

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

Srikakulam -06/2010-11
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**

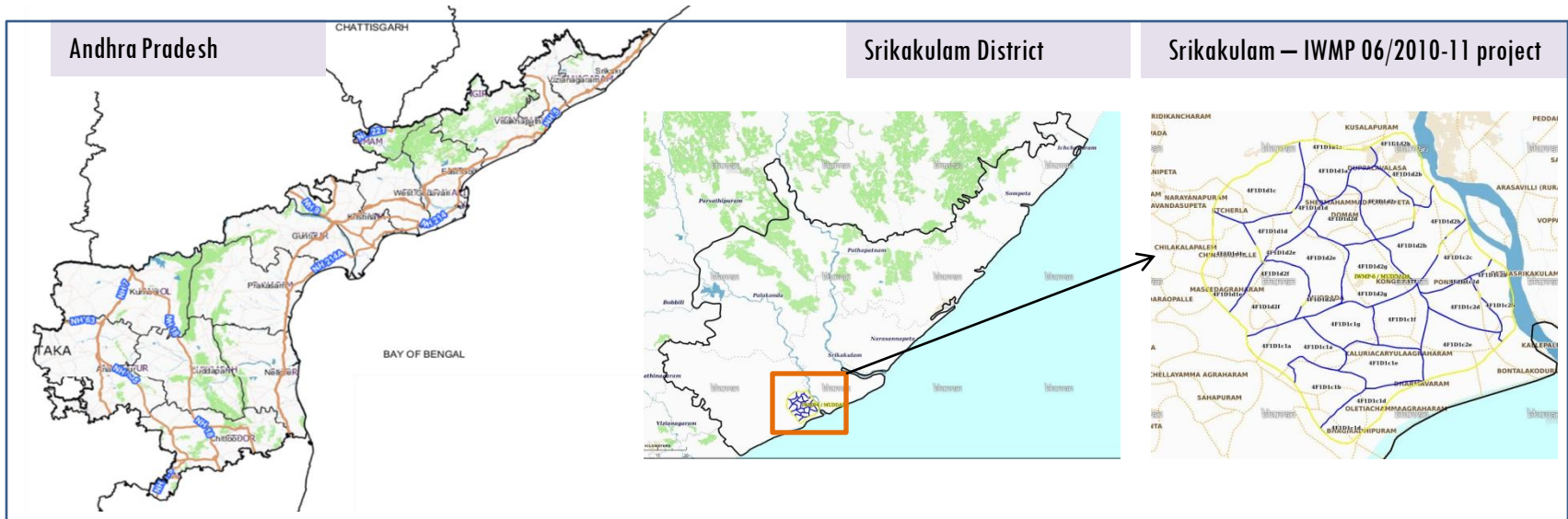
01. STUDY AREA
02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
04. CONCLUSIONS

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-06/2010-11, Srikakulam District of Andhra Pradesh. The total geographical area of the project is 8078.17 ha. It comprises of 21 micro watersheds.
- In the project area 289 Drishti photos were uploaded showing 110 Agriculture/horticulture, 120 aforestation, 33 check dams/checks & plugins, 23 farm ponds etc, and remaining showing other activities.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 23 new farm ponds or dug out pits and 33 check dams/checks & plugins and drainage treatments with 18.55 ha increase in the area.
- Major percentage i.e. 65.42% is covered by the agriculture, 21.71% is covered by plantation, 2.83% is covered by scrubland and remaining by other land use classes.

PROJECT : SRIKAKULAM - IWMP-06/2010-11
DISTRICT : SRIKAKULAM , STATE : ANDHRA PRADESH

- The study area falls in Etcherla Mandal of Srikakulam district of Andhra Pradesh state. The total geographical area of the project is 8078.17 ha. It comprises of 21 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.

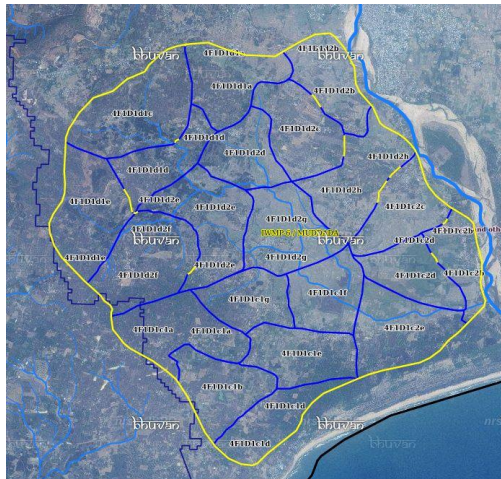
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			8-Jan-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			8-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	289
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

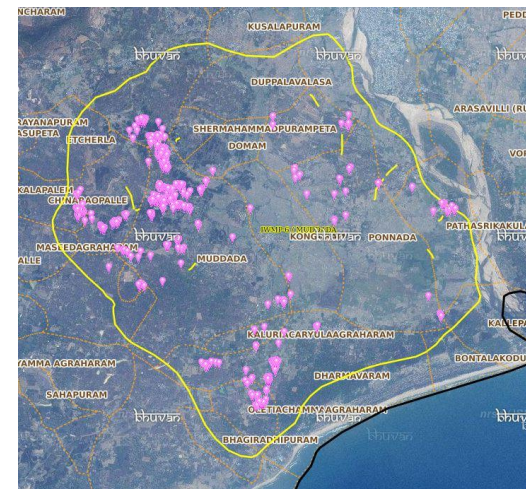


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

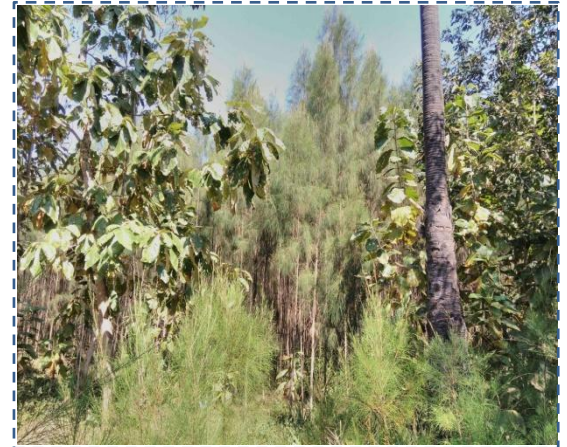
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	116	95
2	Afforestation	190	120
3	Black planting	0	0
4	Bund Planting	0	0
5	Checkdam	3	3
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	33	30
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	23	23
11	Civil work-Check dams /Rock 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	3	3
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	0	0
	TOTAL	409	289

