

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -36/2011-12

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

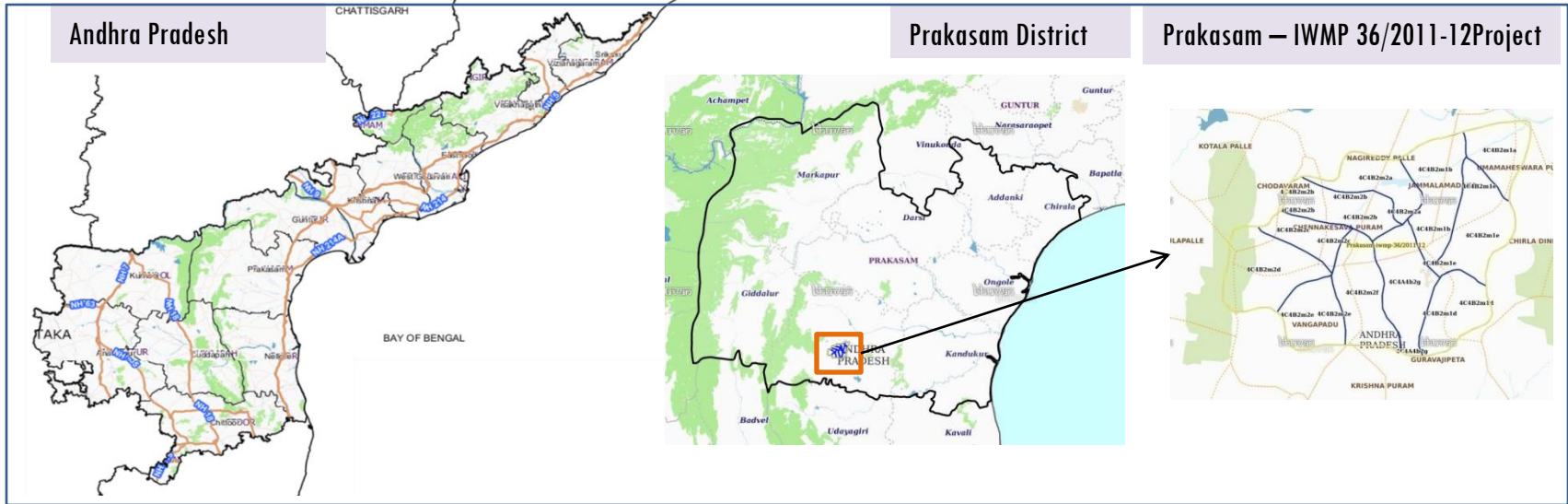
E X E C U T I V E S U M M A R Y

- 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-36/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is 5,415 ha. It comprises of 11 micro watersheds.
- In the project area 403 Drishti photos were uploaded showing 4 check dams, 73 Farm ponds/Percolation tanks, 10 afforestation , 7 field bunds, 6 livelihood activities, 6 checks & plugins and 294 others.
- Major percentage i.e. 72 % is covered by the agriculture, 18% is covered by scrub land, 3.29% covered by forest area and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-36/2011-12

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Kanigiri Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 5,415 ha. It comprises of 11 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.



- Project area witnesses tropical wet and dry climate characterized by year round high temperatures. Prakasam has a record of reaching more than 46°C.
- The average annual rainfall of the district is 798.6 mm, monthly rainfall ranges from nil in March to 182.9 mm in October. October is the wettest month of the year. Southwest monsoon contributes significant rainfall in southern part of the district and Northeast monsoon contributes more than 70% of the rainfall.
- December is the coldest month with normal mean maximum temperature of about 27.1°C and mean minimum temperature of 19.2°C. Temperature begins to rise after February. May is the hottest month with mean daily maximum temperature of about 36.1°C and the mean daily minimum temperature of about 27.7°C. During May and early June the maximum temperature rises occasionally to 46°C and with the onset of SW monsoon by about second week of June, temperature begins to drop rapidly.

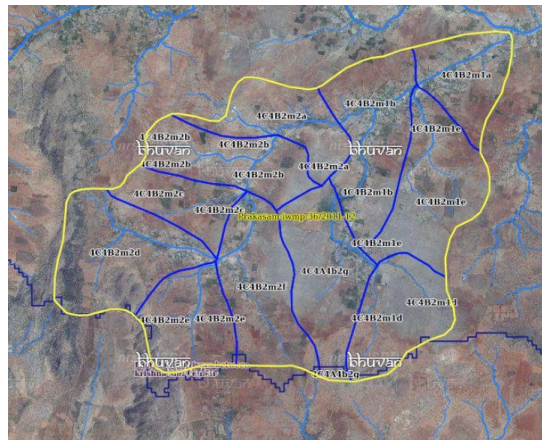
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			05-Feb-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			05-Feb-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	403
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

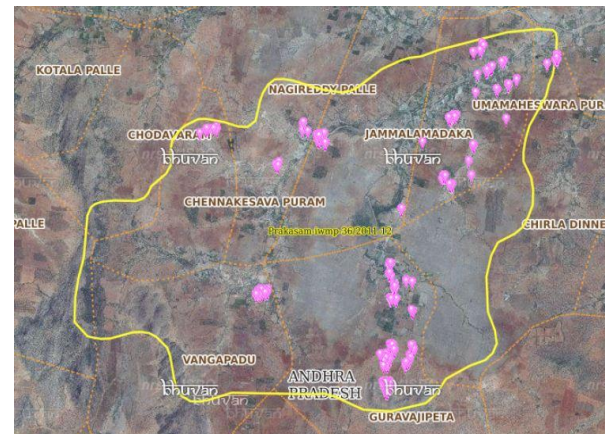


MWS Boundary



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	Agriculture/Horticulture	3	3
2	Afforestation	10	10
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	7	7
6	Terrace	0	0
7	Checks & Plugs	6	6
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	77	73
10	Civil work-Check dams/Rock fill dam	4	4
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	9	6
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	335	294
	TOTAL	451	403

