MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

KURNOOL -25/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
July-2021

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
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Remote Sensing Application Area,
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DEPARTMENT OF LAND RESOURCES
Ministry of Rural Development
Government of India

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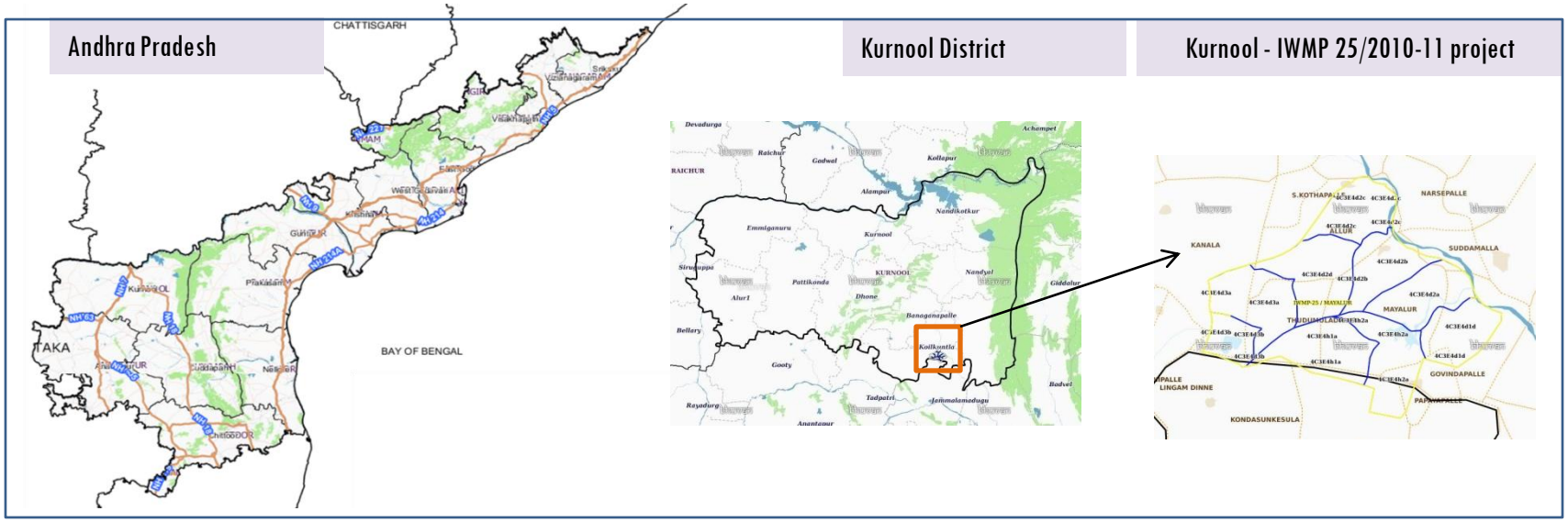
EXECUTIVE SUMMARY

- 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-25/2010-11, Kurnool District of Andhra Pradesh. The total geographical area of the project is 4,572 ha. It comprises of 9 micro watersheds.
- In the project area 778 Drishti photos were uploaded showing 415 checks & plugins, 70 check dams, 50 Farm ponds, 16 agriculture, 6 afforestation, 2 Livelihood measures and remaining showing others.
- Major percentage i.e. 89.1% is covered by the agriculture, 6.6 % is covered by water body and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-25/2010-11
DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Uyyalawada Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 4,572 ha. It comprises of 9 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (***Batch -1***) projects taking 2018-19 (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).

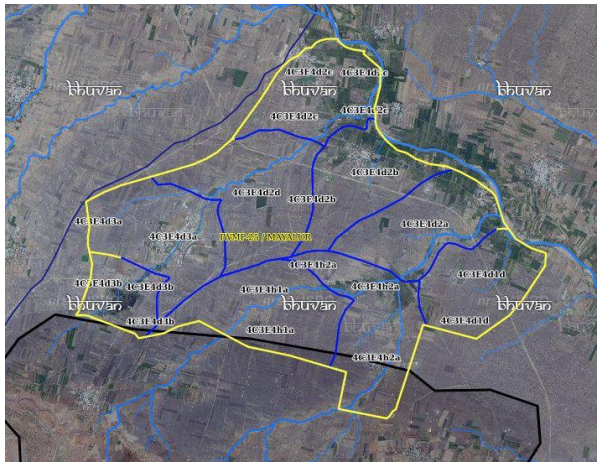
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			23-May-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			23-May-19
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	778
4	Detailed Project Report		

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



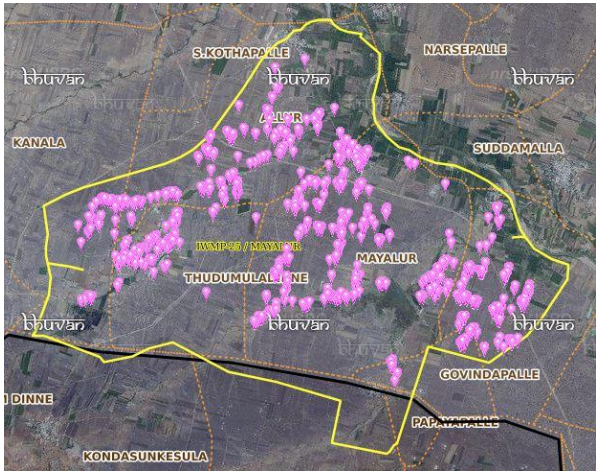
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

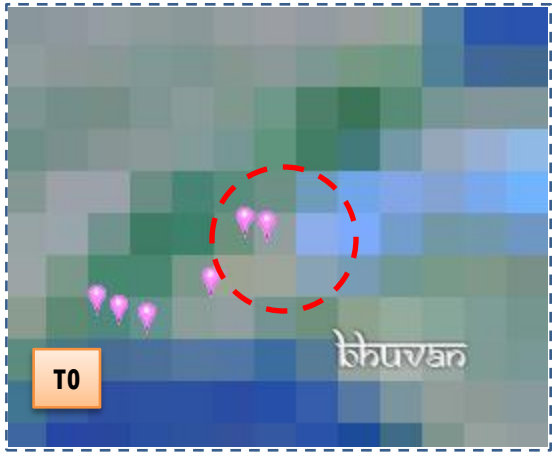
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	6	6
2	Horticulture	0	0
3	Agriculture	19	16
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	60	50
8	Check dams (Civil work)	79	70
9	Checks & plugins	482	415
10	Om (Other measurement)	0	0
11	LM (Livelihood Measures)	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	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	361	210
	TOTAL	**1018**	**778**

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 (2010-11) and T5 is 2018-19 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 Kurnool Dt Andhra Pradesh. IWMP-25/2010-11

