

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

Srikakulam -13/2012-13
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
December-2022

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

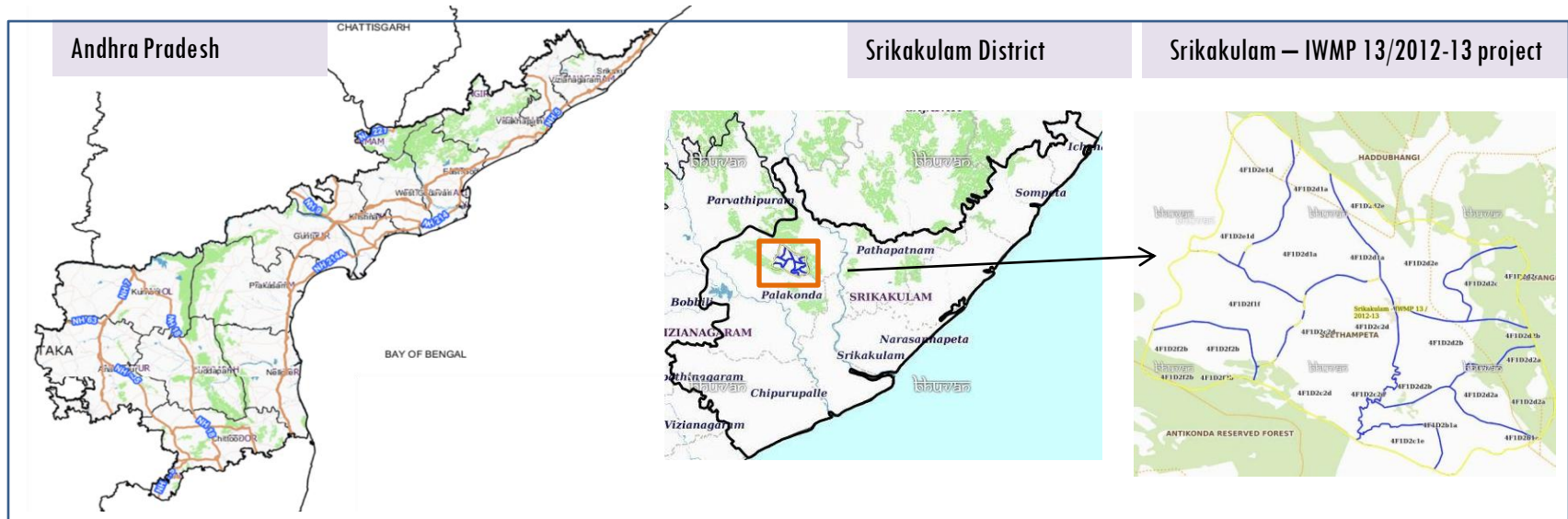
EXECUTIVE SUMMARY

- 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-13/2012-13, Srikakulam District of Andhra Pradesh. The total geographical area of the project is **7,941** ha. It comprises of 11 micro watersheds.
- In the project area 49 Drishti photos were uploaded showing agriculture/horticulture, afforestation, check dams/checks & plugs, Drainage treatments of Nala Revetment, loose boulder structures etc, and remaining showing other activities.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 11 new farm ponds or dug out pits and 22 check dams and drainage treatments with 10.8 ha increase in the area.
- Major percentage i.e. 40 % is covered by the agriculture, 44 % is covered by scrubland , 8 % is covered by forest, 4.9 % by plantation and remaining by other land use classes.

PROJECT : SRIKAKULAM - IWMP-13/2012-13

DISTRICT : SRIKAKULAM , STATE : ANDHRA PRADESH

- The study area falls in Seethampeta Mandal of Srikakulam district of Andhra Pradesh state. The total geographical area of the project is **7,941** ha. It comprises of 11 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2012-13 (T0) period (*Batch -1*) projects taking 2020-21 (T5) period satellite images



- The climate of the region is generally tropical, the mean maximum temperature is 30-40°C April-May and the mean minimum temperature is 17.4°C December-January during the summer season till the onset of the South-West monsoon the heat is oppressive and the day temperature is May sometimes go about 43°C.
- The rainfall in the region is considerably more in the hilly areas as compared to the plains, the annual normal rainfall is 1131 mm (i.e., 61% from South West monsoon and 2.2% from Northeast monsoon) is shared by summer showers and winter rains.

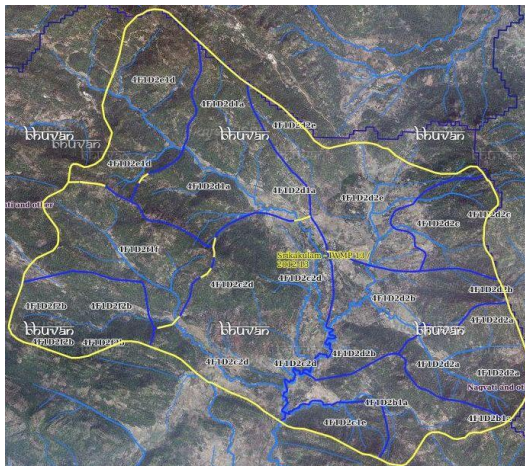
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			28-Jan-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			28-Jan-21
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	Drishti Photographs		
		Total	49
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

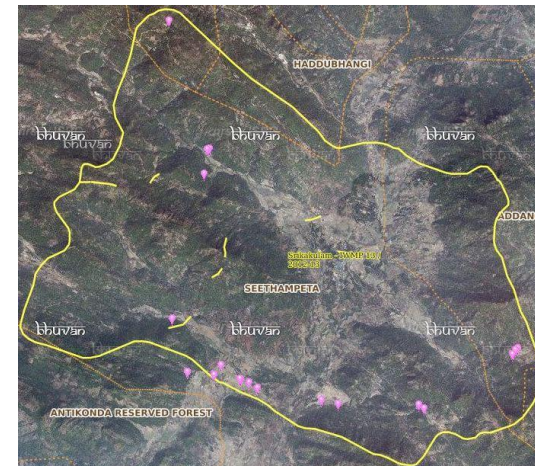


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	2	2
2	Afforestation	4	4
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	4	4
7	Terrace	0	0
8	Gabion structure	0	0
9	Checks & Plugs	22	22
10	Farm ponds/Dug out pit	11	11
11	Civil work-Check dams /Rock fill dam	0	0
12	Drainage treatment /Nala Revetment, loose boulder structure, gully check	0	0
13	Land Developments (afforestation, horticulture and bund plantation of teak)	0	0
14	Lm	0	0
15	Soil moisture conservation	0	0
16	Production system and micro-enterprises	0	1
17	Entry Point Activity	2	2
18	Others	4	4
	TOTAL	49	49

