

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -10/2009-10
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

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

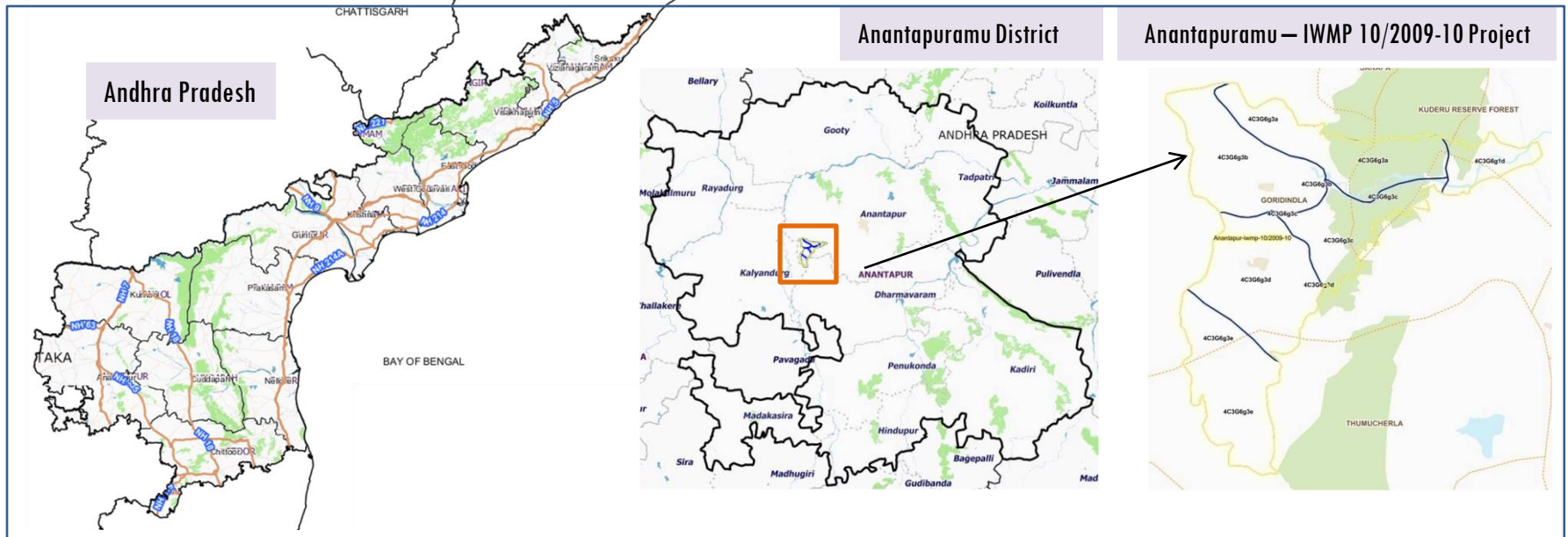
E X E C U T I V E S U M M A R Y

- 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-10/2009-10, Anantapuram District of Andhra Pradesh. The total geographical area of the project is 5,282.70 ha. It comprises of 06 micro watersheds.
- In the project area 34 Drishti photos were uploaded showing 19 check dams,10 Farm ponds, 1Land Development ,2 Cattle proof trench, 1 Rock fill Dam and 1 plantations.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 10 new farm ponds or dug out ponds with 1.4 ha increase in the area.
- Major percentage i.e. 44% is covered by the Scrubland, 33 % is covered by agriculture, 14% by forest and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-10/2009-10

DISTRICT : Anantapuramu , STATE : ANDHRA PRADESH

- The study area falls in Atmakur Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 5282.70 ha. It comprises of 20 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.



- Anantapuramu 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 37 °C range and it reaches around 44 °C to 45 °C.
- Anantapuramu gets pre-monsoon showers starting as early as March, mainly through north-easterly winds blowing in from Kerala. Monsoon arrives in September and lasts until early November with about 250 mm (9.8 in) of precipitation. A dry and mild winter starts in late November and lasts until early February; with little humidity and average temperatures in the 22-23 °C (72-73 °F) range. Total annual rainfall is about 22 in (560 mm).
- Anantapuramu district receives moderate to good rainfall from July to October month.

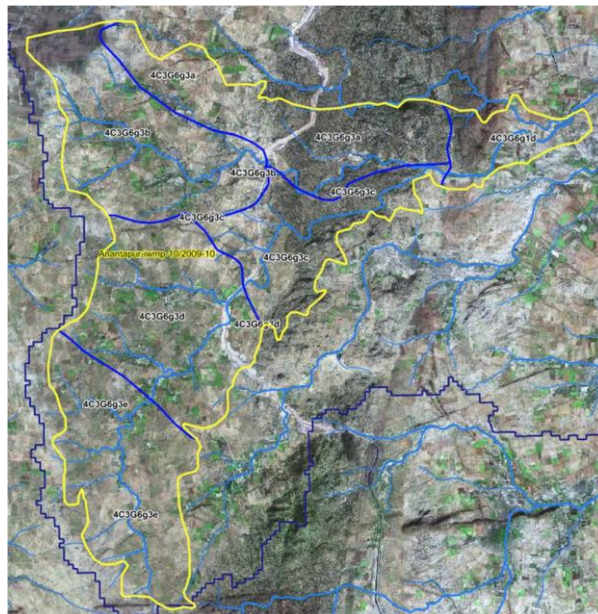
Satellite Data and Ancillary Data

Satellite data*	T1-A**	T1-B**	T5
	2013-14	2011-12	2017-18
LISS IV	2013-14		
SCENE 1			1-Apr-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2013-14		
SCENE 1			1-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)