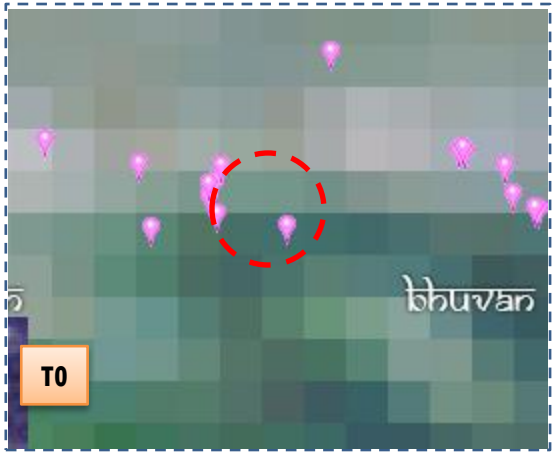


T0:2010-11

T1: 19 May 2014

Drishti Sl no. 792232 MWS :4C3E4d2d

Check dam



T0:2010-11

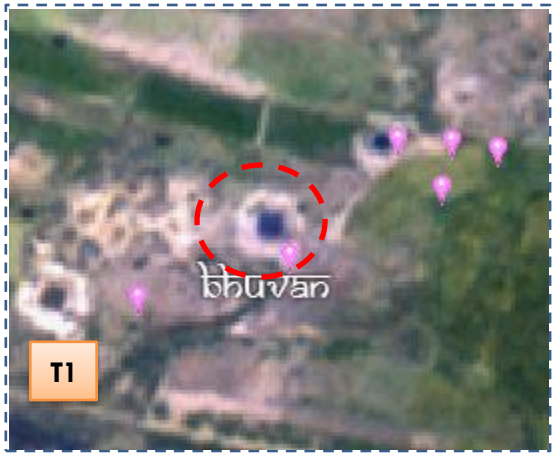
T1: 19 May 2014

Drishti Sl no. 154927 MWS : 4C3E4d2d

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-25/2010-11

T0: 2010-11



T1: 19 May 2014

Drishti Sl no. 793387 MWS : 4D3B6q1c

Farm pond

T0: 2010-11

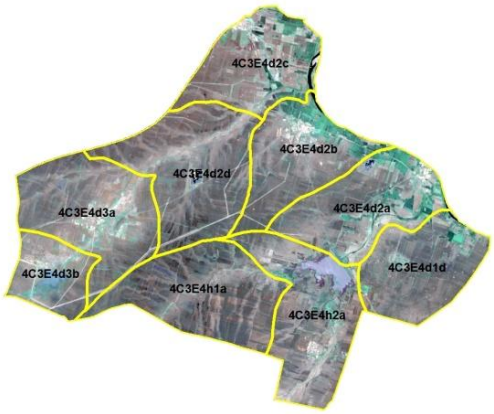
T1: 19 May 2014

Drishti Sl no. 2433831 MWS :4C3E4d3a

Farm pond

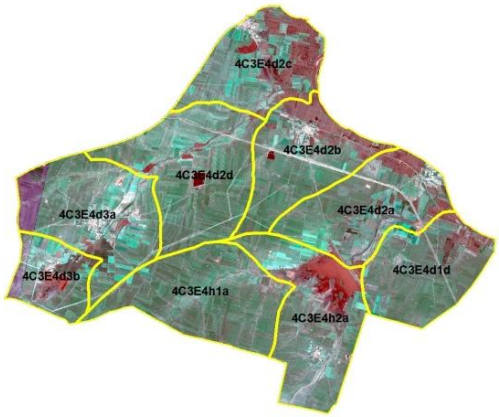
Natural Color Composite

Natural Color Composite- 2010-11



Source:Fusion data,NRSC

Natural Color Composite- 22 nd February 2014

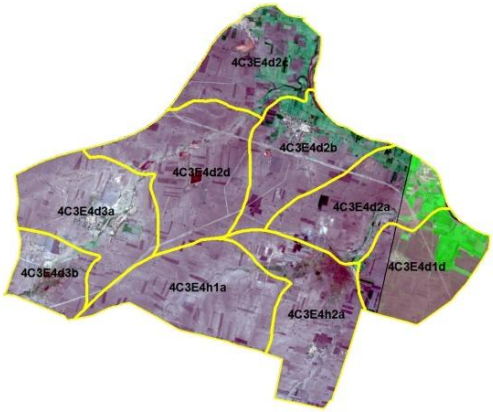


Source:NCC,NRSC

Natural Color Composite- 2016

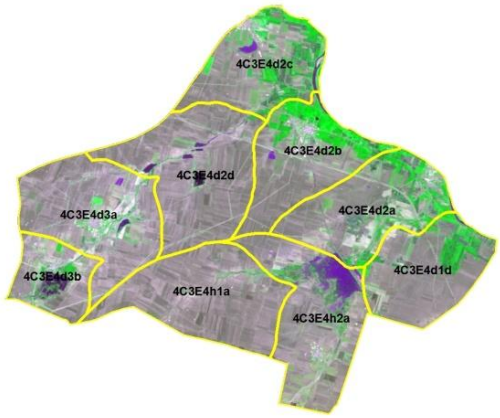
Source:Fusen data,NRSC

Natural Color Composite- 3rd June 2017



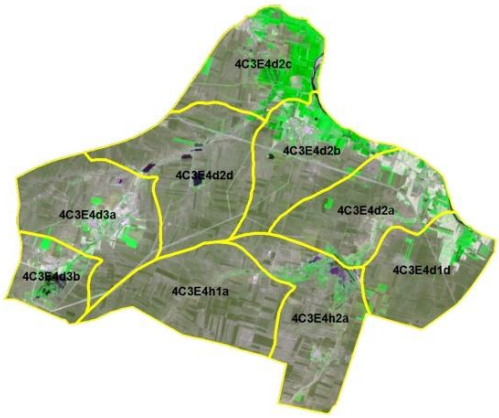
Source:NCC,NRSC

Natural Color Composite-1st March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 25th March 2019



