

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -14/2009-10
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

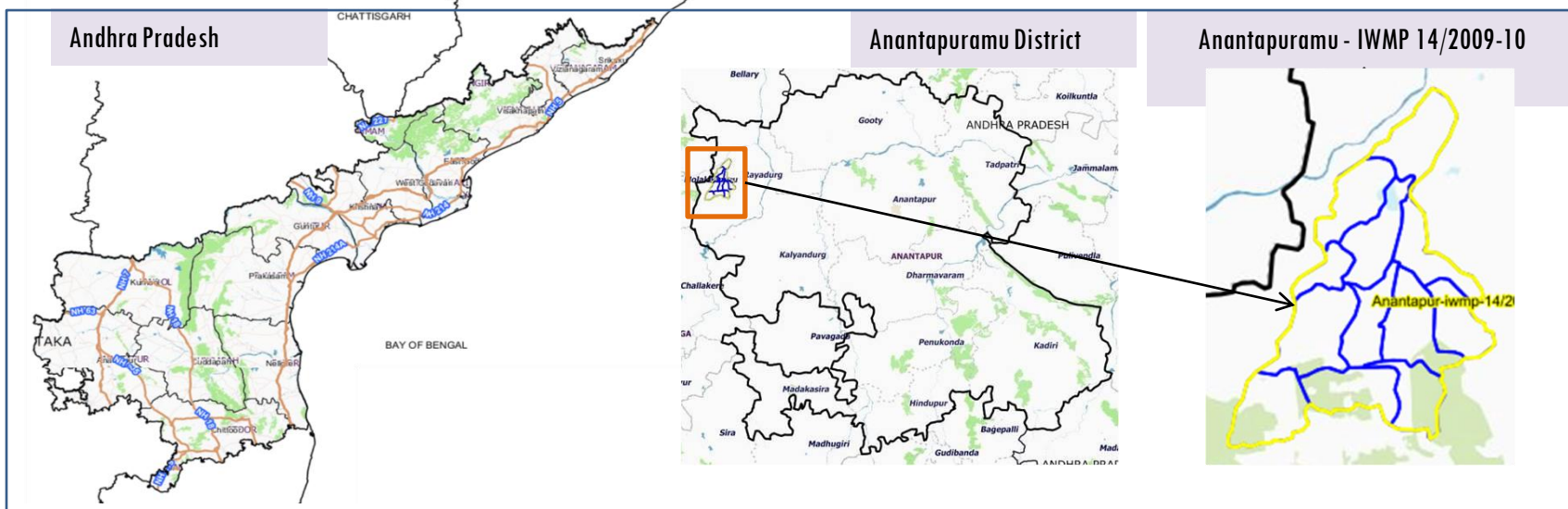
E X E C U T I V E S U M M A R Y

- 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-14/2009-10, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 6,293.12 ha. It comprises of 9 micro watersheds.
- In the project area 21 Drishti photos were uploaded showing 10 check dams/check walls, 9 Farm ponds and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 9 new farm ponds or dug out pits with 4.65 ha increase in the area.
- Major percentage i.e. 72.09 % is covered by the agriculture, 18.51 % is covered by Scrub land, 3.71 % is covered by forest and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-14/2009-10

District : Anantapuramu , State : Andhra Pradesh

- The study area falls in Rayadurg Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 6,293.12 ha. It comprises of 9 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.



- Anantapuram 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.
- Anantapuram 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).
- Anantapuram district receives moderate to good rainfall from July to October month.

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			8-Mar-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			8-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	Drishiti Photographs		
		Total	21
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 Drishiti Points



Drishiti Upload Status

Classification of the Activities

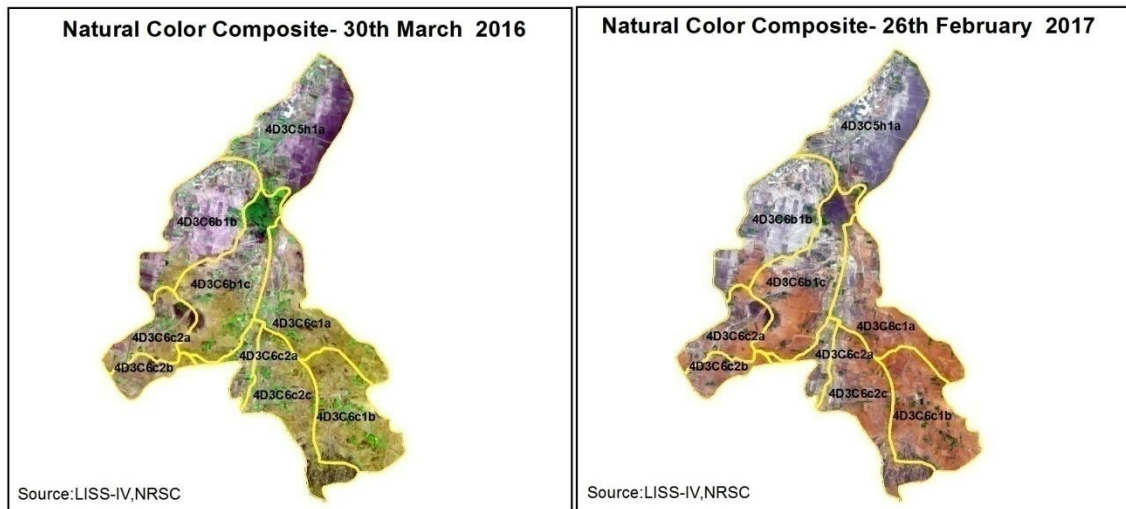
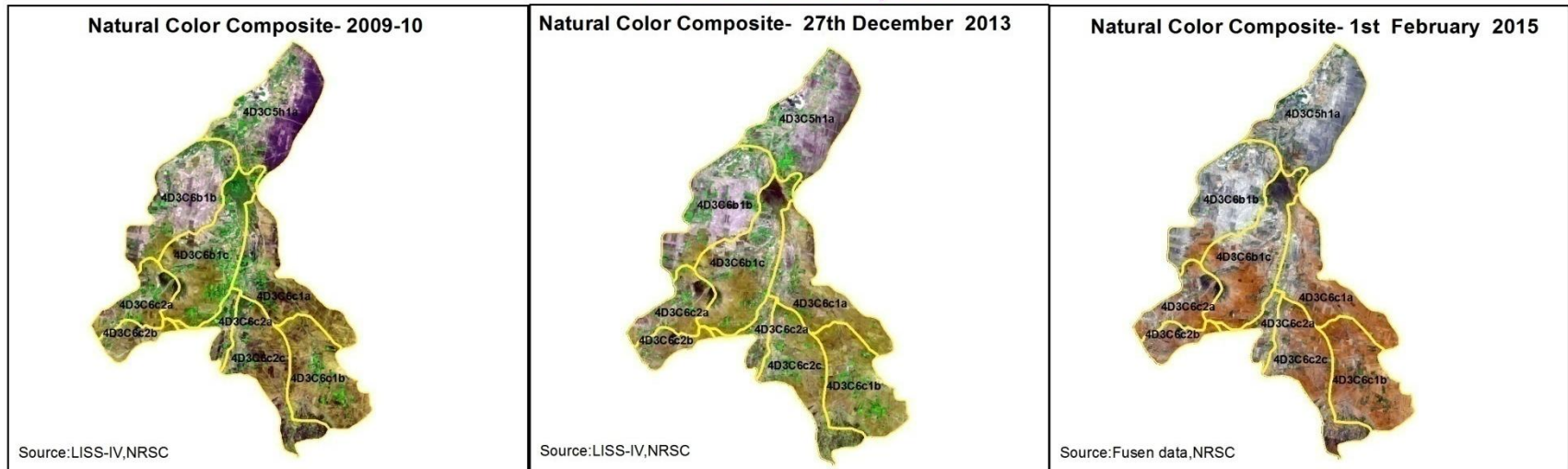
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	0	0
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	9	9
11	Check dams	10	10
12	Nallah Bunds/Drainage treatment	0	0
13	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	2	2
	TOTAL	21	21

