

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-V

GUNTUR -02/2013-14

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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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

- 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-02/2013-14, Guntur District of Andhra Pradesh. The total geographical area of the project is **8,033 ha**. It comprises of 9 micro watersheds.
- In the project area 34 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 15.8 ha, which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 67 % is covered by the agriculture, 16 % is covered by forest, 07 % is covered by scrubland and remaining by other land use classes.

1. STUDY AREA

PROJECT : UPPALAPADU WATERSHED (IWMP-02/2013-14)

DISTRICT : GUNTUR , STATE : ANDHRA PRADESH

- The study area falls in Veldurthi Mandal of Guntur district of Andhra Pradesh state. The total geographical area of the project is **8,033 ha**. It comprises of 9 micro watersheds. 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 and fig 4.

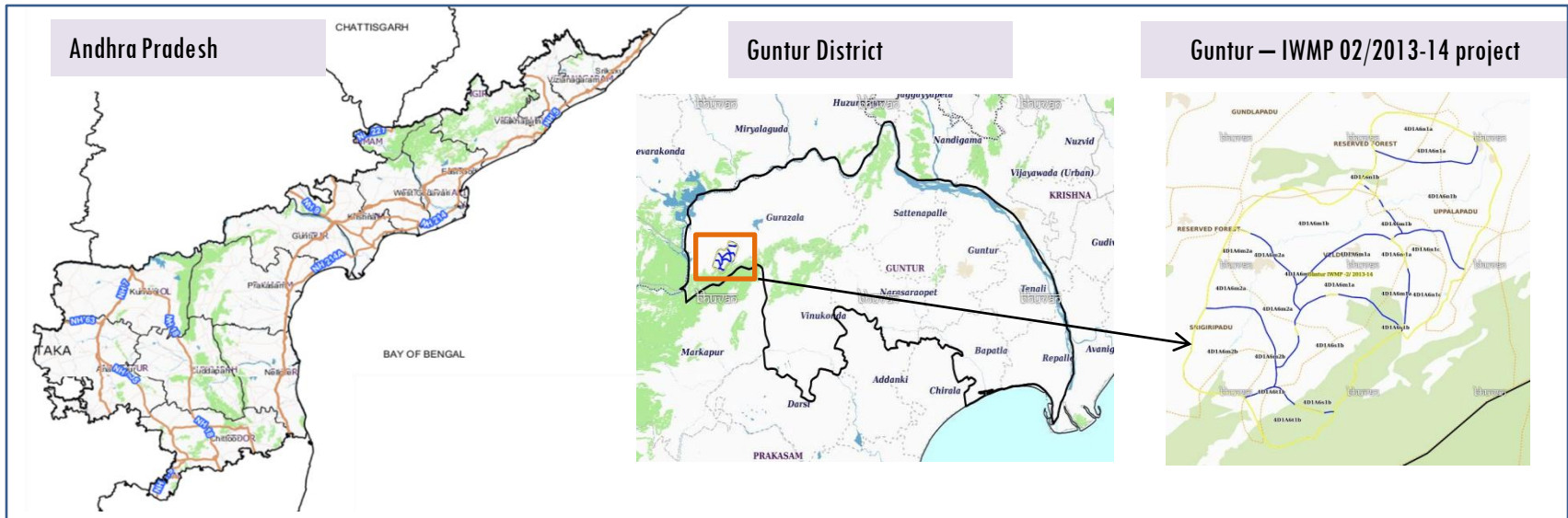


Fig.1. Location map of Uppalapadu Watershed (IWMP-02/2013-14) in Guntur District, A.P

- Guntur City falls within the hot humid region of the country and it is not more than 40 miles from the Sea. The climate of the district is generally hot in summer. The atmospheric humidity in the region around Guntur ranges from 63% to 81%.
- The average annual temperature is 28.5 C and annual rain fall is about 905 mm. Rain storms and cyclones are common in the region during the rainy season, which starts with the monsoons in early June. Cyclones may occur any time of the year, but occur more commonly between May and November.

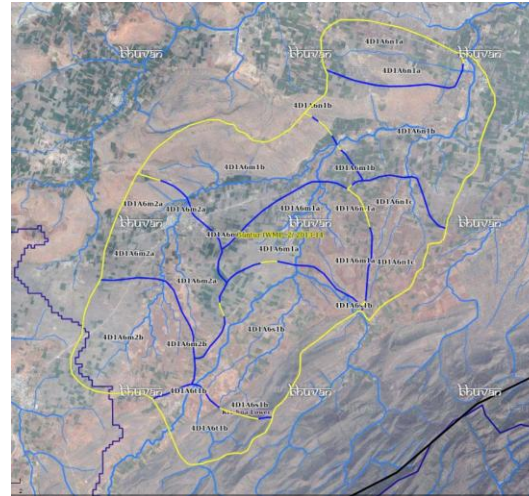
Table I. Satellite Data and Ancillary Data

Satellite data	T0-A	T0-B	T5
	2013-14	2016-17	2021-22
LISS IV	2013-14		
SCENE 1			28-Jan-22
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			28-Jan-22
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	Drishti Photographs		
		Total	34
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

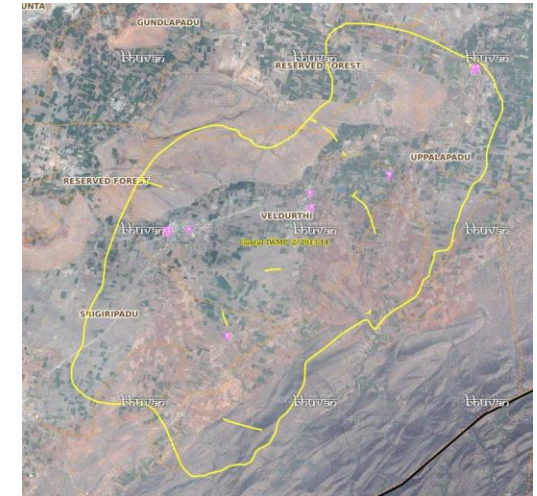


MWS Boundary



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	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	0	0
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	0	0
15	Livelihood Activities-Plantation/Horticulture	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	1	1
18	Others	33	33
	TOTAL	34	34

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, seen in figure 5 & 6.

Fig 4. Uppalapadu Watershed (IWMP-02/2013-14) Natural Colour Composite- 2013-14 to 2021-22