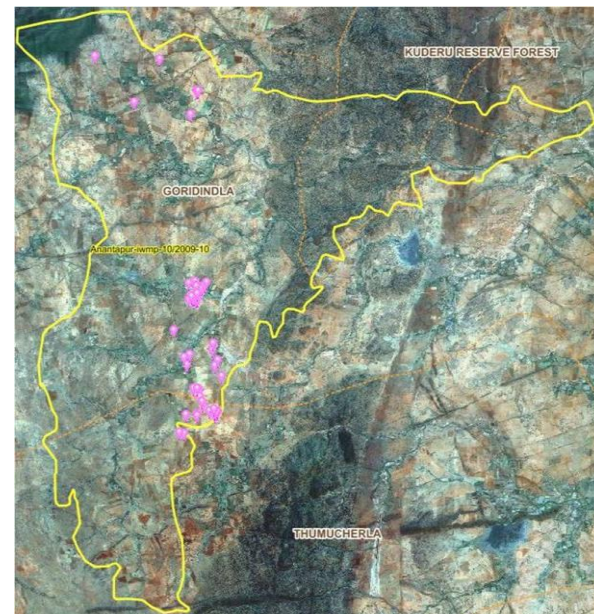


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

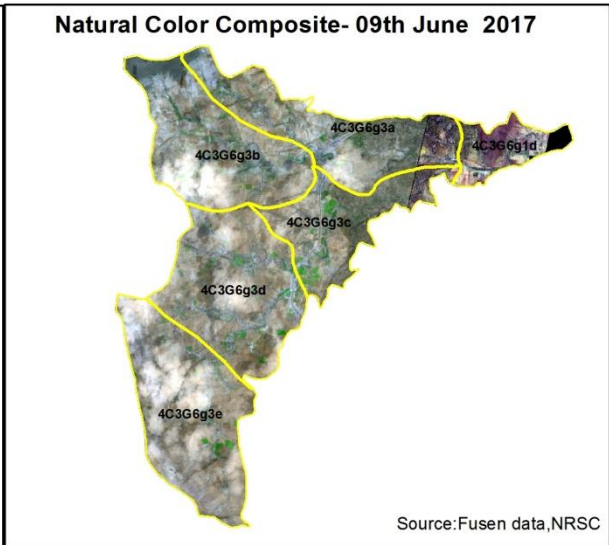
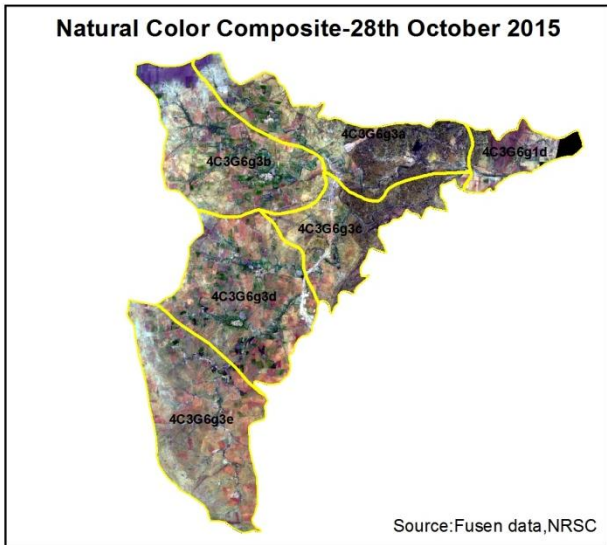
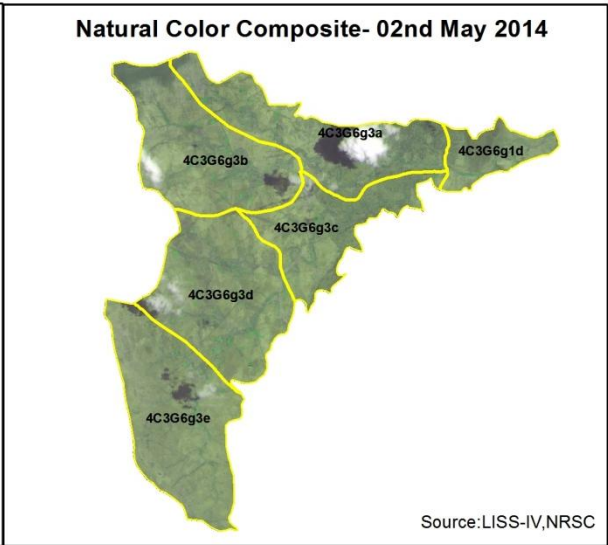
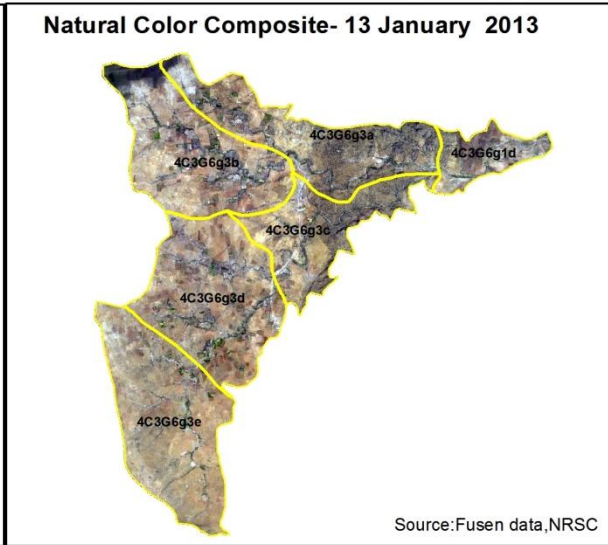
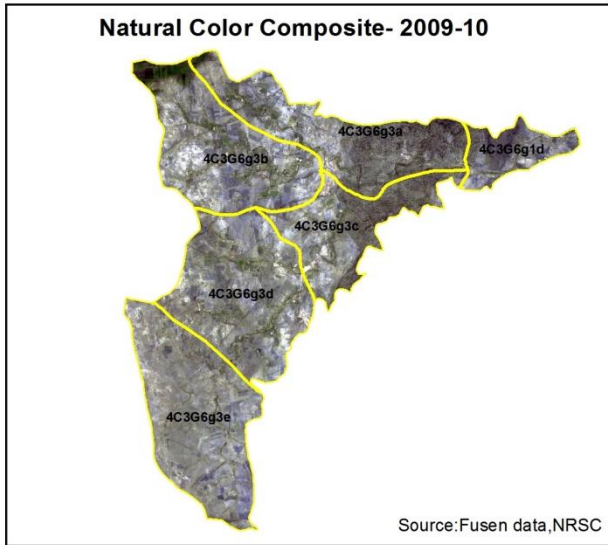
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	0	0
3	Agriculture	80	40
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Lm(Fodder development, Varmi compost)	0	0
8	Checks & Plugs	2	2
9	Gabion structure	0	0
10	Farm ponds	0	0
11	Check dams	30	20
12	Nallah Bunds	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities	5	3
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	0	0
	TOTAL	117	65

MONITORING IN THE PROJECT AREA

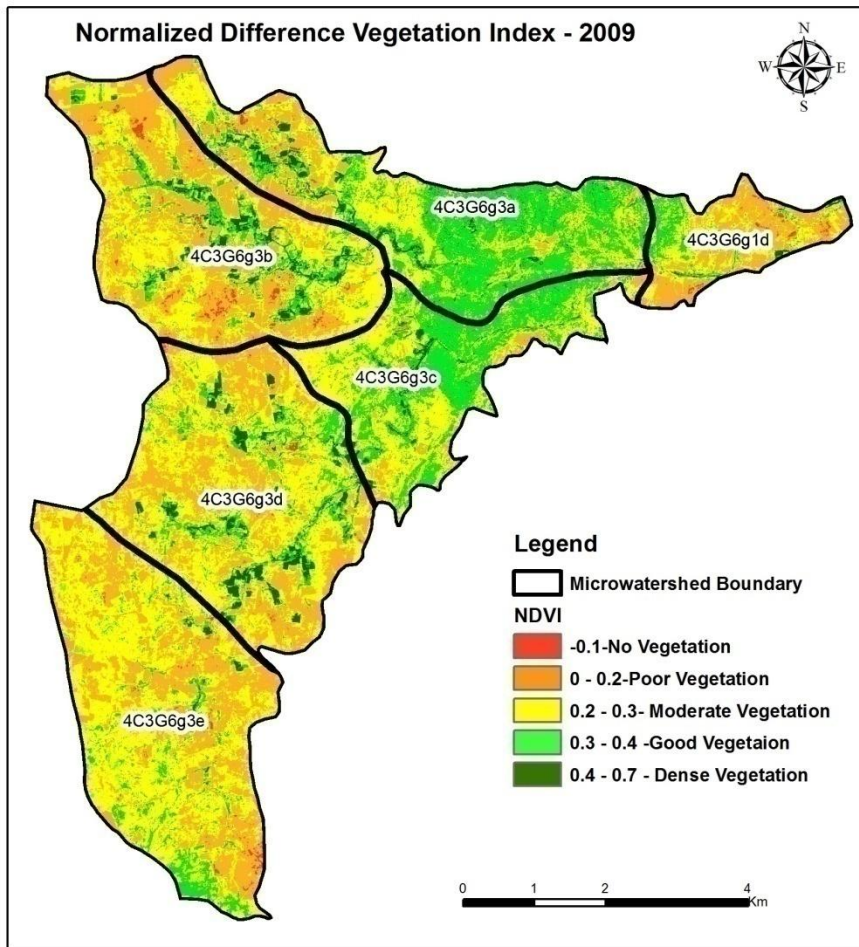
Site Wise Changes in the Project

- 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.

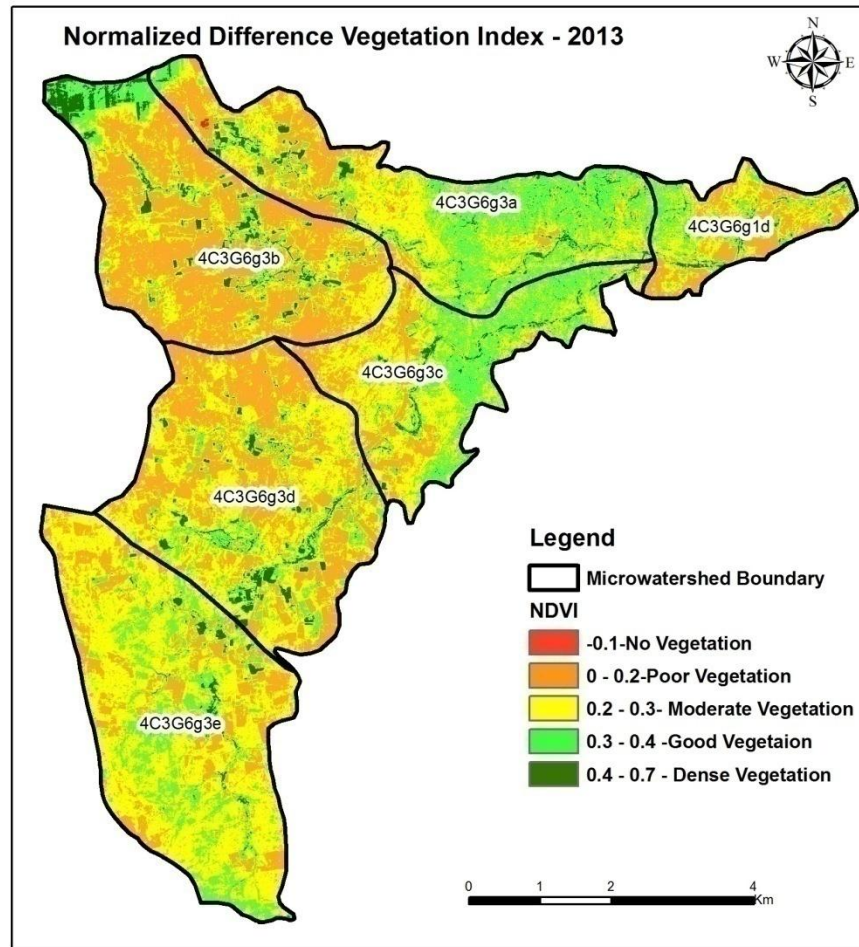
Natural Color Composite – 2009-10 to 2017-18



