MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -33/2011-12
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)
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RURAL DEVELOPMENT AND WATERSHED MONITORING DIVISION
Land Resources and Land Use Mapping and Monitoring Group,
Remote Sensing Application Area,
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DEPARTMENT OF LAND RESOURCES
Ministry of Rural Development
Government of India

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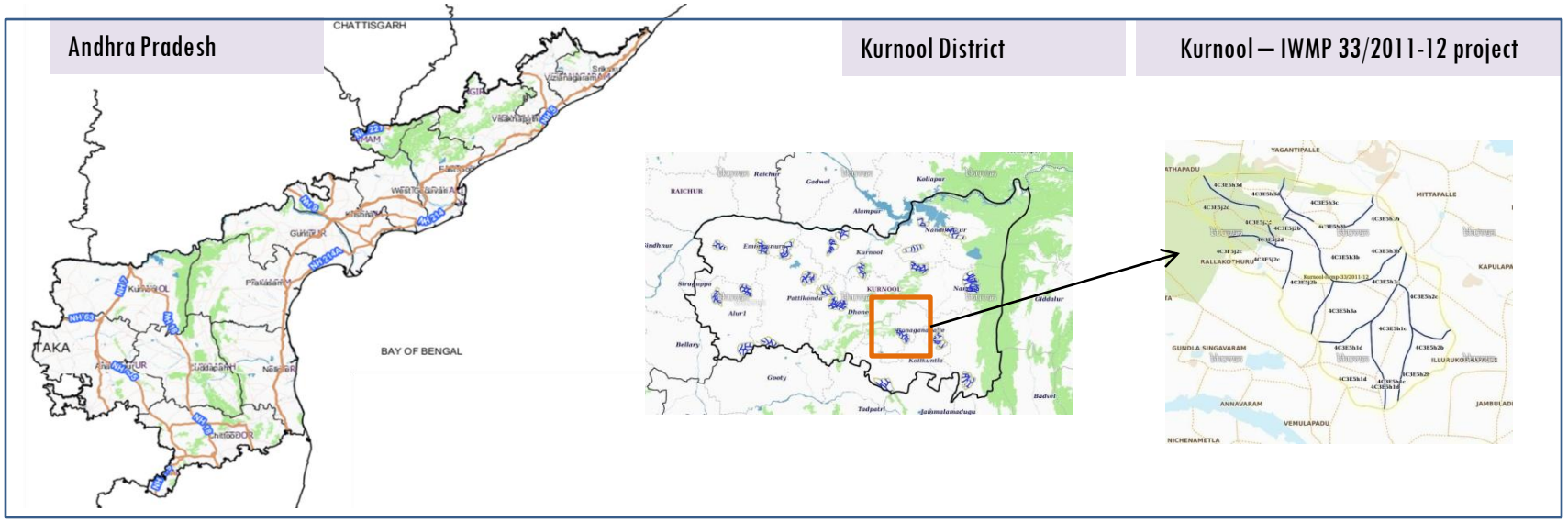
EXECUTIVE SUMMARY

- 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-33/2011-12, Kurnool District of Andhra Pradesh. The total geographical area of the project is **4,904** ha. It comprises of 11 micro watersheds.
- In the project area 222 Drishti photos were uploaded showing check dams/checks & plugins, Farm ponds, Livelihood measures and remaining showing others.
- Major percentage i.e. 71% is covered by the agriculture, 15 % is covered by forest, 7 % is covered by scrub land and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-33/2011-12
DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Banaganapalle Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is **4,904** 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 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).

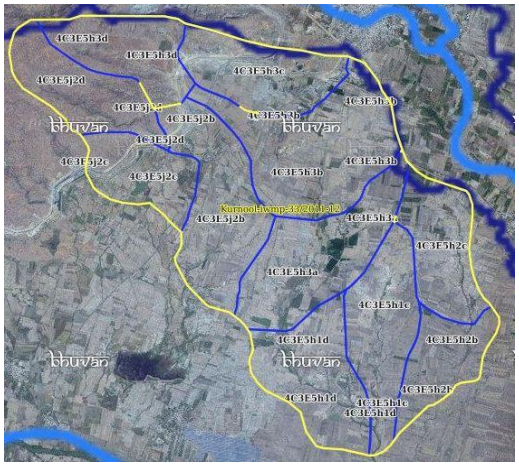
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2011-12	2019-20
LISS IV	2011-12		
SCENE 1			3-Nov-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			3-Nov-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	222
4	Detailed Project Report		

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



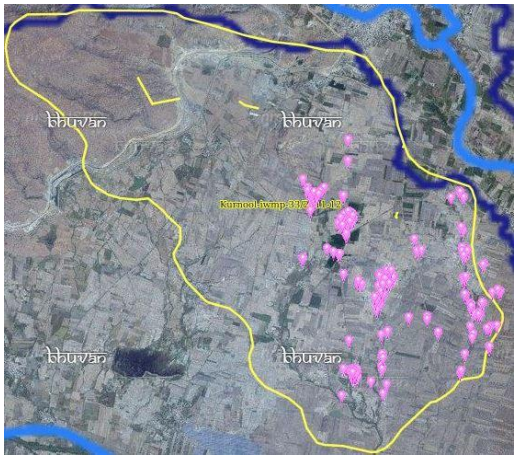
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

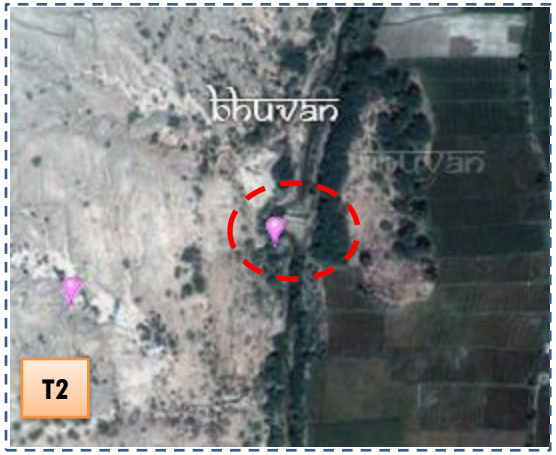
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	2	2
2	Agriculture/Horticulture	0	0
3	Blockplanting	0	0
4	Bund planting	0	0
5	Drainage Treatment	0	0
6	Farm ponds/Dug out pit	29	28
7	Check dams (Civil work)	0	0
8	Checks & plugins	80	76
9	Om (Other measurement)	0	0
10	Field bunds	6	5
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	5	5
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	136	106
	TOTAL	**258**	**222**

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.

