

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -42/2011-12

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

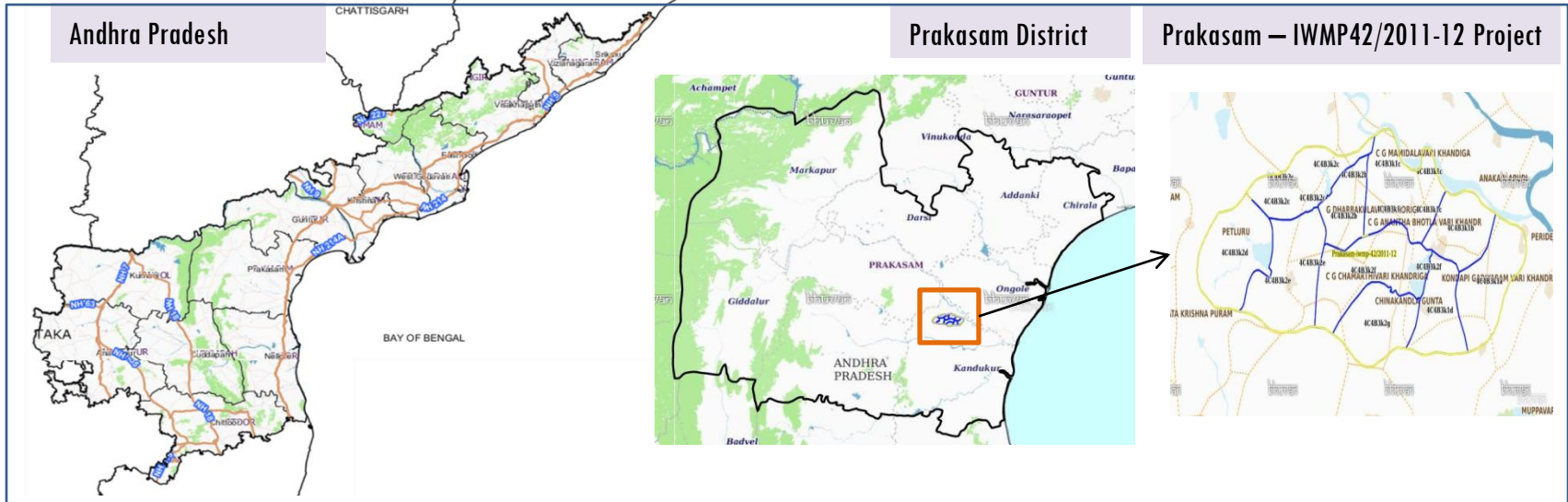
E X E C U T I V E S U M M A R Y

- 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-42/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is 4,793 ha. It comprises of 10 micro watersheds.
- In the project area 164 Drishti photos were uploaded showing 2 agriculture, 1 afforestation, 18 livelihood activities, 2 checks & plugins and 141 others.
- Major percentage i.e. 67% is covered by the agriculture, 15% is covered by scrub land, 6.9% covered by Plantation and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-42/2011-12

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Kondapi Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 4793 ha. It comprises of 10 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.

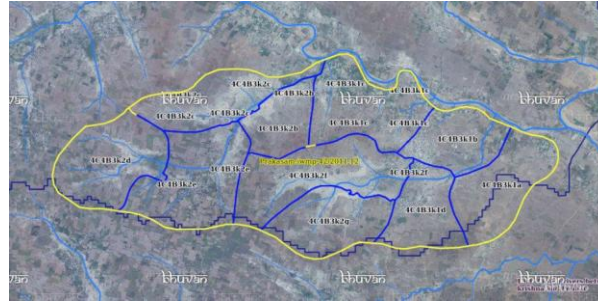
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			05-Feb-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			05-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	164
4	Detailed Project Report		

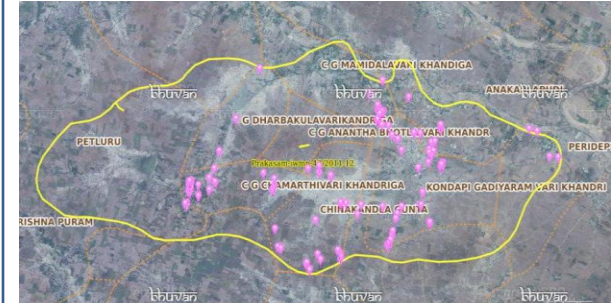
Natural Color Composite overlaid with Project boundaries and high detail stream network



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	2	2
2	Afforestation	1	1
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	2	2
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	0	0
10	Civil work-Check dams/Rock fill dam	0	0
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	18	18
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	146	141
	TOTAL	169	164

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.

