

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -38/2011-12
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

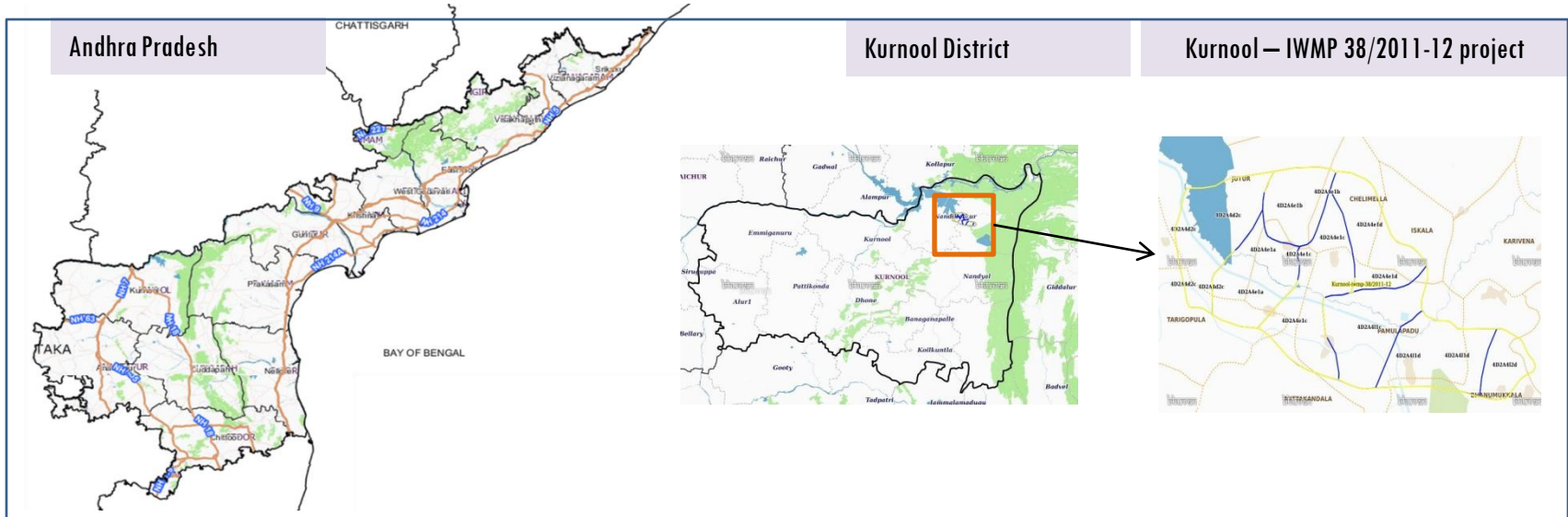
EXECUTIVE SUMMARY

- 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-38/2011-12, Kurnool District of Andhra Pradesh. The total geographical area of the project is **6,785** ha. It comprises of 8 micro watersheds.
- In the project area 595 Drishti photos were uploaded showing check dams/checks & plugins, Farm ponds, Livelihood measures and remaining showing others.
- Water bodies have shown an increased by 302 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 77% is covered by the agriculture, 3.5 % is covered by scrub land, 8.1 % is covered by water body and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-38/2011-12

DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Pamulapadu Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 6,785 ha. It comprises of 8 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 2019-20 (T5) period satellite images



- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).
- The average annual rainfall of the district is 665.5mm, which ranges from nil rainfall in January and December to 139.6 mm in September. August and September are the wettest months. The mean seasonal rainfall distribution is 459.1mm in southwest monsoon (June September), 133.7mm in northeast monsoon (Oct-Dec), 1.9 mm rainfall in Winter (Jan Feb) and 70.8 mm in summer (March–May).

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2011-12	2019-20
LISS IV	2011-12		
SCENE 1			14-Jan-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			14-Jan-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	Drishti Photographs		
		Total	595
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

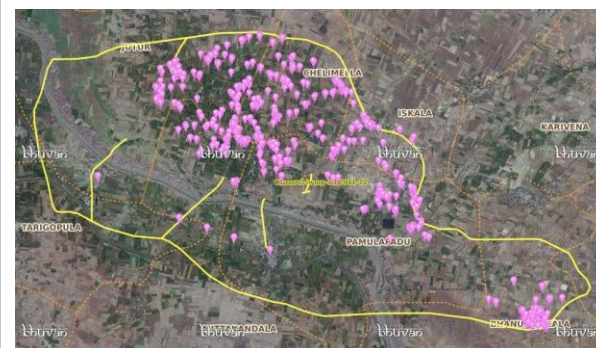


MWS Boundary



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	Afforestation	59	55
2	Agriculture/Horticulture	31	31
3	Blockplanting	0	0
4	Bund planting	0	0
5	Drainage Treatment	0	0
6	Farm ponds/Dug out pit	87	78
7	Check dams (Civil work)	174	150
8	Checks & plugins	56	51
9	Om (Other measurement)	0	0
10	LM (Livelihood Measures)	0	0
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	82	72
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	199	158
	TOTAL	688	595

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 T5 is 2019-20 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.

