MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -03/2009-10
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-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

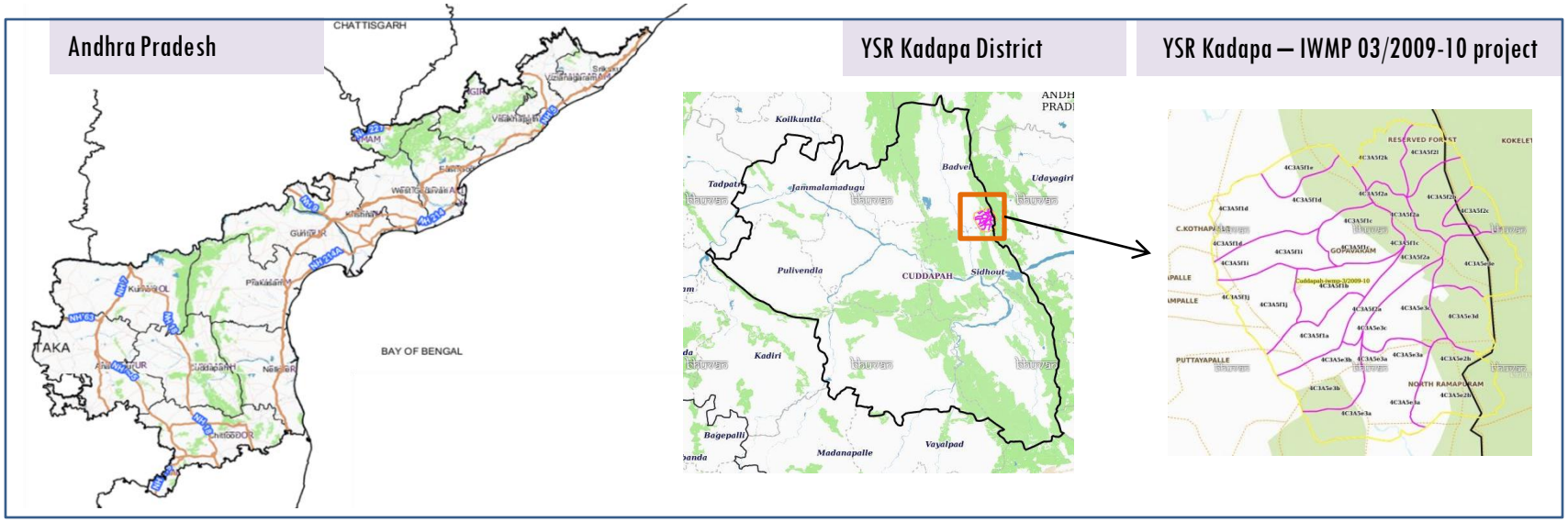
CONTENTS

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-03/2009-10, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is 8497 ha. It comprises of 18 micro watersheds.
- In the project area 307 Drishti photos were uploaded showing 2 farm ponds, dug out pits etc, 2 horticulture and remaining showing other activities.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and 4 check dams and drainage treatments with 10.71 ha increase in the area.
- Major percentage i.e. 22 % is covered by the agriculture, 45 % is covered by forest, 22 % is forest area and remaining by other land use classes.

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

- The study area falls in Thondur Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is 8497 ha. It comprises of 18 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2009-10 (T0) period (***Batch -1***) projects taking 2017-18 (T5) period satellite images



- YSR Kadapa has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 38 °C range and it reaches around 44 °C to 45 °C .
- The average annual rainfall of the YSR Kadapa District is 710 mm, which ranges from nil rainfall in January to 137 mm in October. October is the wettest month of the year. The mean seasonal rainfall distribution is 402.4 mm in southwest monsoon (June - September), 239.1 mm in northeast monsoon (October – December), distribution of rainfall in season wise 56.7 % in south west monsoon, 33.7 % in north east monsoon period.

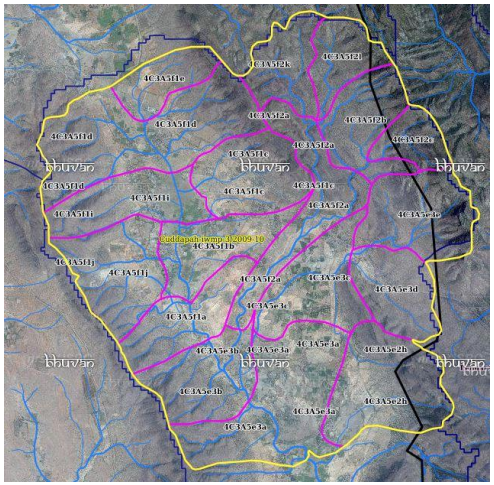
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T1
	2009-10	2011-12	2013-14
LISS IV	2009-10		
SCENE 1			30-Mar-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			30-Mar-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	144
4	Detailed Project Report		

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



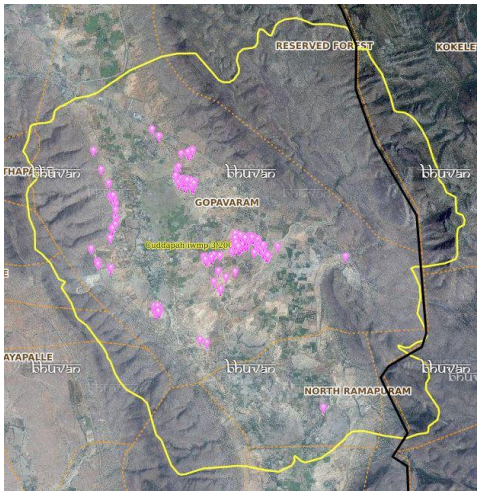
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

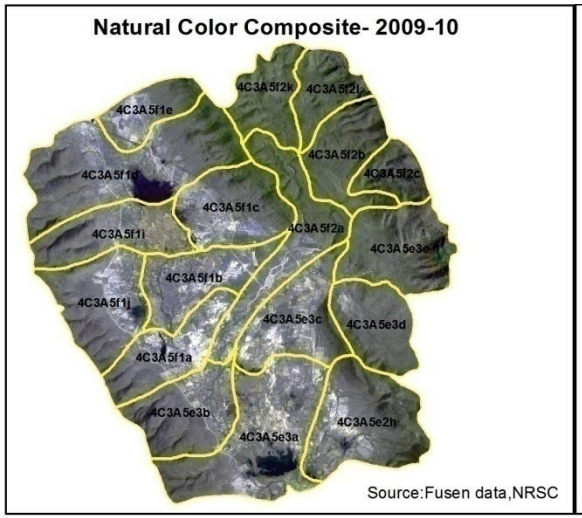
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	3	3
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	0	0
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	2	2
10	Civil work-Check dams/Rock fill dam	0	0
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	2	2
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	427	300
	TOTAL	**438**	**307**