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-06/2010-11



T0:2010-11

T1: 20 March 2013

Drishti Sl no. 2457770 MWS :4F1D1d1e

Afforestation



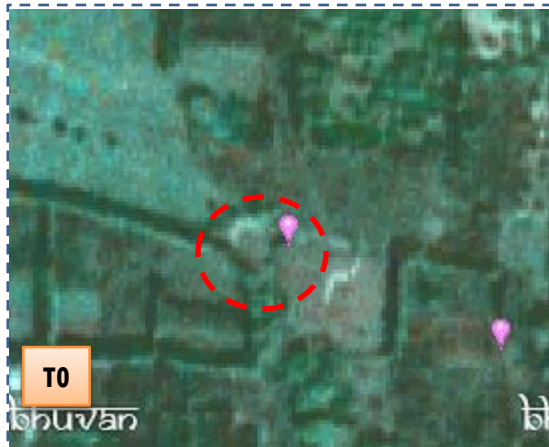
T0:2010-11

T1: 20 March 2013

Drishti Sl no. 132574 MWS : 4F1D1d2c

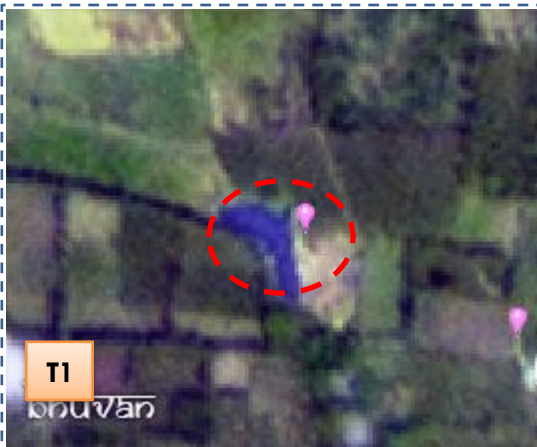
Farm pond

Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-06/2009-10



T0

T0: 2010-11



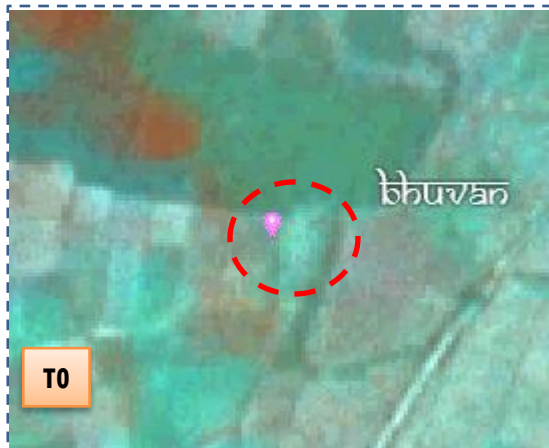
T1

T1: 20 March 2013



Drishti Sl no. 169026 MWS : 4F1D1d2f

Farm pond



