

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -29/2011-12
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

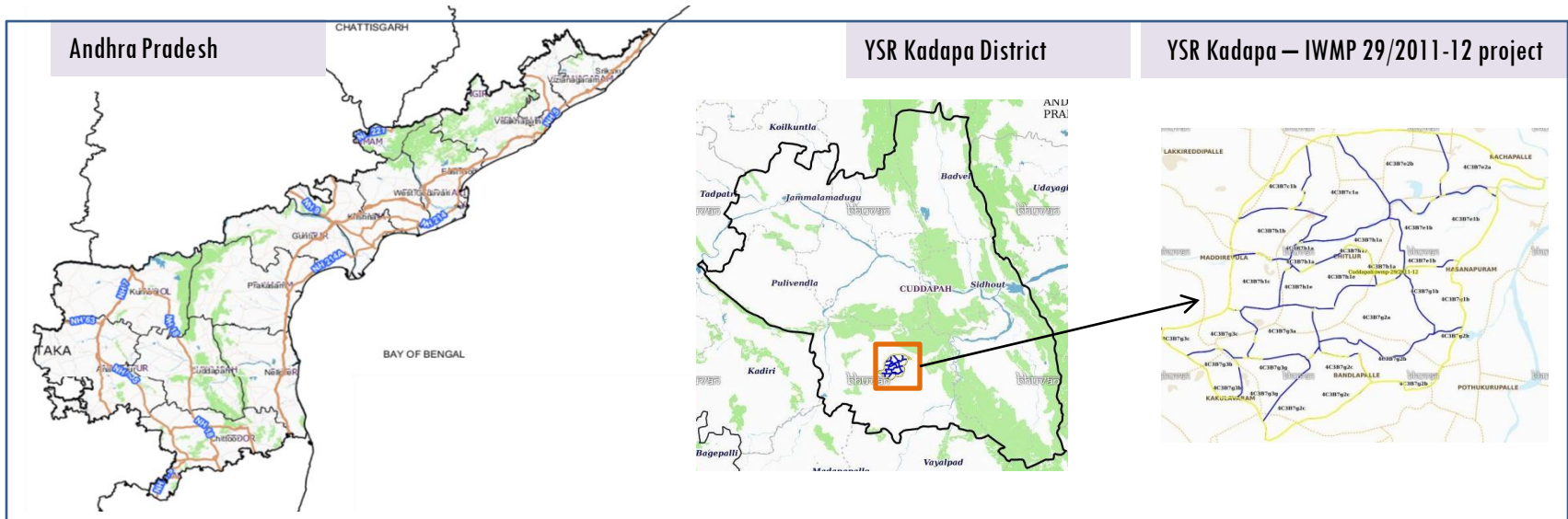
E X E C U T I V E S U M M A R Y

- 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-29/2011-12, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is **9,640** ha. It comprises of 17 micro watersheds.
- In the project area 210 Drishti photos were uploaded showing 15 check dams/Rock fill dam, 4 livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 51 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 67 % is covered by the agriculture, 17 % is scrubland, 4 % is covered by plantation, 7 % is water body area and remaining by other land use classes.

PROJECT : YSR KADAPA - IWMP-29/2011-12

DISTRICT : YSR KADAPA , STATE : ANDHRA PRADESH

- The study area falls in Ramapuram Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is **9,640** ha. It comprises of 17 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**	T1
	2011-12	2012-13	2019-20
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	210
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

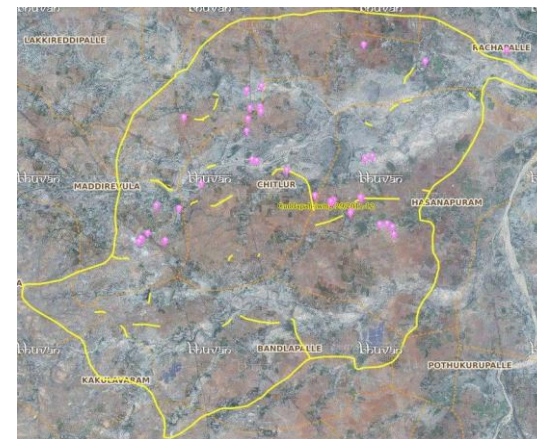


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

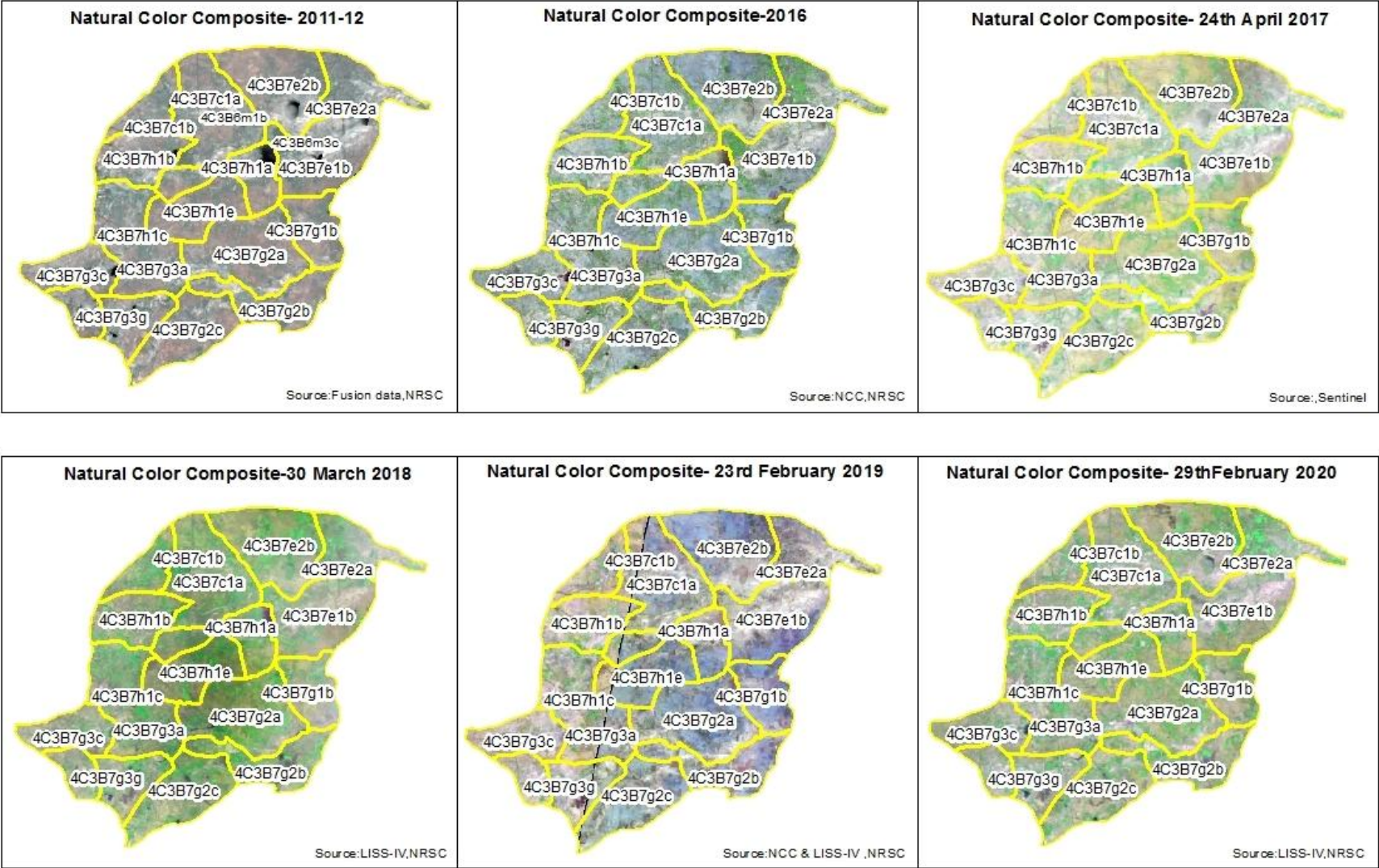
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agronomic measures	0	0
2	Afforestation	21	15
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	8	8
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	7	7
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 (fodder development, varmi compost)	4	4
15	Soil moisture conservation	0	0
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity	0	0
18	Others	204	180
	TOTAL	244	210

