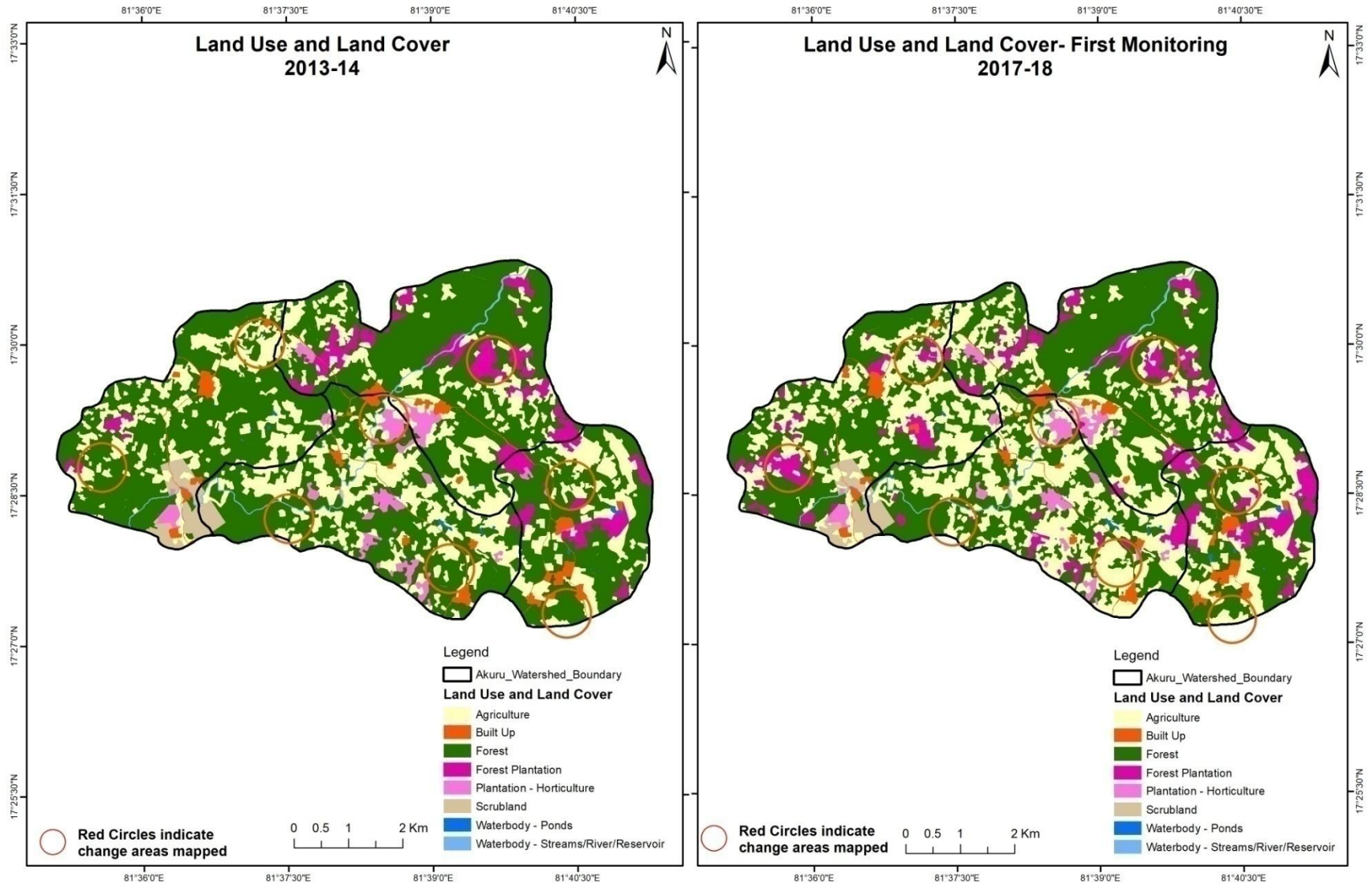


Fig 8. Akuru Watershed (IWMP-06/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