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-33/2011-12

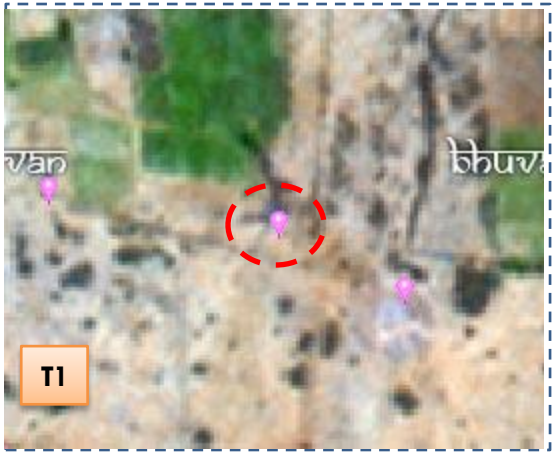


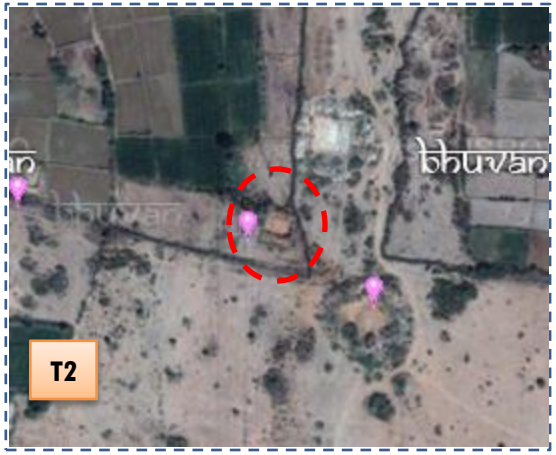
T1: 05 April 2014

T2: 28 February 2018

Drishti Sl no. 1148477 MWS :4C3C2e2a

Check dam





T1: 05 April 2014

T2: 28 February 2018

Drishti Sl no. 1839411 MWS : 4C3C2e2c

Farm pond

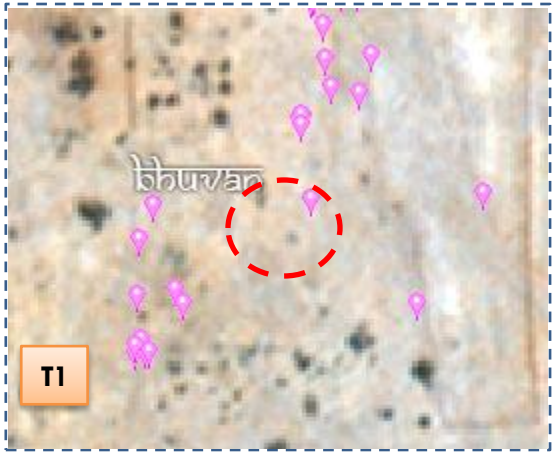
Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-33/2011-12