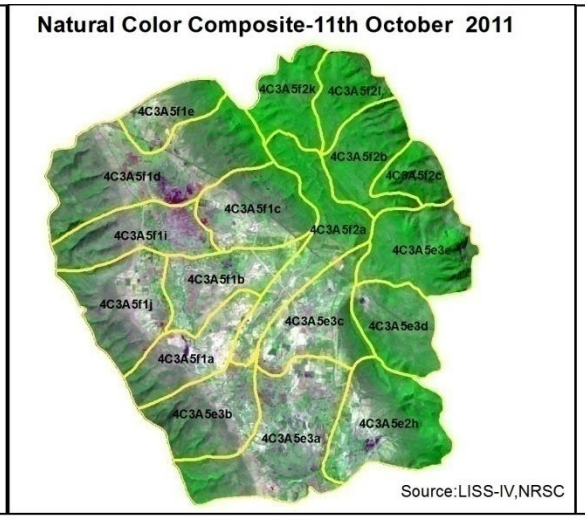
MONITORING IN THE PROJECT AREA

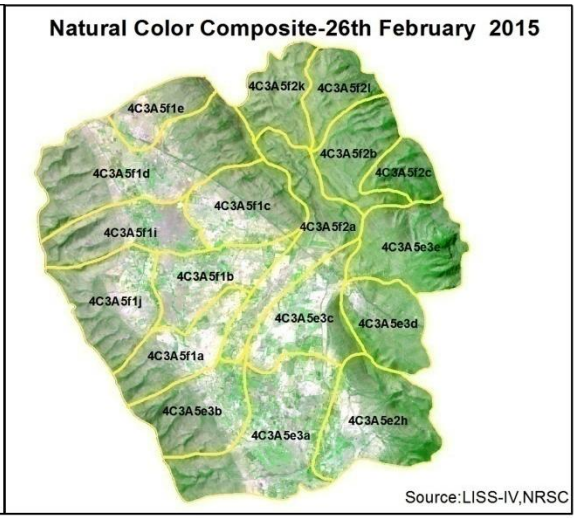
Site Wise Changes in the Project

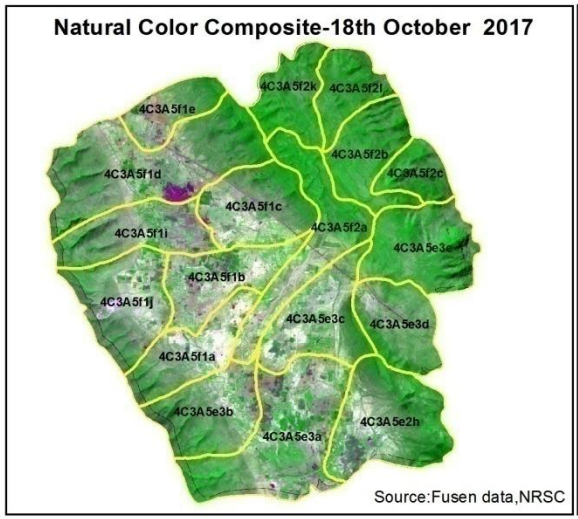
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2009-10) and T5 is 2017-18 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

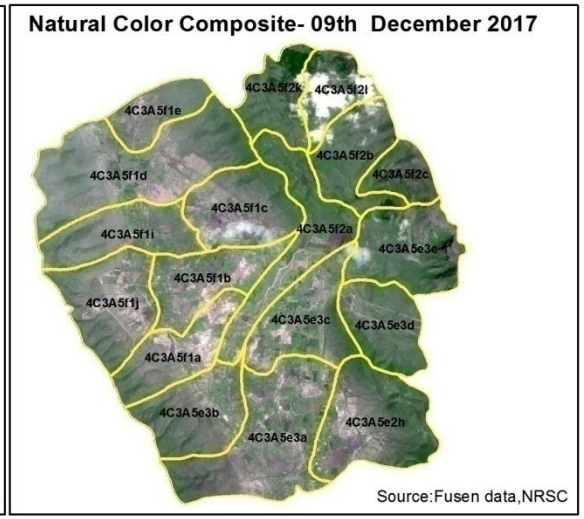
Natural Color Composite – 2009-10 to 2017-18











Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-03/2009-10

T0:2009-10

T1: 21 December 2013

Drishti Sl no. 158416 MWS :4C3D3c1e

Check dam

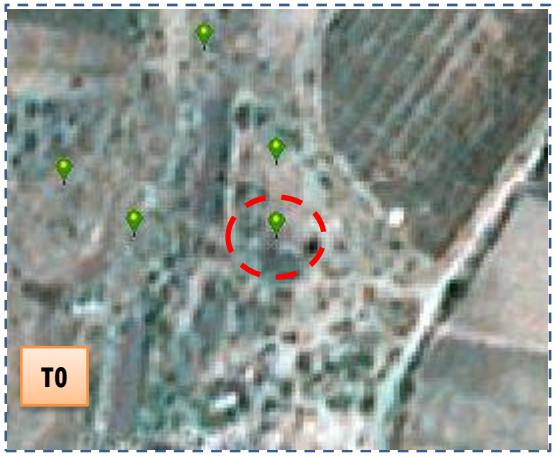
T0:2009-10

T1: 21 December 2013

Drishti Sl no.771758 MWS : 4C3D3c1g

Farm pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-03/2009-10

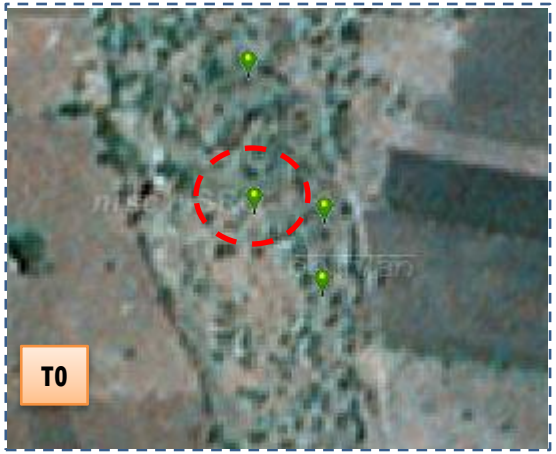


T0: 2009-10

T1: 21 December 2013

Drishti Sl no. 771782 MWS : 4C3D3c1g

Farm pond



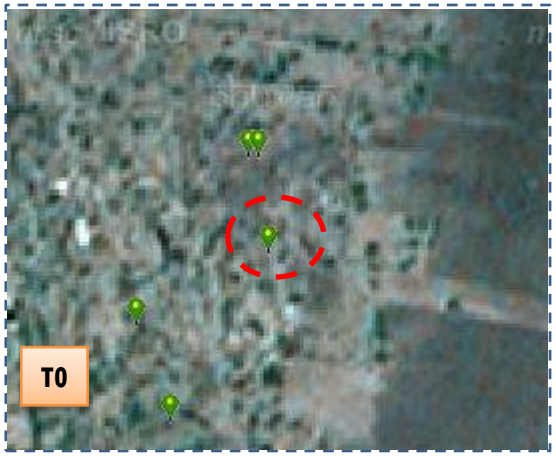
T0: 2009-10

T1: 21 December 2013

Drishti Sl no. 808765 MWS : 4C3D3c1g

Farm pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-03/2009-10



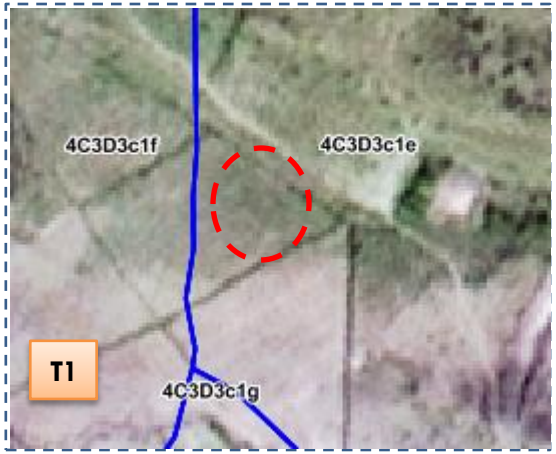
T0: 2009-10

T1: 21 December 2013

Drishti Sl no. 808 MWS : 4C3D3c1g

Farm pond

T0: 2009-10



T1: 21 December 2013

Drishti Sl no. 820168 MWS : 4C3D3c1e

Horticulture

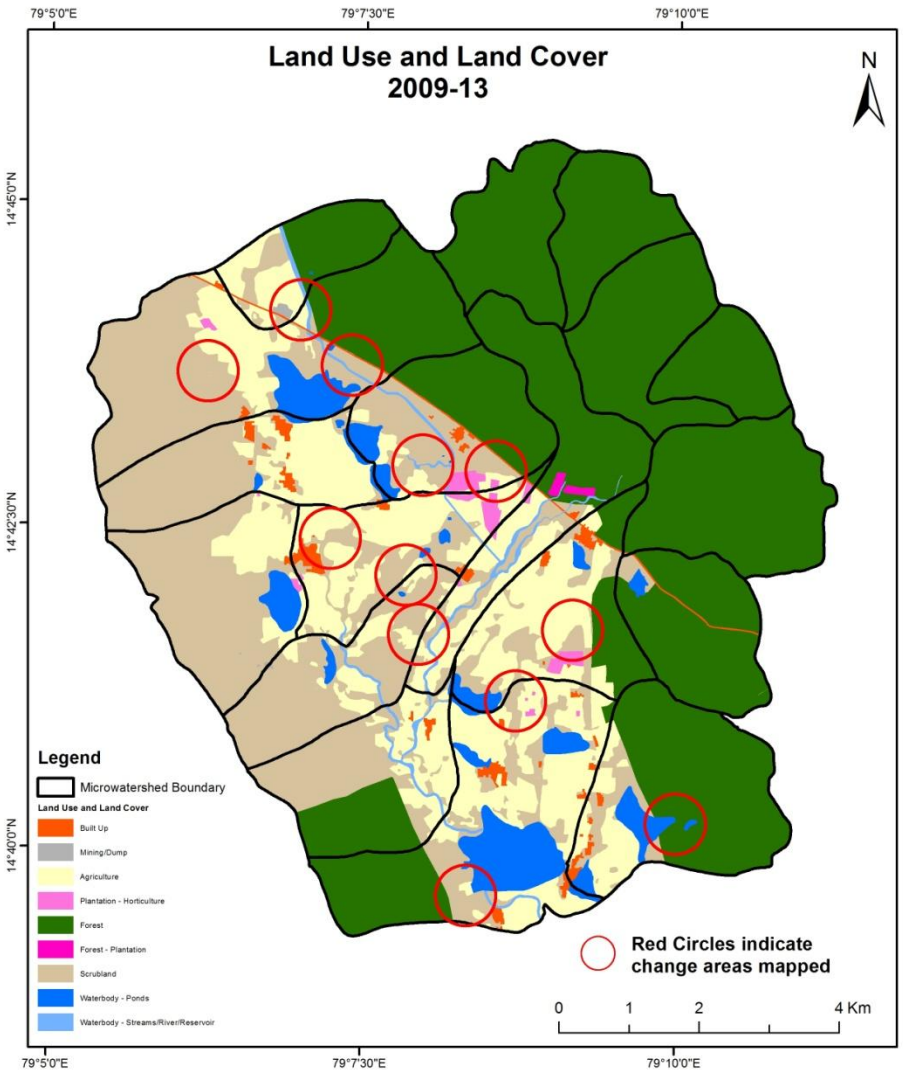
MONITORING IN THE PROJECT AREA

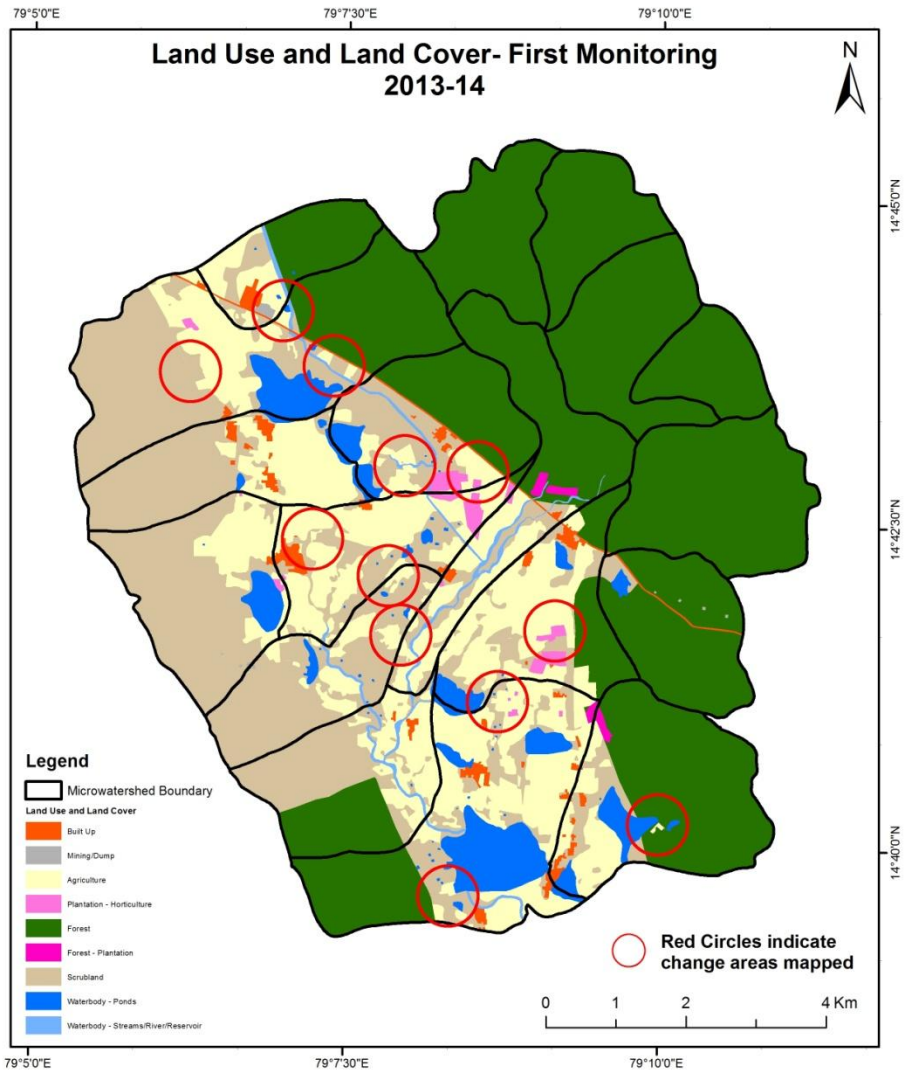
Land use and Land cover Changes in the Project