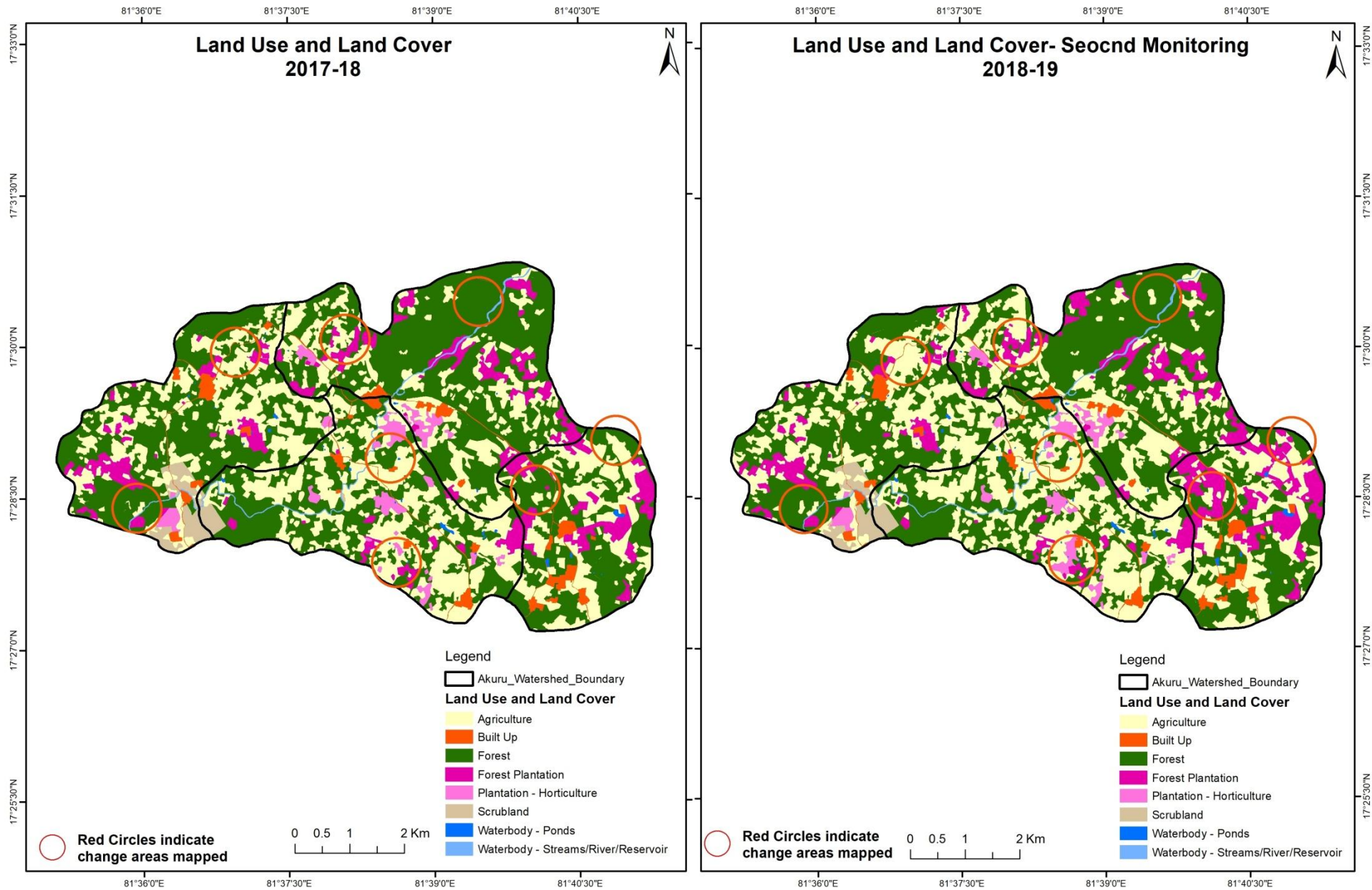


Fig 9. Akuru Watershed (IWMP-06/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