MONITORING IN THE PROJECT AREA

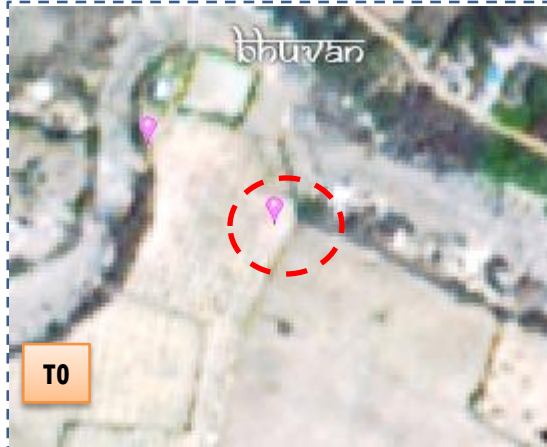
Site Wise Changes in the Project

- 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.

Natural Colour Composite (NCC)



Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-29/2011-12



T0: 30th April 2013



T1: 12 January 2019

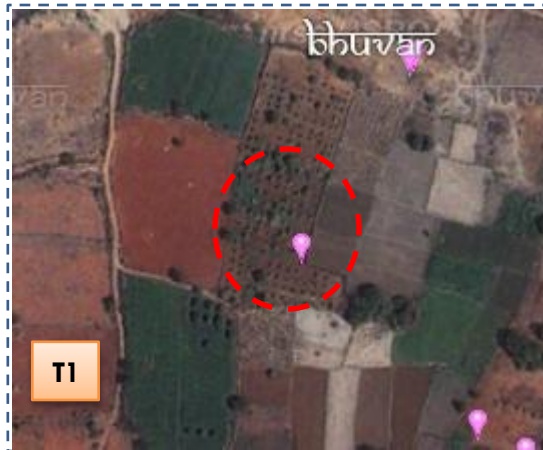


Drishti Sl no. 2012181 MWS :4C3B7g2b

Farm pond



T0: 30th April 2013



T1: 12 January 2019



Drishti Sl no. 1846764 MWS :4C3B7h1e

Horticulture

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-29/2011-12



T0

T0: 30th April 2013



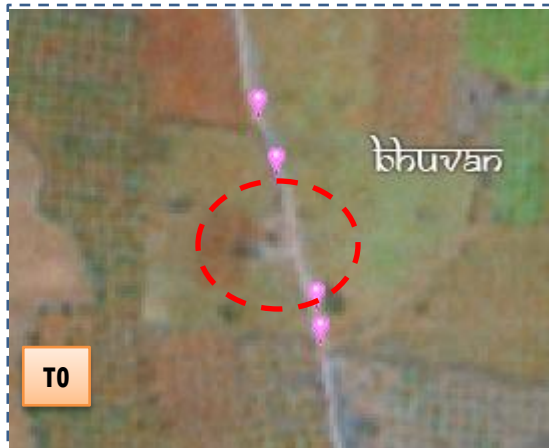
T1

T1: 12 January 2019



Drishti Sl no. 2455995 MWS :4C3B7g2a

Horticulture



T0

T0: 30th April 2013



T1

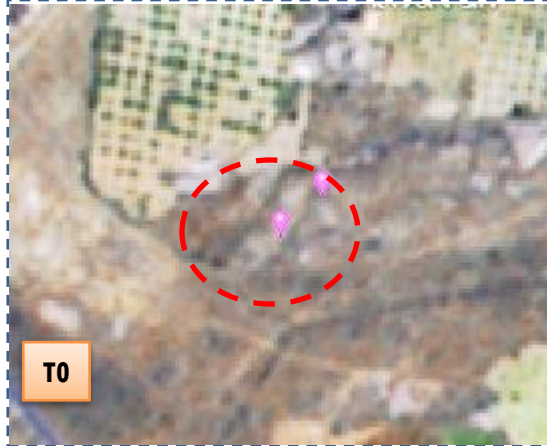
T1: 12 January 2019



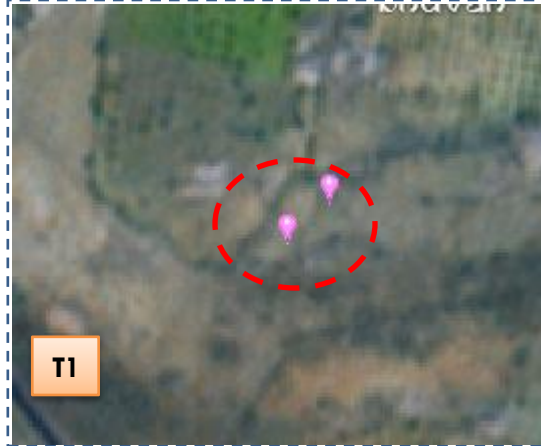
Drishti Sl no. 2456077 MWS :4C3B7g2a

Horticulture

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-29/2011-12



T0: 2010-11



T1: 20 March 2015



Drishti SI no. 178626 MWS : 4C3B1t3a

boulder outlet Civil works



T0: 2010-11



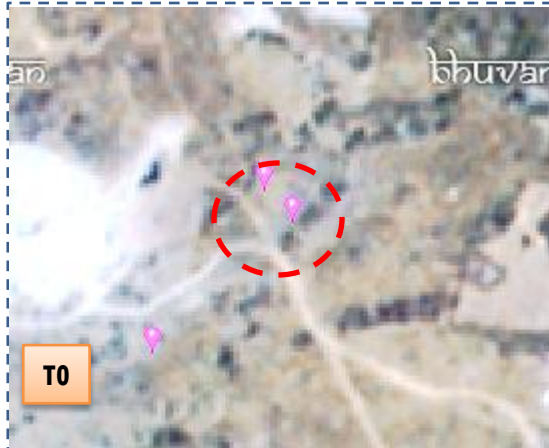
T1: 20 March 2015



Drishti SI no. 2449279 MWS :4C3B1t3a

Horticulture

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-29/2011-12



T0

T0: 2010-11



T1

T1: 20 March 2015



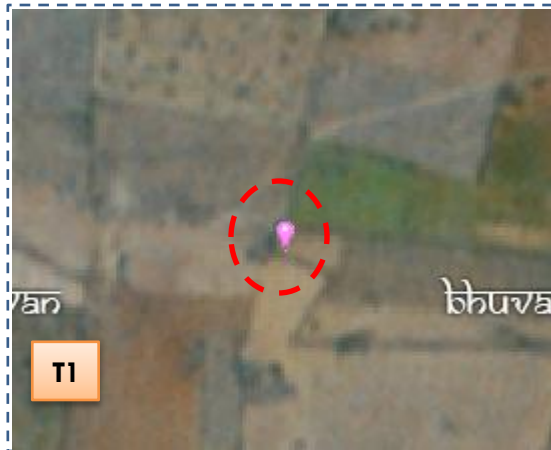
Drishti Sl no. 178671 MWS :4C3B1u3d

Rock fill dam (Civil work)



