

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -18/2010-11

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

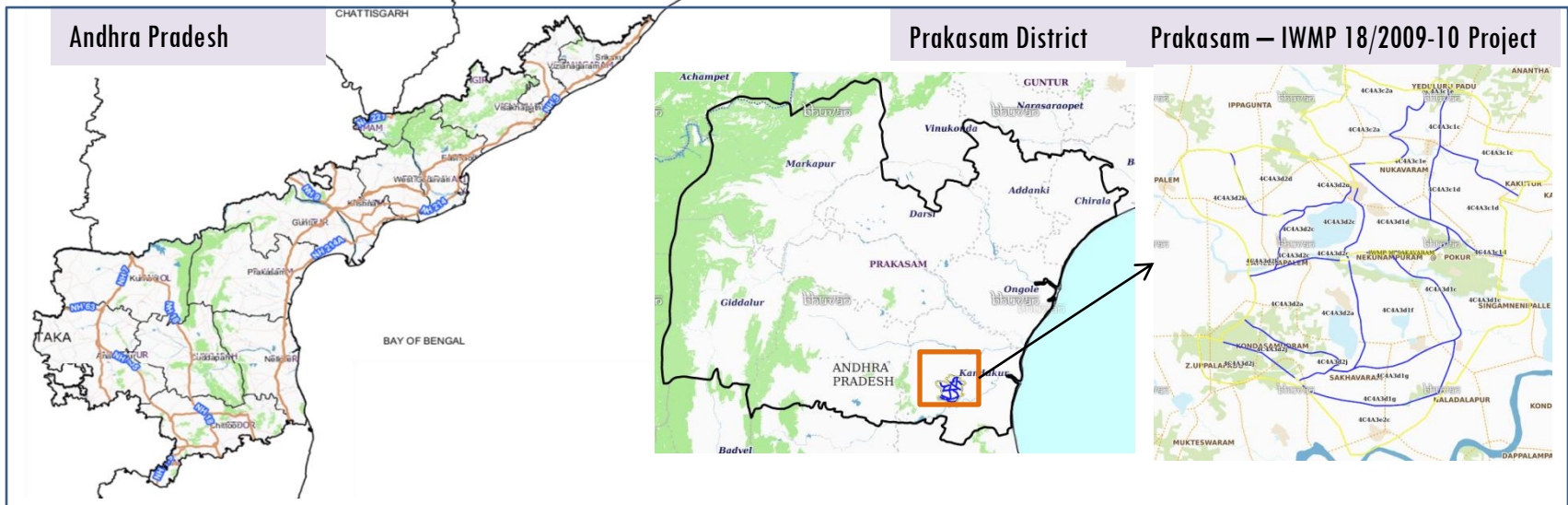
E X E C U T I V E S U M M A R Y

- 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-18/2010-11, Prakasam District of Andhra Pradesh. The total geographical area of the project is 9070.60 ha. It comprises of 15 micro watersheds.
- In the project area 209 Drishti photos were uploaded showing 4 check dams/checks & plugins, 20 afforestation and 185 others.
- Major percentage i.e. 63.63% is covered by the agriculture, 22.90% is covered by plantation, 8.82% is covered by water body, 1.74% is covered by scrub land and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-18/2010-11

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Voletivaripalem Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 9070.60 ha. It comprises of 15 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.



- 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.

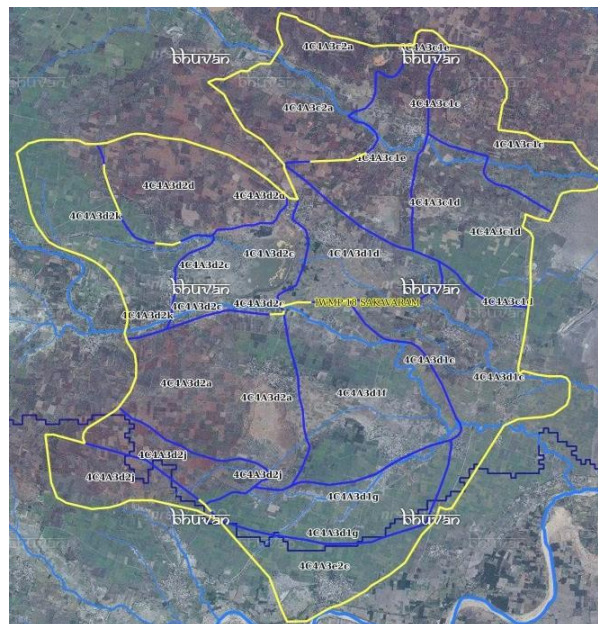
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2017-18
LISS IV	2010-11		
SCENE 1			1-Jan-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			1-Jan-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	209
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

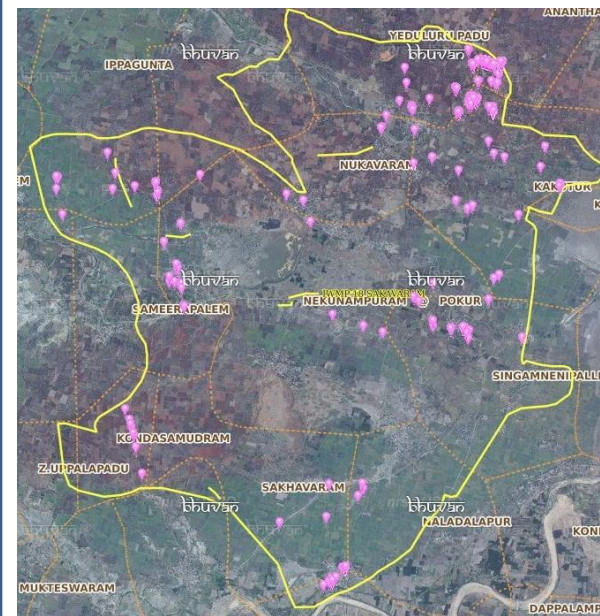


MWS Boundary



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	30	20
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	8	4
9	Gabion structure	0	0
10	Farm ponds	0	0
11	Check dams	0	0
12	Nallah Bunds	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	291	185
	TOTAL	329	209

MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

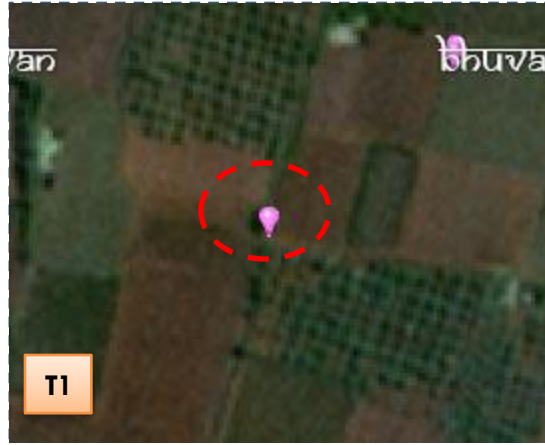
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T0 is the baseline period before implementation (2010-11) and T5 is 2018-19 period for monitoring
- Captures are also provided wherever changes are observed in satellite images, that may match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

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-18/2010-11



T0

T1:2010-11



T1

T2: 20 April 2020



Drishti SI no. 88042 MWS :4C4A3c1c

Afforestation



T0

T1:2010-11



T1

T2: 20 April 2020



Drishti SI no. 7028581 MWS : 4C4A3d2d

Check dam

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-18/2010-11



