

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

KURNOOL -14/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
July-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

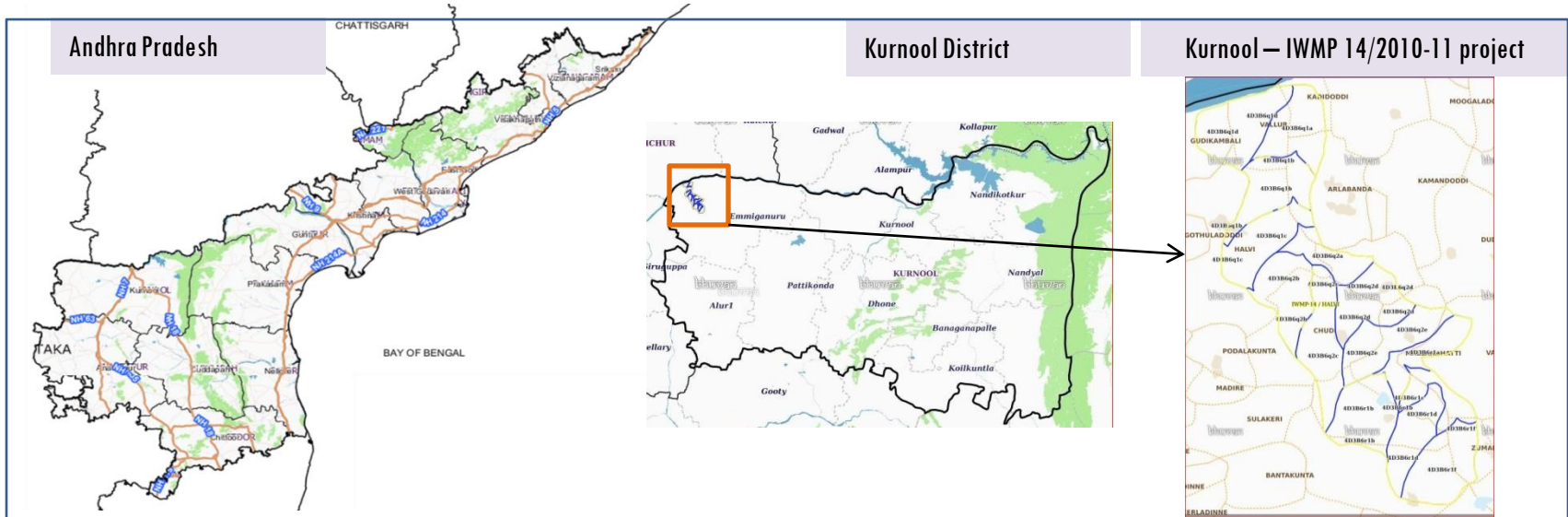
E X E C U T I V E S U M M A R Y

- 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-14/2010-11, Kurnool District of Andhra Pradesh. The total geographical area of the project is 6,185 ha. It comprises of 14 micro watersheds.
- In the project area 101 Drishti photos were uploaded showing 3 check dams, 31 Farm ponds, 7 afforestation and remaining showing others.
- Major percentage i.e. 86% is covered by the agriculture, 3.2 % is covered by scrubland, 5.7 % is covered by water bodies and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-14/2010-11

DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Kowthalam Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 6,185 ha. It comprises of 14 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (**Batch -II**) projects taking 2018-19 (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).

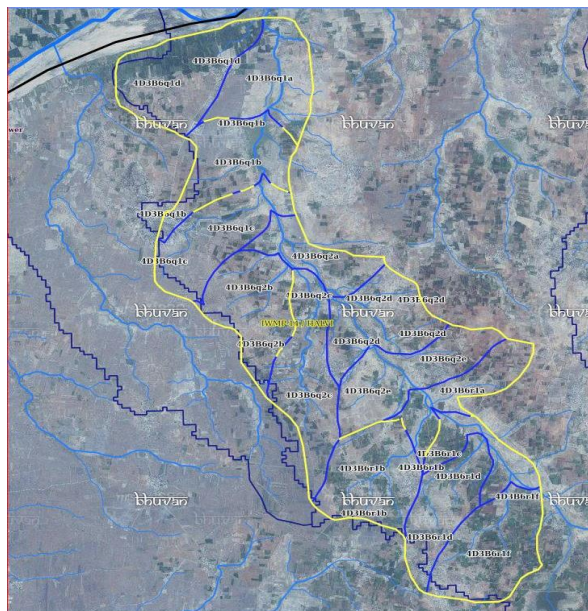
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			23-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			23-Mar-19
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	19
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

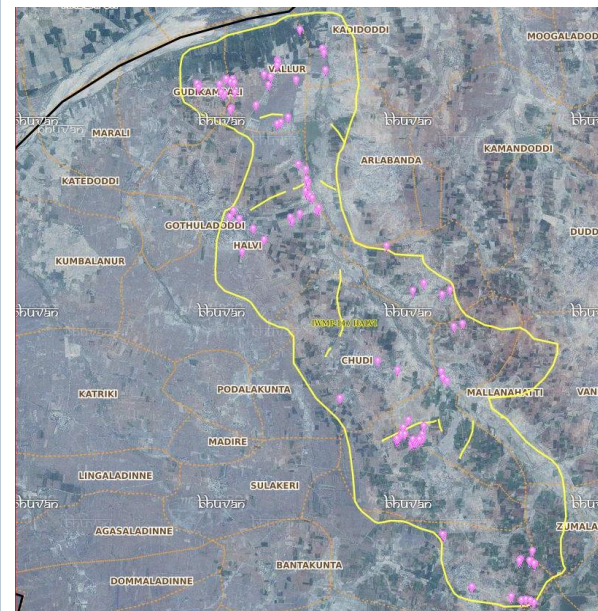


MWS Boundary



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	7	7
2	Horticulture	0	0
3	Agriculture	0	0
4	Checks & Plugins	3	3
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	31	31
8	Check dams (Civil work)	0	0
9	New Activity	0	0
10	Om (Other measurement)	0	0
11	LM (Livelihood Measures)	0	0
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	60	41
	TOTAL	101	82

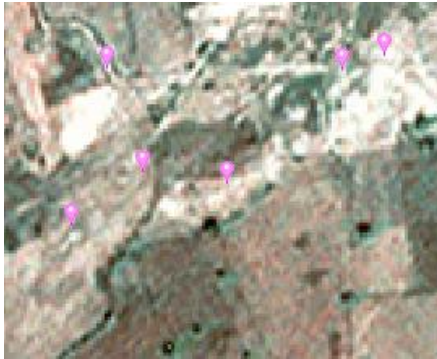
MONITORING IN THE PROJECT AREA

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 (2010-11) and T5 is 2018-19 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.

