MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -3/2009-10
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-2020

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

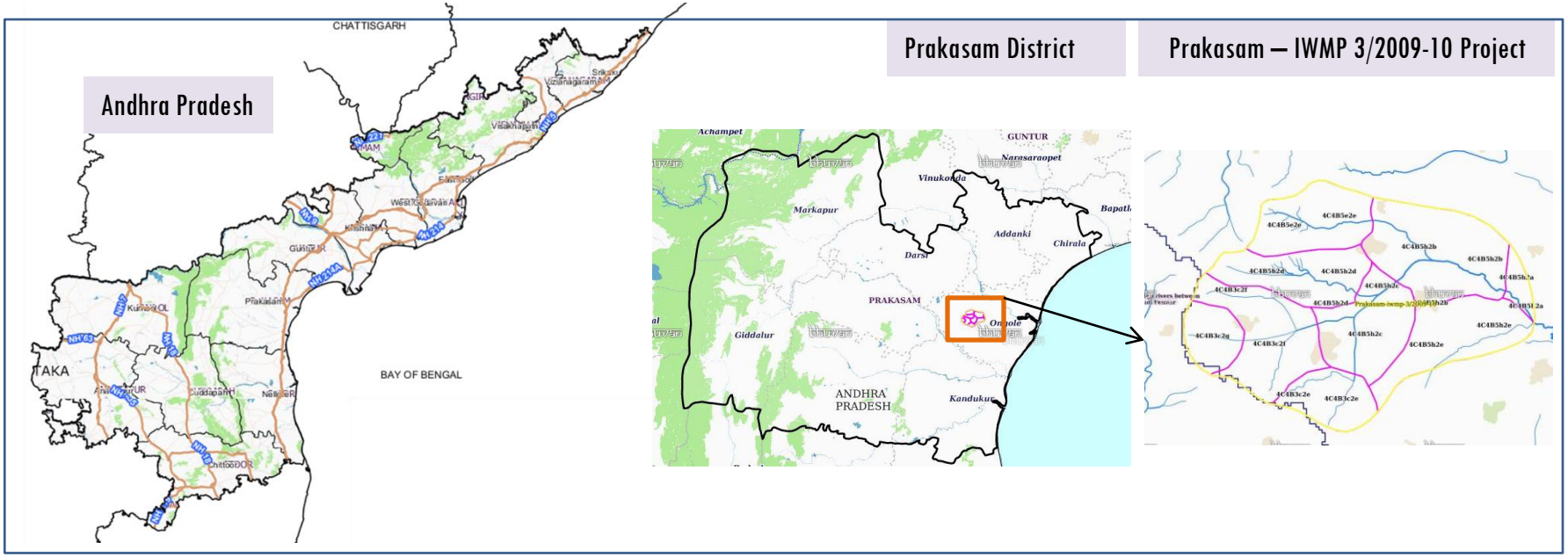
CONTENTS

EXECUTIVE SUMMARY

- 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-02/2009-10, Prakasam District of Andhra Pradesh. The total geographical area of the project is 5,571 ha. It comprises of 21 micro watersheds.
- In the project area 35 Drishti photos were uploaded showing 22 solar lights, 4 plantations, 3 percolation tanks,1 check dams,1 dug out pit, 1 fodder and 2 others.
- Major percentage i.e. 73.39 % is covered by the agriculture, 9.36% is covered by water bodies, 6.62 % by Plantation/Horticulture, 5.92% by scrub land and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-03/2009-10
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Ongole and Tangutur Mandals of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 5,571 ha. It comprises of 21 micro watersheds. Location Map of the study area is shown in Figure below
- Analysis is done for 2009-10 period (***Batch -1***) projects taking 2017-18 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.
- 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.

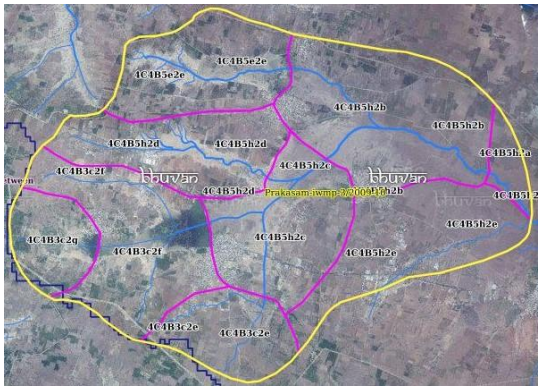
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			16-Apr-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			16-Apr-18
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	34
4	Detailed Project Report		

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



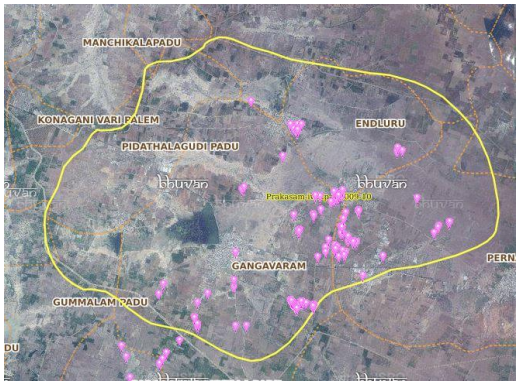
Legend

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	7	6
2	Horticulture plantation-acid lime	0	0
3	Agriculture	1	1
4	Block Plantation	0	0
5	Solar street light	0	0
6	Field Bunds	0	0
7	Fodder	0	0
8	Varmicompost pit	0	0
9	Avenue plantation	0	0
10	Farm ponds	0	0
11	Check dams	1	1
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	104	80
	TOTAL	**113**	**88**

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 (2009-10) and T5 is 2017-18 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-03/2009-10

