MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -07/2009-10
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

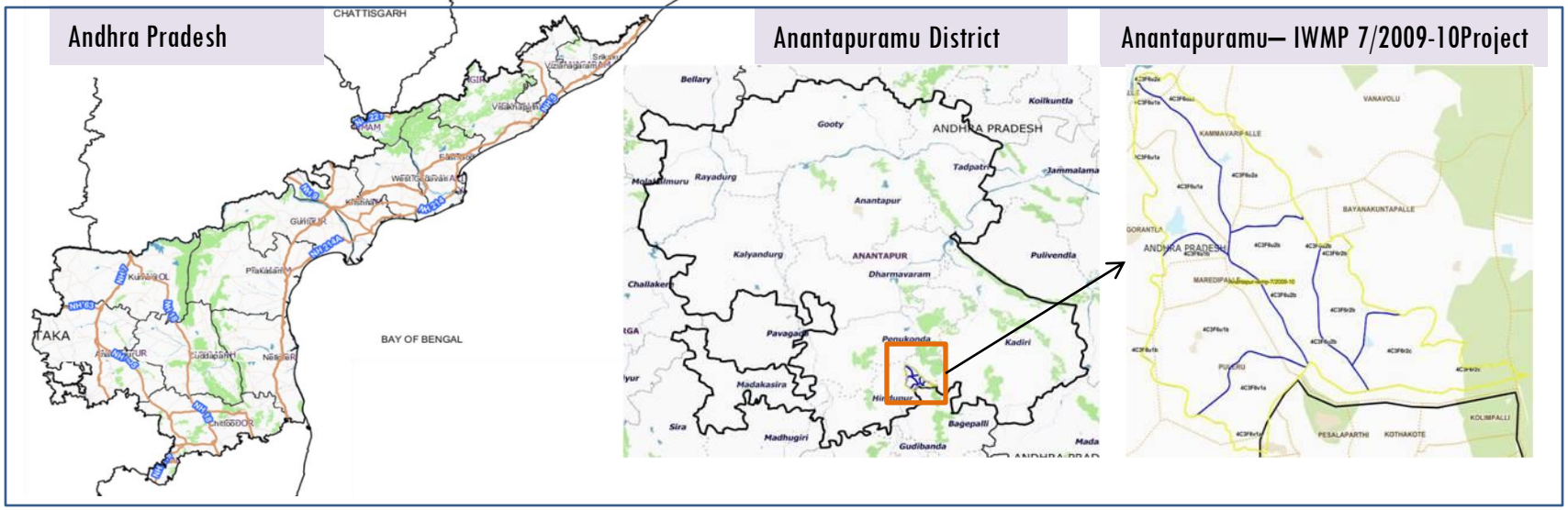
CONTENTS

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-07/2009-10, Anantapur District of Andhra Pradesh. The total geographical area of the project is 5889.76 ha. It comprises of 7 micro watersheds.
- In the project area 8 Drishti photos were uploaded showing 1 check dams,2 Farm ponds, 3 Horticulture development and remaining 2 is others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 7 new farm ponds (Including un geo tagged) or dug out ponds with 8.04 ha increase in the area.
- Major percentage i.e. 77% is covered by the agriculture, 13% is covered by scrub, 3.77% by water bodies and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-07/2009-10
District : Anantapuramu , State : Andhra Pradesh

- The study area falls in Gorentla Mandal of Anantapur district of Andhra Pradesh state. The total geographical area of the project is 5889.76 ha. It comprises of 7 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



- Project area witnesses tropical wet and dry climate characterized by year round high temperatures. Anantapur 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.

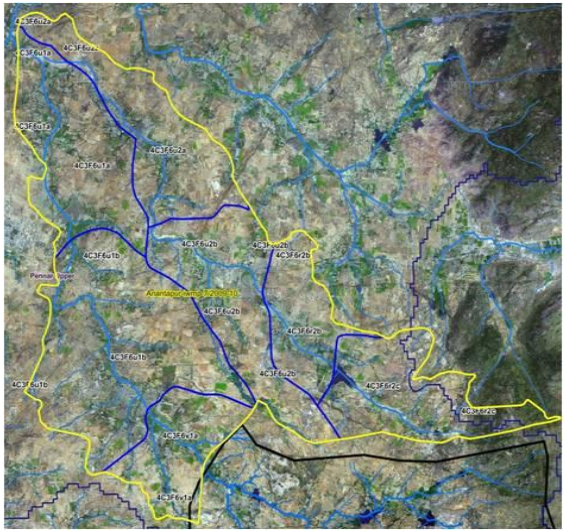
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10		2017-18
LISS IV	2009-10		
SCENE 1			25-Mar-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			25-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	216
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

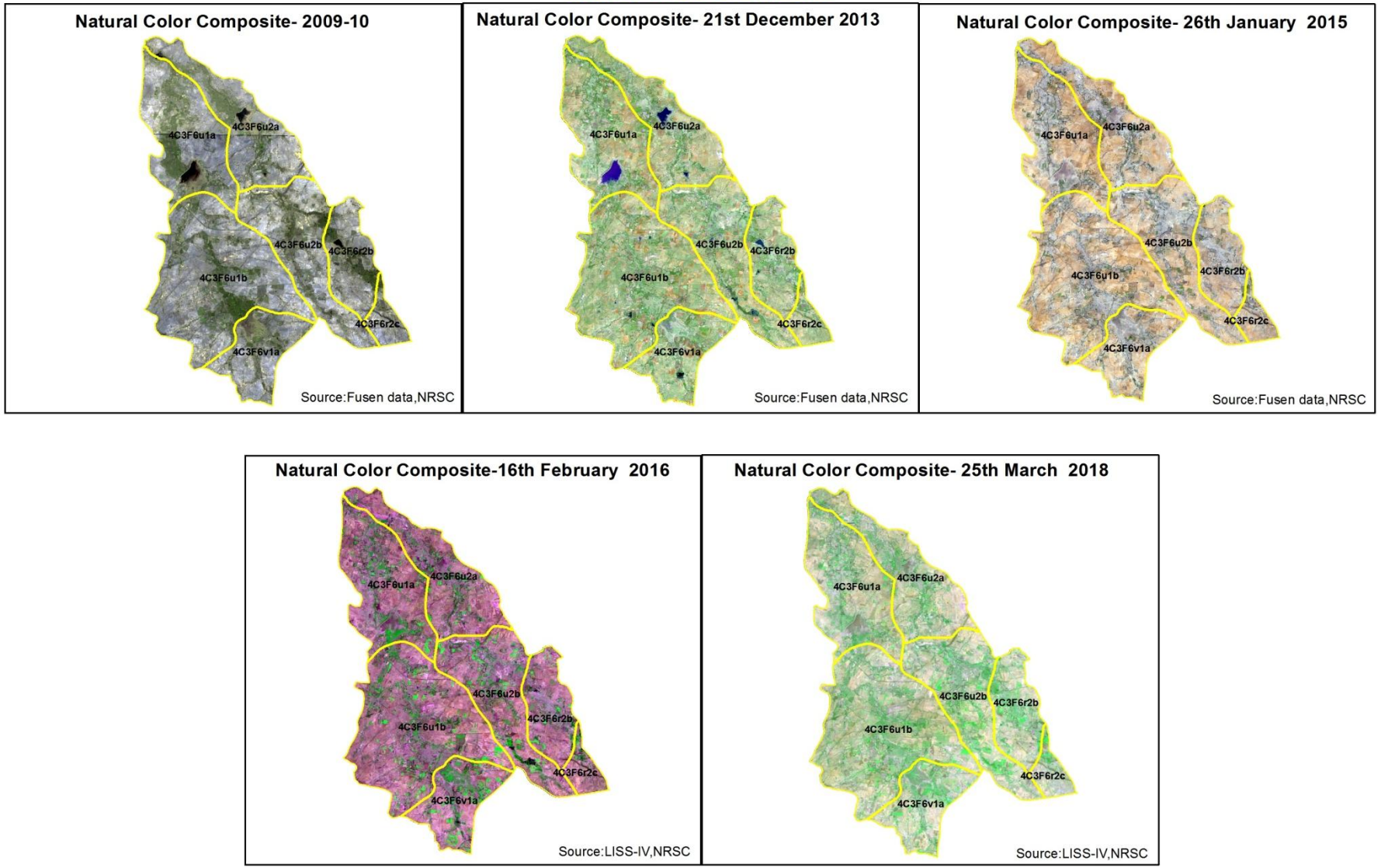
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	2	2
3	Agriculture	0	0
4	Agronomic measures	2	1
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	0	0
9	Gabion structure	0	0
10	Farm ponds	1	1
11	Check dams	3	2
12	Nallah Bunds	0	0
13	Percolation tanks / 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	New Activity	2	2
18	Agronomic measures vm(others)	1	0
	TOTAL	**12**	**9**