MONITORING IN THE PROJECT AREA

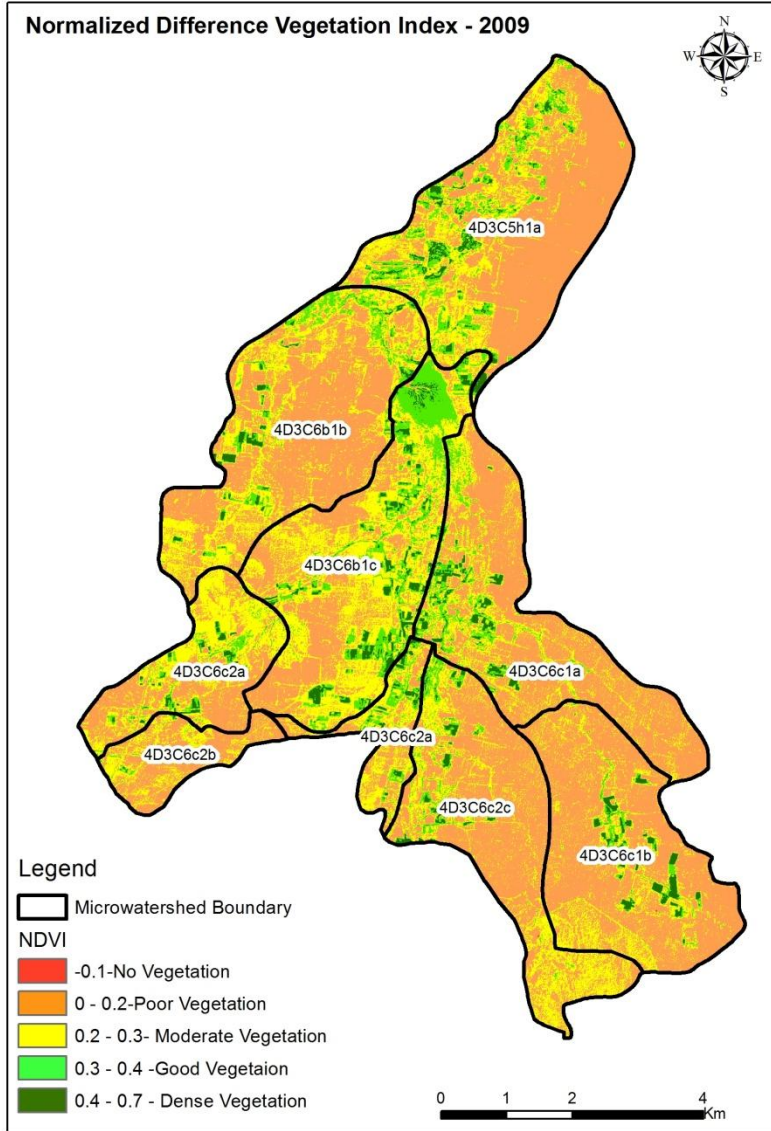
Site Wise Changes in the Project

- 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.

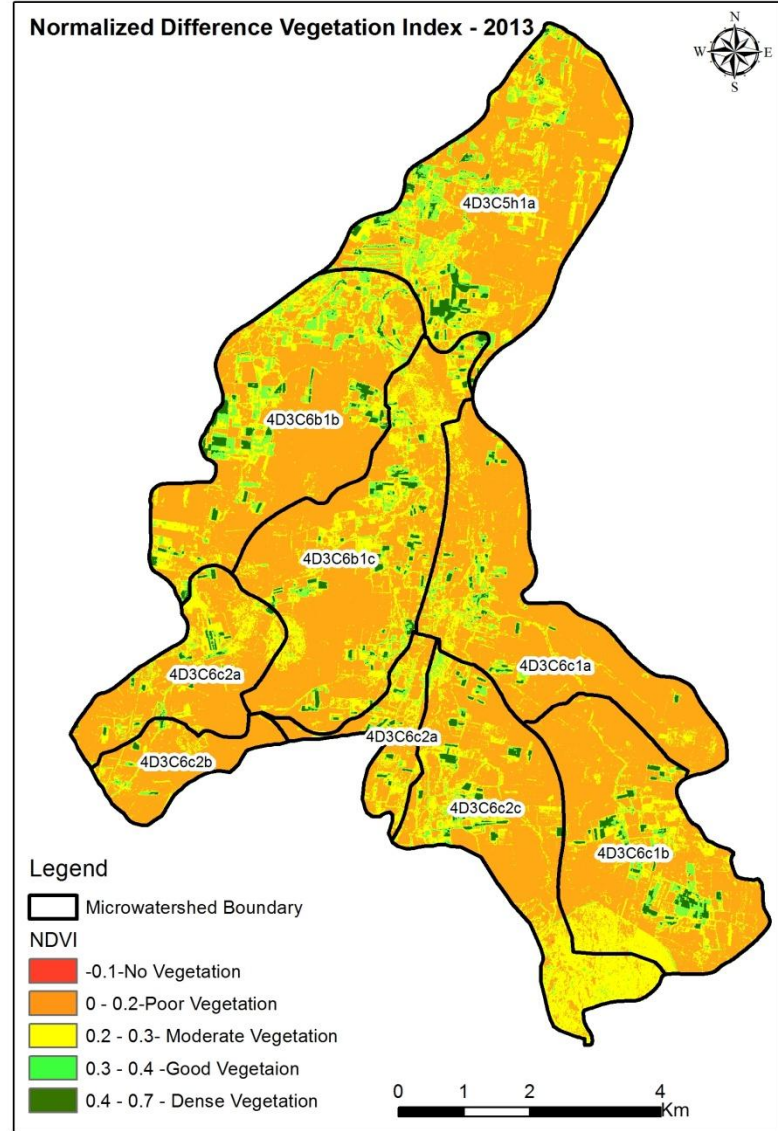
Natural Color Composite – 2009-10 to 2017-18



