

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -46/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
February-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**

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03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
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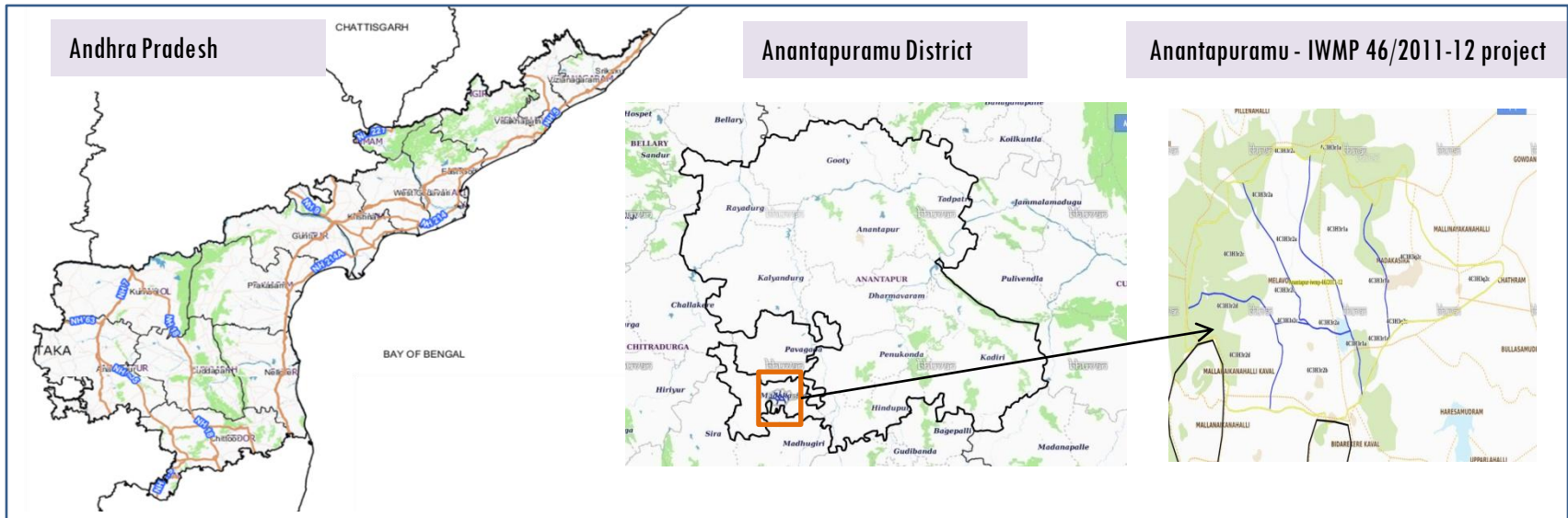
EXECUTIVE SUMMARY

- 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-46/2011-12, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **7,865** ha. It comprises of 6 micro watersheds.
- In the project area 189 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 79 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 58 % is covered by the agriculture, 23 % is covered by forest, 7 % is covered by scrubland and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-46/2011-12

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Madakasira Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 7,865 ha. It comprises of 6 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



- 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.

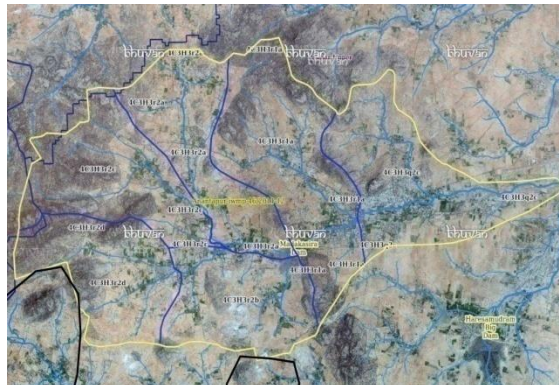
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2013-14	2019-20
LISS IV	2011-12		
SCENE 1			2-Feb-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			2-Feb-20
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	189
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

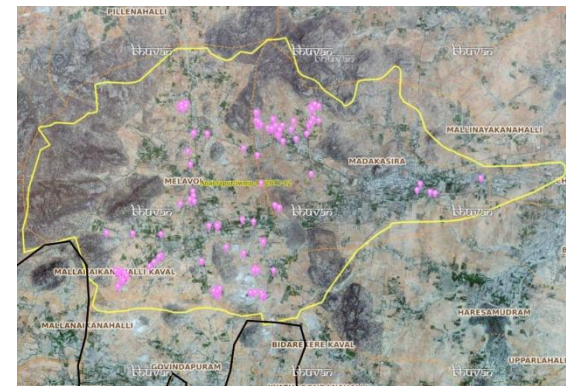


MWS Boundary



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	Afforestation	1	1
2	Horticulture	0	0
3	Agriculture	50	32
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	6	6
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	0	0
11	Civil work-Check dams/Rock fill dam	79	75
12	Nallah Bunds/Drainage treatment	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	1	1
15	Livelihood Activities-Plantation/Horticulture	1	1
16	Capacity Building Activities	0	0
17	Entry Point Activity	16	11
18	Others	62	62
	TOTAL	216	189

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.

Natural Colour Composite (NCC)

