

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-V

VIZIANAGARAM -10/2013-14

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
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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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EXECUTIVE SUMMARY

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-10/2013-14, Vizianagaram District of Andhra Pradesh. The total geographical area of the project is **5,075 ha**. It comprises of 16 micro watersheds.
4. In the project area 216 Drishti photos were uploaded showing 14 check dams/Rock fill dam, 15 entry point activities, 18 checks and plugins, 3 agriculture and 166 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.
6. Water bodies have shown an increase by 67 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
7. Major percentage i.e. 56 % is covered by the agriculture, 17 % is covered by plantation/horticulture, 15 % is forest, 05 % is covered by scrubland and remaining by other land use classes.

STUDY AREA

PROJECT : DOKISEELA (IWMP-10/2013-14)

DISTRICT : VIZIANAGARAM , STATE : ANDHRA PRADESH

- The study area falls in Parvathipuram Mandal of Vizianagaram district of Andhra Pradesh state. The total geographical area of the project is **5,075 ha**. It comprises of 15 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, Fig 04.

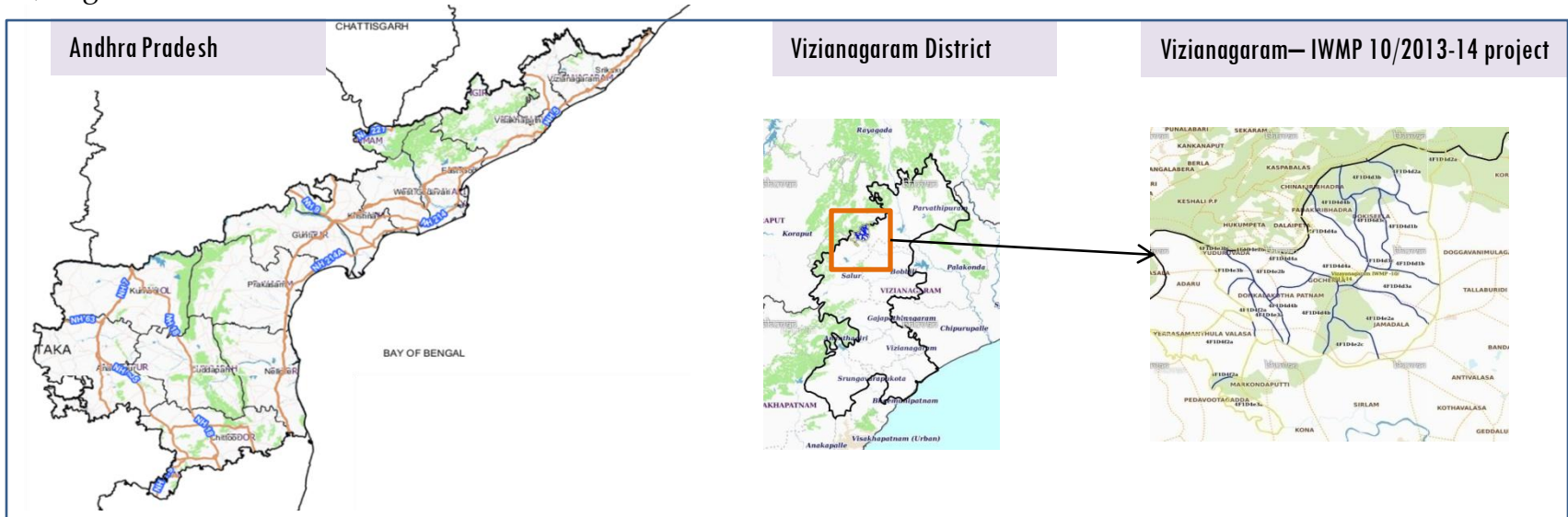


Fig.1. Location map of Dokiseela Watershed (IWMP-10/2013-14) in East Godavari, A.P

- 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).

Satellite Data and Ancillary Data

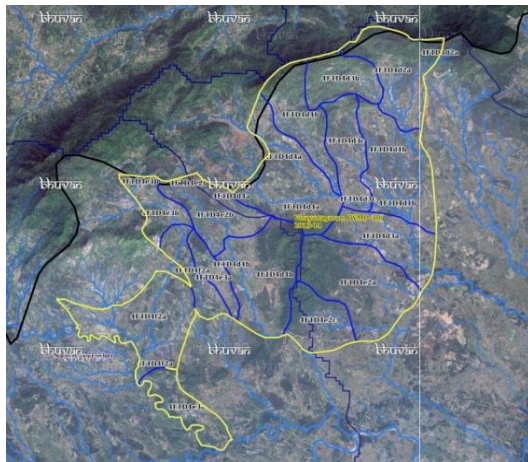
Satellite data	T0-A	T0-B	T5
	2013-14	2011-12	2021-22
LISS IV	2013-14		
SCENE 1			17-Mar-22
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			17-Mar-22
SCENE2			
SCENE 3			
SCENE 4			

Linear Image Self Scanner (LISS)

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	216
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

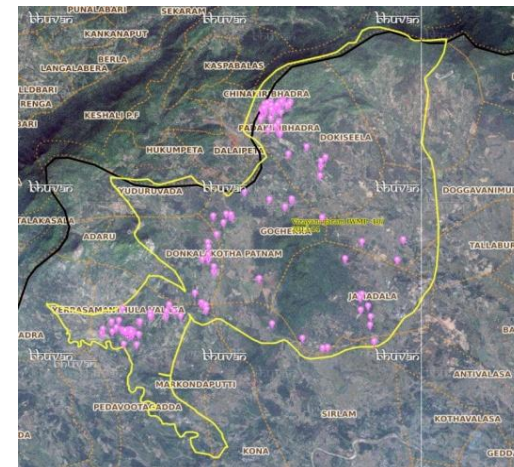


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Table 3. Classification of the Activities

Sr. No	Activity	Number of Photographs uploaded in Drishti Mobile Application	Visible on satellite in Srishti Geoportal
1	Agriculture/Horticulture	3	3
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	19	18
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	0	0
10	Civil work-Check dams/Rock fill dam	14	14
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	15	15
17	Others	171	166
	TOTAL	222	216

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. Dokiseela Watershed (IWMP-10/2013-14) Natural Colour Composite-2013-14 to 2021-22