T0

T0: 2010-11



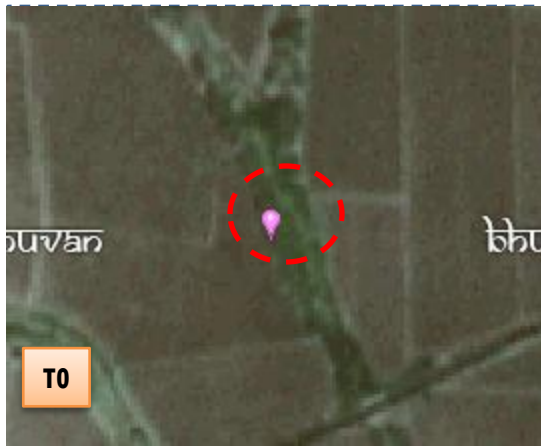
T1

T1: 20 April 2020



Drishti Sl no. 7025586 MWS :4C4A3cle

Percolation Tank



T0

T0: 2010-11



T1

T2: 20 April 2020



Drishti Sl no. 564720 MWS :4C4A3f3a

Checkdam

Prakasam-IWMP-18/2010-11

2009-10



April-2014



Jan-2016



Dec-2017



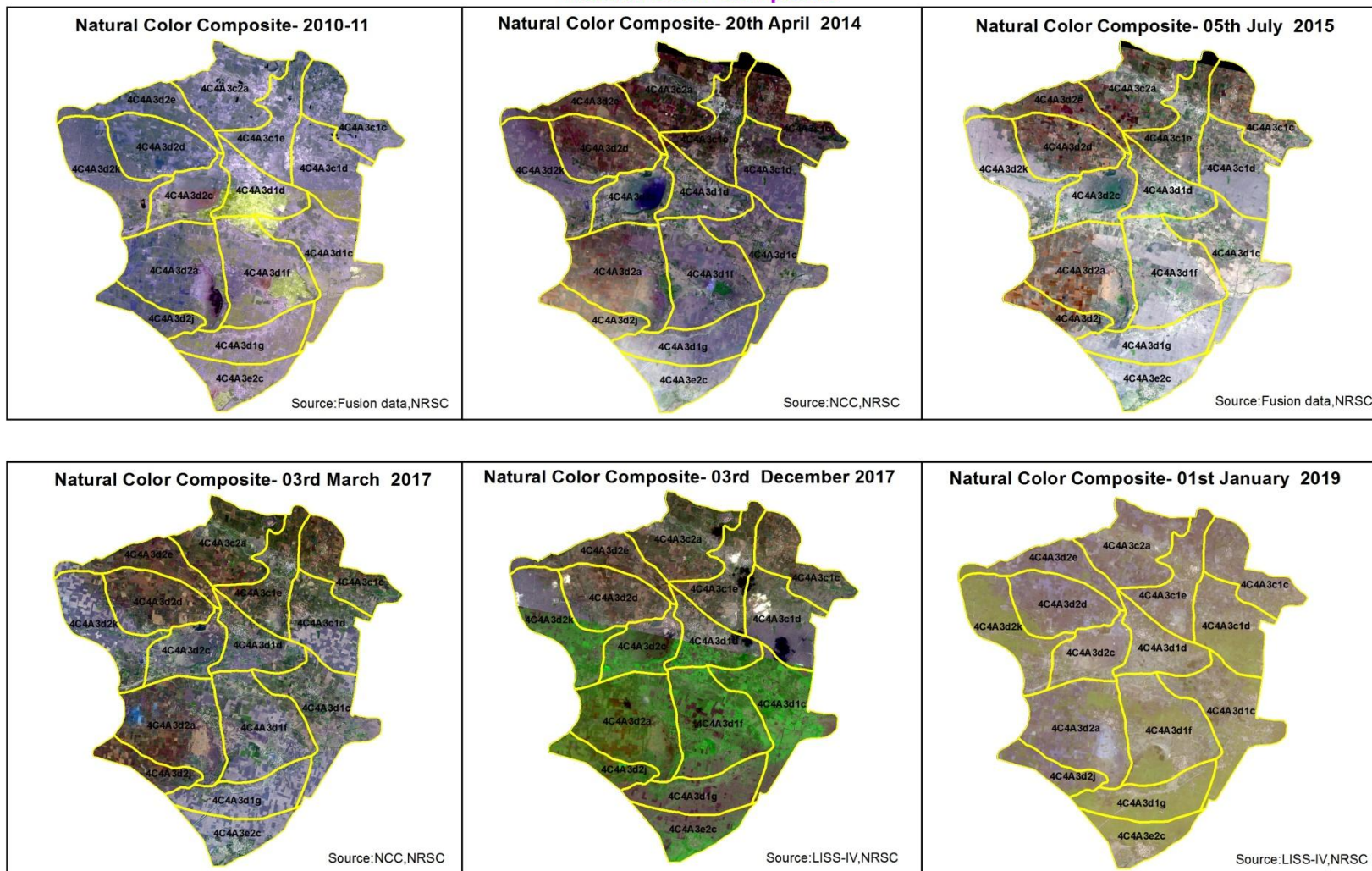
Feb-2019



Activity : Check dam

Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite



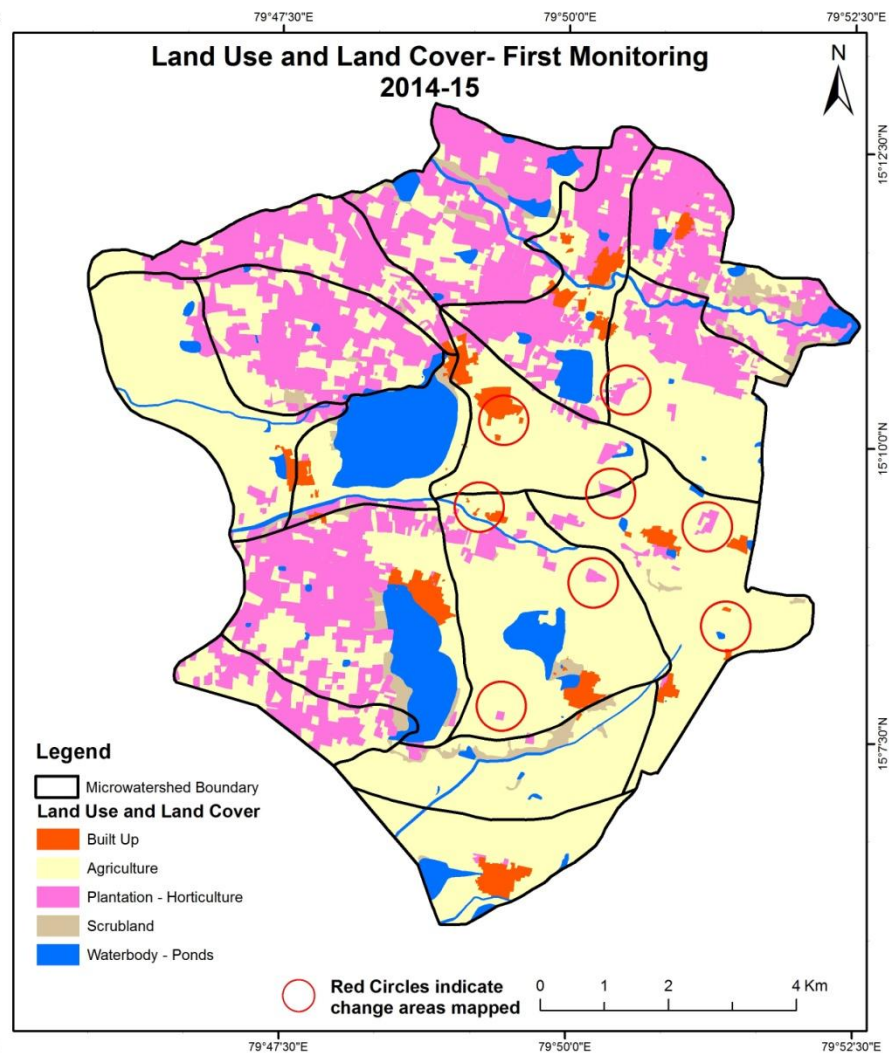
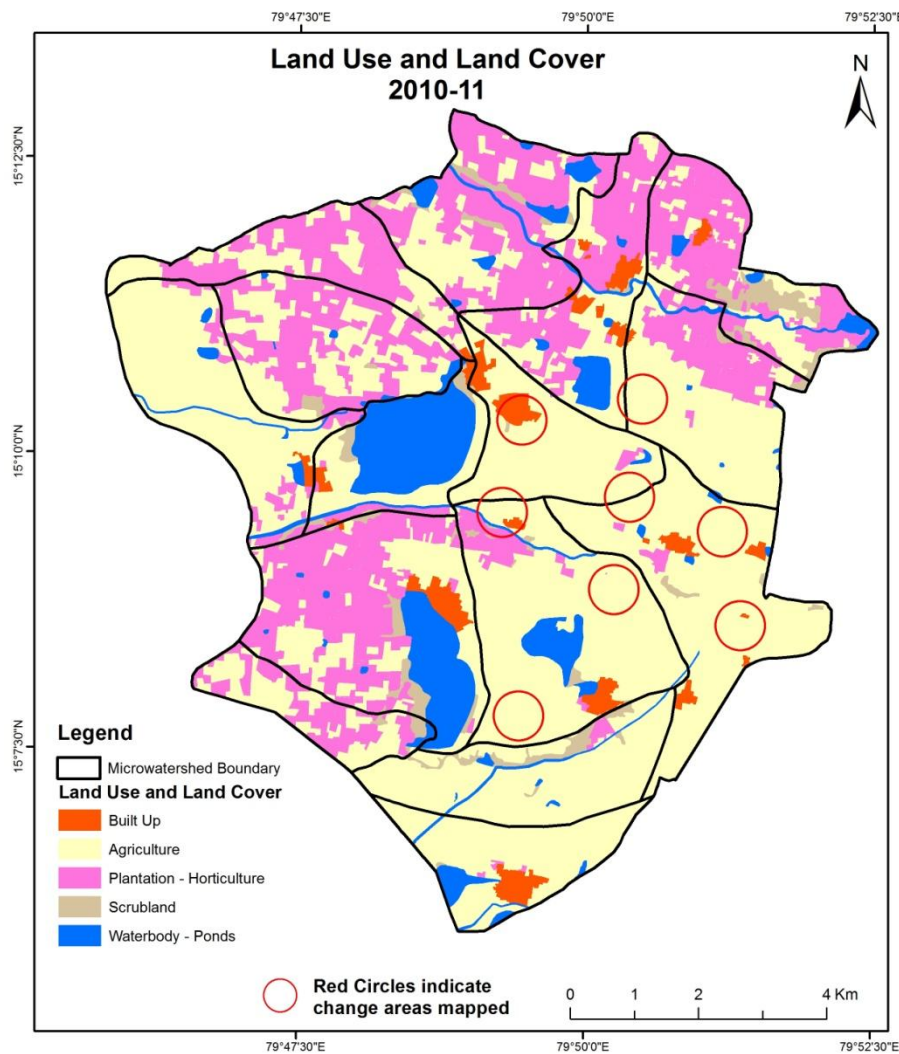
MONITORING IN THE PROJECT AREA

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 (2010-11) and row represents the post implementation period as T5 (2018-19).

