

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-V

SRIKAKULAM -24/2013-14

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad

January-2023

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



AGRICULTURE & SOIL
DIVISION
Andhra Pradesh Space
Applications Centre (APSAC)
ITE&C Department Govt. of
Andhra Pradesh



RURAL DEVELOPMENT AND
WATERSHED MONITORING
DIVISION
Land Resources and Land Use
Mapping and Monitoring Group,
Remote Sensing Application Area,
National Remote Sensing Centre, ISRO



DEPARTMENT OF LAND
RESOURCES
Ministry of Rural Development
Government of India

C O N T E N T S

- **EXECUTIVE SUMMARY**

01. STUDY AREA
02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
04. CONCLUSIONS

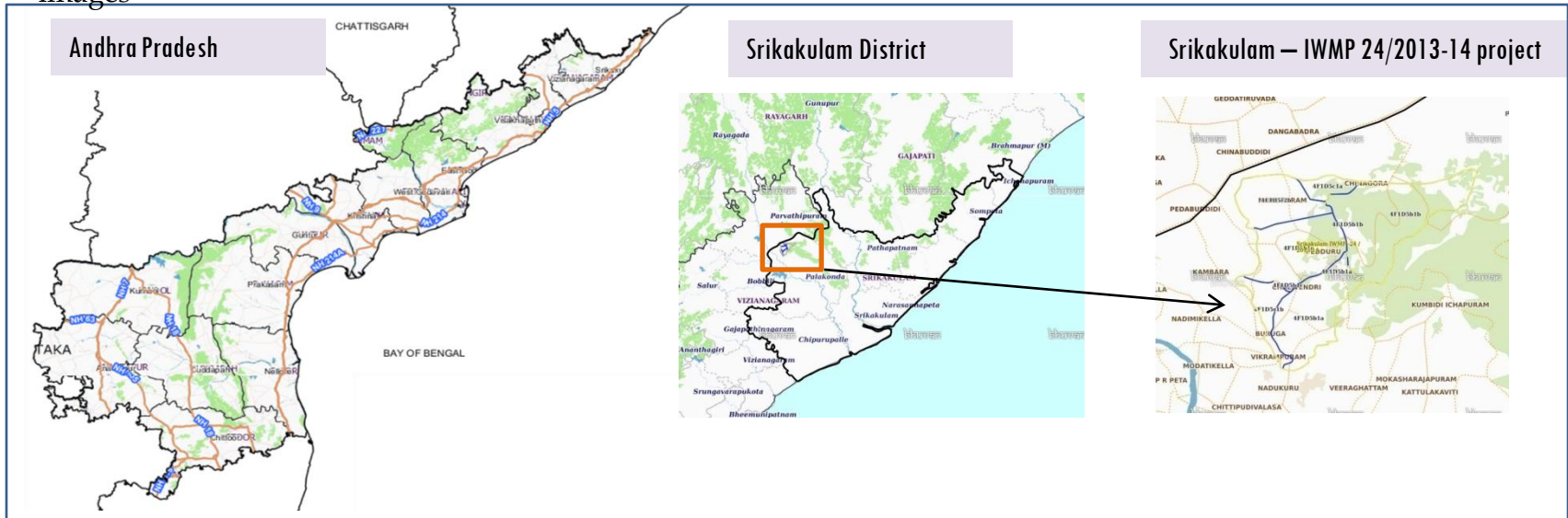
E X E C U T I V E S U M M A R Y

- 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-24/2013-14, Srikakulam District of Andhra Pradesh. The total geographical area of the project is **2,898 ha**. It comprises of 6 micro watersheds.
- In the project area 121 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 26.7 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 62 % is covered by the agriculture, 17 % is covered by forest, 6.7 % is covered by forest plantation and remaining by other land use classes.

PROJECT : SRIKAKULAM - IWMP-24/2013-14

DISTRICT : SRIKAKULAM , STATE : ANDHRA PRADESH

- The study area falls in Veeraghattam and Seethampeta Mandals of Srikakulam district of Andhra Pradesh state. The total geographical area of the project is **2,898 ha**. It comprises of 6 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2013-14 (T0) period (*Batch -1*) projects taking 2021-22 (T5) period satellite images



- 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).

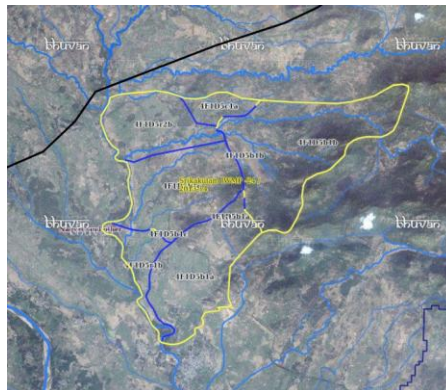
Satellite Data and Ancillary Data

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

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	121
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