T1: 05 April 2014

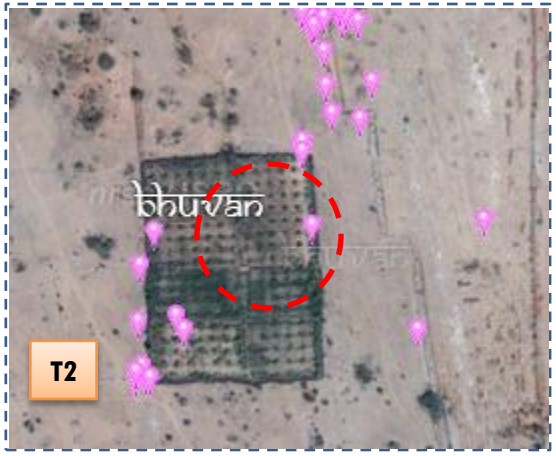
T2: 28 February 2018

Drishti Sl no. 2307097 MWS :4C3C2e2a

Farm pond



T1: 2016



T2: 28 February 2018

Drishti Sl no. 2449838 MWS : 4C3C2e2a

Horticulture

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-33/2011-12

T0:2010-11

T1: 19 March 2016

Drishti Sl no. 142126 MWS :4C3E5h1c

Farm pond

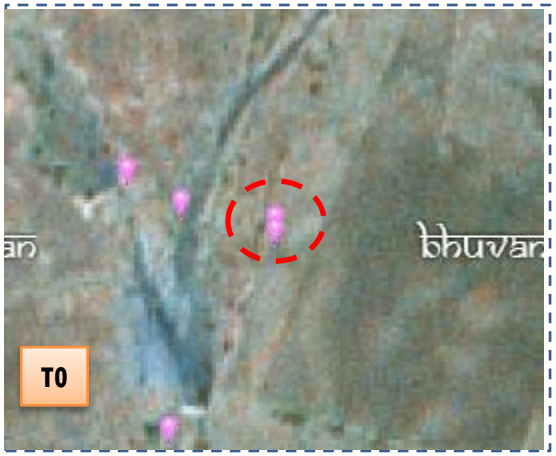
T0:2010-11

T1: 19 March 2016

Drishti Sl no. 142300 MWS : 4C3E5h1c

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-33/2011-12

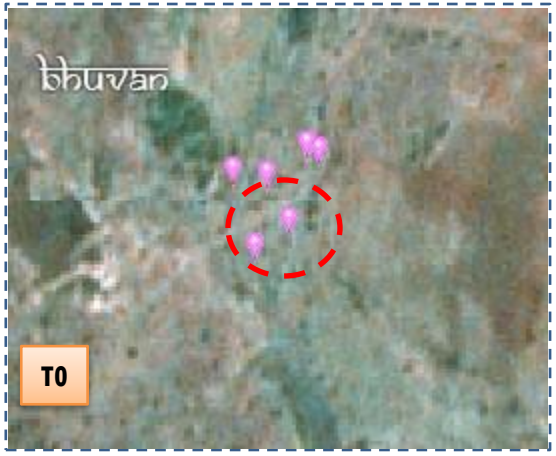


T0: 2010-11

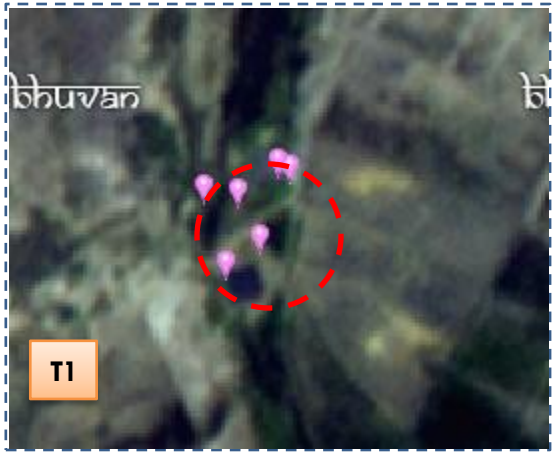
T1: 19 March 2016

Drishti Sl no. 1731435 MWS :4C3E5h1c

Farm pond



T0: 2010-11



T1: 19 March 2016

Drishti Sl no. 1731953 MWS : 4C3E5h2c

Farm pond

Natural Color Composite

Natural Color Composite- 2011-12

Source:LISS-IV,NRSC

Natural Color Composite-19 th March 2016

Source:NCC,NRSC

Natural Color Composite- 03rd June 2017

Source:NCC,NRSC

Natural Color Composite-26th March 2018

Source:LISS-IV,NRSC

Natural Color Composite-04th January 2019

Source:Sentinel-2

Natural Color Composite- 03rd November 2019

Source:LISS-IV,NRSC

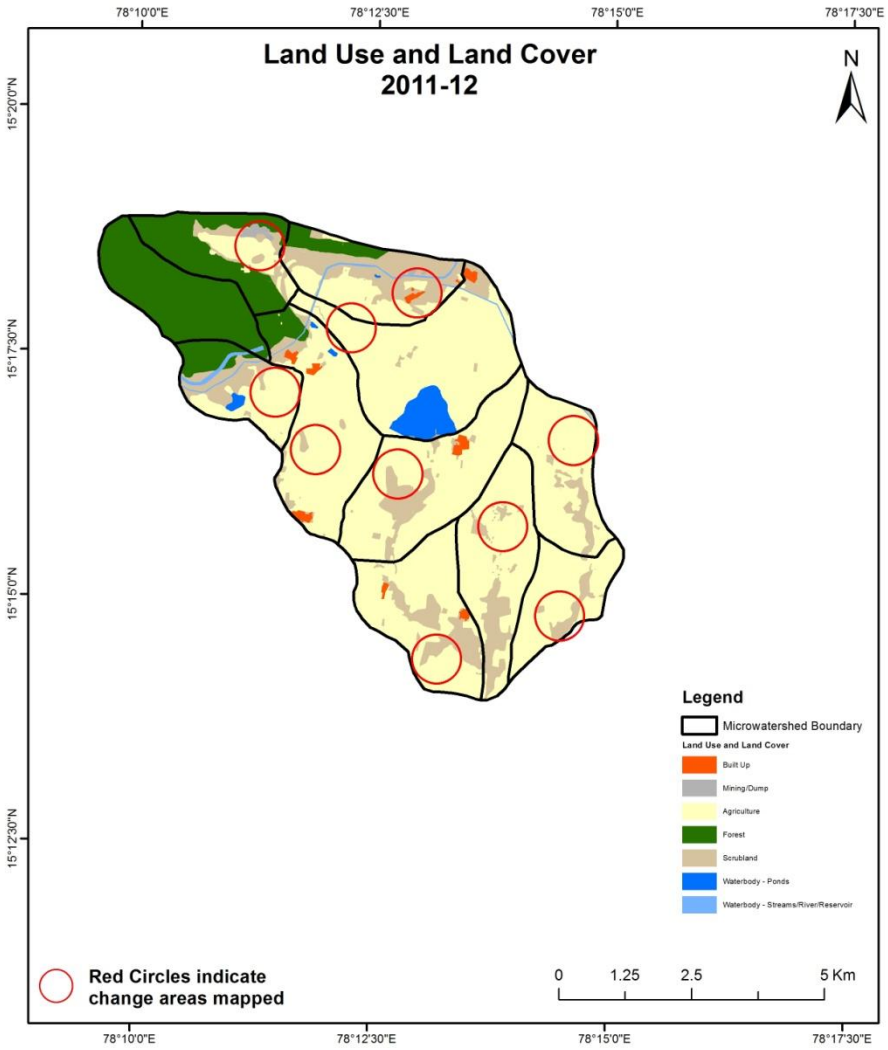
MONITORING IN THE PROJECT AREA

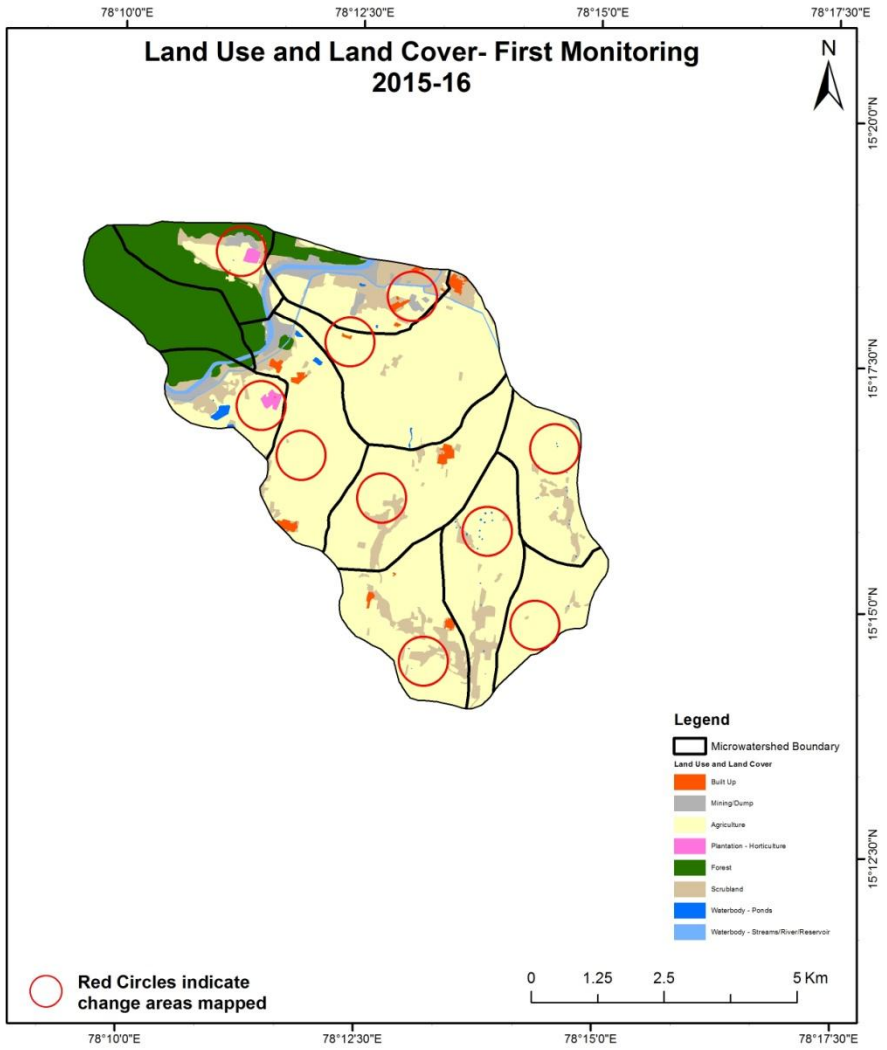
Land use and Land cover Changes in the Project

- Change in land use and land cover 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 (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)

