

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -32/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-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

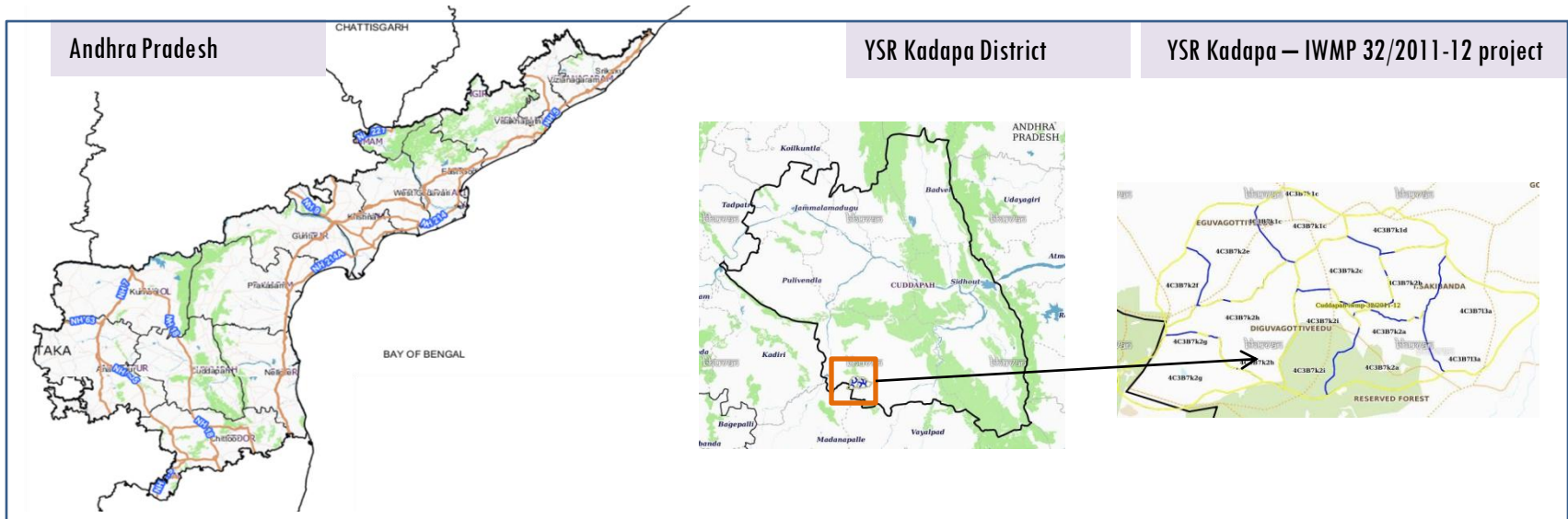
E X E C U T I V E S U M M A R Y

- 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-32/2011-12, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is 5,924 ha. It comprises of 11 micro watersheds.
- In the project area 1210 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and check dams and drainage treatments with 11 ha increase in the area.
- Major percentage i.e. 33 % is covered by the agriculture, 38 % is Scrub land 12 % is covered by forest area, 10 % is covered by plantation/horticulture and remaining by other land use classes.

PROJECT : YSR KADAPA - IWMP-32/2011-12

DISTRICT : YSR KADAPA , STATE : ANDHRA PRADESH

- The study area falls in Chinnamandem Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is 5,924 ha. It comprises of 11 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2011-12 (T0) period (*Batch -1*) projects taking 2015-16 (T1) period satellite images



- YSR Kadapa has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 38 °C range and it reaches around 44 °C to 45 °C .
- The average annual rainfall of the YSR Kadapa District is 710 mm, which ranges from nil rainfall in January to 137 mm in October. October is the wettest month of the year. The mean seasonal rainfall distribution is 402.4 mm in southwest monsoon (June - September), 239.1 mm in northeast monsoon (October – December), distribution of rainfall in season wise 56.7 % in south west monsoon, 33.7 % in north east monsoon period.

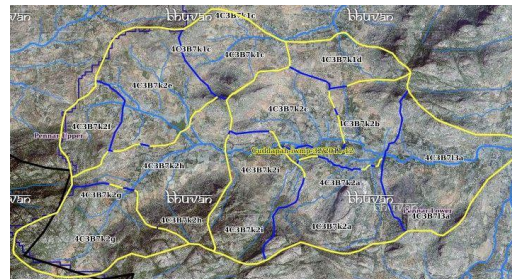
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2015-16
LISS IV	2011-12		
SCENE 1			29-Feb-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			29-Feb-20
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	1210
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

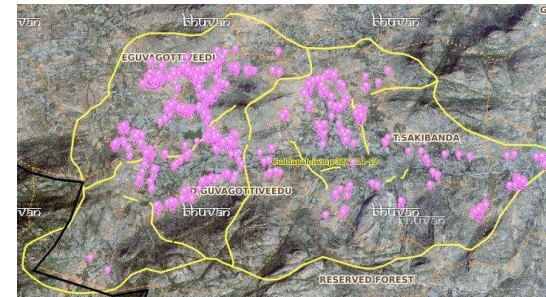


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

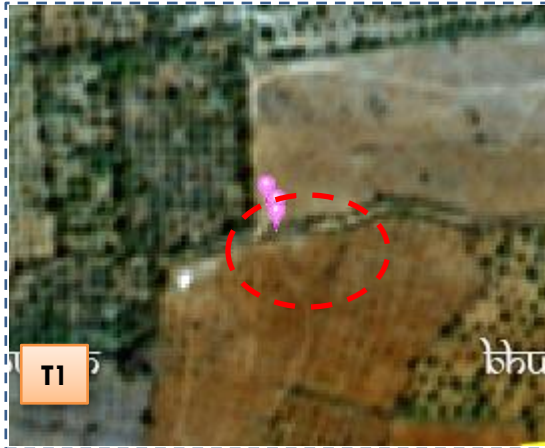
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	362	300
2	Afforestation	2	2
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	26	20
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	0	0
11	Civil work-Check dams /Rock fill dam	107	70
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 (fodder development, varmi compost)	17	17
15	Soil moisture conservation	0	0
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity	1	1
18	Others	1396	800
	TOTAL	1911	1210

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 (2011-12) and T1 is 2015-16 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.

