

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

SRIKAKULAM -11/2011-12
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

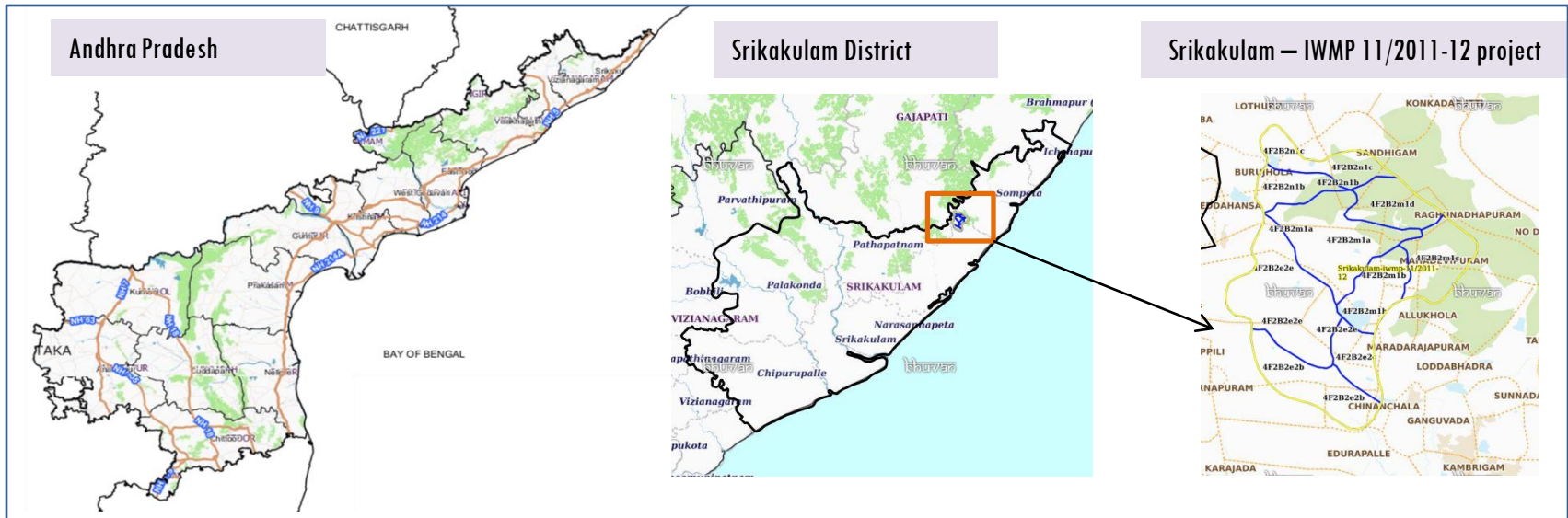
E X E C U T I V E S U M M A R Y

- 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-11/2011-12, Srikakulam District of Andhra Pradesh. The total geographical area of the project is 2,673 ha. It comprises of 9 micro watersheds.
- In the project area 285 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an increased by 38 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 62 % is covered by the agriculture, 21 % is covered by forest, 5.6 % is covered by water body and remaining by other land use classes.

PROJECT : SRIKAKULAM - IWMP-11/2011-12

DISTRICT : SRIKAKULAM , STATE : ANDHRA PRADESH

- The study area falls in Palasa Mandal of Srikakulam district of Andhra Pradesh state. The total geographical area of the project is 2,673 ha. It comprises of 9 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



- The climate of the region is generally tropical, the mean maximum temperature is 30-40°C April-May and the mean minimum temperature is 17.4°C December-January during the summer season till the onset of the South-West monsoon the heat is oppressive and the day temperature is May sometimes go about 43°C.
- The rainfall in the region is considerably more in the hilly areas as compared to the plains, the annual normal rainfall is 1131 mm (i.e., 61% from South West monsoon and 2.2% from Northeast monsoon) is shared by summer showers and winter rains.

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2013-14	2019-20
LISS IV	2011-12		
SCENE 1			11-Oct-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			11-Oct-19
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	285
4	Detailed Project Report	

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



Legend



Drainage (1:10000 Scale)