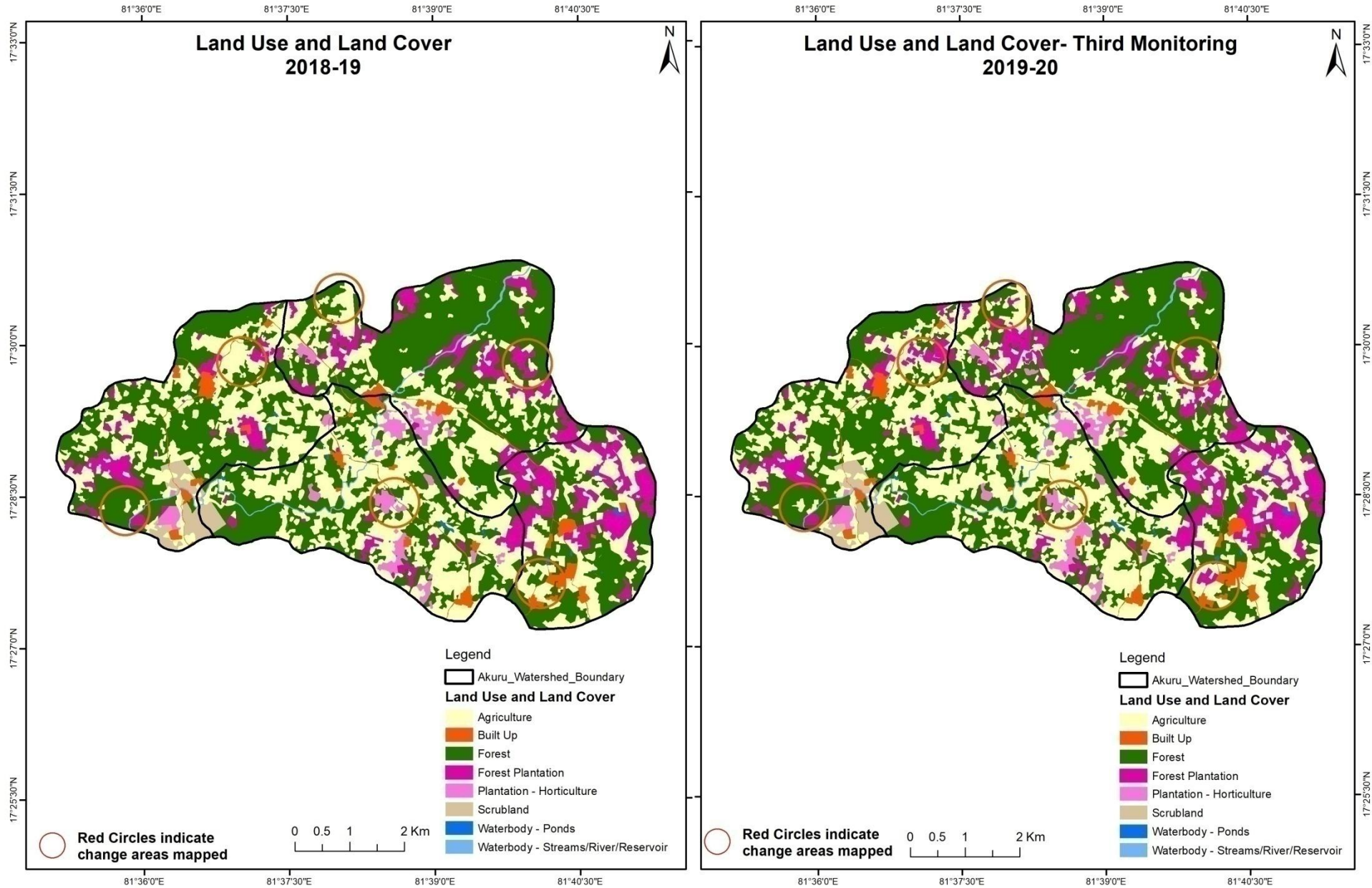


Fig 10. Akuru Watershed (IWMP-06/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