MONITORING IN THE PROJECT AREA

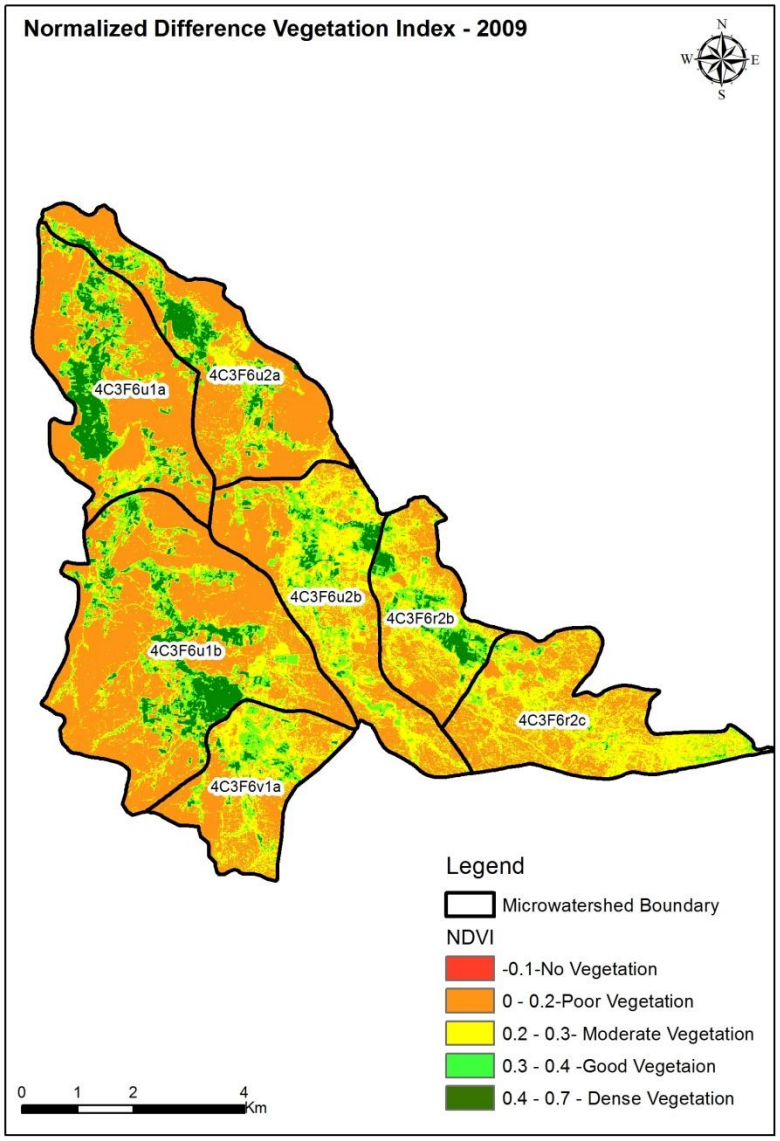
Site Wise Changes in the Project

- 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.

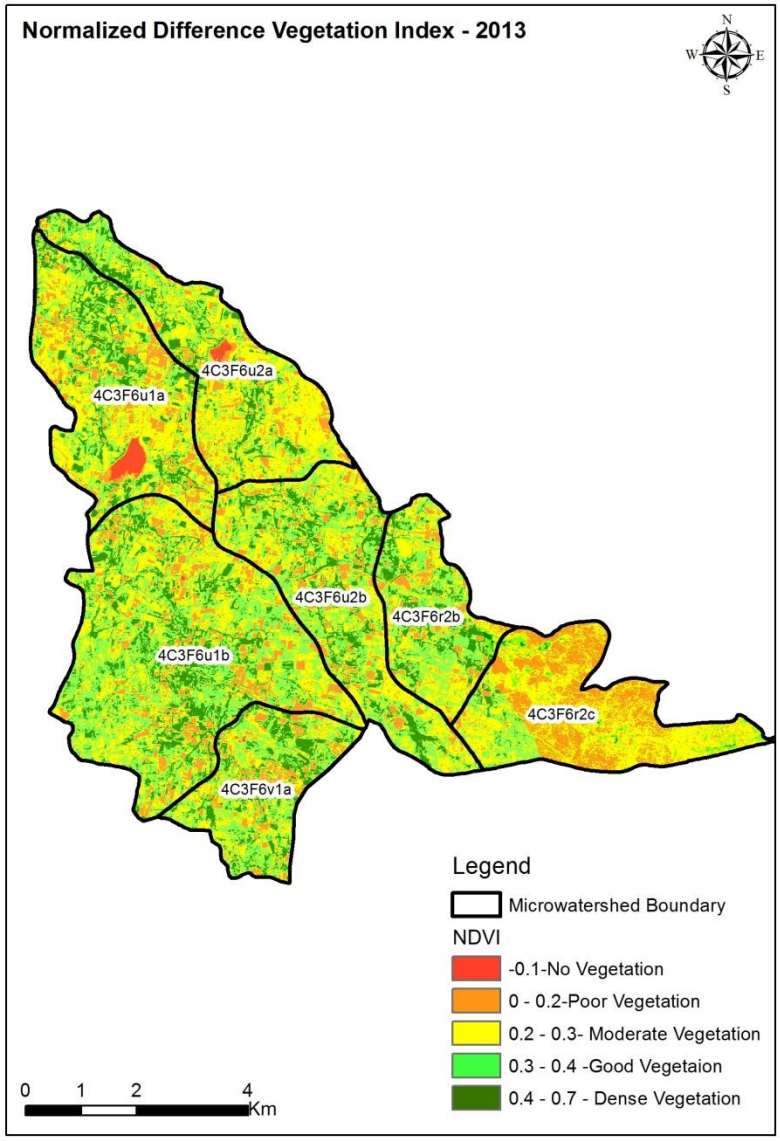
Natural Color Composite – 2009-10 to 2017-18