Source:Sentinel-2

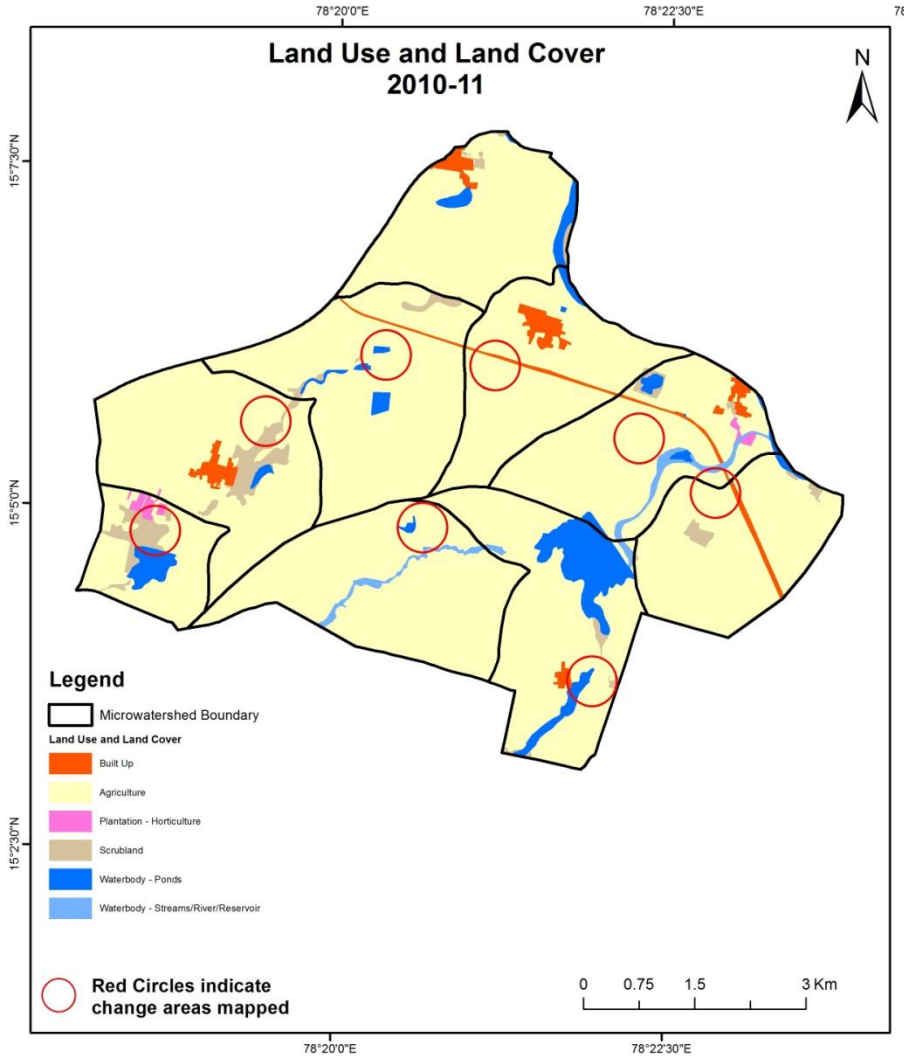
MONITORING IN THE PROJECT AREA

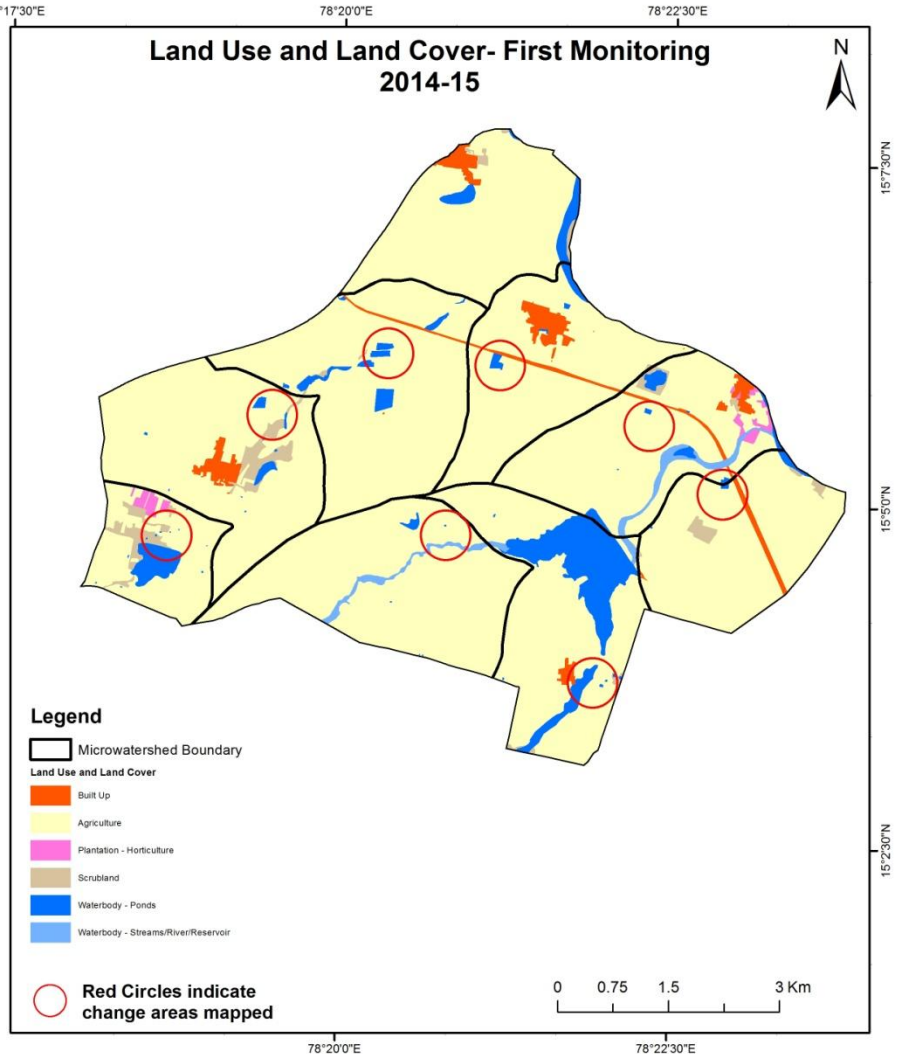
Land use and Land cover Changes in the Project

- Change in land use and land cover form 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 (2010-11) and row represents the T5 (2018-19)