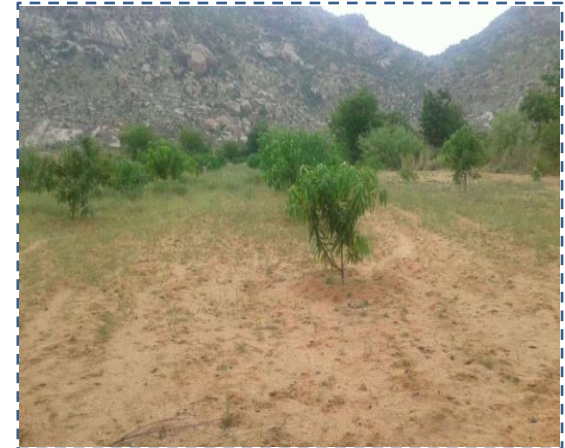
Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-32/2011-12



T1



T2



T1: 12 February 2015

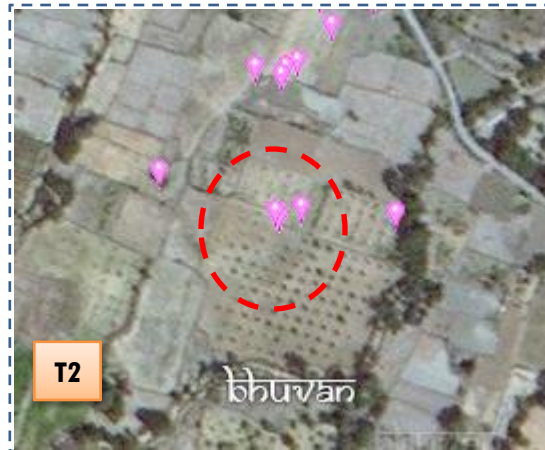
T2: 24 December 2018

Drishti SI no. 843353 MWS : 4C3B7k2f

Horticulture



T1



T2



T1: 12 February 2015

T2: 24 December 2018

Drishti SI no. 2419639 MWS :4C3B7k2f

Horticulture

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-32/2011-12



T1

T1: 22 October 2015



T2

T2: 28 November 2018



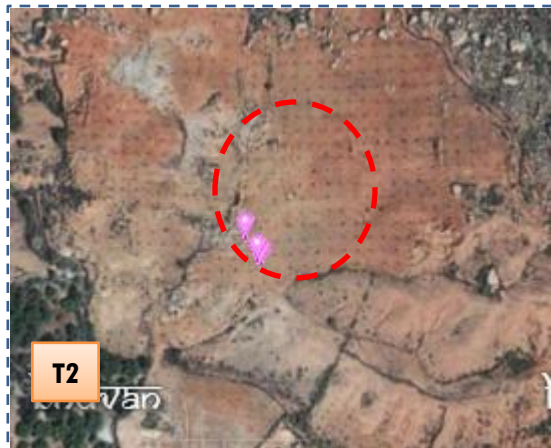
Drishti SI no. 2419725 MWS : 4C3B7k2h

Horticulture



T1

T1: 12 February 2015



T2

T2: 24 December 2018



Drishti SI no. 3083969 MWS : 4C3B7k1d

Horticulture

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-32/2011-12



T0: 2010-11



T1: 22 October 2015



Drishti Sl no. 2558676 MWS :4C3B7k2e

Farm pond



T0: 2010-11



T1: 22 October 2015



Drishti Sl no. 2558704 MWS :4C3B7k2e

Farm pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-32/2011-12



T0: 2010-11



T1: 22 October 2015



Drishti SI no. 1786530 MWS : 4C3B7k2e

Horticulture



T0: 2010-11



T1: 22 October 2015



Drishti SI no. 2665288 MWS : 4C3B7k2e

Horticulture

Natural Colour Composite (NCC)

