

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

ANANTAPURAMU -74/2012-13

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad

December-2022

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



AGRICULTURE & SOIL
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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**

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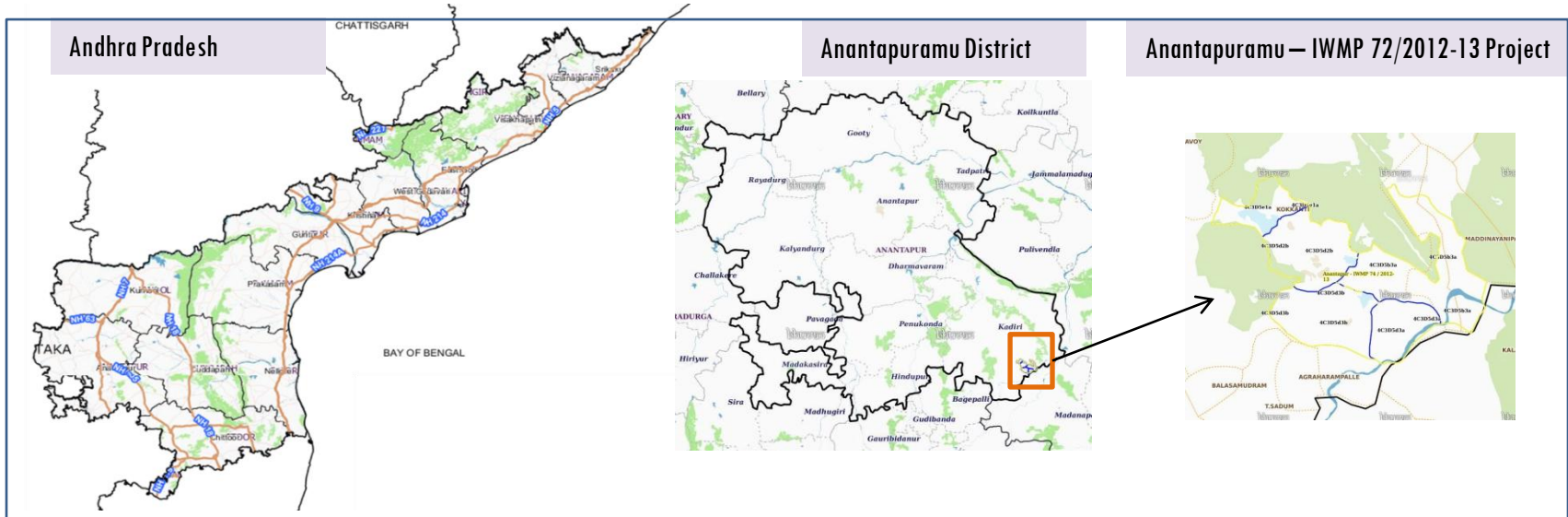
EXECUTIVE SUMMARY

- 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-74/2012-13, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **3,873** ha. It comprises of 5 micro watersheds.
- In the project area 124 Drishti photos were uploaded showing 18 check dams, 53 Farm ponds, 24 Horticulture and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 2 new farm ponds or dug out pits.
- Water bodies have shown an increase by 19 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 60 % is covered by the agriculture, 18 % is covered by scrubland, 7.5% is covered by water body and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-74/2012-13

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Tanakal Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **3,873** ha. It comprises of 5 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



- Anantapuram has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 37 °C range and it reaches around 44 °C to 45 °C.
- Anantapuram gets pre-monsoon showers starting as early as March, mainly through north-easterly winds blowing in from Kerala. Monsoon arrives in September and lasts until early November with about 250 mm (9.8 in) of precipitation. A dry and mild winter starts in late November and lasts until early February; with little humidity and average temperatures in the 22–23 °C (72–73 °F) range. Total annual rainfall is about 22 in (560 mm).
- Anantapuram district receives moderate to good rainfall from July to October month.

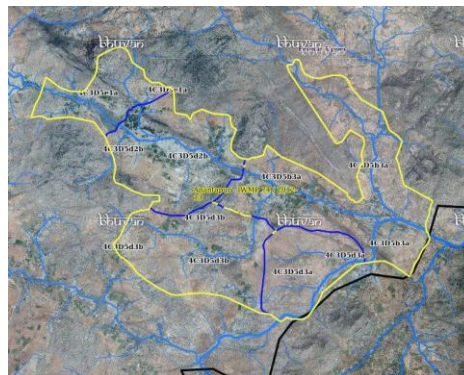
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2012-13	2020-21
LISS IV	2012-13		
SCENE 1			20-Mar-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			20-Mar-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	Drishiti Photographs		
		Total	124
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

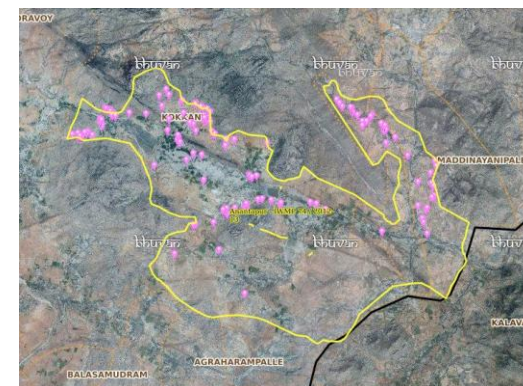


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	4	4
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	7	7
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	2	2
10	Civil work-Check dams/Rock fill dam	59	59
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	0	0
15	Capacity Building Activities	0	0
16	Entry Point Activity	2	2
17	Others	74	50
	TOTAL	148	124

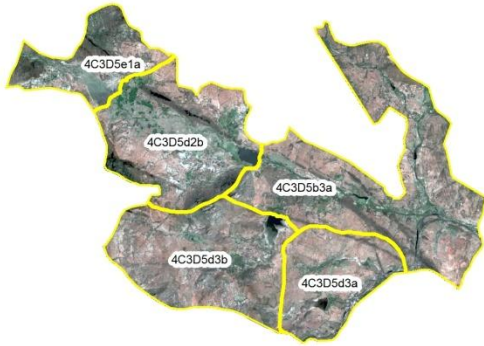
MONITORING IN THE PROJECT AREA

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.

