

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

KURNOOL -11/2009-10
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

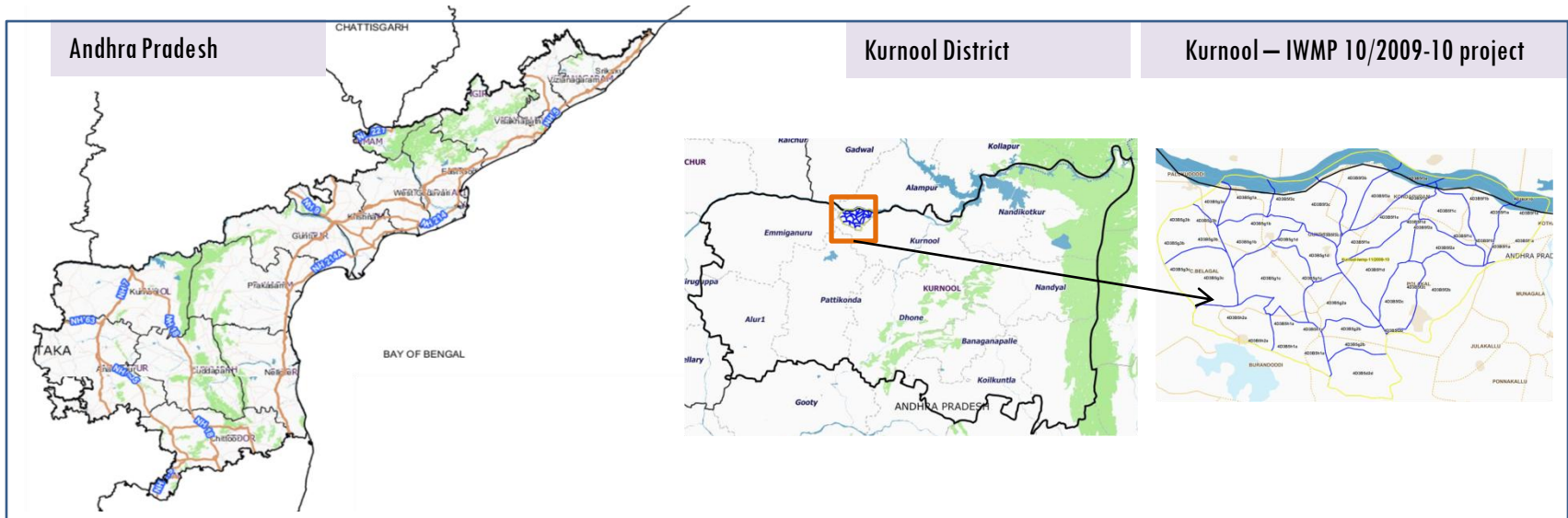
E X E C U T I V E S U M M A R Y

- 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-11/2009-10, Kurnool District of Andhra Pradesh. The total geographical area of the project is 11,690 ha. It comprises of 23 micro watersheds.
- In the project area 129 Drishti photos were uploaded showing 33 civil works of check dams/Rock fill dam, 15 Farm ponds, 56 drainage treatment structures and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 15 new farm ponds or dug out pits with 13.46 ha increase in the area.
- Major percentage i.e. 82.62% is covered by the agriculture, 4.98 % is covered by Scrub land, 7.38 % is covered by water bodies and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-10/2009-10

DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in C.Belagal Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 11,690 ha. It comprises of 23 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



- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).
- The average annual rainfall of the district is 665.5mm, which ranges from nil rainfall in January and December to 139.6 mm in September. August and September are the wettest months. The mean seasonal rainfall distribution is 459.1mm in southwest monsoon (June September), 133.7mm in northeast monsoon (Oct-Dec), 1.9 mm rainfall in Winter (Jan Feb) and 70.8 mm in summer (March–May).

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			30-Apr-17
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			30-Apr-17
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	129
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

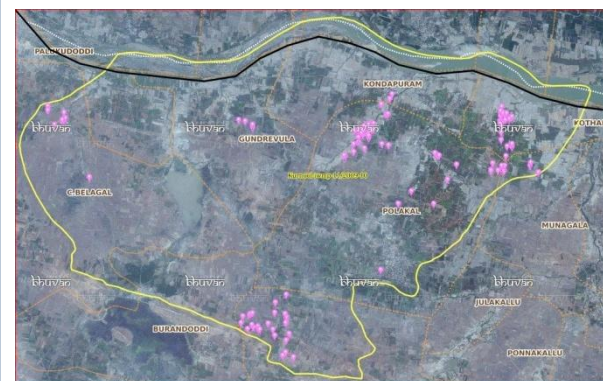


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

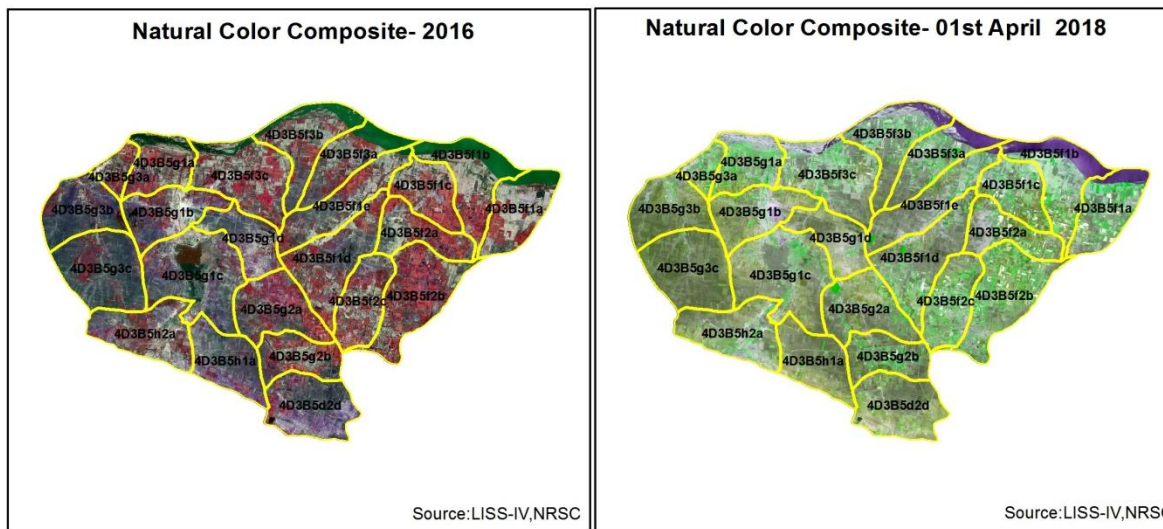
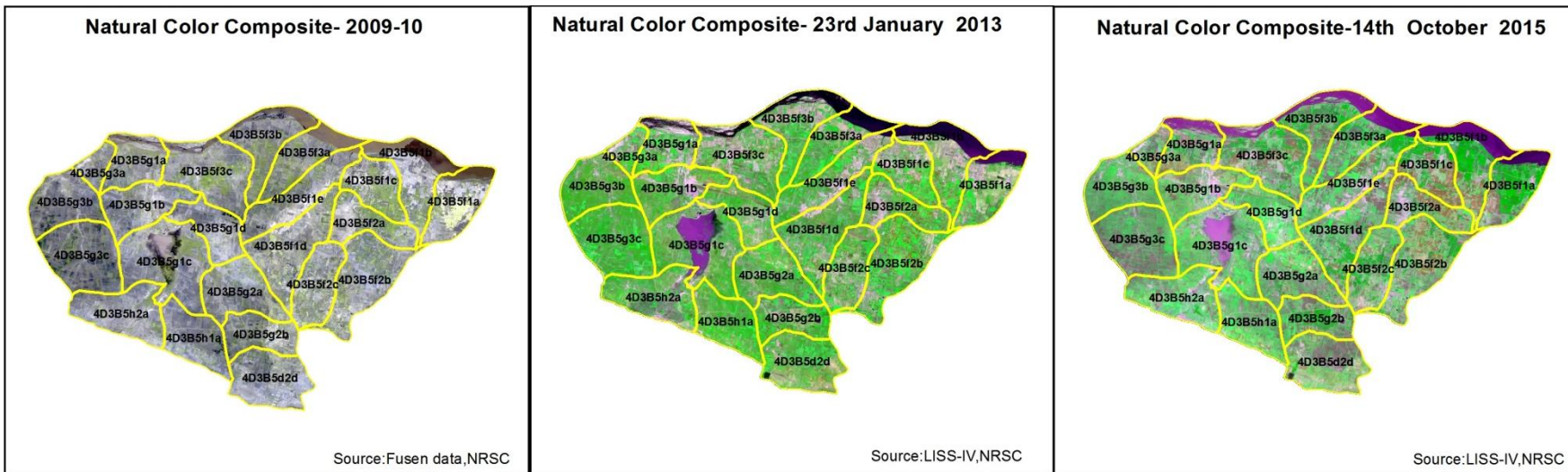
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Blockplanting	0	0
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	0	0
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	18	15
11	Civil works -Check dams/Rock fill dam/Tanks etc.,	40	33
12	Nallah Bunds/Drainage treatment	63	56
13	Water harvesting structures-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	27	25
	TOTAL	148	129