Changes in Vegetation Cover

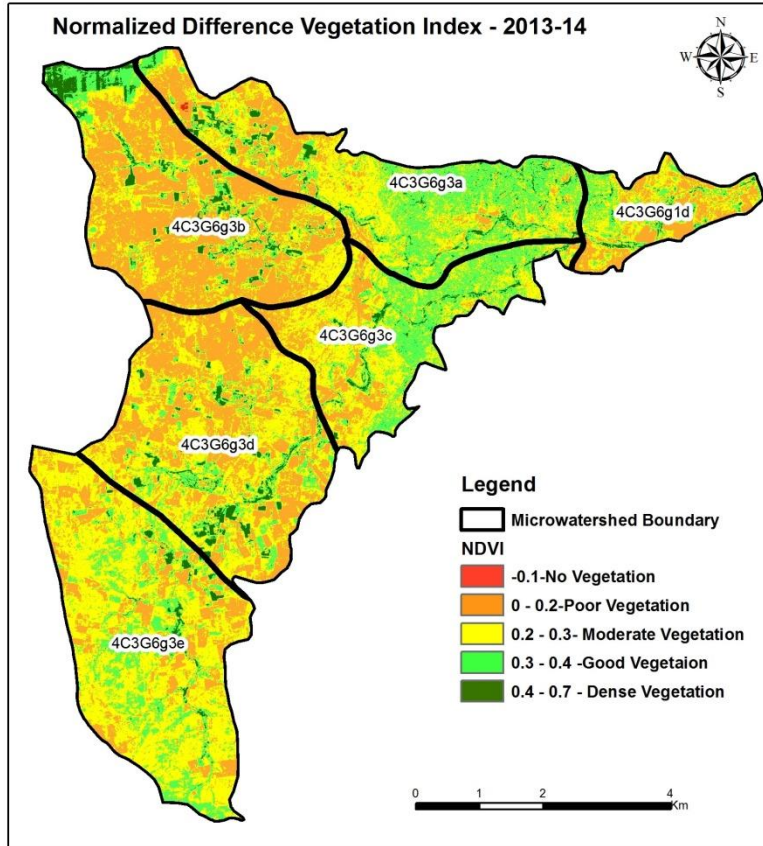


NDVI (2013-14)

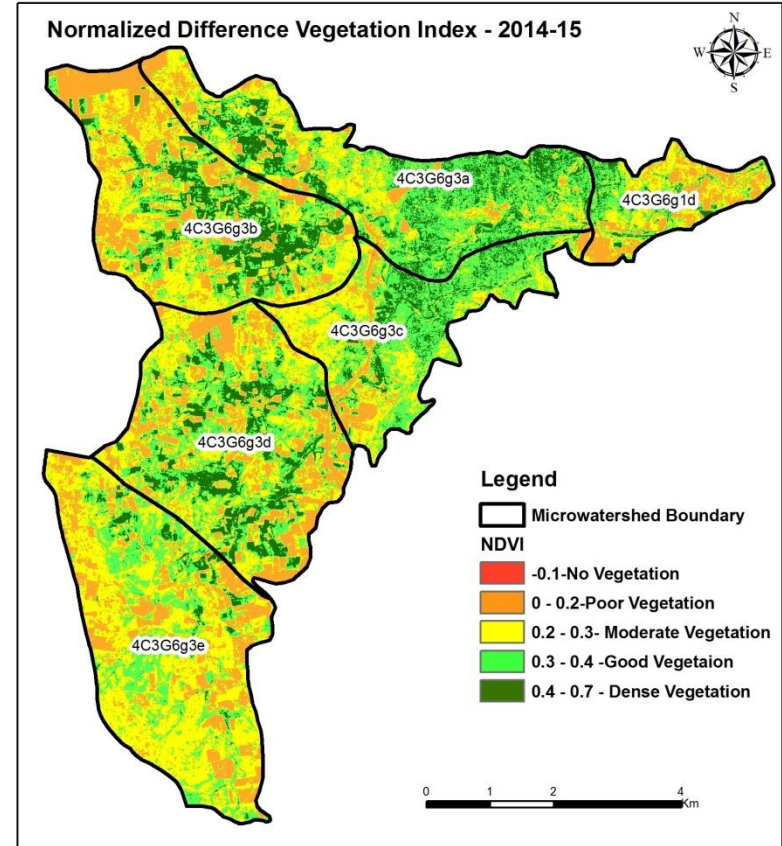


NDVI (28 January 2015)

Changes in Vegetation Cover

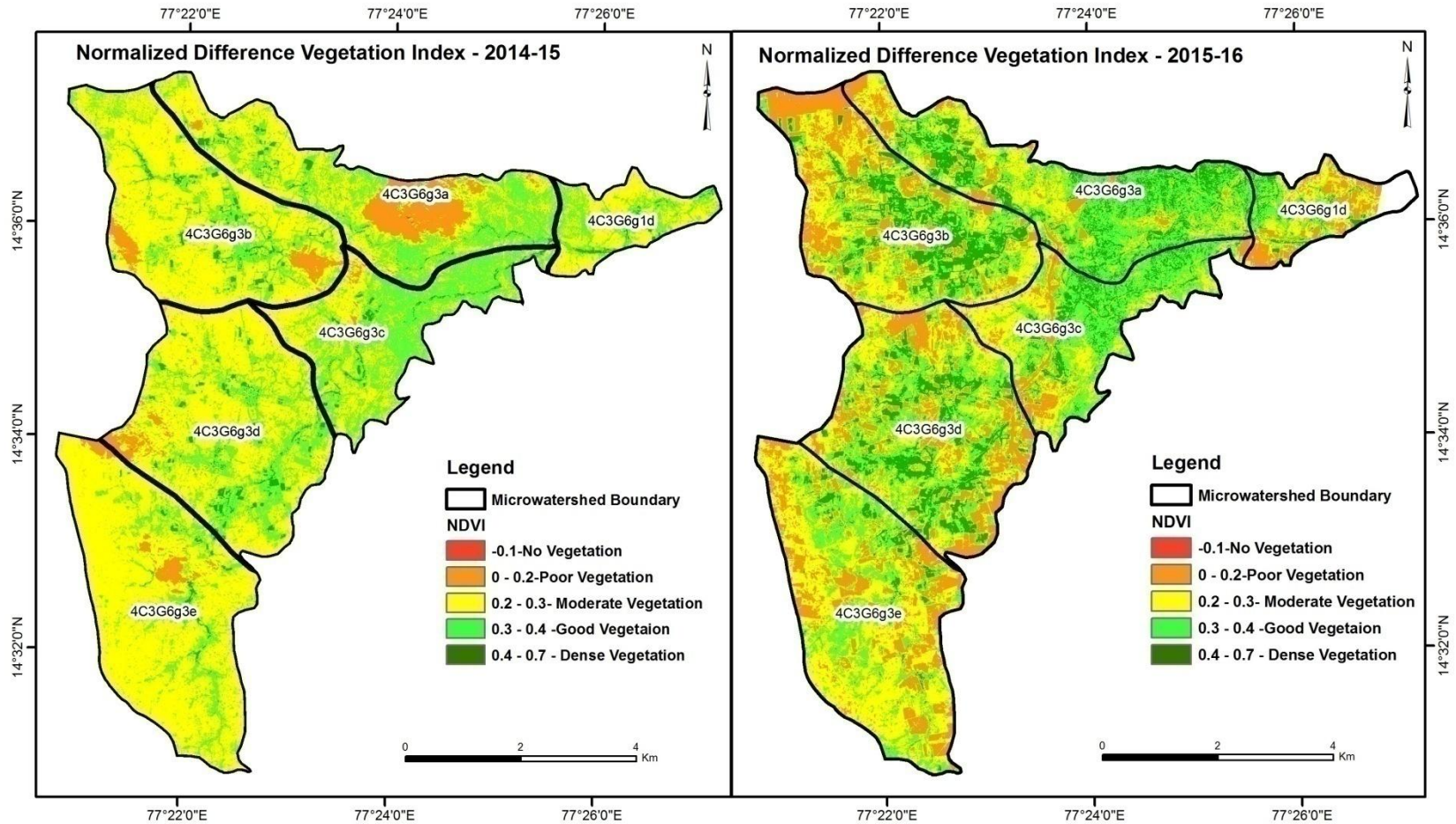


NDVI (2013-14)