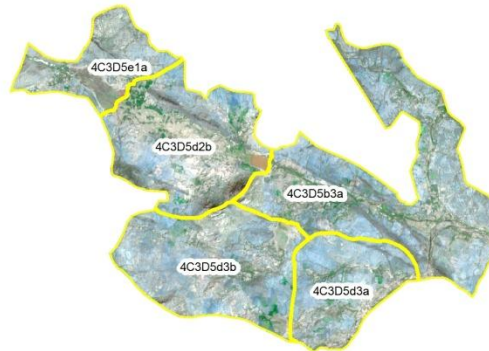
Natural Colour Composite (NCC)

Natural Color Composite- 2012-13



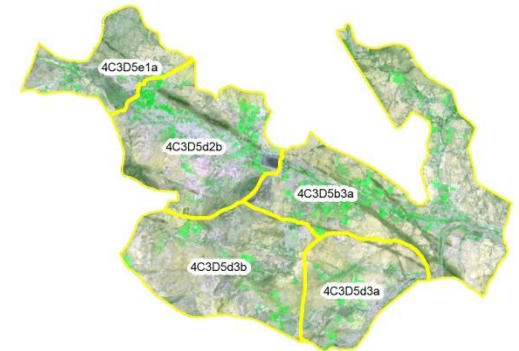
Source:Fusion data,NRSC

Natural Color Composite- 05th Jan2017



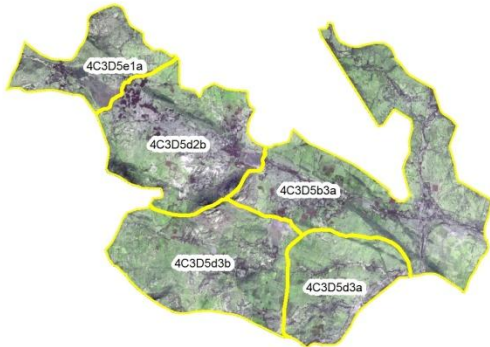
Source:NCC,NRSC

Natural Color Composite - 09th Dec2017



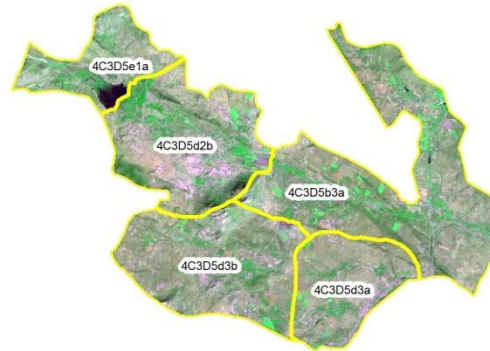
Source:LISS-IV,NRSC

Natural Color Composite-25th Dec2018



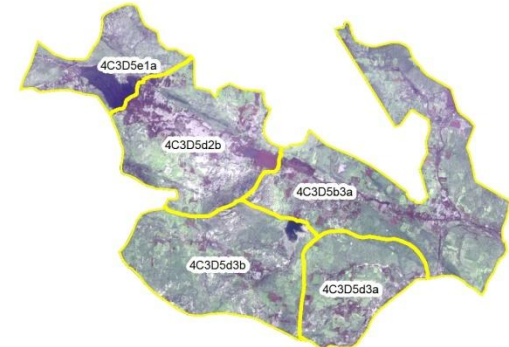
Source:Sentinel

Natural Color Composite- 14th January 2020



Source:LISS-IV,NRSC

Natural Color Composite- 27 th Feb 2021



Source:Sentinel

Monitoring of activities in Ananthapuram District Andhra Pradesh. IWMP-74/2012-13



T0 Satellite data 2012



T1 Satellite data 2013



T2 Satellite data 2015



T3 Satellite data 2017



T4 Satellite data 2018



T5 Satellite data 2020



Drishti Id. 1799088

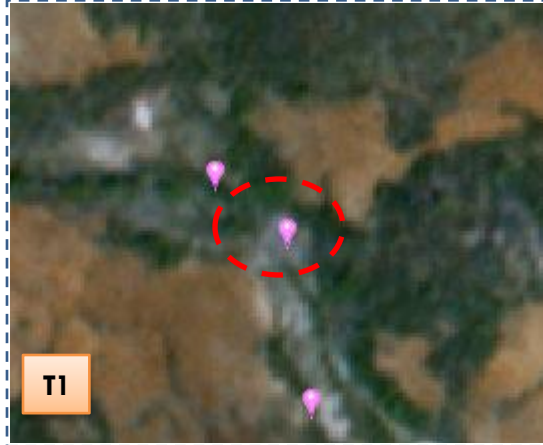
Farm Ponds

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-74/2012-13



T0

T0:2012-13



T1

T1: 05 January 2017



Drishti SI no 1797768- MWS :4C3D5b3a

Check dam



bhuvan

T0:2012-13



T1 bhuvan

T1: 05 January 2017



Drishti SI no. 7026681- MWS : 4C3D5d3b-

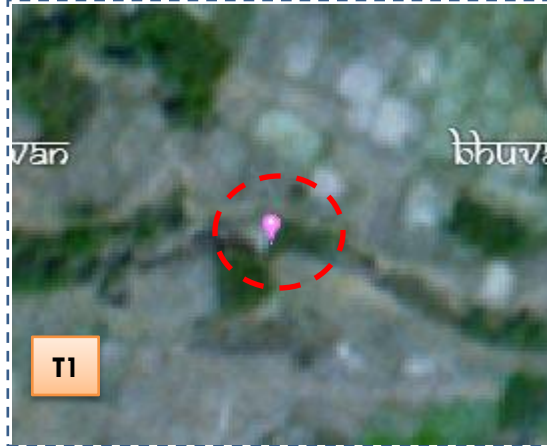
Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-74/2012-13



