

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

ANANTAPURAMU -86/2012-13

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**

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04. CONCLUSIONS

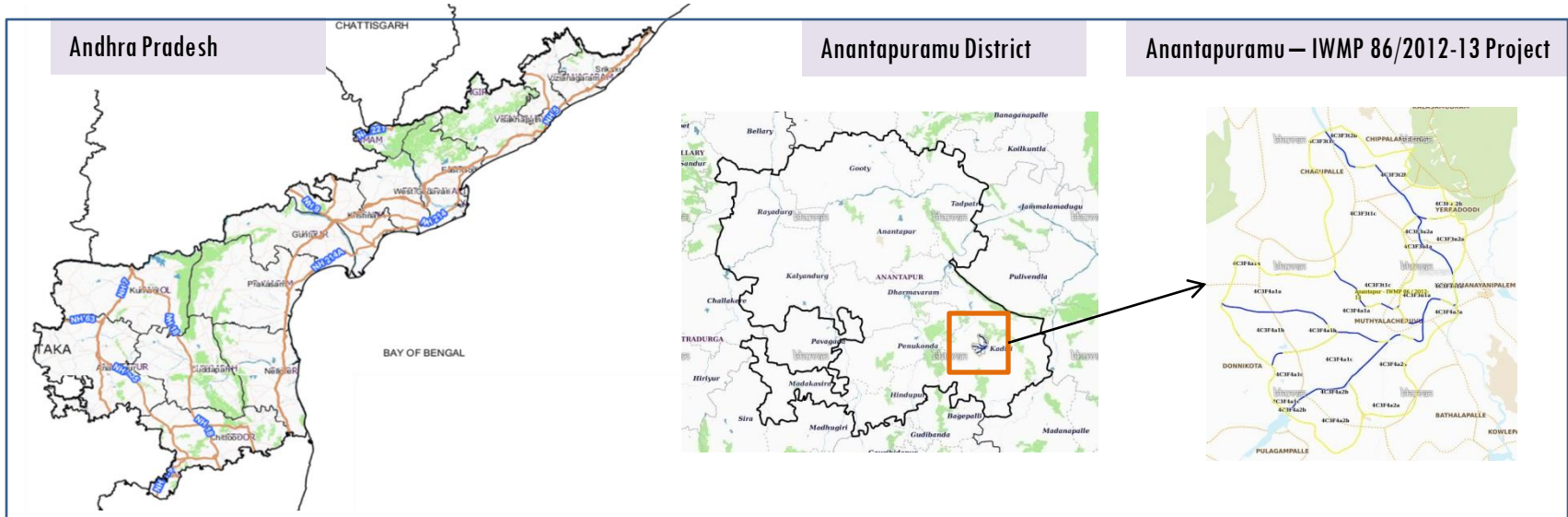
EXECUTIVE SUMMARY

- 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-86/2012-13, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **6,136** ha. It comprises of 09 micro watersheds.
- In the project area 232 Drishti photos were uploaded showing check dams, Farm ponds, Horticulture and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 15 new farm ponds or dug out pits with 8.9 ha increase in the area.
- Major percentage i.e. 57 % is covered by the Agriculture, 34 % is covered by Scrubland, 4.7 % is covered by Water body and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-86/2012-13

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Kadiri Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 6,136 ha. It comprises of 9 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.

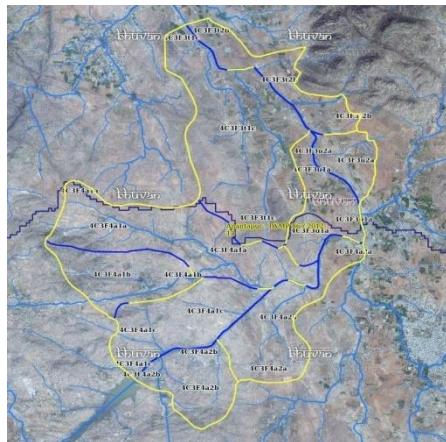
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2012-13	2020-21
LISS IV	2012-13		
SCENE 1			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	Drishiti Photographs	
	Total	232
4	Detailed Project Report	

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



Legend



Drainage (1:10000 Scale)