NDVI (28 January 2015)

Changes in Vegetation Cover



NDVI (2014-15)

NDVI (28 October 2015)

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



T1

T1: 27 March 2013



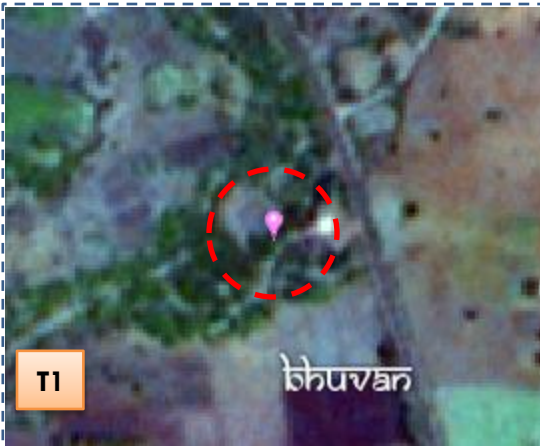
T2

T2: 28 January 2015



Drishti SI no. 766518 MWS :4C3G6g3d

Farm pond



T1

T1: 27 March 2013



T2

T2: 28 January 2015



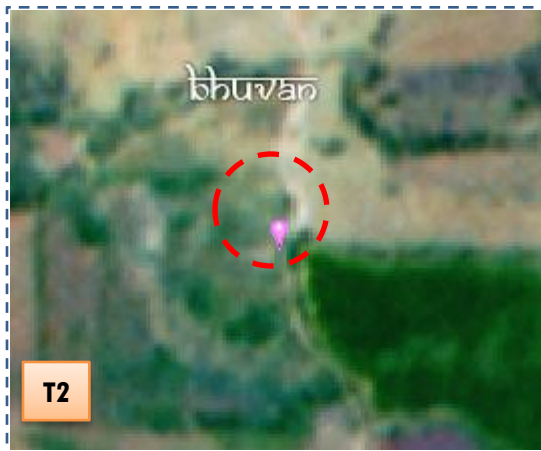
Drishti SI no. 766745 MWS : 4C3G6g3d

Farm pond

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



T1: 27 March 2013

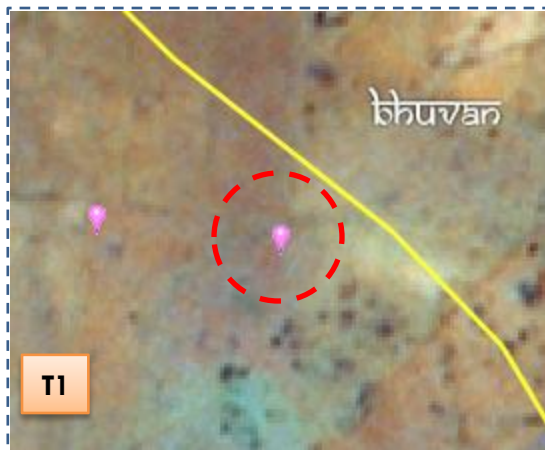


T2: 28 January 2015

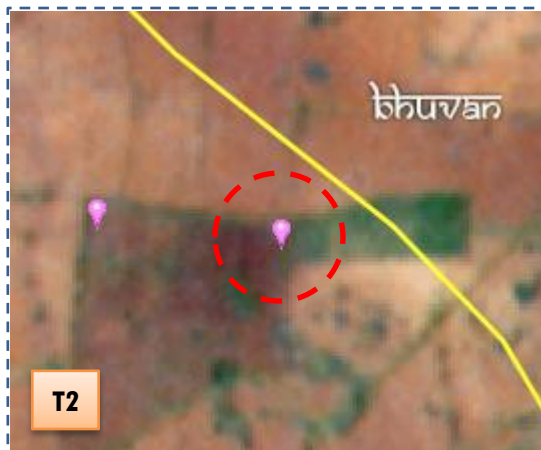


Drishti Sl no. 131821 MWS :4C3G6g3d

Horticulture



T1: 27 March 2013



T2: 28 January 2015



Drishti Sl no. 766759 MWS : 4C3G6g3d

Land Development

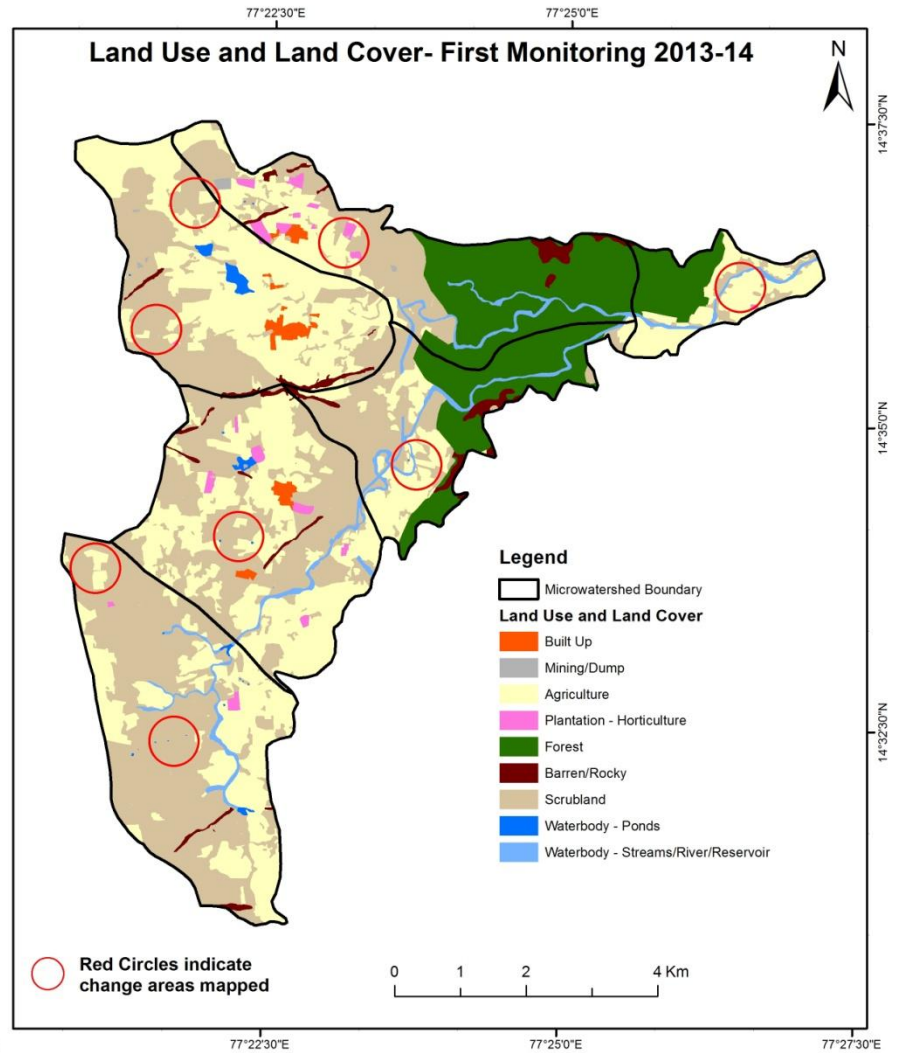
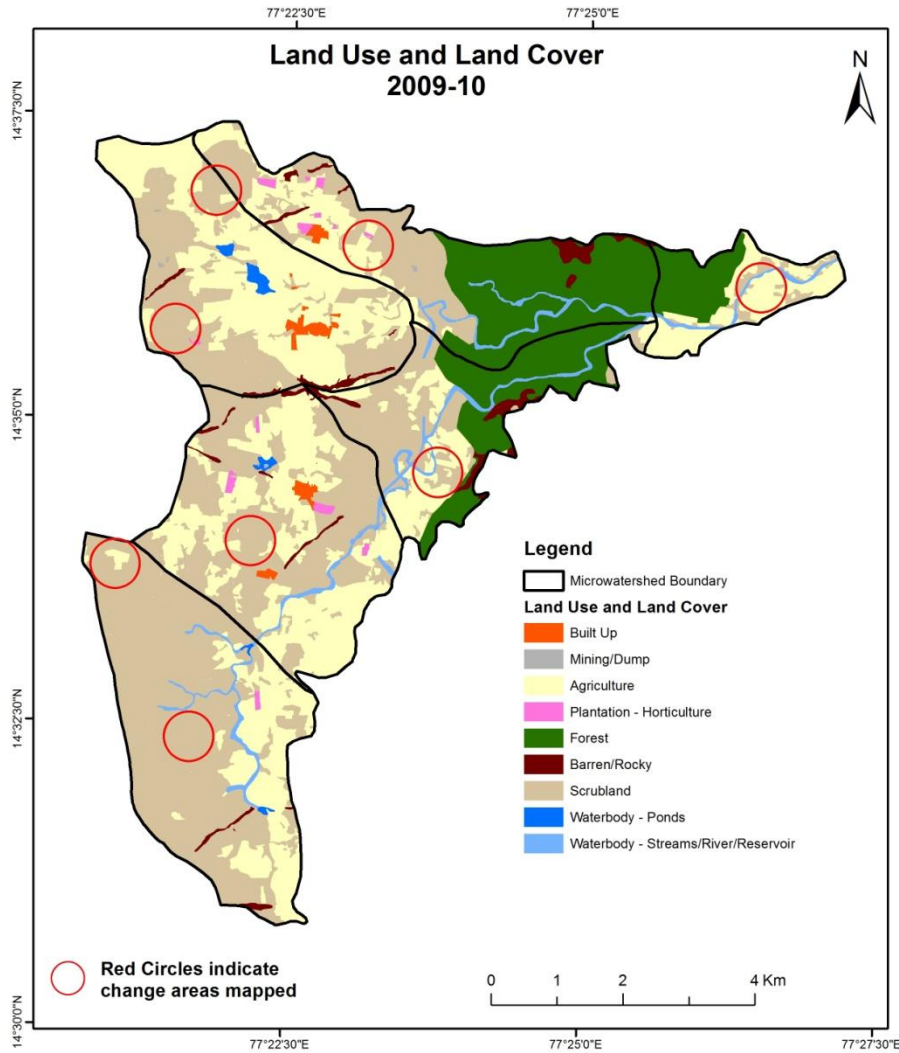
MONITORING IN THE PROJECT AREA