Natural Color Composite- 2011-12



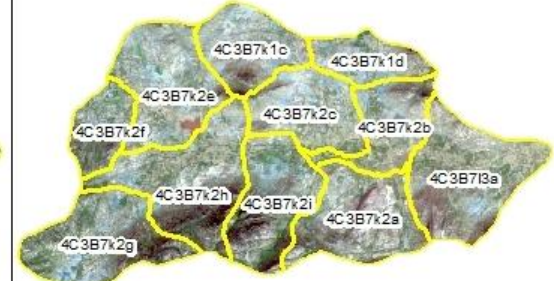
Source:Fusion data,NRSC

Natural Color Composite-22nd October 2015



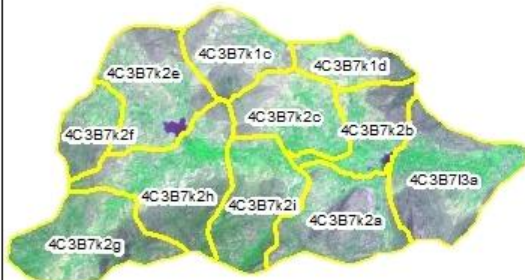
Source:NCC,NRSC

Natural Color Composite- 05th January 2017



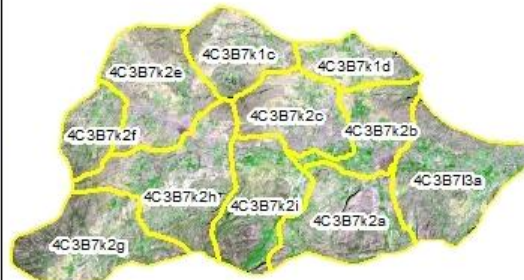
Source:NCC,NRSC

Natural Color Composite-30th March 2018



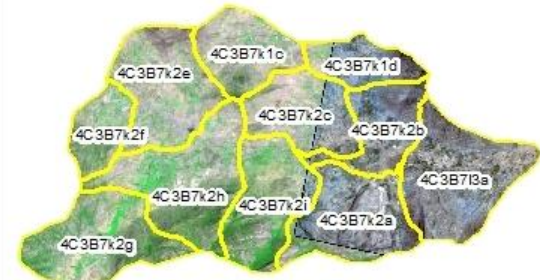
Source:LISS-IV,NRSC

Natural Color Composite- 23rd February 2019



Source:LISS-IV,NRSC

Natural Color Composite- 29thFebruary 2020



Source:LISS-IV,NRSC

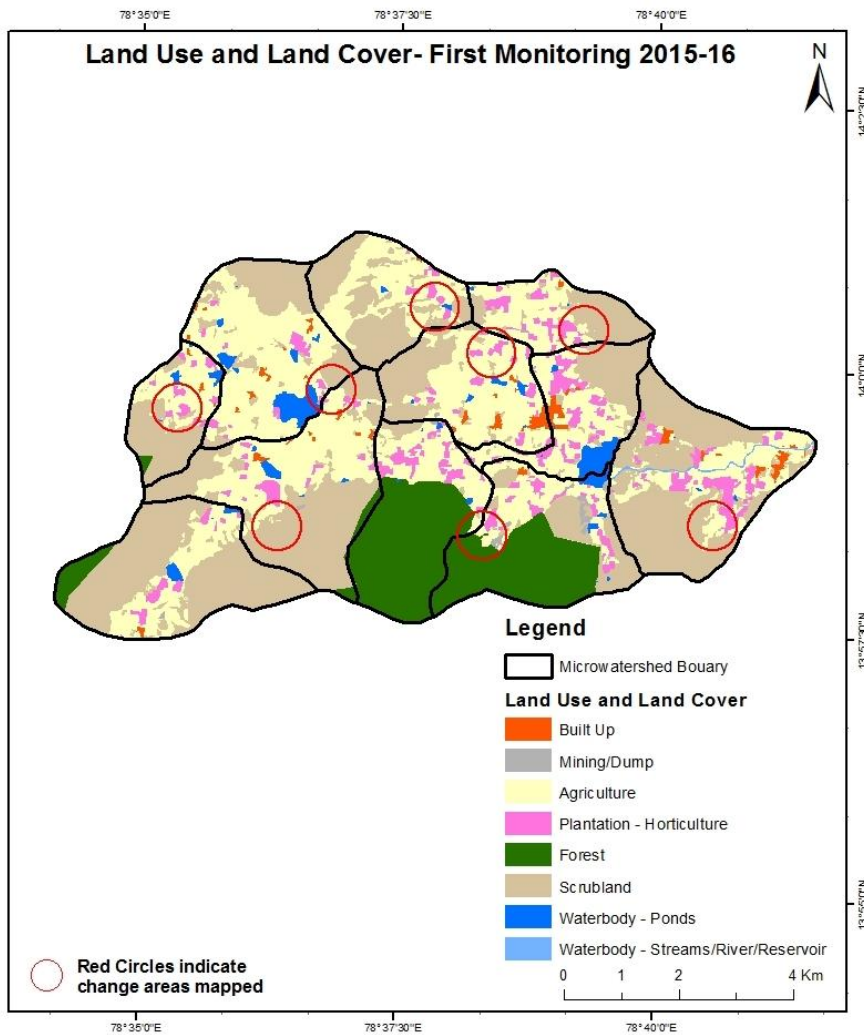
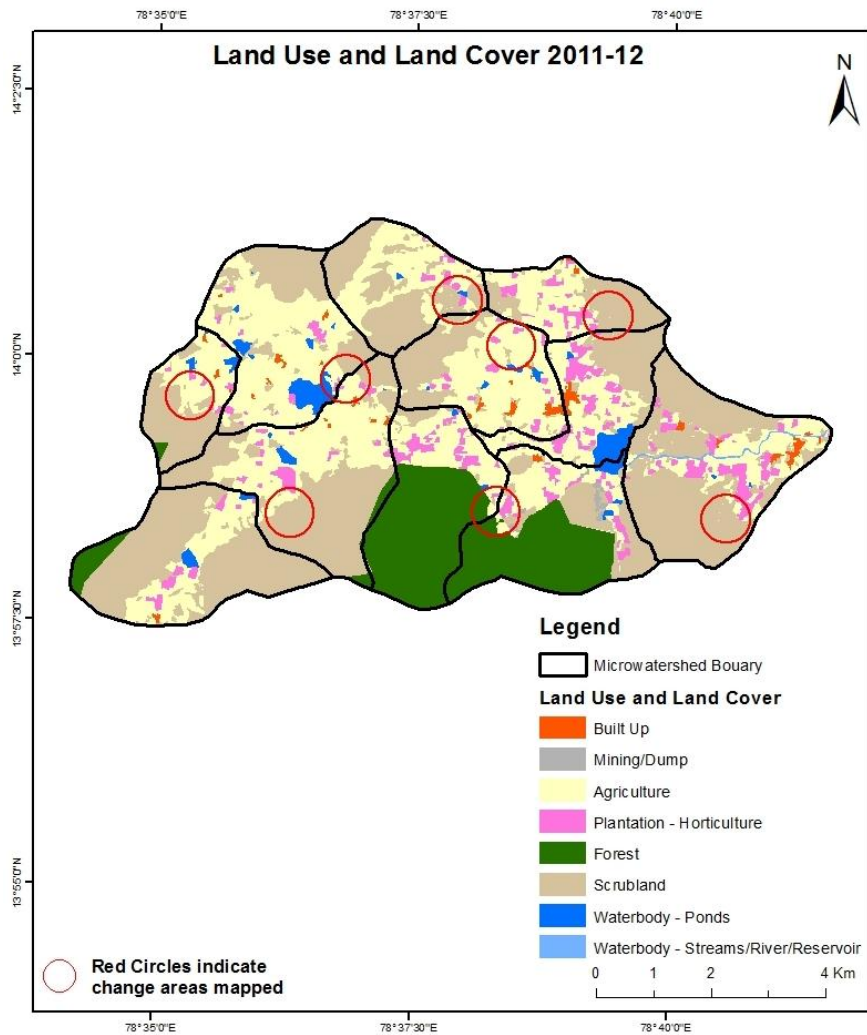
MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

- Change in land use and land cover from T0 to T1 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 T1 are given in the change matrix table.
- In matrix table column represents the T0 (2011-12) and row represents the T1 (2015-16)

