

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -23/2010-11

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

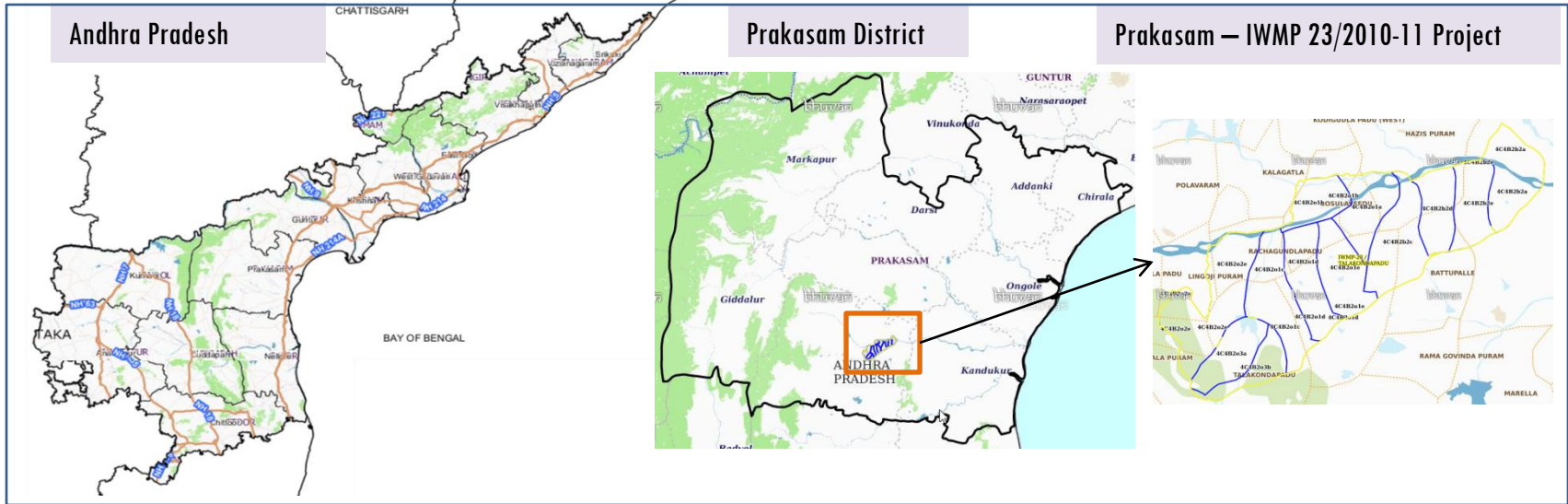
E X E C U T I V E S U M M A R Y

- 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-23/2010-11, Prakasam District of Andhra Pradesh. The total geographical area of the project is 5852.08 ha. It comprises of 13 micro watersheds.
- In the project area 360 Drishti photos were uploaded showing 55 check dams/Checks & plugs, 30 Farm ponds/Percolation tanks, 20 Horticulture, 5 afforestation and 250 others.
- Major percentage i.e. 58.36% is covered by the agriculture, 23.04% is covered by scrub land, 8.09% by forest, 5.43% is covered by water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-23/2010-11

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Tarlupadu Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 5852.08 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.



- 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.

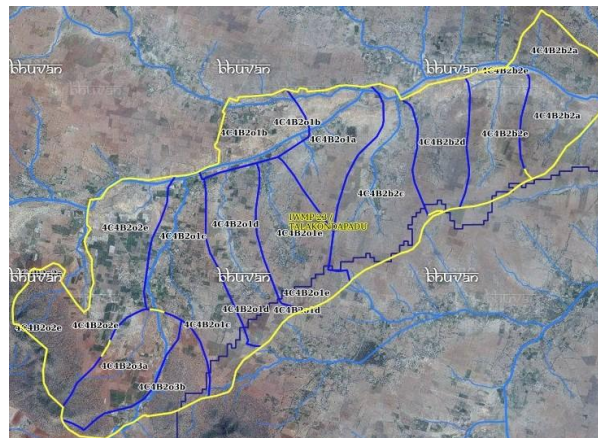
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			9-Jan-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			9-Jan-19
SCENE2			
SCENE 3			
SCENE 4			

Ancillary Data

	Category	Sub category	Status
1	Thematic maps		
	LU LC (1: 10 000)		
		DRAINAGE	YES
		SETTLEMENT	YES
		ROADS/RAILS	No
	LU LC (1: 50 000)		
		2005-06	
		2008-09	
2	Activity Plan Maps		
3	Drishti Photographs		
		Total	360
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

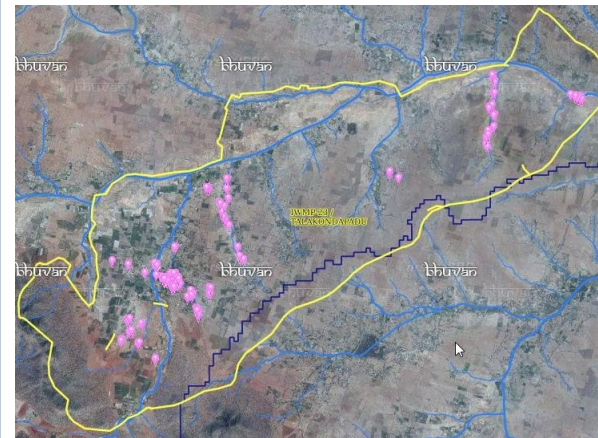


MWS Boundary



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	5	5
2	Horticulture	24	20
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	14	14
9	Gabion structure	0	0
10	Farm ponds	37	30
11	Check dams	41	40
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	362	250
	TOTAL	483	360