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

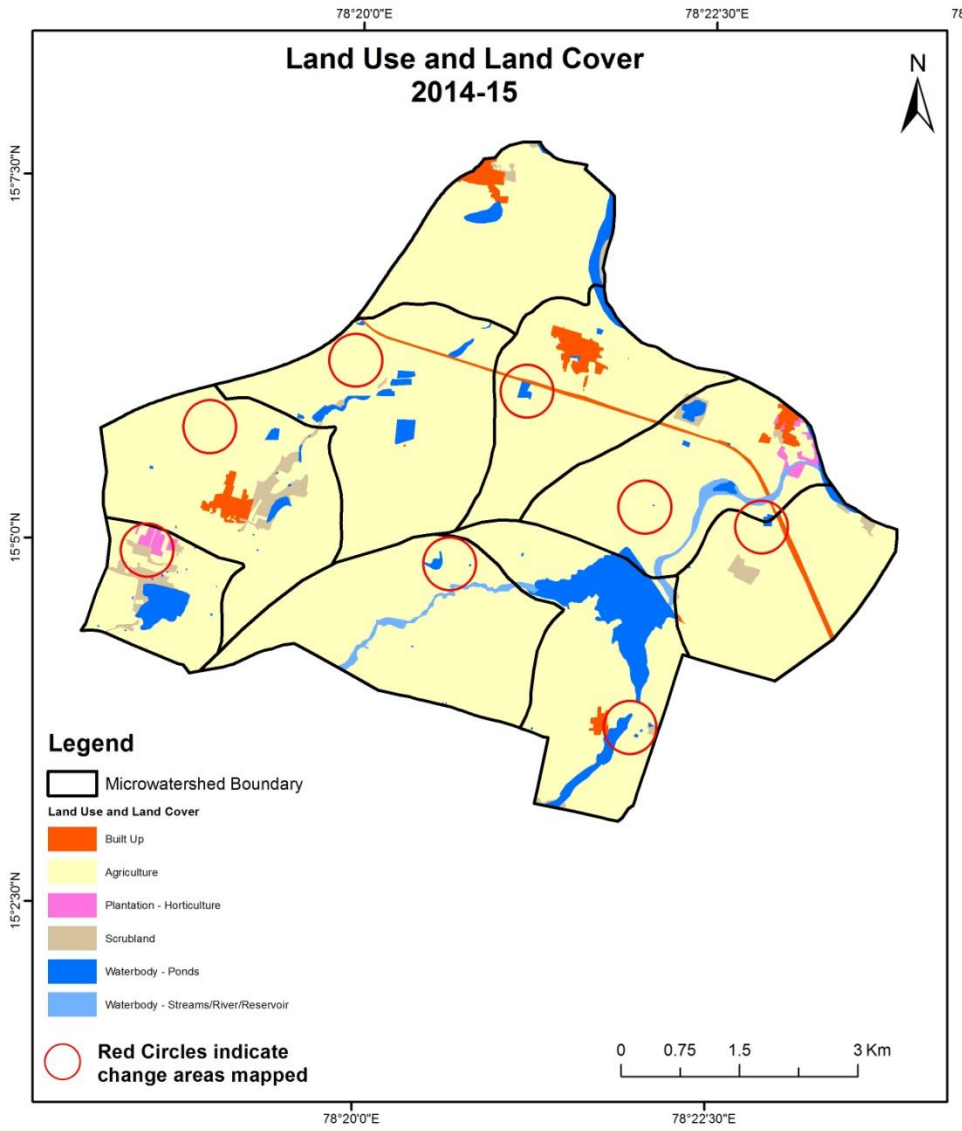
Scale: 1:10000

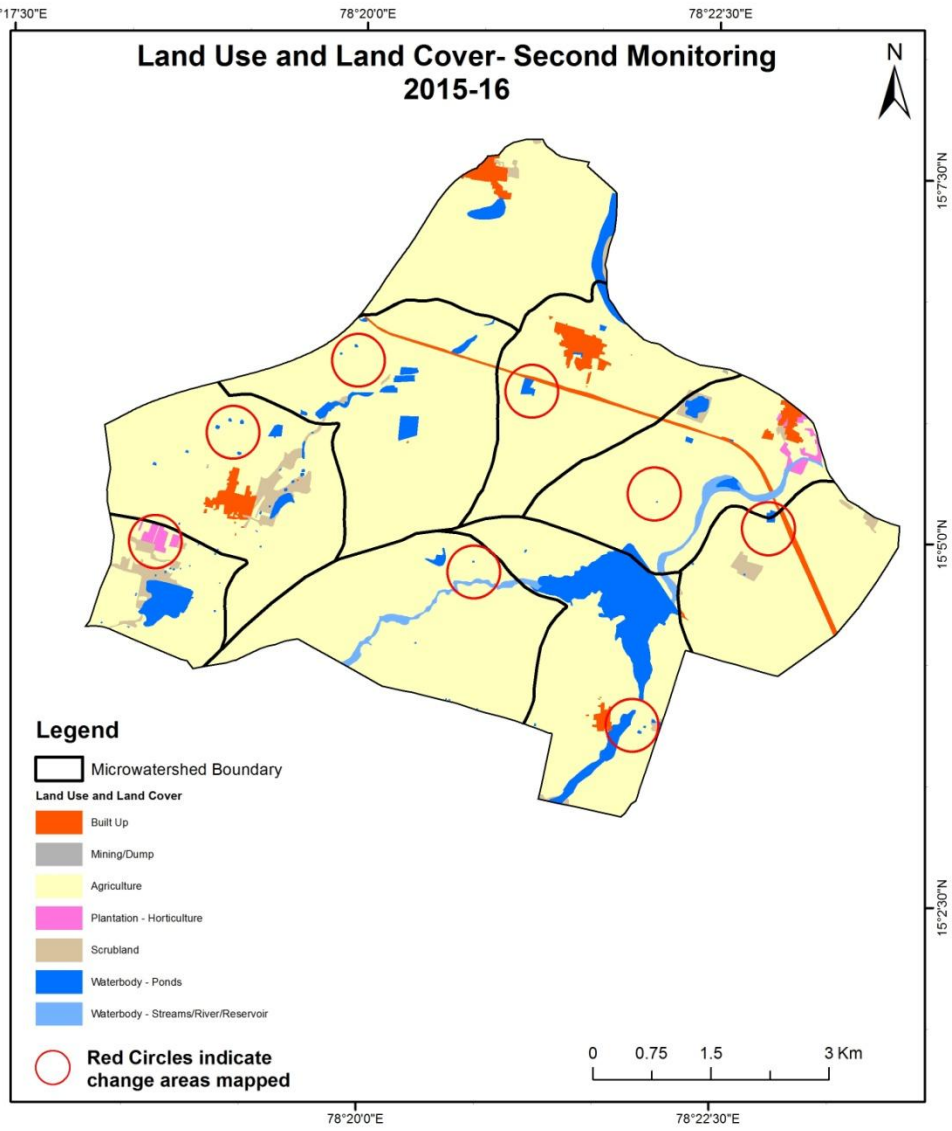




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

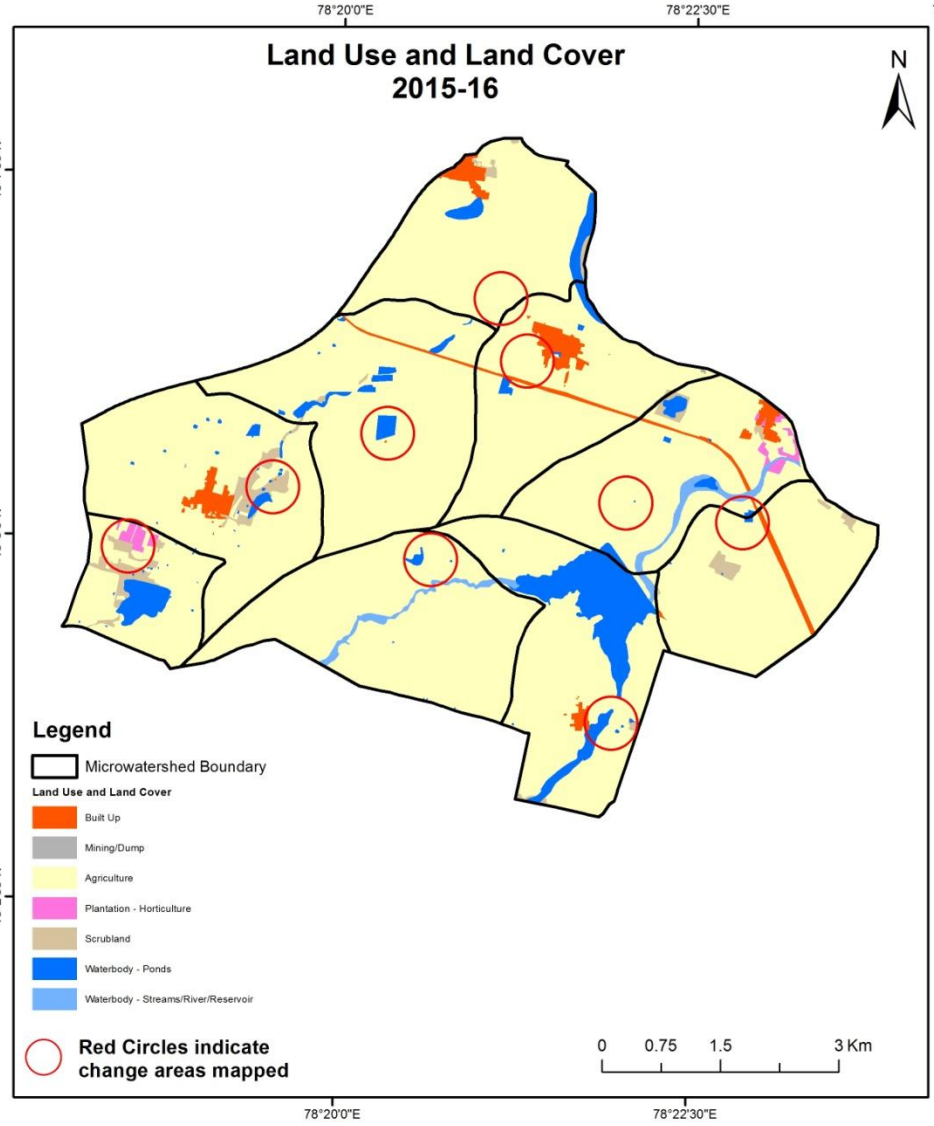