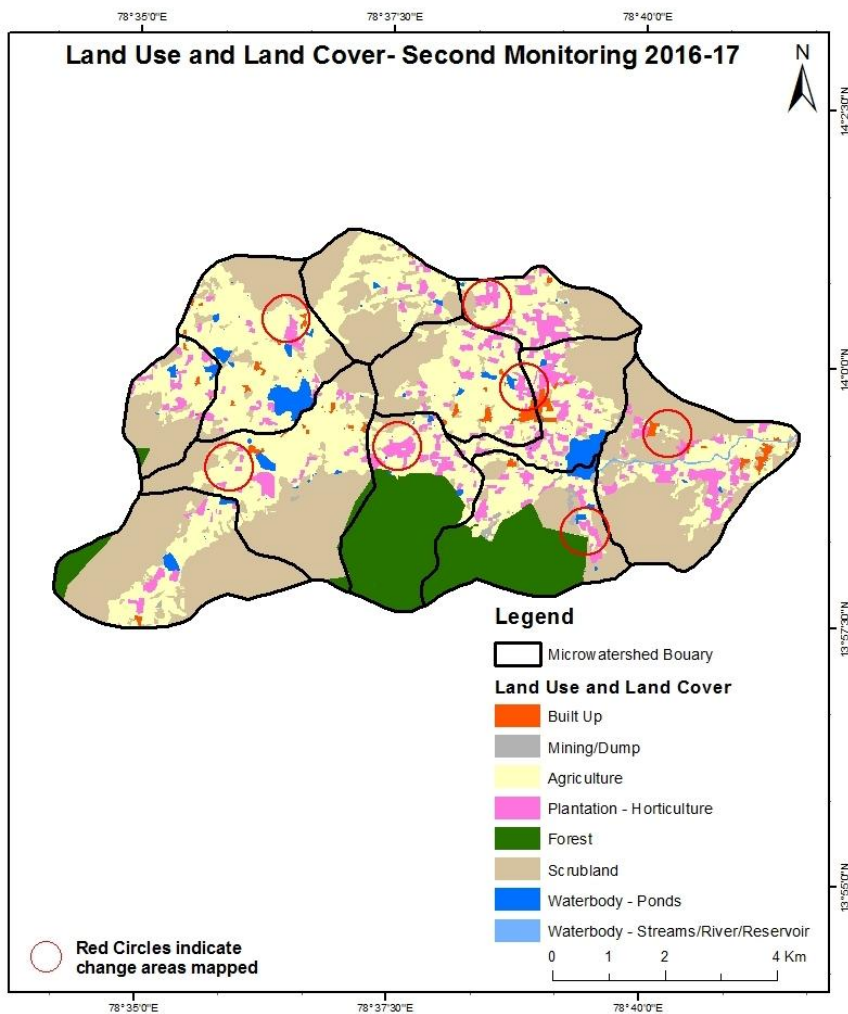
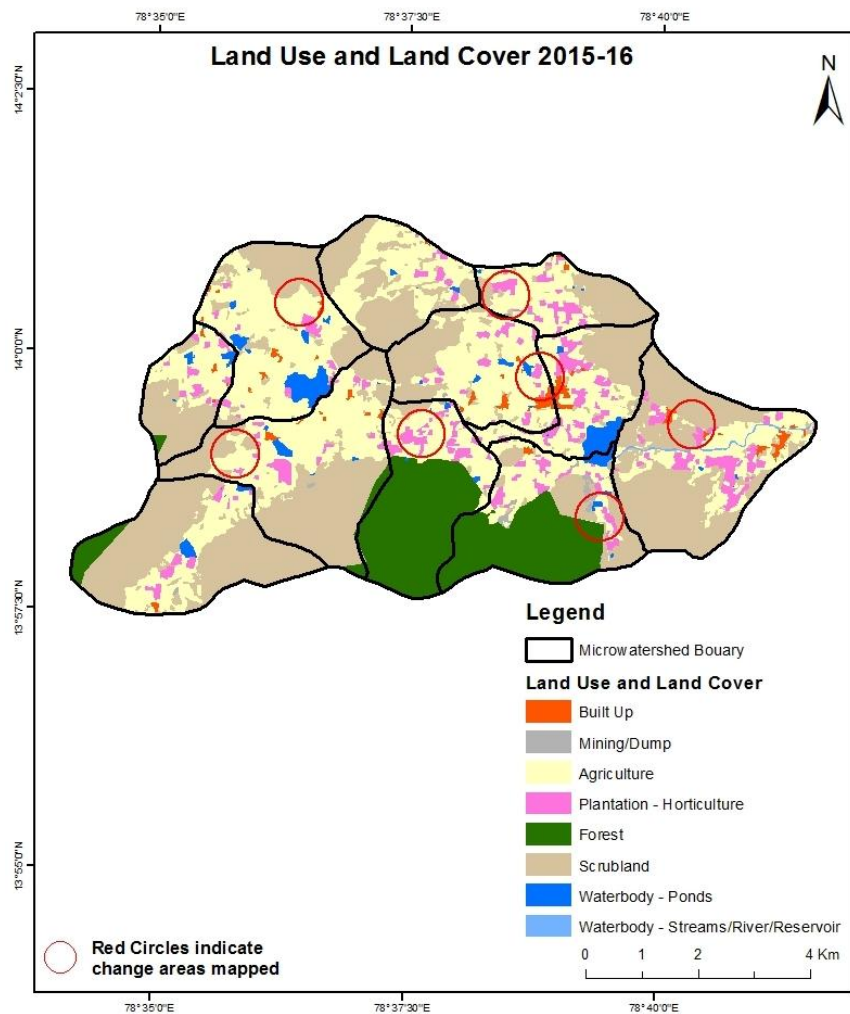
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