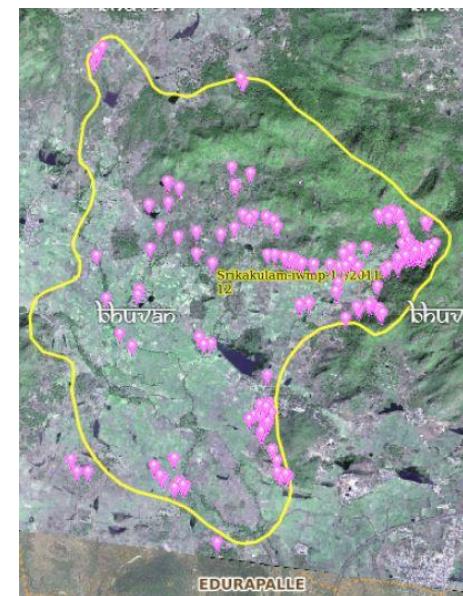


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

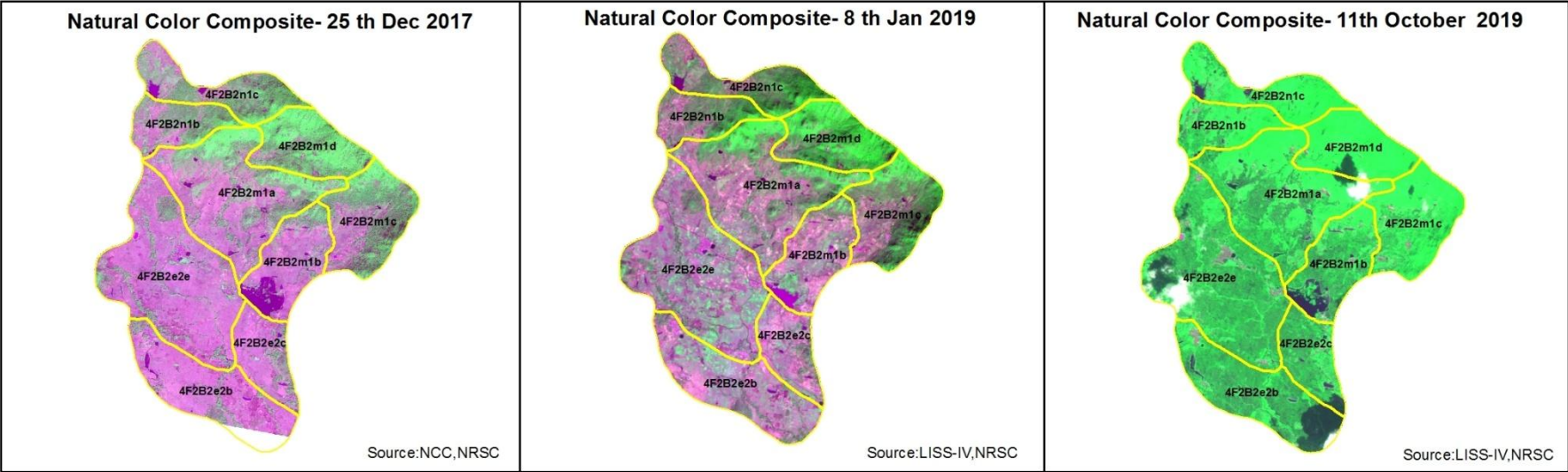
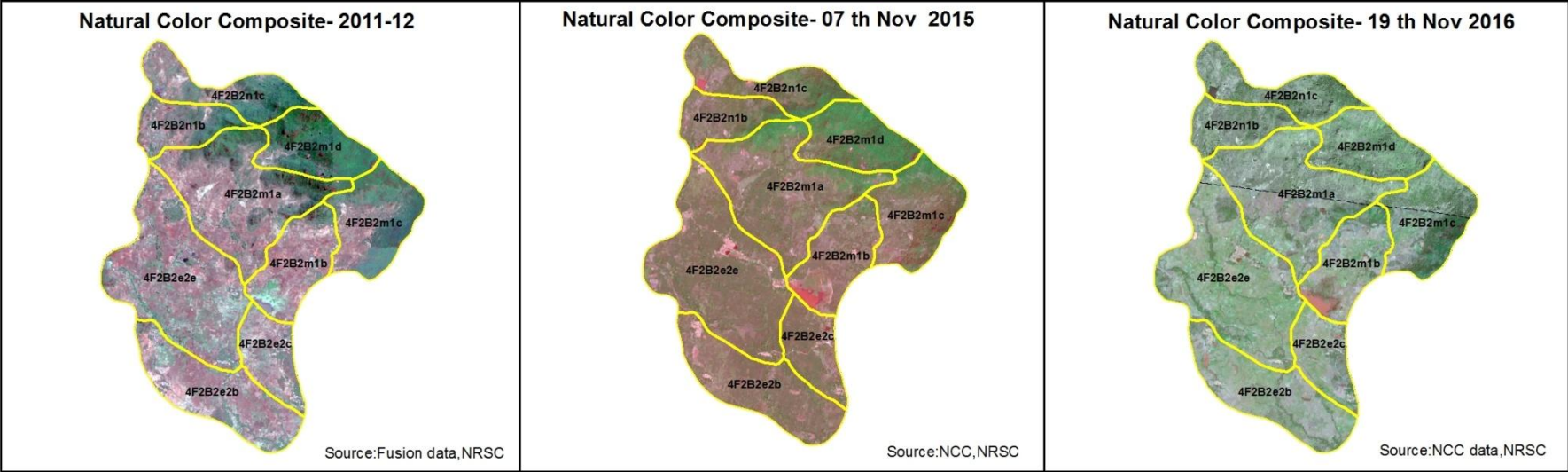
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	7	4
2	Horticulture	0	0
3	Agriculture	84	83
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	90	90
7	Terrace	0	0
8	Checks & Plugs	19	19
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	22	18
11	Civil work-Check dams/Rock fill dam	31	31
12	Nallah 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	17	17
18	Others	23	23
	TOTAL	293	285