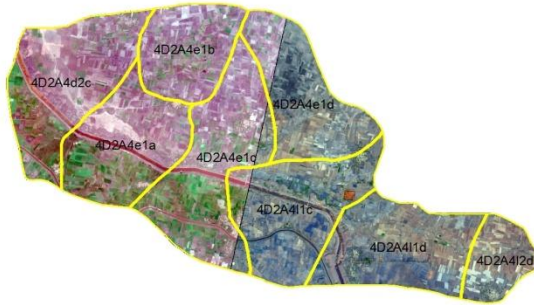
Natural Color Composite

Natural Color Composite- 2011-12



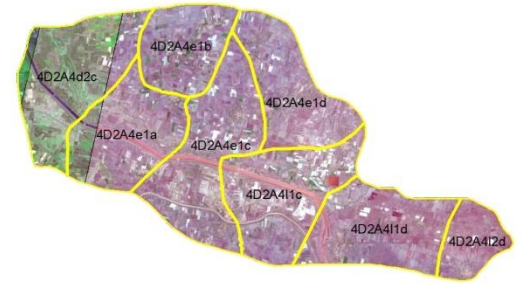
Source:Fusion data,NRSC

Natural Color Composite-14 th November 2015



Source:NCC,NRSC

Natural Color Composite- 1st April 2017



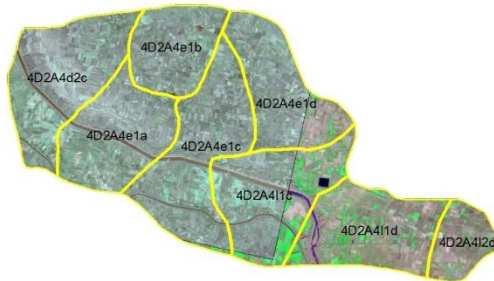
Source:NCC,NRSC

Natural Color Composite-1st March 2018



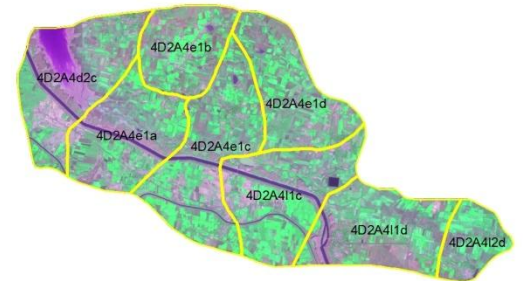
Source:LISS-IV,NRSC

Natural Color Composite-14th January 2019



Source:NCC,NRSC

Natural Color Composite- 14th January 2020



Source:LISS-IV,NRSC

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-38/2011-12



T1:2015-16

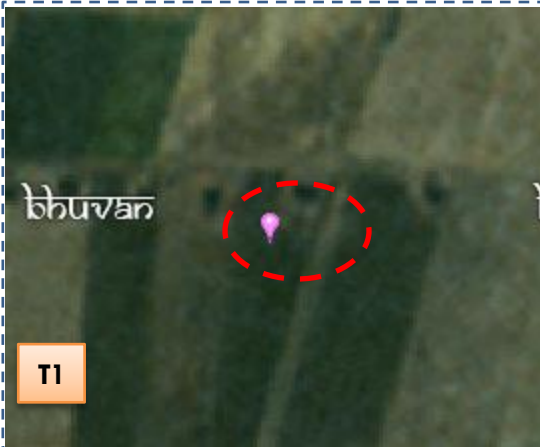


T2: 03 June 2017

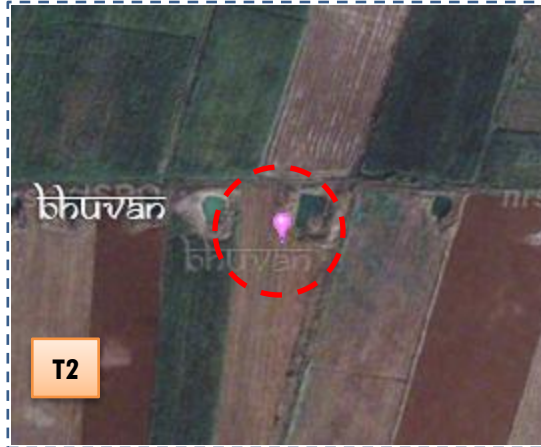


Drishti Sl no. 1176759 MWS :4D2A411c

Bund Plantation



T1:2015-16



T2: 03 June 2017



Drishti Sl no. 156984 MWS :4D2A4d2c

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-38/2011-12



T1

T1: 2015-16



T2

T2: 03 June 2017



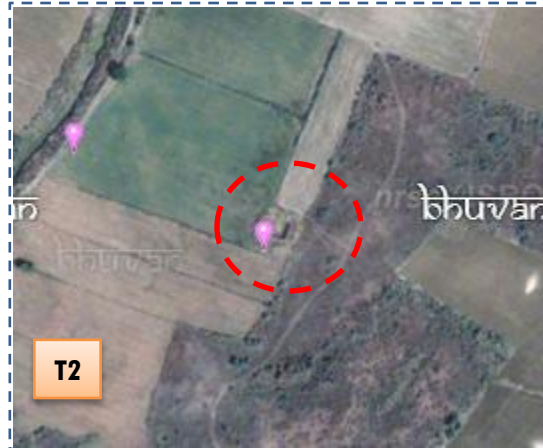
Drishti Sl no. 163009 MWS :4D2A4e1b

Farm pond



T1

T1: 2015-16



T2

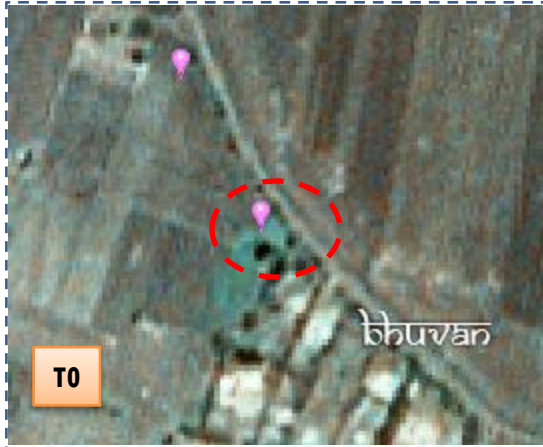
T2: 03 June 2017



Drishti Sl no. 2668078 MWS : 4D2A411d

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-38/2011-12



T0

bhuvan

T0:2010-11



T1

bhuvan

T1: 14 November 2015



Drishti Sl no. 141583 MWS :4D2A4e1a

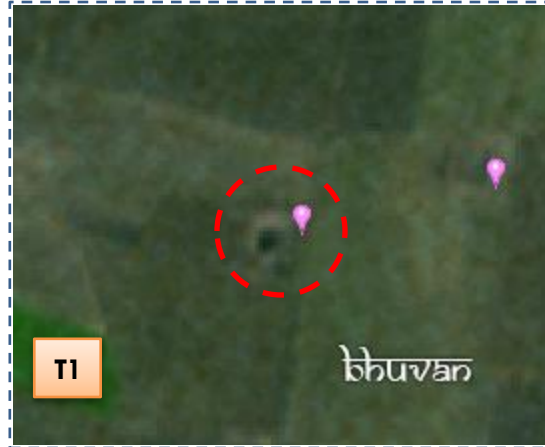
Bund



T0

bhuvan

T0:2010-11



T1

bhuvan

T1: 14 November 2015



Drishti Sl no. 163025 MWS :4D2A4e1a

Dug out

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-38/2011-12



T0

T0: 2010-11



T1

T1: 14 November 2015



Drishti Sl no. 1767806 MWS : 4D2A4e1c

Farm pond



T0

T0: 2010-11



T1

T1: 14 November 2015



Drishti Sl no. 2047038 MWS : 4D2A4e1c

Farm pond

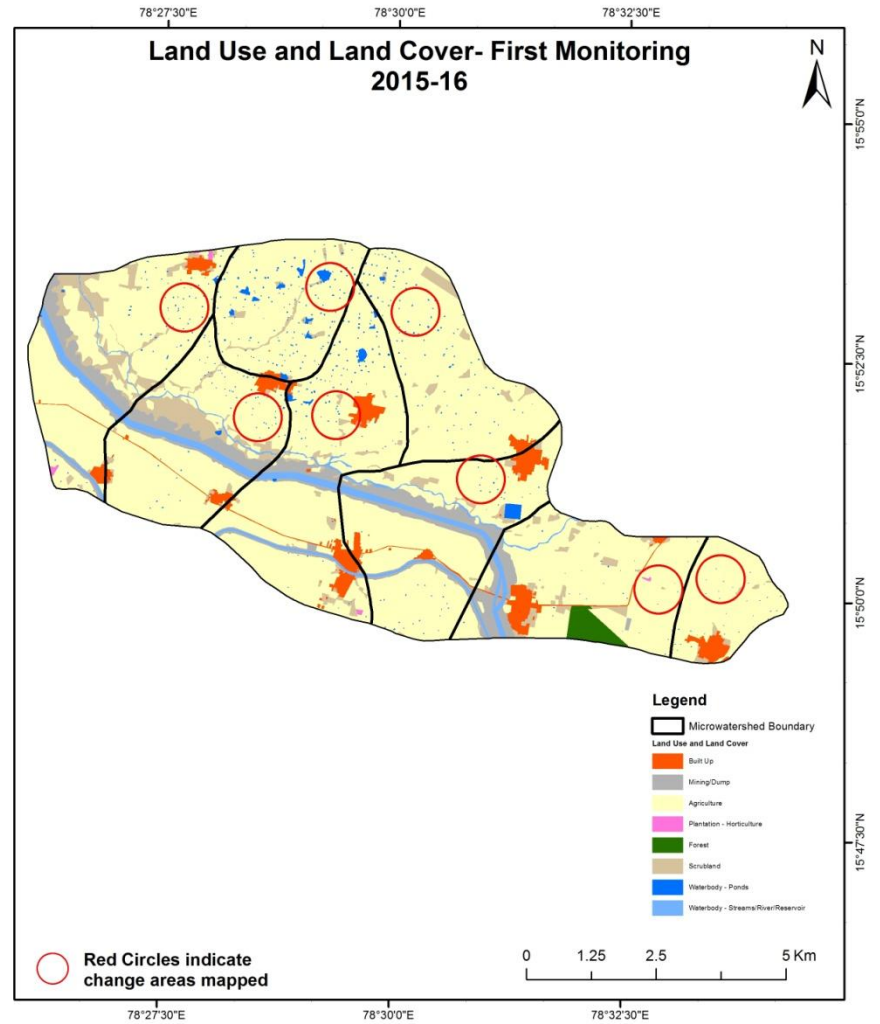
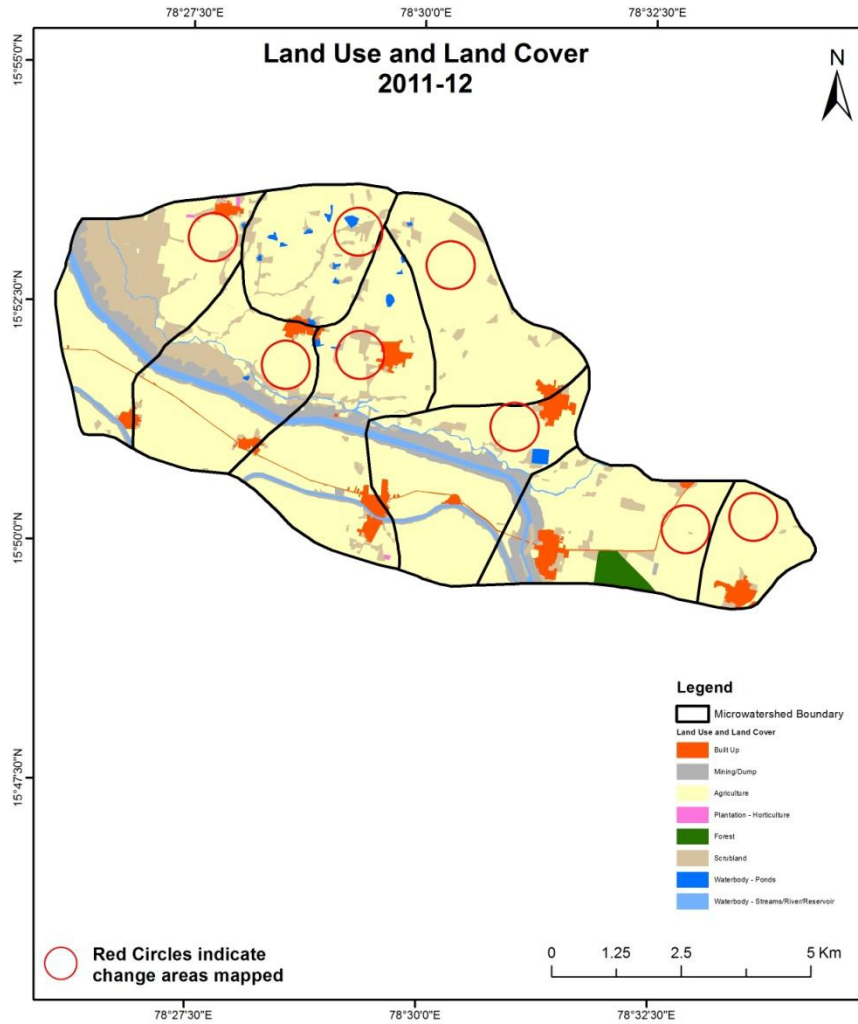
MONITORING IN THE PROJECT AREA

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 (2011-12) and row represents the T5 (2019-20)