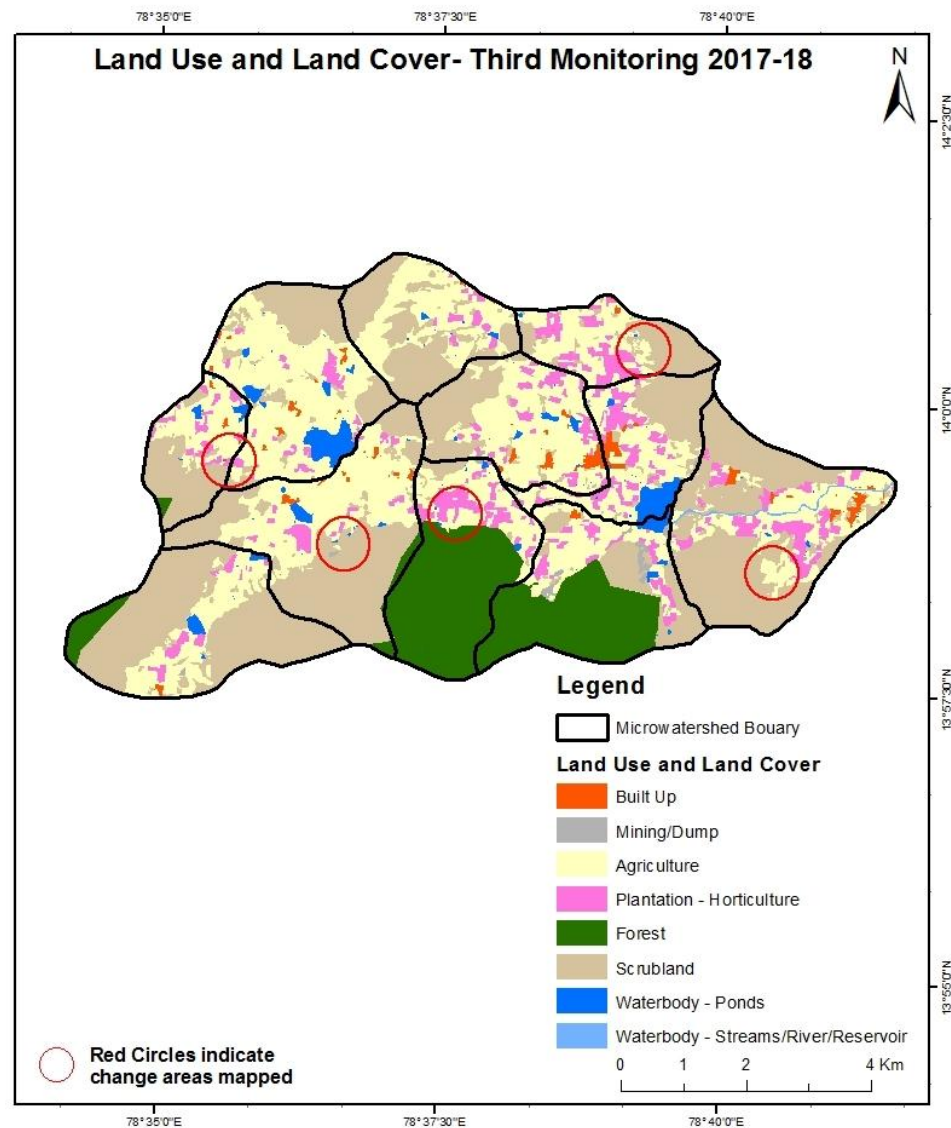
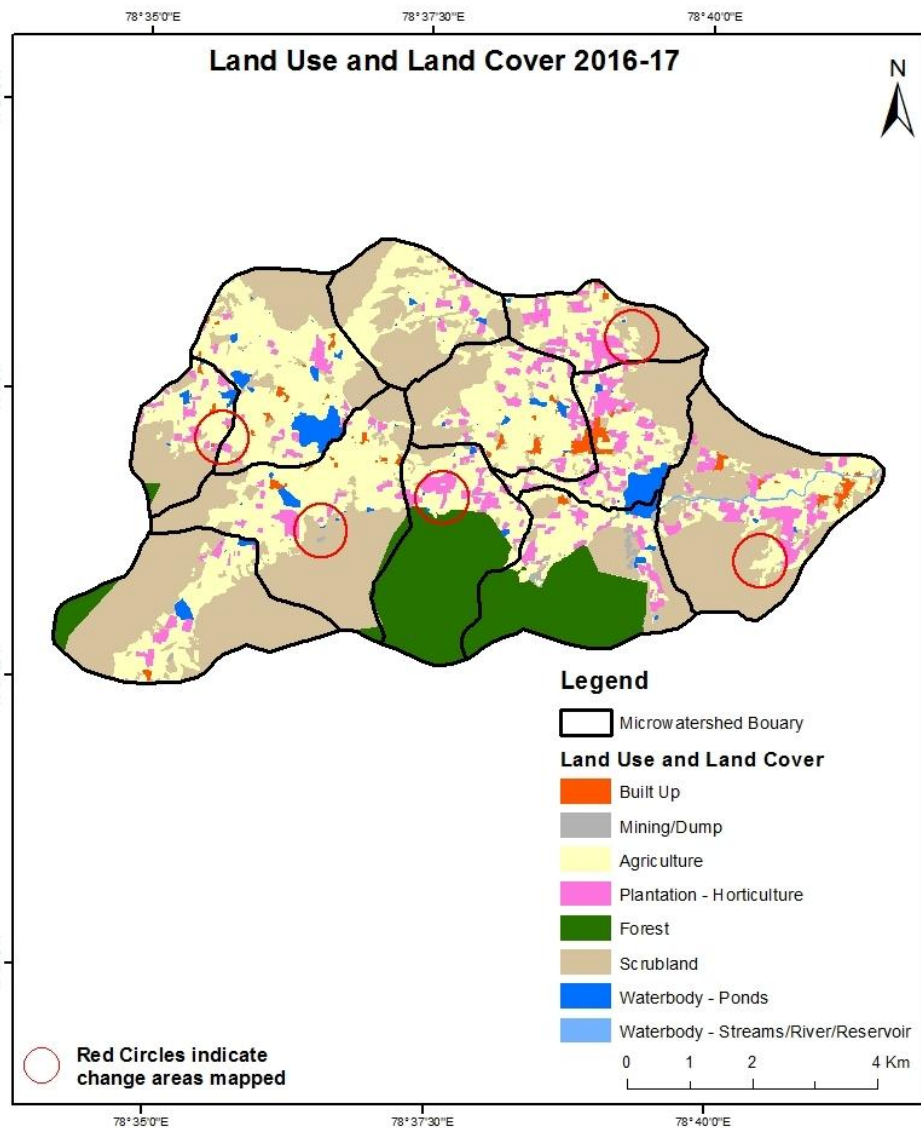
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



