

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -53/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-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

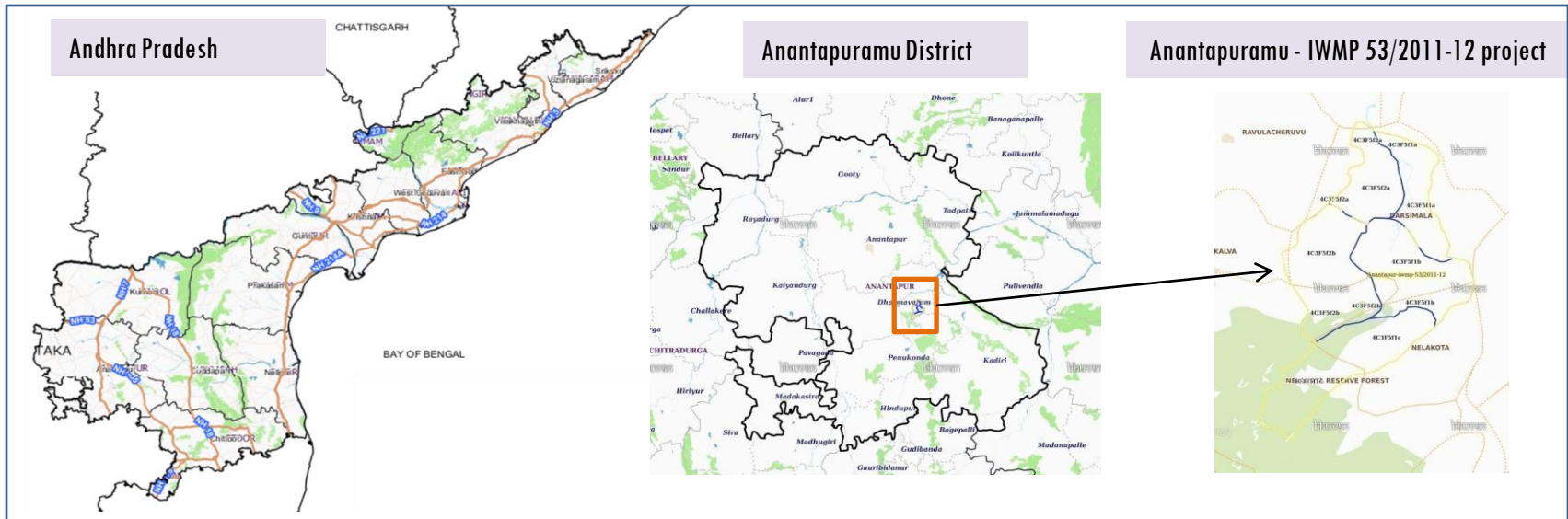
E X E C U T I V E S U M M A R Y

- 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-53/2011-12, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 3977.19 ha. It comprises of 5 micro watersheds.
- In the project area 211 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 23 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 40.5 % is covered by the agriculture, 53 % is covered by Scrub land, 1.98 % is covered by plantation and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-53/2011-12

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Dharmavaram Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 3977.19 ha. It comprises of 5 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.

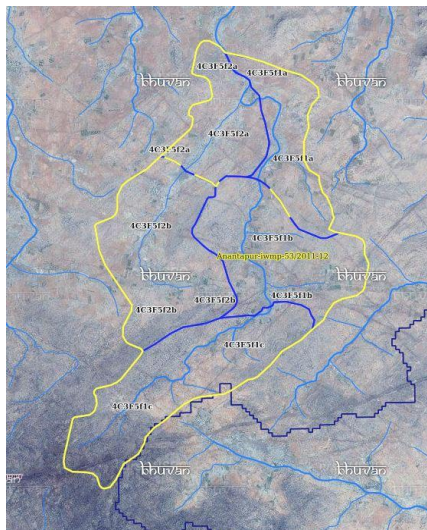
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2011-12	2019-20
LISS IV	2011-12		
SCENE 1			24-Dec-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			24-Dec-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	211
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

