

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

Chittoor -52/2012-13
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

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

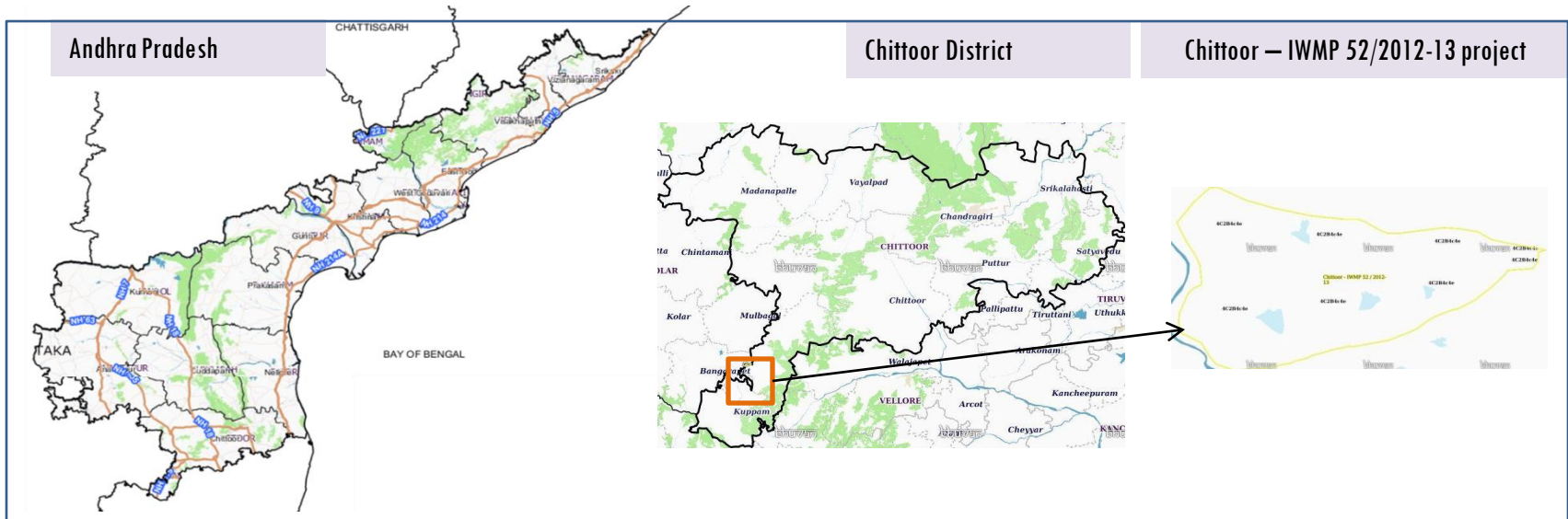
E X E C U T I V E S U M M A R Y

- 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-52/2012-13, Chittoor District of Andhra Pradesh. The total geographical area of the project is **1,686** ha. It comprises of 3 micro watersheds.
- In the project area 48 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.
- Major percentage i.e. 76 % is covered by the agriculture, 14 % is covered by plantation and 4 % is covered by built-up and remaining by other land use classes.

PROJECT : CHITTOOR – IWMP-52/2012-13

DISTRICT : CHITTOOR , STATE : ANDHRA PRADESH

- The study area falls in Venkatagirikota Mandal of Chittoor district of Andhra Pradesh state. The total geographical area of the project is **1,686 ha**. It comprises of 3 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.

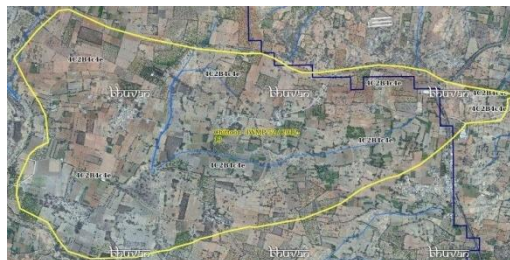
Satellite Data and Ancillary Data

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	48
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

