

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -24/2010-11
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

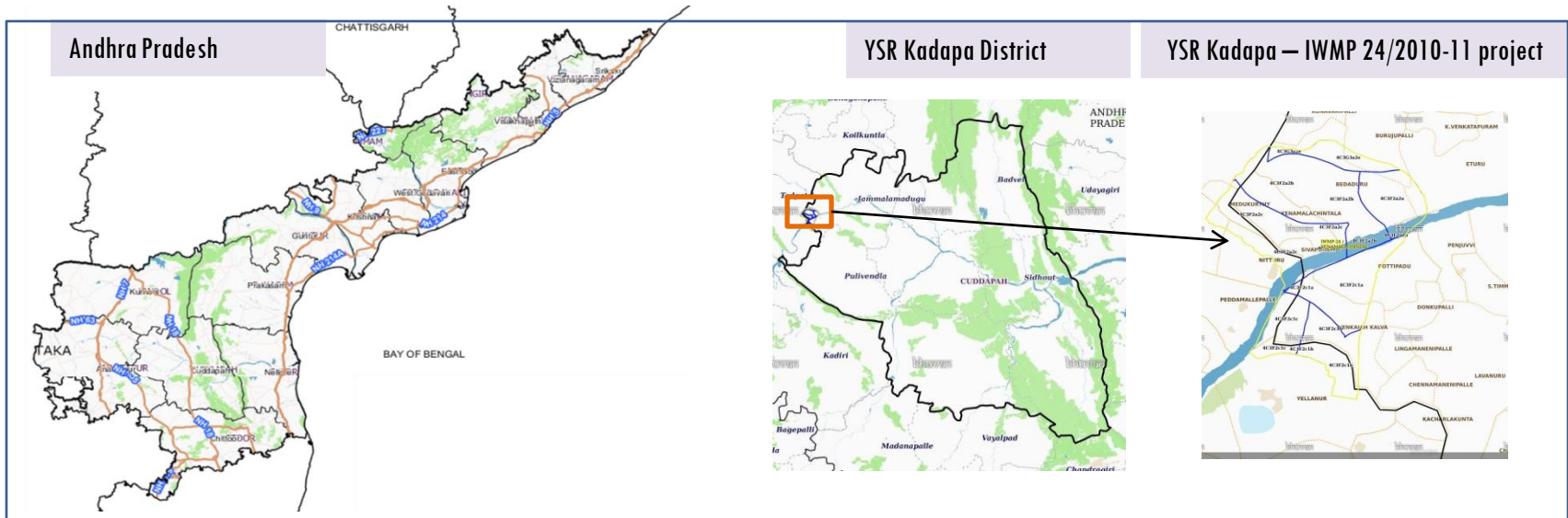
E X E C U T I V E S U M M A R Y

- 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-24/2010-11, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is 5,748 ha. It comprises of 7 micro watersheds.
- In the project area 580 Drishti photos were uploaded showing check dams/Rock fill dam, New activities of boulder removal, farm ponds, dug out pits etc, and remaining showing other activities.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and 4 check dams and drainage treatments with 10.71 ha increase in the area.
- Major percentage i.e. 57.48 % is covered by the agriculture, 21.87 % is covered by scrubland, 7.36 % is plantation area and remaining by other land use classes.

PROJECT : YSR KADAPA - IWMP-24/2010-11

DISTRICT : YSR KADAPA , STATE : ANDHRA PRADESH

- The study area falls in Kondapuram Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is 5,748 ha. It comprises of 7 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (*Batch -1*) projects taking 2018-19 (T5) period satellite images



- YSR Kadapa 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 38 °C range and it reaches around 44 °C to 45 °C .
- The average annual rainfall of the YSR Kadapa District is 710 mm, which ranges from nil rainfall in January to 137 mm in October. October is the wettest month of the year. The mean seasonal rainfall distribution is 402.4 mm in southwest monsoon (June - September), 239.1 mm in northeast monsoon (October - December), distribution of rainfall in season wise 56.7 % in south west monsoon, 33.7 % in north east monsoon period.

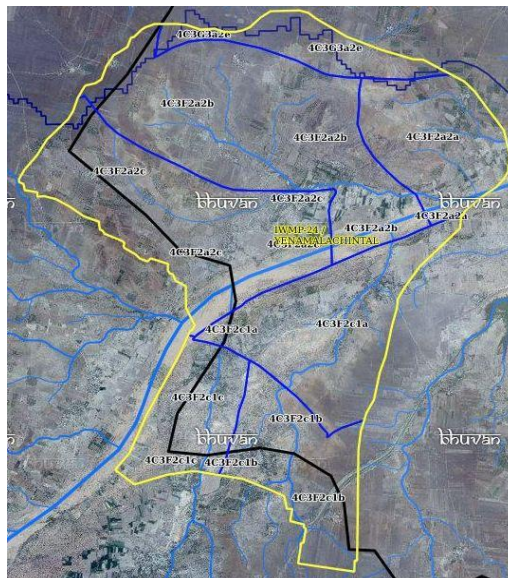
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			25-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			25-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	Drishti Photographs	
	Total	580
4	Detailed Project Report	

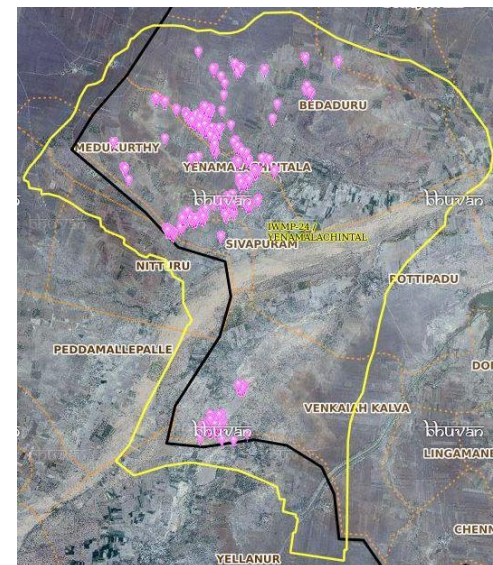
Natural Color Composite overlaid with Project boundaries and high detail stream network



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	Agronomic measures	0	0
2	Afforestation	0	0
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	35	30
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	216	200
11	Civil work-Check dams /Rock fill dam	74	50
12	Drainage treatment /Nala Revetment, loose boulder structure, gully check	0	0
13	Land Developments (afforestation, horticulture and bund plantation of teak)	0	0
14	Lm (fodder development, varmi compost)	0	0
15	Soil moisture conservation	0	0
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity	0	0
18	Others	441	300
	TOTAL	766	580

MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

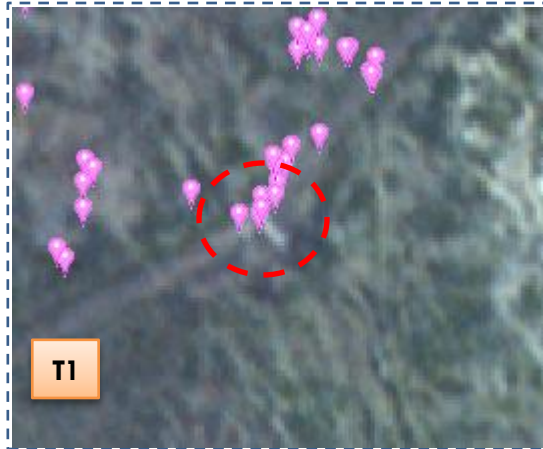
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2010-11) and T5 is 2018-19 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-24/2010-11



T0

T0: 2010-11



T1

T1: 26 January 2015



Drishti Sl no. 2579029 MWS :4C3F2a2b

Check dam



T0

T0: 2010-11



T1

T1: 26 January 2015



Drishti Sl no. 782618 MWS :4C3F2a2b

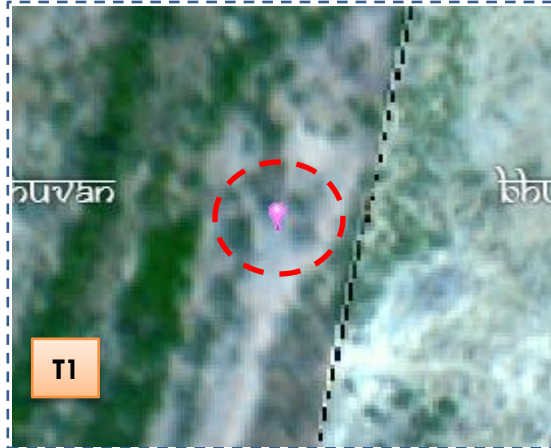
Farm pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-24/2010-11