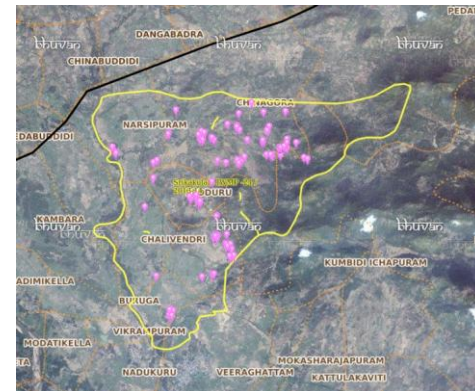


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

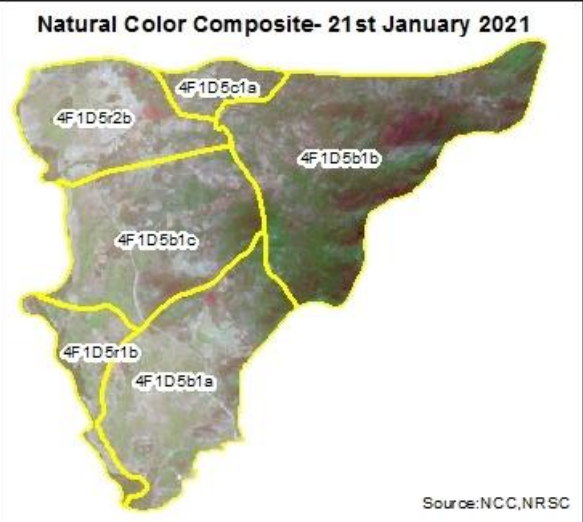
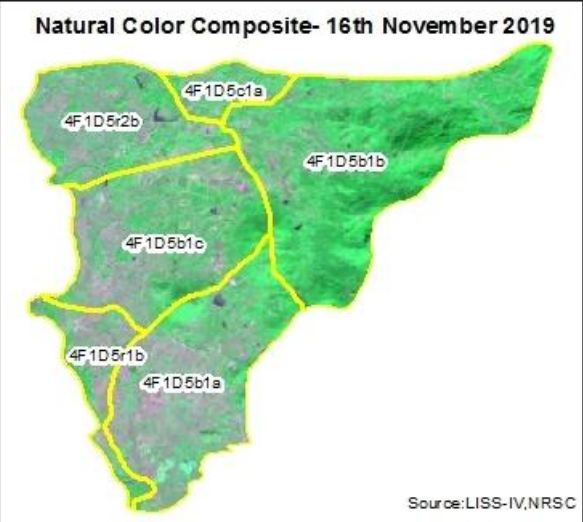
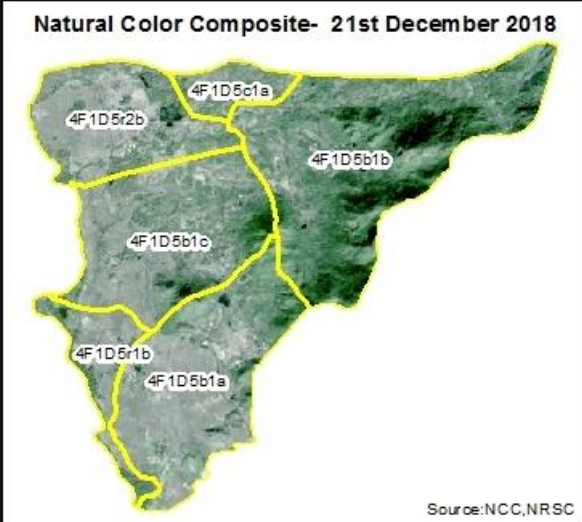
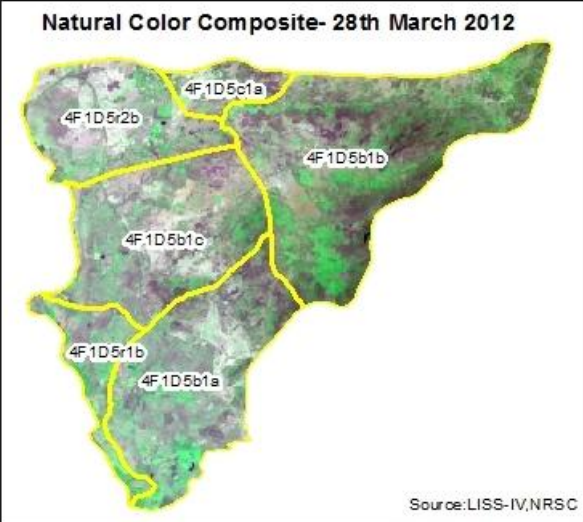
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	1	1
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	2	2
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	11	11
11	Civil work-Check dams/Rock fill dam	0	0
12	Nallah Bunds/Drainage 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	13	13
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	98	94
	TOTAL	125	121

MONITORING IN THE PROJECT AREA

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.

Natural Colour Composite (NCC)