Natural Color Composite- 2011-12



Source:Fusion data,NRSC

Natural Color Composite- 28th October 2015



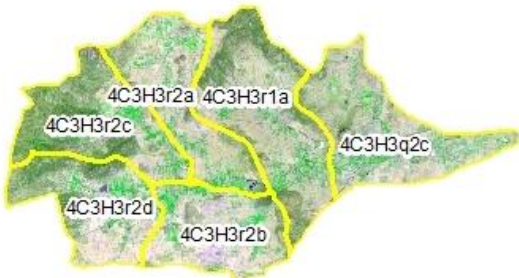
Source:NCC,NRSC

Natural Color Composite - 2016



Source:Fusion data,NRSC

Natural Color Composite-0 5th March 2018



Source:Sentinel,NRSC

Natural Color Composite- 4th January 2019



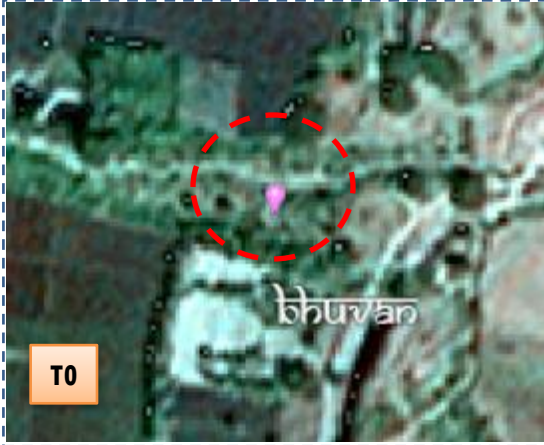
Source:Sentinel,NRSC

Natural Color Composite- 02nd February 2020



Source:LISS-IV,NRSC

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-46/2011-12



T0:2011-12

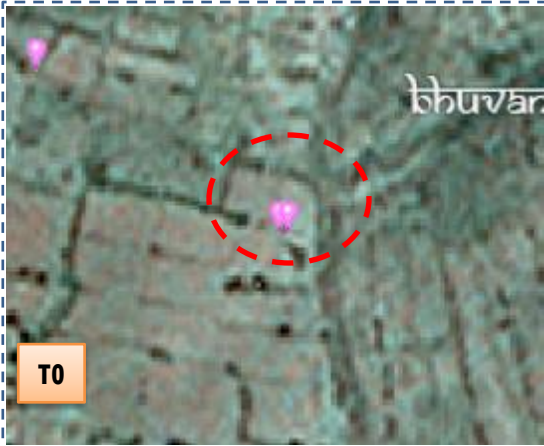