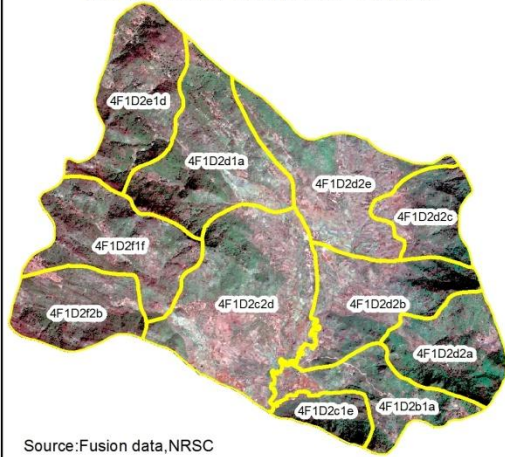
MONITORING IN THE PROJECT AREA

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 (2012-13) and T5 is 2020-21 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 Color Composite

Natural Color Composite- 2012-13



Source:Fusion data,NRSC

Natural Color Composite- 21 March 2017



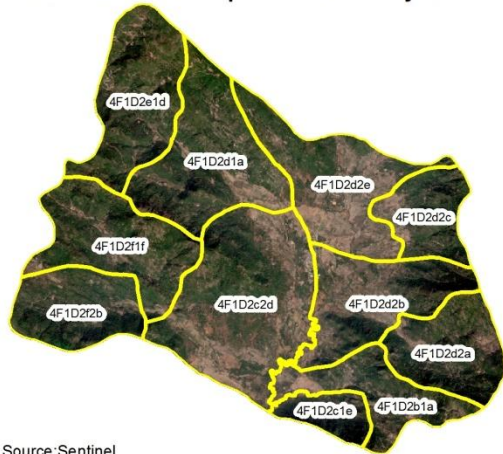
Source:NCC,NRSC

Natural Color Composite - 15 Nov 2018



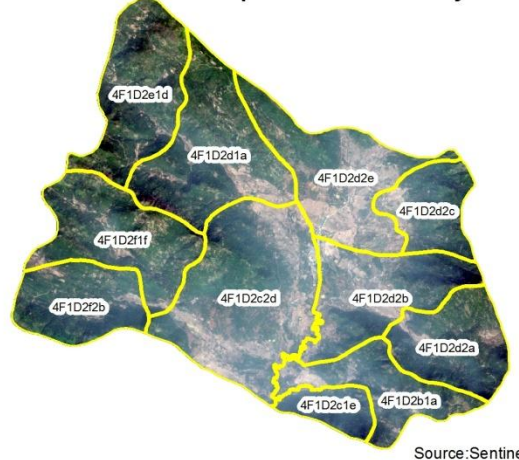
Source:LISS-IV,NRSC

Natural Color Composite-24 January 2019



Source:Sentinel

Natural Color Composite- 19th February 2020



Source:Sentinel

Natural Color Composite- 28 th January 2021



Source:Sentinel

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-13/2012-13



Satellite data 2010



Satellite data 2013



Satellite data 2014



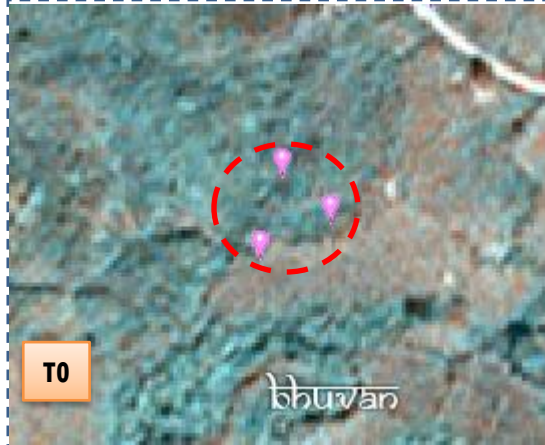
