MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

Chittoor -50/2012-13
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
December-2022

T 0 - T 1 - T 2 - T 3 - T 4 - T 5

AGRICULTURE & SOIL DIVISION
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Ministry of Rural Development
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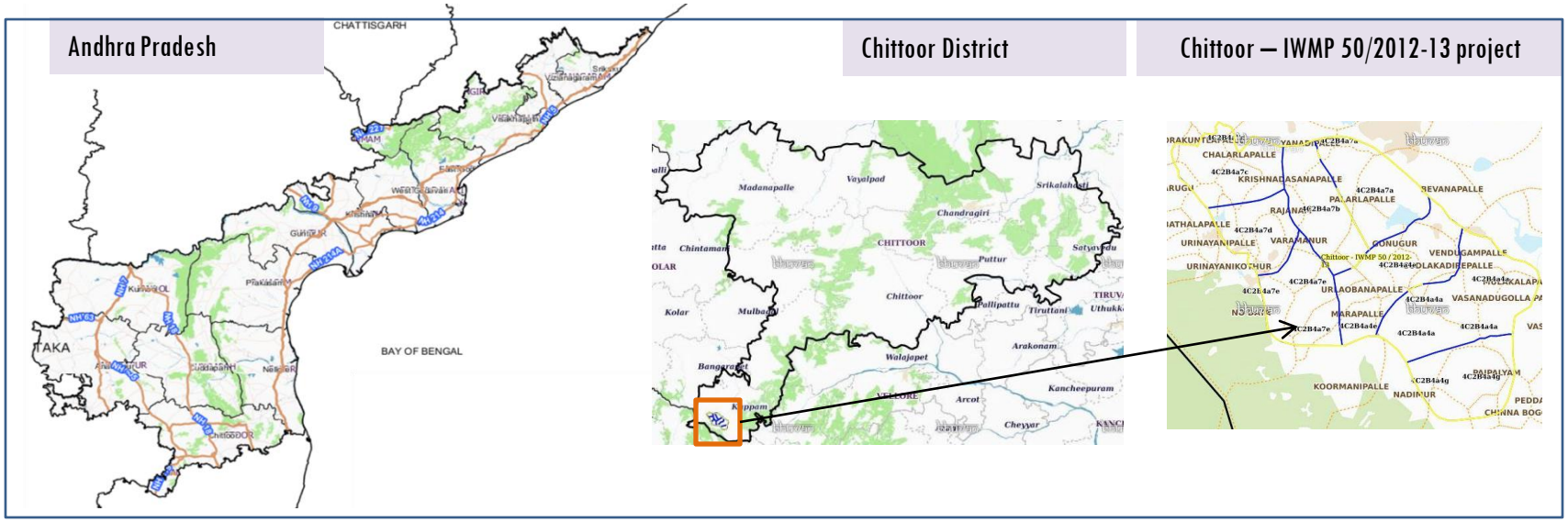
EXECUTIVE SUMMARY

- 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-50/2012-13, Chittoor District of Andhra Pradesh. The total geographical area of the project is 4,667 ha. It comprises of 10 micro watersheds.
- In the project area 299 Drishti photos were uploaded showing all water harvesting structures of check dams/Rock fill dam, recharge pits etc,.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and check dams and drainage treatments with 30 ha increase in the area.
- Water bodies have shown an increase by 24 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 70 % is covered by the agriculture, 10 % is covered by scrub land and 5 % is covered by water body and remaining by other land use classes.

PROJECT : CHITTOOR – IWMP-50/2012-13
DISTRICT : CHITTOOR , STATE : ANDHRA PRADESH

- The study area falls in Kuppam Mandal of Chittoor district of Andhra Pradesh state. The total geographical area of the project is 4,667 ha. It comprises of 10 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 of the district is dry and healthy. Out of 66 mandals in the district, 31 are upland mandals which are located in Madanapalle division and are comparatively cooler than the eastern mandals except Chittoor mandal where the climate is moderate. December and January are the coldest months when the mean maximum temperature will be around 26.40 °C, May is the hottest month with the mean daily maximum temperature rising above 40 °C.
- The district receive 83.62 percent of rainfall during South-West monsoon and North-West monsoon period, the rainfall is nominal in summer. On an average the district receives more than 50 percent of rainfall during North- East monsoon.

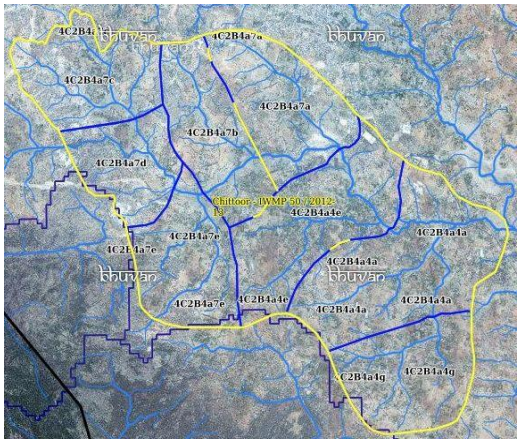
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			27-Feb-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			27-Feb-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	299
4	Detailed Project Report		

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



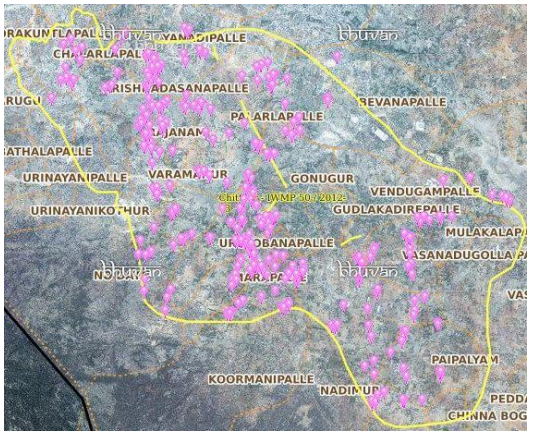
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

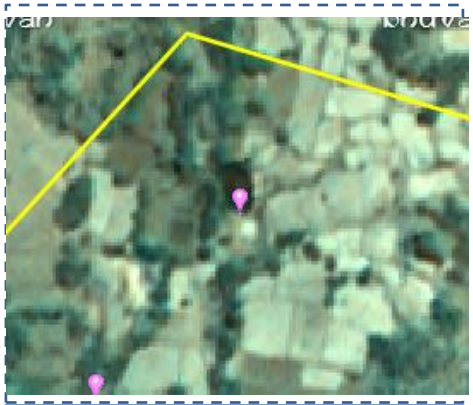
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture	17	15
2	Bunding	0	0
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Existing activity	0	0
8	Checks & Plugs	1	1
9	Entry point Activity	25	20
10	Farm ponds/Dug out pit	3	3
11	Civil work-Check dams /Rock fill dam	98	90
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)	0	0
15	Livelihood Activities (Horticulture)	25	20
16	Production system and micro-enterprises	26	20
17	Entry Point Activity (Cattle thought)	0	0
18	Others	185	150
	TOTAL	**355**	**299**

MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

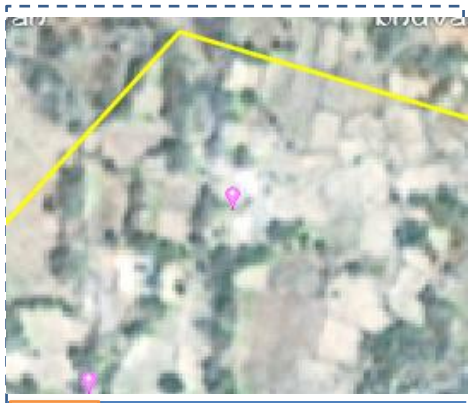
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2012-13) and T5 is 2020-21 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Monitoring of activities in Chittoor District Andhra Pradesh. IWMP-50/2012-13