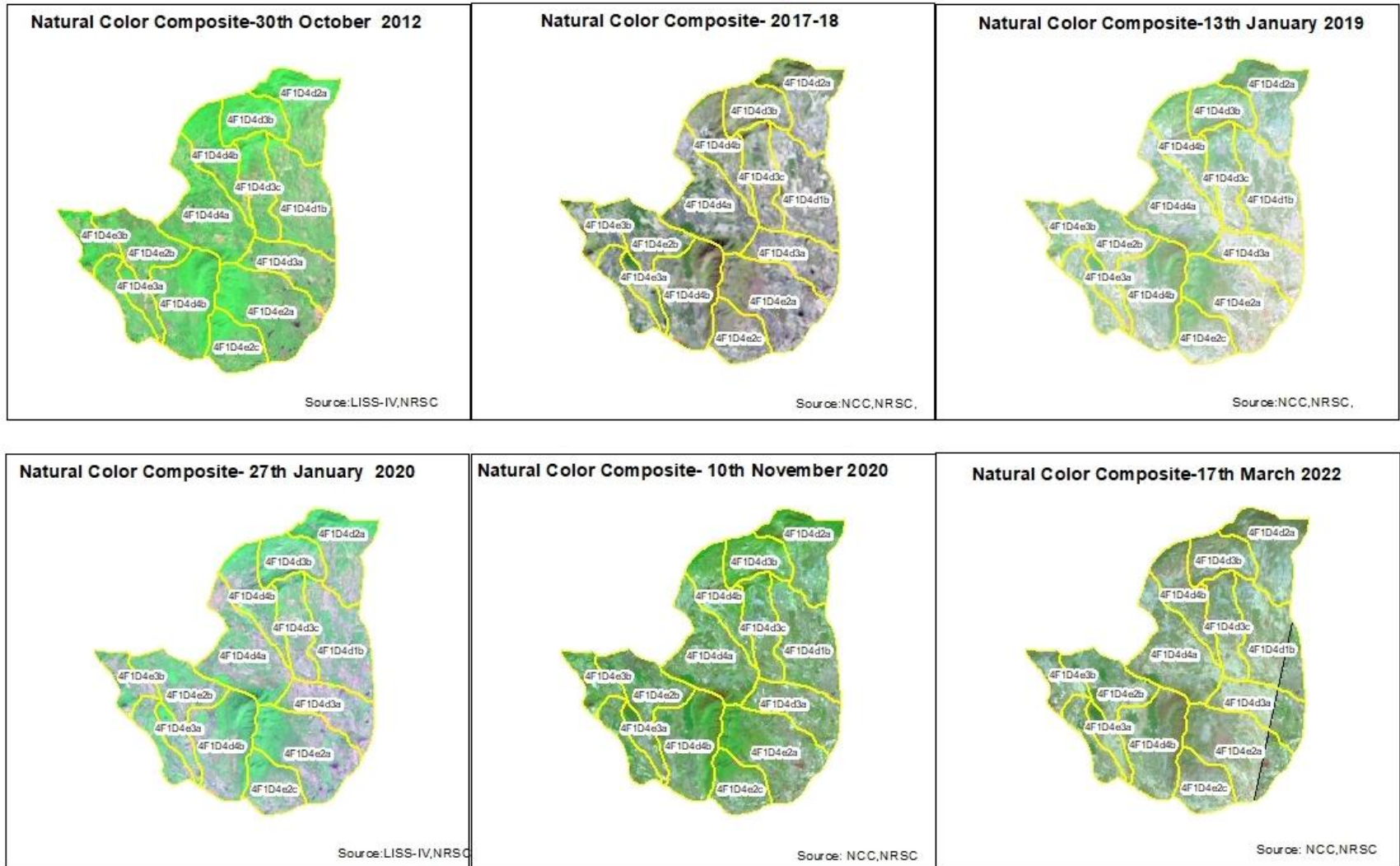


Fig 5. Monitoring of activities in Dokiseela Watershed (IWMP-10/2013-14) Vizianagaram District, Andhra Pradesh



T0:2009-10



T1: 27 November 2017



Drishti SI no. 7014763 MWS :4F1D4f2a

Check Dam



T0:2009-10



T1: 27 November 2017



Drishti SI no. 895999 MWS :4F1D4e2b

Farm pond

Fig 6. Monitoring of activities in Dokiseela Watershed (IWMP-10/2013-14) Vizianagaram District, Andhra Pradesh



T0: 2009-10

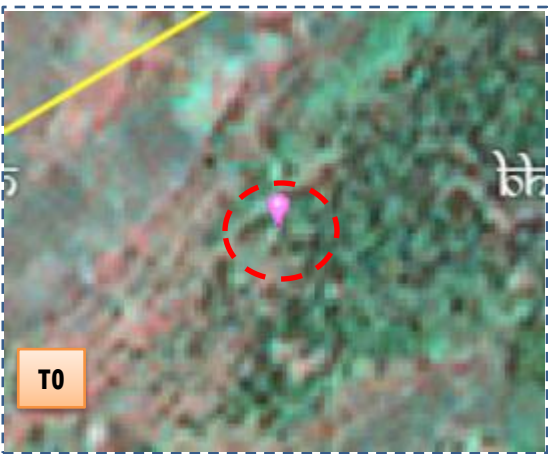


T1: 27 November 2017

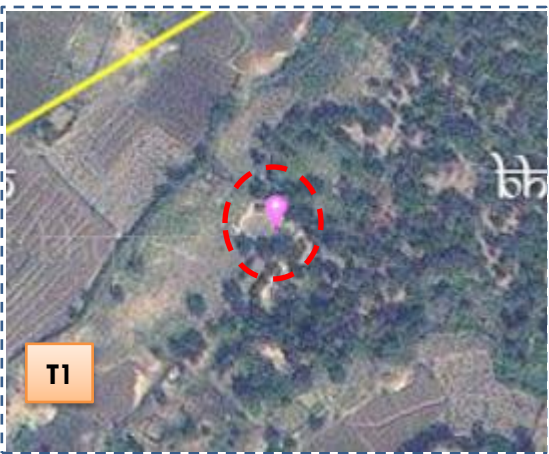


Drishti SI no. 7009666 MWS : 4F1D4d4a

Horticulture



T0: 2009-10



T1: 27 November 2017



Drishti SI no. 7012714 MWS : 4F1D4f2a

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. Dokiseela Watershed (IWMP-10/2013-14), Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2017-18)