T1: 14 April 2017

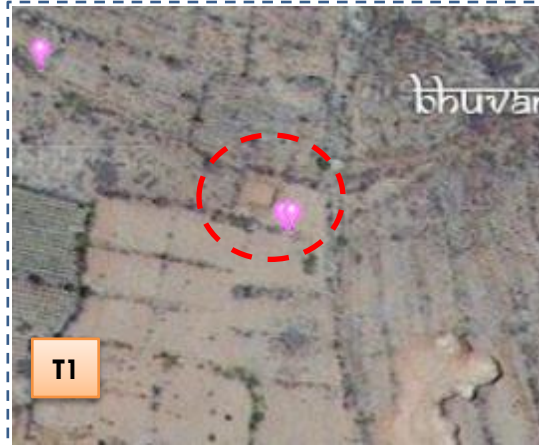


Drishti Sl no. 2497898 MWS : 4C3H3r2d

Check dam



T0:2011-12



T1: 14 April 2017



Drishti Sl no. 2440811 MWS : 4C3H3r2a

Farm pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-46/2011-12



T0:2011-12



T1: 14 April 2017



Drishti Sl no. 1657864 MWS : 4C3H3r2b

Horticulture



T0:2011-12



T1: 14 April 2017



Drishti Sl no. 2498031 MWS : 4C3H3r2d

Farm pond

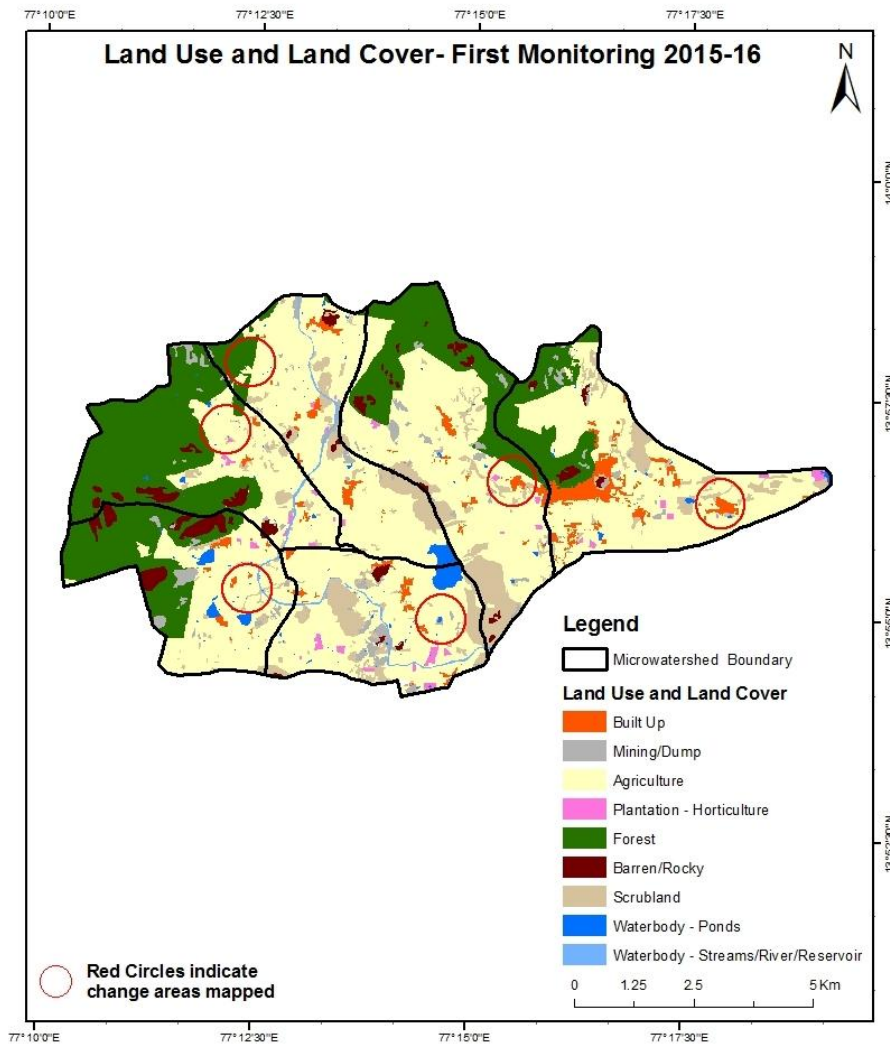
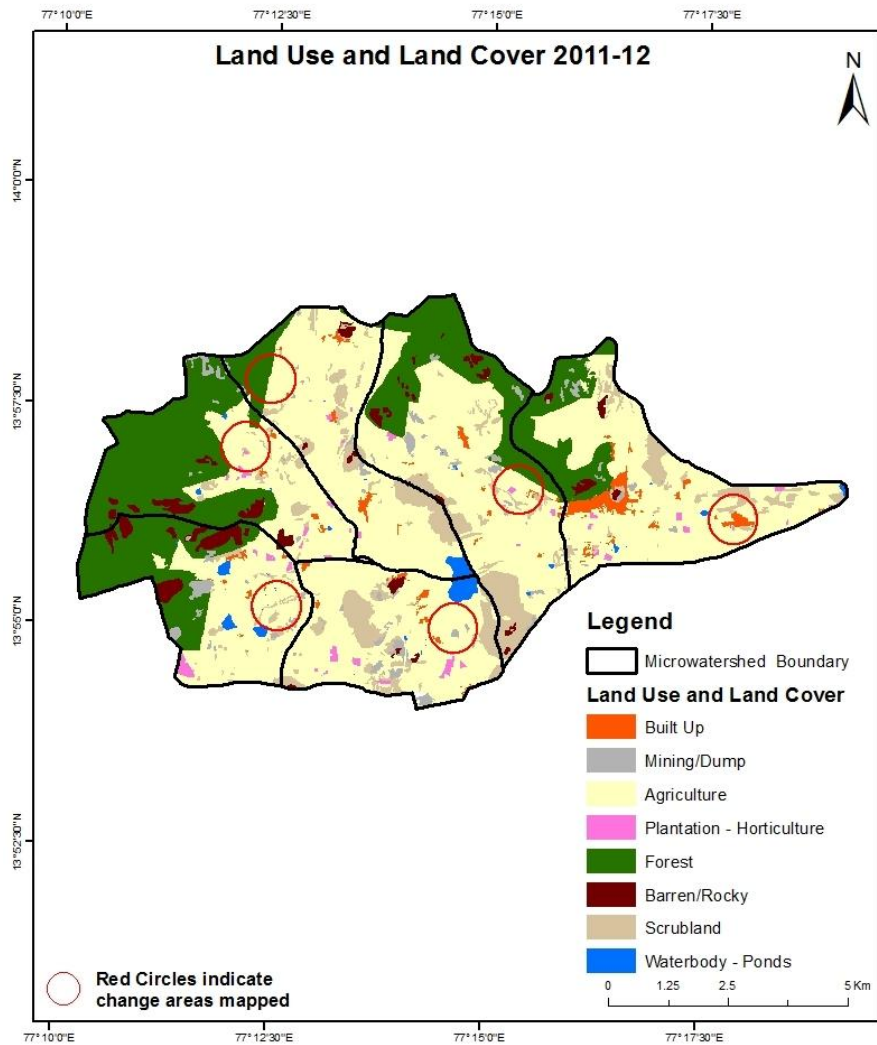
MONITORING IN THE PROJECT AREA