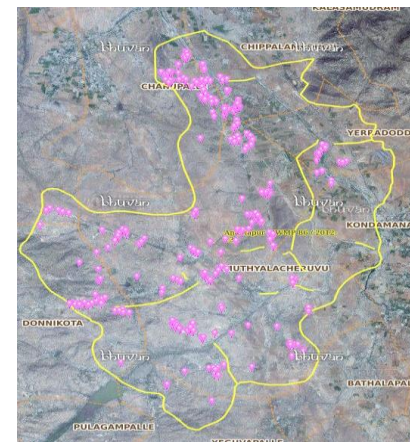


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

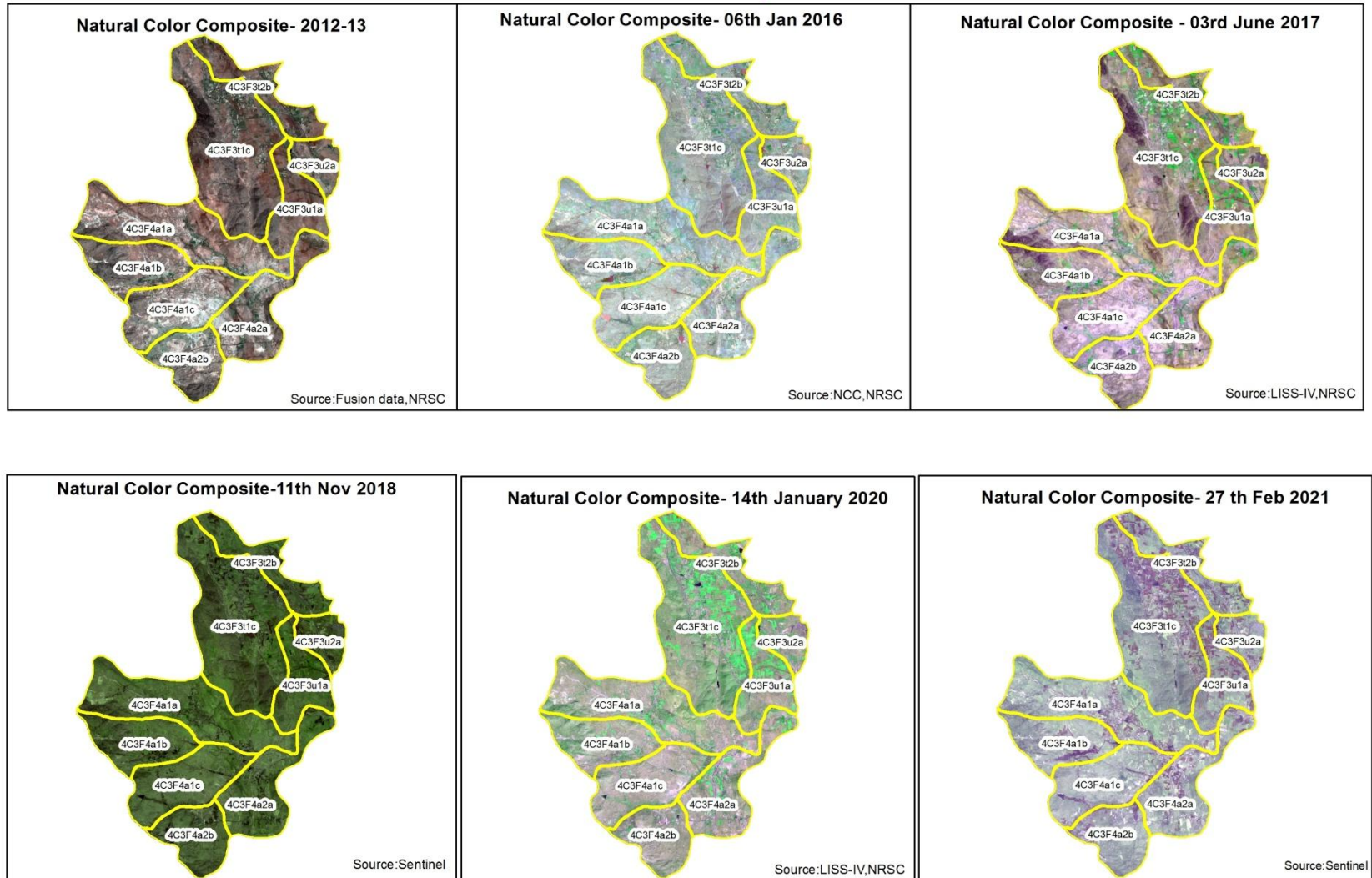
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	1	1
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	16	15
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	17	15
10	Civil work-Check dams/Rock fill dam	50	50
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	1	1
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	246	150
	TOTAL	331	232

MONITORING IN THE PROJECT AREA

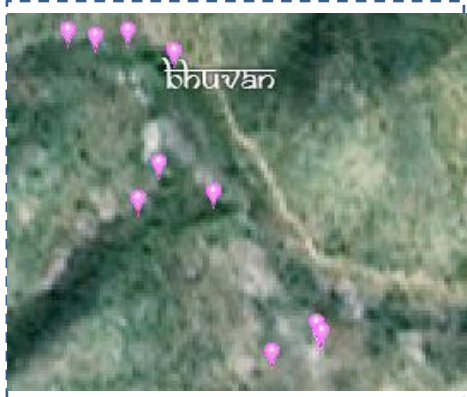
Site Wise Changes in the Project

- 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 Ananthapuram District Andhra Pradesh. IWMP-86/2012-13