Monitoring of activities in Srikakulam District, Andhra Pradesh. IWMP-24/2013-14



T0 Satellite data 2013



T1 Satellite data 2015



T2 Satellite data 2016



T3 Satellite data 2017



T4 Satellite data 2018



T5 Satellite data 2020



Drishti Id. 1704995

Horticulture

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-24/2013-14



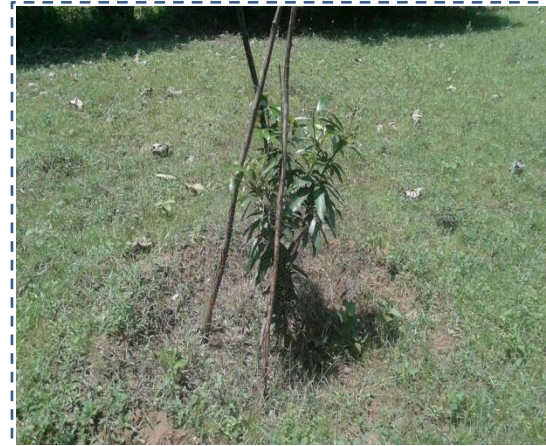
T0

T0:2013-14



T1

T1: 06 January 2017



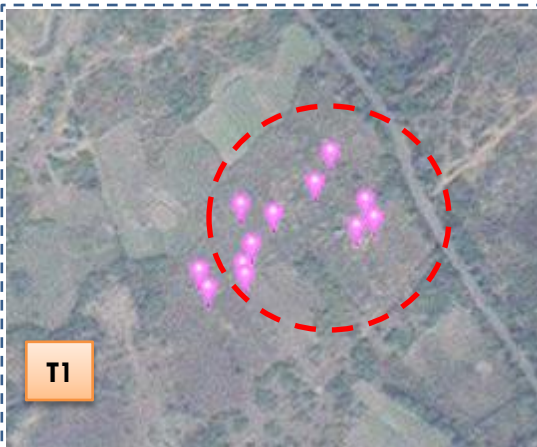
Drishti SI no. 2094086 MWS : 4F1D5r2b

Horticulture



T0

T0:2013-14



T1

T1: 06 January 2017



Drishti SI no. 2461859 MWS : 4F1D5b1a

Horticulture

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-24/2013-14



T0:2013-14

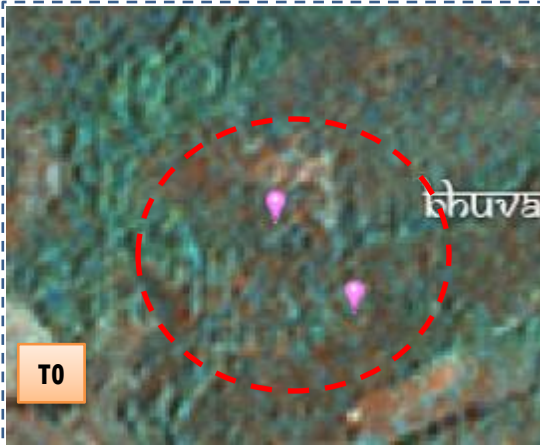


T1: 06 January 2017



Drishti SI no. 1151991 MWS : 4F1D5r2b

Horticulture



T0:2013-14



T1: 06 January 2017



Drishti SI no. 2439066 MWS : 4F1D5b1c

Percolation tank

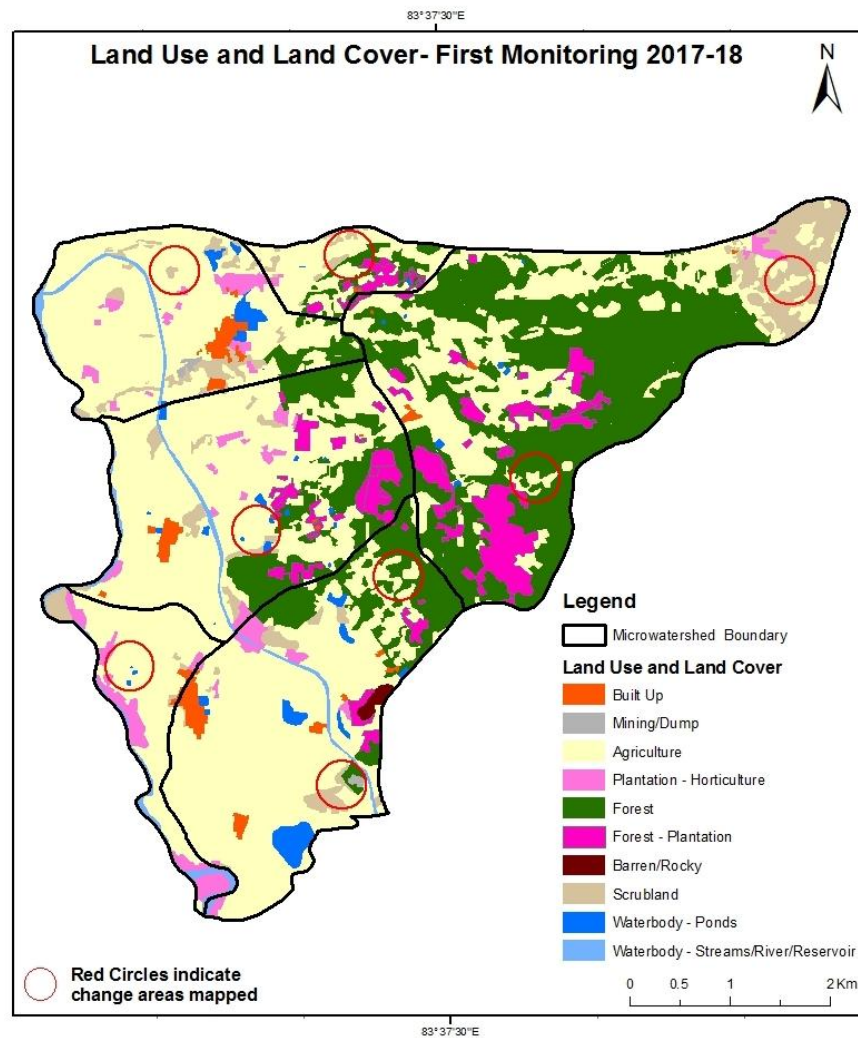
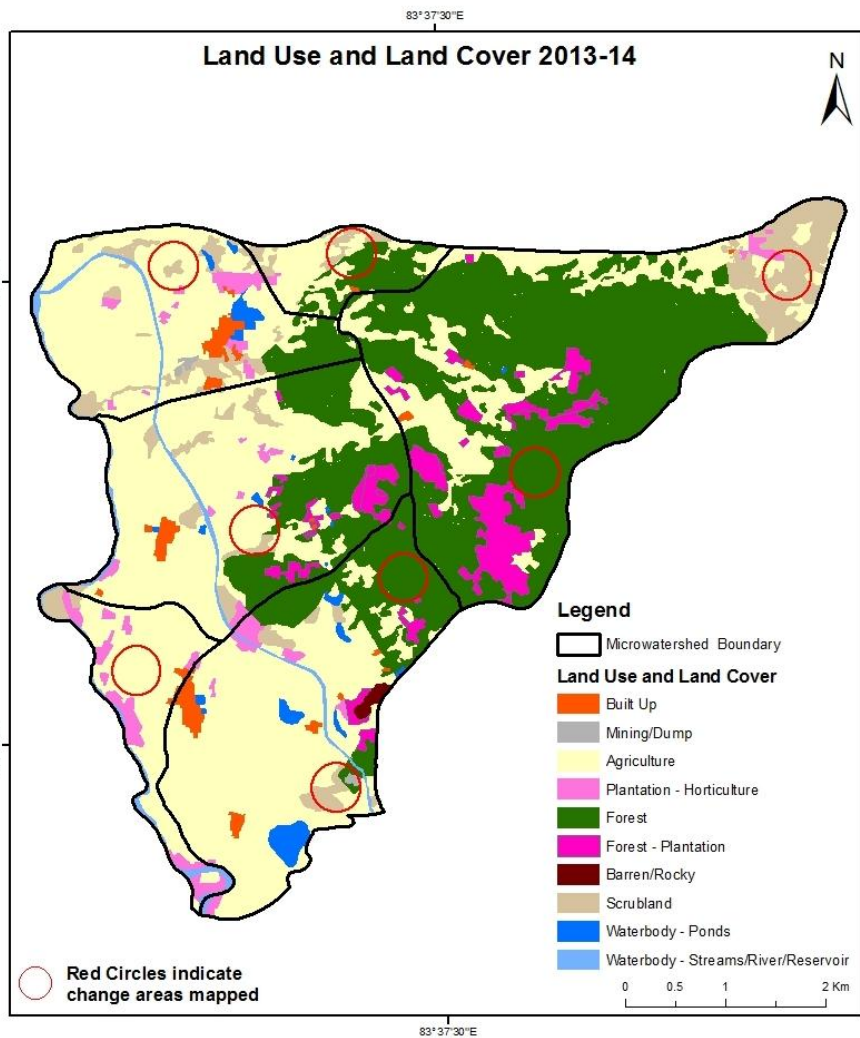
MONITORING IN THE PROJECT AREA

