

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

Srikakulam -07/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
February-2021

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

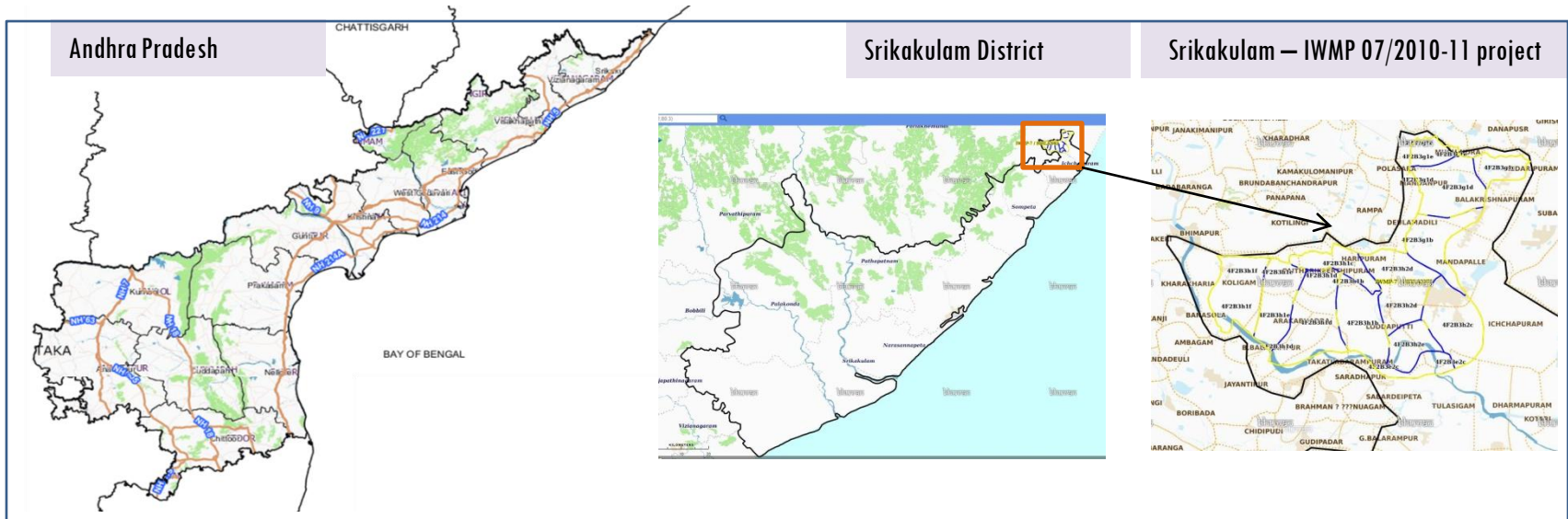
E X E C U T I V E S U M M A R Y

- 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-07/2010-11, Srikakulam District of Andhra Pradesh. The total geographical area of the project is 4,022.02 ha. It comprises of 13 micro watersheds.
- In the project area 45 Drishti photos were uploaded showing 3 Agriculture/horticulture, 20 aforestation, 11 check dams/checks & plugins, 7 farm ponds etc, and remaining showing other activities.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 7 new farm ponds or dug out pits and 11 check dams/checks & plugins and drainage treatments with 26.17 ha increase in the area.
- Major percentage i.e. 69.66% is covered by the agriculture, 6.54% is covered by plantation, 6.54% is covered by scrubland and remaining by other land use classes.

PROJECT : SRIKAKULAM - IWMP-07/2010-11

DISTRICT : SRIKAKULAM , STATE : ANDHRA PRADESH

- The study area falls in Ichchapuram Mandal of Srikakulam district of Andhra Pradesh state. The total geographical area of the project is 4,022.02 ha. It comprises of 13 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (*Batch -1*) projects taking 2018-19 (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.

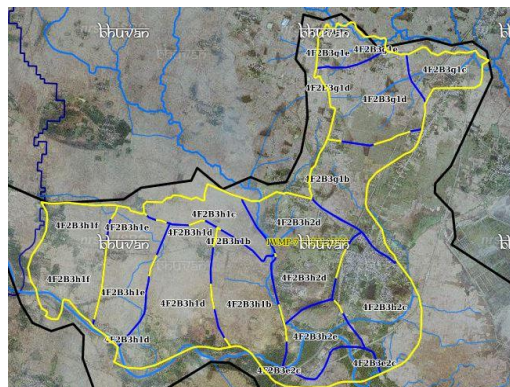
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			14-Dec-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			14-Dec-18
SCENE2			
SCENE 3			

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	45
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

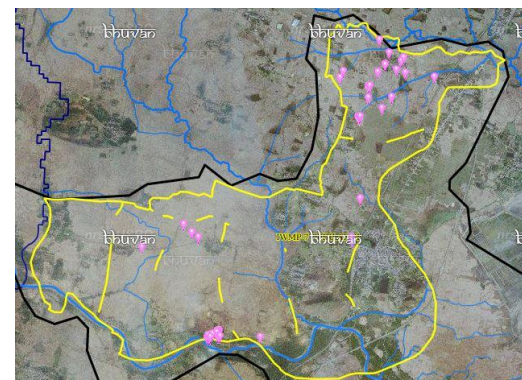


MWS Boundary



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	22	20
3	Black planting	0	0
4	Bund Planting	0	0
5	Checkdam	7	7
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	4	4
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	7	7
11	Civil work-Check dams /Rock fill dam	0	0
12	Drainage treatment /Nala Revetment, loose boulder structure, gully check	0	0
13	Land Developments (afforestation, horticulture and bund plantation of teak)	0	0
14	Lm	2	2
15	Soil moisture conservation	0	0
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity	0	0
18	Others	2	2
	TOTAL	47	45

MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

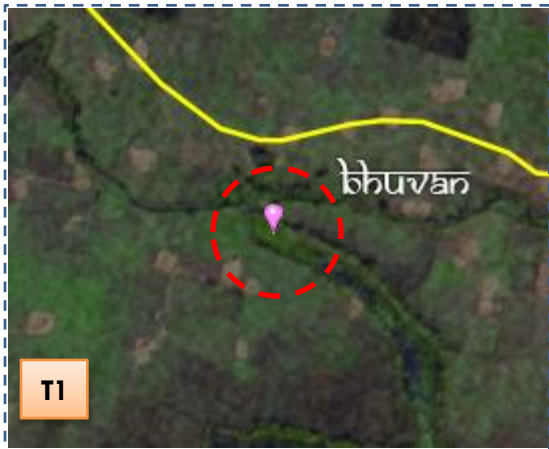
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2010-11) and T5 is 2018-19 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-07/2010-11