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 (2011-12) and row represents the T5 (2019-20)

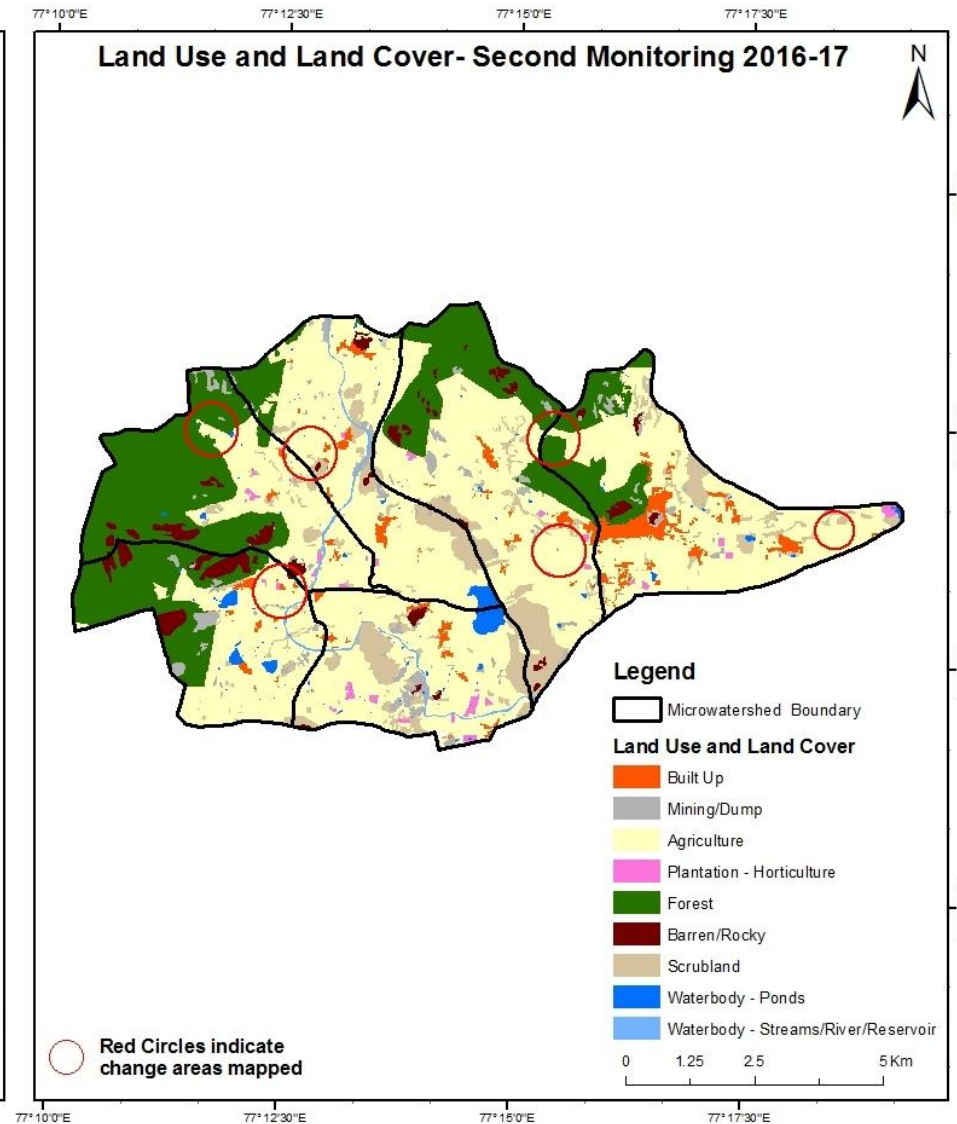
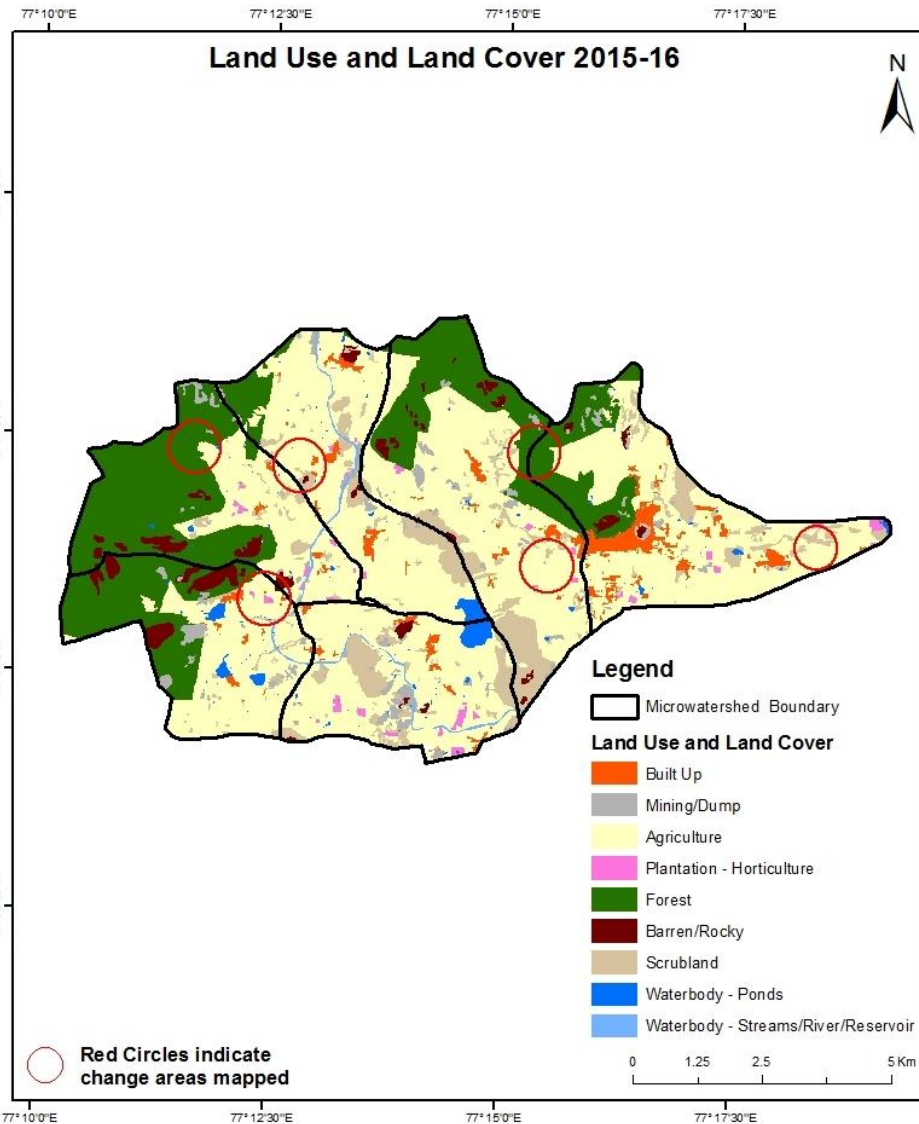
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



