MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

KURNOOL -53/2012-13
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
December-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

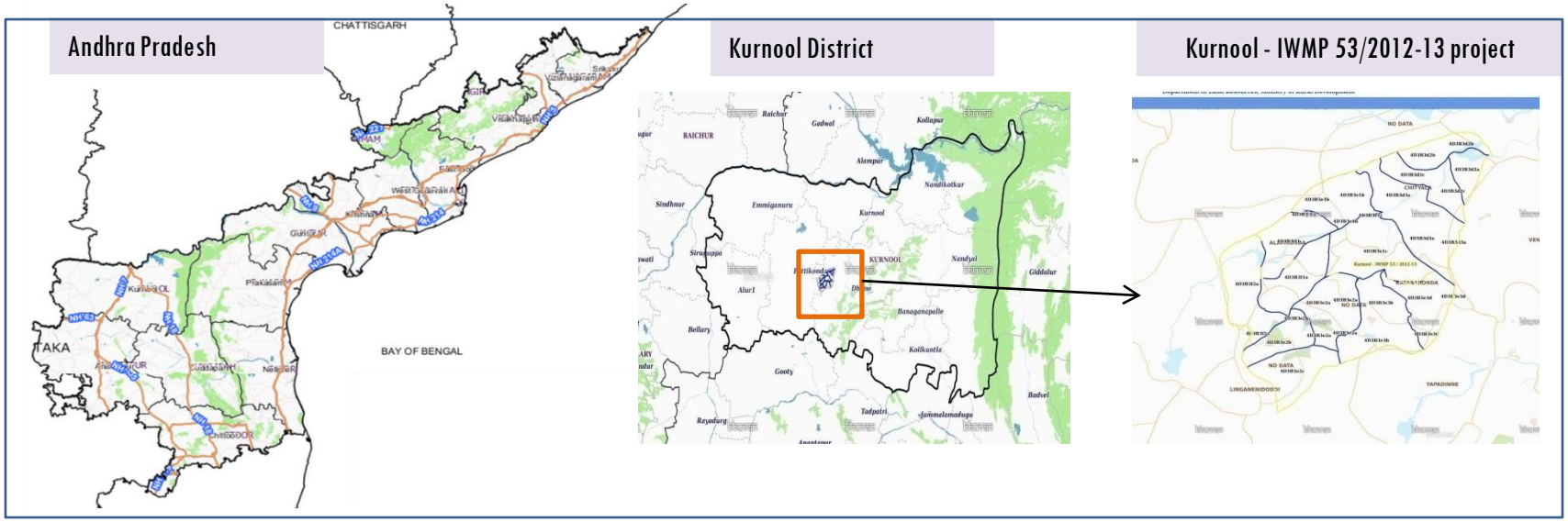
CONTENTS

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-53/2012-13, Kurnool District of Andhra Pradesh. The total geographical area of the project is **8,364** ha. It comprises of 14 micro watersheds.
- In the project area 100 Drishti photos were uploaded showing 69 checks & plugins, 3 Field bunds and remaining showing others.
- Water bodies have shown an decrease by 8.5 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 71.7% is covered by the agriculture, 10.8 % is covered by scrubland, 7.8 % is covered by forest area and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-53/2012-13
DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Krishnagiri Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is **8,364** ha. It comprises of 14 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2012-13 (T0) period (***Batch -1***) projects taking 2020-21 (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).

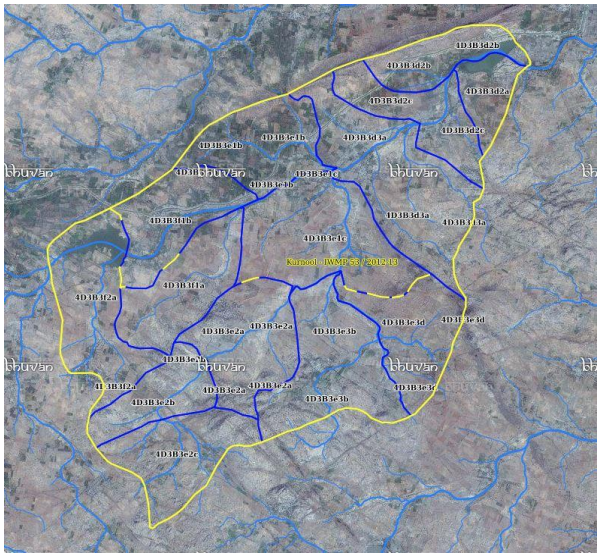
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			28-Jan-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			28-Jan-21
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	100
4	Detailed Project Report		

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



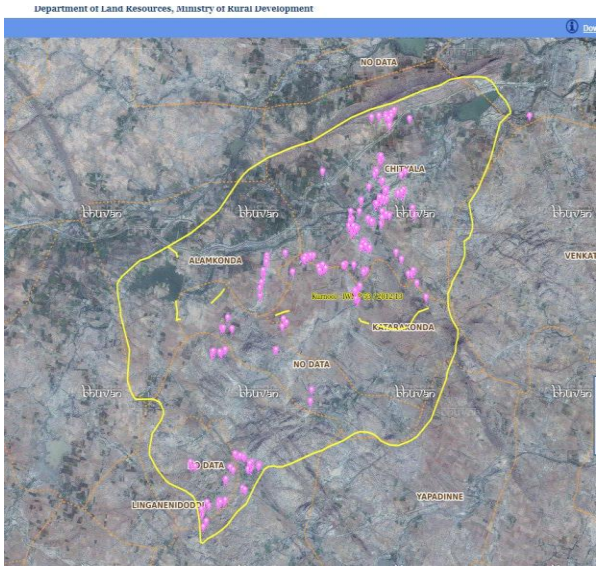
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

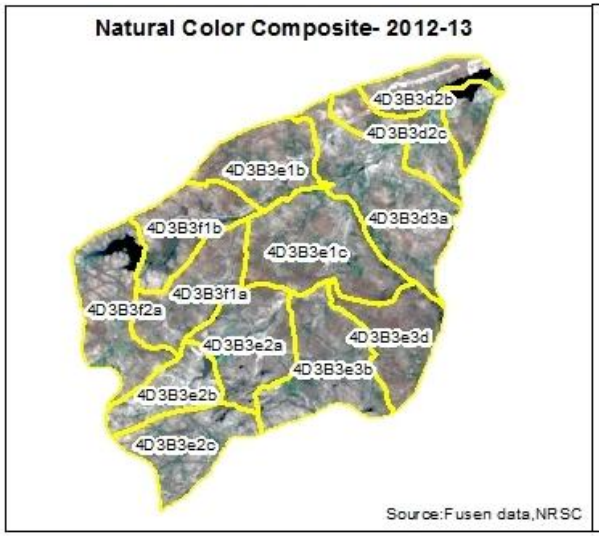
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	18	18
2	Checks & plugins	3	3
3	Agriculture	0	0
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	5	5
8	Check dams (Civil work)	4	4
9	Field bunds	0	0
10	Om (Other measurement)	0	0
11	LM (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	75	70
	TOTAL	**105**	**100**