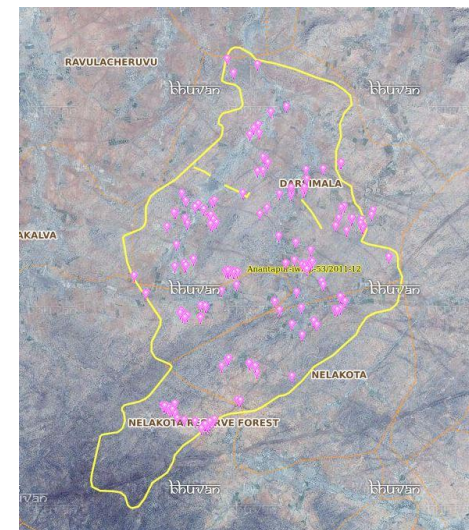


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

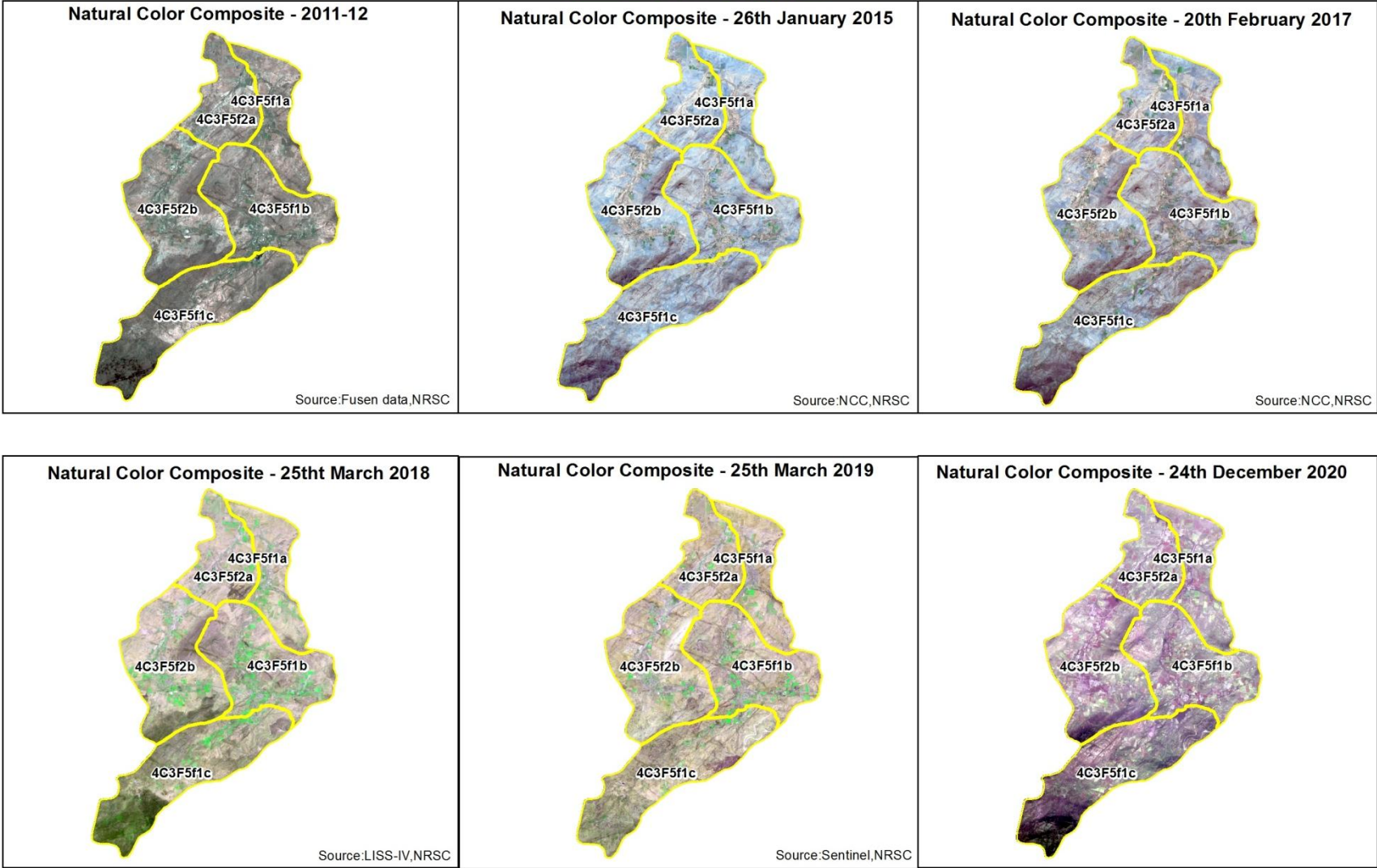
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	2	2
2	Horticulture	0	0
3	Agriculture	7	5
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	13	13
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	5	5
11	Civil work-Check dams/Rock fill dam	32	27
12	Nallah Bunds/Drainage treatment	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities-Plantation/Horticulture	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	6	6
18	Others	160	153
	TOTAL	225	211

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)



Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-53/2011-12



T0

T0:2011-12



T1

T1: 14 April 2017



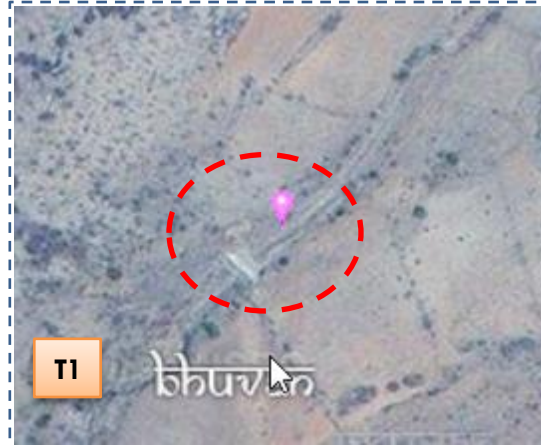
Drishti Sl no. 1614375 MWS : 4C3F5f1a

Check dam



T0

T0:2011-12



T1

T1: 14 April 2017



Drishti Sl no. 7030279 MWS : 4C3F5f1c

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-52/2011-12



T0

T0:2011-12



T1

T1: 14 April 2017



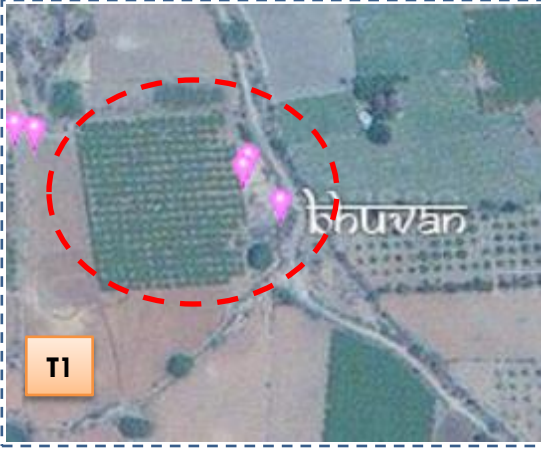
Drishti SI no. 1643448 MWS : 4C3F5f1b

Farm pond



T0

T0:2011-12



T1

T1: 14 April 2017



Drishti SI no. 7030282 MWS : 4C3F5f2b

Horticulture

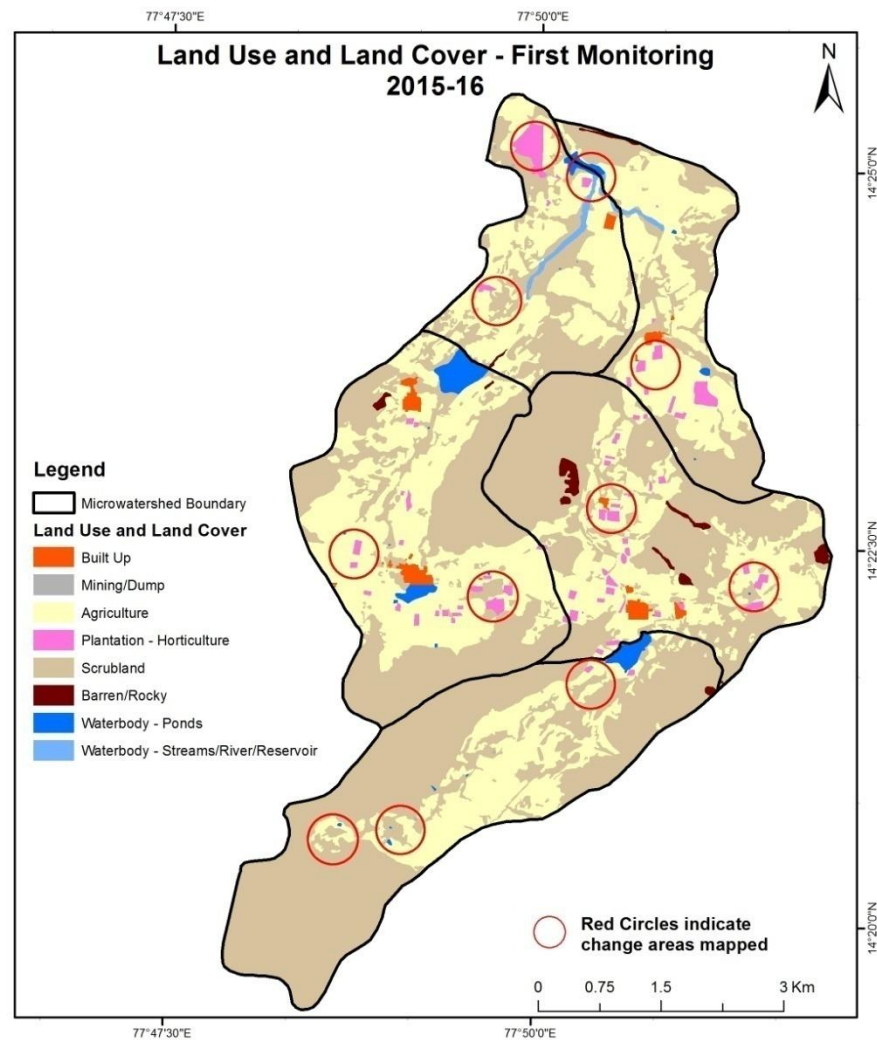
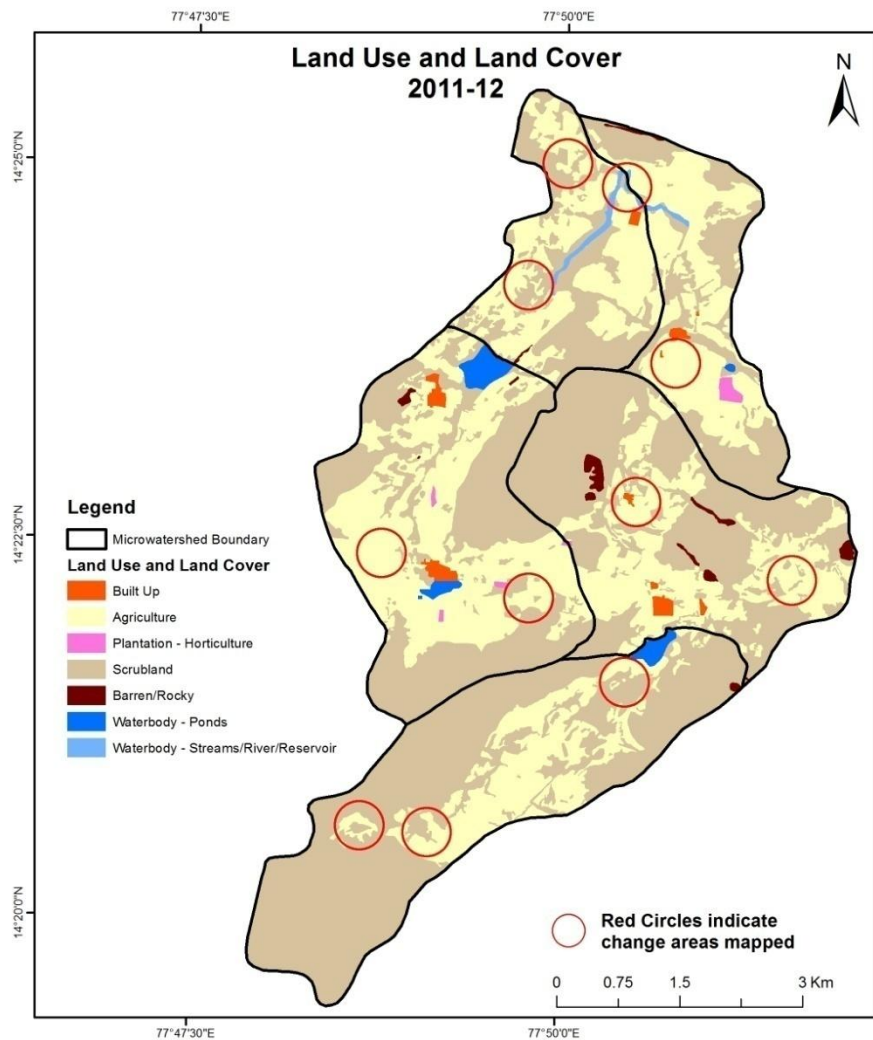
MONITORING IN THE PROJECT AREA