Scale: 1:10000

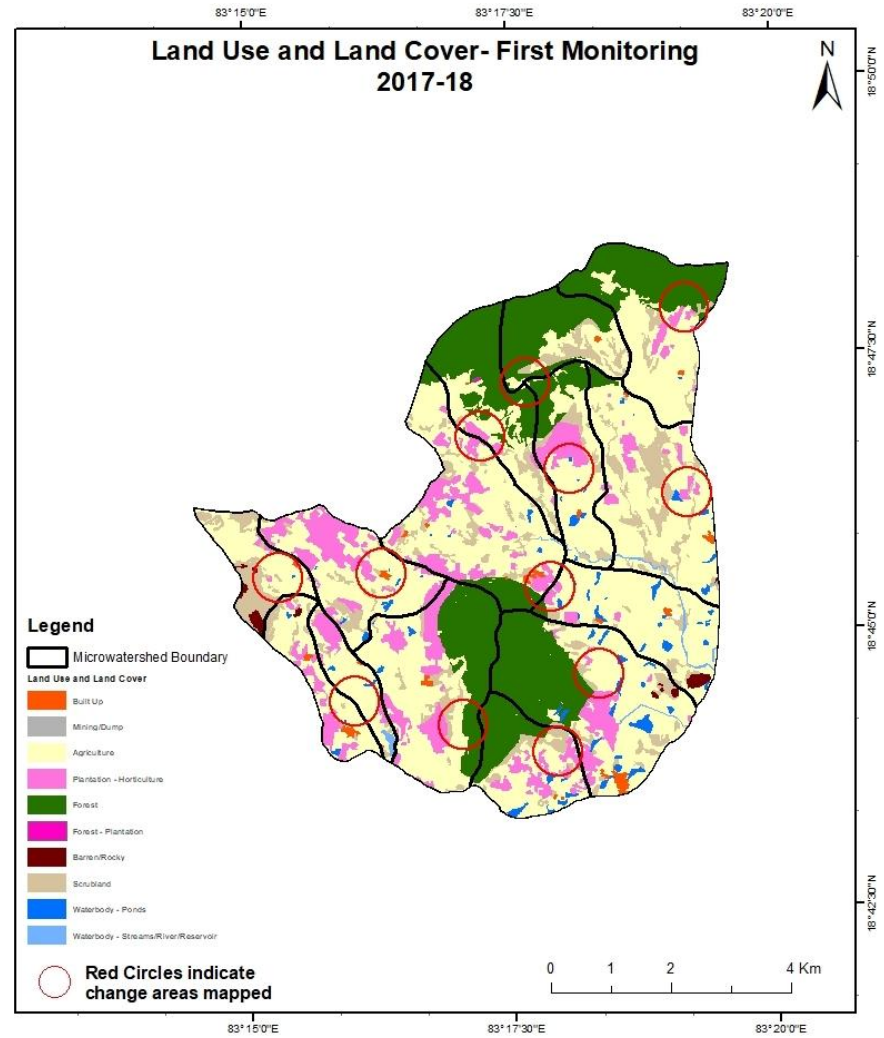
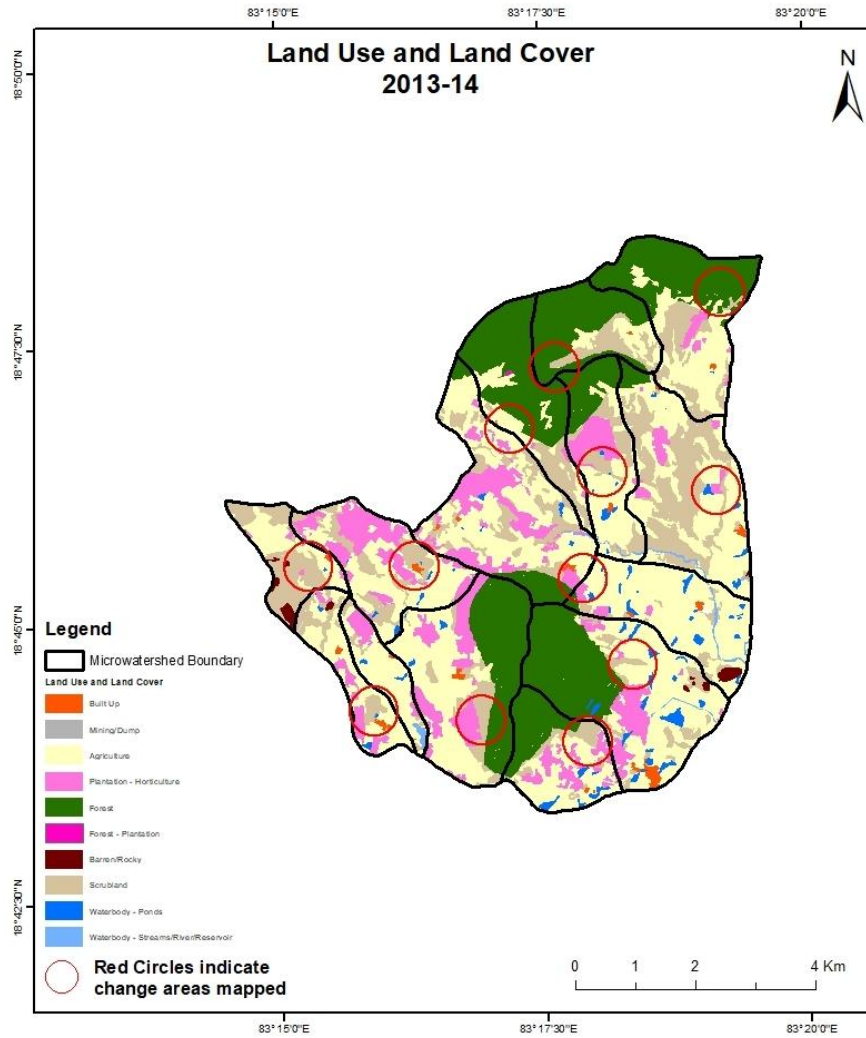


Fig 8. Dokiseela Watershed (IWMP-10/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