T0

T0: 2010-11



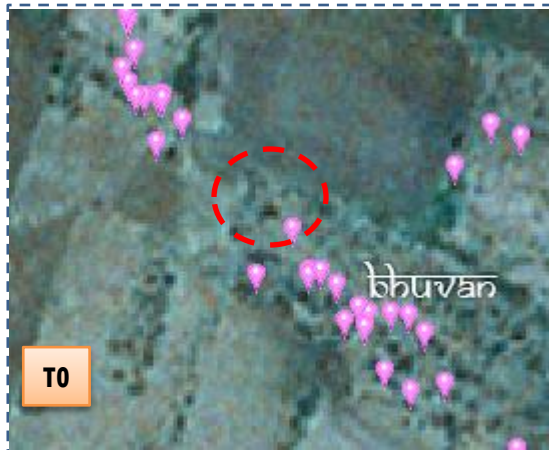
T1

T1: 26 January 2015



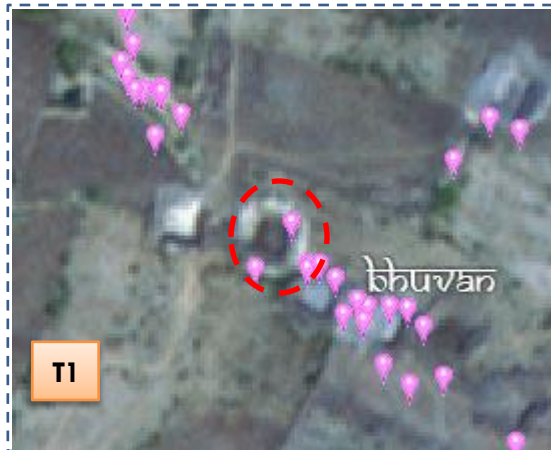
Drishti Sl no. 2163146 MWS : 4C3F2a2b

Farm pond



T0

T0: 2010-11



T1

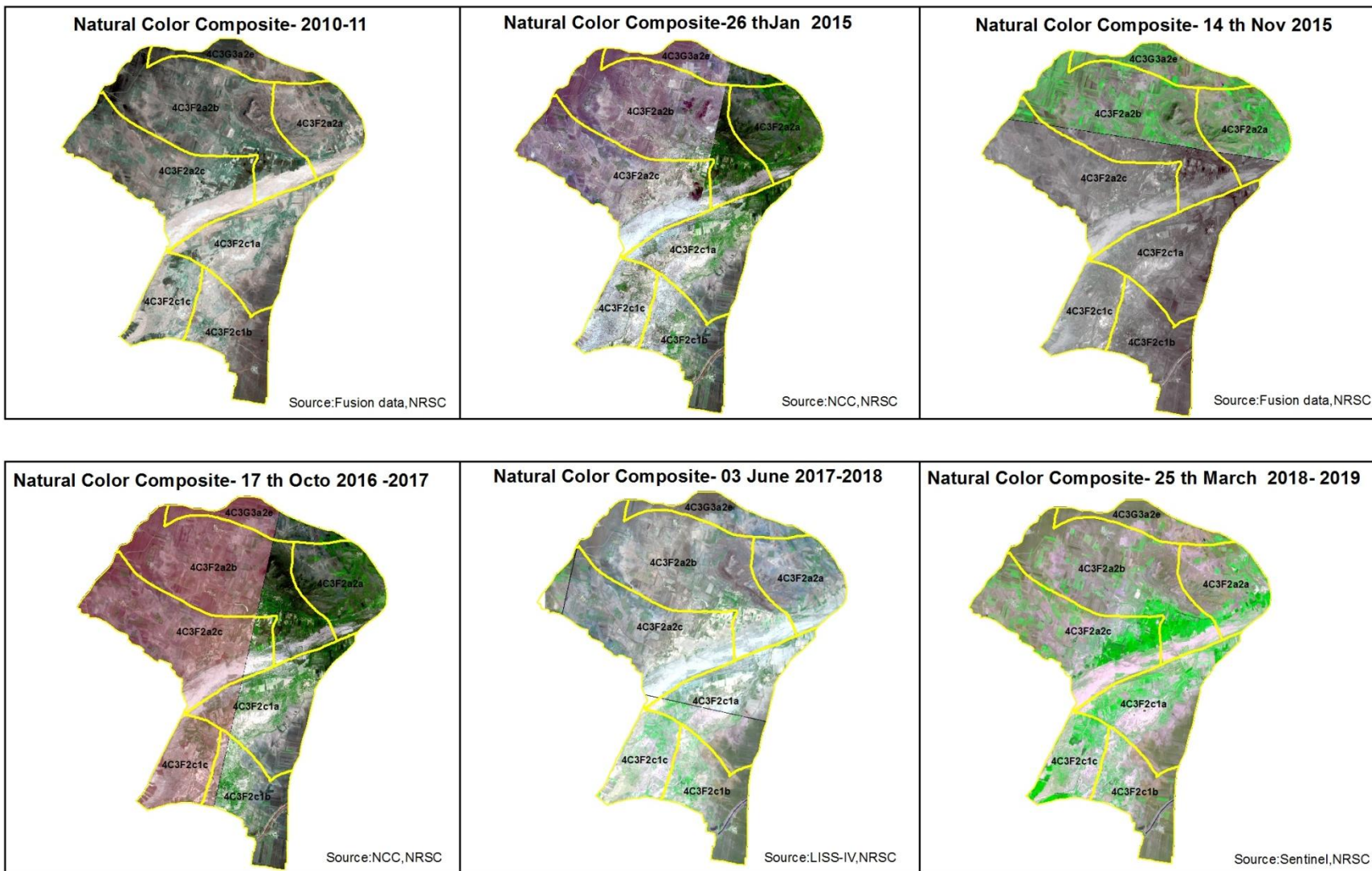
T1: 26 January 2015



Drishti Sl no. 2418459 MWS : 4C3F2a2b

Farm pond

Natural Color Composite – 2010-11 to 2018-19



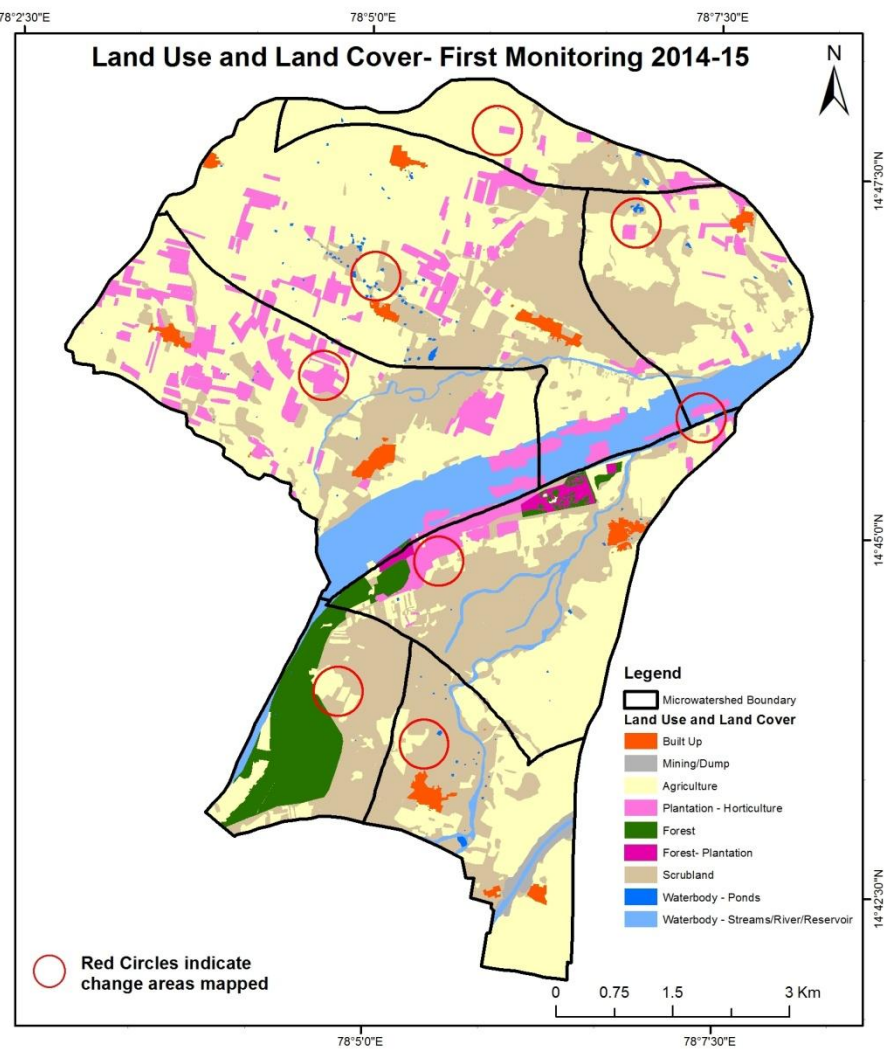
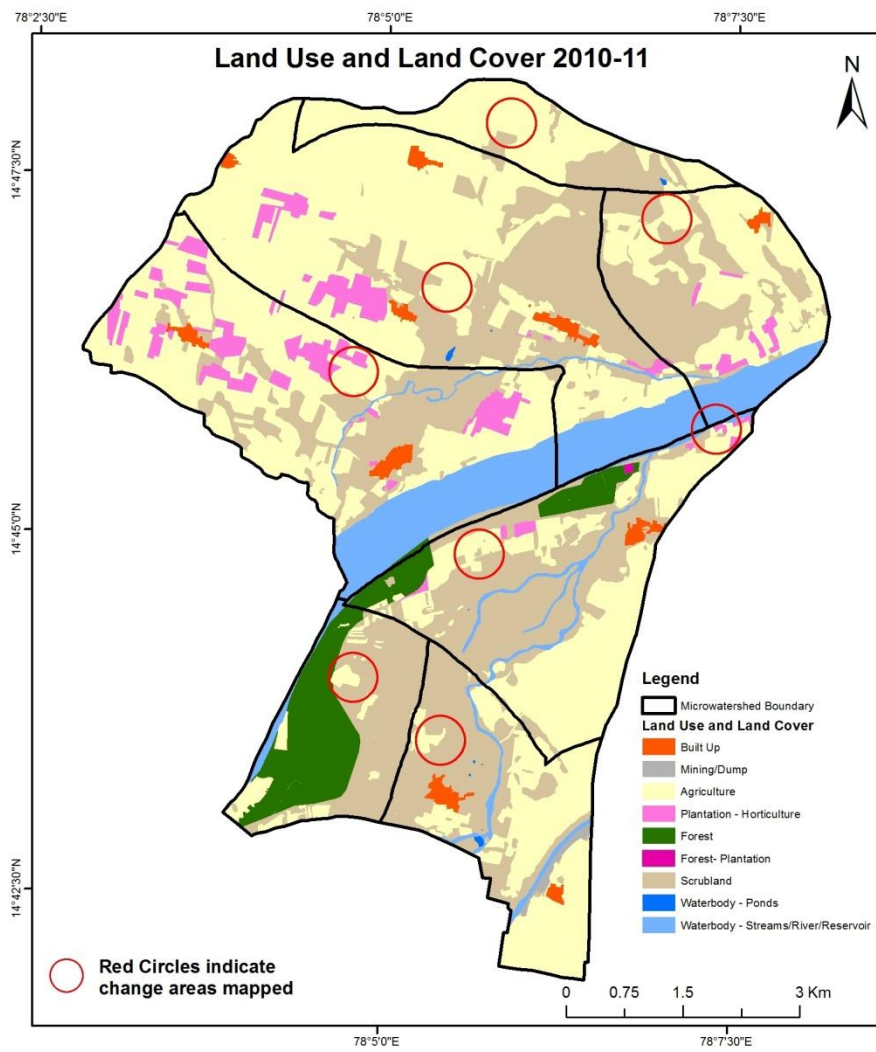
MONITORING IN THE PROJECT AREA