Kurnool-IWMP-14/2010-11

2009-10



November-2014



Feb-2016



Feb-2017



Jan-2019



Drishti Sl.No: 2453675
M.No: 9100985830
Uuid: d9b209e85acd8c63

Activity : Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-14/2010-11



T0

bhuvan

T0:2010-11



T1

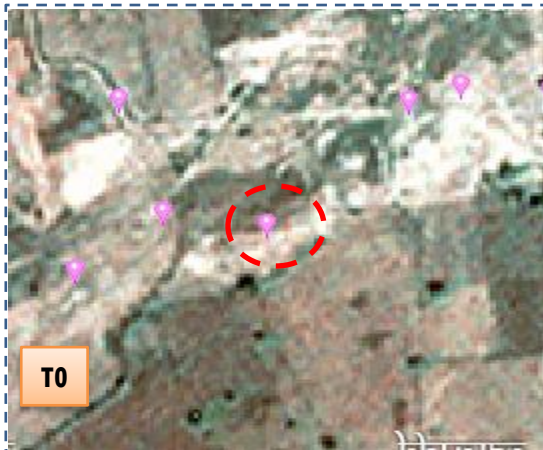
bhuvan

T1: 30 November 2014



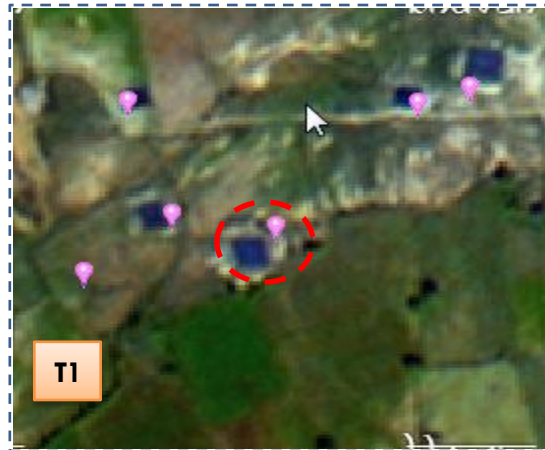
Drishti Sl no. 2453669 MWS : 4D3B6q1c

Farm pond



T0

T0:2010-11



T1

T1: 30 November 2014



Drishti Sl no. 2453675 MWS : 4D3B6q2a

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-14/2010-11



T0

T0: 2010-11



T1

T1: 30 November 2014



Drishti Sl no.146463 MWS : 4D3B6q1c

Farm pond



T0

T0: 2010-11



T1

T1: 30 November 2014

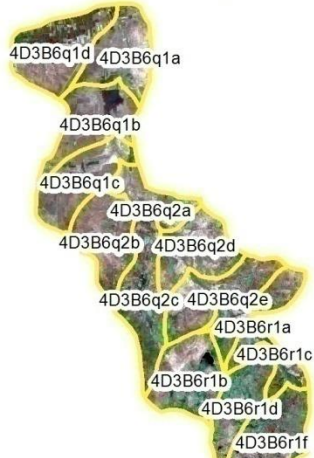


Drishti Sl no. 138541 MWS : 4D3B6r1a

Checkdam