Satellite data 2015



Drishti Id. 727851

Percolation Tank

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-13/2012-13



T0: 2012-13

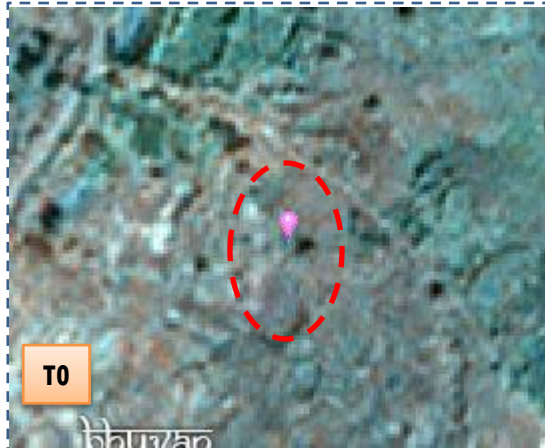


T1: 13 February 2017



Drishti SI no. 1788402 MWS : 4F1D2d2b

Percolation tank



T0: 2012-13



T1: 13 February 2017



Drishti SI no. 727851 MWS : 4F1D2d2b

Percolation tank

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-13/2012-13



T0:2012-13



T1: 13 February 2017



Drishti Sl no. 135174 MWS : 4F1D2c2d

Cattle proof



T0:2012-13



T1: 13 February 2017



Drishti Sl no. 2502245 MWS : 4F1D2f1f

Entry point Activity

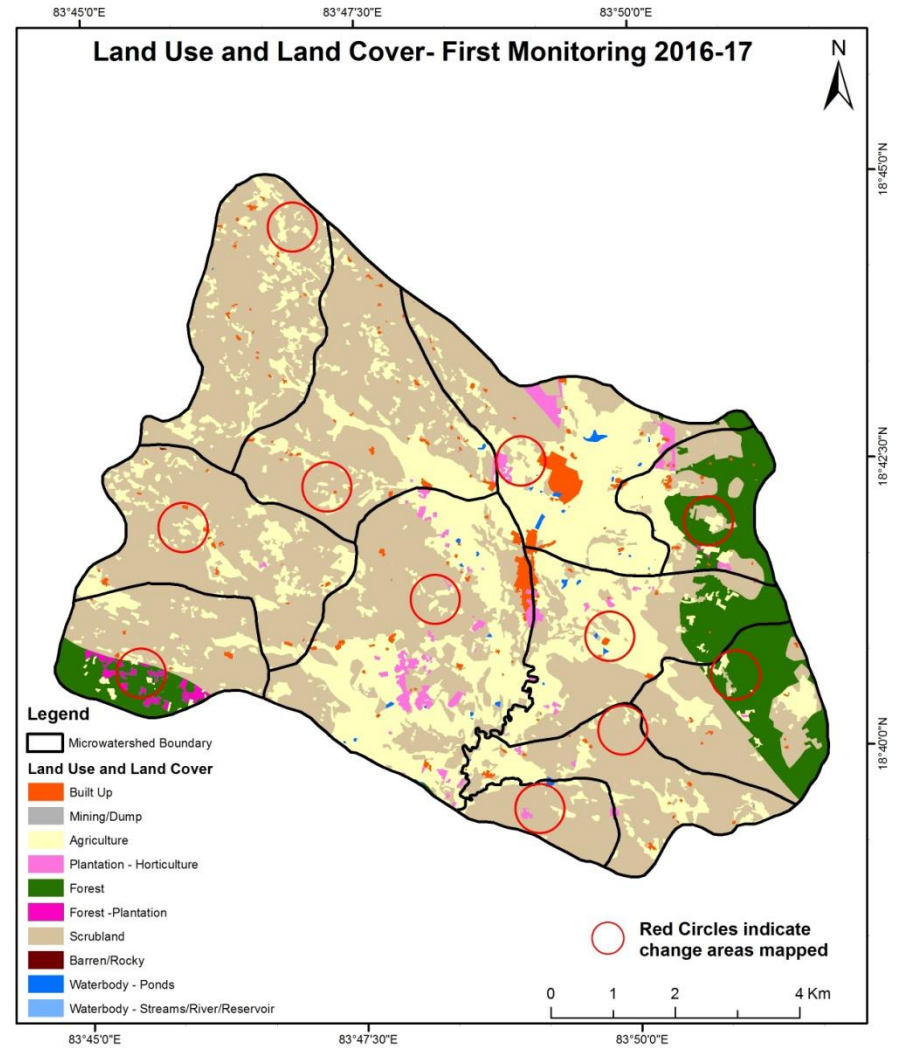
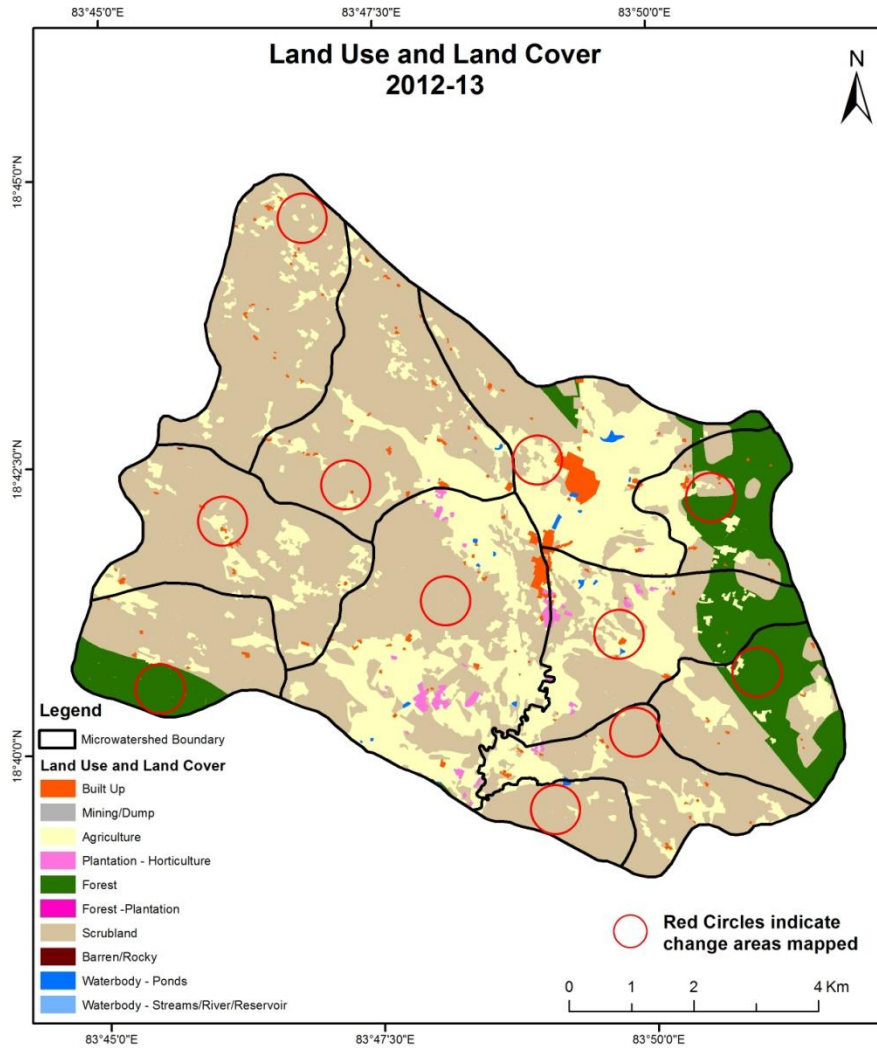
MONITORING IN THE PROJECT AREA

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 (2012-13) and row represents the T5 (2020-21)