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)

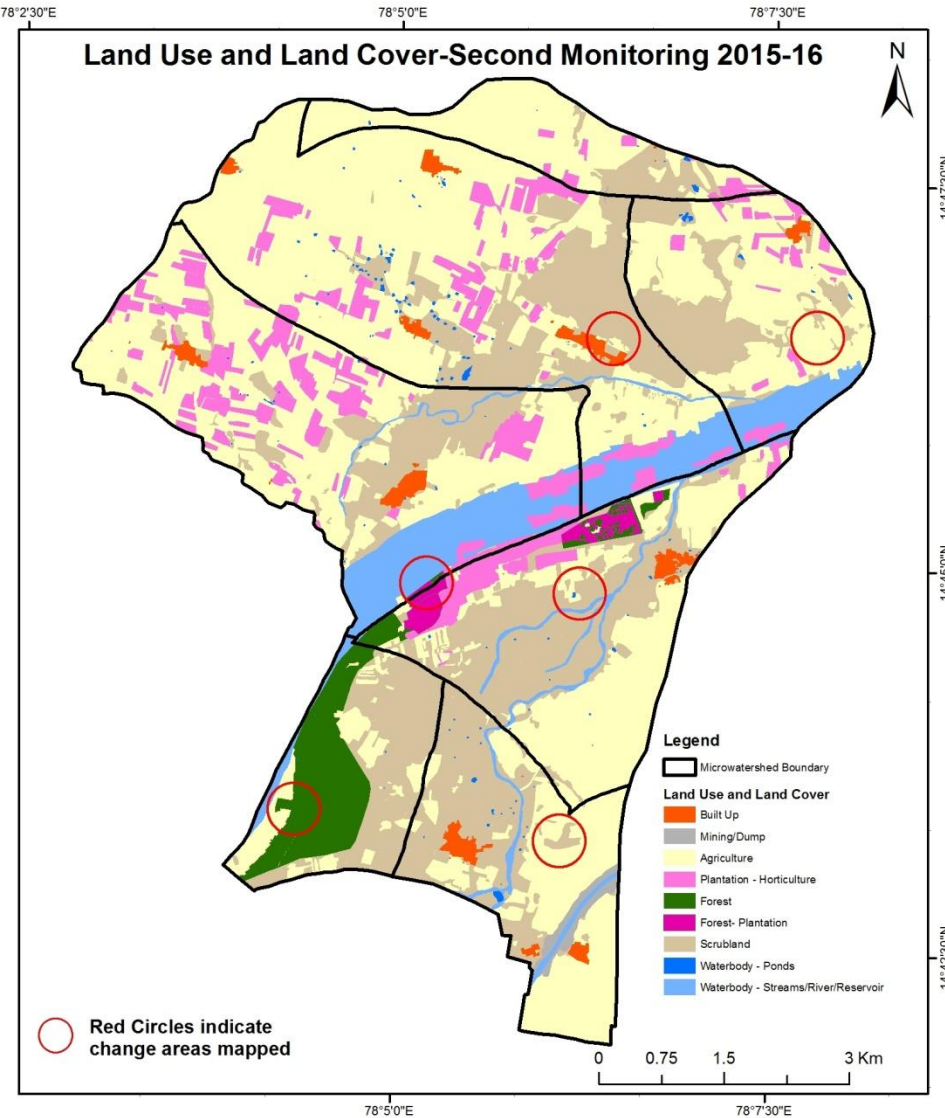
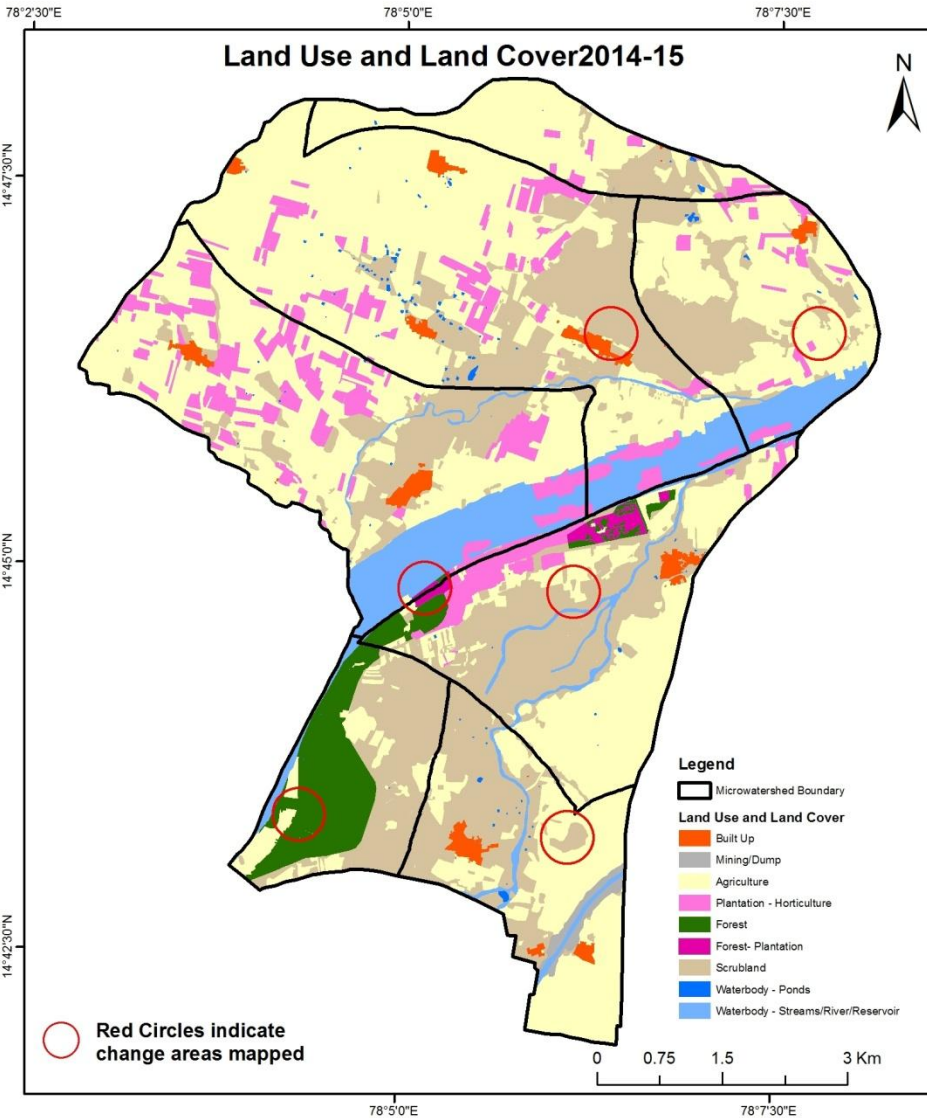
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000j