T0 Satellite data 2013



T1 Satellite data 2015



T2 Satellite data 2016



T3 Satellite data 2017



T4 Satellite data 2018



T5 Satellite data 2020



Drishti Id. 7022292

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-86/2012-13



T0

T0:2012-13



T1

T1: 03 June 2017



Drishti SI no7015175- MWS :4C3F4a1a

Check dam



T0:2012-13



T1

T1: 03 June 2017



Drishti SI no. 1800959 MWS : 4C3F3t1c

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-86/2010-11



T0: 2012-13



T1: 03 June 2017



Drishti SI no. 7025620-- MWS :4C3F3t1c

Check dam



T0: 2012-13



T1: 03 June 2017



Drishti SI no. 7037069-- MWS :4C3F3t1c

Farm Pond

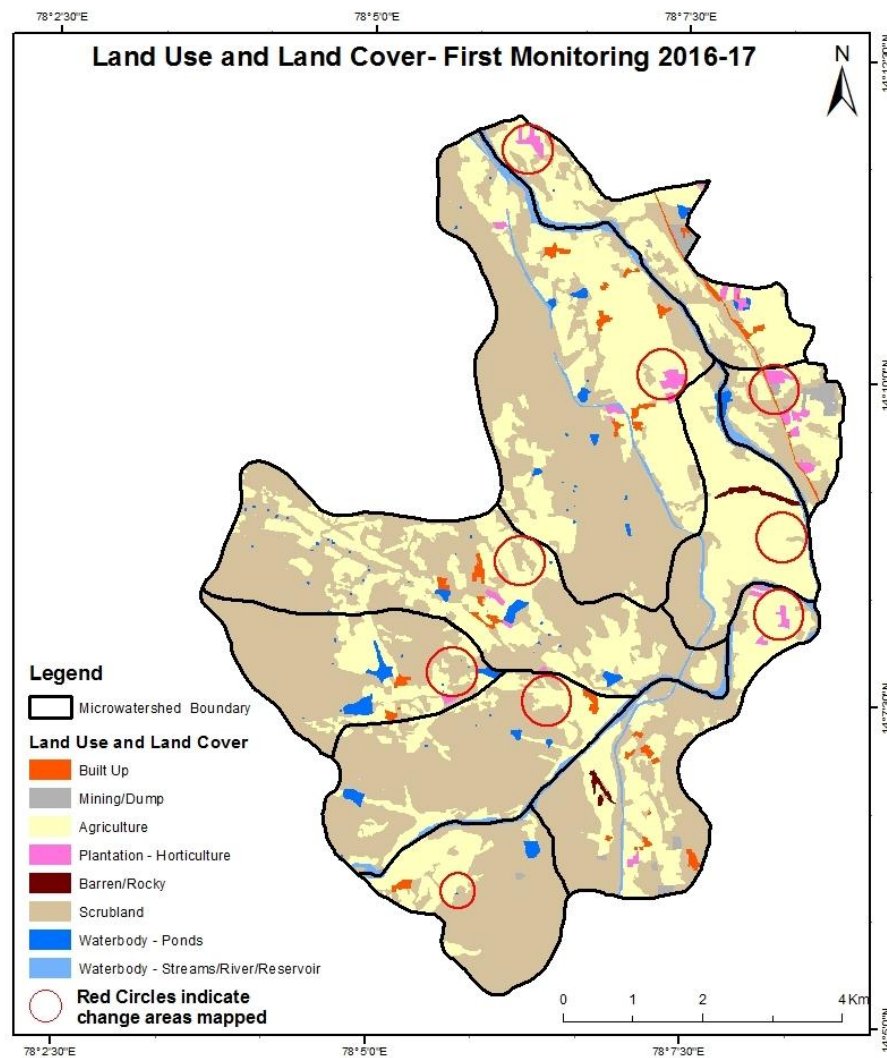
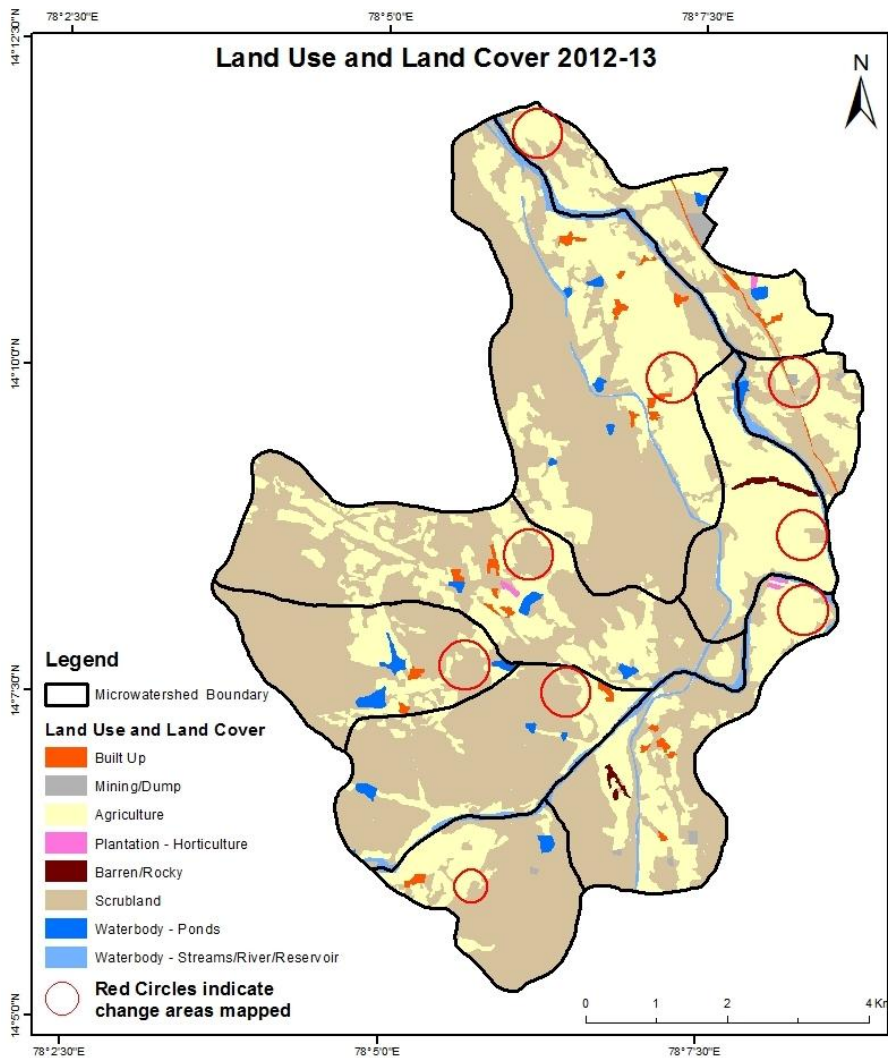
MONITORING IN THE PROJECT AREA

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)