Natural Color Composite

Natural Color Composite- 2010-11



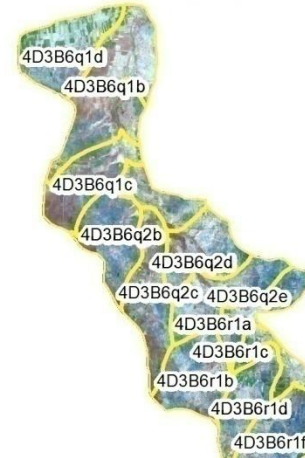
Source:NCC,NRSC

Natural Color Composite - 30th November 2014



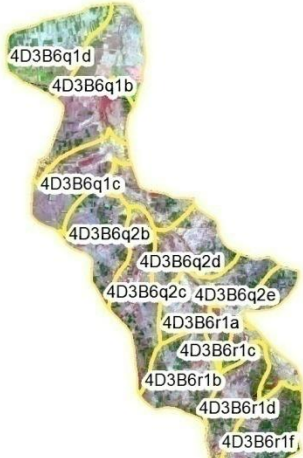
Source:NCC & LISSIV,NRSC

Natural Color Composite - 22nd October 2016



Source:Fusen data,NRSC

Natural Color Composite - 03rd February 2017



Source:NCC,NRSC

Natural Color Composite - 08 March 2018



Source:LISS-IV,NRSC

Natural Color Composite - 23rd March 2019



Source:Sentinel,NRSC

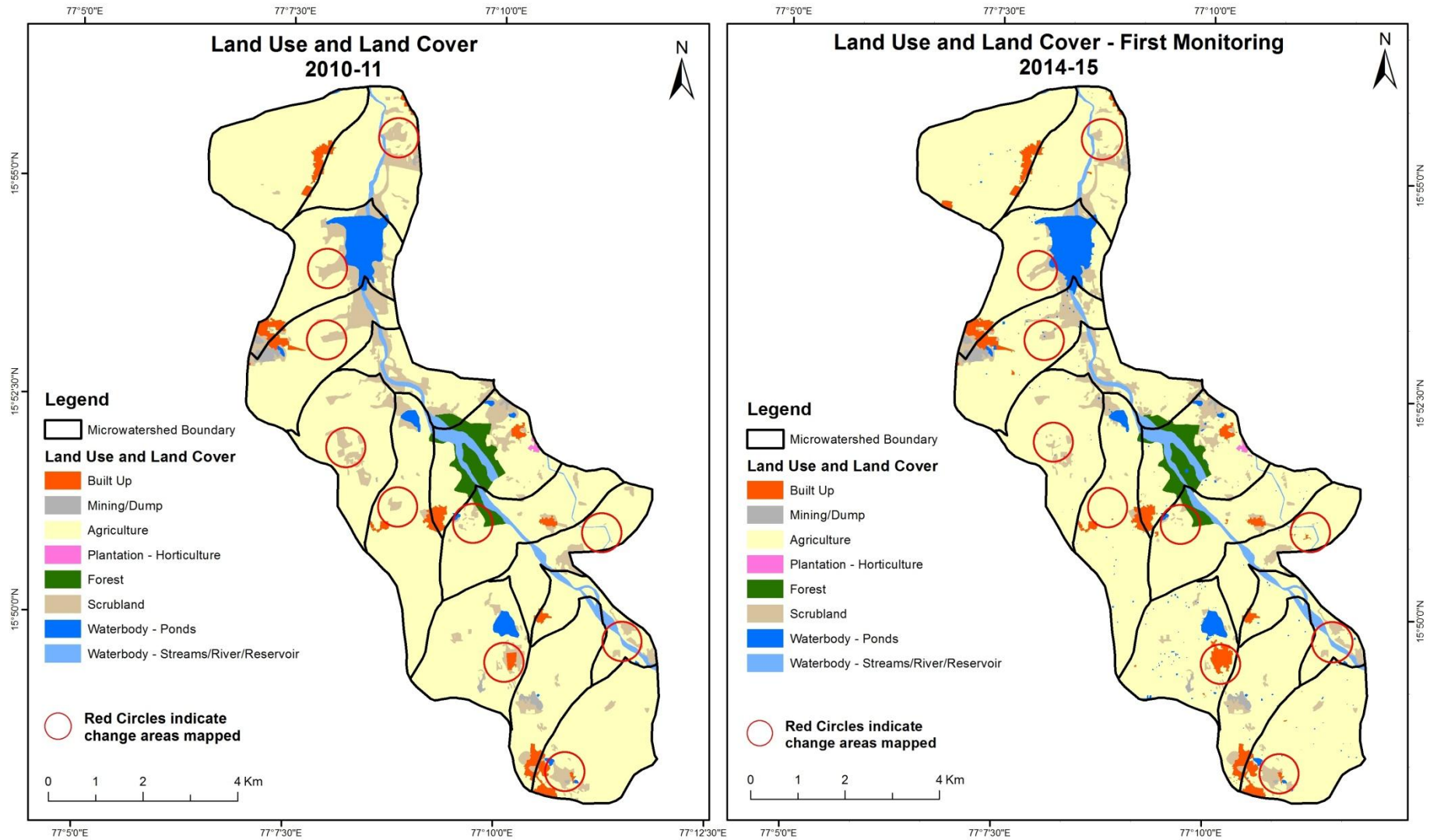
MONITORING IN THE PROJECT AREA

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 (2010-11) and row represents the T5 (2018-19)

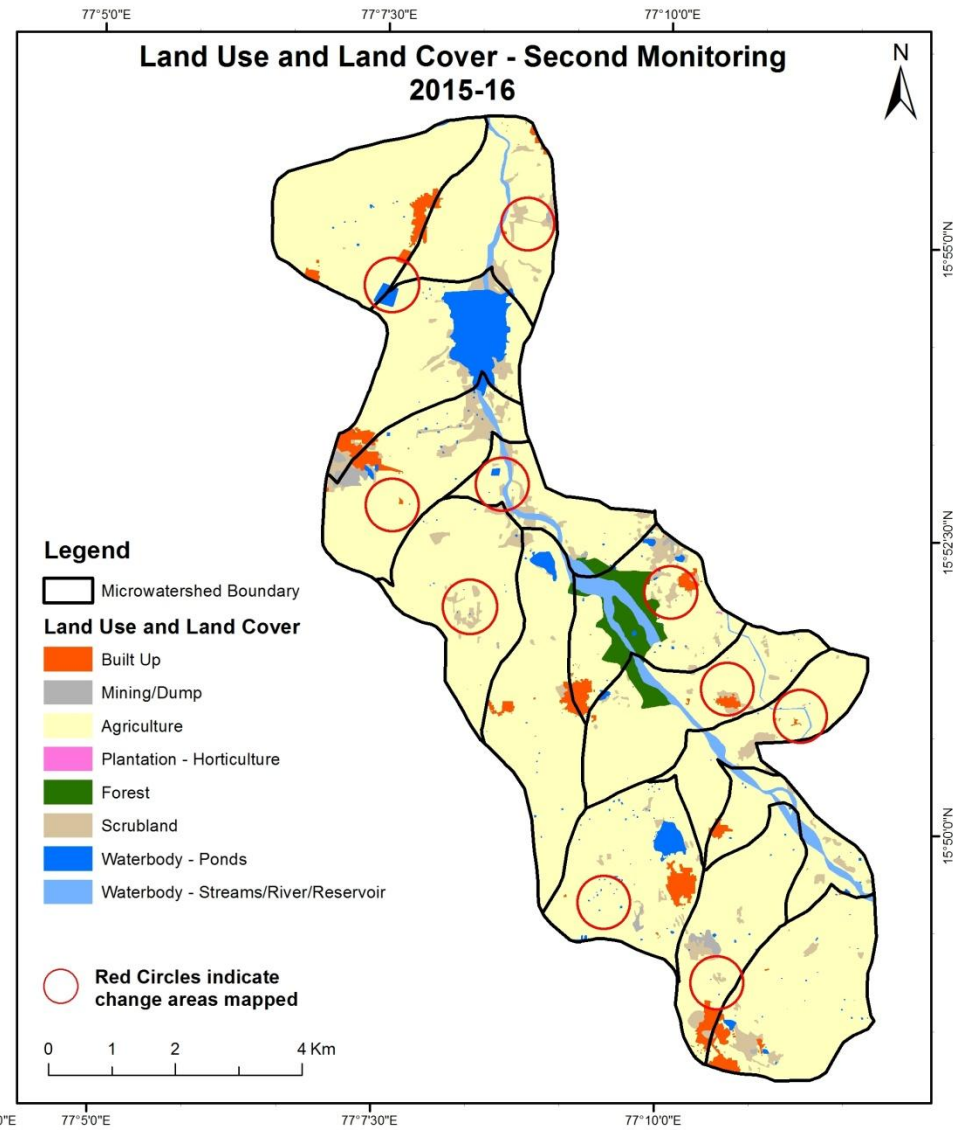
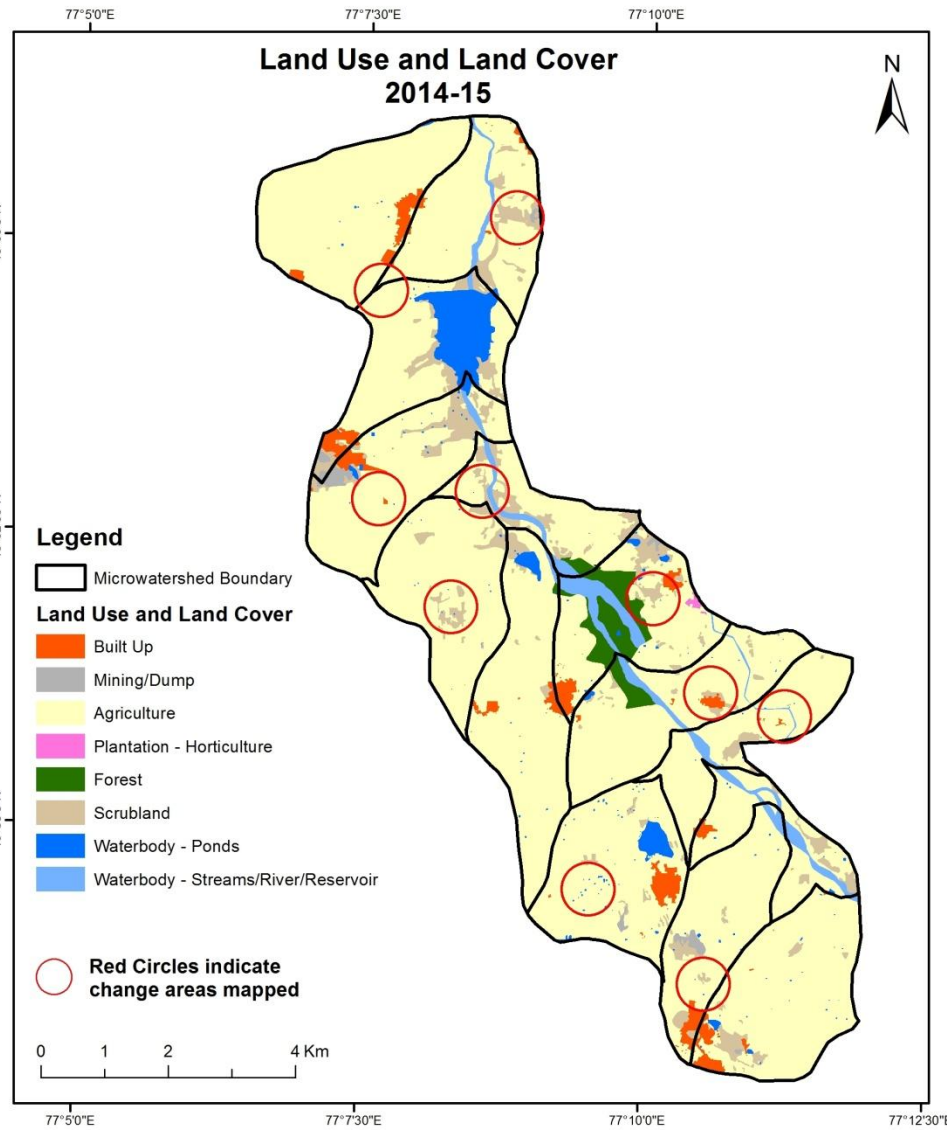
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