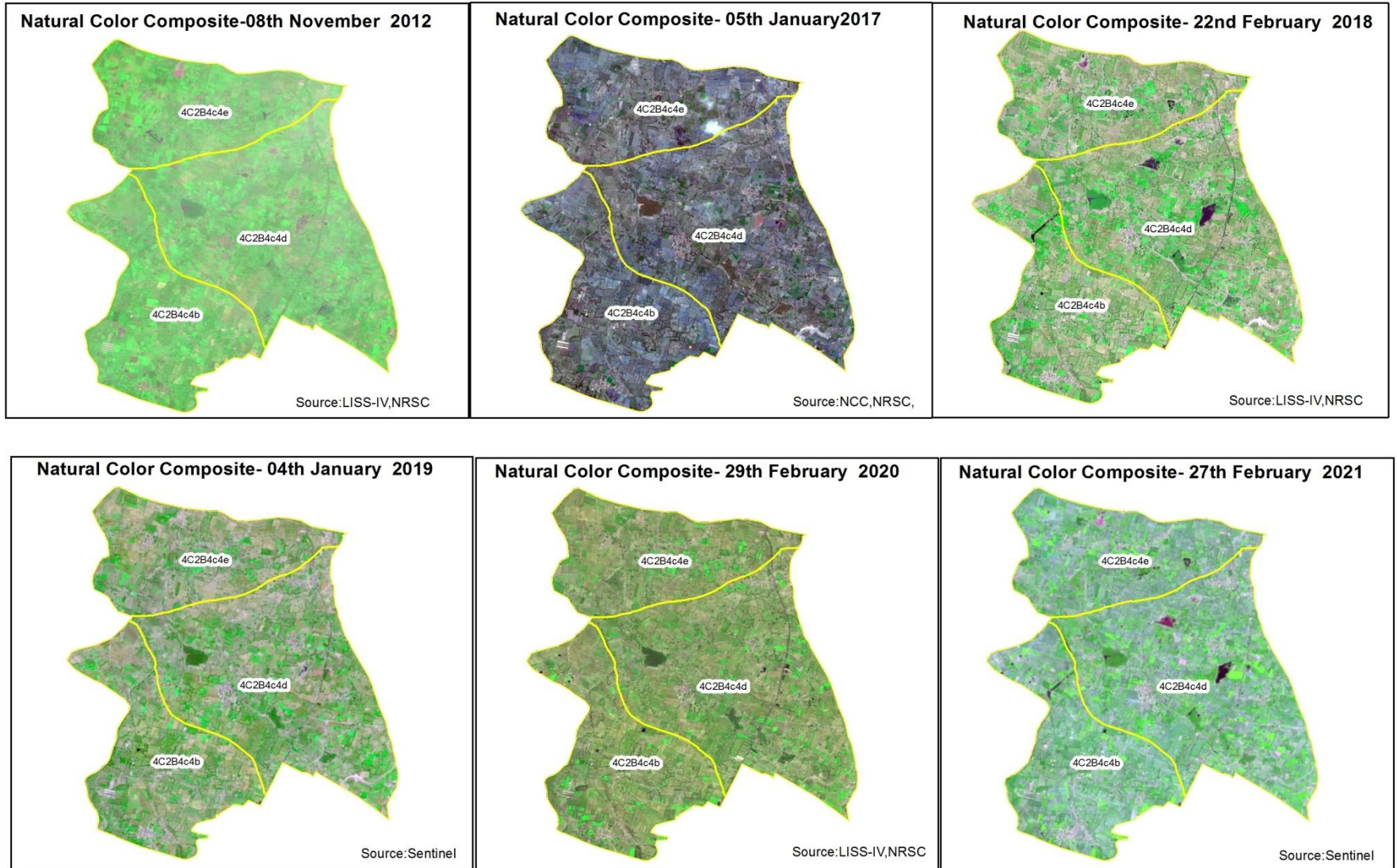
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture	13	13
2	Bunding	0	0
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Existing activity	0	0
8	Checks & Plugs	0	0
9	Entry point Activity	4	4
10	Farm ponds/Dug out pit	0	0
11	Civil work-Check dams /Rock fill dam	8	8
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)	0	0
16	Production system and micro-enterprises	2	2
17	Others	23	23
	TOTAL	48	48

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.

Natural Colour Composite (NCC)



