

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

ANANTAPURAMU -01/2009-10

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

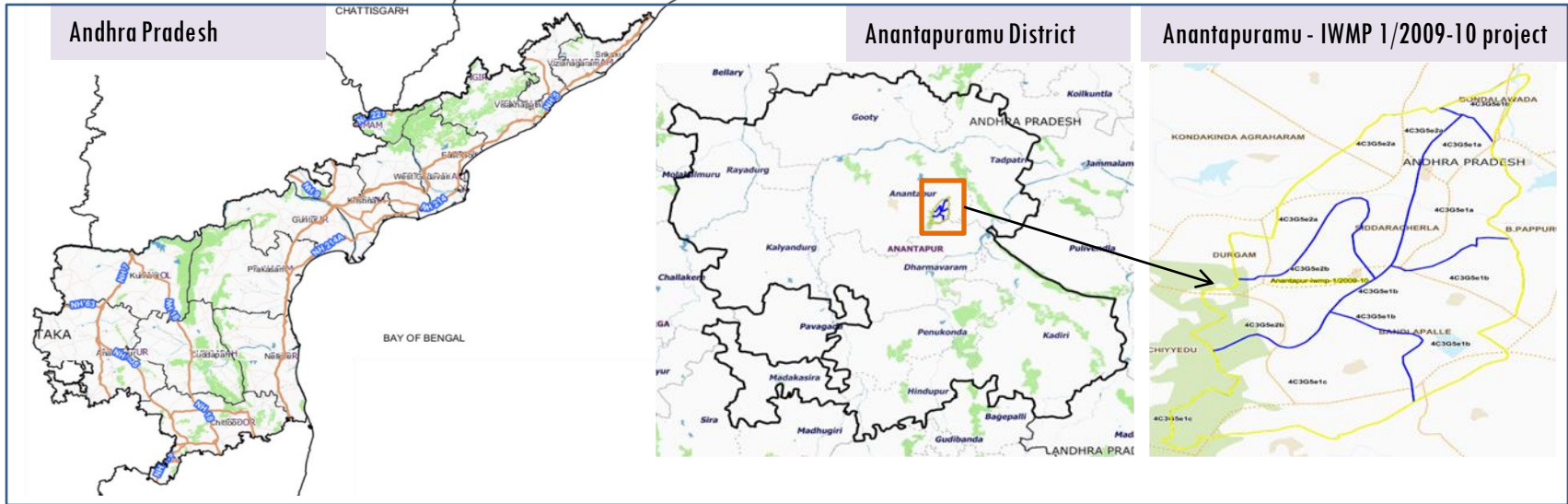
## **E X E C U T I V E   S U M M A R Y**

- 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-01/2009-10, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 5,752 ha. It comprises of 5 micro watersheds.
- In the project area 195 Drishti photos were uploaded showing 18 check dams, 53 Farm ponds, 24 Horticulture and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 53 new farm ponds or dug out pits with 12.71 ha increase in the area.
- Major percentage i.e. 66% is covered by the agriculture, 13.37 % is covered by Scrub land, 13.16 % is covered by forest and remaining by other land use classes.

# PROJECT : ANANTAPURAMU - IWMP-01/2009-10

## DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Narpala Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 5,752 ha. It comprises of 5 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.

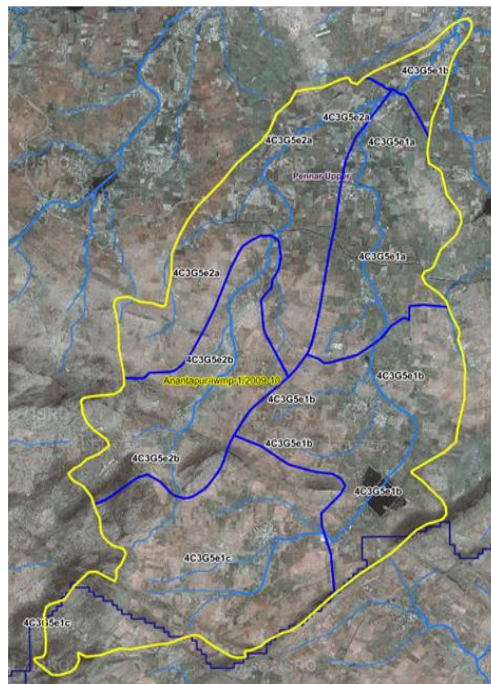
# Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			6-Apr-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			6-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	Drishhti Photographs		
		Total	195
4	Detailed Project Report		

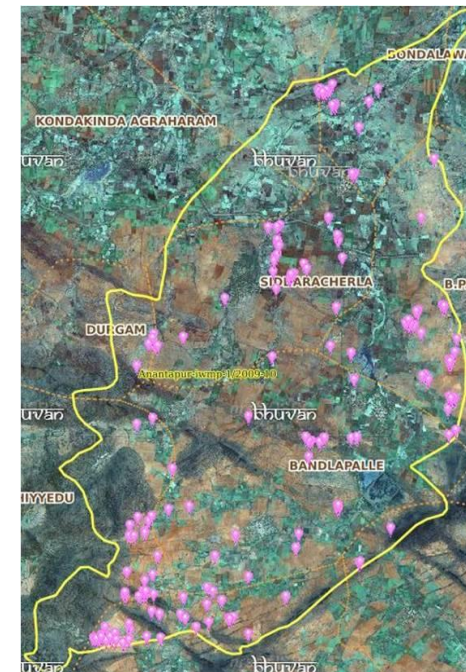
## Natural Color Composite overlaid with Project boundaries and high detail stream network



### Legend

-  Drainage (1:10000 Scale)
-  MWS Boundary
-  Project Boundary

## Natural Color Composite overlaid with Drishhti Points



### Drishhti 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	20	16
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	53	39
11	Civil work-Check dams/Rock fill dam	0	0
12	Nallah Bunds/Drainage treatment	7	6
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities-Plantation/Horticulture	23	18
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	91	70
	<b>TOTAL</b>	<b>194</b>	<b>149</b>