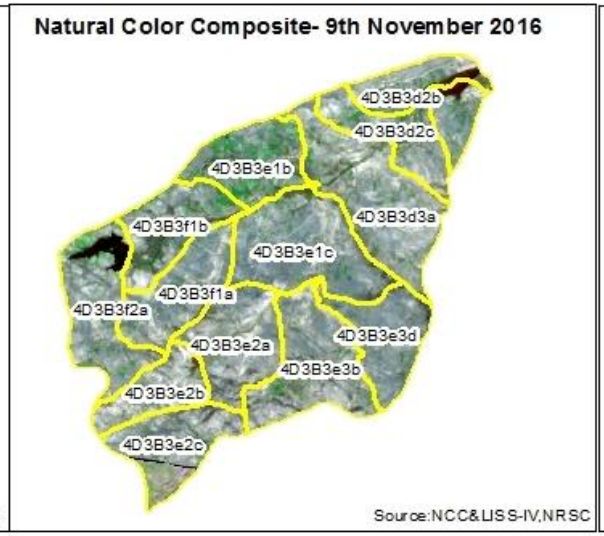
MONITORING IN THE PROJECT AREA

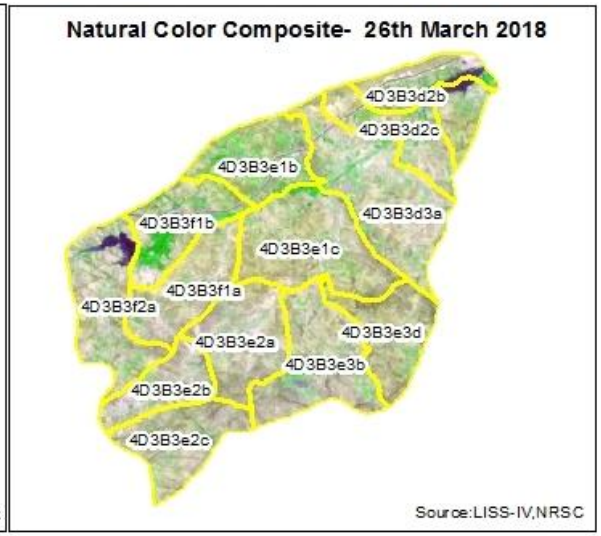
Site Wise Changes in the Project

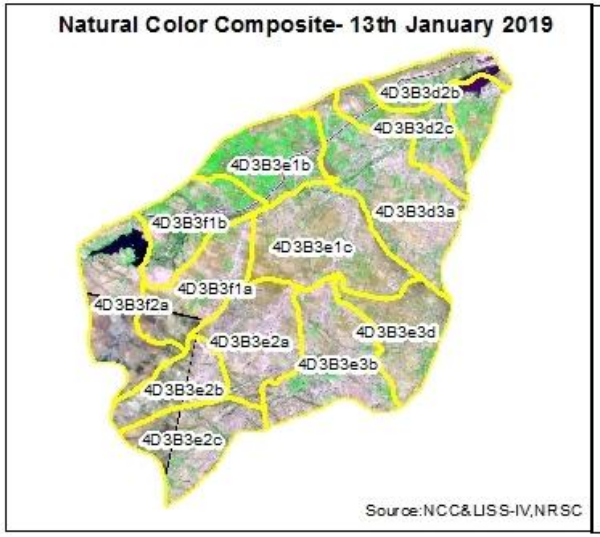
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2010-11) and T5 is 2020-21 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