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

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

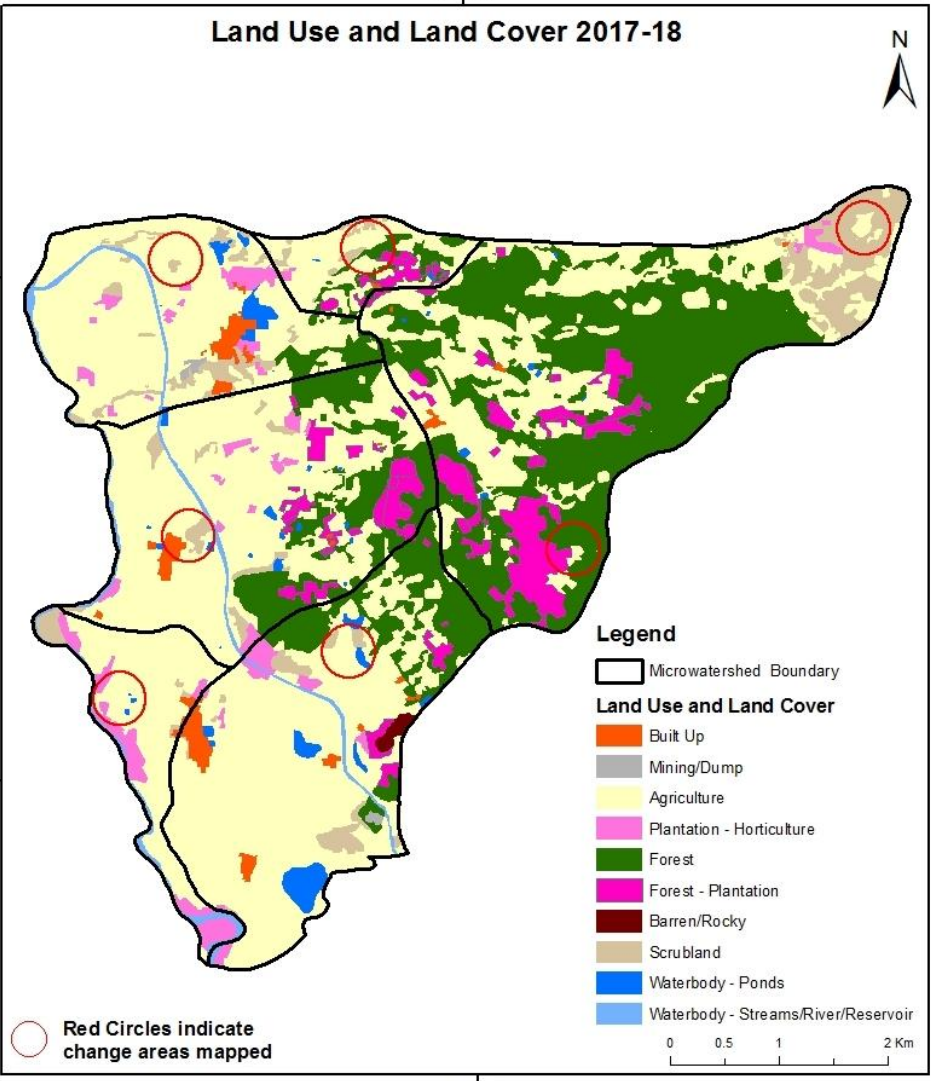
Scale: 1:10000



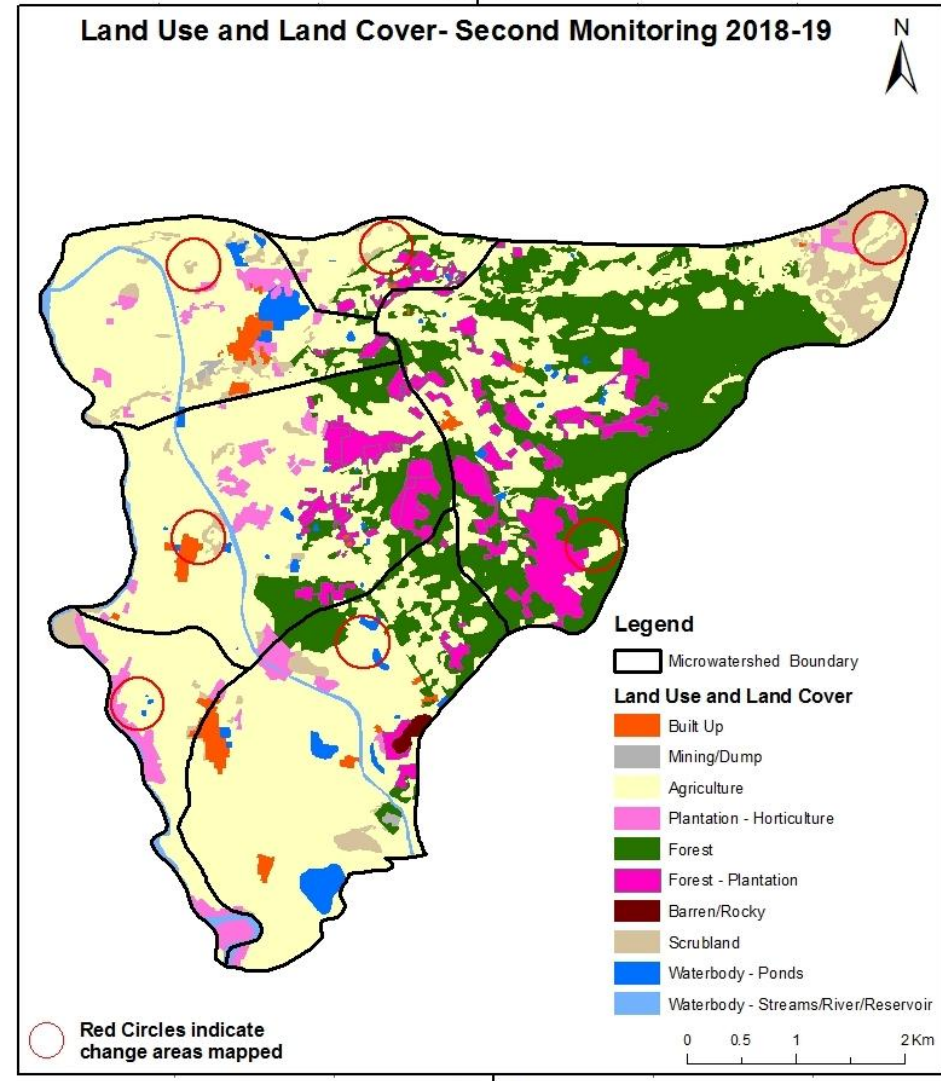
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

Land Use and Land Cover 2017-18



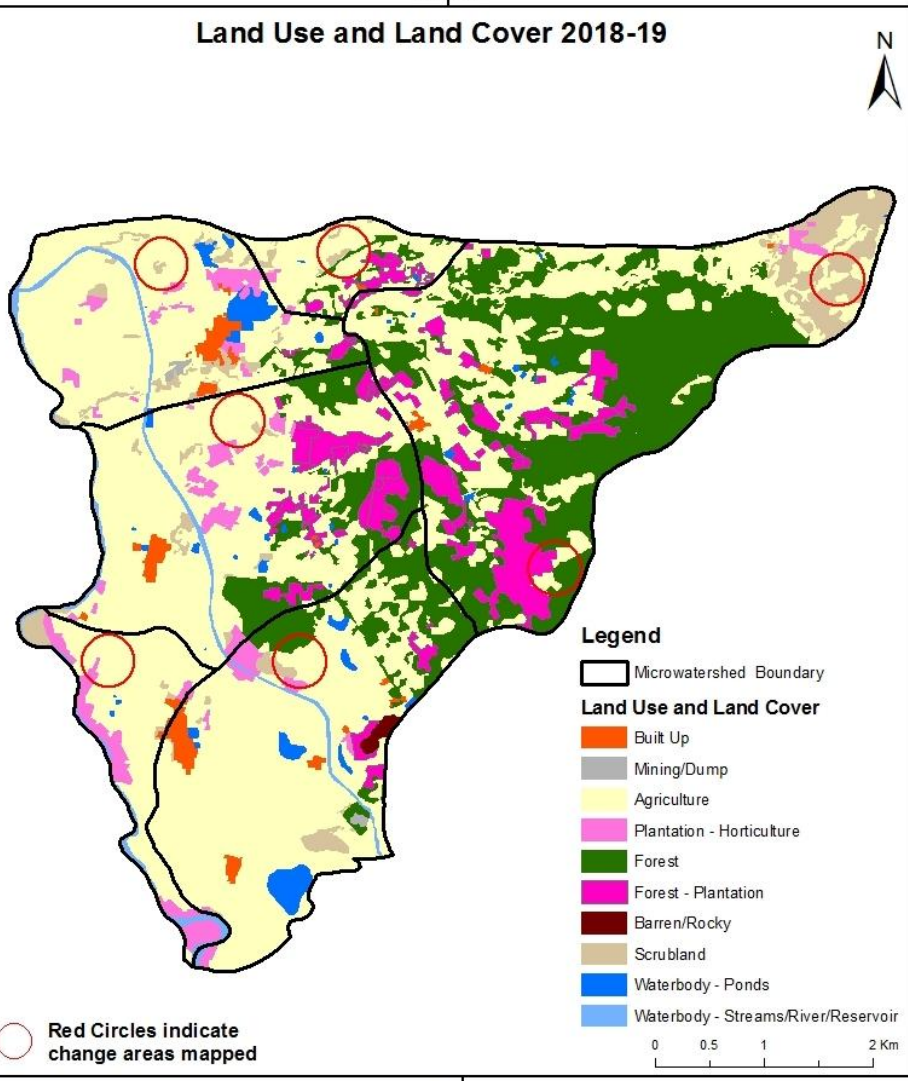
Land Use and Land Cover- Second Monitoring 2018-19