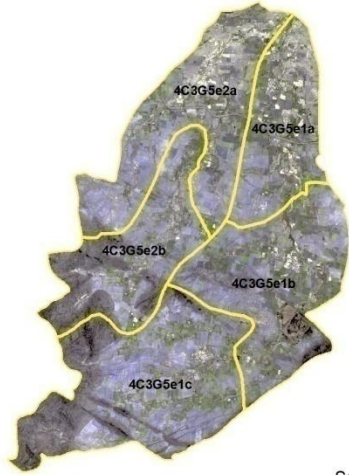
## MONITORING IN THE PROJECT AREA

### 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

Natural Color Composite- 2009-10



Source:Fusen data,NRSC

Natural Color Composite- 04th March 2013



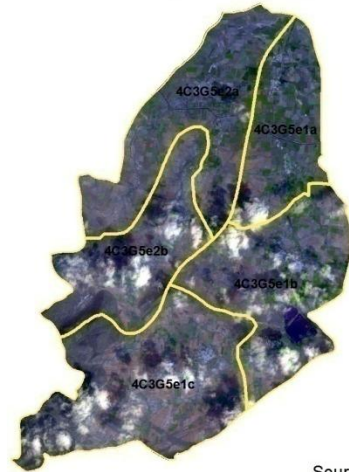
Source:Fusen data,NRSC

Natural Color Composite- 18th February 2015



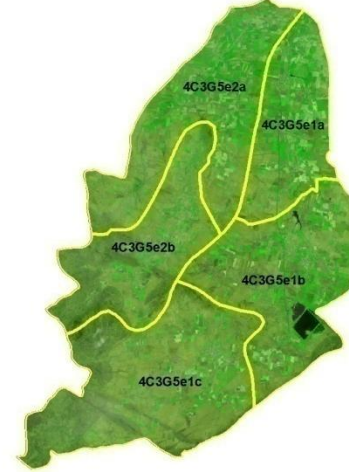
Source:Fusen data,NRSC

Natural Color Composite- 07th December 2015



Source:Fusen data,NRSC

Natural Color Composite- 06th April 2018



Source:LISS-IV,NRSC



# Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-01/2009-10



T0:2009-10



T1: 13 January 2014

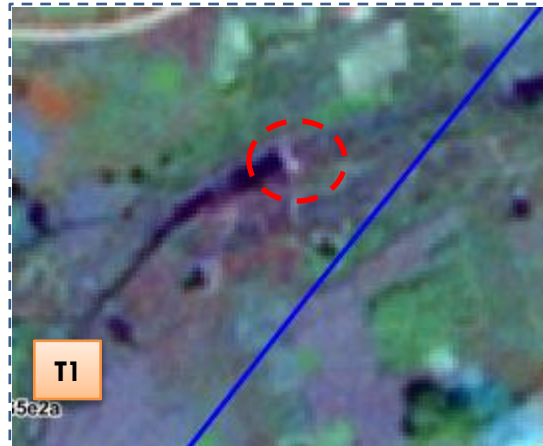


Drishti SI no. 568474 MWS :4C3G5e2a

Dug out pit



T0:2009-10



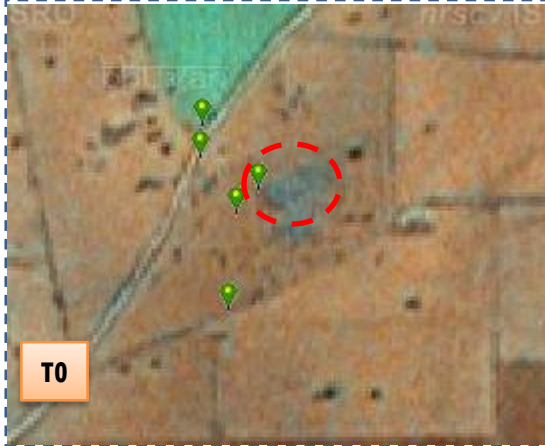
T1: 13 January 2014



Drishti SI no.568702 MWS : 4C3G5e2a

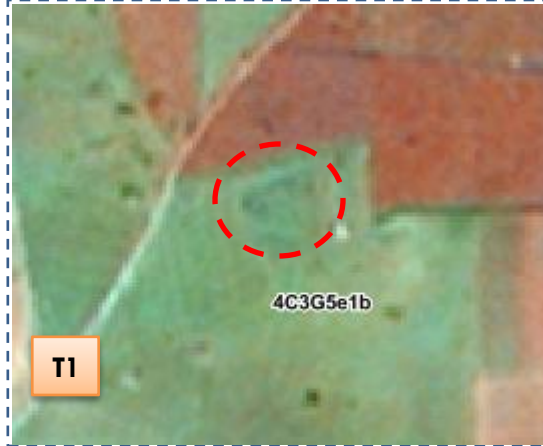
Checkdam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-01/2009-10