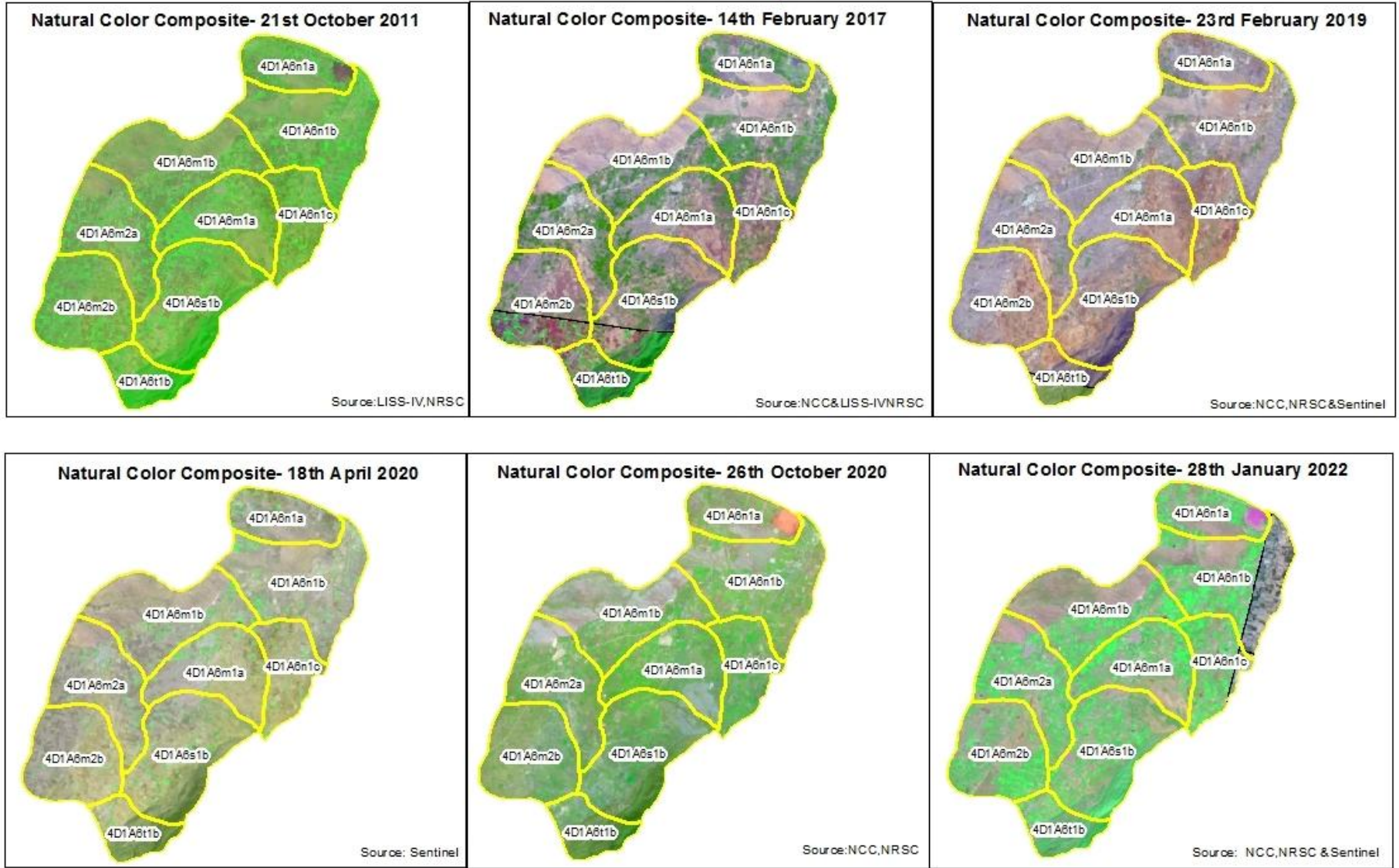


Fig 5. Monitoring of activities in in Uppalapadu Watershed (IWMP-02/2013-14) Guntur District, Andhra Pradesh



T0

T0:2013-14



T1

T1: 17 May 2018



Drishti Sl no. 7032373 MWS : 4D1A6m1a

Entry Point Activities - Cement



T0

T0:2013-14



T1

T1: 17 May 2018



Drishti Sl no. 2848158 MWS : 4D1A6s1b

Entry Point Activities - Cement

Fig 6. Monitoring of activities in in Uppalapadu Watershed (IWMP-02/2013-14) Guntur District, Andhra Pradesh



T0

T0: 2013-14



T1

T1: 17 May 2018



Drishti Sl no. 7032472 MWS : 4D1A6n1a

Entry Point Activities-Solar



T0

T0: 2013-14



T1

T1: 17 May 2018



Drishti Sl no. 7032473 MWS : 4D1A6n1a

Percolation tank

03. MONITORING IN THE PROJECT AREA

3.2 Land use and Land cover Changes in the Project

1. 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.
2. 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.
3. The result obtained for the period T0 to T5 are given in the change matrix table.
4. In matrix table column represents the T0 (2013-14) and row represents the T5 (2021-22) .

Fig 7. Uppalapadu 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

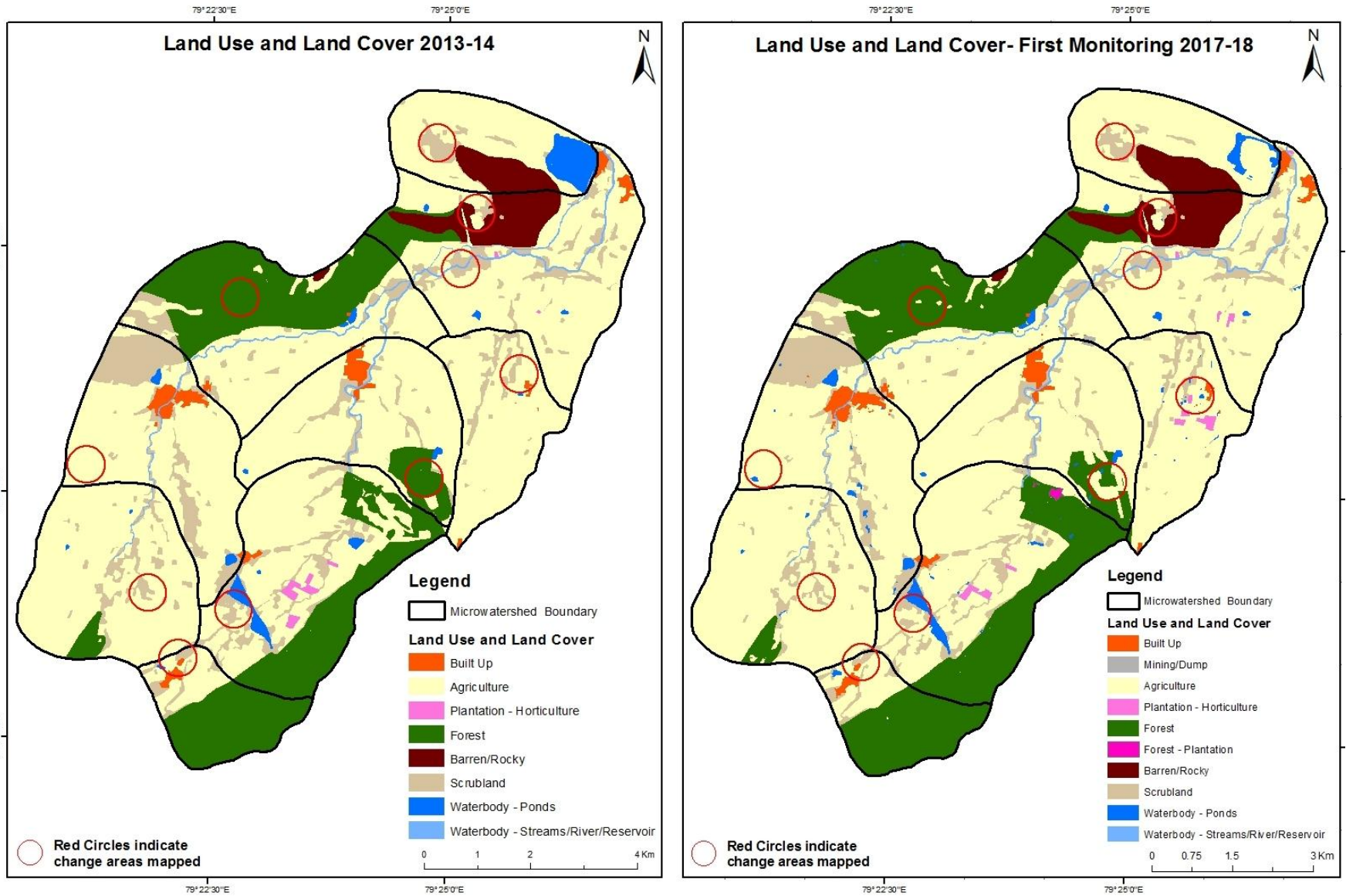
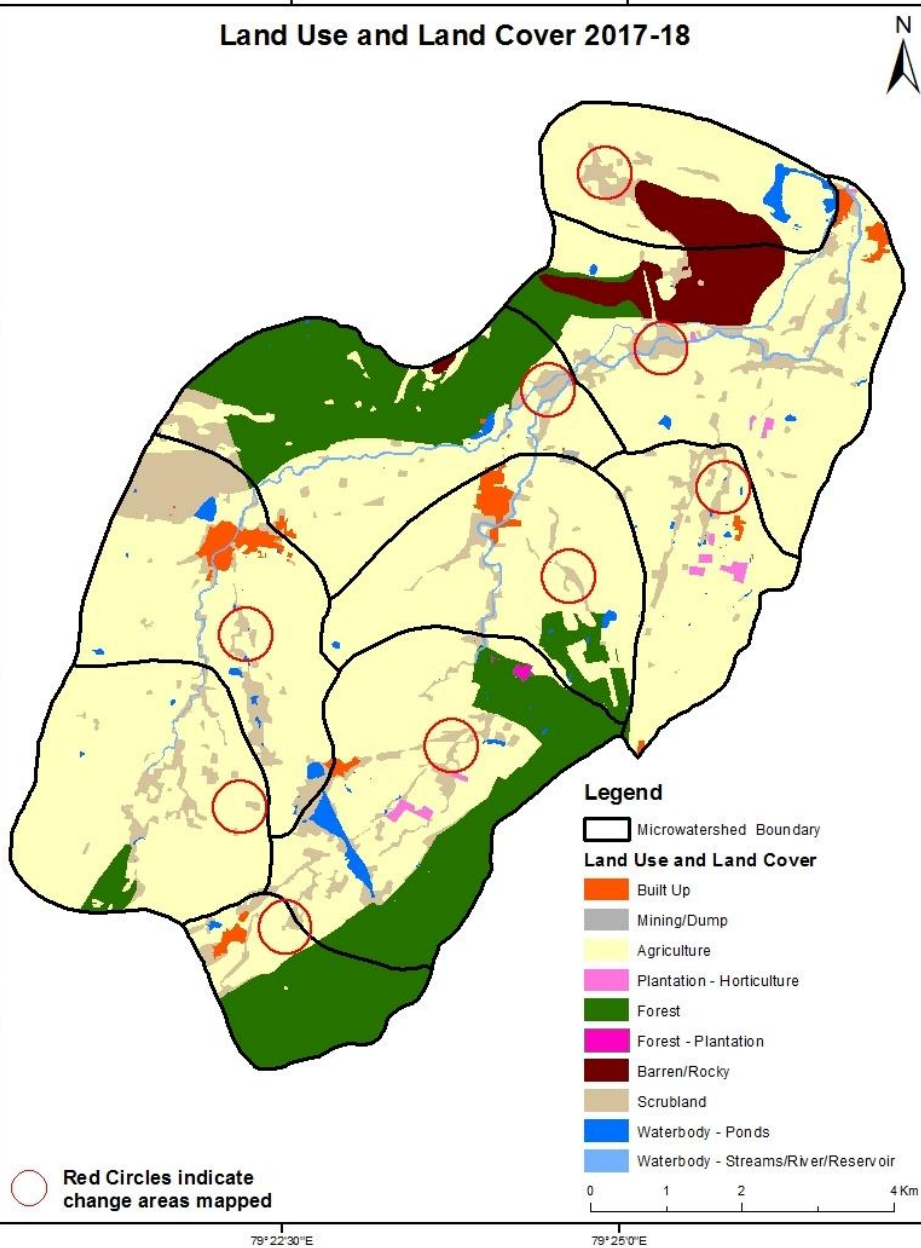