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 Color Composite

Natural Color Composite- 2011-12



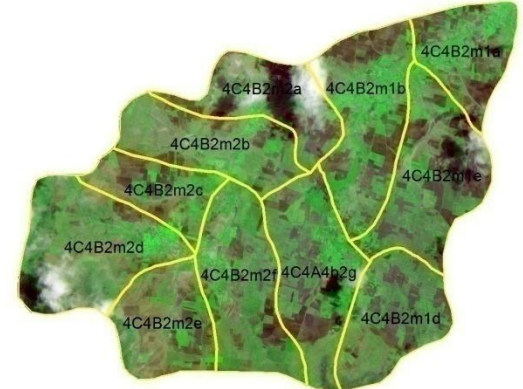
Source:Fusion data,NRSC

Natural Color Composite- 24 th October 2015



Source:LISS-IV,NRSC

Natural Color Composite- 21st July 2017



Source:LISS-IV,NRSC

Natural Color Composite-26 th December 2017



Source:LISS-IV,NRSC

Natural Color Composite- 1st January 2019



Source:Sentinel-2

Natural Color Composite- 5 th February 2020



Source:LISS-IV,NRSC

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-36/2011-12



T0:2011-12



T1: 26 December 2017



Drishti SI no. 2505372 MWS :4C4B2m1a

Check dam



T0:2011-12



T1: 26 December 2017



Drishti SI no. 701872 MWS : 4C4B2m2a

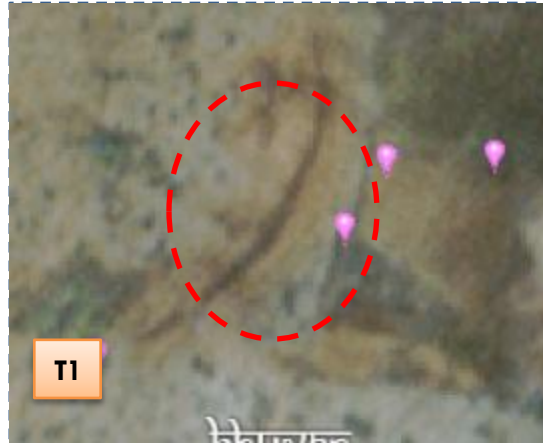
Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-36/2011-12



T0

T0: 2011-12



T1

T1: 26 December 2017



Drishti SI no. 619983 MWS :4C4B2m2b

Percolation tank



T0

T0: 2011-12



T1

T1: 26 December 2017



Drishti SI no. 7045806 MWS :4C4B2m1e

Percolation tank

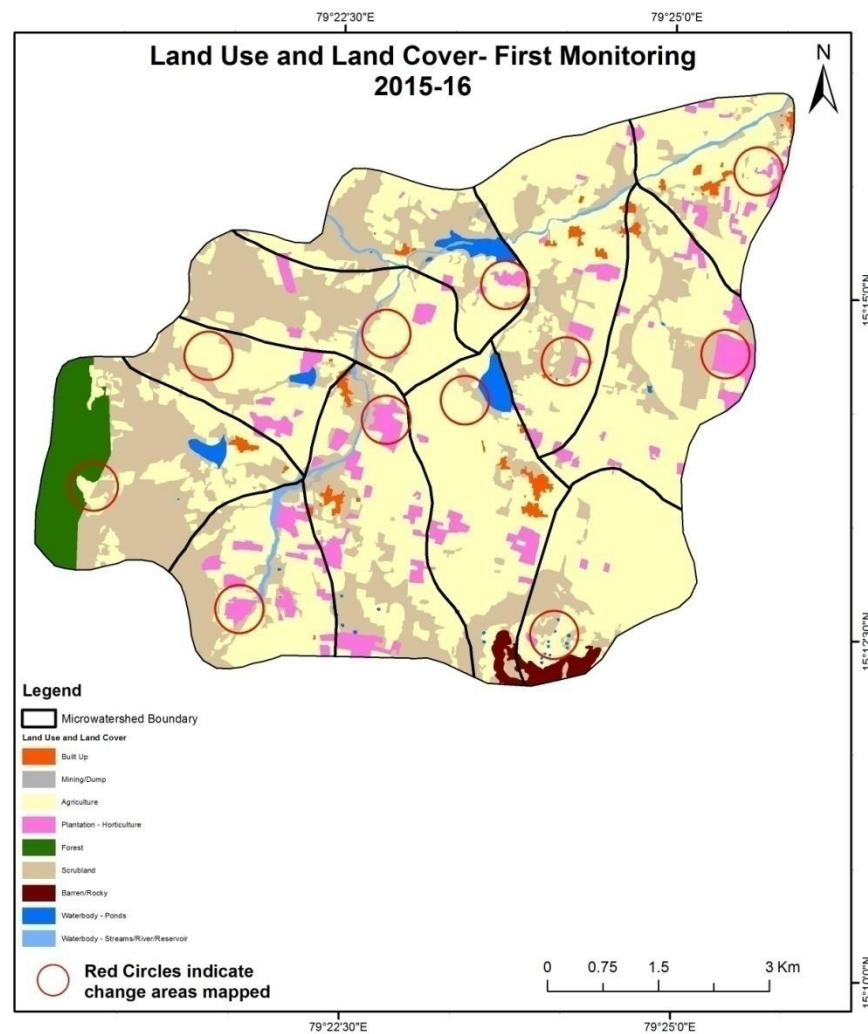
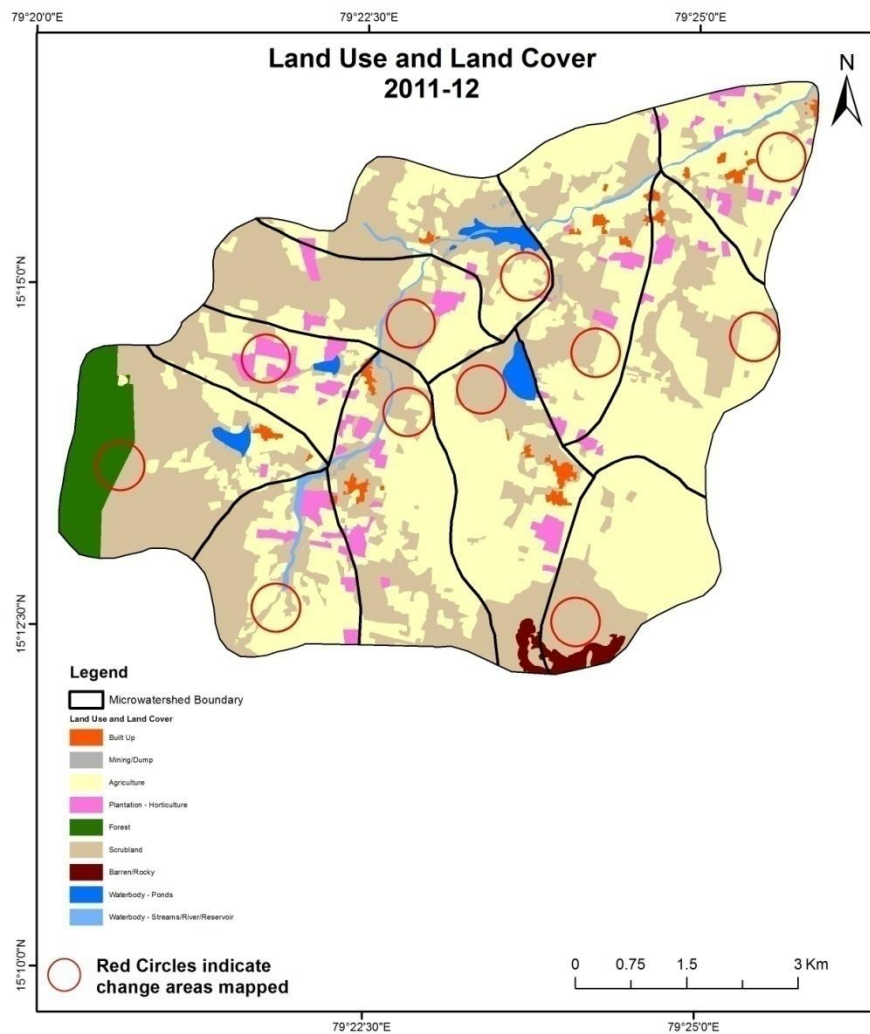
MONITORING IN THE PROJECT AREA