MONITORING IN THE PROJECT AREA

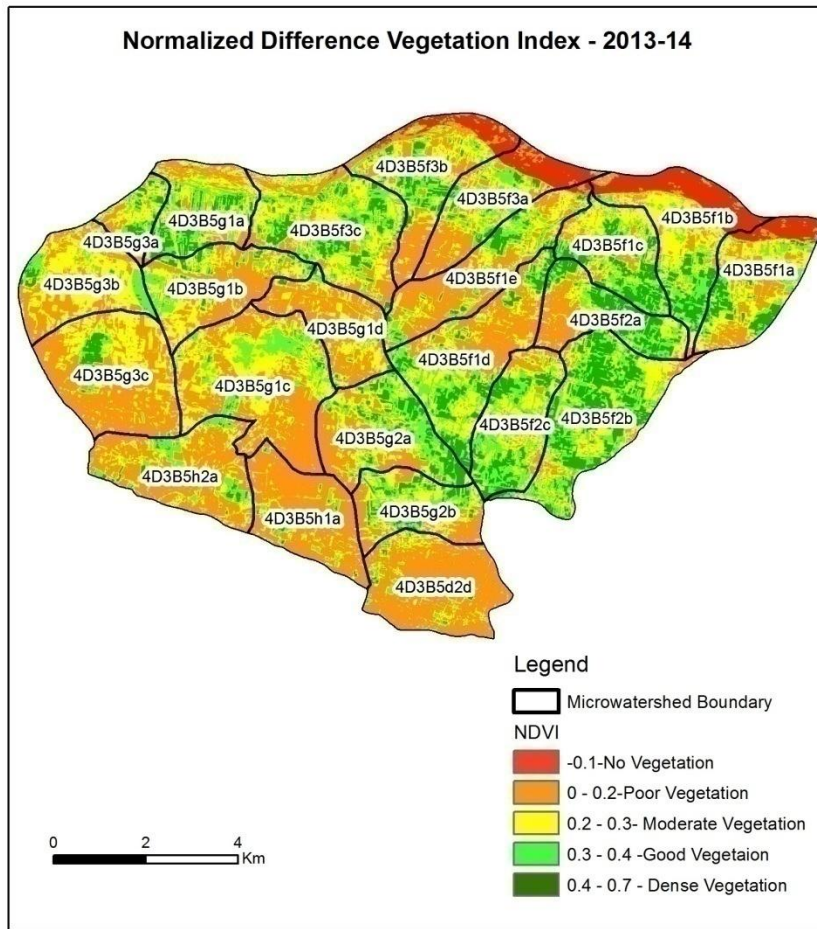
Site Wise Changes in the Project

- 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.

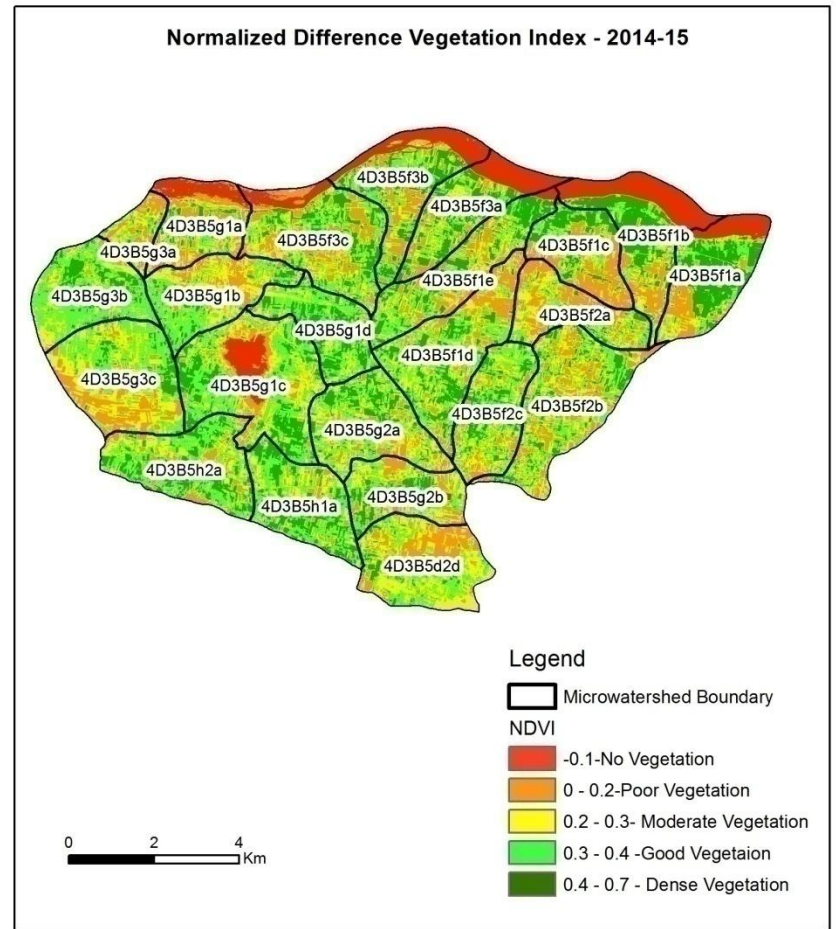
Natural Color Composite – 2009-10 to 2017-18