Monitoring of activities in Chittoor District Andhra Pradesh. IWMP-52/2012-13



T0 Satellite data 2013



T1 Satellite data 2014



T2 Satellite data 2016



T3 Satellite data 2017



T4 Satellite data 2018



T5 Satellite data 2020



Drishiti Id. 2483456

Farm pond

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-52/2012-13



T0

T0:2012-13



T1

T1: 05 January 2017



Drishti Sl no. 1658040 MWS : 4C2B4c4e

Farm pond



T0:2012-13



T1

T1: 05 January 2017



Drishti Sl no. 1783487 MWS :4C2B4c4e

Farm pond

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-52/2010-11



T0 bhuvan

T0: 2012-13



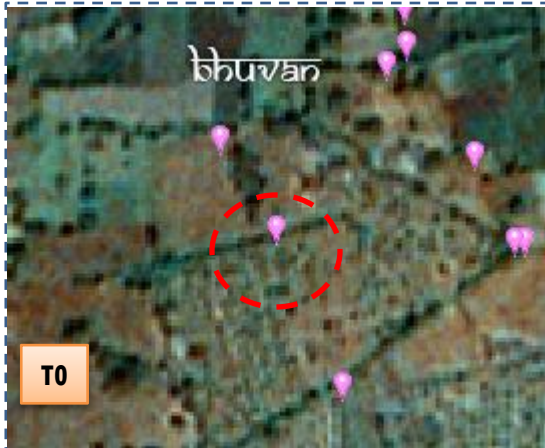
T1 bhuvan

T1: 05 January 2017



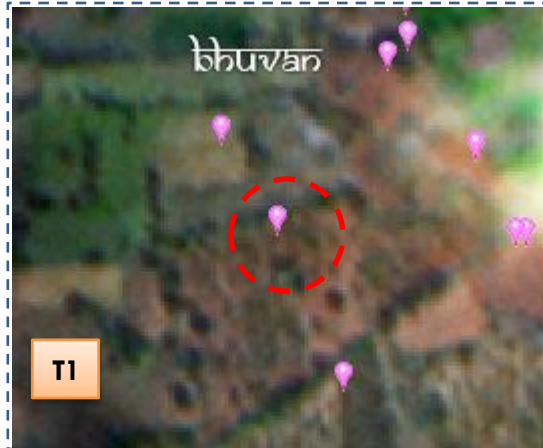
Drishti Sl no. 2483456 MWS : 4C2B4c4e

Farm pond



T0

T0: 2012-13



T1

T1: 05 January 2017



Drishti Sl no. 7045608 MWS :4C2B4c4e

Horticulture

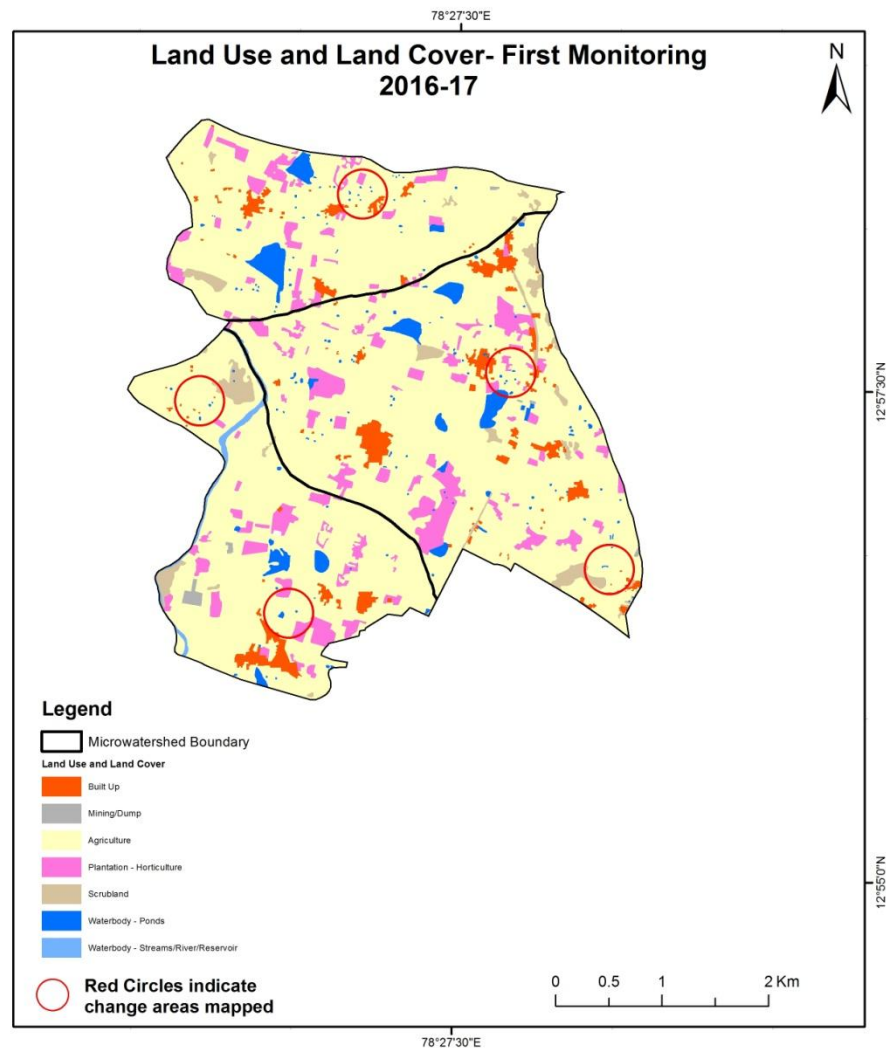
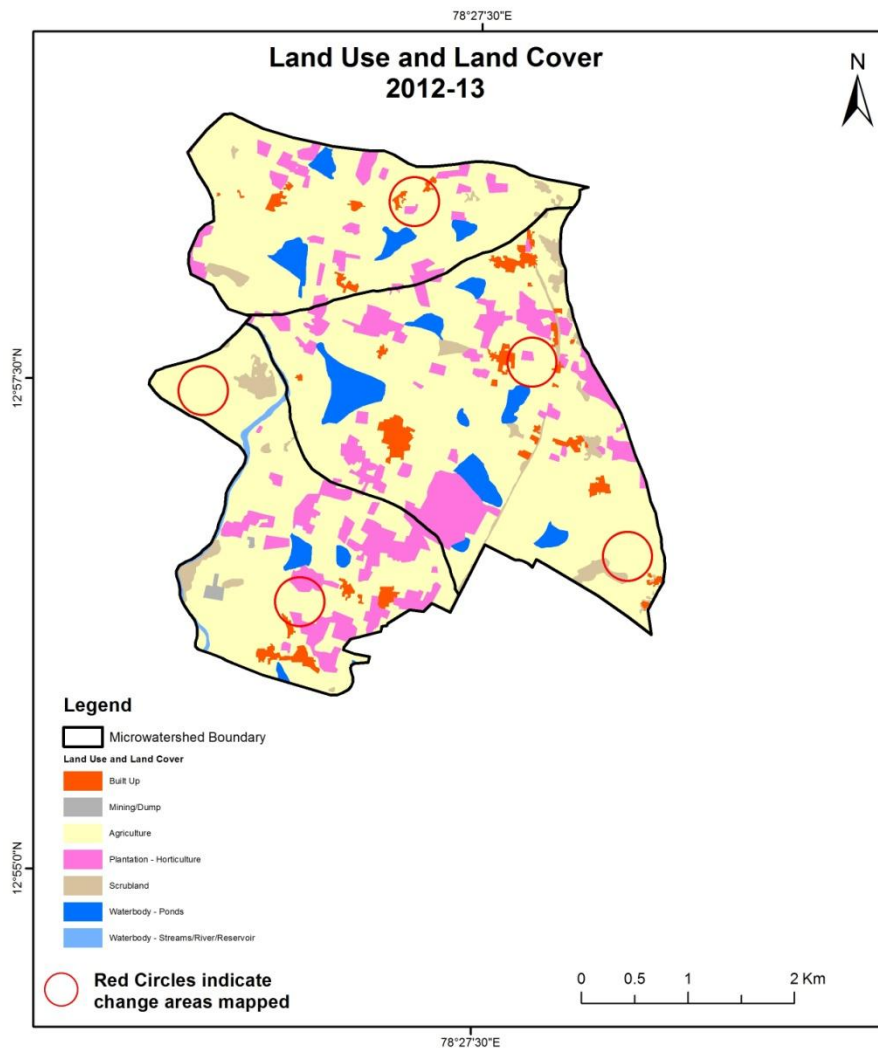
MONITORING IN THE PROJECT AREA