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-23/2010-11



T0

T1:2010-11



T1

T2: 13 May 2014



Drishti SI no. 561841

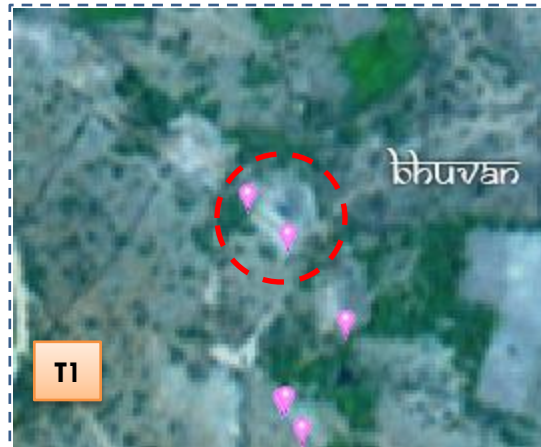
MWS :4C4B2o3a

Check dam



T0

T1:2010-11



T1

T2: 13 May 2014



Drishti SI no. 560090

MWS :4C4B2o1c

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-23/2010-11



T0

T0: 2010-11



T1

T1: 13 May 2014



Drishti Sl no. 562130 MWS :4C4B2o1c

Farm pond



T0

T0: 2010-11



T1

T2: 13 May 2014