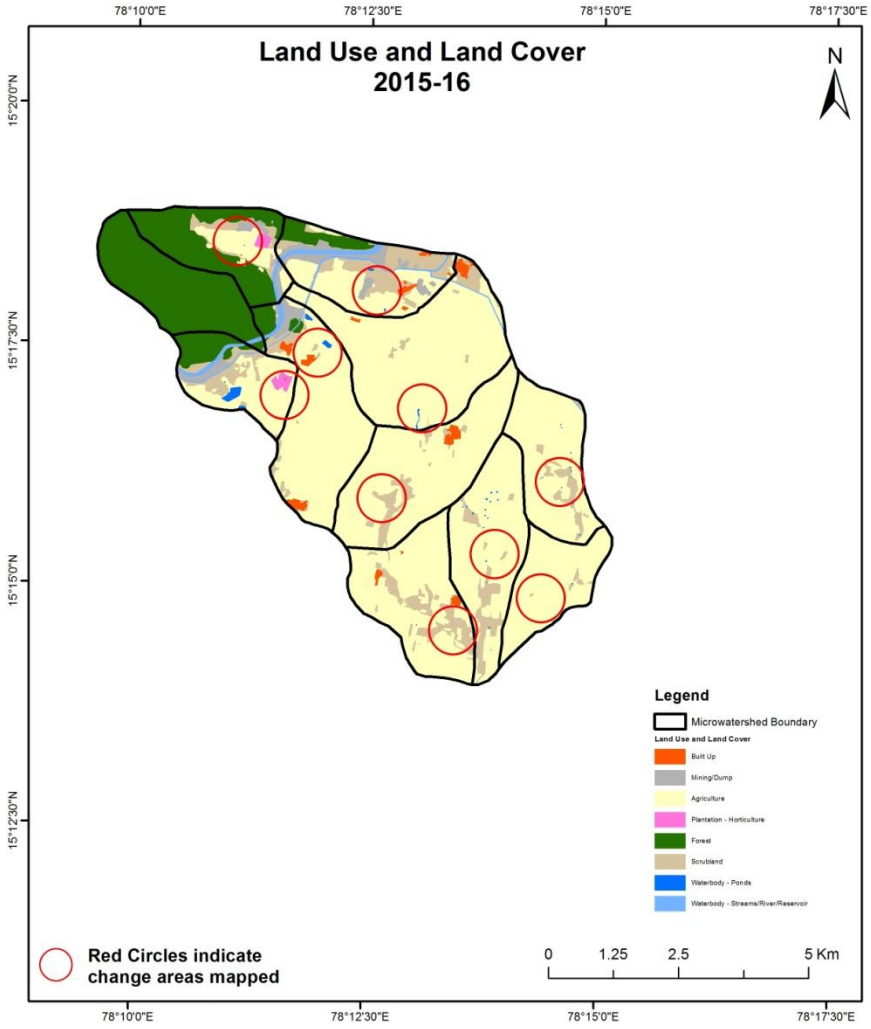
Scale: 1:10000

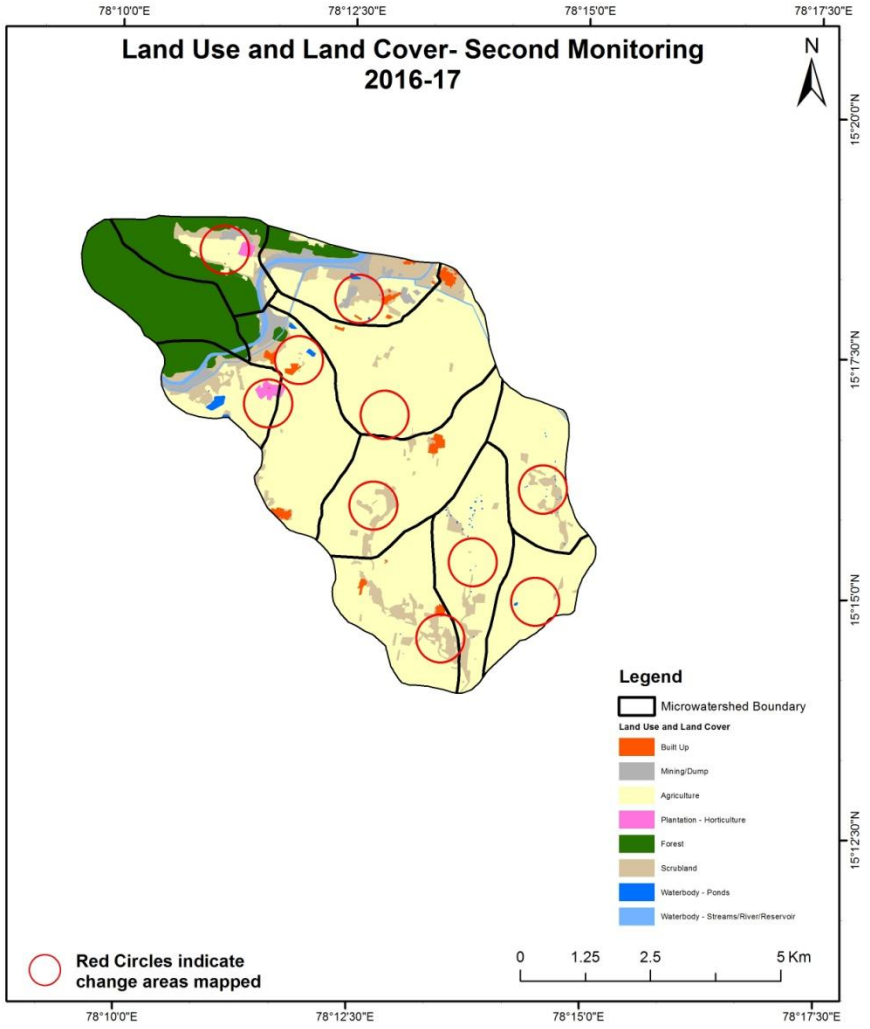




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

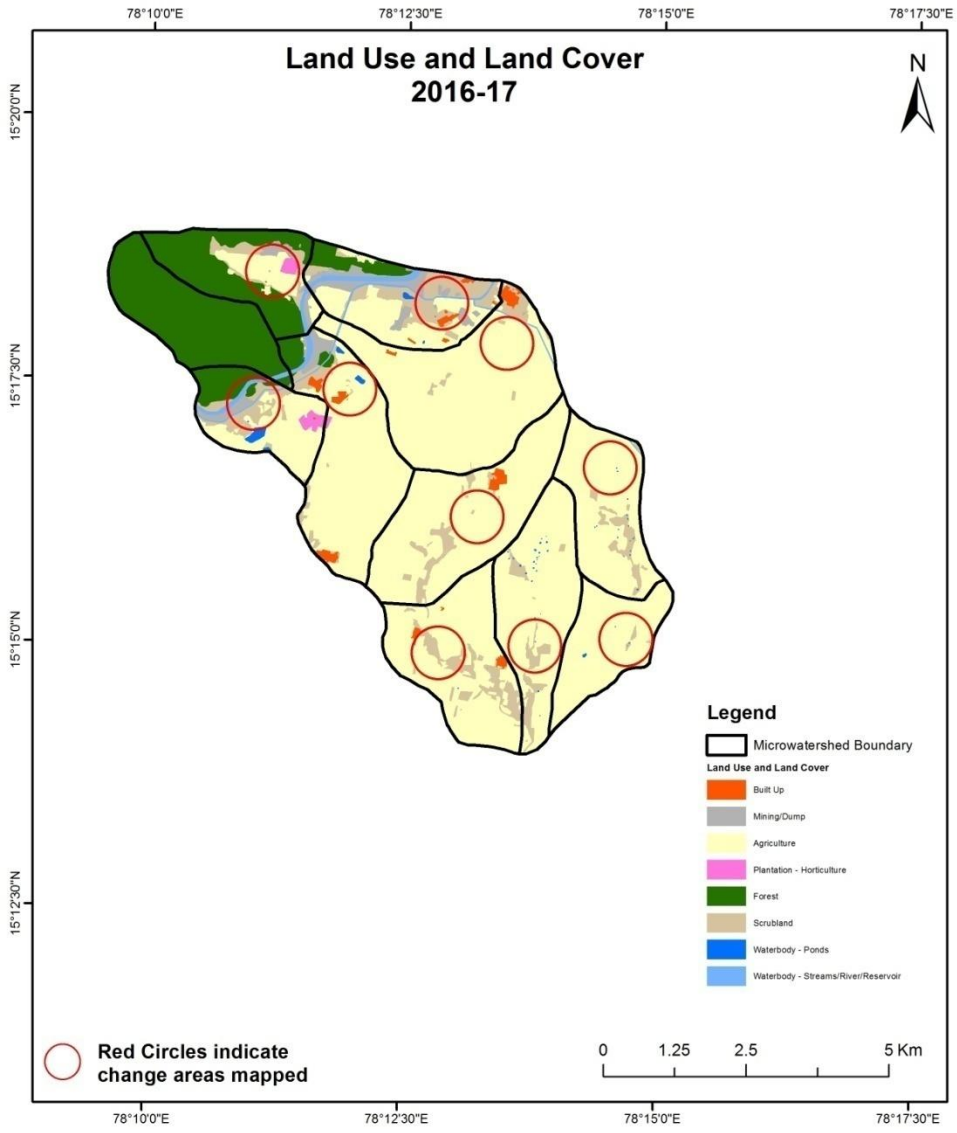
Scale: 1:10000

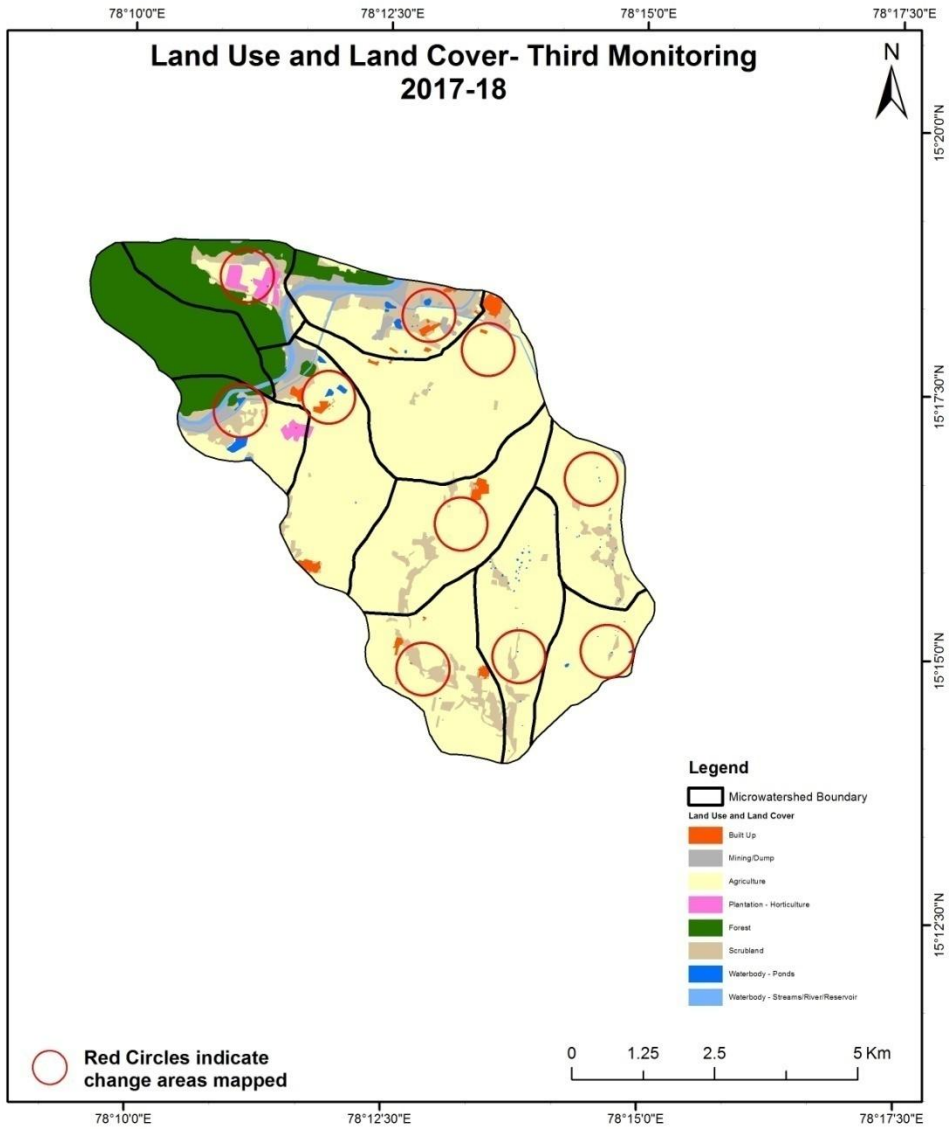




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