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 (2009-10) and row represents the T5 (2017-18).

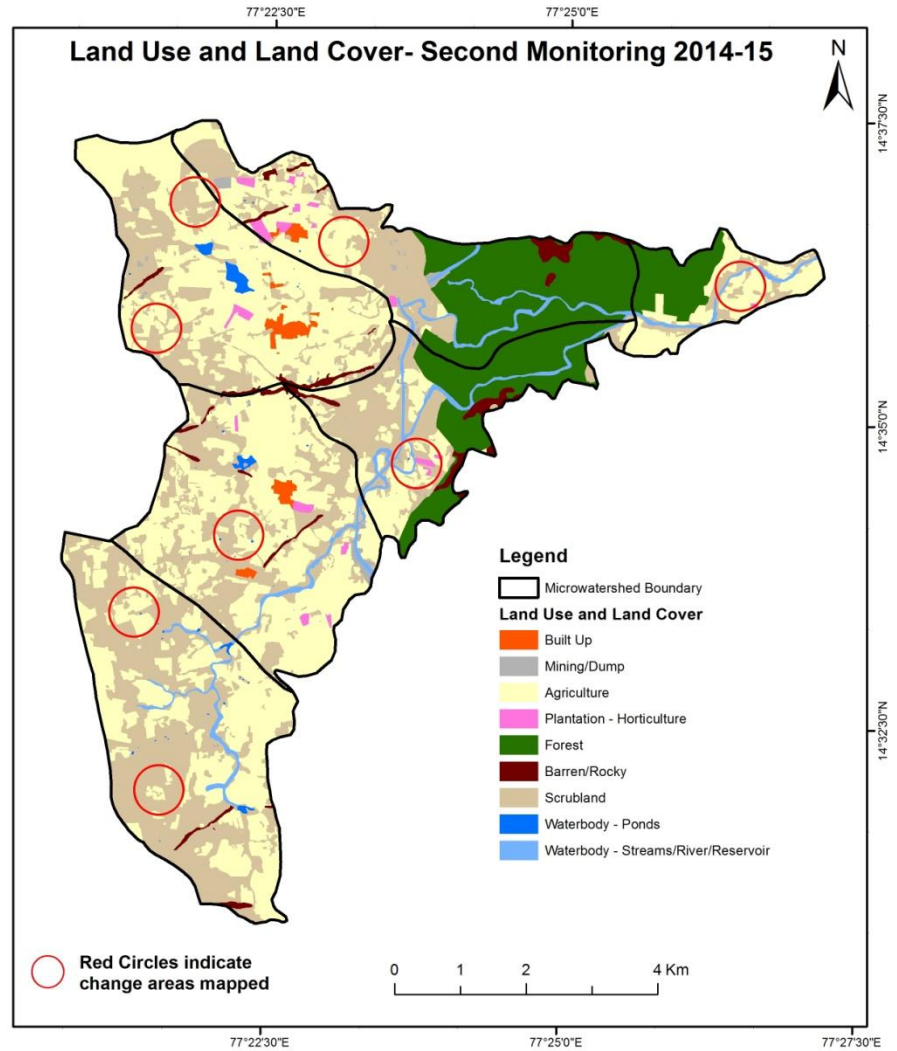
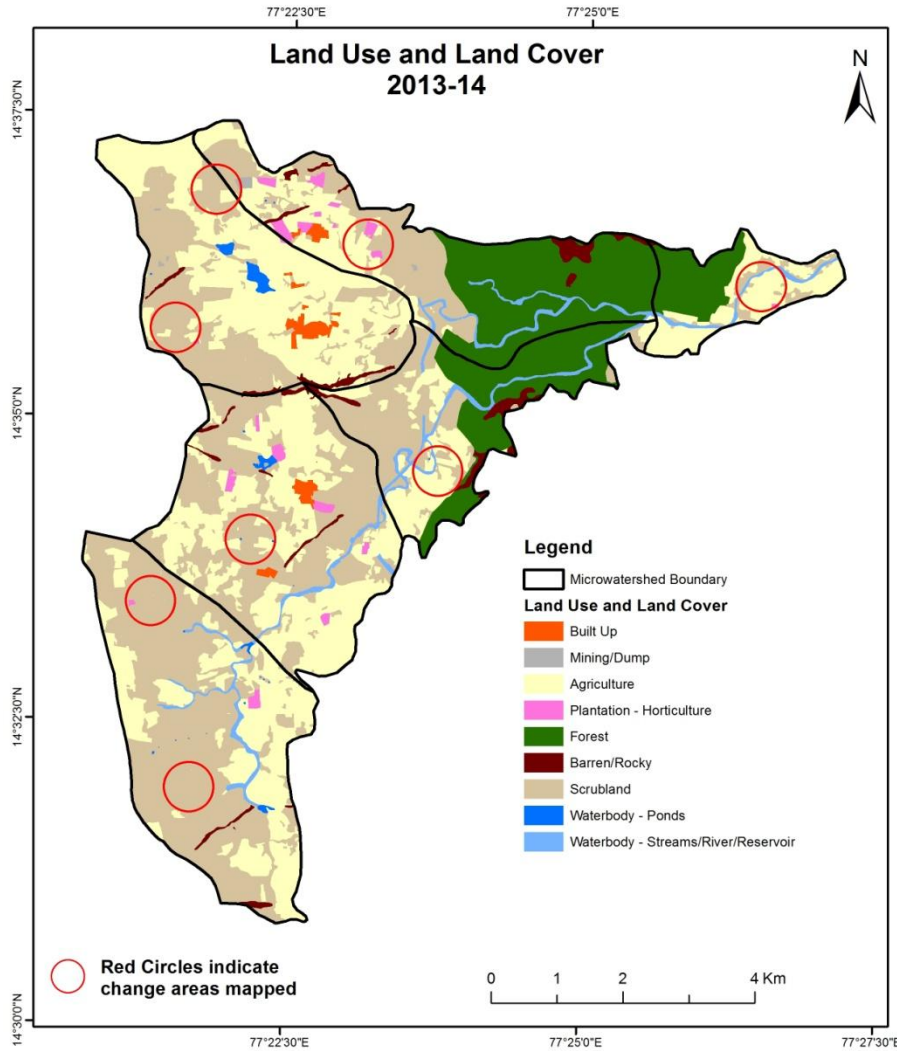
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