Changes in Vegetation Cover

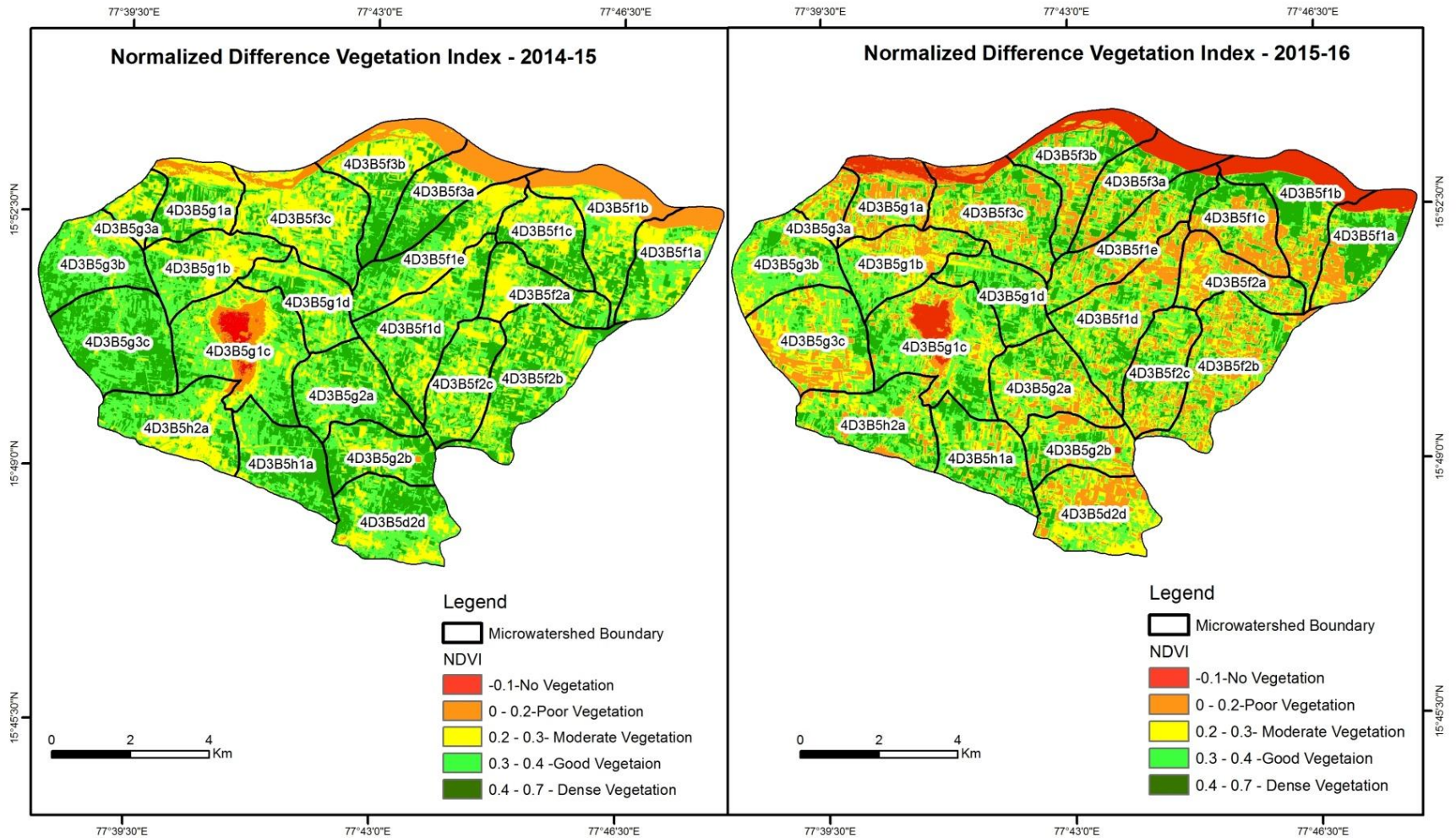


NDVI (2013-14)



NDVI (2014-15)

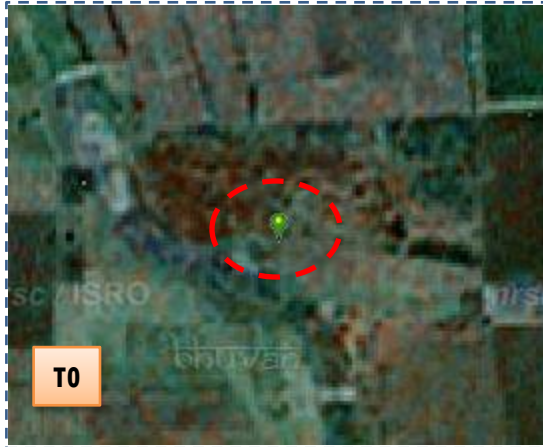
Changes in Vegetation Cover



NDVI (2014-15)

NDVI (2015-16)