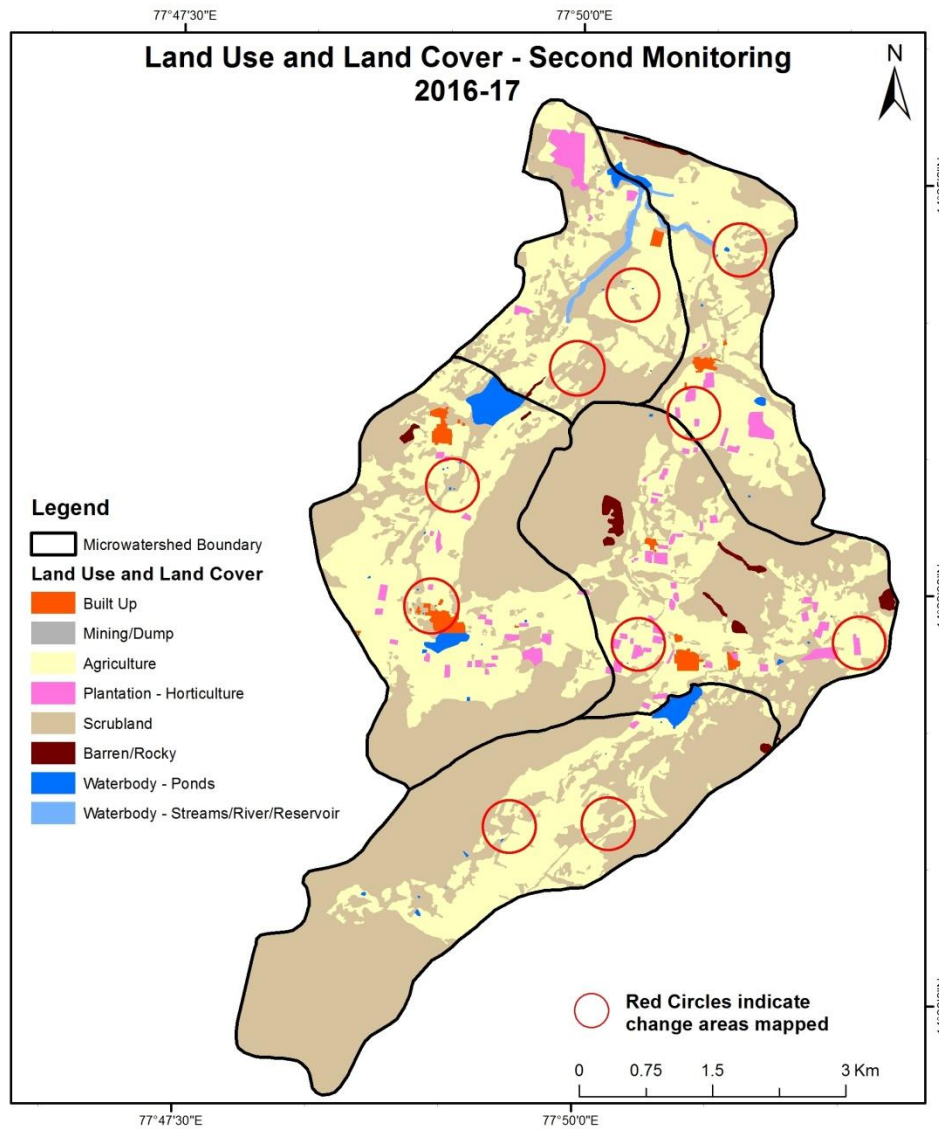
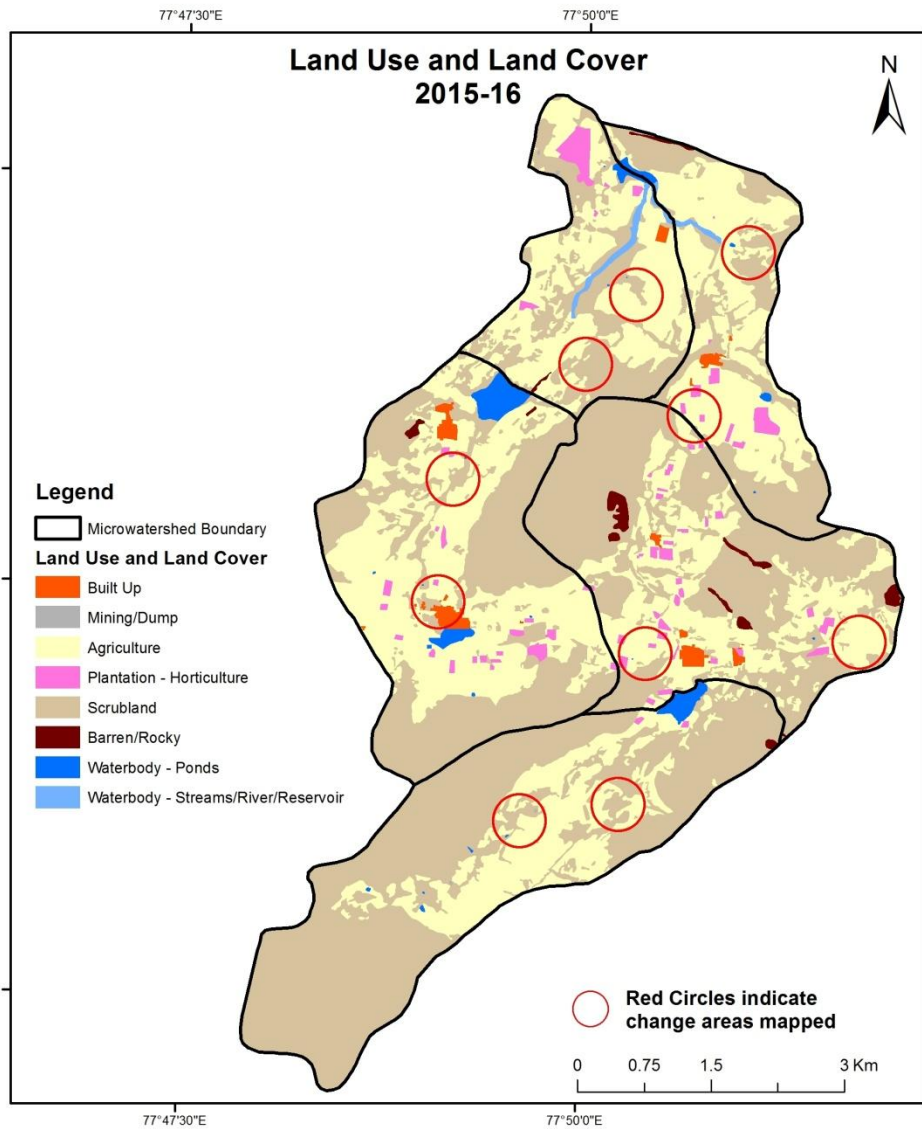
Land use and Land cover Changes in the Project

- 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 (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

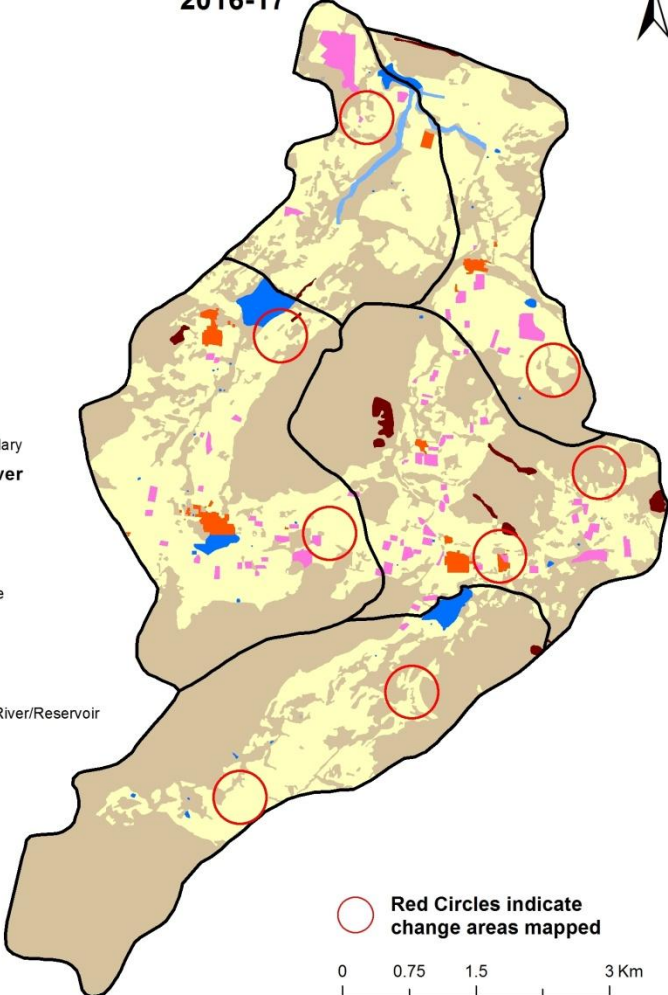




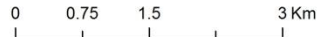
Land Use and Land Cover 2016-17



- Legend**
- Microwatershed Boundary
 - Land Use and Land Cover**
 - Built Up
 - Mining/Dump
 - Agriculture
 - Plantation - Horticulture
 - Scrubland
 - Barren/Rocky
 - Waterbody - Ponds
 - Waterbody - Streams/River/Reservoir