T0

T0: 2012-13



T1

T1: 05 January 2017



Drishti SI no7033575- MWS 4C3D5b3a

Checkdam



T0

T0: 2012-13



T1

T1: 05 January 2017



Drishti SI no. 2493405- MWS :4C3D5e1a

Farm Pond

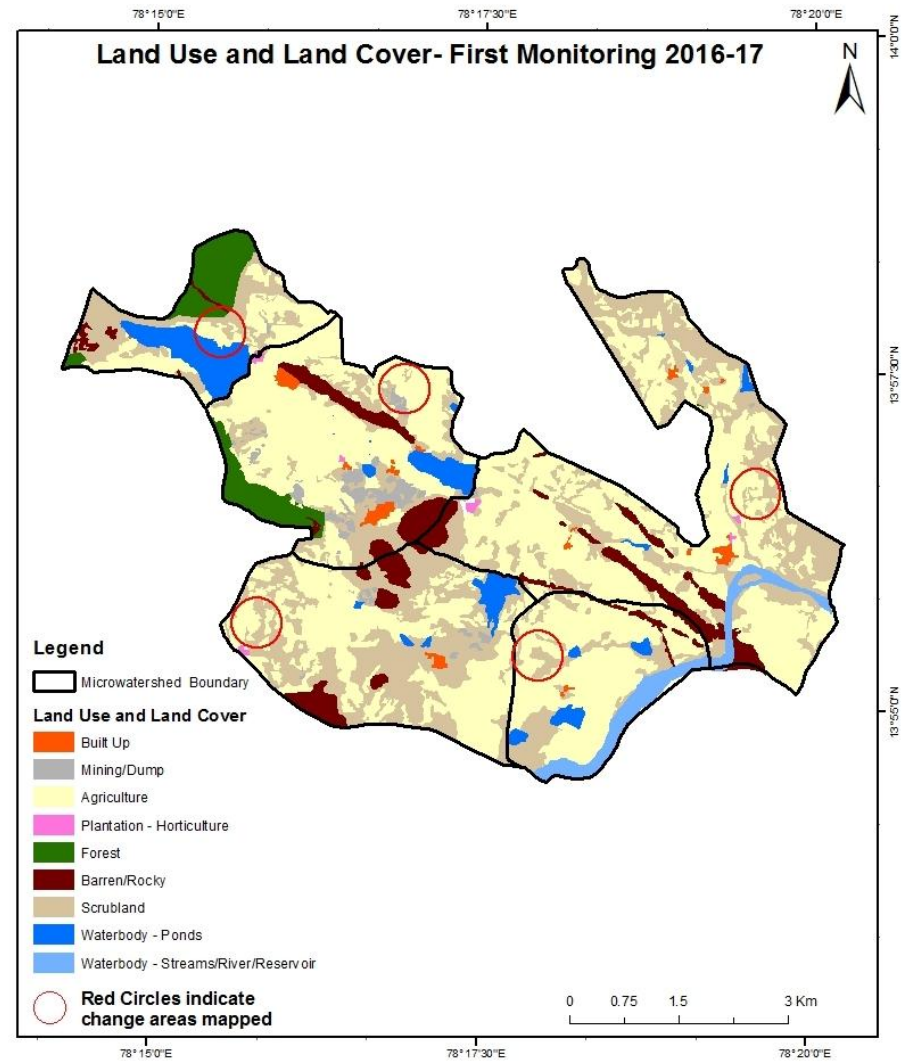
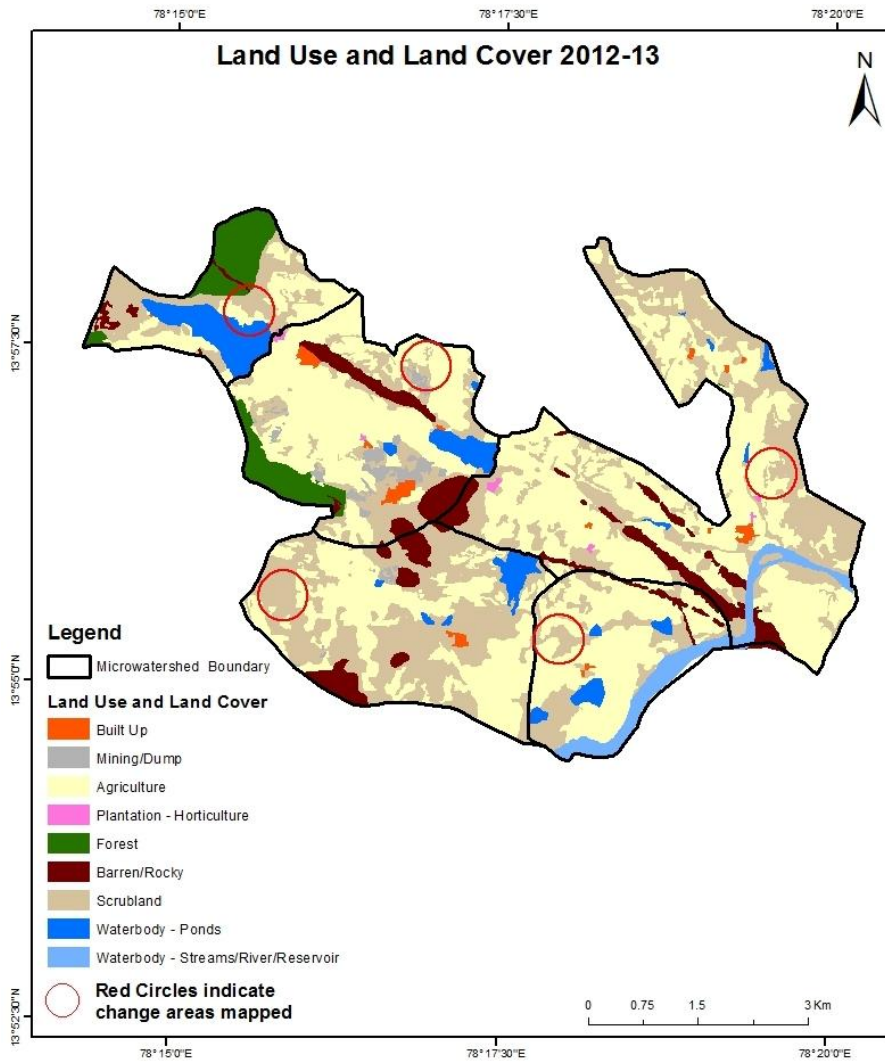
MONITORING IN THE PROJECT AREA

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)