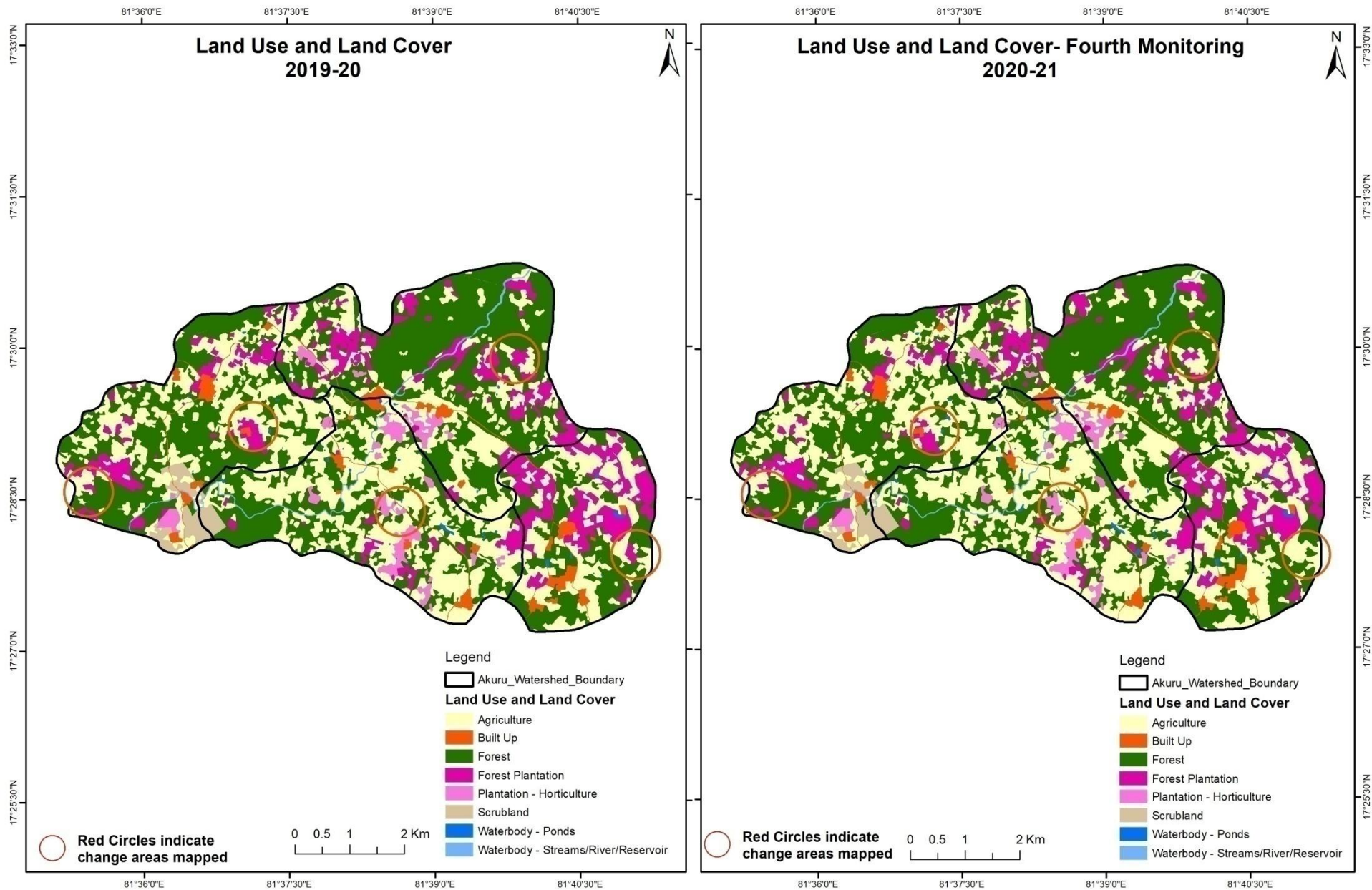


Fig 11. Akuru Watershed (IWMP-06/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2020-21 to 2021-22)