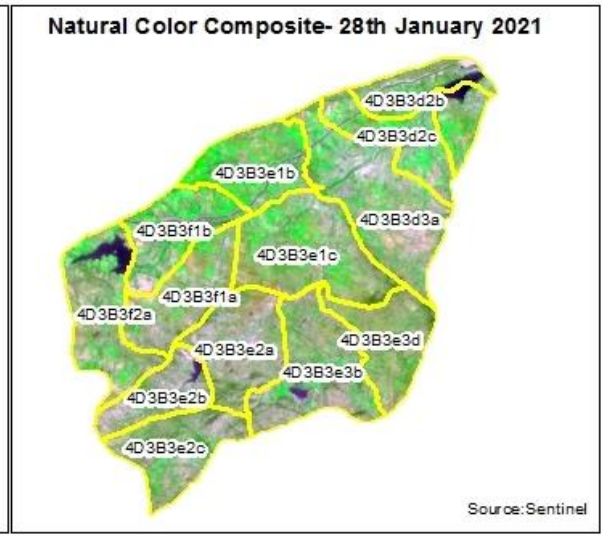
Natural Color Composite











Monitoring of activities in Kurnool District Andhra Pradesh. IWMP-53/2012-13

T0 Satellite data 2013

T1 Satellite data 2015

T2 Satellite data 2016

T3 Satellite data 2017

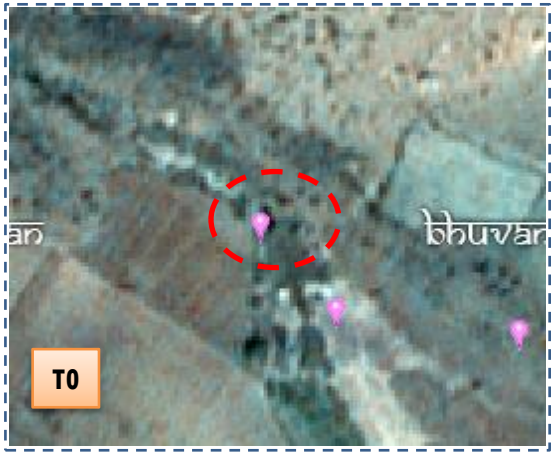
T4 Satellite data 2019

T5 Satellite data 2020

Drishti Id. 129401

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-53/2012-13



T0:2012-13

T1: 19 December 2016

Drishti Sl no. 2485988 MWS : 4D3B3e2c

Check dam

T0:2012-13

T1: 19 December 2016

Drishti Sl no. 129401 MWS : 4D3B3f1a

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-53/2012-13

T0: 2012-13

T1: 19 December 2016

Drishti Sl no. 2558293 MWS : 4D3B3f1a

Farm pond

T0: 2012-13

T1: 19 December 2016

Drishti Sl no. 2516849 MWS : 4D3B3e2c

Horticulture

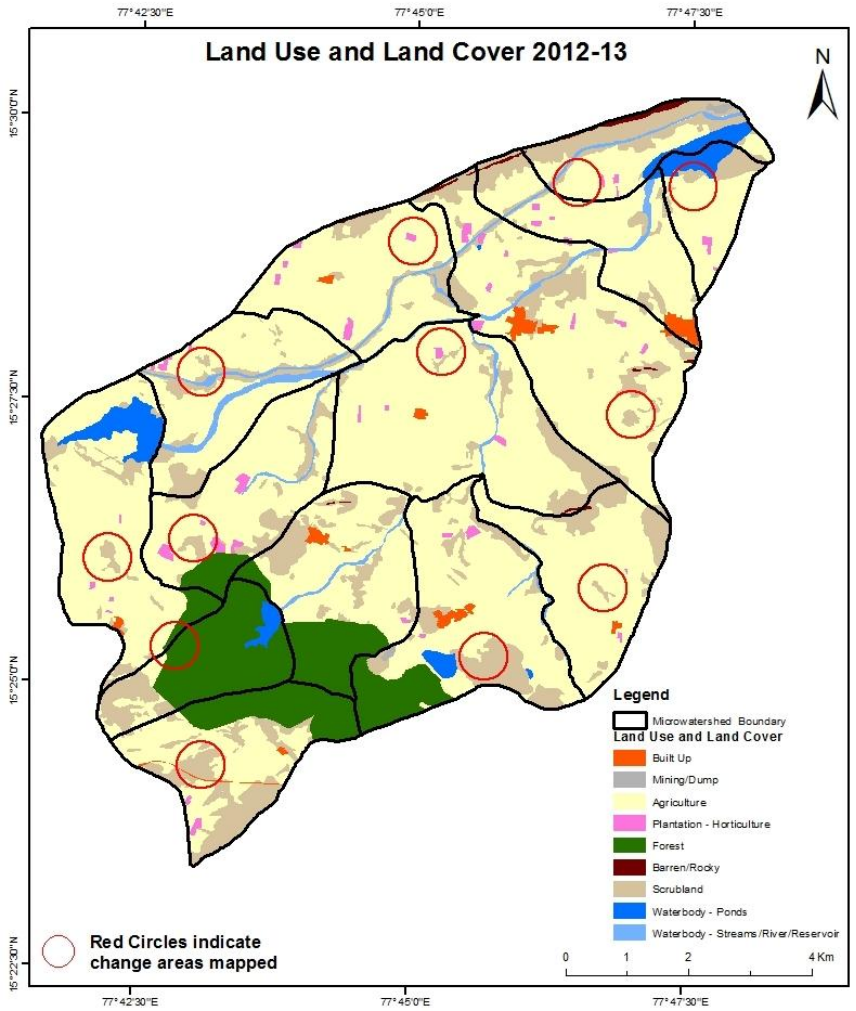
MONITORING IN THE PROJECT AREA

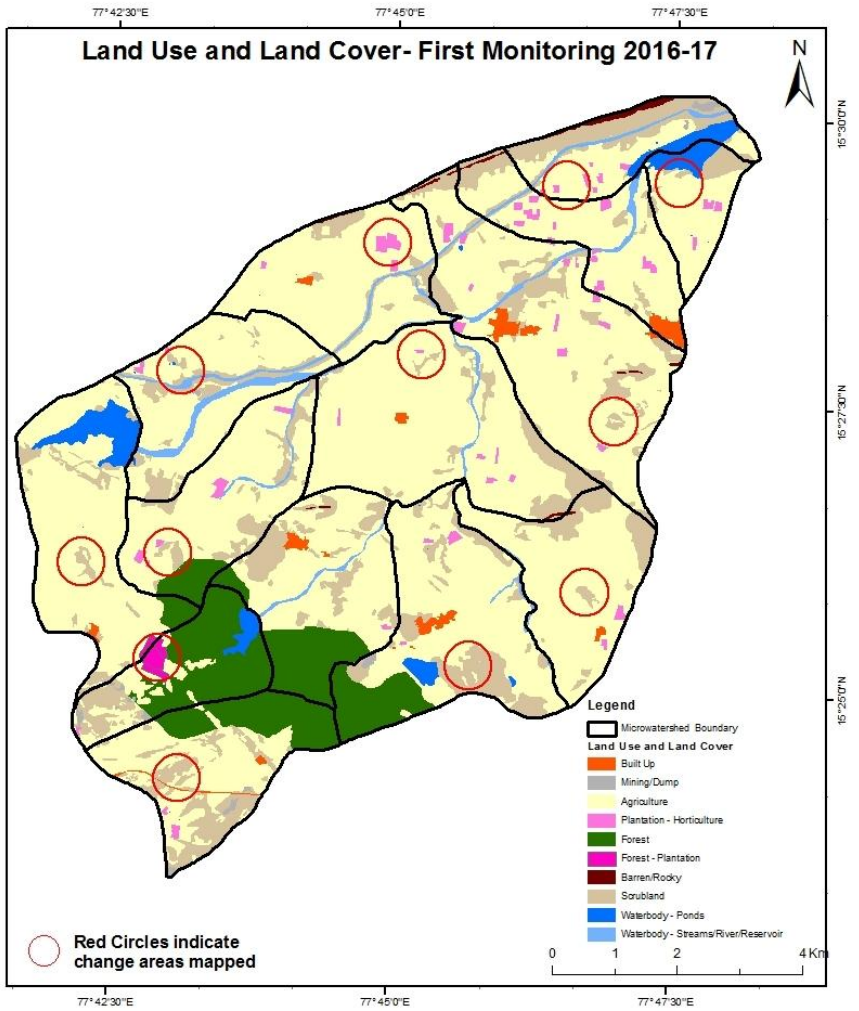
Land use and Land cover Changes in the Project

- 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 (2012-13) and row represents the T5 (2020-21)