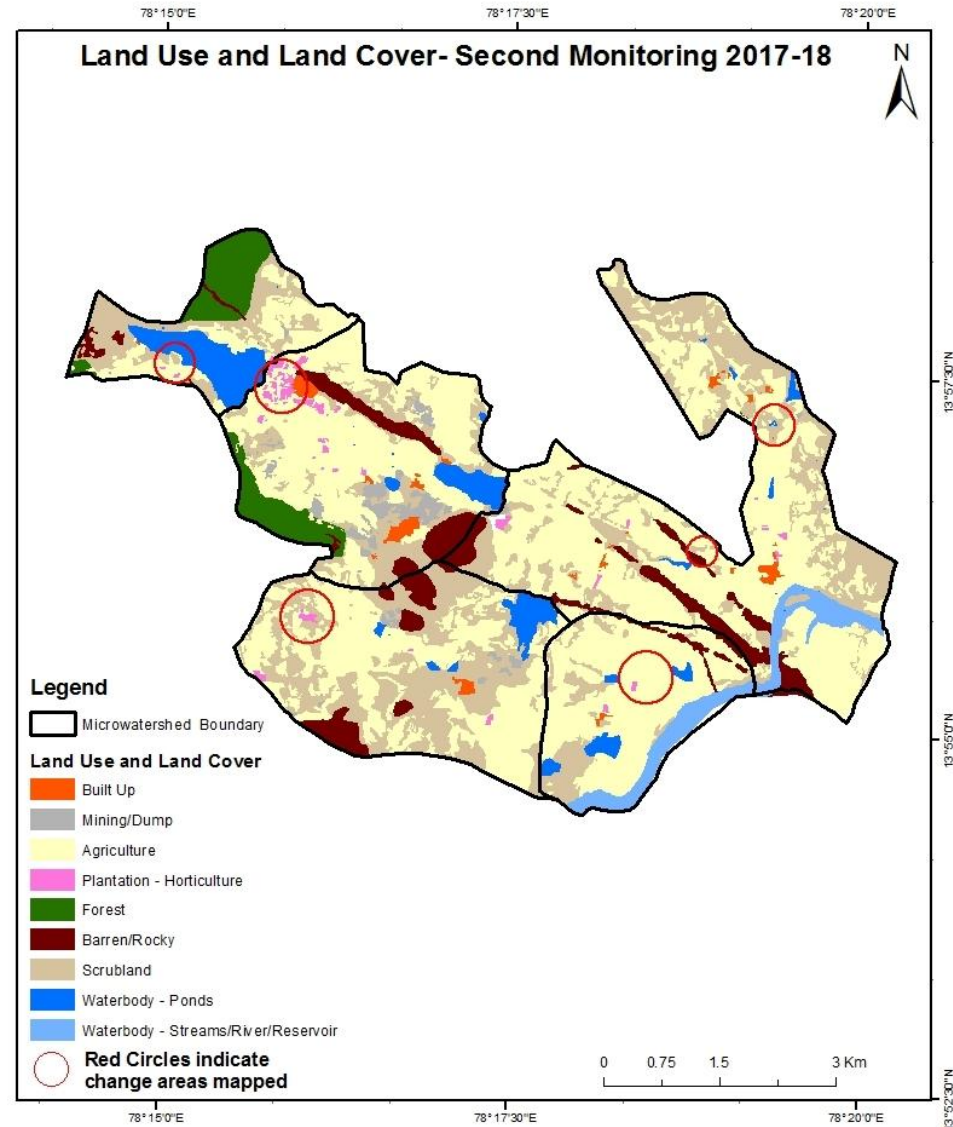
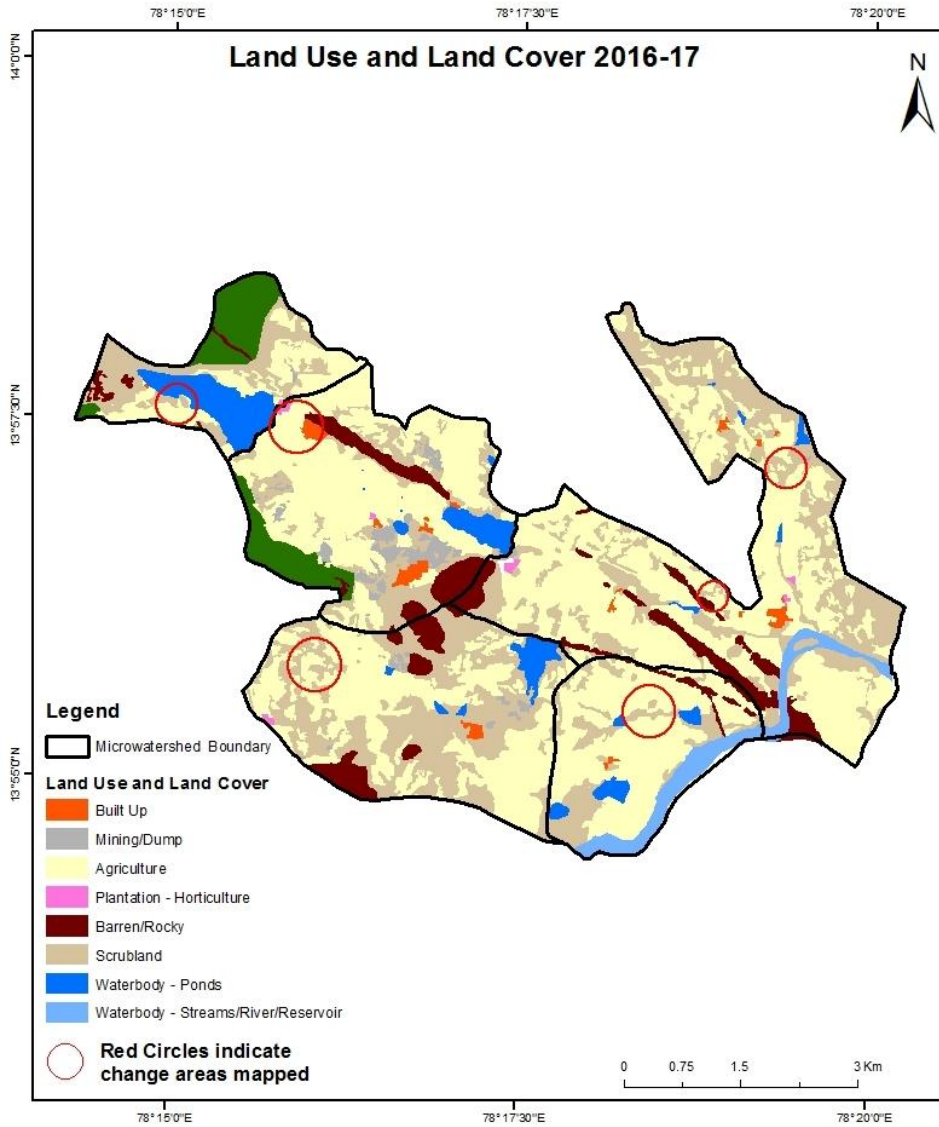
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