Scale: 1:10000

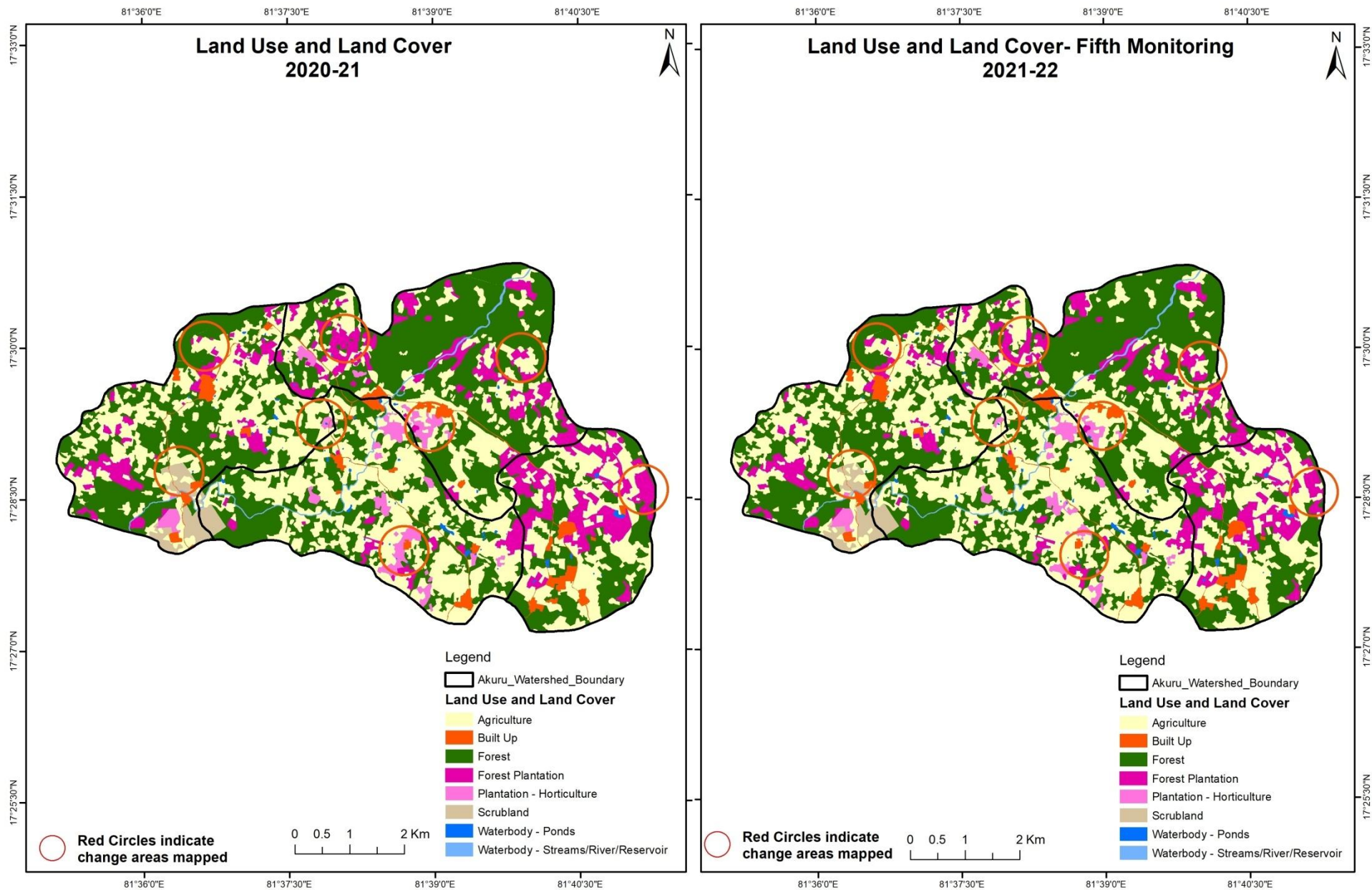
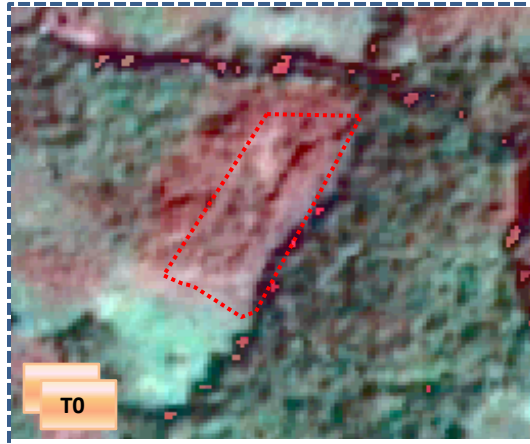
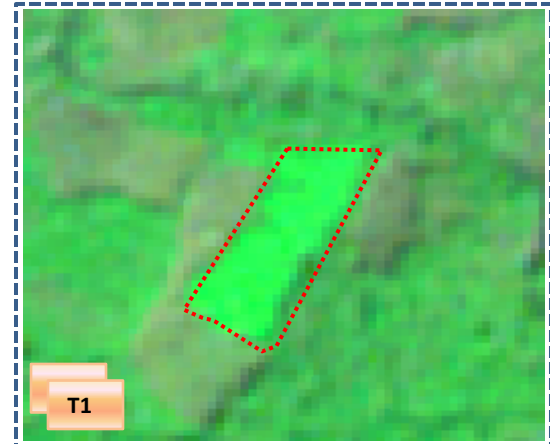