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-11/2009-10



T0:2009-10



T1: 4 December 2013



Drishti SI no. 148906 MWS :D3B5g2b

Farm pond



T0:2009-10



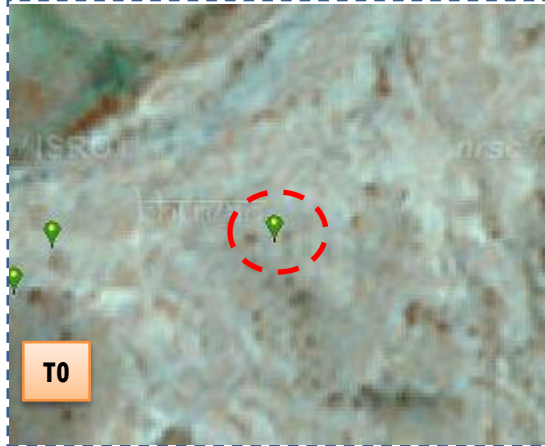
T1: 4 December 2013



Drishti SI no.152069 MWS : 4D3B5f1d

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-11/2009-10



T0: 2009-10

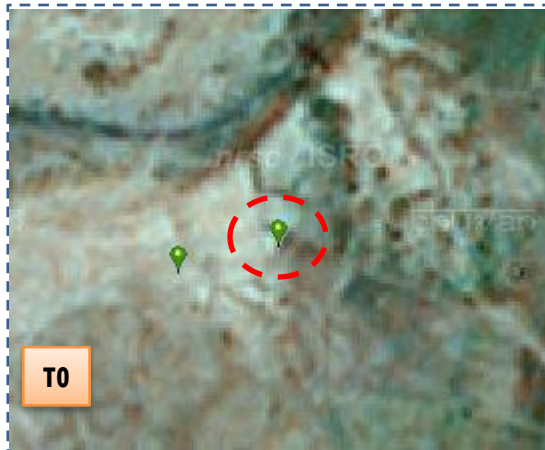


T1: 4 December 2013



Drishti SI no. 152475 MWS :D3B5g2b

Farm pond



T0: 2009-10



T1: 4 December 2013



Drishti SI no. 152536 MWS :4D3B5f1d

Farm pond

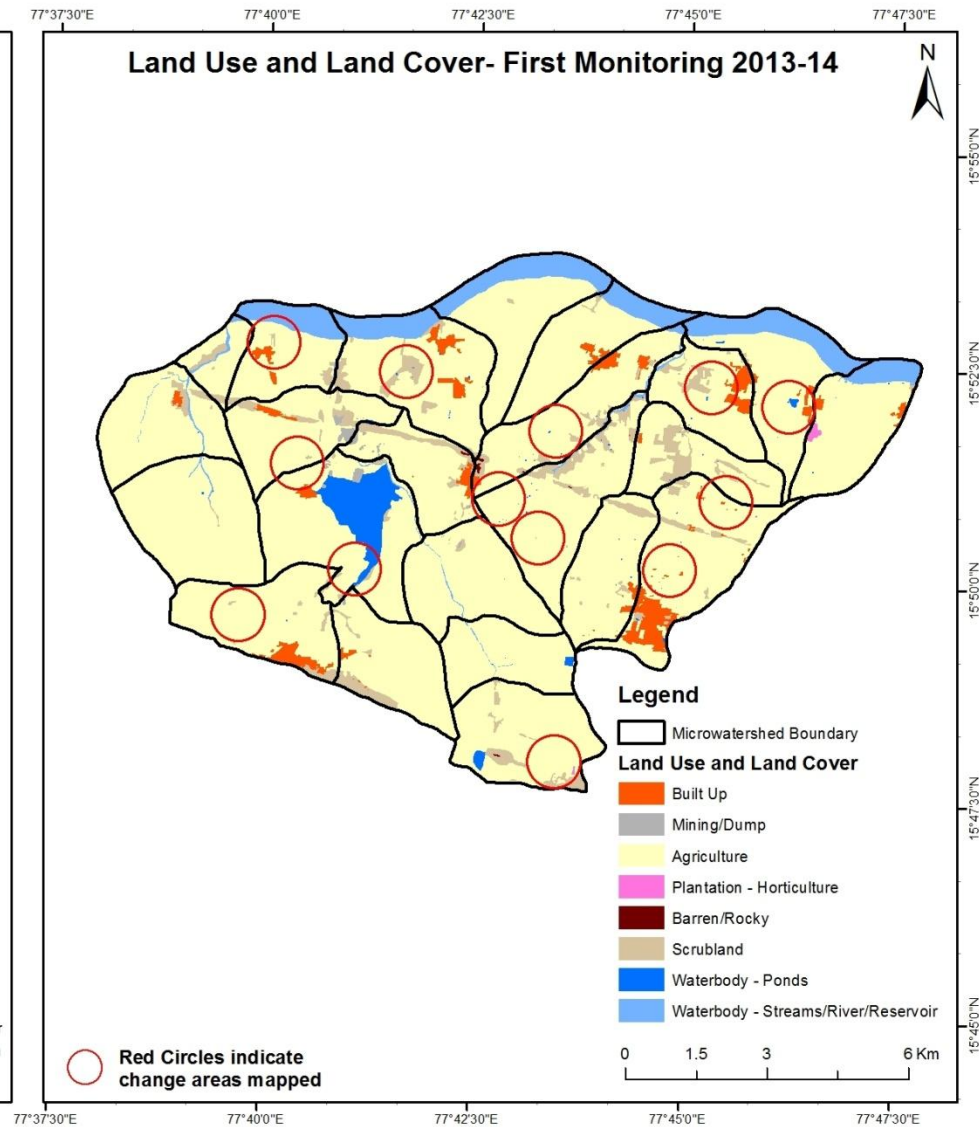
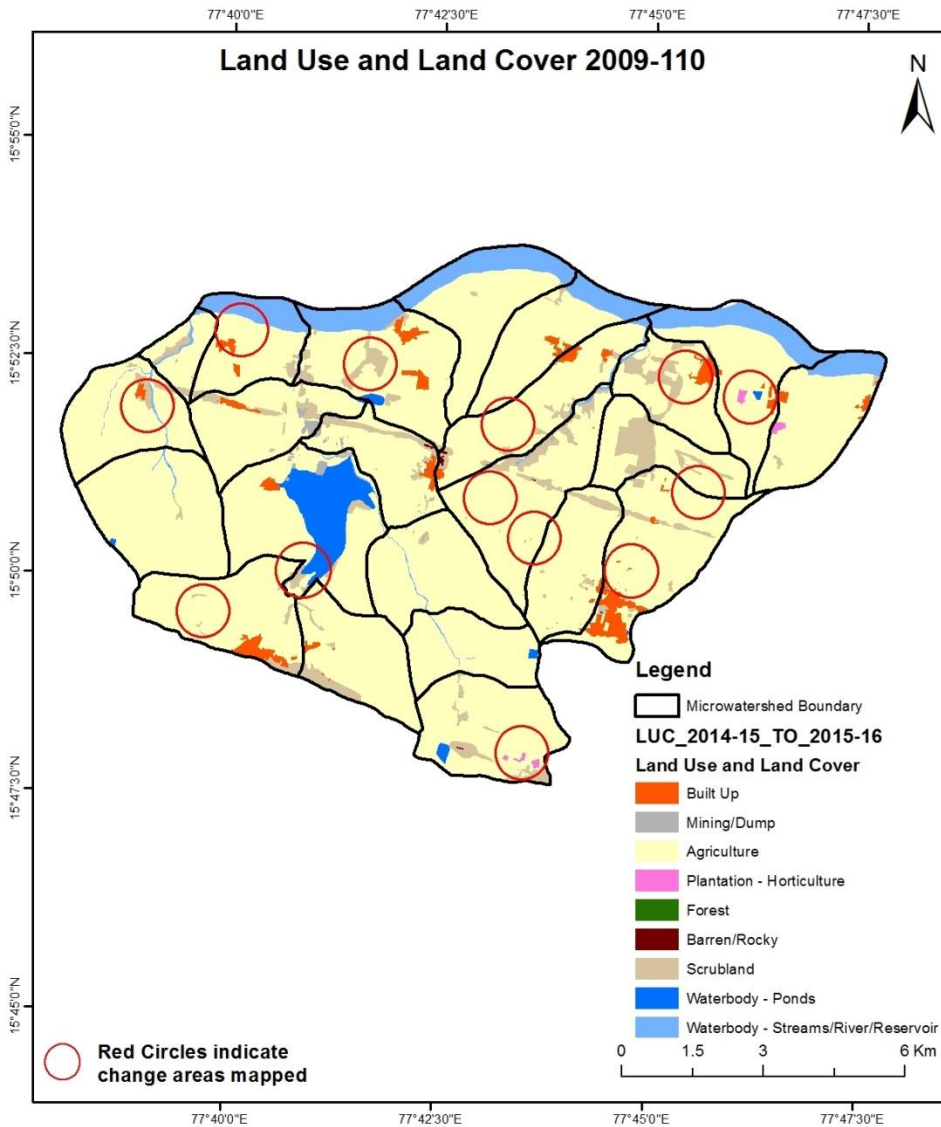
MONITORING IN THE PROJECT AREA

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)

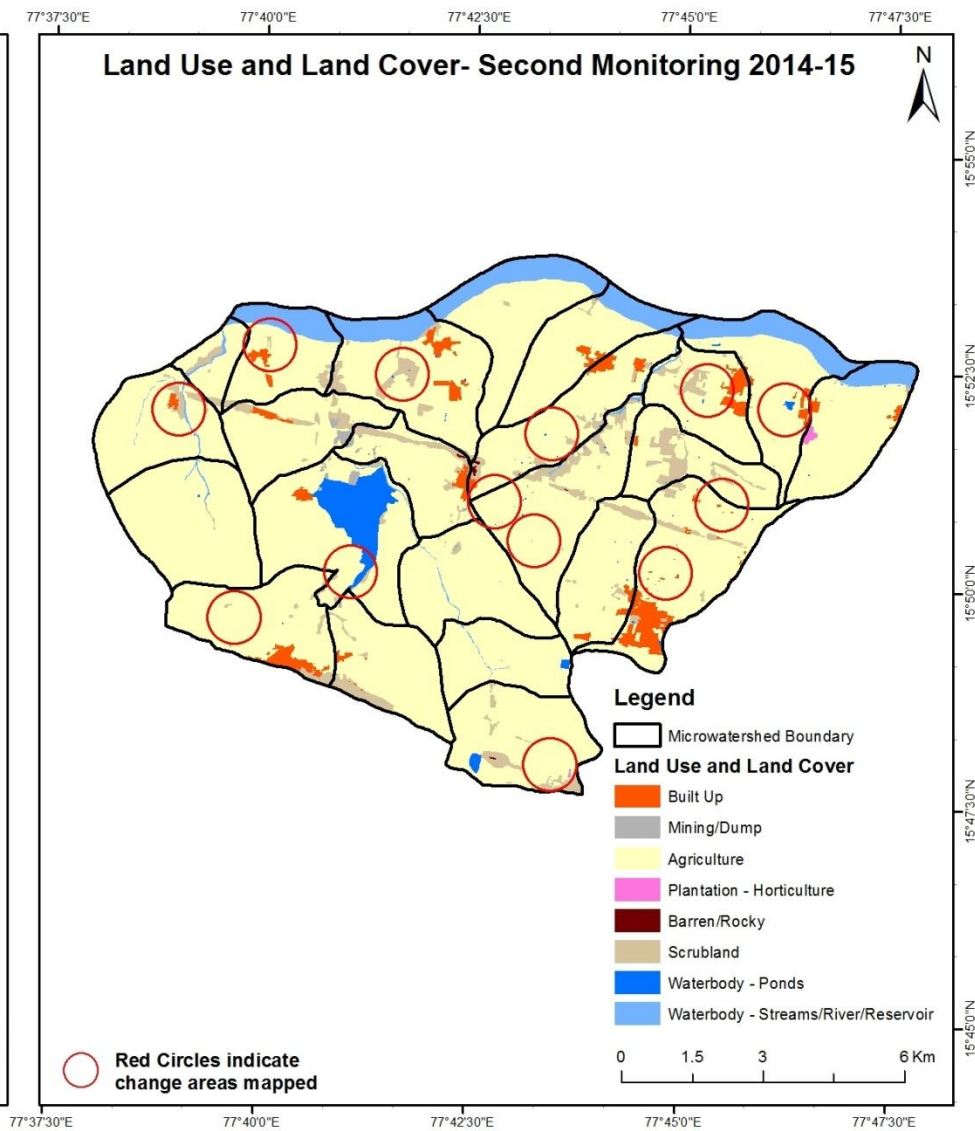
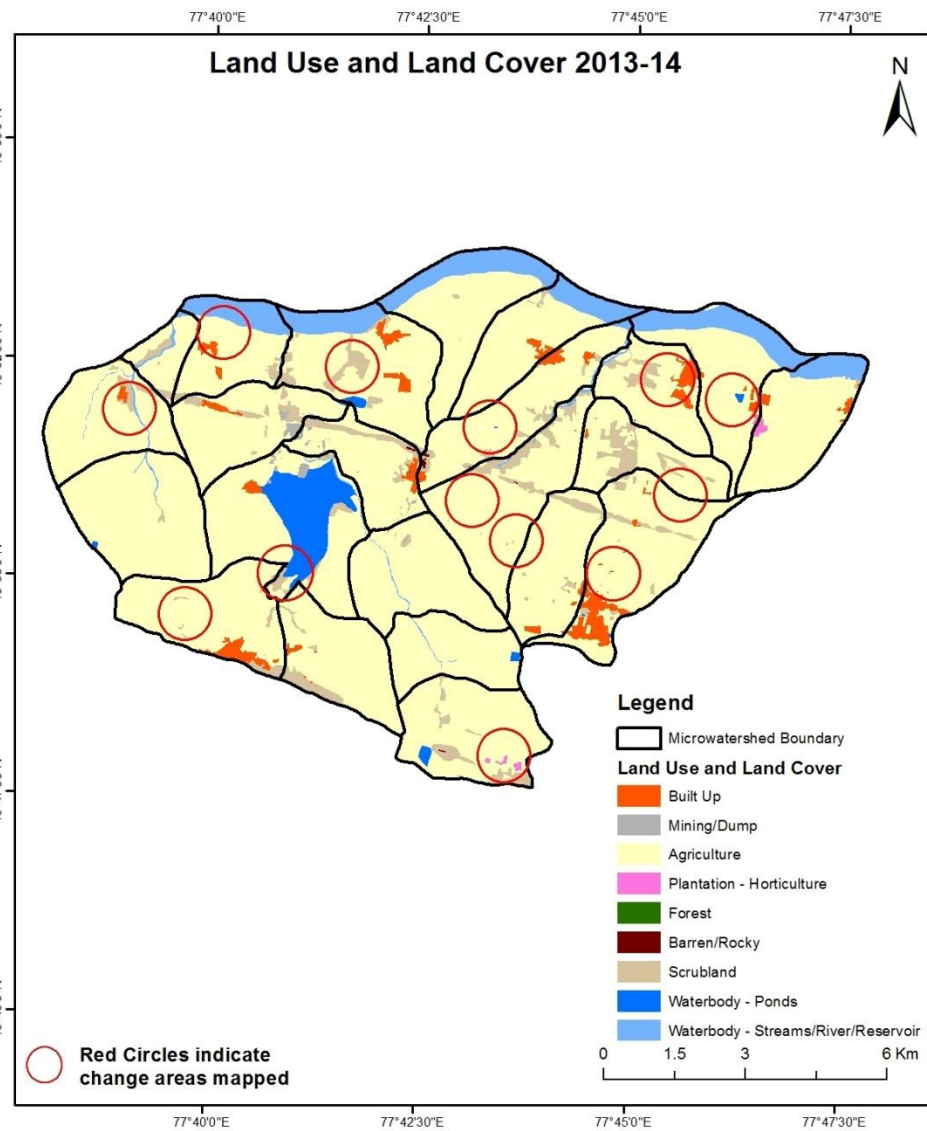
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