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 pre implementation period as T0 (2011-12) and row represents the post implementation period as T5 (2019-20) .

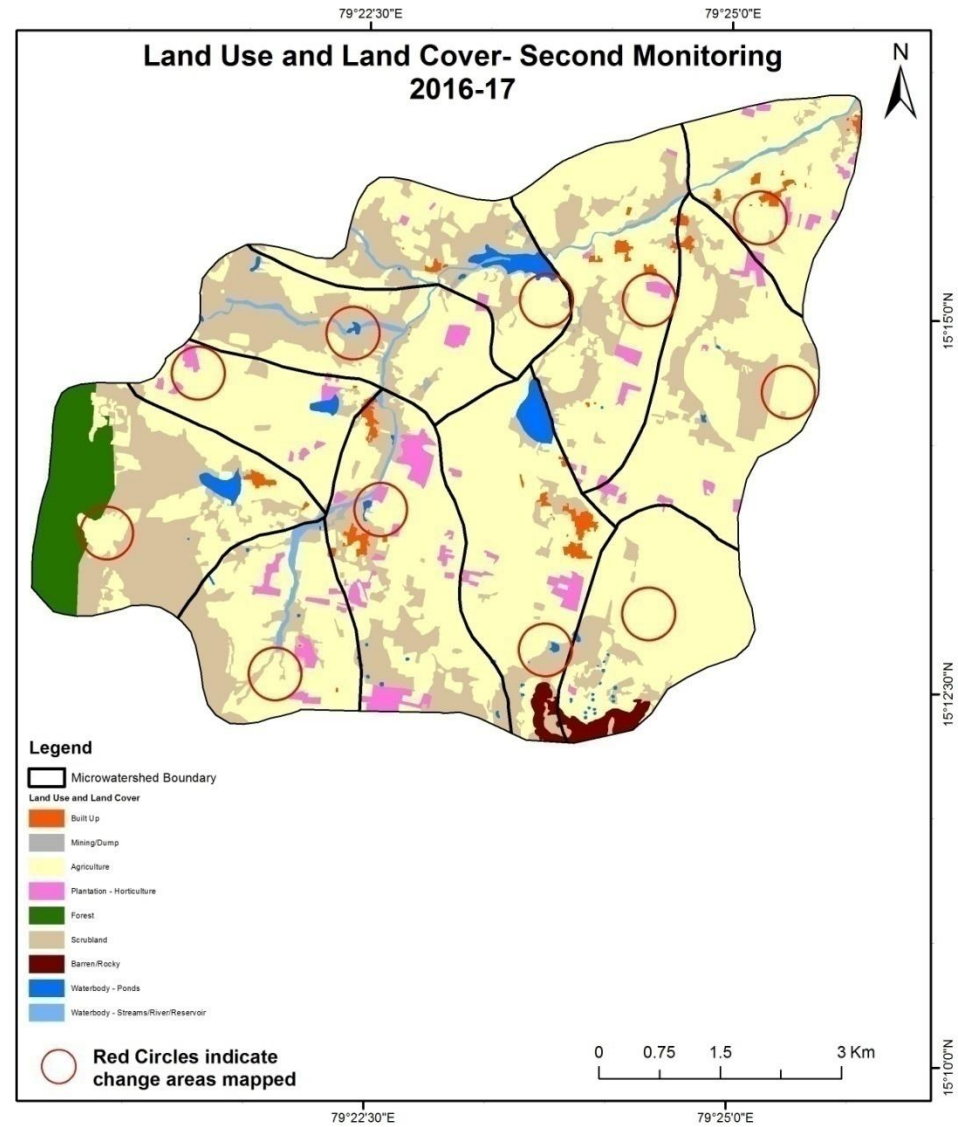
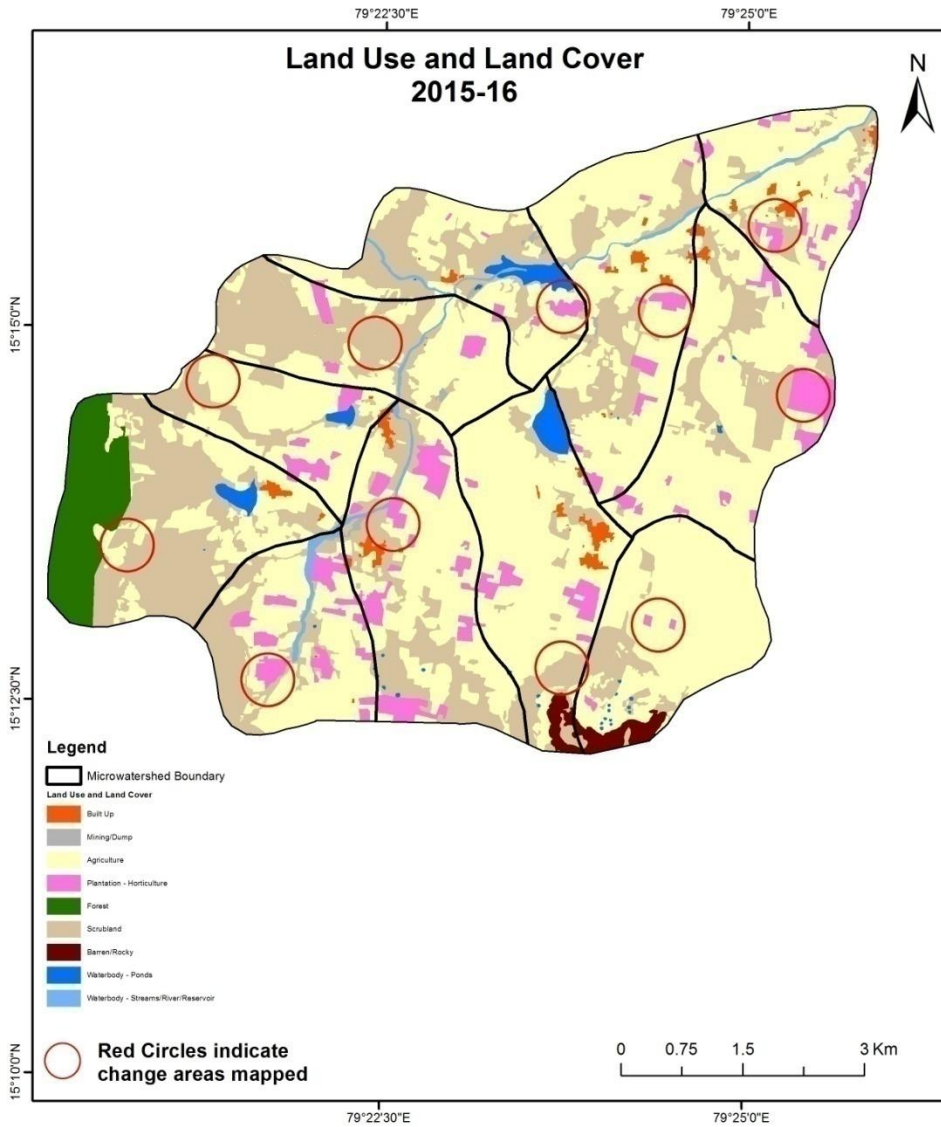
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