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-11/2011-12



T0

T0:2011-12



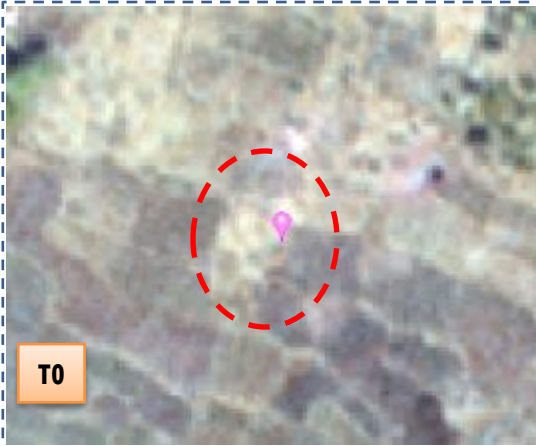
T1

T1: 19 November 2016



Drishti Sl no. 137203 MWS : 4F2B2m1c

Farm pond



T0

T0:2011-12



T1

T1: 19 November 2016



Drishti Sl no. 137307 MWS : 4F2B2m1a

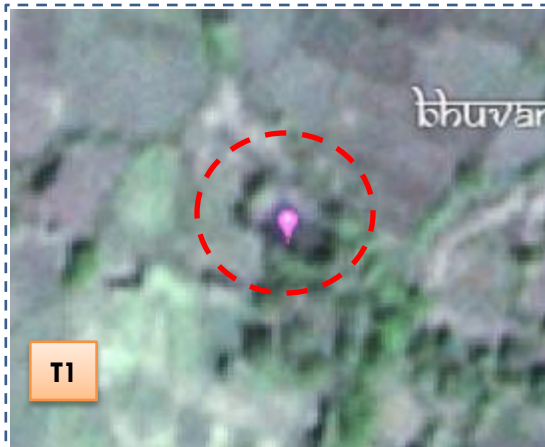
Farm pond

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-11/2011-12



T0

T0:2011-12



T1

T1: 19 November 2016



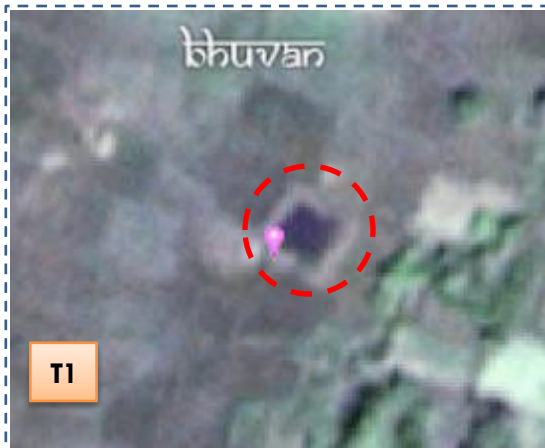
Drishti SI no. 392754 MWS : 4F2B2m1a

Farm pond



T0

T0:2011-12



T1

T1: 19 November 2016



Drishti SI no. 392851 MWS : 4F2B2m1a

Farm pond

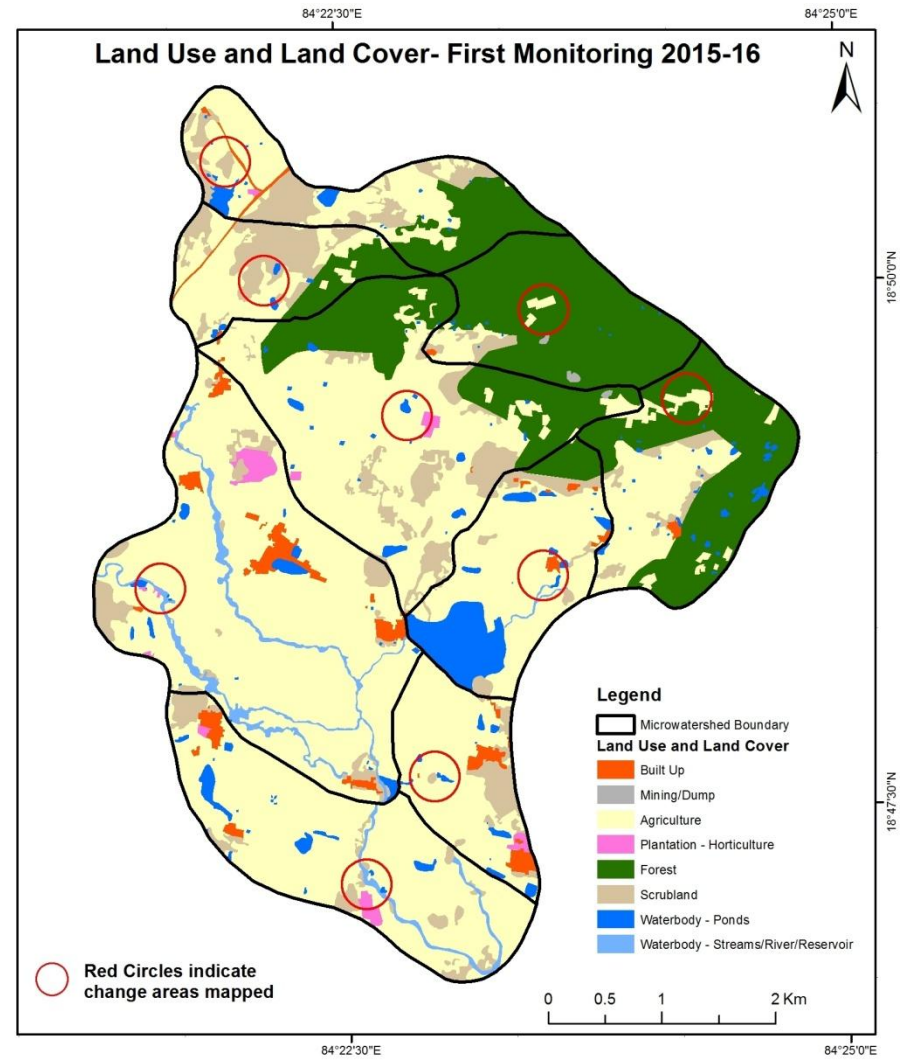
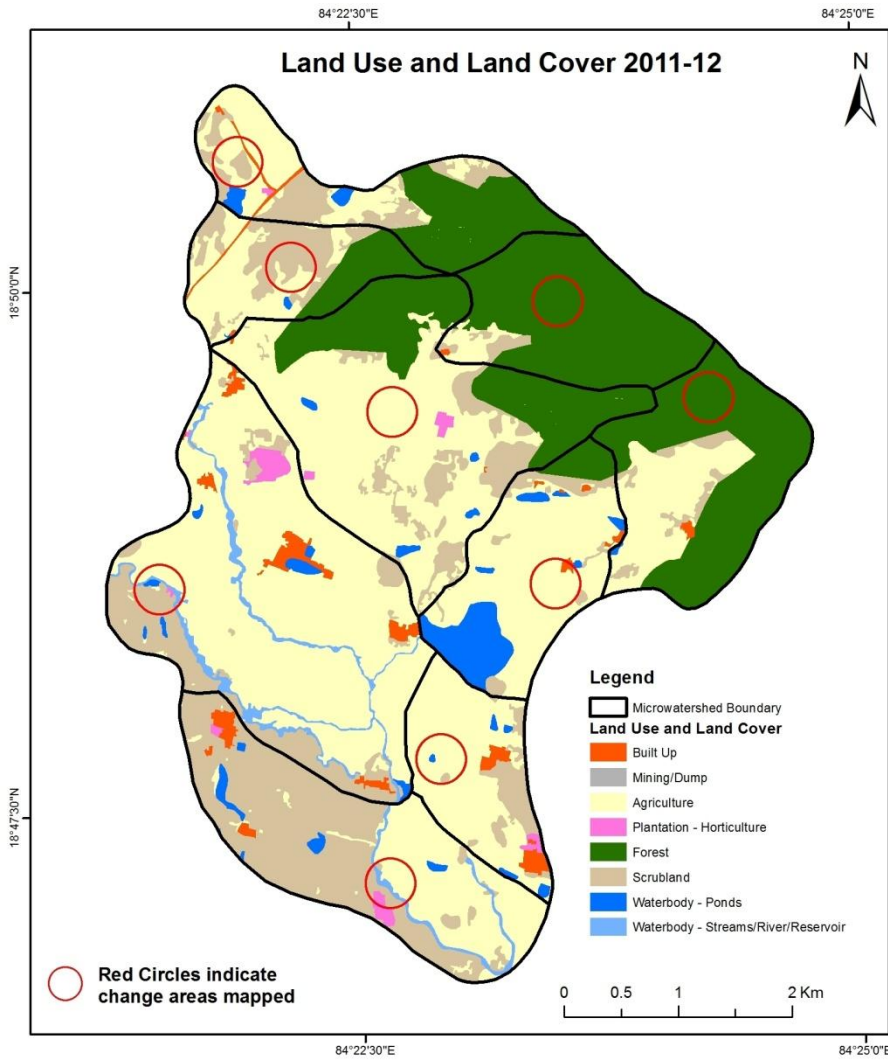
MONITORING IN THE PROJECT AREA

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)