T0

T0:2010-11



T1

T1: 27 December 2014



Drishti SI no. 129900 MWS :4F2B3g1e

Afforestation



T0:2010-11



T1

T1: 27 December 2014



Drishti SI no. 130501 MWS :4F2B3g1d

Farm pond

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-07/2010-11



T0

T0: 2010-11



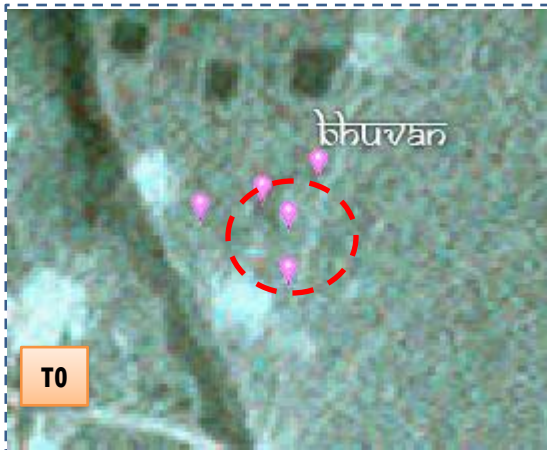
T1

T1: 27 December 2014



Drishti Sl no. 130510 MWS :4F2B3g1d

Farm pond



T0

T0: 2010-11



T1

T1: 27 December 2014



Drishti Sl no. 2512166 MWS : 4F2B3g1d

Farm pond

Srikakulam-IWMP-07/2010-11

2009-10



Dec-2014



March-2017

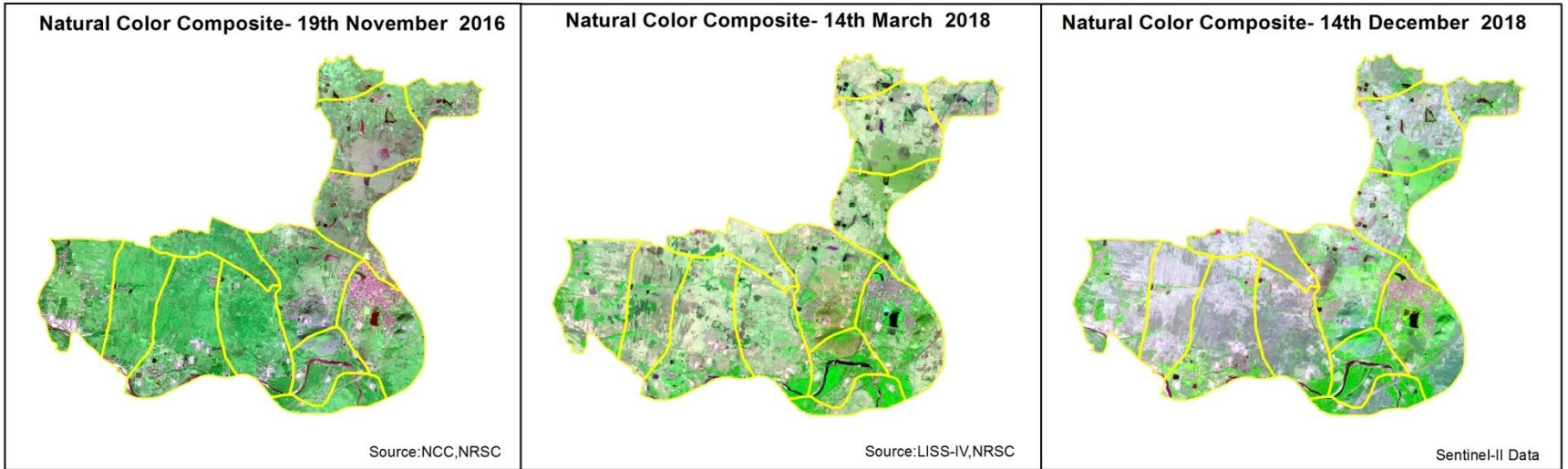
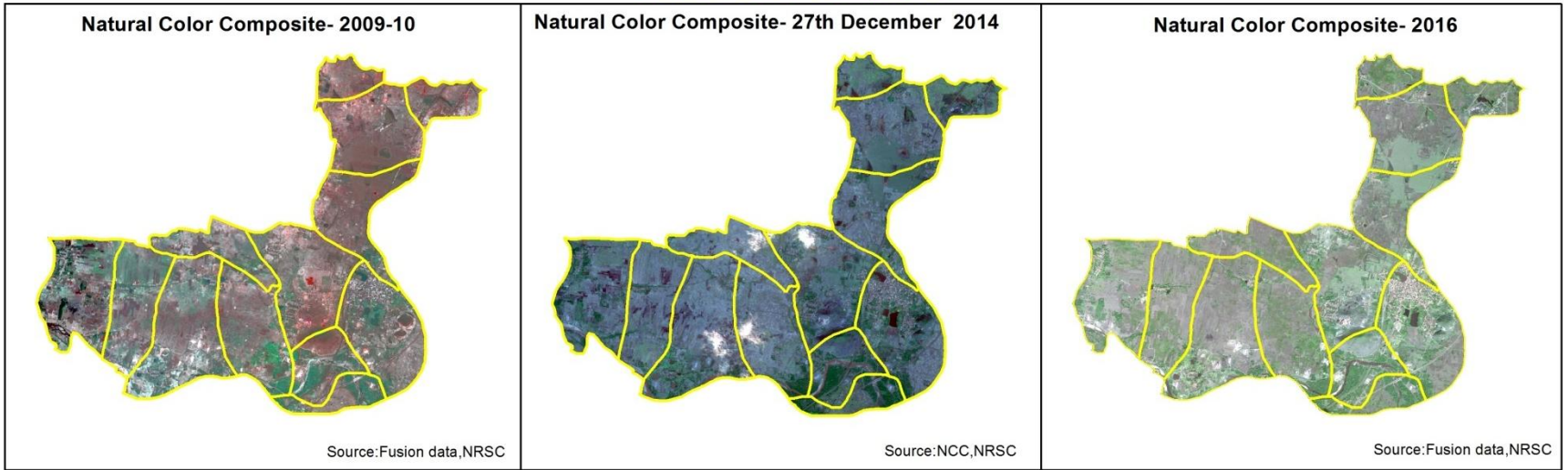