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

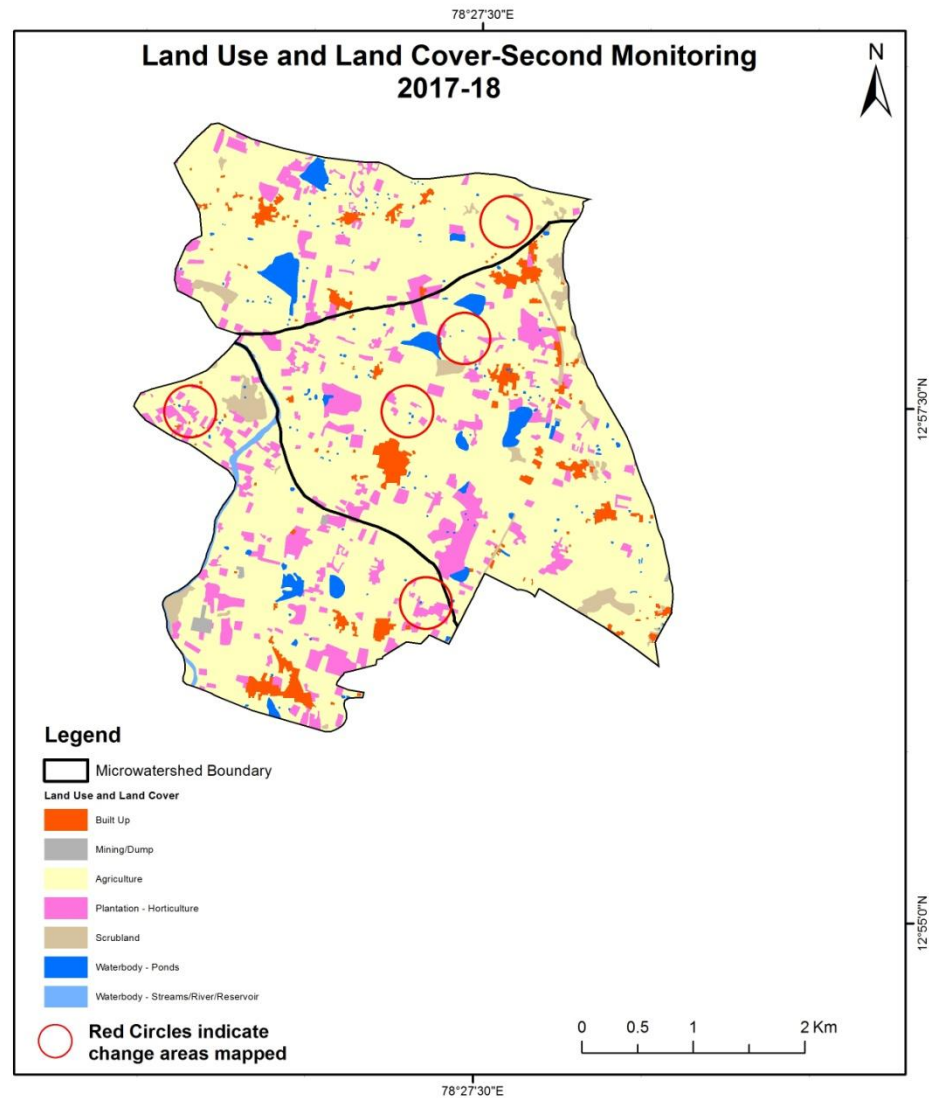
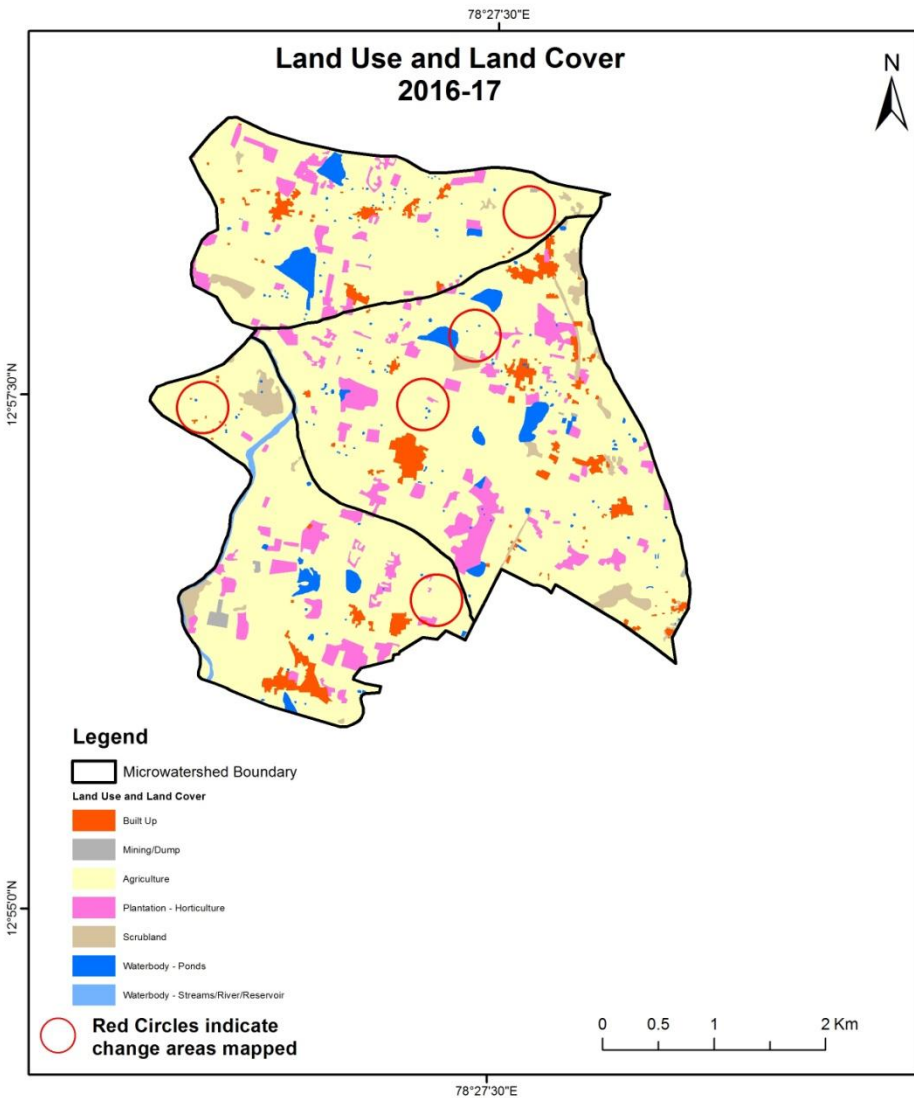
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