T0

T0: 2009-10



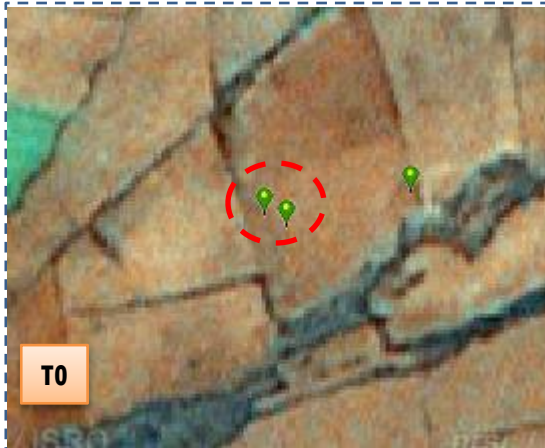
T1

T1: 13 January 2014



Drishti Sl no. 564858 MWS :4C3G5e1b

**Boulder Removal**



T0

T0: 2009-10



T1

T1: 13 January 2014



Drishti Sl no. 568675 MWS :4C3G5e1c

**Farm pond**

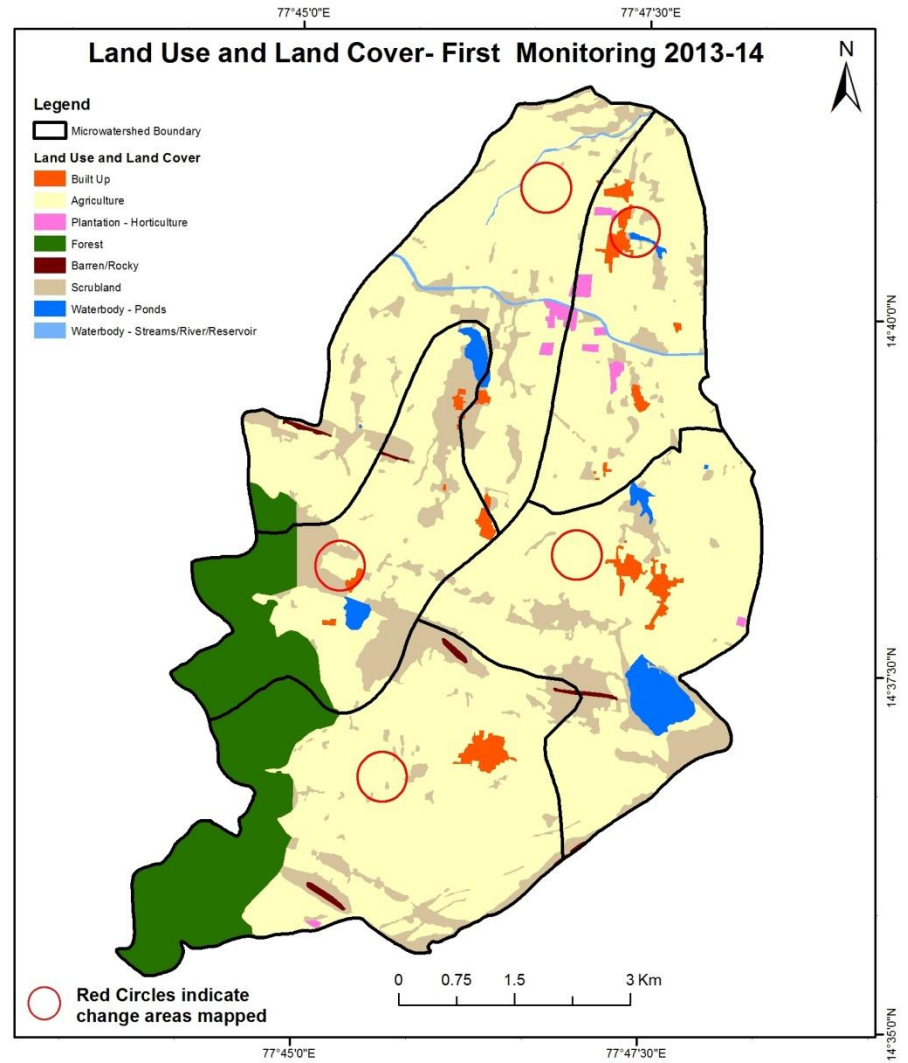
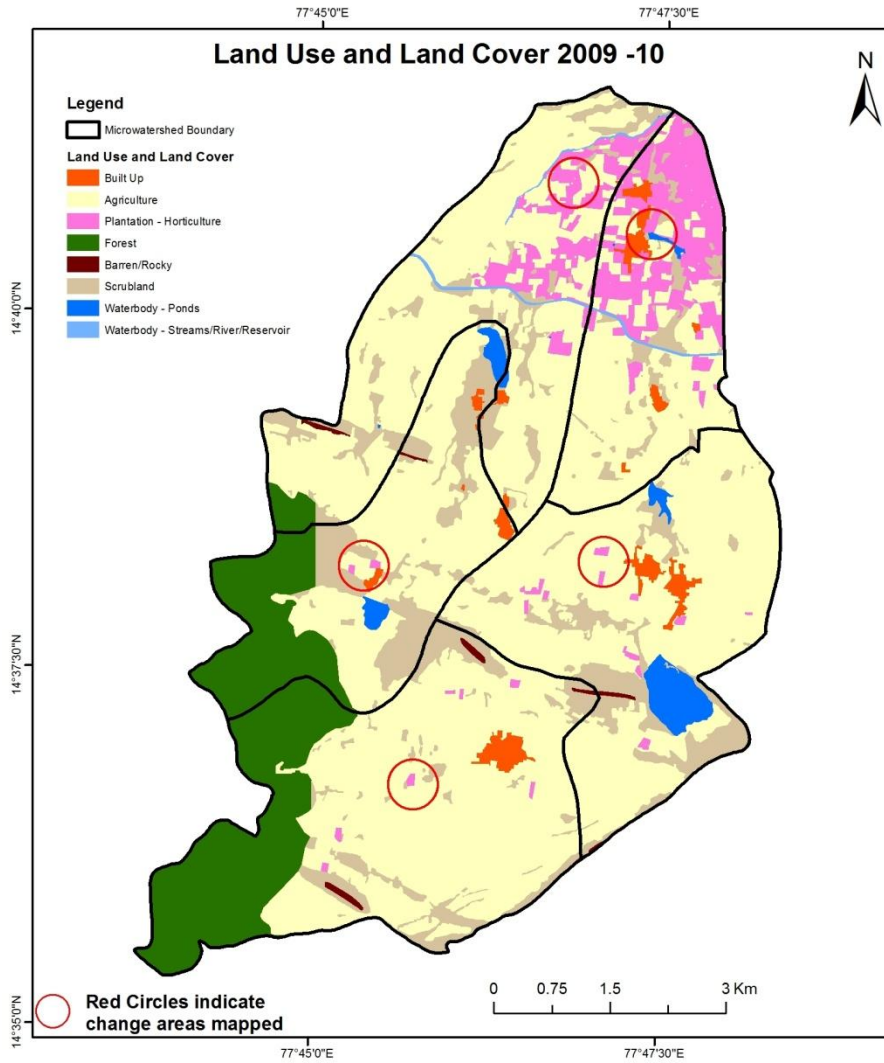
## MONITORING IN THE PROJECT AREA