Fig 8. Uppalapadu Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

Land Use and Land Cover 2017-18



Land Use and Land Cover- Second Monitoring 2018-19

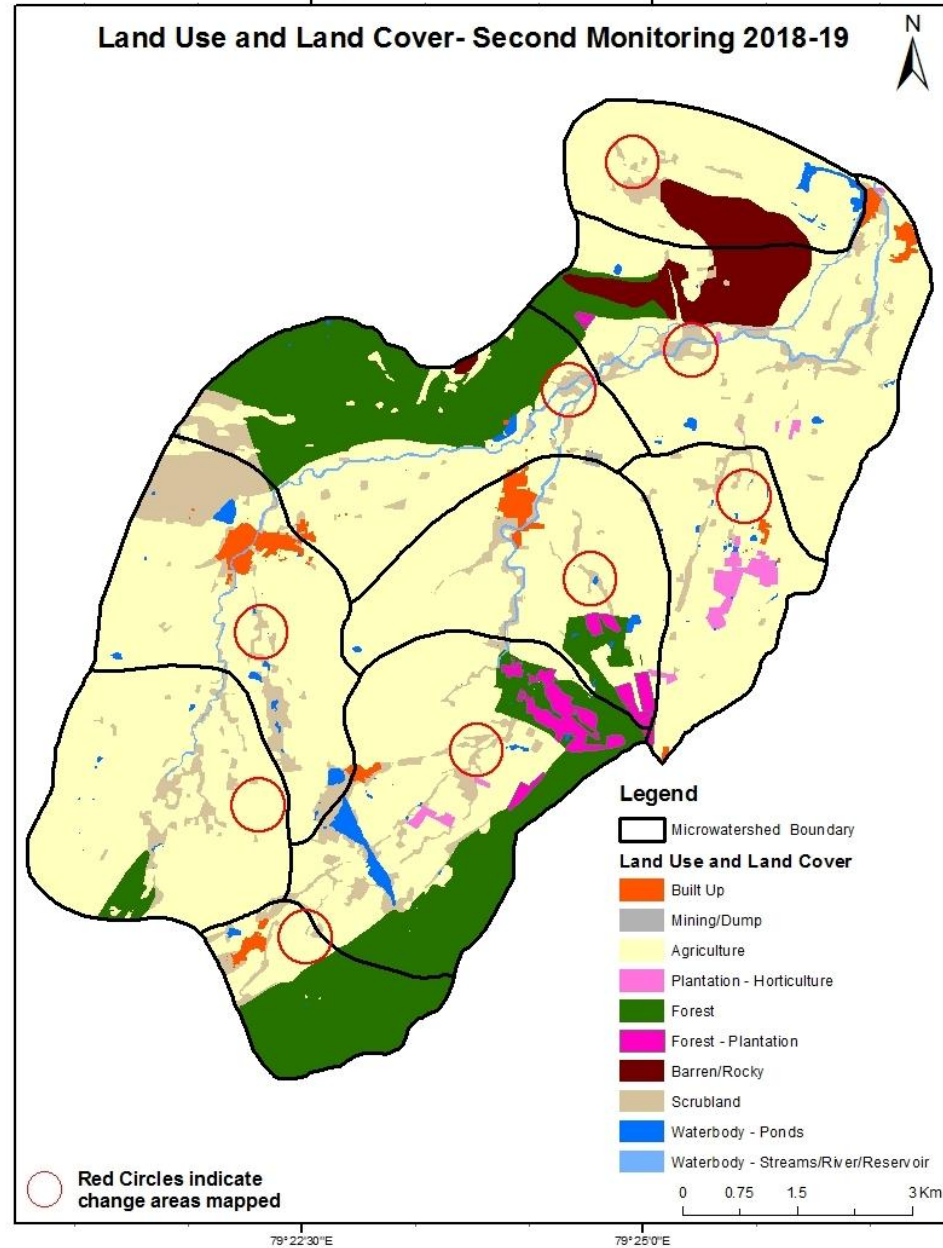
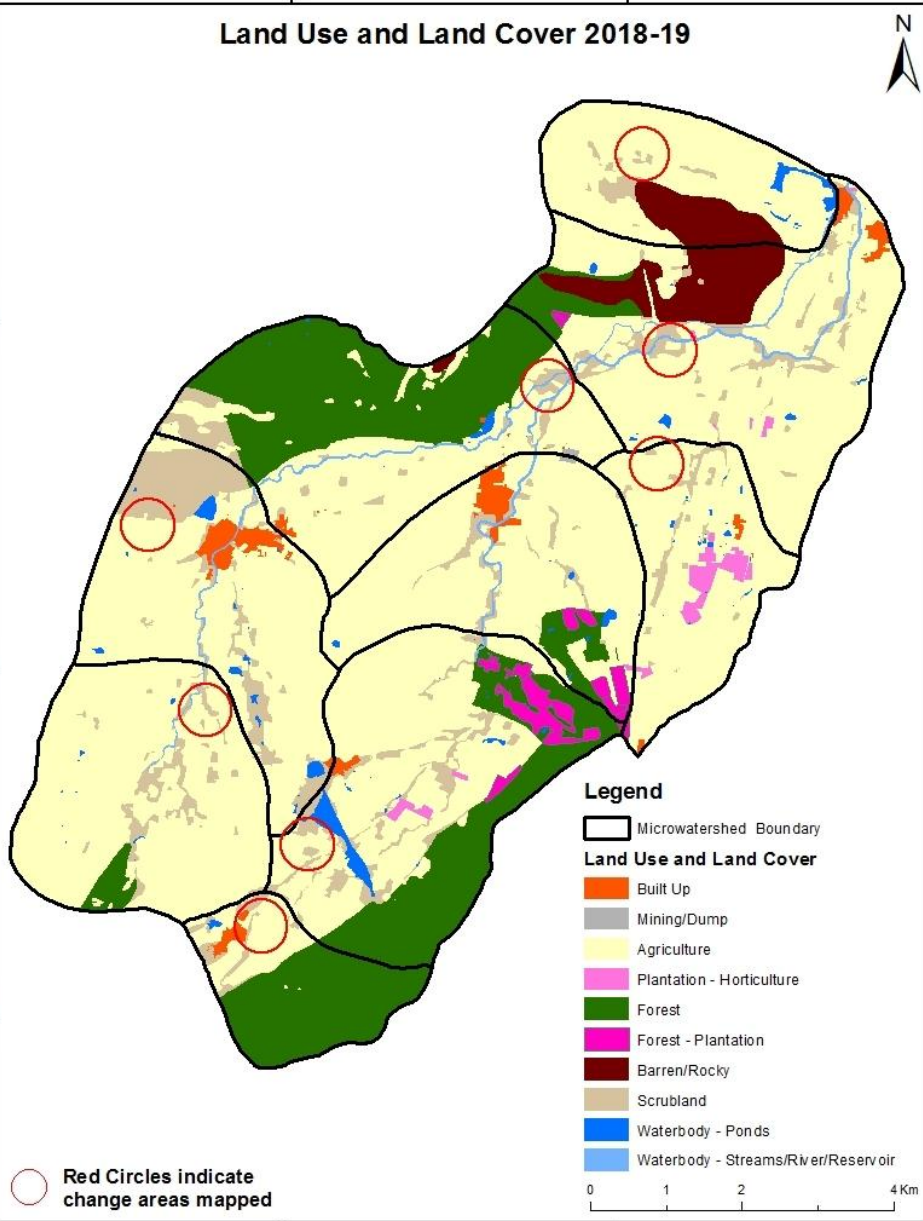