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

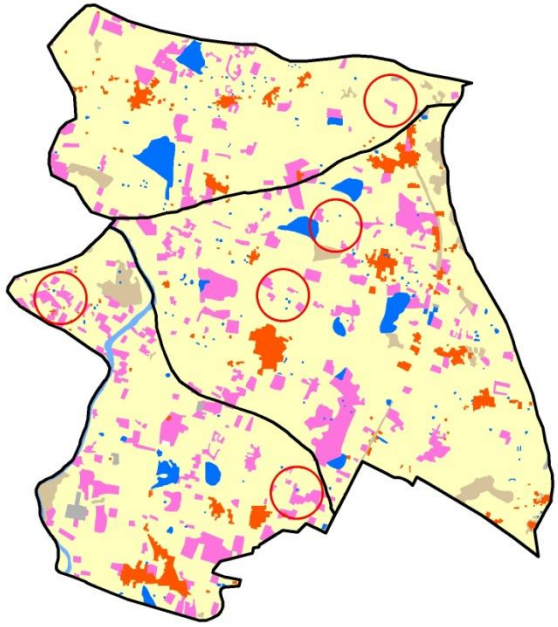


Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

78°27'30"E

Land Use and Land Cover 2017-18



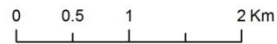
Legend

▭ Microwatershed Boundary

Land Use and Land Cover

- ▭ Built Up
- ▭ Mining/Dump
- ▭ Agriculture
- ▭ Plantation - Horticulture
- ▭ Scrubland
- ▭ Waterbody - Ponds
- ▭ Waterbody - Streams/River/Reservoir

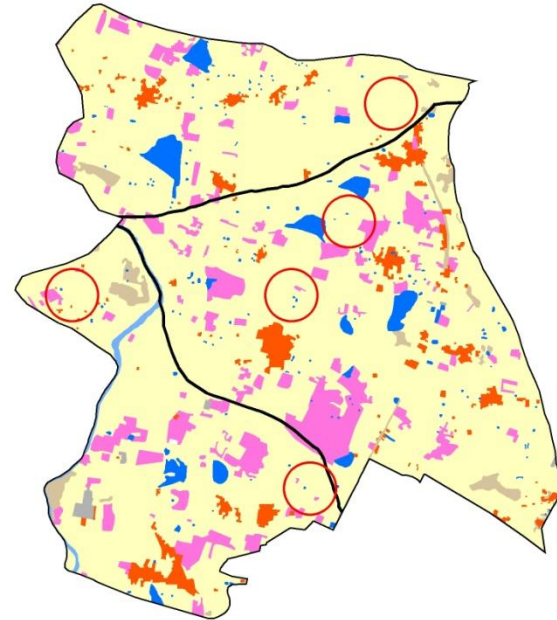
○ Red Circles indicate change areas mapped



78°27'30"E

78°27'30"E

Land Use and Land Cover-Third Monitoring 2018-19



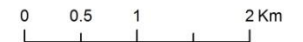
Legend

▭ Microwatershed Boundary

Land Use and Land Cover

- ▭ Built Up
- ▭ Mining/Dump
- ▭ Agriculture
- ▭ Plantation - Horticulture
- ▭ Scrubland
- ▭ Waterbody - Ponds
- ▭ Waterbody - Streams/River/Reservoir