T0 Satellite data 2010

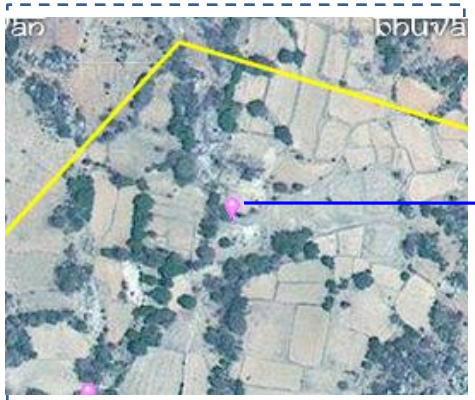
T1 Satellite data 2013



T2 Satellite data 2014

T3 Satellite data 2015

T4 Satellite data 2017



T5 Satellite data 2017

Drishti Id. 7011781

Percolation tanks or Ground Water Recharge Structure

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-50/2012-13

T0:2012-13

T1: 22 January 2017

Drishti Sl no. 859153 MWS : 4C2A8k2c

Farm pond

T0:2012-13

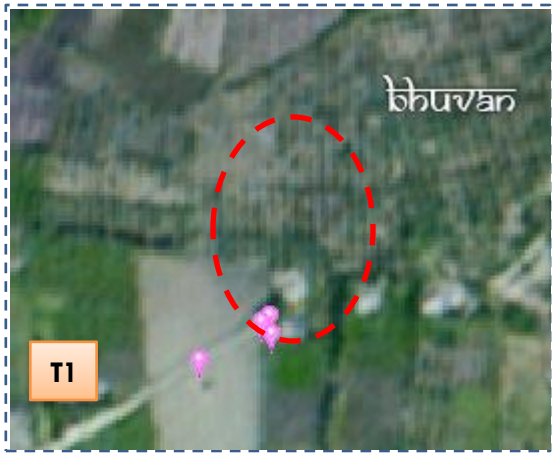
T1: 22 January 2017

Drishti Sl no. 1646207 MWS : 4C2A8k2c

Farm pond

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-50/2010-11

T0: 2012-13



T1: 22 January 2017

Drishti Sl no. 627721 MWS : 4C2A8k2c

Horticulture

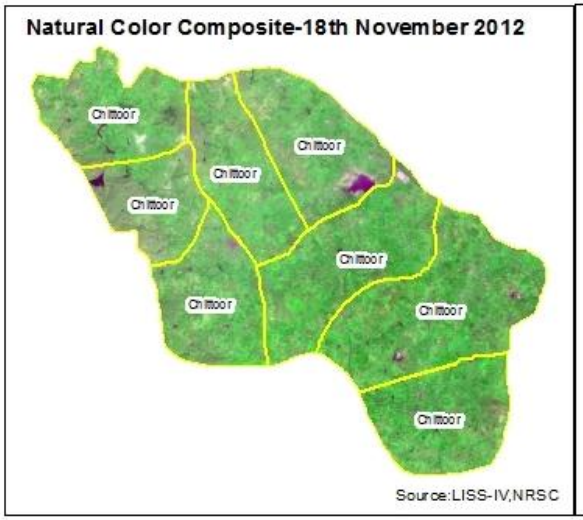
T0: 2012-13

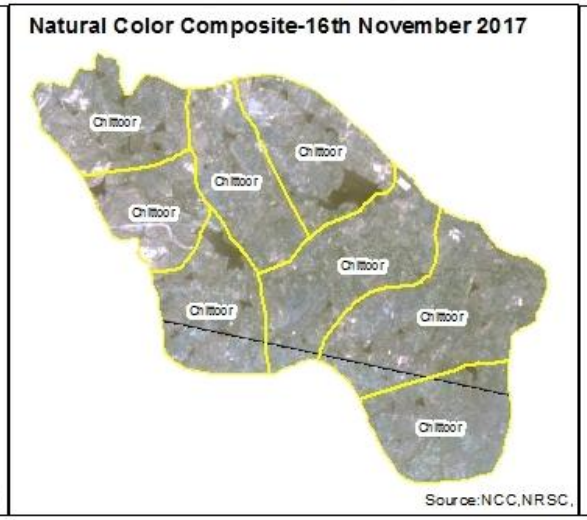
T1: 22 January 2017

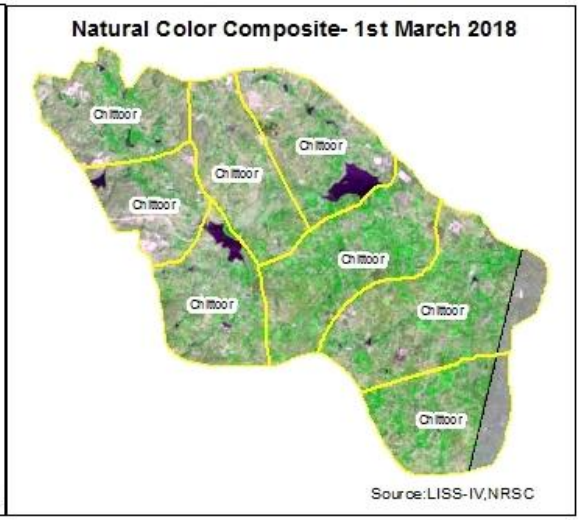
Drishti Sl no. 829019 MWS :4C2A8e3c

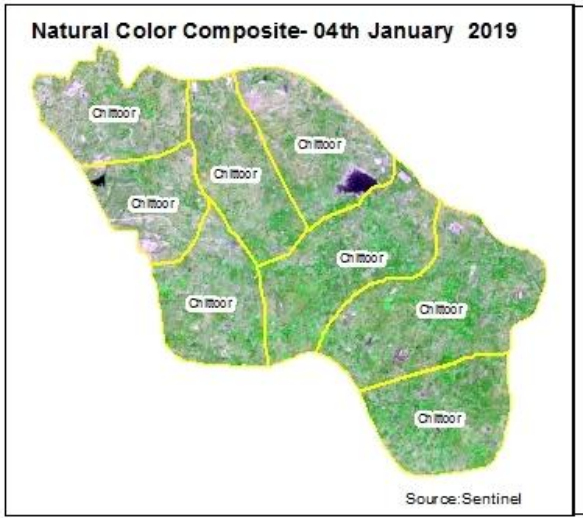
Check dam

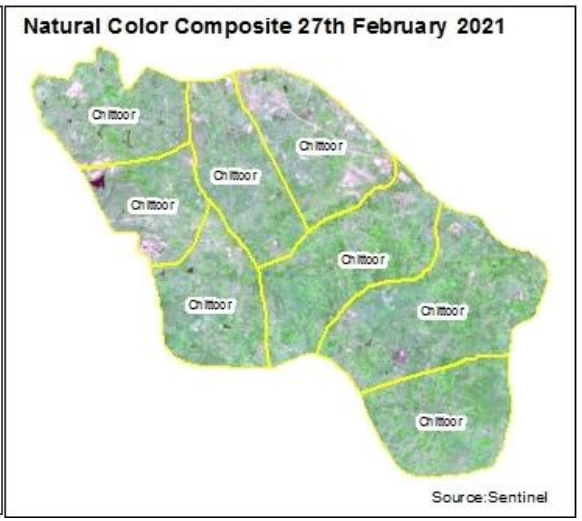
Natural Colour Composite (NCC)