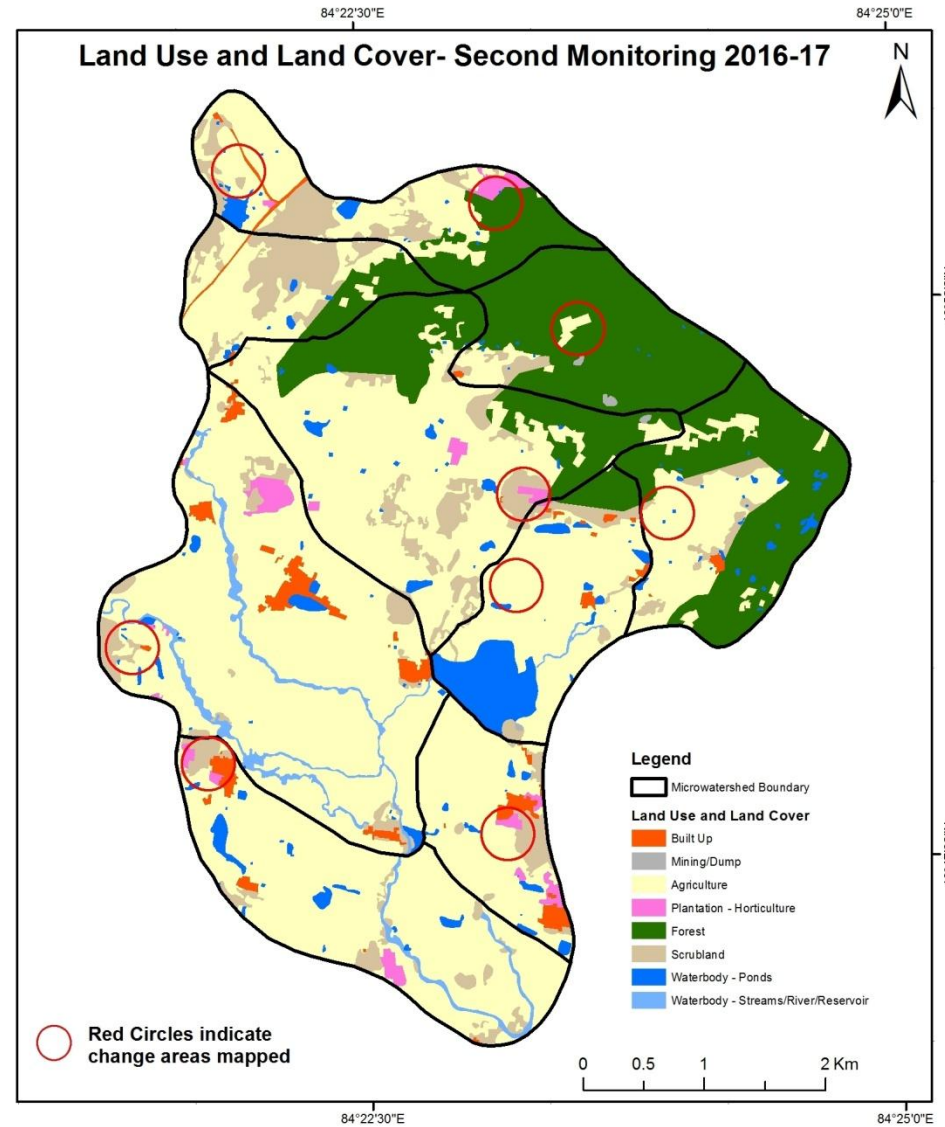
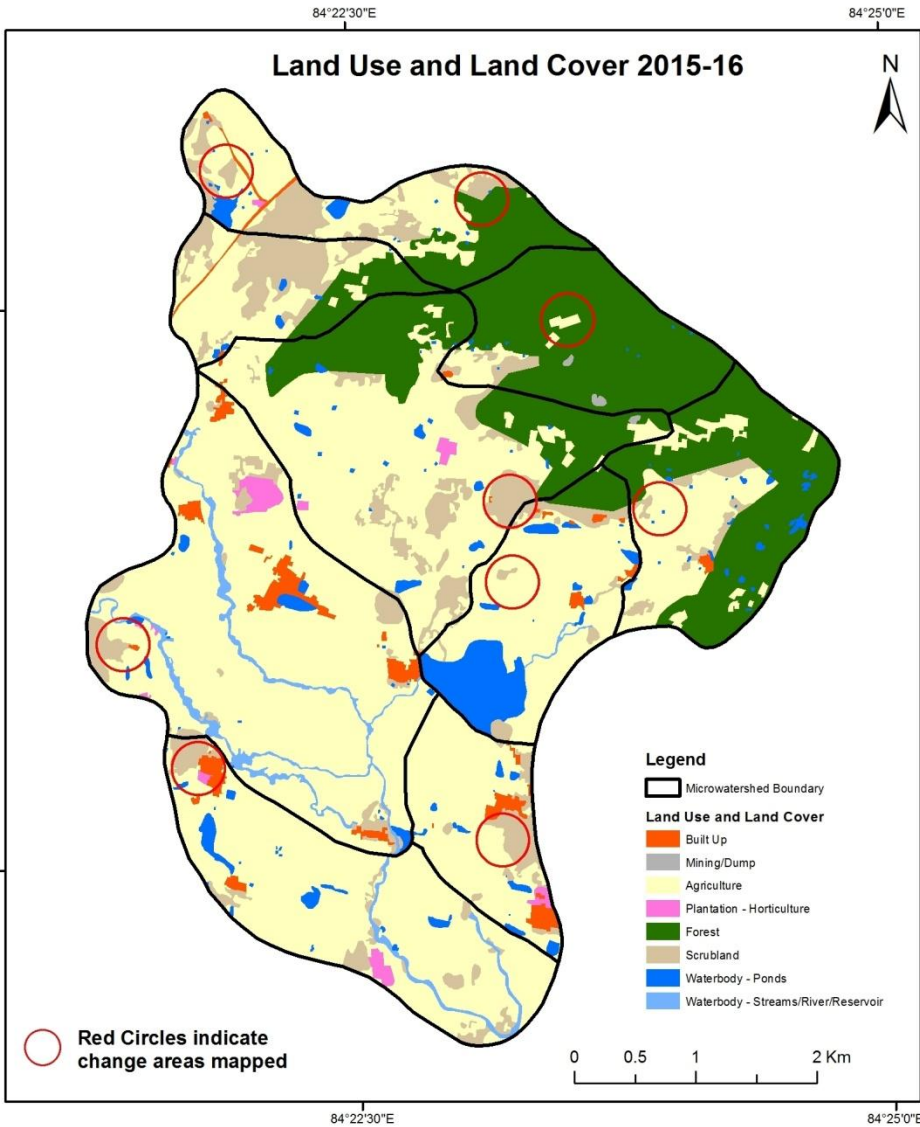
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