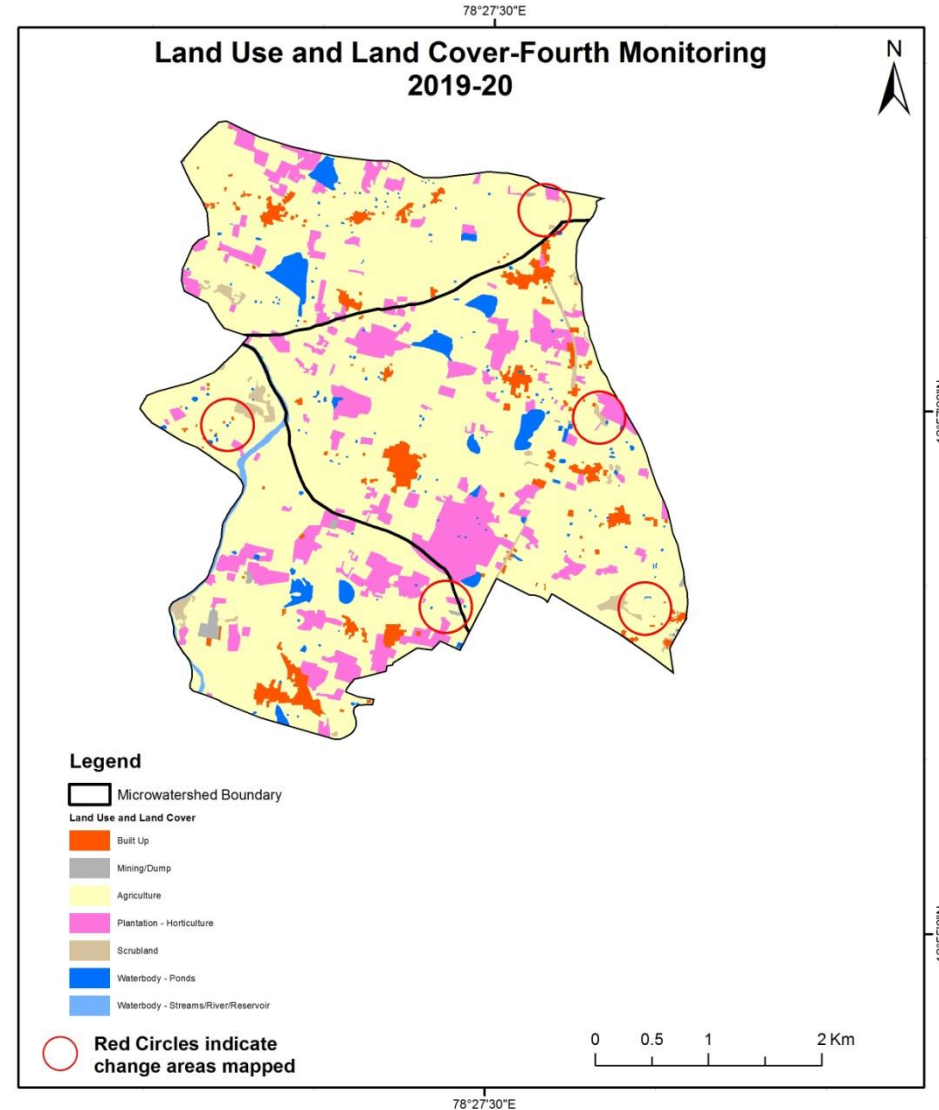
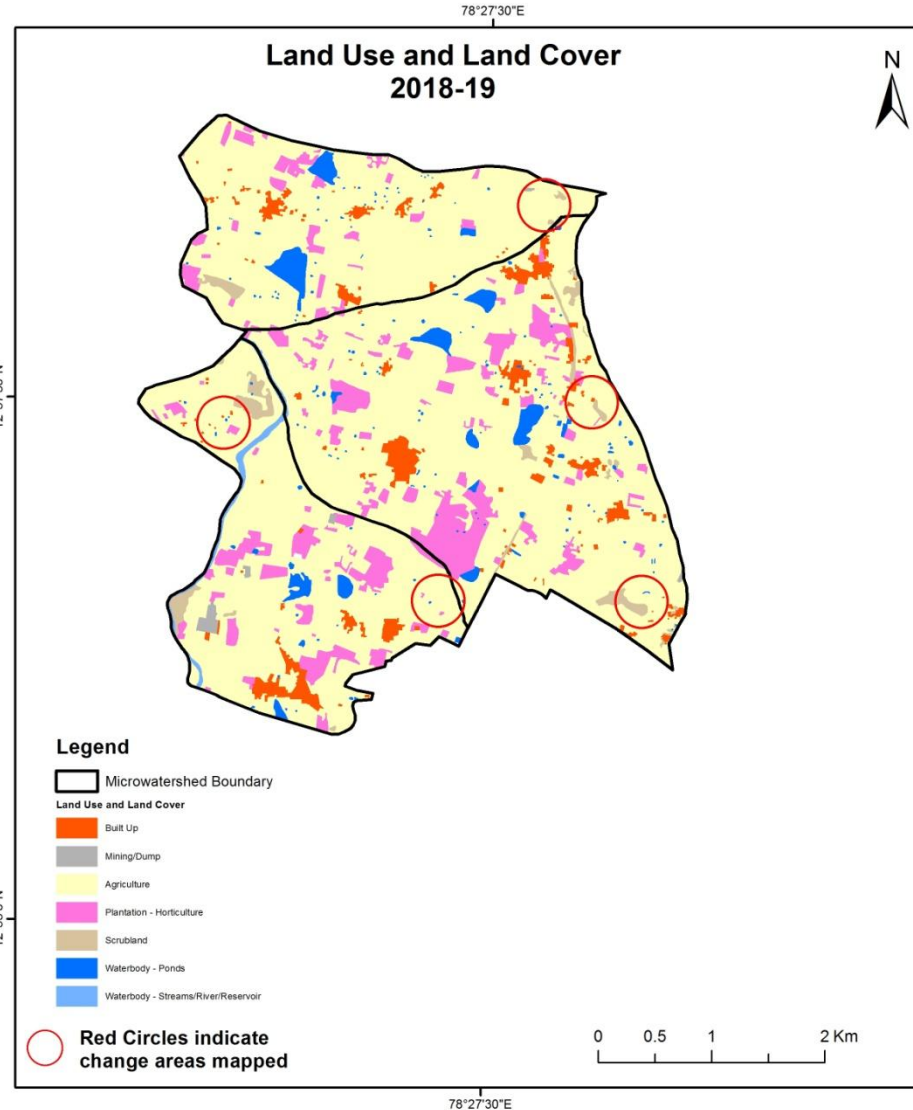
○ Red Circles indicate change areas mapped