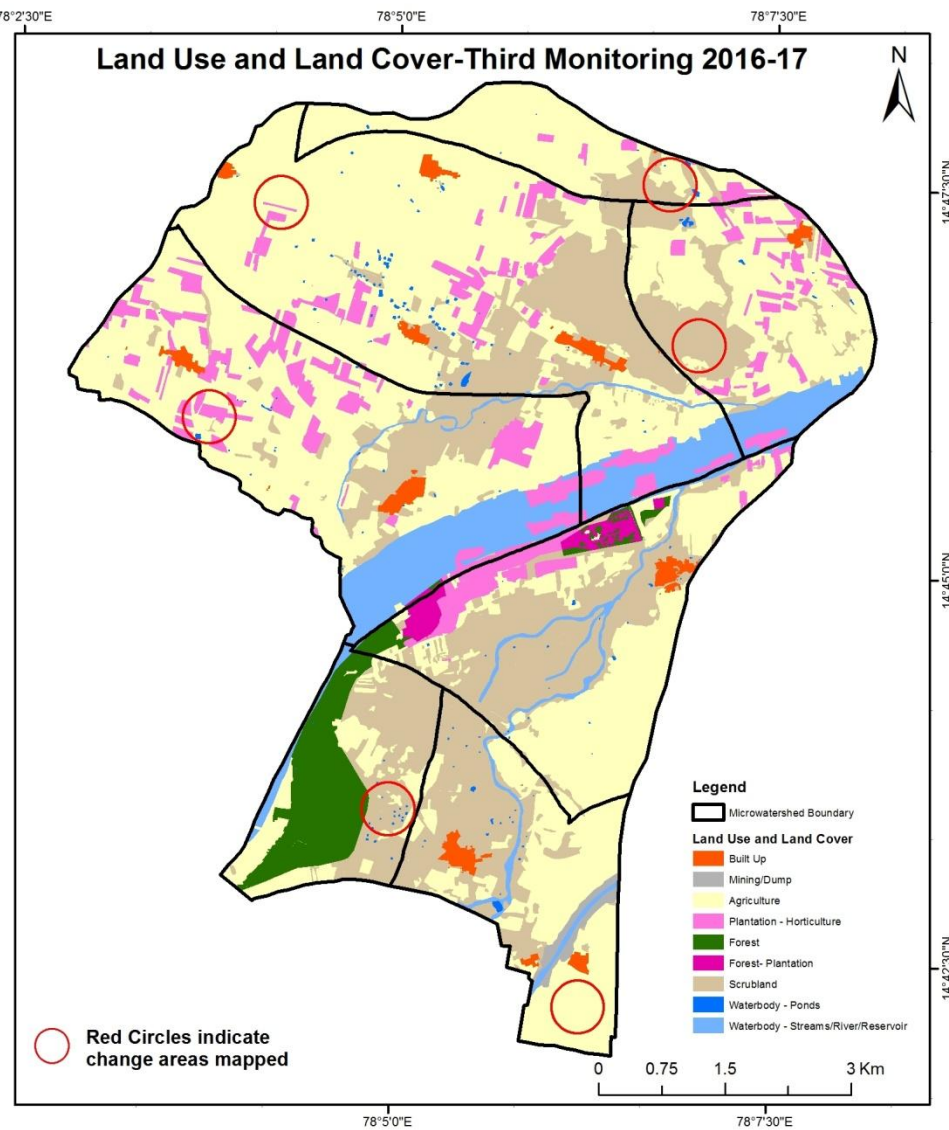
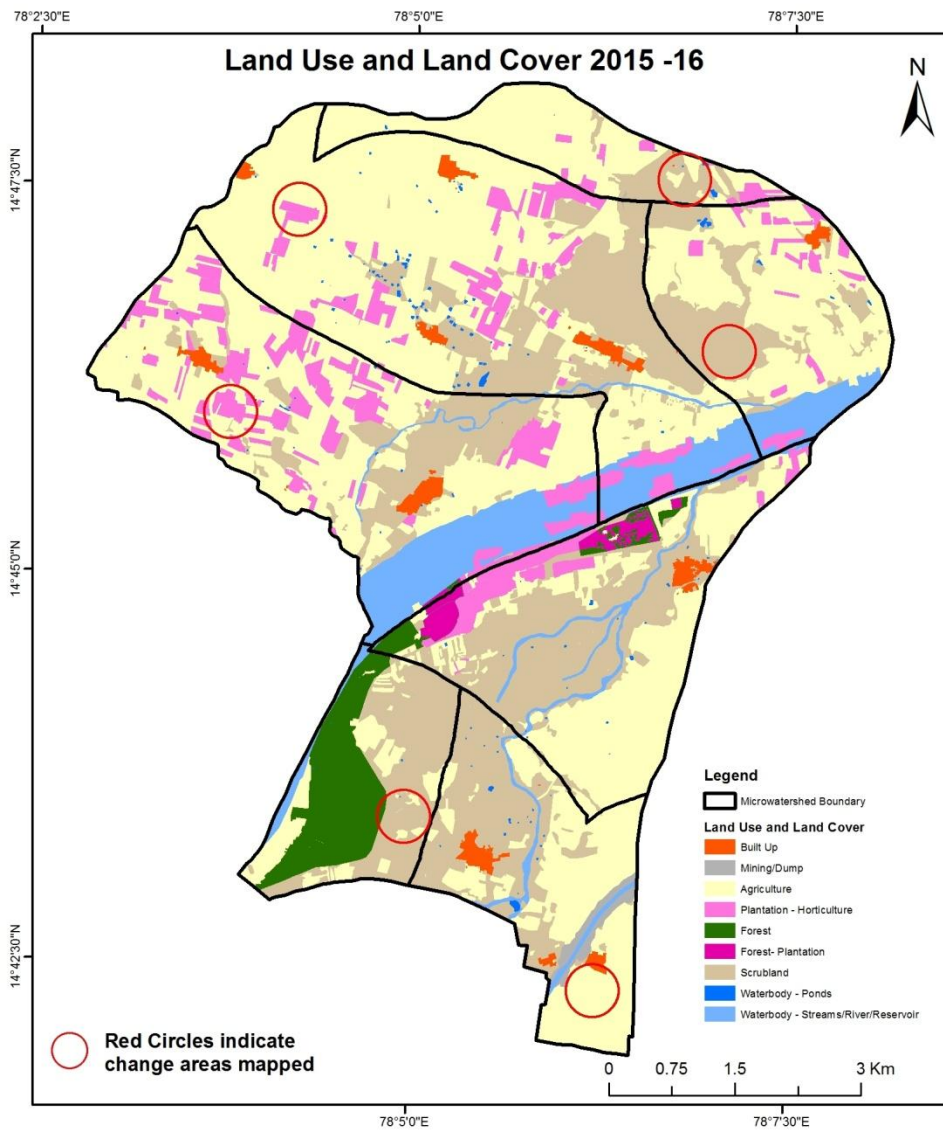
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000j