Fig 9. Uppalapadu Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

Land Use and Land Cover 2018-19



Land Use and Land Cover- Third Monitoring 2019-20

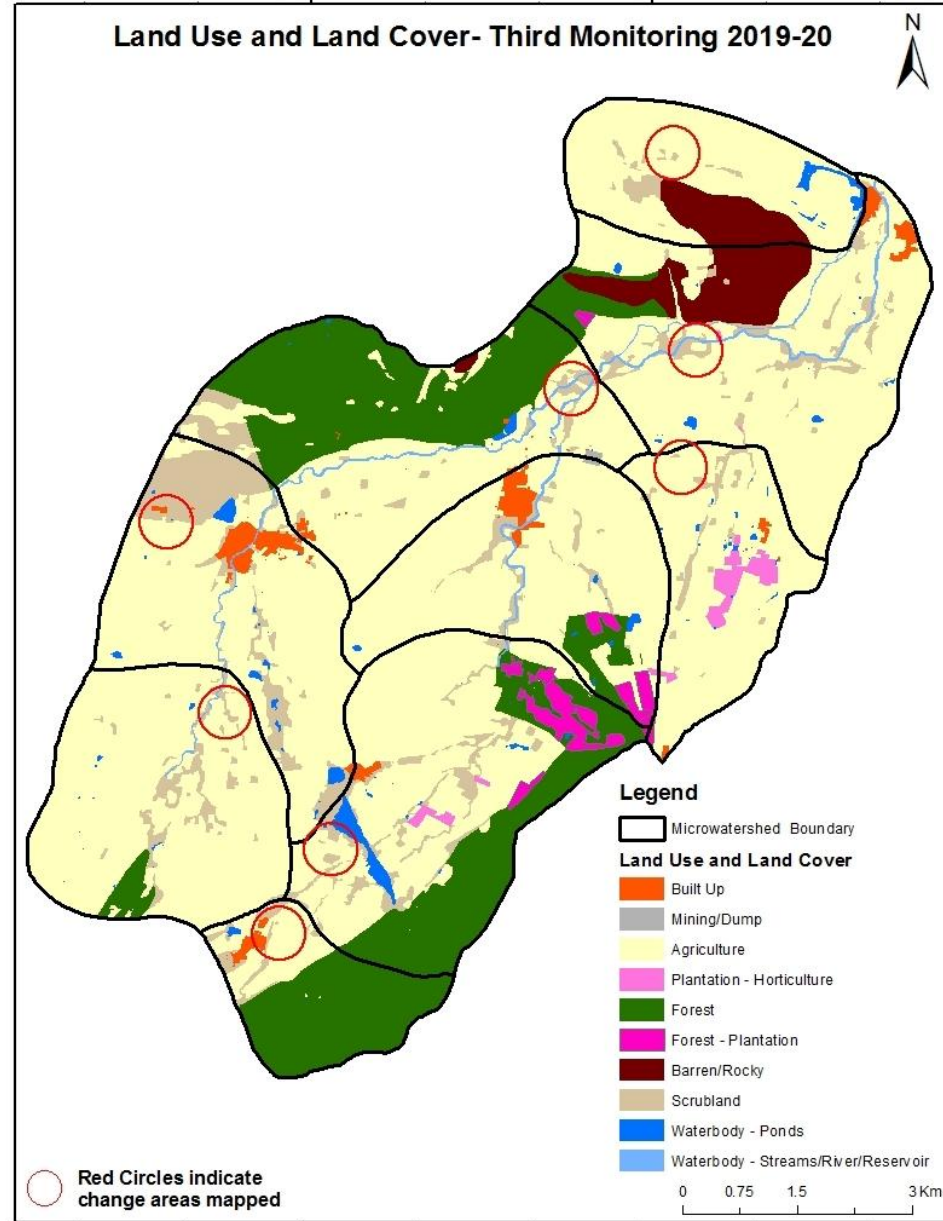
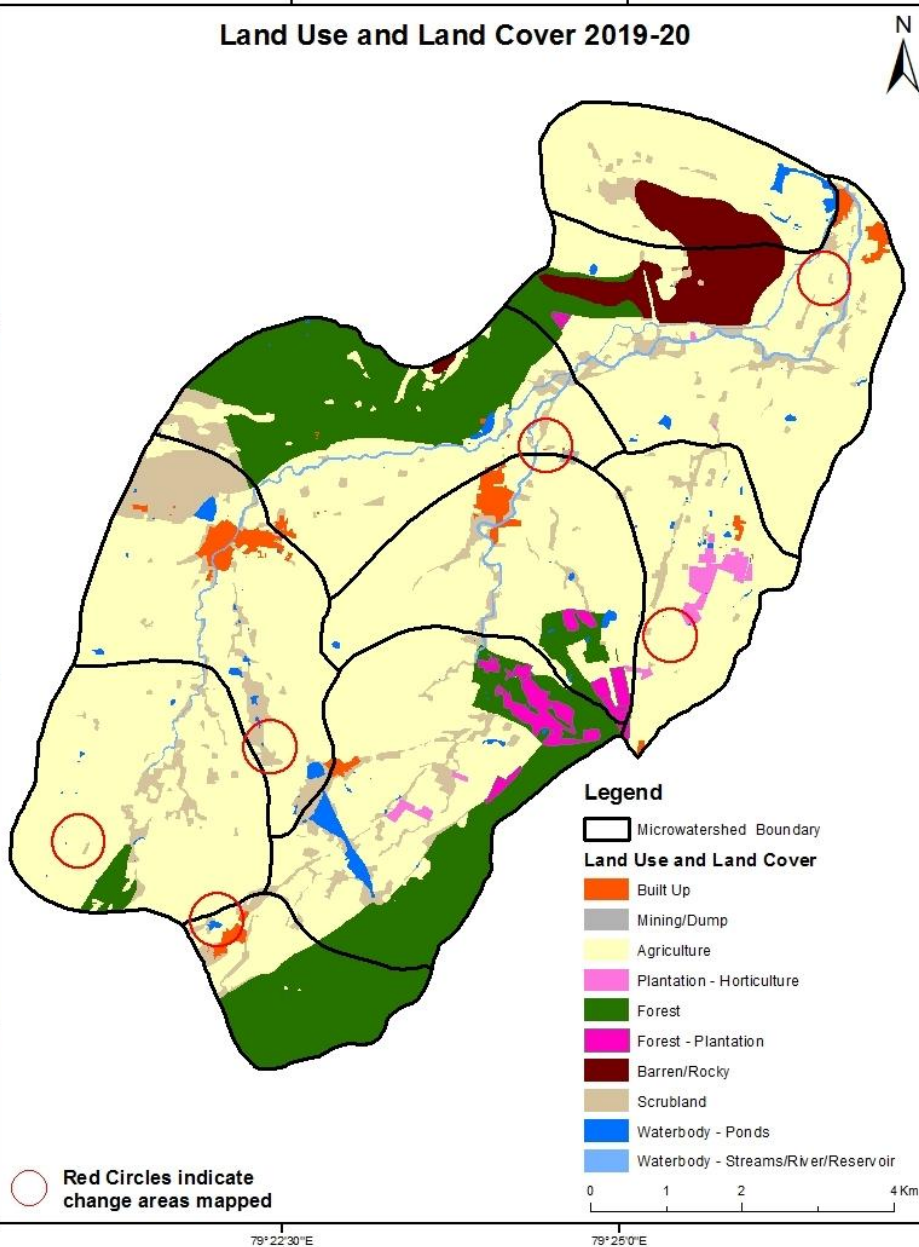