Changes in Vegetation Cover

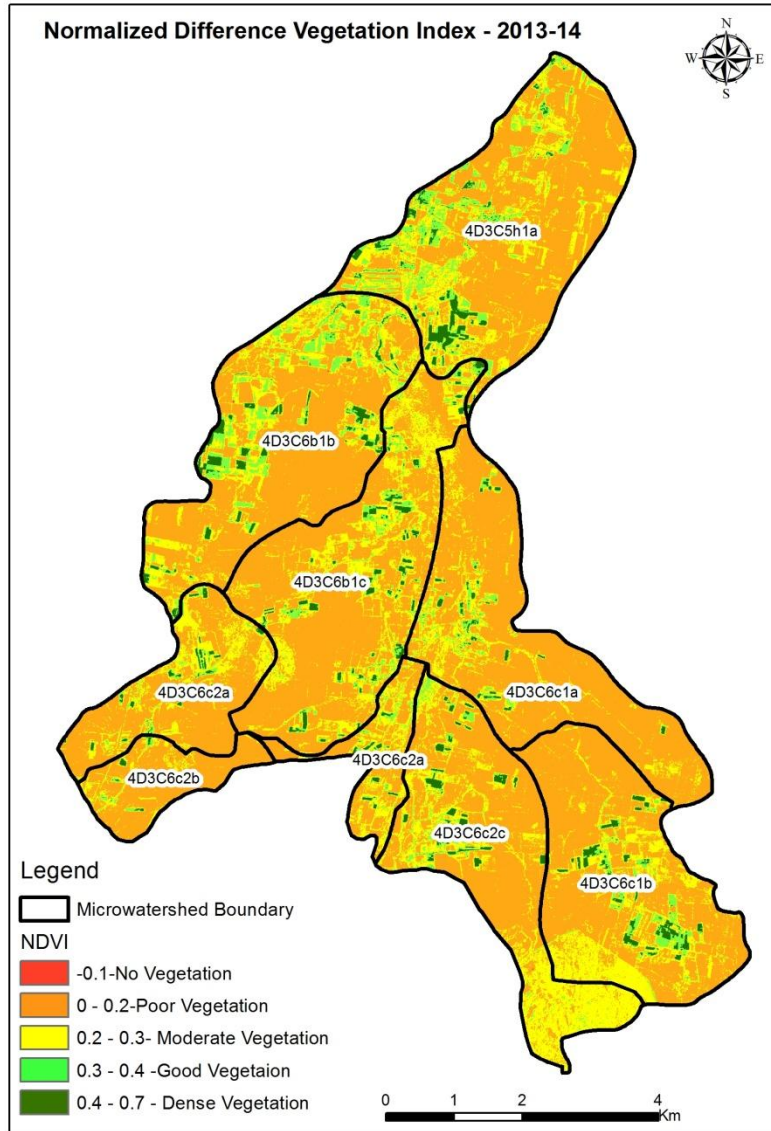


NDVI (2009-10)

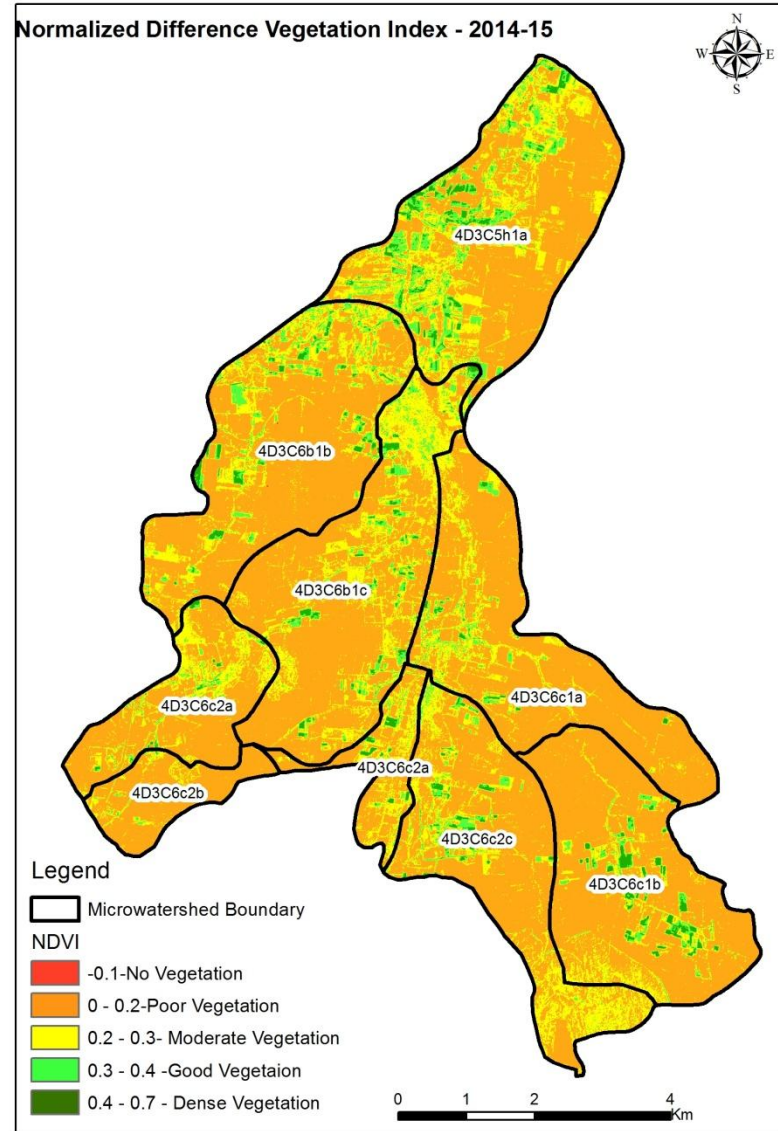


NDVI (12 October 2015)

Changes in Vegetation Cover

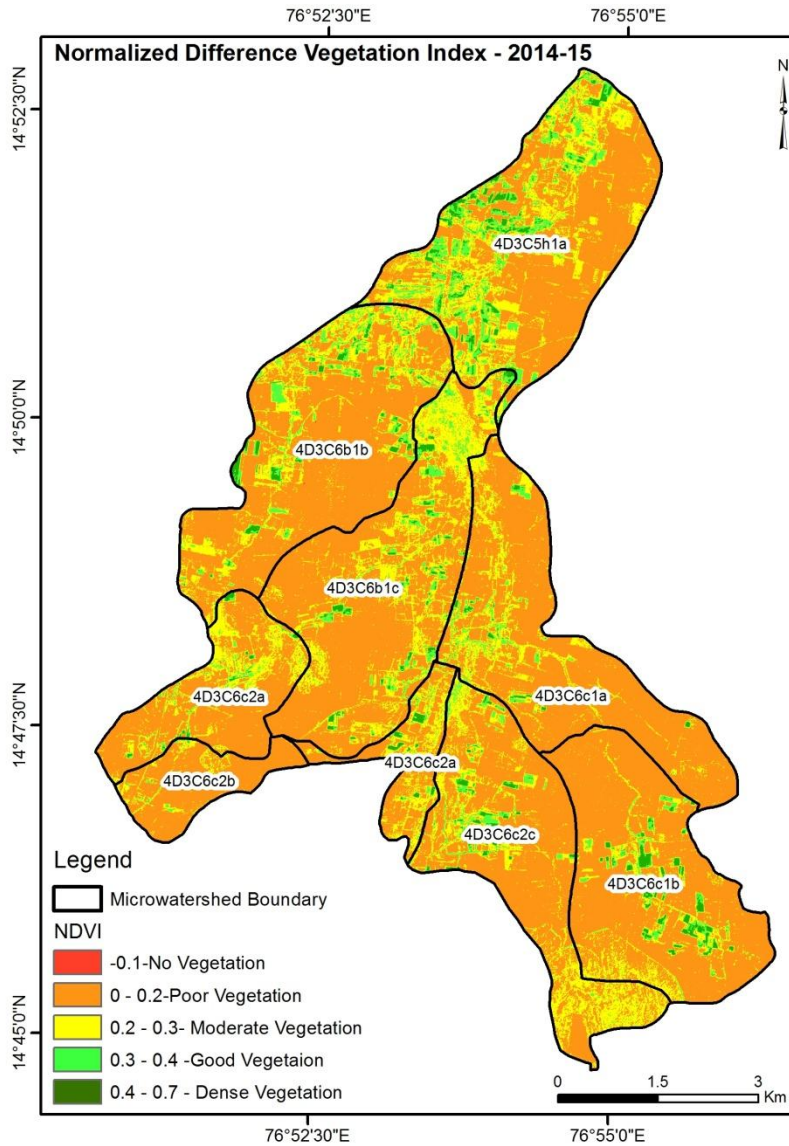


NDVI (2013-14)