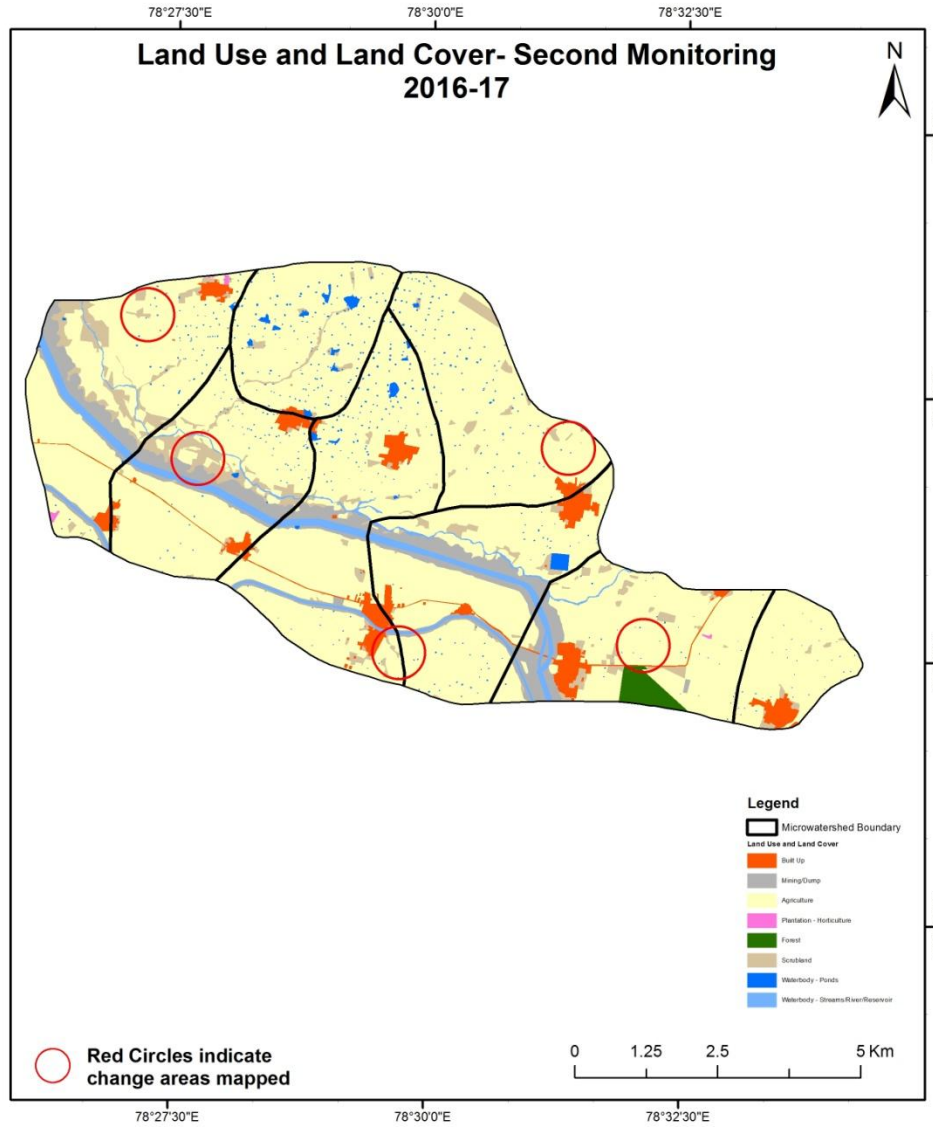
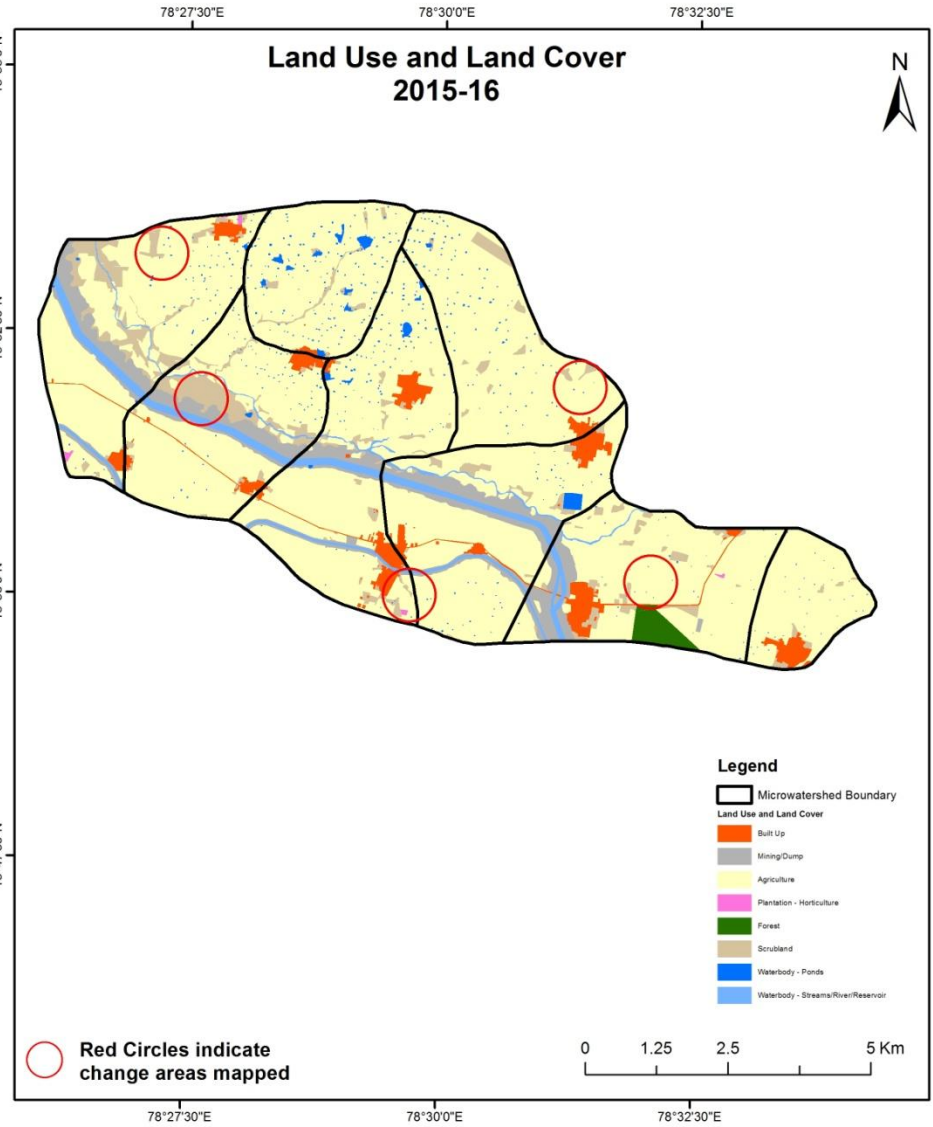
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