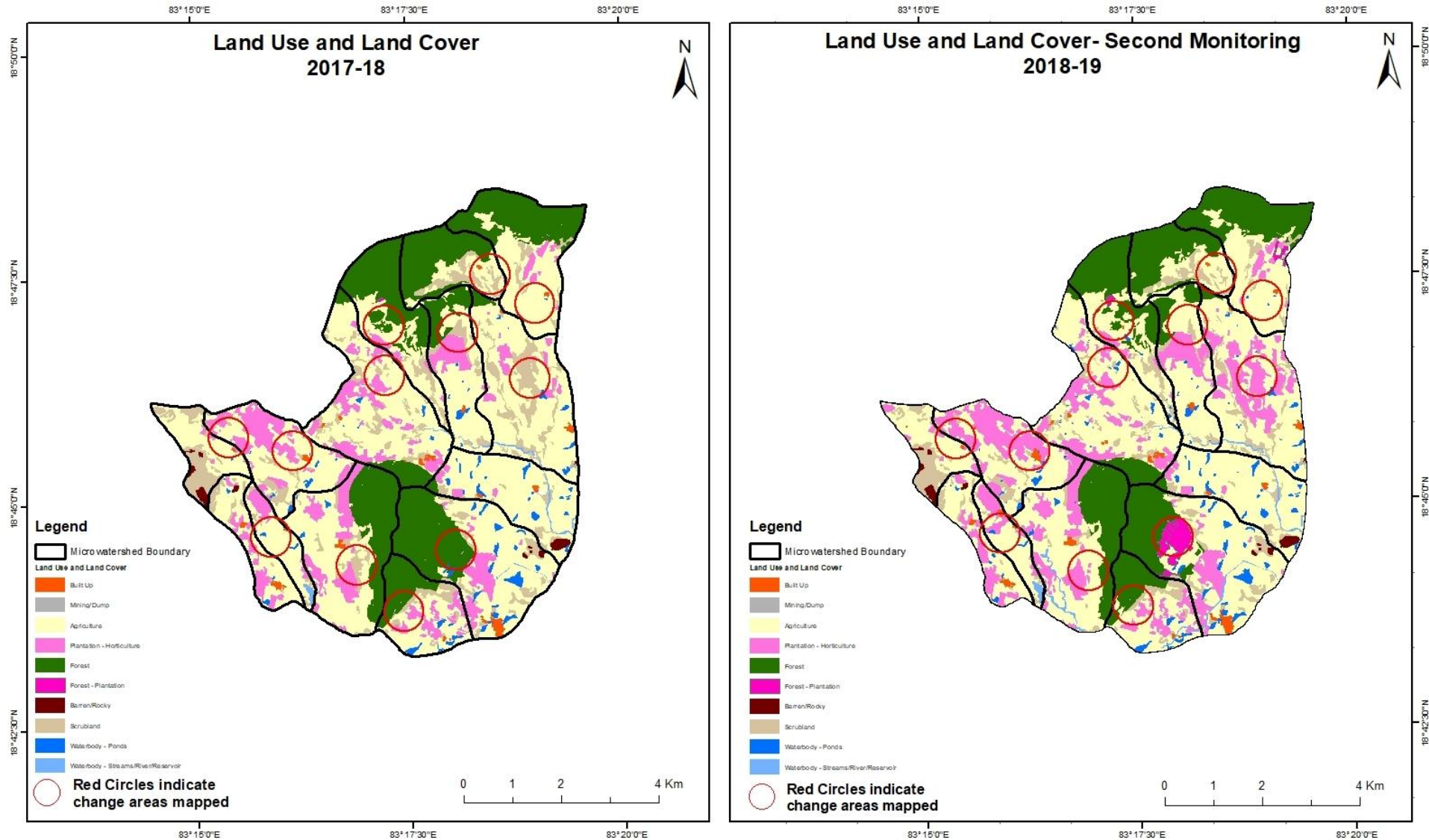


Fig 9. Dokiseela Watershed (IWMP-10/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