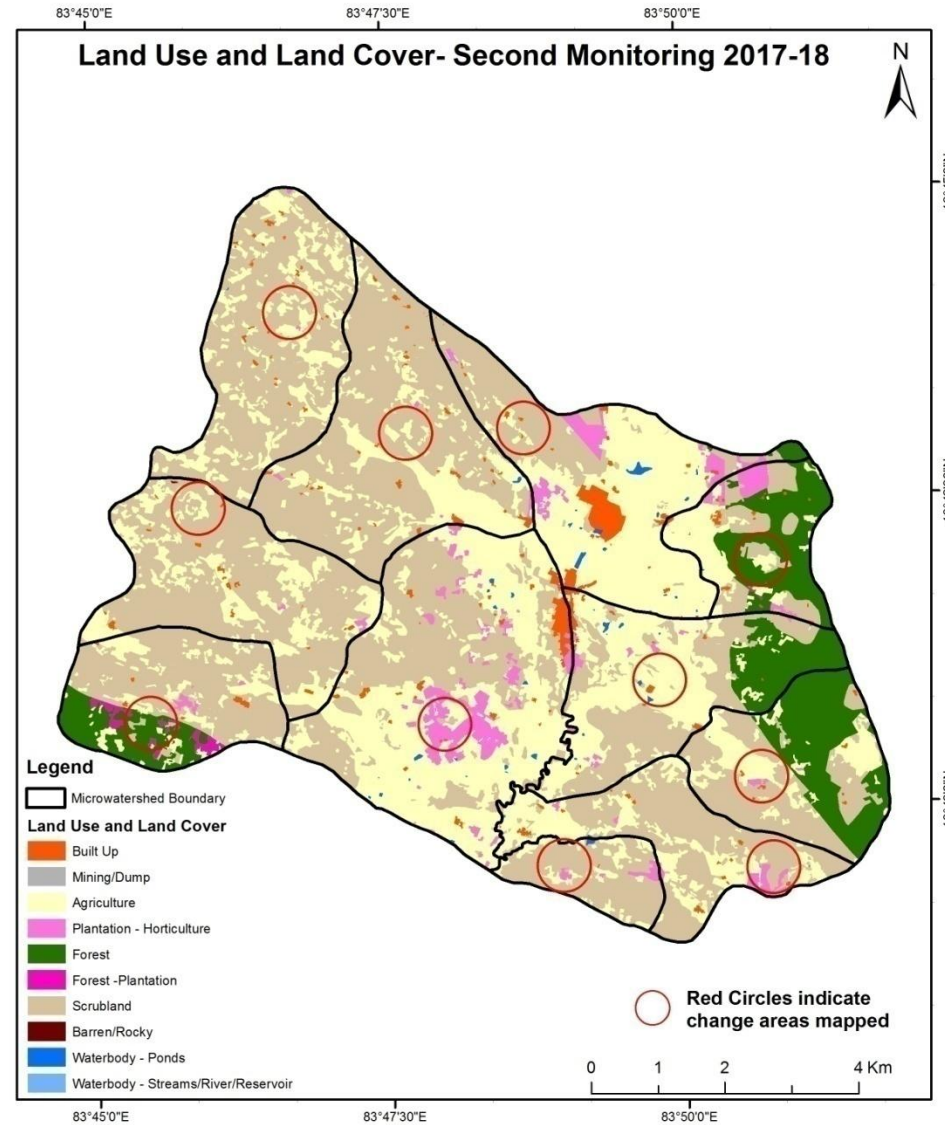
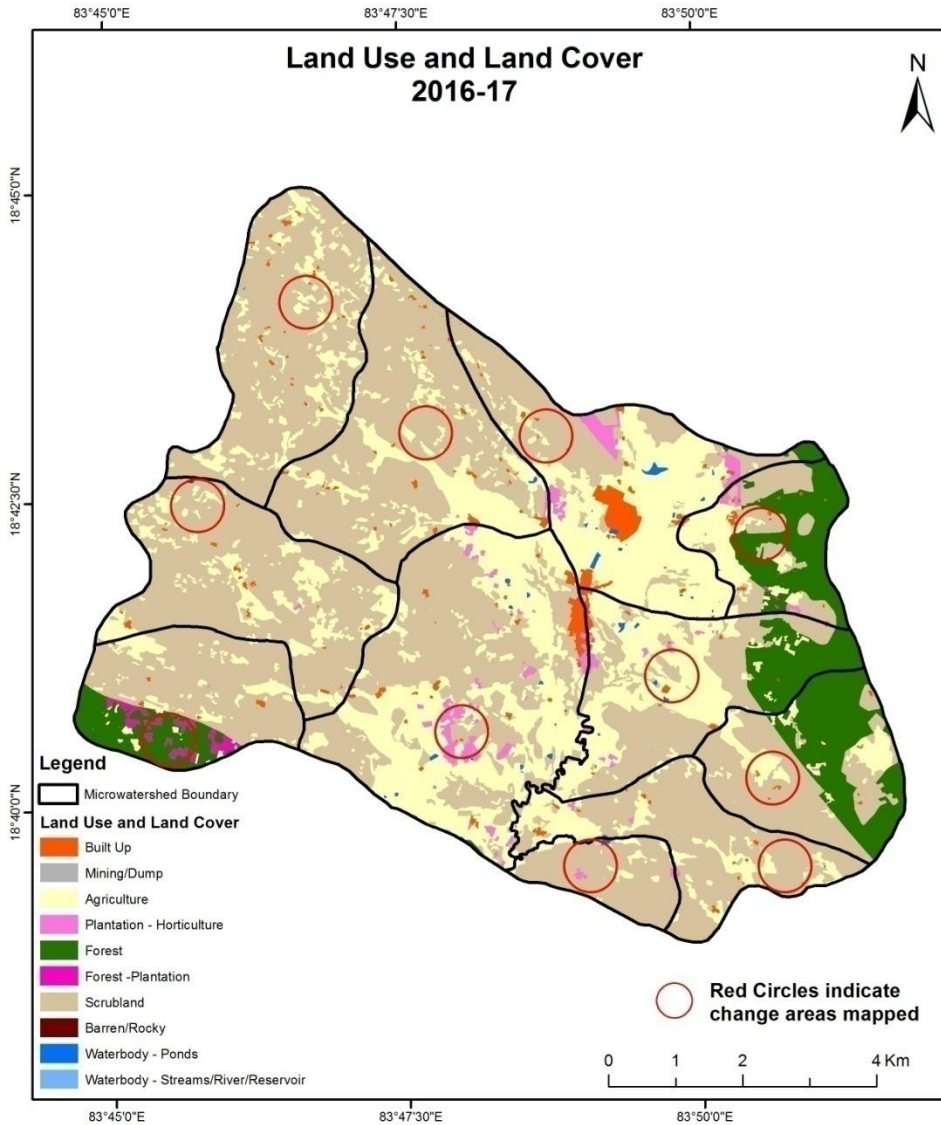
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