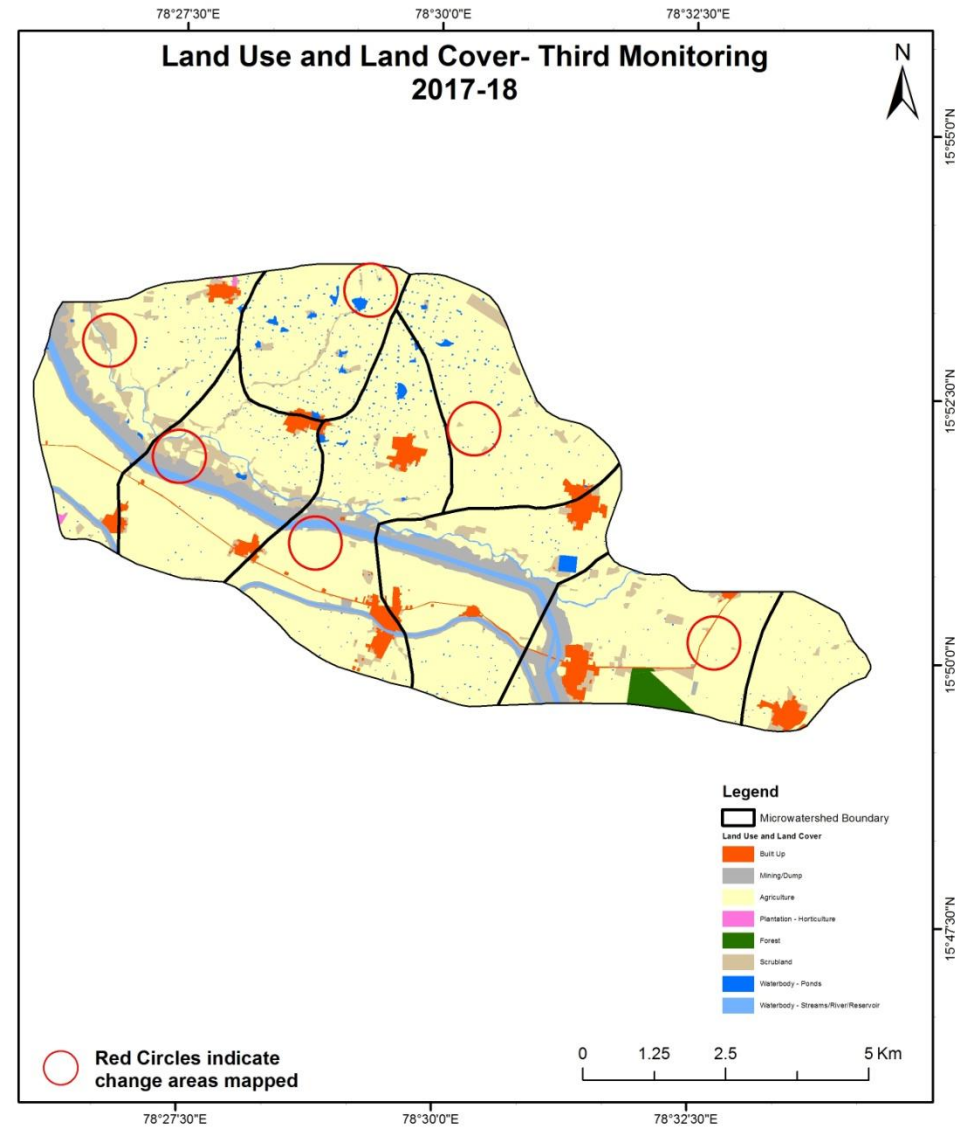
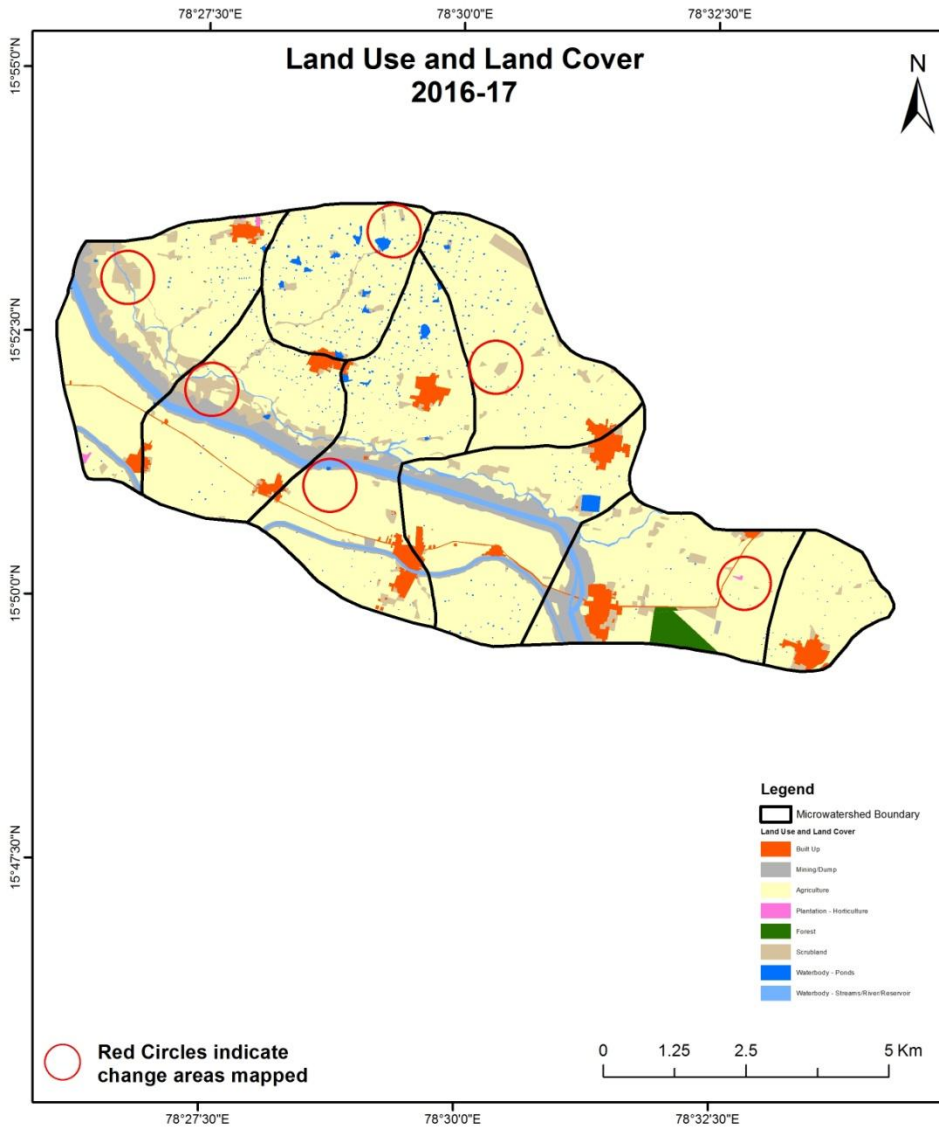
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