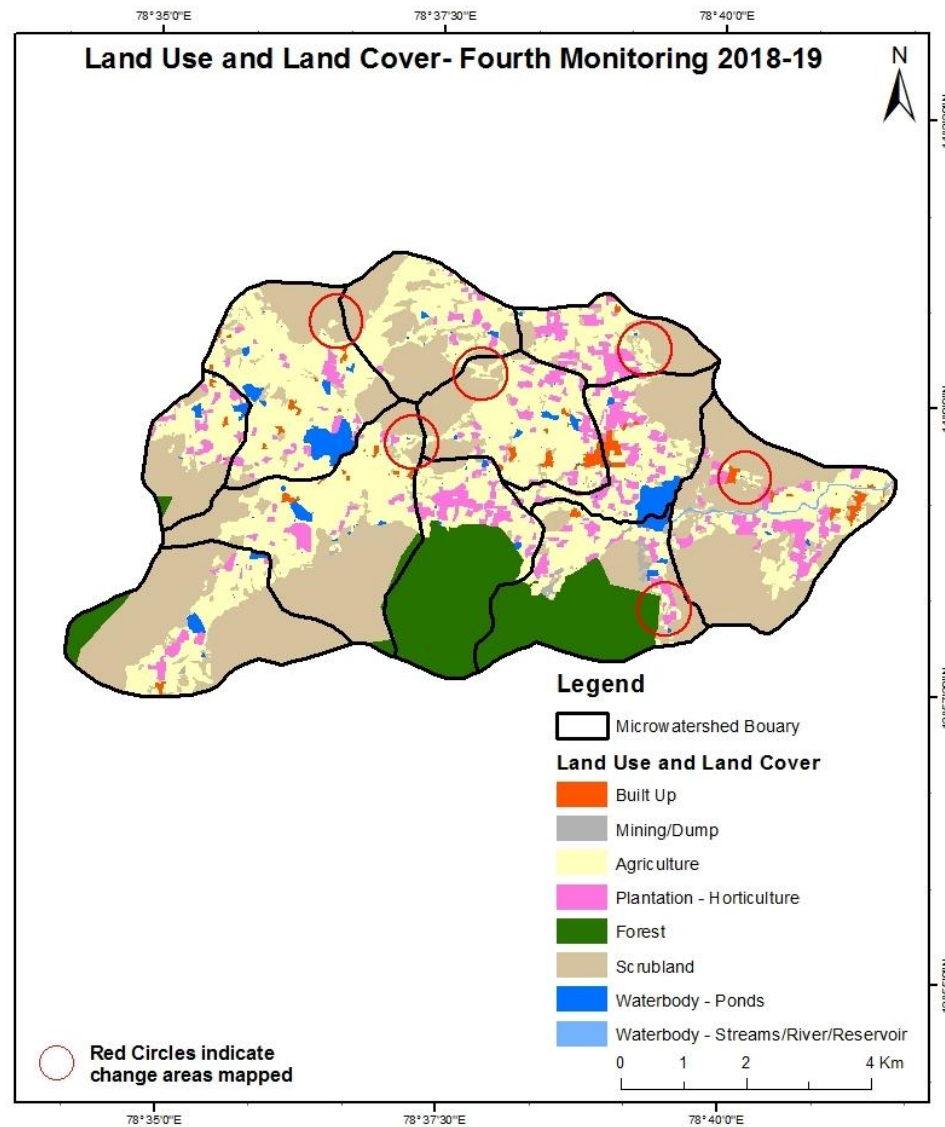
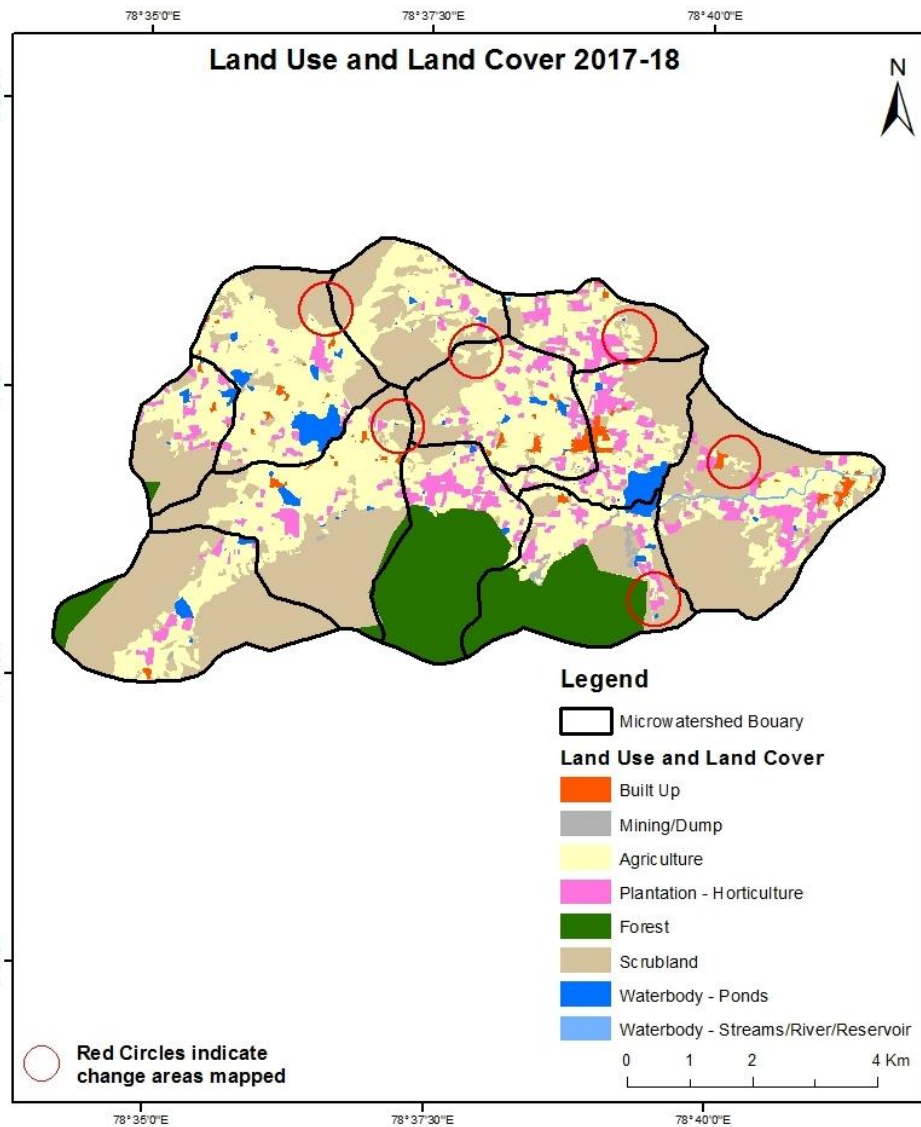
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