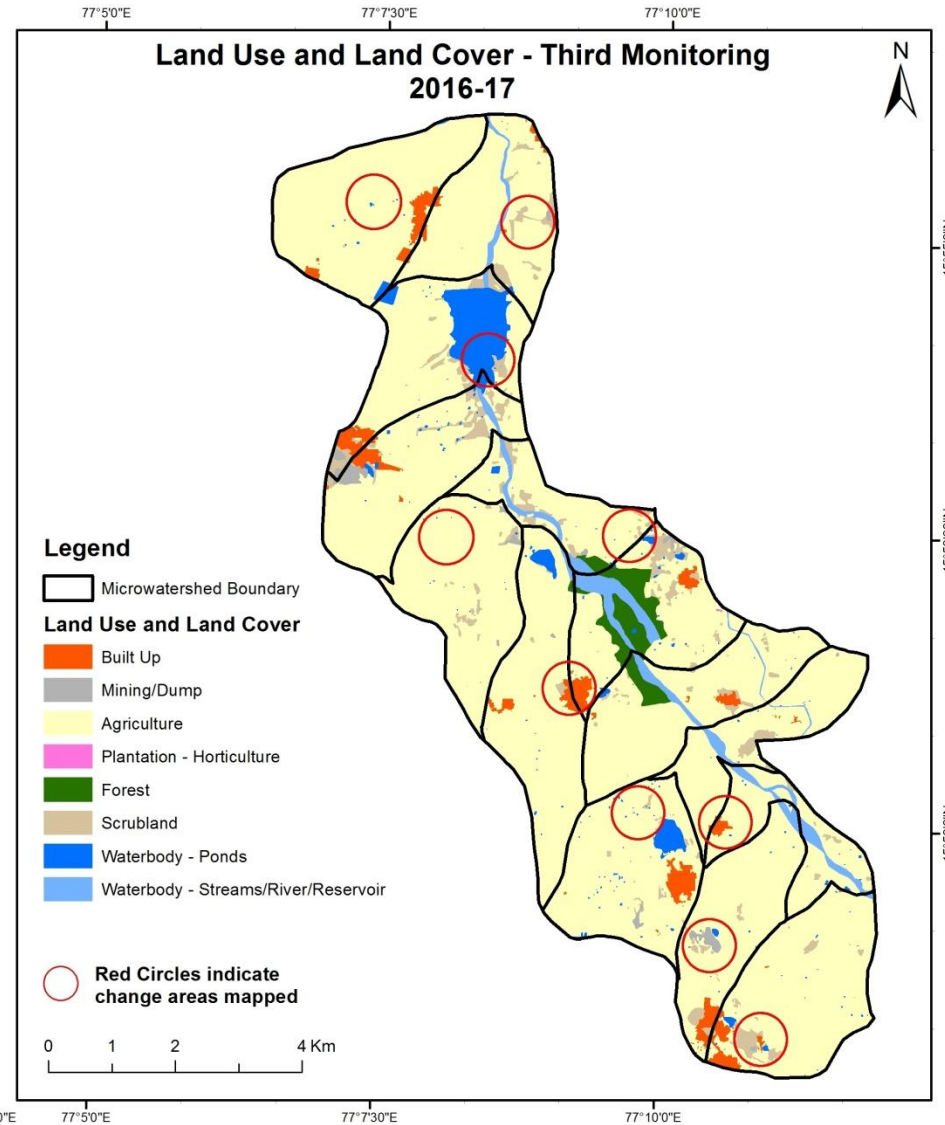
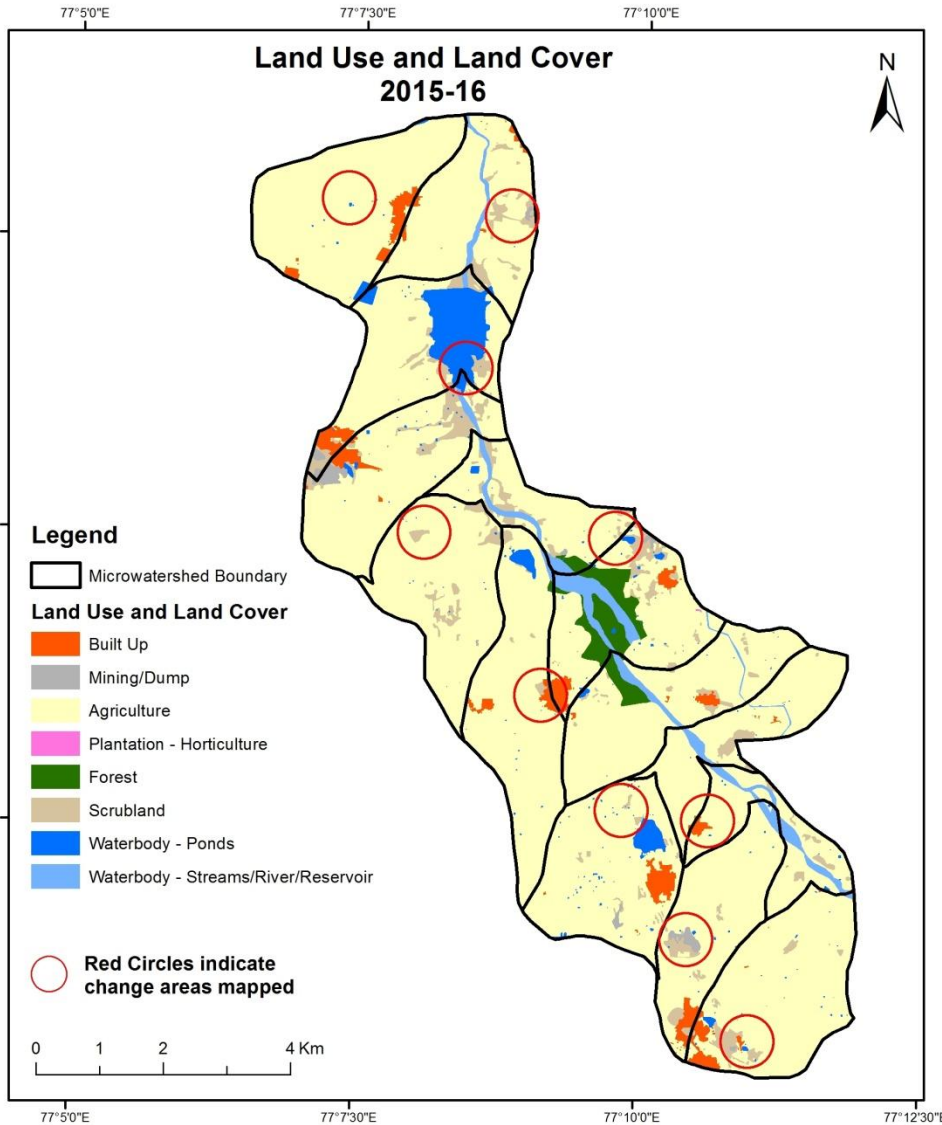
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