T0

T0: 2010-11



T1

T1: 20 March 2015



Drishti Sl no. 86386 MWS : 4C3B1t3a

Horticulture

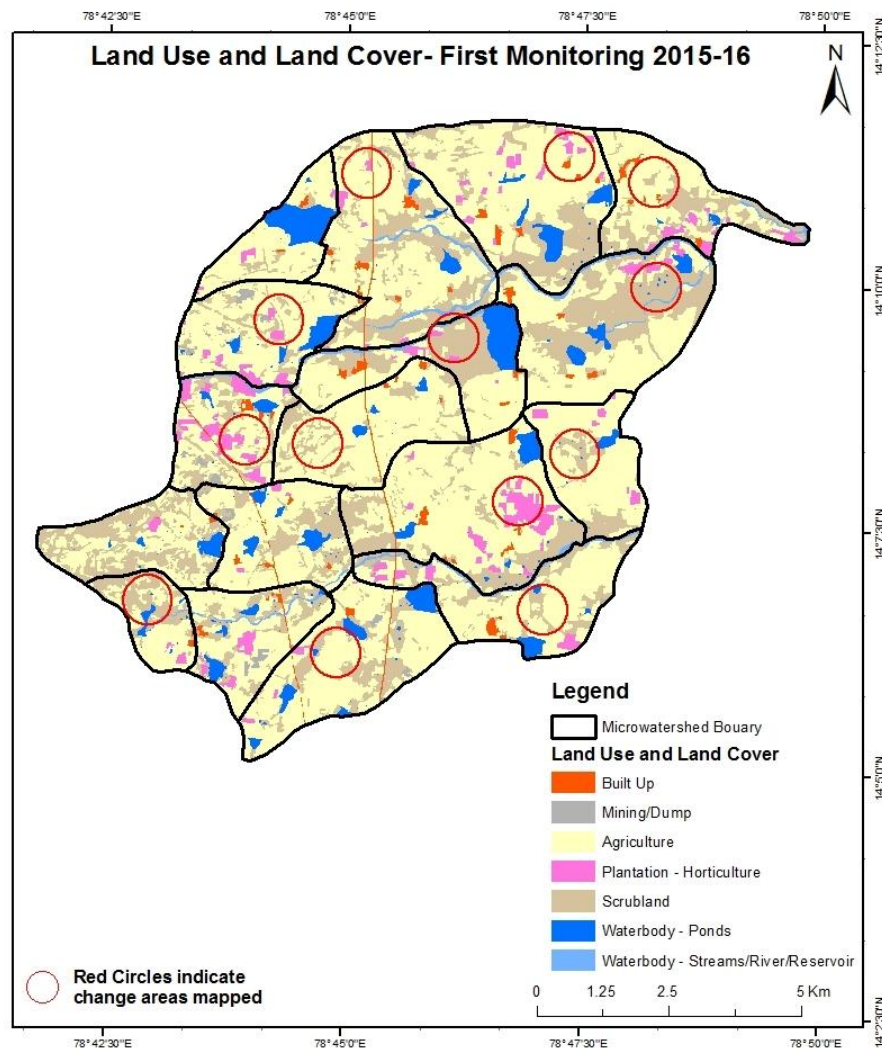
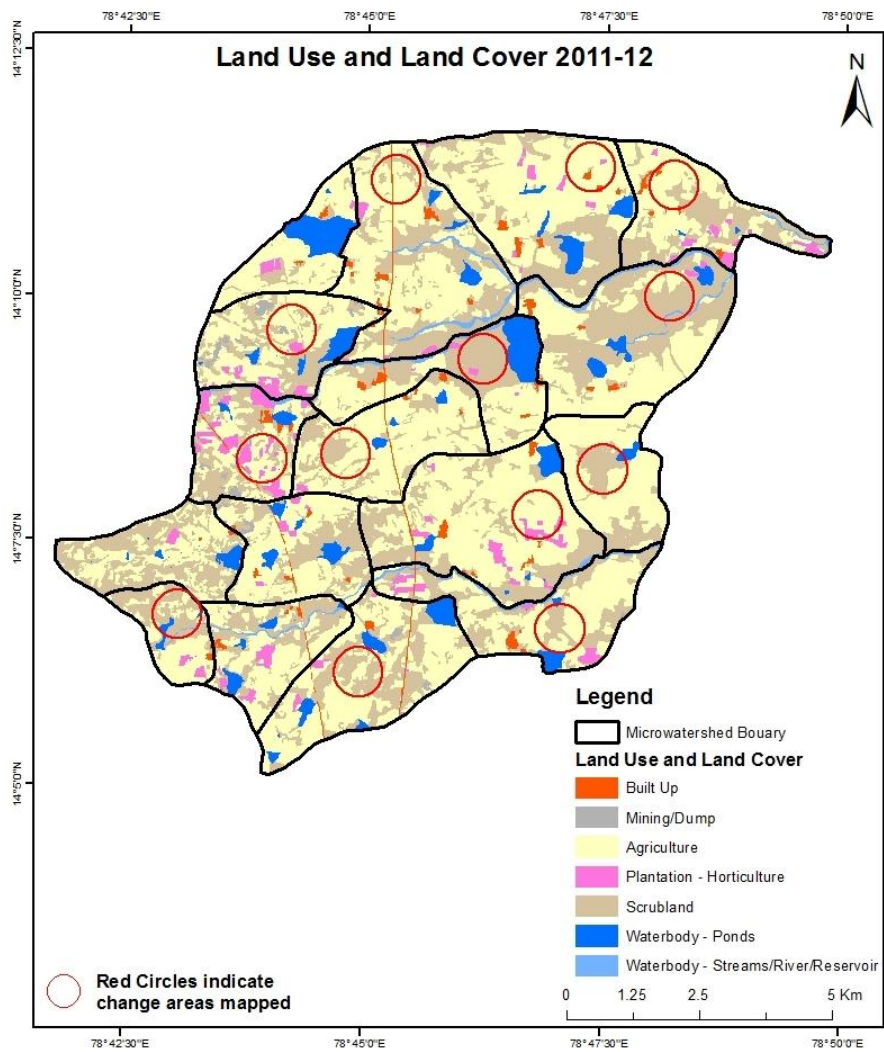
MONITORING IN THE PROJECT AREA

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)