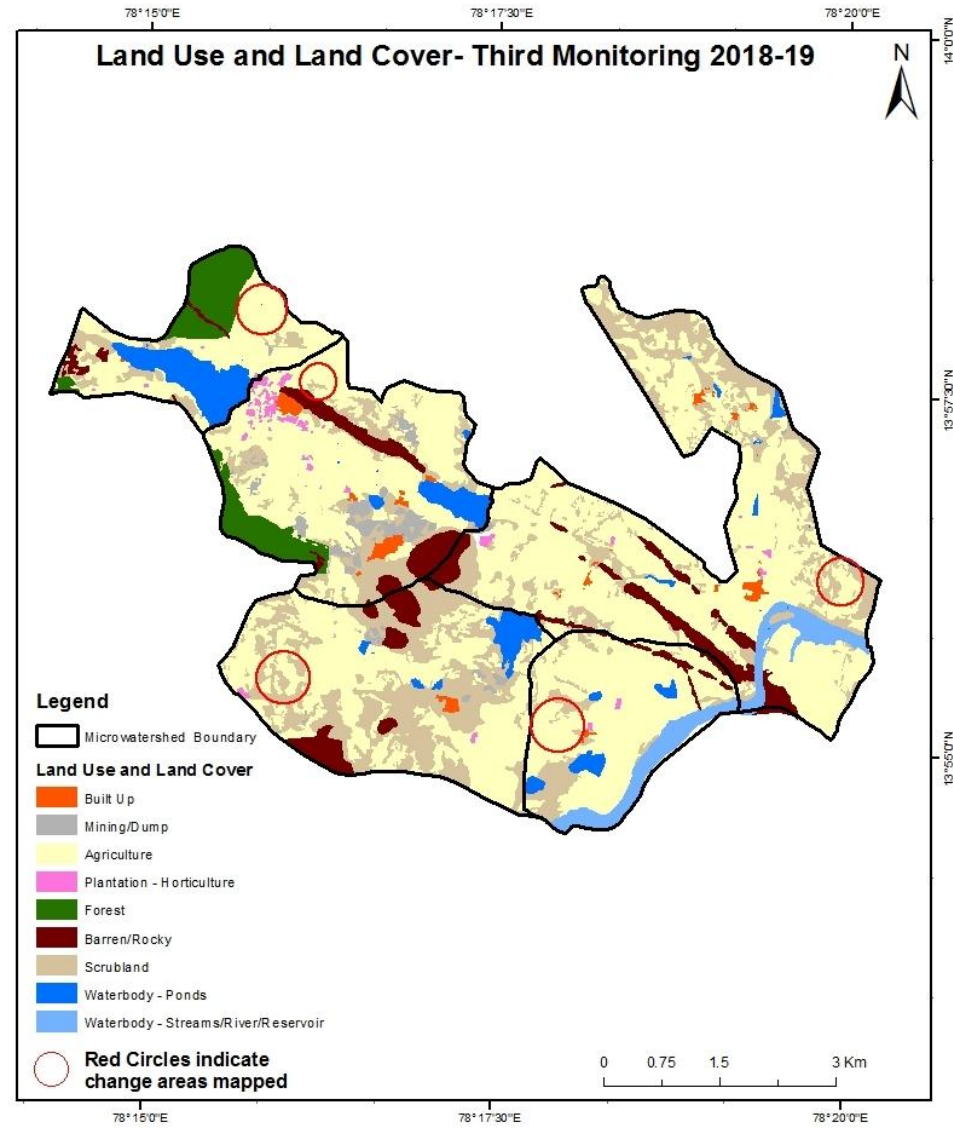
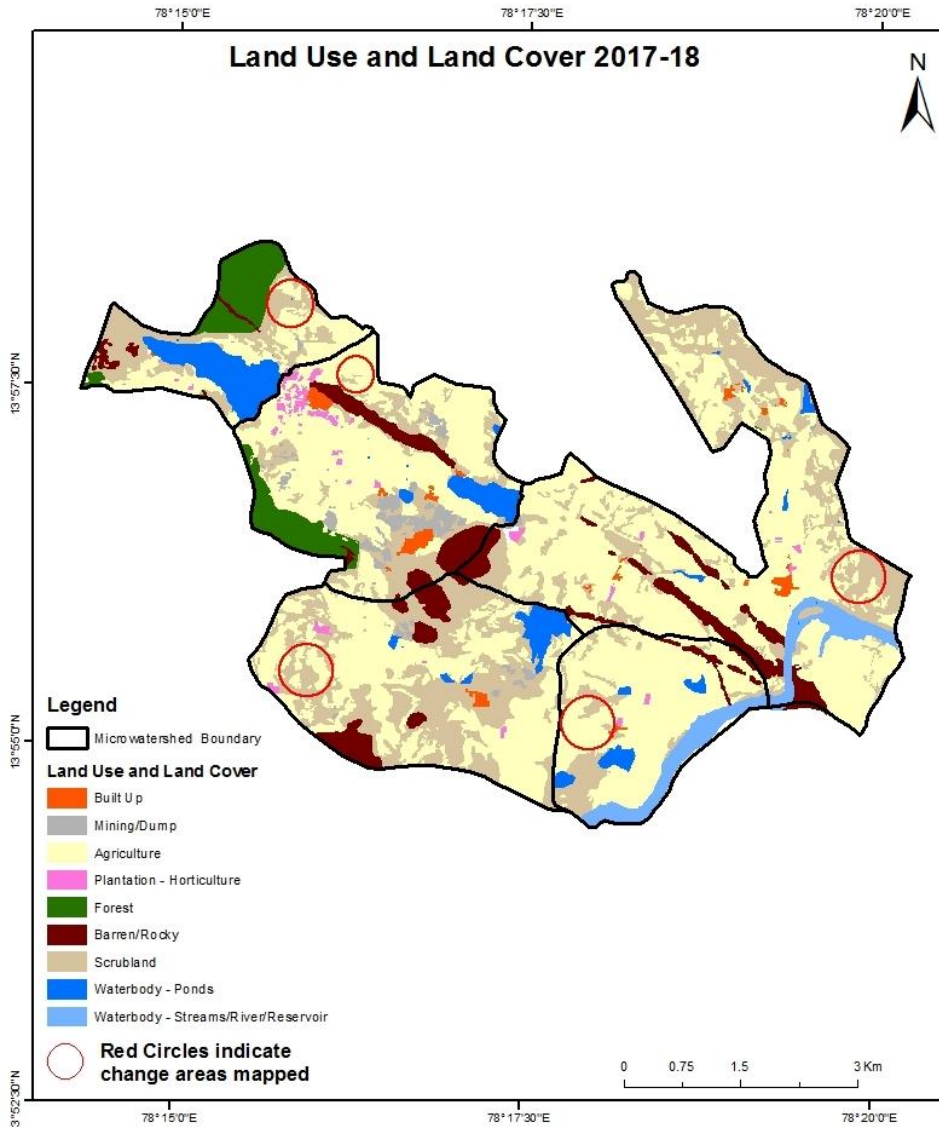
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