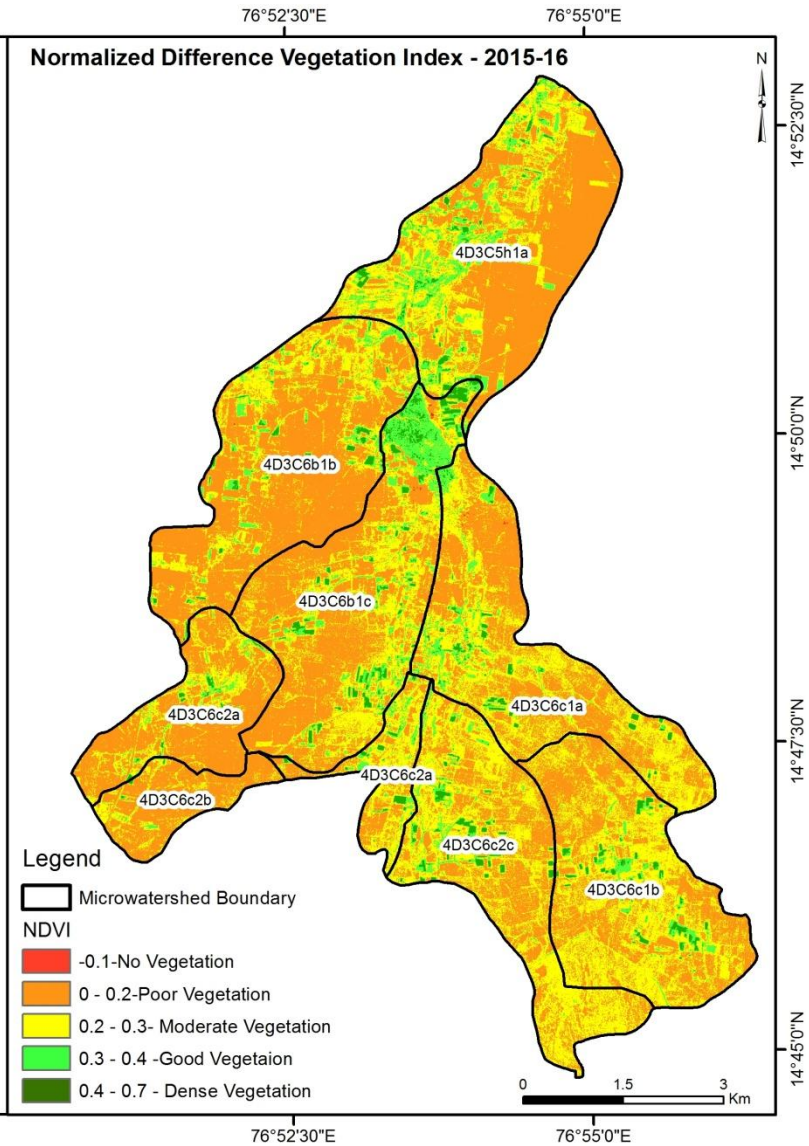


NDVI (1 February 2015)

Changes in Vegetation Cover



NDVI (2014-15)



NDVI (1 February 2016)

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-14/2009-10



T0

T0:2009-10



T1

T1: 27 December 2013

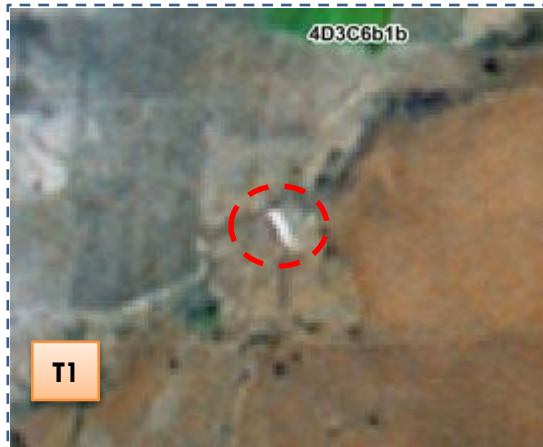


Drishti Sl no. 575851 MWS :4D3C6c2a

Farm pond



T0:2009-10



T1

T1: 27 December 2013



Drishti Sl no.126645 MWS : 4D3C6b1b

Checkdam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-14/2009-10



T0: 2009-10



T1: 27 December 2013



Drishti Sl no. 12082016 MWS :4D3C6b1b

Check wall



T0: 2009-10



T1: 27 December 2013



Drishti Sl no. 126065 MWS :4D3C6c2a

Check wall

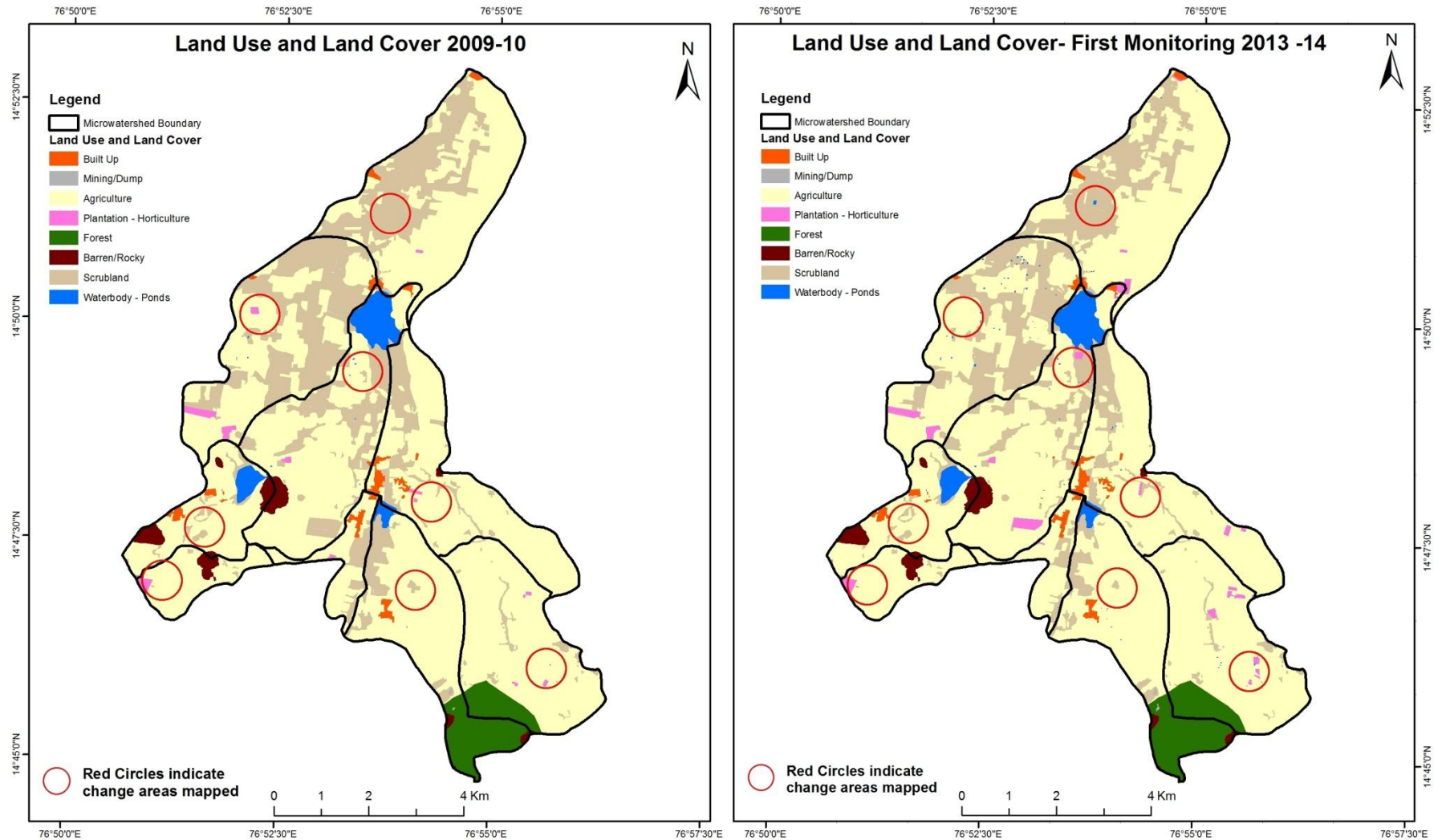
MONITORING IN THE PROJECT AREA

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) .