Jan-2019



Activity : Farm pond

Natural Color Composite – 2009-10 to 2017-18



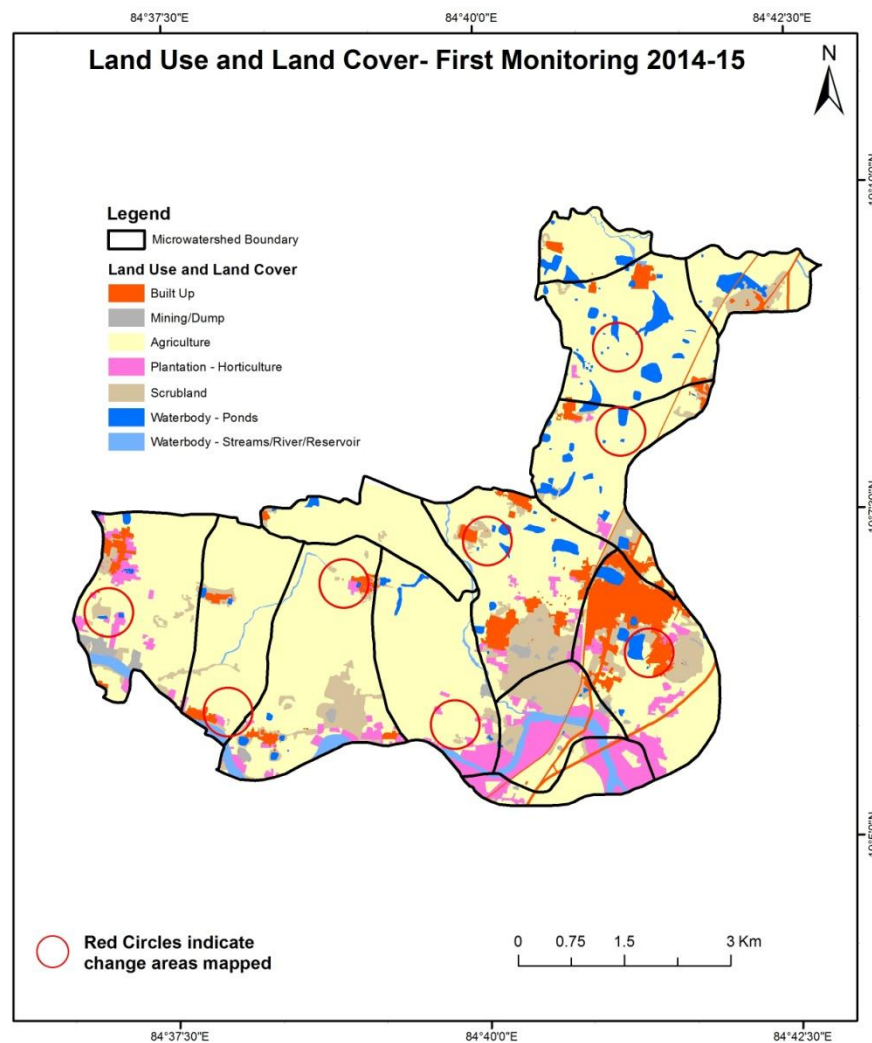
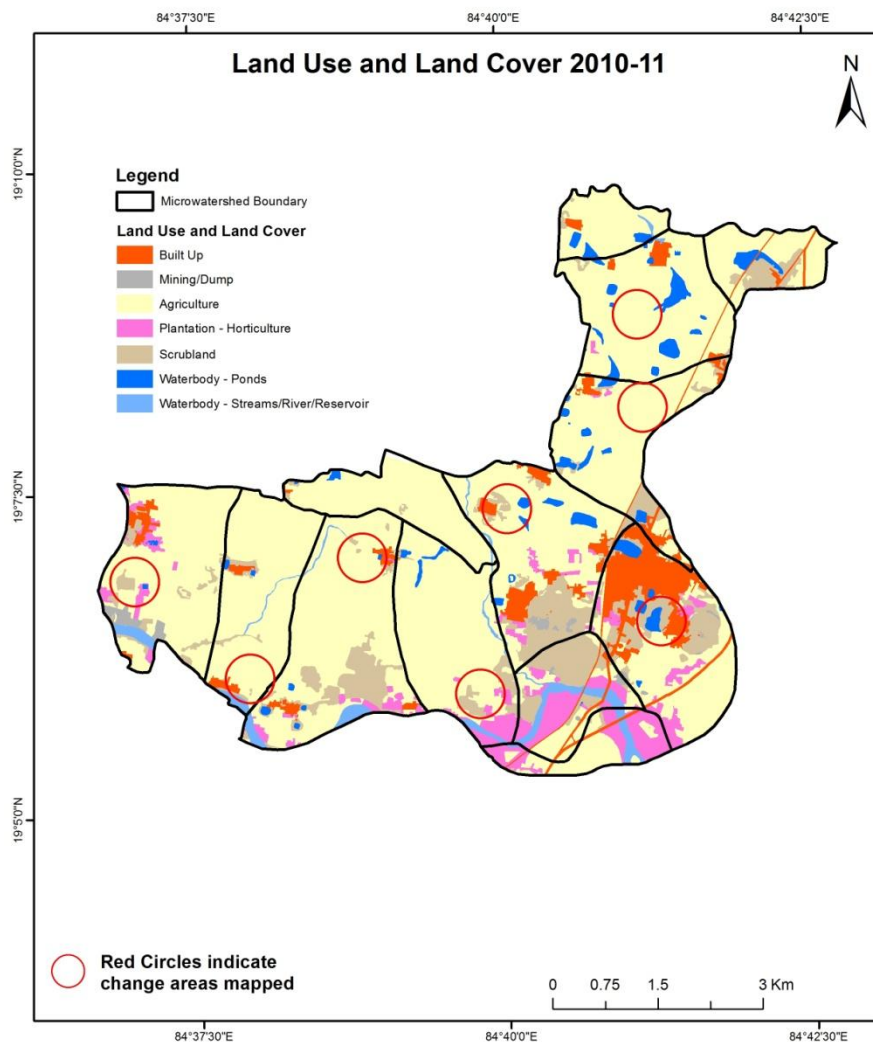
MONITORING IN THE PROJECT AREA