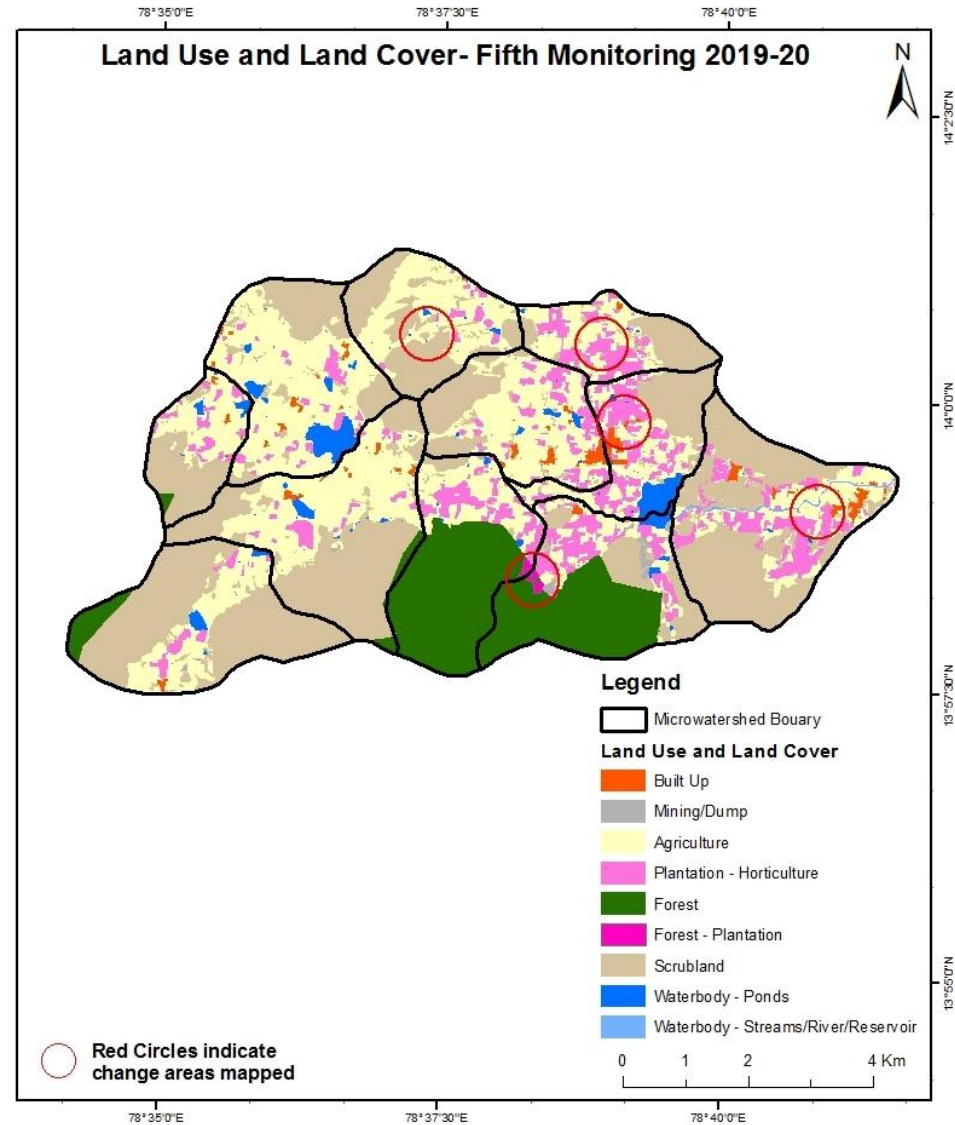
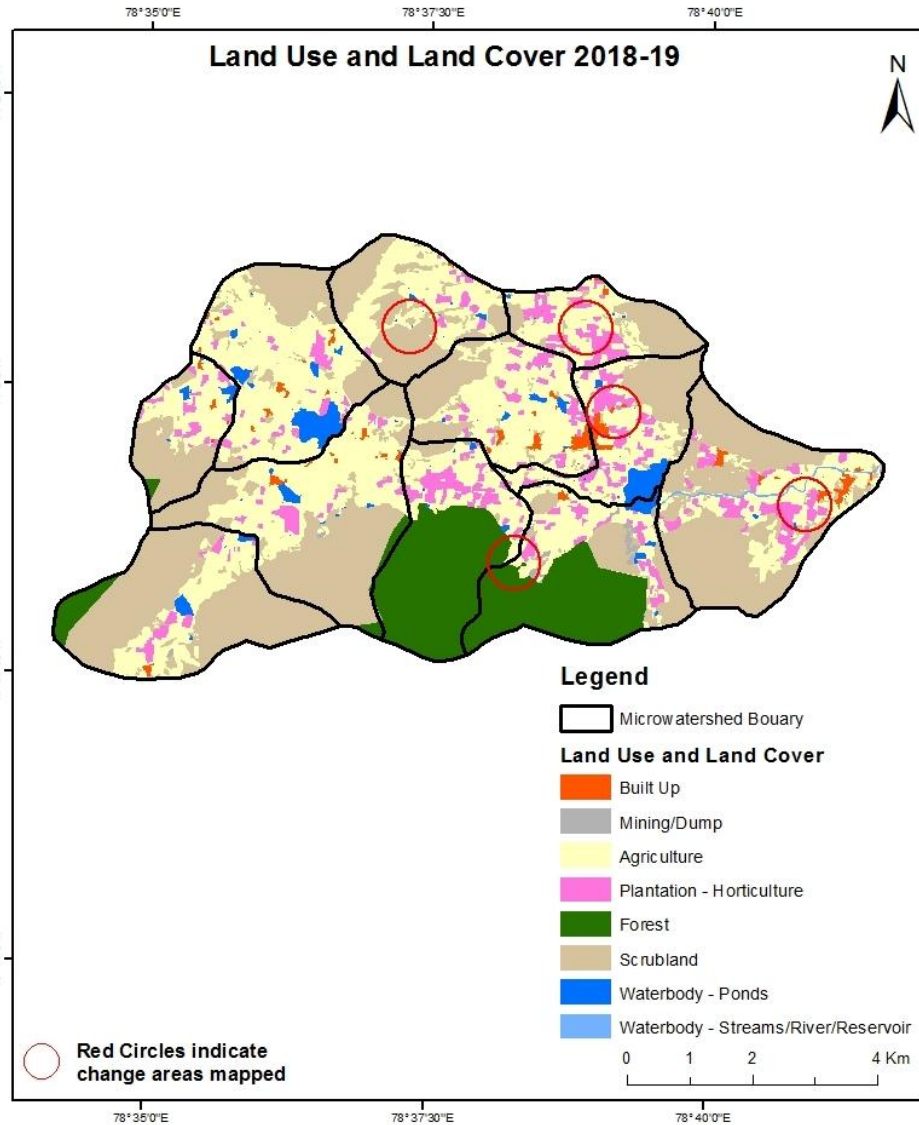
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

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



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

Agriculture to Plantation



TO: 2011-12 (78°40'44.043"E 13°58'58.796"N)



TO: 22 October 2015

Agriculture to Water body



TO: 2011-12 (78°37'20.797"E 14°0'46.164"N)



TO: 22 October 2015

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

Scrub to Agriculture



T0: 2011-12 (78°35'59.132"E 14°0'42.966"N)



T1: 22 October 2015

Scrub to Built-up



T0: 2011-12 (78°39'3.731"E 13°59'38.825"N)



T1: 22 October 2015

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

Agriculture to Plantation



T1

T1: 2015-16(78°35'2.39"E 13°59'51.036"N)



T2

T2: 05 January 2017

Agriculture to Plantation



T1

T1: 2015-16 (78°35'28.588"E 14°0'0.716"N)