### 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)

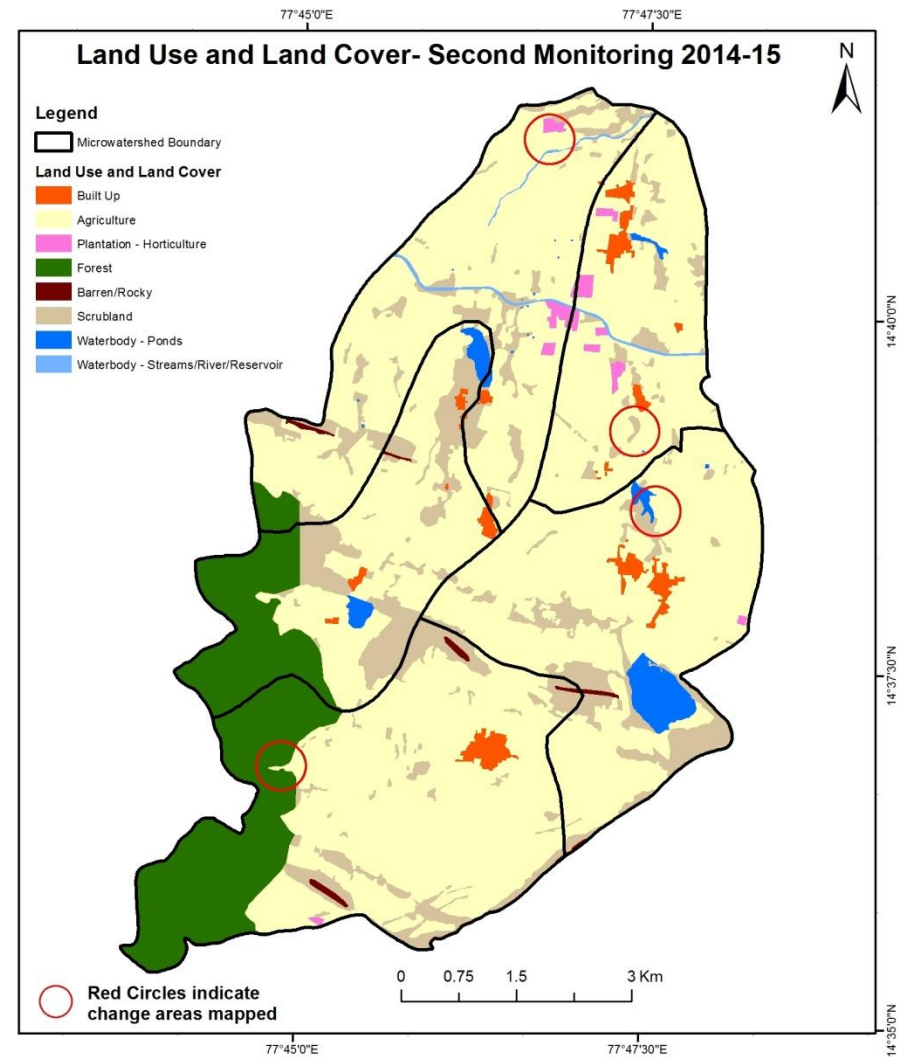
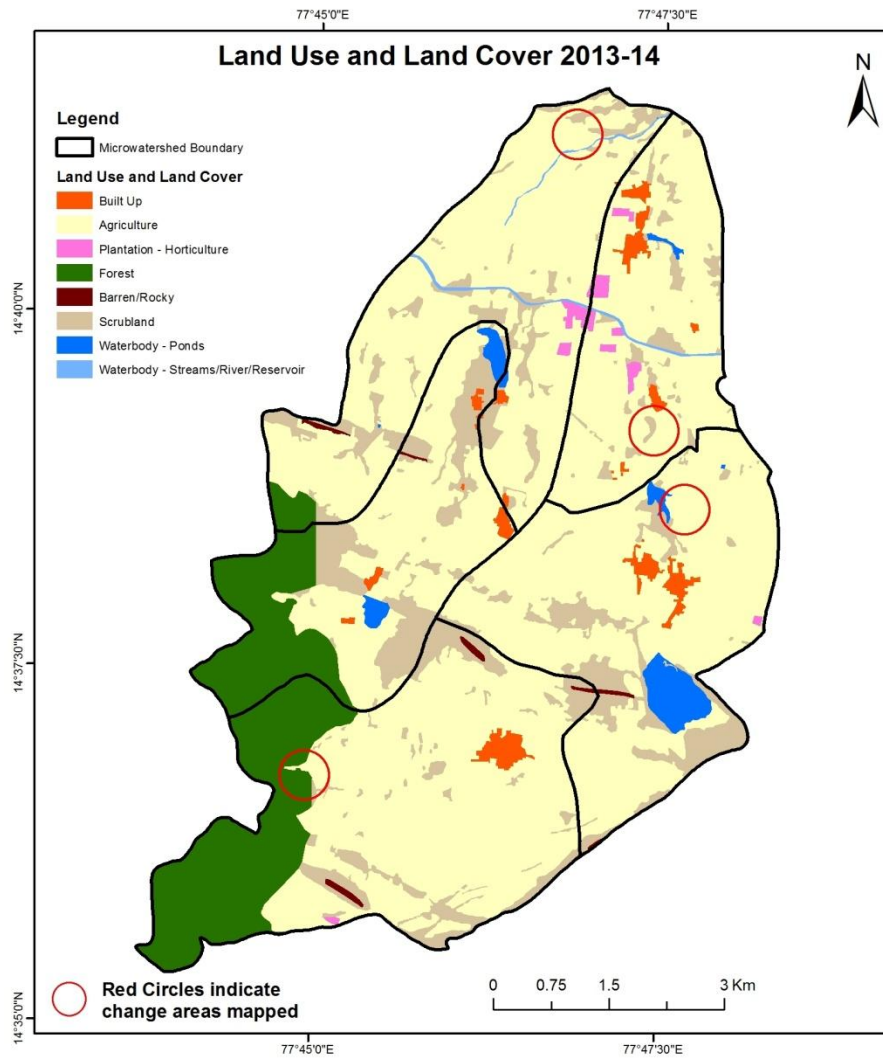
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