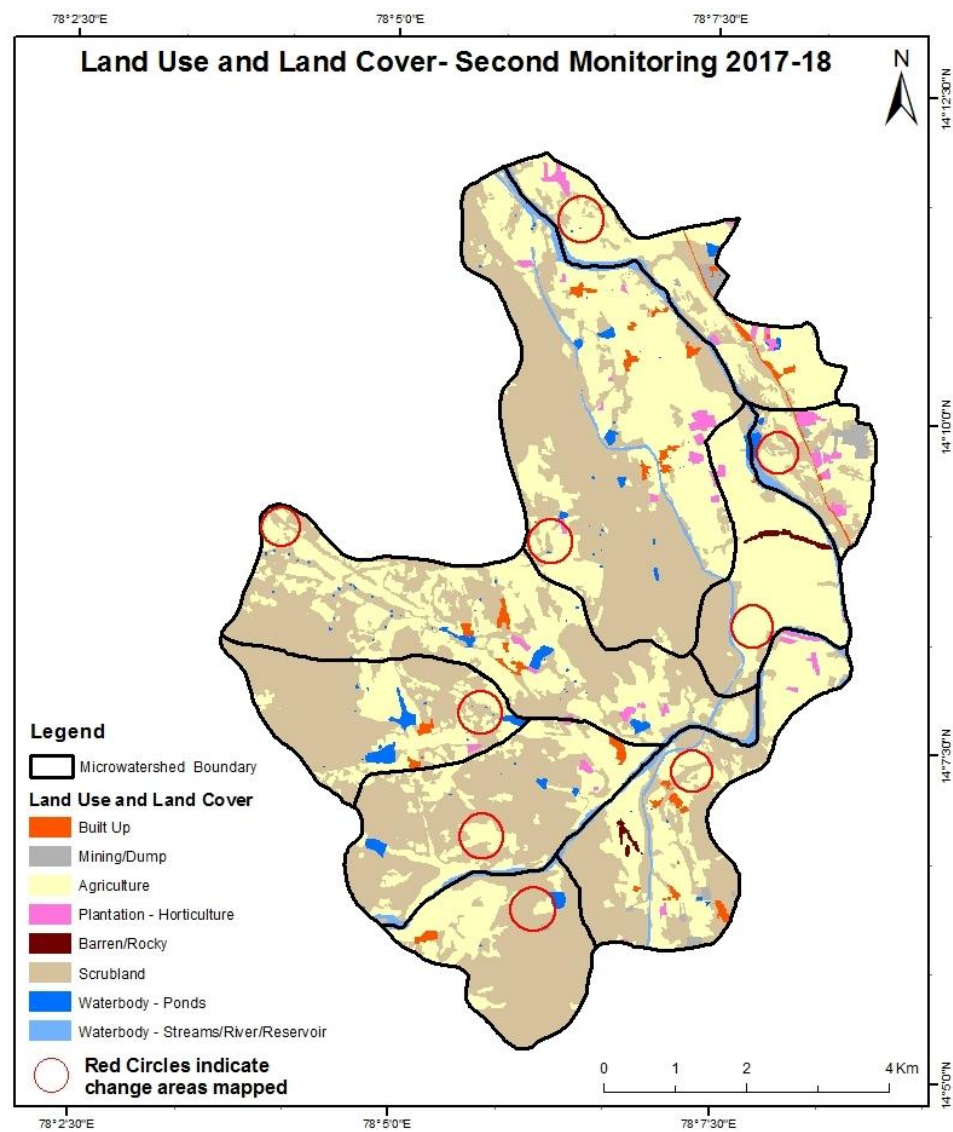
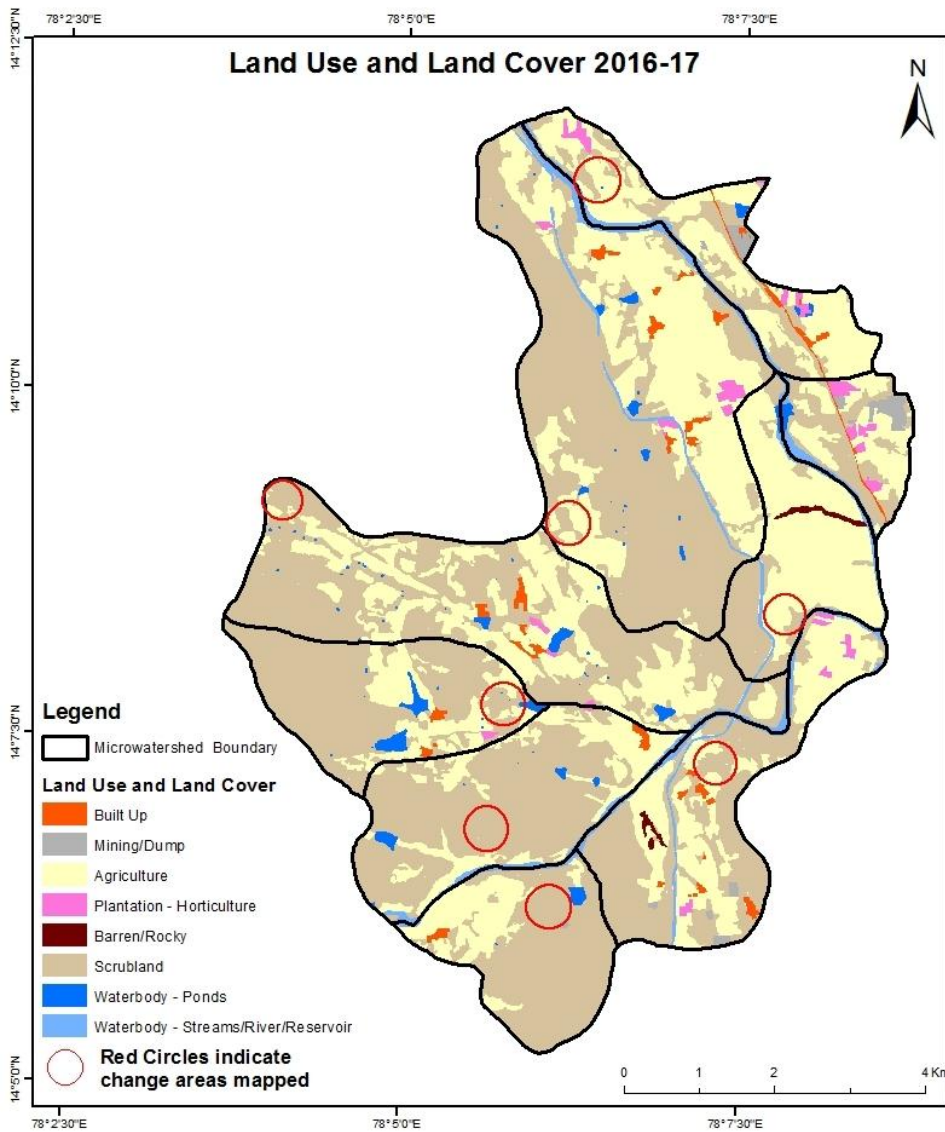
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