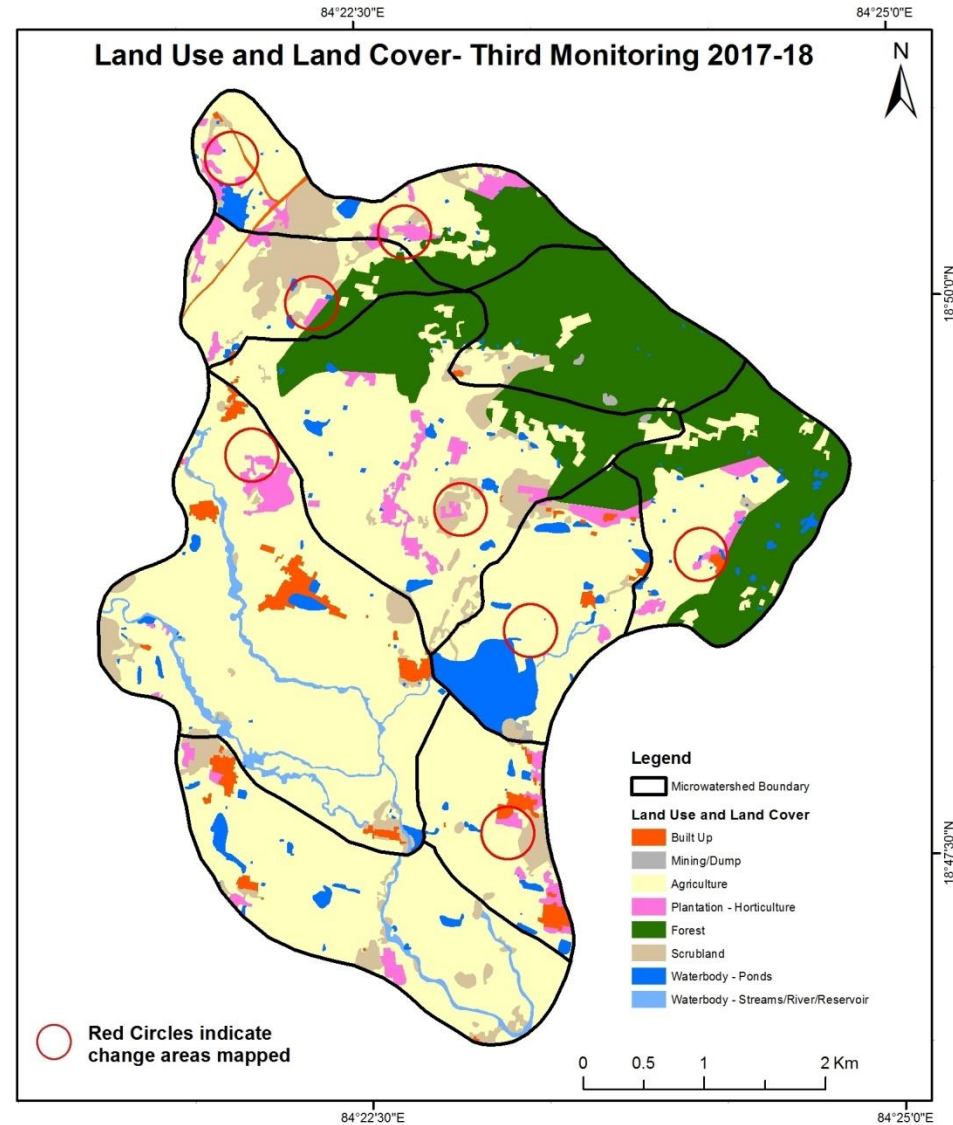
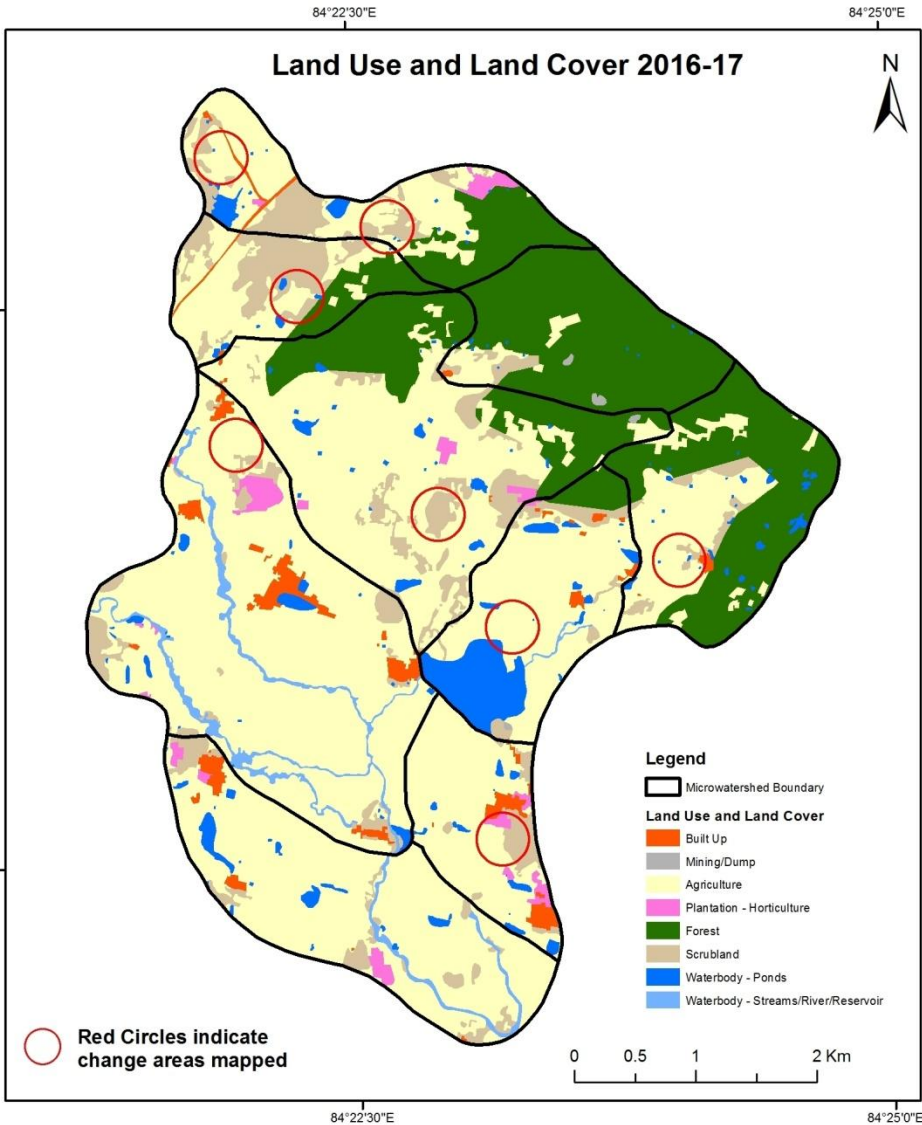
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