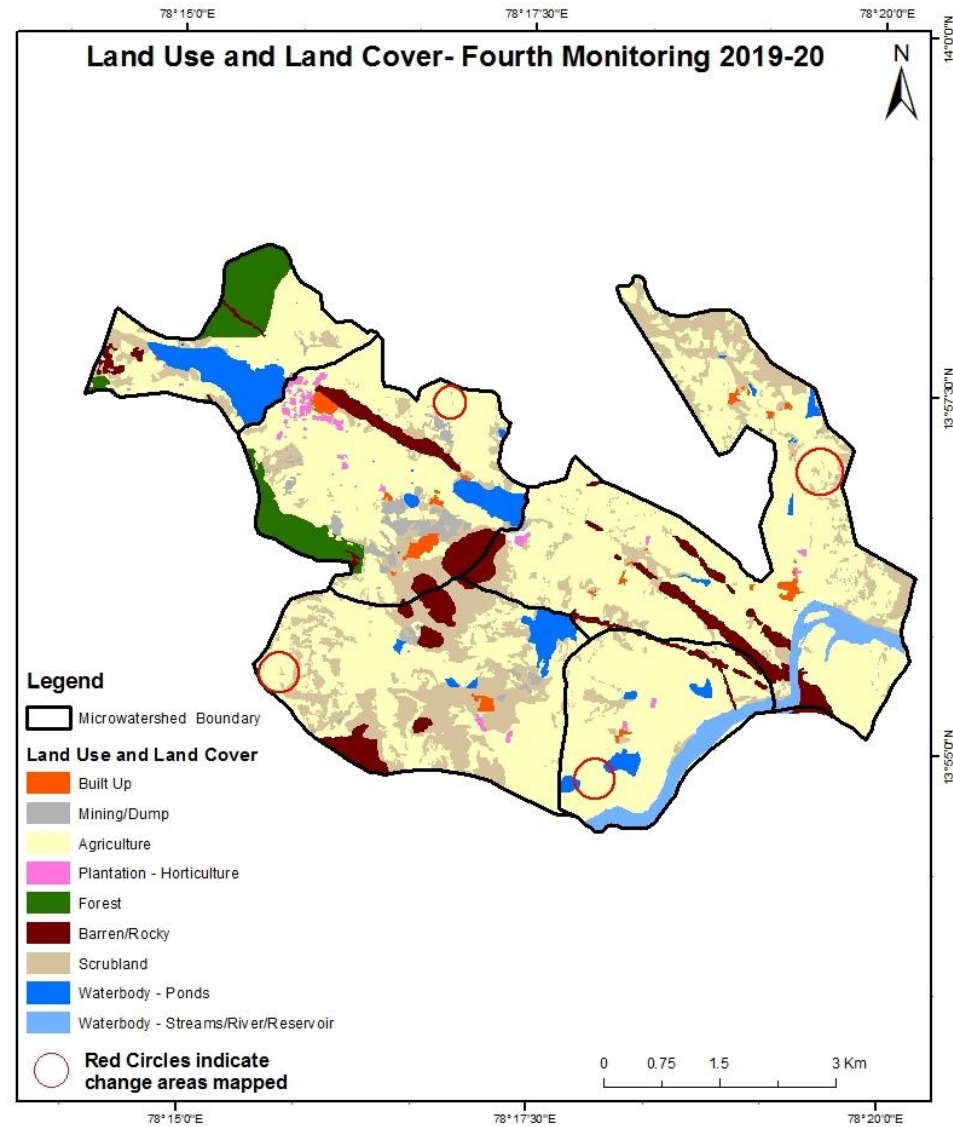
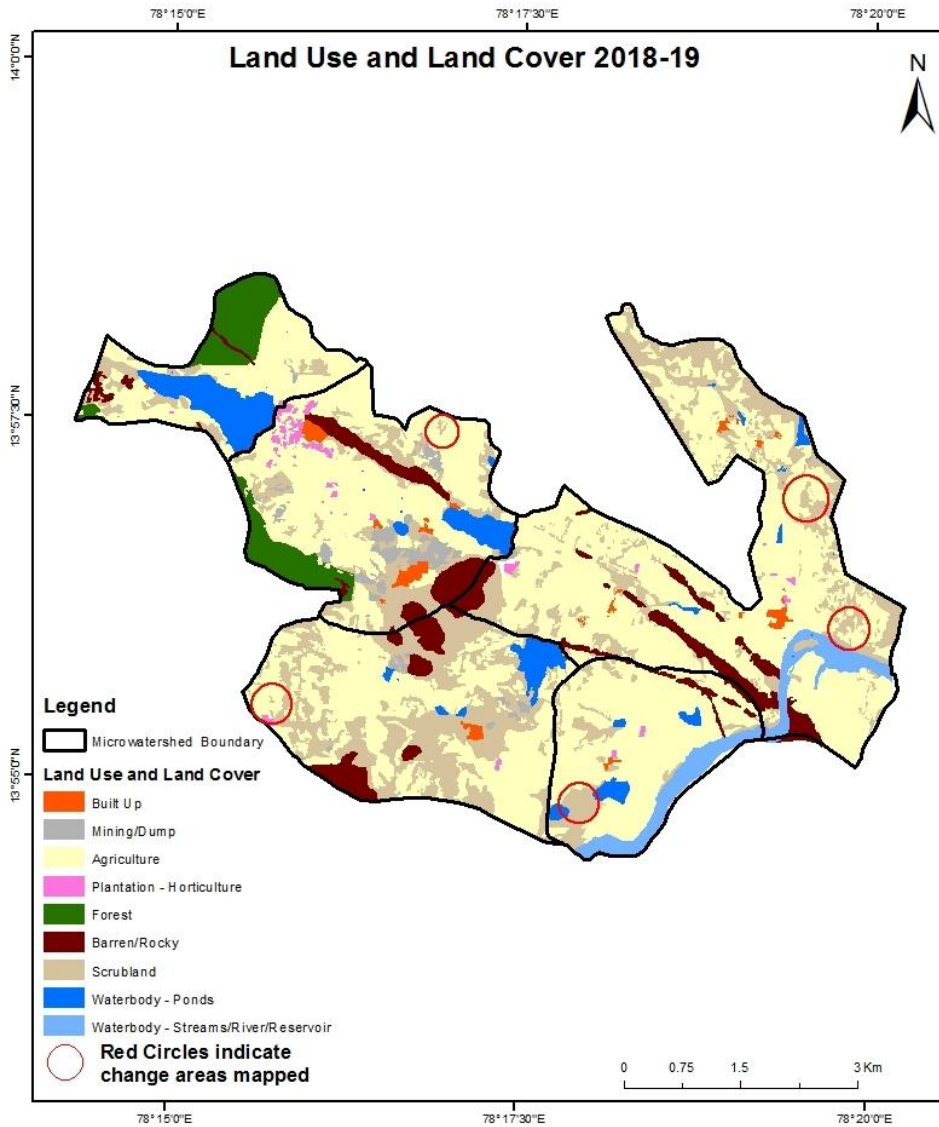
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