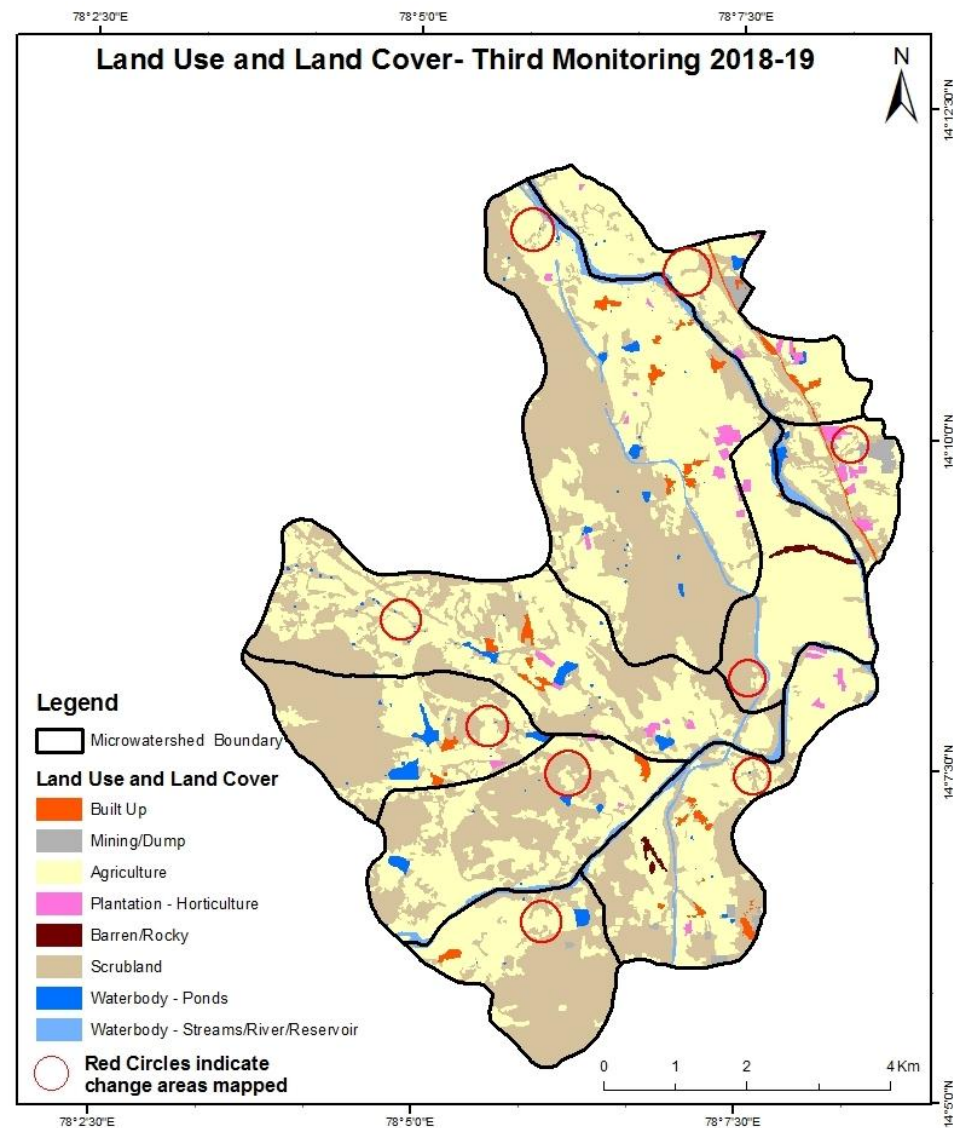
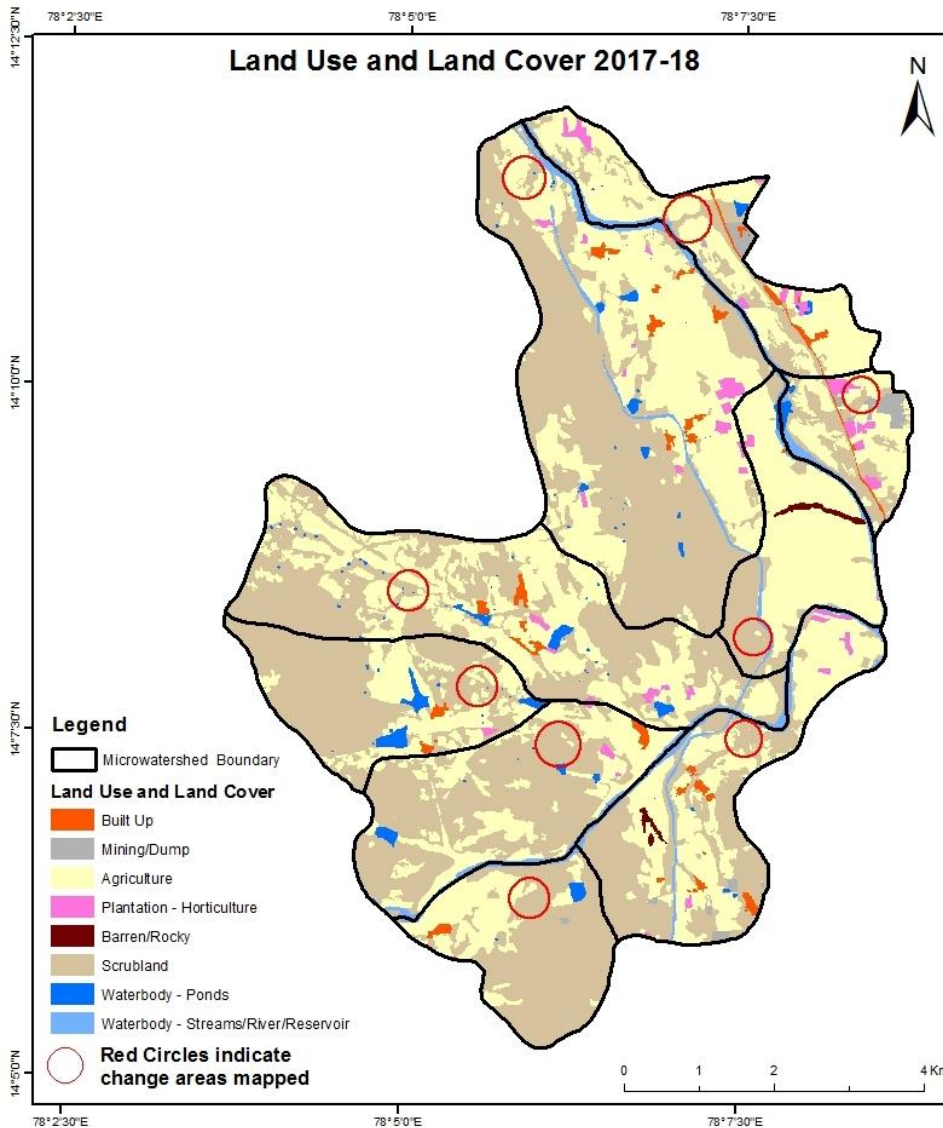
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