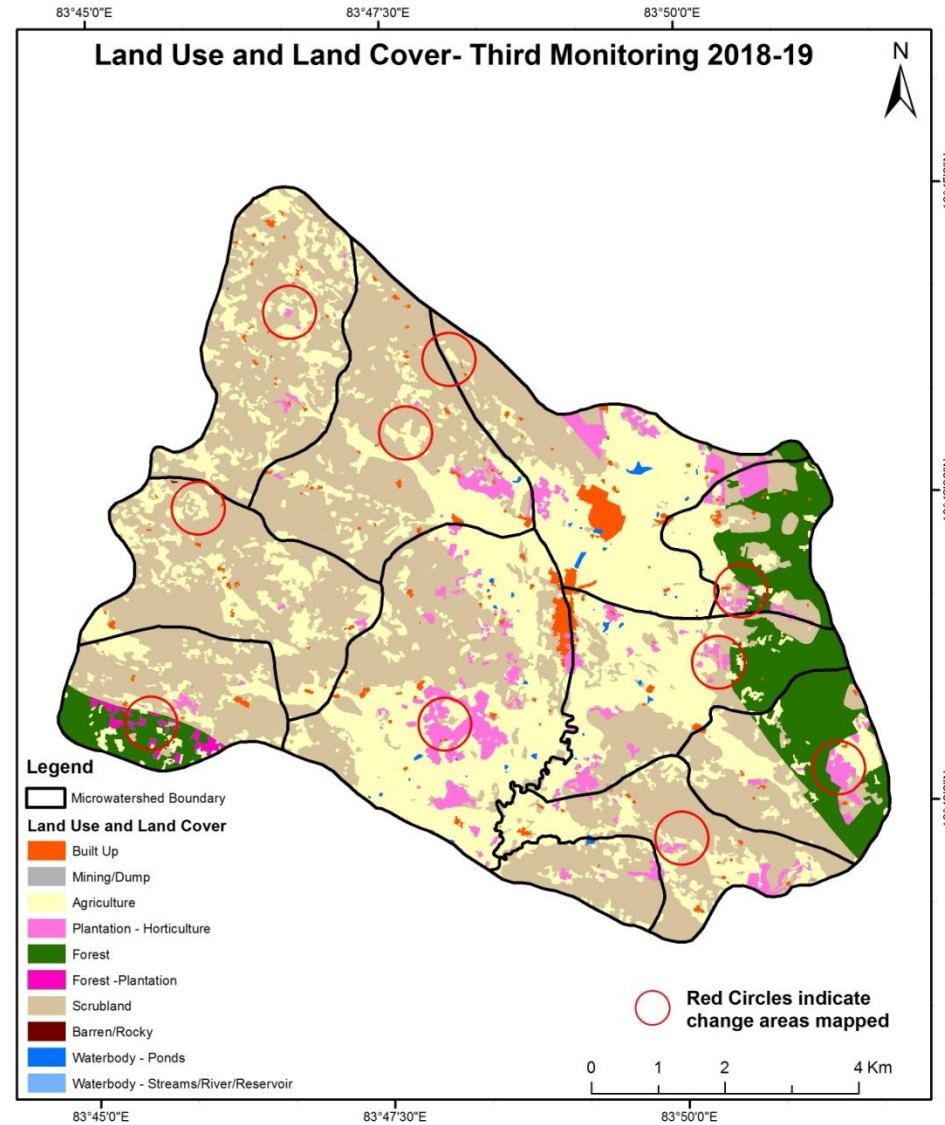
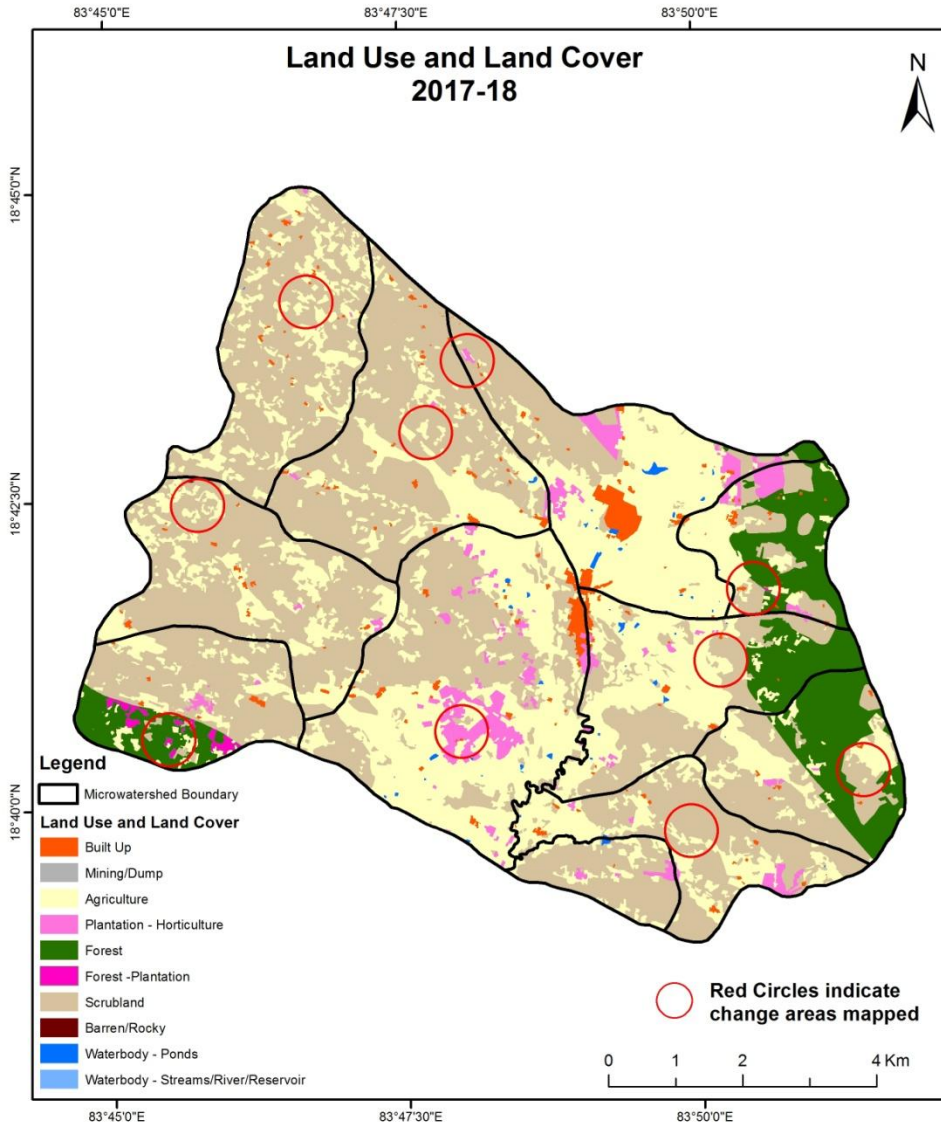
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