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

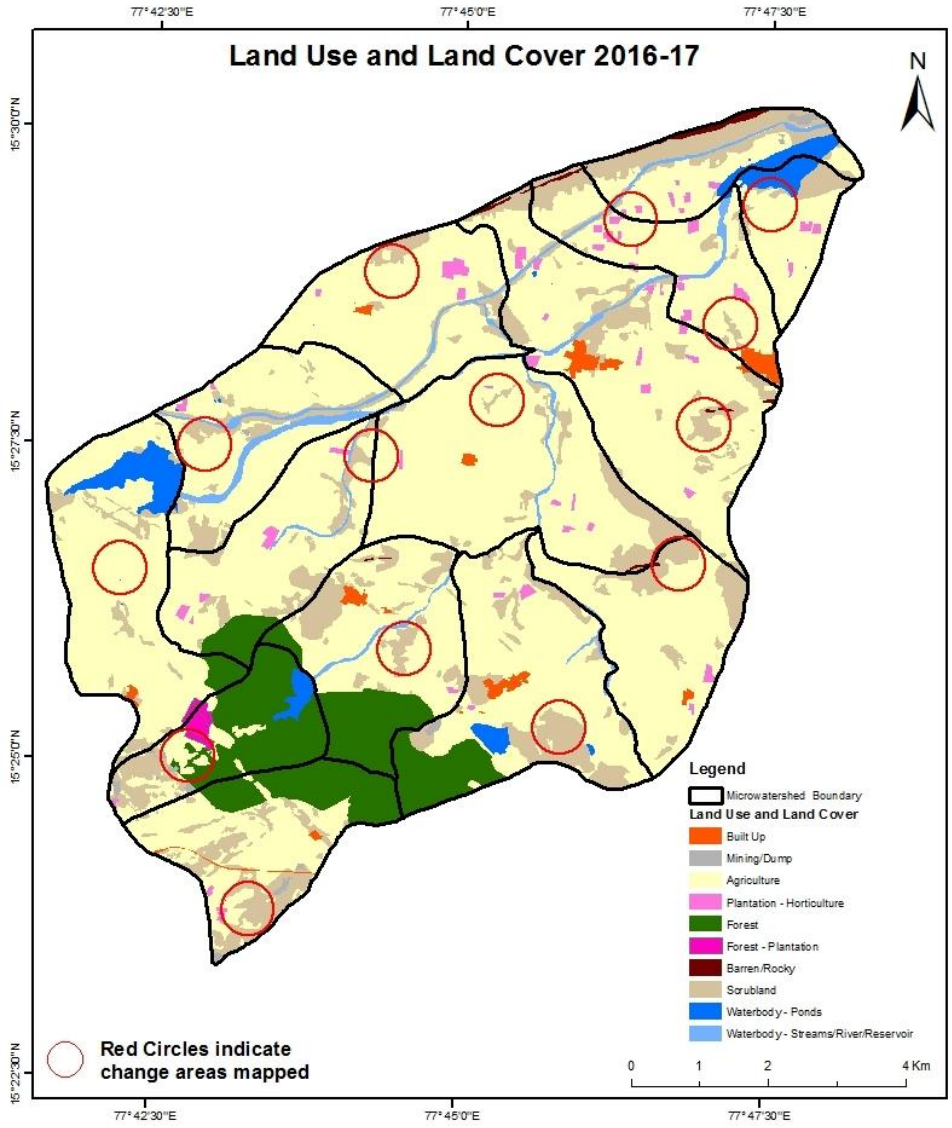
Scale: 1:10000

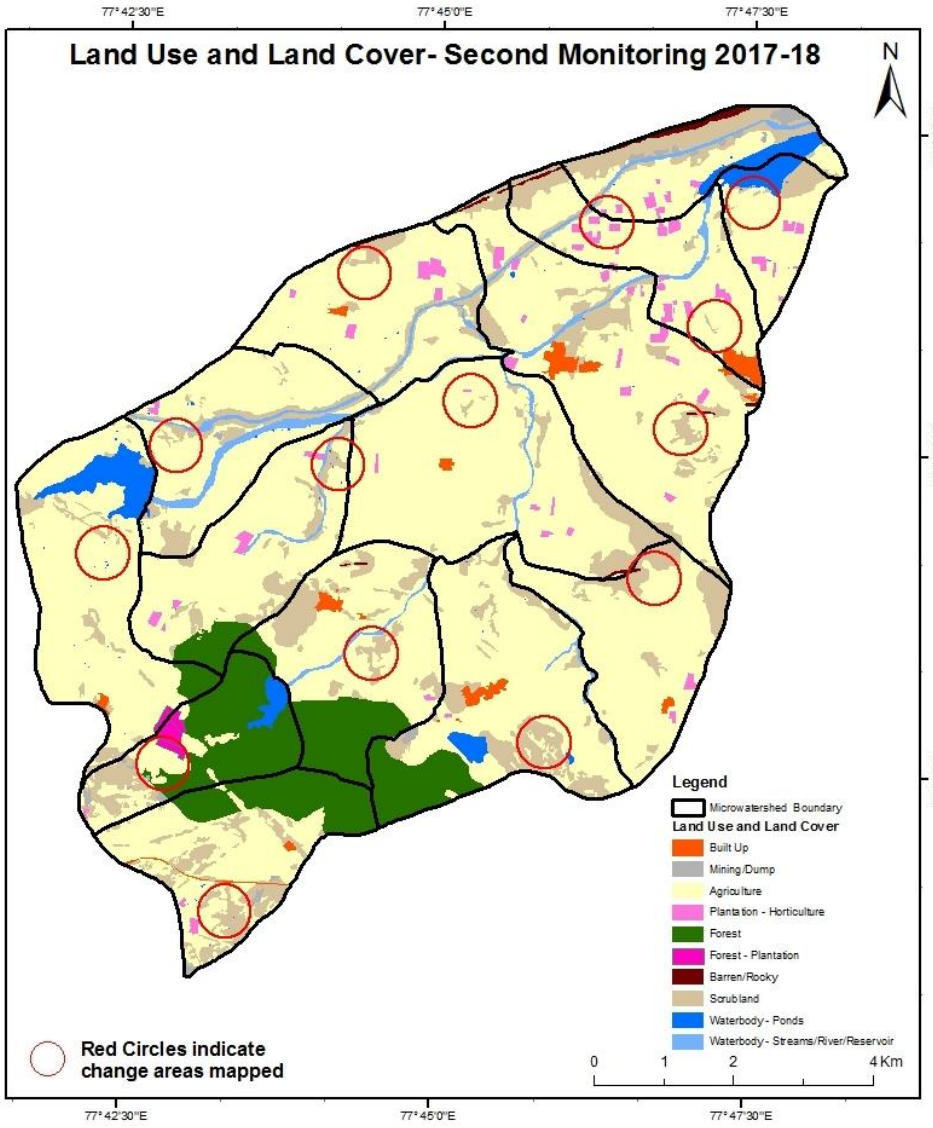




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

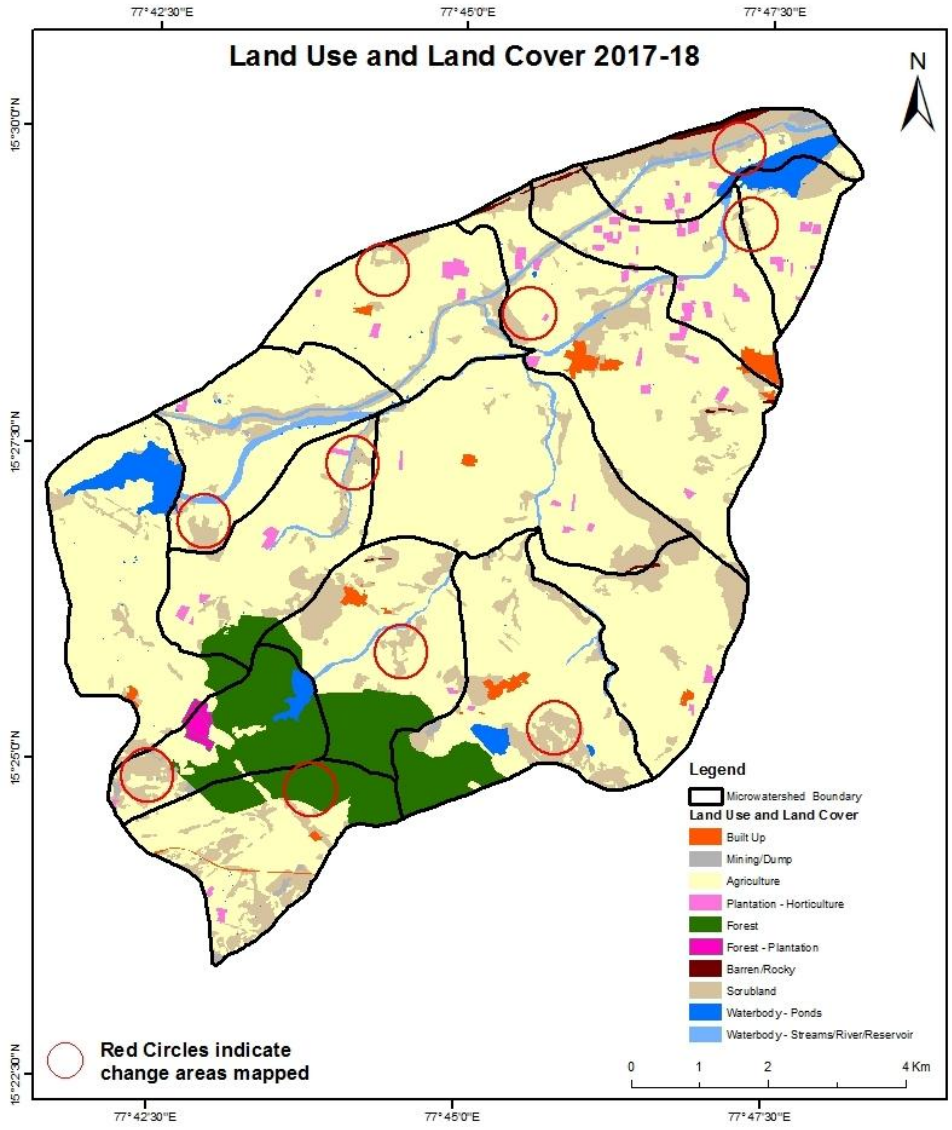
Scale: 1:10000