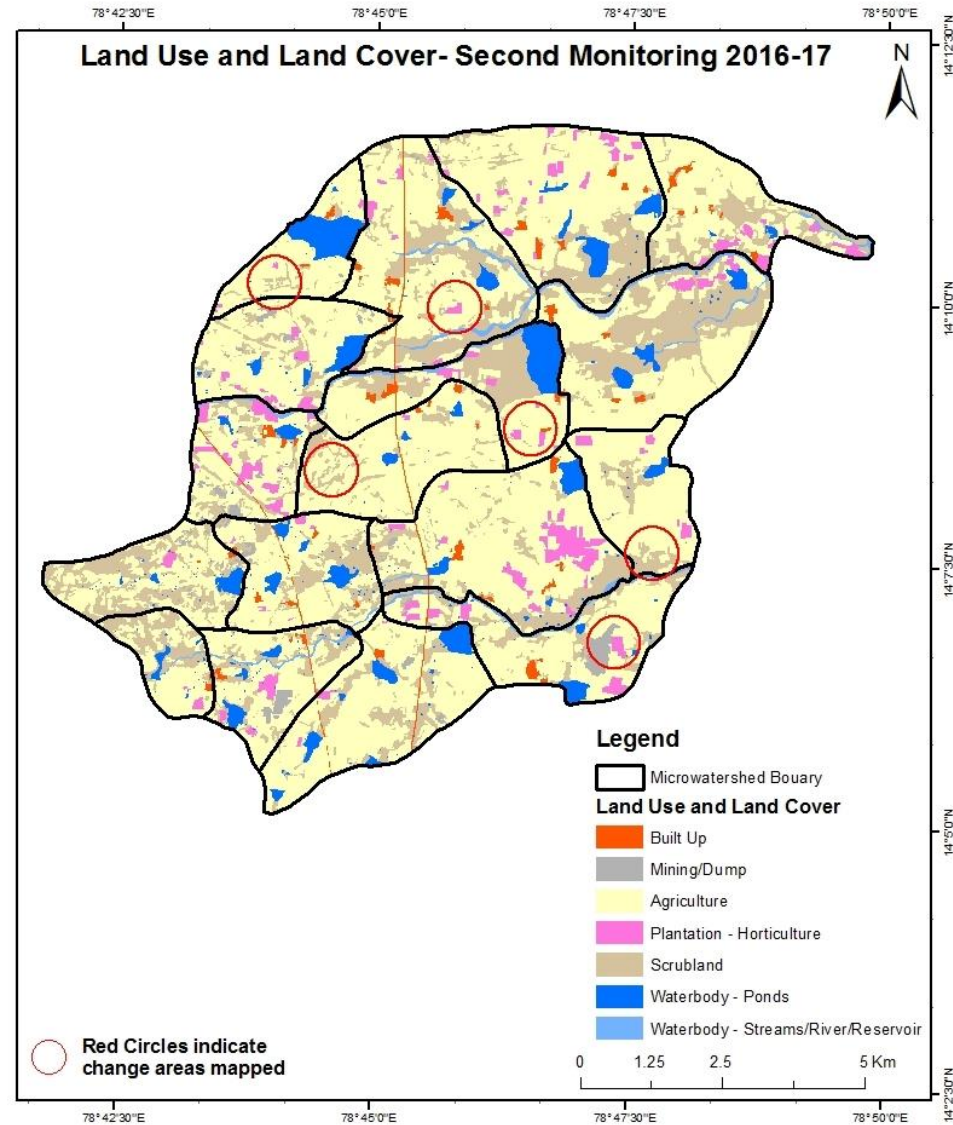
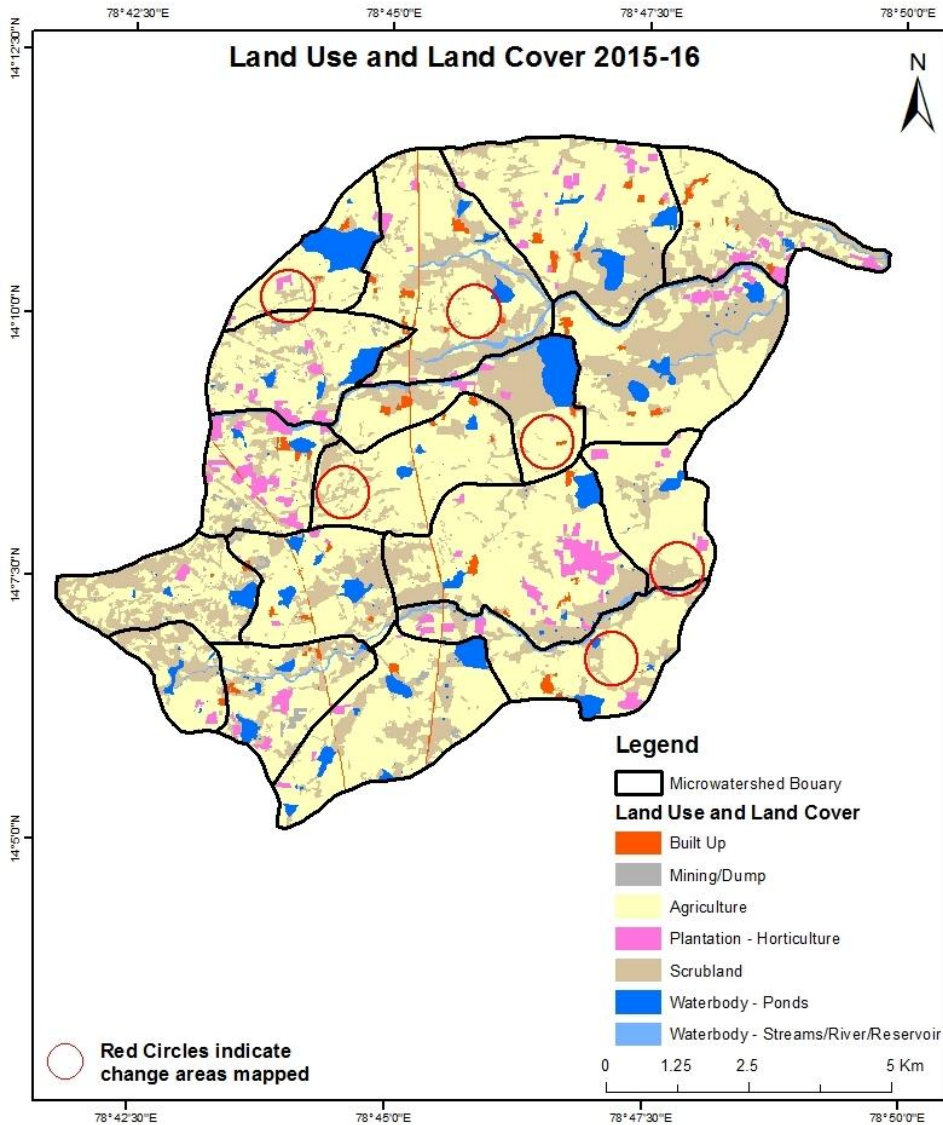
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