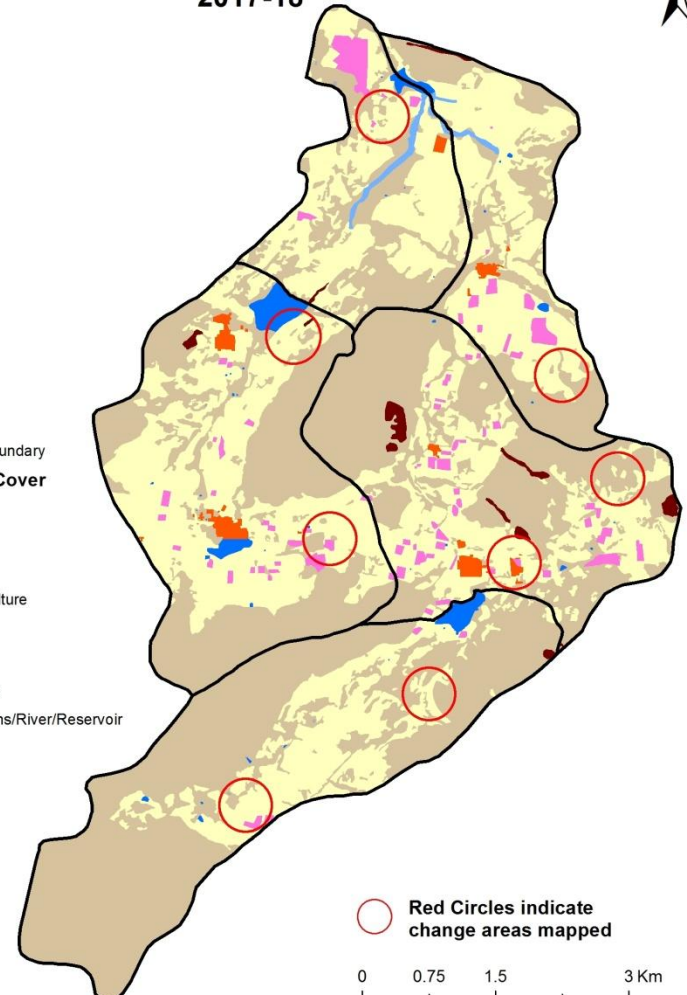
Red Circles indicate
change areas mapped



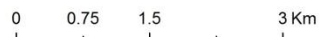
Land Use and Land Cover - Third Monitoring 2017-18



- Legend**
- Microwatershed Boundary
 - Land Use and Land Cover**
 - Built Up
 - Mining/Dump
 - Agriculture
 - Plantation - Horticulture
 - Scrubland
 - Barren/Rocky
 - Waterbody - Ponds
 - Waterbody - Streams/River/Reservoir



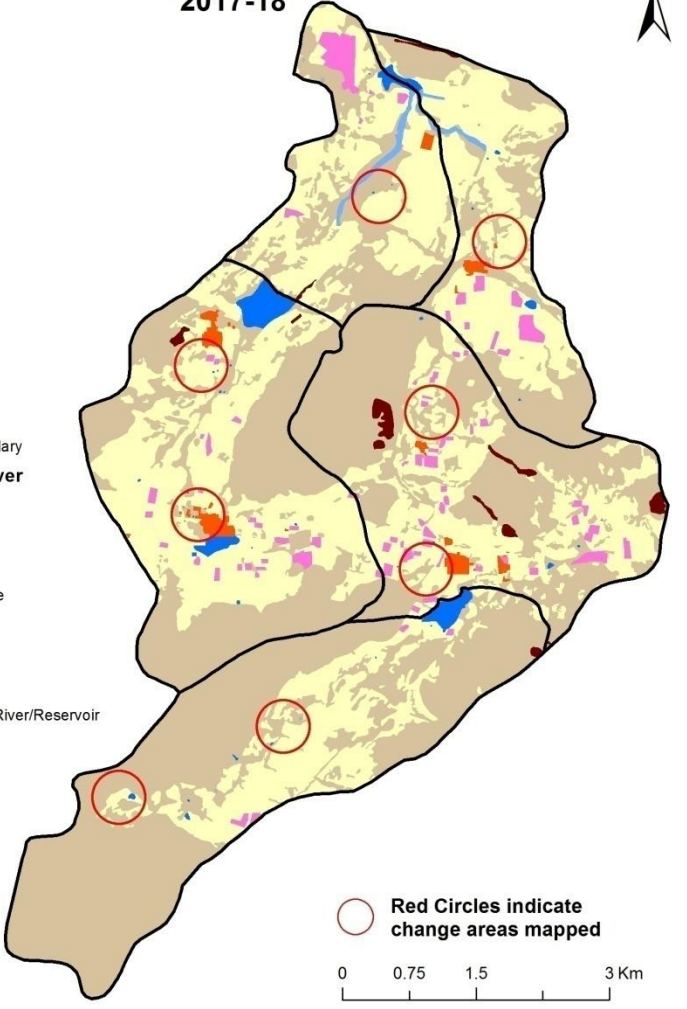
Red Circles indicate
change areas mapped



Land Use and Land Cover 2017-18



- Legend**
- Microwatershed Boundary
 - Land Use and Land Cover**
 - Built Up
 - Mining/Dump
 - Agriculture
 - Plantation - Horticulture
 - Scrubland
 - Barren/Rocky
 - Waterbody - Ponds
 - Waterbody - Streams/River/Reservoir