Fig 10. Uppalapadu Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

Land Use and Land Cover 2019-20



Land Use and Land Cover- Fourth Monitoring 2020-21

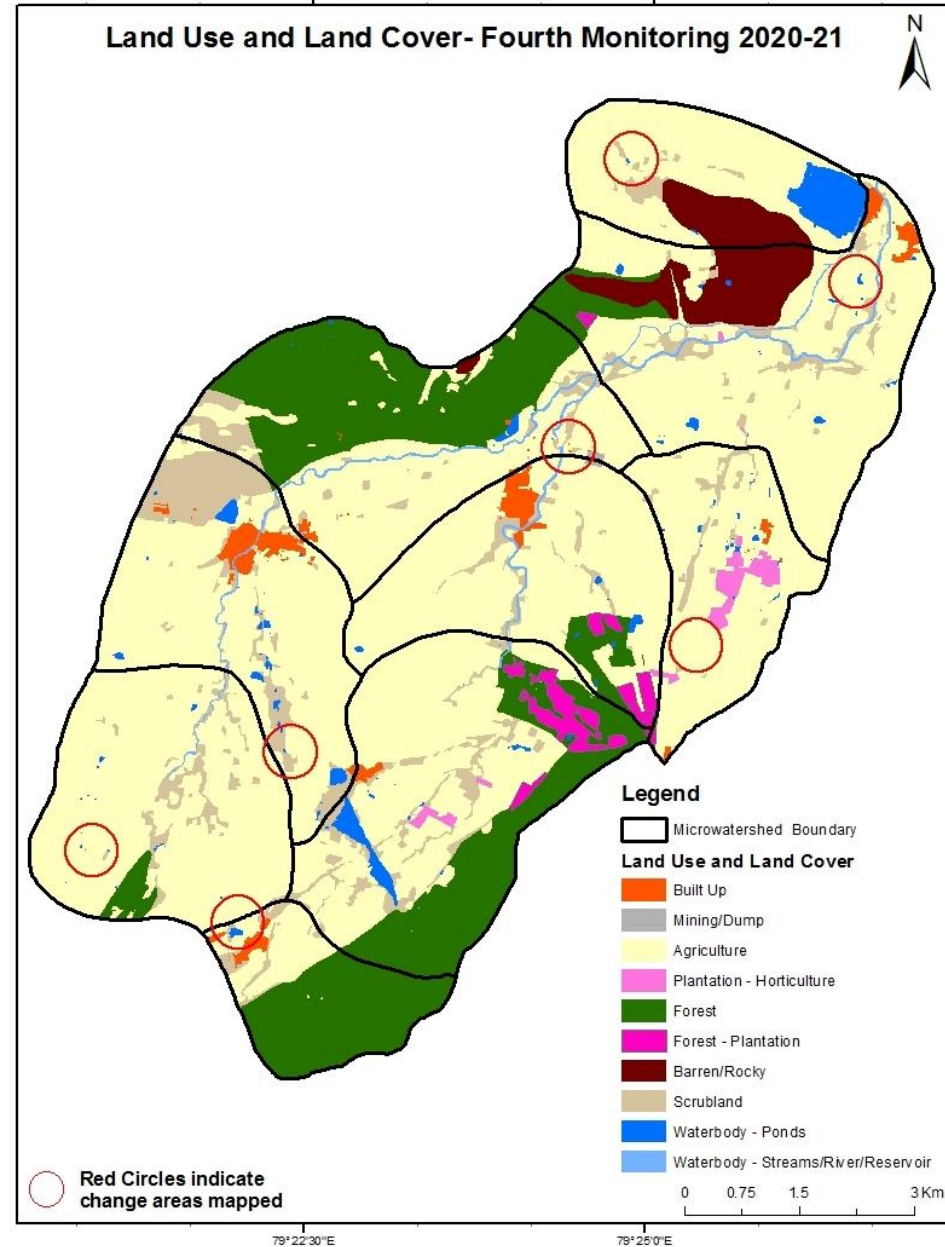
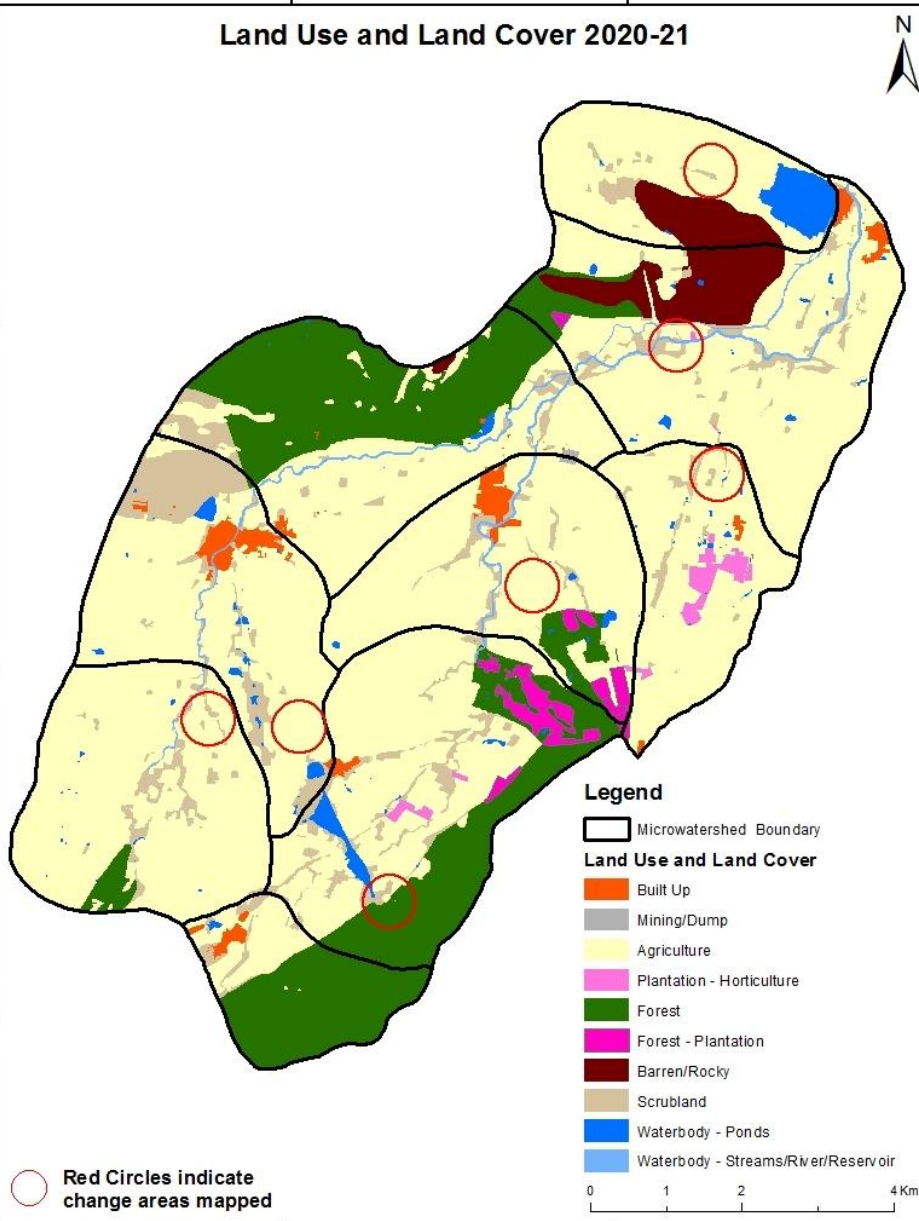