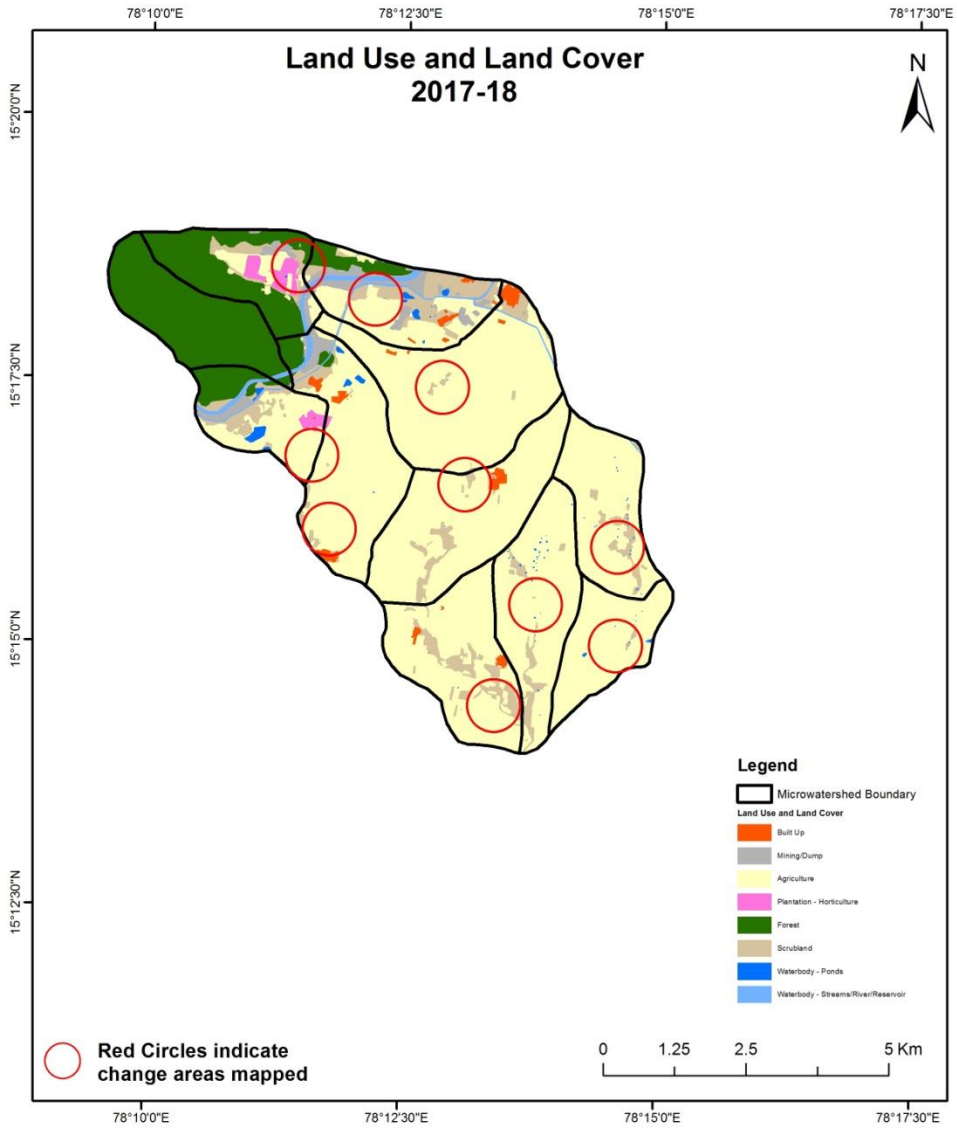
Scale: 1:10000

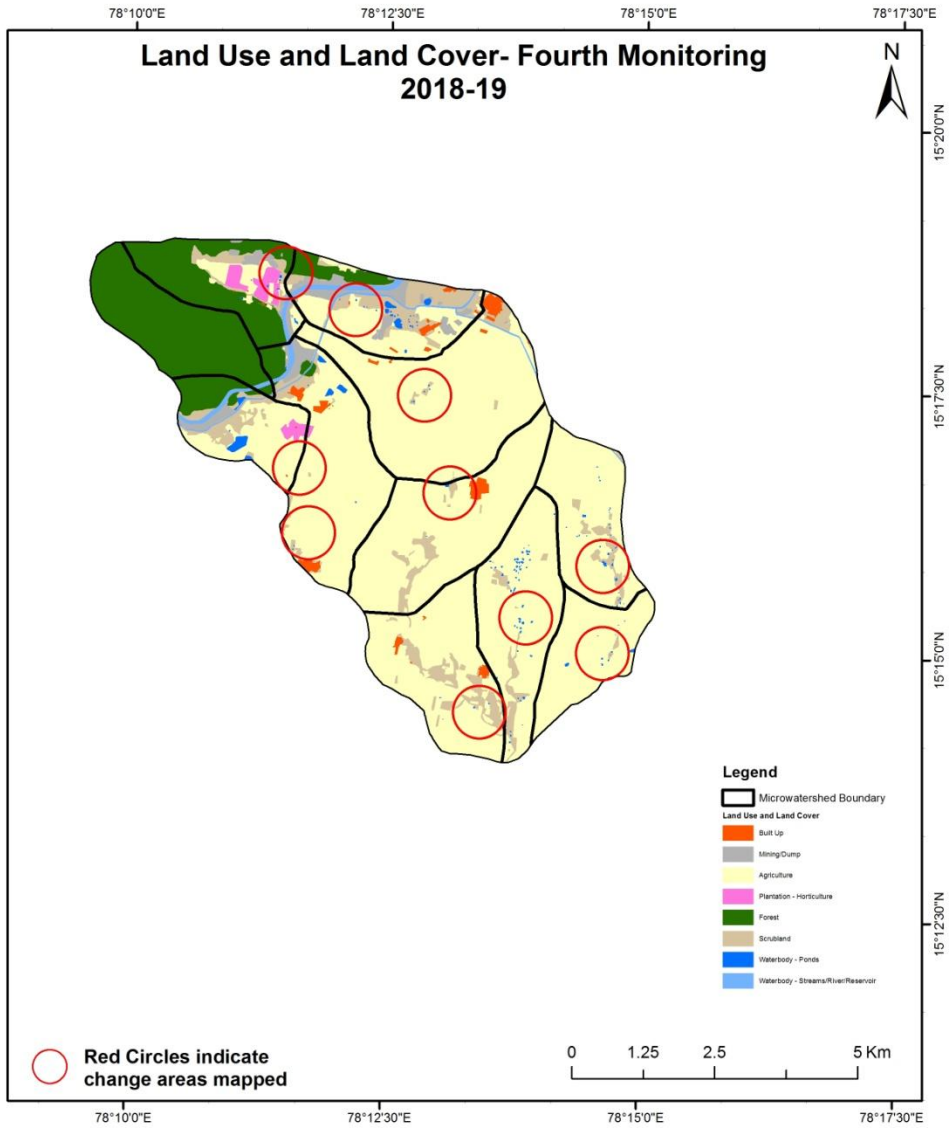




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

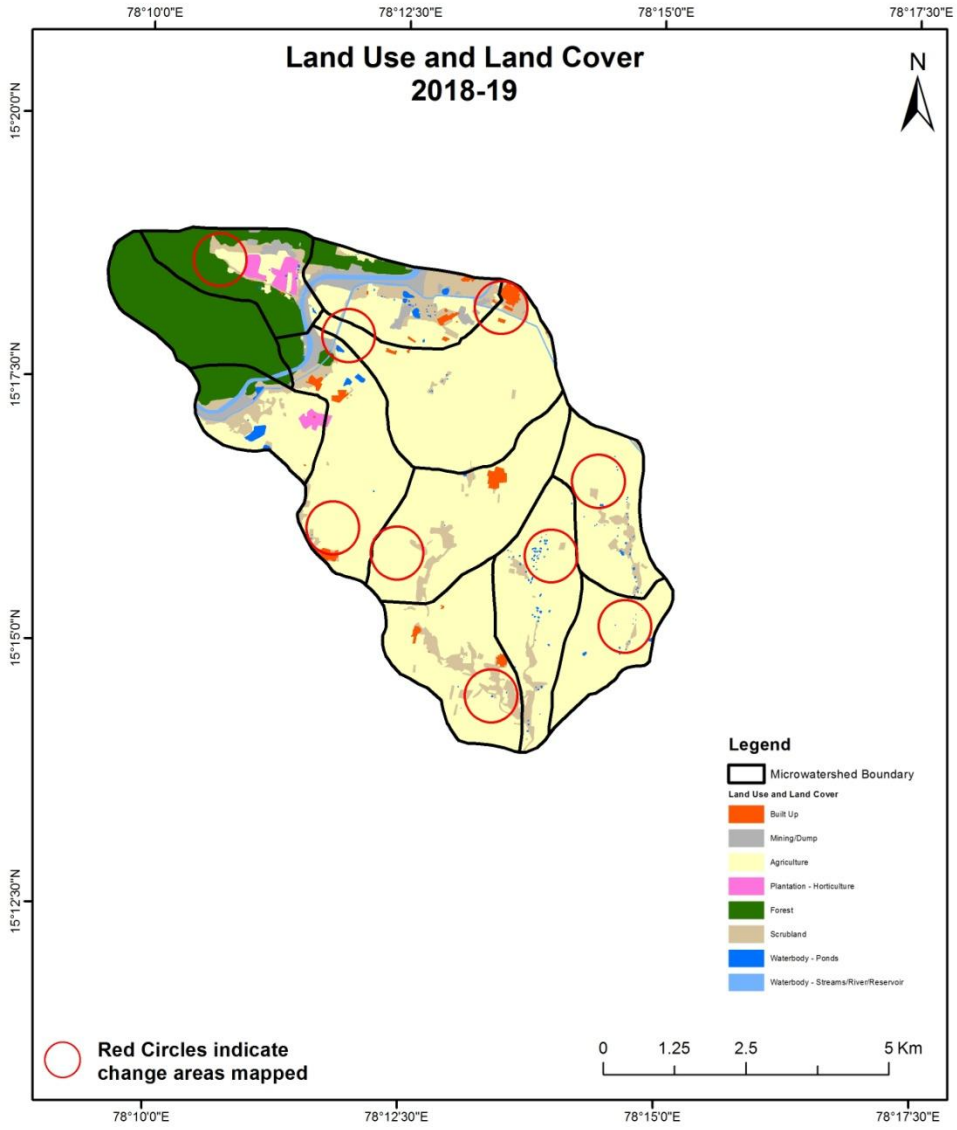
Scale: 1:10000

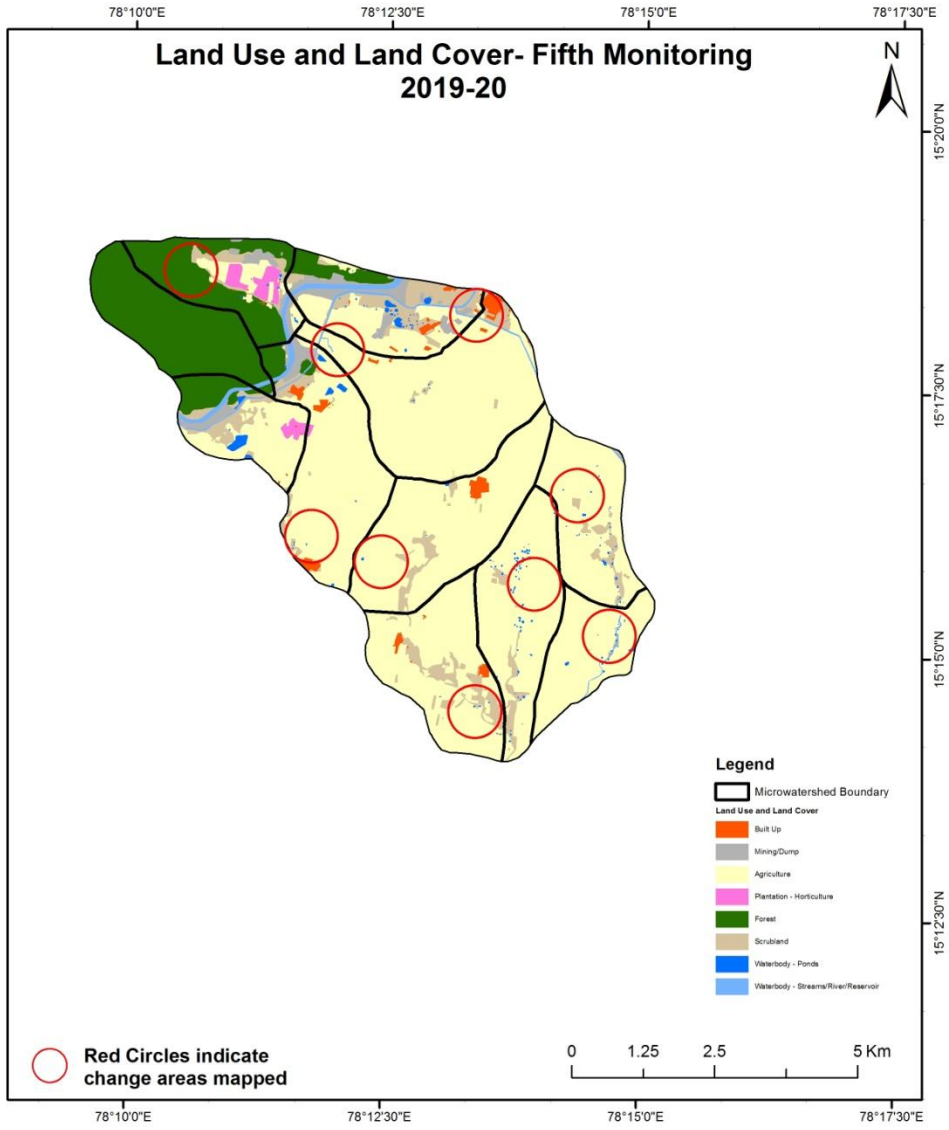