Fig 12. Akuru Watershed (IWMP-06/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0: 2013-14 (81°36'50.036"E 17°28'28.584"N)

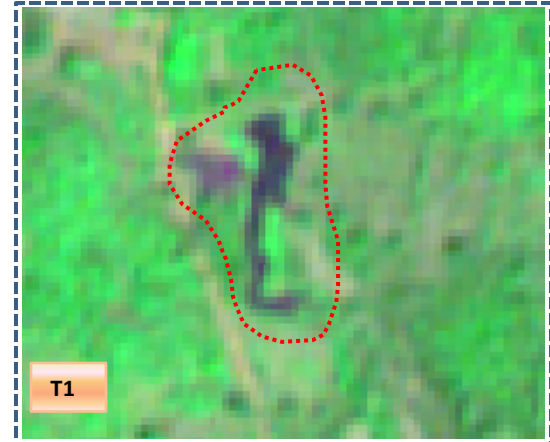


T1: 04 March 2018

Agriculture to water body



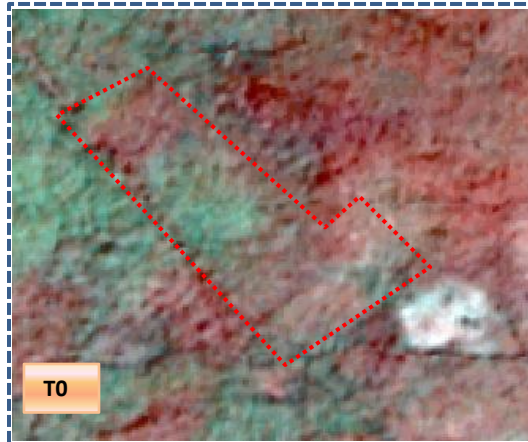
T0: 2013-14 (81°40'9.328"E 17°27'52.115"N)