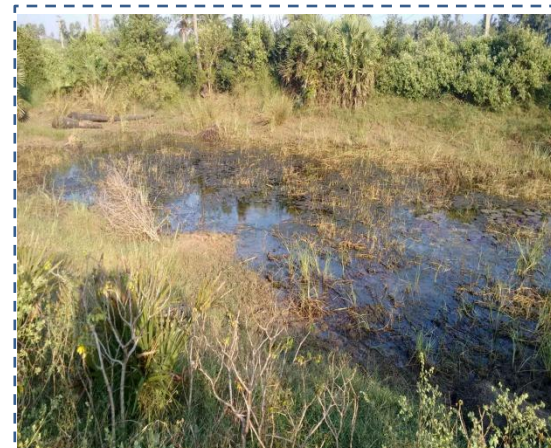
T0

T0: 2010-11



T1

T1: 20 March 2013



Drishti Sl no. 190438 MWS : 4F1D1c1e

Percolation Tank

Srikakulam-IWMP-06/2010-11

2009-10



March-2013



Feb-2016



June-2017



2019

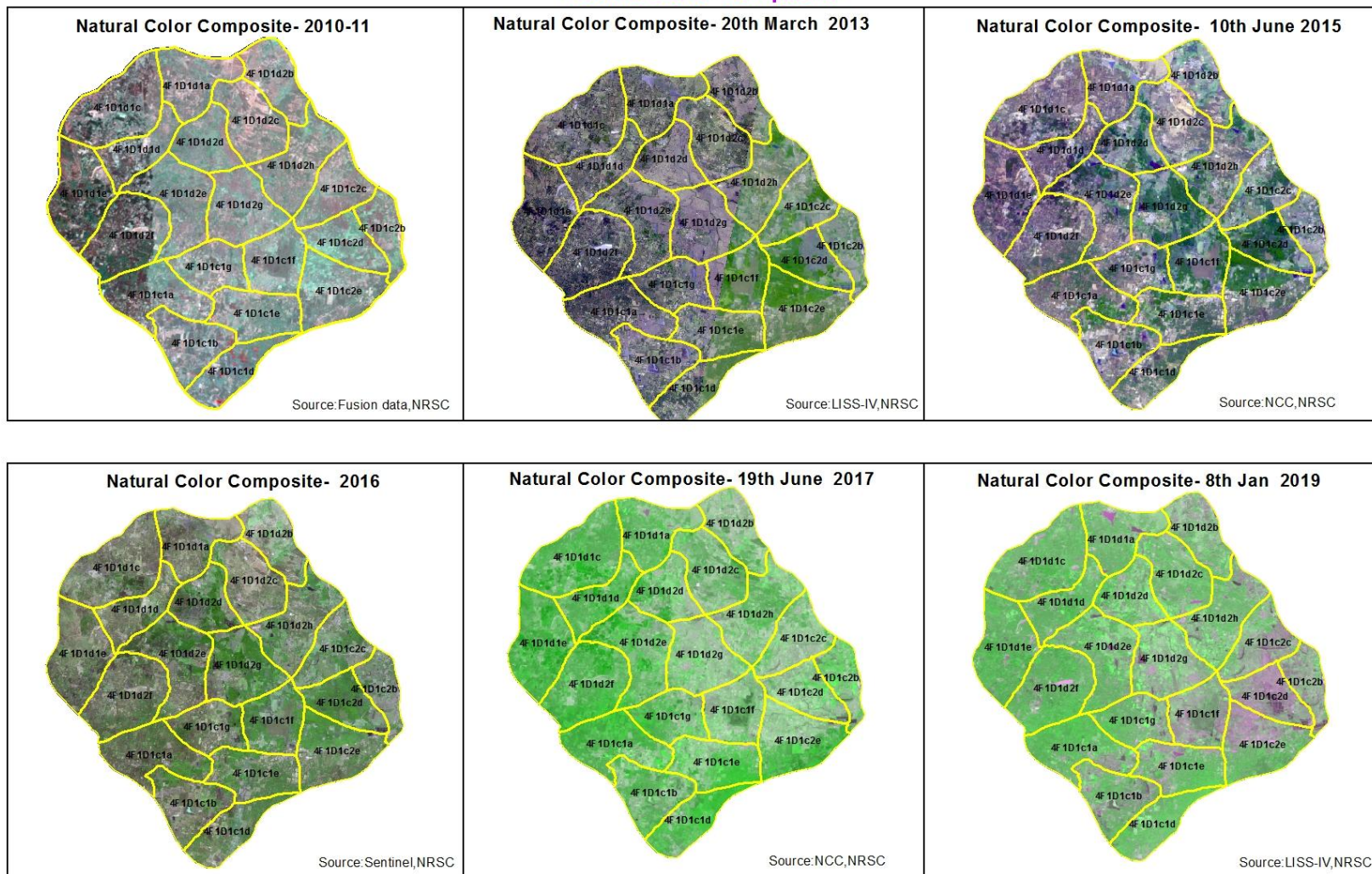


Drishiti Sl.No.: 124336
M.No.: 7093896938
Uuid: 6c48d57166fd7862

Activity : Check dam

Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite



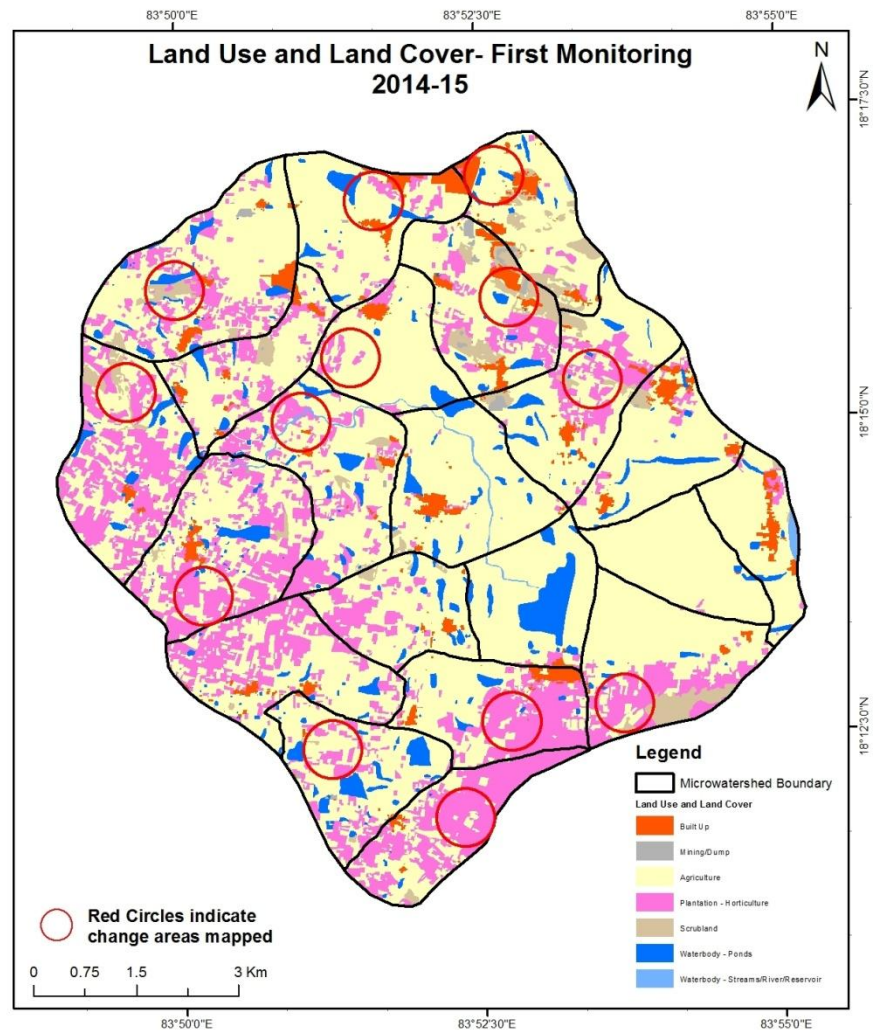
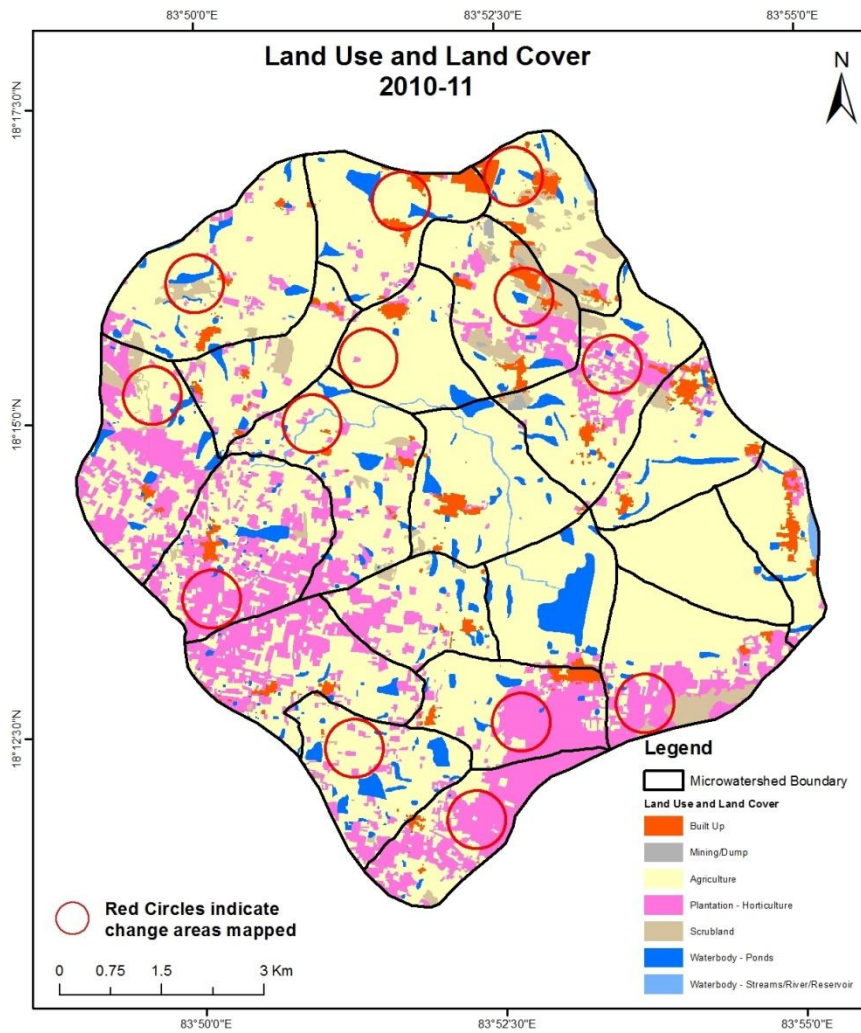
MONITORING IN THE PROJECT AREA