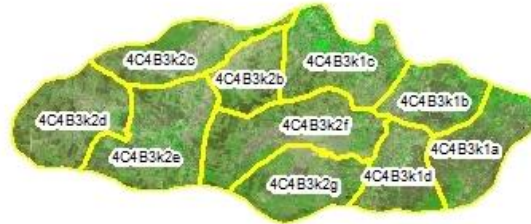
Natural Color Composite

Natural Color Composite- 2011-12



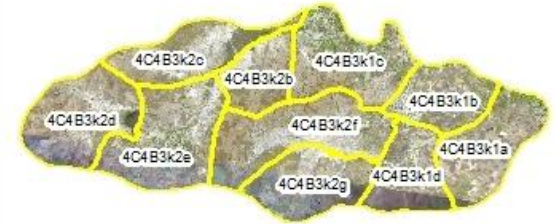
Source: Fusion data, NRSC

Natural Color Composite-03rd May 2016



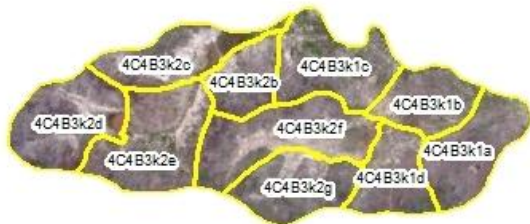
Source: LISS-IV, NRSC

Natural Color Composite- 03rd March 2017



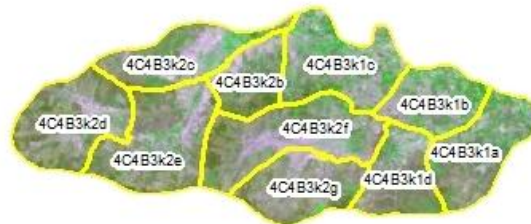
Source: NCC, NRSC

Natural Color Composite-03rd December 2017



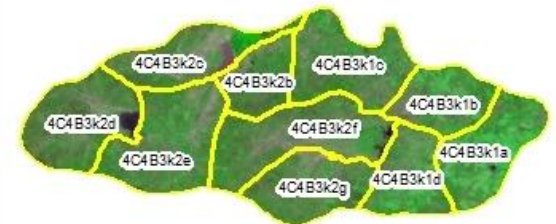
Source: NCC, NRSC

Natural Color Composite- 23rd February 2019



Source: LISS-IV, NRSC

Natural Color Composite- 05 th February 2020



Source: LISS-IV, NRSC

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-42/2011-12