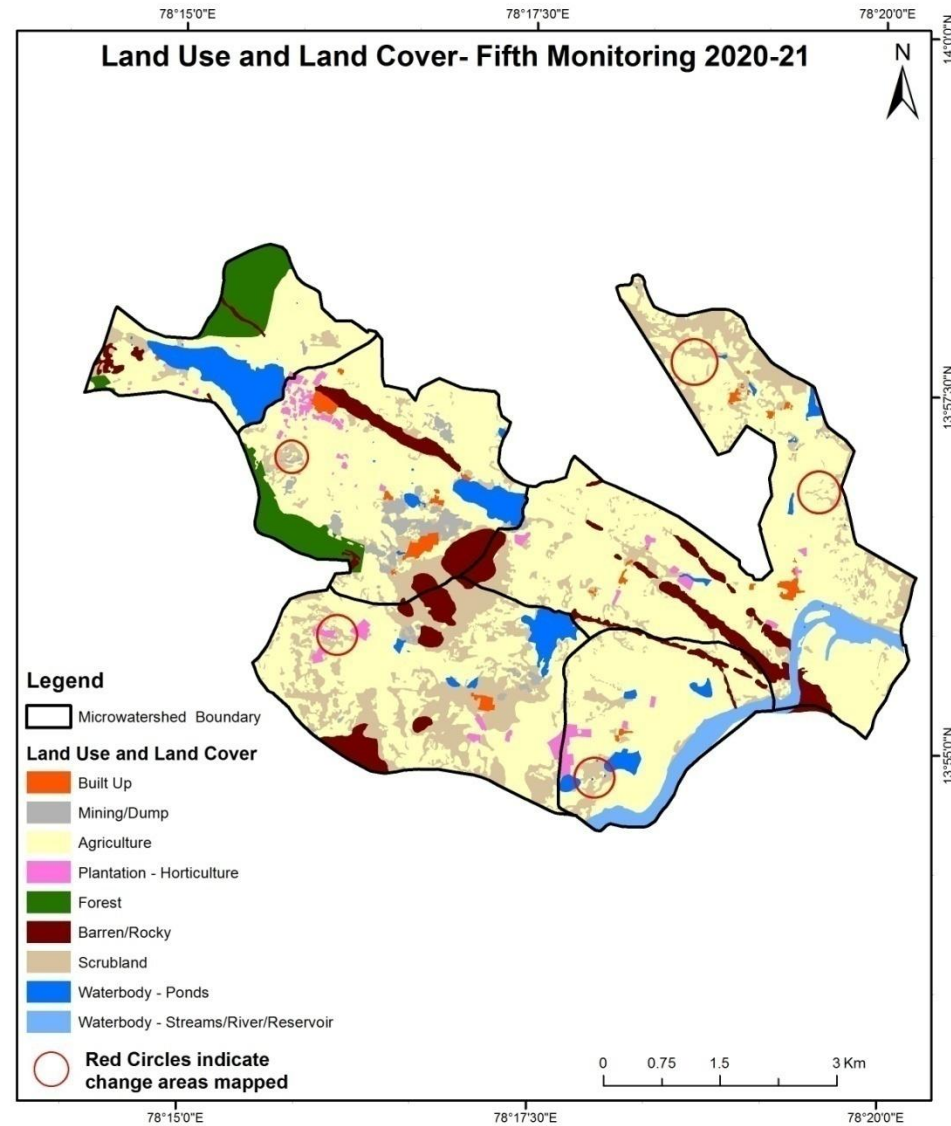
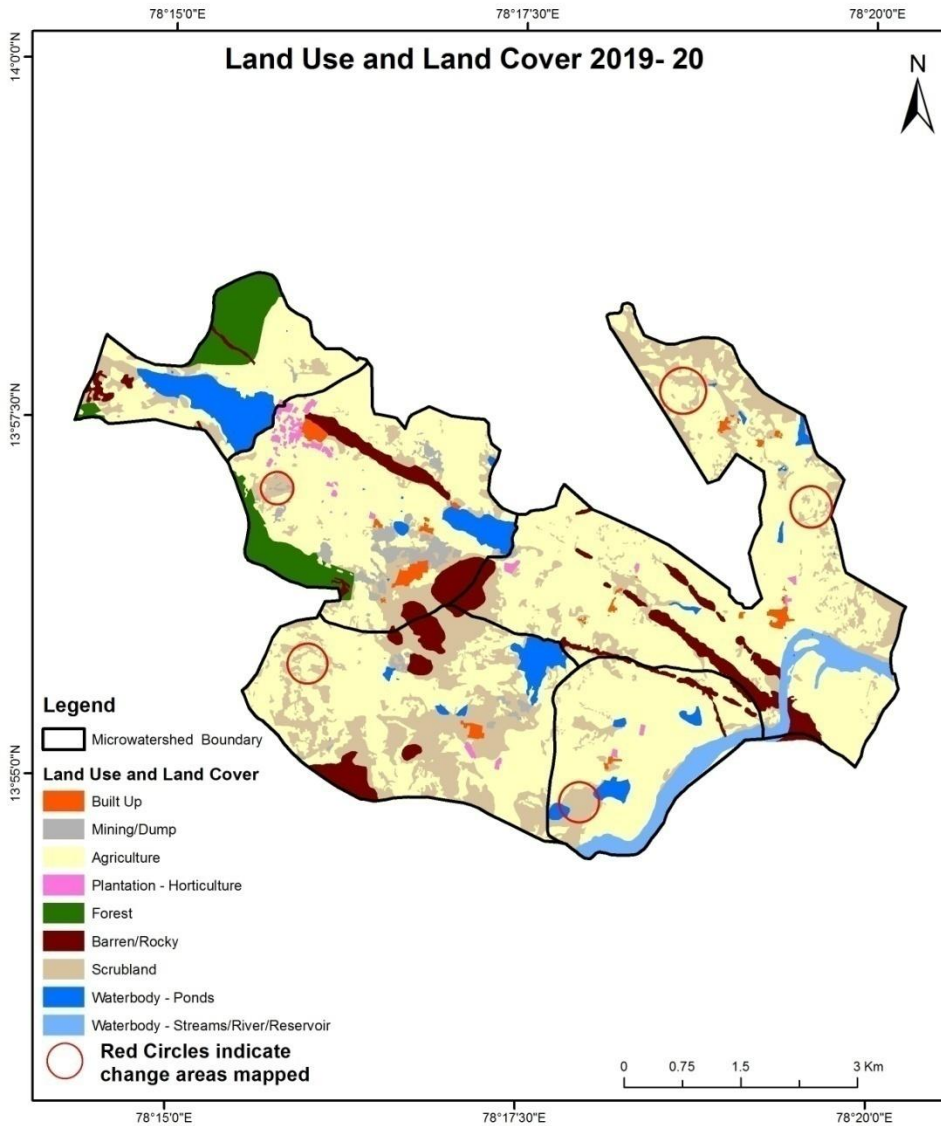
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

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

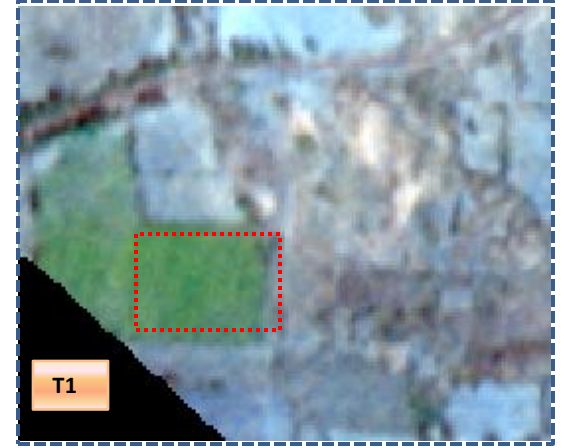


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0: 2012-13(78°15'44.541"E 13°55'23.553"N)