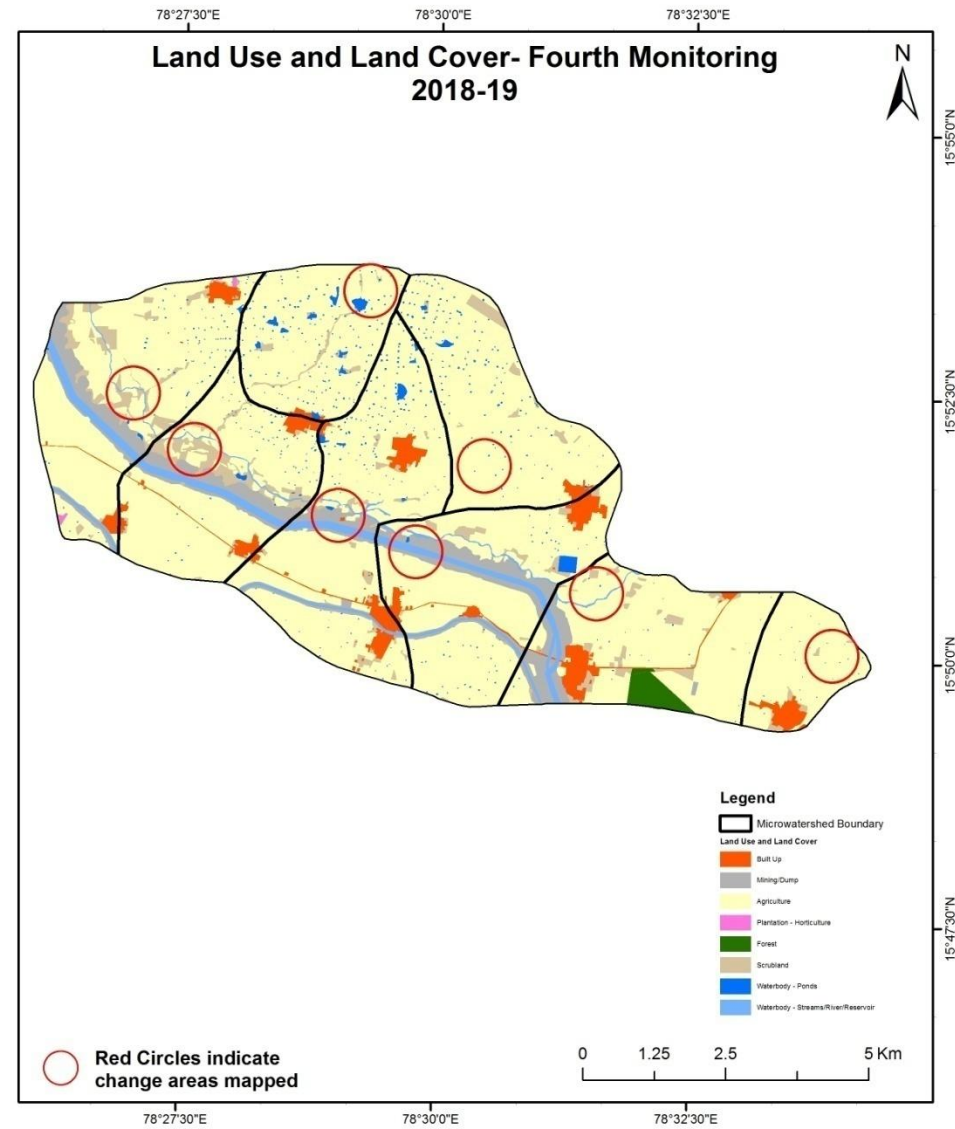
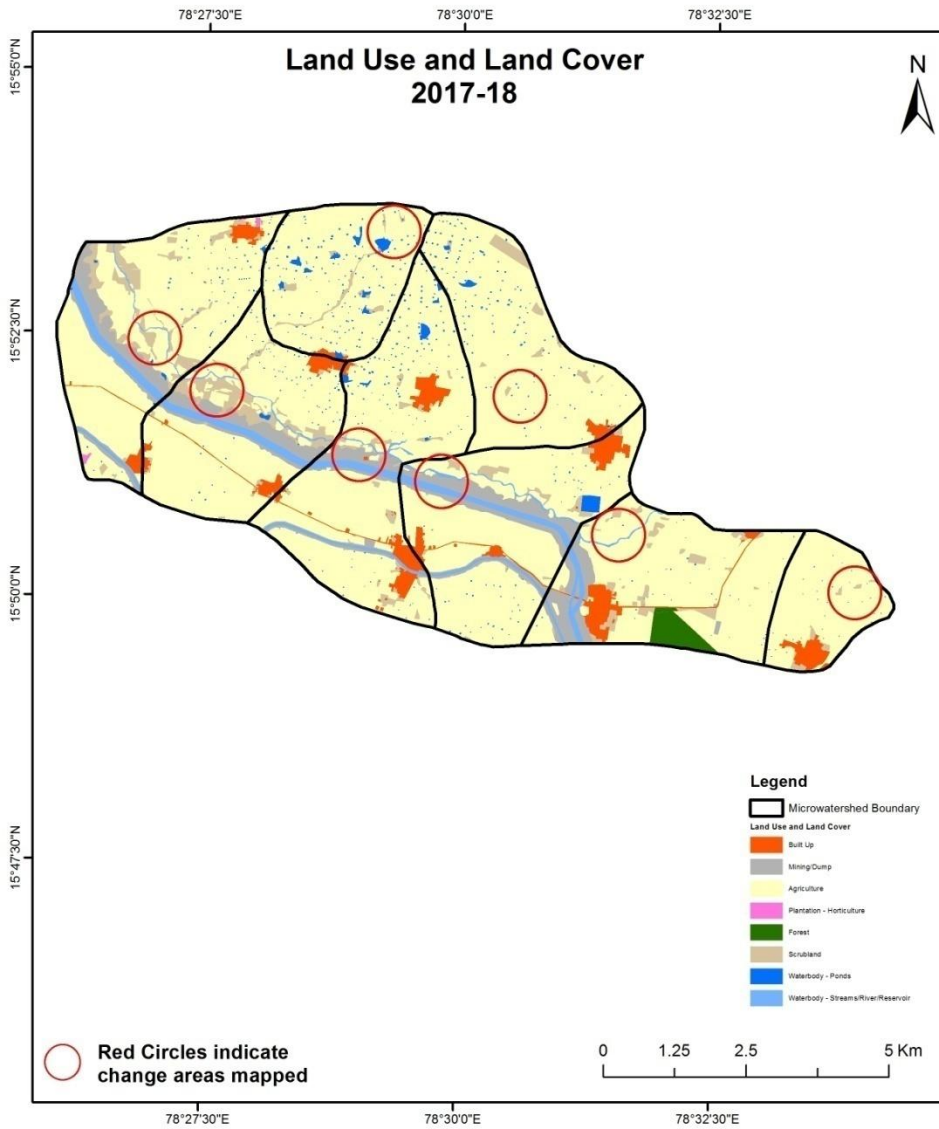
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