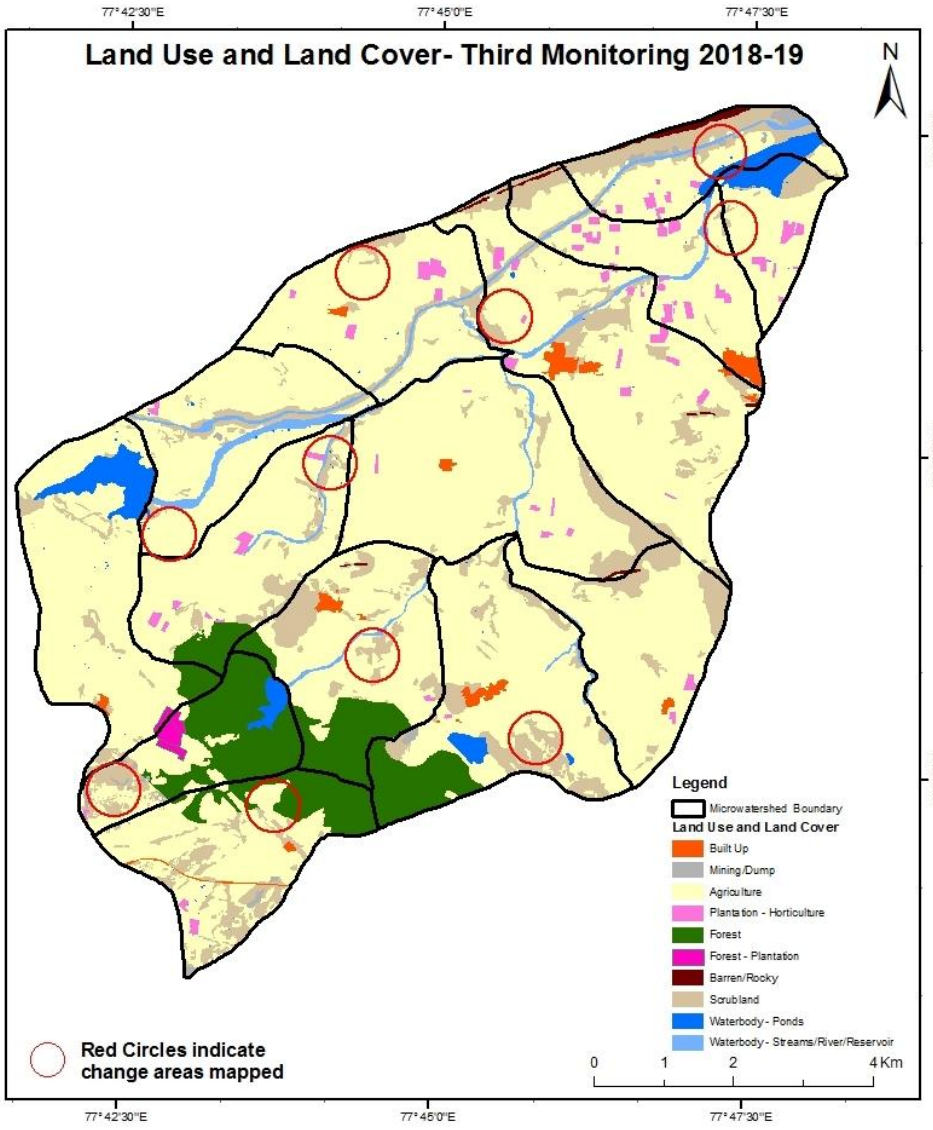




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

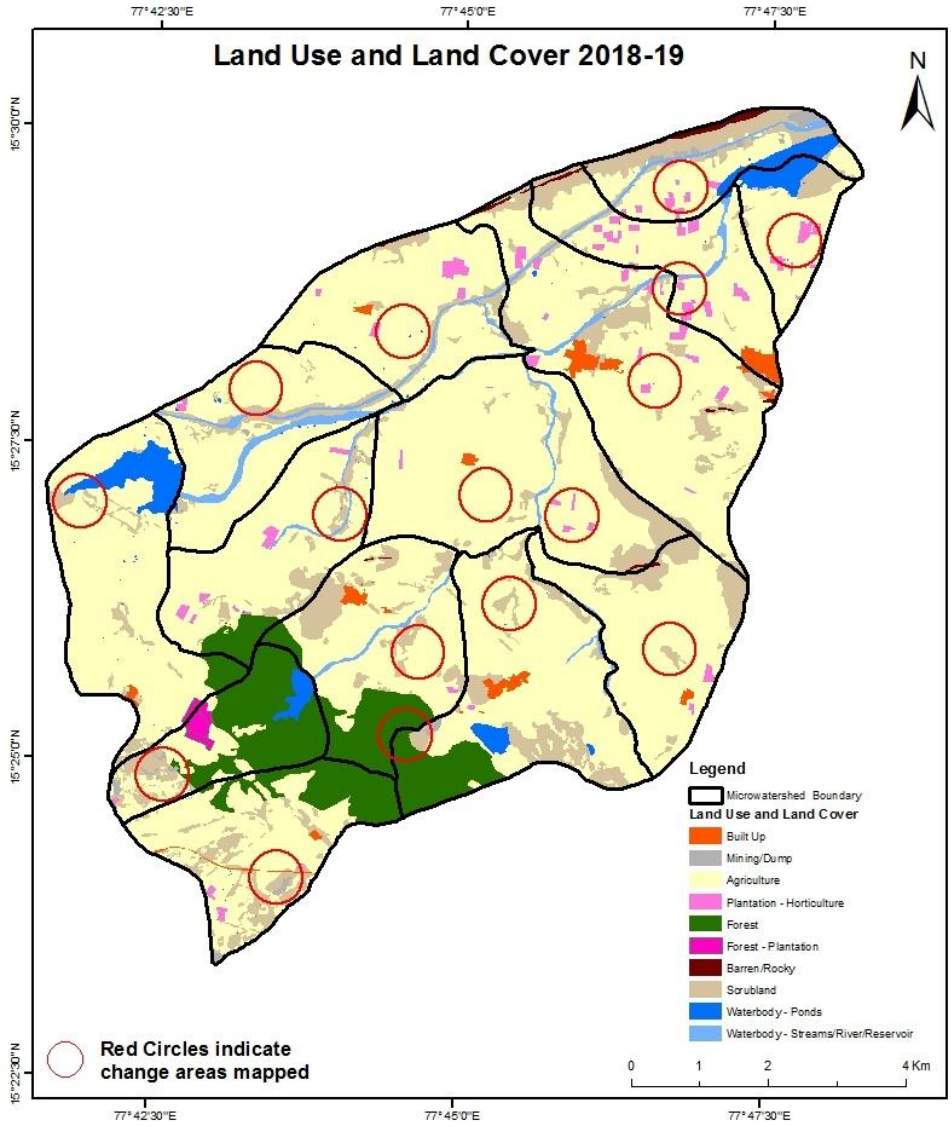
Scale: 1:10000

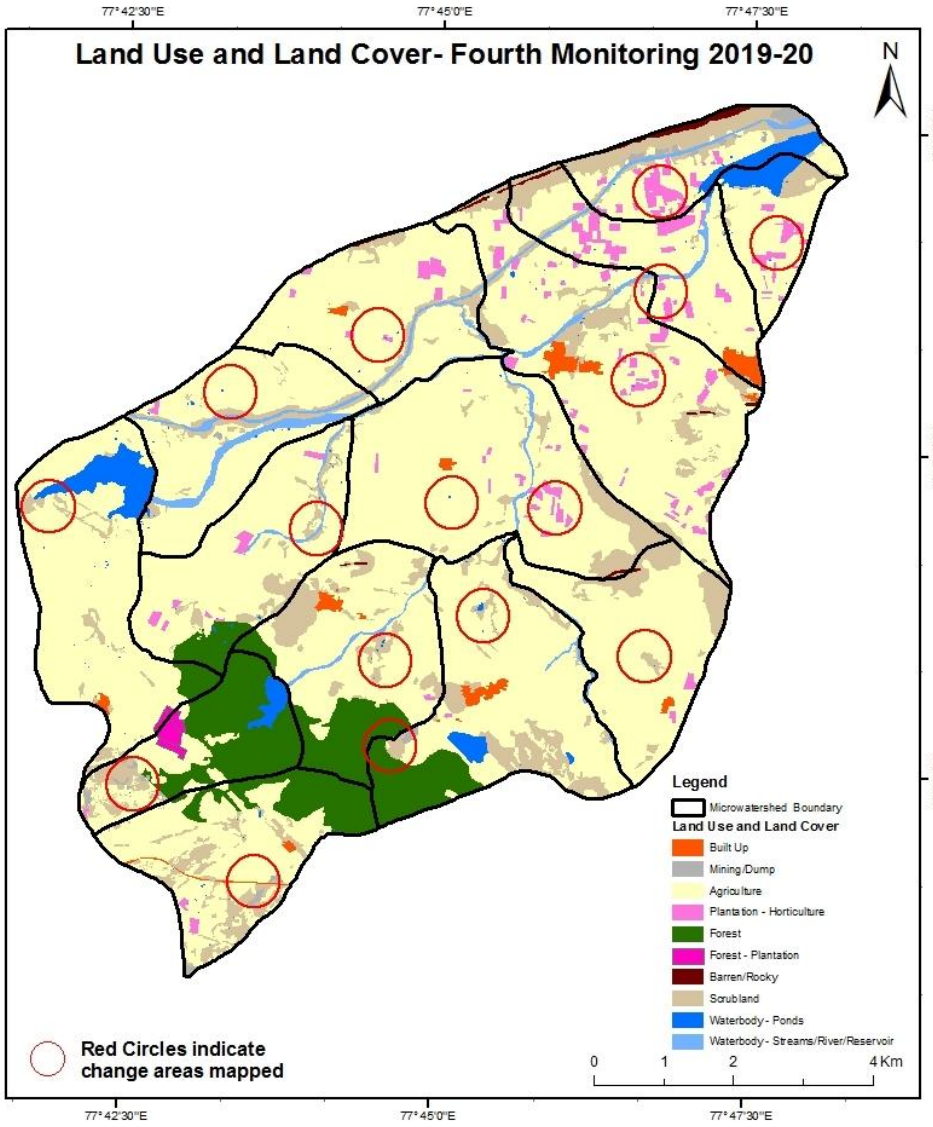




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

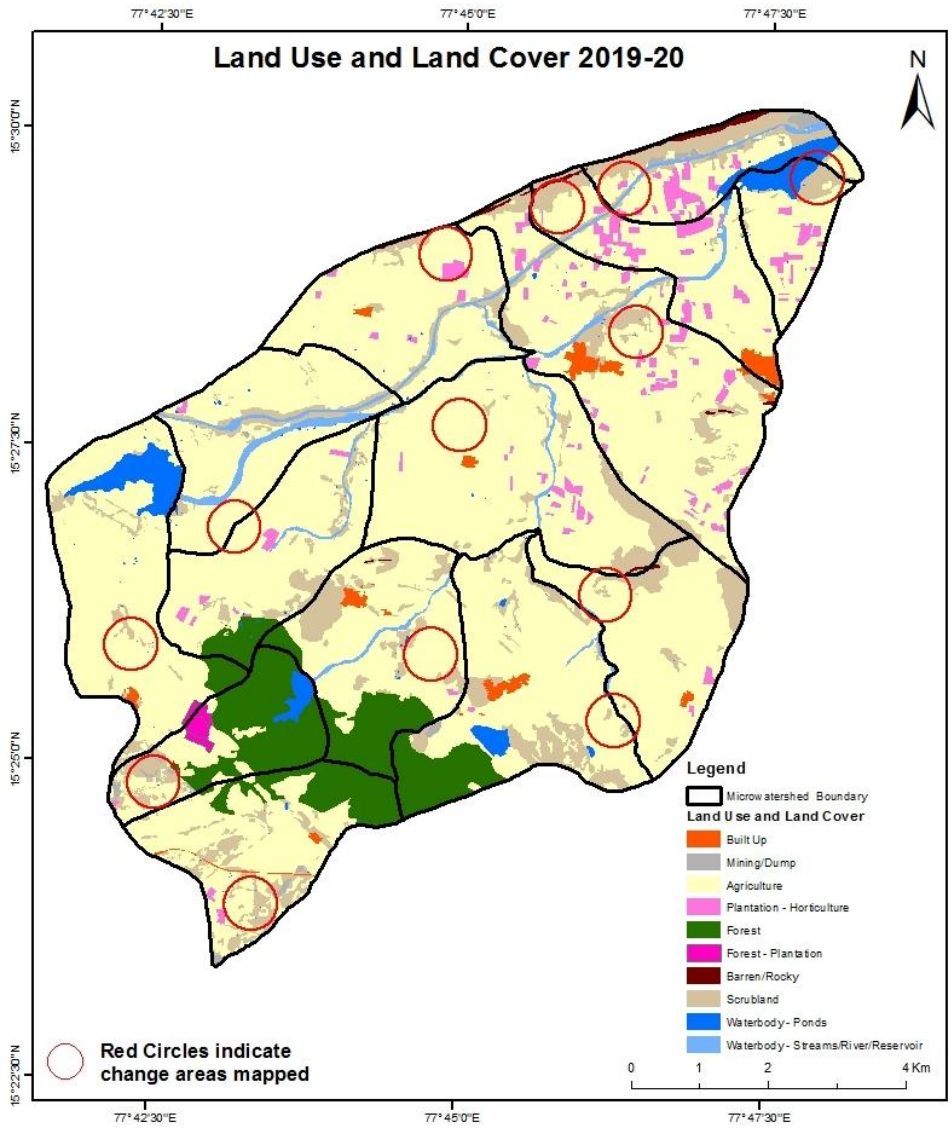