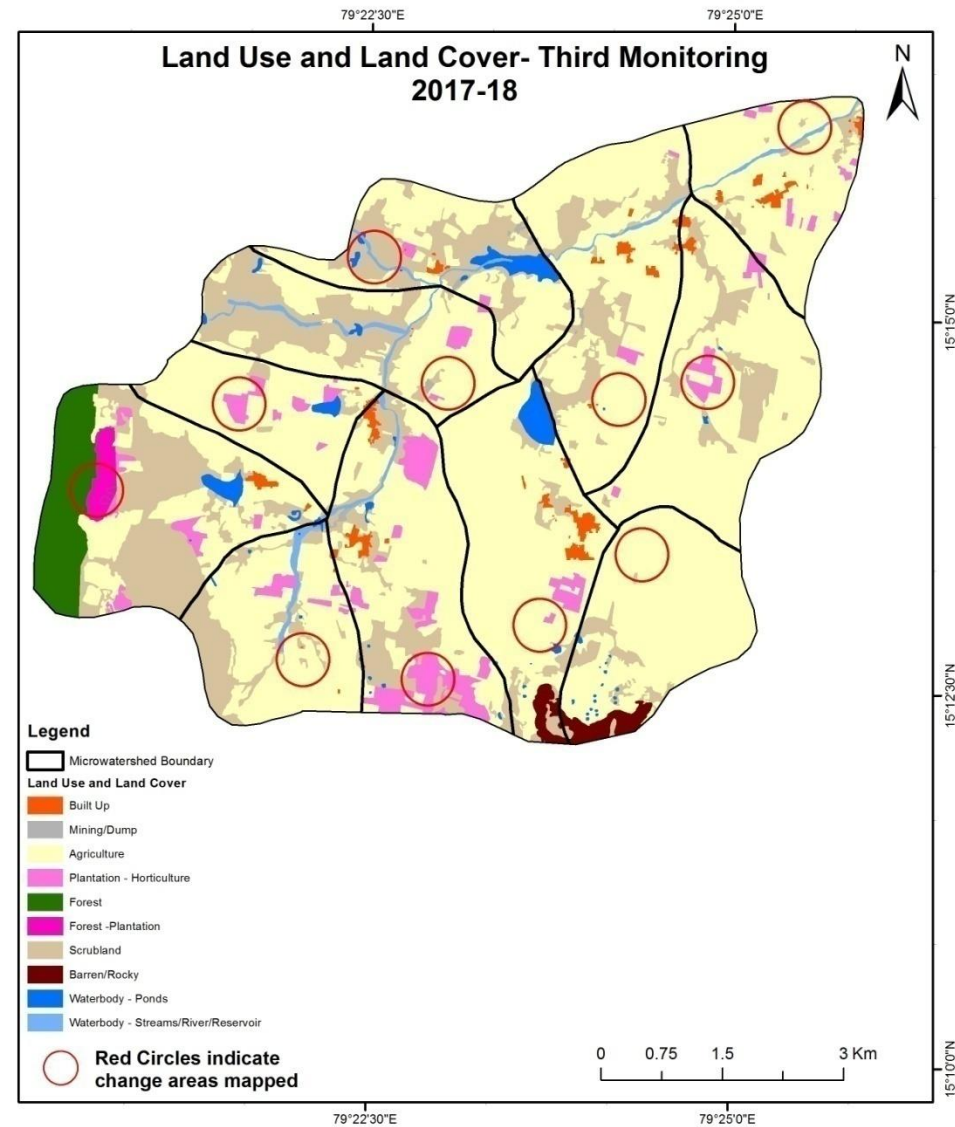
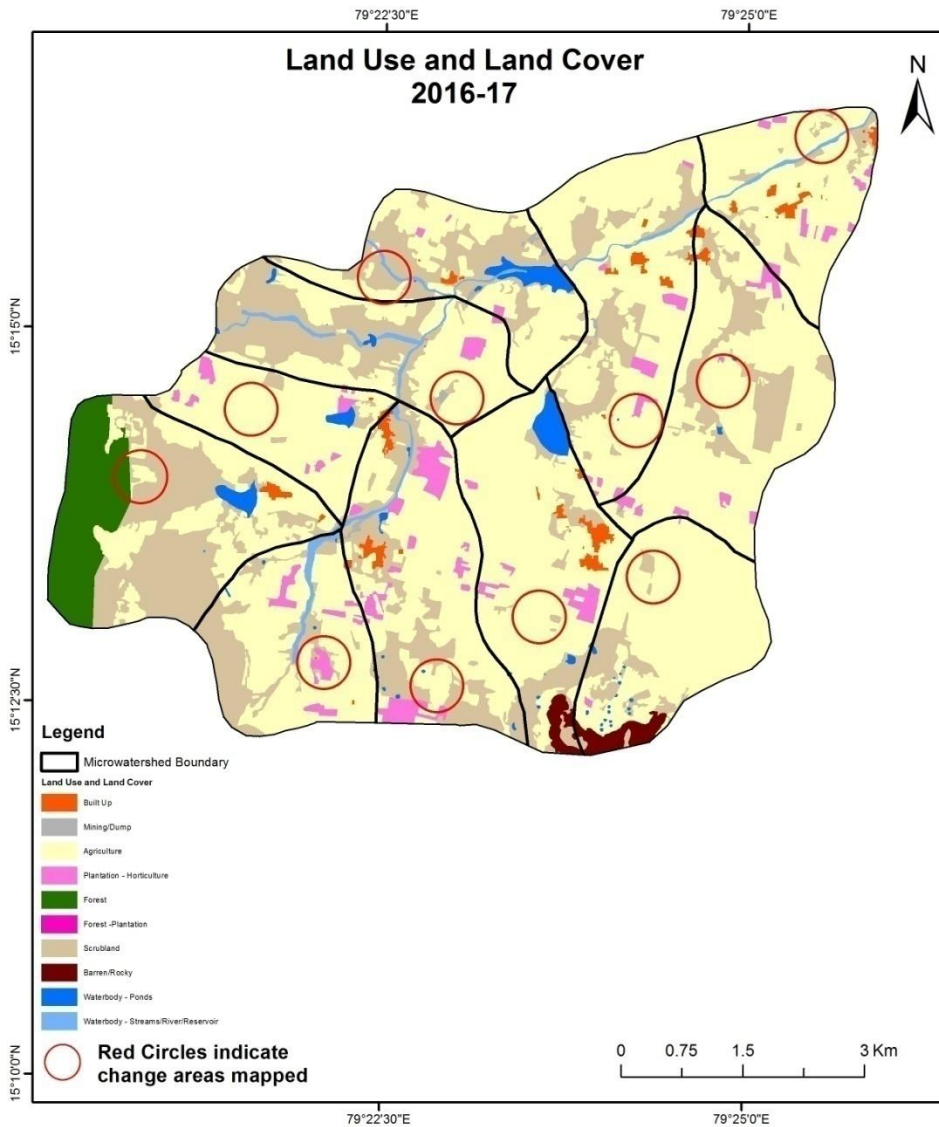
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