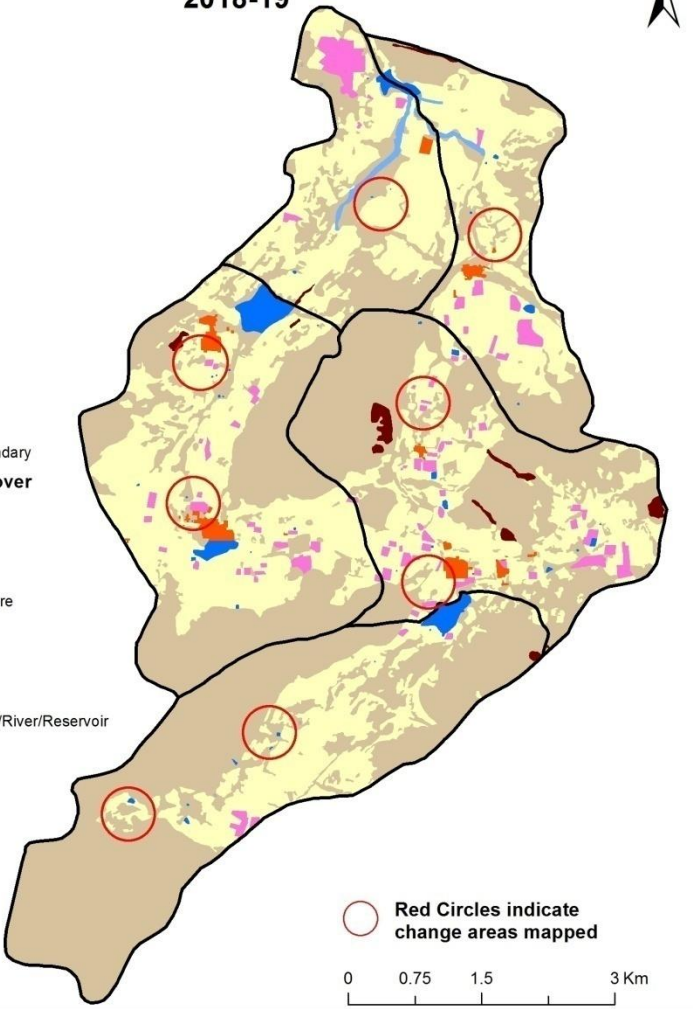


Red Circles indicate
change areas mapped

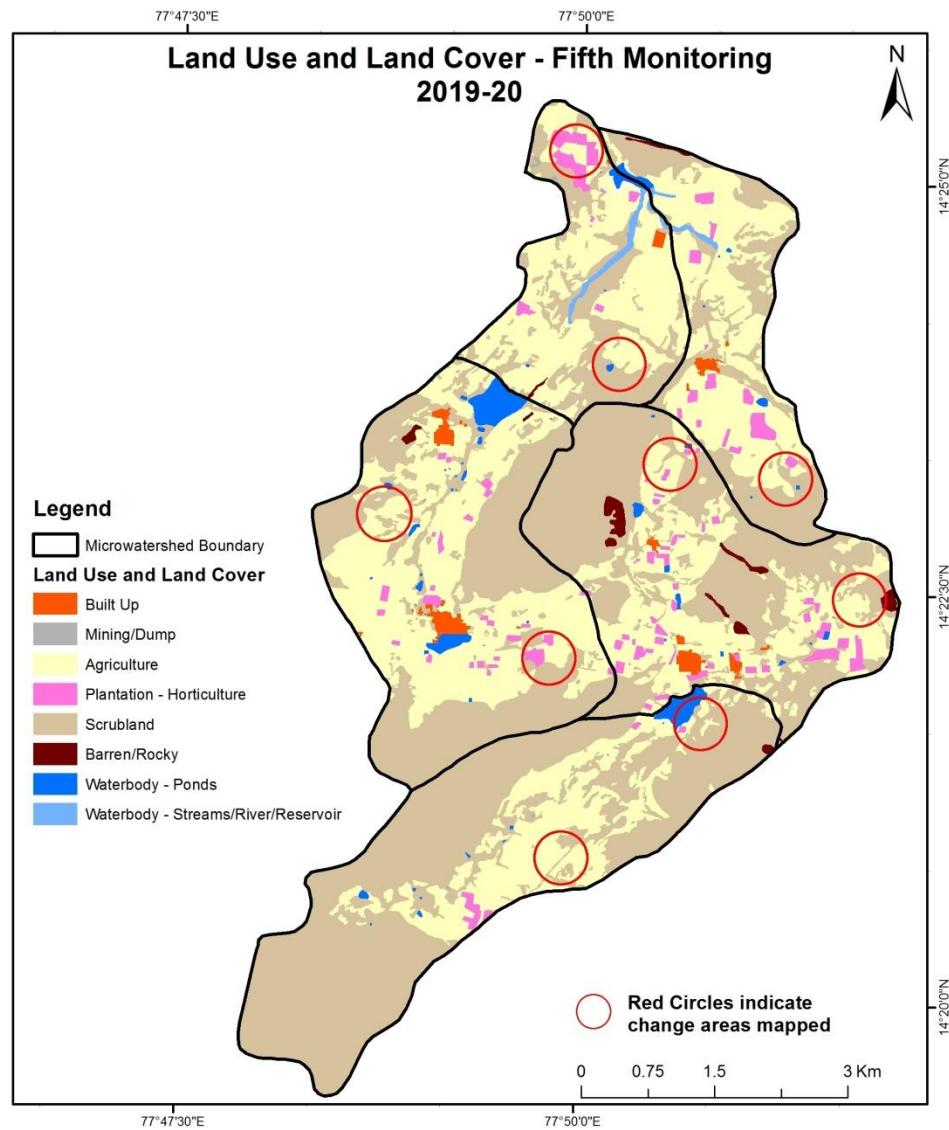
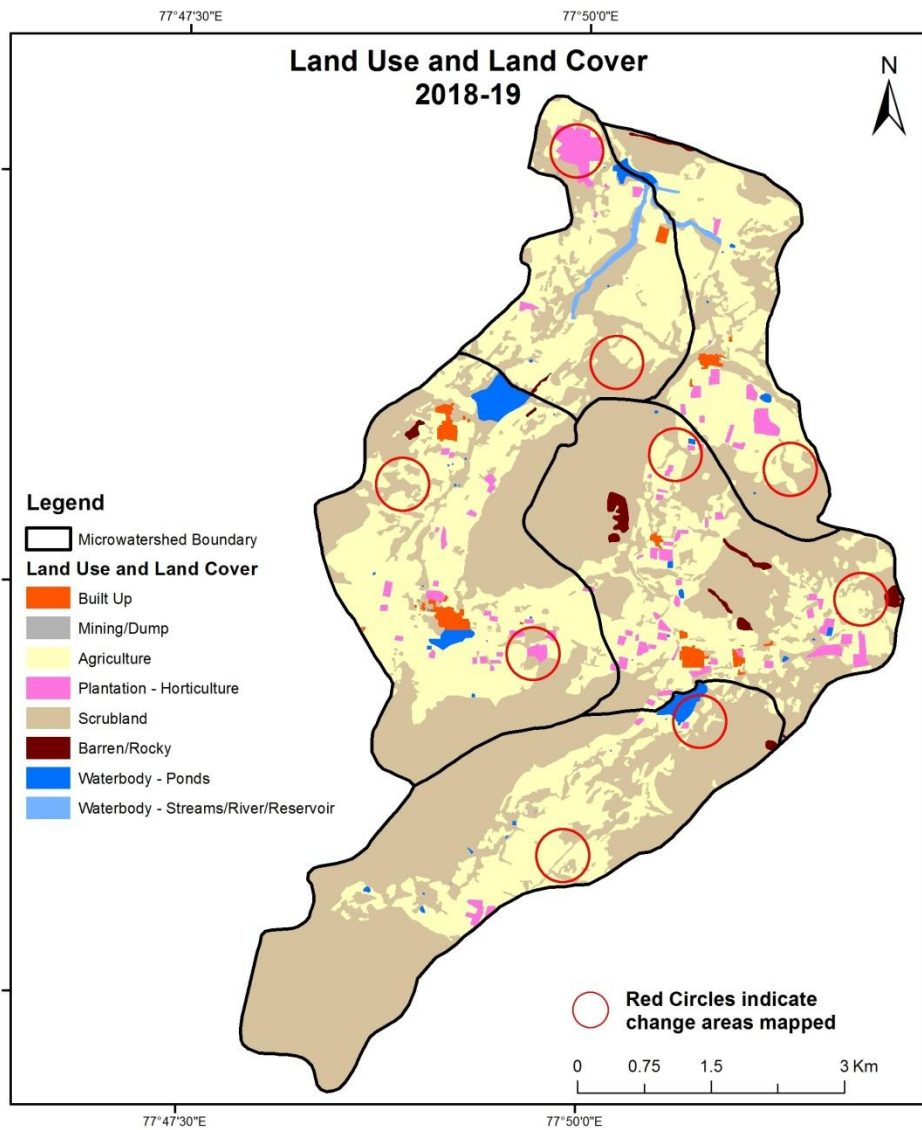
Land Use and Land Cover - Fourth Monitoring 2018-19