T0:2011-12



T1: 03 May 2016



Drishti Sl no. 818789_ MWS :4C4B3k1c

Check dam



T0:2011-12



T1: 03 May 2016



Drishti Sl no. 7017228 MWS : 4C4B3k2e

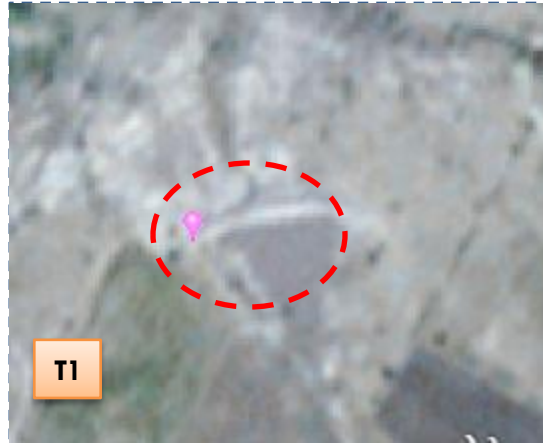
Percolation Tank

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-42/2011-12



T0

T0: 2011-12



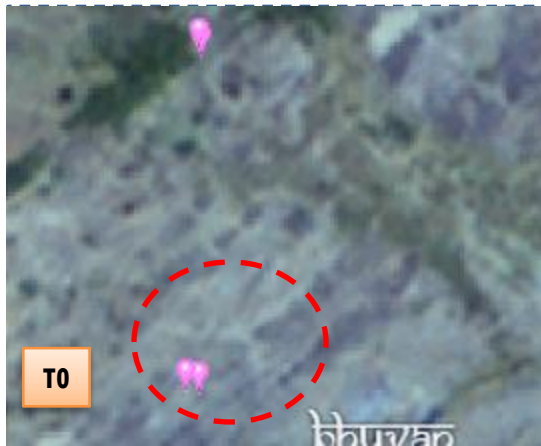
T1

T1: 03 May 2016



Drishti Sl no. 7017241 MWS :

Percolation Tank



T0

T0: 2011-12



T1

T1: 03 May 2016



Drishti Sl no. 7017262 MWS :4C4B3k2f

Percolation Tank

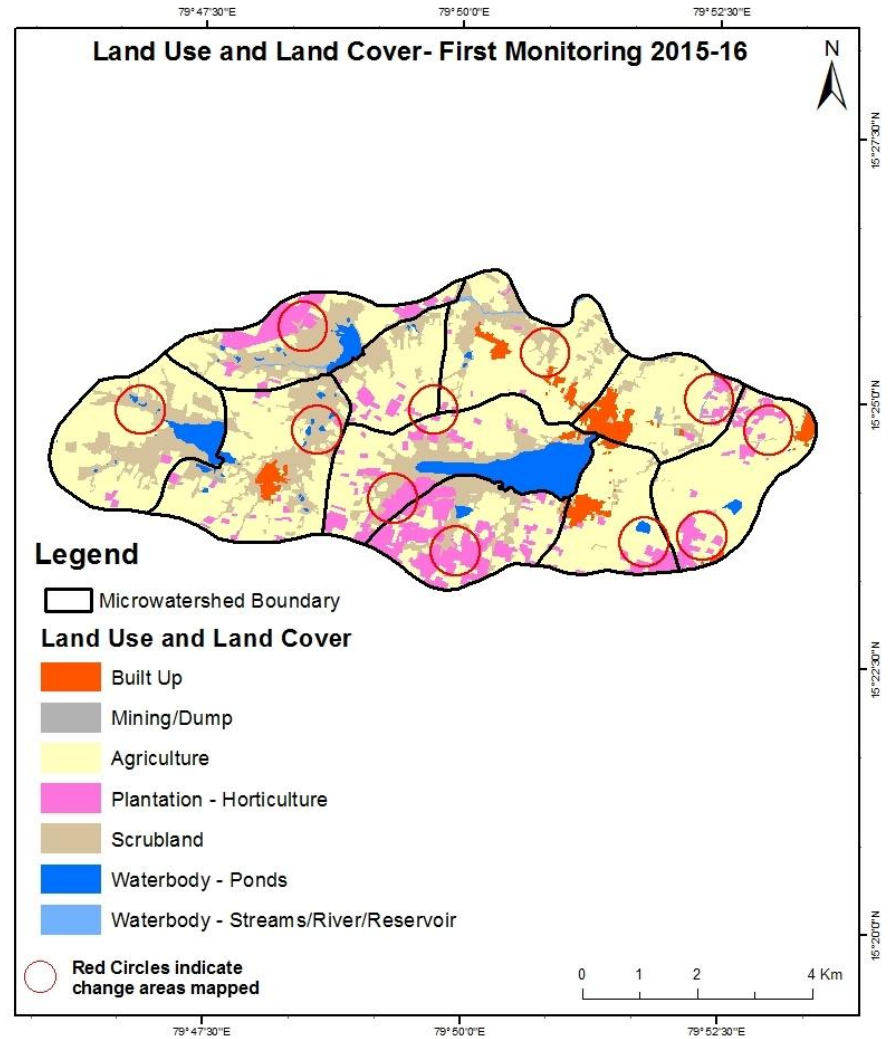
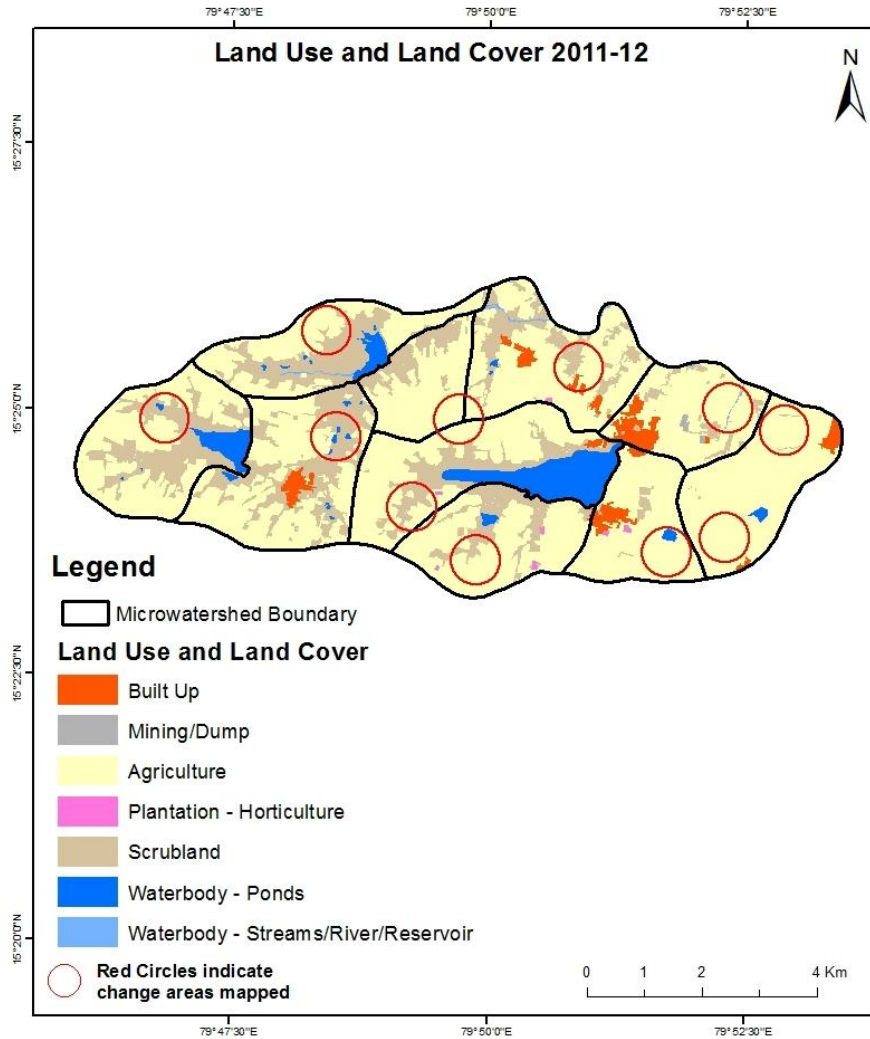
MONITORING IN THE PROJECT AREA