Drishti Sl no. 688829 MWS :4C4B2b2e

Water harvesting structure

Prakasam-IWMP-23/2010-11

2009-10



May-2014



Jan-2016



Jan-2017



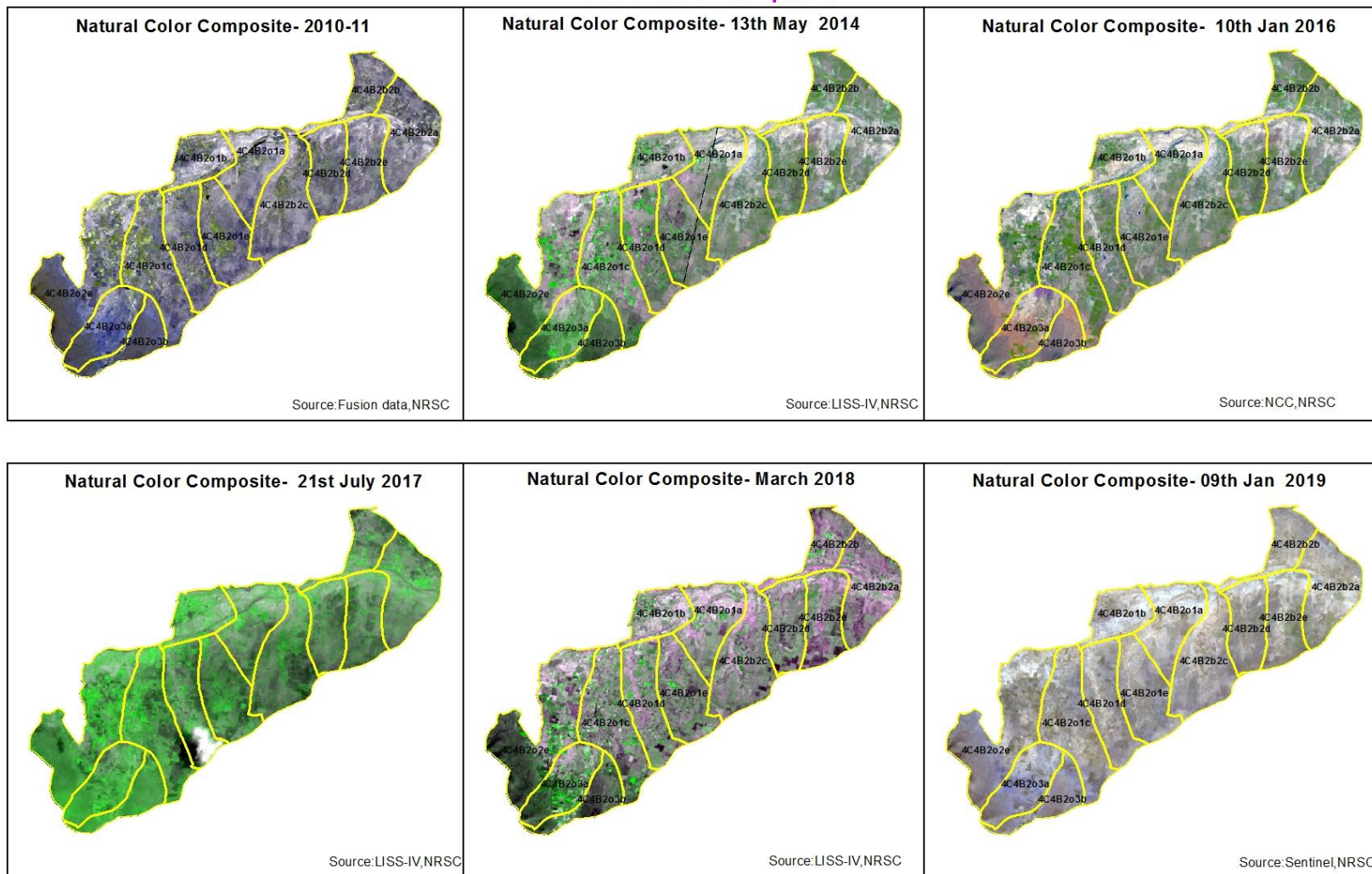
Jan-2018



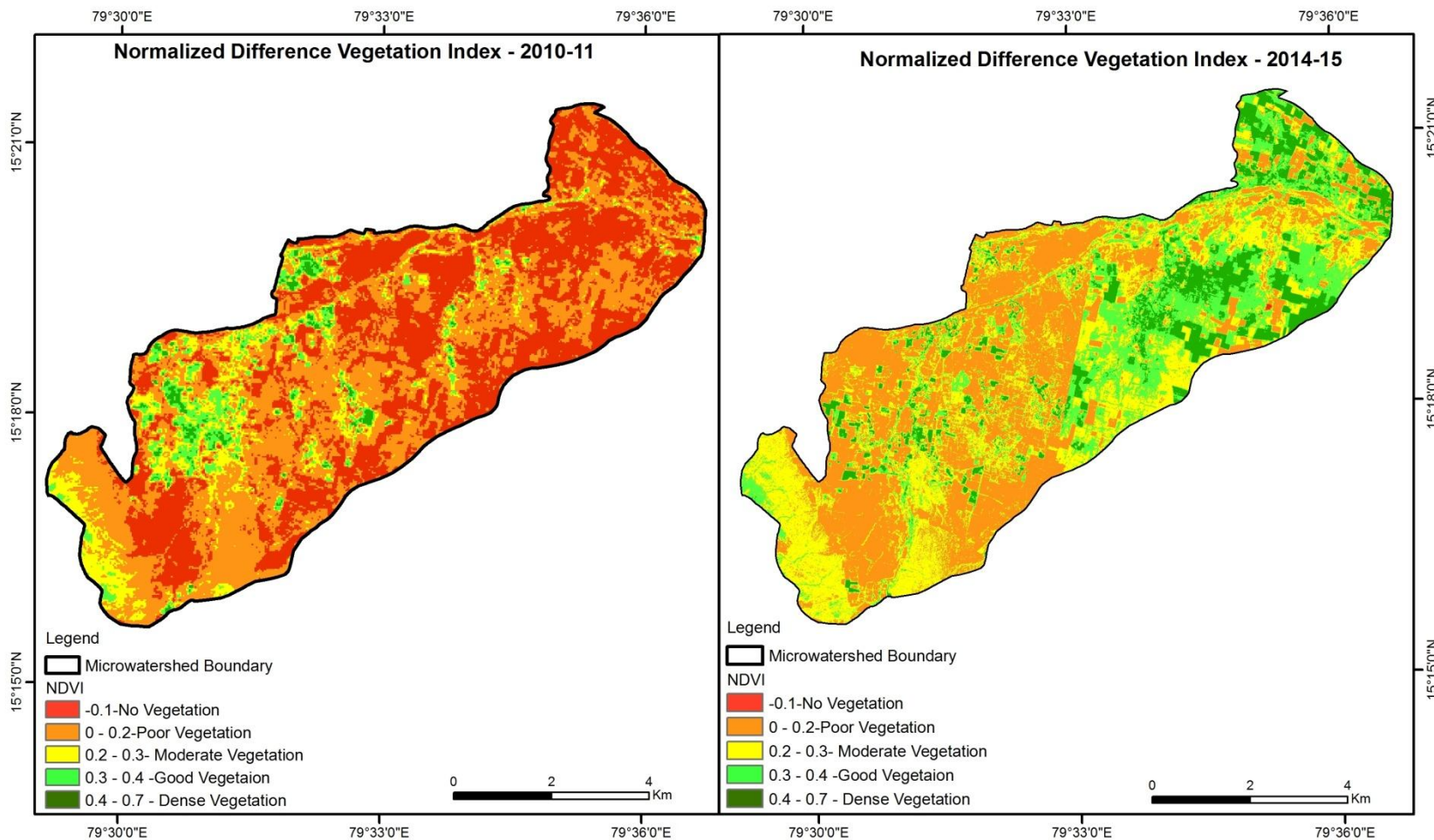
Activity : Percolation tank

Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite



Normalized Differential Vegetation Index



NDVI-2010-11

NDVI-2014-15

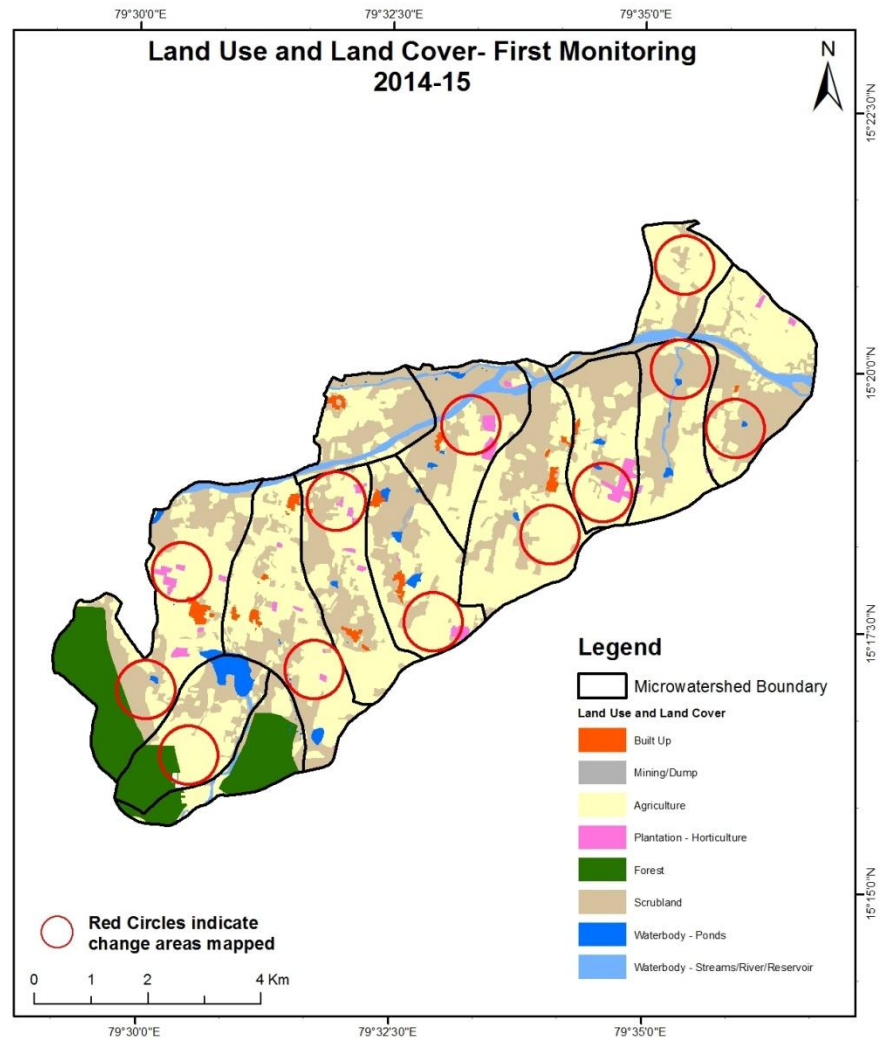
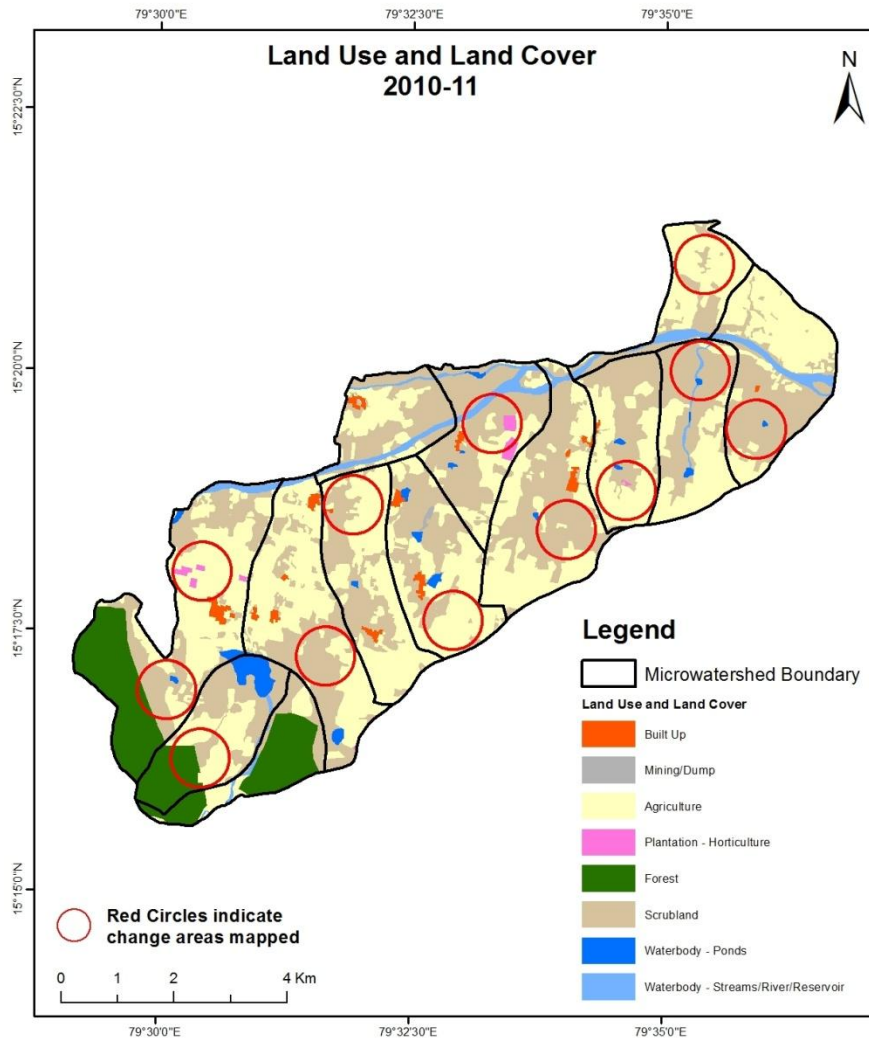
MONITORING IN THE PROJECT AREA