Scale: 1:10000

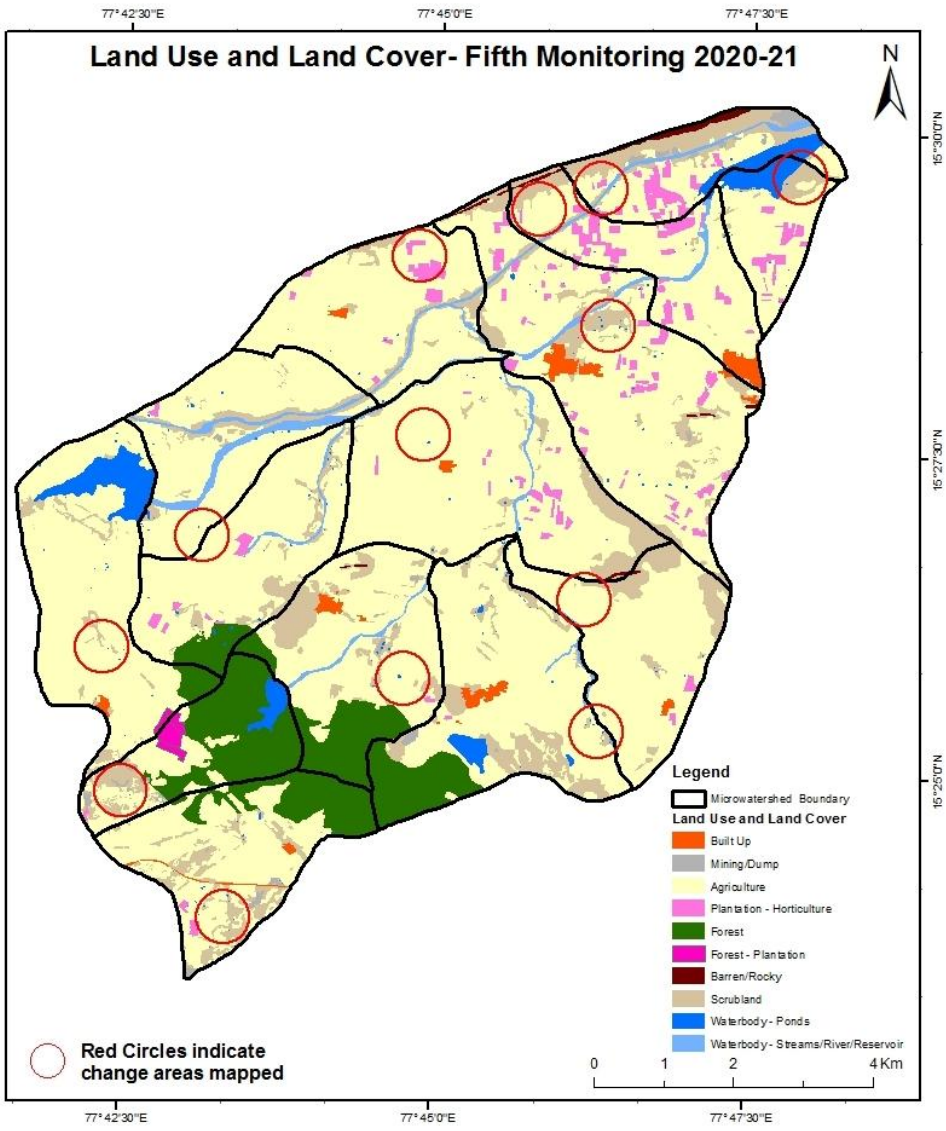




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

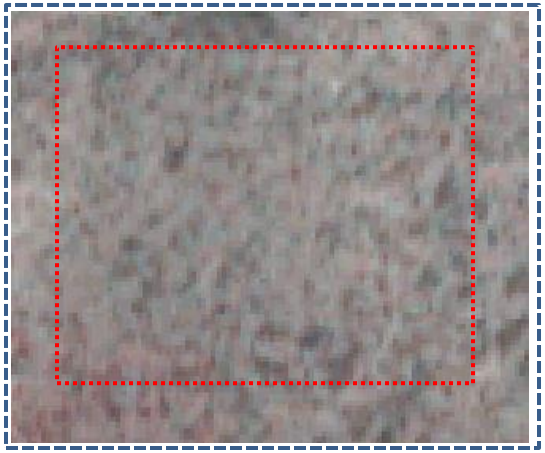
Scale: 1:10000



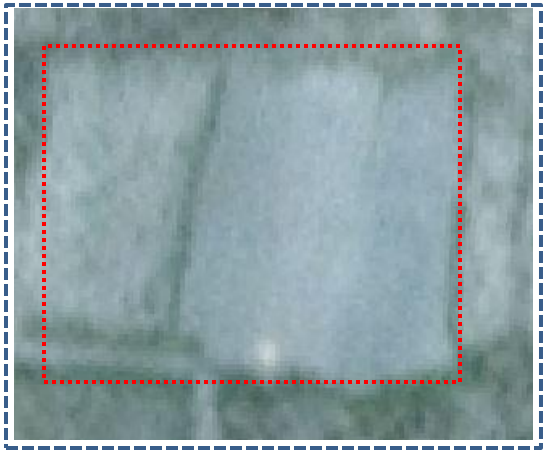


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture