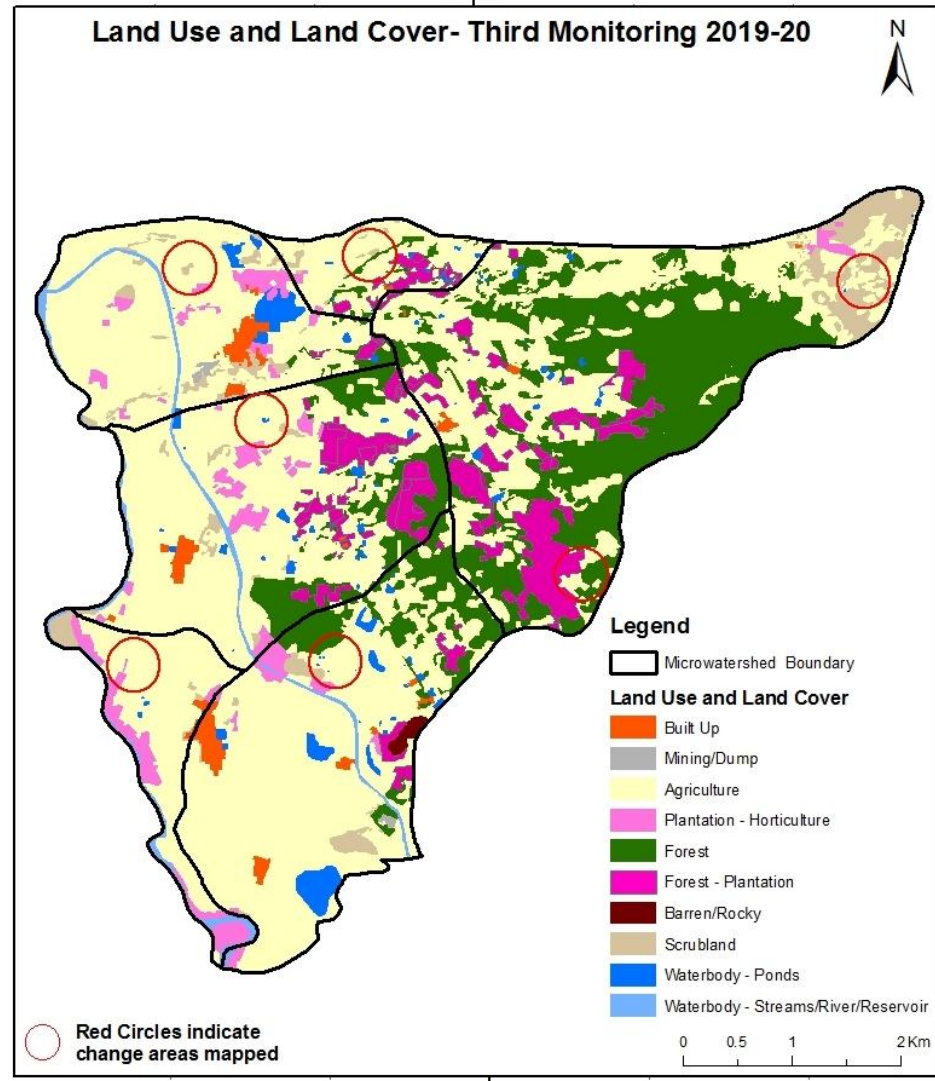
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