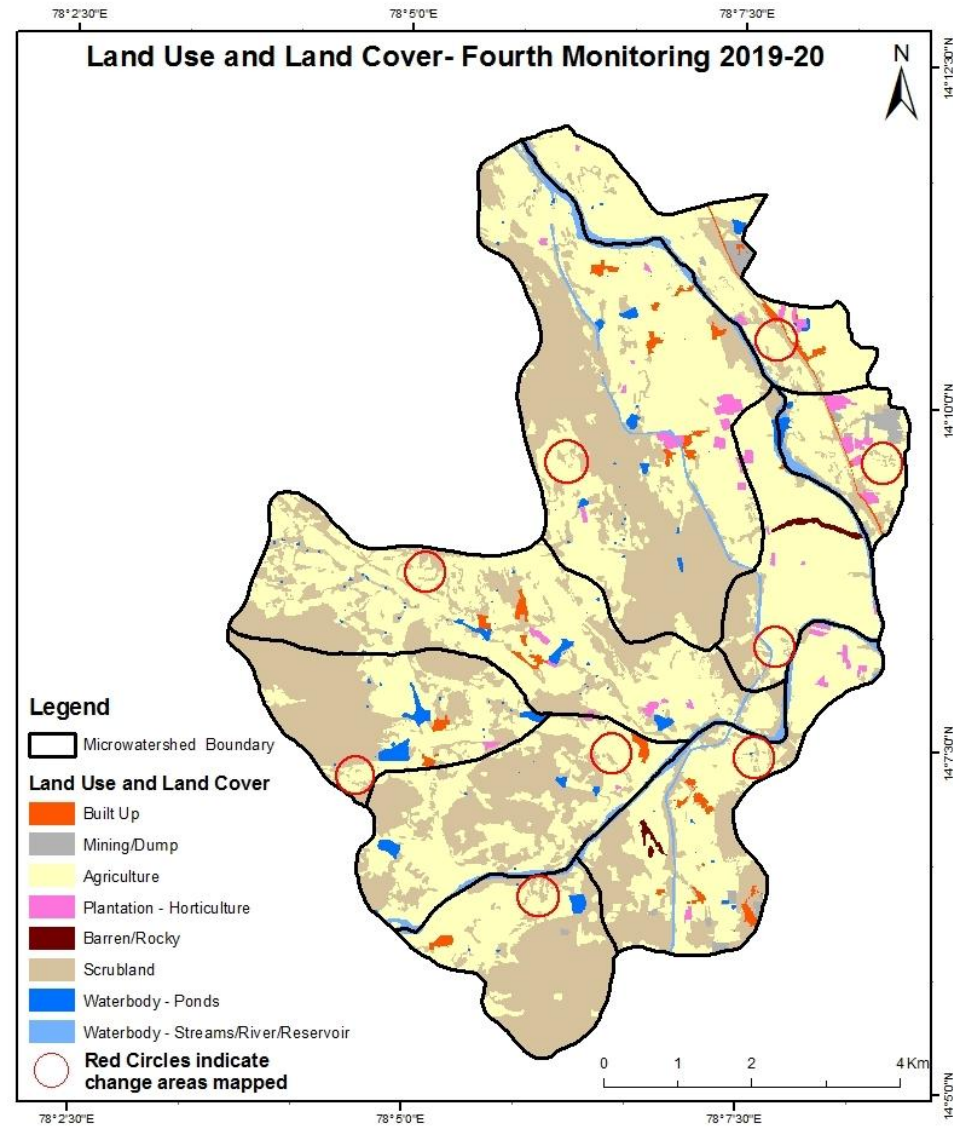
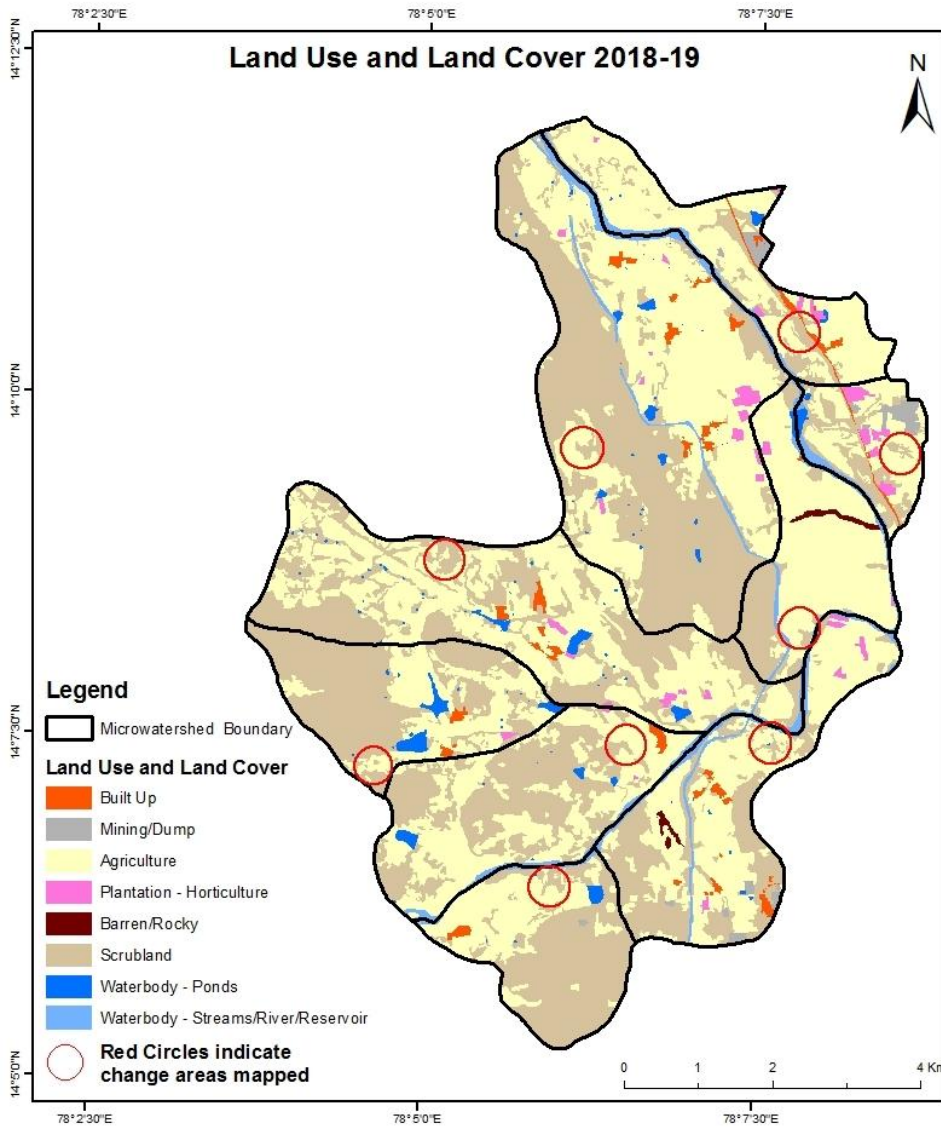
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