78°27'30"E

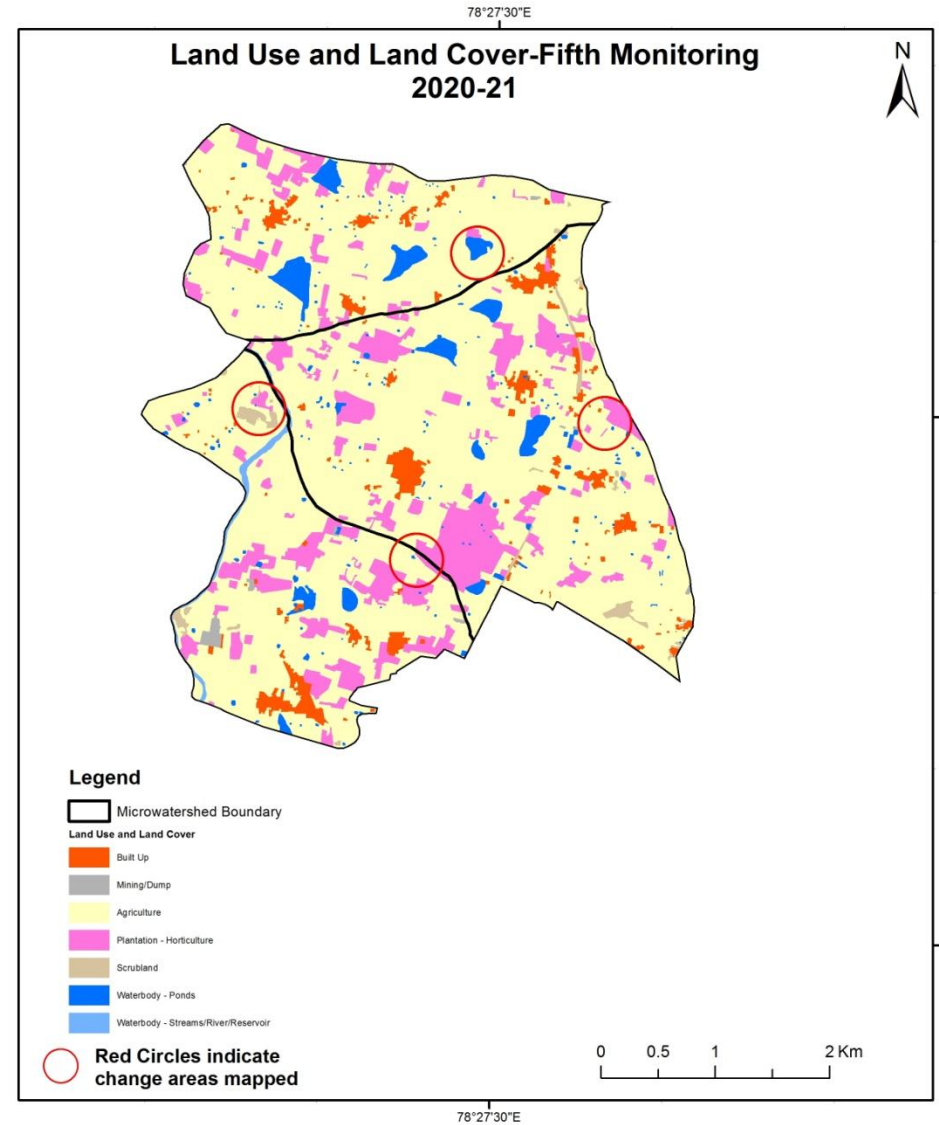
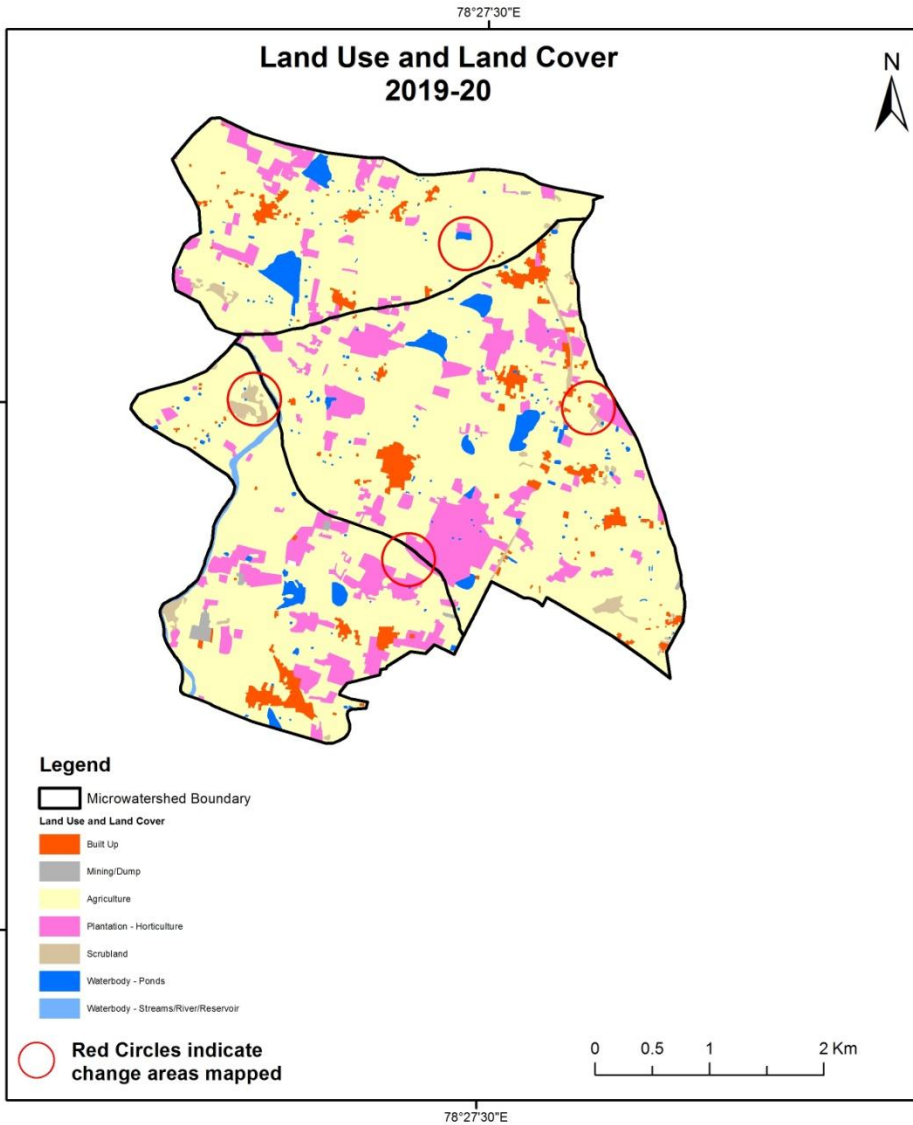
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