T1:2014-15

T2: 22 june 2016

Drishti Sl no. 784647 MWS :4C4B5j2c

Check dam

T1:2014-15

T2: 22 june 2016

Drishti Sl no.560084 MWS : 4C4B5j2c

Check dam

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-03/2009-10

T1: 2014-15

T2: 22 june 2016

Drishti Sl no. 560073 MWS :4C4b5j3b

Farm pond

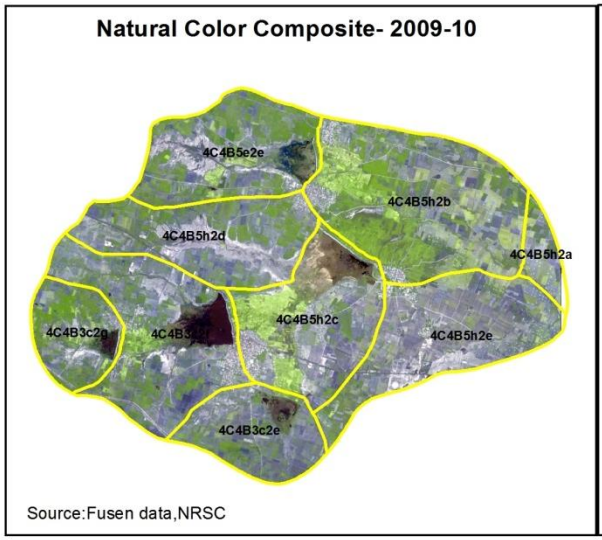
T1: 2014-15

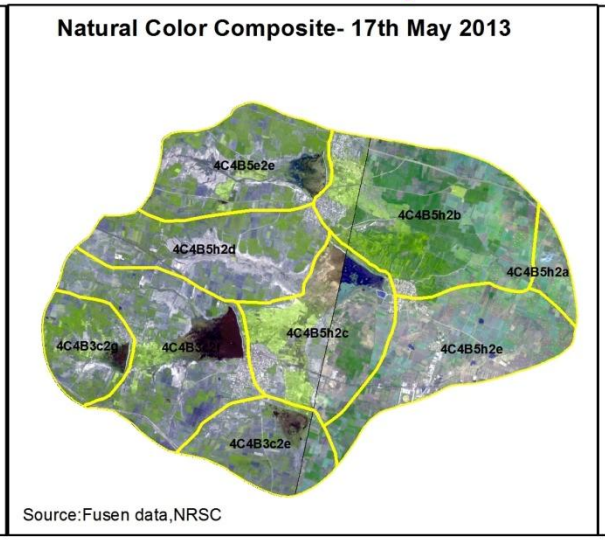
T2: 22 june 2016

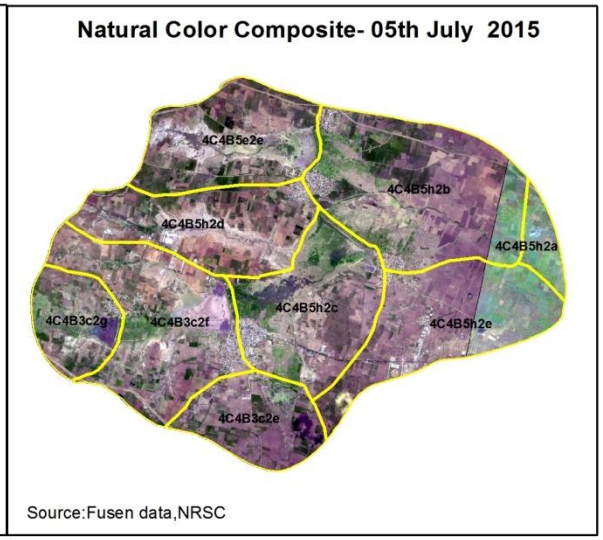
Drishti Sl no. 560073 MWS :4C4B5j2b

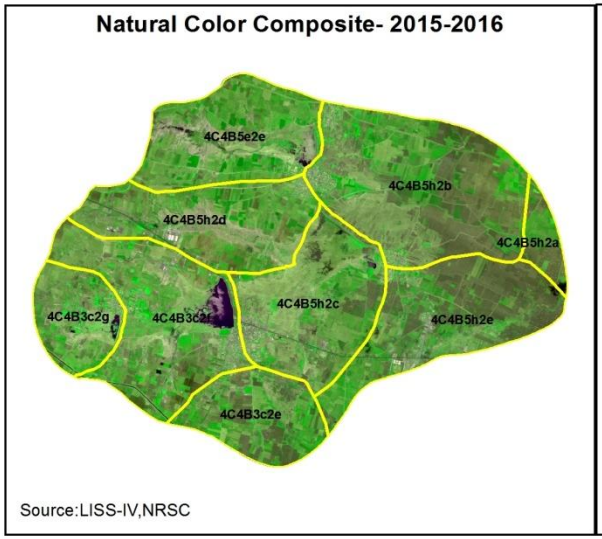
New Activity (plantation)

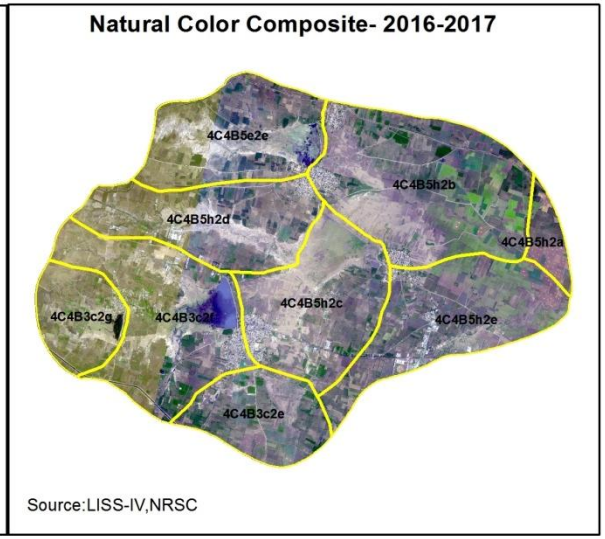
Natural Color Composite – 2009-10 to 2017-18



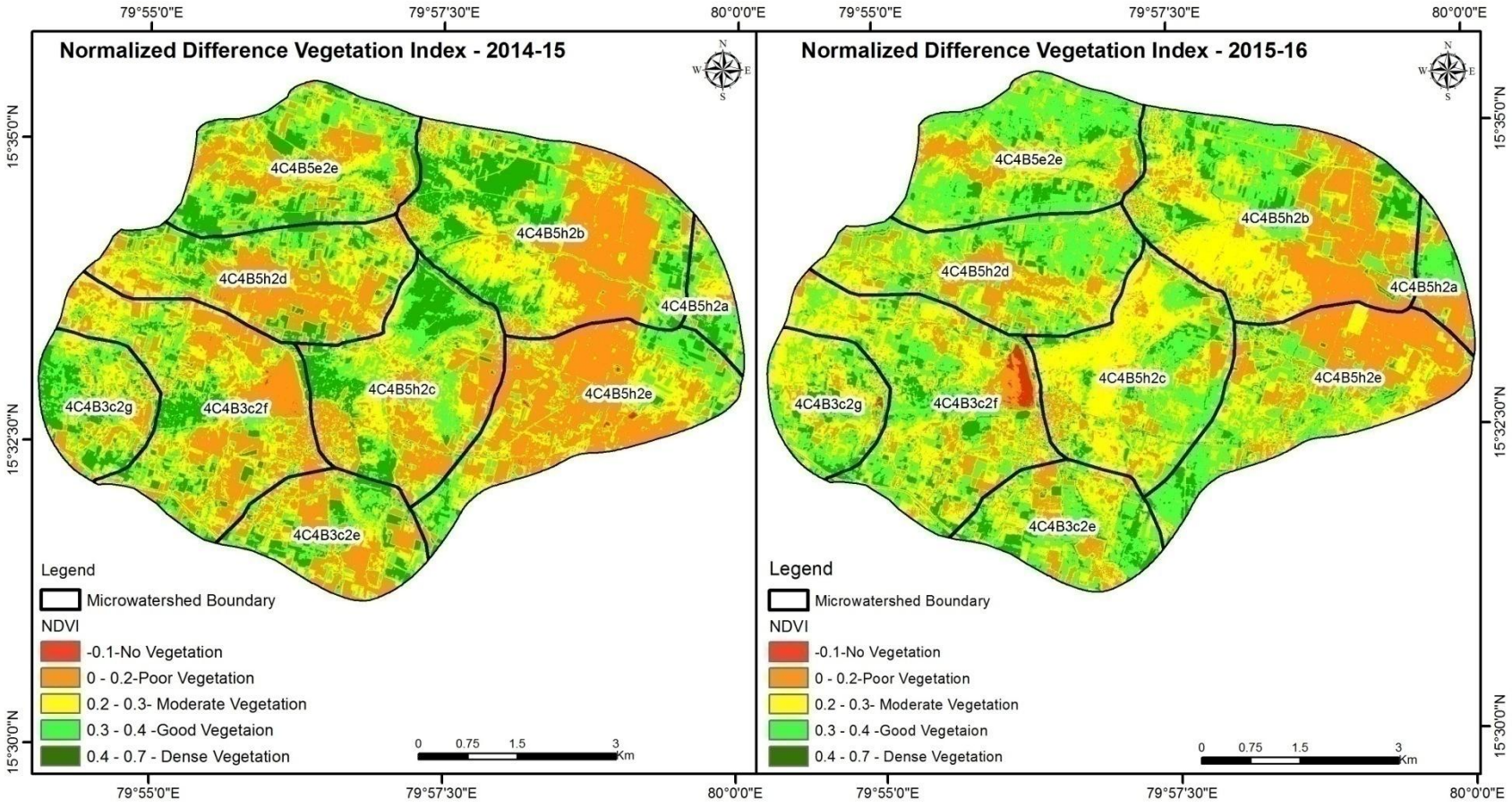








Changes in Vegetation Cover



NDVI (2014-15)