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 T0 (2010-11) and row represents the T5 (2018-19)

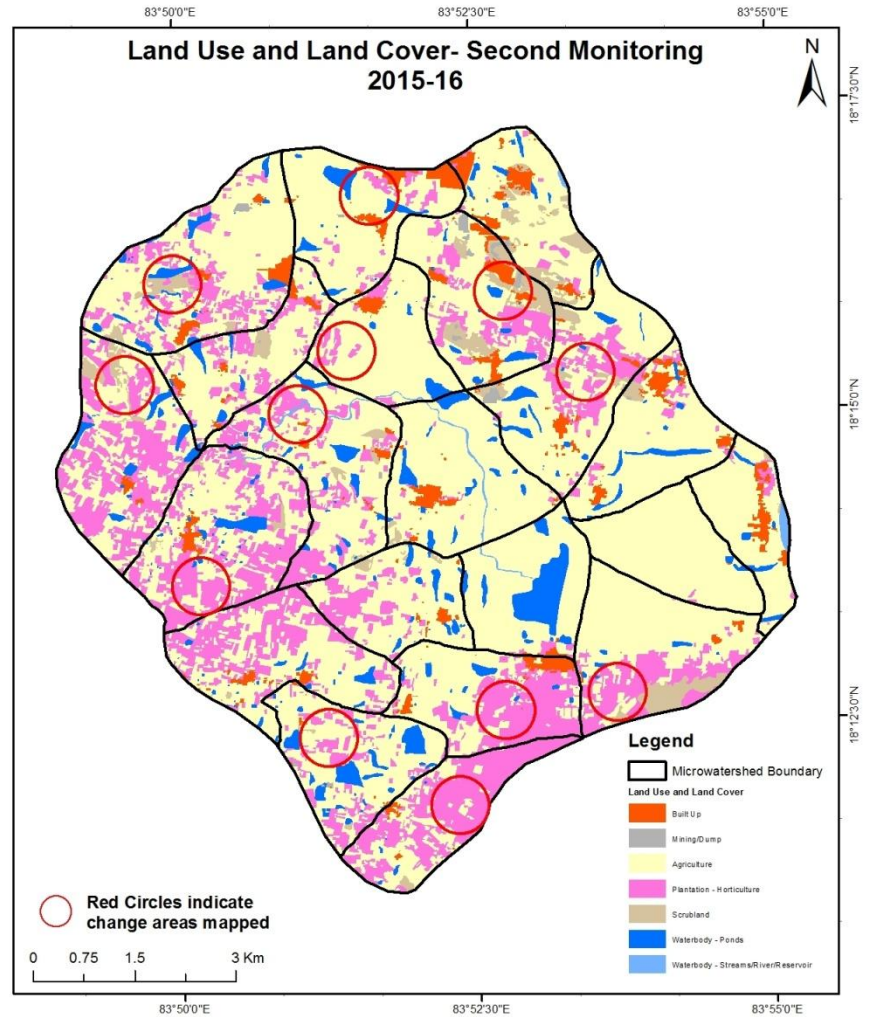
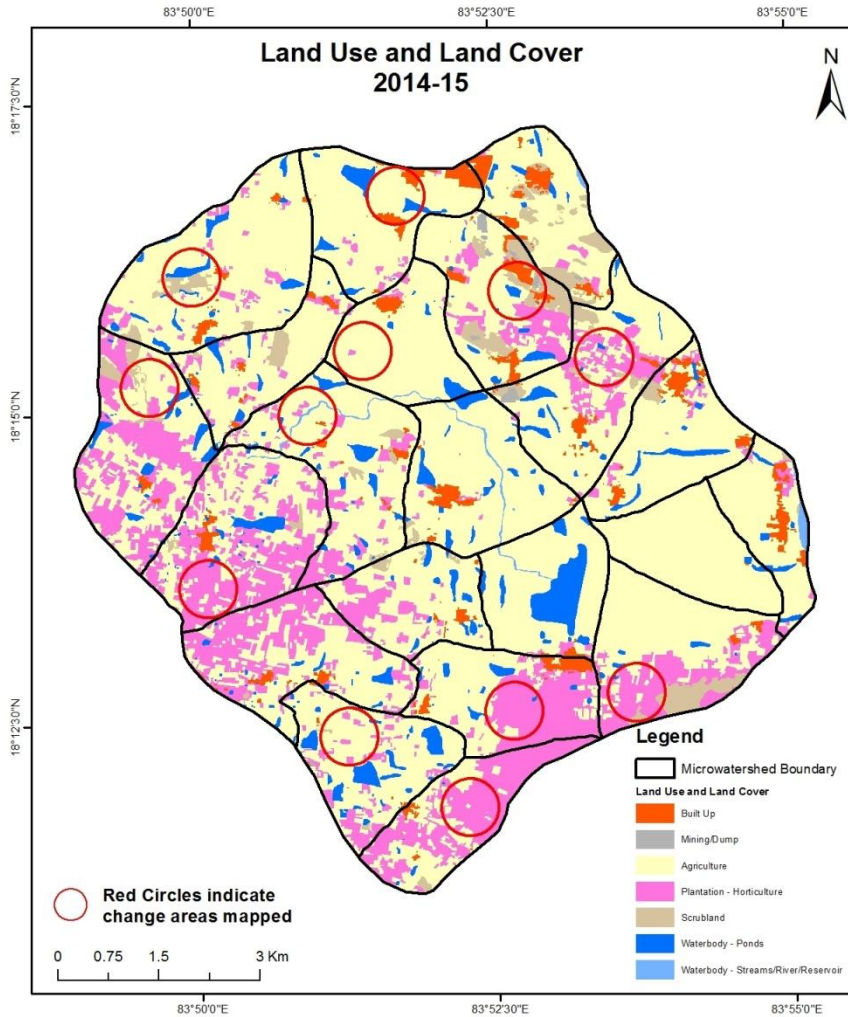
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