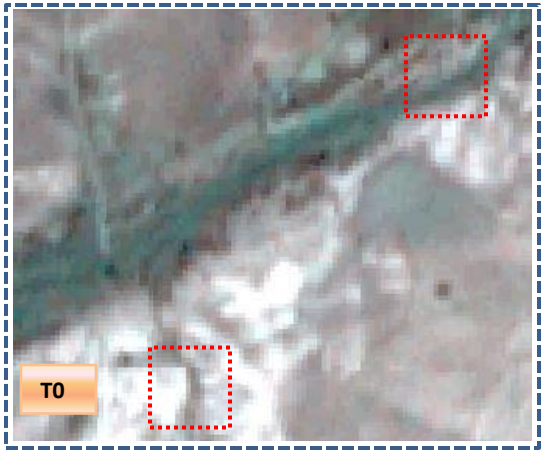


T0: 2012-13(77°46'51.141"E 15°29'16.543"N)

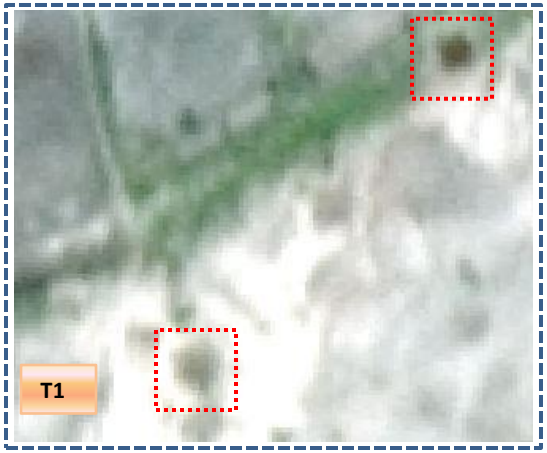


T1: 19 December2016

Scrub to Farm pond



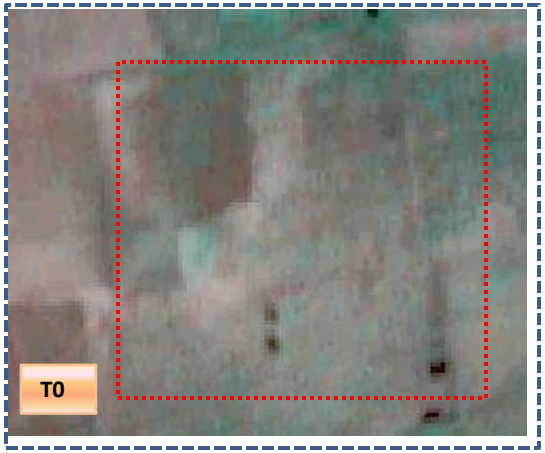
T0: 2012-13(77°45'14.229"E 15°26'38.04"N)