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) .

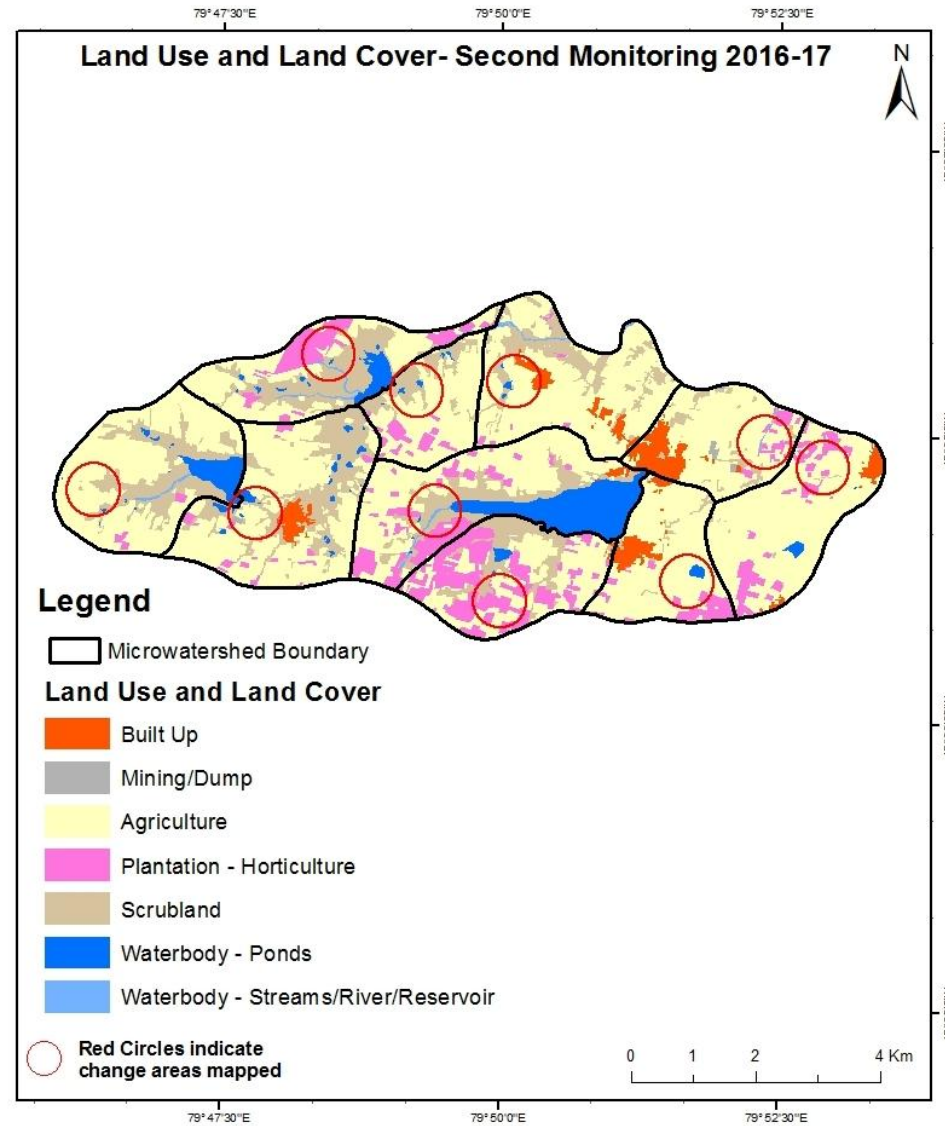
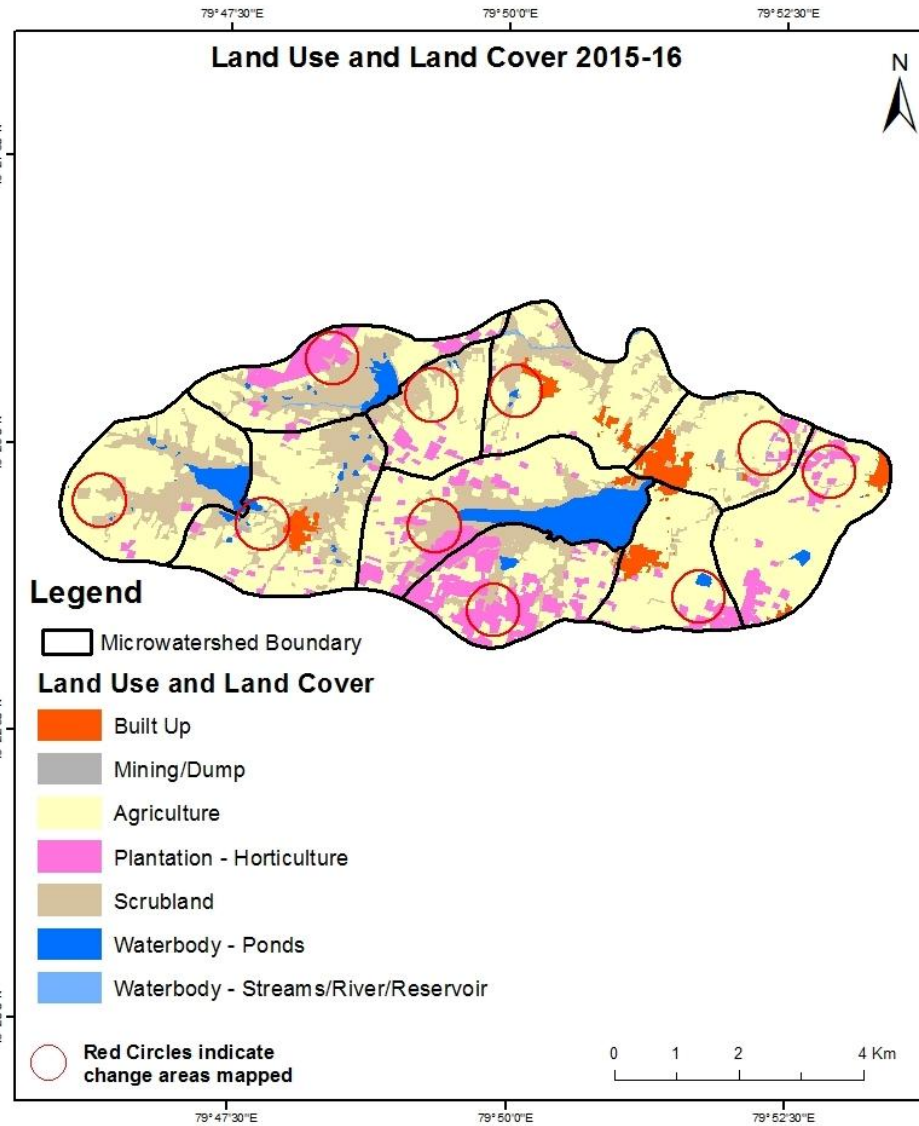
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