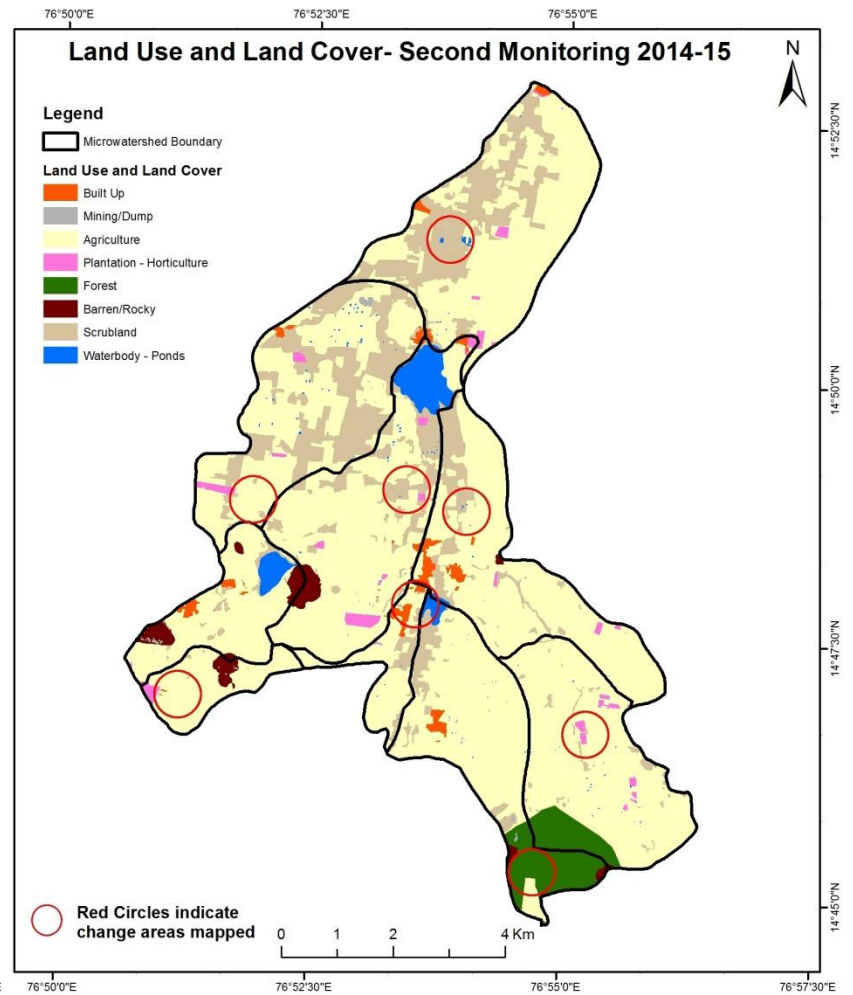
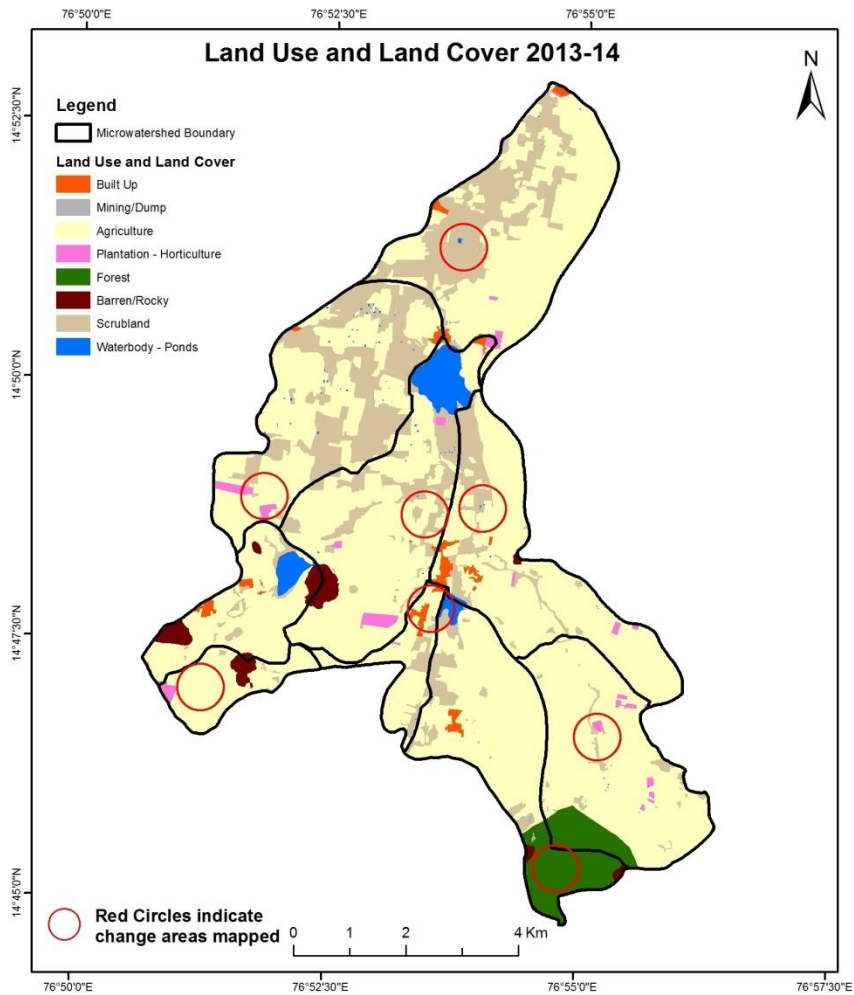
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