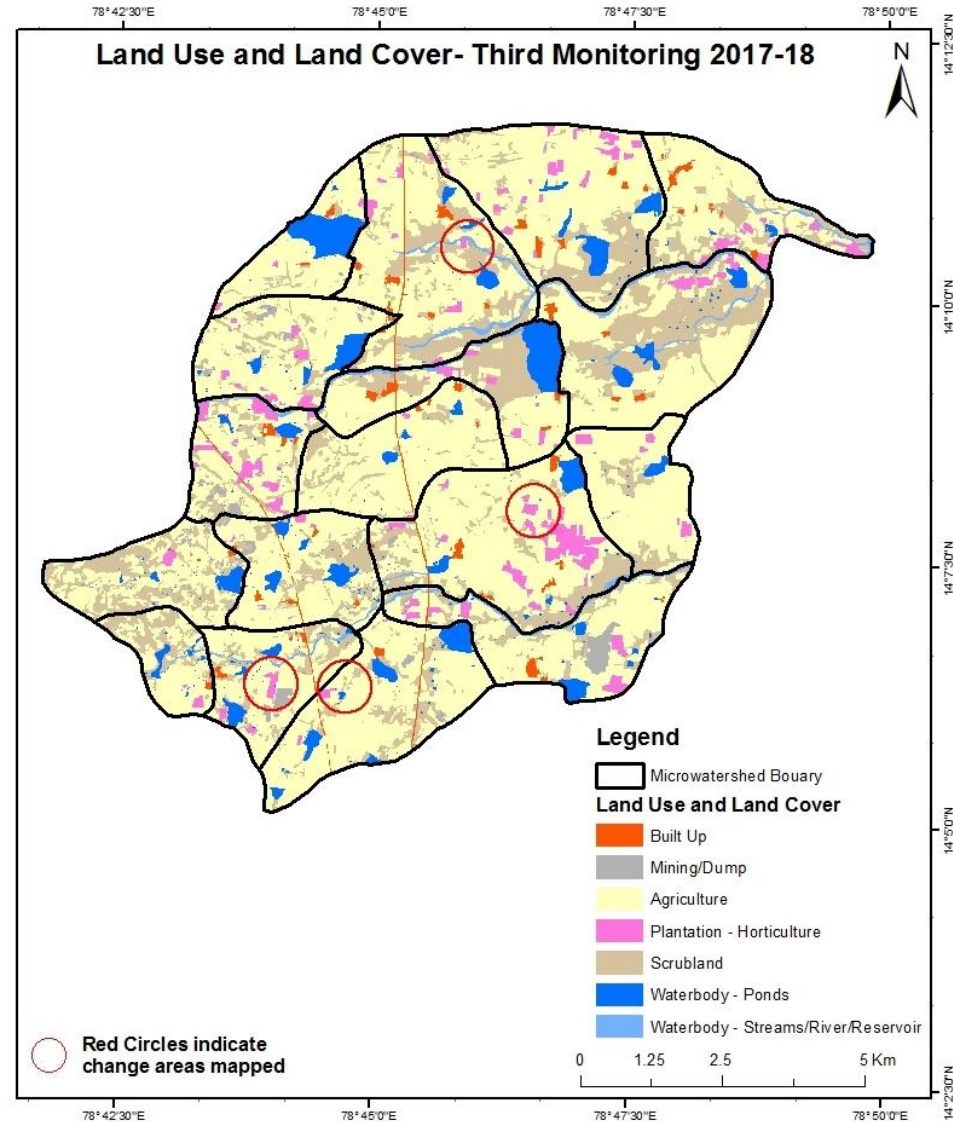
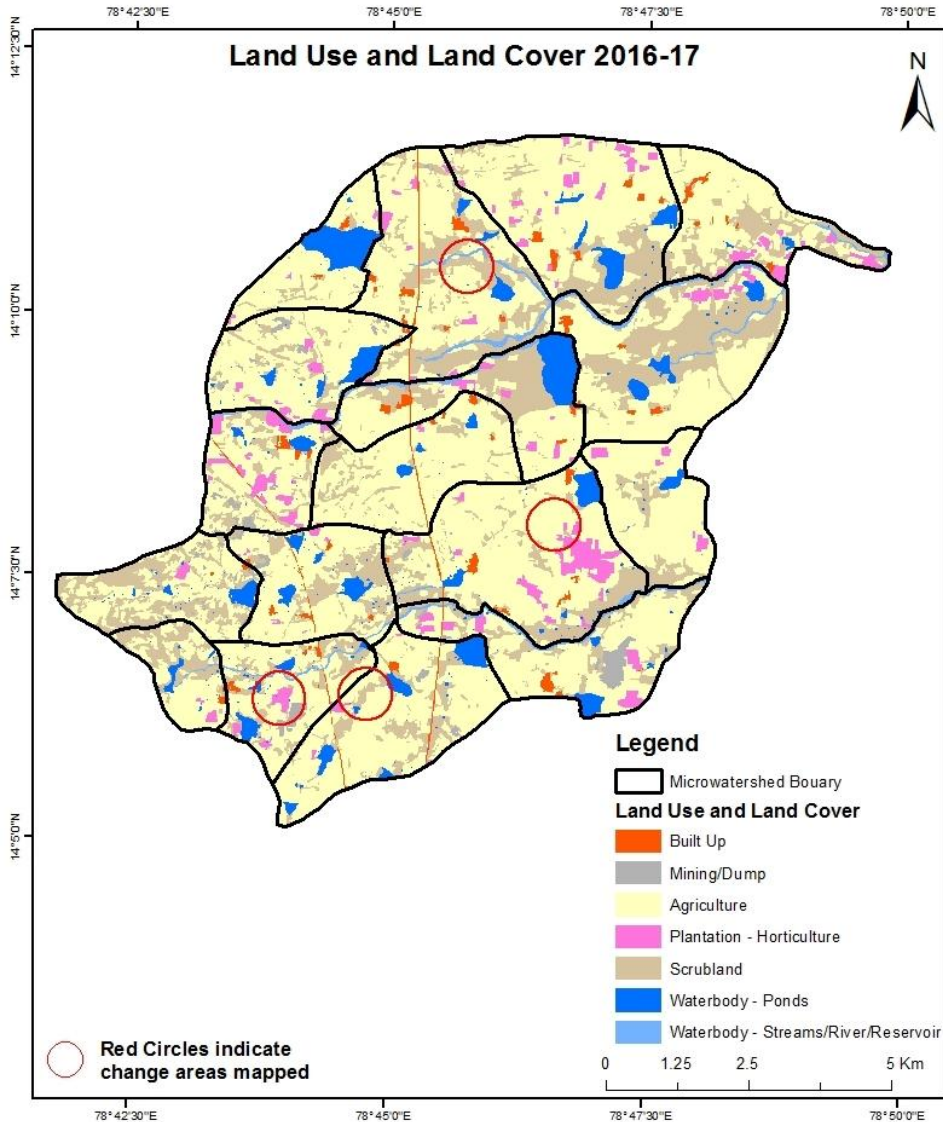
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