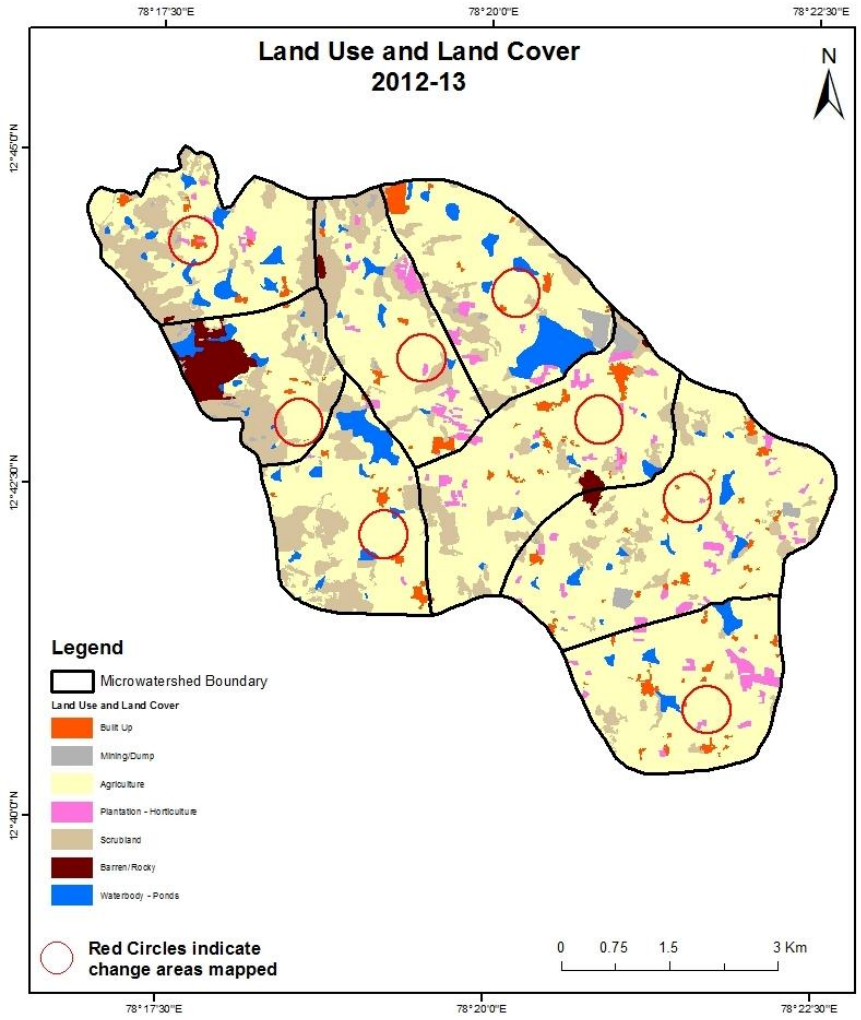
MONITORING IN THE PROJECT AREA

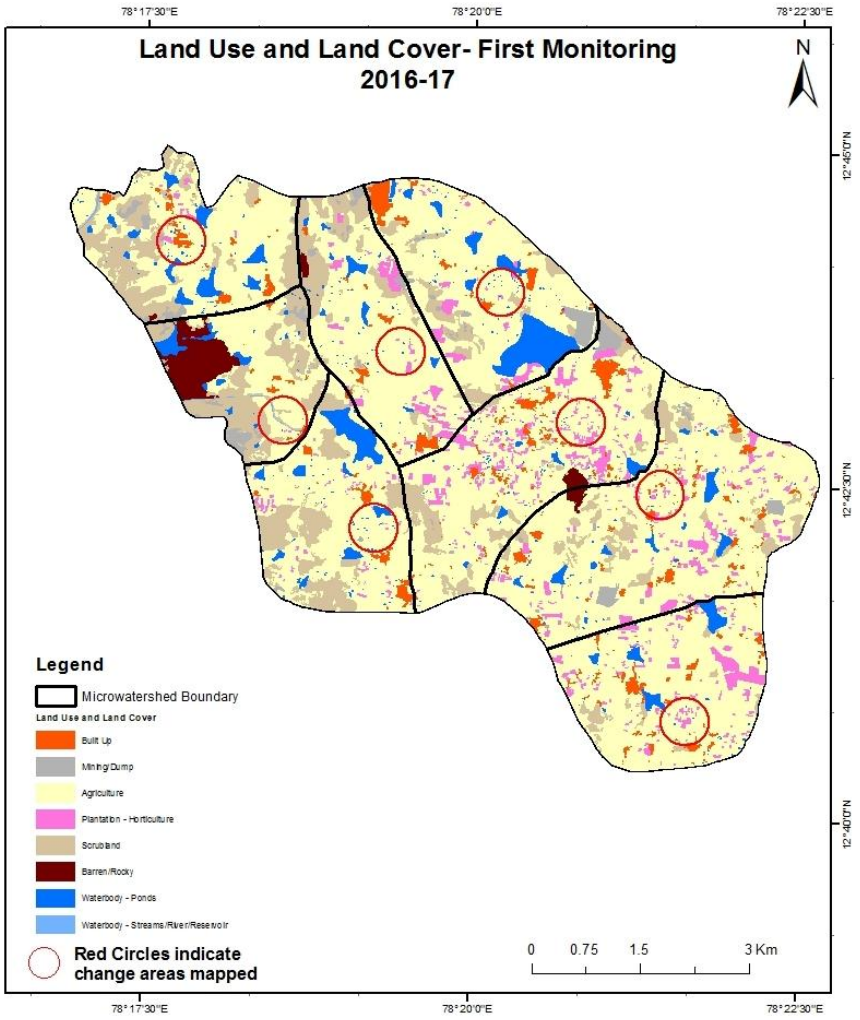
Land use and Land cover Changes in the Project

- 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)