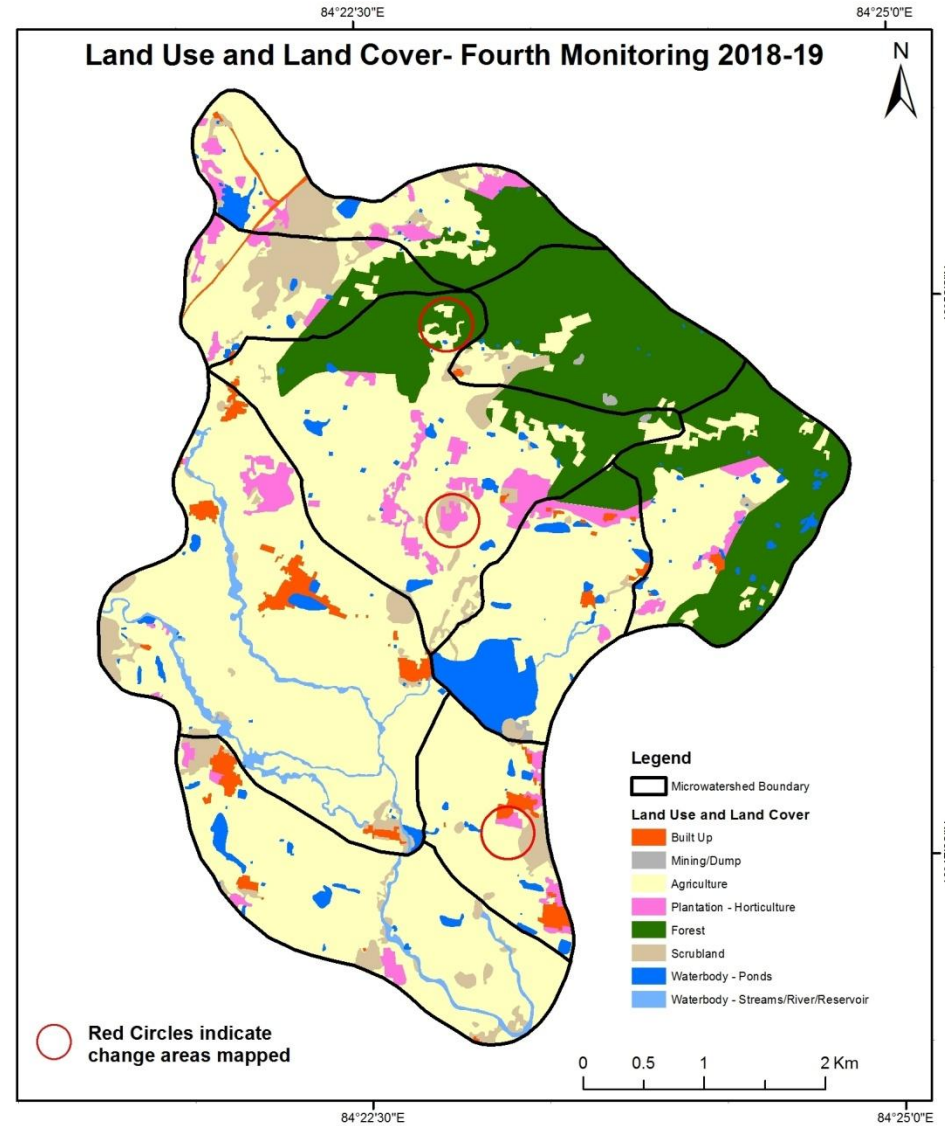
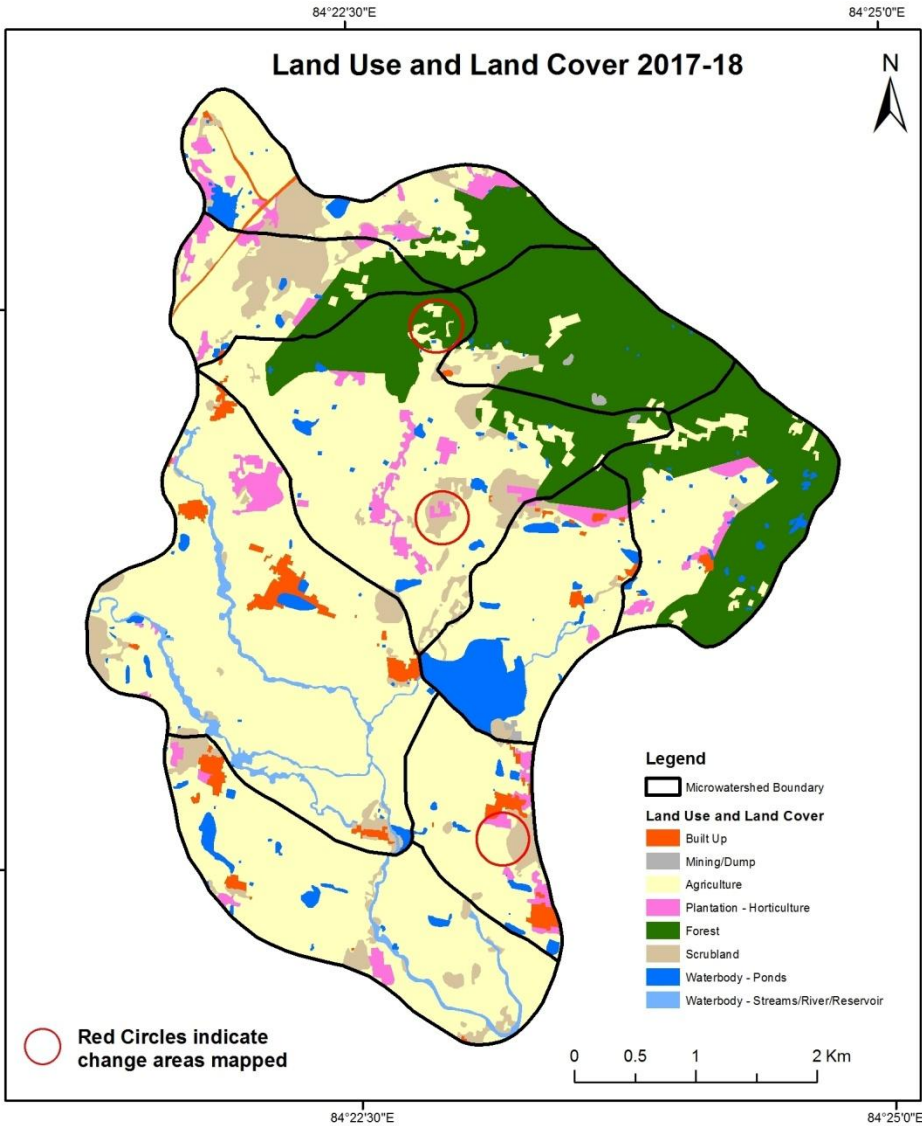
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