Fig 11. Uppalapadu Watershed (IWMP-02/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2020-21 to 2021-22)

Scale: 1:10000

Land Use and Land Cover 2020-21



Land Use and Land Cover- Fifth Monitoring 2021-22

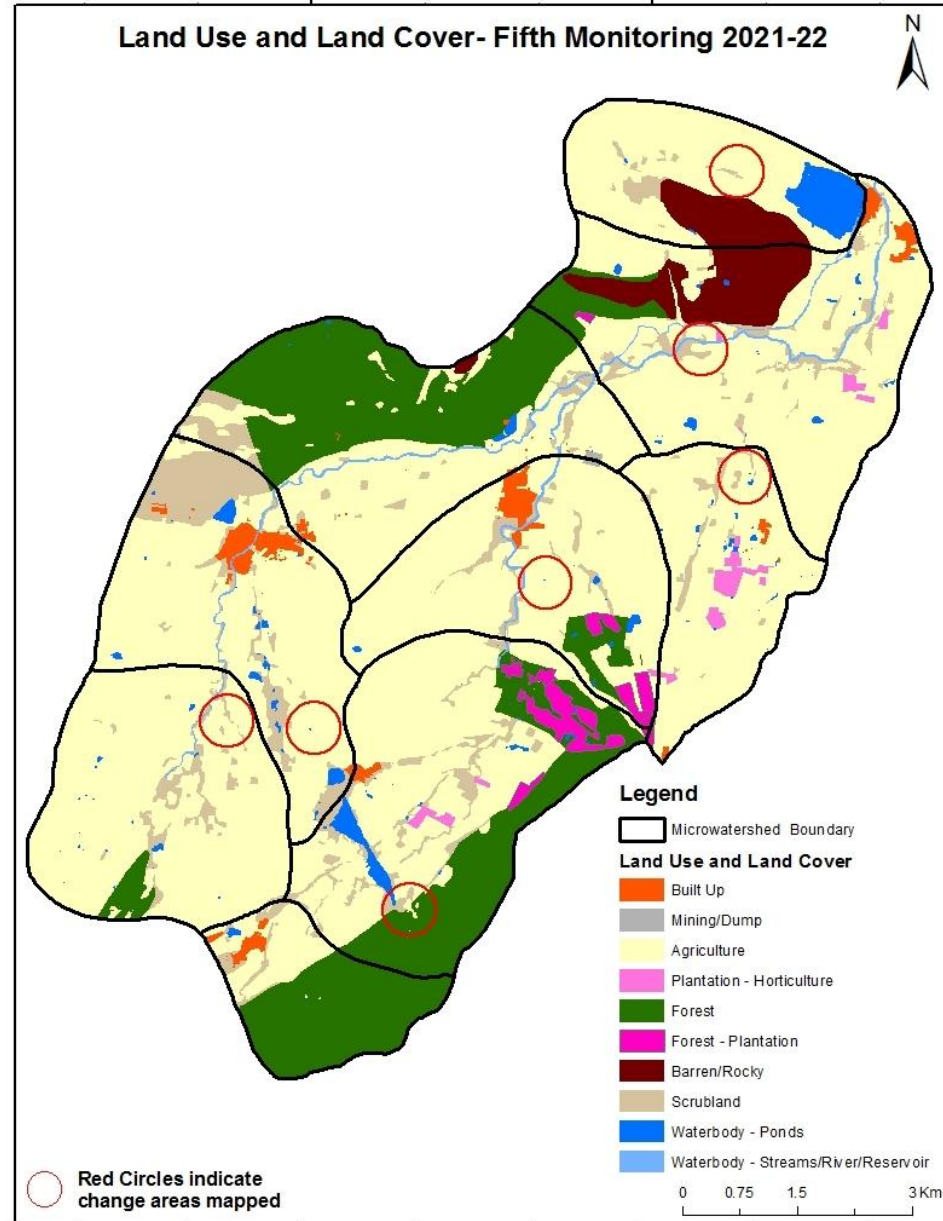


Fig 12. Uppalapadu Watershed (IWMP-02/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