NDVI (2015-16)

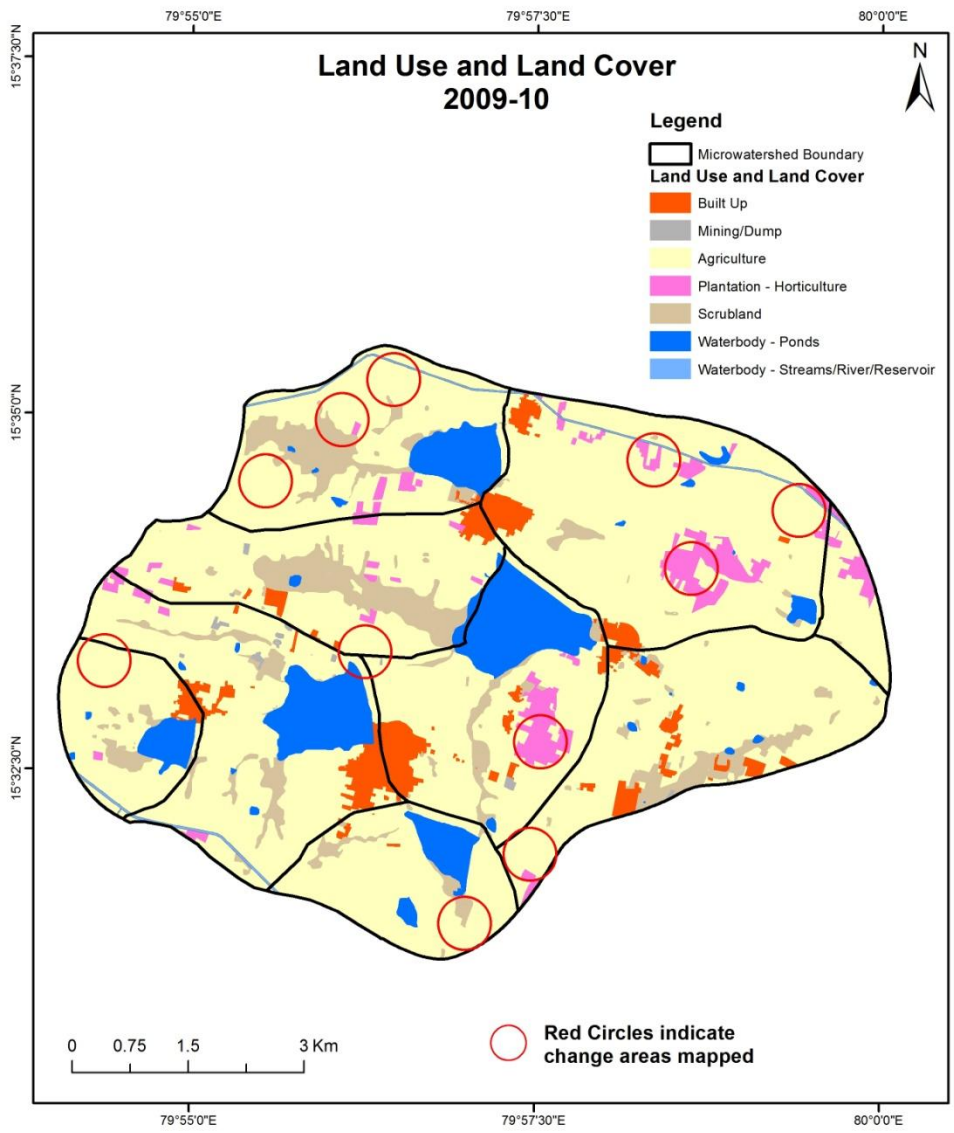
MONITORING IN THE PROJECT AREA

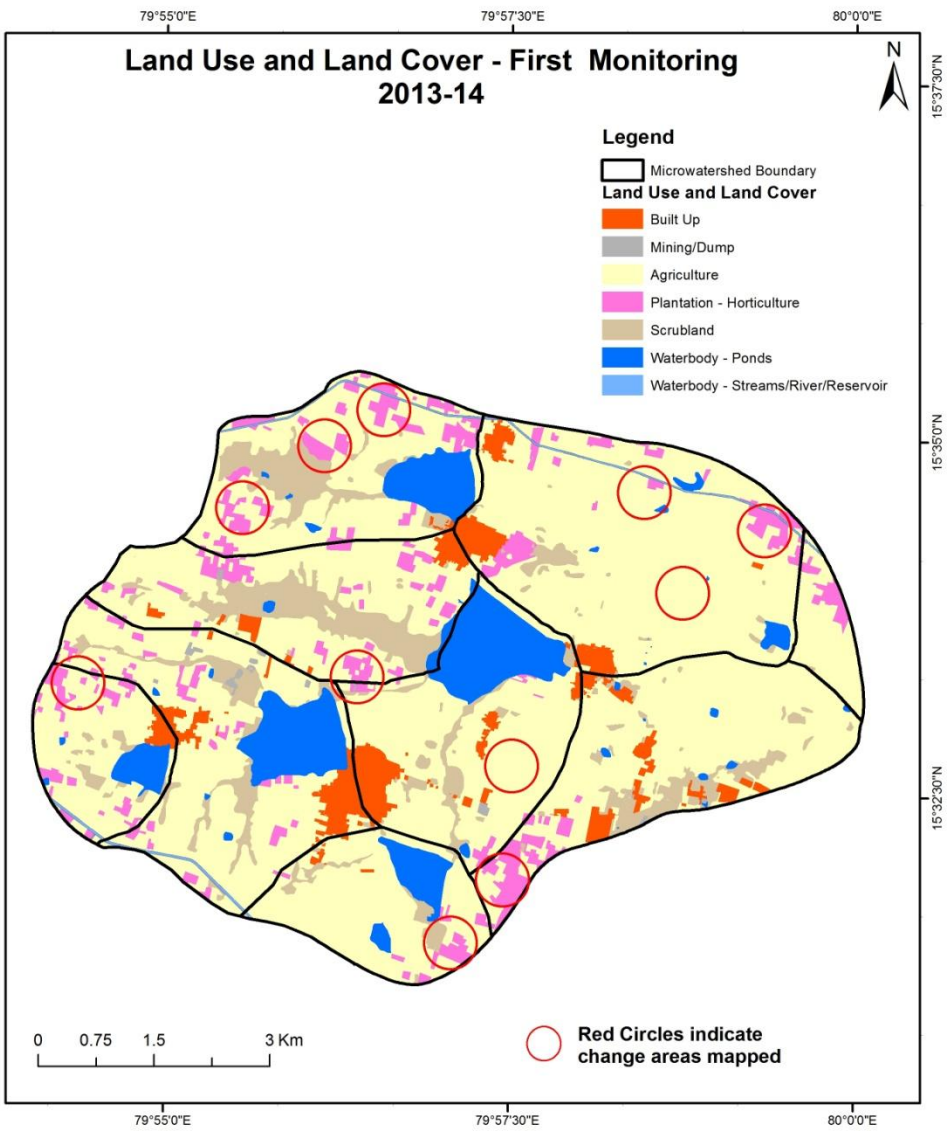
Land use and Land cover Changes in the Project

- Change in land use and land cover form 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.