- 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.
- In matrix table column represents the T0 (2009-10) and row represents the T5 (2017-18)

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

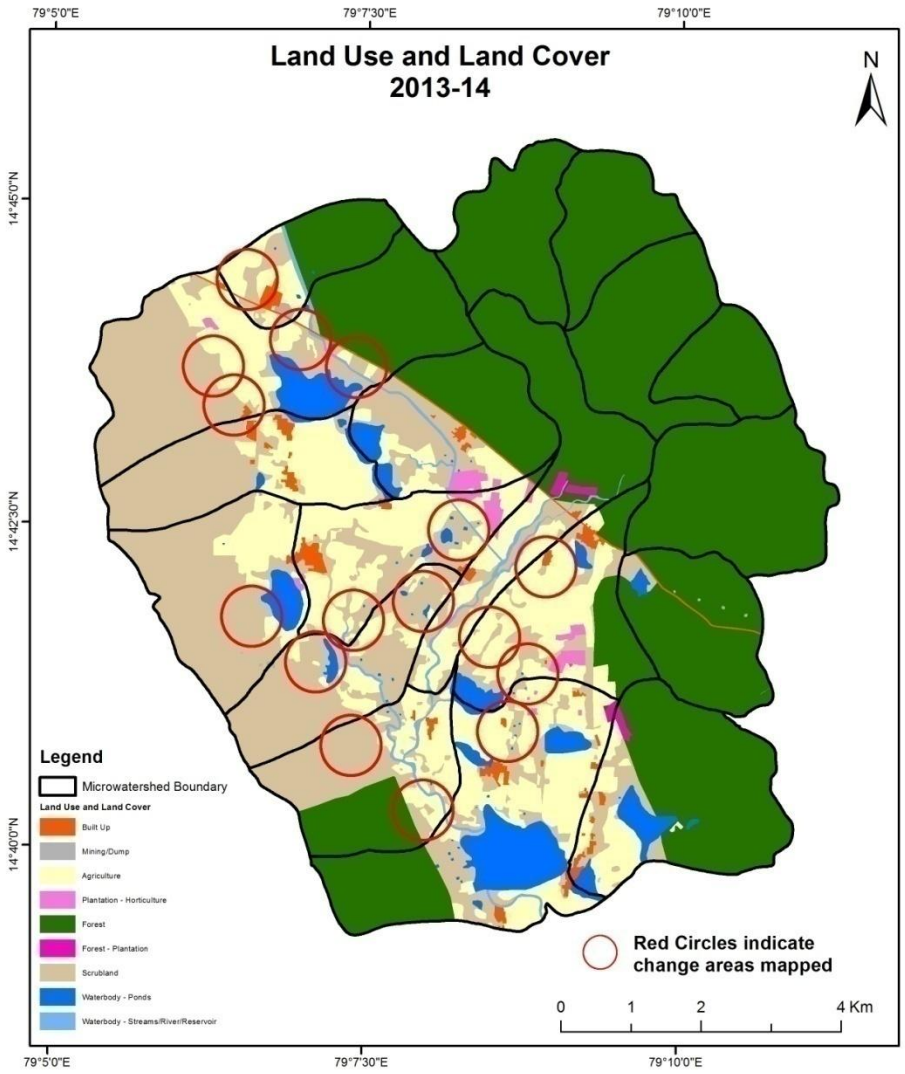