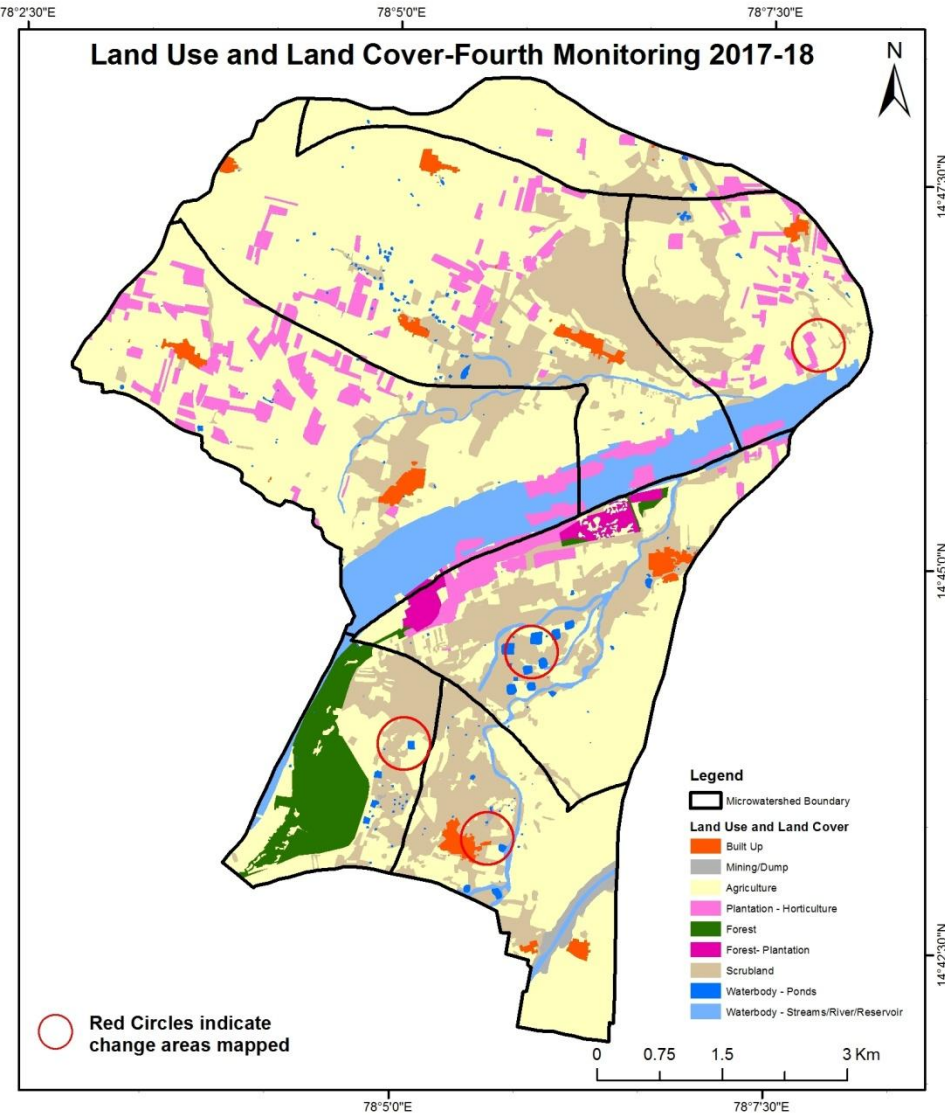
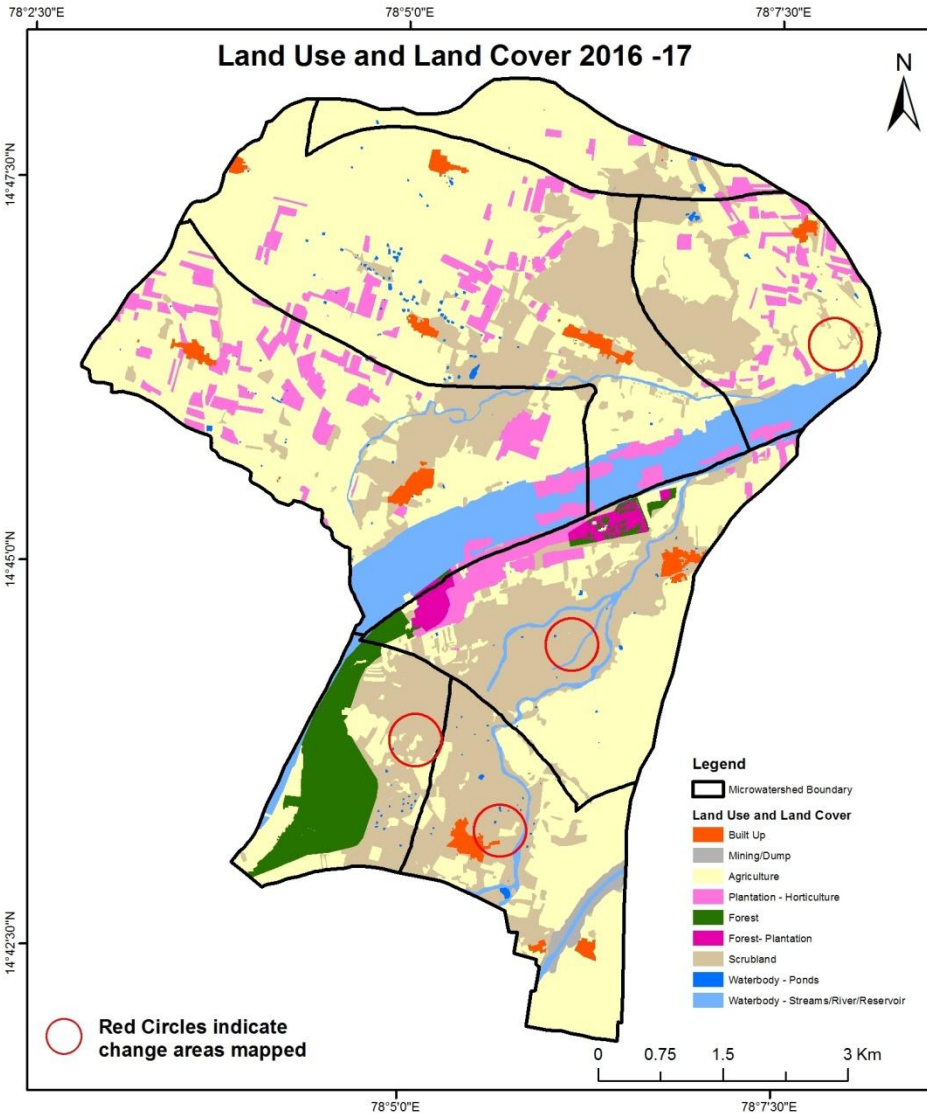
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000j