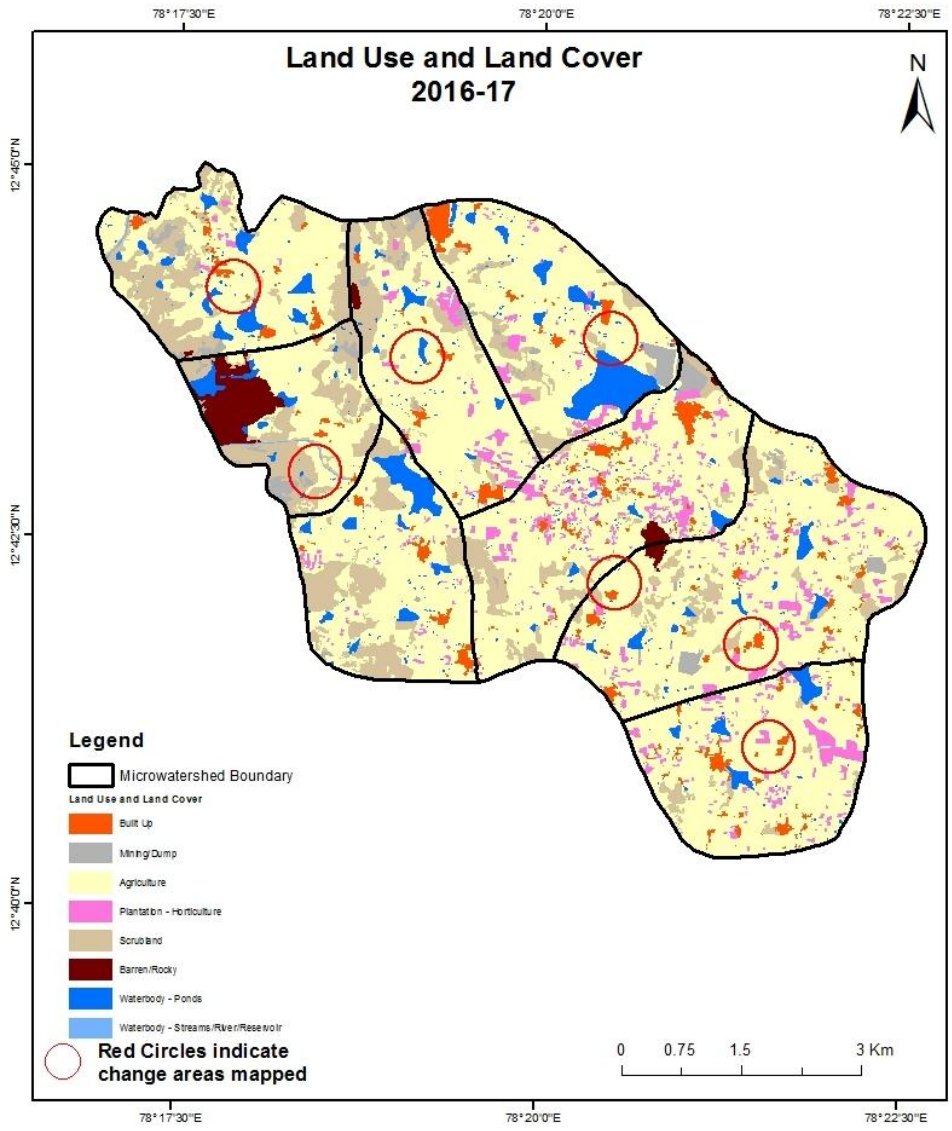
Scale: 1:10000

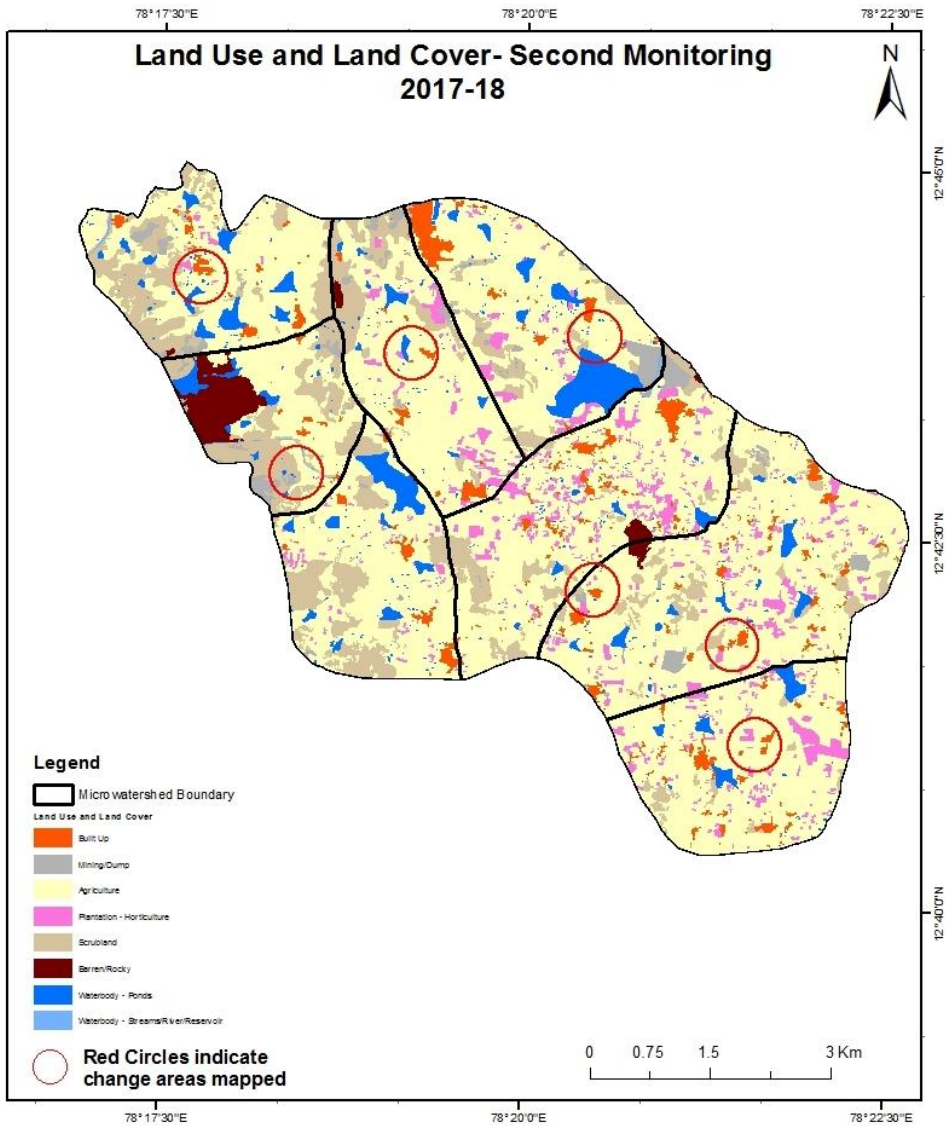




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

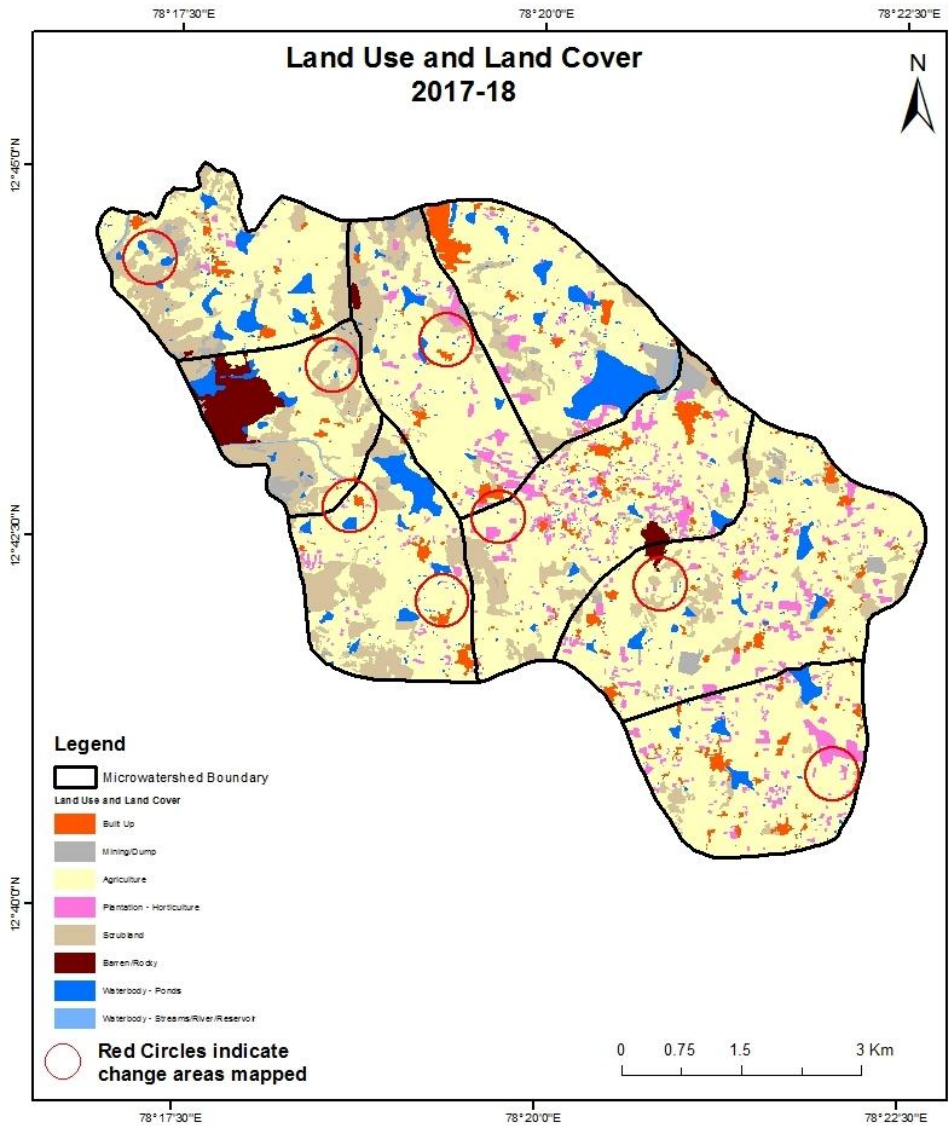
Scale: 1:10000