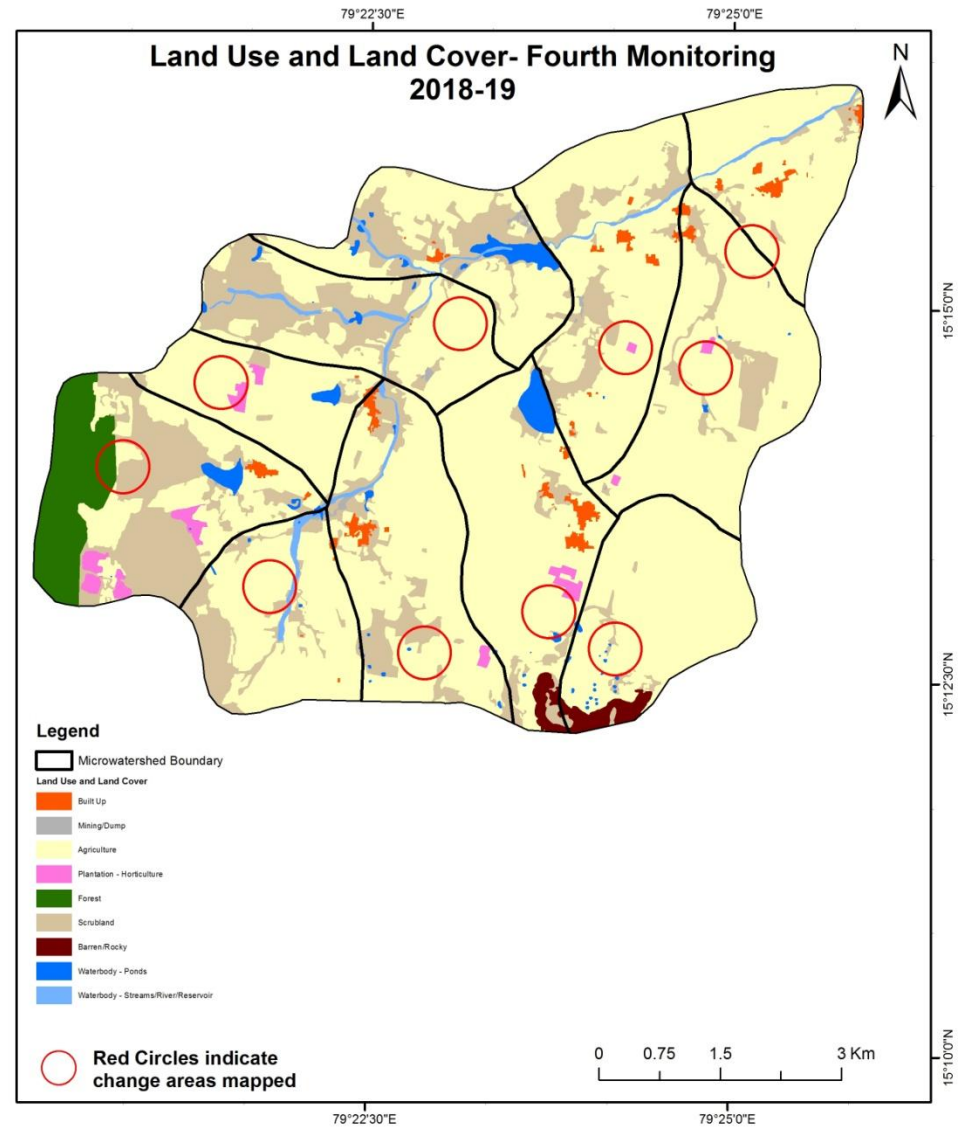
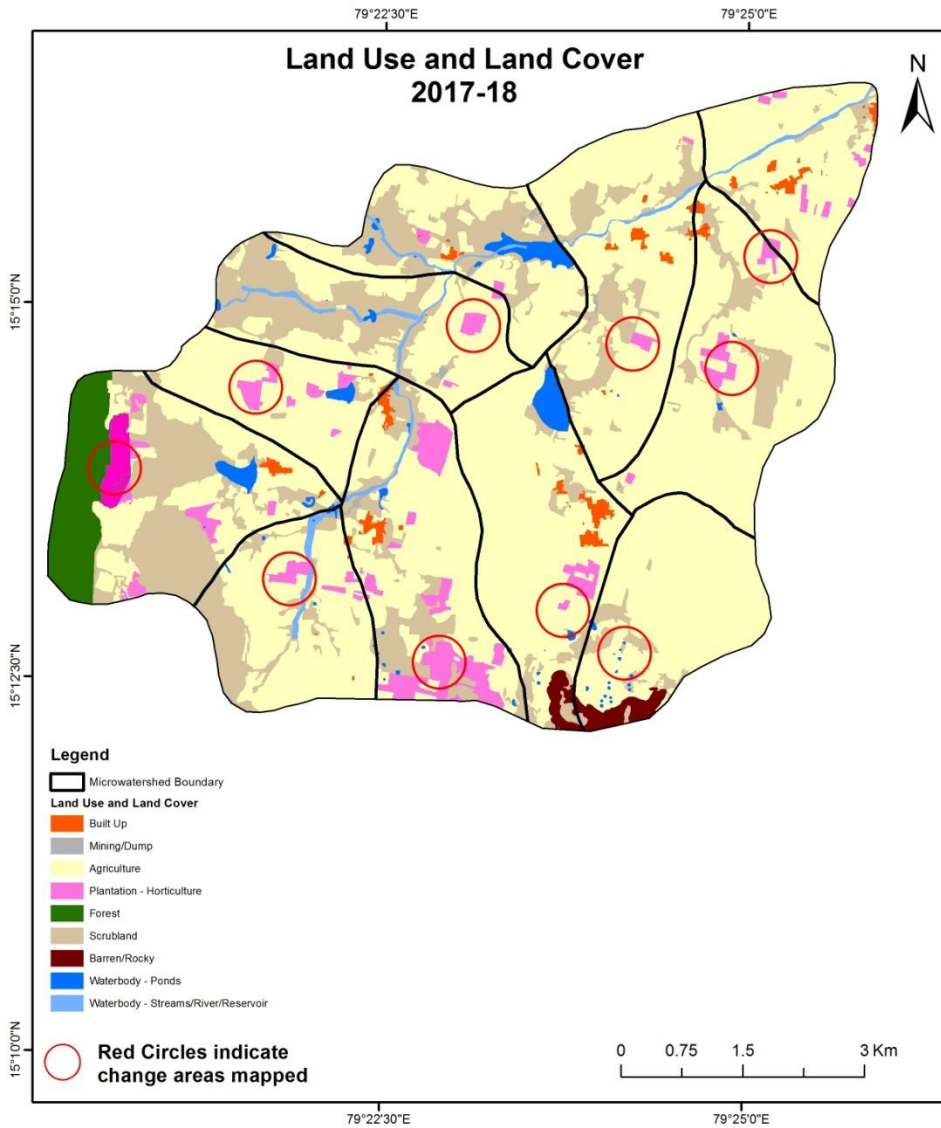
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