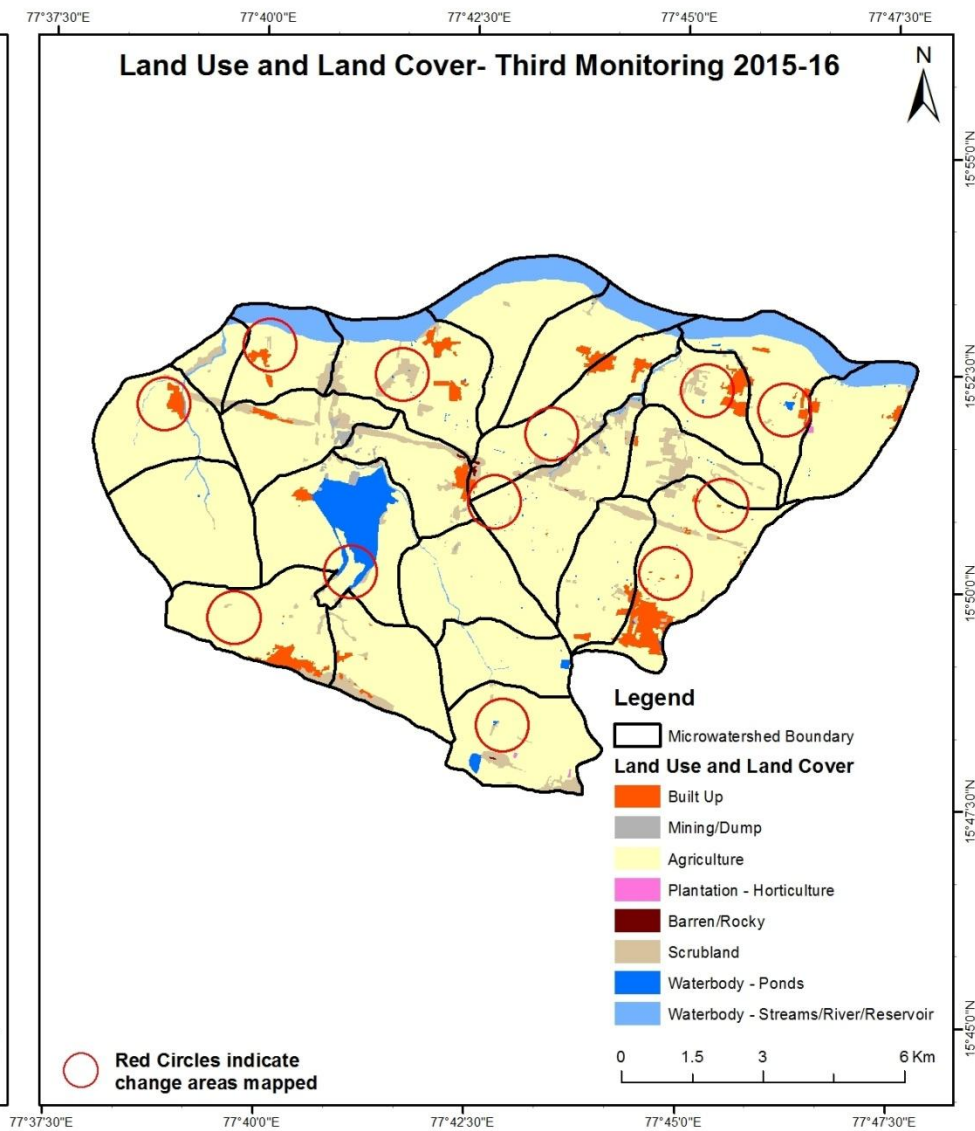
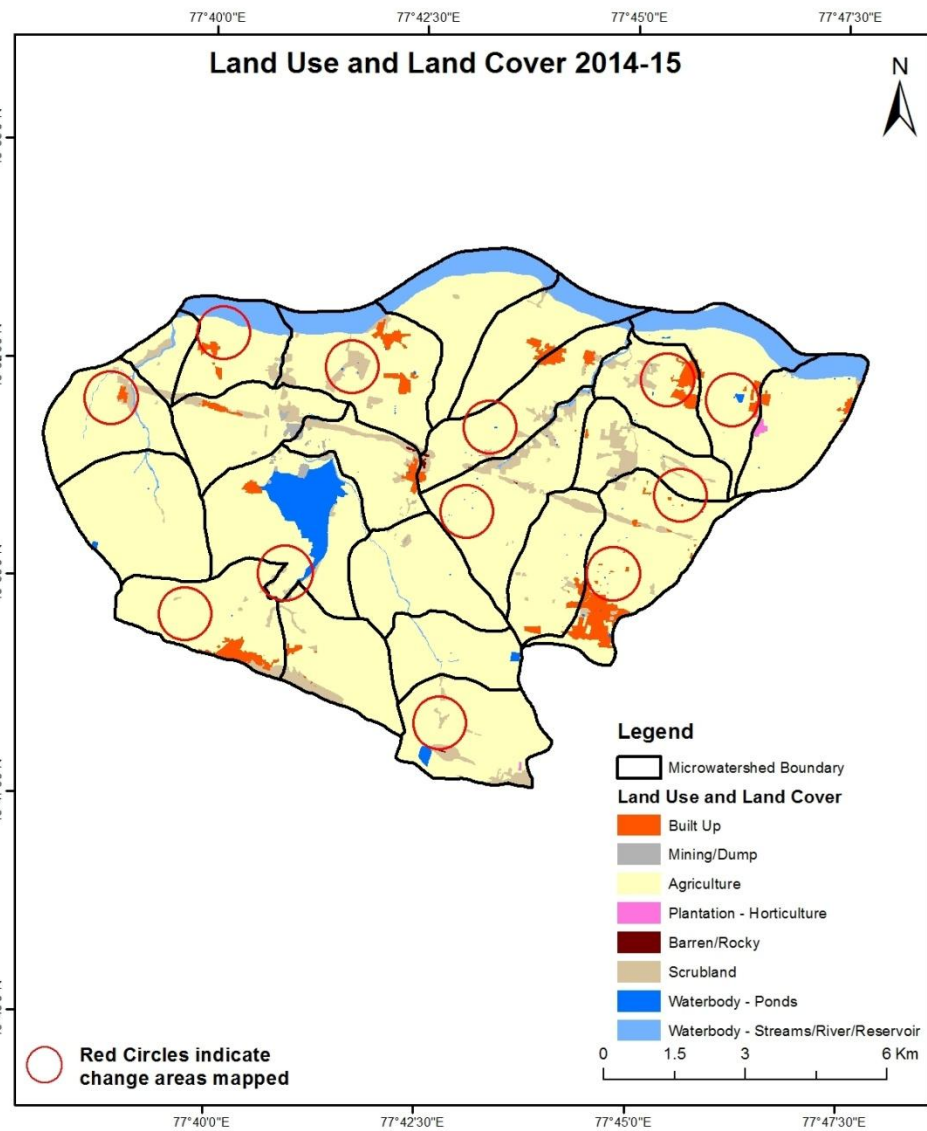
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