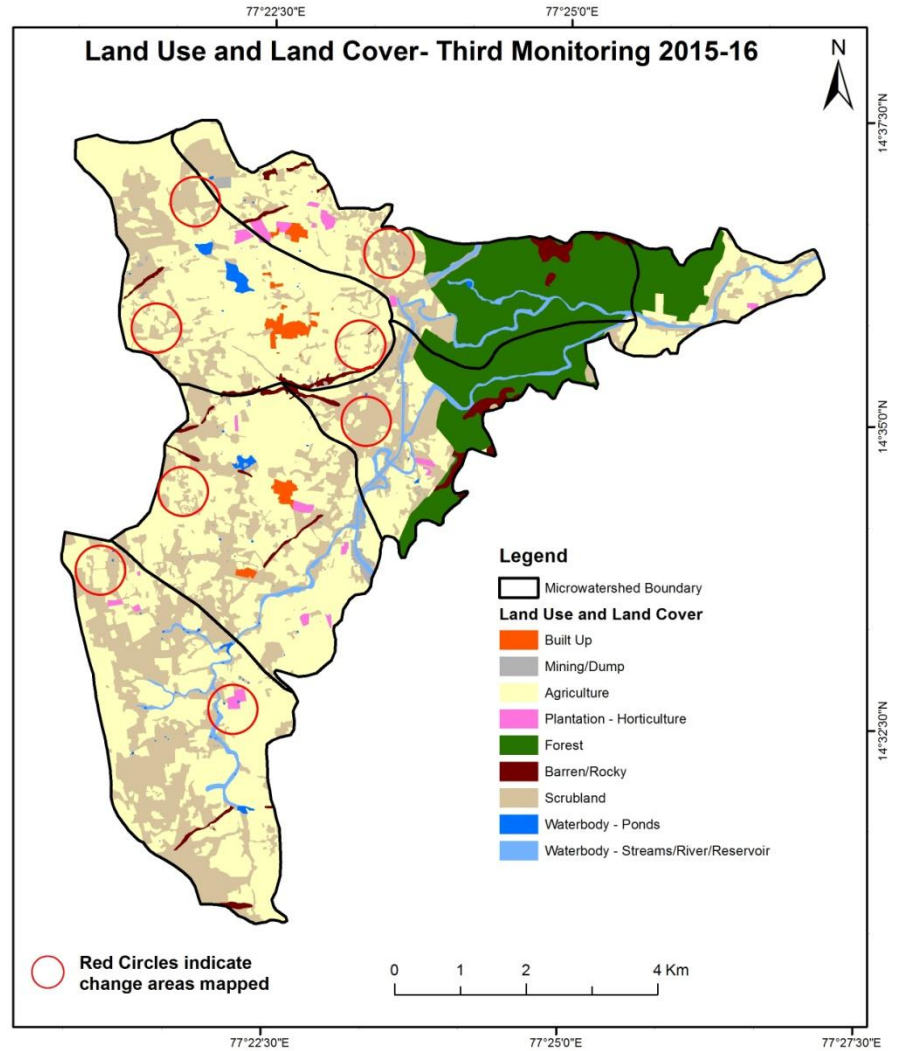
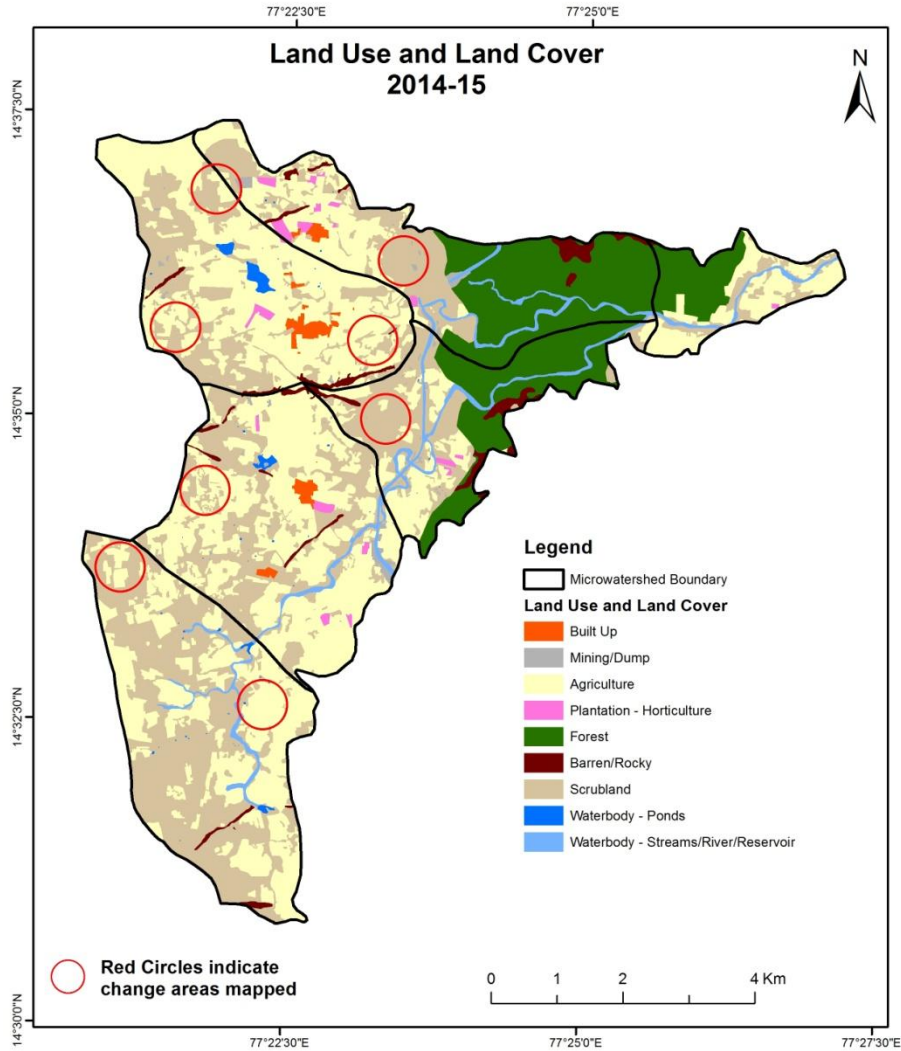
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