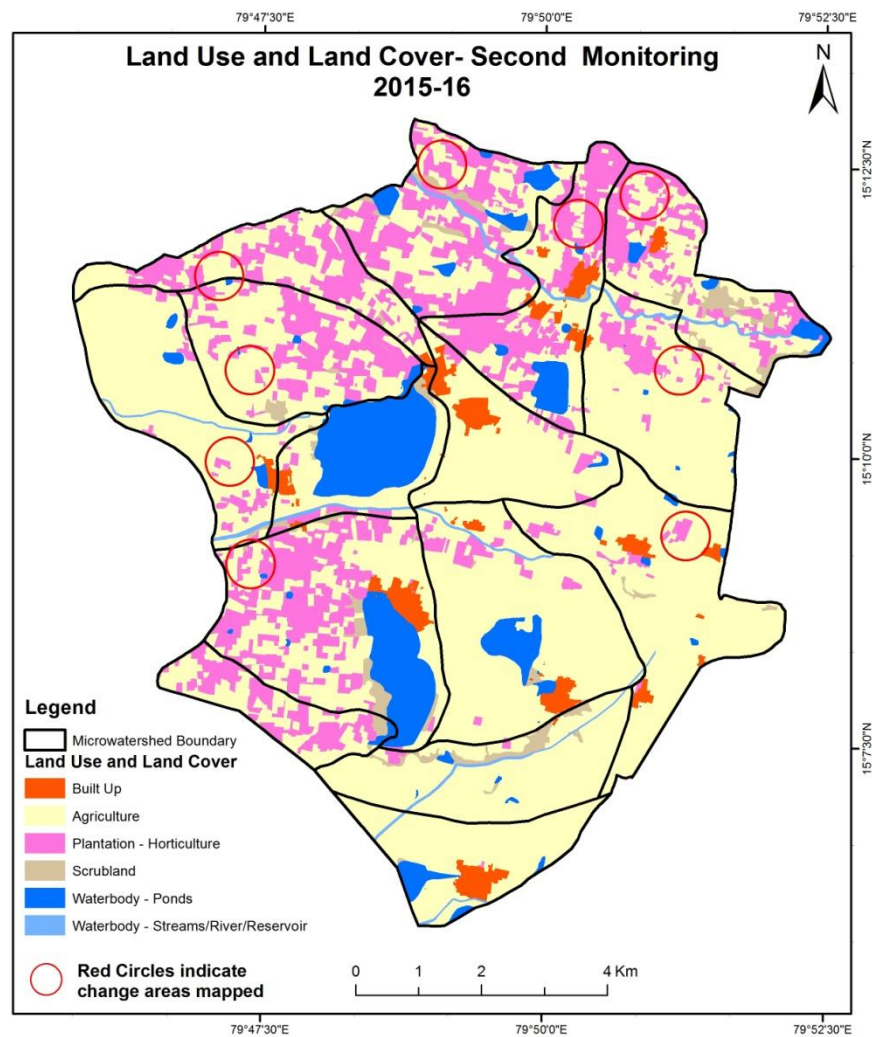
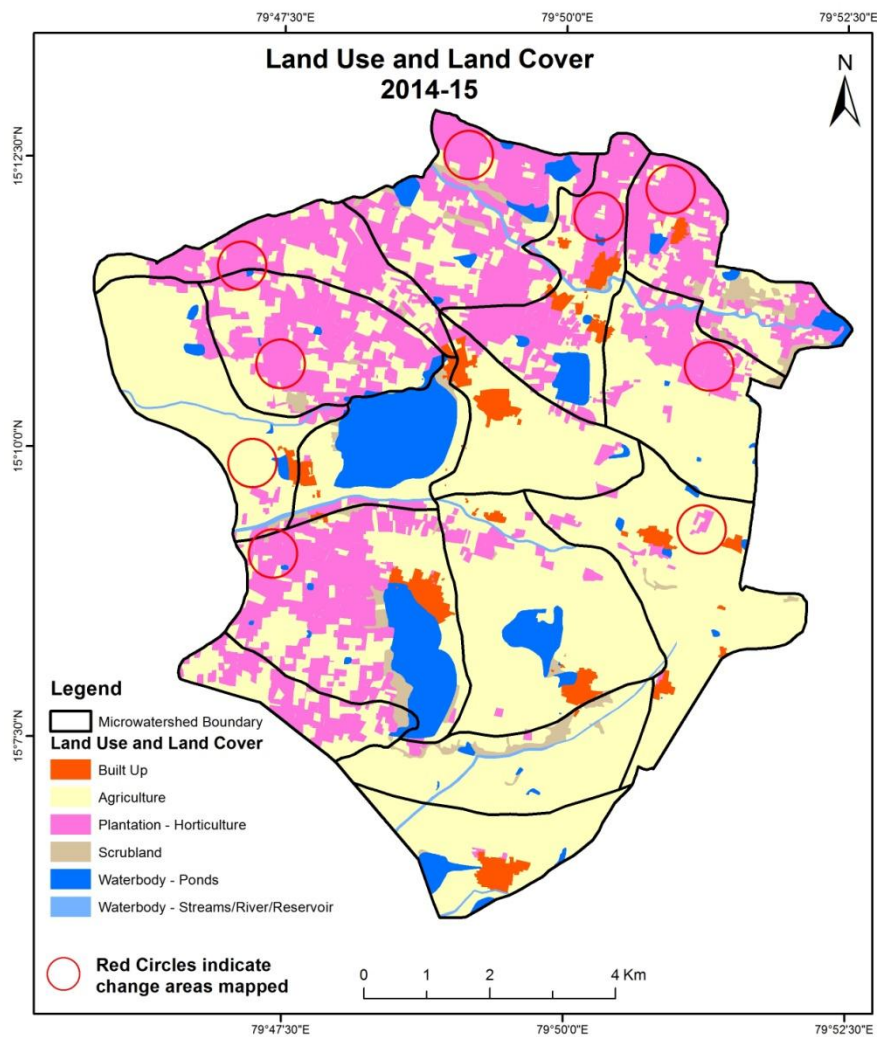
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