T1: 05 January 2017

Agriculture to Water body



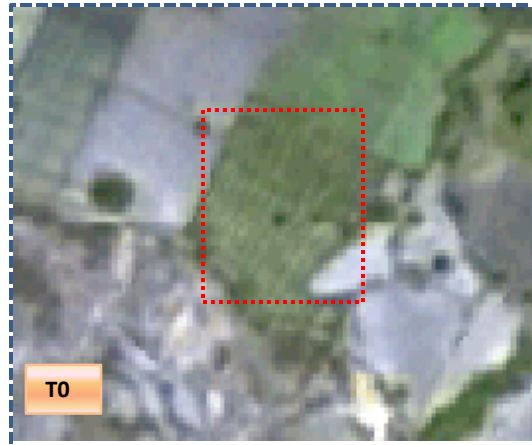
T0: 2012-13 (78°16'21.709"E 13°57'8.73"N)



T1: 05 January 2017

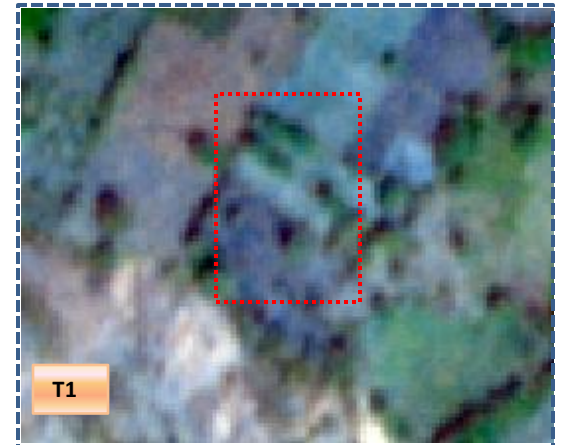
Land Use and Land Cover changes for Pre and Post treatment dates

Plantation to Agriculture



T0

T0: 2012-13(78°18'10.751"E 13°56'2.152"N)



T1

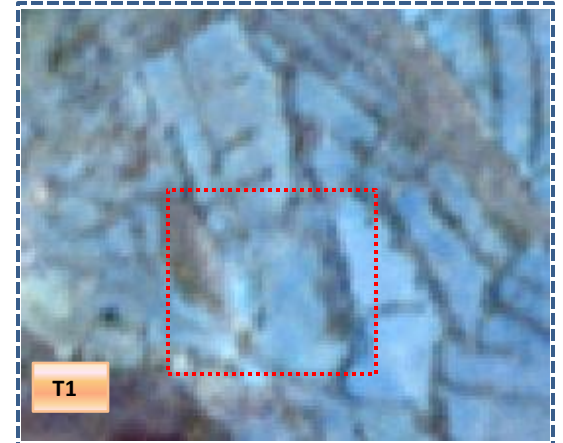
T1: 05 January 2017

Scrubland to Agriculture



T0

T0: 2012-13(78°16'4.648"E 13°56'3.032"N)



T1

T1: 05 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	29.84												29.84
Mining/dump		46.74											46.74
Agriculture	2.92	0.18	1856.79	1.52				5.92	0.23				1867.56
Plantation Horticulture			0.89	6.90									7.79
Forest					151.80								151.80
Forest Plantation													
Barren Rocky			1.04				237.45						238.49
Scrub	1.25	14.68	115.23					1128.63					1259.79
Waterbody- Streams/River											99.27		99.27
Waterbody – Ponds			2.00						169.79				171.79
Grand Total	34.01	61.61	1975.95	8.41	151.80		237.45	1134.55	170.01		99.27		3873.07

- 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 4.8 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrub and water body in T1.
- In T1 118 ha of the agriculture area has increased from plantations, barren rocky, 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	34.01												34.01
Mining/dump		61.61											61.61
Agriculture	0.76		1933.43	24.48				14.49	1.68		1.11		1975.95
Plantation Horticulture				8.41									8.41
Forest			1.06		150.39		0.36						151.80
Forest Plantation													
Barren Rocky							237.19						237.45
Scrub	1.24		95.80	0.02			0.19	1016.82	15.78		4.70		1134.55
Waterbody- Streams/River									99.17		0.10		99.27
Waterbody – Ponds			1.58								168.44		170.01
Grand Total	36.02	61.61	2032.12	32.91	150.39		237.74	1031.31	116.63		174.34		3873.07

- 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 28 ha of the agriculture area has decreased and it is converted into Built-up, plantations, scrub and water body in T2.
- In T2 97 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-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	36.02												36.02
Mining/dump		61.61											61.61
Agriculture			2032.12										2032.12
Plantation Horticulture			4.51	28.40									32.91
Forest					150.34						0.05		150.39
Forest Plantation													
Barren Rocky							237.74						237.74
Scrub	0.07		167.38					863.86					1031.31
Waterbody- Streams/River			0.45						116.18				116.63
Waterbody – Ponds			0.07								174.28		174.34
Grand Total	36.08	61.61	2204.53	28.40	150.34		237.74	863.86	116.18		174.32		3873.07

- 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 171 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	36.08												36.08
Mining/dump		61.61											61.61
Agriculture			2202.95	1.58									2204.53
Plantation Horticulture			1.93	26.47									28.40
Forest			0.56		149.79								150.34
Forest Plantation													
Barren Rocky							237.74						237.74
Scrub			130.93					732.86			0.07		863.86
Waterbody- Streams/River									116.18				116.18
Waterbody – Ponds											174.32		174.32
Grand Total	36.08	61.61	2336.35	28.05	149.79		237.74	732.86	116.18		174.40		3873.07

- 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 1.5 ha of the agriculture area has decreased and it is converted into plantations area in T4.
- In T4 132 ha of the agriculture area has increased from plantations, forest and scrubland 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	36.08										36.08	
Mining/dump		61.61									61.61	
Agriculture	0.50		2305.13	29.99						0.80	2336.41	
Plantation Horticulture				28.05							28.05	
Forest			0.58		149.21						149.79	
Forest Plantation												
Barren Rocky							237.74				237.74	
Scrub	0.36	0.86	120.27	1.13				608.87		1.35	732.84	
Waterbody- Streams/River									116.18		116.18	
Waterbody – Ponds										174.40	174.40	
Grand Total	36.95	62.47	2425.98	59.17	149.21		237.74	608.87	116.18	176.54	3873.10	

- 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 31 ha of the agriculture area has decreased and it is converted into built-up, plantations and water body area in T5.
- In T5 120 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 increase of 21 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 108, 56, 172, 131 & 89 Hectares from T0-T1, T1 to T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 558 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 51 Hectares in plantation/horticulture** area in between 2012-13 (T0) & 2020-21 (T5) years.
6. There is a decrease of 608 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (02) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (02) verified from the portal.