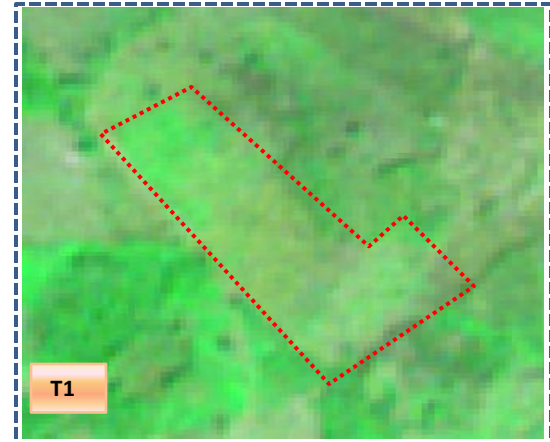
T1: 04 March 2018

Fig 13. Akuru Watershed (IWMP-06/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture

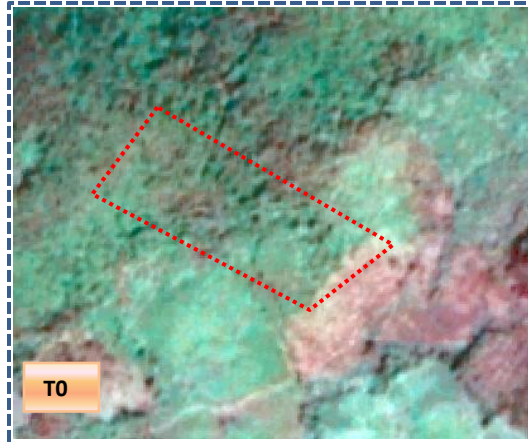


T0: 2013-14 (81°39'34.241"E 17°28'18.019"N)



T1: 04 March 2018

Scrub to Agriculture



T0: 2013-14 (81°37'4.449"E 17°29'34.793"N)



T1: 04 March 2018

Table 4. showing change matrix depicting Land cover transitions for Akuru Watershed (IWMP-06/2013-14) 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	117.51												117.51
Mining/dump													
Agriculture	5.69		1241.14	1.55		14.9				0.22			1263.5
Plantation Horticulture	0.51		16.4	90.66		16.59							124.16
Forest	2.55		325.9	4.18	2335.47	124.68				1.29			2794.07
Forest Plantation			28.51			215.13							243.64
Barren Rocky													
Scrub			6.53					75.04					81.57
Waterbody- Streams/River									28.67				28.67
Waterbody – Ponds										8.46			8.46
Grand Total	126.26		1618.48	96.39	2335.47	371.3		75.04	28.67	9.97			4661.58

Interpretation: The example of “Agriculture” Land cover for the period 2009-10 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 22 ha of the agriculture area has decreased and it is converted into built-up (5.6 ha), plantation/horticulture (1.5 ha), forest plantation (14 ha) and water body (0.2 ha) in T1.
3. In T1 377 ha of the agriculture area has increased from plantation/horticulture (16 ha), forest (325 ha), forest plantation (28 ha) and scrubland (6.5 ha) of T0.

Table 5. showing change matrix depicting Land cover transitions for Akuru Watershed (IWMP-06/2013-14) 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	126.26										126.26	
Mining/dump												
Agriculture			1566.7	11.74		39.71				0.33	1618.48	
Plantation Horticulture			4.29	92.1							96.39	
Forest	0.78		136.93	1.4	2141.98	53.1				1.28	2335.47	
Forest Plantation			3.48			367.63				0.19	371.3	
Barren Rocky												
Scrub			3.05					71.99			75.04	
Waterbody- Streams/River									28.67		28.67	
Waterbody – Ponds										9.97	9.97	
Grand Total	127.04		1714.45	105.24	2141.98	460.44		71.99	28.67	11.77	4661.58	

4. In T1 51 ha of the agriculture area has decreased and it is converted into plantations/horticulture (11.7 ha), forest-plantation (39 ha) and water body (0.3 ha) in T2.