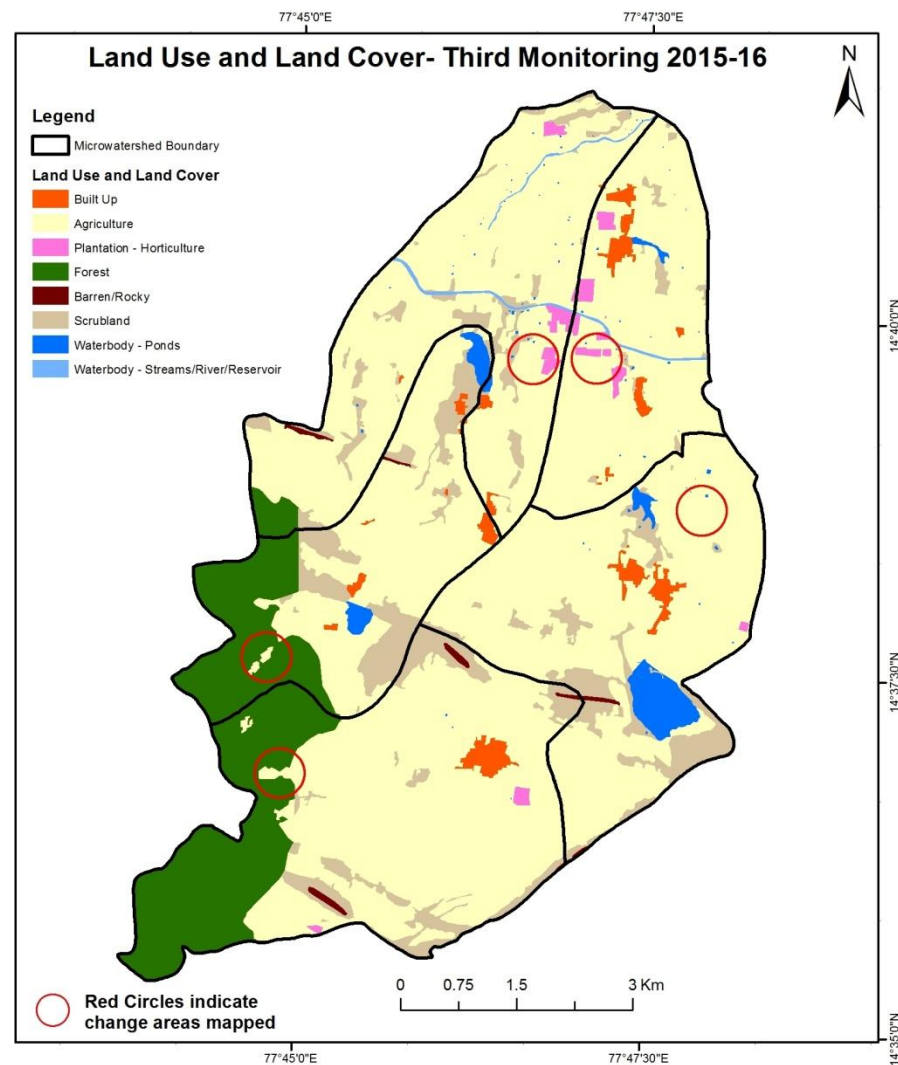
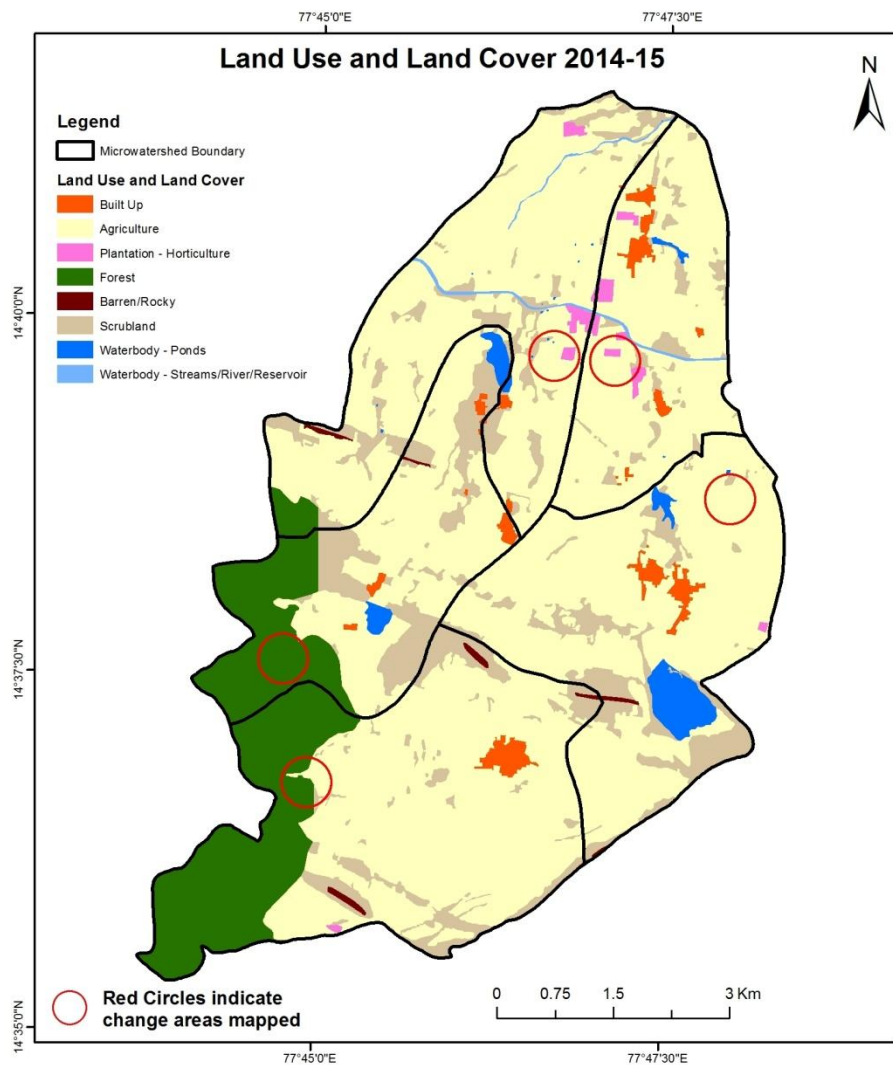
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2015-16)