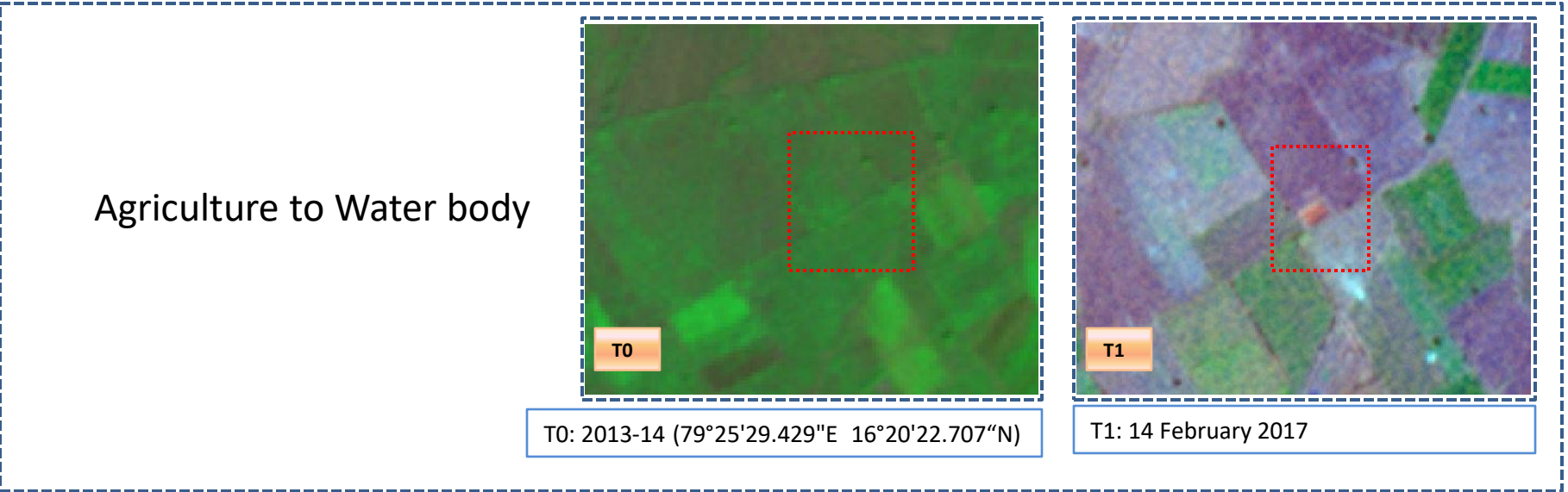
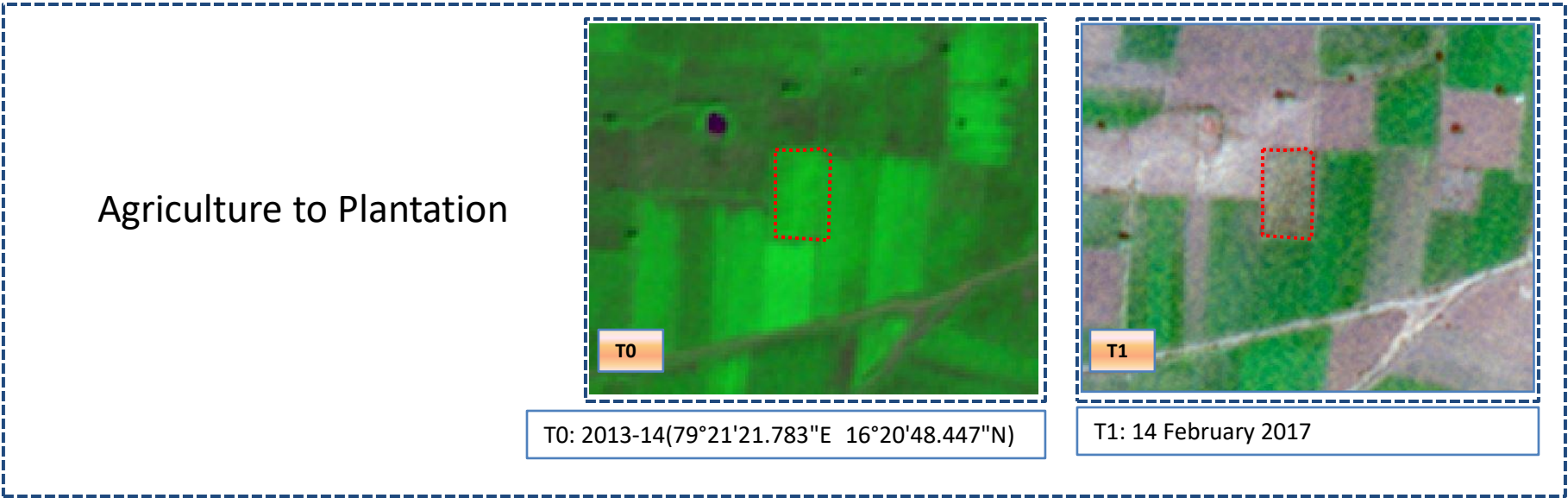


Fig 13. Uppalapadu Watershed (IWMP-02/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

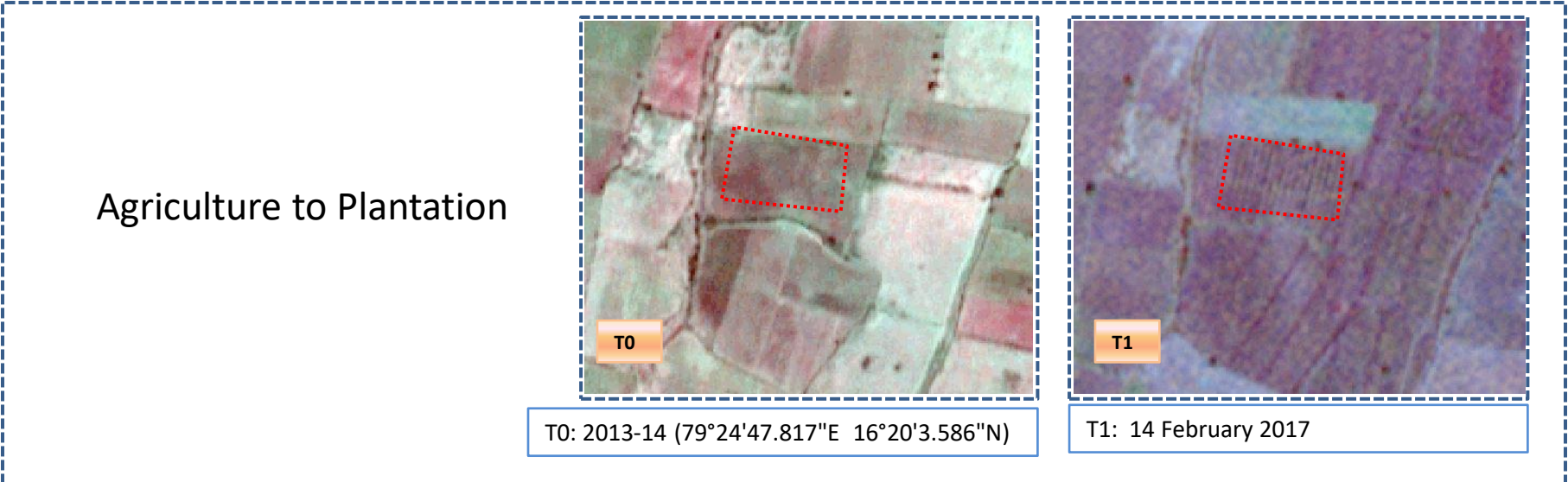
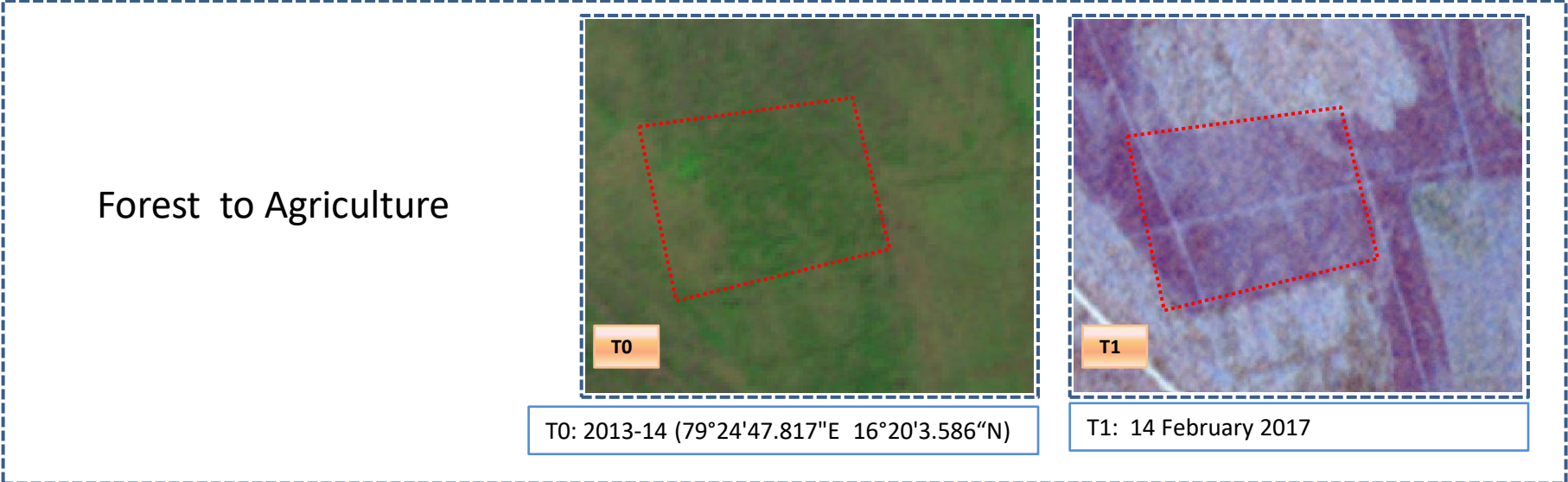