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 (2010-11) and row represents the T5 (2018-19)

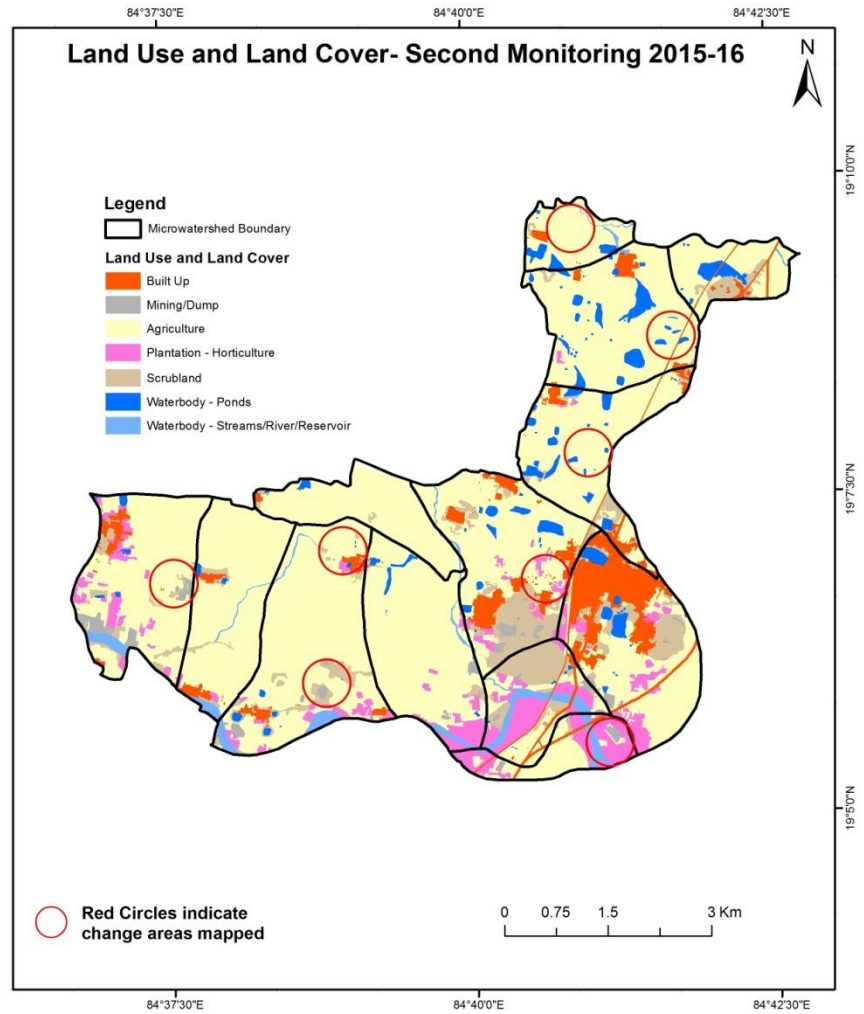
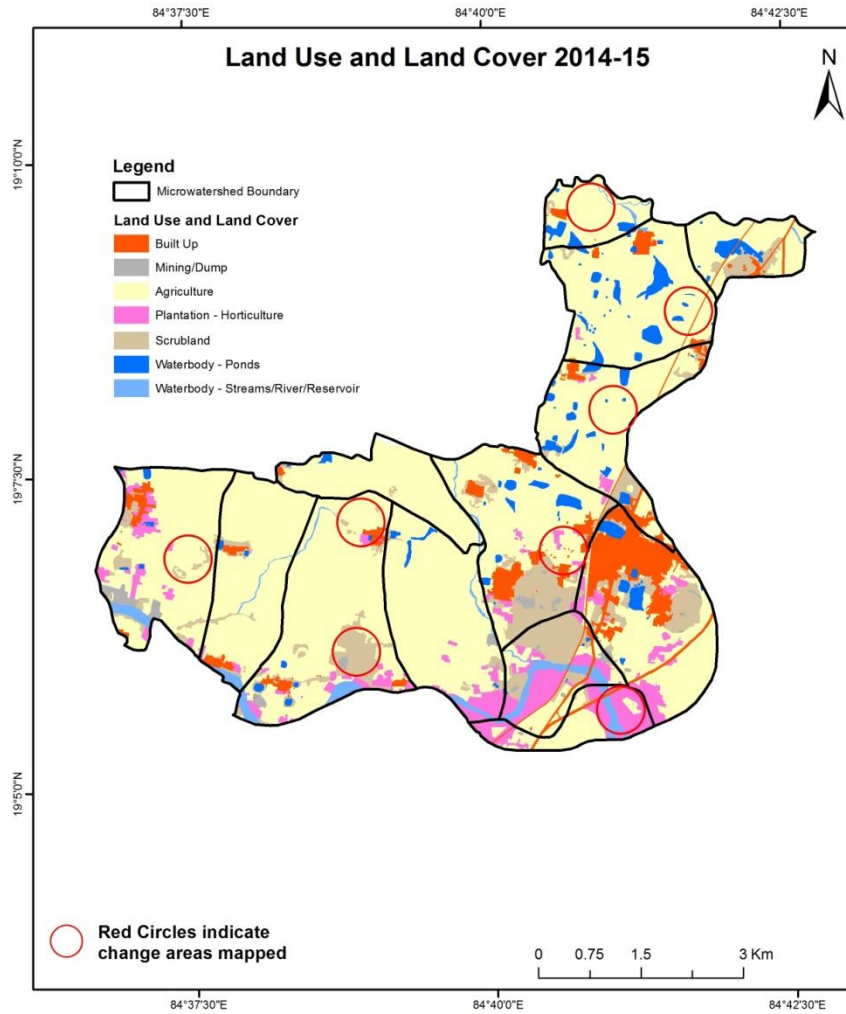
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