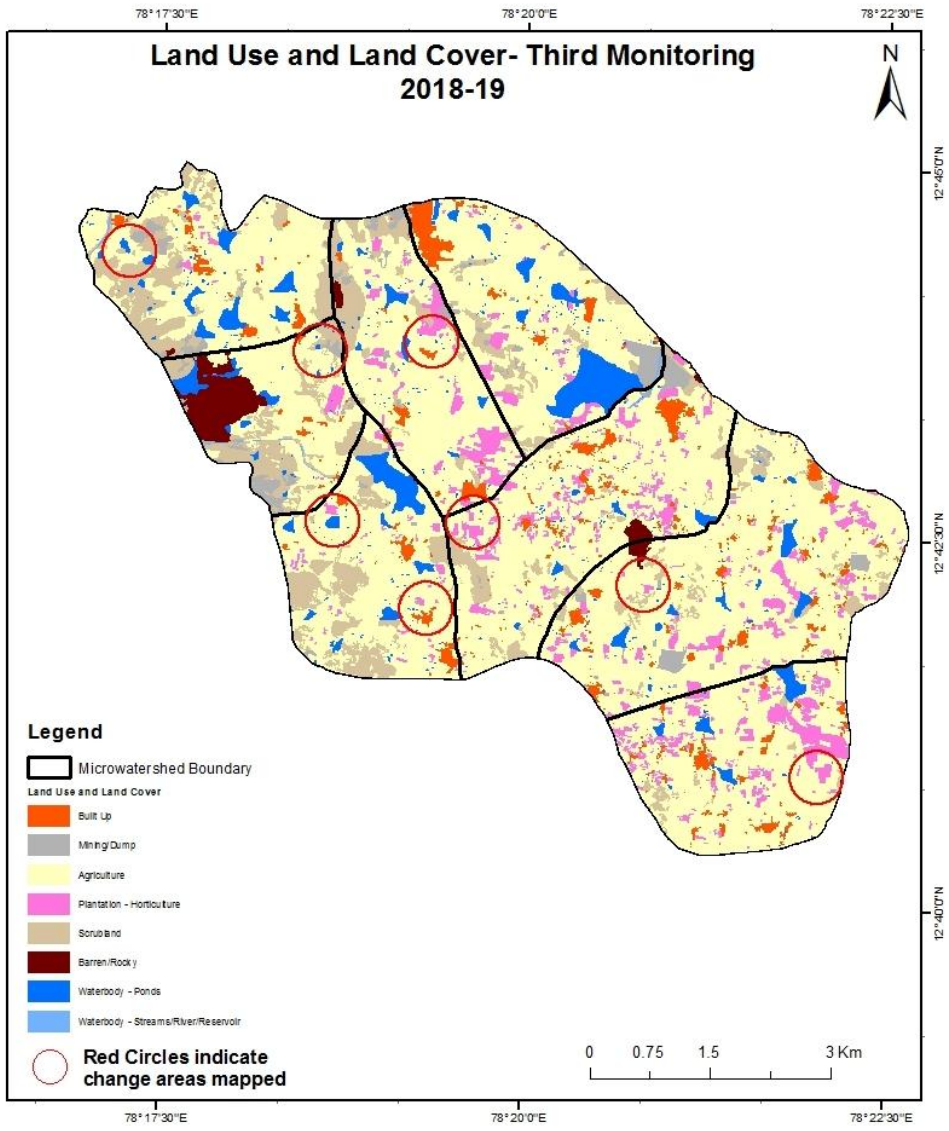




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

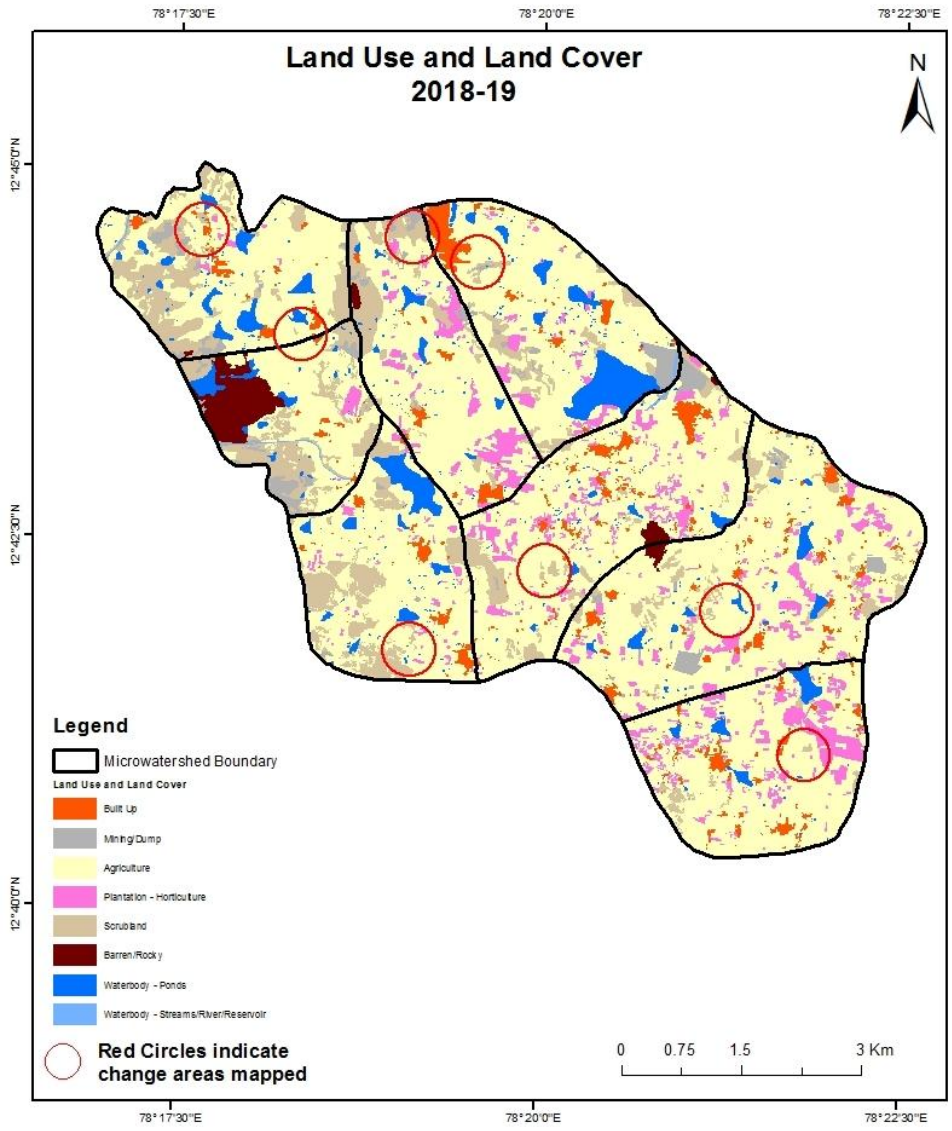
Scale: 1:10000

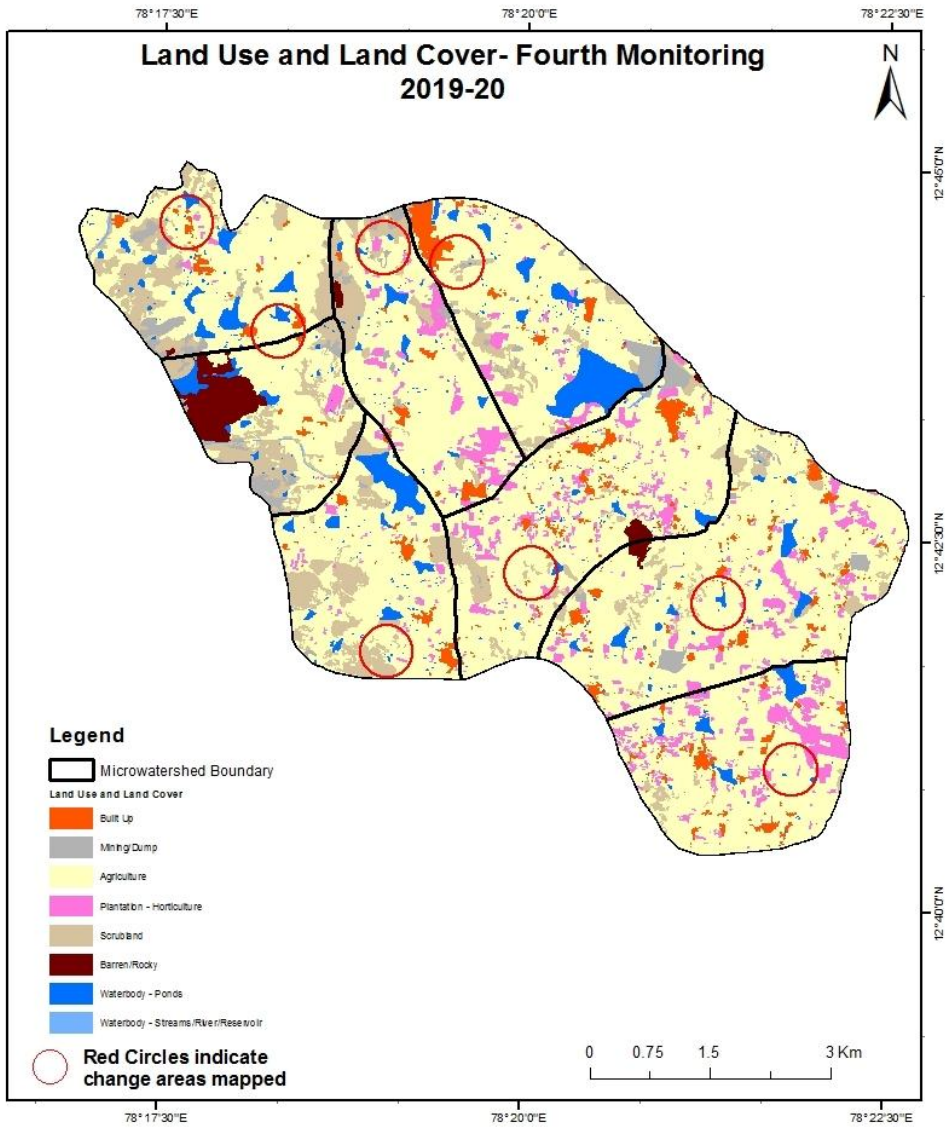