Table 4. showing change matrix depicting Land cover transitions for Uppalapadu Watershed (IWMP-02/2013-14) during study period-2013-14 to 2017-18

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	102.88												102.88
Mining/dump													
Agriculture	3.12	3.85	5144.98	14.51	64.91						7.4		5238.77
Plantation Horticulture			10.33	10.24									20.57
Forest			38.2		1360.91	4.19			0.67		1.89		1405.86
Forest Plantation													
Barren Rocky							281.56						281.56
Scrub	3.74		72.41					701.68			6.66		784.49
Waterbody- Streams/River									74.76				74.76
Waterbody – Ponds	0.02		54.63								69.83		124.48
Grand Total	109.76	3.85	5320.55	24.75	1425.82	4.19	281.56	701.68	75.43	85.78	8033.37		

•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 93.7 ha of the agriculture area has decreased and it is converted into Built-up (3.1 ha), mining/dump (3.8 ha), plantation/horticulture(14.5 ha), forest (64.9 ha) and water body (7.4 ha) in T1.
3. In T1 175.5 ha of the agriculture area has increased from plantations/horticulture (10.3 ha), forest (38.2 ha) and scrubland (72.4 ha) and water body (54.6 ha) of T0.

Table 5. showing change matrix depicting Land cover transitions for Uppalapadu Watershed (IWMP-02/2013-14) 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	109.76										109.76	
Mining/dump		3.85									3.85	
Agriculture	0.81	0.16	5279.96	28.07		8.4		1.86		1.29	5320.55	
Plantation Horticulture			0.38	24.29						0.08	24.75	
Forest			7.78		1335.72	82.32					1425.82	
Forest Plantation						4.19					4.19	
Barren Rocky							281.56				281.56	
Scrub	1.25		94.82	0.17				604.85		0.59	701.68	
Waterbody- Streams/River			0.49						74.94		75.43	
Waterbody – Ponds			7.56							78.22	85.78	
Grand Total	111.82	4.01	5390.99	52.53	1335.72	94.91	281.56	606.71	74.94	80.18	8033.37	

4. In T1 40.5 ha of the agriculture area has decreased and it is converted into Built-up (0.8 ha), plantations (28 ha), forest plantation (8.4 ha) scrub (1.8 ha) and water body (1.2 ha) in T2.

5. In T2 111 ha of the agriculture area has increased from plantations/horticulture (0.3 ha), forest (7.7 ha) scrubland (94.8 ha) and water body (8 ha) of T1.

Table 6. showing change matrix depicting Land cover transitions for Uppalapadu Watershed (IWMP-02/2013-14) during study period - 2018-19 to 2019-20

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	111.82												111.82
Mining/dump		4.01											4.01
Agriculture	0.23		5390.49								0.27		5390.99
Plantation Horticulture			3.59	48.94									52.53
Forest	0.22		0.59		1334.91								1335.72
Forest Plantation						94.91							94.91
Barren Rocky							281.56						281.56
Scrub	1.36		21.38					583.81			0.16		606.71
Waterbody- Streams/River									74.94				74.94
Waterbody – Ponds											80.18		80.18
Grand Total	113.63	4.01	5416.05	48.94	1334.91	94.91	281.56	583.81	74.94	80.61			8033.37

6. In T2 0.5 ha of the agriculture area has decreased and it is converted into Built-up (0.23 ha) and water body (0.27 ha) in T3.

7. In T3 25.5 ha of the agriculture area has increased from plantations/horticulture (3.5 ha), forest (0.59 ha) and scrubland (21.3 ha) of T2.

Table 7. showing change matrix depicting Land cover transitions for Uppalapadu Watershed (IWMP-02/2013-14) 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	113.63												113.63
Mining/dump		4.01											4.01
Agriculture	0.45		5362.31								53.29		5416.05
Plantation Horticulture				48.94									48.94
Forest					1334.91								1334.91
Forest Plantation						94.91							94.91
Barren Rocky							281.56						281.56
Scrub	2.01		3.59					575.07			3.14		583.81
Waterbody- Streams/River									74.94				74.94
Waterbody – Ponds											80.61		80.61
Grand Total	116.09	4.01	5365.9	48.94	1334.91	94.91	281.56	575.07	74.94	137.04			8033.37

8. In T3 53.7 ha of the agriculture area has decreased and it is converted into built-up (0.4 ha) and water body (53.2 ha) in T4.

9. In T4 3.5 ha of the agriculture area has increased from scrubland (3.59 ha) of T3.

Table 8. showing change matrix depicting Land cover transitions for Uppalapadu 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	116.09										116.09	
Mining/dump		4.01									4.01	
Agriculture	0.51		5353.92	9.18						2.29	5365.9	
Plantation Horticulture			11.44	37.5							48.94	
Forest			13.52		1321.22					0.17	1334.91	
Forest Plantation			1.27			93.34				0.3	94.91	
Barren Rocky							281.56				281.56	
Scrub	0.17		13.78					560.77		0.35	575.07	
Waterbody- Streams/River									74.94		74.94	
Waterbody – Ponds										137.04	137.04	
Grand Total	116.77	4.01	5393.93	46.68	1321.22	93.34	281.56	560.77	74.94	140.15	8033.37	

10. In T4 11.9 ha of the agriculture area has decreased and it is converted into built-up (0.5 ha), plantations/horticulture (9.1 ha) and water body (2.2 ha) in T5.

11. In T5 80 ha of the agriculture area has increased from plantations/horticulture (11.4 ha), forest (13.5 ha), forest plantation (1.2 ha) and scrubland (13.7 ha) of T4.

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 15 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 81, 70, 25 & 28 Hectares from T0-T1, T1-T2, T2-T3 & T4-T5 respectively and overall increase of 155 Hectares in Crop land area as compared between baseline Land Use/Land Cover data 2013-14 (T0) & 2021-22 (T5) years.
5. About **26 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 223 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
7. 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.