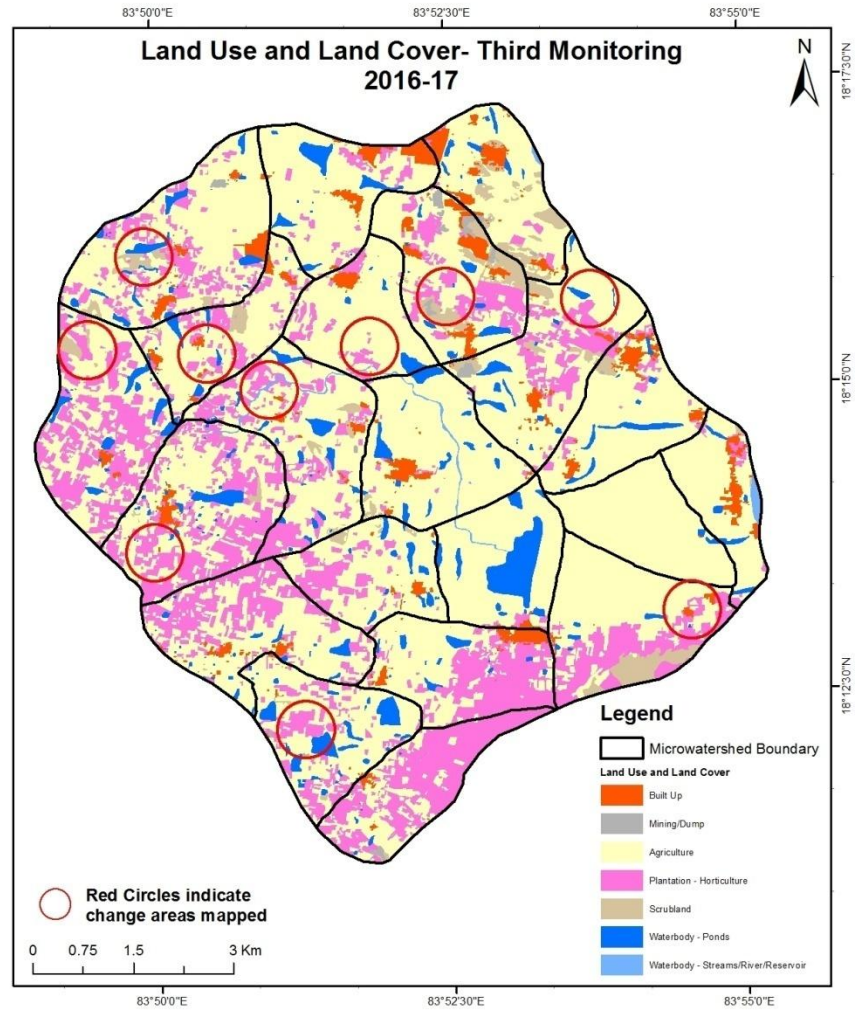
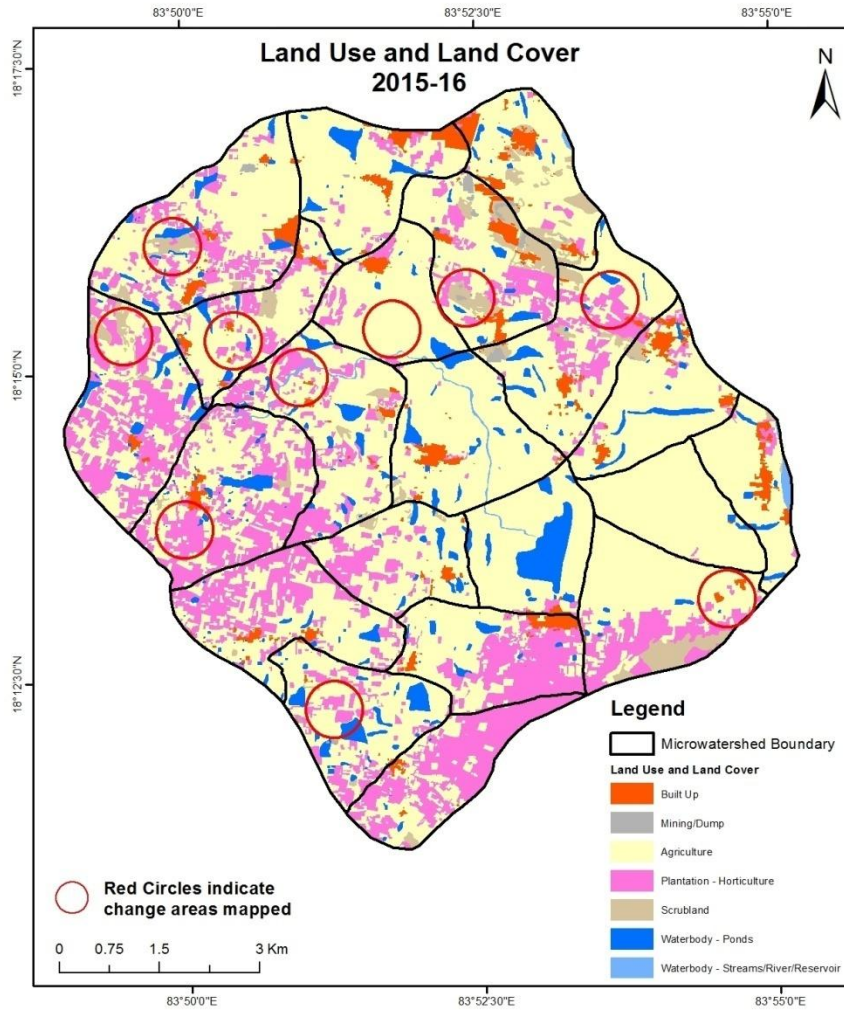
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