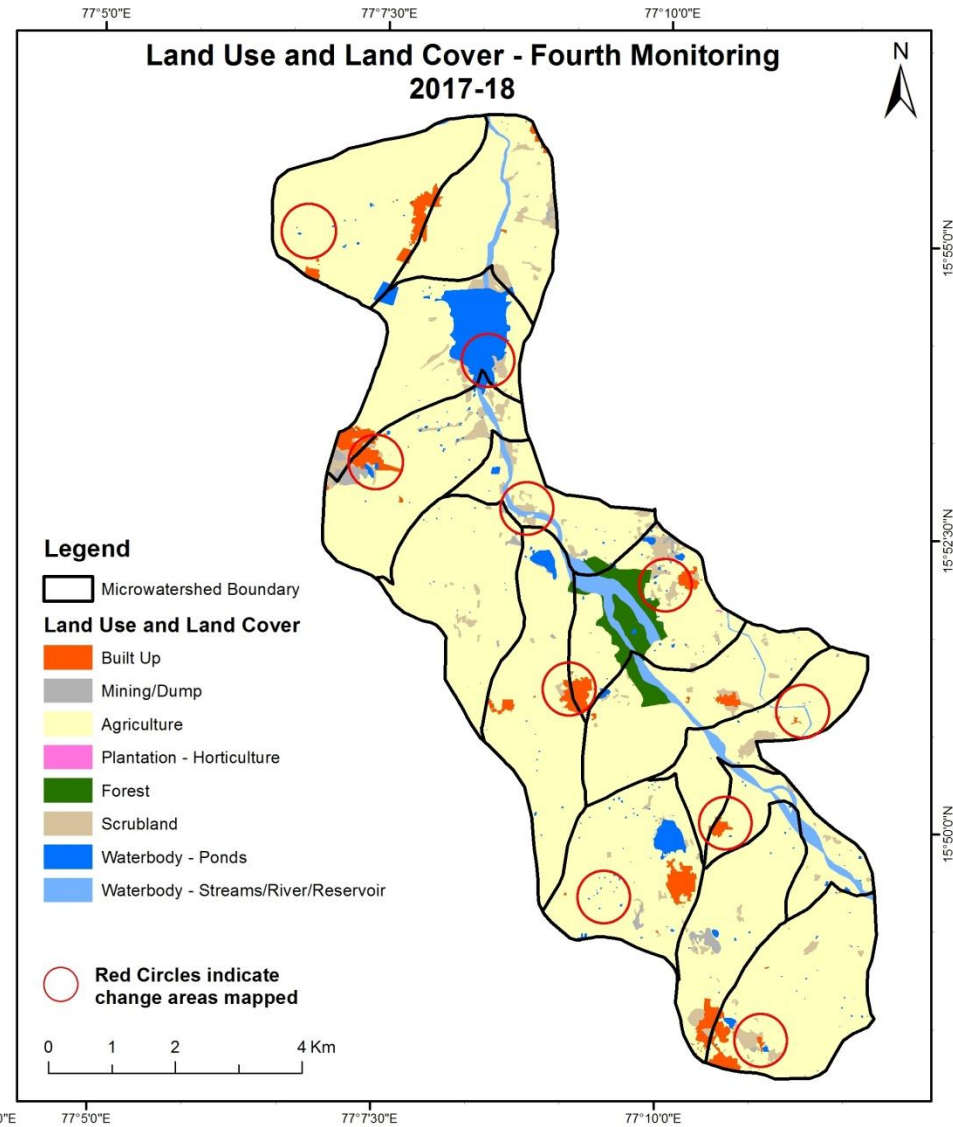
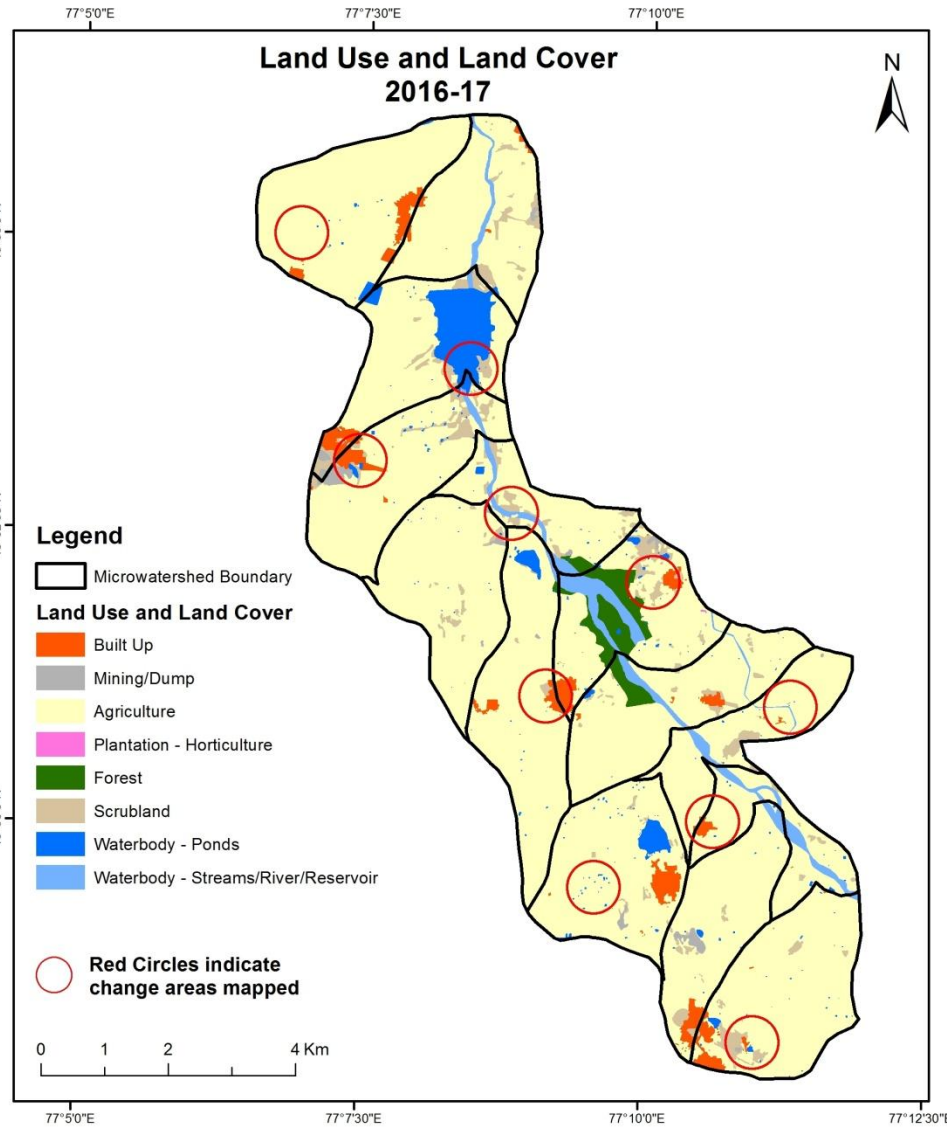
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