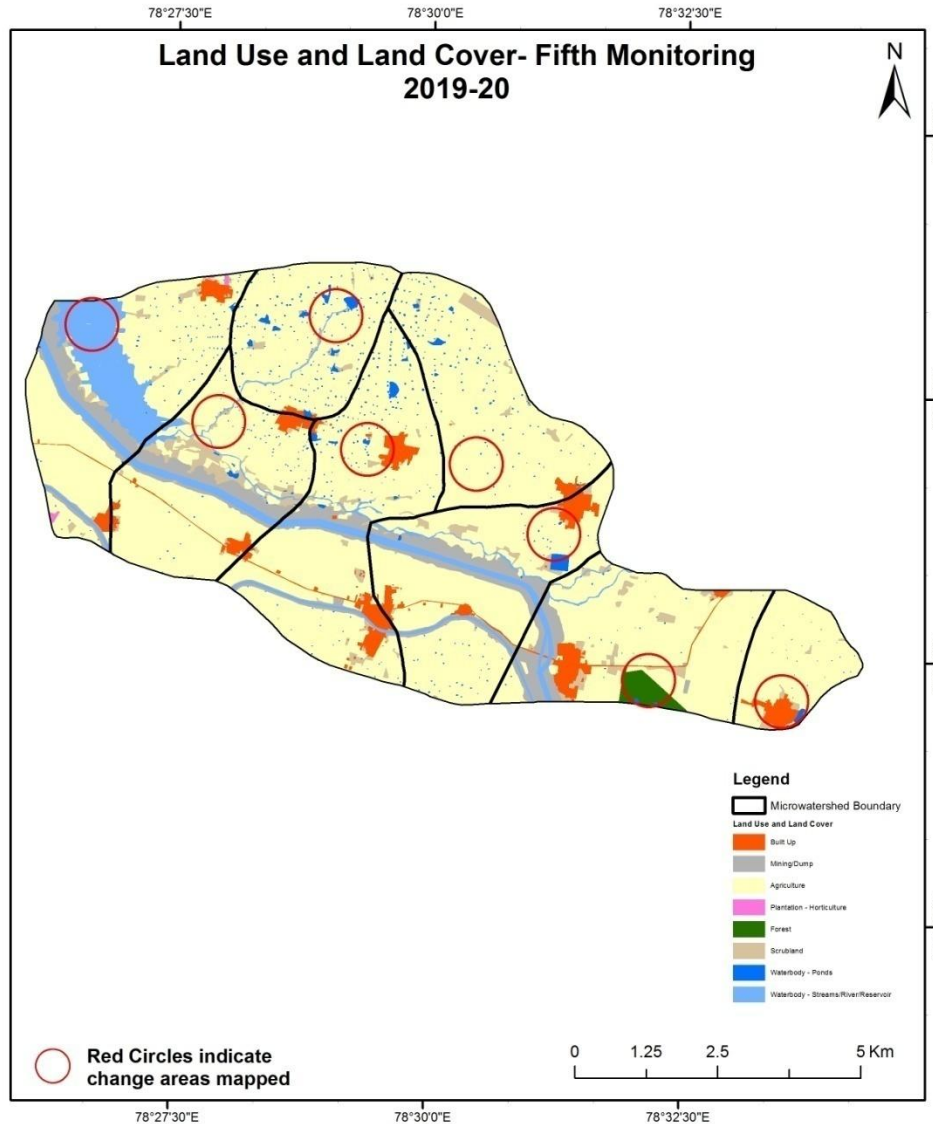
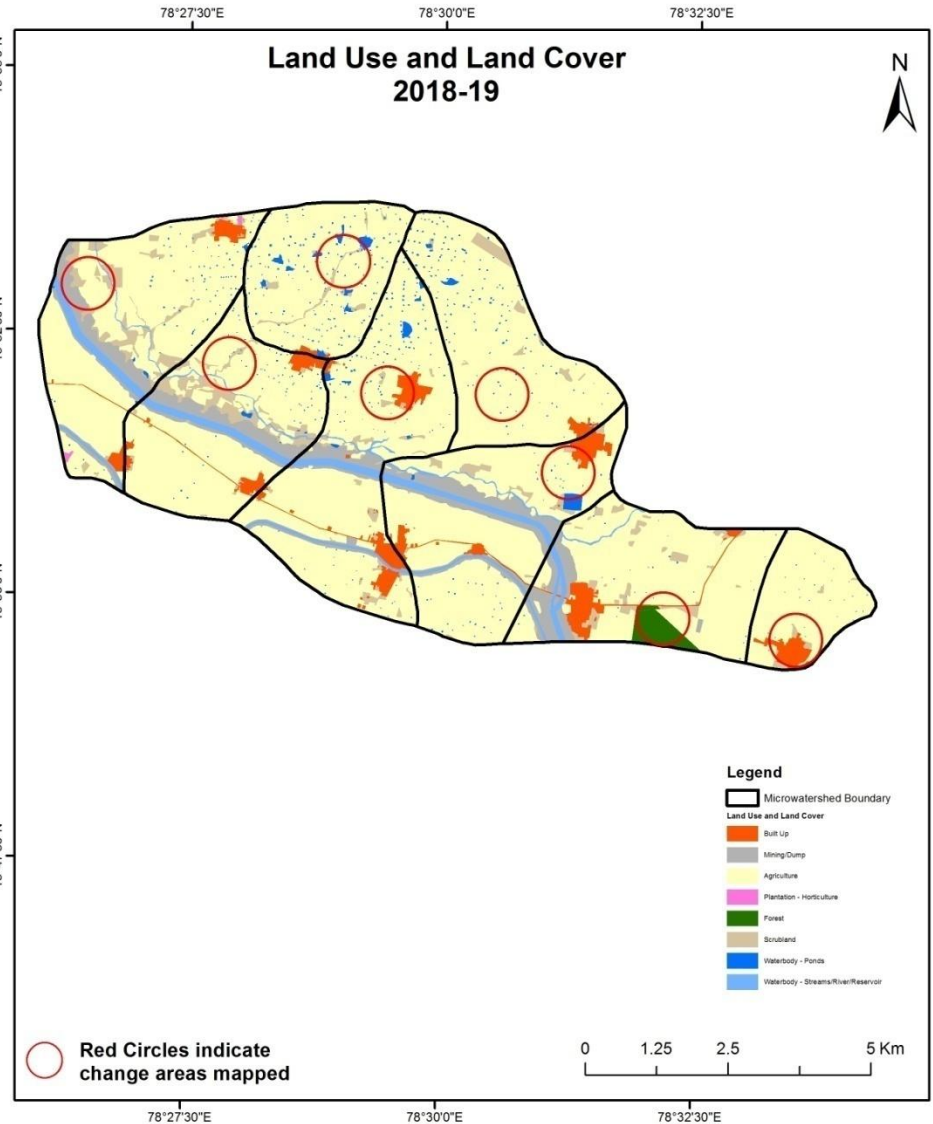
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