Scale: 1:10000

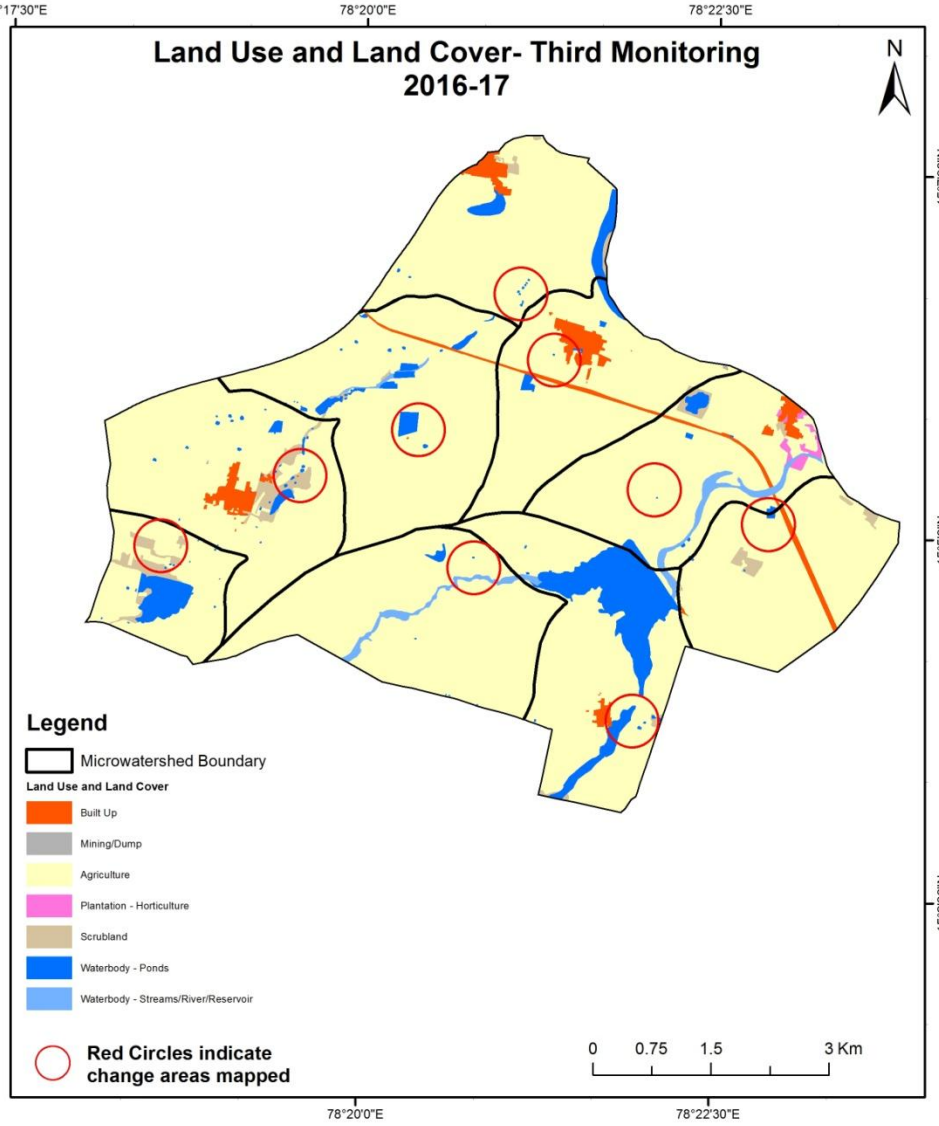




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

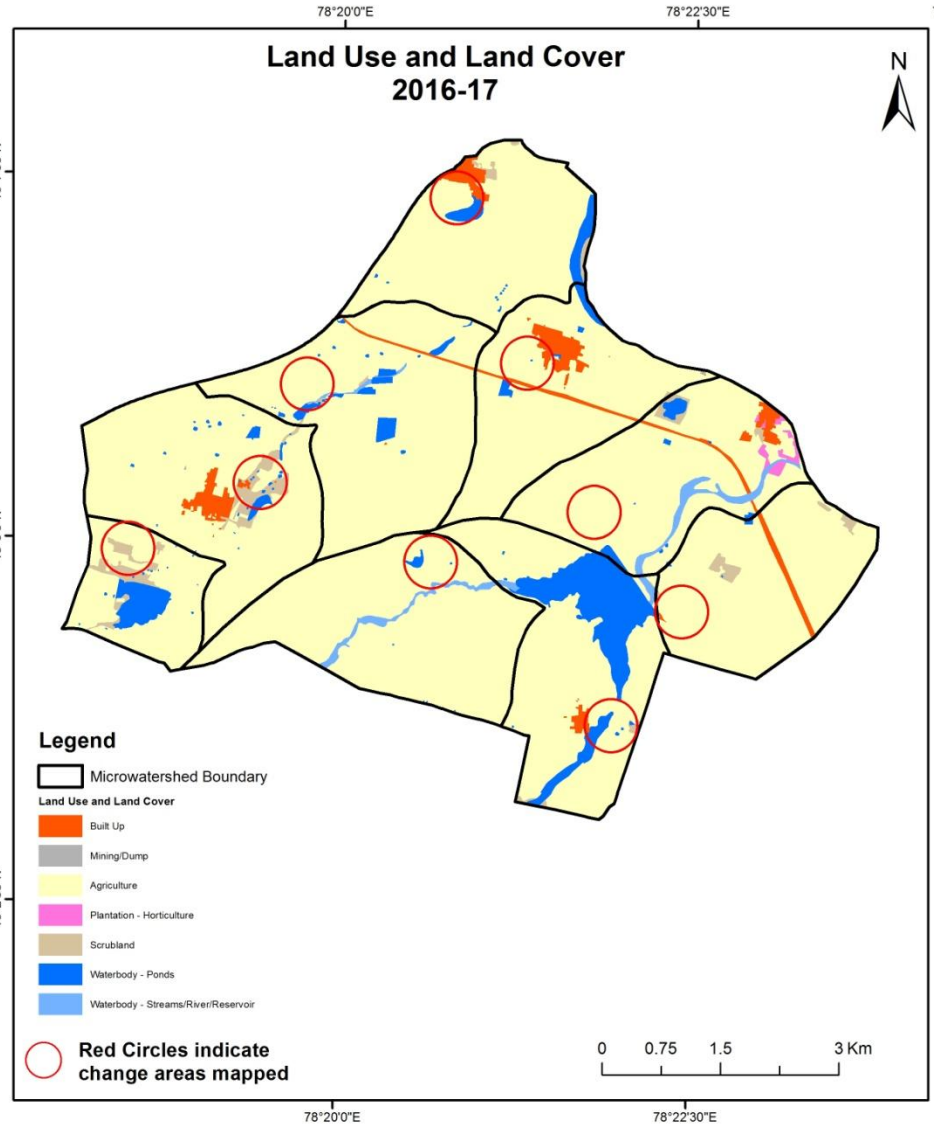
Scale: 1:10000

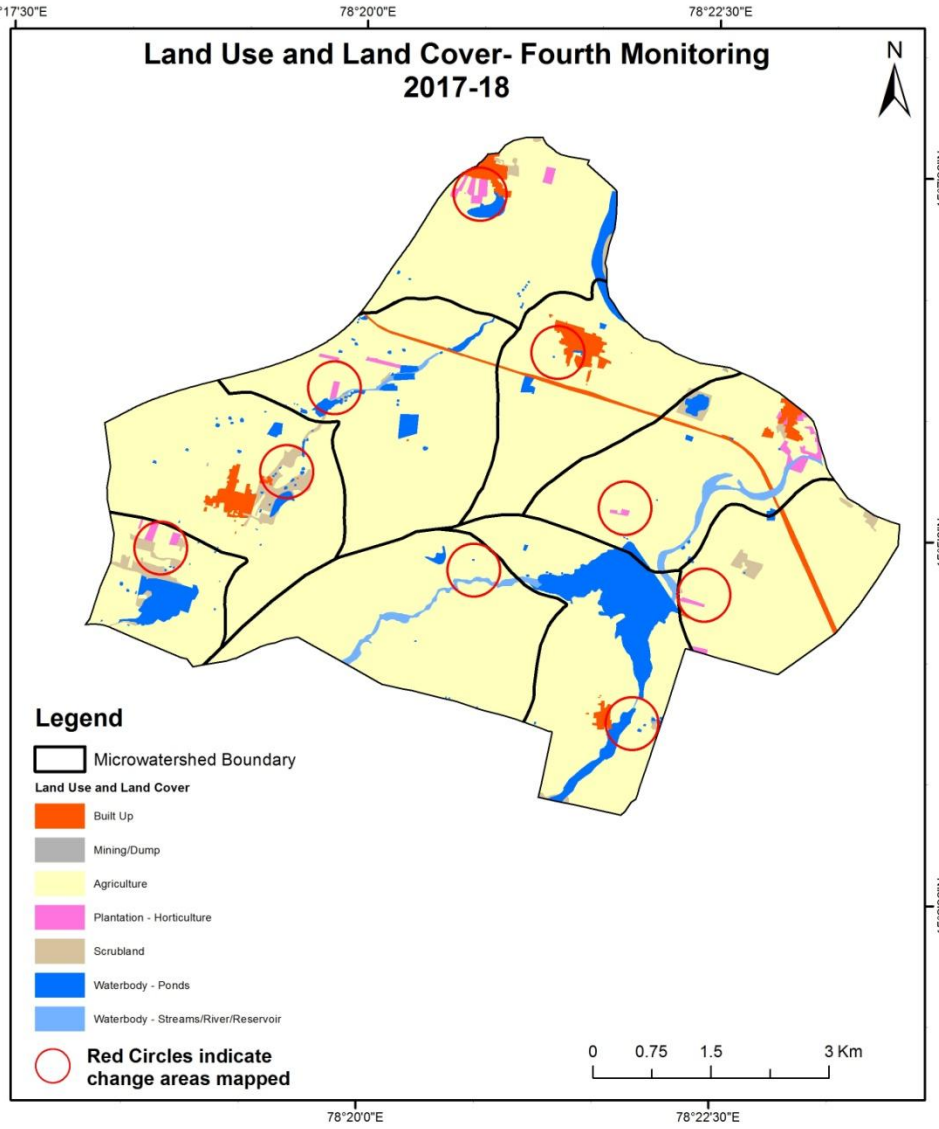