Scale: 1:10000



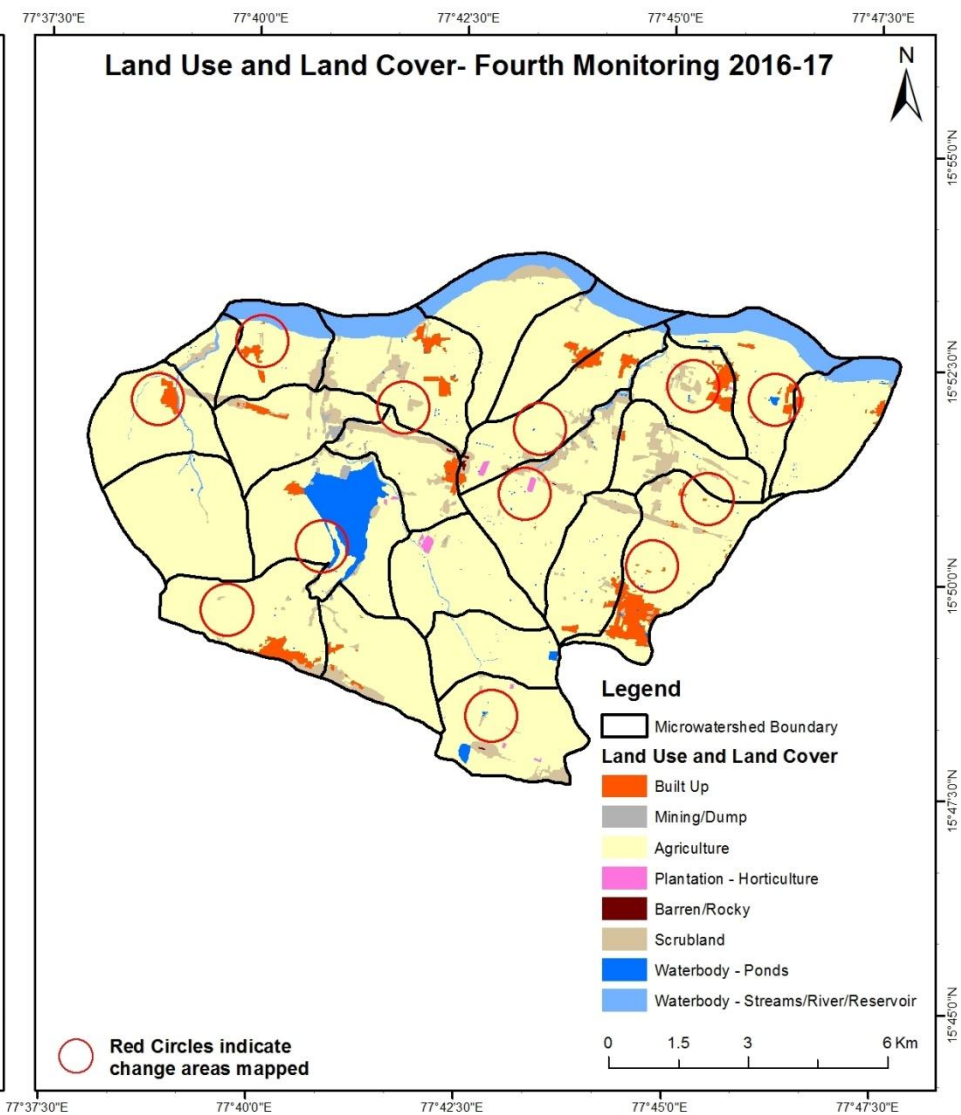
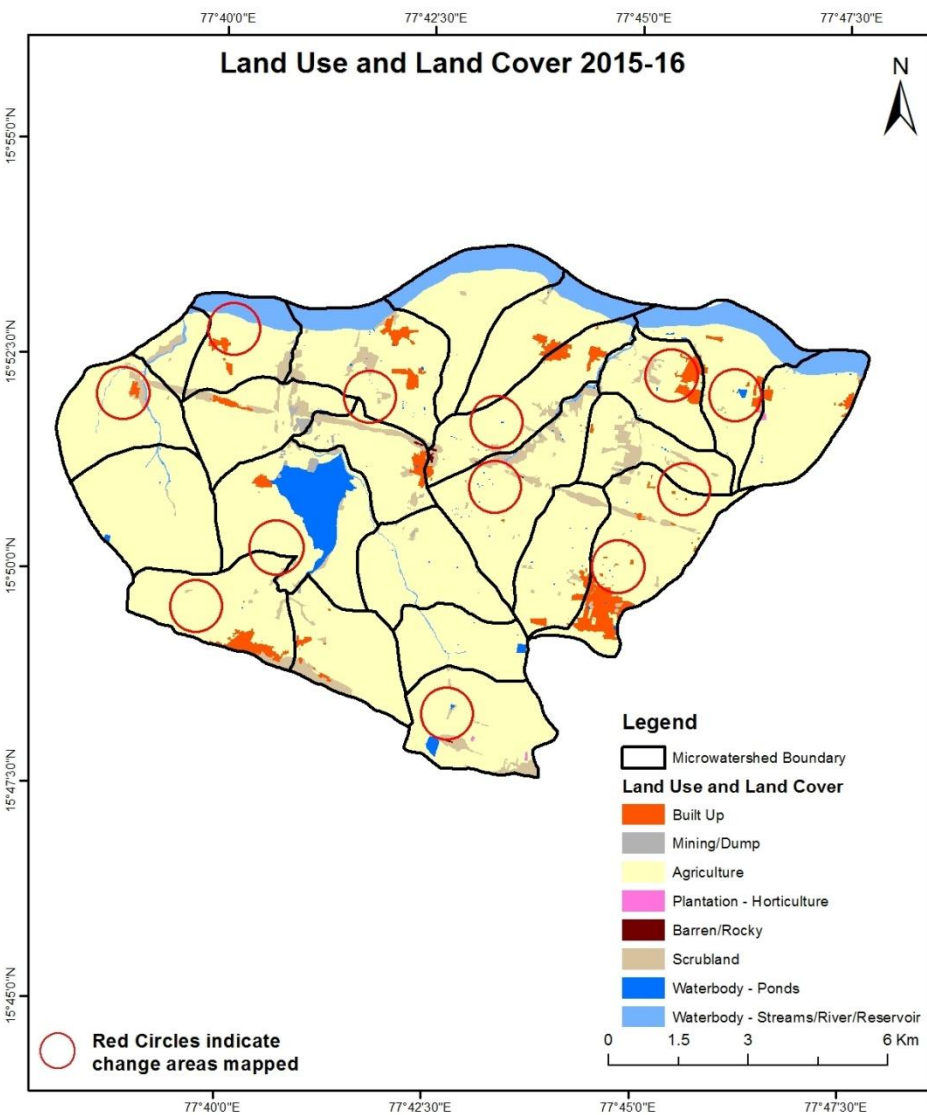
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