Scale: 1:10000

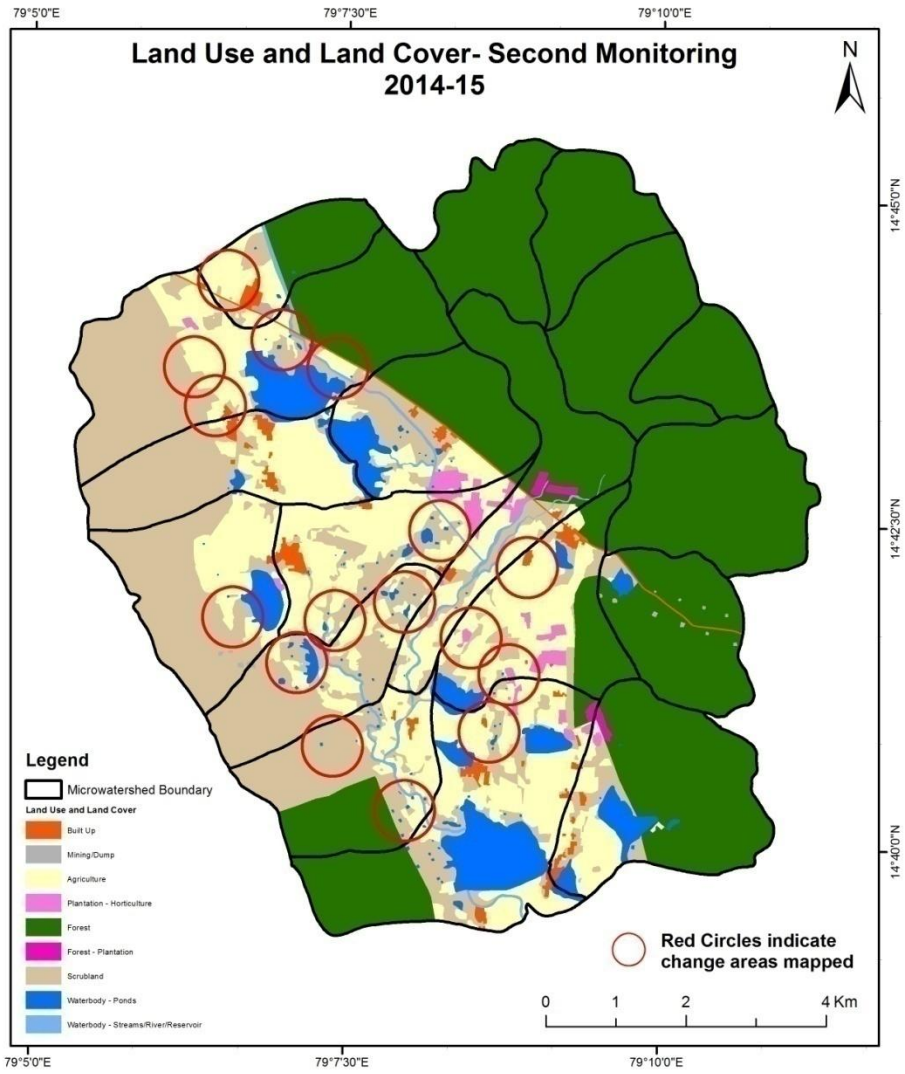




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

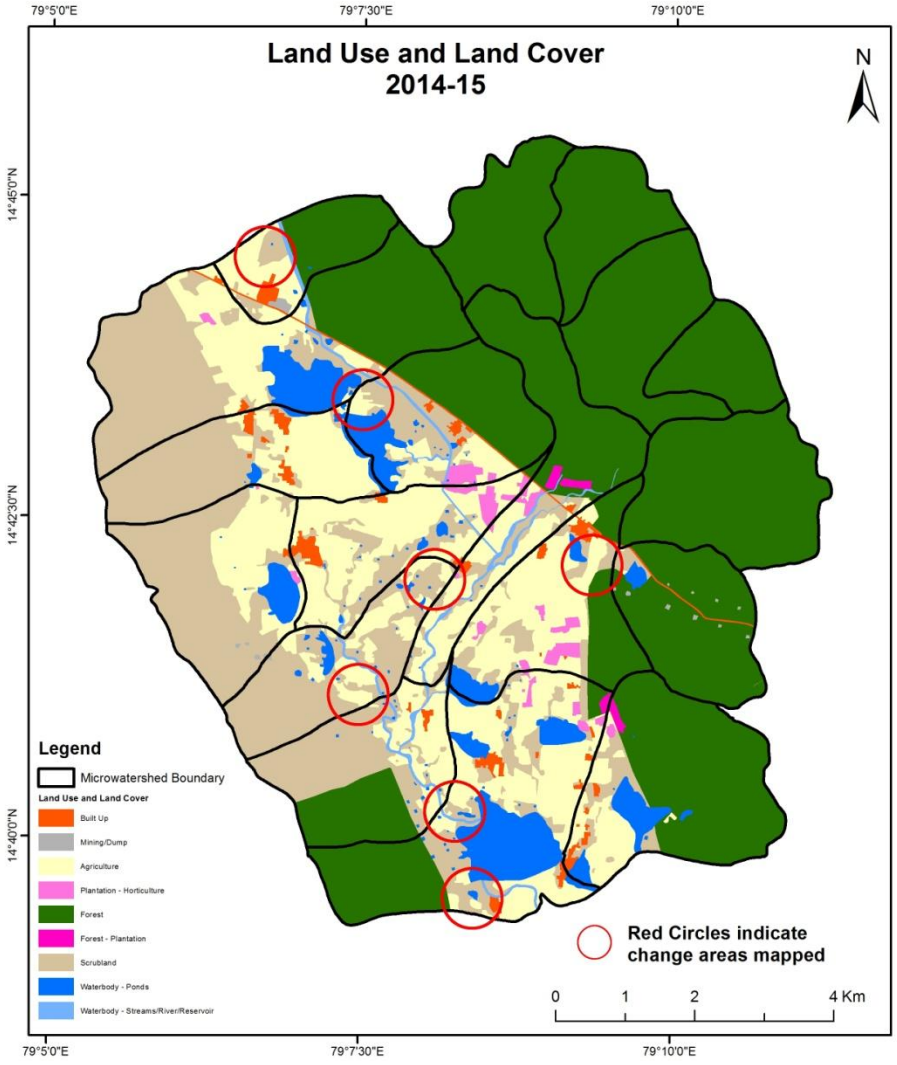
Scale: 1:10000

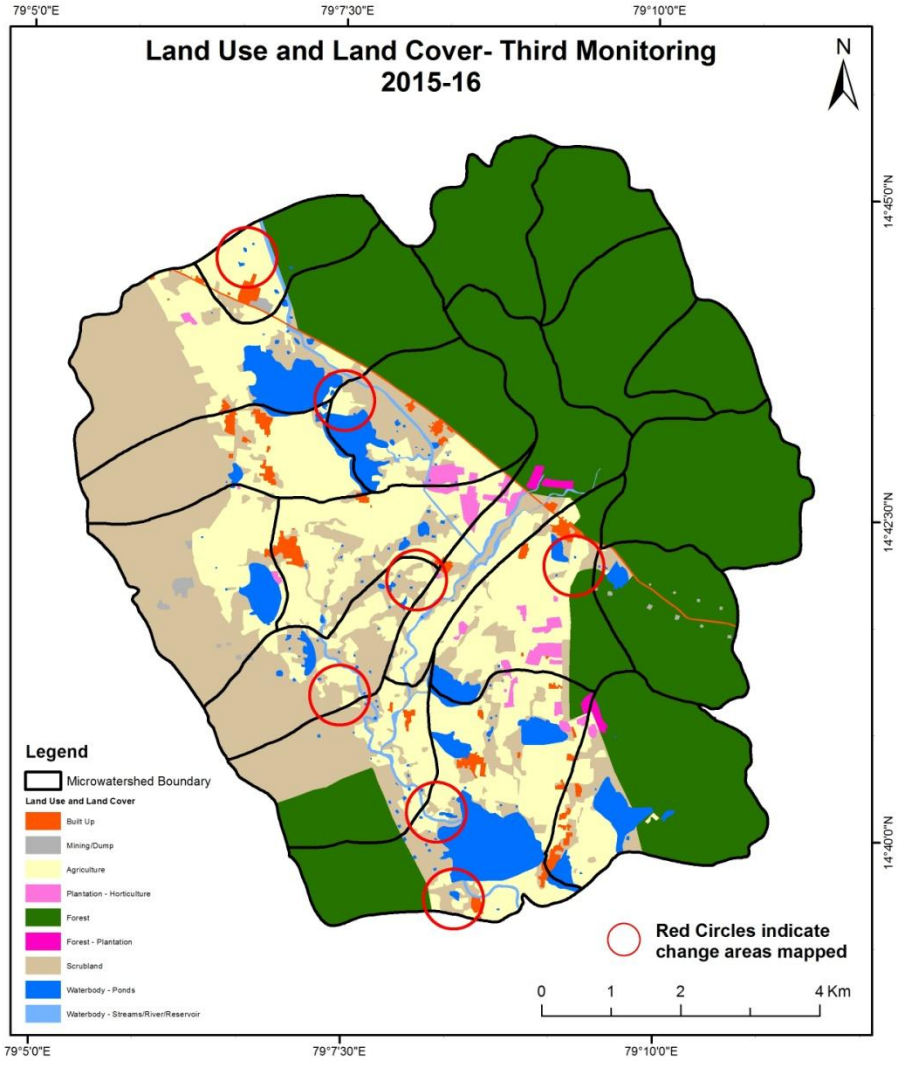