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

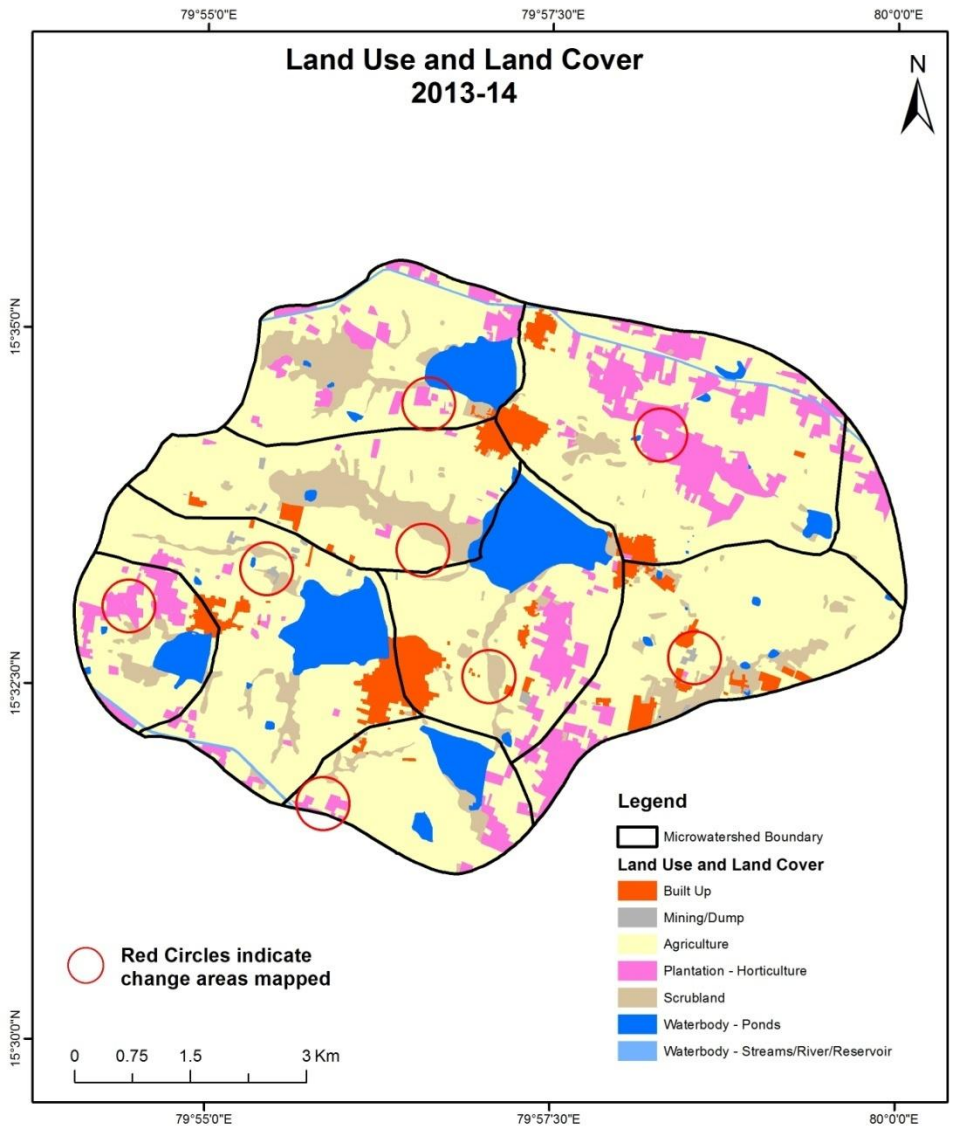
Scale: 1:10000

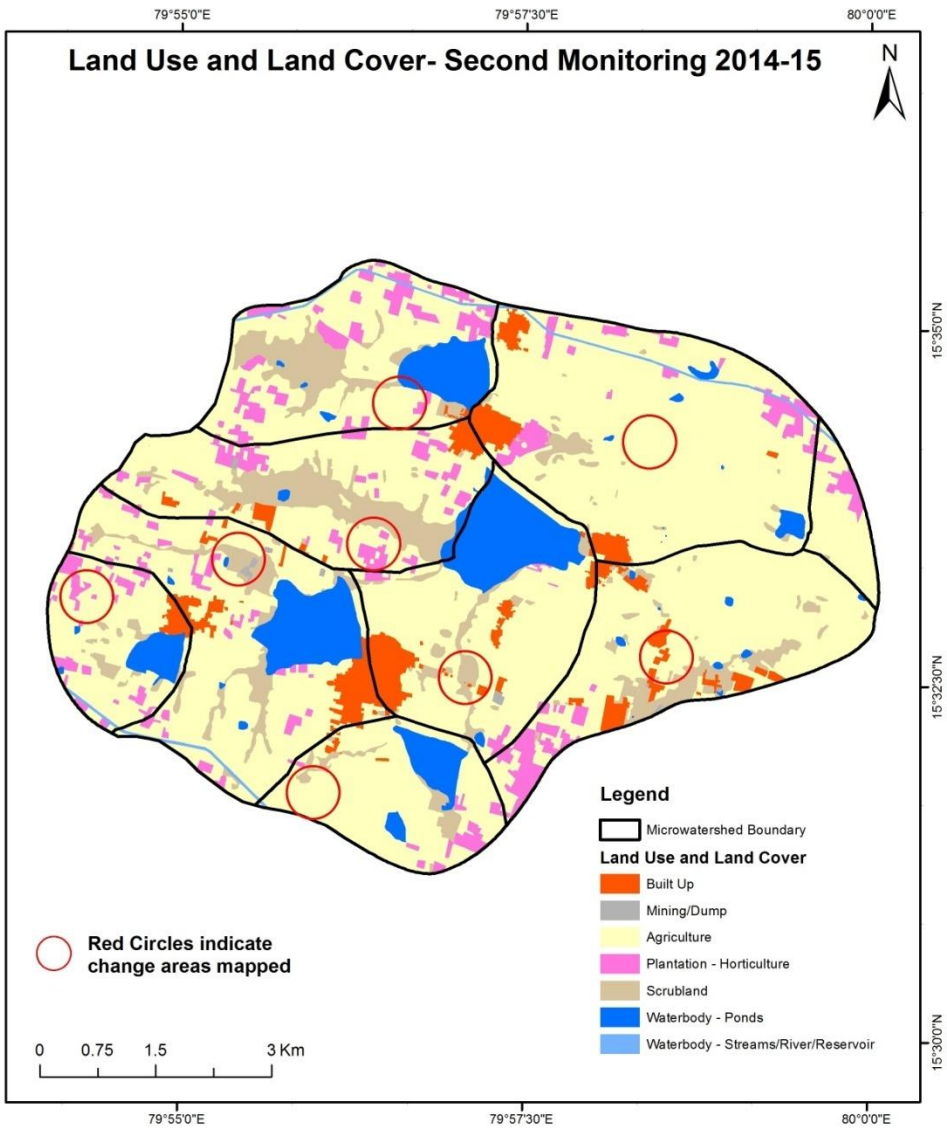




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

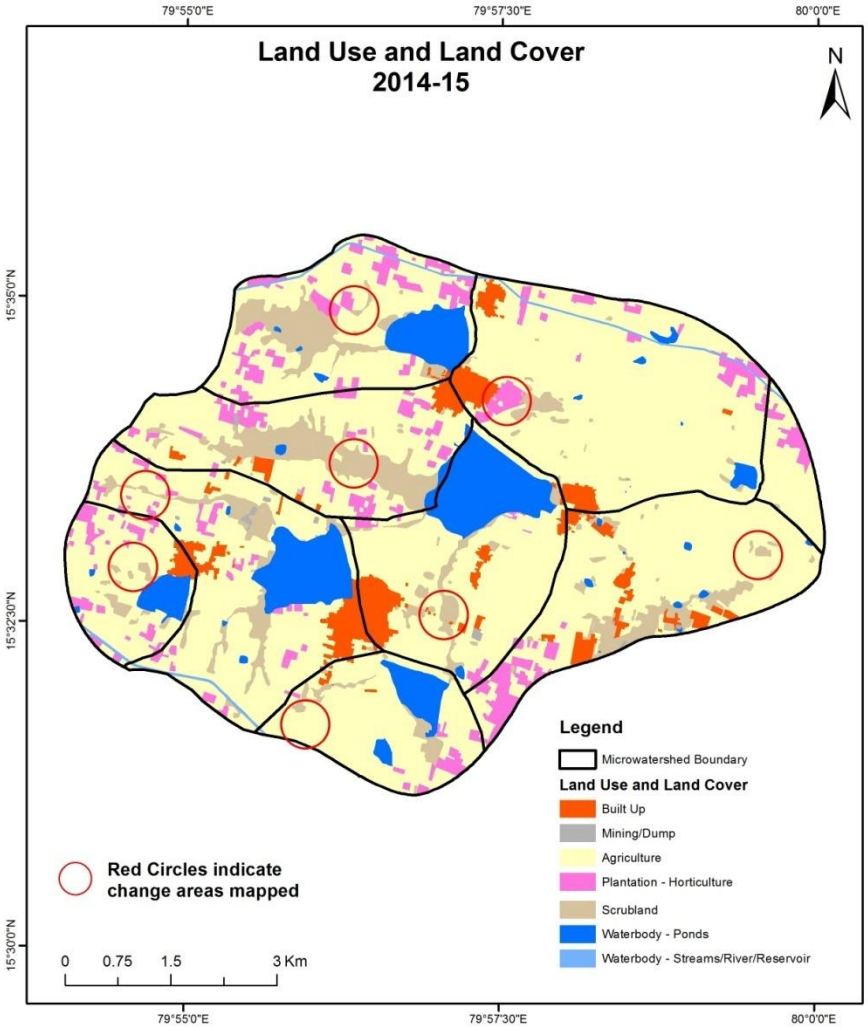
Scale: 1:10000

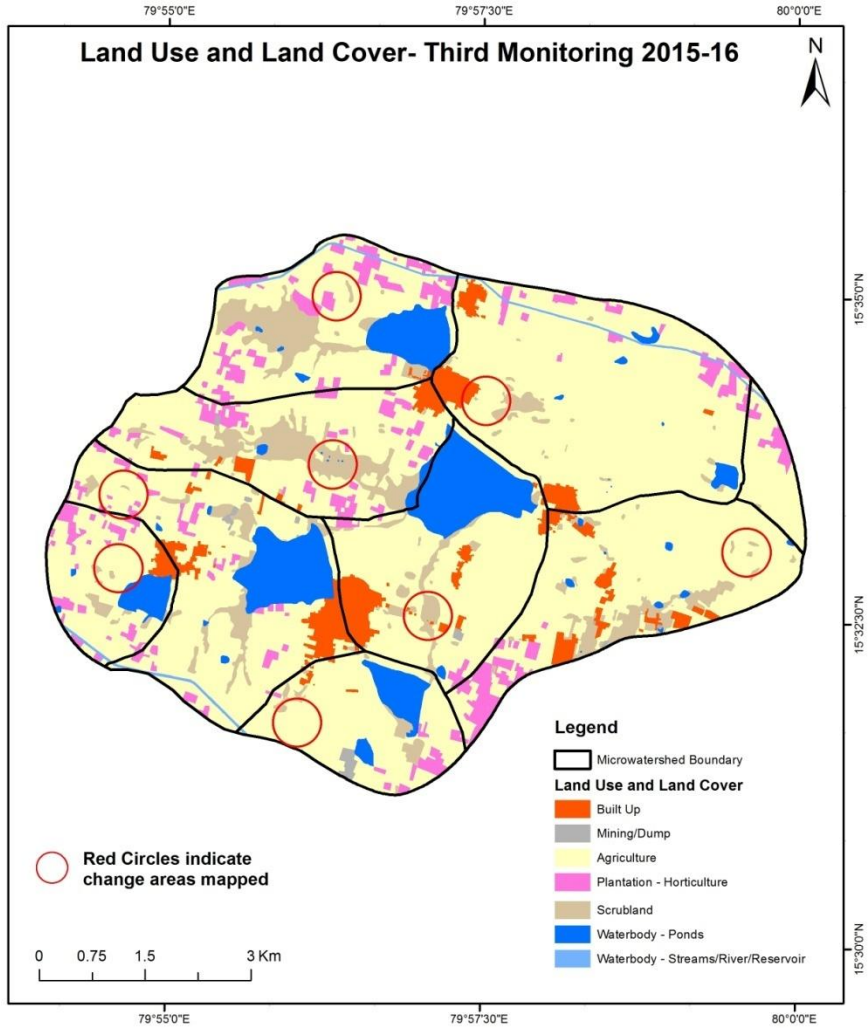




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

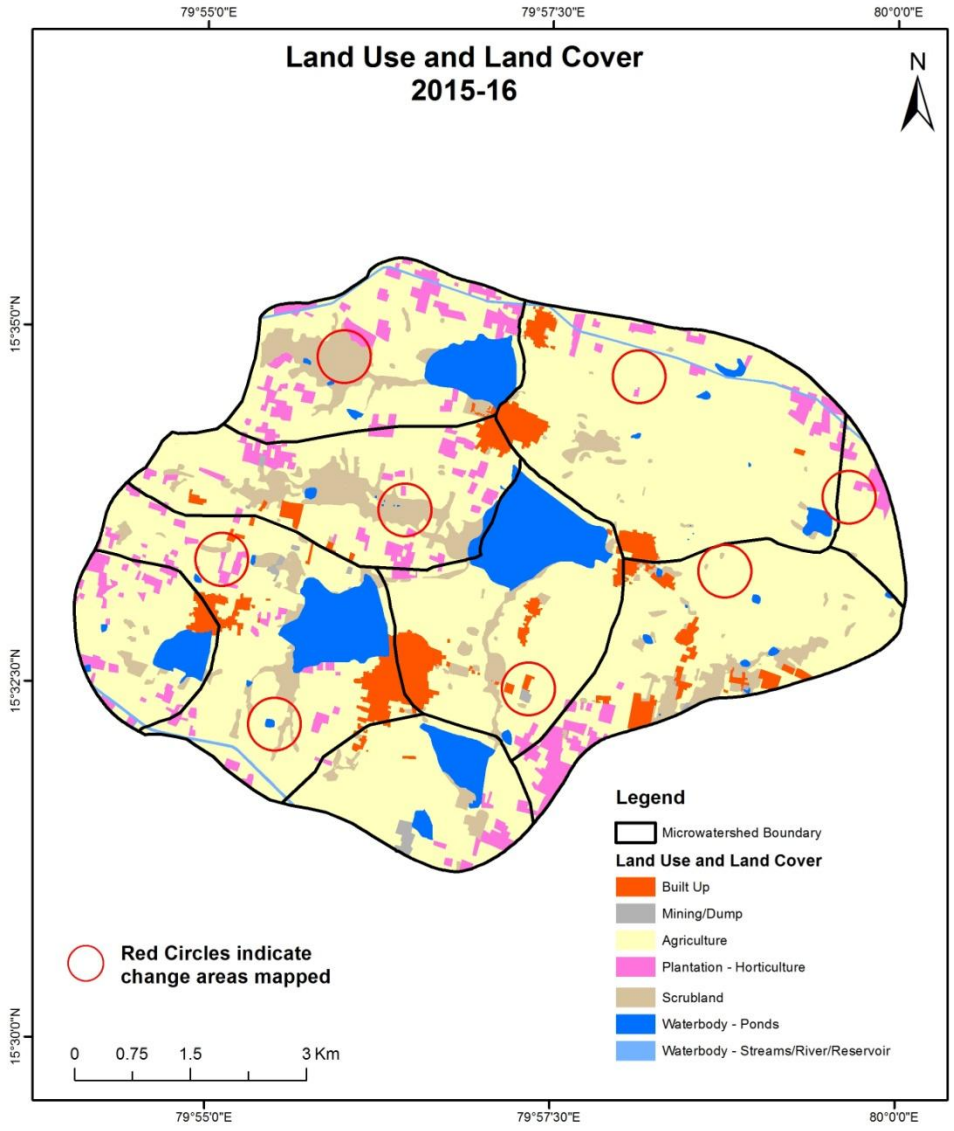
Scale: 1:10000

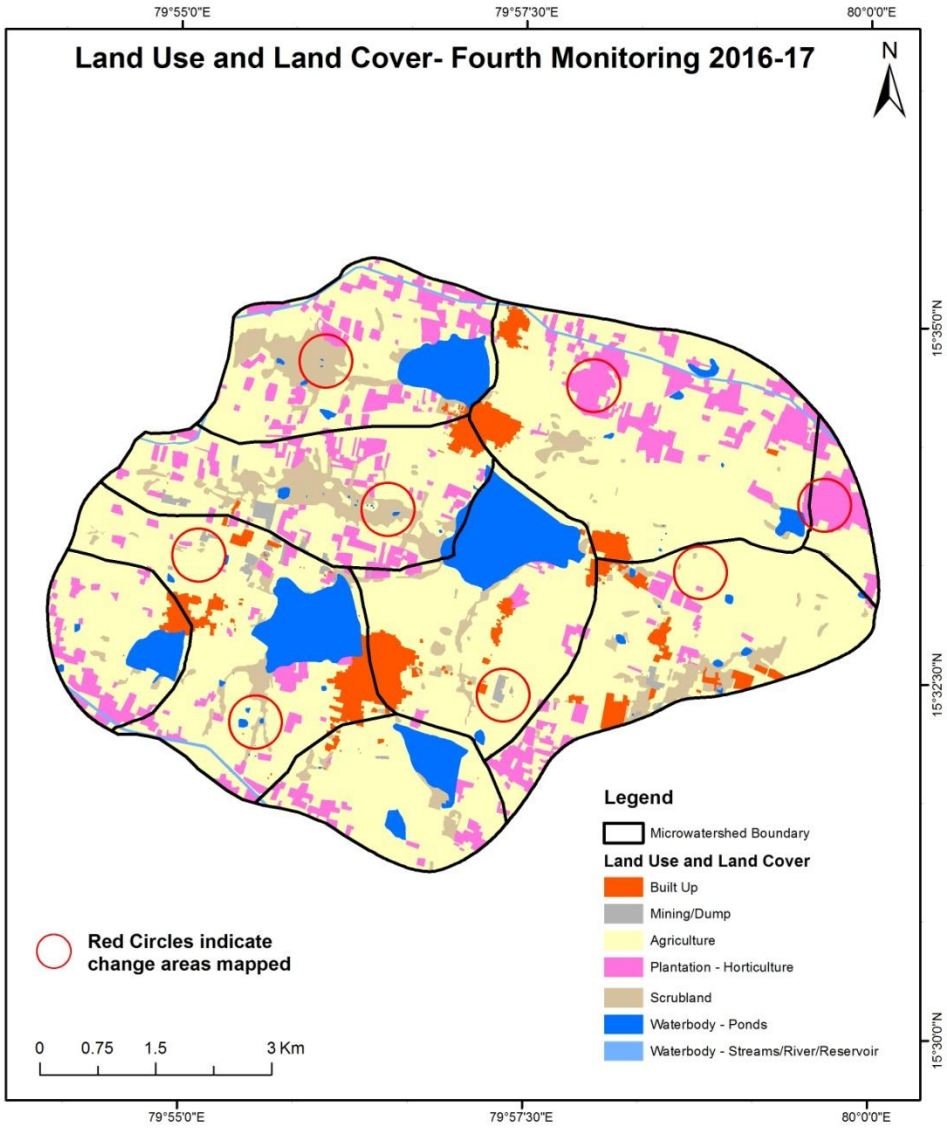




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

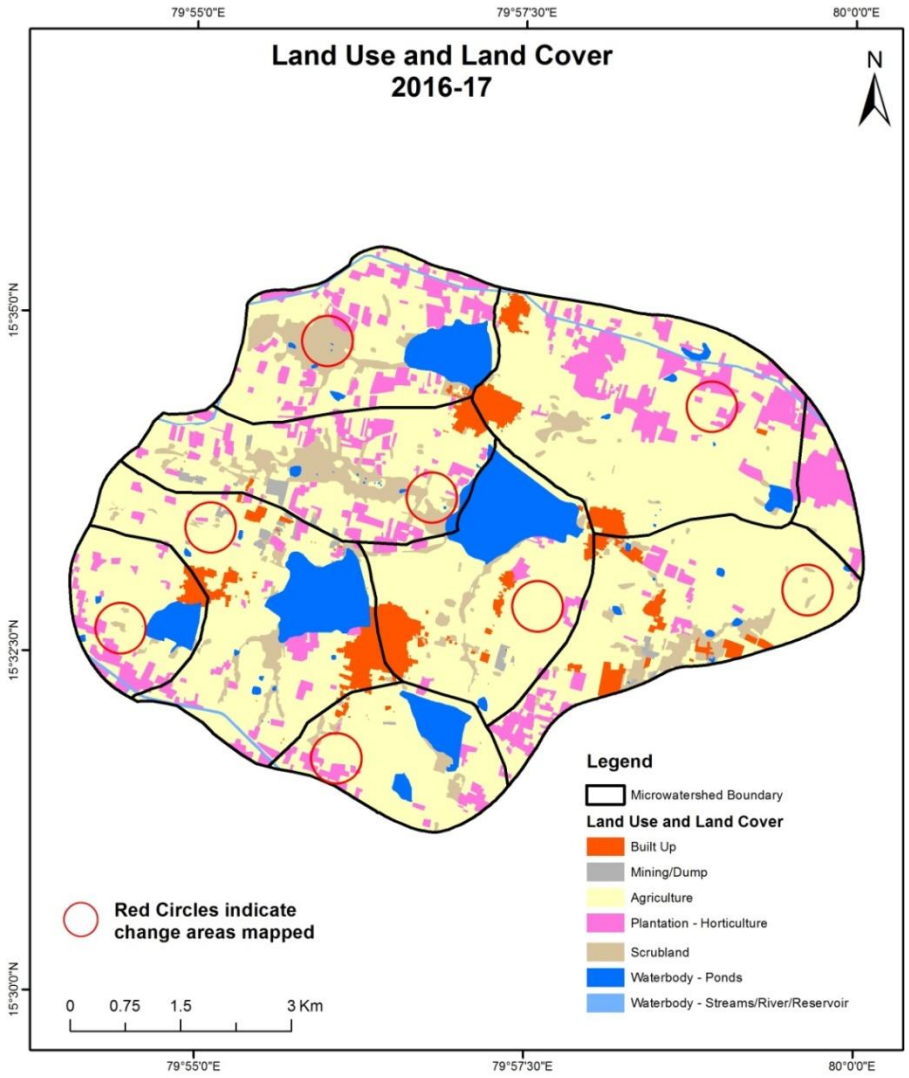
Scale: 1:10000

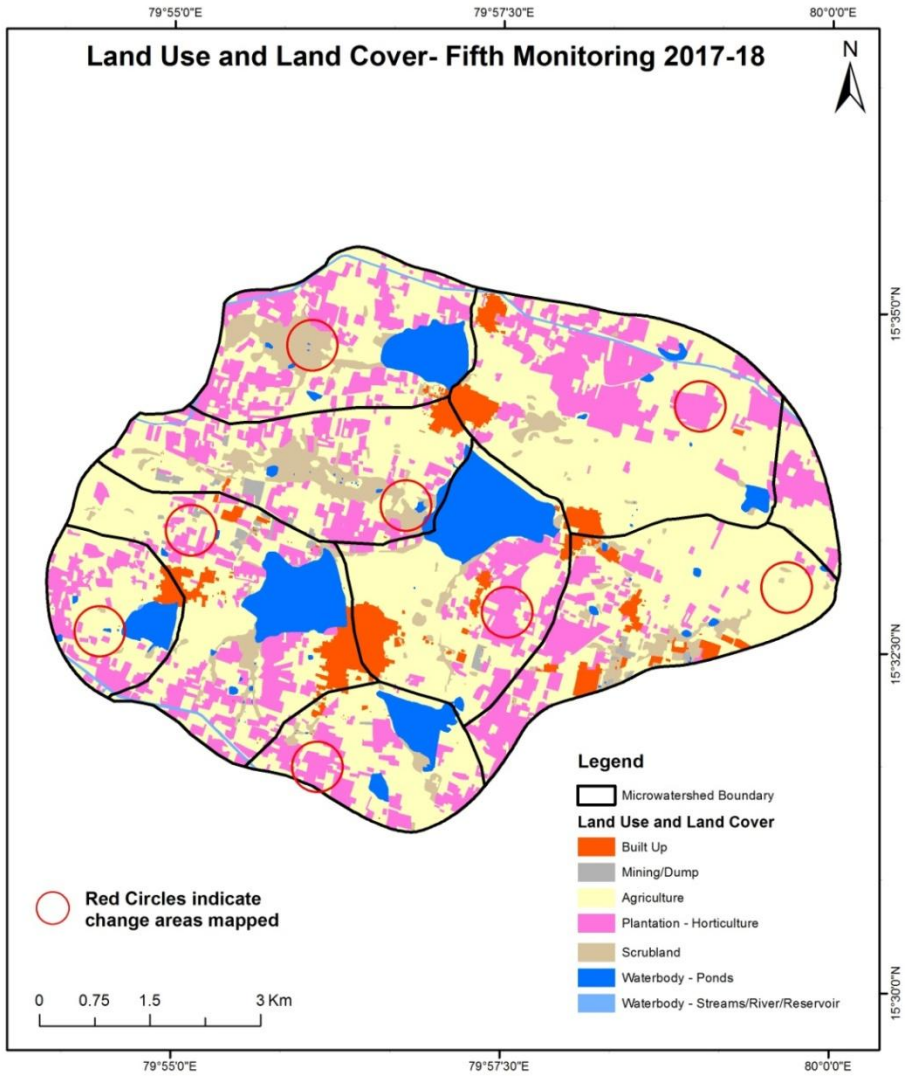




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000

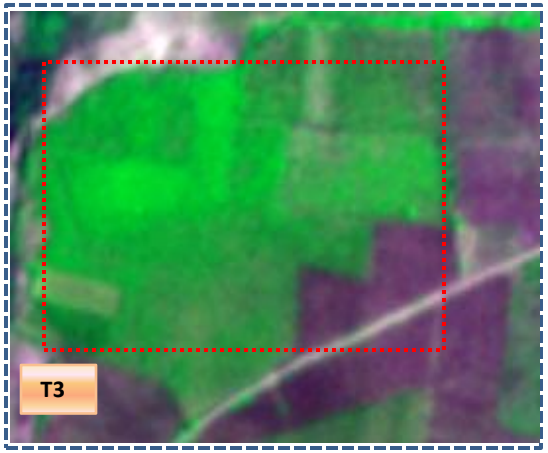




Land Use and Land Cover changes for Pre and Post treatment dates

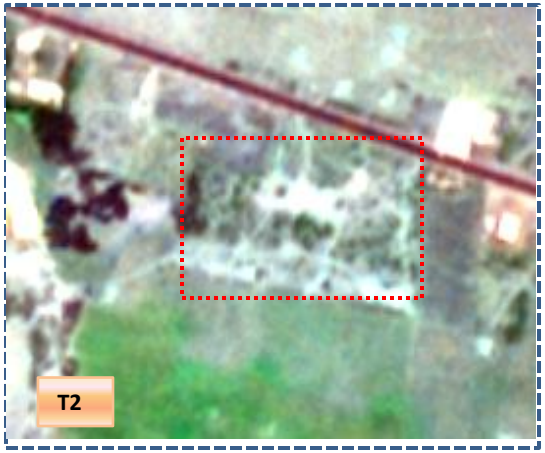
Fallow to Agriculture

T2: 2014-15

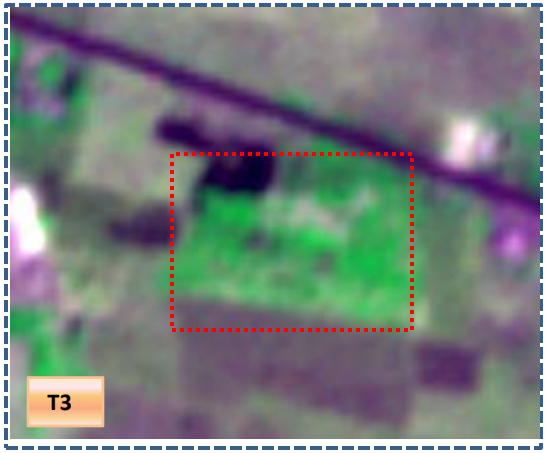


T3: 22 june 2016

Scrub to Agriculture



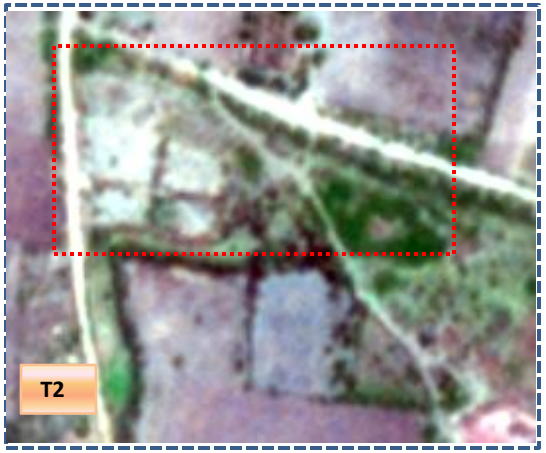
T2: 2014-15



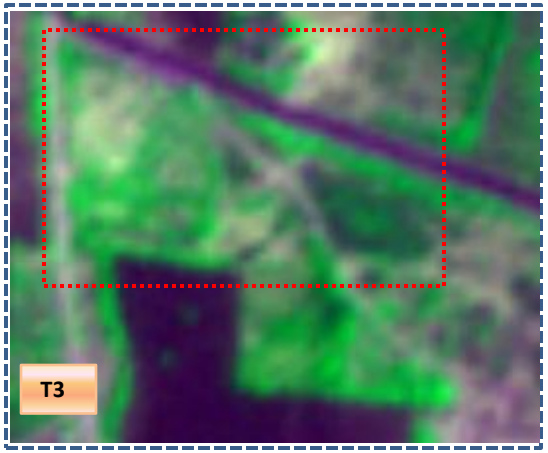
T3: 22 june 2016

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

Scrub to Agriculture

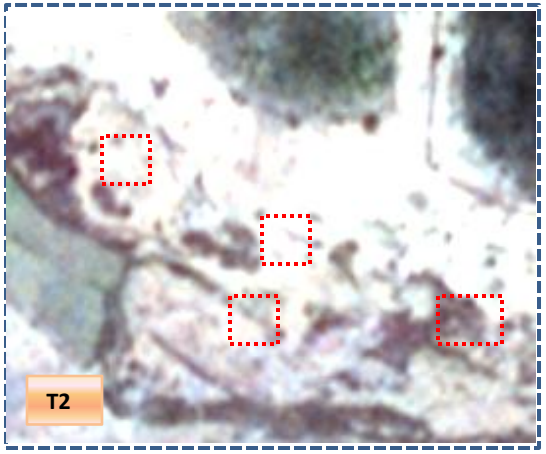


T2: 2014-15

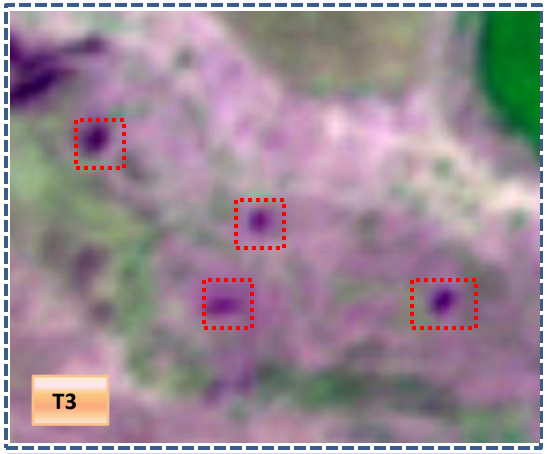


T3: 22 june 2016