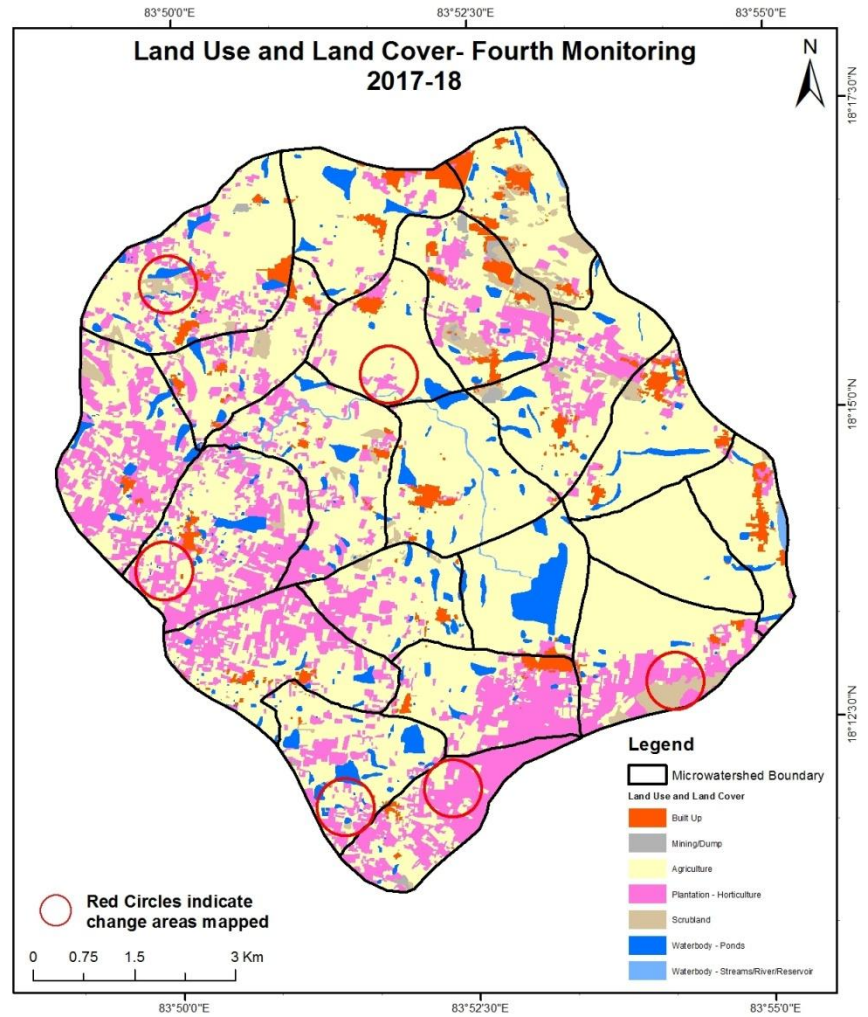
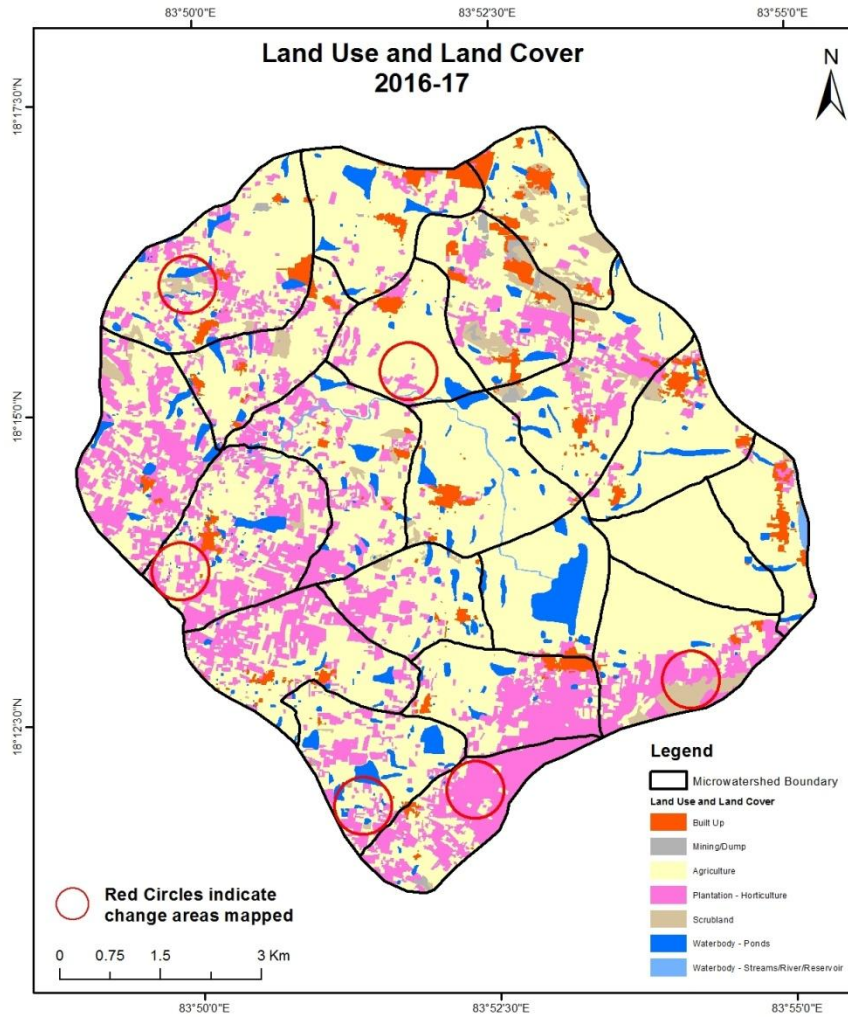
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