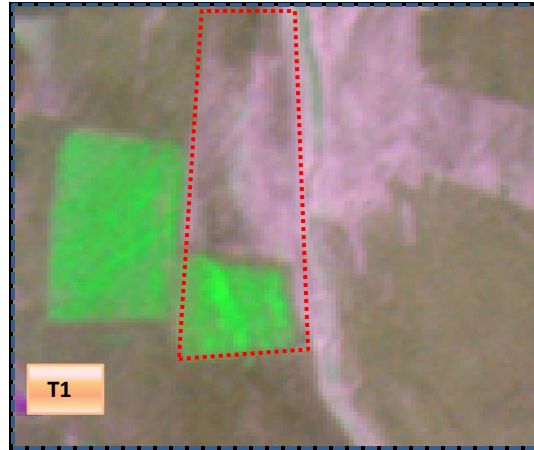
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



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

Scrub to Agriculture

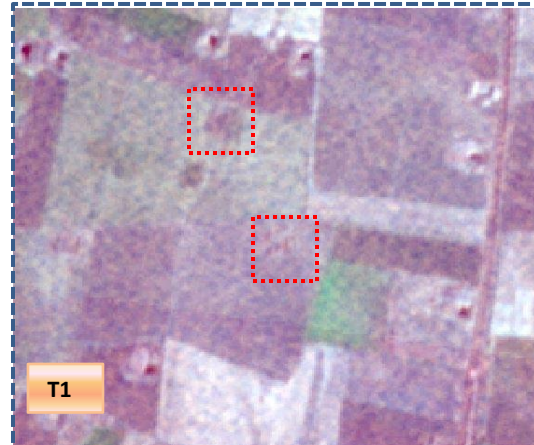


T1: 2015-16(78°26'32.344"E 15°53'16.266"N)



T2: 01 April 2017

Agriculture to water body



T1: 2015-16 (78°29'25.959"E 15°52'49.95"N)



T2: 01 April 2017

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

Scrub to Agriculture

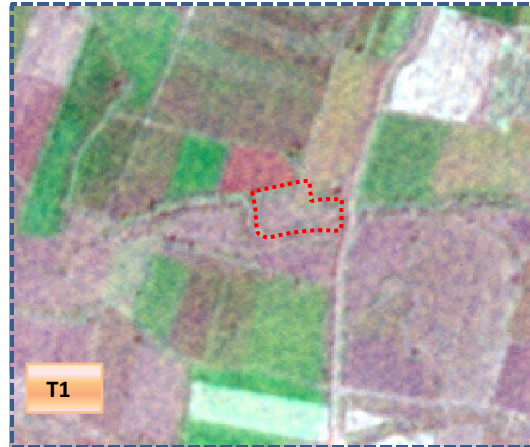


T1: 2015-16(78°31'25.771"E 15°52'10.904"N)



T2: 01 April 2017

Agriculture to water body



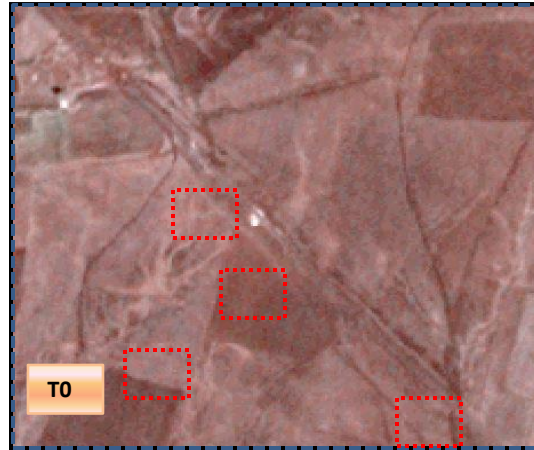
T1: 2015-16(78°29'40.182"E 15°51'31.02"N)



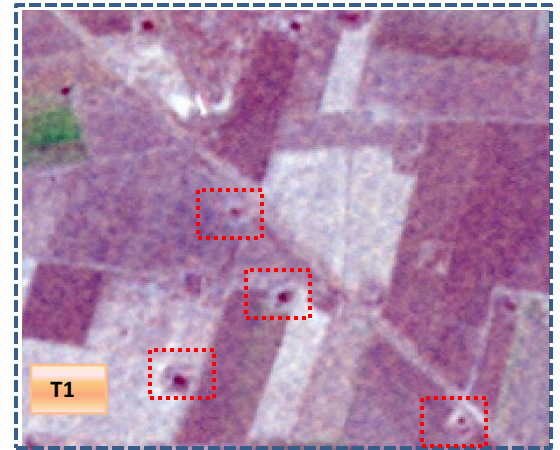
T2: 01 April 2017

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

Agriculture to Water body



T0: 2011-12 (78°28'2.937"E 15°53'11.024"N)