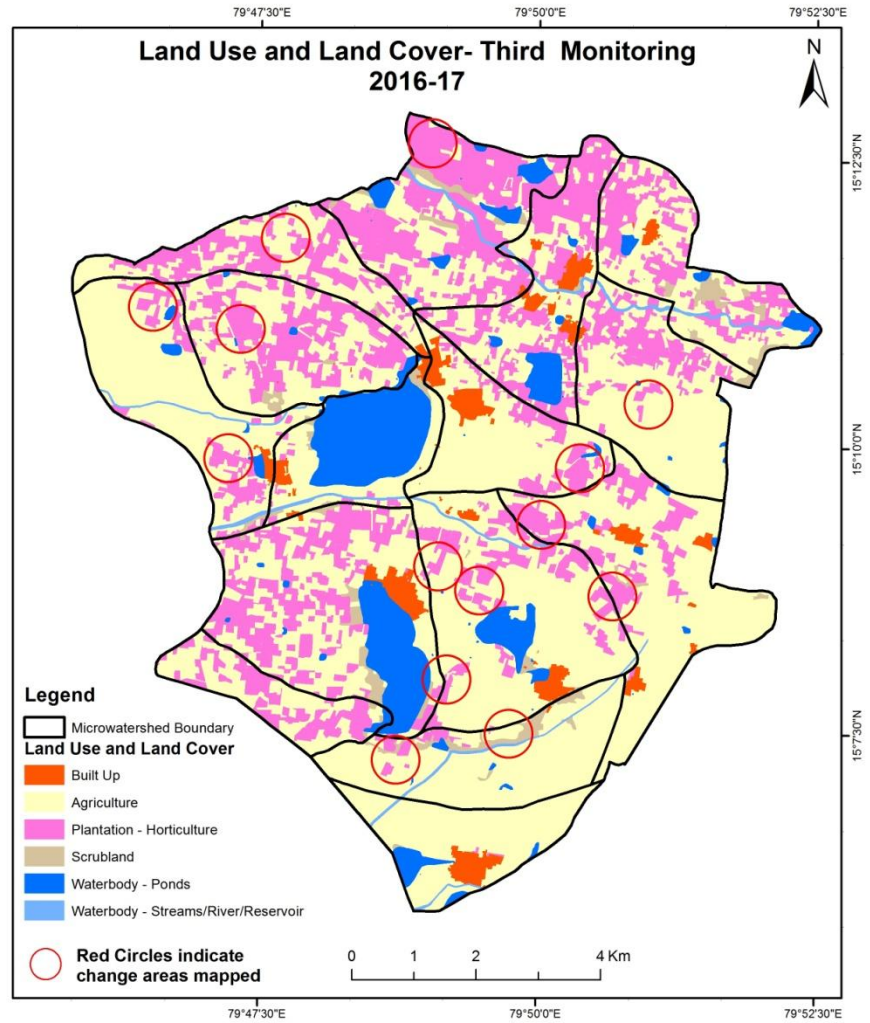
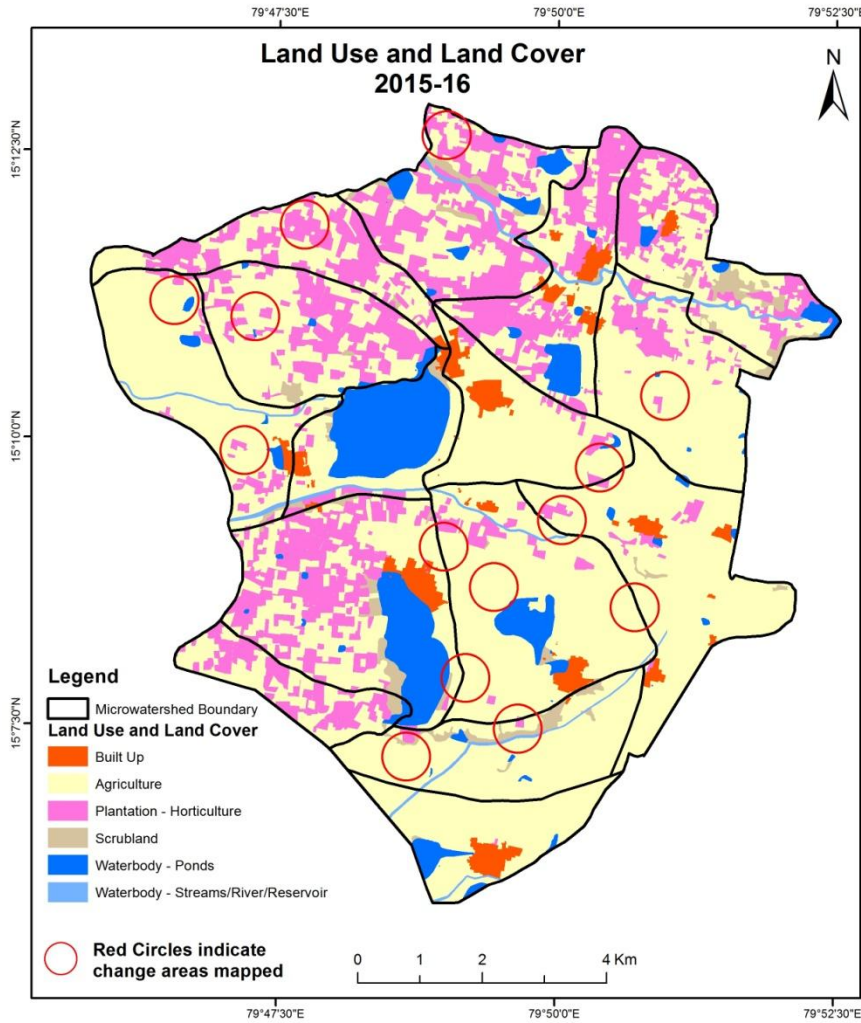
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