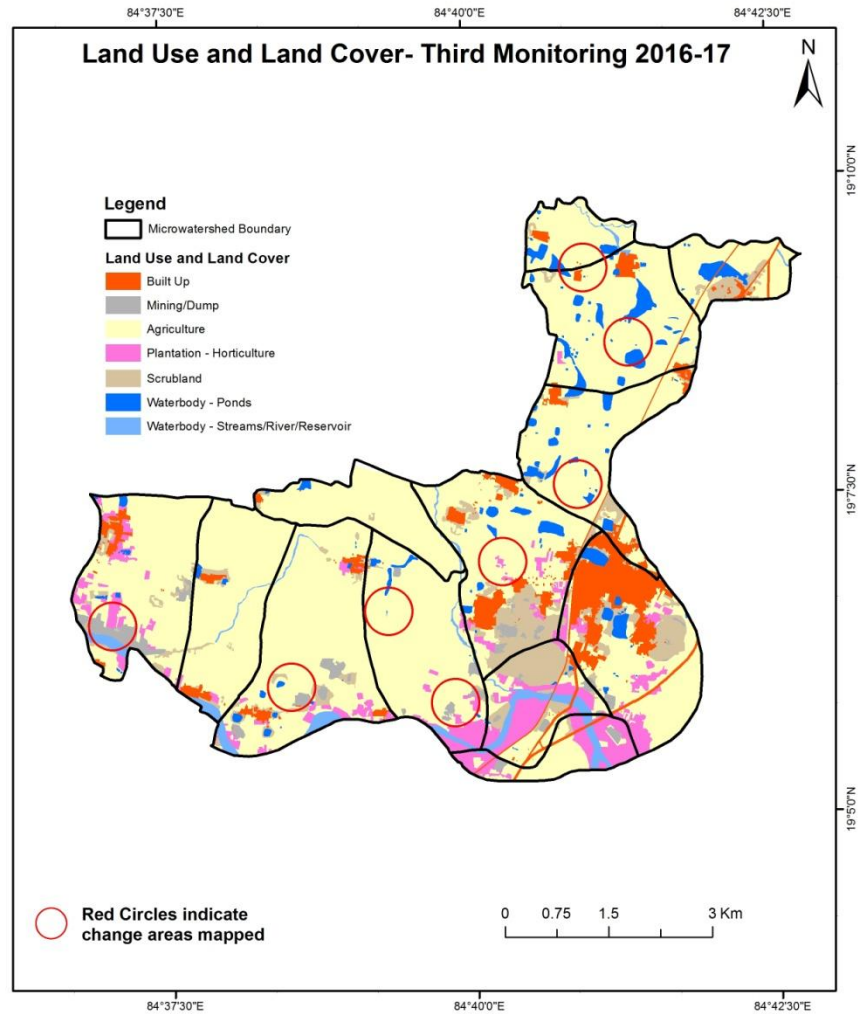
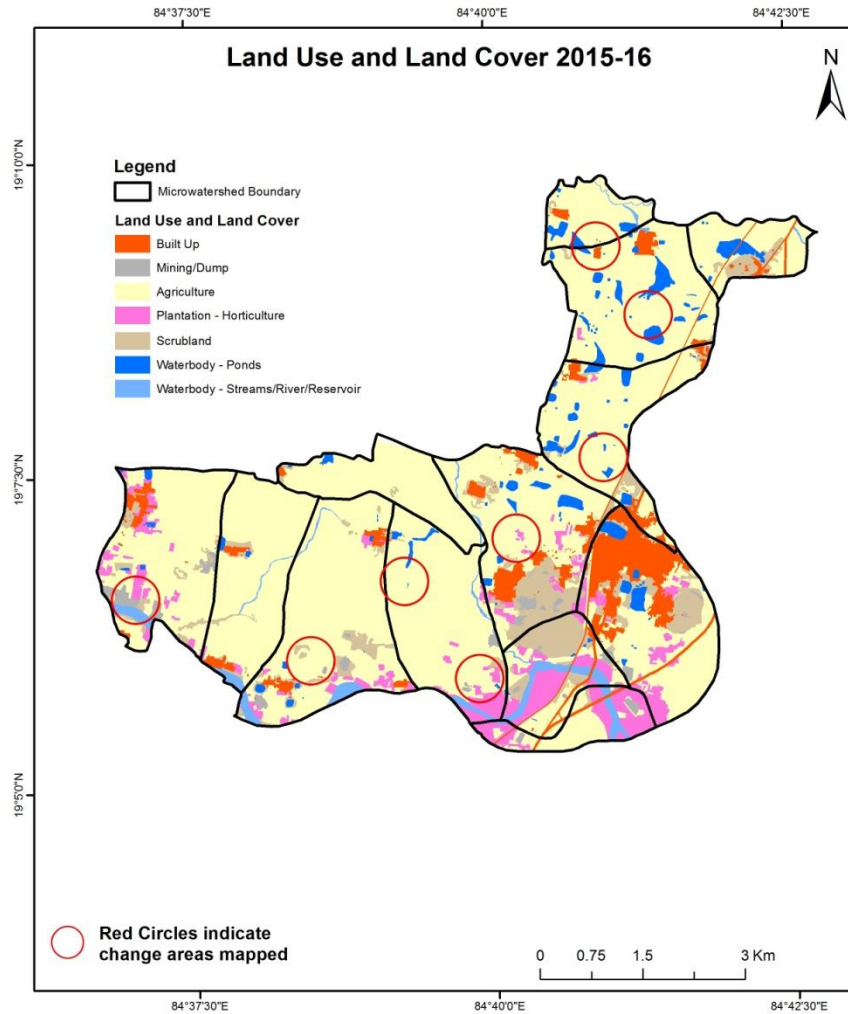
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