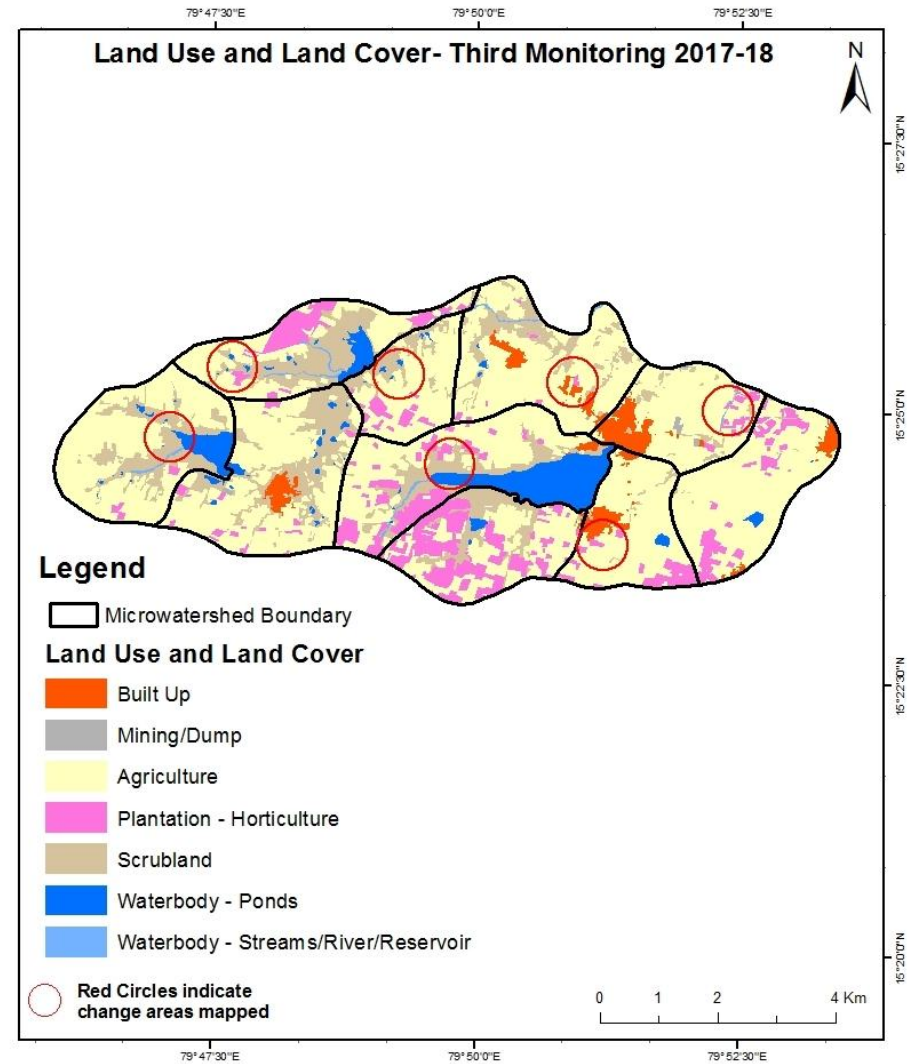
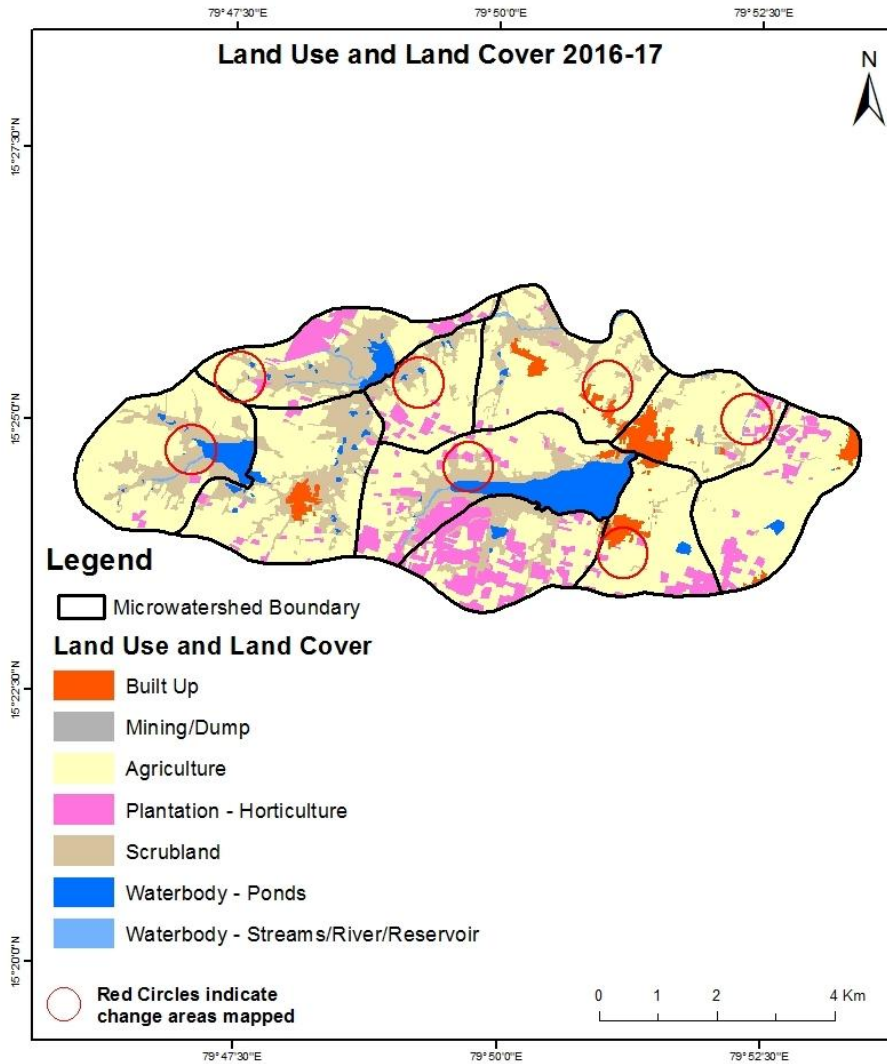
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