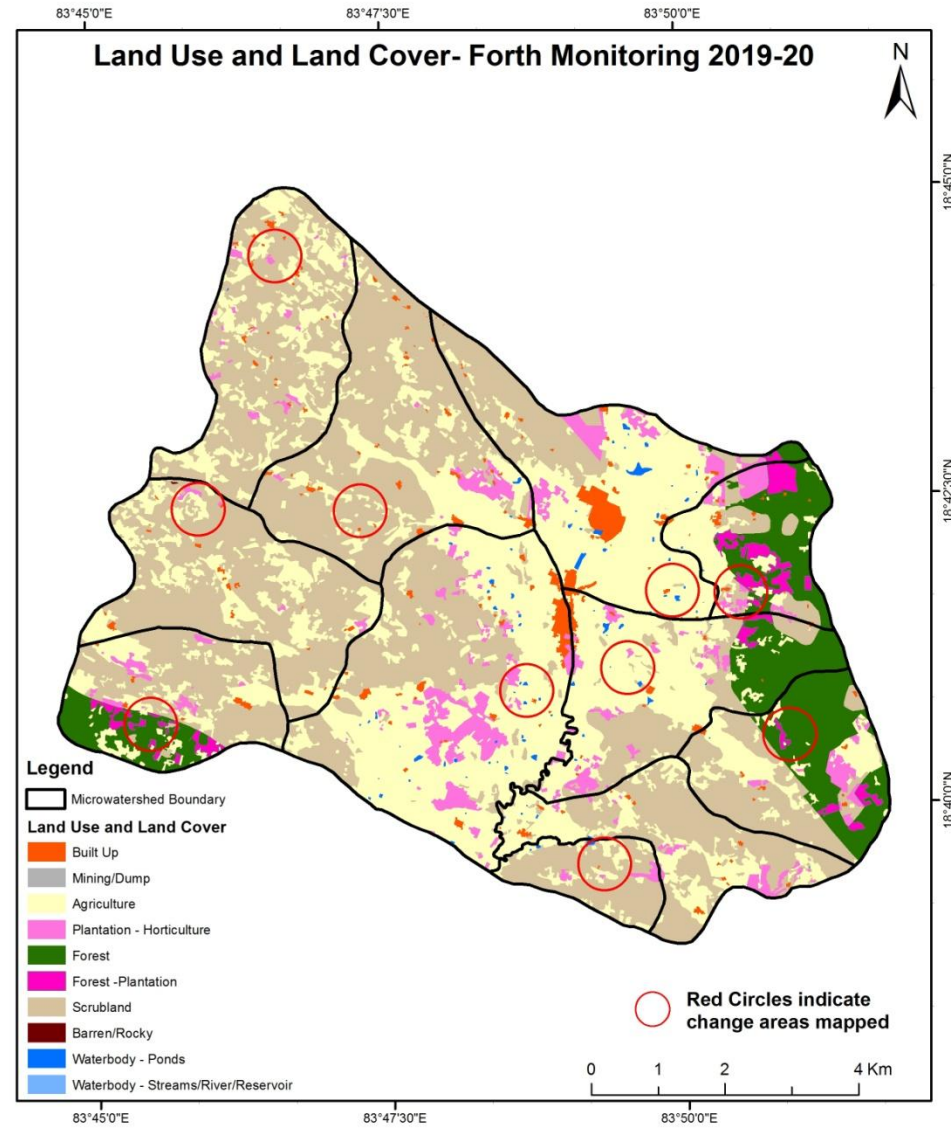
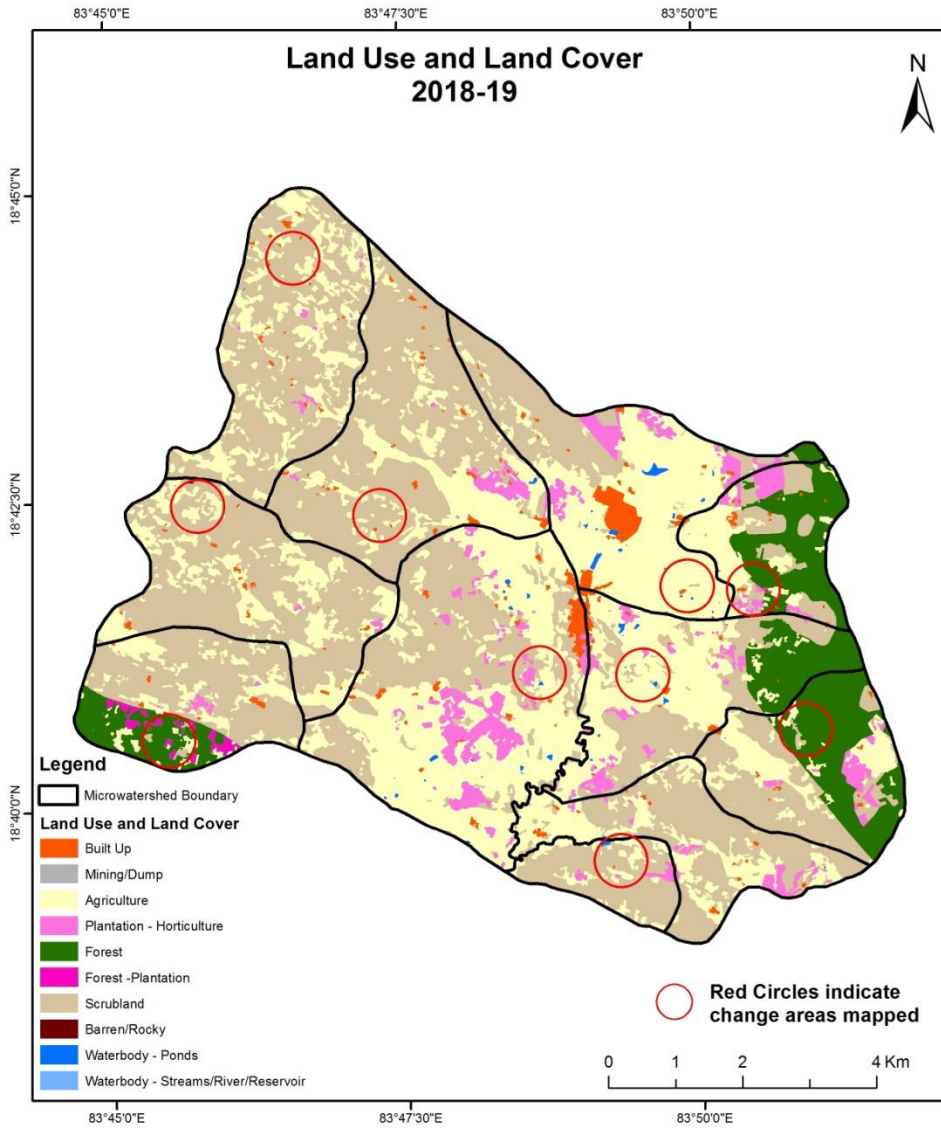
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