- Legend**
- Microwatershed Boundary
 - Land Use and Land Cover**
 - Built Up
 - Mining/Dump
 - Agriculture
 - Plantation - Horticulture
 - Scrubland
 - Barren/Rocky
 - Waterbody - Ponds
 - Waterbody - Streams/River/Reservoir



Red Circles indicate
change areas mapped

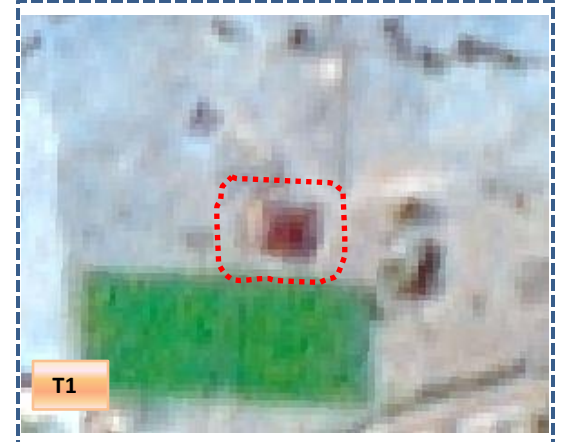


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body



T0: 2011-12(77°49'41.078"E 14°22'18.898"N)



T1: 26th January 2015

Agriculture to Plantation



T0: 2011-12 (77°50'41.953"E 14°23'42.21"N)



T1: 26th January 2015

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

Scrub to Water body

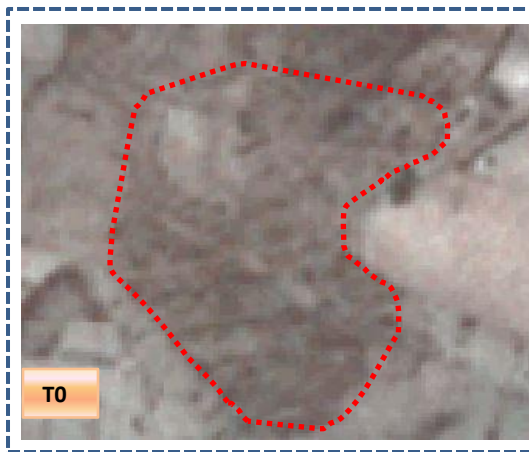


T0: 2011-12(77°49'15.36"E 14°23'16.752"N)

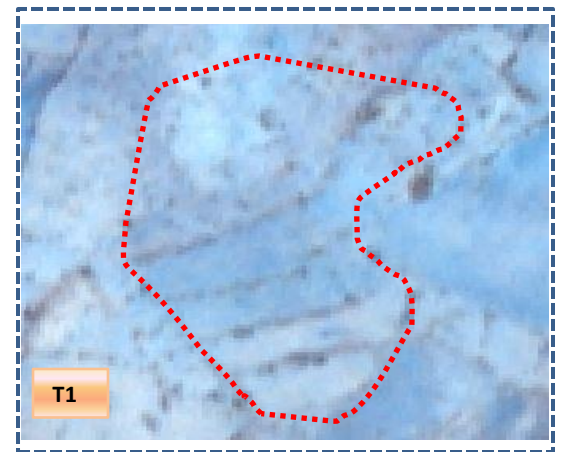


T1: 26th January 2015

Scrub to Agriculture



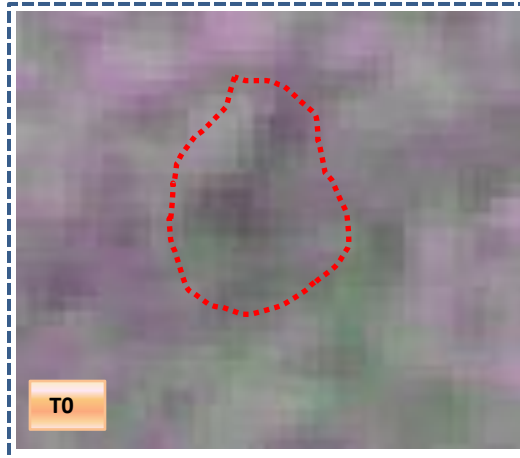
T0: 2011-12 (77°49'49.234"E 14°25'24.05"N)



T1: 26th January 2015

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

Scrub To Agriculture

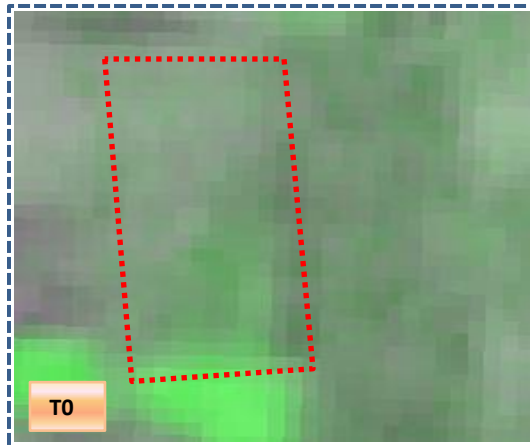


T0: 2011-12 (77°50'50.676"E 14°21'19.556"N)

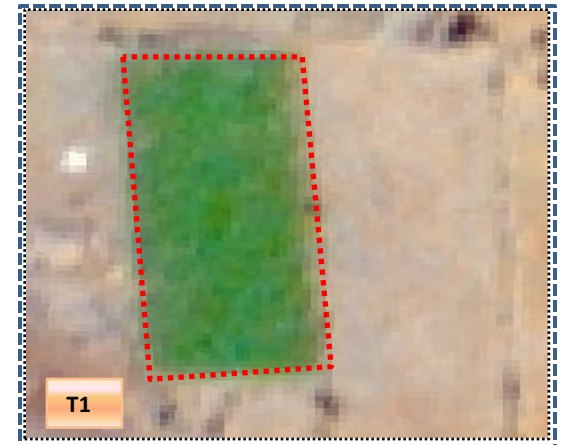


T1: 26 January 2015

Agriculture to Plantation



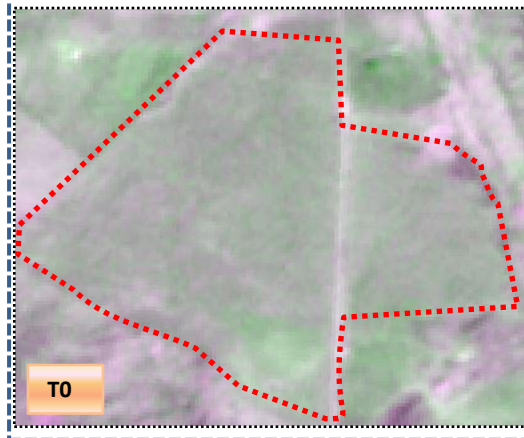
T0: 2011-12 (77°50'36.572"E 14°23'35.957"N)