Scale: 1:10000



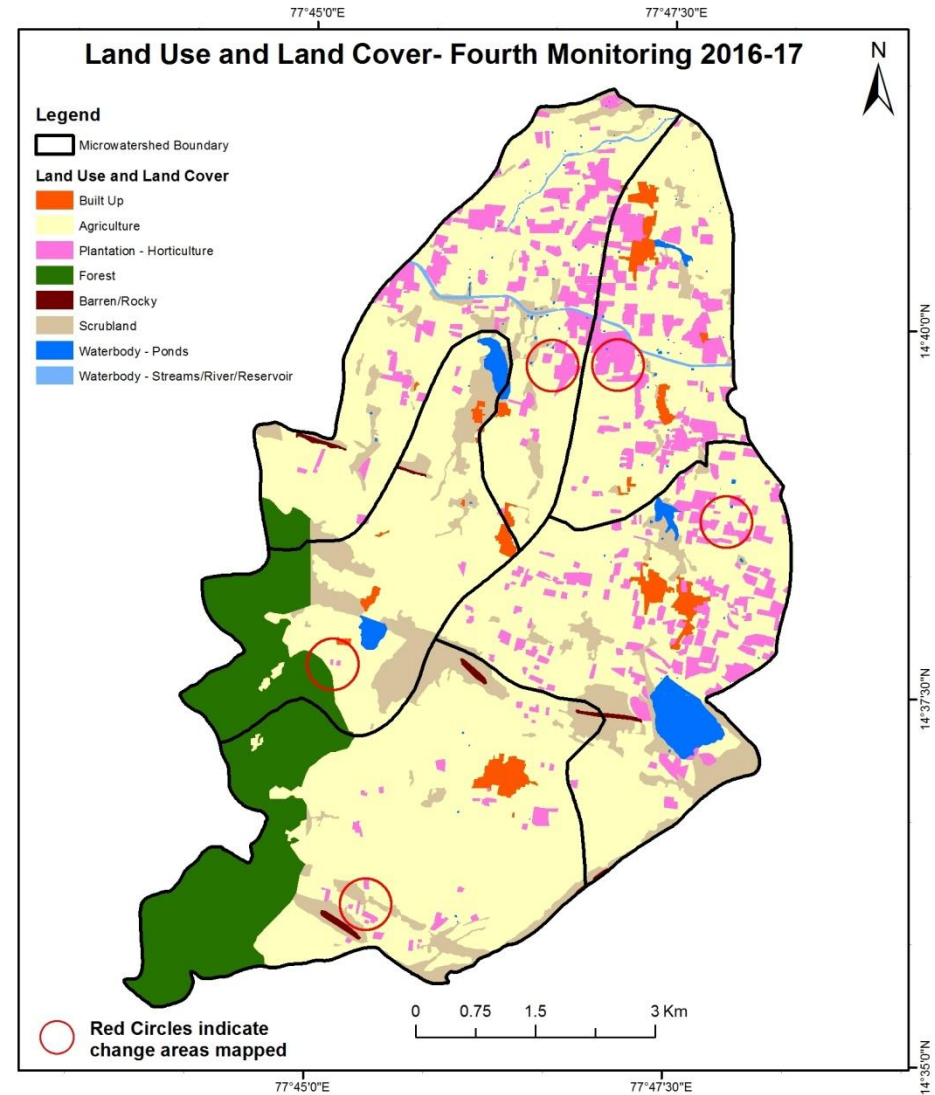
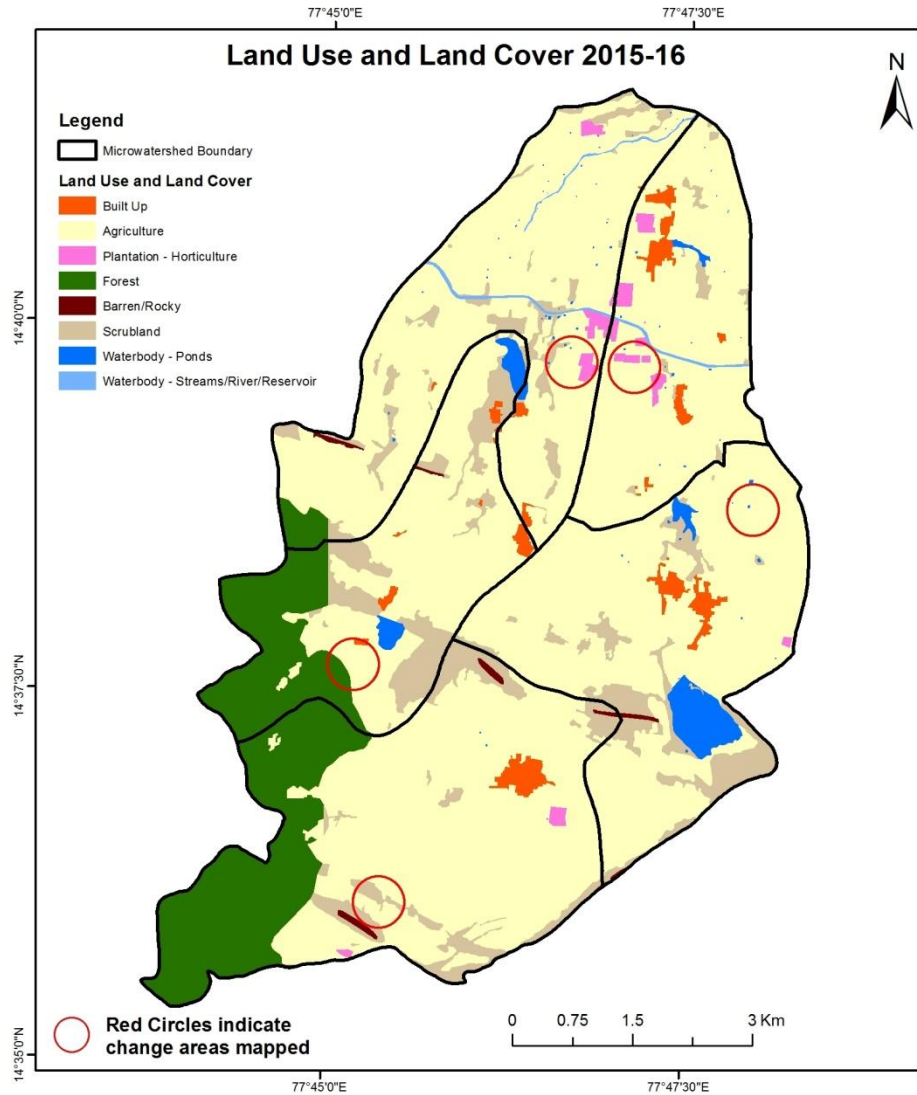
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