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

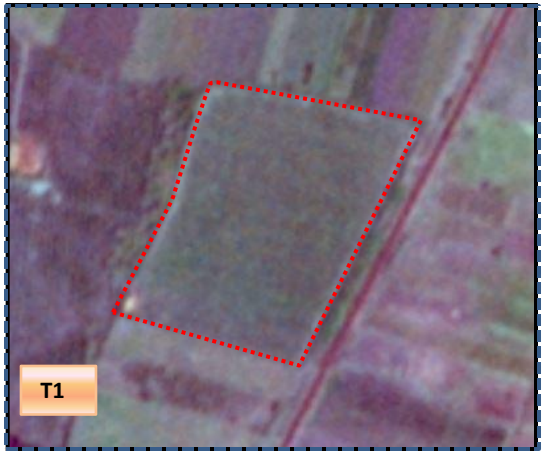
Scale: 1:10000





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

Agriculture to Plantation



T1: 2015-16(78°11'42.876"E 15°17'5.969"N)

T2: 03 June 2017

Agriculture to water body

T1: 2015-16 (78°13'48.205"E 15°15'50.409"N)

T2: 03 June 2017

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

Scrub to Agriculture

T1: 2015-16(78°12'41.342"E 15°15'39.884"N)

T2: 03 June 2017

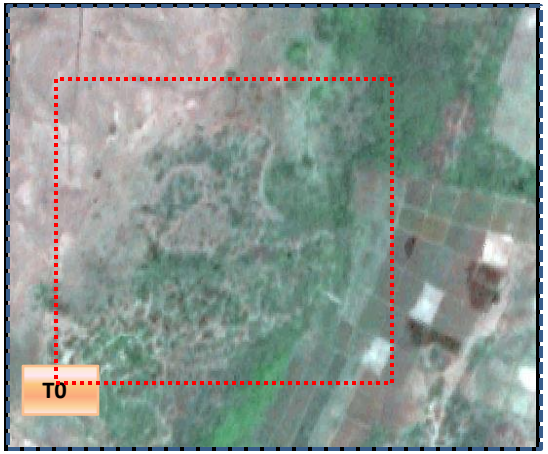
Scrub to Agriculture

T1: 2015-16(78°12'51.017"E 15°17'32.319"N)