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

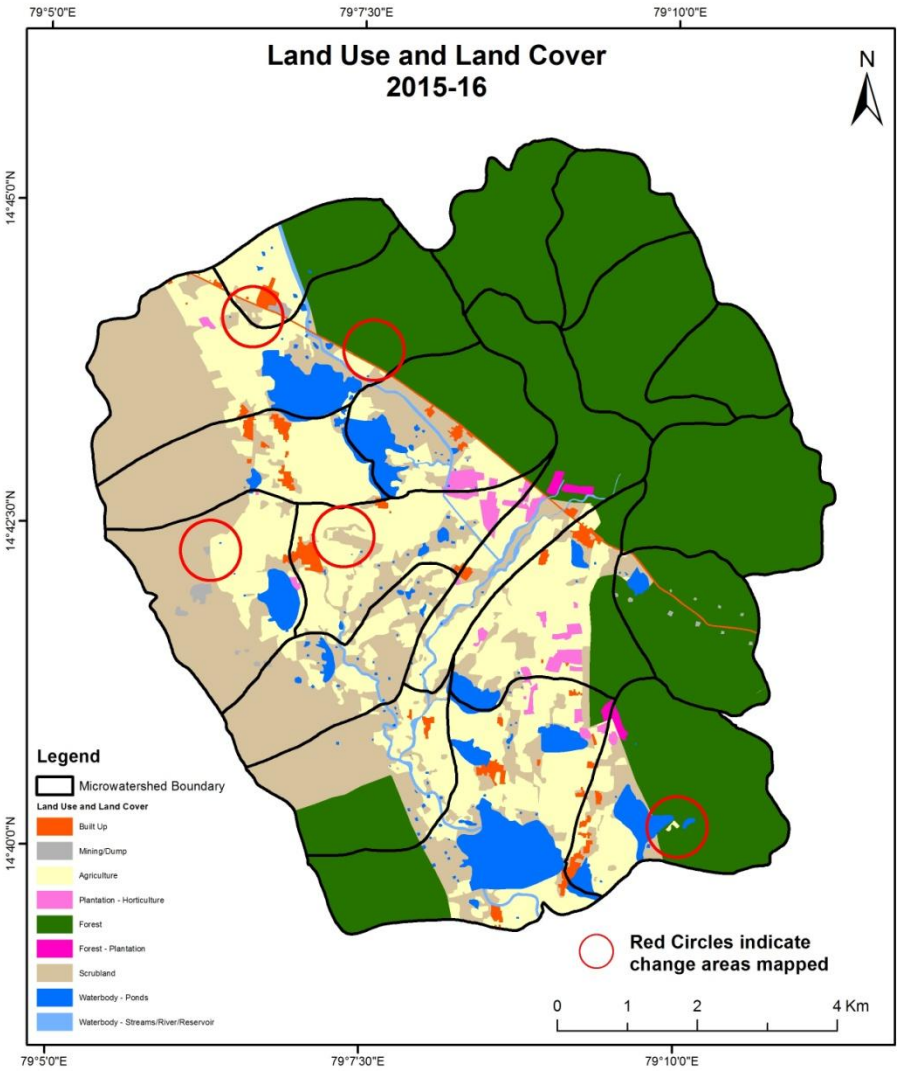
Scale: 1:10000

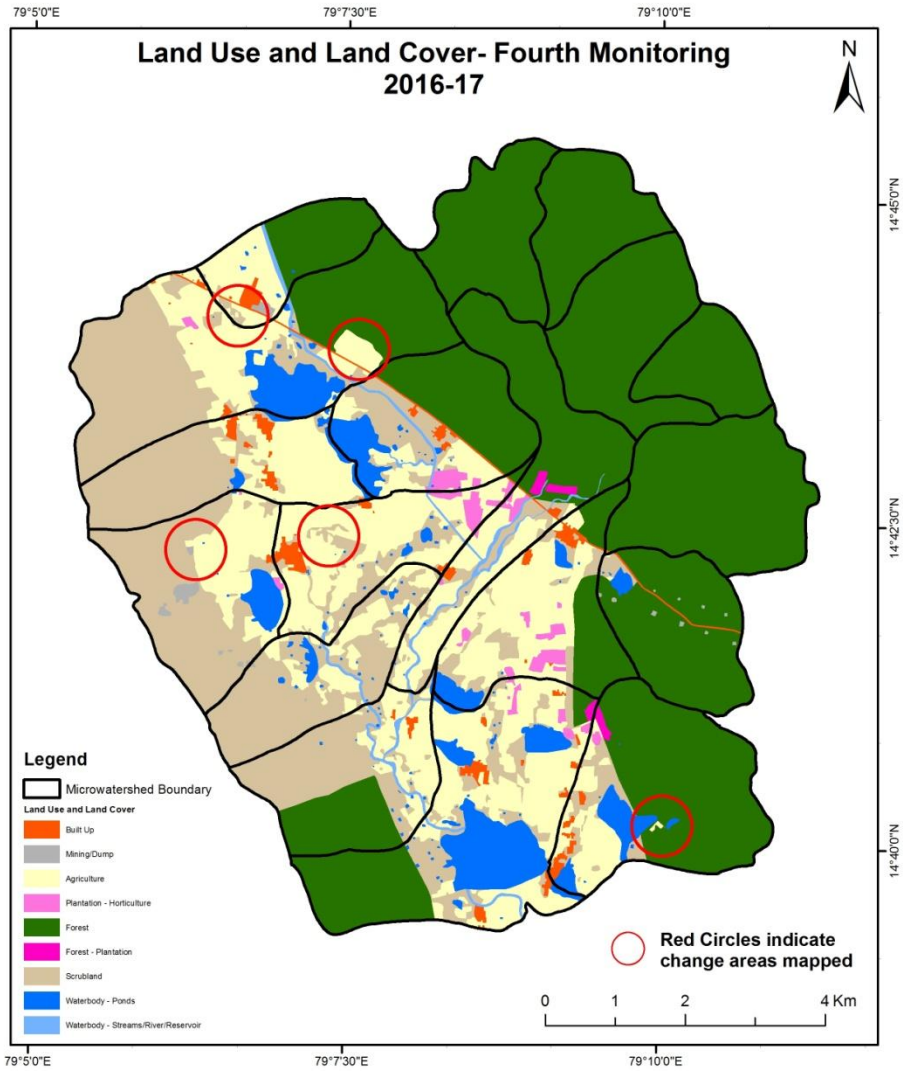




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

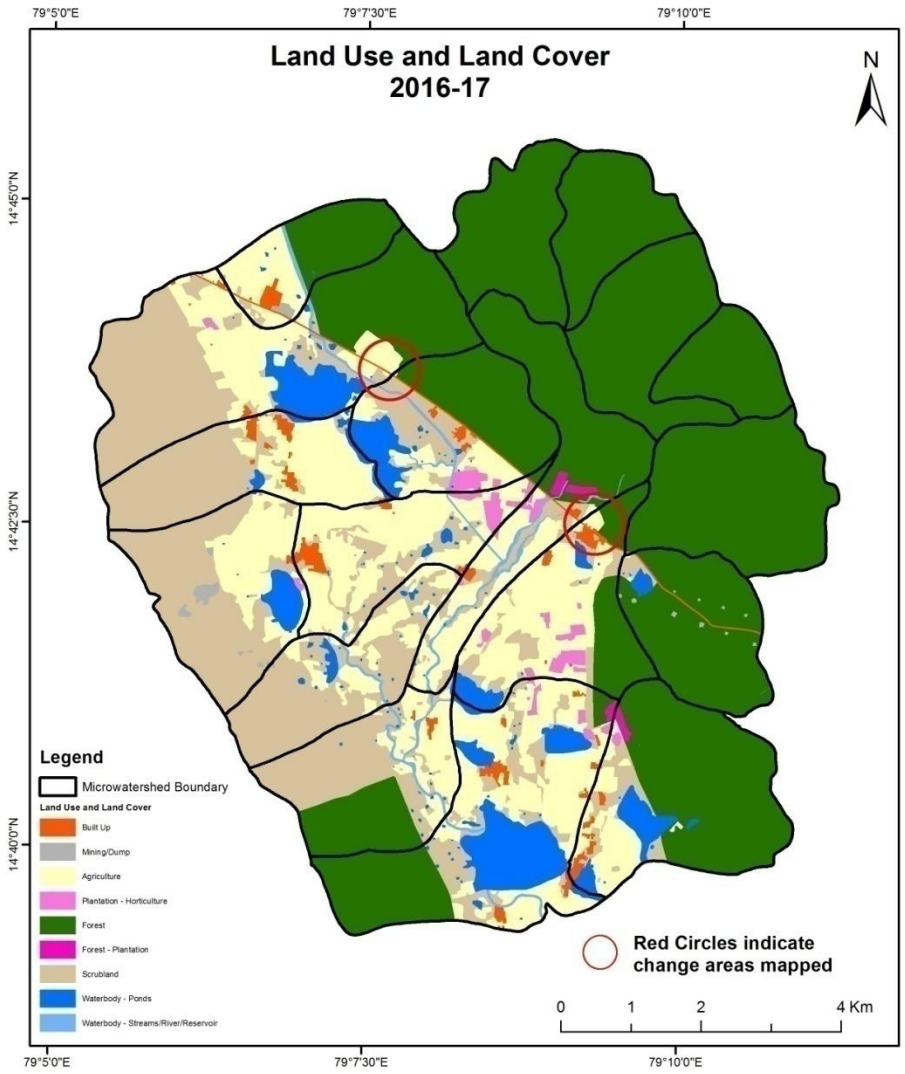