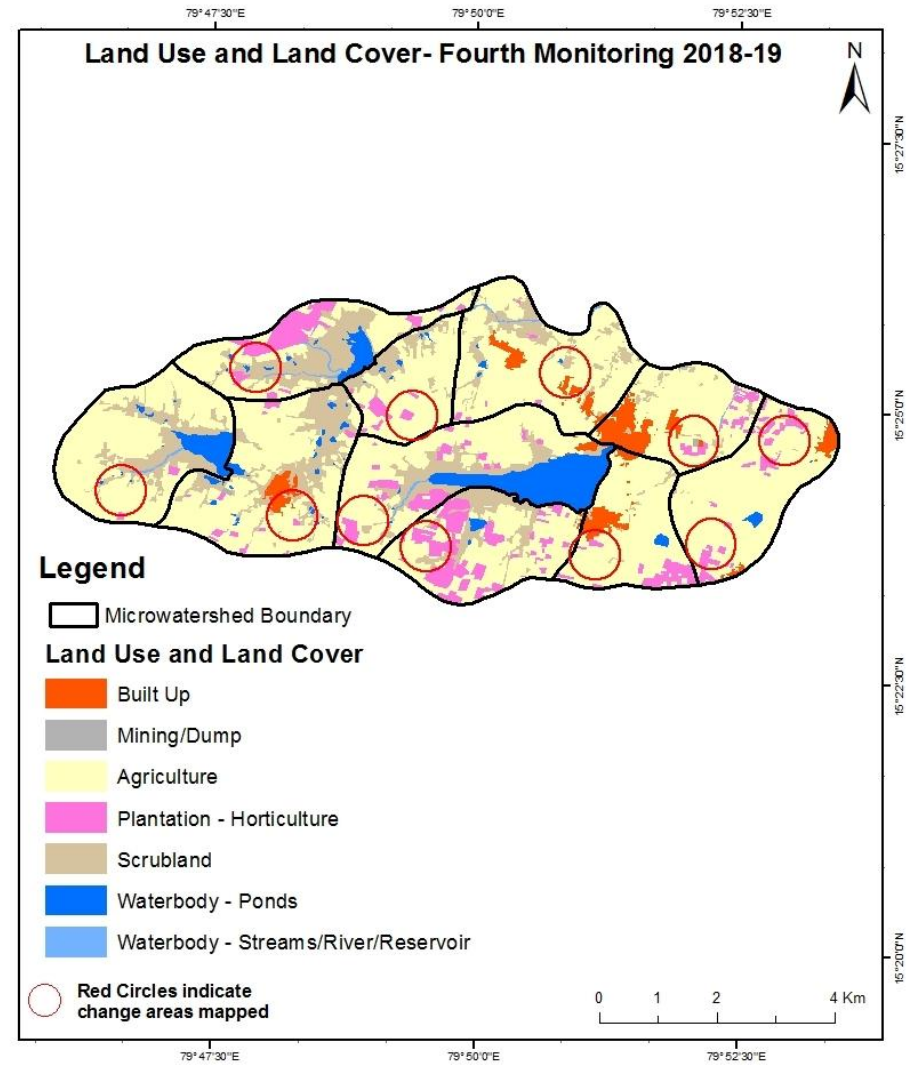
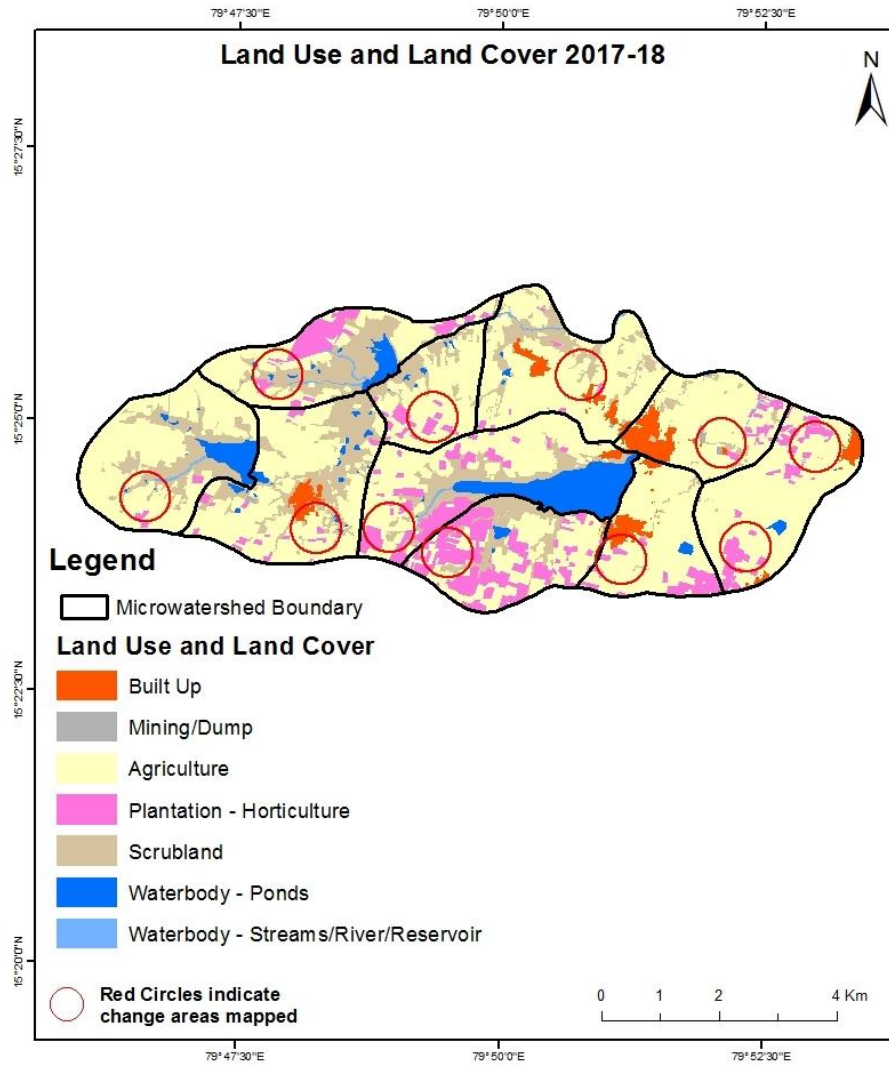
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