Land Use and Land Cover 2018-19

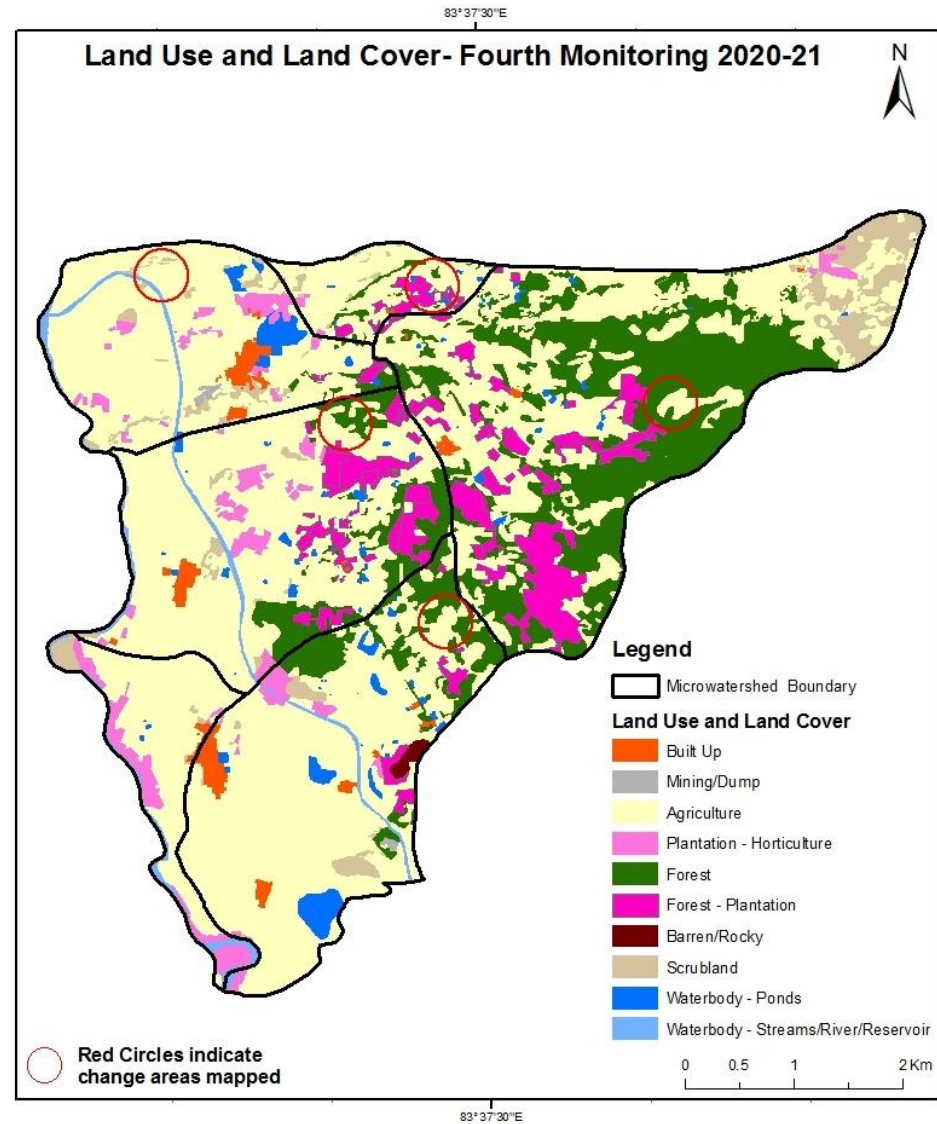
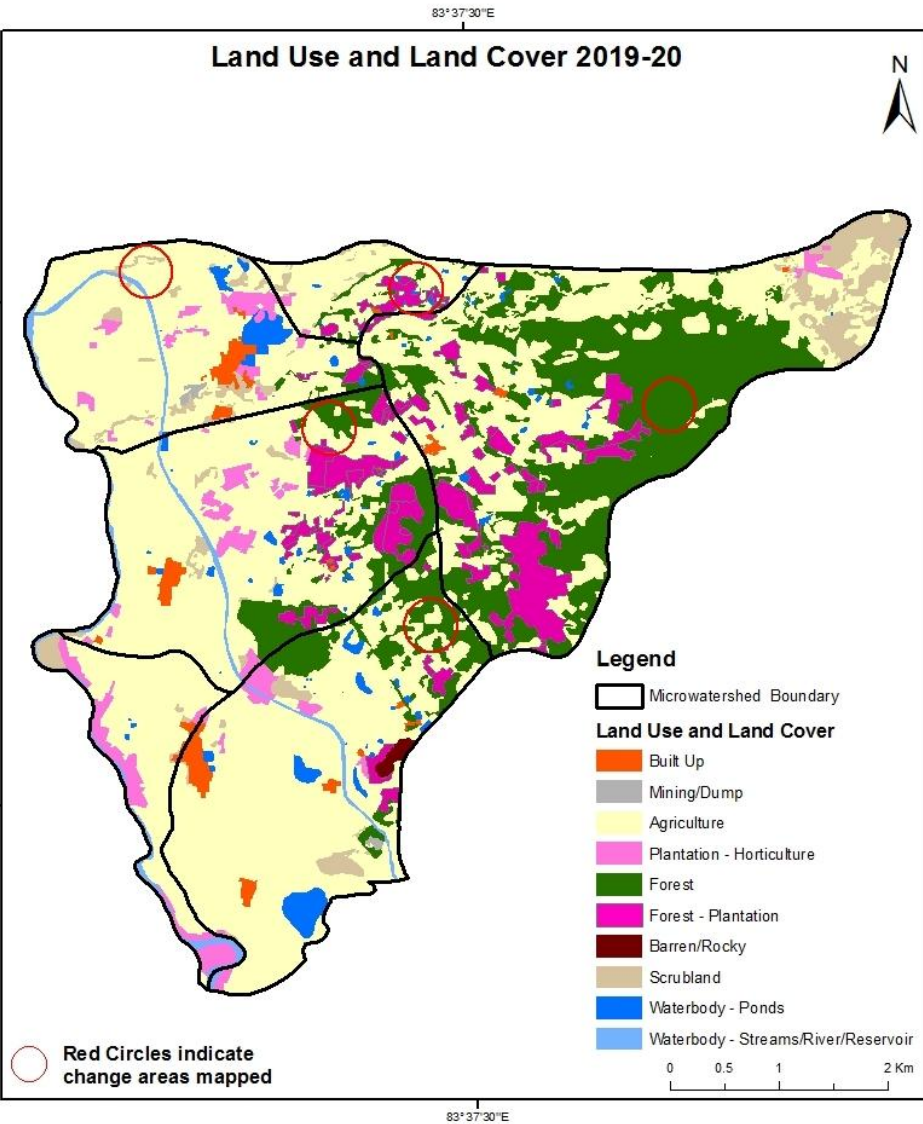