Changes in Vegetation Cover

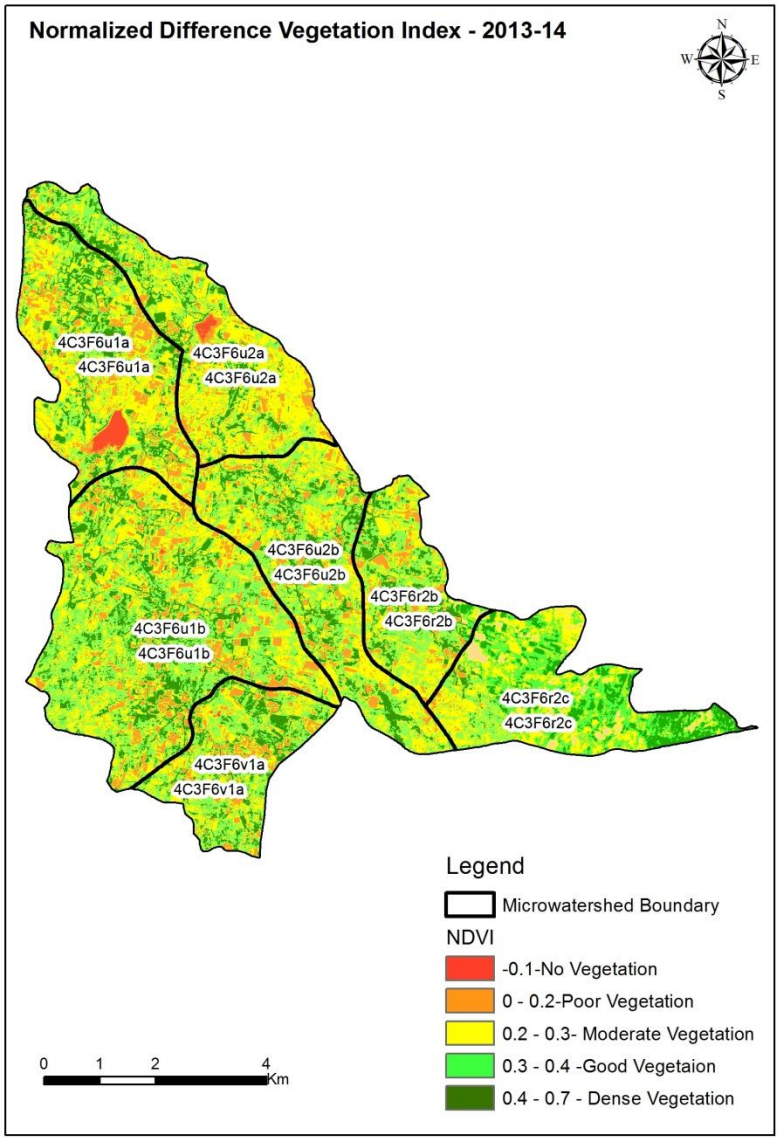


NDVI (2009-10)

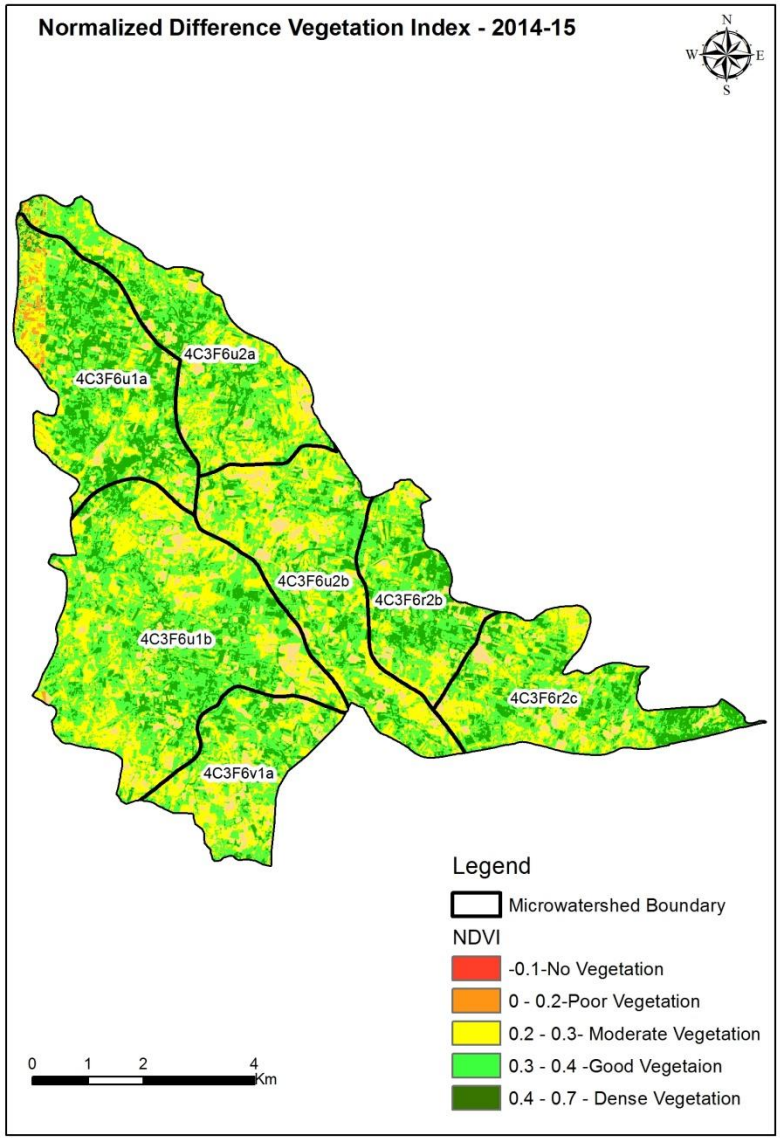


NDVI (12 October 2015)

Changes in Vegetation Cover



NDVI (2013-14)



NDVI (22 October 2015)