Scale: 1:10000



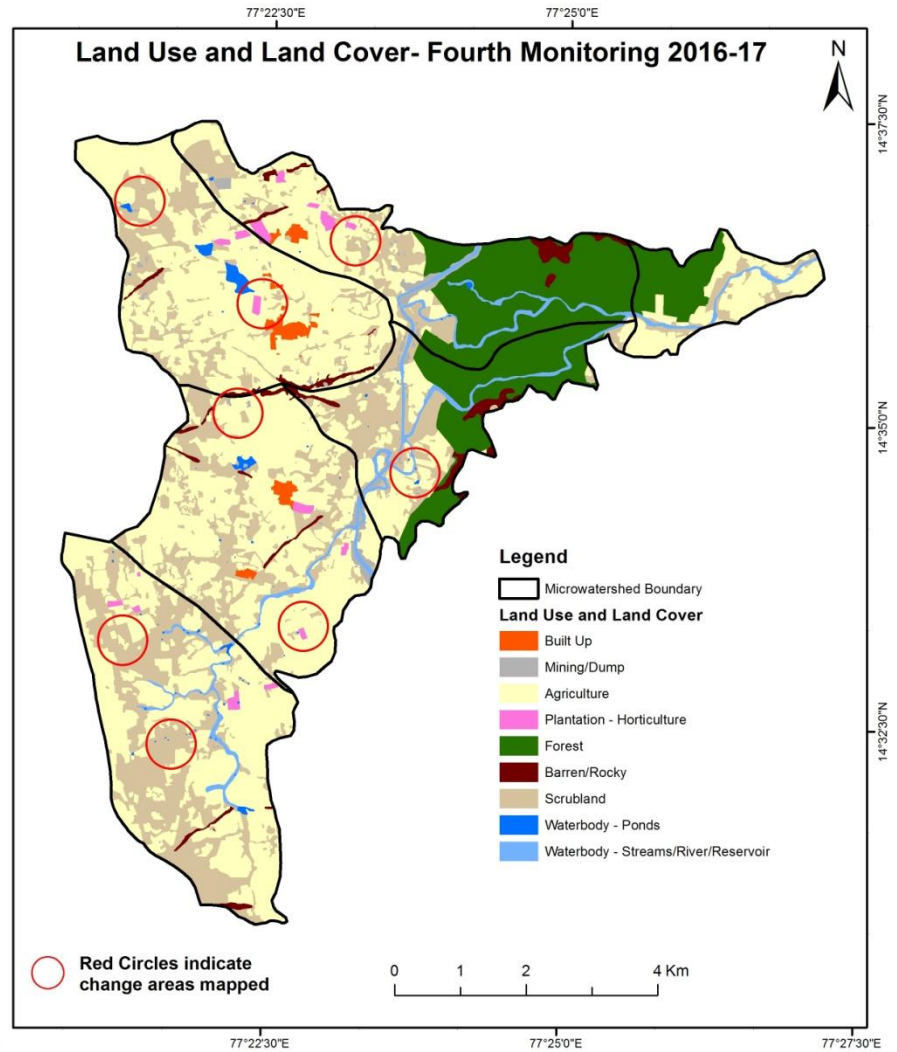
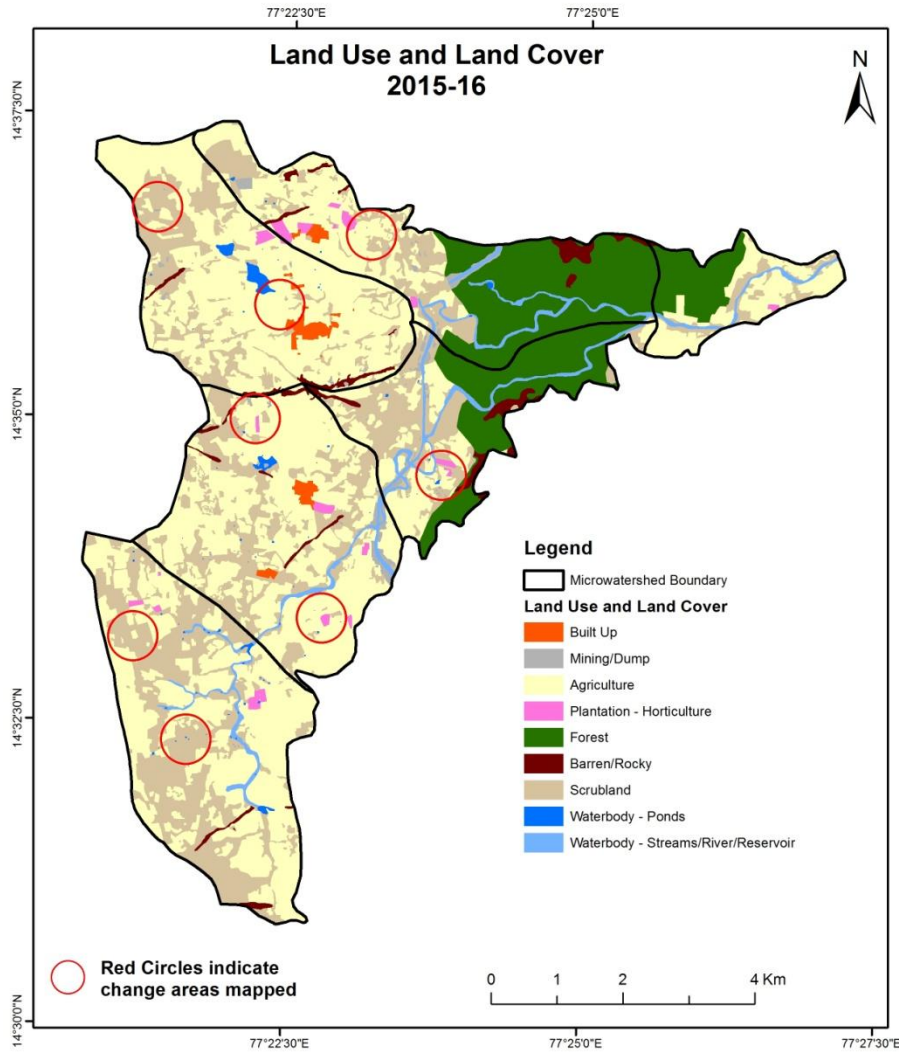
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



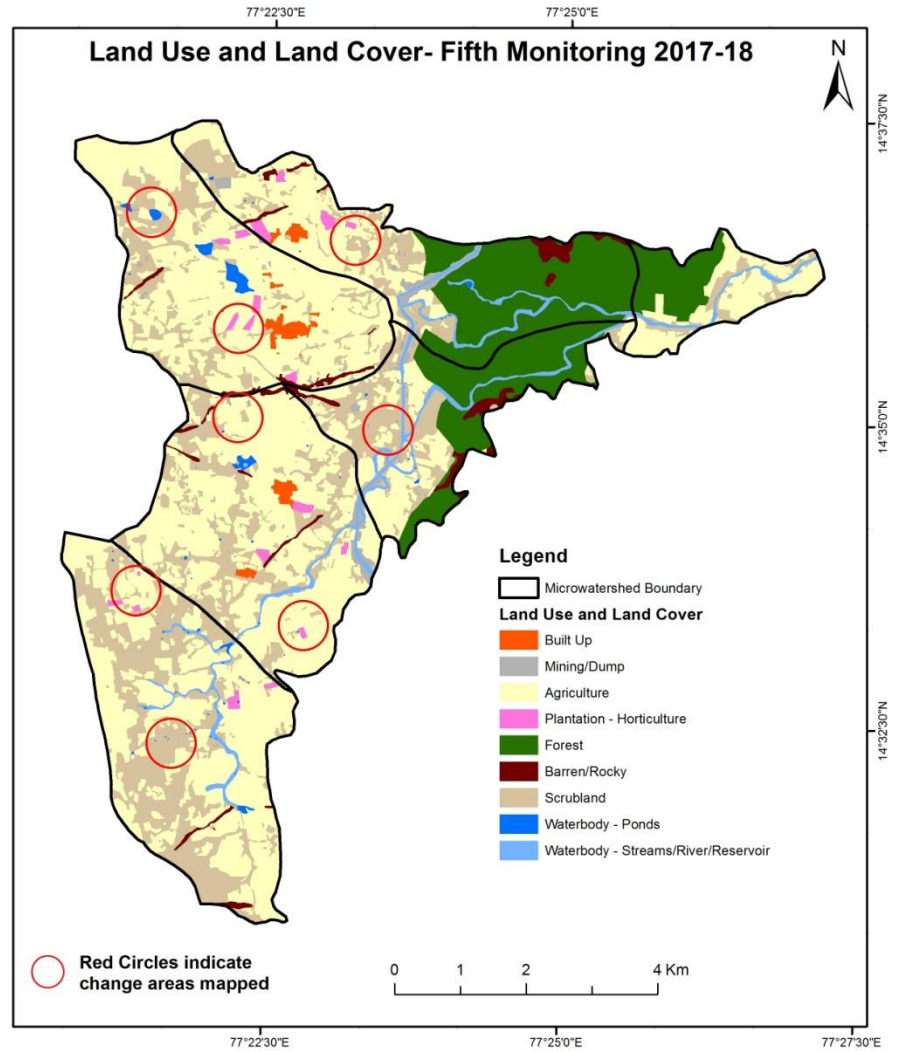
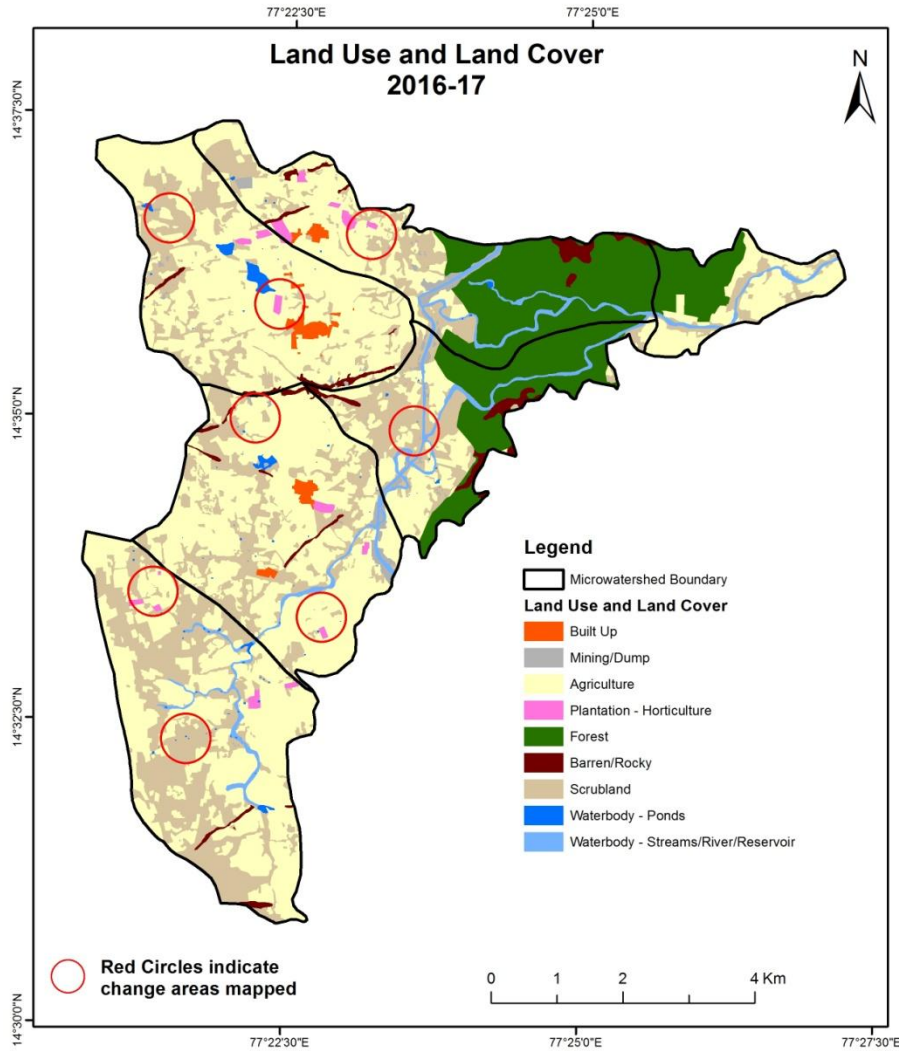
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