Scale: 1:10000

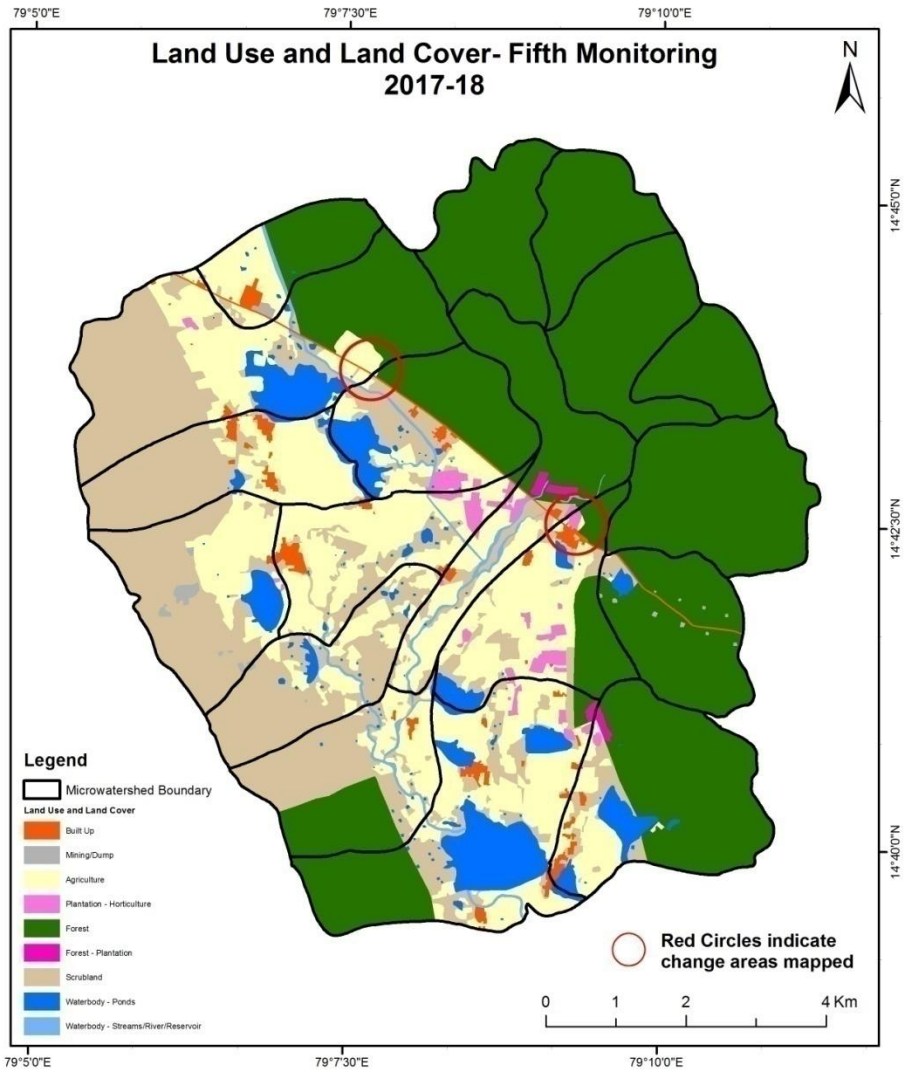




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000





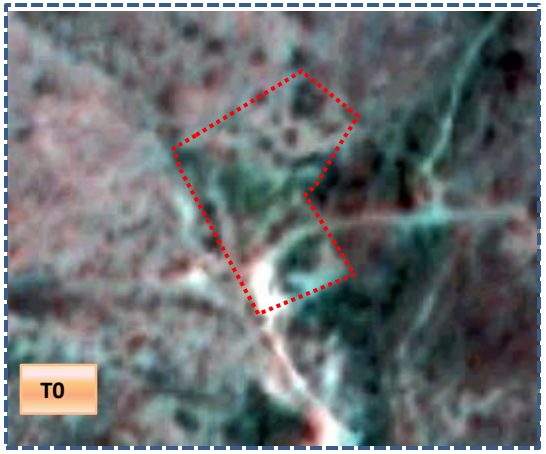
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body