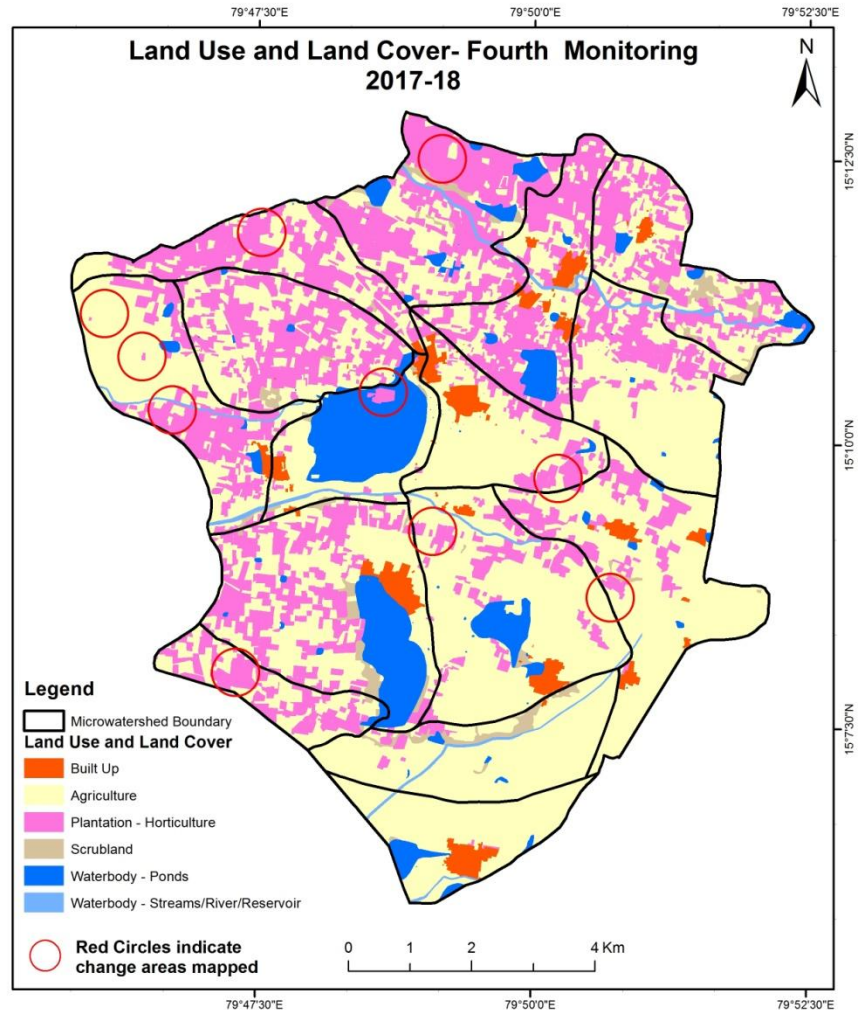
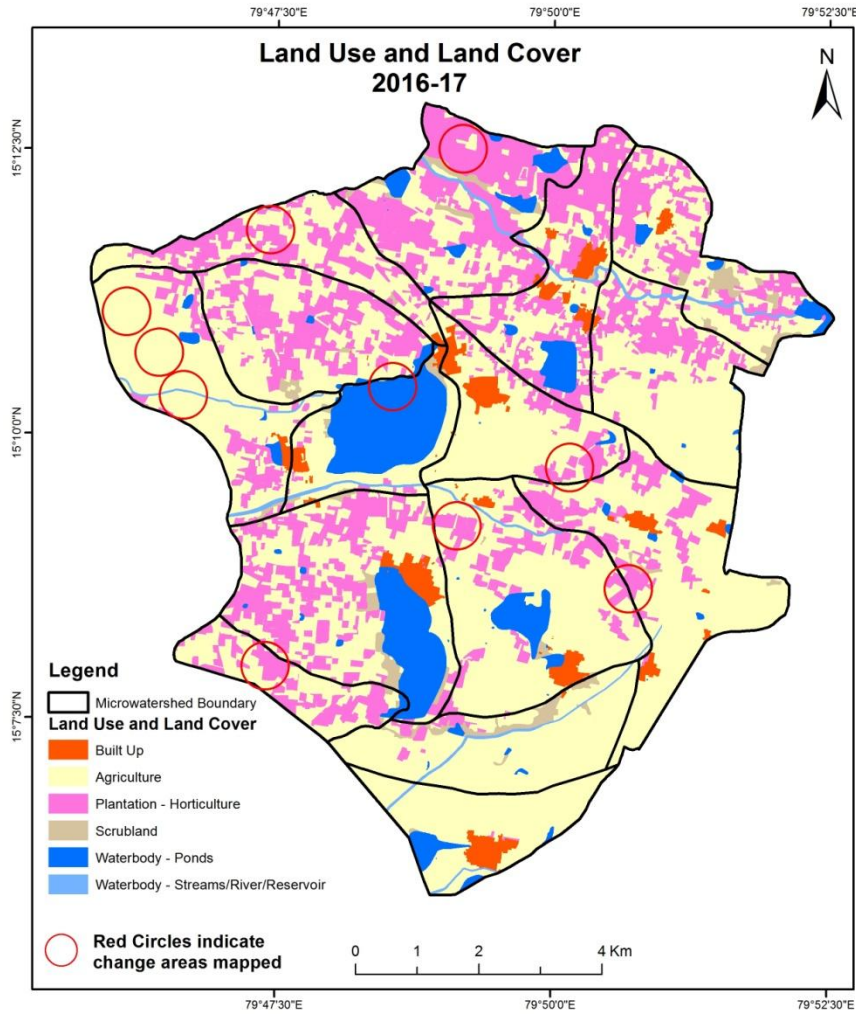
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