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



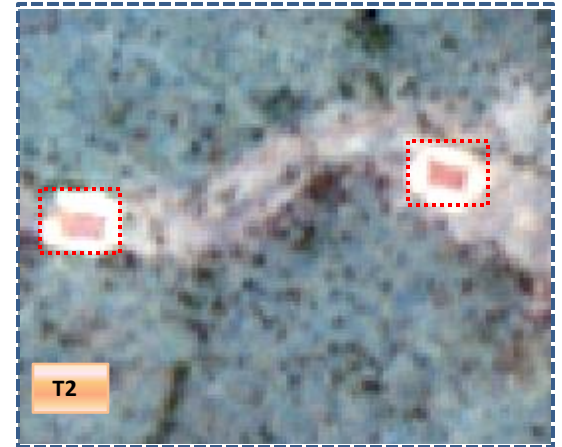
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Water body



T1

T1: 2013



T2

T2: 28 January 2013

Scrub to Plantations



T1

T1: 2013

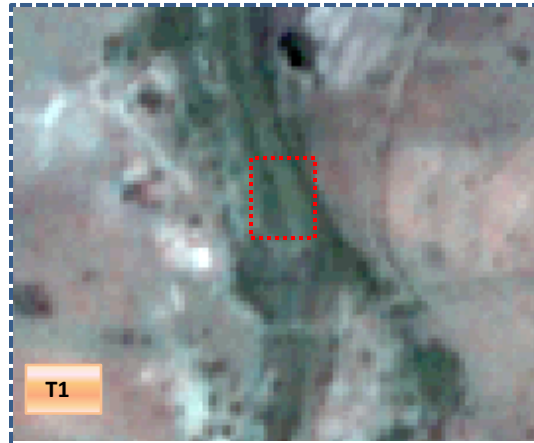


T2

T2: 28 January 2013

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

Scrub to Water body



T1

T1: 2013



T2

T2: 23 January 2013

Agriculture to Plantation



T1

T1: 2013



T2

T2: 23 January 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	35.03										35.03
Mining/dump		3.16									3.16
Agriculture	3.37		1727.19	11.95				2.87		0.09	1745.47
Plantation Horticulture			1.27	23.35							24.63
Forest					788.68						788.68
Forest Plantation											
Barren Rocky							102.42				102.42
Scrub	3.07	4.07	191.58	11.72				2214.45	1.12	1.14	2427.15
Waterbody- Streams/River									135.24		135.24
Waterbody – Ponds										20.93	20.93
Grand Total	41.47	7.23	1920.04	47.02	788.68		102.42	2217.33	136.37	22.16	5282.70

- 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 18.28 ha of agriculture are decreased and it is converted into built up, plantation, scrubland and water body in T2.
- In T2 192.85 ha of agriculture are increased from plantation 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- 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	41.47										41.47
Mining/dump		7.23									7.23
Agriculture	0.19	6.21	1806.67	13.51				90.40	2.45	0.61	1920.04
Plantation Horticulture			21.18	25.84							47.02
Forest		3.47	3.63		776.38				5.20		788.68
Forest Plantation											
Barren Rocky							102.42				102.42
Scrub		15.04	479.51					1720.11	1.99	0.68	2217.33
Waterbody- Streams/River									136.37		136.37
Waterbody – Ponds										22.16	22.16
Grand Total	41.66	31.95	2311.00	39.35	776.38		102.42	1810.50	146.00	23.44	5282.70

- 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 113.37 ha of agriculture are decreased and it is converted into built-up, Mining/dump, plantation, scrubland and water body in T2.
- In T2 504.33 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										
T2	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	41.66										41.66
Mining/dump		30.93									30.93
Agriculture	0.27	1.42	2286.43	17.40				4.74		0.73	2311.00
Plantation Horticulture			11.90	27.45							39.35
Forest		2.91			772.71					0.76	776.38
Forest Plantation											
Barren Rocky		0.56					101.86				102.42
Scrub		9.53	416.74	1.34				1383.30		0.62	1811.53
Waterbody- Streams/River			0.77						144.48	0.75	146.00
Waterbody – Ponds										23.44	23.44
Grand Total	41.92	45.36	2715.84	46.18	772.71		101.86	1388.04	144.48	26.30	5282.70

- 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 24.57 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation, scrubland and water body in T3.
- In T3 429.41 ha of agriculture are increased from mining/dump, barren rocky, scrubland and forest of T2. The additional agriculture area is coming from waterbody in T3 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period- 2014-15 to 2015-16

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	41.92										41.92
Mining/dump		45.36									45.36
Agriculture	0.78		2704.01	9.72						1.33	2715.84
Plantation Horticulture			18.32	27.86							46.18
Forest					772.71						772.71
Forest Plantation											
Barren Rocky							101.86				101.86
Scrub		8.21	52.52	2.12				1323.09	1.84	0.28	1388.04
Waterbody- Streams/River			0.54						143.94		144.48
Waterbody – Ponds			0.15							26.15	26.30
Grand Total	42.71	53.57	2775.53	39.70	772.71		101.86	1323.09	145.78	27.76	5282.70

- 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 11.83 ha of agriculture are decreased and it is converted into built-up, plantation and water body in T4.
- In T4 71.52 ha of agriculture are increased from plantation, scrubland and water body of T3.
- The additional agriculture area is 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 (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	42.71										42.71
Mining/dump		53.57									53.57
Agriculture			2766.26	9.27							2775.53
Plantation Horticulture			1.14	38.55							39.70
Forest					772.71						772.71
Forest Plantation											
Barren Rocky							101.86				101.86
Scrub		1.52	25.71					1293.20		2.66	1323.09
Waterbody- Streams/River									145.74	0.04	145.78
Waterbody – Ponds										27.76	27.76
Grand Total	42.71	55.09	2793.12	47.82	772.71		101.86	1293.20	145.74	30.46	5282.70

- 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 9.27 ha of agriculture are decreased and it is converted into plantation in T5.
- In T5 26.85 ha of agriculture are increased from plantation and scrubland of T4.
- The additional agriculture area is 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 20.03 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 174.57, 390.96, 404.84, 59.69 & 17.58 Hectares From T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 1047.65 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 1133.95 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.