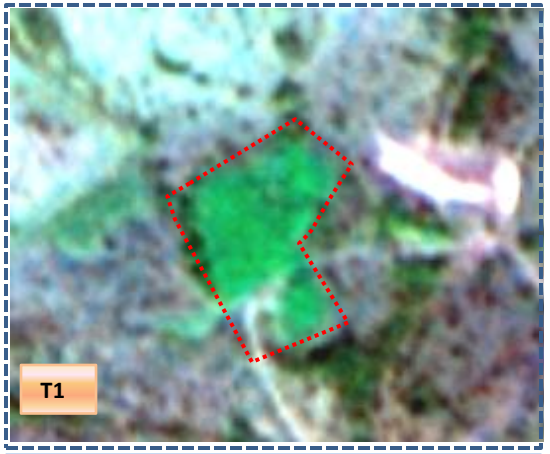
T0: 2009-10

T1: 21 December 2013

Scrub to Agriculture



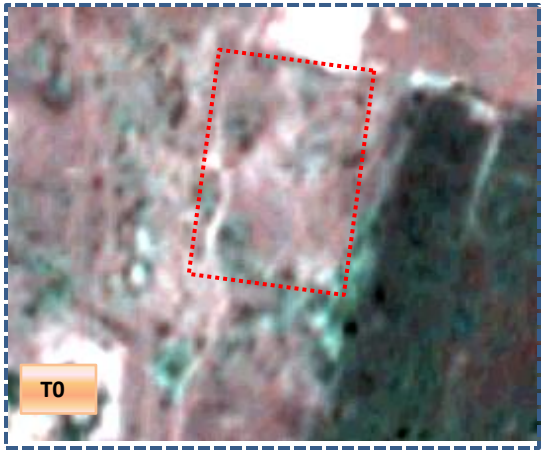
T0: 2009-10



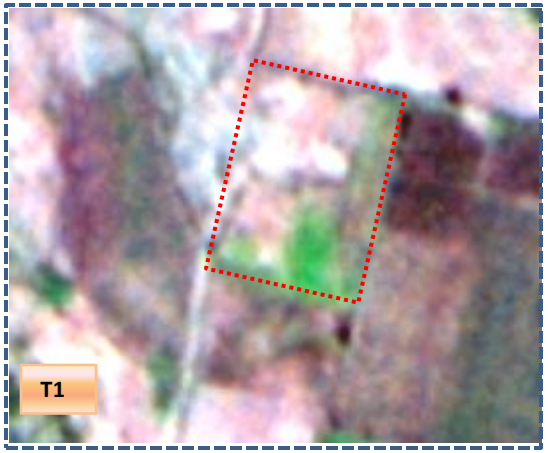
T1: 21 December 2013

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

Scrub to Agriculture

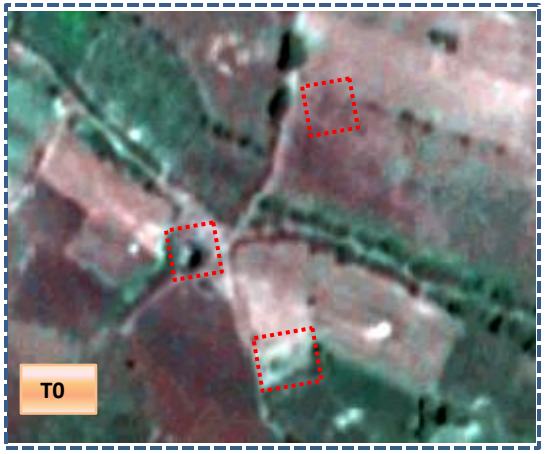


T0: 2009-10

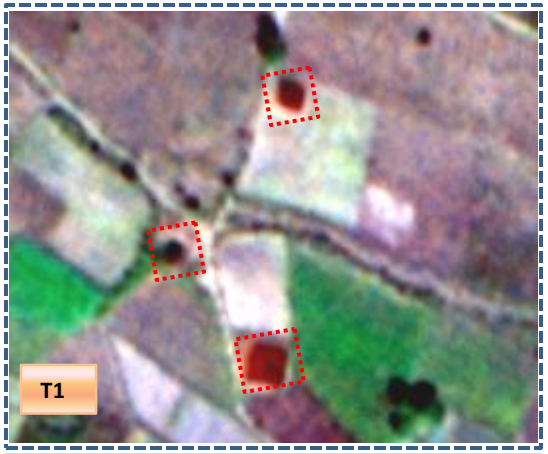


T1:21 December 2013

Agriculture to Water body



T0: 2009-10



T1: 21 December 2013

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	116.05										**116.05**
Mining/dump		5.58									**5.58**
Agriculture	1.03	0.28	1680.52	24.20	20.62			18.42		25.12	**1770.19**
Plantation Horticulture			0.35	55.96						0.16	**56.46**
Forest	0.46	2.21			3887.15					0.07	**3889.89**
Forest Plantation						18.41					**18.41**
Barren Rocky											
Scrub	1.42	1.40	179.87					1933.70		43.75	**2160.13**
Waterbody-Streams/River									78.89		**78.89**
Waterbody – Ponds										402.39	**402.39**
Grand Total	**118.96**	**9.47**	**1860.74**	**80.15**	**3907.77**	**18.41**		**1952.12**	**78.89**	**471.49**	**8497.99**

- 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 13 ha of the agriculture area has decreased and it is converted into scrub, plantation and water body etc in T1.
- In T1 83 ha of the agriculture area has increased from plantations and scrubland area 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	116.05										**116.05**
Mining/dump		5.58									**5.58**
Agriculture	1.03	0.28	1680.52	24.20	20.62			18.42		25.12	**1770.19**
Plantation Horticulture			0.35	55.96						0.16	**56.46**
Forest	0.46	2.21			3887.15					0.07	**3889.89**
Forest Plantation						18.41					**18.41**
Barren Rocky											
Scrub	1.42	1.40	179.87					1933.70		43.75	**2160.13**
Waterbody-Streams/River									78.89		**78.89**
Waterbody – Ponds										402.39	**402.39**
Grand Total	**118.96**	**9.47**	**1860.74**	**80.15**	**3907.77**	**18.41**		**1952.12**	**78.89**	**471.49**	**8497.99**

- 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 89 ha of the agriculture area has decreased and it is converted into scrub, plantation and water body etc in T1.
- In T1 180 ha of the agriculture area has increased from plantations and scrubland area 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 (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	118.96										**118.96**
Mining/dump		9.47									**9.47**
Agriculture	2.75		1850.52	1.60				4.78		1.08	**1860.74**
Plantation Horticulture				80.15							**80.15**
Forest					3907.77						**3907.77**
Forest Plantation						18.41					**18.41**
Barren Rocky											
Scrub	0.82	9.06	44.36					1896.71		1.18	**1952.12**
Waterbody-Streams/River									78.89		**78.89**
Waterbody – Ponds										471.49	**471.49**
Grand Total	**122.53**	**18.52**	**1894.88**	**81.75**	**3907.77**	**18.41**		**1901.49**	**78.89**	**473.75**	**8497.99**

- 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 10 ha of the agriculture area has decreased and it is converted into scrub, plantation and water body etc in T1.
- In T1 44 ha of the agriculture area has increased from scrubland area 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-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	122.53										**122.53**
Mining/dump		18.52									**18.52**
Agriculture	0.07	0.56	1894.25								**1894.88**
Plantation Horticulture				81.75							**81.75**
Forest			23.42		3884.35						**3907.77**
Forest Plantation						18.41					**18.41**
Barren Rocky											
Scrub	0.21	1.66	5.90					1893.72			**1901.49**
Waterbody-Streams/River									78.89		**78.89**
Waterbody – Ponds			2.59							471.16	**473.75**
Grand Total	**122.82**	**20.74**	**1926.16**	**81.75**	**3884.35**	**18.41**		**1893.72**	**78.89**	**471.16**	**8497.99**

- 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 0.6 ha of the agriculture area has decreased and it is converted into scrub, plantation and water body etc in T1.
- In T1 31 ha of the agriculture area has increased from forest, scrubland and water body area 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-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	122.82										**122.82**
Mining/dump		20.74									**20.74**
Agriculture			1920.47	5.63						0.06	**1926.16**
Plantation Horticulture			0.68	81.08							**81.75**
Forest					3884.35						**3884.35**
Forest Plantation						18.41					**18.41**
Barren Rocky											
Scrub	0.16	1.24	4.49					1887.83			**1893.72**
Waterbody-Streams/River									78.89		**78.89**
Waterbody – Ponds			2.73							468.43	**471.16**
Grand Total	**122.98**	**21.98**	**1928.36**	**86.71**	**3884.35**	**18.41**		**1887.83**	**78.89**	**468.49**	**8497.99**

- 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 5.6 ha of the agriculture area has decreased and it is converted into scrub, plantation and water body etc in T1.
- In T1 7.8 ha of the agriculture area has increased from plantation, scrubland and water body area of T0. The additional agriculture are coming from waterbody in T1 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 77 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 70, 90, 34, 31 & 2 Hectares From T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 229 Hectares in Crop land area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
5. There is a decrease of 366 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.