5. In T2 147 ha of the agriculture area has increased from plantations/horticulture (4.2 ha), forest (136 ha) and scrubland (3 ha) of T1.

Table 6. showing change matrix depicting Land cover transitions for Akuru Watershed (IWMP-06/2013-14) 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	127.04												127.04
Mining/dump													
Agriculture			1655.61	2.3	0.38	55.67					0.49		1714.45
Plantation Horticulture			2.07	103.17									105.24
Forest			55.03	6.3	2056.82	23.22					0.61		2141.98
Forest Plantation			12.2			448					0.24		460.44
Barren Rocky													
Scrub								71.99					71.99
Waterbody- Streams/River									28.67				28.67
Waterbody – Ponds											11.77		11.77
Grand Total	127.04		1724.91	111.77	2057.2	526.89		71.99	28.67		13.11		4661.58

6. In T2 58 ha of the agriculture area has decreased and it is converted into plantations/horticulture (2.3 ha), forest (0.3 ha), forest-plantation (55 ha) and water body (0.4 ha) in T3.

7. In T3 69 ha of the agriculture area has increased from plantations/horticulture (2.7 ha), forest (55 ha), forest plantation (12 ha) of T2.

Table 7. showing change matrix depicting Land cover transitions for Akuru Watershed (IWMP-06/2013-14) 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	127.04										127.04	
Mining/dump												
Agriculture			1720.26			3.7				0.95	1724.91	
Plantation Horticulture			2.85	108.78						0.14	111.77	
Forest			70.84		1985.34					1.02	2057.2	
Forest Plantation			17.07			509.31				0.51	526.89	
Barren Rocky												
Scrub			0.48					71.51			71.99	
Waterbody- Streams/River									28.67		28.67	
Waterbody – Ponds										13.11	13.11	
Grand Total	127.04		1811.5	108.78	1985.34	513.01		71.51	28.67	15.73	4661.58	

8. In T2 4.6 ha of the agriculture area has decreased and it is converted into forest-plantation (3.7 ha) and water body (0.9 ha) in T3.

9. In T4 59.6 ha of the agriculture area has increased from plantations/horticulture (2.8 ha), forest (70.8 ha), forest-plantation (17 ha) and scrubland (0.4 ha) of T3.

Table 8. showing change matrix depicting Land cover transitions for Akuru Watershed (IWMP-06/2013-14) 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		
T4													
Built up	127.04												127.04
Mining/dump													
Agriculture			1797.74	2.85		10.5					0.41		1811.5
Plantation Horticulture			21.13	87.49							0.16		108.78
Forest			32.61		1952.71						0.02		1985.34
Forest Plantation			56.97			456.04							513.01
Barren Rocky													
Scrub			3.26					68.25					71.51
Waterbody- Streams/River									28.67				28.67
Waterbody – Ponds											15.73		15.73
Grand Total	127.04		1911.71	90.34	1952.71	466.54		68.25	28.67		16.32		4661.58

10. In T4 13 ha of the agriculture area has decreased and it is converted into plantations/horticulture (2.8 ha), forest plantation (10.5 ha) in and water body (0.4 ha) T5.

11. In T5 113 ha of the agriculture area has increased from plantations/horticulture (21 ha), forest (32.6 ha), forest plantation (56.9 ha) and scrubland (3.2 ha) of T4.

Conclusion

1. 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.
2. There is an increase of 7.8 Hectares in Reservoir / Tanks area as compared between baseline Land Use/Land Cover data 2013-14 (T0) & 2021-22 (T5) years.
3. There is an increase of 355, 95, 10, 86 & 100 ha Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 648 Hectares in Crop land area as compared between baseline Land Use/Land Cover data 2013-14 (T0) & 2021-22 (T5) years.
4. There is a decrease of 13 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
5. Farm ponds (09) is visible on IWMP (Integrated Watershed Management Programme) 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