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).

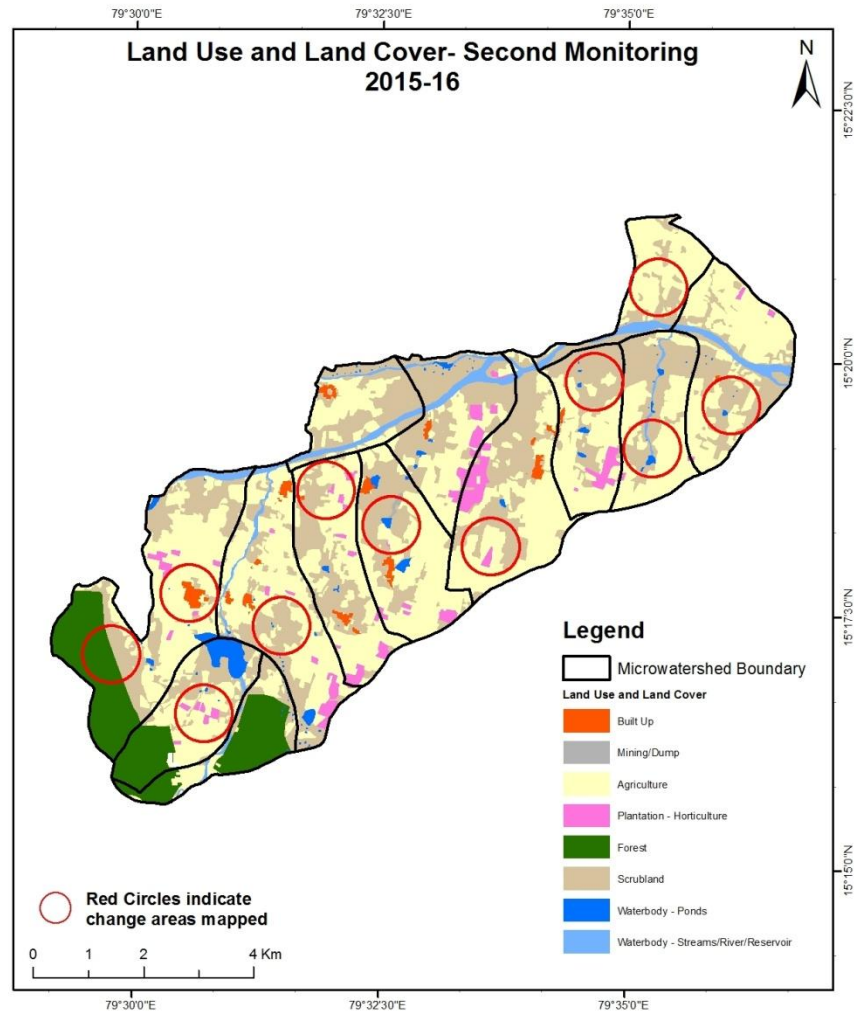
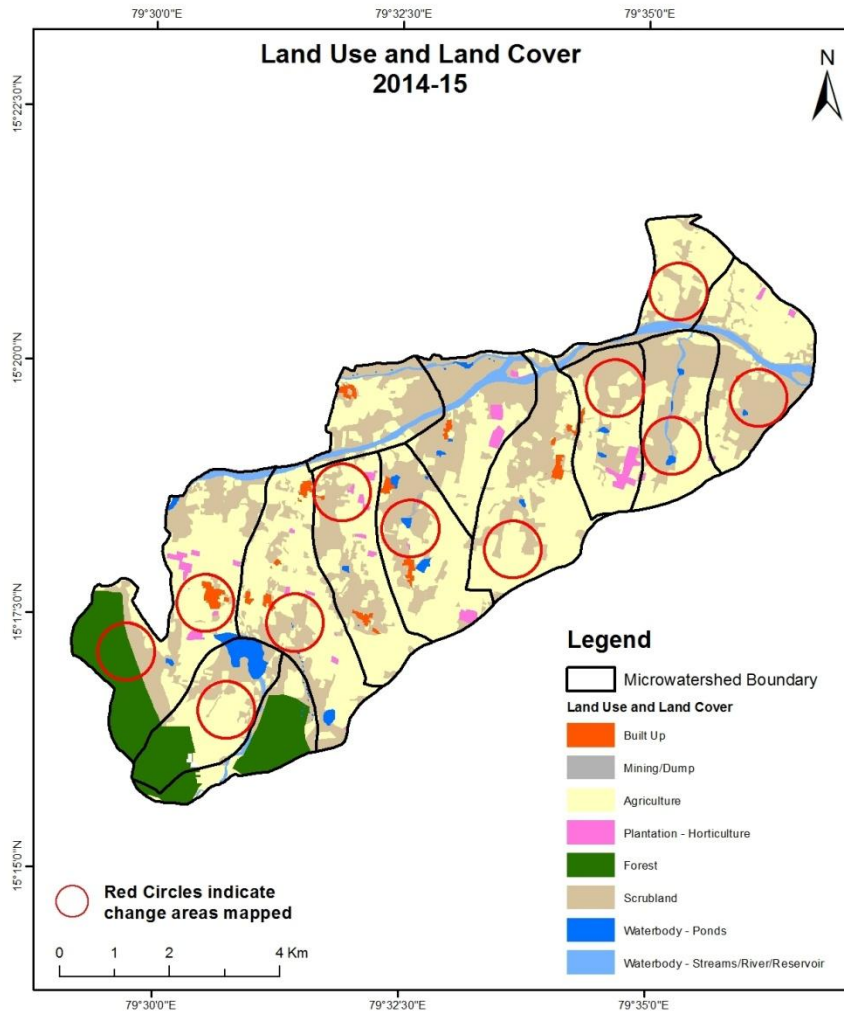
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