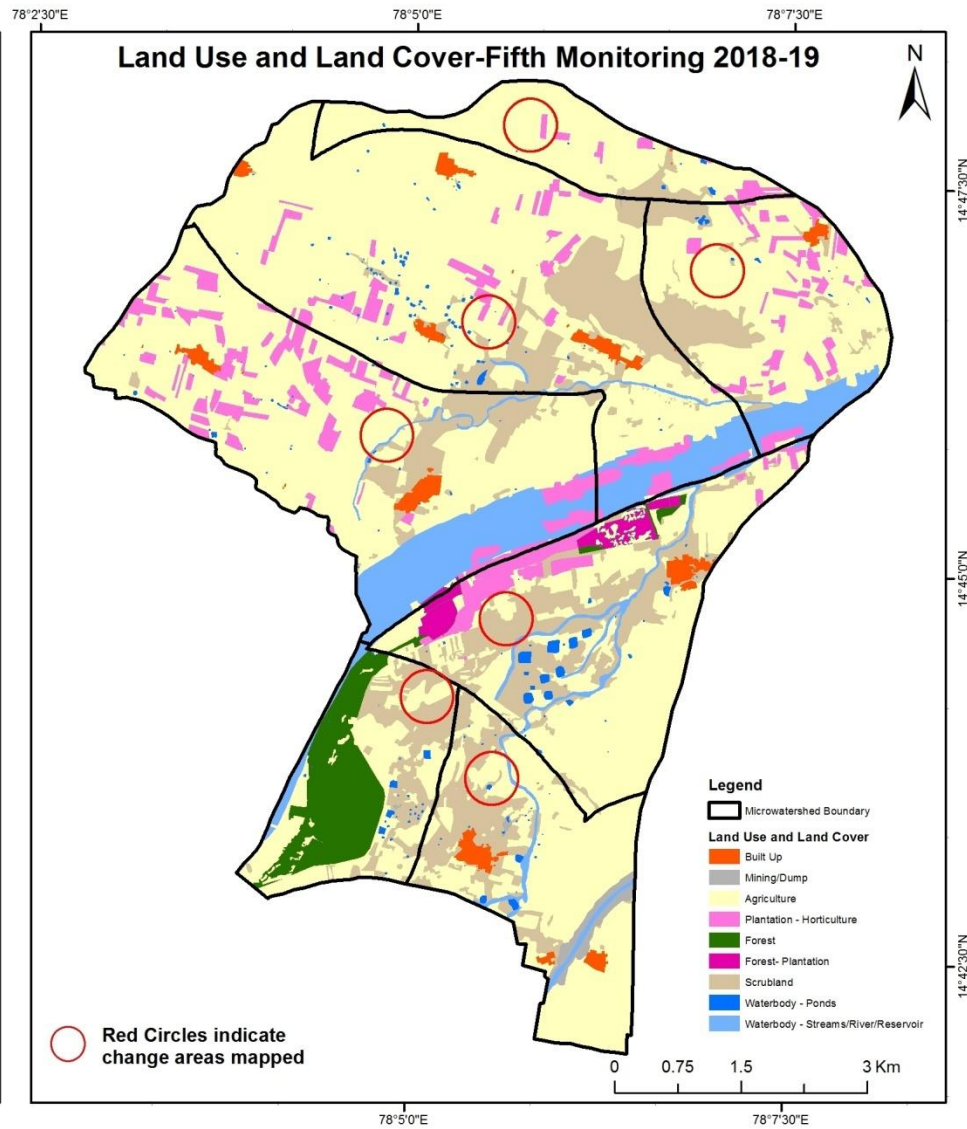
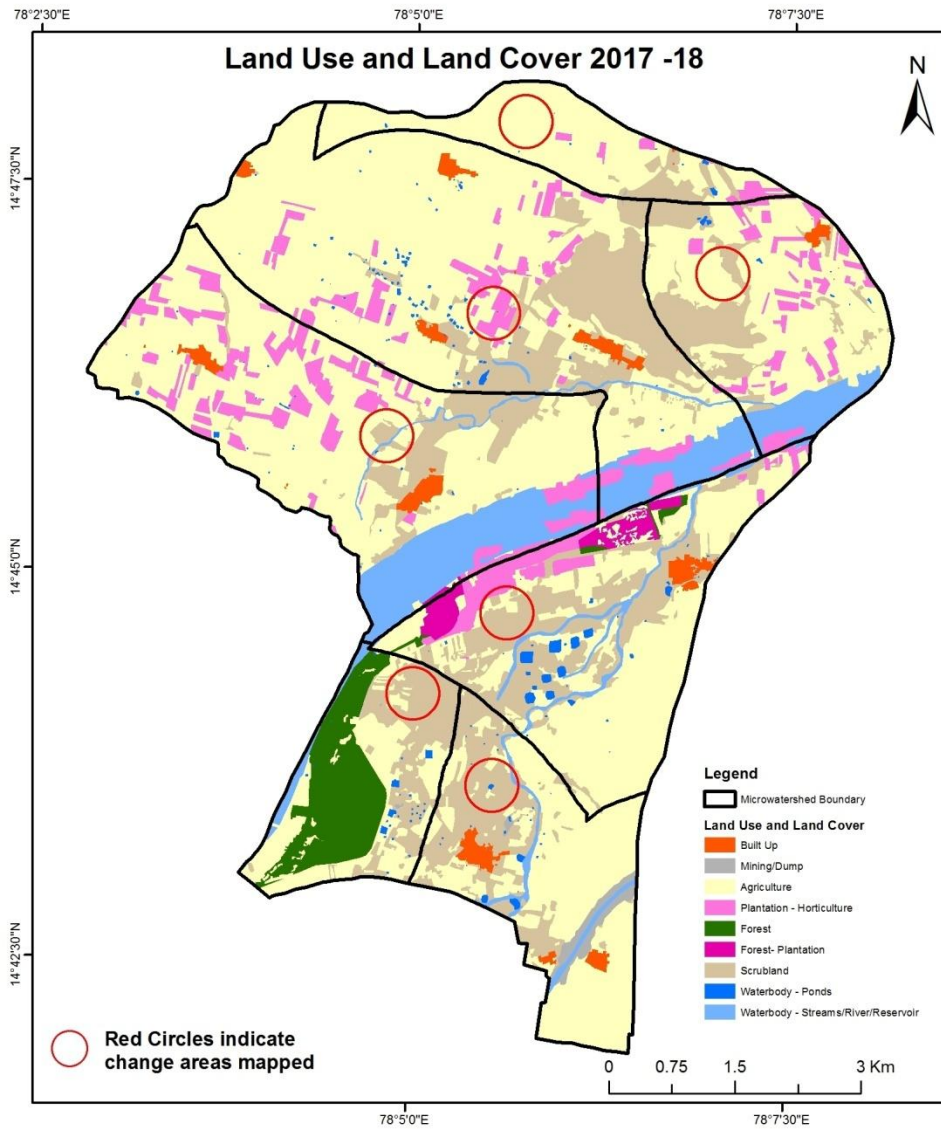
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000j