Land Use and Land Cover- Third Monitoring 2019-20



Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

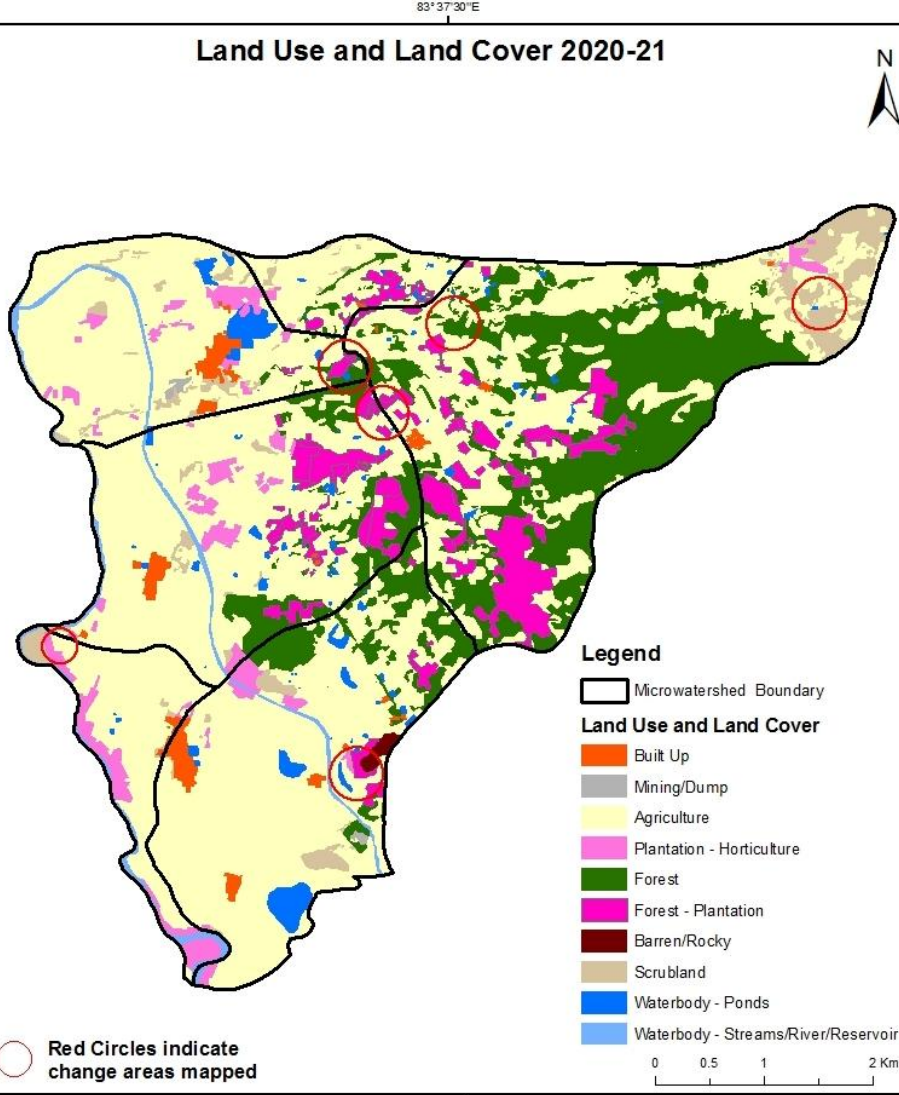
Scale: 1:10000



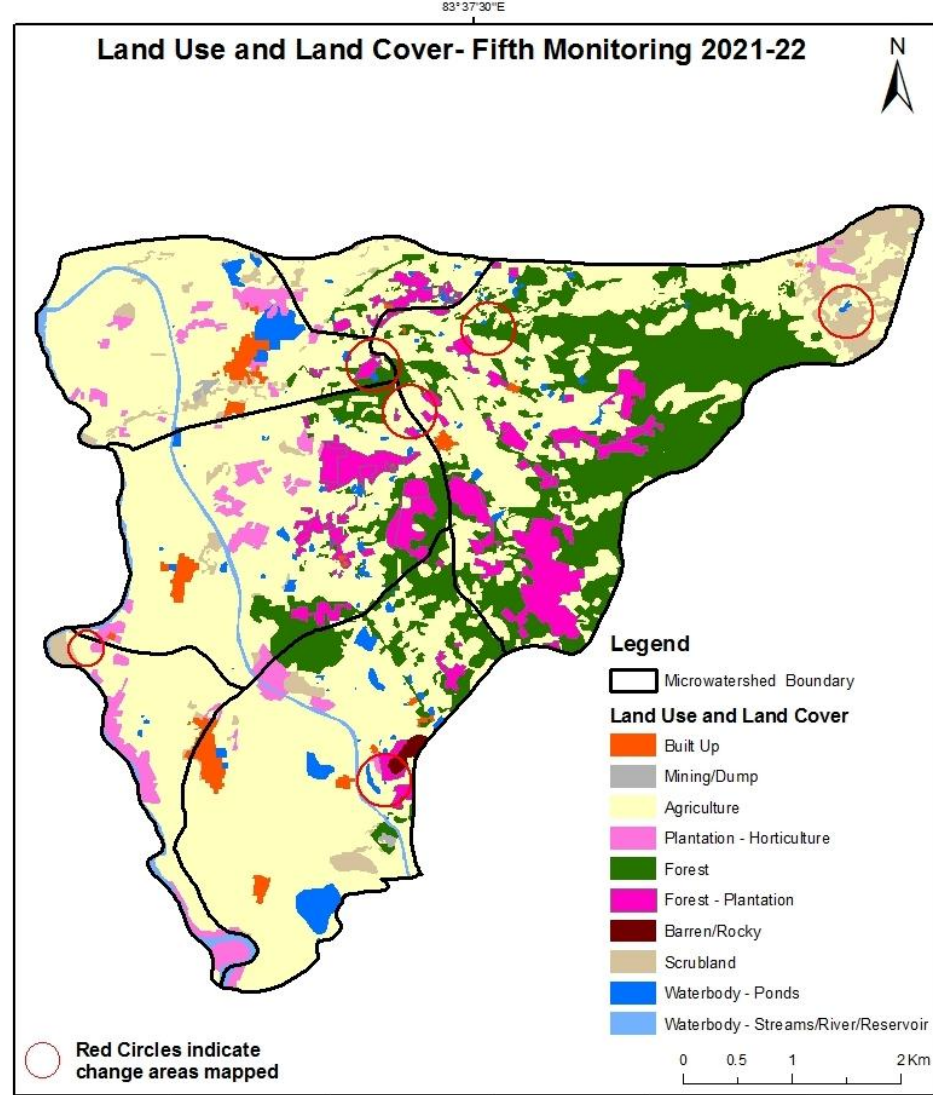
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2020-21 to 2021-22)

Scale: 1:10000

Land Use and Land Cover 2020-21



Land Use and Land Cover- Fifth Monitoring 2021-22

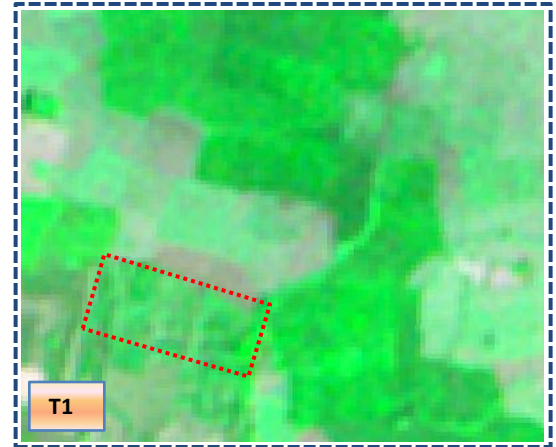


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0: 2013-14 (83°35'30.25"E 18°44'31.377"N)

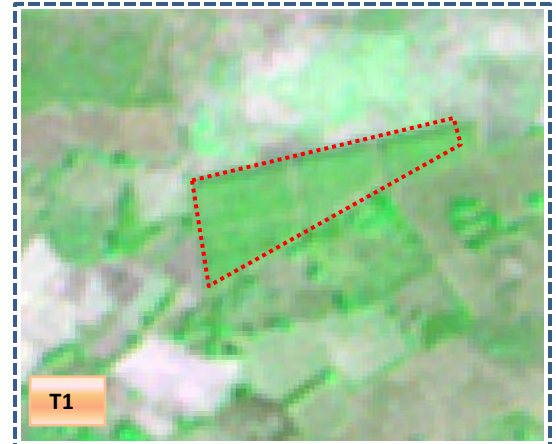


T1: 02 April 2018

Agriculture to Plantation



T0: 2013-14 (83°36'16.292"E 18°44'9.062"N)