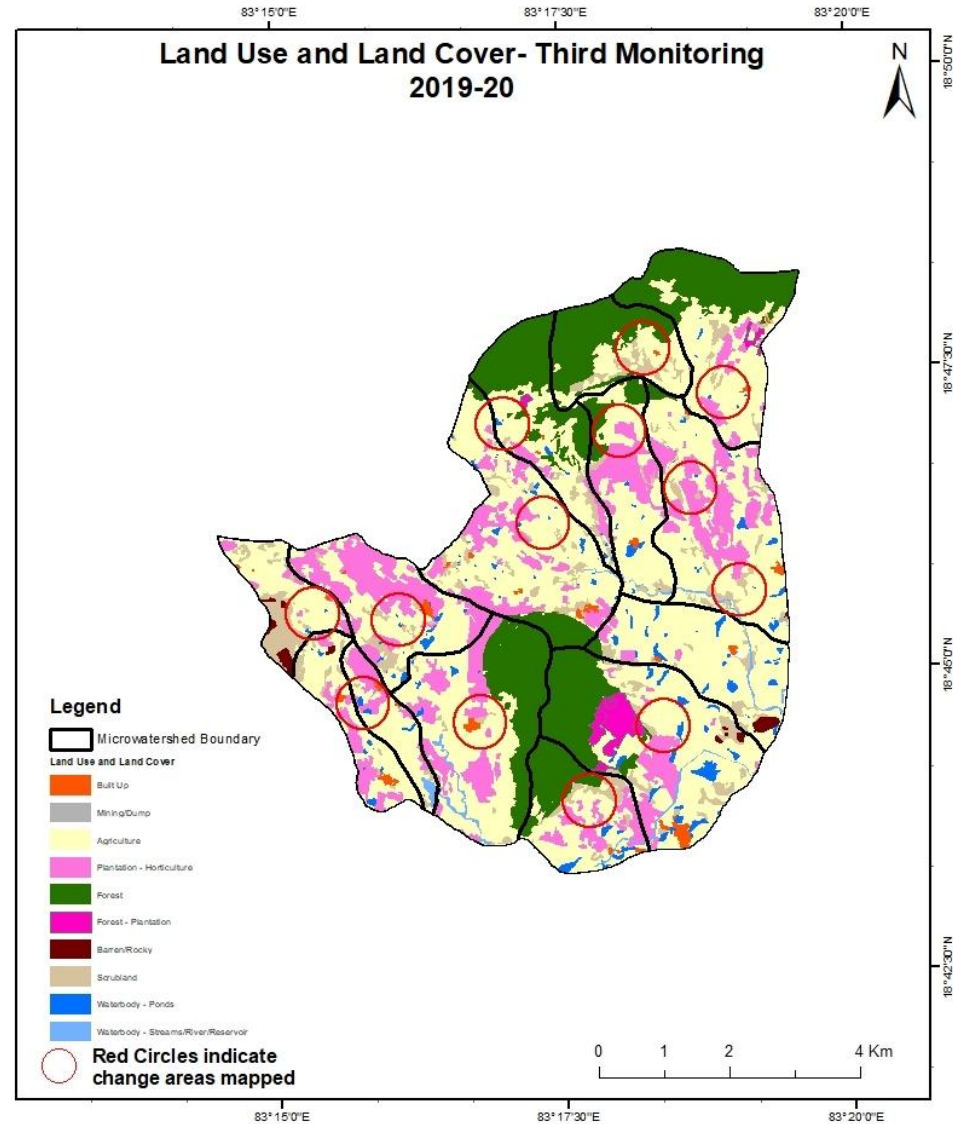
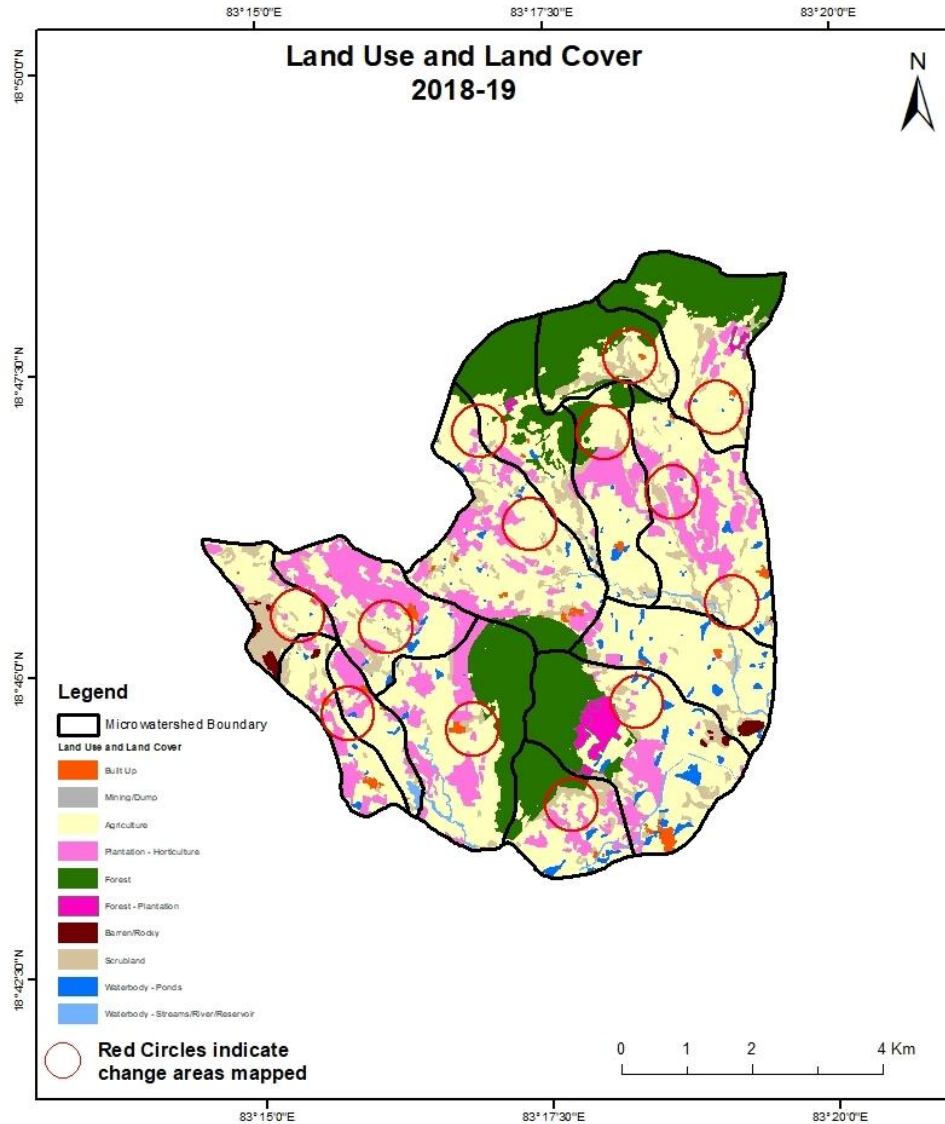