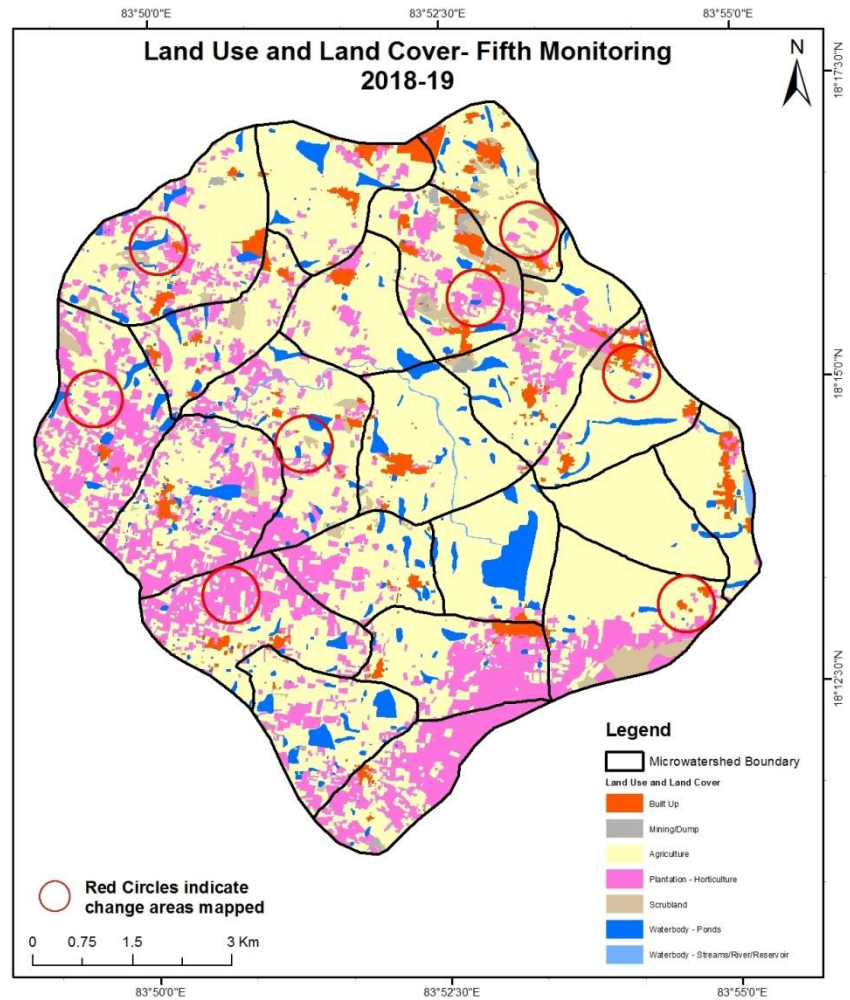
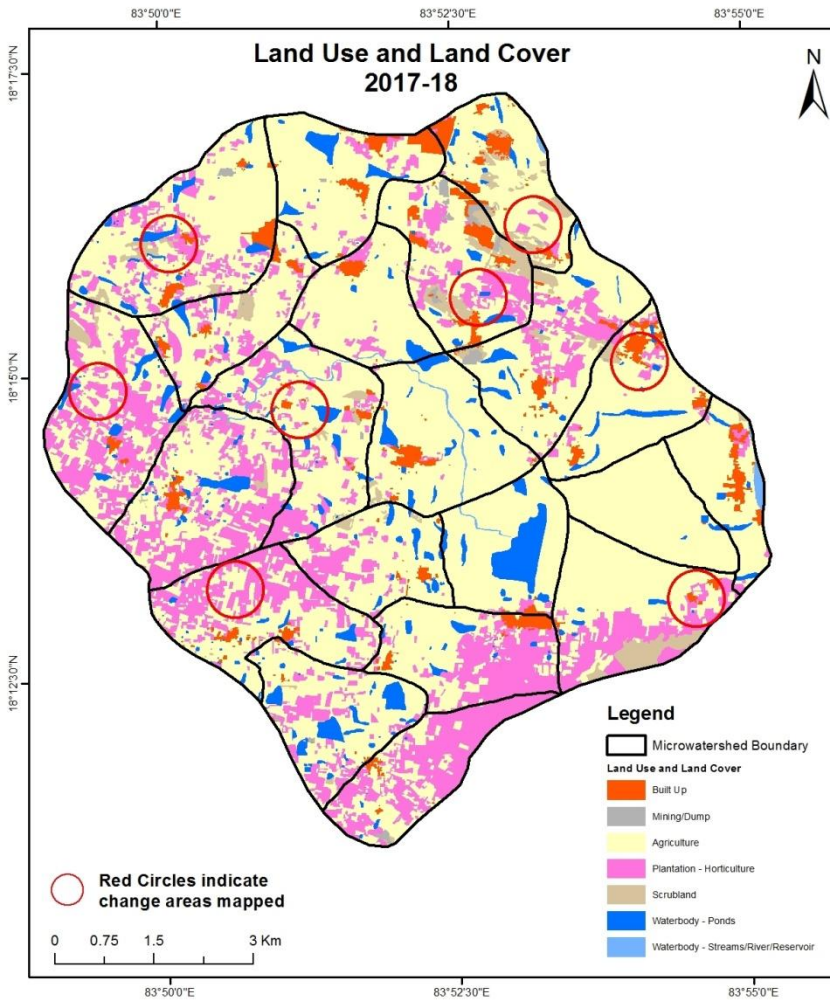
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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