Scrub to Water body



T2: 2014-15



T3: 22 june 2016

Table showing change matrix depicting Land cover transitions during study period-2009-10 to 2013-14

Land cover	Monitoring period (T1)										Units in Hectares
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	241.02										**241.02**
Mining/dump		11.30									**11.30**
Agriculture	4.93	0.60	3677.99	409.13				27.13		0.58	**4120.37**
Plantation Horticulture			30.88	174.83							**205.71**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.63		13.90					463.69			**478.22**
Waterbody-Streams/River									37.72		**37.72**
Waterbody – Ponds										477.30	**477.30**
Grand Total	**246.58**	**11.91**	**3722.78**	**583.96**				**490.82**	**37.72**	**477.88**	**5571.64**

- 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 442 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation , scrub and water body in T1.
- In T1 44 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-2013-14 to 2014-15

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	246.58										**246.58**
Mining/dump		11.91									**11.91**
Agriculture	10.86	0.99	3449.23	200.35				61.32		0.03	**3722.78**
Plantation Horticulture			392.60	191.37							**583.96**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.79		13.50					476.53			**490.82**
Waterbody-Streams/River									37.72		**37.72**
Waterbody – Ponds			1.72						473.85	2.31	**477.88**
Grand Total	**258.23**	**12.89**	**3857.05**	**391.72**				**537.84**	**511.57**	**2.34**	**5571.64**

- 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 273 ha of agriculture are decreased and it is converted into built-up, mining, plantation, scrubland and water body in T2.
- In T2 407 ha of agriculture are increased from plantation, scrub land 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-2014-15 to 2015-16

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	258.23										**258.23**
Mining/dump		12.89									**12.89**
Agriculture		7.86	3849.19								**3857.05**
Plantation Horticulture			23.96	367.75							**391.72**
Forest											
Forest Plantation											
Barren Rocky											
Scrub			60.92					476.62		0.30	**537.84**
Waterbody-Streams/River									511.57		**511.57**
Waterbody – Ponds										2.34	**2.34**
Grand Total	**258.23**	**20.75**	**3934.08**	**367.75**				**476.62**	**511.57**	**2.64**	**5571.64**

- 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 7.8 ha of agriculture are decreased and it is converted into mining/dump area in T3.