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

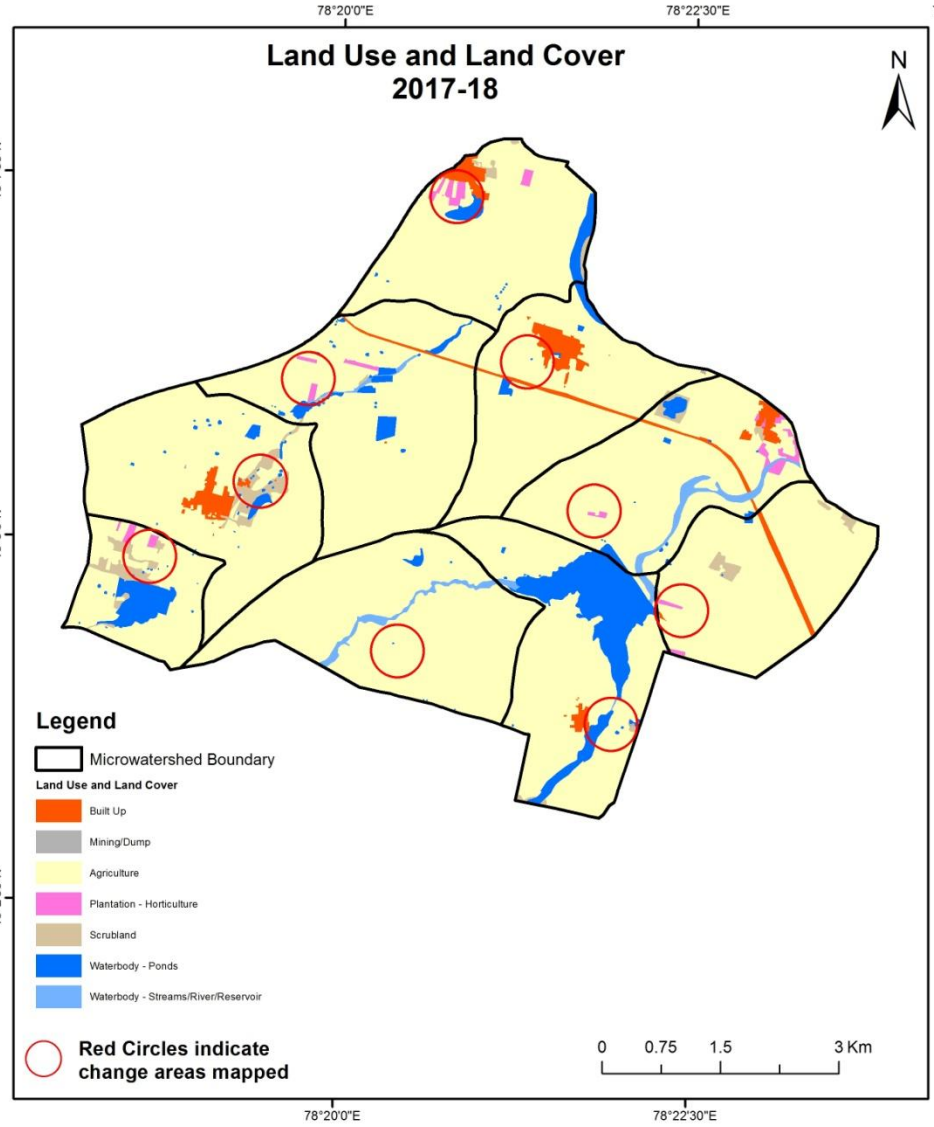
Scale: 1:10000

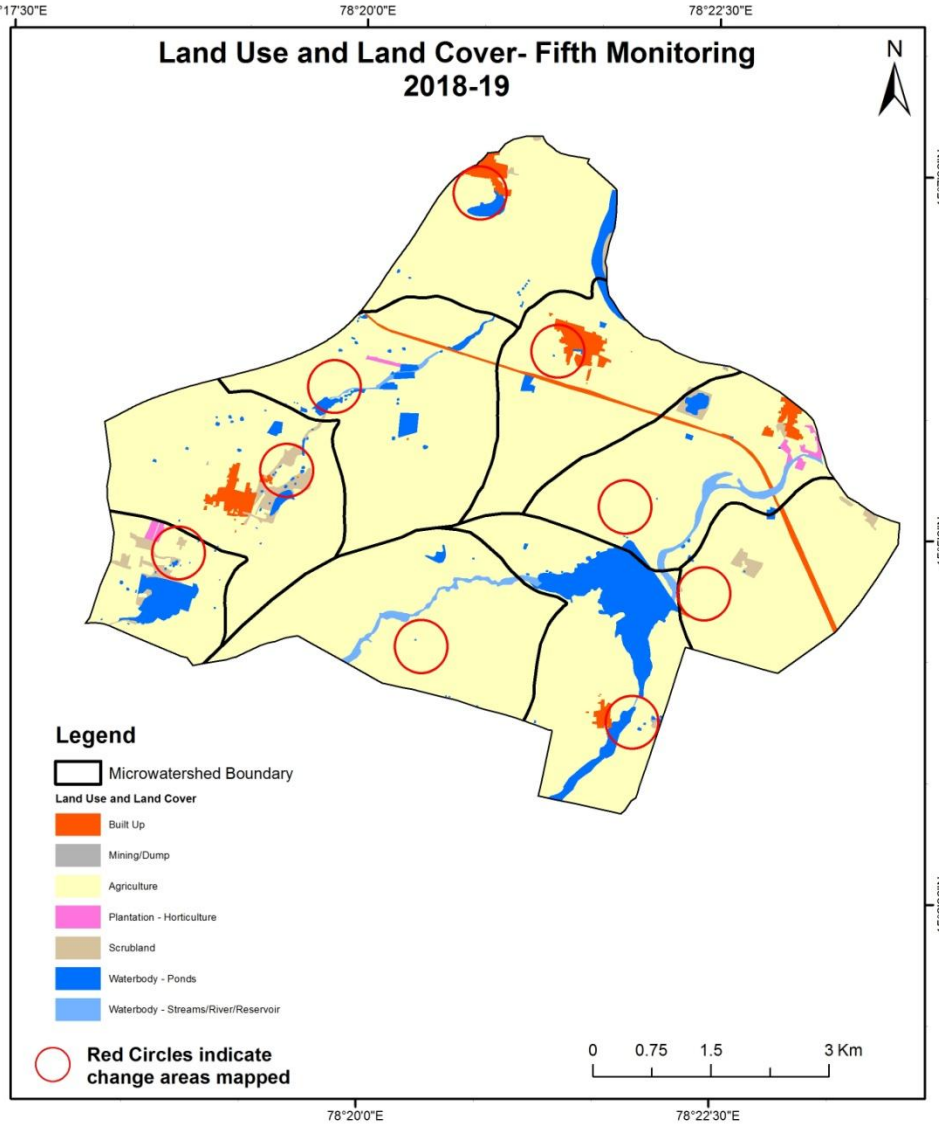




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

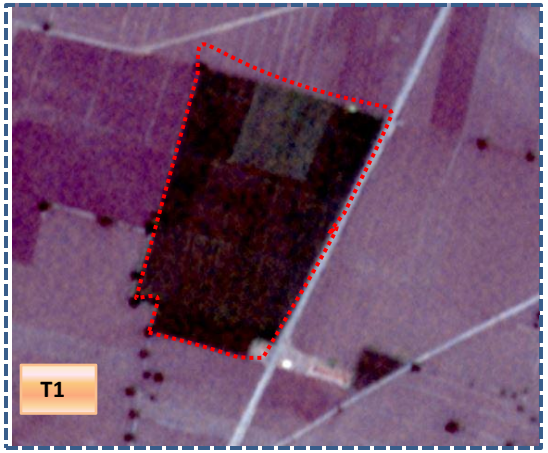




Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

T0: 2015-16(78°20'2.305"E 15°7'17.188"N)



T1: 3rd June 2017

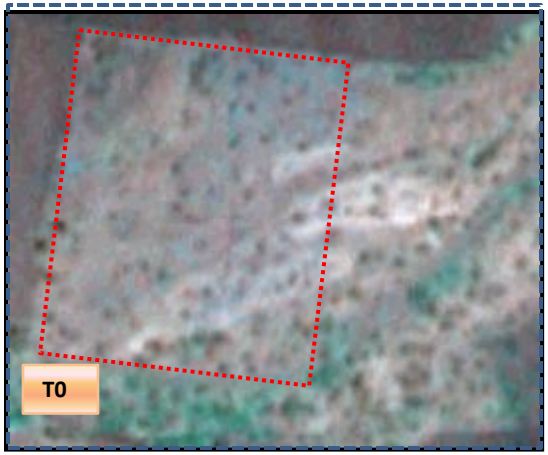
Agriculture to Water body

T0: 2015-16 (78°18'21.125"E 15°4'37.928"N)