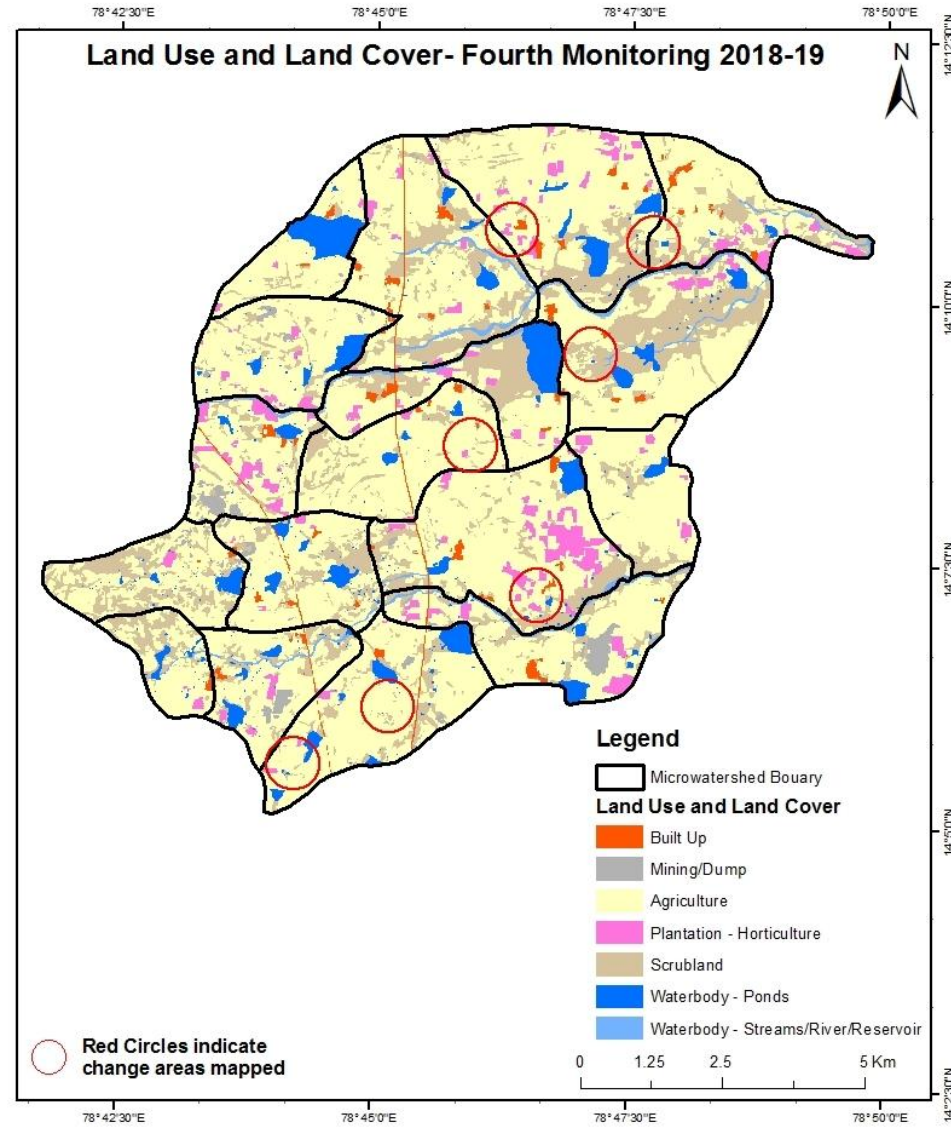
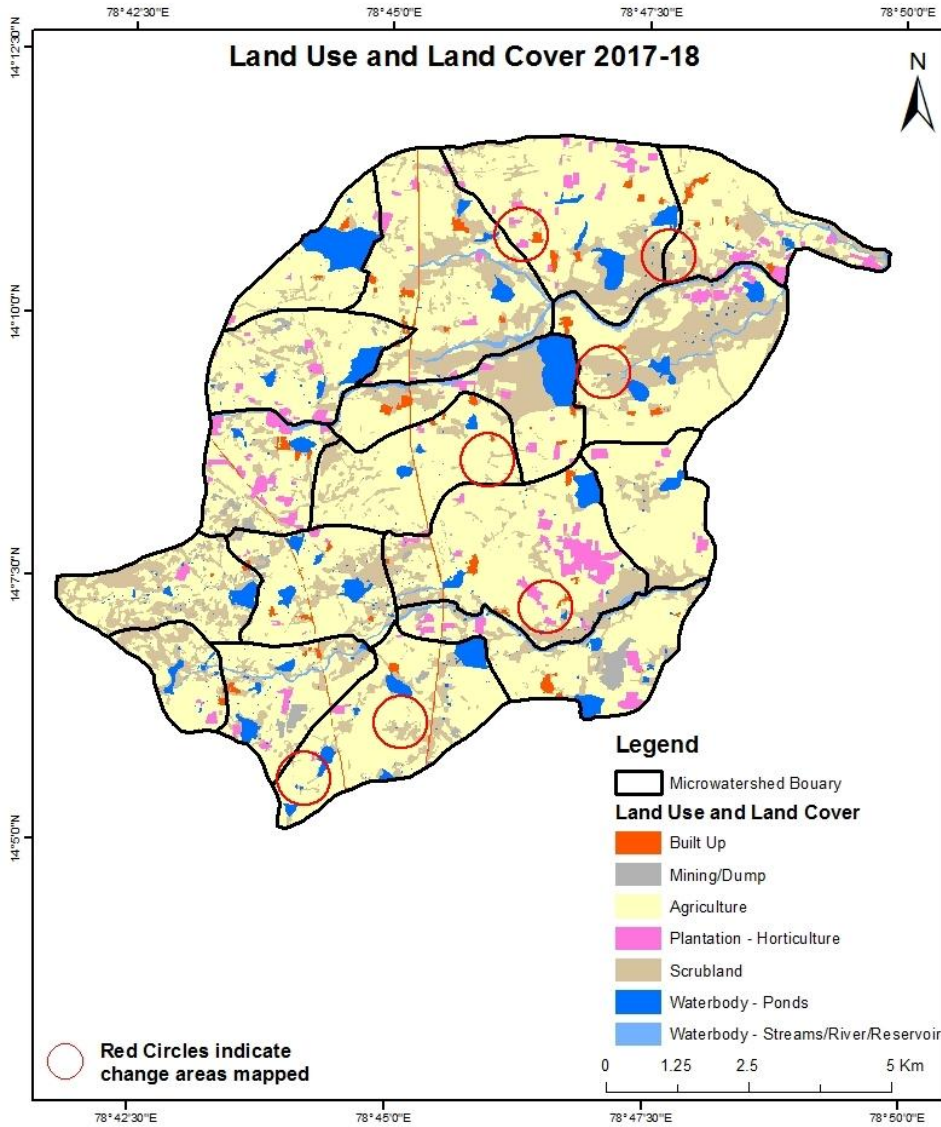
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