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

Scale: 1:10000j

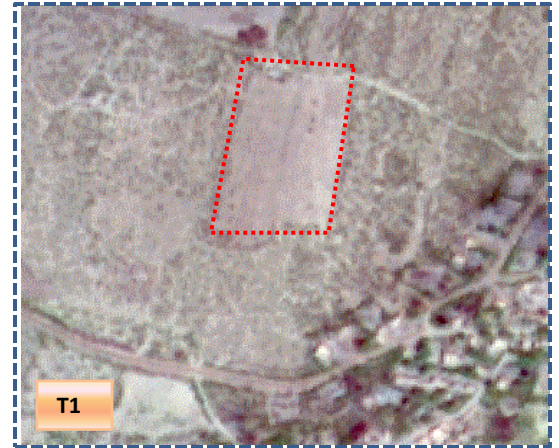


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture

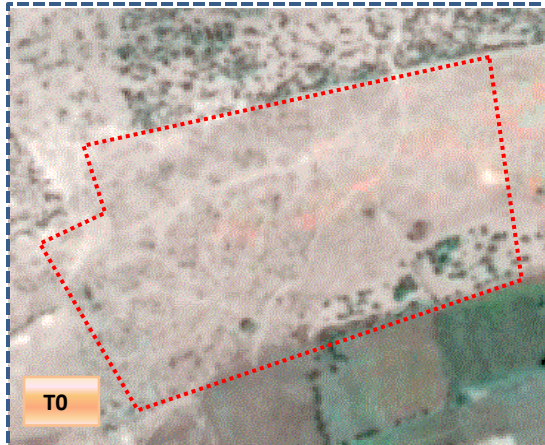


T0: 2010-11(78°4'53.723"E 14°45'37.255"N)



T1: 26 Jan 2015

Agriculture to Plantation



T0: 2010-11 (78°5'29.72"E 14°44'56.112"N)



T1: 26 Jan 2015

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

Agriculture to Plantation



T0: 2010-11



T0: 25 January 2015

Scrub to Plantation



T0: 2010-11



T0: 25 January 2015

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

Agriculture to Water body



T0

T0: 2010-11



T1

T1: 25 January 2015

Agriculture to Water body



T0

T0: 2010-11



T1

T1: 25 January 2015

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	77.13										77.13	
Mining/dump		12.22									12.22	
Agriculture	5.30		2529.08	255.04				15.40		3.05	2807.86	
Plantation Horticulture			99.38	128.94				0.69		0.32	229.33	
Forest			14.84	1.80	219.16	26.87				0.06	262.74	
Forest Plantation						1.45					1.45	
Barren Rocky												
Scrub	3.15	13.20	247.05	38.65				1551.76		7.58	1861.40	
Waterbody- Streams/River			12.45	60.49					420.32		493.26	
Waterbody – Ponds										3.11	3.11	
Grand Total	85.58	25.42	2902.80	484.93	219.16	28.32		1567.86	420.32	14.11	5748.50	

- 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 278 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T1.
- In T1 373 ha of the agriculture area has increased from plantations, forest, 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-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		
Built up	85.58												85.58
Mining/dump		25.42											25.42
Agriculture	0.10		2864.24	23.80				13.75			0.91		2902.80
Plantation Horticulture			15.08	469.79							0.05		484.93
Forest			5.64		199.91	13.62							219.16
Forest Plantation						28.32							28.32
Barren Rocky													
Scrub			34.89					1532.29			0.68		1567.86
Waterbody- Streams/River									420.32				420.32
Waterbody – Ponds											14.11		14.11
Grand Total	85.68	25.42	2919.84	493.59	199.91	41.94		1546.04	420.32		15.76		5748.50

- 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 38 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T2.
- In T2 55 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	85.68										85.68	
Mining/dump		25.42									25.42	
Agriculture			2885.57	31.52				2.05		0.70	2919.84	
Plantation Horticulture			71.36	422.12						0.11	493.59	
Forest					199.91						199.91	
Forest Plantation						41.94					41.94	
Barren Rocky												
Scrub			141.52	2.28				1400.89		1.35	1546.04	
Waterbody- Streams/River			0.97						419.34		420.32	
Waterbody – Ponds										15.76	15.76	
Grand Total	85.68	25.42	3099.42	455.92	199.91	41.94		1402.95	419.34	17.91	5748.50	

- 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 34 ha of the agriculture area has decreased and it is converted into plantation, scrubland and water body in T3.
- In T3 213 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-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	85.68										85.68	
Mining/dump		25.42									25.42	
Agriculture	1.03		3079.34	15.05		2.85				1.15	3099.42	
Plantation Horticulture			35.36	420.46						0.11	455.92	
Forest			25.13		174.71					0.07	199.91	
Forest Plantation						41.94					41.94	
Barren Rocky												
Scrub	1.87	1.95	249.48	1.83				1128.87	2.19	16.75	1402.95	
Waterbody- Streams/River			2.37	2.48					414.50		419.34	
Waterbody – Ponds										17.91	17.91	
Grand Total	88.58	27.38	3391.67	439.81	174.71	44.79		1128.87	416.69	35.99	5748.50	

- 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 20 ha of the agriculture area has decreased and it is converted into Built-up, plantation, forest plantation and water body in T4.
- In T4 312 ha of the agriculture area has increased from plantation, 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	88.58										88.58	
Mining/dump		27.38									27.38	
Agriculture	0.08		3385.12	5.86						0.62	3391.67	
Plantation Horticulture			42.55	397.18						0.08	439.81	
Forest					174.71						174.71	
Forest Plantation						44.79					44.79	
Barren Rocky												
Scrub			219.04					909.28		0.55	1128.87	
Waterbody- Streams/River			4.72						411.97		416.69	
Waterbody – Ponds										35.99	35.99	
Grand Total	88.66	27.38	3651.43	403.04	174.71	44.79		909.28	411.97	37.24	5748.50	

- 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 06 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T4.
- In T5 266 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 47 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 94, 17, 179, 292 & 259 Hectares From T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 843 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is an increase of 173 ha of the plantation area as compared between 2010-11 (T0) & 2018-19 (T5).
6. There is a decrease of 333 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (200) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (216) verified from the portal.