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

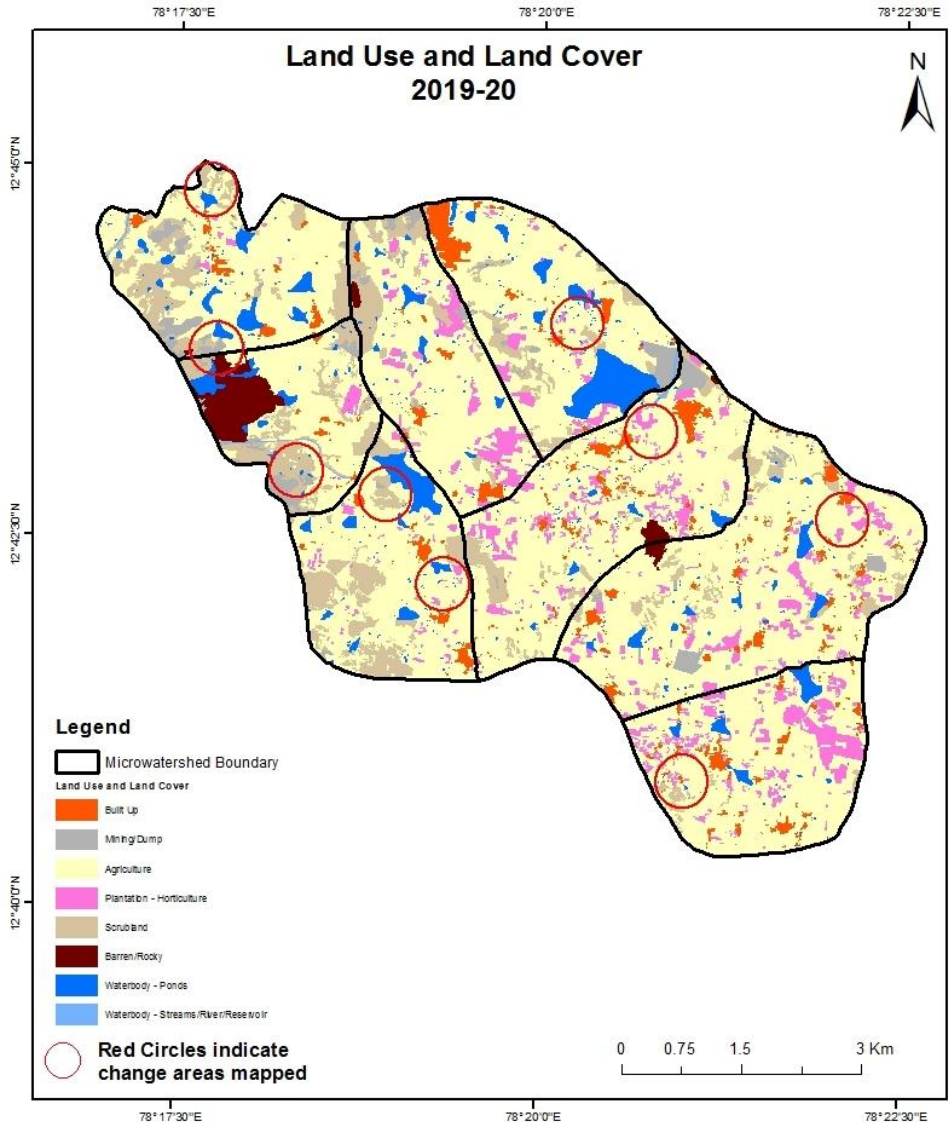
Scale: 1:10000

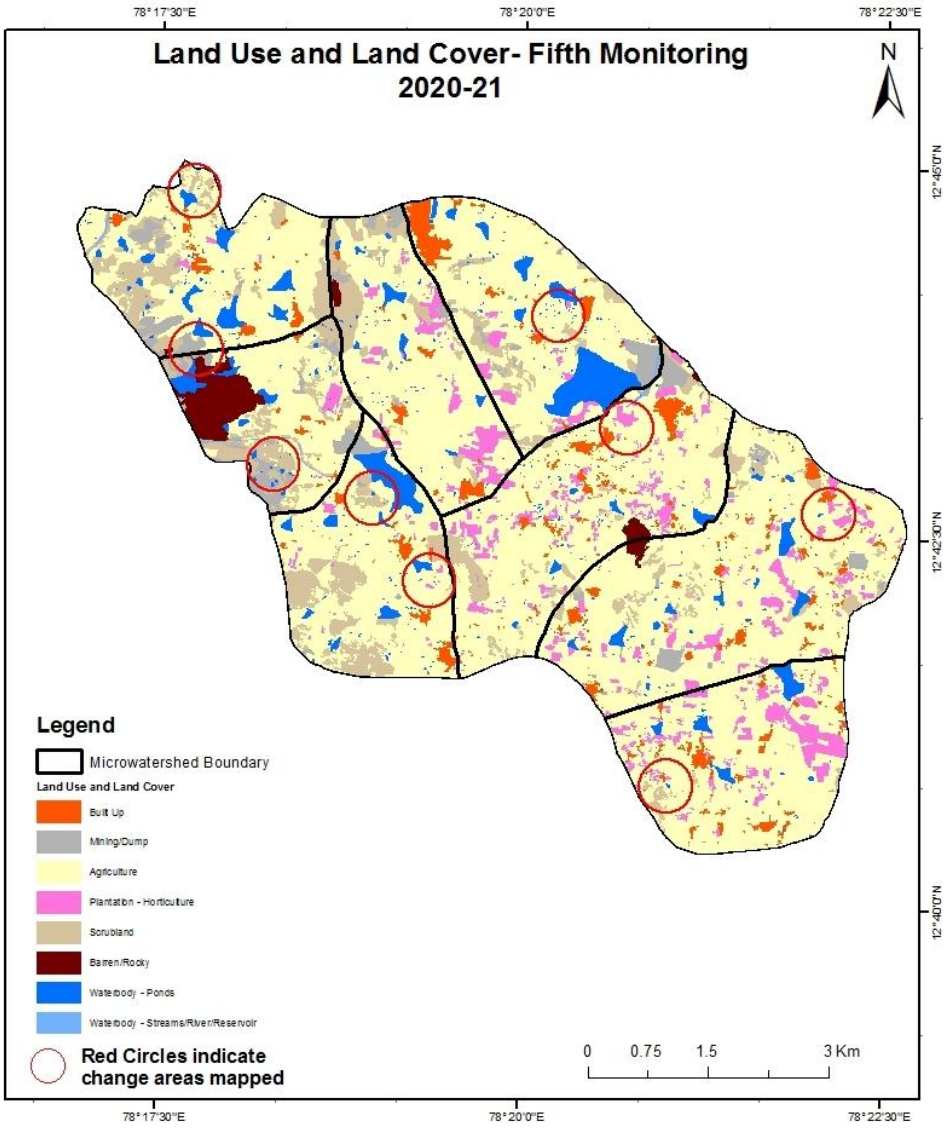




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

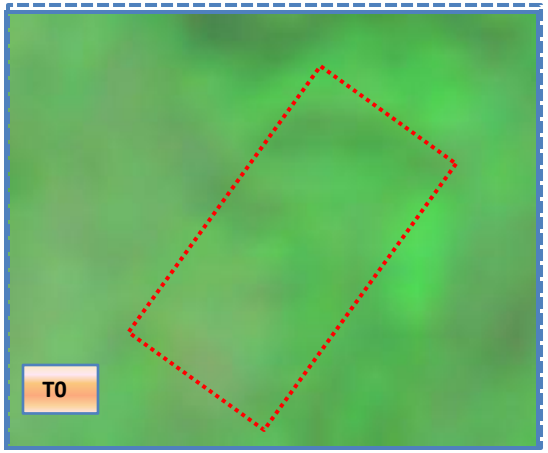