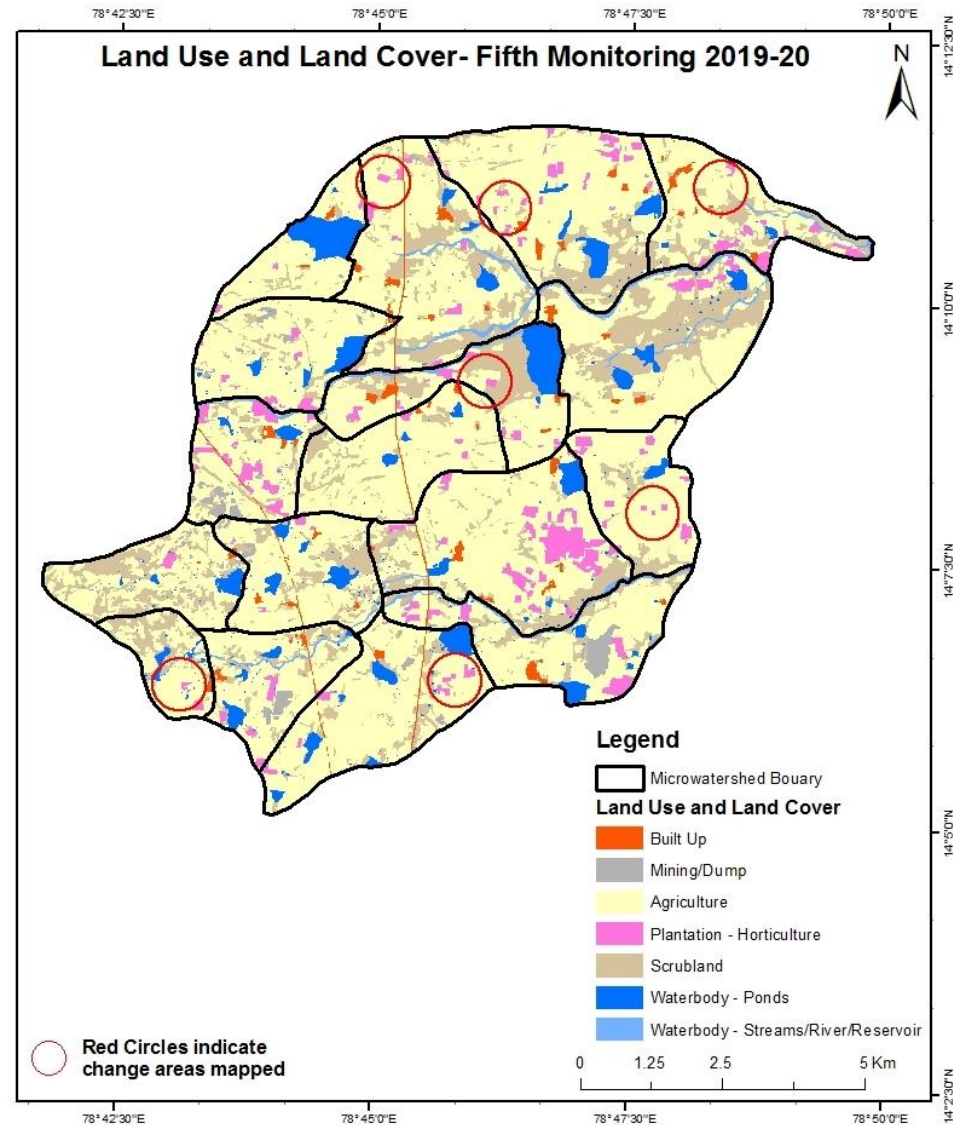
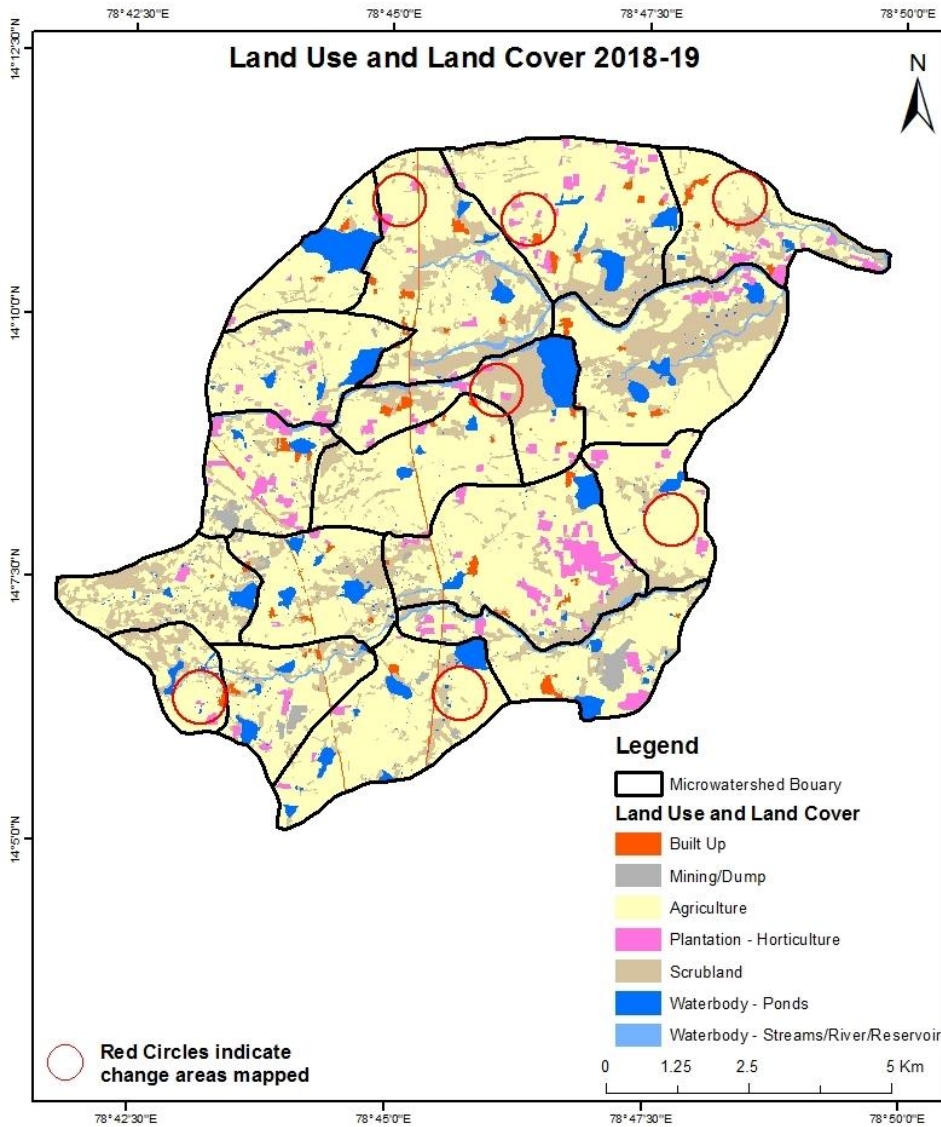
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



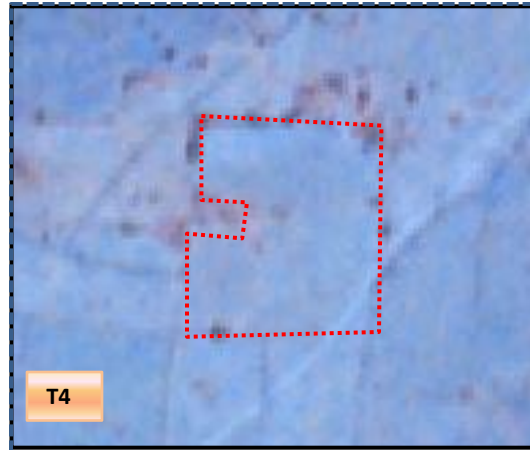
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