T1: 14 November 2015

Scrub to Agriculture



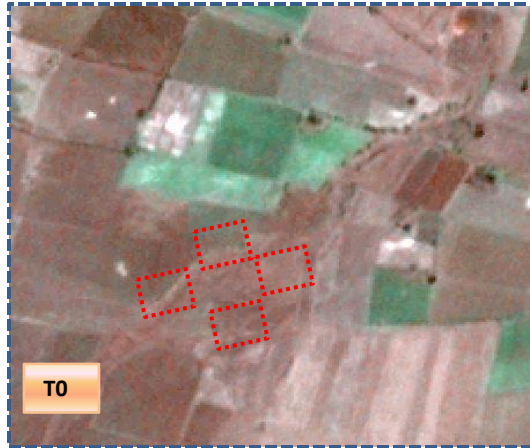
T0: 2011-12 (78°29'23.074"E 15°52'8.893"N)



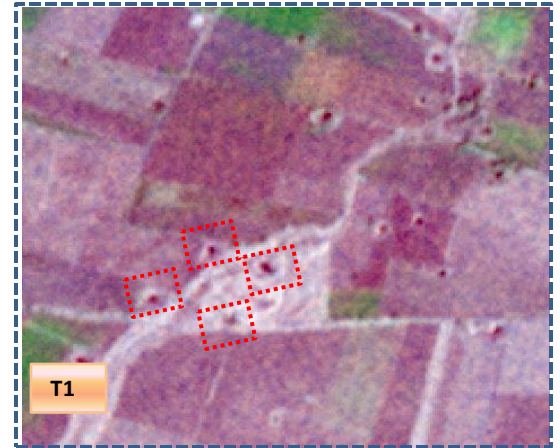
T1: 14 November 2015

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

Scrub to Water body

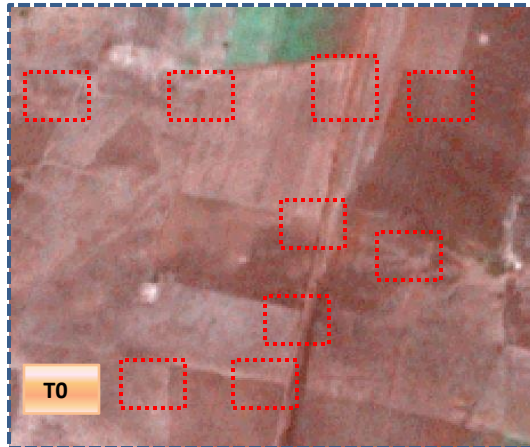


T0: 2011-12 (78°28'0.562"E 15°52'19.41"N)

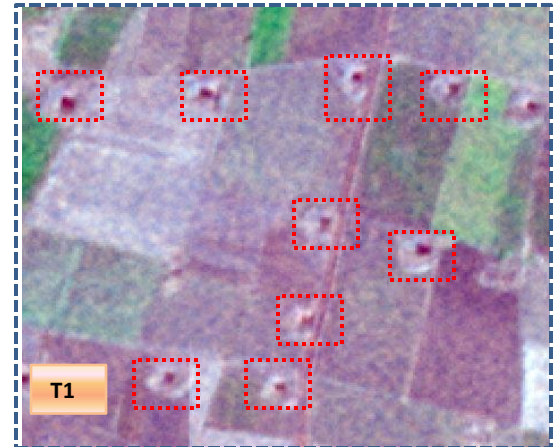


T1: 14 November 2015

Agriculture to Water body



T0: 2011-12 (78°29'37.378"E 15°53'17.156"N)



T1: 14 November 2015

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	244.24										244.24	
Mining/dump		408.26									408.26	
Agriculture	9.90	3.47	5032.05	2.99					29.28		5077.70	
Plantation Horticulture	0.17		0.90	3.17							4.25	
Forest			3.98		50.19						54.17	
Forest Plantation												
Barren Rocky												
Scrub	1.07		324.04					408.17	7.36	6.41	747.04	
Waterbody- Streams/River									214.93		214.93	
Waterbody – Ponds										34.61	34.61	
Grand Total	255.38	411.73	5360.98	6.17	50.19			408.17	222.29	70.29	6785.20	

- 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 39 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 324 ha of the agriculture area has increased from plantations, forest 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-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	255.38										255.38	
Mining/dump		411.73									411.73	
Agriculture	0.13		5357.64					0.58		2.62	5360.98	
Plantation Horticulture			1.04	5.12							6.17	
Forest					50.19						50.19	
Forest Plantation												
Barren Rocky												
Scrub	4.14	0.19	34.88					368.39		0.56	408.17	
Waterbody- Streams/River									222.29		222.29	
Waterbody – Ponds										70.29	70.29	
Grand Total	259.66	411.92	5393.56	5.12	50.19			368.98	222.29	73.48	6785.20	

- 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 3.3 ha of the agriculture area has decreased and it is converted into Built-up, scrubland and water body in T2.
- In T2 35.9 ha of the agriculture area has increased from plantations 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-2016-17 to 2017-18

Land cover	Monitoring period (T3)										Units in Hectares		
T2	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	259.66												259.66
Mining/dump		411.92											411.92
Agriculture	2.22	0.32	5384.35					0.88		5.80			5393.56
Plantation Horticulture			0.80	4.32									5.12
Forest					50.19								50.19
Forest Plantation													
Barren Rocky													
Scrub	1.38		26.75					339.47		1.37			368.98
Waterbody- Streams/River									222.29				222.29
Waterbody – Ponds			0.44							73.04			73.48
Grand Total	263.26	412.24	5412.34	4.32	50.19			340.36	222.29	80.21			6785.20

- 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 09 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, scrubland and water body in T3.
- In T3 27 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	263.26										263.26	
Mining/dump		411.78							0.46		412.24	
Agriculture	2.75		5404.68					2.94		1.97	5412.34	
Plantation Horticulture			0.10	4.22							4.32	
Forest					50.19						50.19	
Forest Plantation												
Barren Rocky												
Scrub	2.89		15.50					320.96		1.01	340.36	
Waterbody- Streams/River									222.29		222.29	
Waterbody – Ponds			0.89							79.32	80.21	
Grand Total	268.89	411.78	5421.17	4.22	50.19			323.90	222.29	82.76	6785.20	

- 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 07 ha of the agriculture area has decreased and it is converted into Built-up, scrubland and water body in T4.
- In T4 16 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		
Built up	268.89												268.89
Mining/dump		411.68									0.10		411.78
Agriculture	2.96		5245.26						165.97		6.97		5421.17
Plantation Horticulture				4.22									4.22
Forest			2.42		46.92						0.86		50.19
Forest Plantation													
Barren Rocky													
Scrub	1.39		5.58					243.51	71.35		2.07		323.90
Waterbody- Streams/River									222.29				222.29
Waterbody – Ponds									0.91		81.85		82.76
Grand Total	273.24	411.68	5253.26	4.22	46.92			243.51	460.52		91.85		6785.20

- 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 175 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.
- In T5 08 ha of the agriculture area has increased from forest 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 302 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
4. There is an increase of 283, 32, 18 & 8 Hectares from T0-T1, T1-T2, T2-T3 & T3-T4 respectively, there is a decrease of 167 hectares from T4-T5 and overall increase of 175 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is a decrease of 503 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
6. Farm ponds (78) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (87) verified from the portal.