T1: 02 April 2018

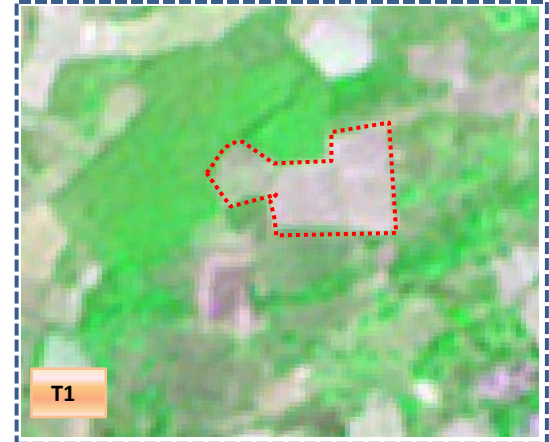
Land Use and Land Cover changes for Pre and Post treatment dates

Forest to Agriculture



T0

T0: 2013-14 (83°36'39.983"E 18°43'47.998"N)



T1

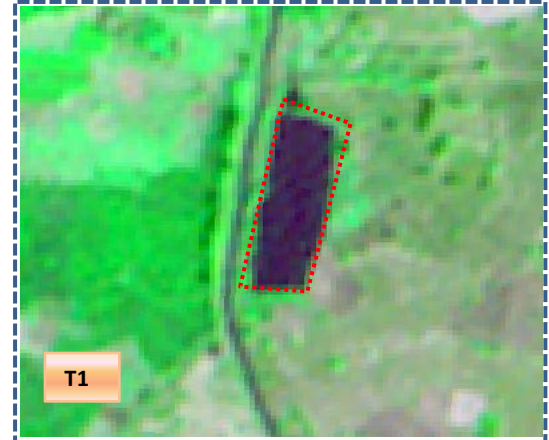
T1: 02 April 2018

Agriculture to Water body



T0

T0: 2013-14 (83°35'55.183"E 18°44'18.408"N)



T1

T1: 02 April 2018

Table showing change matrix depicting Land cover transitions 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	40.17												40.17
Mining/dump		3.72											3.72
Agriculture	1.08		1384.67	10.80	5.24	9.78		5.81			3.51		1420.89
Plantation Horticulture			3.66	70.16									73.82
Forest	0.37		189.15		722.78	25.92					1.50		939.72
Forest Plantation			0.34			133.15							133.48
Barren Rocky							5.67						5.67
Scrub			40.01					147.49			2.00		189.50
Waterbody- Streams/River									56.06				56.06
Waterbody – Ponds											34.86		34.86
Grand Total	41.62	3.72	1617.83	80.96	728.02	168.85	5.67	153.30	56.06	41.86			2898

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
- In T0 36 ha of the agriculture area has decreased and it is converted into Built-up, plantation, forest, forest plantation and water body in T1.
- In T1 233 ha of the agriculture area has increased from plantations, forest, forest plantation and scrubland of T0. The additional agriculture are coming from waterbody in T1 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions 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	41.62												41.62
Mining/dump		3.72											3.72
Agriculture	0.60		1563.82	18.86		27.27		0.69			6.59		1617.83
Plantation Horticulture			2.17	78.79									80.96
Forest	0.20		87.76		625.44	14.17					0.46		728.02
Forest Plantation	0.03		0.72			167.94					0.16		168.85
Barren Rocky							5.67						5.67
Scrub	0.08		28.99					124.20			0.04		153.30
Waterbody- Streams/River			0.14						55.92				56.06
Waterbody – Ponds											41.86		41.86
Grand Total	42.53	3.72	1683.60	97.65	625.44	209.37	5.67	124.89	55.92	49.11			2898

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T1 54 ha of the agriculture area has decreased and it is converted into Built-up, plantations, forest plantation, scrub and water body in T2.
- In T2 119 ha of the agriculture area has increased from plantations, forest, forest plantation, scrubland and water body of T1.
- The additional agriculture are coming from waterbody in T2 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions 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	42.53												42.53
Mining/dump		3.55	0.17										3.72
Agriculture	0.34		1676.24	0.85							6.17		1683.60
Plantation Horticulture			1.43	96.23									97.65
Forest			58.31		564.46						2.67		625.44
Forest Plantation						209.29					0.08		209.37
Barren Rocky							5.67						5.67
Scrub			10.86					114.03					124.89
Waterbody- Streams/River									55.92				55.92
Waterbody – Ponds											49.11		49.11
Grand Total	42.87	3.55	1747.00	97.08	564.46	209.29	5.67	114.03	55.92	58.03			2898

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T2 7.3 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T3.
- In T3 70.7 ha of the agriculture area has increased from Built-up, plantations, forest and scrubland of T2.
- The additional agriculture are coming from waterbody in T3 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2019-20 to 2020-21

Land cover	Monitoring period (T4)										Units in Hectares	
T3	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	42.87											42.87
Mining/dump		3.55										3.55
Agriculture	0.62		1744.80	1.14						0.45		1747.00
Plantation Horticulture			1.90	95.18								97.08
Forest			39.44		524.01	0.78				0.23		564.46
Forest Plantation			1.28			208.01						209.29
Barren Rocky							5.67					5.67
Scrub	0.21		4.14					109.67				114.03
Waterbody- Streams/River									55.92			55.92
Waterbody – Ponds										58.03		58.03
Grand Total	43.70	3.55	1791.56	96.32	524.01	208.79	5.67	109.67	55.92	58.71		2898

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T3 2.2 ha of the agriculture area has decreased and it is converted into built-up, plantations and water body in T4.
- In T4 46 ha of the agriculture area has increased from plantations, forest, forest plantation and scrubland of T3.
- The additional agriculture are coming from waterbody in T4 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions 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	43.70												43.70
Mining/dump		3.55											3.55
Agriculture	0.24		1781.62	7.07							2.63		1791.56
Plantation Horticulture			3.22	93.10									96.32
Forest			7.59		516.14						0.27		524.01
Forest Plantation	0.05		14.06			194.68							208.79
Barren Rocky							5.67						5.67
Scrub	0.11		2.16					107.25			0.16		109.67
Waterbody- Streams/River									55.92				55.92
Waterbody – Ponds											58.71		58.71
Grand Total	44.10	3.55	1808.66	100.17	516.14	194.68	5.67	107.25	55.92	61.76			2898

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T4 9.9 ha of the agriculture area has decreased and it is converted into built-up, plantations and water body in T5.
- In T5 27 ha of the agriculture area has increased from plantations, forest, forest plantation and scrubland of T4.
- The additional agriculture are coming from waterbody in T5 represents seasonal agriculture.

Conclusion

1. DPR of the project is uploaded on to Bhuvan Portal.
2. 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.
3. There is an increase of 27 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2013-14 (T0) & 2021-22 (T5) years.
4. There is an increase of 196, 65, 63, 44 & 17 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 387 Hectares in Crop land area as compared between baseline LU/LC 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 82 Hectares in Scrubland area as compared between 2013-14 (T0) & 2021-22 (T5) years.
7. Farm ponds (11) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (11) verified from the portal.