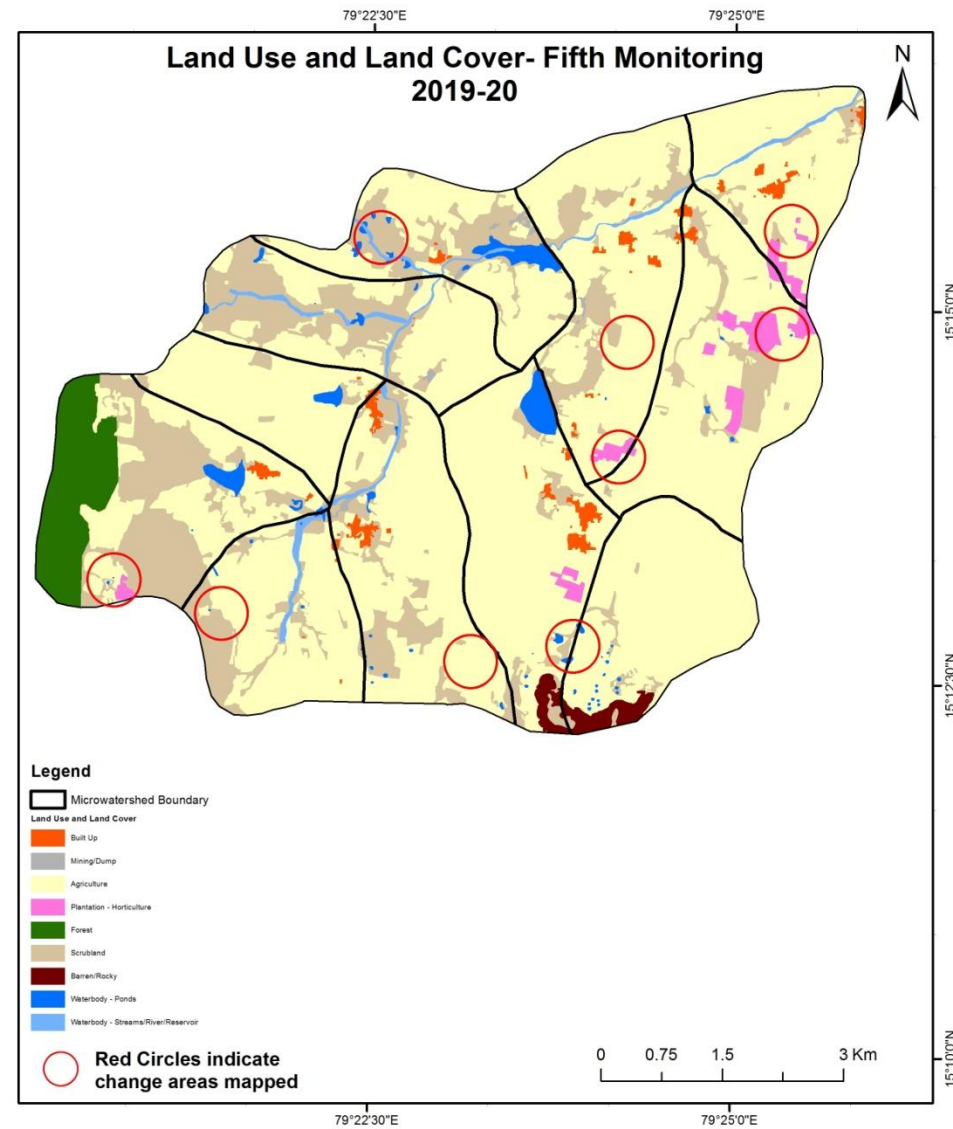
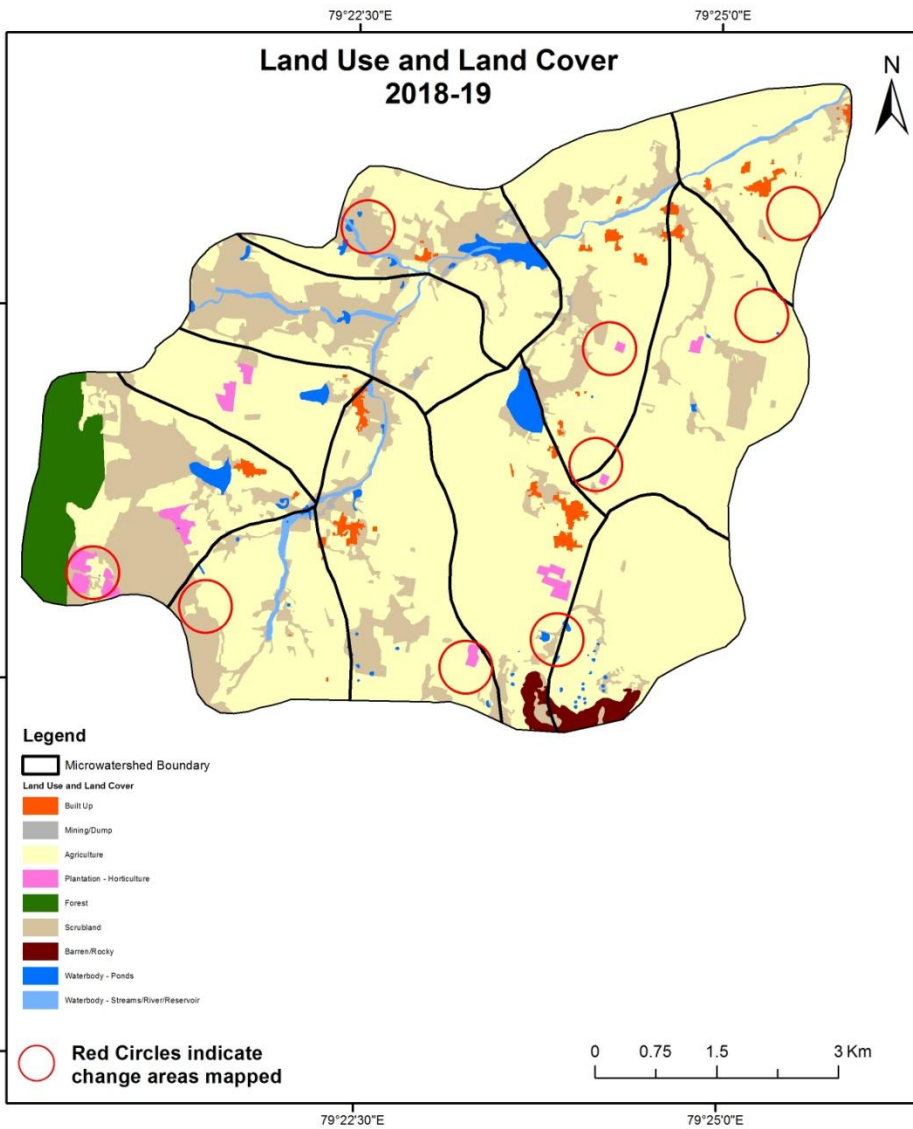
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