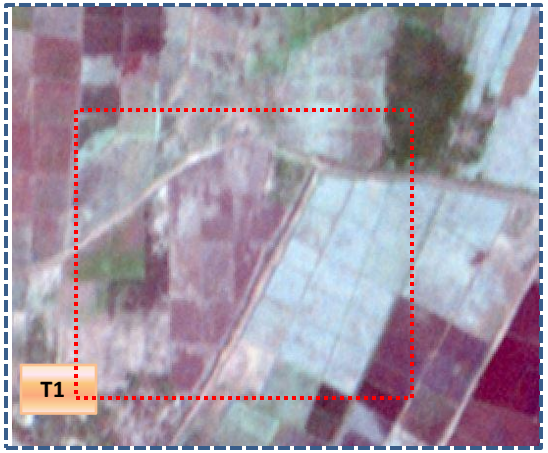
T2: 03 June 2017

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

Scrub to Agriculture



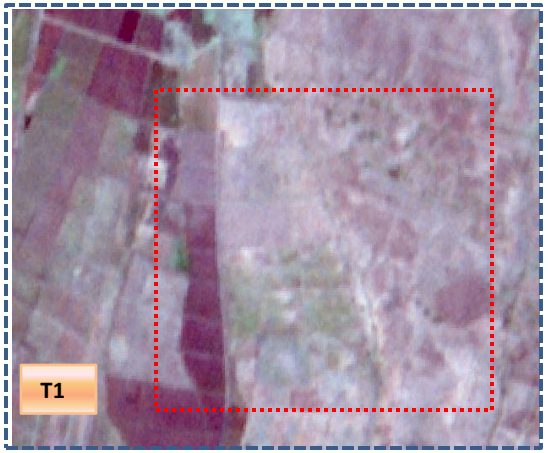
T0: 2011-12 (78°13'0.991"E 15°16'3.546"N)



T1: 19 Mar 2016

Scrub to Agriculture

T0: 2011-12 (78°11'46.251"E 15°16'34.356"N)



T1: 19 Mar 2016

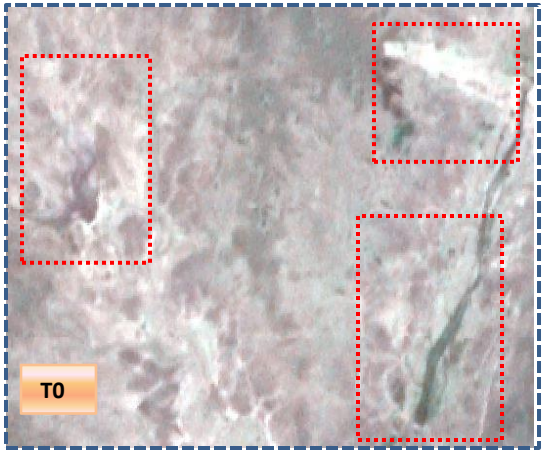
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Built-up

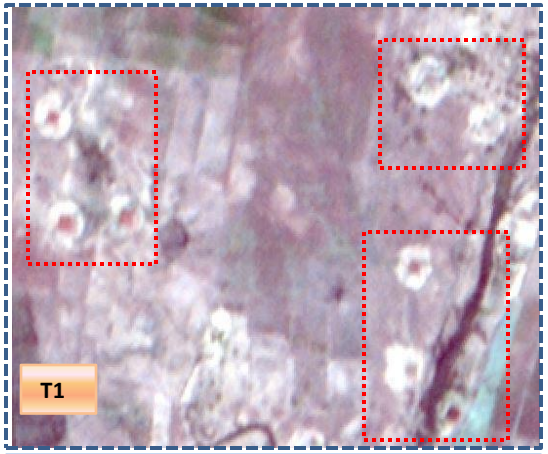
T0: 2011-12 (78°12'52.677"E 15°17'53.478"N)

T1: 19 Mar 2016

Agriculture to Water body



T0: 2011-12 (78°13'46.435"E 15°15'47.863"N)



T1: 19 Mar 2016

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

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	37.89										**37.89**
Mining/dump		12.79									**12.79**
Agriculture	2.47	5.65	3210.83	15.27				2.45	4.55	2.95	**3244.16**
Plantation Horticulture											
Forest	0.04	18.52	0.98		741.02				11.52	0.11	**772.19**
Forest Plantation											
Barren Rocky											
Scrub	4.75	67.65	174.17	0.74				449.80	14.36	0.72	**712.17**
Waterbody-Streams/River									37.03		**37.03**
Waterbody – Ponds			78.15							10.47	**88.62**
Grand Total	**45.14**	**104.60**	**3464.13**	**16.00**	**741.02**			**452.25**	**67.46**	**14.25**	**4904.85**

- 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 33 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 252 ha of the agriculture area has increased from 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
T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	45.14										**45.14**
Mining/dump		104.60									**104.60**
Agriculture	0.74	1.14	3458.24	3.63						0.37	**3464.13**
Plantation Horticulture				16.00							**16.00**
Forest	0.06		1.29		739.67						**741.02**
Forest Plantation											
Barren Rocky											
Scrub	0.90	0.54	35.58					413.24	0.22	1.76	**452.25**
Waterbody-Streams/River									67.46		**67.46**
Waterbody – Ponds			0.87							13.38	**14.25**
Grand Total	**46.85**	**106.28**	**3495.98**	**19.63**	**739.67**			**413.24**	**67.68**	**15.51**	**4904.85**

• 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 05 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T2.

• In T2 36 ha of the agriculture area has increased from 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
T2	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	46.85										**46.85**
Mining/dump		105.06								1.23	**106.28**
Agriculture	0.42		3470.78	23.06						1.73	**3495.98**
Plantation Horticulture				19.63							**19.63**
Forest		1.43			738.24						**739.67**
Forest Plantation											
Barren Rocky											
Scrub	2.50	4.25	15.10					386.73		4.66	**413.24**
Waterbody-Streams/River									67.68		**67.68**
Waterbody – Ponds										15.51	**15.51**
Grand Total	**49.77**	**110.74**	**3485.87**	**42.69**	**738.24**			**386.73**	**67.68**	**23.12**	**4904.85**

- 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 25 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T3.
- In T3 15 ha of the agriculture area has increased from scrubland area 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
T3	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	49.77										**49.77**
Mining/dump		110.61								0.12	**110.74**
Agriculture	0.37		3480.79							4.71	**3485.87**
Plantation Horticulture				42.69							**42.69**
Forest	0.22	1.45			736.44					0.14	**738.24**
Forest Plantation											
Barren Rocky											
Scrub	3.65	0.51	2.56					377.07		2.93	**386.73**
Waterbody-Streams/River									67.68		**67.68**
Waterbody – Ponds										23.12	**23.12**
Grand Total	**54.01**	**112.58**	**3483.35**	**42.69**	**736.44**			**377.07**	**67.68**	**31.03**	**4904.85**

- 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 05 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.
- In T4 02 ha of the agriculture area has increased from scrubland area 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
T4	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	54.01										**54.01**
Mining/dump		112.58									**112.58**
Agriculture	0.29	0.08	3477.77						3.59	1.63	**3483.35**
Plantation Horticulture	0.05			42.64							**42.69**
Forest			0.46		735.97						**736.44**
Forest Plantation											
Barren Rocky											
Scrub	1.14	0.51	3.48					369.88	0.93	1.12	**377.07**
Waterbody-Streams/River									67.68		**67.68**
Waterbody – Ponds										31.03	**31.03**
Grand Total	**55.49**	**113.16**	**3481.72**	**42.64**	**735.97**			**369.88**	**72.20**	**33.78**	**4904.85**

• 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 05 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and water body in T5.

•In T5 03 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 decrease of 19 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 219 & 31 Hectares from T0 to T1 & T1-T2 respectively, there is a decrease of 10, 02 & 01 hectares from T2-T3, T3-T4 & T4-T5 respectively and overall increase of 237 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 42 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 342 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (28) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (29) verified from the portal.