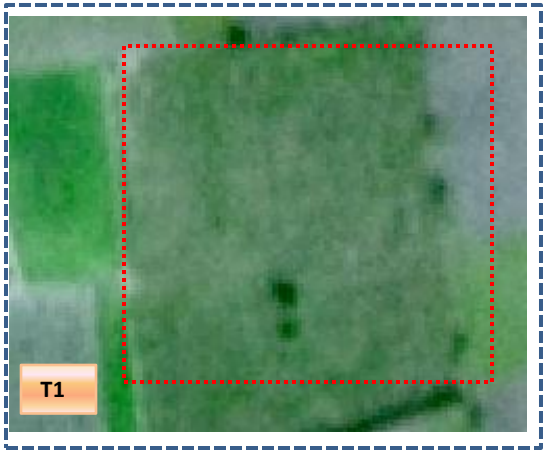
T1: 19 December2016

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

Agriculture to Horticulture

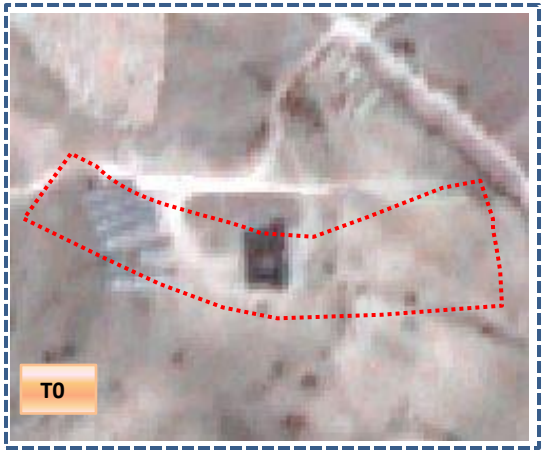


T0: 2012-13(77°46'51.141"E 15°29'16.543"N)

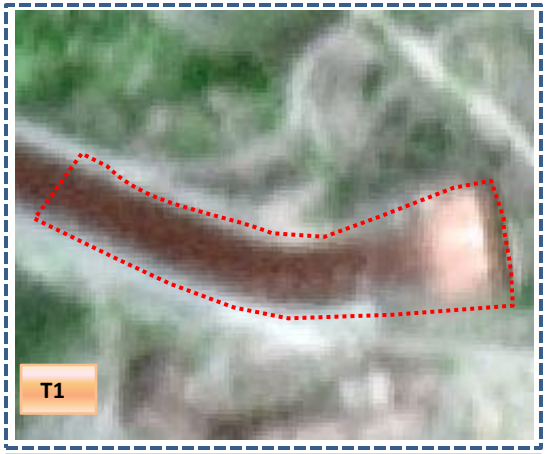


T1: 19 December2016

Agriculture to canal



T0: 2012-13(77°43'2.567"E 15°27'39.065"N)



T1: 19 December2016

Table showing change matrix depicting Land cover transitions during study period-2012-13 to 2016-17

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	76.30										**76.30**
Mining/dump		8.44									**8.44**
Agriculture	1.43	1.52	5536.78	52.85				18.30		0.92	**5611.80**
Plantation Horticulture			32.89	46.68							**79.56**
Forest		0.39	43.89			725.93	20.98				**791.19**
Forest Plantation											
Barren Rocky					34.10						**34.10**
Scrub	0.20	12.52	120.87					1240.03		1.05	**1374.67**
Waterbody-Streams/River			1.10						198.73		**199.83**
Waterbody – Ponds			5.76							182.50	**188.26**
Grand Total	**77.93**	**22.86**	**5741.29**	**99.52**	**34.10**	**725.93**	**20.98**	**1258.33**	**198.73**	**184.47**	**8364.15**

- 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 75 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 204 ha of the agriculture area has increased from plantations, forest, scrubland, and water body of T2. The additional agriculture are coming from waterbody in T1 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2016-17 to 2017-18

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	77.93										**77.93**
Mining/dump		22.86									**22.86**
Agriculture	1.14		5703.67	23.62				10.29		2.57	**5741.29**
Plantation Horticulture			6.05	93.47							**99.52**
Forest			7.93		718.00						**725.93**
Forest Plantation						20.98					**20.98**
Barren Rocky							34.10				**34.10**
Scrub	2.05	10.95	128.60					1115.84		0.90	**1258.33**
Waterbody-Streams/River			1.67						197.06		**198.73**
Waterbody – Ponds										184.47	**184.47**
Grand Total	**81.12**	**33.81**	**5847.92**	**117.09**	**718.00**	**20.98**	**34.10**	**1126.12**	**197.06**	**187.94**	**8364.15**

• 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 27 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrubland and water body in T2.

• In T2 134 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-2017-18 to 2018-19

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	81.12										**81.12**
Mining/dump		32.89	0.92								**33.81**
Agriculture	0.37		5842.63	4.92							**5847.92**
Plantation Horticulture			0.81	116.28							**117.09**
Forest			63.41		654.59						**718.00**
Forest Plantation						20.98					**20.98**
Barren Rocky							34.10				**34.10**
Scrub		1.21	99.17					1024.30	1.45		**1126.12**
Waterbody-Streams/River									197.06		**197.06**
Waterbody – Ponds										187.94	**187.94**
Grand Total	**81.49**	**34.09**	**6006.95**	**121.20**	**654.59**	**20.98**	**34.10**	**1024.30**	**198.51**	**187.94**	**8364.15**

- 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 05 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T3.
- In T3 164 ha of the agriculture area has increased from mining/dump, plantations, forest 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-2018-19 to 2019-20

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	81.49										**81.49**
Mining/dump		34.00	0.09								**34.09**
Agriculture	1.11		5894.21	110.02				0.25	1.35		**6006.95**
Plantation Horticulture			7.96	113.22					0.02		**121.20**
Forest			1.60		652.42				0.57		**654.59**
Forest Plantation						20.98					**20.98**
Barren Rocky							34.10				**34.10**
Scrub	1.28	0.22	58.53					961.71	2.56		**1024.30**
Waterbody-Streams/River			0.75							197.76	**198.51**
Waterbody – Ponds			0.38						187.56		**187.94**
Grand Total	**83.88**	**34.21**	**5963.53**	**223.24**	**652.42**	**20.98**	**34.10**	**961.96**	**192.07**	**197.76**	**8364.15**

• 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 112 ha of the agriculture area has decreased and it is converted into Built-up, plantations, scrub land and water body in T4.

•In T4 69 ha of the agriculture area has increased from mining/dump, 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-2019-20 to 2020-21

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	83.88										**83.88**
Mining/dump		34.09		0.13							**34.21**
Agriculture	0.07	0.15	5949.65	8.96						4.70	**5963.53**
Plantation Horticulture			7.40	215.84							**223.24**
Forest					652.42						**652.42**
Forest Plantation						20.98					**20.98**
Barren Rocky							34.10				**34.10**
Scrub	0.22	5.67	44.59					909.34		2.14	**961.96**
Waterbody-Streams/River									197.76		**197.76**
Waterbody – Ponds										192.07	**192.07**
Grand Total	**84.17**	**39.91**	**6001.64**	**224.92**	**652.42**	**20.98**	**34.10**	**909.34**	**197.76**	**198.91**	**8364.15**

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

•In T5 51 ha of the agriculture area has increased from plantation 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 8.5 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
4. There is an increase of 129, 106, 159 & 38 Hectares from T0-T1, T1-T2, T2-T3 & T4-T5 respectively and there is a decrease of 43 Hectares from T3-T4 and overall increase of 389 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. About **145 Hectares of the plantation/horticulture area has been increased** from 2012-13 (T0) & 2020-21 (T5) years.
6. There is a decrease of 465 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (05) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (05) verified from the portal.