Scale: 1:10000



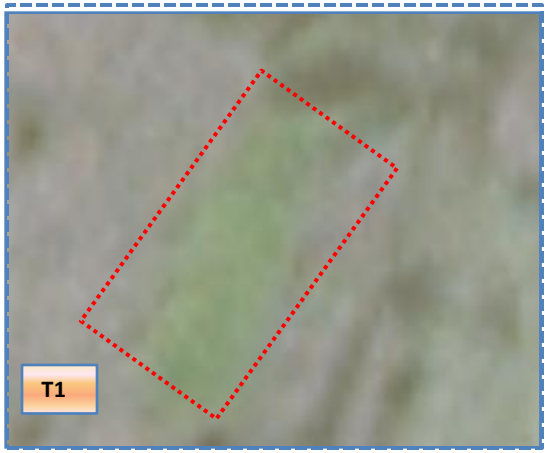


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

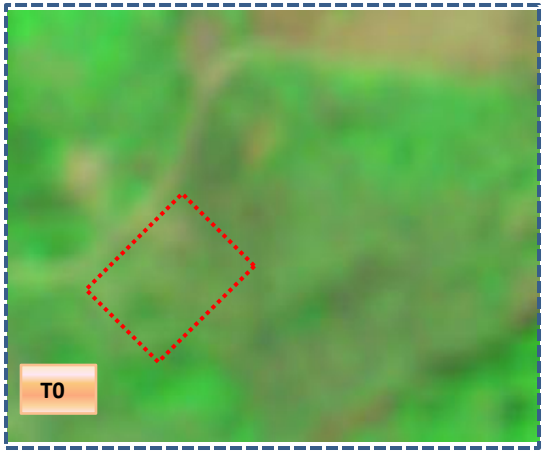


T0: 2012-13(78°20'7.479"E 12°44'11.215"N)