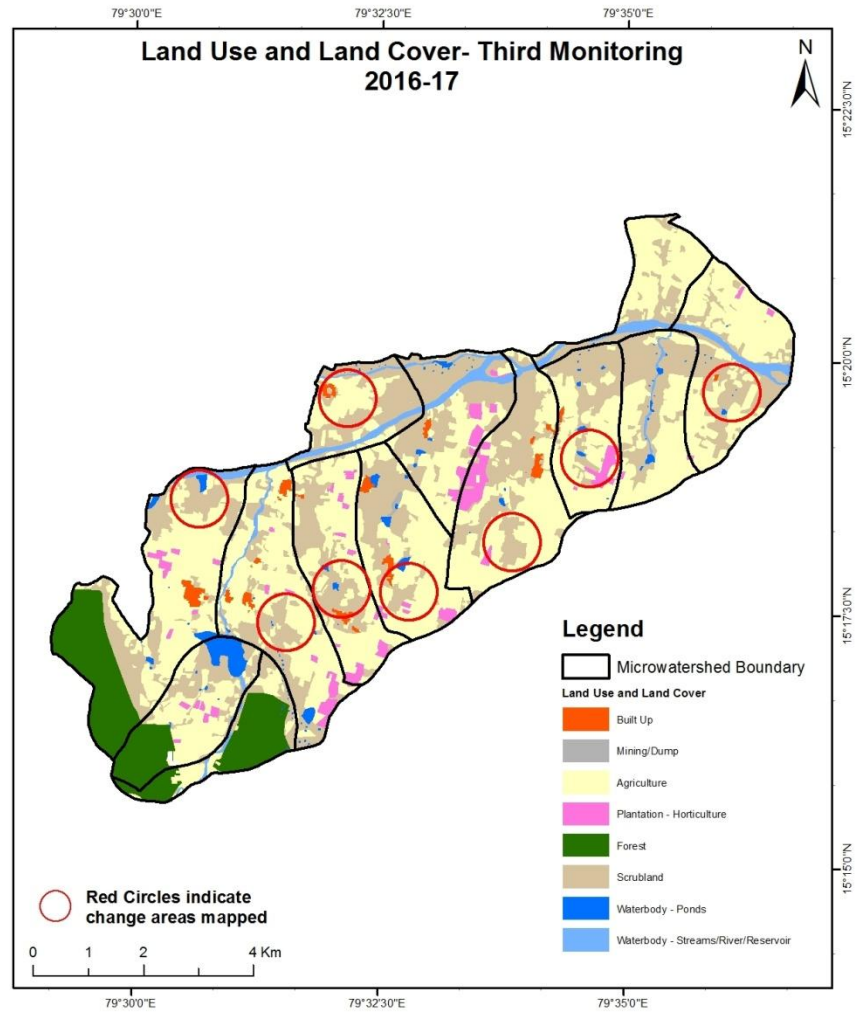
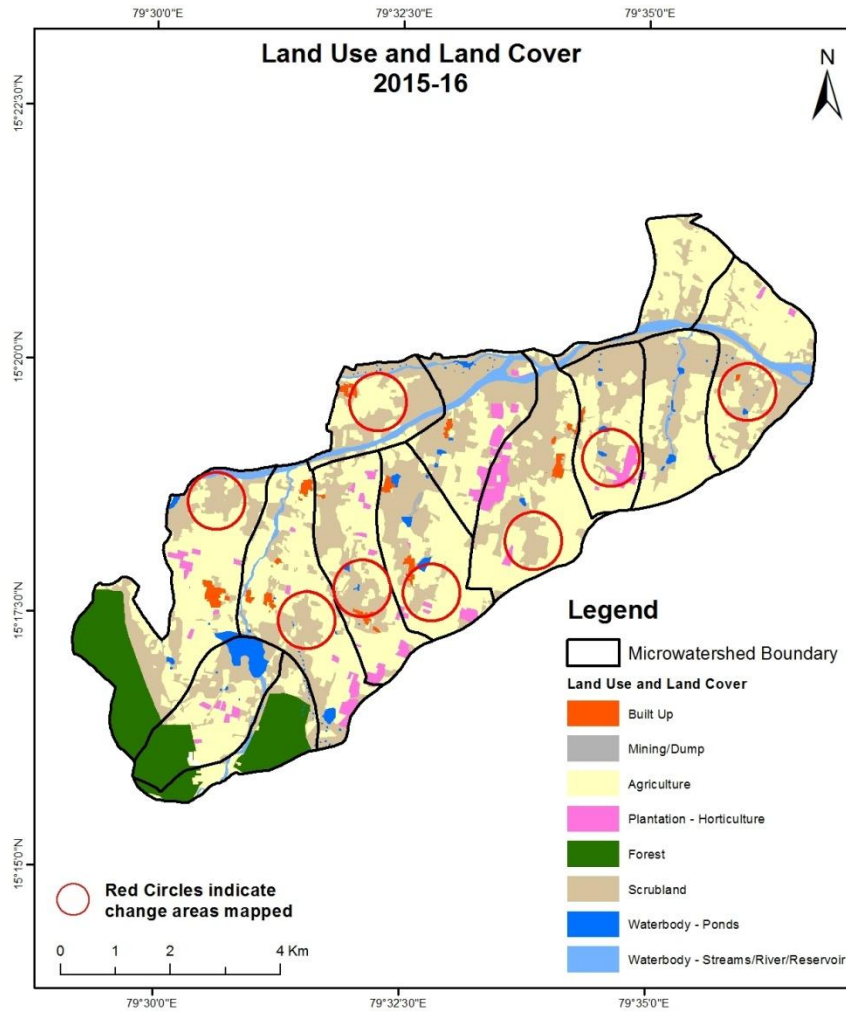
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