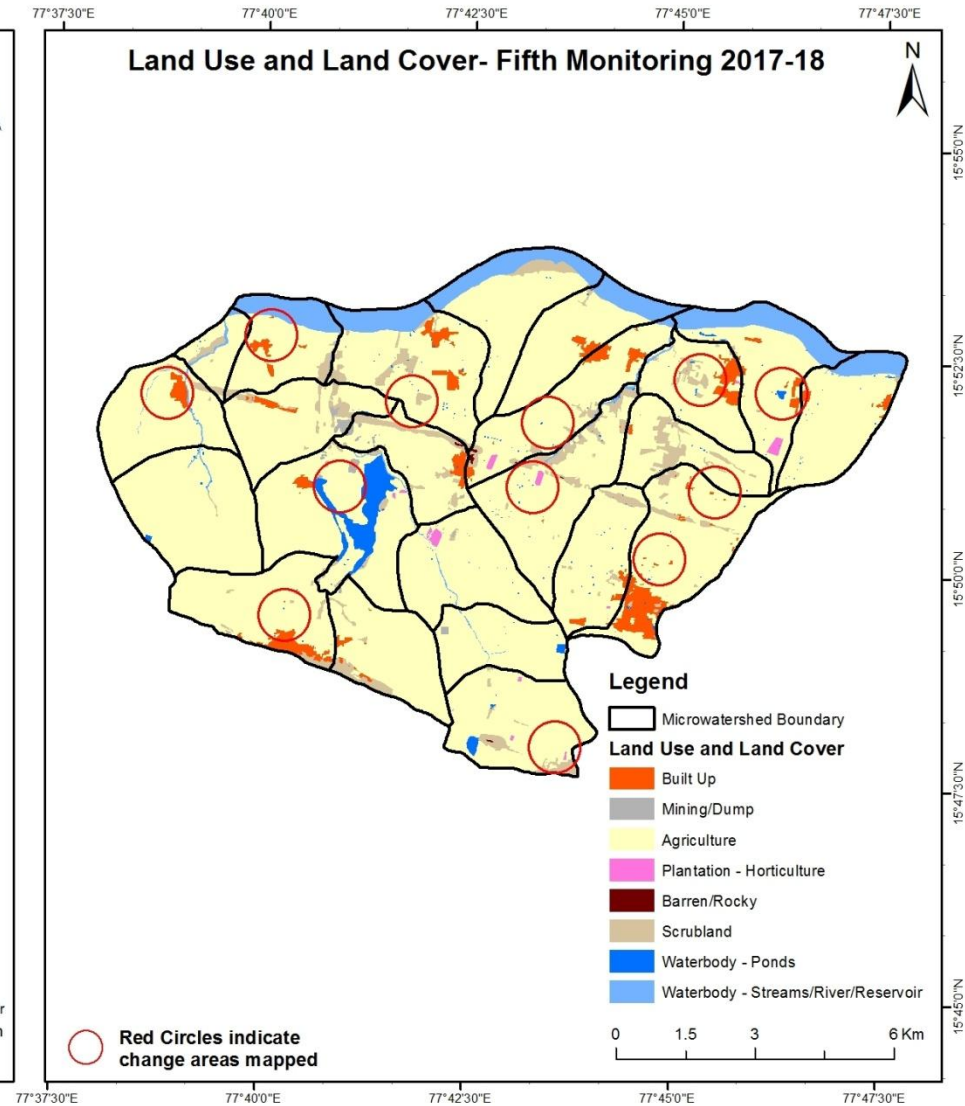
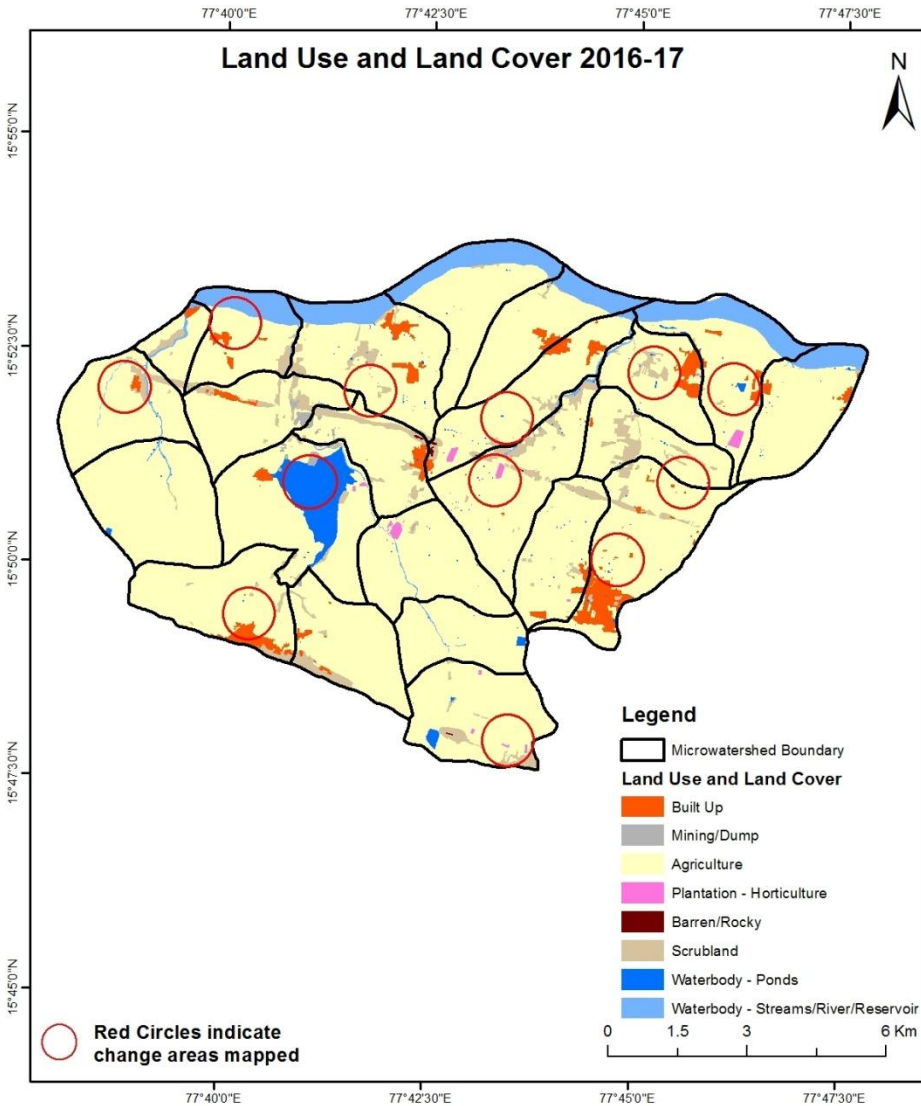
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



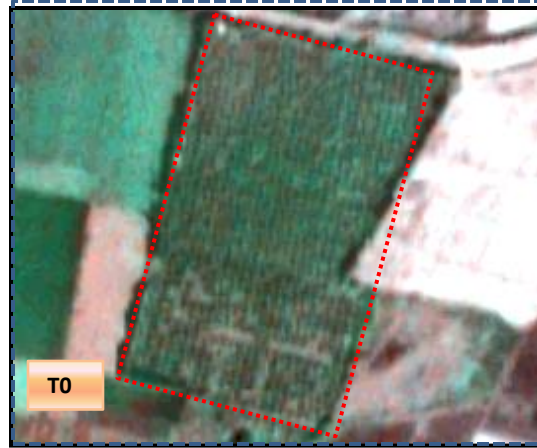
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000