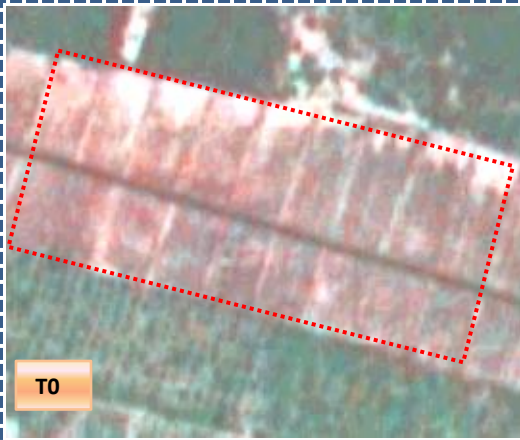
T0: 2010-11



T1

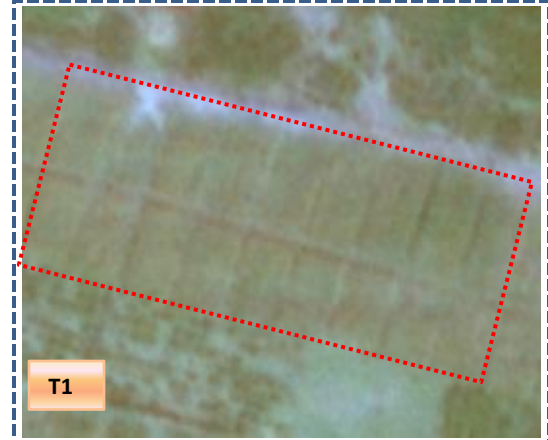
T1: 20 March 2013

Fallow land to Agriculture



T0

T0: 2010-11



T1

T1: 20 March 2013

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

Agriculture to water body



T1: 2014-15 (83°49'43.844E 18°14'30.554N)



T2: 10 January 2016

Plantation to Agriculture



T1: 2014-15 (83°50'26.01"E 18°14'10.888"N)



T2: 10 January 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	155.34										155.34
Mining/dump		11.44									11.44
Agriculture	72.69	1.83	4929.78	152.54				8.90	0.10	17.33	5183.18
Plantation Horticulture	25.77	1.36	553.94	1394.10						5.24	1980.41
Forest											
Forest Plantation											
Barren Rocky											
Scrub	9.82	1.12	33.94					272.17		3.04	320.09
Waterbody- Streams/River									30.92		30.92
Waterbody – Ponds	0.17		2.33							394.29	396.79
Grand Total	263.80	15.74	5519.99	1546.65				281.08	31.02	419.90	8078.17

- 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 253.40 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation, scrubland and water body of T5.
- In T5 590.21 ha of agriculture are increased from plantation, scrubland and water body 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		
T1													
Built up	263.80												263.80
Mining/dump		15.74											15.74
Agriculture	25.27	5.06	5055.18	431.27							3.21		5519.99
Plantation Horticulture	1.07		195.23	1350.31							0.05		1546.65
Forest													
Forest Plantation													
Barren Rocky													
Scrub	1.09	2.71	12.35					264.93					281.08
Waterbody- Streams/River									31.02				31.02
Waterbody – Ponds	0.65	0.16	0.21								418.88		419.90
Grand Total	291.88	23.67	5262.97	1781.58				264.93	31.02		422.13		8078.17

- 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 464.81 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 207.78 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	291.88										291.88	
Mining/dump		23.67									23.67	
Agriculture	8.53	0.79	5202.17	50.80						0.67	5262.97	
Plantation Horticulture	2.38		50.37	1728.77						0.06	1781.58	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.69	6.52	16.18	4.15				237.40			264.93	
Waterbody- Streams/River									31.02		31.02	
Waterbody – Ponds										422.13	422.13	
Grand Total	303.48	30.98	5268.71	1783.72				237.40	31.02	422.86	8078.17	

- 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 60.80 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T3.
- In T3 66.54 ha of agriculture are increased from plantation, 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-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	303.48										303.48	
Mining/dump		30.98									30.98	
Agriculture	5.76		5226.97	34.12						1.86	5268.71	
Plantation Horticulture	1.11		75.23	1707.15						0.23	1783.72	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.77	0.76	0.66					234.60		0.60	237.40	
Waterbody- Streams/River									31.02		31.02	
Waterbody – Ponds										422.86	422.86	
Grand Total	311.13	31.74	5302.86	1741.27				234.60	31.02	425.55	8078.17	

- 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 41.74 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T4.
- In T4 75.89 ha of agriculture are increased from plantation 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-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	311.13										311.13	
Mining/dump		31.74									31.74	
Agriculture	7.11		5256.55	36.29						2.92	5302.86	
Plantation Horticulture	0.58		22.97	1717.60						0.12	1741.27	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	0.27		5.39					228.72		0.23	234.60	
Waterbody- Streams/River									31.02		31.02	
Waterbody – Ponds										425.55	425.55	
Grand Total	319.09	31.74	5284.91	1753.89				228.72	31.02	428.81	8078.17	

- 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 46.31 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T5.
- In T5 28.36 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 increase of 32.12 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 336.81, 5.74 & 34.15 Hectares From T0 to T1, T2 to T3 & T3 to T4 and There is an increase of 257.03 & 17.95 Hectares From T1 to T2 & T4 to T5. The overall increase of 101.73 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is decrease of 226.52 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 91.38 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (23) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (23) verified from the portal.