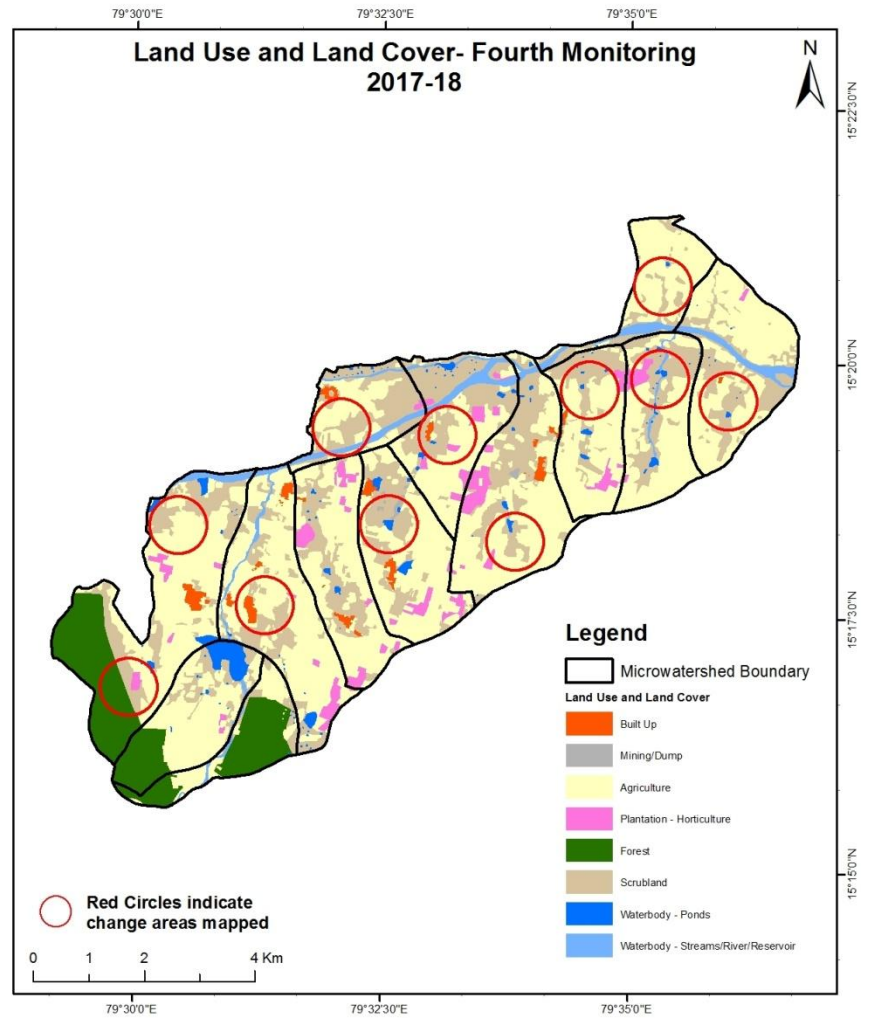
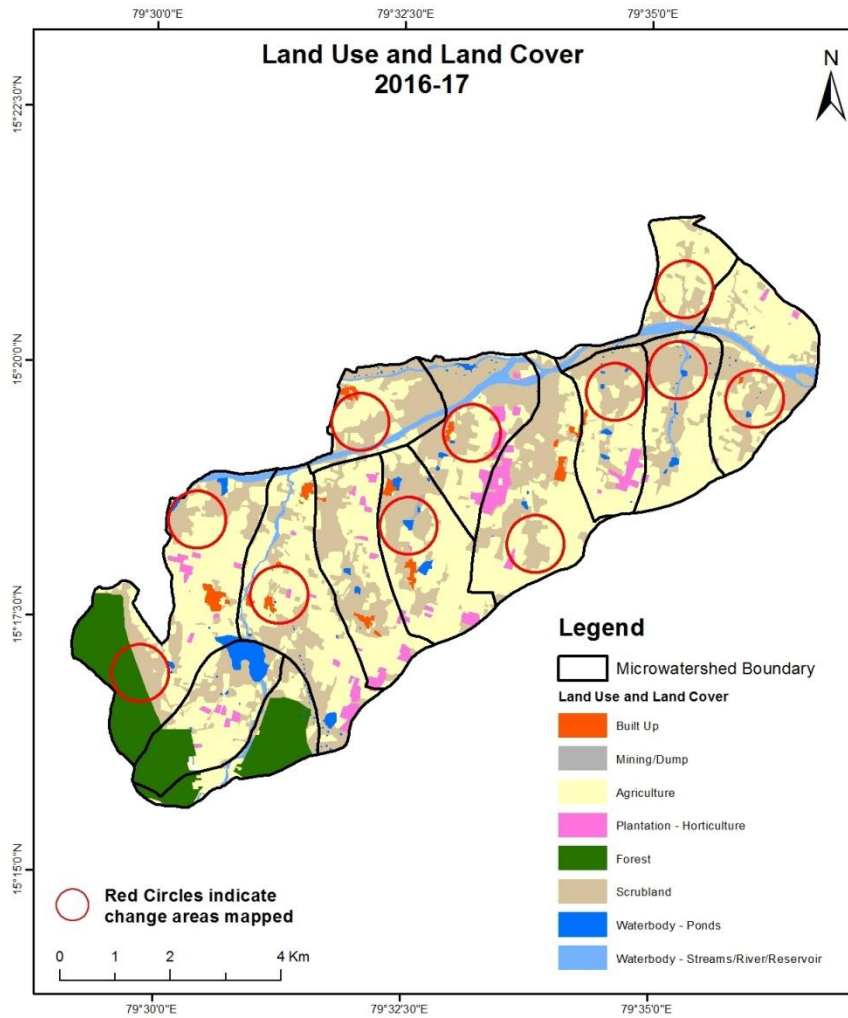
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