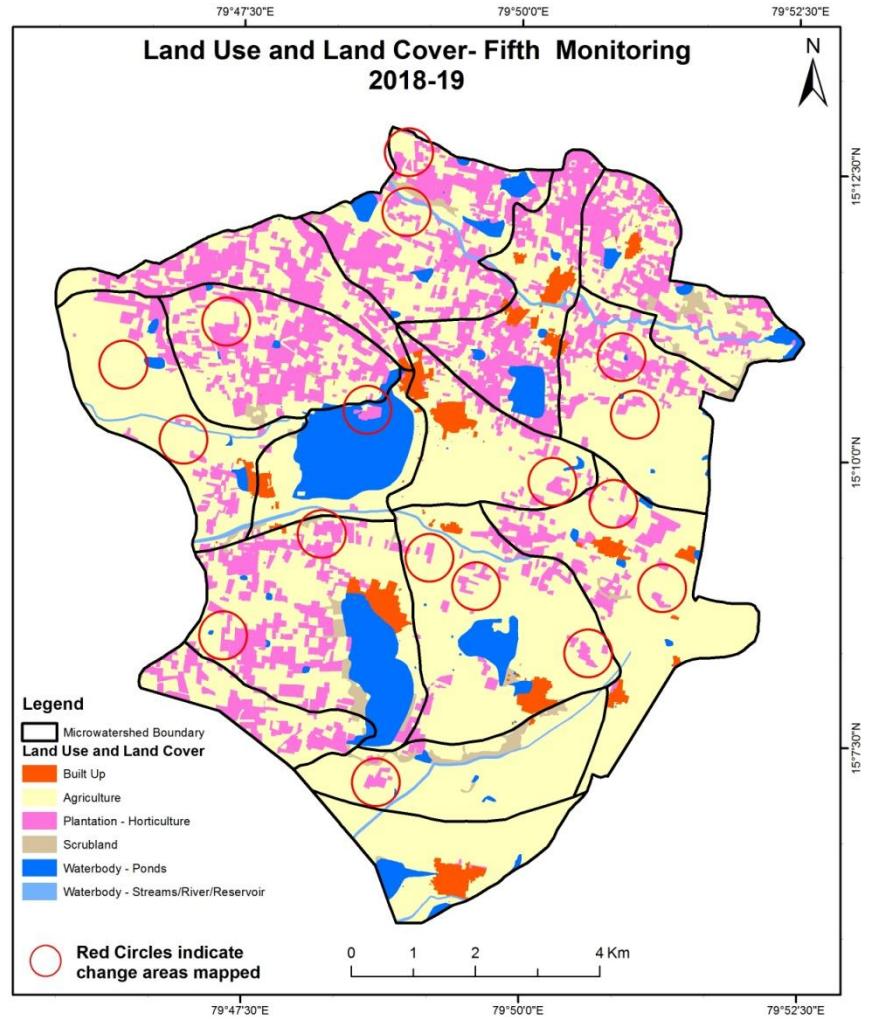
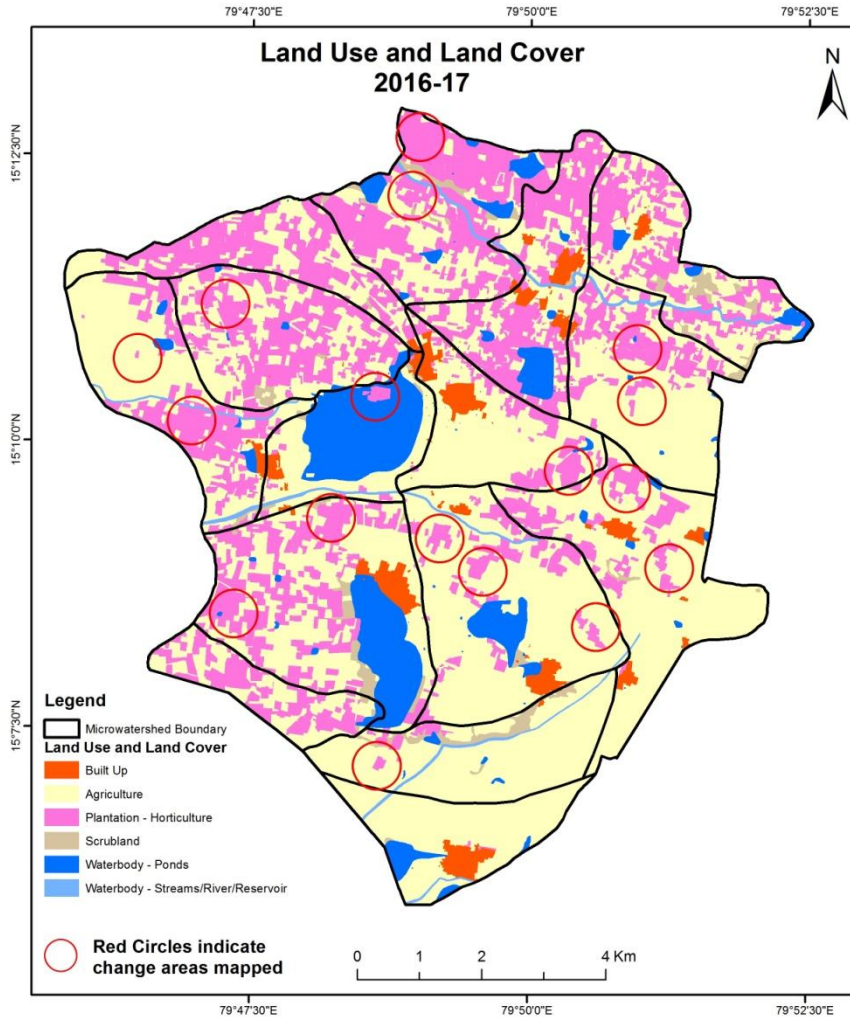
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



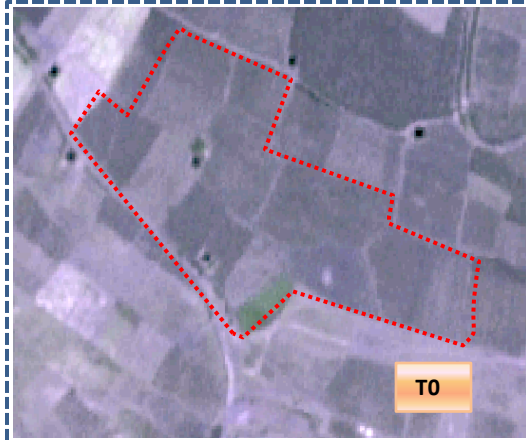
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



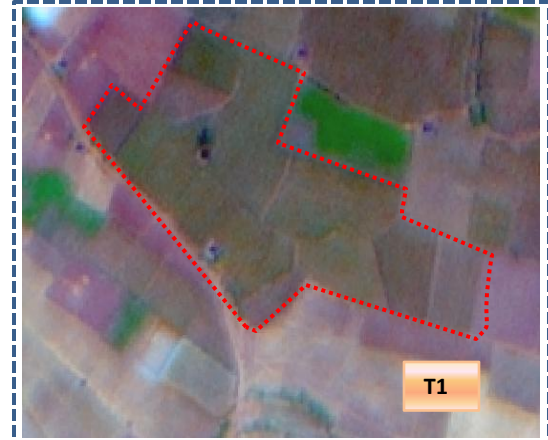
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0