Fig 10. Dokiseela Watershed (IWMP-10/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

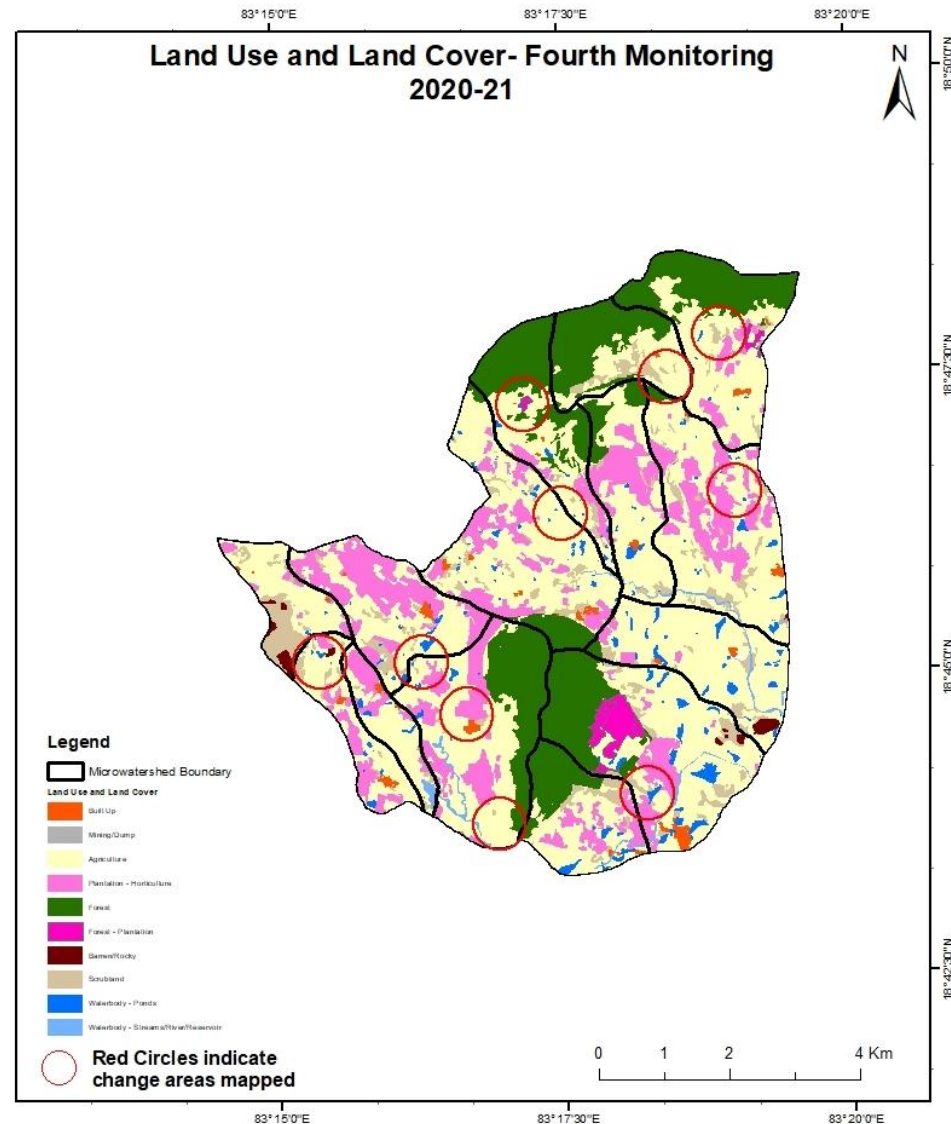
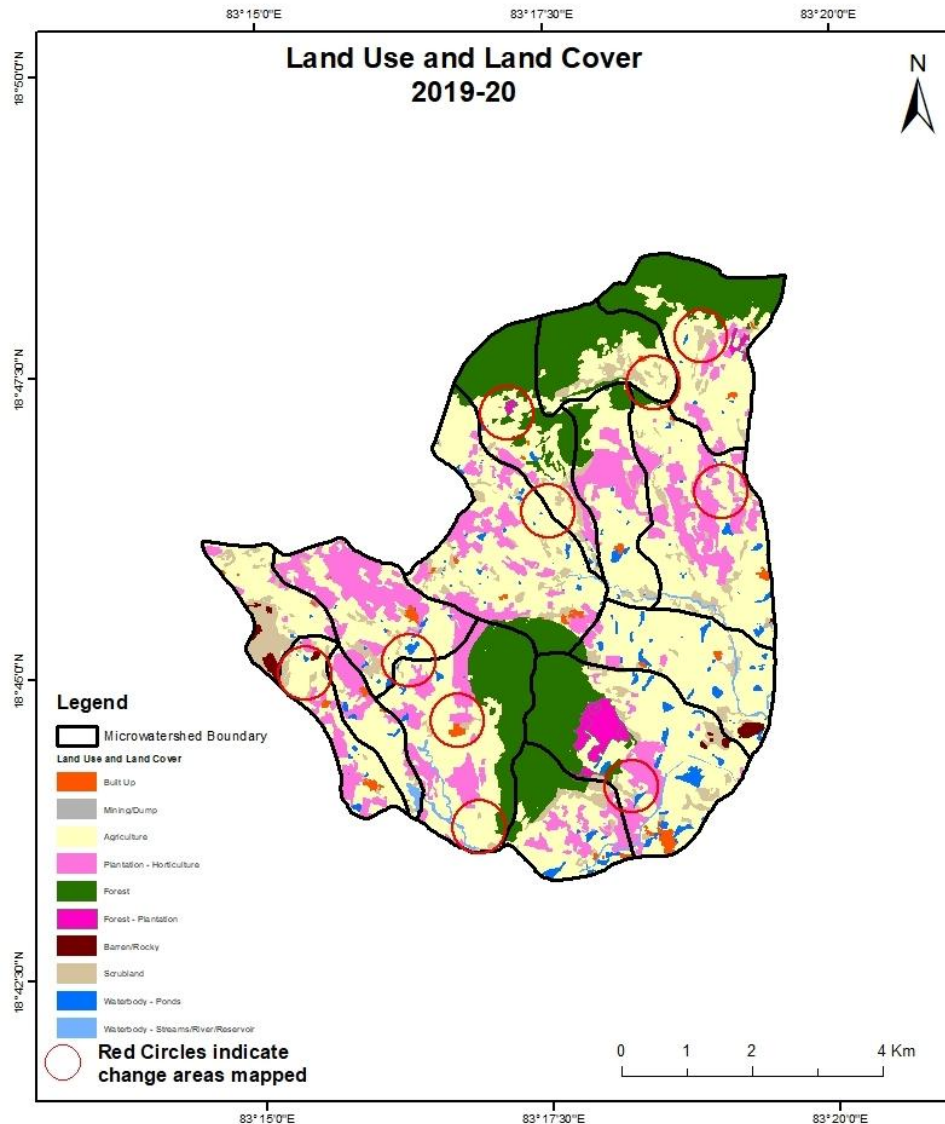


Fig 11. Dokiseela Watershed (IWMP-10/2013-14) Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2020-21 to 2021-22)