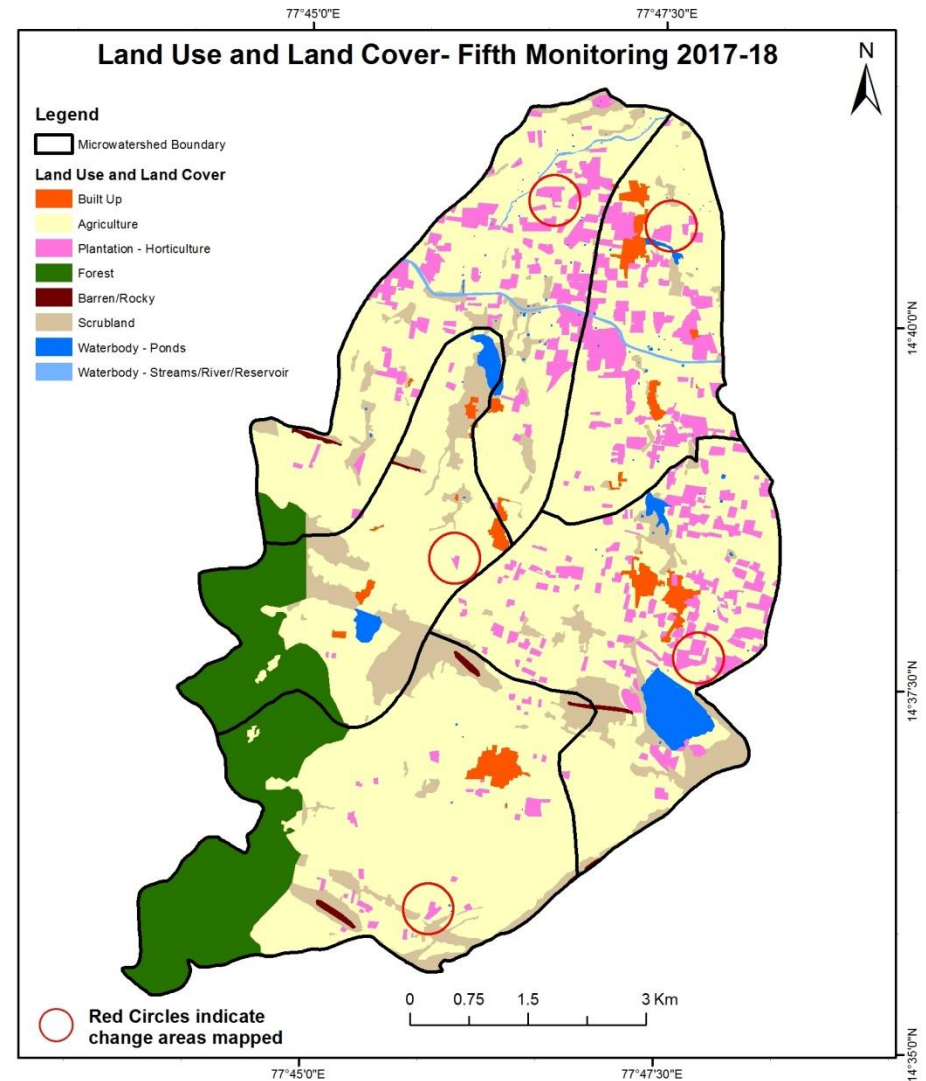
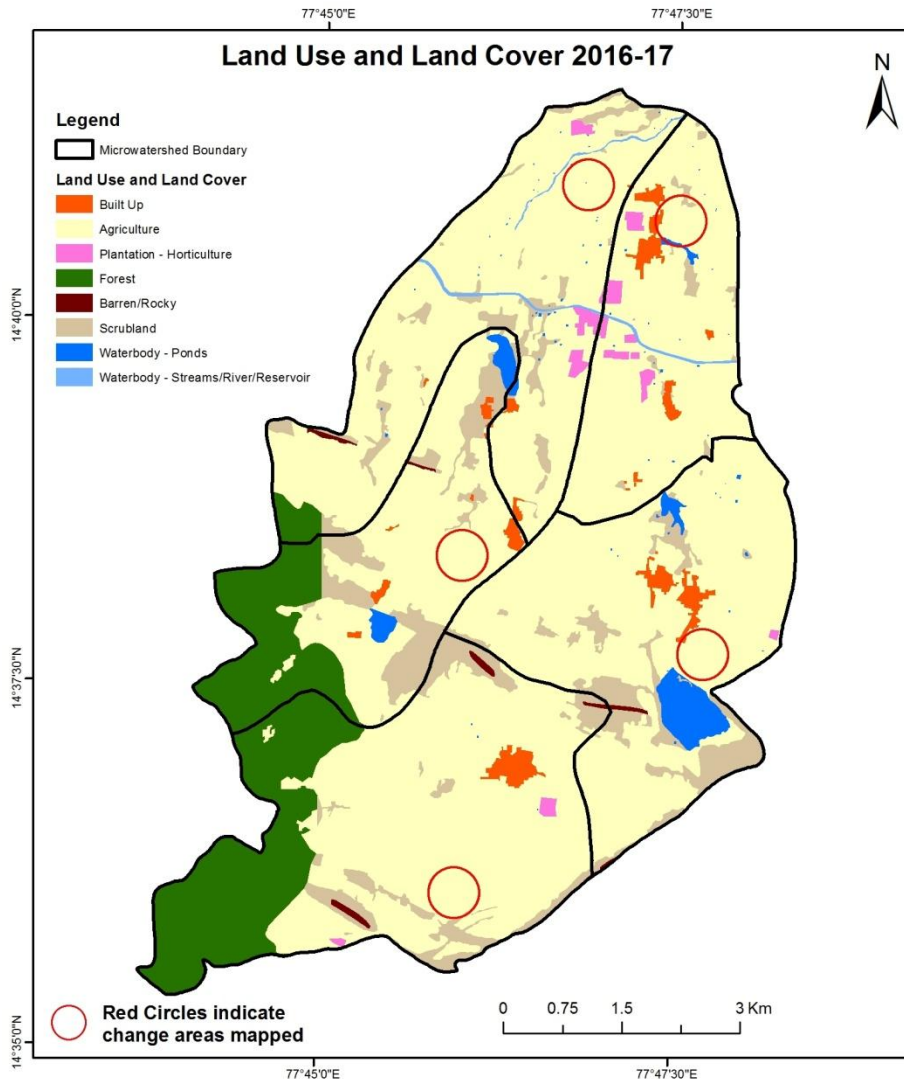
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