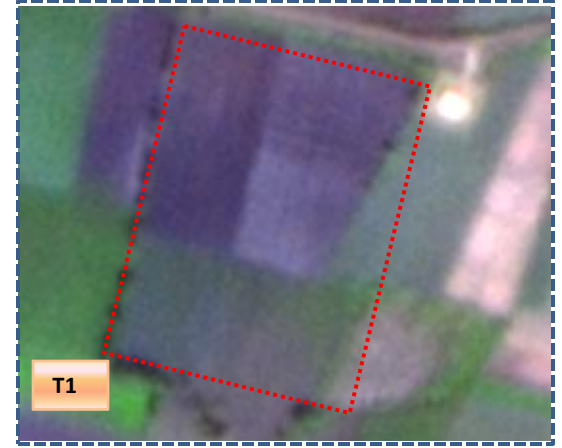


Land Use and Land Cover changes for Pre and Post treatment dates

Plantation to Agriculture

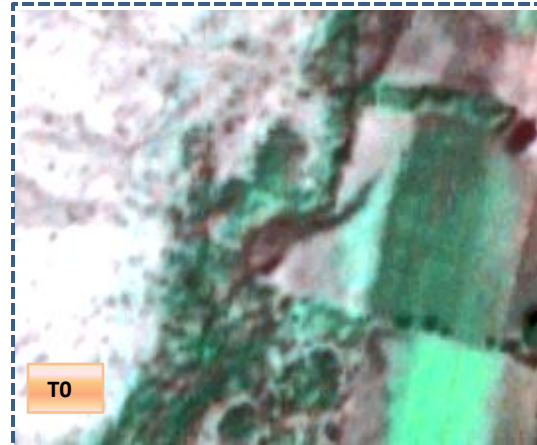


T0: 2009-10



T1: 4 December 2013

Scrub to Agriculture



T0: 2009-10



T1: 4 December 2013

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

Scrub to Water body



T0

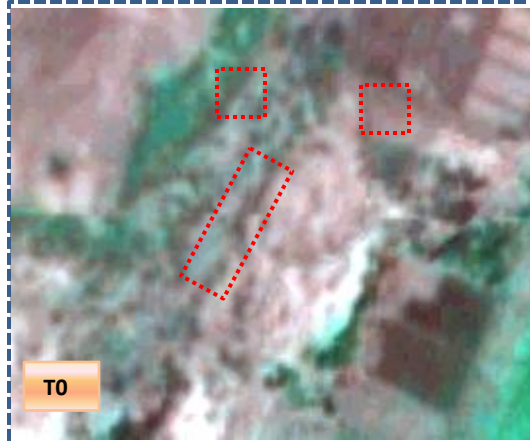
T0: 2009-10



T1

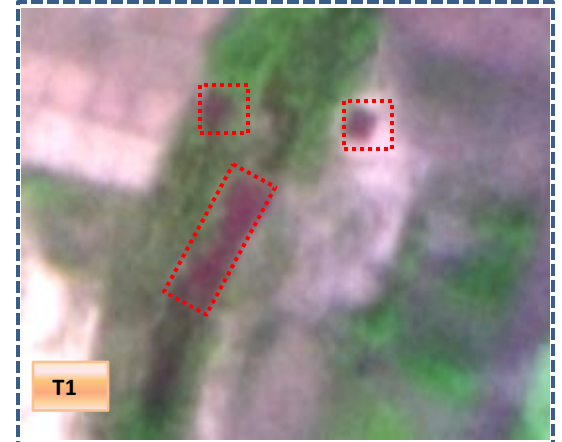
T1: 4 December 2013

Scrub to Water body



T0

T0: 2009-10



T1

T1: 4 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	248.40										248.40
Mining/dump		28.13									28.13
Agriculture	19.11		9657.34	3.76				3.75	1.32	13.34	9698.61
Plantation Horticulture			4.25	11.33							15.57
Forest											
Forest Plantation											
Barren Rocky							4.41				4.41
Scrub			56.69					612.20	0.49	0.35	669.73
Waterbody- Streams/River									763.25		763.25
Waterbody – Ponds										268.82	268.82
Grand Total	267.51	28.13	9718.28	15.09			4.41	615.94	765.06	282.51	11696.93

- 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 41.27 ha of the agriculture area has decreased and it is converted into built up, plantation, scrub land and water body in T1.
- In T1 60.94 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										
T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	267.51										267.51
Mining/dump		28.13									28.13
Agriculture	41.79	0.88	9666.82					2.87	0.61	5.31	9718.28
Plantation Horticulture			5.75	9.33							15.09
Forest											
Forest Plantation											
Barren Rocky							4.41				4.41
Scrub	0.69		52.33					561.52		1.40	615.94
Waterbody- Streams/River			1.78						763.28		765.06
Waterbody – Ponds			74.75							207.75	282.51
Grand Total	309.99	29.01	9801.44	9.33			4.41	564.39	763.89	214.47	11696.93

- 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 51.46 ha of the agriculture area has decreased and it is converted into built up, mining/dump, scrubland and water body in T2.
- In T2 134.62 ha of the agriculture area has increased from plantation, scrubland 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	309.99												309.99
Mining/dump		29.01											
Agriculture	10.68	0.12	9751.43	0.67				24.75			13.79		10.68
Plantation Horticulture			4.82	4.51									
Forest													
Forest Plantation													
Barren Rocky							4.41						
Scrub	10.51		53.33					500.07			0.48		10.51
Waterbody- Streams/River									763.89				
Waterbody – Ponds											214.47		
Grand Total	331.18	29.13	9809.58	5.18			4.41	524.83	763.89		228.74		331.18

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
- In T2 50.01 ha of the agriculture area has been decreased and it is converted into built up, mining/dump, plantation, scrubland and water body in T3.
- In T2 58.15 ha of the agriculture area has increased from plantation and scrubland of T3.
- 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	331.18										331.18	
Mining/dump		29.13									29.13	
Agriculture	5.41	0.19	9759.72	19.89				20.34		4.05	9809.58	
Plantation Horticulture			2.93	2.25							5.18	
Forest												
Forest Plantation												
Barren Rocky							4.41				4.41	
Scrub	0.58		5.14					518.62		0.48	524.83	
Waterbody- Streams/River			0.55						763.34		763.89	
Waterbody – Ponds										228.74	228.74	
Grand Total	337.17	29.31	9768.34	22.13			4.41	538.95	763.34	233.26	11696.93	

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
- In T3 49.87 ha of the agriculture area has been decreased and it is converted into built up, mining/dump, plantation, scrubland and water body in T4.
- In T4 8.62 ha of the agriculture area has increased from plantation, scrubland and water body of T5.
- 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	337.17										337.17	
Mining/dump		29.31									29.31	
Agriculture	1.67		9756.96	7.89						1.83	9768.34	
Plantation Horticulture				22.13							22.13	
Forest												
Forest Plantation												
Barren Rocky							4.41				4.41	
Scrub	2.73		4.82					531.06		0.34	538.95	
Waterbody- Streams/River			0.16						763.18		763.34	
Waterbody – Ponds			0.10							233.17	233.26	
Grand Total	341.57	29.31	9762.03	30.02			4.41	531.06	763.18	235.34	11696.93	

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents the changes in between the classes.
- In T4 11.38 ha of the agriculture area has been decreased and it is converted into built up, mining/dump, plantation, scrubland and water body in T5.
- In T5 5.08 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 decrease of 33.54 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 19.67, 83.16 & 8.15 Hectares From T0-T1, T1-T2 & T2-T3 respectively and overall increase of 382.23 Hectares in Crop land area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
5. There is a increase of 14 Hectares in Plantation/Horticulture area as compared between 2009-10 (T0) & 2017-18 (T5) years.
6. There is a decrease of 138.67 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
7. Farm ponds (15) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (18) verified from the portal.