- In T3 84 ha of agriculture are increased from scrub land and plantation 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-2015-16 to 2016-17

Land cover	Monitoring period (T4)										Units in Hectares
T3	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	258.23										**258.23**
Mining/dump		12.89	7.86								**20.75**
Agriculture	12.29	2.70	3417.38	497.46					3.32	0.93	**3934.08**
Plantation Horticulture	0.15		192.19	175.40							**367.75**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.80	2.15	67.78	4.55				400.15		1.20	**476.62**
Waterbody-Streams/River			1.46						510.11		**511.57**
Waterbody – Ponds			1.05							1.59	**2.64**
Grand Total	**271.46**	**17.74**	**3687.72**	**677.41**				**400.15**	**513.43**	**3.72**	**5571.64**

- 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 516 ha of agriculture are decreased and it is converted into Built-up, mining, plantation, and water body in T4.
- In T4 270 ha of agriculture are increased from mining, scrub land, plantation and waterbody 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-2016-17 to 2017-18

Land cover	Monitoring period (T5)										Units in Hectares
T4	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	271.46										**271.46**
Mining/dump		17.74									**17.74**
Agriculture	4.97	1.56	2909.04	763.66					0.39	8.09	**3687.72**
Plantation Horticulture	0.03		110.26	567.12							**677.41**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.45	0.91	28.50	0.84				367.61		0.83	**400.15**
Waterbody-Streams/River									513.43		**513.43**
Waterbody – Ponds		0.23	0.34	0.28						2.88	**3.72**
Grand Total	**277.91**	**20.44**	**3048.14**	**1331.91**				**367.61**	**513.83**	**11.80**	**5571.64**

- 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 778 ha of agriculture are decreased and it is converted into built-up, mining, plantation, and water body in T5.
- In T5 139 ha of agriculture are increased from scrub land, plantation and waterbody 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 10.6 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
4. There is an increase of 11 & 77 Hectares From T1-T2 & T2-T3 respectively and there is a decrease of 397, 246 & 639 Hectares of cropland area from T0-T1, T3-T4 & T4-T5 and overall decrease of 1,072 Hectares in Crop land area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
5. There is an increase of 1,126 ha of the Plantation/Horticulture area has been increased between 2009-10 (t0) & 2017-18 (T5) years.
6. There is a decrease of 110 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.