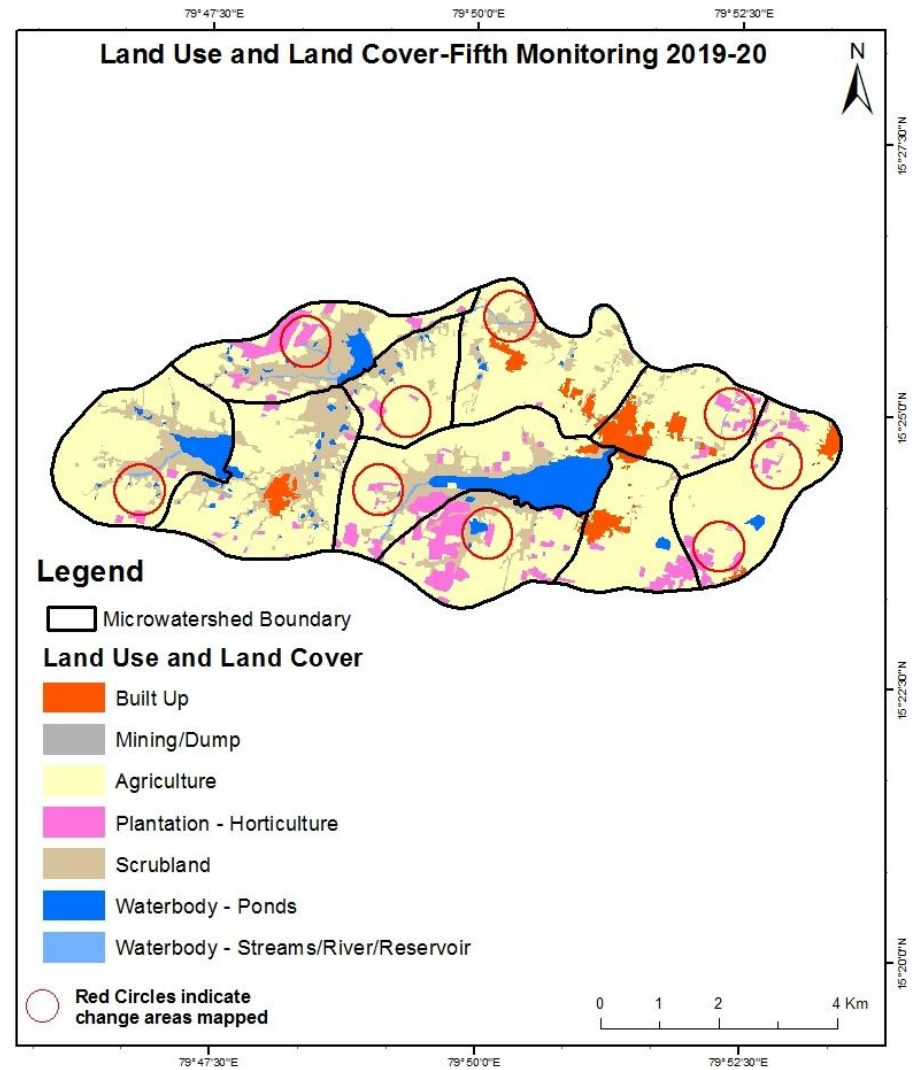
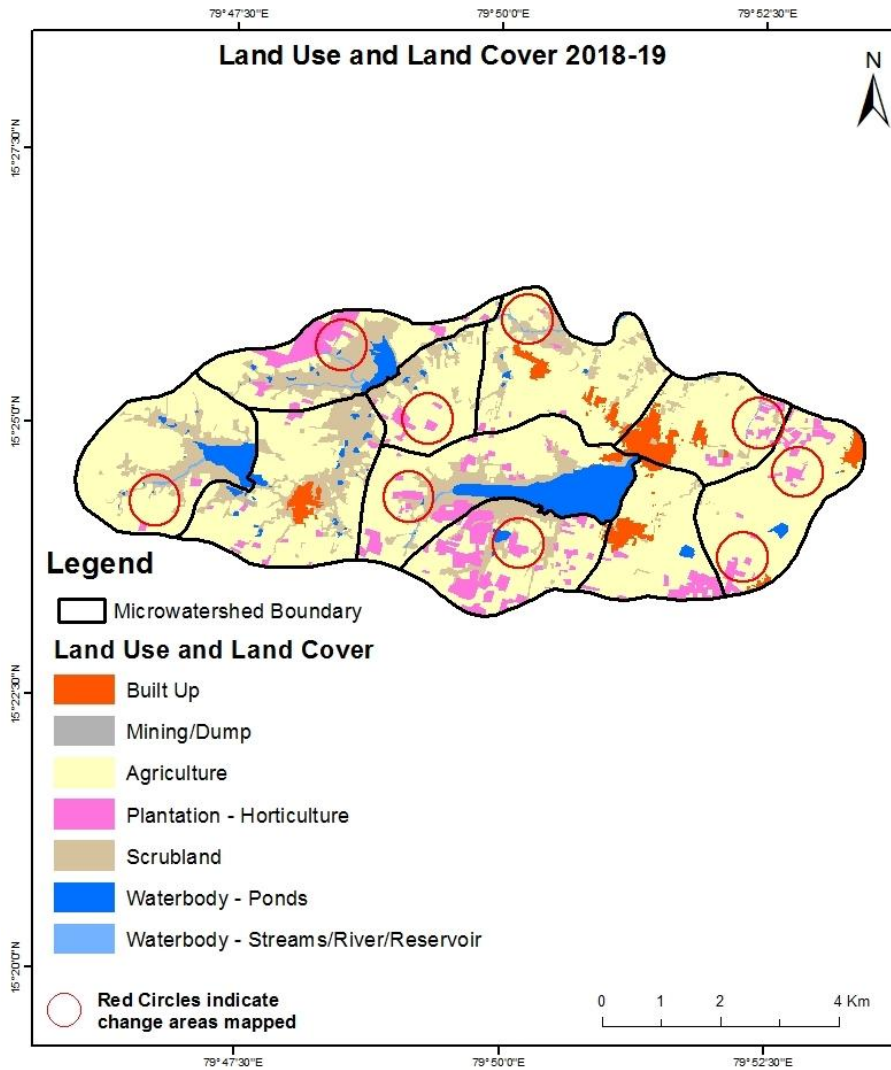
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

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

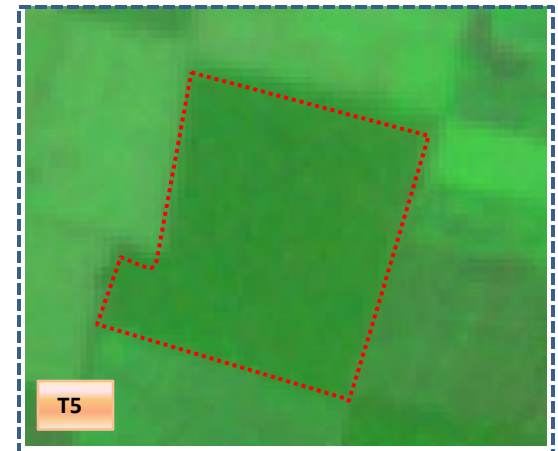


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

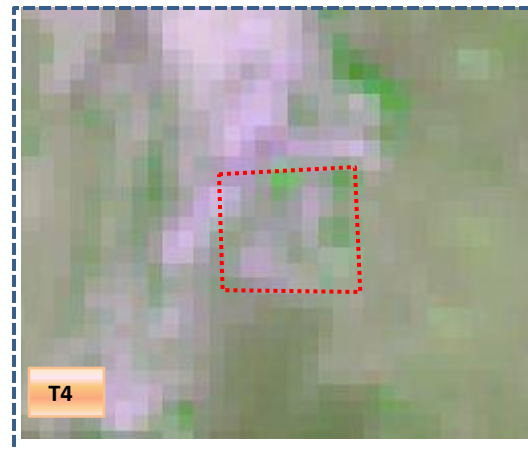


T4: 2018-19 (79°51'59.563"E 15°23'51.732"N)

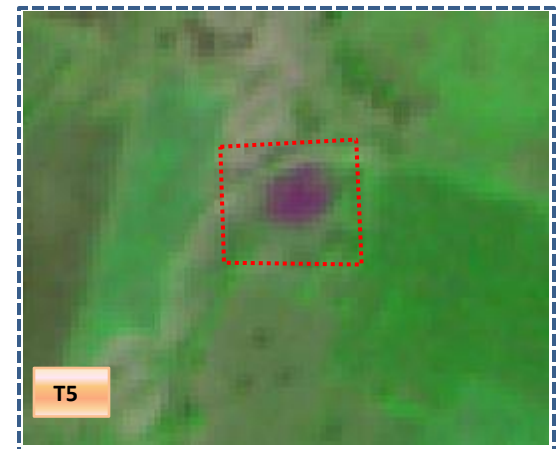


T5: 05 February 2020

Agriculture to Waterbody



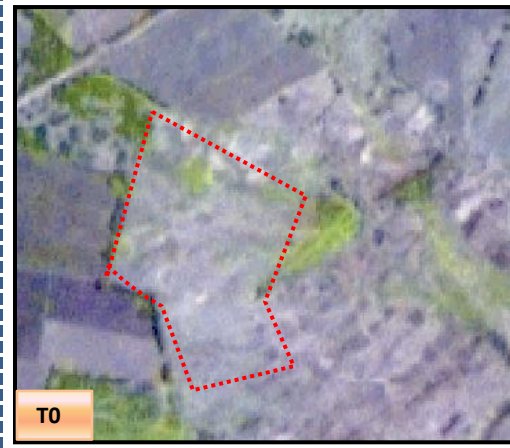
T5: 2018-19 (79°46'59.713"E 15°24'15.348"N)