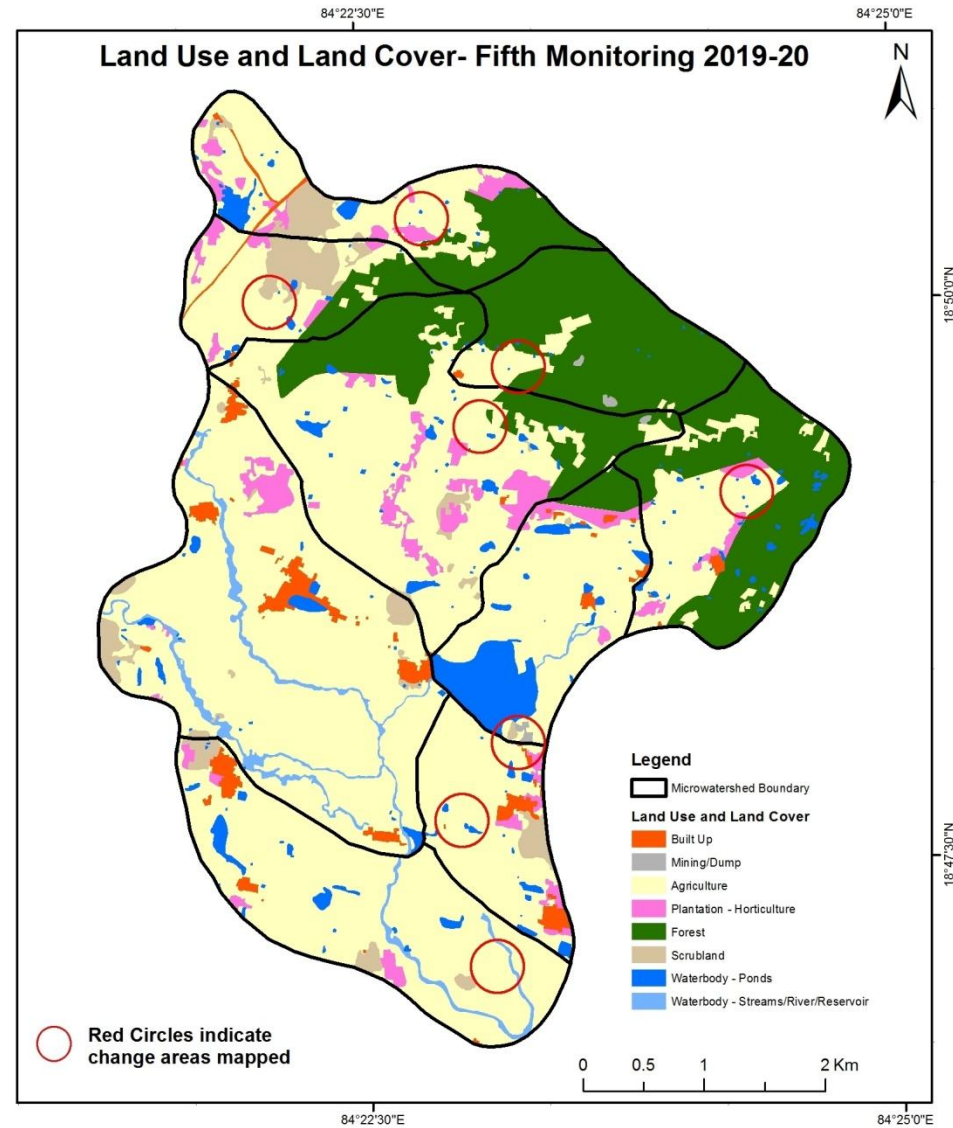
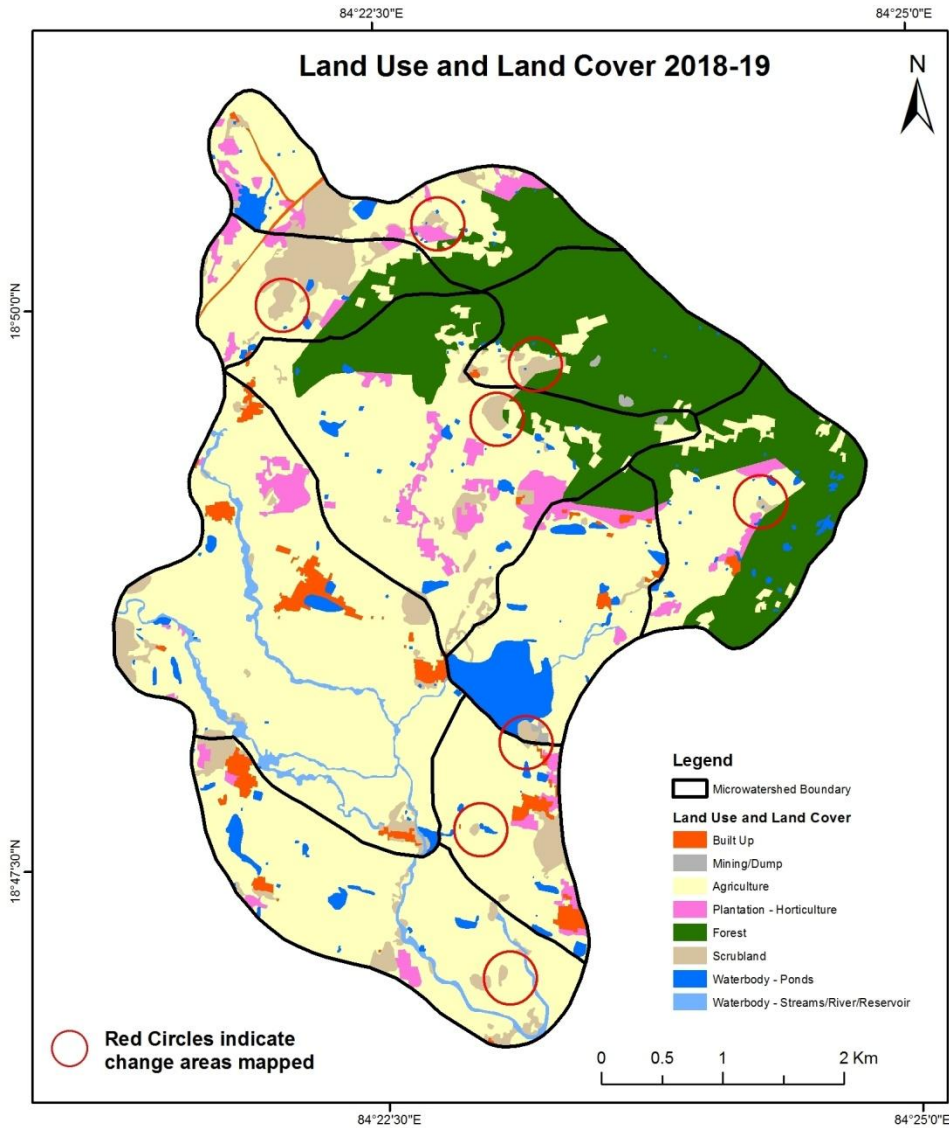
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



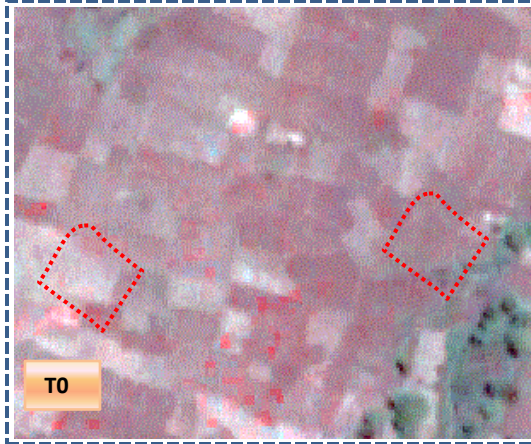
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