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

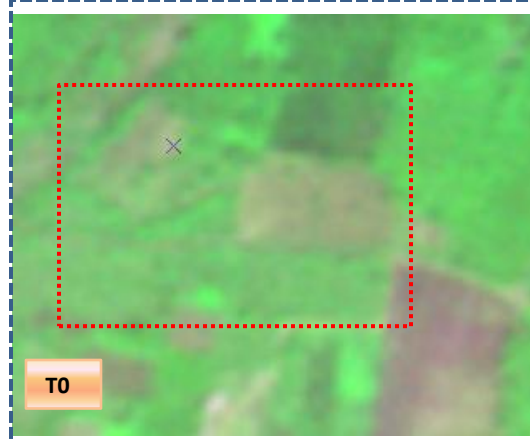


T0: 2012-13 (78°26'12.269"E 12°58'45.624"N)



T1: 05 January 2017

Scrub to Agriculture



T0: 2012-13 (78°26'7.524"E 12°56'38.282"N)



T1: 05 January 2017

Table showing change matrix depicting Land cover transitions during study period-2015-16 to 2016-17

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	
T0												
Built up	48.45										48.45	
Mining/dump		3.29									3.29	
Agriculture	11.83	0.85	1212.44	25.88					7.07		1258.08	
Plantation Horticulture	0.96		121.91	101.66						0.81	225.34	
Forest												
Forest Plantation												
Barren Rocky												
Scrub			7.79	0.61				45.30			53.70	
Waterbody- Streams/River									13.02		13.02	
Waterbody – Ponds	0.06		29.31	15.80						38.99	84.17	
Grand Total	61.31	4.14	1371.44	143.95				45.30	13.02	46.87	1686.03	

- 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 45 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 160 ha of the agriculture area has increased from plantations, 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-2016-17 to 2017-18

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	61.31										61.31	
Mining/dump		4.14									4.14	
Agriculture	2.80	0.72	1292.24	76.37						0.22	1372.34	
Plantation Horticulture		0.22	18.17	125.98						0.03	144.40	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.05		0.46					44.79			45.30	
Waterbody- Streams/River									12.06		12.06	
Waterbody – Ponds										46.75	46.75	
Grand Total	64.16	5.08	1310.87	202.35				44.79	12.06	47.00	1686.30	

- 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 80 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T2.
- In T2 18 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	64.16										64.16	
Mining/dump		5.08									5.08	
Agriculture	0.71	0.60	1270.90	38.31						0.35	1310.87	
Plantation Horticulture	0.37		75.85	126.13							202.35	
Forest												
Forest Plantation												
Barren Rocky												
Scrub			9.51	2.81				32.25		0.23	44.79	
Waterbody- Streams/River									12.06		12.06	
Waterbody – Ponds										47.00	47.00	
Grand Total	65.24	5.68	1356.25	167.25				32.25	12.06	47.57	1686.30	

- 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 39 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and plantations in T3.
- In T3 85 ha of the agriculture area has increased from plantations 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	65.24										65.24	
Mining/dump		5.68									5.68	
Agriculture	0.94	0.27	1275.07	79.35						0.62	1356.25	
Plantation Horticulture			13.31	153.86						0.08	167.25	
Forest												
Forest Plantation												
Barren Rocky												
Scrub			8.64					23.54		0.07	32.25	
Waterbody- Streams/River									12.06		12.06	
Waterbody – Ponds			0.09							47.48	47.57	
Grand Total	66.18	5.96	1297.11	233.21				23.54	12.06	48.24	1686.30	

- 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 81 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T4.
- In T4 22 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
T4												
Built up	66.18										66.18	
Mining/dump		5.38								0.22	5.60	
Agriculture	0.61		1279.16	10.67						9.43	1299.87	
Plantation Horticulture	0.33		4.59	223.97						0.42	229.31	
Forest												
Forest Plantation												
Barren Rocky												
Scrub			4.48	1.56				17.51			23.54	
Waterbody- Streams/River									13.02		13.02	
Waterbody – Ponds	0.39									48.12	48.51	
Grand Total	67.52	5.38	1288.23	236.21				17.51	13.02	58.18	1686.03	

- 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 20 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 09 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 decrease of 25 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 113 & 45 Hectares from T0 to T1 & T2-T3, there is a decrease of 61, 59 & 11 Hectares from T1 to T2, T3-T4 & T4-T5 respectively and overall increase of 30 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. There is an **increase of 10 Hectares in agriculture/plantation** in during the project period of 2012-13 (T0) to 2020-21 (T5) years.
6. There is a decrease of 36 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (0) verified from the portal.