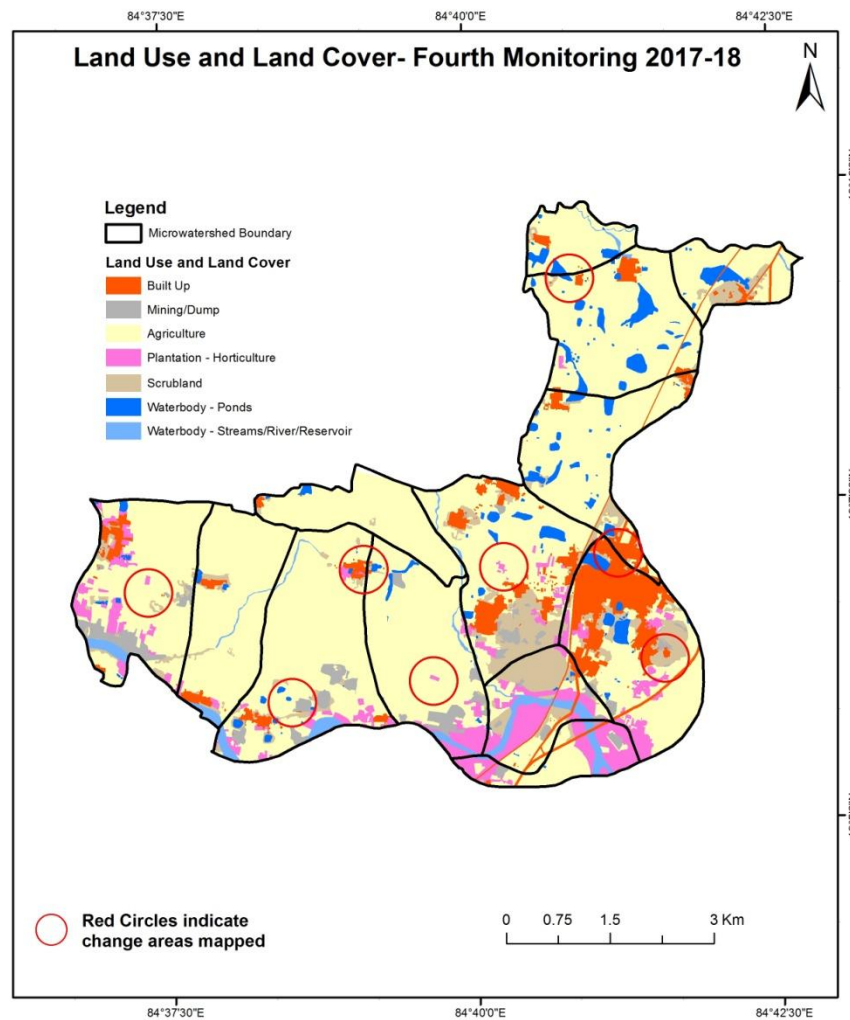
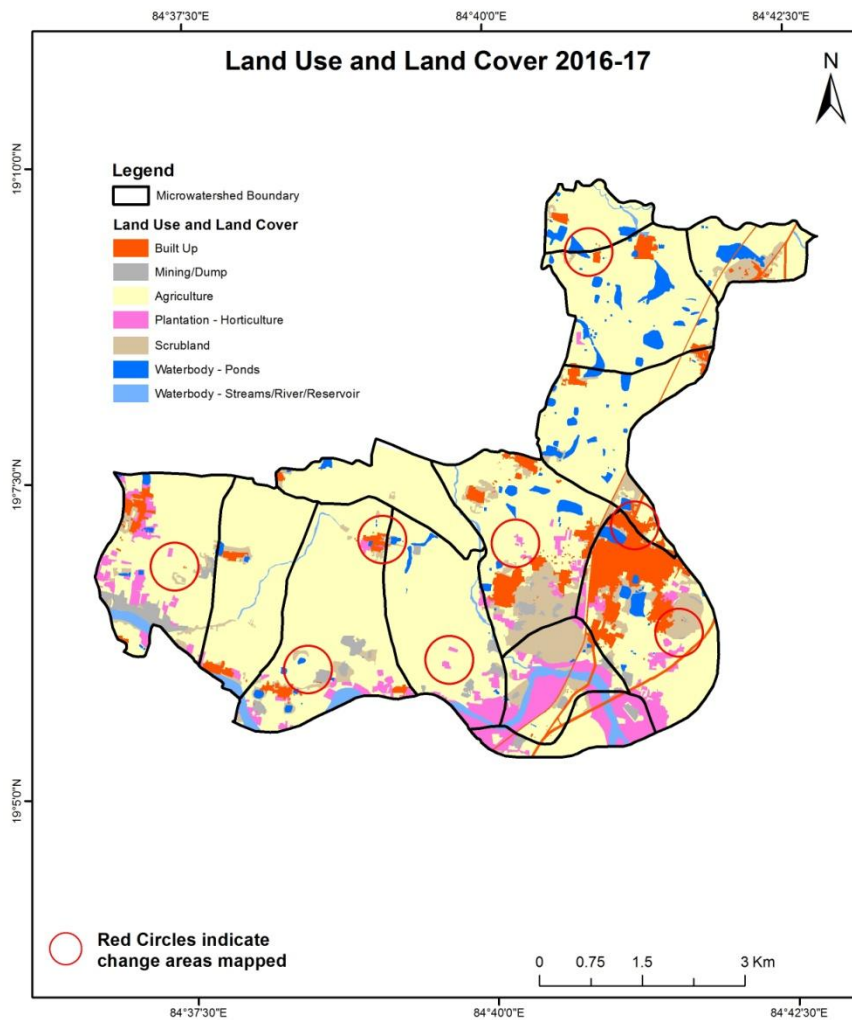
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