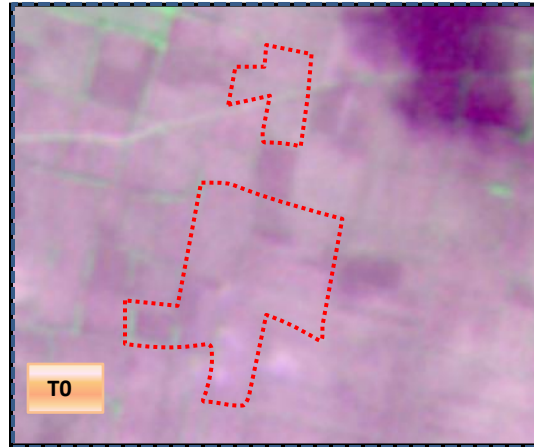
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

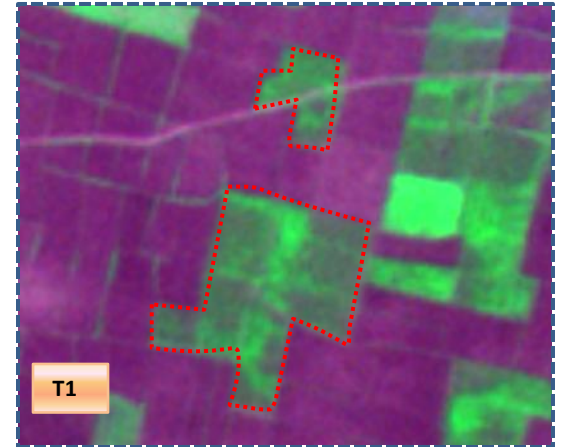


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

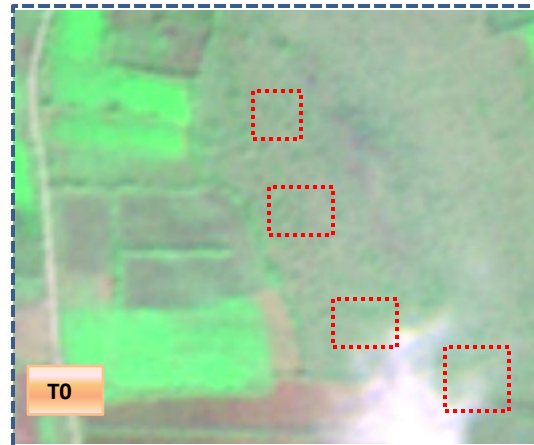


T0: 2011-12(79°23'1.918"E 15°13'25.371"N)

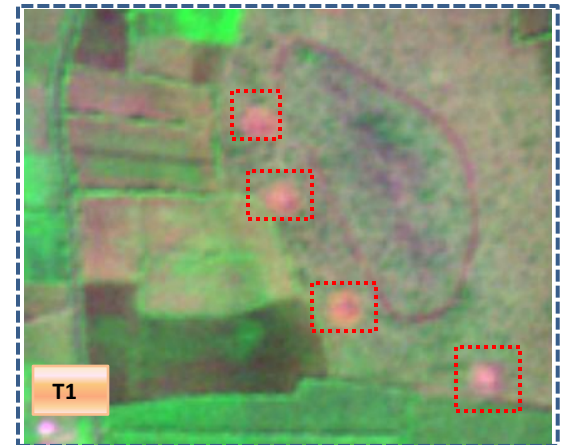


T1: 24th October 2015

Scrub to water body



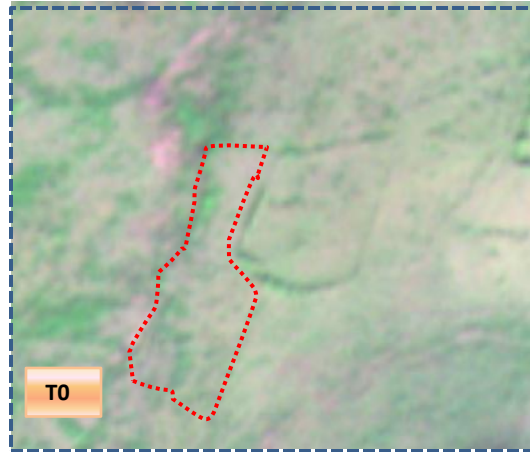
T0: 2011-12 (79°22'29.921"E 15°12'40.1"N)