T1: 2010-11



T1

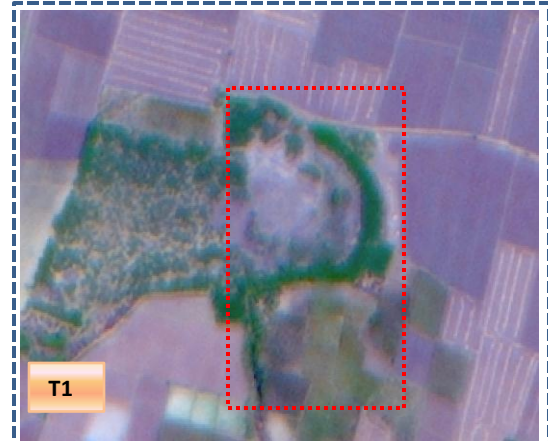
T2: 20 April 2014

Scrub to Agriculture



T0

T1: 2010-11



T1

T2: 20 April 2014

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

Scrub to Water body



T0: 2010-11

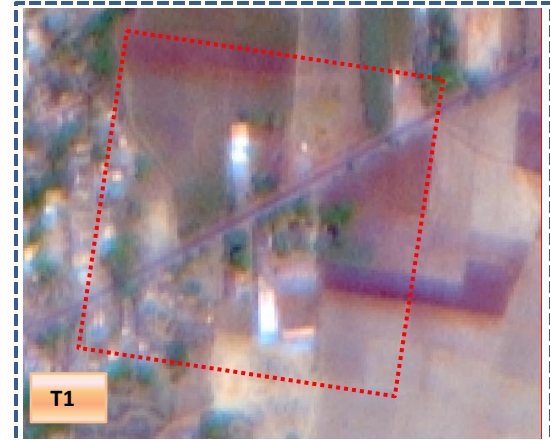


T2: 20 April 2014

Plantation to Agriculture



T0: 2010-11



T2: 20 April 2014

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

Agriculture to Plantation



T4

T4: 2017-18 (79°49'42.345E 15°11'46.852N)



T5

T5: 01 January 2019

Plantation to Agriculture



T4

T4: 2017-18 (79°50'52.616E 15°11'20.387N)

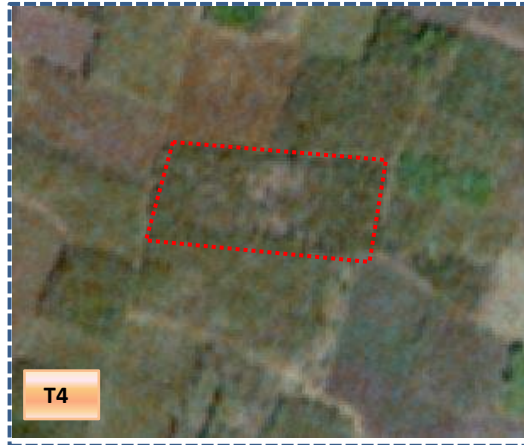


T5

T5: 01 January 2019

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

Plantation to Agriculture

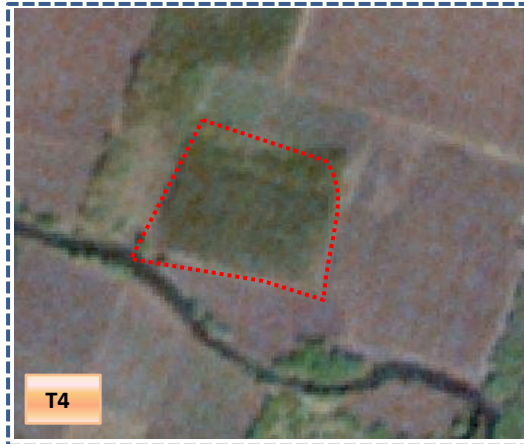


T4: 2017-18(79°50'56.398E 15°11'7.229N)



T5: 01 January 2019

Plantation to Agriculture



T4: 2017-18(79°51'52.845E 15°10'50.878N)



T5: 01 January 2019

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	238.51										238.51
Mining/dump											
Agriculture	7.06		4789.47	451.78				0.09		1.58	5249.99
Plantation Horticulture	5.52		382.99	2116.58						0.54	2505.62
Forest											
Forest Plantation											
Barren Rocky											
Scrub	2.72		42.76	6.33				214.91		0.18	266.91
Waterbody- Streams/River									104.22		104.22
Waterbody – Ponds	0.21									705.13	705.34
Grand Total	254.02		5215.22	2574.68				215.00	104.22	707.44	9070.60

- 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 460.52 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T1.
- In T1 425.75 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										
T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	254.02										254.02
Mining/dump											
Agriculture	0.31		5169.24	45.49						0.18	5215.22
Plantation Horticulture	0.27		731.54	1842.85						0.03	2574.68
Forest											
Forest Plantation											
Barren Rocky											
Scrub								215.00			215.00
Waterbody- Streams/River									104.22		104.22
Waterbody – Ponds										707.44	707.44
Grand Total	254.60		5900.79	1888.34				215.00	104.22	707.65	9070.60

- 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 45.98 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T2.
- In T2 731.54 ha of agriculture are increased from plantation 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	254.60												254.60
Mining/dump													
Agriculture	0.81		4724.12	1175.06							0.80		5900.79
Plantation Horticulture			636.66	1251.68									1888.34
Forest													
Forest Plantation													
Barren Rocky													
Scrub	0.19		19.50					195.31					215.00
Waterbody- Streams/River									104.22				104.22
Waterbody – Ponds											707.65		707.65
Grand Total	255.59		5380.28	2426.74				195.31	104.22		708.44		9070.60

- 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 1176.67 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.
- In T3 656.17 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	255.59										255.59	
Mining/dump												
Agriculture	1.32		4910.97	467.51						0.49	5380.28	
Plantation Horticulture	0.63		183.29	2242.77						0.04	2426.74	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.09		20.73					174.49			195.31	
Waterbody- Streams/River				0.50					103.72		104.22	
Waterbody – Ponds			4.28	7.97						696.19	708.44	
Grand Total	257.63		5119.27	2718.76				174.49	103.72	696.72	9070.60	

- 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 469.31 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T4.
- In T4 208.30 ha of agriculture are increased from plantation, scrubland and water body 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		
T4													
Built up	257.63												257.63
Mining/dump													
Agriculture	3.41		5005.33	110.53									5119.27
Plantation Horticulture	0.57		751.14	1967.05									2718.76
Forest													
Forest Plantation													
Barren Rocky													
Scrub	1.15		15.15					158.19					174.49
Waterbody- Streams/River									103.72				103.72
Waterbody – Ponds											696.72		696.72
Grand Total	262.76		5771.62	2077.58				158.19	103.72		696.72		9070.60

- 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 113.94 ha of agriculture are decreased and it is converted into built-up and plantation of T5.
- In T5 766.29 ha of agriculture are increased from plantation 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 decrease of 9.12 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 685.57 & 652.35 Hectares From T1 to T2 & T4 to T5 and there is an decrease of 34.77, 520.50 & 261.01 Hectares From T0 to T1, T2 to T3 & T3 to T4. The overall increase of 521.63 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is decrease of 428.04 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 108.72 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (0) verified from the portal.