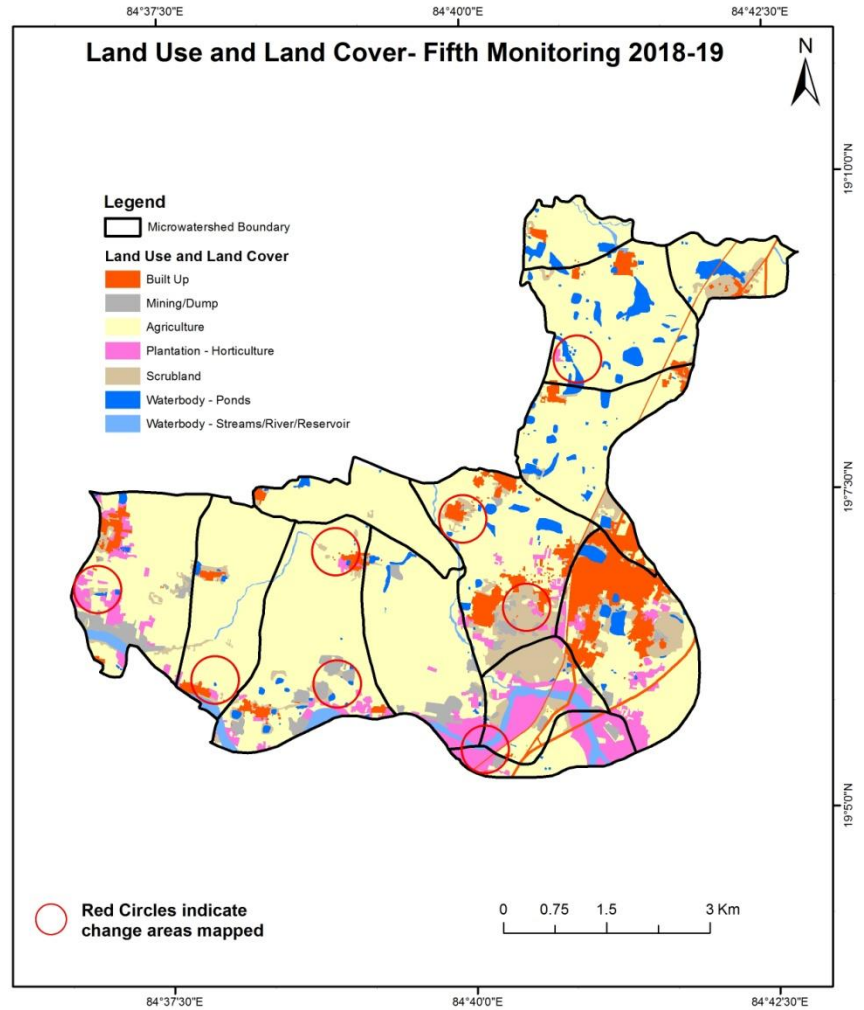
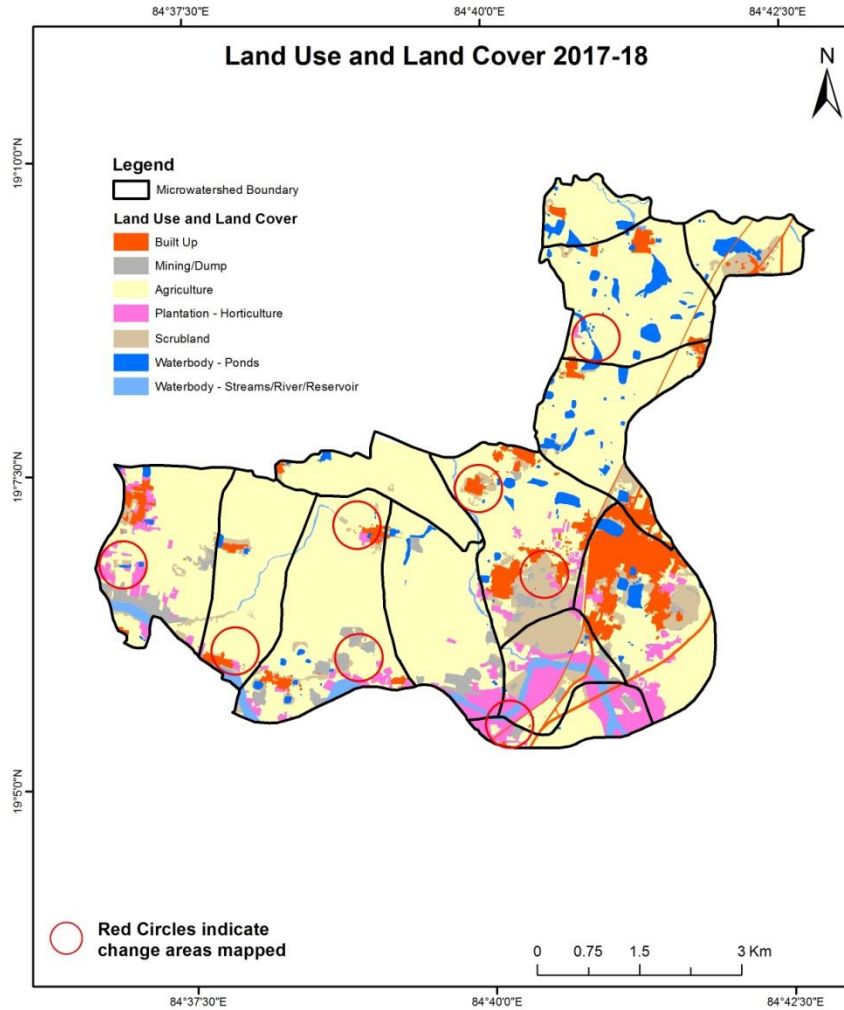
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



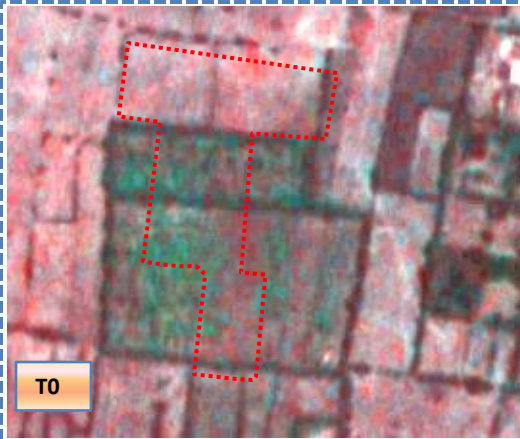
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