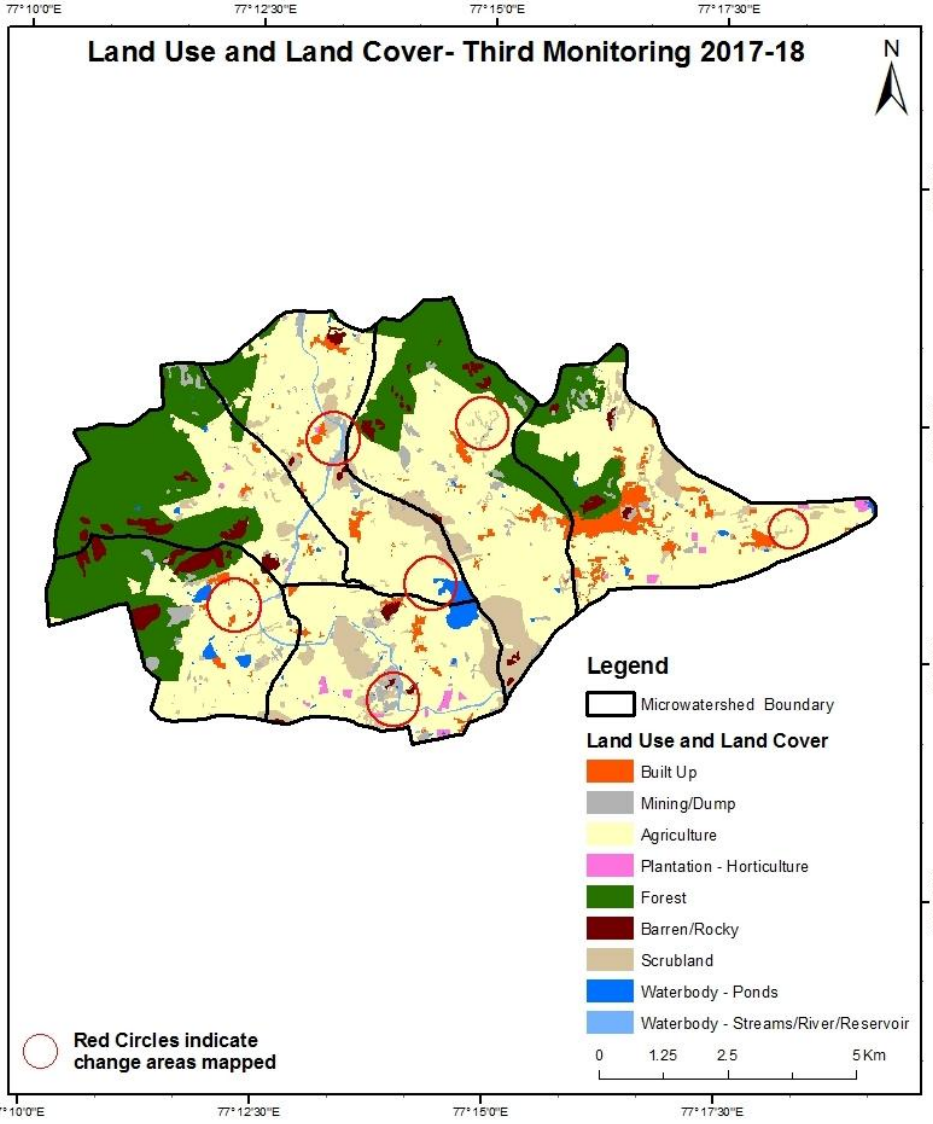
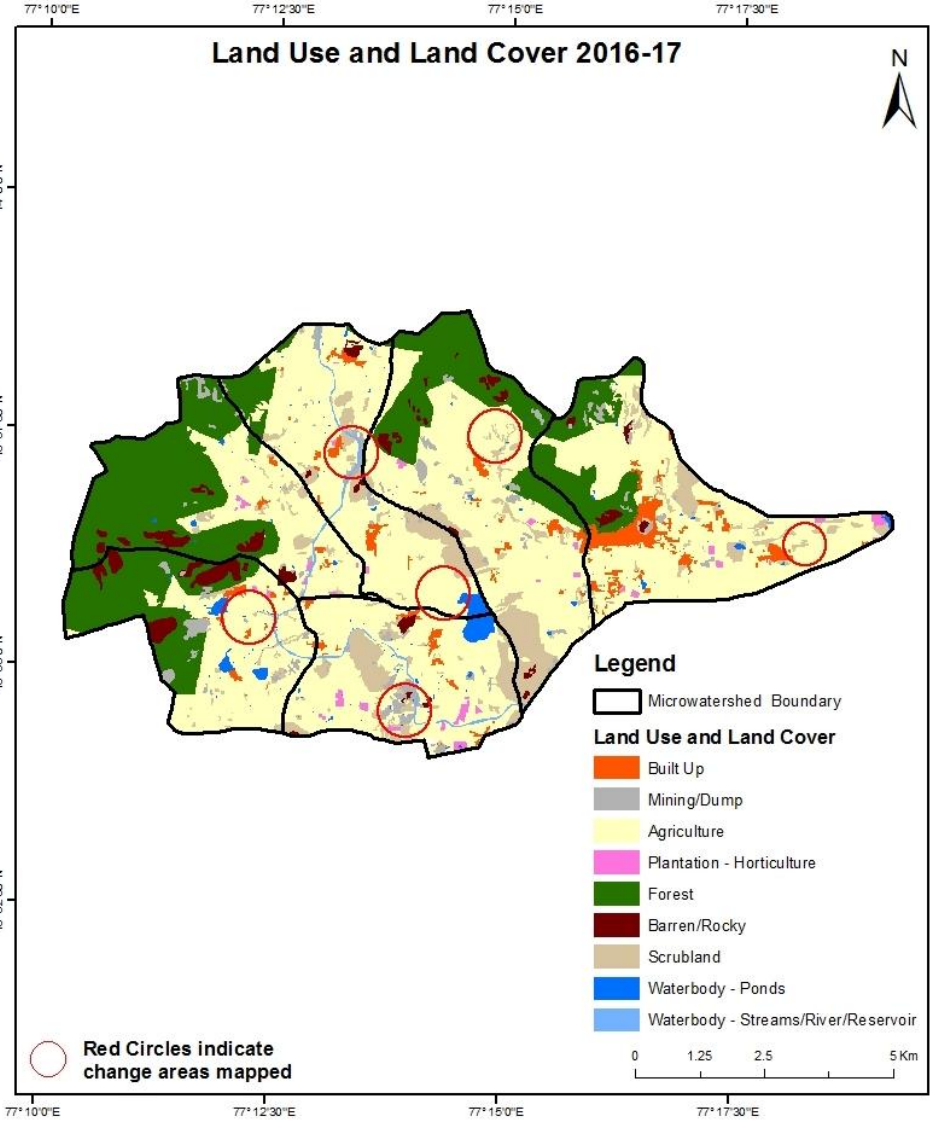
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016 -17)