Scale: 1:10000

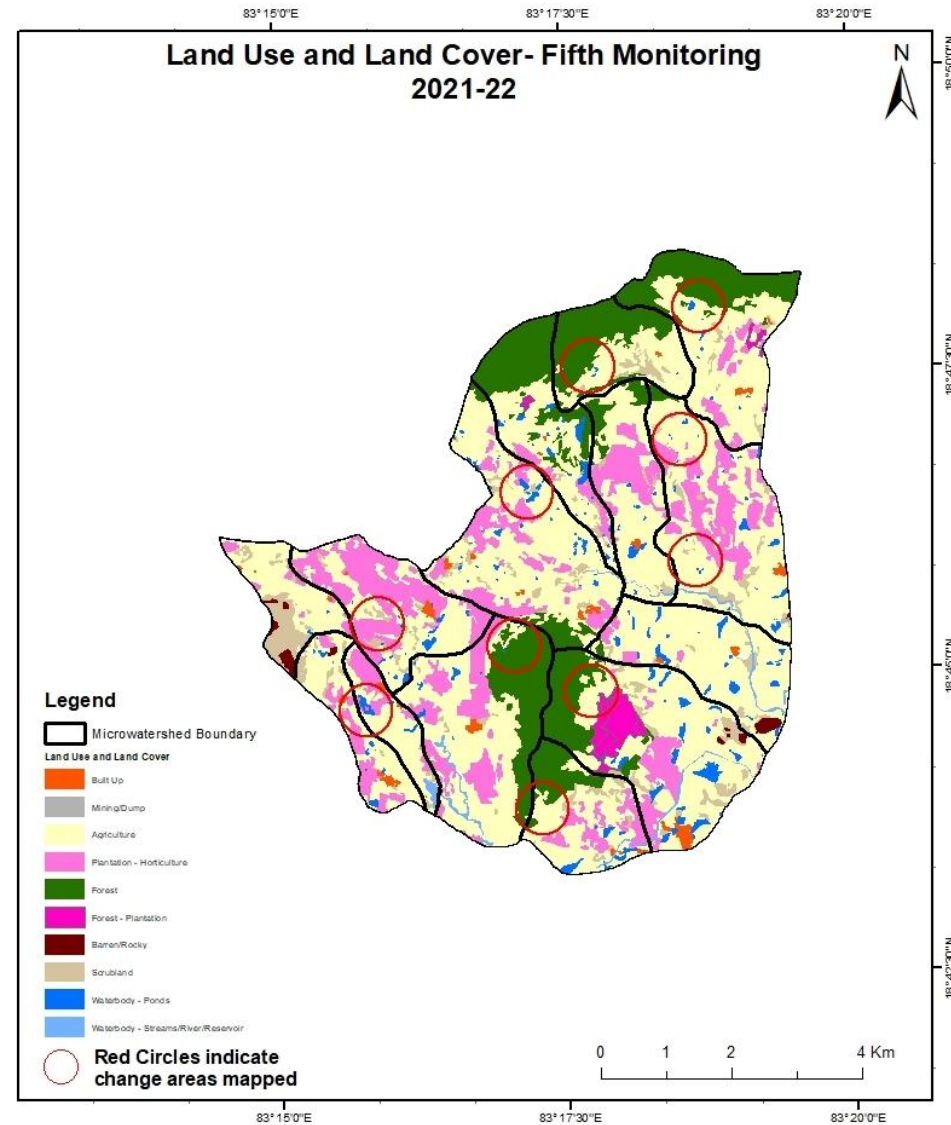
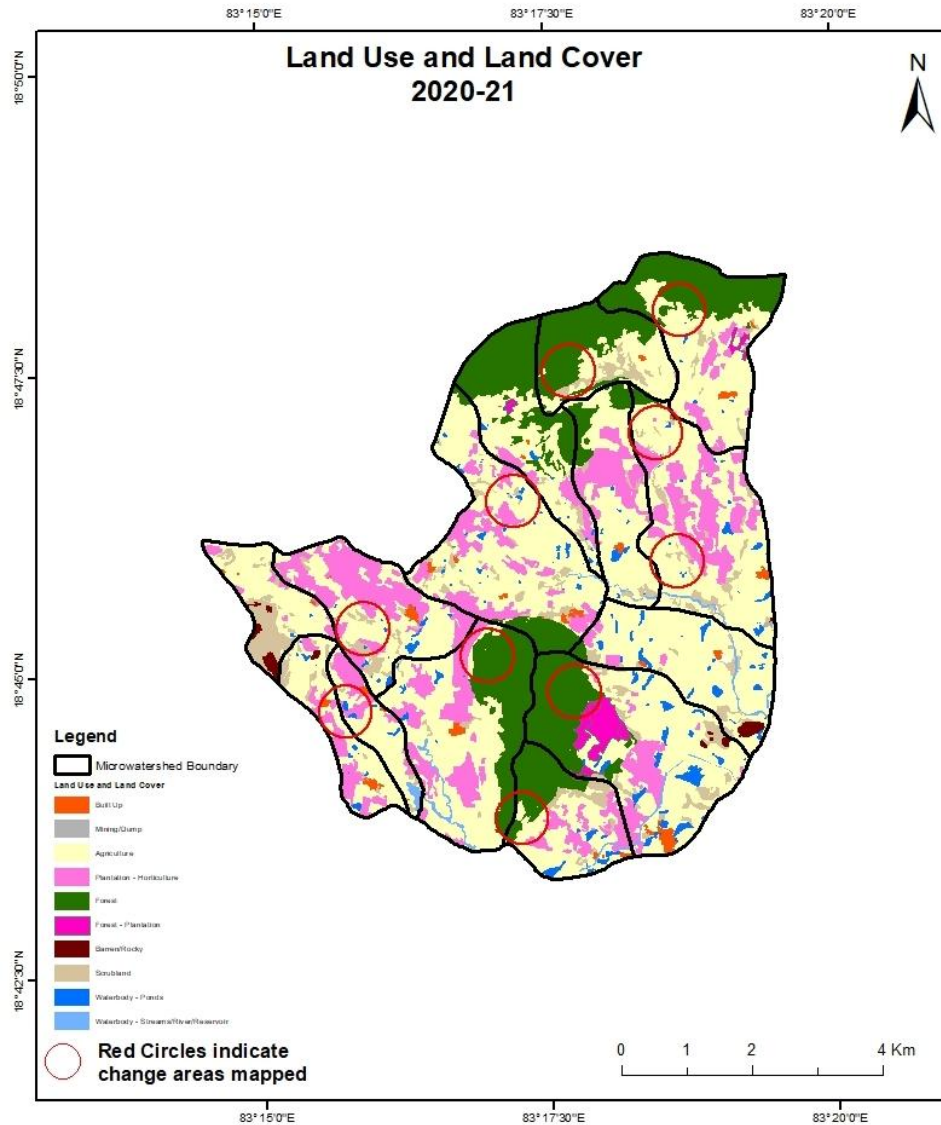
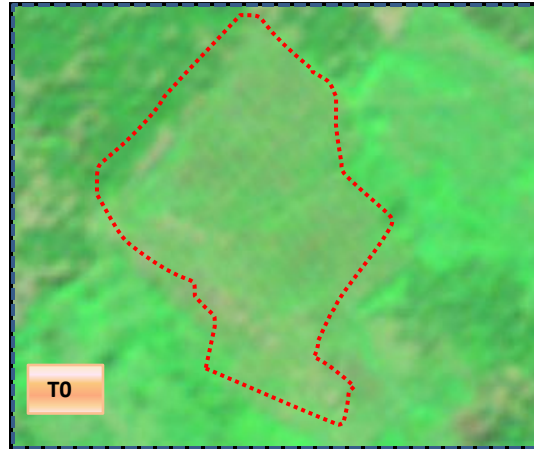


Fig 12. Dokiseela Watershed (IWMP-10/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0: 2013-14(83°15'52.049"E 18°45'41.147"N)



T1: 2016

Agriculture to Plantation



T0: 2013-14 (83°15'26.36"E 18°44'49.842"N)



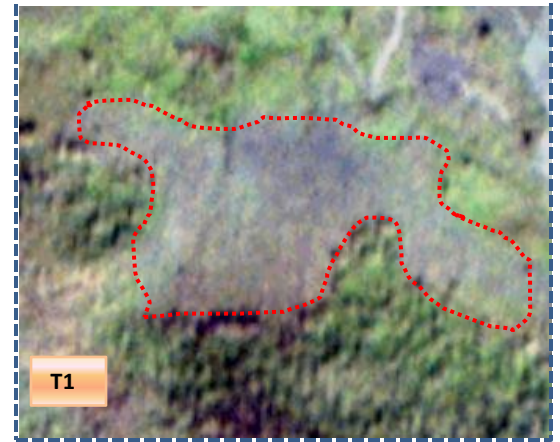
T1: 2016

Fig 13. Dokiseela Watershed (IWMP-10/2013-14) Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture

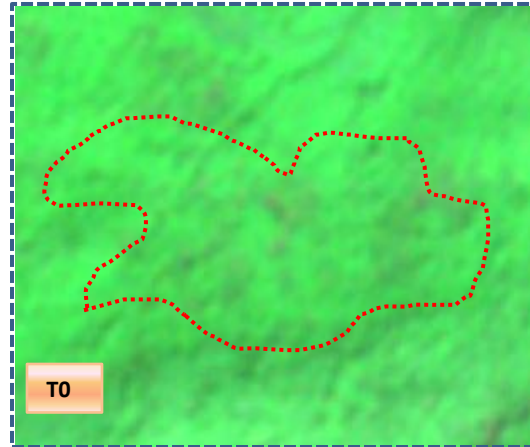


T0: 2013-14(83°18'14.662"E 18°47'23.954"N)



T1: 2016

Scrub to Agriculture



T0: 2013-14(83°17'32.83"E 18°47'13.522"N)



T1: 2016

Table 4. showing change matrix depicting Land cover transitions for Dokiseela Watershed (IWMP-10/2013-14) 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	32.67												32.67
Mining/dump		1.32											1.32
Agriculture	1.71		2109.48	46.75						0.84			2158.78
Plantation Horticulture	0.16		70.35	519.39									589.9
Forest	0.07		108.34	5.1	1134.06								1247.57
Forest Plantation						0.95							0.95
Barren Rocky							23.71						23.71
Scrub	1.4		402.41	11.69				507.15					922.65
Waterbody- Streams/River									21.46				21.46
Waterbody – Ponds										75.78			75.78
Grand Total	36.01	1.32	2690.58	582.93	1134.06	0.95	23.71	507.15	21.46	76.62			5075

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 represent the changes in between the classes.
2. In T0 49 ha of the agriculture area has decreased and it is converted into Built-up (1.7 ha), plantation/horticulture (46.7 ha) and water body (0.8 ha) in T1.
3. In T1 581 ha of the agriculture area has increased from plantations/horticulture (70 ha), forest (108 ha) and scrubland (402 ha) of T0.

Table 5. showing change matrix depicting Land cover transitions for Dokiseela Watershed (IWMP-10/2013-14) 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		
T1													
Built up	36.01												36.01
Mining/dump		1.32											1.32
Agriculture	6.09		2484.97	164.09		7.59			17.25	10.59			2690.58
Plantation Horticulture	0.22			582.41						0.3			582.93
Forest			90.89		998.03	45.14							1134.06
Forest Plantation						0.95							0.95
Barren Rocky							23.71						23.71
Scrub	0.62		85.54	44.44				375.09		1.46			507.15
Waterbody- Streams/River									21.46				21.46
Waterbody – Ponds									0.05	76.57			76.62
Grand Total	42.94	1.32	2661.4	790.94	998.03	53.68	23.71	375.09	38.76	88.92			5075

3. In T1 180 ha of the agriculture area has decreased and it is converted into Built-up (6 ha), plantations/horticulture (164 ha), forest-plantation (7.5 ha) and water body (27.7 ha) in T2.

4. In T2 176 ha of the agriculture area has increased from forest (90.8 ha) and scrubland (85 ha) of T1.

Table 6. showing change matrix depicting Land cover transitions for Dokiseela Watershed (IWMP-10/2013-14) 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	42.94										42.94	
Mining/dump		1.32									1.32	
Agriculture	1.94		2606.65	41.58		3.34				7.89	2661.4	
Plantation Horticulture				790.61						0.33	790.94	
Forest			27.6	0.29	970.14						998.03	
Forest Plantation						53.68					53.68	
Barren Rocky							23.71				23.71	
Scrub	0.47		39.08	3.24				331.84	0.21	0.25	375.09	
Waterbody- Streams/River									38.76		38.76	
Waterbody – Ponds										88.92	88.92	
Grand Total	45.35	1.32	2673.33	835.72	970.14	57.02	23.71	331.84	38.97	97.39	5075	

5. In T2 51 ha of the agriculture area has decreased and it is converted into Built-up (1.9 ha), plantations/horticulture (41 ha), forest-plantation (3 ha) and water body (7.8 ha) in T3.

6. In T3 66 ha of the agriculture area has increased from forest (27 ha) and scrubland (39 ha) of T2.

Table 7. showing change matrix depicting Land cover transitions for Dokiseela Watershed (IWMP-10/2013-14) 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	
T3												
Built up	45.35										45.35	
Mining/dump		1.32									1.32	
Agriculture	1.75		2657.64	8.15						5.79	2673.33	
Plantation Horticulture				835.39						0.33	835.72	
Forest			31.55		938.59						970.14	
Forest Plantation						57.02					57.02	
Barren Rocky							23.71				23.71	
Scrub	0.87		24.53	5.2				300.45		0.79	331.84	
Waterbody- Streams/River									38.97		38.97	
Waterbody – Ponds										97.39	97.39	
Grand Total	47.97	1.32	2713.72	848.74	938.59	57.02	23.71	300.45	38.97	104.3	5075	

7. In T3 15 ha of the agriculture area has decreased and it is converted into built-up (1.7 ha), plantations/horticulture (8 ha) and water body (5.7 ha) in T4.

8. In T4 56 ha of the agriculture area has increased from forest (31 ha) and scrubland (24.5 ha) of T3.

Table 8. showing change matrix depicting Land cover transitions for Dokiseela Watershed (IWMP-10/2013-14) 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	47.9										0.07		47.97
Mining/dump		1.32											1.32
Agriculture			2680.05	18.3		6.49					8.88		2713.72
Plantation Horticulture	0.2			844.38							4.16		848.74
Forest			122.01		805.45	4.58					6.55		938.59
Forest Plantation						57.02							57.02
Barren Rocky							23.71						23.71
Scrub	0.34		44.5					253.5			2.11		300.45
Waterbody- Streams/River			0.21						38.76				38.97
Waterbody – Ponds											104.3		104.3
Grand Total	48.44	1.32	2846.77	862.68	805.45	68.09	23.71	253.5	38.76		126.07		5075

9. In T4 27 ha of the agriculture area has decreased and it is converted into plantations (18.3 ha), forest plantation (6.4 ha) and water body (8.8 ha) in T5.

10. In T5 166 ha of the agriculture area has increased from forest (122 ha), scrubland (44.5 ha) and water body (0.2 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 67 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 531, 11, 40 & 133 Hectares from T0-T1, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 687 Hectares in Crop land area as compared between baseline Land Use/Land Cover data 2013-14 (T0) & 2021-22 (T5) years.
4. About **272 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 669 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
6. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (0) 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