Monitoring of activities in Anantapur District Andhra Pradesh. IWMP-07/2009-10

T0:2009-10

T1: 21 December 2013

Drishti Sl no. 1619223 MWS :4C3F6u1b

Check dam

T0:2009-10

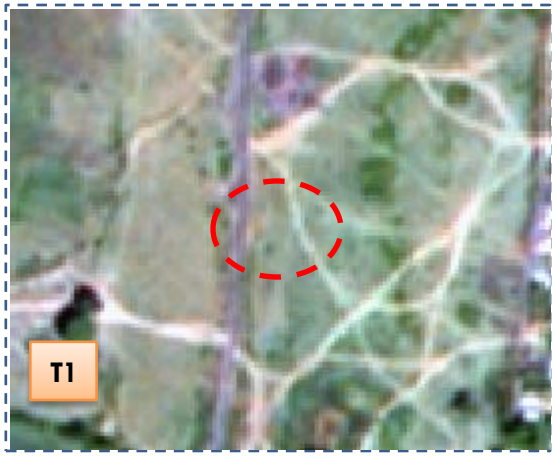
T1: 21 December 2013

Drishti Sl no.128504 MWS : 4C3F6r2b

Horticulture/Plantation

Monitoring of activities in Anantapur District Andhra Pradesh. IWMP-07/2009-10

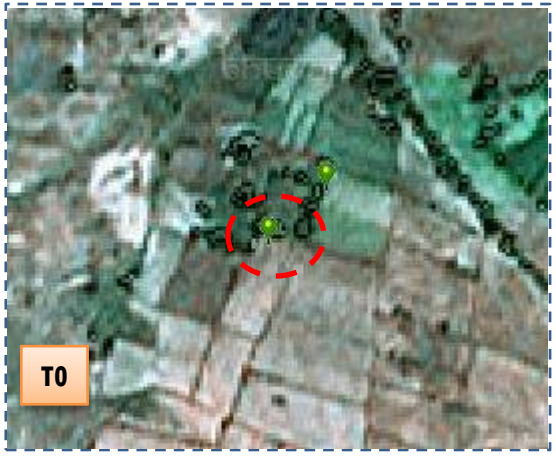
T0: 2009-10



T1: 21 December 2013

Drishti Sl no. 128530 MWS :4C3F6r2b

Horticulture/Plantation



T0: 2009-10

T1: 21 December 2013

Drishti Sl no. 128528 MWS :4C3F6r2b

Horticulture/Plantation

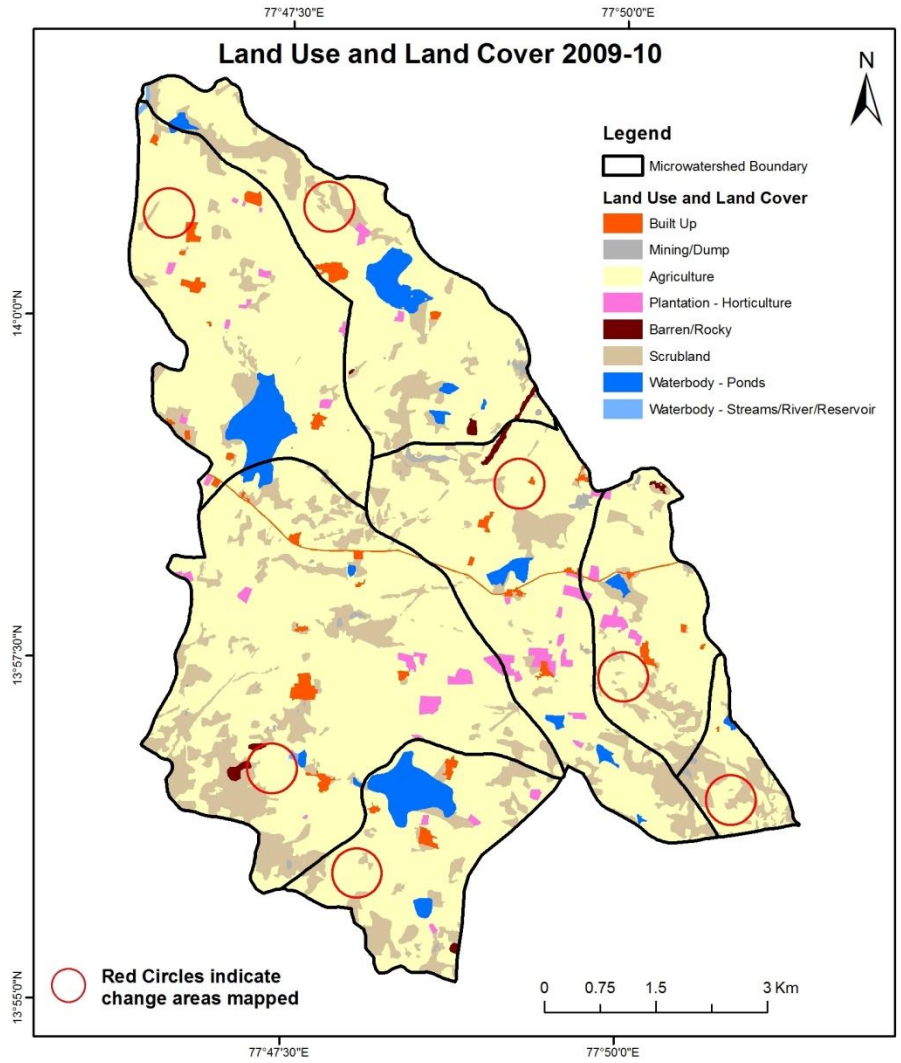
MONITORING IN THE PROJECT AREA

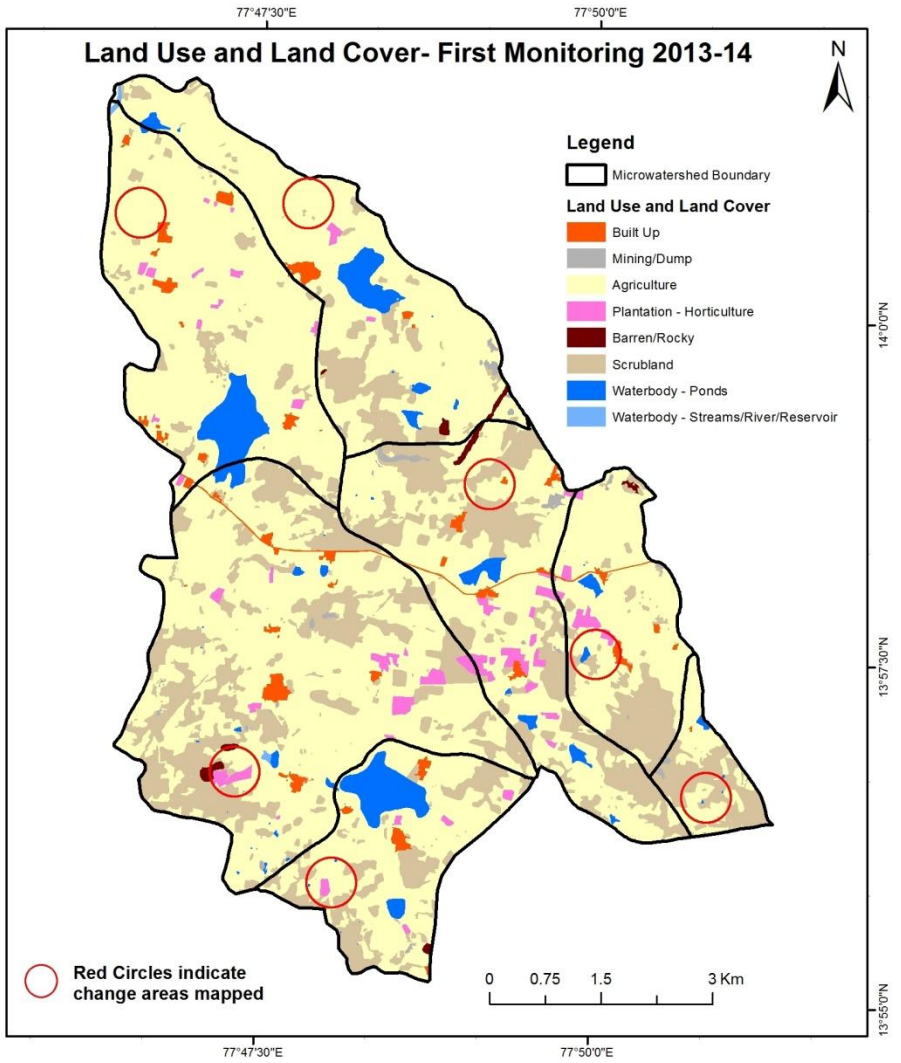
Land use and Land cover Changes in the Project

- 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 pre implementation period as T0 (2009-10) and row represents the post implementation period as T5 (2017-18) .