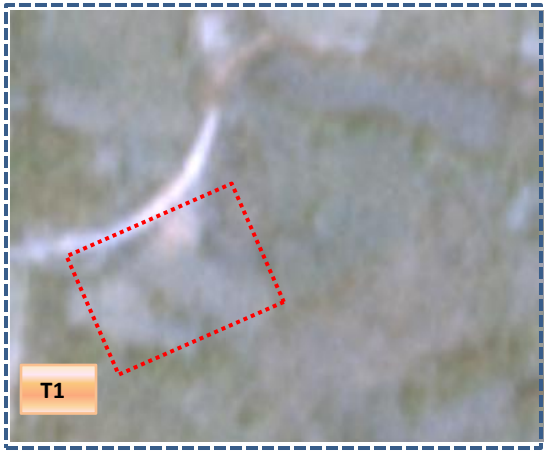


T1: 22 January 2017

Scrub to Agriculture



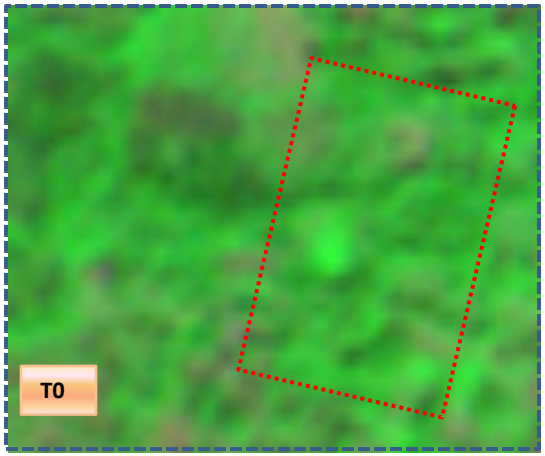
T0: 2012-13(78°20'47.844"E 12°42'6.433“N)



T1: 22 January 2017

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

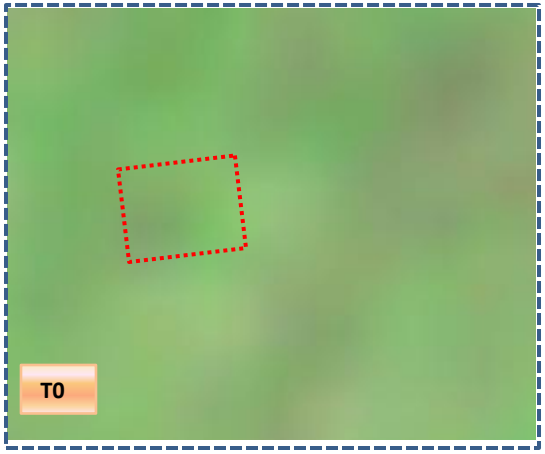
Agriculture to Plantation



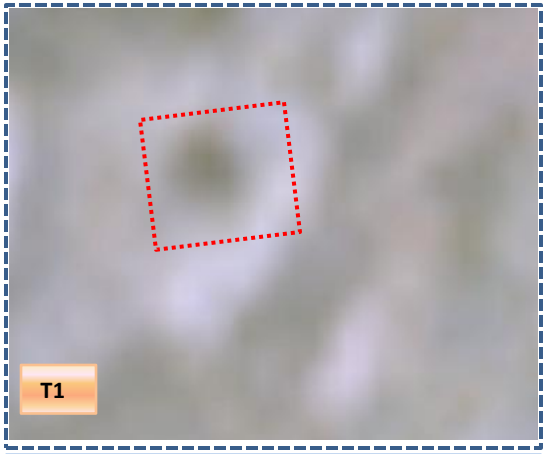
T0: 2012-13(78°20'56.715"E 12°42'39.082“N)

T1: 22 January 2017

Scrub to Water body



T0: 2012-13(78°17'12.201"E 12°44'8.811"N)



T1: 22 January 2017

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	110.55		0.32							0.12	110.99
Mining/dump		48.43	0.91						0.05		49.39
Agriculture	47.85	8.24	3089.63	110.3				9.68	2.54	20.8	3289.04
Plantation Horticulture	1.43	2.15	7	123.6							134.18
Forest											
Forest Plantation											
Barren Rocky		0.25					83.87				84.12
Scrub	2.2	30.78	78.24	5.79				662.37	1.25	1.58	782.21
Waterbody-Streams/River											
Waterbody – Ponds			4.79	0.27						212.54	217.6
Grand Total	**162.03**	**89.85**	**3180.89**	**239.96**			**83.87**	**672.05**	**3.84**	**235.04**	**4667.53**

• 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 199 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 91 ha of the agriculture area has increased from built-up, mining/dump, plantations, 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	161.83			0.2							**162.03**
Mining/dump		89.85									**89.85**
Agriculture	6.6	4.41	3150.12	17.19					1.9	0.67	**3180.89**
Plantation Horticulture	0.06		9.64	230.26							**239.96**
Forest											
Forest Plantation											
Barren Rocky							83.87				**83.87**
Scrub	4.69	5.14	16.24	0.06				645.51		0.41	**672.05**
Waterbody-Streams/River									3.84		**3.84**
Waterbody – Ponds										235.04	**235.04**
Grand Total	**173.18**	**99.4**	**3176**	**247.71**			**83.87**	**645.51**	**5.74**	**236.12**	**4667.53**

- 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 30 ha of the agriculture area has decreased and it is converted into Built-up , mining/dump, plantations and water body in T2.
- In T2 25 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-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	173.18										**173.18**
Mining/dump		99.4									**99.4**
Agriculture	11.13	6.74	3058.76	98.31					0.62	0.44	**3176**
Plantation Horticulture	0.77	0.06	50.63	196.21						0.04	**247.71**
Forest											
Forest Plantation											
Barren Rocky		1.12					82.75				**83.87**
Scrub	0.92	5.01	75.21	23.06				540.68		0.63	**645.51**
Waterbody-Streams/River									5.74		**5.74**
Waterbody – Ponds			3.82	0.13						232.17	**236.12**
Grand Total	**186**	**112.33**	**3188.42**	**317.71**			**82.75**	**540.68**	**6.36**	**233.28**	**4667.53**

- 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 117 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T3.
- In T3 129 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-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	186										**186**
Mining/dump		112.33									**112.33**
Agriculture	0.32	0.31	3186.78							1.01	**3188.42**
Plantation Horticulture			0.48	317.23							**317.71**
Forest											
Forest Plantation											
Barren Rocky							82.75				**82.75**
Scrub		10.8	17.21	0.17				512.22		0.28	**540.68**
Waterbody-Streams/River									6.36		**6.36**
Waterbody – Ponds			0.32	0.24						232.72	**233.28**
Grand Total	**186.32**	**123.44**	**3204.79**	**317.64**			**82.75**	**512.22**	**6.36**	**234.01**	**4667.53**

• 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 1.6 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and water body in T4.

•In T4 18 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-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	186.32										**186.32**
Mining/dump		122.89								0.55	**123.44**
Agriculture	0.28	0.83	3202.54	0.97						0.17	**3204.79**
Plantation Horticulture			46.75	270.89							**317.64**
Forest											
Forest Plantation											
Barren Rocky		1.01					81.74				**82.75**
Scrub	0.56	29.24	6.36					475.5		0.56	**512.22**
Waterbody-Streams/River									6.36		**6.36**
Waterbody – Ponds										234.01	**234.01**
Grand Total	**187.16**	**153.97**	**3255.65**	**271.86**			**81.74**	**475.5**	**6.36**	**235.29**	**4667.53**

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

•In T5 53 ha of the agriculture area has increased from 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 24 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 12, 16 & 50 Hectares from T2-T3, T3-T4 & T4-T5 respectively, there is a decrease of 108 & 04 Hectares from T0 to T1 and overall decrease of 33 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. There is a **increase of 137 Hectares in plantation/horticulture area as compared** between 2012-13 (T0) & 2020-21 (T5) years.
6. There is a decrease of 306 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (3) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (3) verified from the portal.