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 Plantation



T0: 2009-10

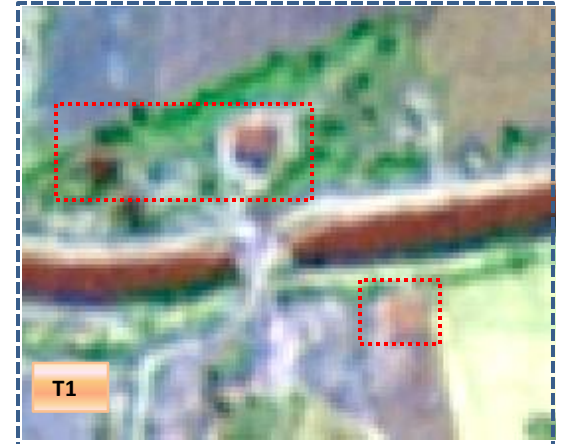


T1: 13 January 2014

Scrub to water body



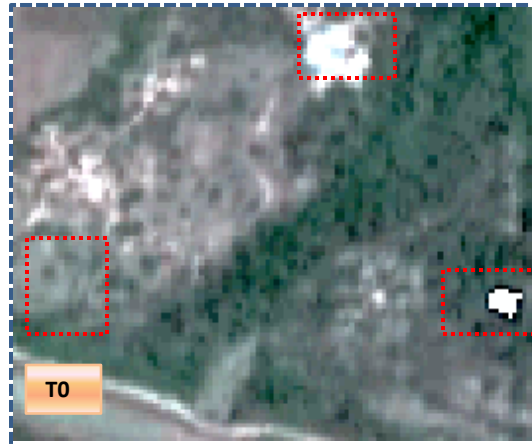
T0: 2009-10



T1: 13 January 2014

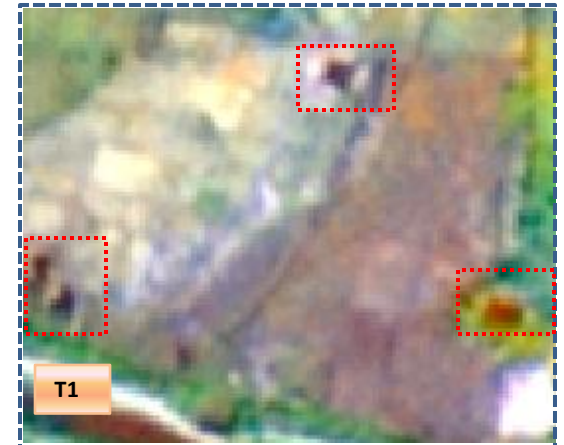
## Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Water body



T0

T0: 2009-10



T1

T1: 13 January 2014

Scrub to Agriculture



T0

T0: 2009-10



T1

T1: 13 January 2014

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

### Agriculture to Plantation



T0

T0: 2009-10



T1

T1: 13 January 2014

### Scrub to Agriculture



T0

T0: 2009-10



T1

T1: 13 January 2014

**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		
<b>T0</b>													
<b>Built up</b>	92.44											92.44	
<b>Mining/dump</b>													
<b>Agriculture</b>	0.15		3645.20	10.44	1.48			19.02		0.28		3676.57	
<b>Plantation Horticulture</b>			364.01	23.21								387.22	
<b>Forest</b>					701.09							701.09	
<b>Forest Plantation</b>													
<b>Barren Rocky</b>							18.06					18.06	
<b>Scrub</b>	1.64		29.01	0.82				732.10				763.57	
<b>Waterbody- Streams/River</b>									21.61			21.61	
<b>Waterbody – Ponds</b>			0.13							92.24		92.38	
<b>Grand Total</b>	<b>94.23</b>		<b>4038.35</b>	<b>34.47</b>	<b>702.57</b>		<b>18.06</b>	<b>751.12</b>	<b>21.61</b>	<b>92.53</b>		<b>5752.93</b>	

- 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 31.38 ha of the agriculture area has decreased and it is converted into built up, plantation, forest, scrubland and water body in T1.
- In T1 393.15 ha of the agriculture area has increased from plantation, scrubland and water body 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	94.23										94.23
Mining/dump											
Agriculture			4033.72	4.27						0.36	4038.35
Plantation Horticulture				34.47							34.47
Forest					702.57						702.57
Forest Plantation											
Barren Rocky							18.06				18.06
Scrub			16.97					733.65		0.50	751.12
Waterbody- Streams/River									21.61		21.61
Waterbody – Ponds										92.53	92.53
<b>Grand Total</b>	<b>94.23</b>		<b>4050.69</b>	<b>38.74</b>	<b>702.57</b>		<b>18.06</b>	<b>733.65</b>	<b>21.61</b>	<b>93.39</b>	<b>5752.93</b>

- 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 4.63 ha of the agriculture area has decreased and it is converted into plantation and water body in T2.
- In T2 16.97 ha of the 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	94.23										94.23
Mining/dump											
Agriculture	0.63		4034.88	12.82						2.36	4050.69
Plantation Horticulture			0.82	37.92							38.74
Forest			12.33		690.24						702.57
Forest Plantation											
Barren Rocky							18.06				18.06
Scrub	3.70		175.97					552.84		1.14	733.65
Waterbody- Streams/River									21.61		21.61
Waterbody – Ponds										93.39	93.39
<b>Grand Total</b>	<b>98.55</b>		<b>4224.00</b>	<b>50.74</b>	<b>690.24</b>		<b>18.06</b>	<b>552.84</b>	<b>21.61</b>	<b>96.90</b>	<b>5752.93</b>

- 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 15.81 ha of the agriculture area has decreased and it is converted into built-up, plantation and water body in T3.
- In T3 189.12 ha of the agriculture area has increased from plantation, forest and scrubland 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	98.55										98.55
Mining/dump											
Agriculture	6.40		3714.81	494.46				6.97		1.37	4224.00
Plantation Horticulture			7.89	42.80						0.05	50.74
Forest					690.24						690.24
Forest Plantation											
Barren Rocky							18.06				18.06
Scrub			9.98	3.94				537.89		1.03	552.84
Waterbody- Streams/River									21.61		21.61
Waterbody – Ponds			0.04							96.85	96.90
<b>Grand Total</b>	<b>104.96</b>		<b>3732.72</b>	<b>541.20</b>	<b>690.24</b>		<b>18.06</b>	<b>544.85</b>	<b>21.61</b>	<b>99.30</b>	<b>5752.93</b>

- 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 509.19 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, 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	104.96										104.96
Mining/dump											
Agriculture			3568.84	163.79						0.09	3732.72
Plantation Horticulture			283.09	258.07						0.04	541.20
Forest					690.24						690.24
Forest Plantation											
Barren Rocky							18.06				18.06
Scrub			1.90					542.92		0.04	544.85
Waterbody- Streams/River									21.61		21.61
Waterbody – Ponds			0.04							99.26	99.30
<b>Grand Total</b>	<b>104.96</b>		<b>3853.86</b>	<b>421.86</b>	<b>690.24</b>		<b>18.06</b>	<b>542.92</b>	<b>21.61</b>	<b>99.43</b>	<b>5752.93</b>

- 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 163.88 ha of the agriculture area has decreased and it is converted into plantation and water body in T5.
- In T5 285.03 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 7.06 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 361.78, 12.34, 173.31 & 121.14 Hectares From T0-T1, T1-T2, T2-T3 & T4-T5 respectively and overall increase of 668.57 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 34 Hectares in Plantation/Horticulture area as compared between 2009-10 (T0) & 2017-18 (T5) years.
6. There is a decrease of 220.66 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
7. Farm ponds (39) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (53) verified from the portal.