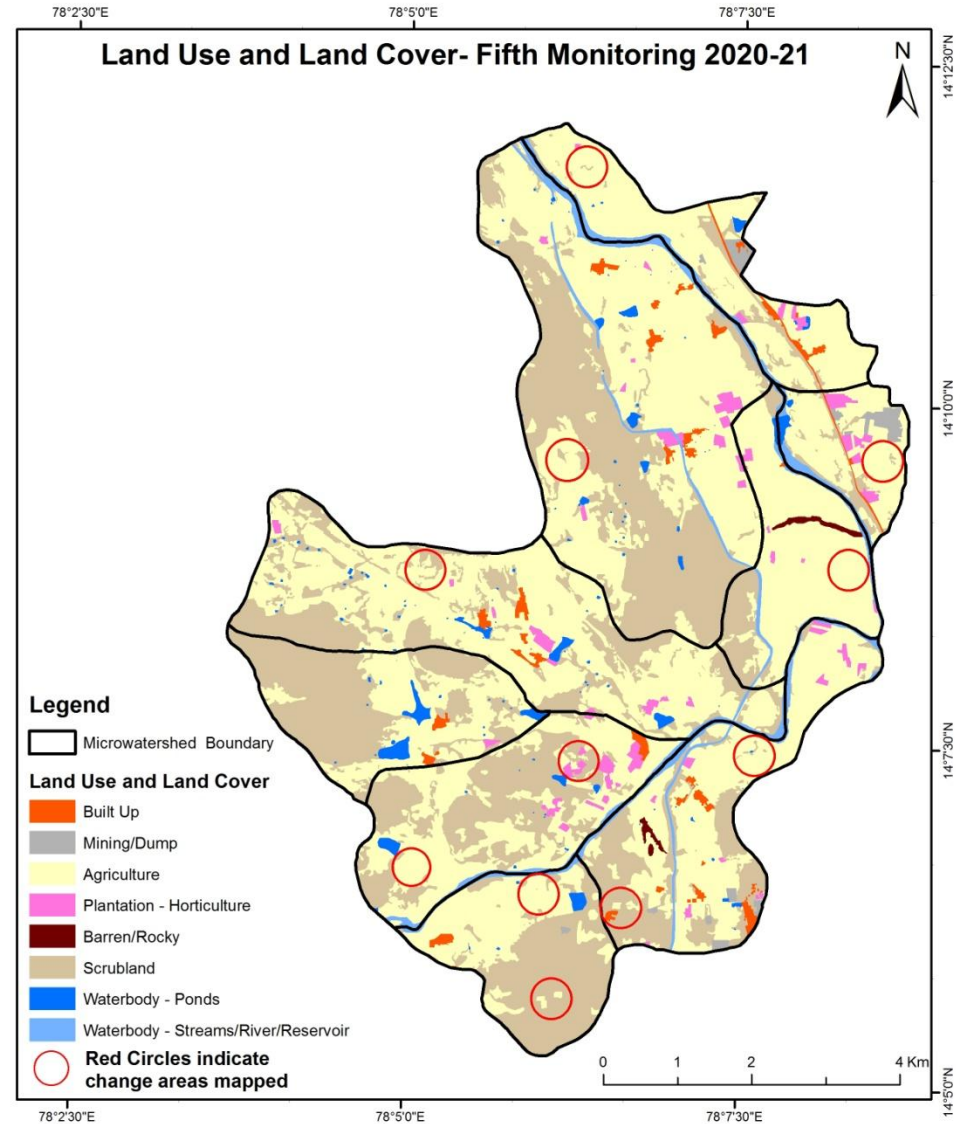
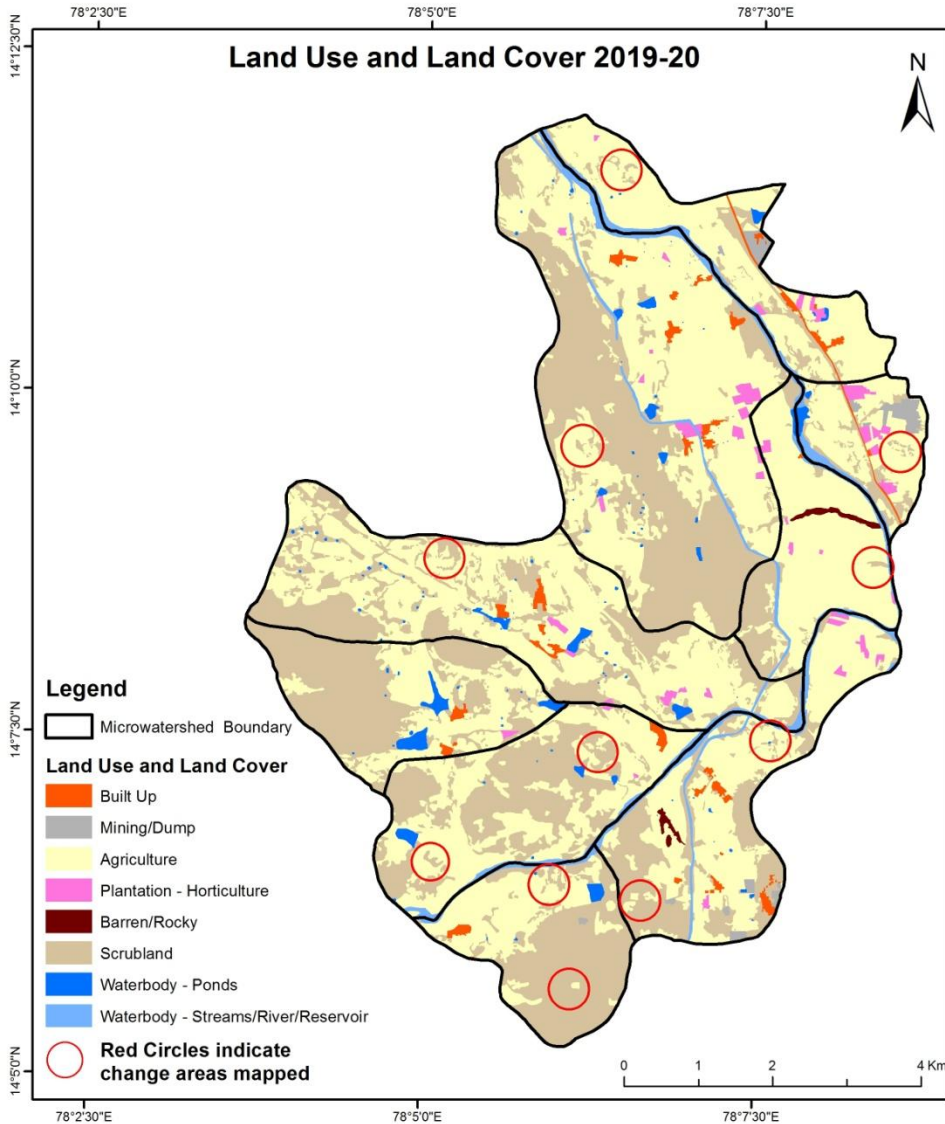
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

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 Water body



T0: 2012-13()

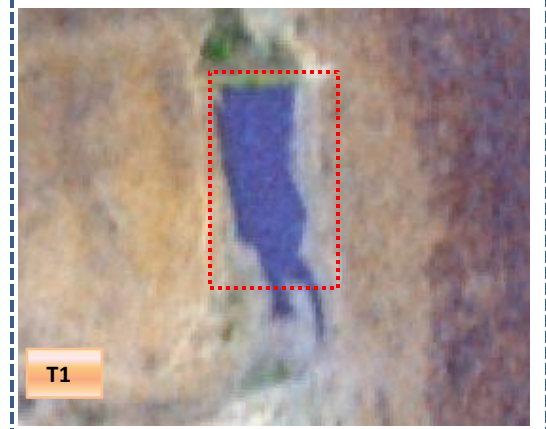


T1: 03 June 2017

Scrubland to Water body



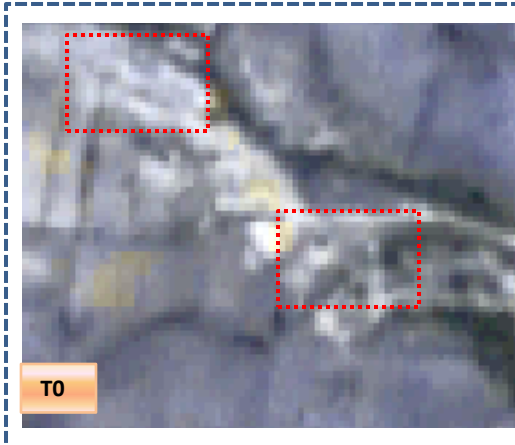
T0: 2012-13()