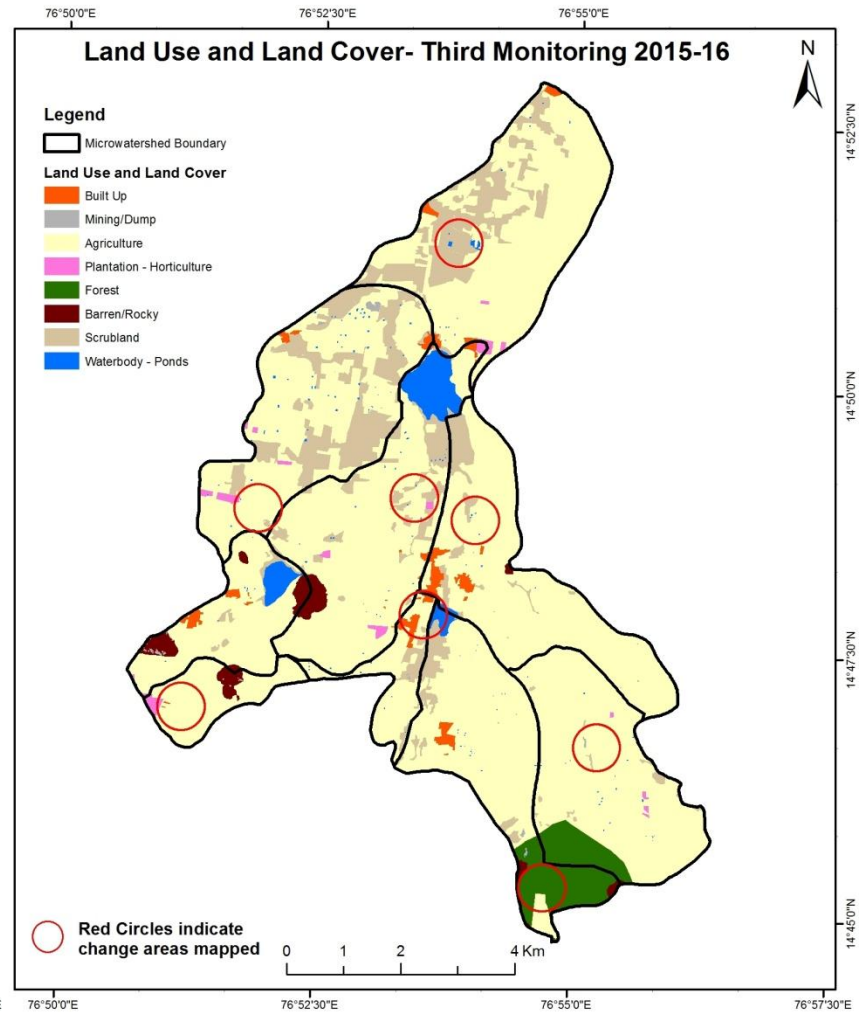
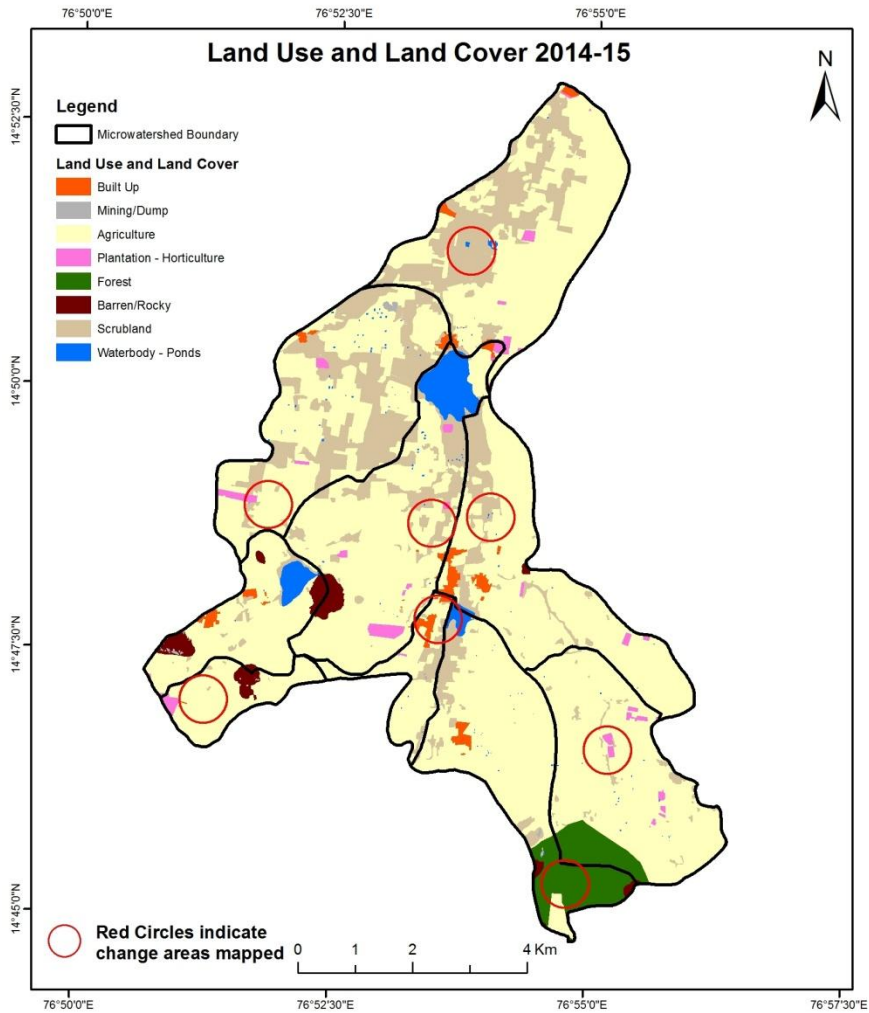
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

Scale: 1:10000



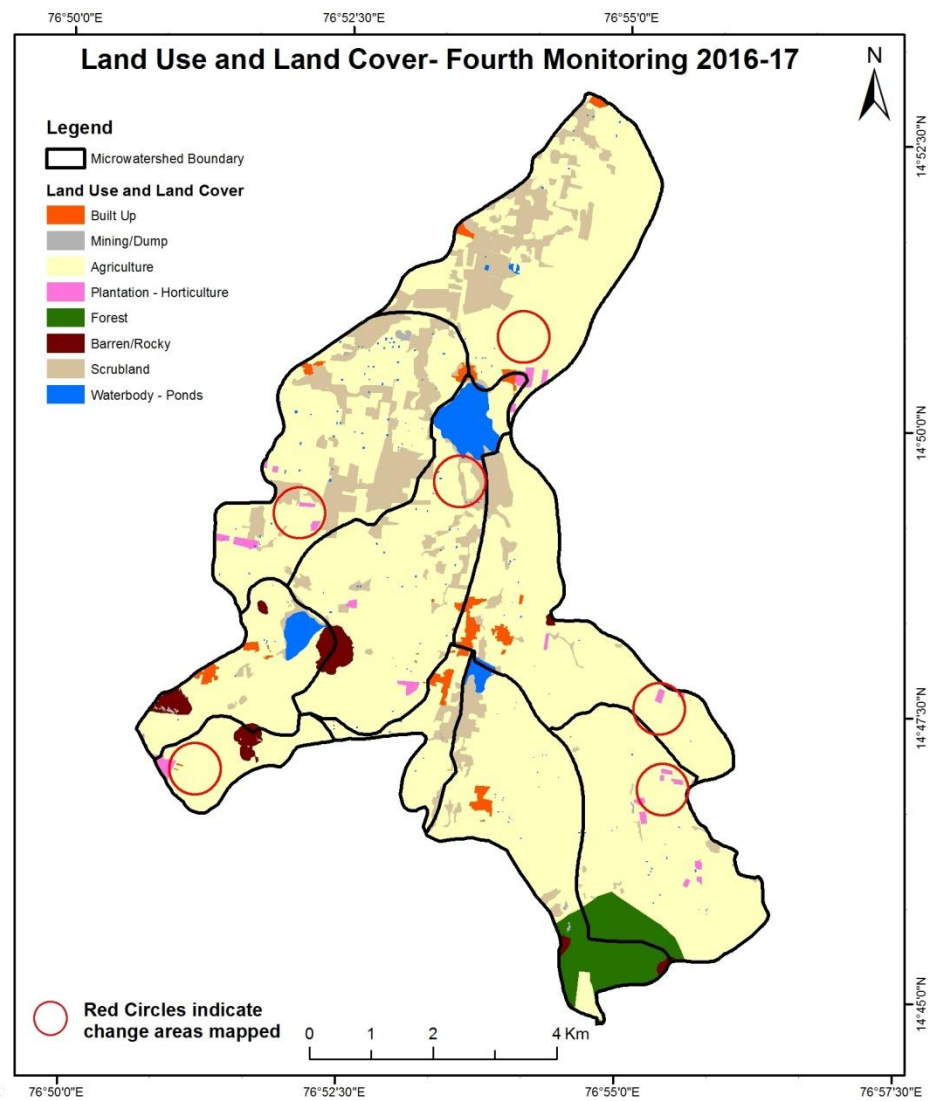
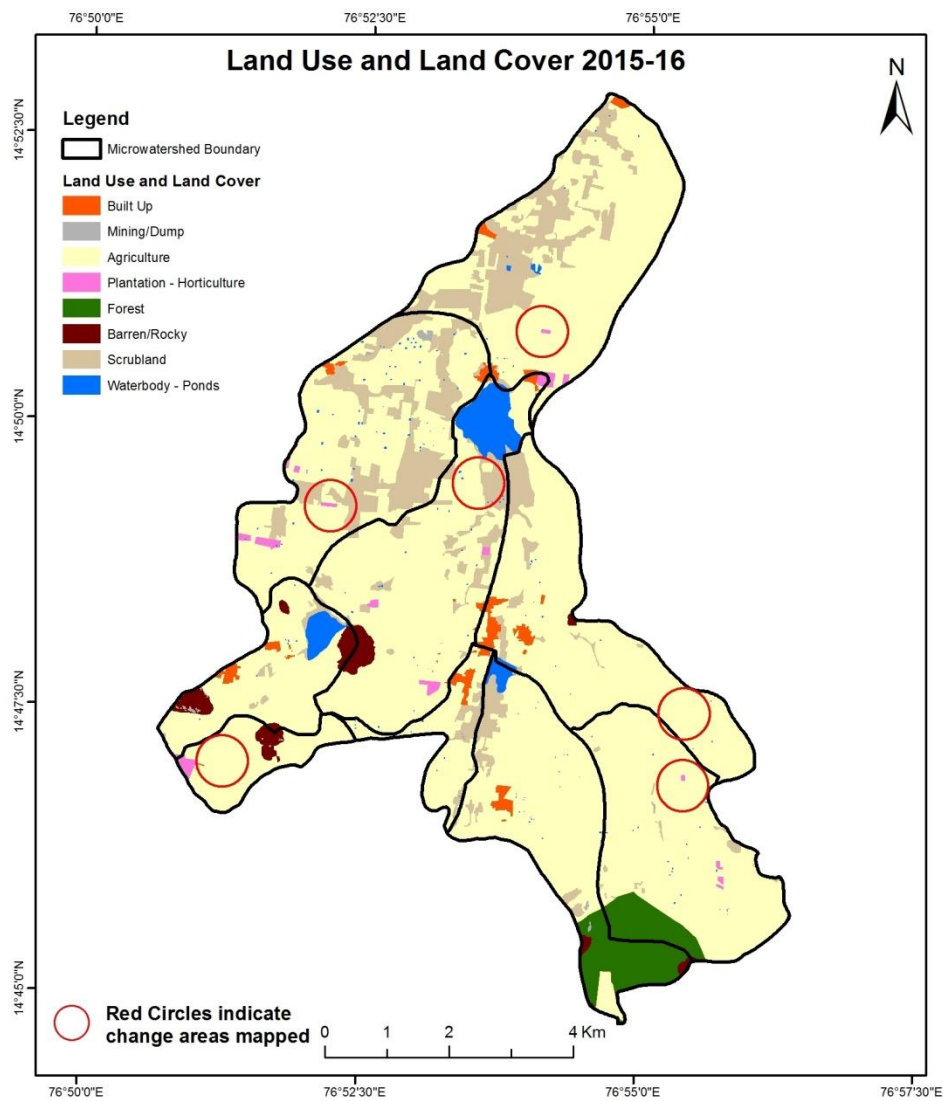
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