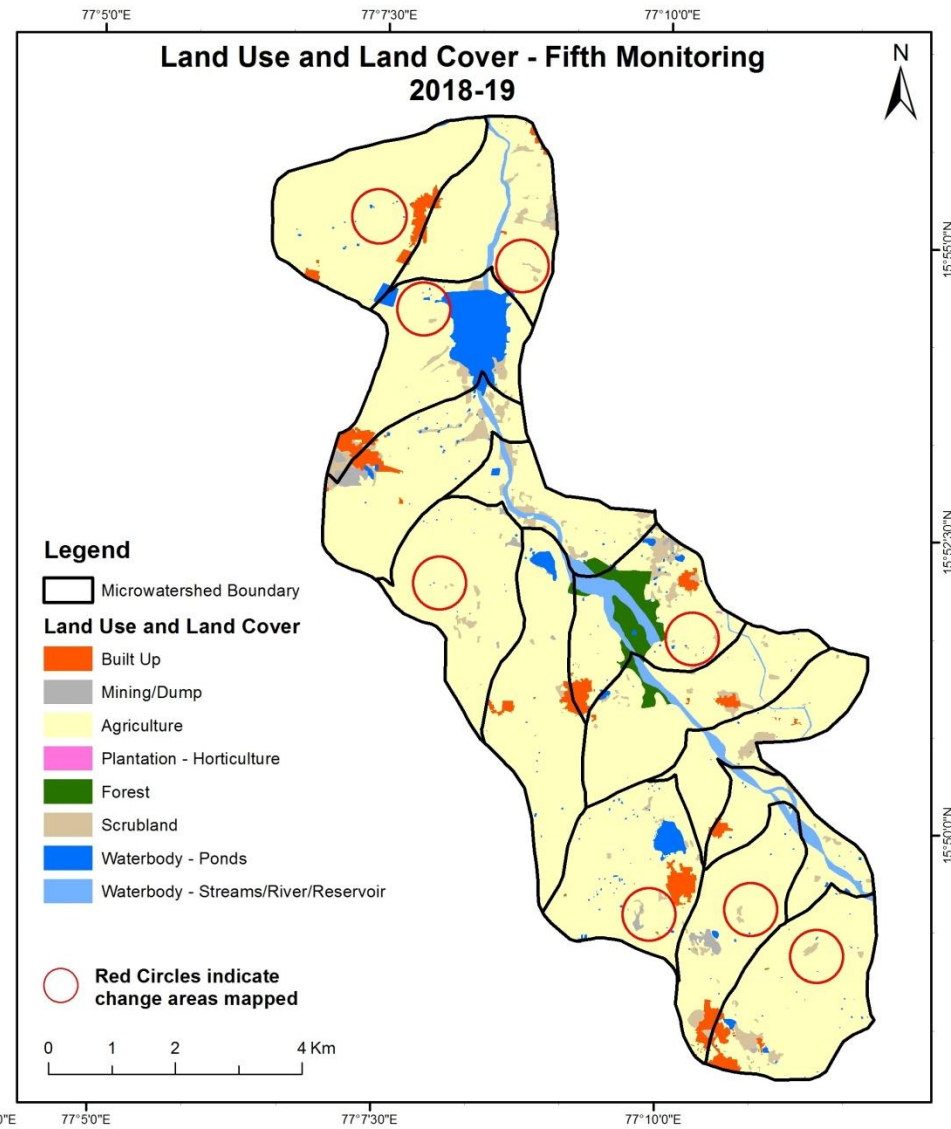
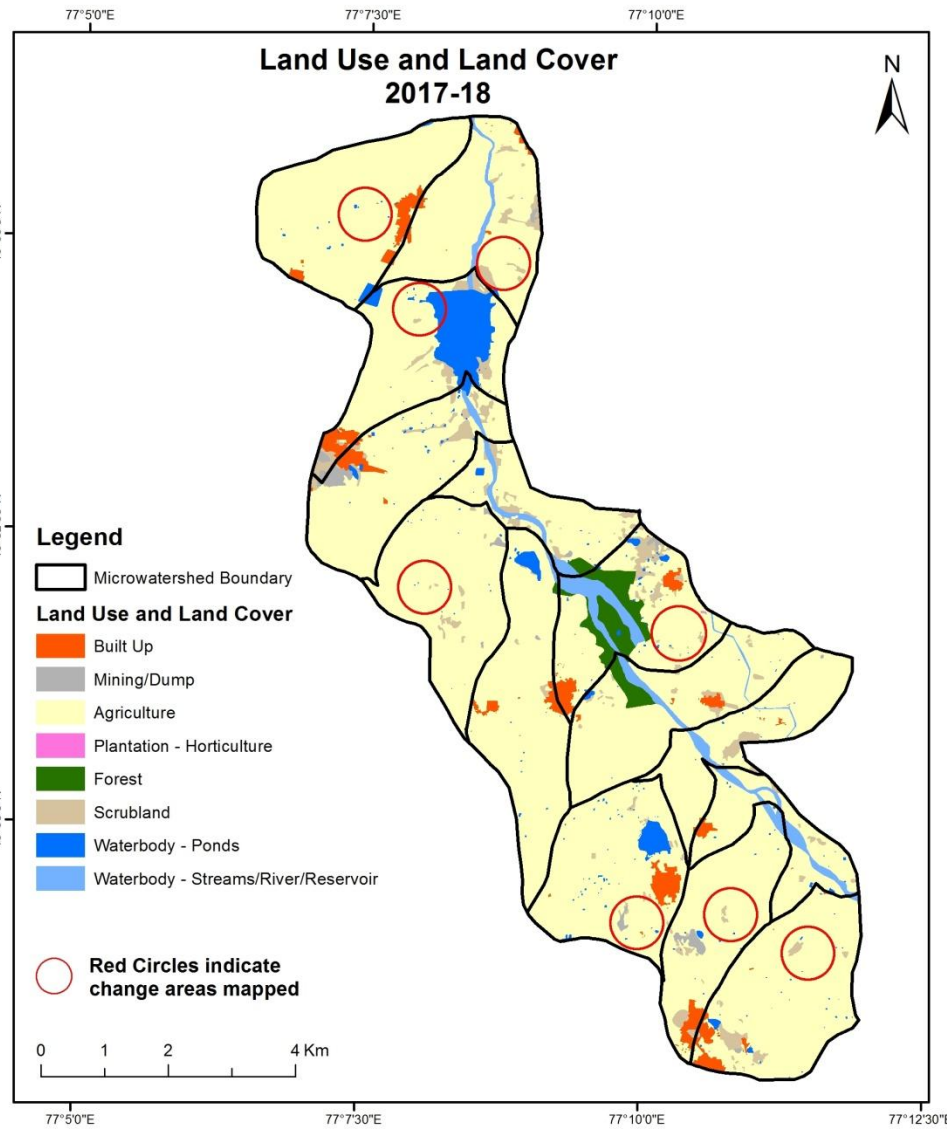
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