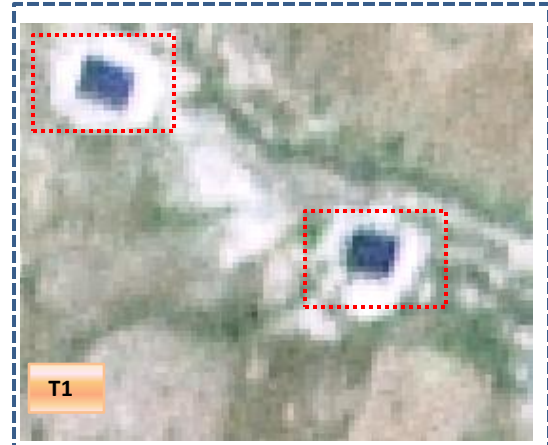
T1: : 03 June 2017

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

Scrubland to Water body

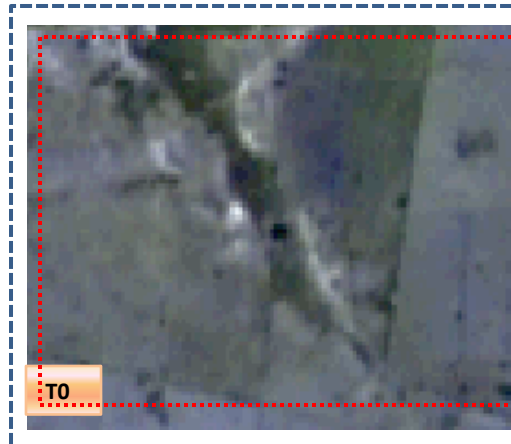


T0: 2012-13()

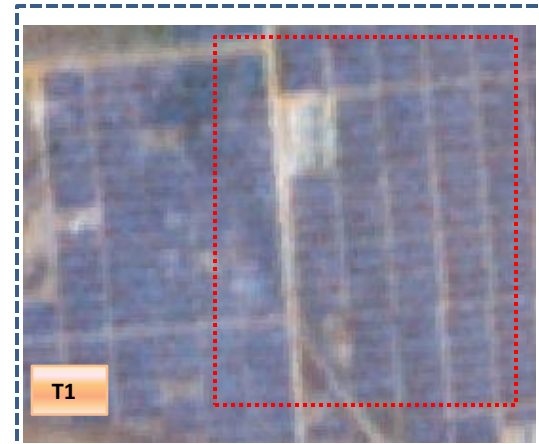


T1: 03 June 2017

Scrubland to Mining (Solar)



T0: 2012-13()



T1: : 03 June 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	61.63												61.63
Mining/dump	1.07	18.87											19.93
Agriculture	2.45	11.28	2186.31	44.14						0.65			2244.83
Plantation Horticulture	0.35			6.91									7.26
Forest													
Forest Plantation													
Barren Rocky							14.01						14.01
Scrub	5.33	6.40	106.01	5.48				3378.05		6.47			3507.74
Waterbody- Streams/River									217.77				217.77
Waterbody – Ponds				2.24						61.55			63.79
Grand Total	70.83	36.54	2292.32	58.77			14.01	3378.05	217.77	68.67			6136.96

- 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 58 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 106 ha of the agriculture area has increased from scrubland of T2. 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 (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	70.32		0.51										70.83
Mining/dump		35.90	0.58								0.06		36.54
Agriculture	1.89	0.35	2267.60	20.22							2.25		2292.32
Plantation Horticulture			4.56	54.21									58.77
Forest													
Forest Plantation													
Barren Rocky							14.01						14.01
Scrub	2.06	0.60	335.78	4.38				3032.55			2.68		3378.05
Waterbody- Streams/River	0.08		0.31						217.37				217.77
Waterbody – Ponds	0.05		0.57								68.05		68.67
Grand Total	74.39	36.85	2609.92	78.82			14.01	3032.55	217.37		73.05		6136.96

- 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 24 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T2.
- In T2 341 ha of the agriculture area has increased from built-up, 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	74.35		0.05										74.39
Mining/dump		36.85											36.85
Agriculture	0.11		2609.22	0.45							0.13		2609.92
Plantation Horticulture			14.95	63.86									78.82
Forest													
Forest Plantation													
Barren Rocky							14.01						14.01
Scrub	0.91	2.30	454.00					2574.87			0.48		3032.55
Waterbody- Streams/River									217.37				217.37
Waterbody – Ponds											73.05		73.05
Grand Total	75.37	39.15	3078.22	64.32			14.01	2574.87	217.37		73.66		6136.96

- 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 0.7 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T3.
- In T3 468 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	75.35		0.02										75.37
Mining/dump		39.15											39.15
Agriculture	0.14		3070.34	7.74									3078.22
Plantation Horticulture			1.08	63.23									64.32
Forest													
Forest Plantation													
Barren Rocky							14.01						14.01
Scrub	0.23		284.03					2290.47			0.15		2574.87
Waterbody- Streams/River			1.40						215.97				217.37
Waterbody – Ponds			1.00								72.66		73.66
Grand Total	75.71	39.15	3357.87	70.97			14.01	2290.47	215.97		72.81		6136.96

- 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 07 ha of the agriculture area has decreased and it is converted into Built-up and plantations in T4.
- In T4 287 ha of the agriculture area has increased from plantations 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	75.71												75.71
Mining/dump		38.74		0.40									39.15
Agriculture	1.91		3329.49	25.86							0.62		3357.88
Plantation Horticulture				70.97									70.97
Forest													
Forest Plantation													
Barren Rocky					14.01								14.01
Scrub	2.01		182.63	5.14				2099.38			1.30		2290.47
Waterbody- Streams/River									215.97				215.97
Waterbody – Ponds	0.18										72.63		72.81
Grand Total	79.81	38.74	3512.12	102.38	14.01			2099.38	215.97		74.56		6136.97

- 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 28 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 182 ha of the agriculture area has increased from 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 8.9 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 47, 317, 468, 279, 154 Hectares from T0-T1, T1 to T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 1,267 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. About **95 Hectares of plantation/horticulture** area has been increased in during the monitoring period of 2012-13 (T0) to 2020-21 (T5) years.
6. There is a decrease of 1,408 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (15) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (17) verified from the portal.