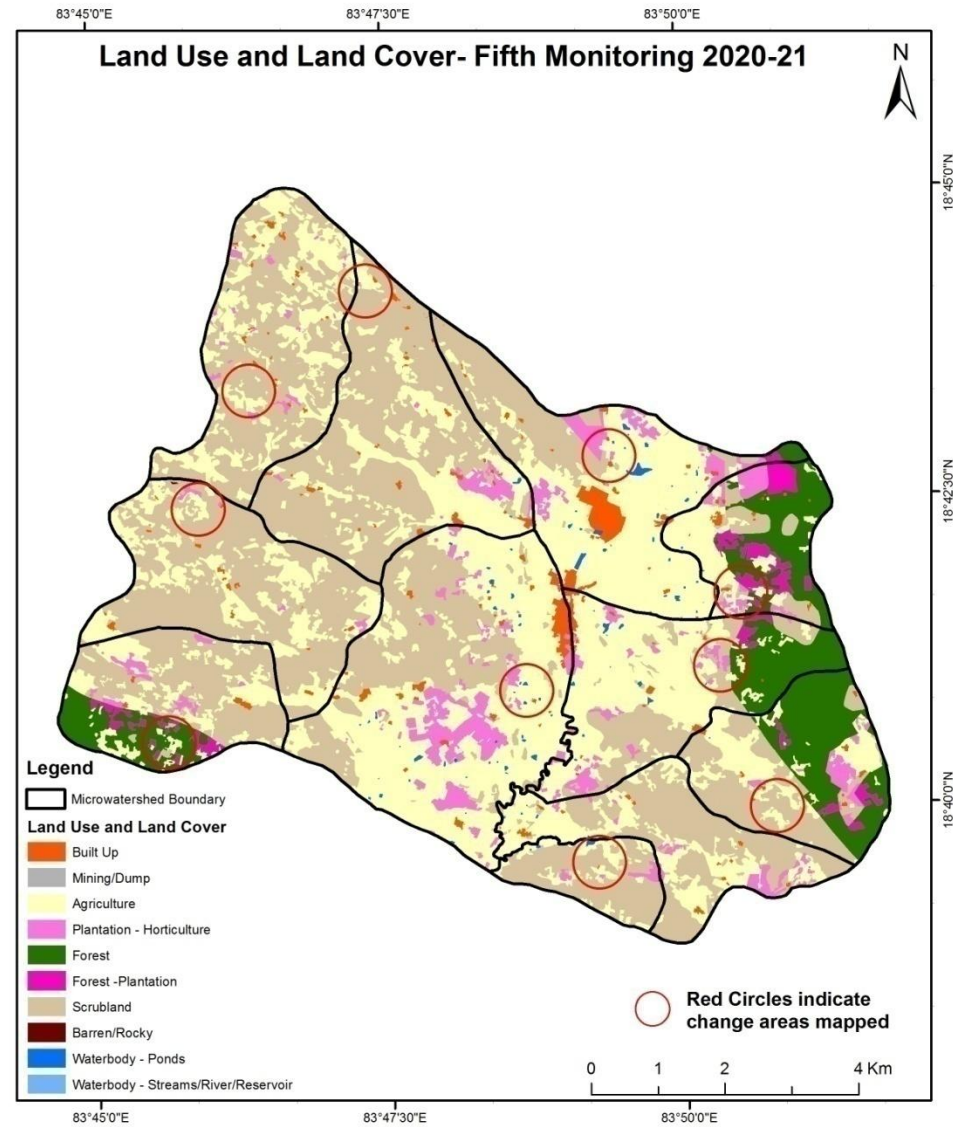
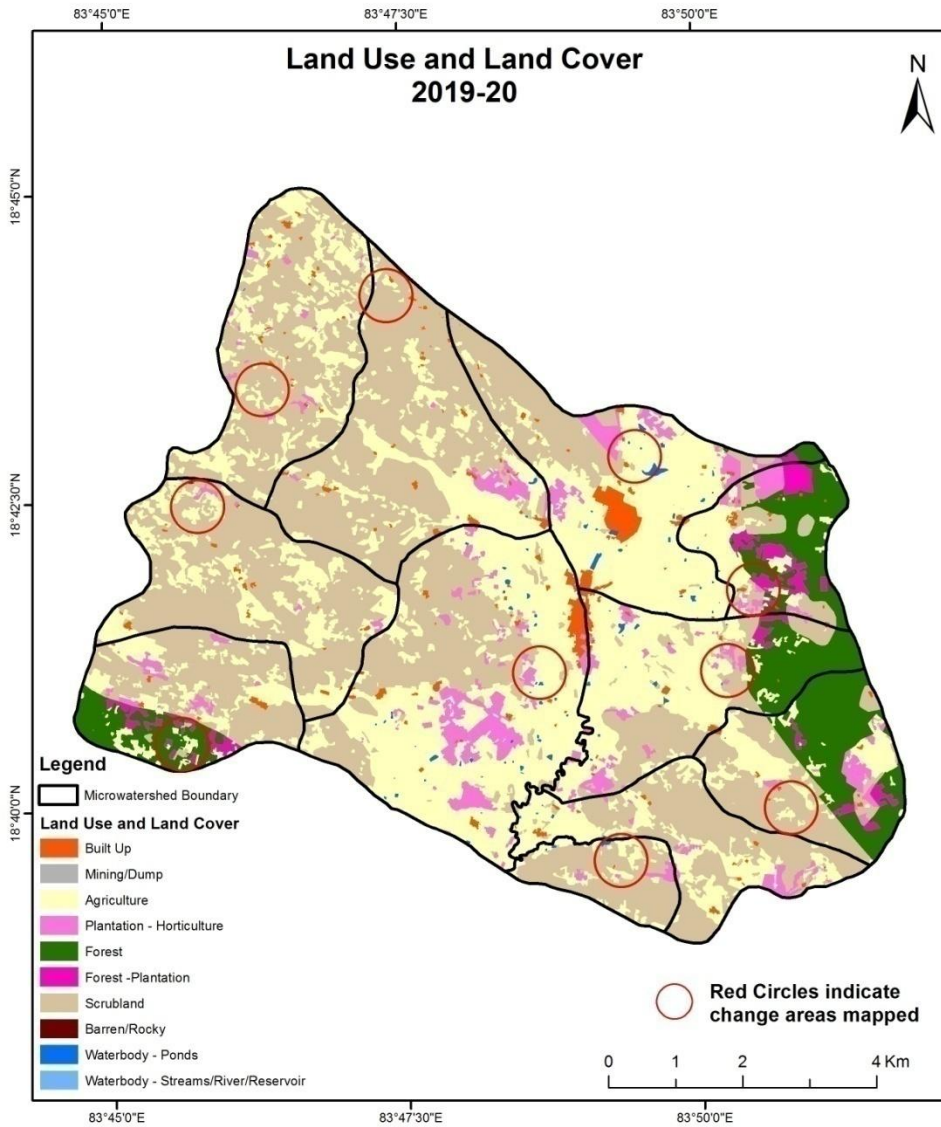
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



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 changes for Pre and Post treatment dates

Agriculture to Plantation

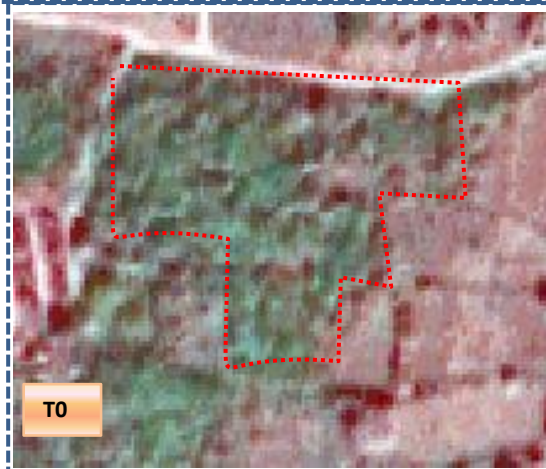


T0: 2012-13(83°47'41.146"E
18°40'40.32"N)