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

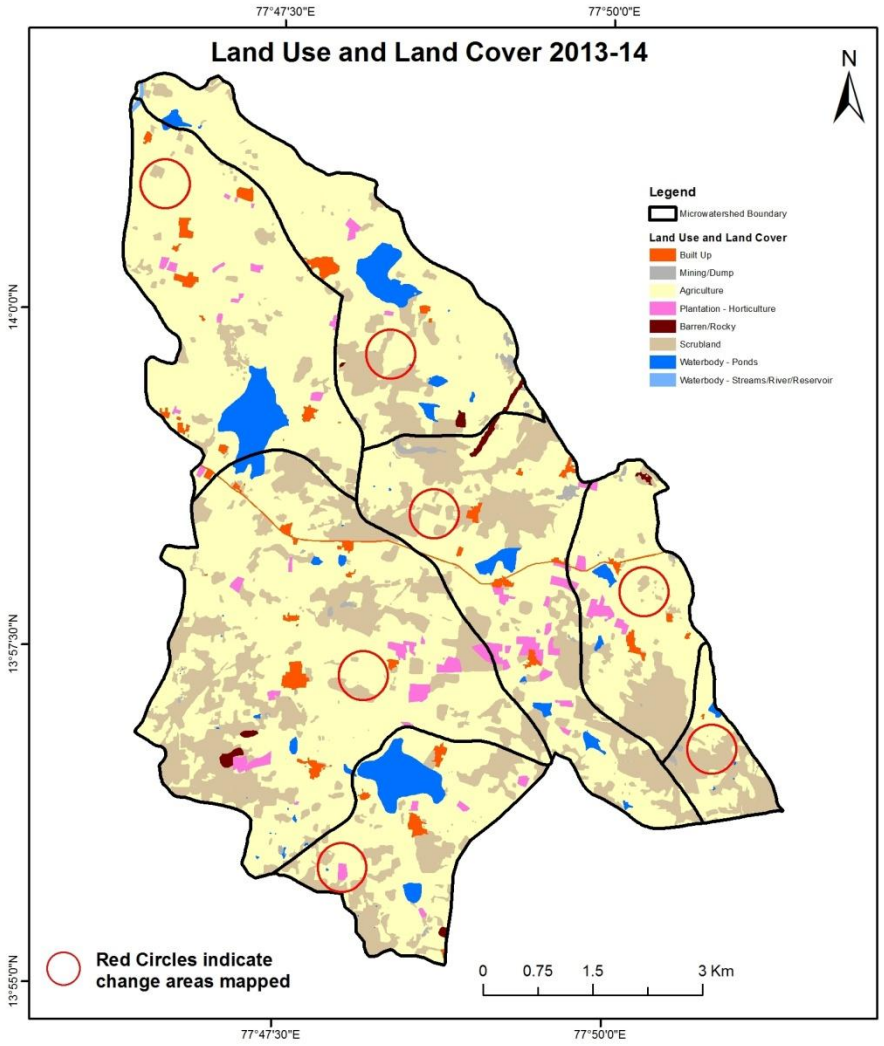
Scale: 1:10000

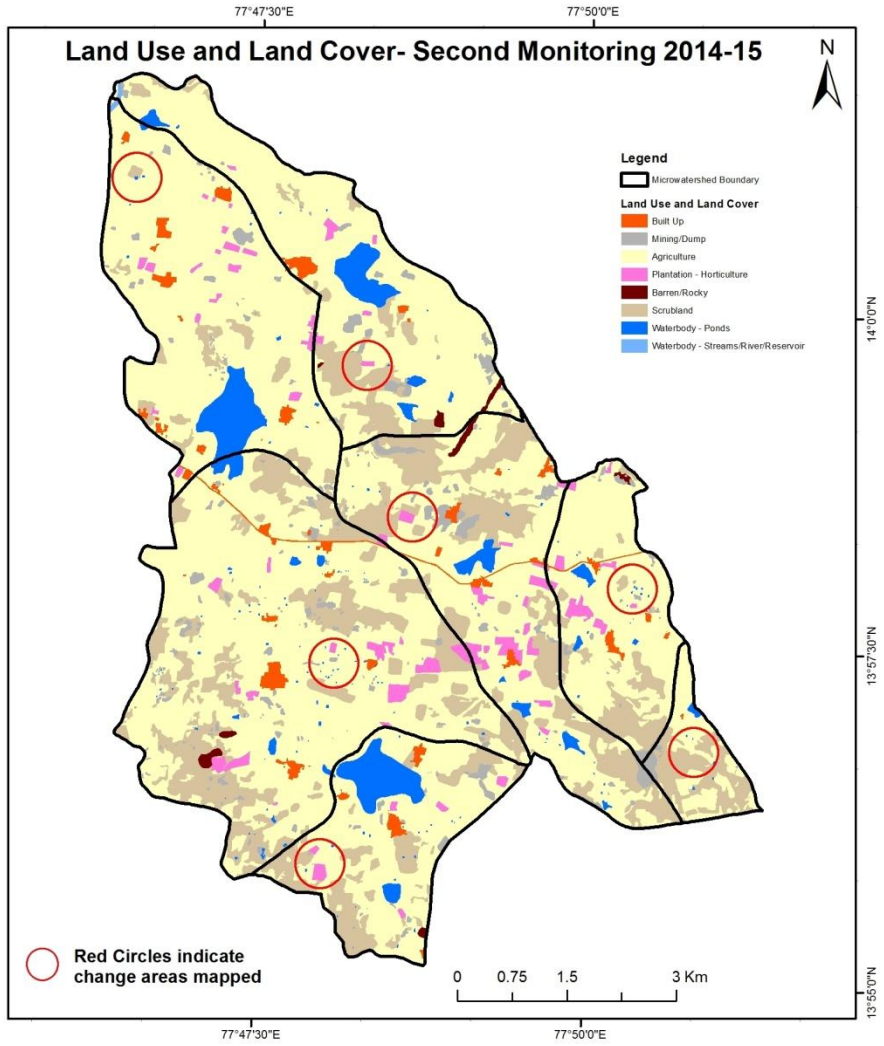




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

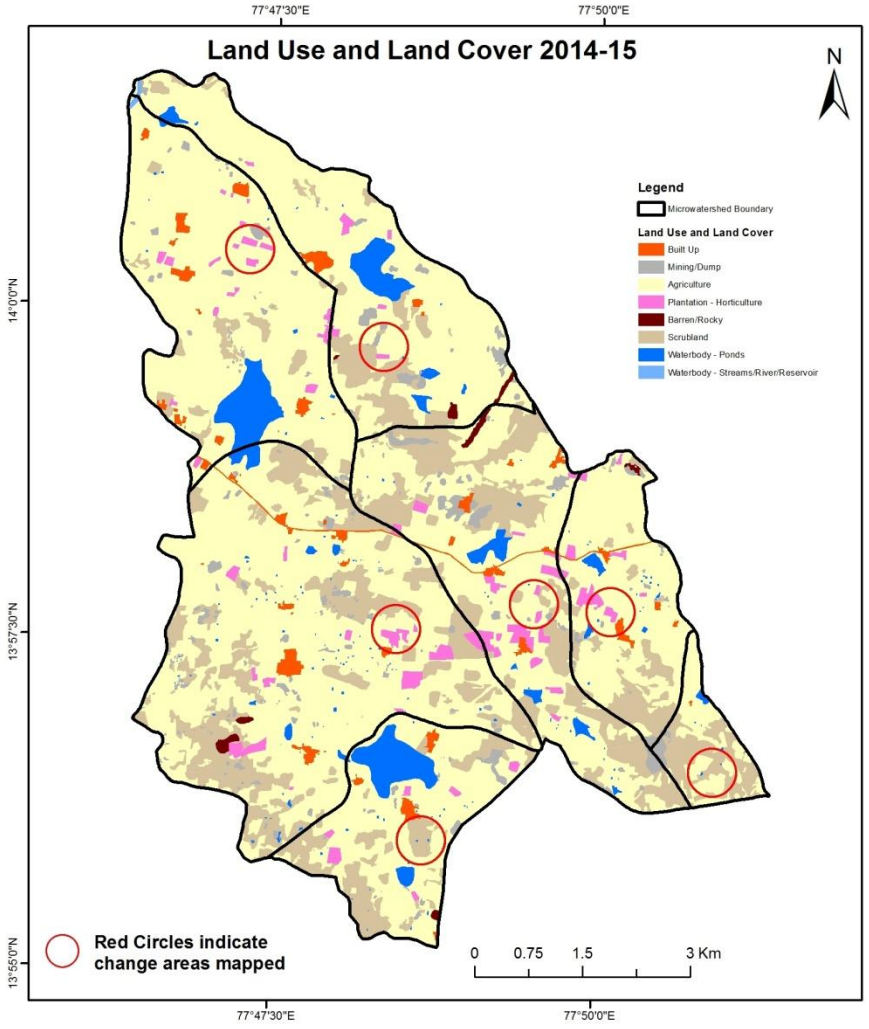
Scale: 1:10000

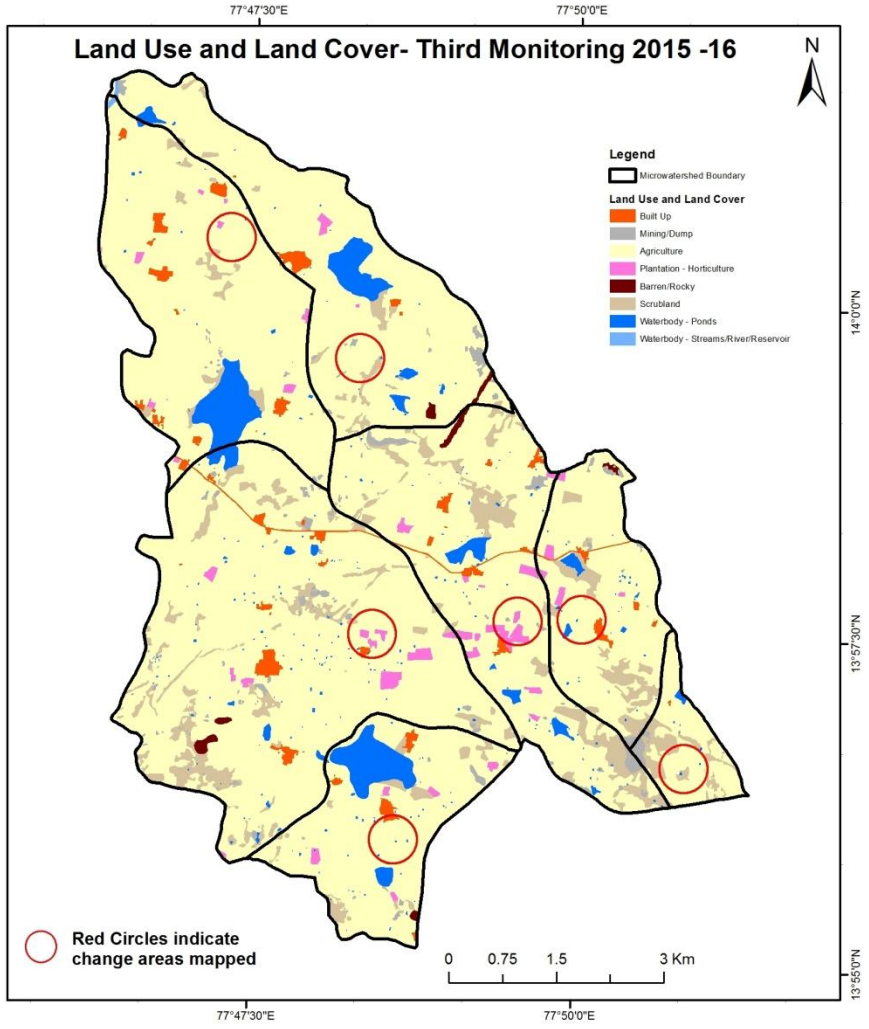




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

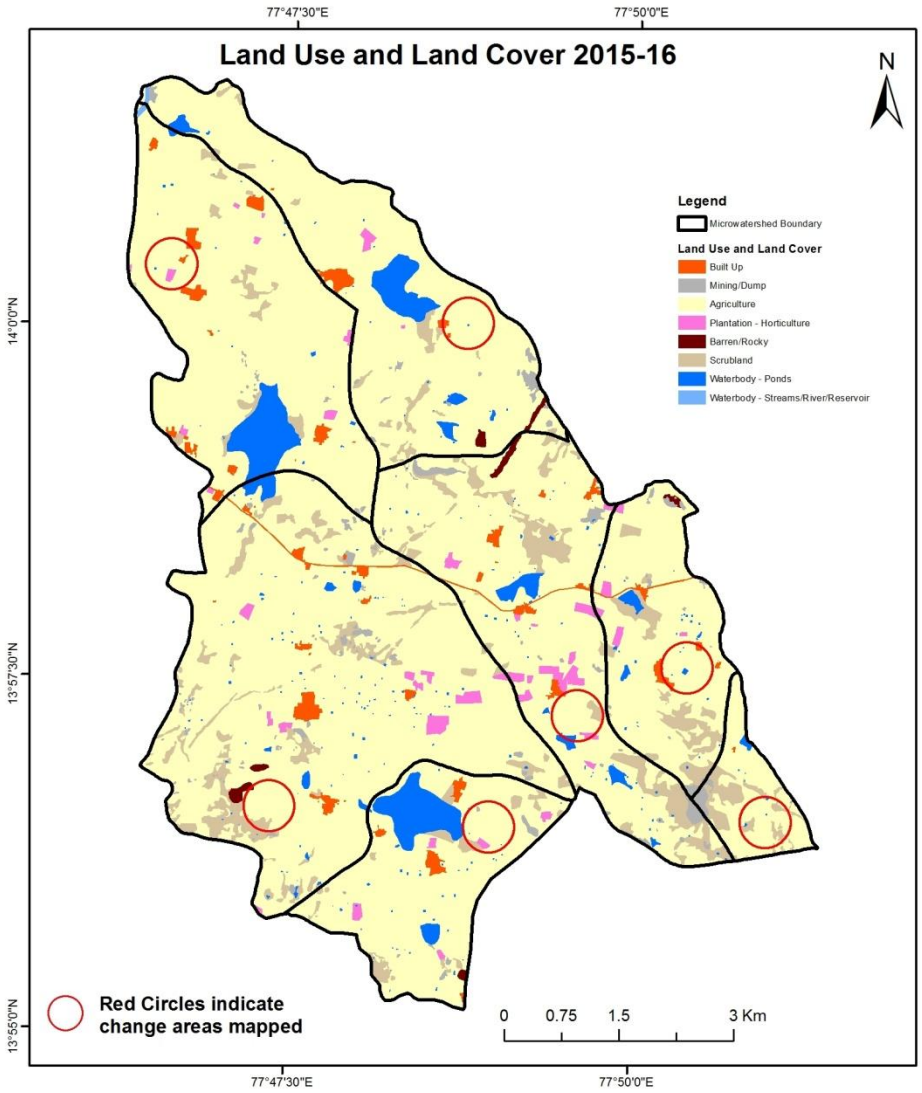
Scale: 1:10000

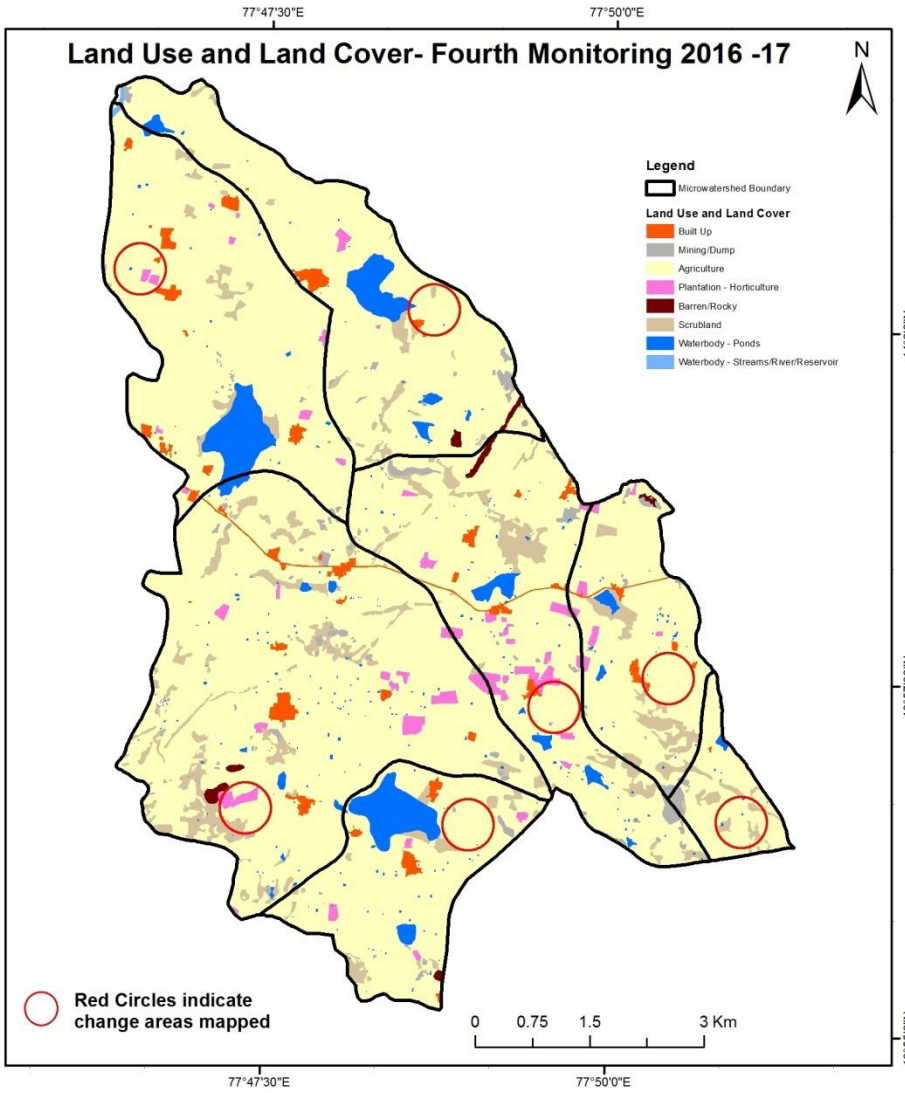




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

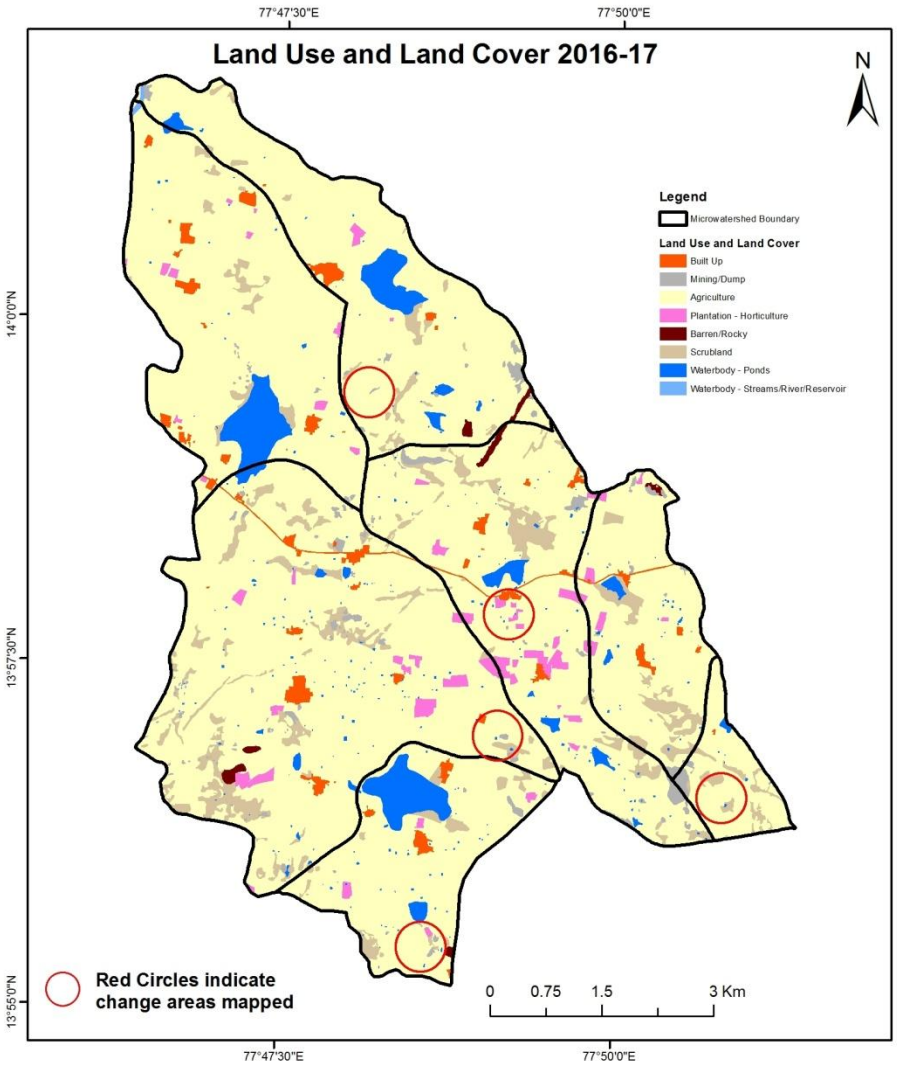
Scale: 1:10000

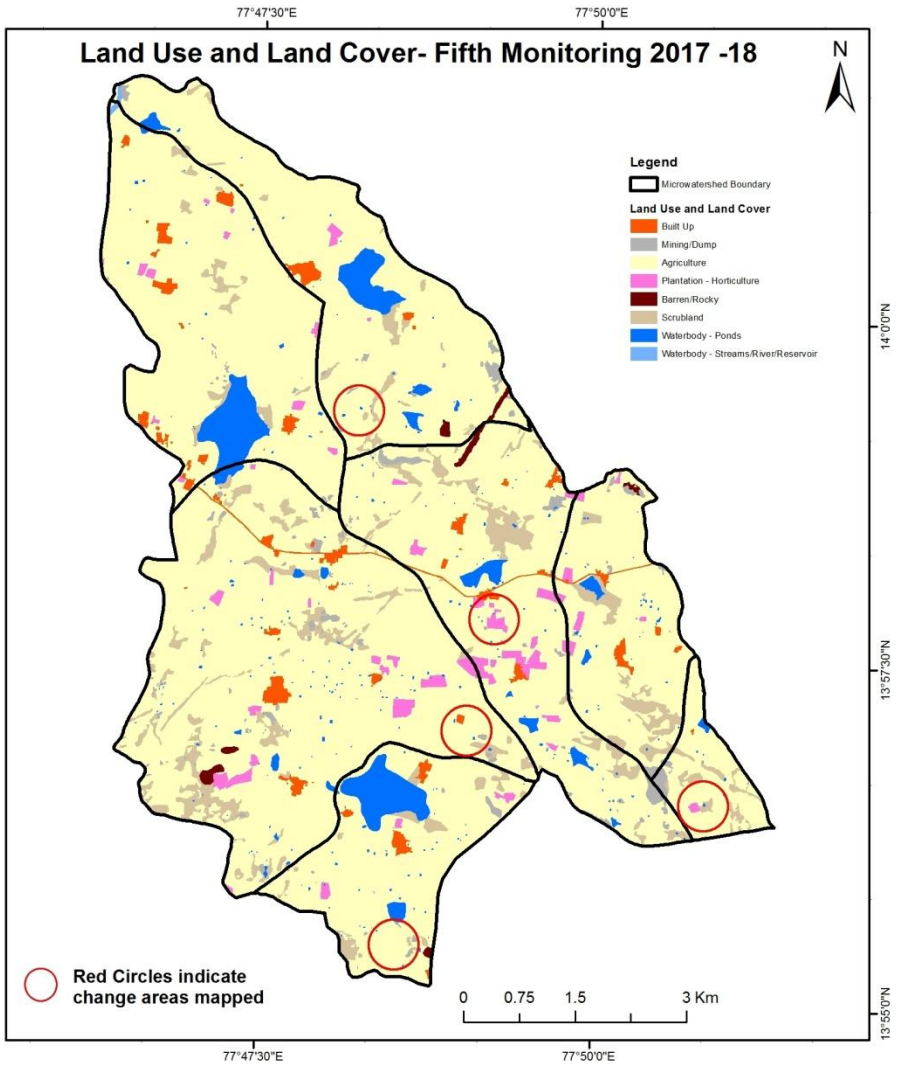




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

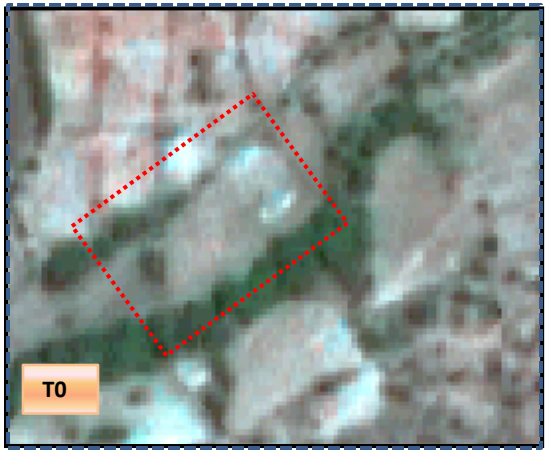
Scale: 1:10000





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

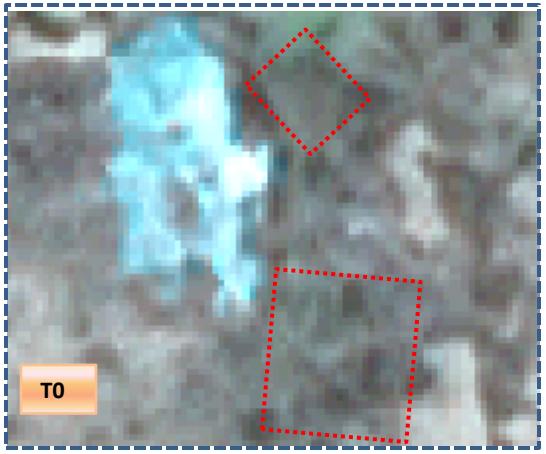
Scrub to Plantation



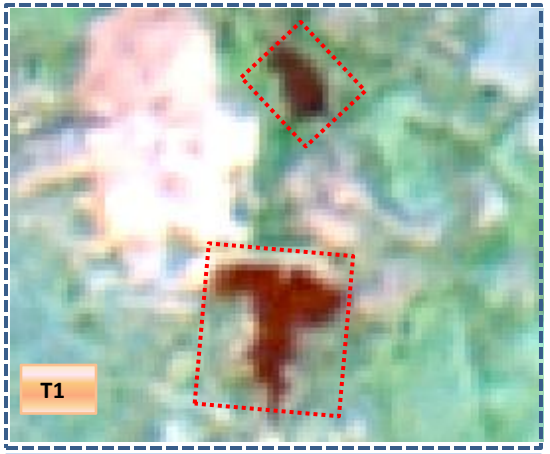
T0: 2009-10

T1: 21 December 2013

Scrub to Water body



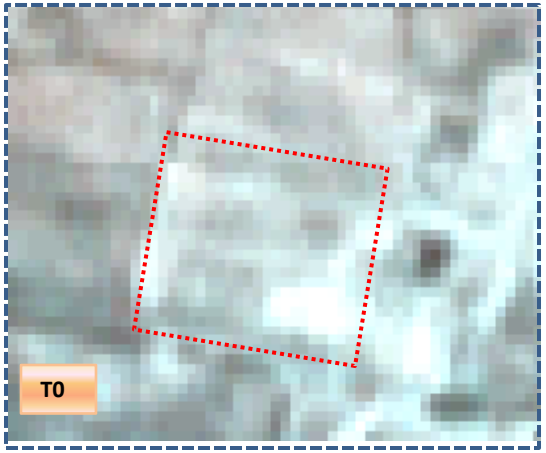
T0: 2009-10



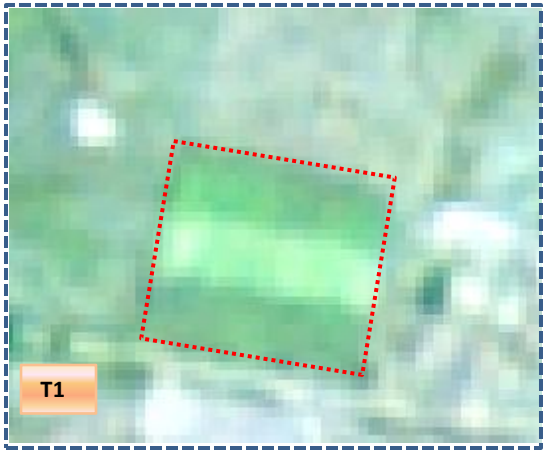
T1: 21 December 2013

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

Scrub to Agriculture

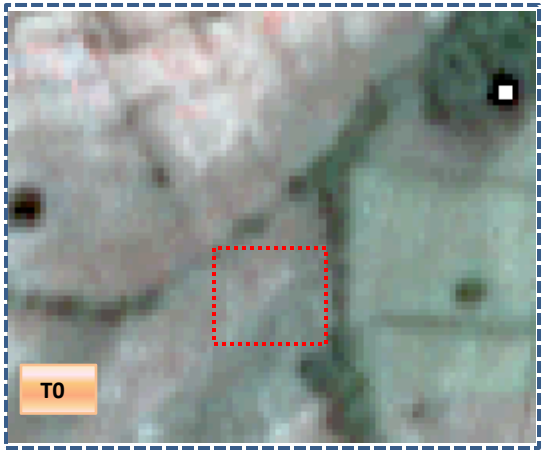


T0: 2009-10

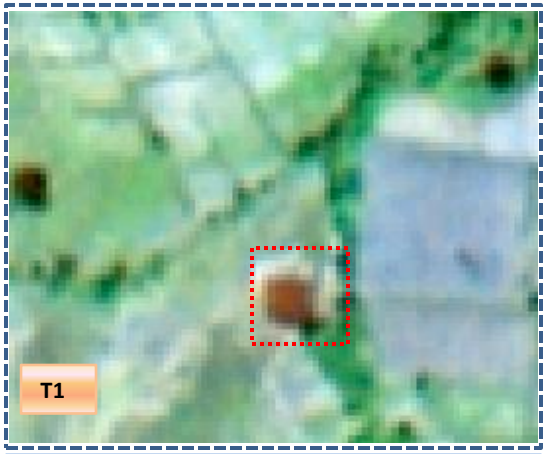


T1: 21 December 2013

Agriculture to Waterbody



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	89.06										89.06
Mining/dump		24.77								0.11	24.88
Agriculture	4.63		3676.06	18.69				820.84		0.72	4520.95