Scale: 1:10000



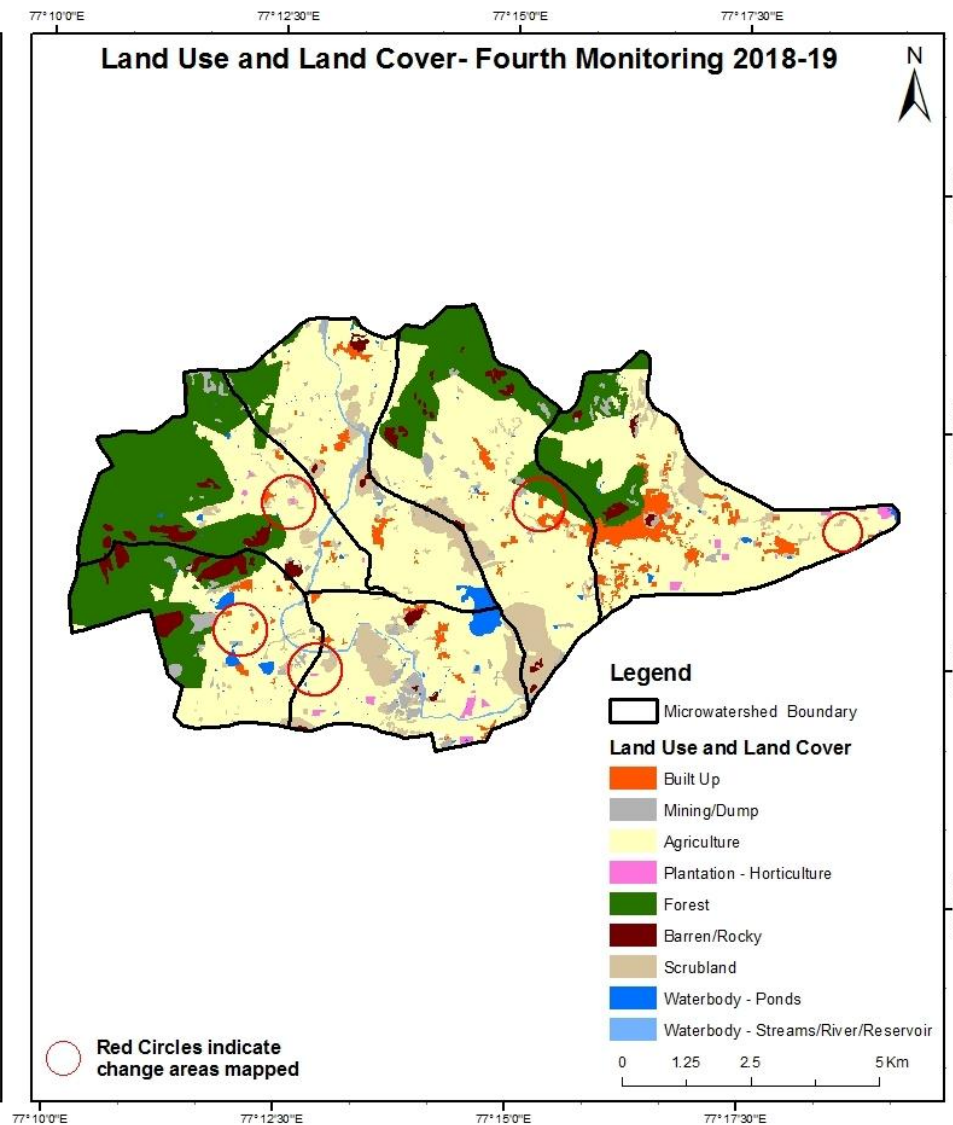
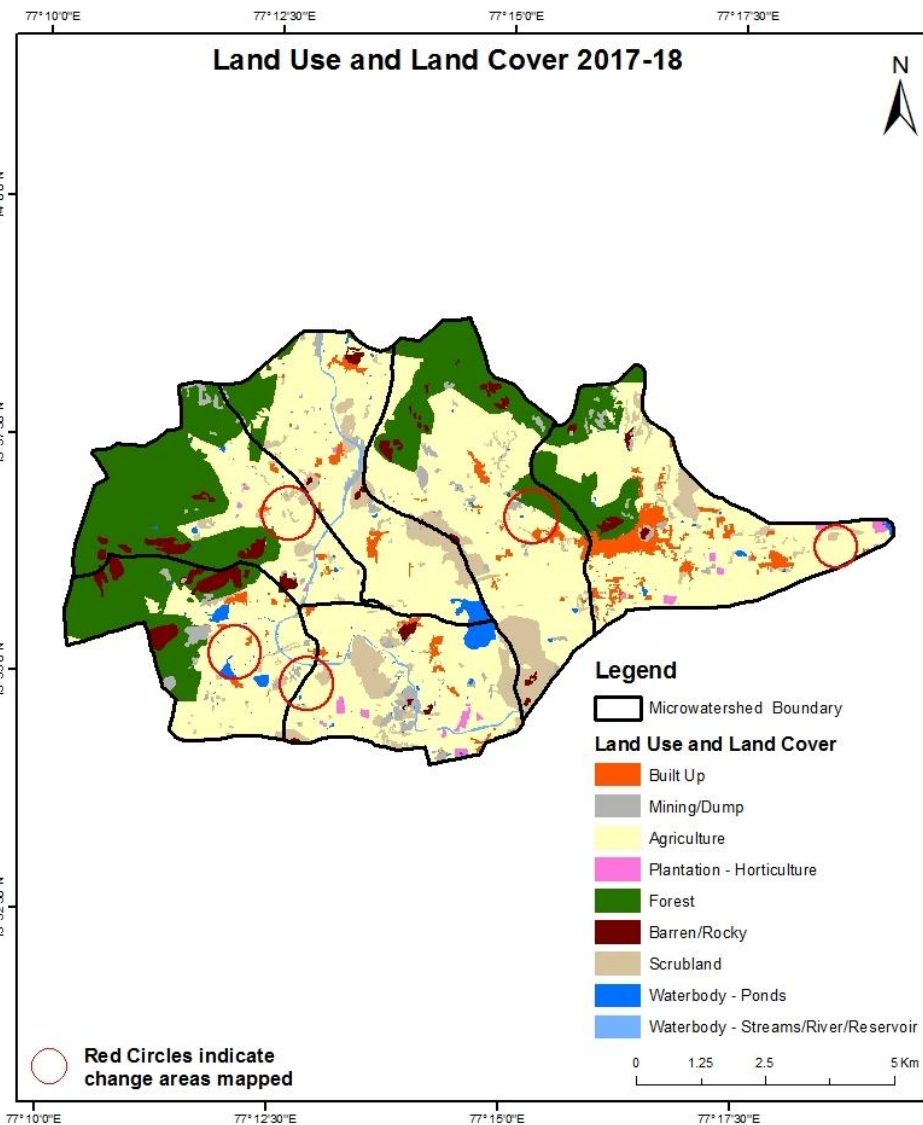
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