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

Agriculture to Plantation



T0

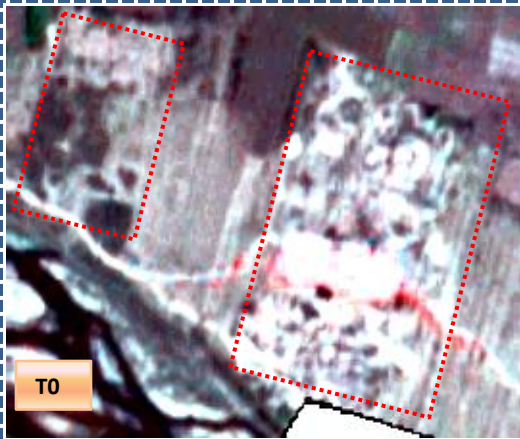
T0: 2010-11



T1

T1: 27 December 2014

Scrub to Agriculture



T0

T0: 2010-11



T1

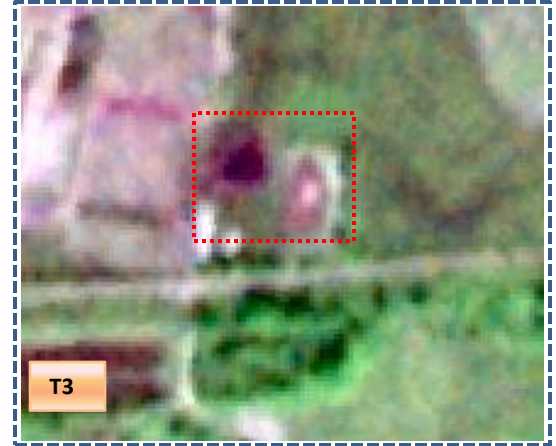
T1: 27 December 2014

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

Agriculture to Water body

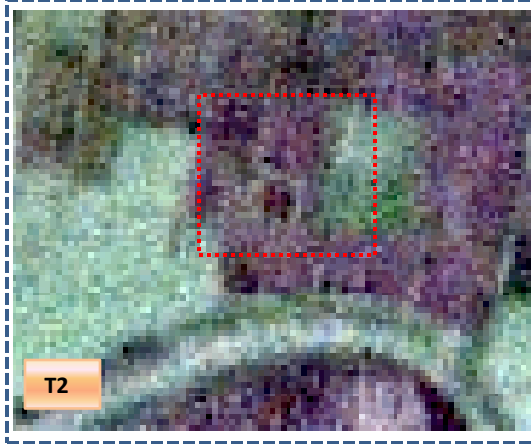


T2: 2015-16(84°38'39.592"E 19°5'55.63"N)

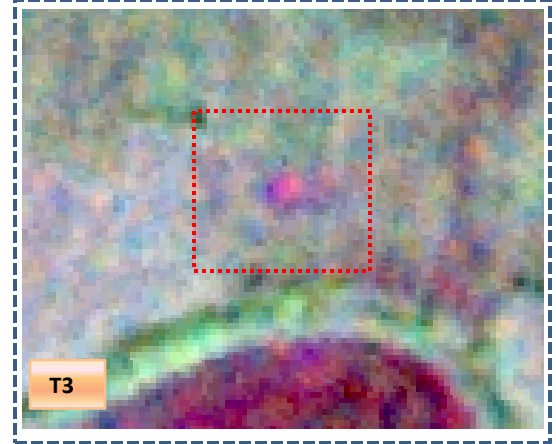


T3: 19 November 2016

Agriculture to Water body



T2: 2015-16(84°41'23.564"E 19°8'40.071"N)



T3: 19 November 2016

Table showing change matrix depicting Land cover transitions during study period-2010-11 to 2014-15

Land cover	Monitoring period (T1)										
	Units in Hectares										Grand Total
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	
Built up	268.85										268.85
Mining/dump		26.65									26.65
Agriculture	9.55	3.84	2795.21	34.93					2.55	19.82	2865.89
Plantation Horticulture	0.31		6.64	218.04							224.99
Forest											
Forest Plantation											
Barren Rocky											
Scrub	4.40	5.86	42.50	2.16				371.21		6.57	432.70
Waterbody- Streams/River									89.34		89.34
Waterbody – Ponds										113.60	113.60
Grand Total	283.11	36.35	2844.34	255.13				371.21	91.89	139.98	4022.02

- 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 70.69 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T1.
- In T1 49.14 ha of agriculture are increased from plantation 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-2014-15 to 2015-16

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	283.11										283.11	
Mining/dump		36.35									36.35	
Agriculture	3.38	11.21	2808.67	18.41						2.67	2844.34	
Plantation Horticulture	0.72		17.11	237.20						0.10	255.13	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	6.00	4.51	46.36	2.00				311.21		1.13	371.21	
Waterbody- Streams/River									91.89		91.89	
Waterbody – Ponds			0.11							139.87	139.98	
Grand Total	293.22	52.07	2872.25	257.61				311.21	91.89	143.78	4022.02	

- 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 35.67 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 63.58 ha of agriculture are increased from plantation, scrubland and water body 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-2015-16 to 2016-17

Land cover	Monitoring period (T3)										
	Units in Hectares										
T2	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	293.22										293.22
Mining/dump		52.07									52.07
Agriculture	2.01	18.79	2843.95	4.69						2.82	2872.25
Plantation Horticulture	0.17		3.50	253.80						0.14	257.61
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.70	11.64	11.69	0.71				285.39		1.08	311.21
Waterbody- Streams/River									91.89		91.89
Waterbody – Ponds										143.78	143.78
Grand Total	296.10	82.49	2859.13	259.19				285.39	91.89	147.83	4022.02

- 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 28.30 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T3.
- In T3 15.19 ha of agriculture are increased from plantation 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-2016-17 to 2017-18

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	296.10										296.10	
Mining/dump		82.49									82.49	
Agriculture	19.42	25.45	2811.97	1.22						1.08	2859.13	
Plantation Horticulture	1.58		1.68	255.93							259.19	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	3.28	8.52						273.53		0.05	285.39	
Waterbody- Streams/River									91.89		91.89	
Waterbody – Ponds										147.83	147.83	
Grand Total	320.37	116.46	2813.65	257.15				273.53	91.89	148.96	4022.02	

- 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 47.17 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T4.
- In T4 1.68 ha of agriculture are increased from plantation 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-2017-18 to 2018-19

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	320.37										320.37	
Mining/dump		115.31								1.15	116.46	
Agriculture	3.43	2.86	2794.77	4.98						7.62	2813.65	
Plantation Horticulture				256.92						0.24	257.15	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	1.60	0.53	6.44	0.96				262.96		1.04	273.53	
Waterbody- Streams/River									91.89		91.89	
Waterbody – Ponds			0.55							148.41	148.96	
Grand Total	325.40	118.70	2801.76	262.85				262.96	91.89	158.46	4022.02	

- 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 18.88 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T5.
- In T5 7.00 ha of agriculture are increased from 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 47.41 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
4. There is an increase of 27.90 Hectares From T1 to T2 , and there is a decrease of 21.55, 13.12, 45.48 & 11.89 Hectares From T0 to T1, T2 to T3, T3 to T4 & T4 to T5 . The overall decrease of 64.13 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is an increase of 37.86 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 169.74 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (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.