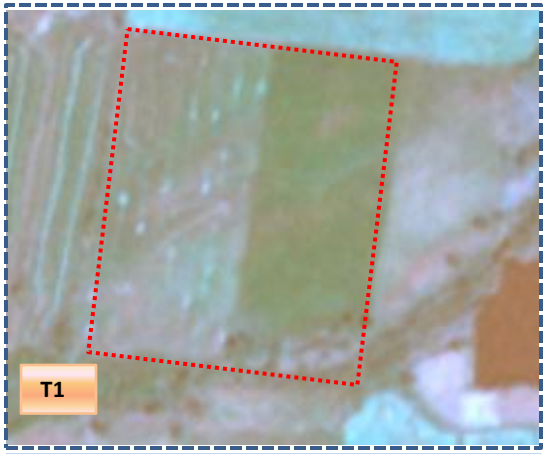
T1: 3rd June 2017

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

Scrubland to Agriculture

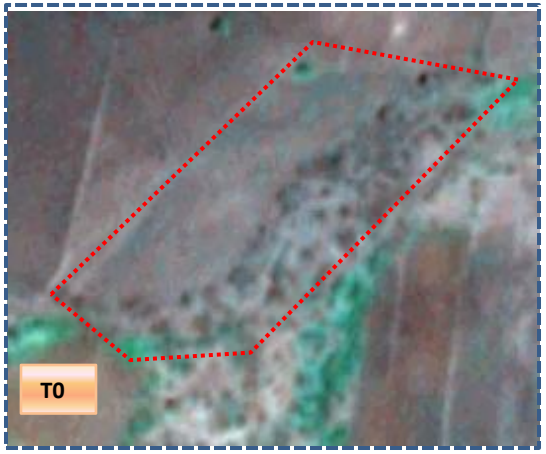


T0: 2010-11

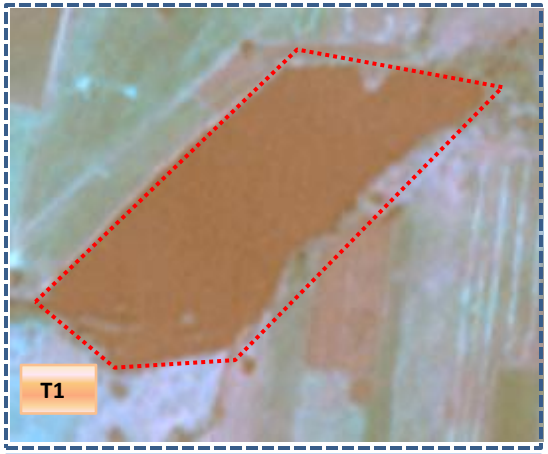


T1: 19 May 2014

Scrub to water body



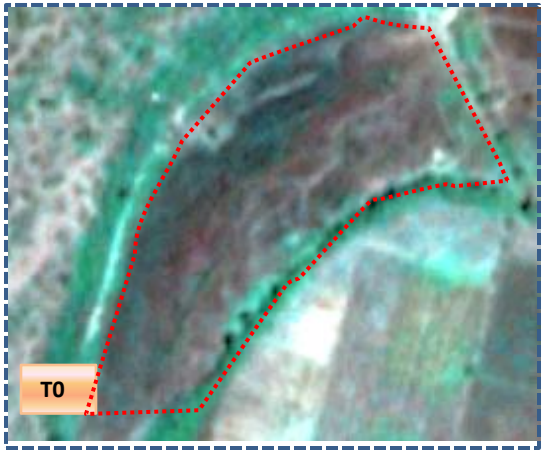
T0: 2010-11



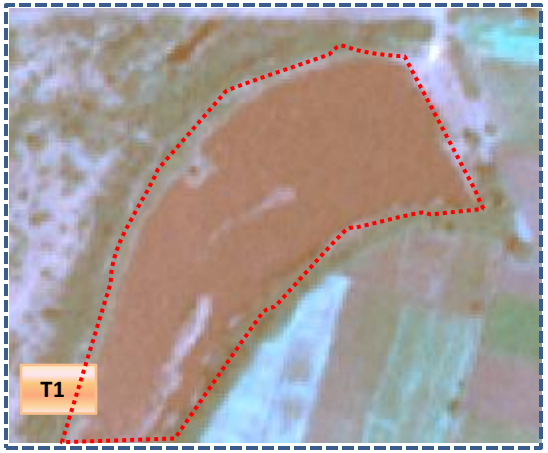
T1: 19 May 2014

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

Increased Water spread Area



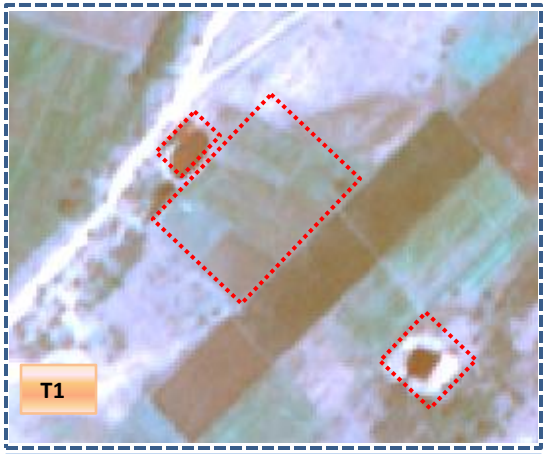
T0: 2010-11



T1: 19 May 2014

Scrub to Agriculture and Water body

T0: 2010-11



T1: 19 May 2014

Table showing change matrix depicting Land cover transitions during study period-2010-11 to 2014-15

Land cover	Monitoring period (T1)										Units in Hectares
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	102.36										**102.36**
Mining/dump											
Agriculture	6.26		4037.55	5.47						41.73	**4091.00**
Plantation Horticulture			0.54	13.84							**14.37**
Forest											
Forest Plantation											
Barren Rocky											
Scrub			30.95					82.98		6.66	**120.59**
Waterbody-Streams/River									45.07		**45.07**
Waterbody – Ponds										198.73	**198.73**
Grand Total	**108.62**		**4069.03**	**19.30**				**82.98**	**45.07**	**247.12**	**4572.13**

- 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 53.4 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T1.
- In T1 31.4 ha of the agriculture area has increased from plantations 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-2014-15 to 2015-16

Land cover	Monitoring period (T2)										Units in Hectares
T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	108.62										**108.62**
Mining/dump											
Agriculture	1.07	0.34	4065.70							1.92	**4069.03**
Plantation Horticulture				19.30							**19.30**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.04							82.67		0.27	**82.98**
Waterbody-Streams/River									45.07		**45.07**
Waterbody – Ponds			8.42							238.71	**247.12**
Grand Total	**109.73**	**0.34**	**4074.12**	**19.30**				**82.67**	**45.07**	**240.90**	**4572.13**

- 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, mining/dump and water body in T2.
- In T2 8.4 ha of the agriculture area has increased from 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-2015-16 to 2016-17

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	109.73										**109.73**
Mining/dump		0.34									**0.34**
Agriculture	0.16		4065.24						3.41	5.31	**4074.12**
Plantation Horticulture			9.43	9.87							**19.30**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.27		0.77					78.10		2.53	**82.67**
Waterbody-Streams/River									45.07		**45.07**
Waterbody – Ponds			4.11							236.79	**240.90**
Grand Total	**111.16**	**0.34**	**4079.55**	**9.87**				**78.10**	**48.48**	**244.63**	**4572.13**

- 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 5.4 ha of the agriculture area has decreased and it is converted into Built-up and water body in T3.
- In T3 14.4 ha of the agriculture area has increased from plantation, 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-2016-17 to 2017-18

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	111.16										**111.16**
Mining/dump		0.34									**0.34**
Agriculture	0.12		4049.17	23.52					1.13	5.61	**4079.55**
Plantation Horticulture				9.87							**9.87**
Forest											
Forest Plantation											
Barren Rocky											
Scrub		0.27						76.38		1.45	**78.10**
Waterbody-Streams/River									48.48		**48.48**
Waterbody – Ponds										244.63	**244.63**
Grand Total	**111.28**	**0.61**	**4049.17**	**33.39**				**76.38**	**49.61**	**251.69**	**4572.13**

• 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 2.9 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.

•The additional agriculture are coming from waterbody in T4 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2017-18 to 2018-19

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	111.28										**111.28**
Mining/dump		0.61									**0.61**
Agriculture	0.05		4046.20	1.95						0.96	**4049.17**
Plantation Horticulture	0.10		21.60	11.69							**33.39**
Forest											
Forest Plantation											
Barren Rocky											
Scrub			10.05					65.94		0.39	**76.38**
Waterbody-Streams/River									49.61		**49.61**
Waterbody – Ponds										251.69	**251.69**
Grand Total	**111.44**	**0.61**	**4077.86**	**13.64**				**65.94**	**49.61**	**253.04**	**4572.13**

• In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.

•In T5 2.9 ha of the agriculture area has increased from built-up, plantation and scrubland of T4.

• In T3 31.6 ha of the agriculture area has increased from plantation and scrubland of T2.

• 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 58 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
4. There is an increase of 5, 5 & 28 Hectares From T1-T2, T2-T3 & T4-T5 respectively and overall increase of 38 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is a decrease of 54 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
6. Farm ponds (50) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.