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

Agriculture to Plantation

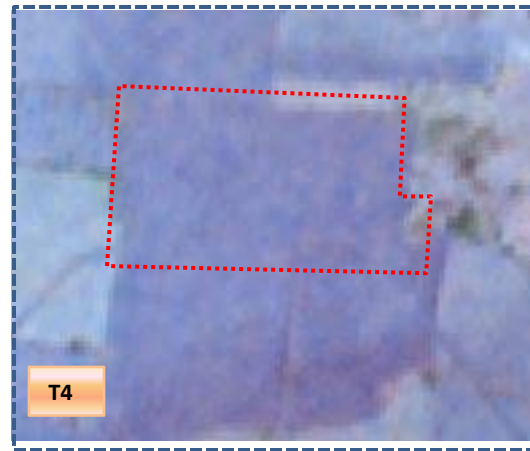


T4: 2018-19 (78°47'50.141"E 14°8'4.869"N)



T5: 29 February 2020

Agriculture to Plantaion



T4: 2018-19 (78°47'17.659"E 14°8'7.079"N)



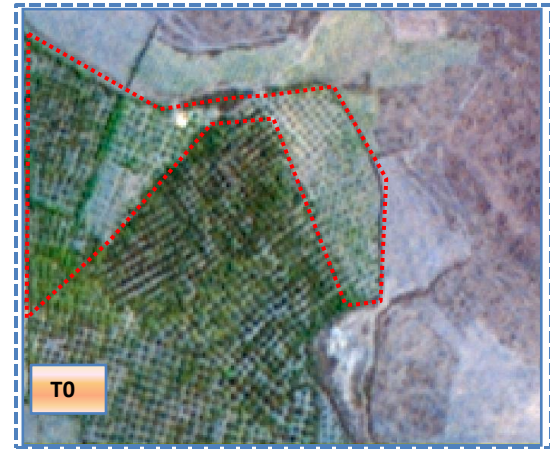
T5: 29 February 2020

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

Agriculture to Plantation



T0: 2011-12 (latlong)



T0: 13 May 2014

Agriculture to Plantation



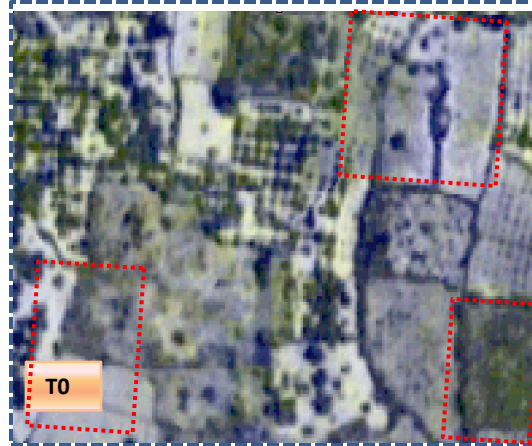
T0: 2011-12 (latlong)



T0: 13 May 2014

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

Agriculture to Plantation

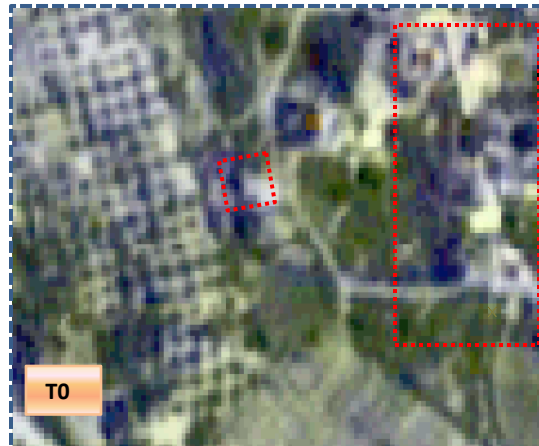


T0: 2011-12 (latlong)



T1: 13 May 2014

Agriculture to Built-up



T0: 2011-12 (latlong)



T1: 13 May 2014

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	
T0												
Built up	140.45										140.45	
Mining/dump		43.64	6.22								49.86	
Agriculture	1.54	8.79	5200.37	127.38				15.20		2.58	5355.85	
Plantation Horticulture	0.43	0.41	56.57	237.68						0.02	295.11	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	3.26	3.27	755.65	0.44				2385.39	0.06	16.40	3164.46	
Waterbody- Streams/River									161.30		161.30	
Waterbody – Ponds			1.26							471.95	473.21	
Grand Total	145.67	56.10	6020.07	365.50				2400.59	161.36	490.95	9640.24	

- 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 140 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 818 ha of the agriculture area has increased from mining/dump, plantations, 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	145.67										145.67	
Mining/dump		54.34	1.65							0.11	56.10	
Agriculture	0.74	32.55	5947.76	33.34						5.67	6020.07	
Plantation Horticulture			39.45	325.62						0.43	365.50	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.93	17.51	272.32					2103.64	2.48	3.71	2400.59	
Waterbody- Streams/River									161.36		161.36	
Waterbody – Ponds			0.02							490.93	490.95	
Grand Total	147.34	104.40	6261.20	358.96				2103.64	163.84	500.85	9640.24	

- 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 72 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T2.
- In T2 313 ha of the agriculture area has increased from mining/dump, plantations, 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	147.34										147.34	
Mining/dump		104.40									104.40	
Agriculture	2.04	1.37	6239.10	16.41						2.30	6261.20	
Plantation Horticulture		0.08	6.20	352.67						0.01	358.96	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	1.04		90.91					1997.33	7.25	7.11	2103.64	
Waterbody- Streams/River			0.18						163.67		163.84	
Waterbody – Ponds										500.85	500.85	
Grand Total	150.42	105.85	6336.38	369.07				1997.33	170.91	510.27	9640.24	

- 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 22 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T3.
- In T3 97 ha of the agriculture area has increased from plantations, scrubland and water body 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	150.42												150.42
Mining/dump		105.85											105.85
Agriculture	1.65	6.23	6274.89	49.88				2.09			1.65		6336.38
Plantation Horticulture	0.02		9.83	359.23									369.07
Forest													
Forest Plantation													
Barren Rocky													
Scrub	1.22	9.29	188.56					1795.68	2.12		0.47		1997.33
Waterbody- Streams/River									170.91				170.91
Waterbody – Ponds			0.13								510.14		510.27
Grand Total	153.30	121.36	6473.40	409.11				1797.77	173.04		512.26		9640.24

- 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 59 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations, scrubland and water body in T4.
- In T4 198 ha of the agriculture area has increased from plantations, 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	153.30										153.30	
Mining/dump		116.92	2.83					1.62			121.36	
Agriculture	1.28	1.96	6434.05	35.68						0.43	6473.40	
Plantation Horticulture			15.95	393.16							409.11	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.70	0.14	64.65					1731.86		0.42	1797.77	
Waterbody- Streams/River									173.04		173.04	
Waterbody – Ponds										512.26	512.26	
Grand Total	155.28	119.02	6517.48	428.84				1733.48	173.04	513.11	9640.24	

- 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 39 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T5.
- In T5 83 ha of the agriculture area has increased from mining/dump, plantations 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 51 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 664, 241, 75, 137 & 44 Hectares From T1 to T2, T2-T3, T3 to T4 & T4-T5 respectively and overall increase of 1161 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 133 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2018-19 (T5) years.
6. There is a decrease of 1,430 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.