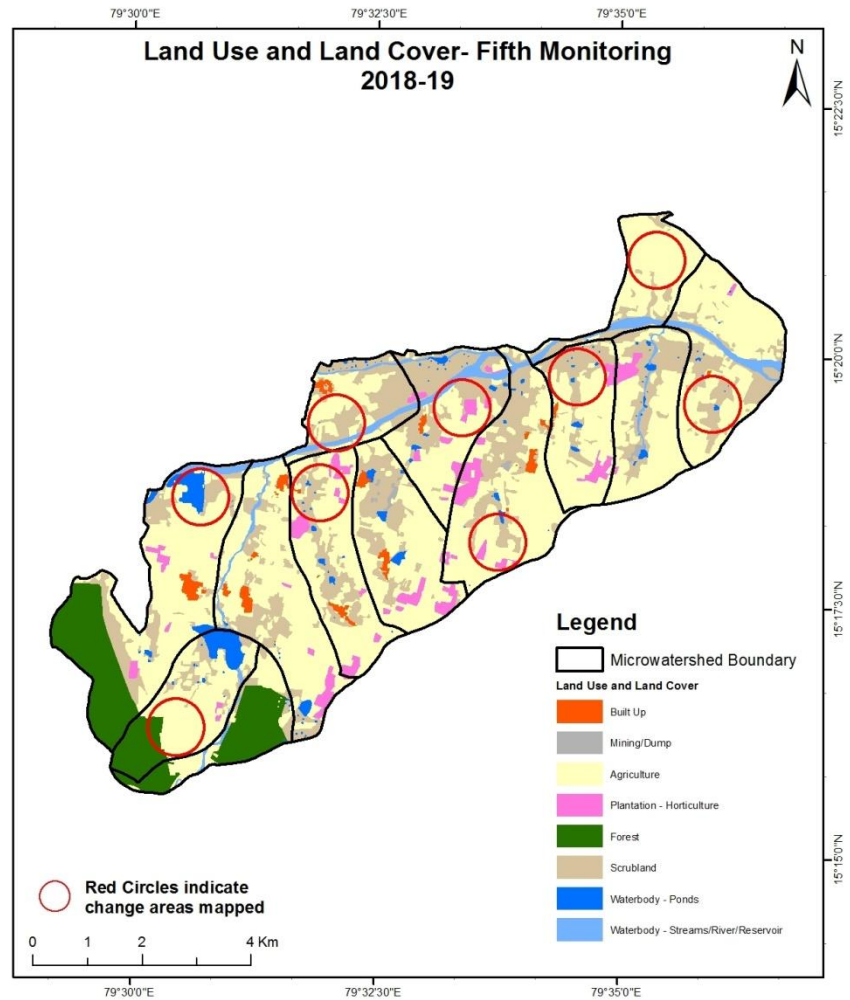
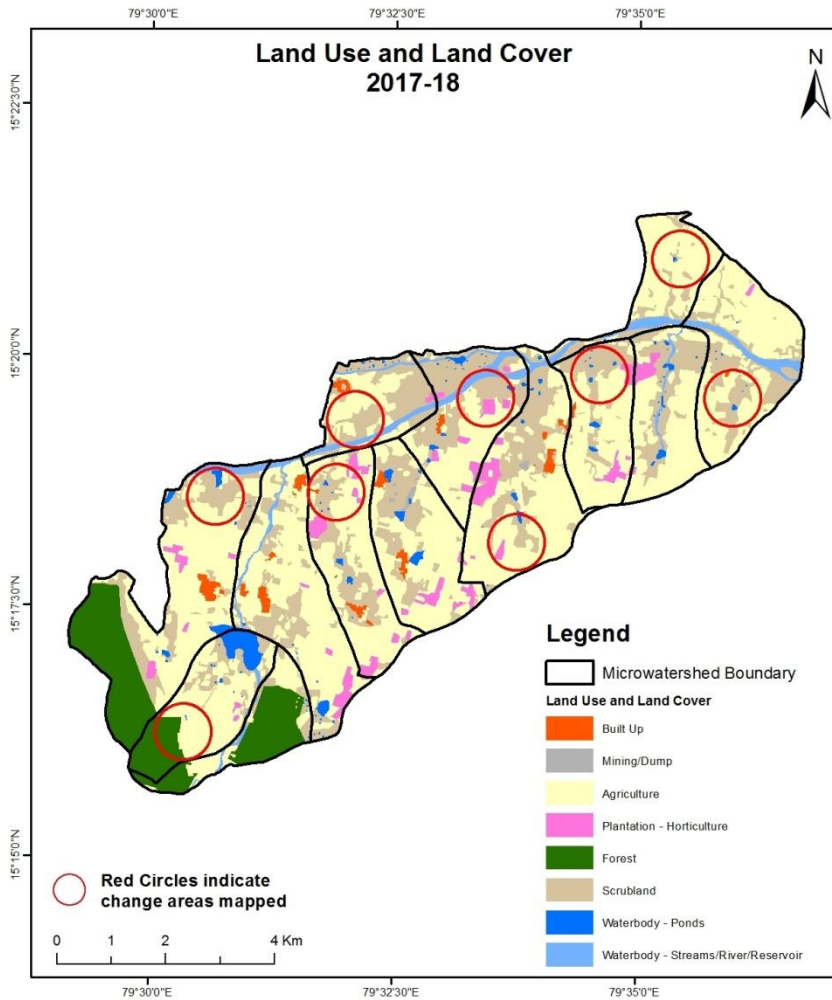
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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: 2010-11