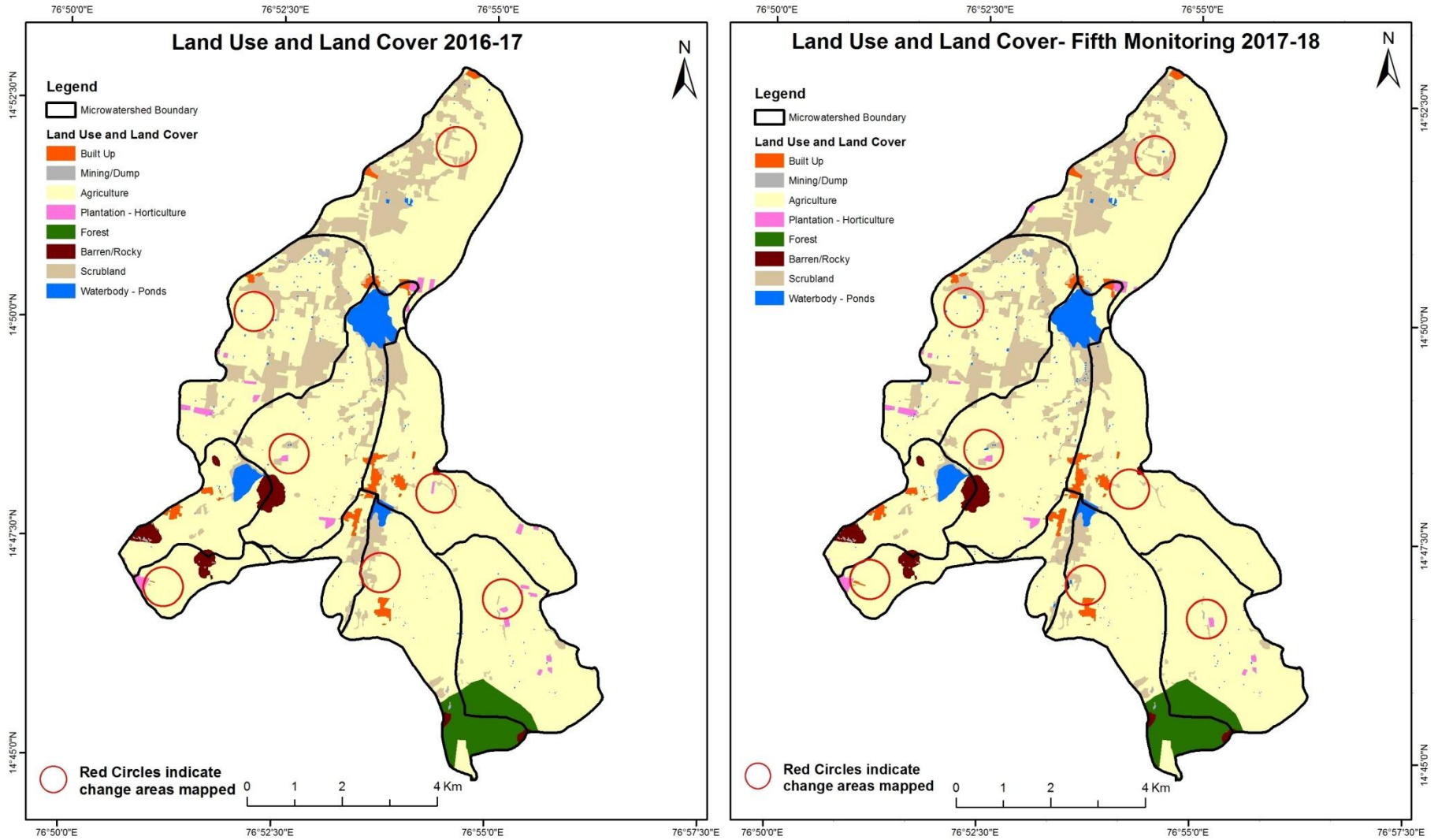
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