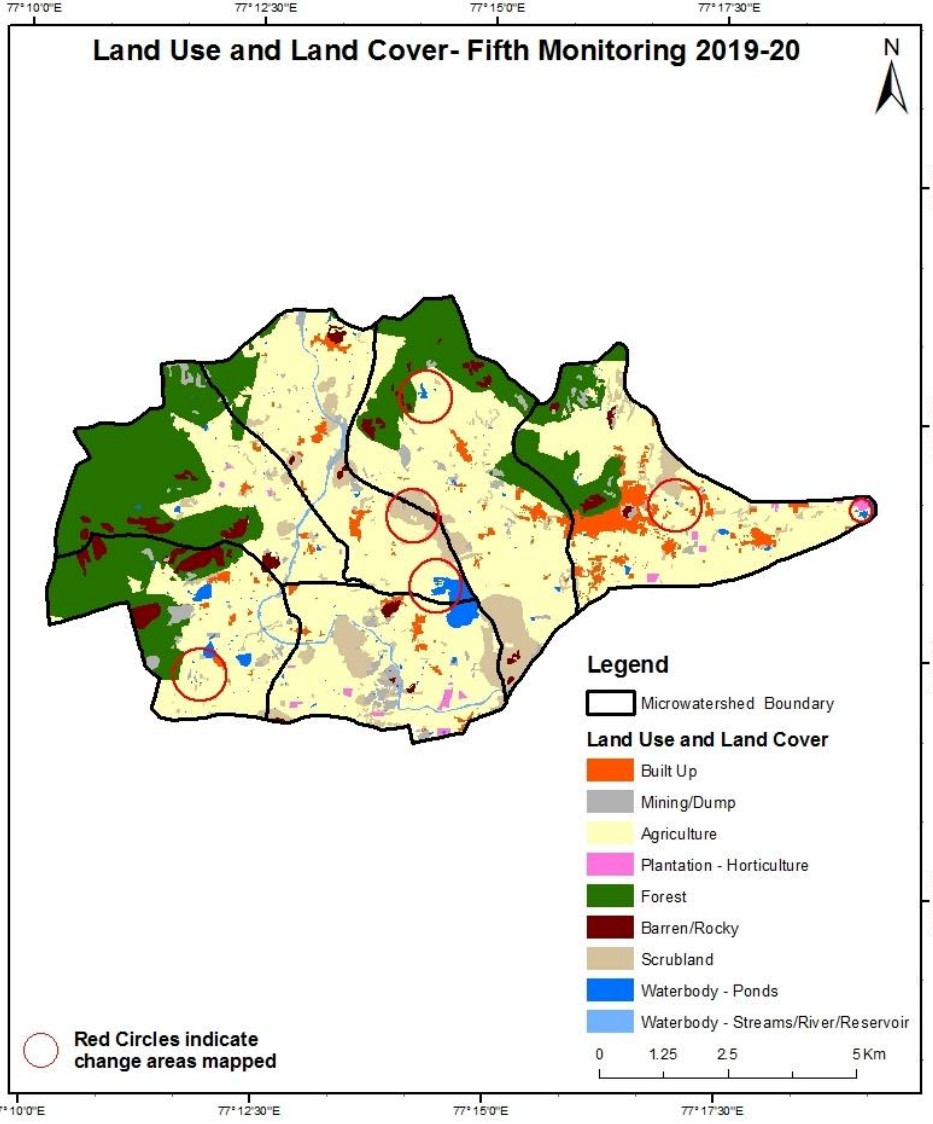
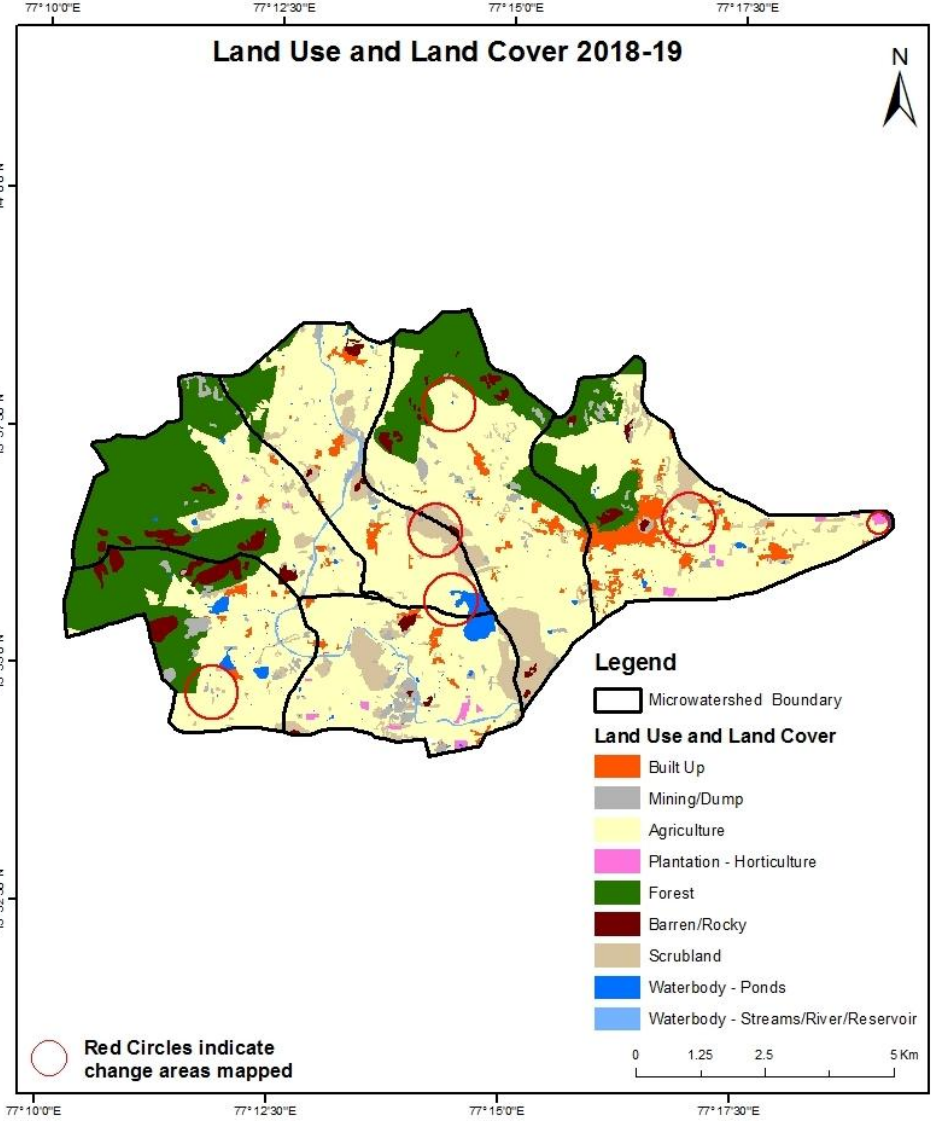
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



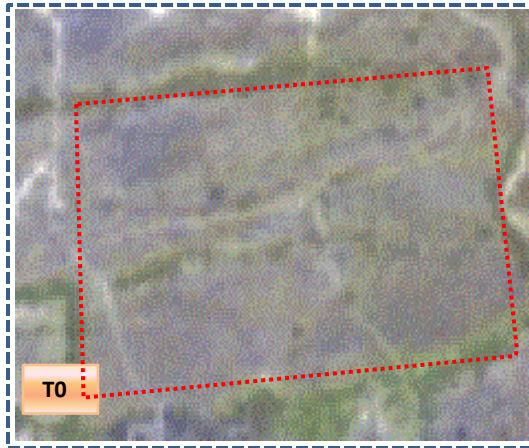
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

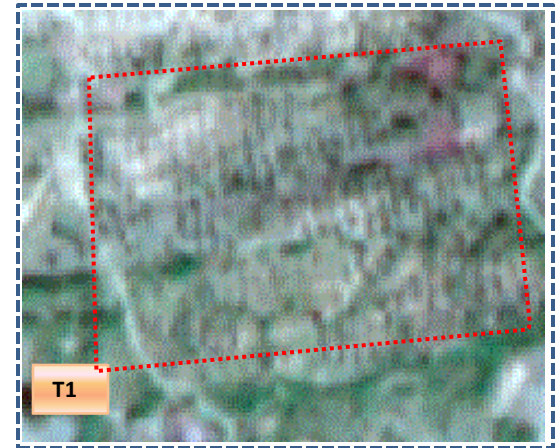


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

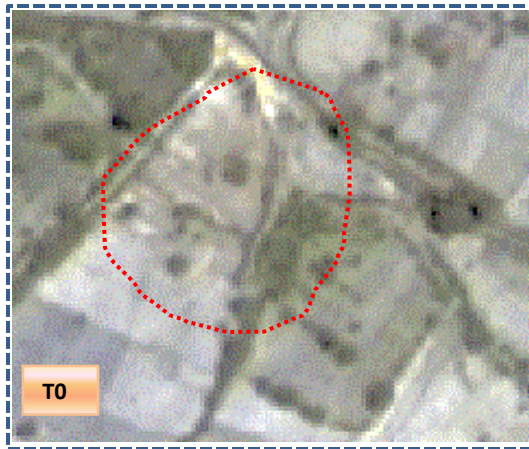


T0: 2011-12 (77°19'0.069"E 13°56'40.91"N)