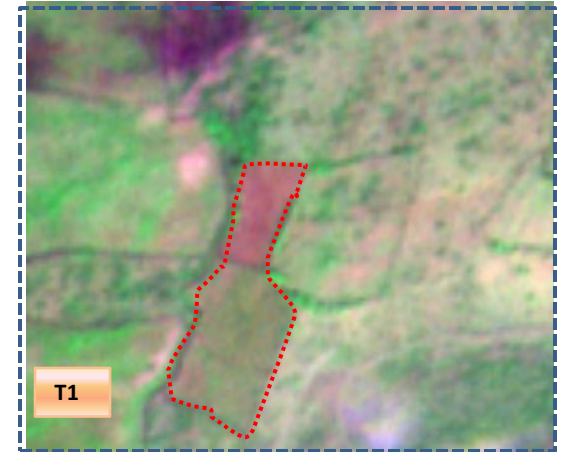
T1: 24th October 2015

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

Scrub to Agriculture

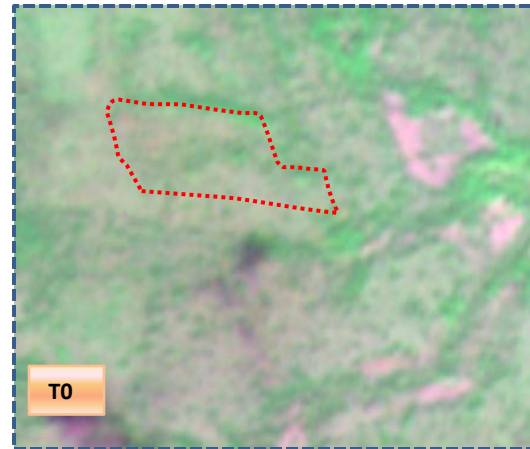


T0: 2011-12(79°20'49.07"E 15°13'35.765"N)

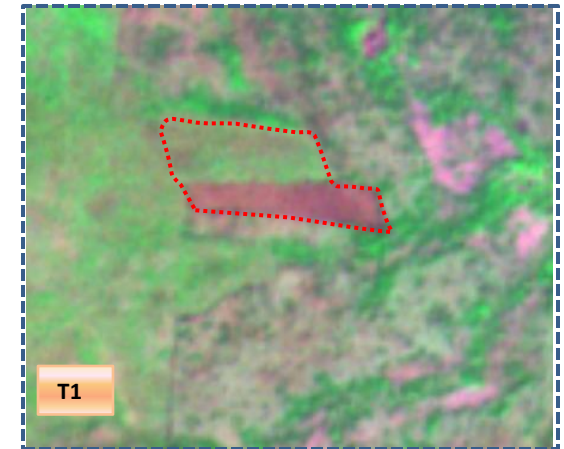


T1: 24th October 2015

Scrub to Agriculture



T0: 2011-12(79°20'50.568"E 15°14'1.964"N)



T1: 24th October 2015

Table showing change matrix depicting Land cover transitions during the 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	55.37										55.37	
Mining/dump		9.65									9.65	
Agriculture	1.38	0.18	2611.35	160.88						0.49	2774.27	
Plantation Horticulture			76.01	150.60						0.03	226.64	
Forest			7.82		179.06						186.88	
Forest Plantation												
Barren Rocky							43.97				43.97	
Scrub	1.68		513.17	24.77				1464.49	1.52	4.04	2009.68	
Waterbody- Streams/River									49.40		49.40	
Waterbody – Ponds										59.66	59.66	
Grand Total	58.43	9.83	3208.35	336.25	179.06		43.97	1464.49	50.92	64.22	5415.53	

- 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 162 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 597 ha of the agriculture area has increased from 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		
Built up	58.43												58.43
Mining/dump		9.83											9.83
Agriculture			3190.64	16.96							0.75		3208.35
Plantation Horticulture			186.03	150.10							0.12		336.25
Forest			0.15		178.91								179.06
Forest Plantation													
Barren Rocky							43.97						43.97
Scrub	0.98		188.83	2.63				1253.53	11.58		6.95		1464.49
Waterbody- Streams/River									50.92				50.92
Waterbody – Ponds											64.22		64.22
Grand Total	59.41	9.83	3565.65	169.69	178.91		43.97	1253.53	62.50		72.03		5415.53

- 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 17 ha of the agriculture area has decreased and it is converted into plantation and water body in T2.
- In T2 375 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	59.41										59.41	
Mining/dump		9.83									9.83	
Agriculture	1.02		3477.77	83.32				0.09		3.45	3565.65	
Plantation Horticulture			70.03	99.67							169.69	
Forest			0.89		148.59	29.43					178.91	
Forest Plantation												
Barren Rocky							43.97				43.97	
Scrub	0.14		142.37	33.50				1076.81		0.71	1253.53	
Waterbody- Streams/River									61.64	0.86	62.50	
Waterbody – Ponds										72.03	72.03	
Grand Total	60.57	9.83	3691.05	216.49	148.59	29.43	43.97	1076.90	61.64	77.06	5415.53	

- 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 87 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T3.
- In T3 213 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	
T3												
Built up	60.57										60.57	
Mining/dump		9.83									9.83	
Agriculture	2.73		3675.98	11.72						0.61	3691.05	
Plantation Horticulture			176.03	40.46							216.49	
Forest					148.59						148.59	
Forest Plantation					29.43						29.43	
Barren Rocky						43.97					43.97	
Scrub	0.96	0.88	83.40					990.47		1.20	1076.90	
Waterbody- Streams/River									61.64		61.64	
Waterbody – Ponds										77.06	77.06	
Grand Total	64.26	10.71	3935.41	52.19	178.02		43.97	990.47	61.64	78.87	5415.53	

- 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 15 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T4.
- In T4 259 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	
T4												
Built up	64.26										64.26	
Mining/dump		10.71									10.71	
Agriculture	0.92		3867.29	66.63						0.57	3935.41	
Plantation Horticulture			37.01	15.18							52.19	
Forest					178.02						178.02	
Forest Plantation												
Barren Rocky							43.97				43.97	
Scrub	0.17	0.57	2.15					986.20		1.37	990.47	
Waterbody- Streams/River									61.64		61.64	
Waterbody – Ponds										78.87	78.87	
Grand Total	65.34	11.28	3906.45	81.81	178.02		43.97	986.20	61.64	80.81	5415.53	

- 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 68 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 39 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 33 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 434, 357, 125 & 244 Hectares From T0 to T1, T1-T2, T2 to T3 & T3-T4 respectively and overall increase of 1,132 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is a decrease of 1,023 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
6. Farm ponds (73) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (77) verified from the portal.