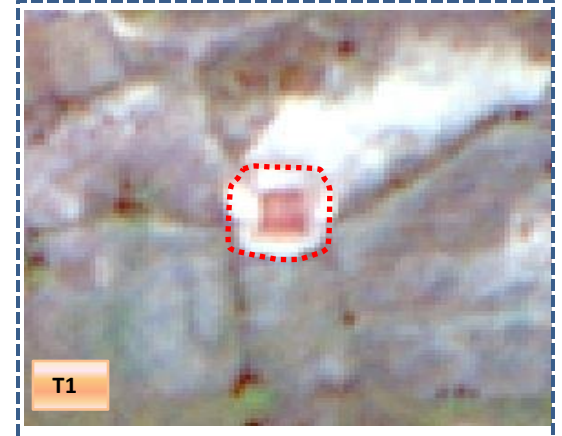


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body

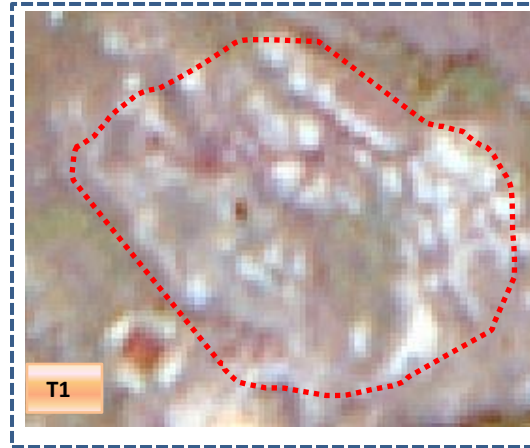


T0: 2010-11 (77°10'6.232"E 15°51'34.187"N)

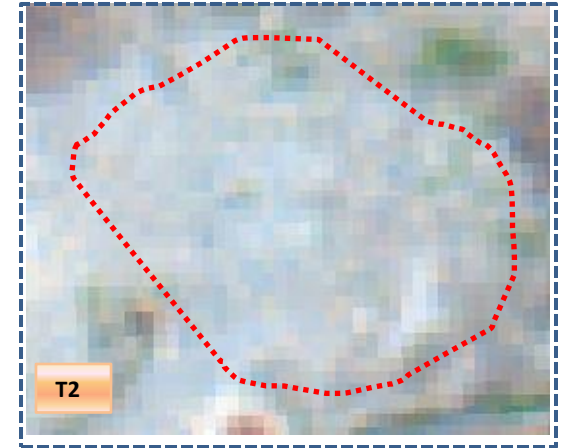


T1: 30th November 2014

Scrubland and Agriculture



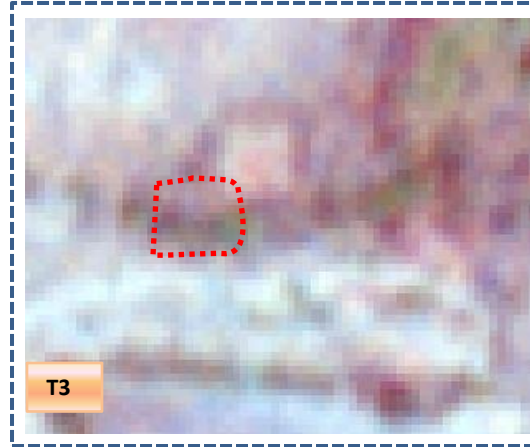
T1: 2014-15 (77°8'52.304"E 15°52'25.089"N)



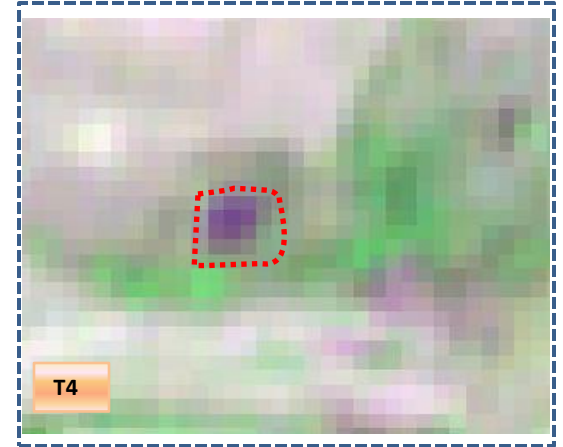
T2: 22nd October 2016

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

Agriculture to Water body



T3: 2016-17 ($77^{\circ}10'1.911''\text{E}$ $15^{\circ}52'12.567''\text{N}$)



T4: 08th March 2018

Scrubland to Agriculture



T4: 2017-18 ($77^{\circ}7'53.803''\text{E}$ $15^{\circ}53'51.245''\text{N}$)