T1: 13 May 2014

Agriculture to Plantation



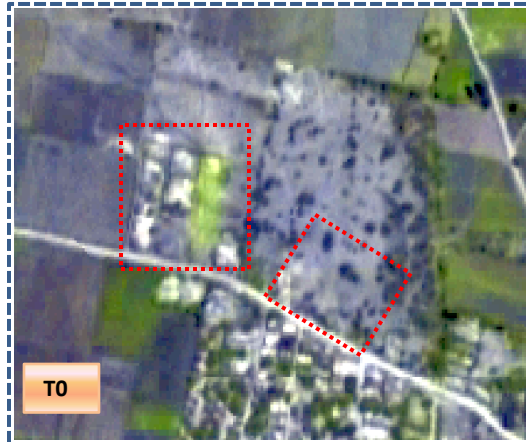
T0: 2010-11



T1: 13 May 2014

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

Scrub to Built-up



T0

T0: 2010-11



T1

T1: 13 May 2014

Scrub to Agriculture



T0

T0: 2010-11



T1

T1: 13 May 2014

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

Scrub to Agriculture



T2: 2015-16 (79°34'18.151"E 15°19'11.238"N)

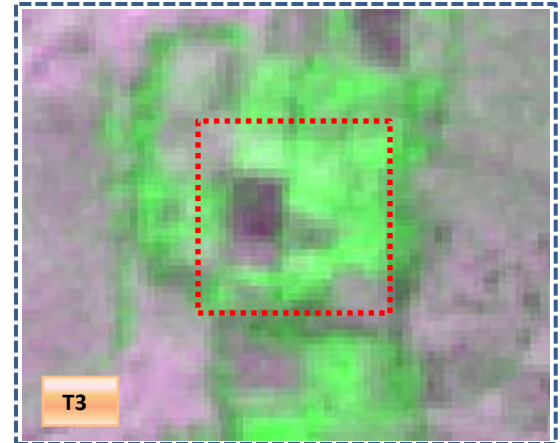


T3: 20 March 2017

Agriculture to Water body



T2: 2015-16 (79°33'45.486"E 15°18'43.752"N)



T3: 20 March 2017

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	59.15										59.15
Mining/dump		4.08									4.08
Agriculture	7.01		2568.55	54.38				22.34		0.25	2652.53
Plantation Horticulture				23.09							23.09
Forest			1.24		489.87	2.65				0.27	494.02
Forest Plantation											
Barren Rocky											
Scrub	0.31		443.12	1.74				1922.05		2.39	2369.61
Waterbody- Streams/River									174.57		174.57
Waterbody – Ponds										75.04	75.04
Grand Total	66.46	4.08	3012.90	79.21	489.87	2.65		1944.39	174.57	77.95	5852.08

- 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 83.98 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body of T5.
- In T5 444.36 ha of agriculture are increased from forest and scrubland of T4. The additional agriculture are coming from water body in T5 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	
Built up	66.46										66.46	
Mining/dump		4.08									4.08	
Agriculture			2811.86	100.68				84.66	14.83	0.87	3012.90	
Plantation Horticulture			3.11	75.89						0.22	79.21	
Forest	0.06		2.74		486.95					0.12	489.87	
Forest Plantation						2.65					2.65	
Barren Rocky												
Scrub			87.00					1849.96		7.42	1944.39	
Waterbody- Streams/River									174.57		174.57	
Waterbody – Ponds										77.95	77.95	
Grand Total	66.52	4.08	2904.70	176.56	486.95	2.65		1934.63	189.40	86.58	5852.08	

- 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 201.04 ha of agriculture are decreased and it is converted into plantation, scrubland and water body of T2.
- In T2 92.84 ha of agriculture are increased from plantation, 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-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	66.52										66.52	
Mining/dump		4.08									4.08	
Agriculture			2903.19							1.52	2904.70	
Plantation Horticulture				176.56							176.56	
Forest			0.51		486.45						486.95	
Forest Plantation						2.65					2.65	
Barren Rocky												
Scrub			36.85					1892.25		5.53	1934.63	
Waterbody- Streams/River								189.40			189.40	
Waterbody – Ponds										86.58	86.58	
Grand Total	66.52	4.08	2940.55	176.56	486.45	2.65		1892.25	189.40	93.63	5852.08	

- 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 1.52 ha of agriculture are decreased and it is converted into water body of T3.
- In T3 37.36 ha of agriculture are increased from forest 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	
Built up	66.52										66.52	
Mining/dump		4.08									4.08	
Agriculture	3.85		2903.98	32.41						0.31	2940.55	
Plantation Horticulture			63.38	113.18							176.56	
Forest			12.85		473.59						486.45	
Forest Plantation			2.65								2.65	
Barren Rocky												
Scrub	0.51	4.38	331.90	49.22				1494.95		11.28	1892.25	
Waterbody- Streams/River									189.40		189.40	
Waterbody – Ponds			2.36							91.26	93.63	
Grand Total	70.89	8.46	3317.13	194.81	473.59			1494.95	189.40	102.85	5852.08	

- 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 36.57 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T4.
- In T4 413.15 ha of agriculture are increased from plantation, forest, forest 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	
Built up	70.89										70.89	
Mining/dump		8.46									8.46	
Agriculture	2.52		3292.90	18.12						3.59	3317.13	
Plantation Horticulture			2.40	192.21						0.20	194.81	
Forest			0.29		473.30						473.59	
Forest Plantation												
Barren Rocky												
Scrub	0.18	4.68	116.03	0.40				1348.33		25.33	1494.95	
Waterbody- Streams/River									189.40		189.40	
Waterbody – Ponds			3.38							99.48	102.85	
Grand Total	73.59	13.14	3415.00	210.73	473.30			1348.33	189.40	128.60	5852.08	

- 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 24.23 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T5.
- In T5 122.10 ha of agriculture are increased from plantation, forest, 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 68.39 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 360.38, 35.85, 376.58 & 97.87 Hectares From T0 to T1, T2 to T3, T3 to T4 & T4 to T5 and There is an decrease of 108.20 Hectares From T1 to T2. The overall increase of 762.47 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 187.63 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 1021.28 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (37) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (30) verified from the portal.