Plantation Horticulture	0.06		3.31	86.52							89.89
Forest											
Forest Plantation											
Barren Rocky							21.12				21.12
Scrub	8.44		358.48	3.58				540.86	0.06	7.13	918.54
Waterbody-Streams/River									4.25		4.25
Waterbody – Ponds										221.07	221.07
Grand Total	**102.19**	**24.77**	**4037.85**	**108.79**			**21.12**	**1361.70**	**4.30**	**229.03**	**5889.76**

- 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 844.89 ha of agriculture are decreased and it is converted into built-up, plantation, scrubland and water body in T1.
- In T1 361.79 ha of agriculture area has 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	102.19										102.19
Mining/dump		24.77									24.77
Agriculture	0.96	0.15	3910.09	23.58				97.76		5.31	4037.85
Plantation Horticulture				108.79							108.79
Forest											
Forest Plantation											
Barren Rocky							21.12				21.12
Scrub	0.32	131.42	169.94	0.87				1053.96		5.19	1361.70
Waterbody-Streams/River									4.30		4.30
Waterbody – Ponds										229.03	229.03
Grand Total	**103.48**	**156.34**	**4080.03**	**133.24**			**21.12**	**1151.72**	**4.30**	**239.54**	**5889.76**

• 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 127.76 ha of agriculture are decreased and it is converted into built up, mining/dump, plantation, scrubland and water body in T2.

• In T2 169.94 ha of agriculture area has increased from 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- 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	103.48										103.48