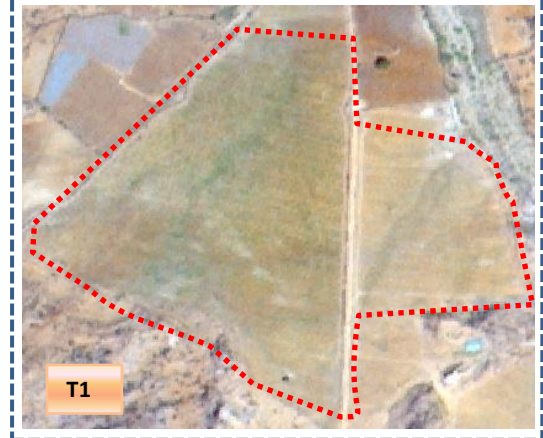
T1: 26 January 2015

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

Scrub to Plantation

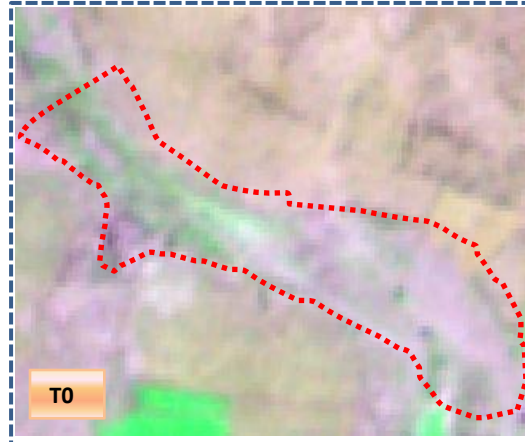


T0: 2011-12 (77°49'57.333"E 14°25'11.022"N)

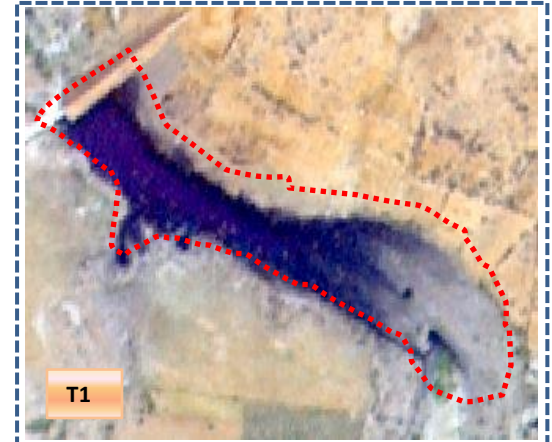


T1: 26 January 2015

Scrub to Waterbody



T0: 2011-12 (77°50'16.288E 14°25'2.281N)



T1: 26 January 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	27.98												27.98
Mining/dump													
Agriculture	3.21		1516.45	56.22						7.06			1582.94
Plantation Horticulture				10.13									10.13
Forest													
Forest Plantation													
Barren Rocky		0.10					25.68						25.78
Scrub	0.44	0.61	74.29	3.40				2194.40		1.47			2274.61
Waterbody- Streams/River									17.25				17.25
Waterbody – Ponds										38.50			38.50
Grand Total	31.63	0.71	1590.74	69.75			25.68	2194.40	17.25	47.04			3977.19

- 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 66 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T1.
- In T1 74 ha of the agriculture area has increased from scrubland area 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		
Built up	31.63												31.63
Mining/dump		0.71											0.71
Agriculture	0.11		1576.43	13.06					0.79	0.35			1590.74
Plantation Horticulture			0.53	69.21									69.75
Forest													
Forest Plantation													
Barren Rocky							25.68						25.68
Scrub	1.10		23.53					2168.99		0.77			2194.40
Waterbody- Streams/River									17.25				17.25
Waterbody – Ponds										47.04			47.04
Grand Total	32.84	0.71	1600.50	82.28			25.68	2168.99	18.03	48.15			3977.19

- 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 14 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.
- In T2 24 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-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	32.84										32.84	
Mining/dump		0.71									0.71	
Agriculture			1594.79	5.02				0.49		0.20	1600.50	
Plantation Horticulture				82.28							82.28	
Forest												
Forest Plantation												
Barren Rocky							25.68				25.68	
Scrub	0.27		4.18					2164.55			2168.99	
Waterbody- Streams/River									18.03		18.03	
Waterbody – Ponds								0.09		48.07	48.15	
Grand Total	33.11	0.71	1598.97	87.29			25.68	2165.12	18.03	48.27	3977.19	

- 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 05 ha of the agriculture area has decreased and it is converted into plantations , scrubland and water body in T3.
- In T3 04 ha of the agriculture area has increased from scrubland area 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		
Built up	33.11												33.11
Mining/dump		0.71											0.71
Agriculture			1582.12	15.25							1.60		1598.97
Plantation Horticulture			0.84	85.89							0.56		87.29
Forest													
Forest Plantation													
Barren Rocky							25.68						25.68
Scrub	0.41		12.76					2151.64			0.32		2165.12
Waterbody- Streams/River									18.03				18.03
Waterbody – Ponds											48.27		48.27
Grand Total	33.52	0.71	1595.72	101.15			25.68	2151.64	18.03		50.75		3977.19

- 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 16 ha of the agriculture area has decreased and it is converted into plantations and water body in T4.
- In T4 13 ha of the agriculture area has increased from plantations 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	33.52										33.52	
Mining/dump		0.71									0.71	
Agriculture	1.43		1581.98	9.44						2.88	1595.72	
Plantation Horticulture			5.53	95.61							101.15	
Forest												
Forest Plantation												
Barren Rocky							25.68				25.68	
Scrub	0.63	0.90	24.49					2118.36		7.26	2151.64	
Waterbody- Streams/River									18.03		18.03	
Waterbody – Ponds										50.75	50.75	
Grand Total	35.58	1.61	1612.00	105.05			25.68	2118.36	18.03	60.89	3977.19	

- 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 13 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 30 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 23 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 07, 09 & 16 Hectares From T0 to T1, T1-T2 & T4-T5 respectively and overall increase of 29 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 94 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 156 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (5) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (5) verified from the portal.