T1: 30 December 2015

Agriculture to Water body



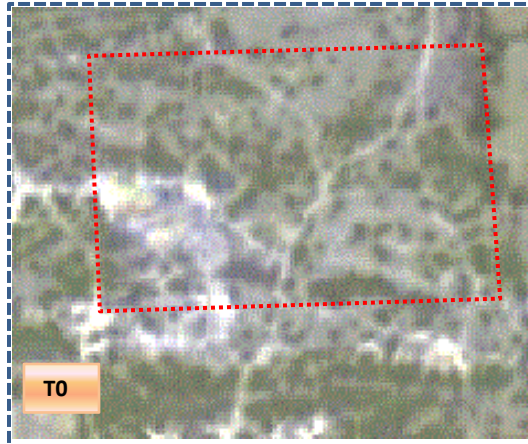
T0: 2011-12 (77°11'54.358"E 13°57'22.602"N)



T1: 30 December 2015

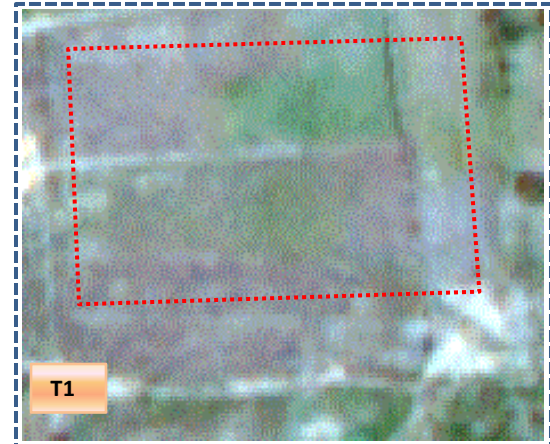
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

T0: 2011-12 (77°17'57.863"E 13°56'36.982"N)



T1

T1: 30 December 2015

Scrub to Water body



T0

T0: 2011-12(77°18'47.817"E 13°56'36.164"N)



T1

T1: 30 December 2015

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

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	140.20												140.20
Mining/dump	0.33	160.44	1.88					0.48			1.47		164.60
Agriculture	88.14	12.67	4343.98	13.13				52.00	47.30		12.32		4569.54
Plantation Horticulture	0.50		16.86	47.91							0.53		65.79
Forest	4.55		22.06		1894.90						1.89		1923.40
Forest Plantation													
Barren Rocky		7.05					205.14						212.19
Scrub	11.59	24.13	33.76					641.22			2.07		712.77
Waterbody- Streams/River													
Waterbody – Ponds											76.70		76.70
Grand Total	245.30	204.30	4418.54	61.04	1894.90		205.14	693.70	47.30		94.97		7865.19

- 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 225 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 74 ha of the agriculture area has increased from mining/dump, plantations, forest and scrubland 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
T1													
Built up	245.30												245.30
Mining/dump		204.30											204.30
Agriculture	0.10	2.49	4414.68	0.55	0.72								4418.54
Plantation Horticulture	0.97		2.00	58.07									61.04
Forest			29.14		1865.76								1894.90
Forest Plantation													
Barren Rocky							205.14						205.14
Scrub	0.62	0.66	11.90					680.53					693.70
Waterbody- Streams/River									47.30				47.30
Waterbody – Ponds										94.97			94.97
Grand Total	246.98	207.45	4457.72	58.62	1866.48		205.14	680.53	47.30		94.97		7865.19

- 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 03 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and forest in T2.
- In T2 43 ha of the agriculture area has increased from plantations, forest 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-2016-17 to 2017-18

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	246.98												246.98
Mining/dump		207.45											207.45
Agriculture	10.88	0.87	4439.35	3.69						2.93			4457.72
Plantation Horticulture			17.71	40.91									58.62
Forest			25.19		1841.29								1866.48
Forest Plantation													
Barren Rocky							205.14						205.14
Scrub	1.68	0.12	77.87					600.66		0.20			680.53
Waterbody- Streams/River									47.30				47.30
Waterbody – Ponds										94.97			94.97
Grand Total	259.54	208.44	4560.12	44.61	1841.29		205.14	600.66	47.30	98.11			7865.19

- 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 18 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T3.
- In T3 120 ha of the agriculture area has increased from 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-2017-18 to 2018-19

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	
T3												
Built up	259.54										259.54	
Mining/dump	1.15	204.91	2.37								208.44	
Agriculture	13.57	4.36	4536.54	5.24					0.40		4560.12	
Plantation Horticulture	1.06		7.91	35.64							44.61	
Forest			2.41		1838.88						1841.29	
Forest Plantation												
Barren Rocky		0.93					204.21				205.14	
Scrub	1.46	2.26	7.00					589.94			600.66	
Waterbody- Streams/River									47.30		47.30	
Waterbody – Ponds										98.11	98.11	
Grand Total	276.78	212.46	4556.24	40.88	1838.88		204.21	589.94	47.30	98.51	7865.19	

- 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 23 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T4.
- In T4 19 ha of the agriculture area has increased from mining/dump, 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-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	276.78												276.78
Mining/dump	0.87	208.95	2.56							0.08			212.46
Agriculture	14.37	0.23	4528.88	2.49						10.27			4556.24
Plantation Horticulture	2.54			38.34									40.88
Forest	2.41		5.14		1831.34								1838.88
Forest Plantation													
Barren Rocky							204.21						204.21
Scrub	0.60		14.08					574.85		0.41			589.94
Waterbody- Streams/River									47.30				47.30
Waterbody – Ponds										98.51			98.51
Grand Total	297.56	209.18	4550.65	40.83	1831.34		204.21	574.85	47.30	109.27			7865.19

- 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 27 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T5.
- In T5 21 ha of the agriculture area has increased from mining/dump, forest and scrubland area 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 79 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 39 & 102 Hectares from T1 to T2 & T2-T3 respectively, there is a decrease of 151, 05 & 05 hectares from T0-T1, T3 to T4 & T4-T5 respectively and overall decrease of 18 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. About **157 ha of the built-up area has been increased** during the monitoring period of 2011-12 (T0) to 2019-20 (T5).
6. There is a decrease of 137 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (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.