T5: 23rd March 2019

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

Agriculture to Water body



T0

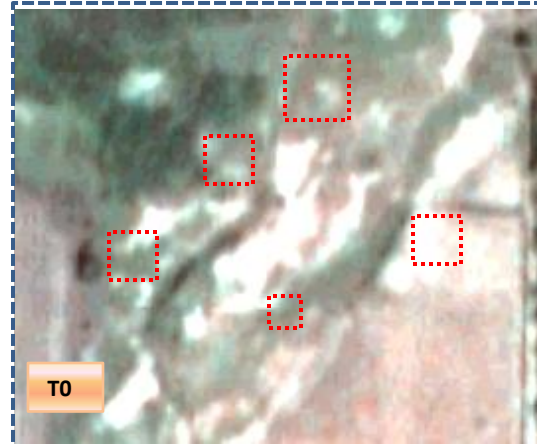
T0: 2010-11



T1

T1: 30 November 2014

Scrub to water body



T0

T0: 2010-11

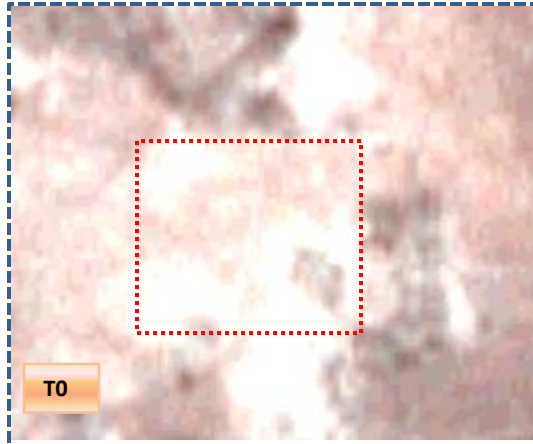


T1

T1: 30 November 2014

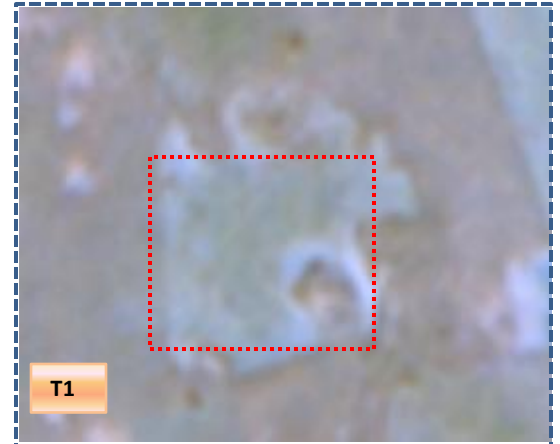
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

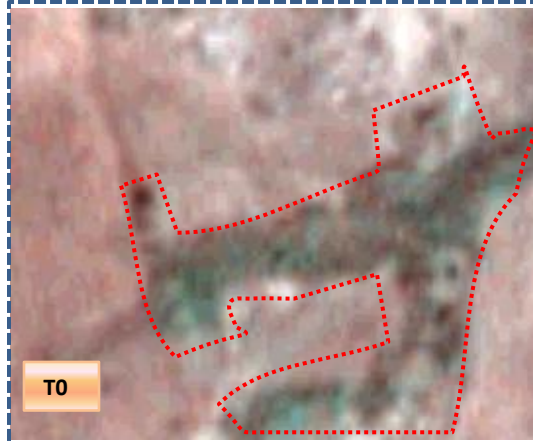
T0: 2010-11



T1

T1: 30 November 2014

Scrub to Agriculture



T0

T0: 2010-11



T1

T1: 30 November 2014

Table showing change matrix depicting Land cover transitions during study period-2010-11 to 2014-15

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	134.02												134.02
Mining/dump		31.75											31.75
Agriculture	13.25	0.10	5026.35	0.29				1.54			10.62		5052.13
Plantation Horticulture			0.37	3.69									4.06
Forest			4.93		111.67						0.61		117.21
Forest Plantation													
Barren Rocky													
Scrub	14.24		120.23					378.29			18.92		531.67
Waterbody- Streams/River									170.59				170.59
Waterbody – Ponds											143.60		143.60
Grand Total	161.51	31.85	5151.87	3.98	111.67			379.83	170.59		173.75		6185.04

- 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 25 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrubland and water body in T1.
- In T1 125 ha of the agriculture area has increased from plantations, forest 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-2014-15 to 2015-16

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	161.51										161.51	
Mining/dump		31.85									31.85	
Agriculture	2.86		5138.16							10.84	5151.87	
Plantation Horticulture			3.69	0.29							3.98	
Forest			1.63		109.68					0.36	111.67	
Forest Plantation												
Barren Rocky												
Scrub		0.84	82.17					295.11		1.71	379.83	
Waterbody- Streams/River			0.54						170.06		170.59	
Waterbody – Ponds			4.61							169.15	173.75	
Grand Total	164.37	32.68	5230.80	0.29	109.68			295.11	170.06	182.06	6185.04	

- 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 13 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 87 ha of the agriculture area has increased from plantations, 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	164.37												164.37
Mining/dump		32.68											32.68
Agriculture	1.60		5227.13							2.07			5230.80
Plantation Horticulture				0.29									0.29
Forest			4.64		105.01						0.03		109.68
Forest Plantation													
Barren Rocky													
Scrub	0.29	4.07	55.69					234.10			0.96		295.11
Waterbody- Streams/River			0.43						169.63				170.06
Waterbody – Ponds											182.06		182.06
Grand Total	166.26	36.75	5287.88	0.29	105.01			234.10	169.63		185.13		6185.04

- 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 03 ha of the agriculture area has decreased and it is converted into Built-up and water body in T3.
- In T3 60 ha of the agriculture area has increased from forest, 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-2016-17 to 2017-18

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	166.26												166.26
Mining/dump		36.75											36.75
Agriculture	0.88		5285.77							1.23			5287.88
Plantation Horticulture				0.29									0.29
Forest			1.18		103.73					0.10			105.01
Forest Plantation													
Barren Rocky													
Scrub			22.05					211.12		0.93			234.10
Waterbody- Streams/River									169.63				169.63
Waterbody – Ponds			0.30							184.82			185.13
Grand Total	167.14	36.75	5309.30	0.29	103.73			211.12	169.63	187.09			6185.04

- 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 02 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.
- In T4 23 ha of the agriculture area has increased from forest, 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-2017-18 to 2018-19

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	167.14												167.14
Mining/dump		36.75											36.75
Agriculture			5309.30										5309.30
Plantation Horticulture				0.29									0.29
Forest			18.48		85.26								103.73
Forest Plantation													
Barren Rocky													
Scrub			12.41					198.67			0.04		211.12
Waterbody- Streams/River									169.63				169.63
Waterbody – Ponds											187.09		187.09
Grand Total	167.14	36.75	5340.19	0.29	85.26			198.67	169.63		187.13		6185.04

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T5 30 ha of the agriculture area has increased from forest and scrubland 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 42 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
4. There is an increase of 99, 78, 57, 21 & 30 Hectares From T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 288 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is a decrease of 333 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
6. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.