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

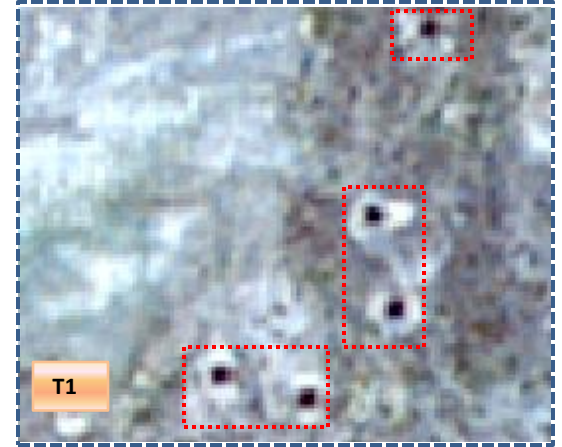


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to water body

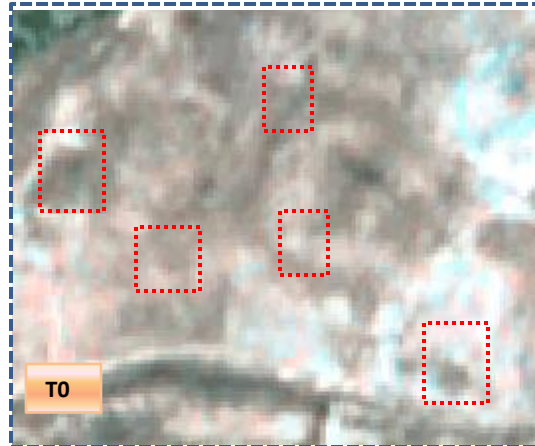


T0: 2009-10

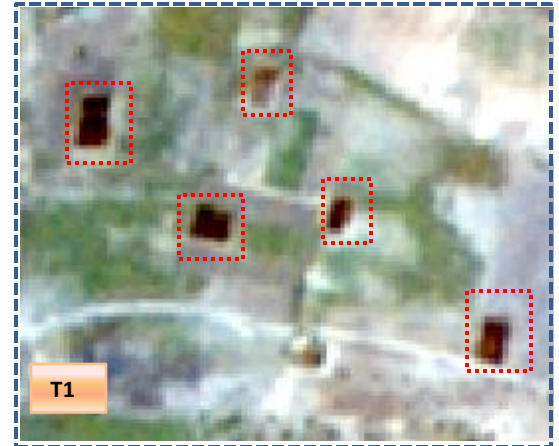


T1: 27 December 2013

Scrub to water body



T0: 2009-10



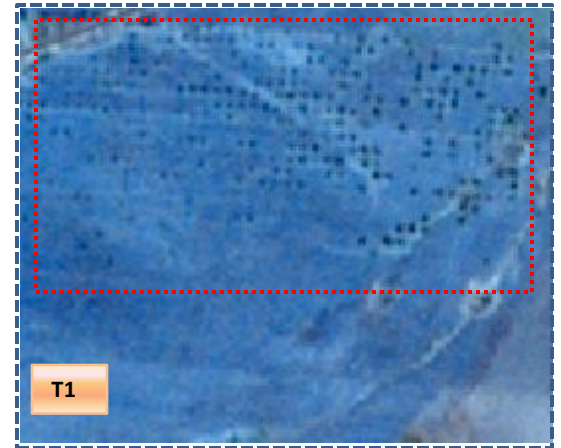
T1: 27 December 2013

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

Scrub to Plantations

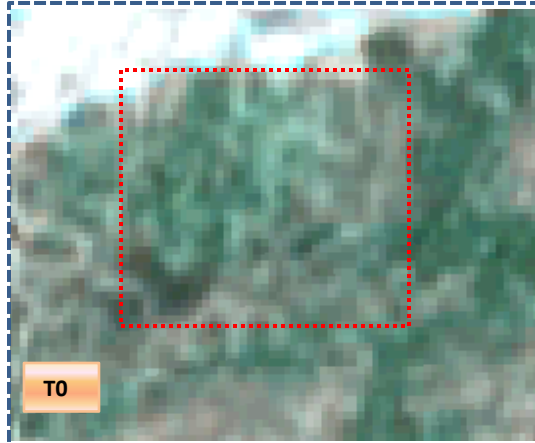


T0: 2009-10

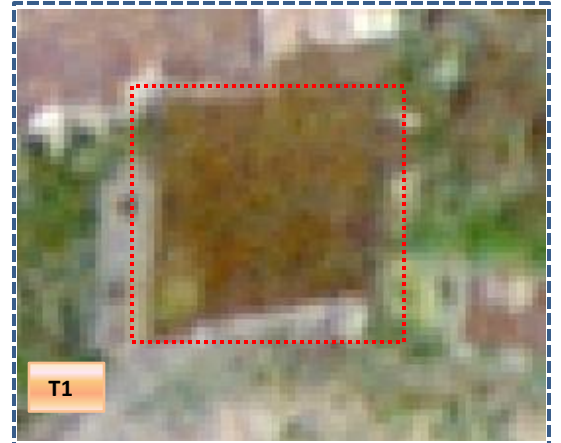


T1: 27 December 2013

Scrub to Agriculture



T0: 2009-10



T1: 27 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	70.22												70.22
Mining/dump		1.06											1.06
Agriculture	0.83		4249.79	26.17				20.91			1.49		4299.19
Plantation Horticulture			8.31	28.91									37.22
Forest		0.32			238.54								238.86
Forest Plantation													
Barren Rocky							88.21						88.21
Scrub	1.13		233.54	15.61				1177.46			2.73		1430.47
Waterbody- Streams/River													
Waterbody – Ponds											127.89		127.89
Grand Total	72.18	1.38	4491.64	70.68	238.54		88.21	1198.37			132.11		6293.12

- 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 49.40 ha of the agriculture area has decreased and it is converted into built up, plantation, scrubland and water body in T1.
- In T1 241.85 ha of the 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
T1													
Built up	72.18												72.18
Mining/dump		1.30									0.08		1.38
Agriculture	9.56	3.51	4371.27	12.75				90.84			3.71		4491.64
Plantation Horticulture			7.74	62.94									70.68
Forest			20.48		218.06								238.54
Forest Plantation													
Barren Rocky		2.47					85.74						88.21
Scrub	2.92	0.36	168.27	1.50				1025.32					1198.37
Waterbody- Streams/River													
Waterbody – Ponds											132.11		132.11
Grand Total	84.67	7.64	4567.76	77.19	218.06		85.74	1116.16			135.91		6293.12

- 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 120.37 ha of the agriculture area has decreased and it is converted into built up, mining/dump, plantation, scrubland and water body in T2.
- In T2 196.49 ha of the agriculture area has 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- 2014-15 to 2015-16

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	84.67												84.67
Mining/dump		7.64											7.64
Agriculture			4561.85	3.03				0.61			2.26		4567.76
Plantation Horticulture			39.97	37.11							0.10		77.19
Forest					218.06								218.06
Forest Plantation													
Barren Rocky							85.74						85.74
Scrub	1.08	1.16	311.61					801.47			0.84		1116.16
Waterbody- Streams/River													
Waterbody – Ponds			0.76								135.15		135.91
Grand Total	85.75	8.80	4914.19	40.15	218.06		85.74	802.08			138.35		6293.12

- 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 5.91 ha of the agriculture area has decreased and it is converted into plantation, scrubland and water body in T3.
- In T3 352.34 ha of the agriculture area has 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- 2015-16 to 2016-17

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		
Built up	85.75												85.75
Mining/dump		8.80											8.80
Agriculture	0.11		4892.84	17.43				2.82			1.00		4914.19
Plantation Horticulture			2.87	37.28									40.15
Forest					218.06								218.06
Forest Plantation													
Barren Rocky							85.74						85.74
Scrub			15.04					786.87			0.18		802.08
Waterbody- Streams/River													
Waterbody – Ponds											138.35		138.35
Grand Total	85.86	8.80	4910.74	54.71	218.06		85.74	789.68			139.52		6293.12

- 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 21.35 ha of the agriculture area has decreased and it is converted into built up, plantation, scrubland and water body in T4.
- In T4 17.91 ha of the agriculture area has 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- 2016-17 to 2017-18

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	85.86										85.86	
Mining/dump		8.80									8.80	
Agriculture	2.69		4903.44	1.53						3.08	4910.74	
Plantation Horticulture			15.59	39.12							54.71	
Forest					218.06						218.06	
Forest Plantation												
Barren Rocky							85.74				85.74	
Scrub	0.09	0.41	15.17					771.99		2.02	789.68	
Waterbody- Streams/River												
Waterbody – Ponds			0.22							139.30	139.52	
Grand Total	88.64	9.21	4934.43	40.64	218.06		85.74	771.99		144.41	6293.12	

- 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 7.30 ha of the agriculture area has decreased and it is converted into built up, plantation and water body in T5.
- In T5 30.99 ha of the agriculture area has 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 16.51 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 192.45, 76.12, 346.43 & 23.68 Hectares From T0-T1, T1-T2, T2-T3 & T4-T5 respectively and overall increase of 638.68 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 658.48 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
6. Farm ponds (9) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (9) verified from the portal.