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

Agriculture to Water body

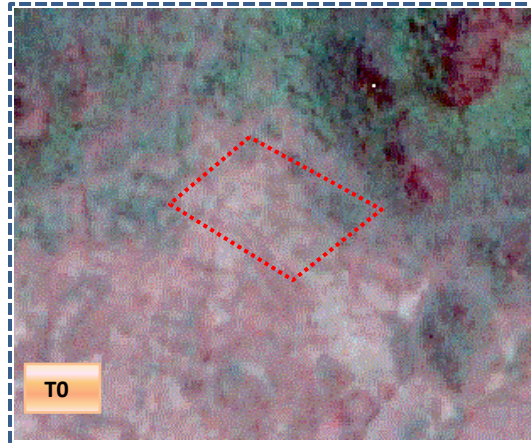


T0: 2011-12 (84°22'35.241"E 18°49'18.609"N)



T1: 07 November 2015

Scrub to Water body



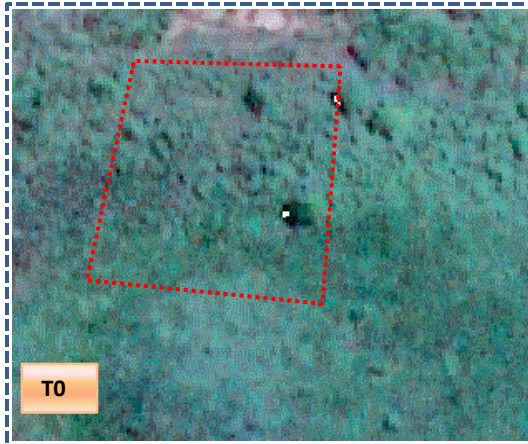
T0: 2011-12 (84°22'22.177"E 18°49'40.252"N)



T1: 07 November 2015

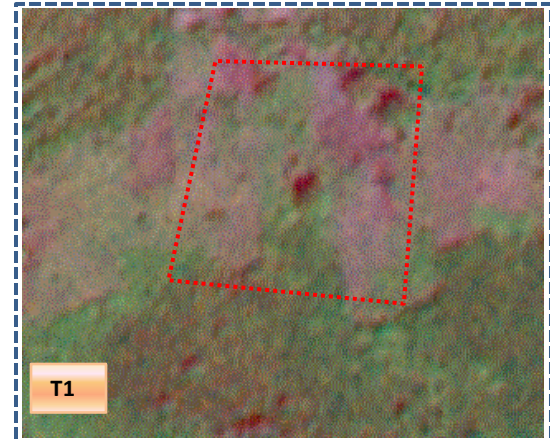
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

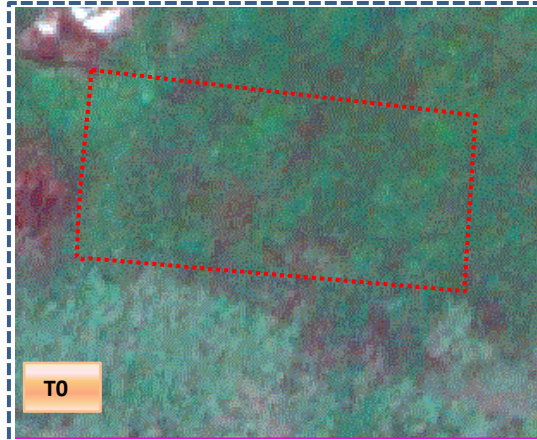
T0: 2011-12(84°22'42.146"E 18°50'12.686"N)



T1

T1: 07 November 2015

Scrub to Agriculture



T0

T0: 2011-12(84°23'55.532"E 18°49'24.8"N)



T1

T1: 07 November 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		
T0													
Built up	42.62												42.62
Mining/dump													
Agriculture	8.62		1298.82	0.56					1.60	19.36			1328.97
Plantation Horticulture			0.03	18.56									18.59
Forest		1.91	62.46		590.09						5.32		659.78
Forest Plantation													
Barren Rocky													
Scrub	0.29		240.13					269.76			1.36		511.53
Waterbody- Streams/River									42.93				42.93
Waterbody – Ponds											69.41		69.41
Grand Total	51.52	1.91	1601.45	19.13	590.09			269.76	44.53		95.45		2673.83

- 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 30 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T1.
- In T1 240 ha of the agriculture area has increased from plantations 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	51.52												51.52
Mining/dump		1.912											1.91
Agriculture	0.28		1598.48								2.68		1601.45
Plantation Horticulture				19.13									19.13
Forest			6.84		583.26								590.09
Forest Plantation													
Barren Rocky													
Scrub	0.26	0.362	8.22	14.30				246.61					269.76
Waterbody- Streams/River									44.53				44.53
Waterbody – Ponds											95.45		95.45
Grand Total	52.06	2.274	1613.54	33.43	583.26			246.61	44.53		98.13		2673.83

- 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 2.9 ha of the agriculture area has decreased and it is converted into Built-up and water body in T2.
- In T2 8.2 ha of the agriculture area has increased from 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	52.06										52.06	
Mining/dump		2.27									2.27	
Agriculture	1.55	1.13	1605.48	3.41						1.97	1613.54	
Plantation Horticulture			0.23	33.20							33.43	
Forest			2.89		580.37						583.26	
Forest Plantation												
Barren Rocky												
Scrub	0.04		12.28	62.47				170.71		1.10	246.61	
Waterbody- Streams/River									44.53		44.53	
Waterbody – Ponds										98.13	98.13	
Grand Total	53.65	3.41	1620.88	99.08	580.37			170.71	44.53	101.21	2673.83	

- 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 8 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T3.
- In T3 12 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-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	53.65												53.65
Mining/dump		3.41											3.41
Agriculture	1.05		1618.62								1.21		1620.88
Plantation Horticulture			1.19	97.89									99.08
Forest			3.20		577.10						0.06		580.37
Forest Plantation													
Barren Rocky													
Scrub	0.61		1.46	16.27					152.16		0.21		170.71
Waterbody- Streams/River									44.53				44.53
Waterbody – Ponds											101.21		101.21
Grand Total	55.31	3.41	1624.47	114.16	577.10			152.16	44.53		102.69		2673.83

- 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 02 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.
- In T4 02 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-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	
T4												
Built up	55.31										55.31	
Mining/dump		3.41									3.41	
Agriculture	0.94		1620.42							3.12	1624.47	
Plantation Horticulture				114.16							114.16	
Forest					576.98					0.12	577.10	
Forest Plantation												
Barren Rocky												
Scrub	0.50		59.40					92.08		0.18	152.16	
Waterbody- Streams/River									44.53		44.53	
Waterbody – Ponds										102.69	102.69	
Grand Total	56.74	3.41	1679.82	114.16	576.98			92.08	44.53	106.11	2673.83	

- 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 04 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.
- In T5 59 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 38 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 272, 12, 07, 03 & 55 Hectares From T0 to T1, T1-T2, T2-T3, T3 to T4 & T4-T5 respectively and overall increase of 350 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 95 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 419 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.