Mining/dump		74.84	80.85							0.65	156.34
Agriculture	0.38	0.76	3930.47	5.76				139.45		3.22	4080.03
Plantation Horticulture	0.05		61.91	71.21						0.07	133.24
Forest											
Forest Plantation											
Barren Rocky		0.35					20.77				21.12
Scrub	0.07	1.51	866.42	1.11				281.10		1.51	1151.72
Waterbody-Streams/River									4.25	0.06	4.30
Waterbody – Ponds			1.73							237.80	239.54
Grand Total	**103.98**	**77.46**	**4941.39**	**78.07**			**20.77**	**420.54**	**4.25**	**243.31**	**5889.76**

• 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 149.56 ha of agriculture area has been decreased and it is converted into built up, mining/dump, plantation, scrubland and water body in T3.

• In T3 930.07 ha of agriculture area has been increased from mining/dump, 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- 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	103.98										103.98
Mining/dump		77.46									77.46
Agriculture	4.33		4892.78	28.15				15.16		0.98	4941.39
Plantation Horticulture	0.13		3.93	74.02							78.07
Forest											
Forest Plantation											
Barren Rocky							20.77				20.77
Scrub		0.98	71.79					347.77			420.54
Waterbody-Streams/River			1.46						2.79		4.25
Waterbody – Ponds			4.52							238.79	243.31
Grand Total	**108.43**	**78.44**	**4974.48**	**102.17**			**20.77**	**362.93**	**2.79**	**239.76**	**5889.76**

• 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 48.61 ha of agriculture area has been decreased and it is converted into built up, plantation, scrubland and water body in T4.

• In T4 81.70 ha of agriculture area has been 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- 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	108.43										108.43
Mining/dump		78.44									78.44
Agriculture	2.62		4961.09	7.15				3.25		0.37	4974.48
Plantation Horticulture			4.76	97.29						0.12	102.17
Forest											
Forest Plantation											
Barren Rocky							20.77				20.77
Scrub			6.09					356.71		0.12	362.93
Waterbody-Streams/River									2.79		2.79
Waterbody – Ponds			0.21							239.55	239.76
Grand Total	**111.05**	**78.44**	**4972.15**	**104.44**			**20.77**	**359.97**	**2.79**	**240.16**	**5889.76**

• 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 13.39 ha of agriculture area has been decreased and it is converted into built up, plantation, scrubland and water body in T5.

• In T5 11.06 ha of agriculture area has been increased from plantation, 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 17.63 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 42.18, 861.35 & 33.09 Hectares From T1-T2, T2-T3 & T3-T4 respectively and overall increase of 936.62 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 558.58 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
6. Farm ponds (1) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.