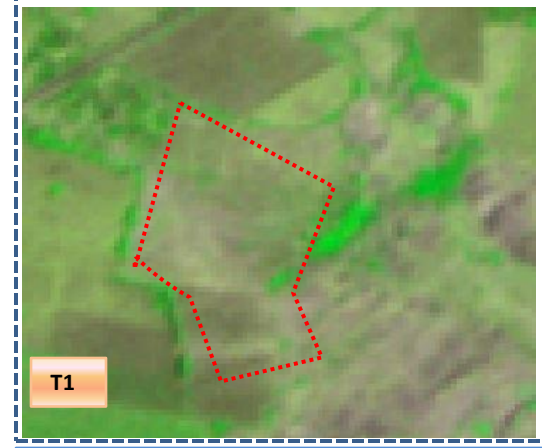
T5: 05 February 2020

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

Scrub To Agriculture



T0: 2011-12 (79°49'16.772"E 15°24'27.517"N)



T1: 03 May 2016

Scrub to Agriculture



T0: 2011-12 (79°52'26.959"E 15°24'41.472"N)



T1: 03 May 2016

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

Agriculture to Plantation

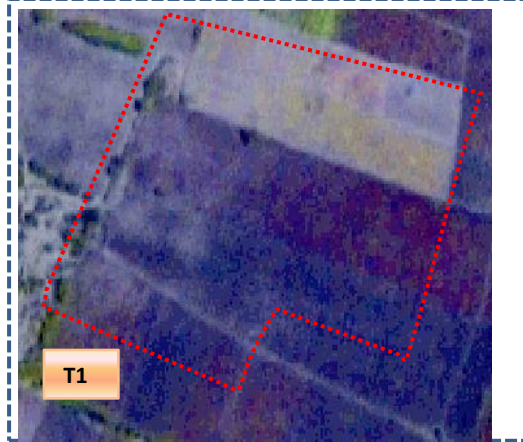


T0: 2011-12 (79°48'44.26"E 15°23'53.045"N)



T1: 03 May 2016

Agriculture to Plantation



T0: 2011-12(79°48'44.393"E 15°23'53.624"N)



T1: 03 May 2016

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	131.63												131.63
Mining/dump		5.16											5.16
Agriculture	19.23	1.64	2765.27	526.35				32.07		0.29			3344.86
Plantation Horticulture				6.68									6.68
Forest													
Forest Plantation													
Barren Rocky													
Scrub	4.75		115.24	9.39				902.41		9.65			1041.44
Waterbody- Streams/River									23.28				23.28
Waterbody – Ponds										239.87			239.87
Grand Total	155.61	6.80	2880.51	542.42				934.48	23.28	249.81			4792.91

- 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 547 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 188 ha of the agriculture area has increased from 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	155.61												155.61
Mining/dump		6.80											6.80
Agriculture	2.46		2858.49	16.67				2.84		0.03			2880.51
Plantation Horticulture			55.09	487.34									542.42
Forest													
Forest Plantation													
Barren Rocky													
Scrub	0.50		57.98					859.77	11.35	4.87			934.48
Waterbody- Streams/River									23.28				23.28
Waterbody – Ponds										249.81			249.81
Grand Total	158.58	6.80	2971.56	504.01				862.62	34.63	254.71			4792.91

- 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 19 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T2.
- In T2 113 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	158.58										158.58	
Mining/dump		6.80									6.80	
Agriculture	2.25		2951.82	15.47				2.03			2971.56	
Plantation Horticulture	0.06		11.20	492.75							504.01	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.34		54.80					806.00		1.48	862.62	
Waterbody- Streams/River			0.51						34.12		34.63	
Waterbody – Ponds			0.09							254.62	254.71	
Grand Total	161.22	6.80	3018.42	508.21				808.03	34.12	256.10	4792.91	

- 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 17 ha of the agriculture area has decreased and it is converted into Built-up , plantations and scrubland in T3.
- In T3 66 ha of the agriculture area has increased from plantations, scrubland and water body 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	161.22										161.22	
Mining/dump	3.43	3.37									6.80	
Agriculture	6.16		2992.70	19.18						0.38	3018.42	
Plantation Horticulture			154.06	354.15							508.21	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.72		53.13					752.46		1.72	808.03	
Waterbody- Streams/River									34.12		34.12	
Waterbody – Ponds	0.04									256.06	256.10	
Grand Total	171.58	3.37	3199.89	373.33				752.46	34.12	258.17	4792.91	

- 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 25 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 207 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	171.58										171.58	
Mining/dump		3.37									3.37	
Agriculture	6.04	0.27	3122.41	62.62				5.41		3.13	3199.89	
Plantation Horticulture			103.44	269.51						0.38	373.33	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.07	0.37	14.17					734.49		3.36	752.46	
Waterbody- Streams/River									34.12		34.12	
Waterbody – Ponds			1.60							256.56	258.17	
Grand Total	177.69	4.01	3241.62	332.13				739.90	34.12	263.44	4792.91	

- 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 72 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 119 ha of the agriculture area has increased from plantations, scrubland and water body 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 34 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 91, 46, 181 & 41 Hectares From T1 to T2, T2-T3, T3 to T4 & T4-T5 respectively and there is a decrease of 464 ha during T0 to T1 and overall 103 ha of the cropland area has decreased as compared between baseline LU/LC data of 2011-12 (T0) & 2019-20 (T5) years.
5. There is an **increase of 325 ha of the Plantation/Horticulture** area in between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 301 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.