T2

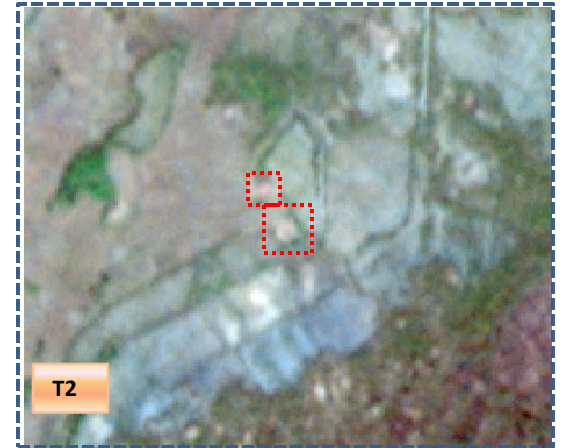
T2: 05 January 2017

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

Agriculture to Water body

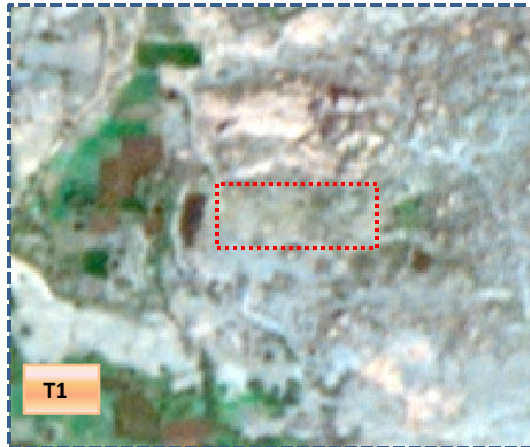


T1: 2015-16(78°35'39.777"E 13°58'19.702"N)



T2: 05 January 2017

Scrub to Agriculture



T1: 2015-16(78°39'8.979"E 14°0'38.768"N)



T2: 05 January 2017

Table showing change matrix depicting Land cover transitions during study period-2011-12 to 2015-16

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	52.52										52.52	
Mining/dump		15.29	0.22								15.51	
Agriculture	10.14	3.22	2045.51	46.97				3.87		6.16	2115.87	
Plantation Horticulture	1.14		10.06	315.57						0.18	326.95	
Forest			2.99		752.41					0.37	755.77	
Forest Plantation												
Barren Rocky												
Scrub	4.15	3.86	95.71					2417.70		1.43	2522.85	
Waterbody- Streams/River									11.42		11.42	
Waterbody – Ponds										123.80	123.80	
Grand Total	67.94	22.37	2154.49	362.54	752.41			2421.57	11.42	131.94	5924.69	

- 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 66 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrubland and water body in T1.
- In T1 108 ha of the agriculture area has increased from mining/dump, plantations, forest, scrubland and water body 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-2015-16 to 2016-17

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	67.94										67.94	
Mining/dump		20.93						1.43			22.37	
Agriculture	1.23		2062.38	88.32				0.37		2.19	2154.49	
Plantation Horticulture	0.10		6.05	356.36						0.03	362.54	
Forest			1.57		750.80					0.03	752.41	
Forest Plantation												
Barren Rocky												
Scrub	0.04		22.07	2.04				2397.35		0.07	2421.57	
Waterbody- Streams/River									11.42		11.42	
Waterbody – Ponds			0.11							131.83	131.94	
Grand Total	69.31	20.93	2092.19	446.73	750.80			2399.16	11.42	134.15	5924.69	

- 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 91 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T2.
- In T2 29 ha of the agriculture area has increased from plantations, forest, 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-2016-17 to 2017-18

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	69.31										69.31	
Mining/dump		20.93									20.93	
Agriculture			2076.46	15.36						0.38	2092.19	
Plantation Horticulture			1.20	445.52						0.00	446.73	
Forest					750.80						750.80	
Forest Plantation												
Barren Rocky												
Scrub			14.47					2384.36		0.33	2399.16	
Waterbody- Streams/River									11.42		11.42	
Waterbody – Ponds										134.15	134.15	
Grand Total	69.31	20.93	2092.12	460.88	750.80			2384.36	11.42	134.87	5924.69	

- 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 15 ha of the agriculture area has decreased and it is converted into plantations and water body in T3.
- In T3 15 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-2017-18 to 2018-19

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	69.31										69.31	
Mining/dump		20.93									20.93	
Agriculture	0.58		2077.60	13.89						0.05	2092.12	
Plantation Horticulture			7.36	453.47						0.05	460.88	
Forest			5.47		745.33						750.80	
Forest Plantation												
Barren Rocky												
Scrub	0.36	0.66	69.61	0.49				2313.19		0.04	2384.36	
Waterbody- Streams/River			0.06						11.37		11.42	
Waterbody – Ponds										134.87	134.87	
Grand Total	70.24	21.60	2160.09	467.85	745.33			2313.19	11.37	135.01	5924.69	

- 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 14 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 82 ha of the agriculture area has increased from plantations, forest, scrubland and water body 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-2018-19 to 2019-20

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	70.24										70.24	
Mining/dump		20.76	0.58	0.25							21.60	
Agriculture	1.95		1972.00	176.40		9.38				0.36	2160.09	
Plantation Horticulture	0.26		3.42	464.18							467.85	
Forest					745.26	0.08					745.33	
Forest Plantation												
Barren Rocky												
Scrub	0.51	0.36	23.41	2.40				2286.27		0.25	2313.19	
Waterbody- Streams/River			0.26						11.11		11.37	
Waterbody – Ponds										135.01	135.01	
Grand Total	72.96	21.12	1999.67	643.22	745.26	9.46		2286.27	11.11	135.62	5924.69	

- 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 178 ha of the agriculture area has decreased and it is converted into Built-up, plantations, forest and water body in T5.
- In T5 27 ha of the agriculture area has increased from mining/dump, plantations, scrubland and water body 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 11 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2011-12 (T0) & 2018-19 (T5) years.
4. There is an increase of 38 & 67 Hectares From T0 to T1 & T3-T4, there is a decrease of 62, -0.07 & 160 ha from T1-T2, T2-T2 & T4-T5 respectively and overall decrease of 116 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2018-19 (T5) years.
5. There is **an increase of 316 ha of the Plantation/Horticulture** area has been increased between 2011-12 (T0) & 2018-19 (T5) years.
6. There is a decrease of 236 Hectares in Scrubland area as compared between 2011-12 (T0) & 2018-19 (T5) years.
7. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.