T1: 13 January 2016

Scrub to Plantation



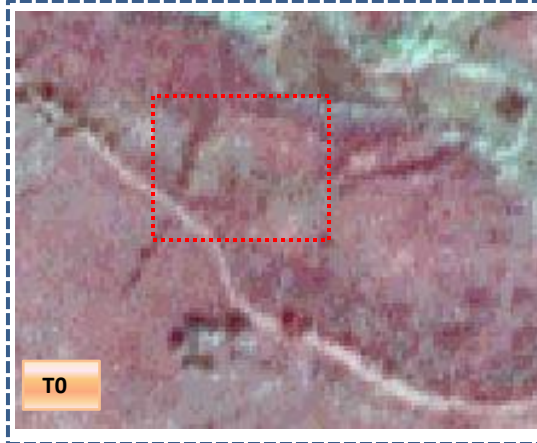
T0: 2012-13 (83°47'50.424"E
18°42'16.096"N)



T1: 13 January 2016

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

Agriculture to Water body



T0

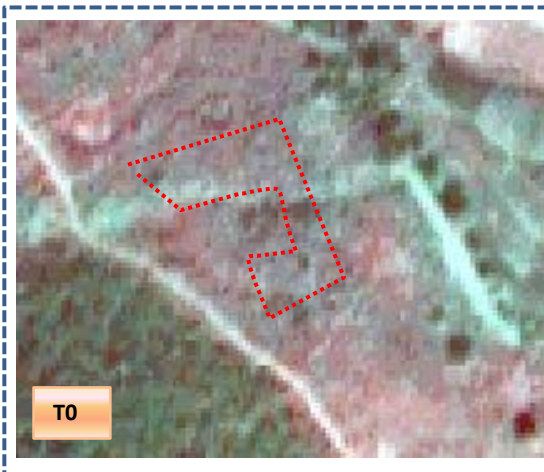
T0: 2012-13(83°49'43.242"E
18°41'33.317"N)



T1

T1: 13 January 2016

Scrub to Agriculture



T0

T0: 2012-13(83°47'7.417"E
18°40'35.187"N)



T1

T1: 13 January 2016

Table showing change matrix depicting Land cover transitions during study period-2012-13 to 2016-17

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	109.78												109.78
Mining/dump		0.23											0.23
Agriculture	11.91		1944.37	22.20		0.23		4.00			1.82		1984.53
Plantation Horticulture	0.37		4.87	41.61									46.85
Forest	0.20		11.32	18.44	700.51	29.85		69.55					829.87
Forest Plantation						0.12							0.12
Barren Rocky							0.26						0.26
Scrub	5.58		339.37	30.71				4573.57			1.33		4950.57
Waterbody- Streams/River									6.35				6.35
Waterbody – Ponds											13.03		13.03
Grand Total	127.85	0.23	2299.93	112.96	700.51	30.20	0.26	4647.11	6.35	16.18			7941.59

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T0 40 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrub and water body in T1.
- In T1 355 ha of the agriculture area has increased from plantations, forest and scrubland of T2. The additional agriculture are coming from waterbody in T1 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2016-17 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	127.72			0.12							127.85	
Mining/dump		0.23									0.23	
Agriculture	1.87		2287.20	7.67	0.84			1.46		0.89	2299.93	
Plantation Horticulture			3.10	109.86							112.96	
Forest	0.08		26.21		674.22						700.51	
Forest Plantation			0.58			21.70		7.93			30.20	
Barren Rocky							0.26				0.26	
Scrub	3.02		470.17	119.73				4054.16		0.03	4647.11	
Waterbody- Streams/River									6.35		6.35	
Waterbody – Ponds										16.18	16.18	
Grand Total	132.69	0.23	2787.27	237.39	675.06	21.70	0.26	4063.55	6.35	17.10	7941.59	

- 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 12.7 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrub and water body in T2.
- In T2 500 ha of the agriculture area has increased from plantations, forest and scrubland 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-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	132.69												132.69
Mining/dump		0.23											0.23
Agriculture			2774.55	12.72									2787.27
Plantation Horticulture	0.12		2.78	234.48									237.39
Forest					675.06								675.06
Forest Plantation						21.70							21.70
Barren Rocky							0.26						0.26
Scrub	2.23		76.97	108.56		4.09		3871.69					4063.55
Waterbody- Streams/River									6.35				6.35
Waterbody – Ponds			0.09								17.01		17.10
Grand Total	135.05	0.23	2854.39	355.76	675.06	25.79	0.26	3871.69	6.35		17.01		7941.59

- 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 12 ha of the agriculture area has decreased and it is converted into plantations in T3.
- In T3 79 ha of the agriculture area has increased from plantations 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-2018-19 to 2019-20

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	135.05											135.05
Mining/dump		0.23										0.23
Agriculture	1.49		2844.57	2.29						6.04		2854.39
Plantation Horticulture				355.71						0.04		355.76
Forest			4.99		640.05	30.02						675.06
Forest Plantation						25.76				0.03		25.79
Barren Rocky							0.26					0.26
Scrub	1.46		160.68	28.45		52.45		3627.92		0.74		3871.69
Waterbody- Streams/River									6.35			6.35
Waterbody – Ponds										17.01		17.01
Grand Total	138.00	0.23	3010.24	386.46	640.05	108.23	0.26	3627.92	6.35	23.87		7941.59

- 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 09 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 165 ha of the agriculture area has increased from forest 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-2019-20 to 2020-21

Land cover	Monitoring period (T5)										Units in Hectares		
T4	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	138.00												138.00
Mining/dump		0.23											0.23
Agriculture	3.44		2997.04	9.75									3010.24
Plantation Horticulture	0.46			386.00									386.46
Forest	0.07				639.98								640.05
Forest Plantation						108.23							108.23
Barren Rocky							0.26						0.26
Scrub	1.59		115.83					3510.49					3627.92
Waterbody- Streams/River									6.35				6.35
Waterbody – Ponds											23.87		23.87
Grand Total	143.57	0.23	3112.87	395.75	639.98	108.23	0.26	3510.49	6.35		23.87		7941.59

- 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 13 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T5.
- In T5 115 ha of the agriculture area has increased from 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 10 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
4. There is an increase of 315, 487, 67, 155 & 102 Hectares from T0-T1, T1 to T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 1,128 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. There is a **increase of 348 Hectares in plantation/horticulture area** as compared between 2012-13 (T0) & 2020-21 (T5) years.
6. There is a decrease of 1,440 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (13) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (13) verified from the portal.