

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -21/2010-11
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

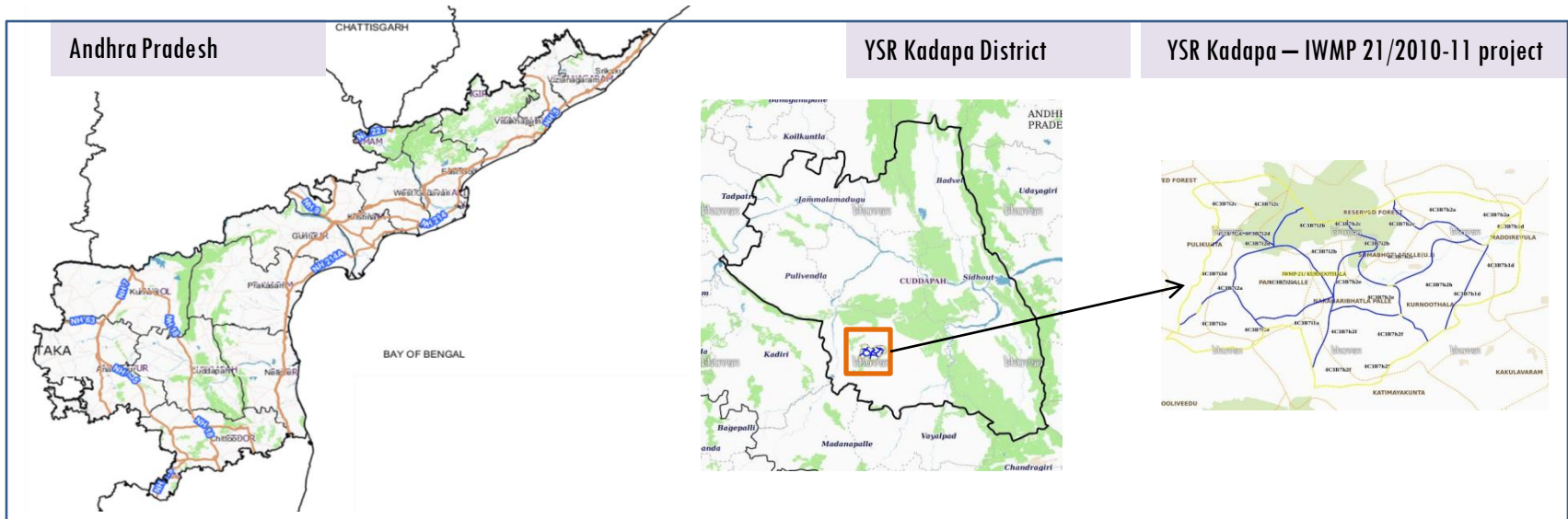
E X E C U T I V E S U M M A R Y

- 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-21/2010-11, YSR Kadapa District of Andhra Pradesh. The total geographical area of the project is 7,702.31 ha. It comprises of 12 micro watersheds.
- In the project area 1069 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 Water bodies have shown an decrease by 4.30 ha , which correspond to the various bodies that have been converted into other land use classes in this period.
- Major percentage i.e. 46 % is covered by the agriculture, 21 % is covered by scrubland, 13 % is forest , 8 % is plantation area and remaining by other land use classes.

PROJECT : YSR KADAPA - IWMP-21/2010-11

DISTRICT : YSR KADAPA , STATE : ANDHRA PRADESH

- The study area falls in Lakkireddipalle Mandal of YSR Kadapa district of Andhra Pradesh state. The total geographical area of the project is 7,702 ha. It comprises of 12 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.

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agronomic measures	149	149
2	Afforestation	2	2
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	60	60
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	8	8
11	Civil work-Check dams /Rock fill dam	314	280
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)	6	6
15	Soil moisture conservation	0	0
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity	114	50
18	Others	784	520
	TOTAL	1437	1069

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-21/2010-11



T0

bhuvan

T0: 2010-11



T1

bhuvan

T1: 22 October 2015



Drishti SI no. 1989472 MWS :4C3B7h2e

Farm pond



T0

bhuvan

T0: 2010-11



T1

bhuvan

T1: 22 October 2015



Drishti SI no. 2090566 MWS :4C3B7h2c

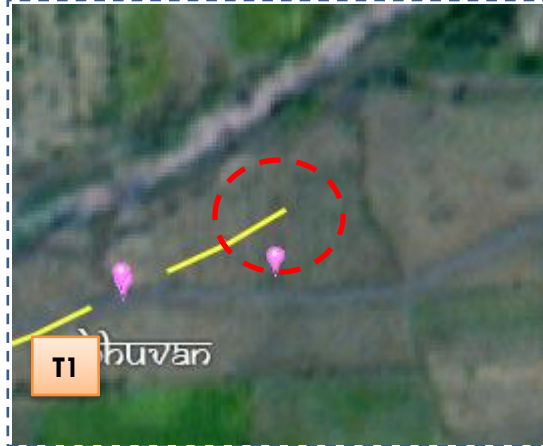
Farm pond

Monitoring of activities in YSR Kadapa Dt Andhra Pradesh. IWMP-21/2010-11



T0

T0: 2010-11



T1

T1: 22 October 2015



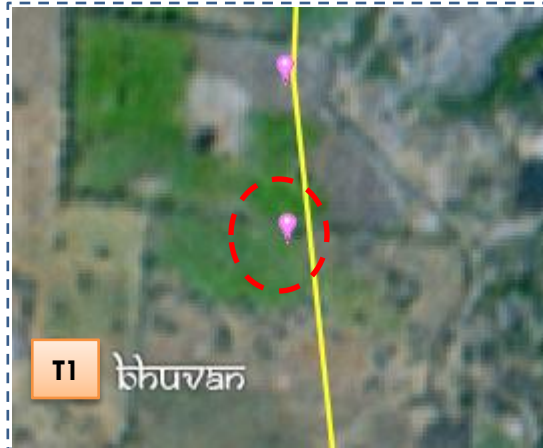
Drishti Sl no. 2700174 MWS :4C3B1u3d

Horticulture



T0

T0: 2010-11



T1

T1: 22 October 2015

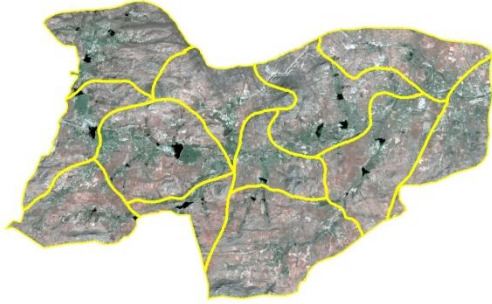


Drishti Sl no. 2410031 MWS : 4C3B7h1d

Horticulture

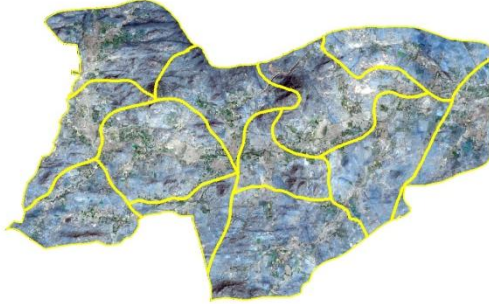
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2009-10



Source:Fusion data,NRSC

Natural Color Composite- 12th February 2015



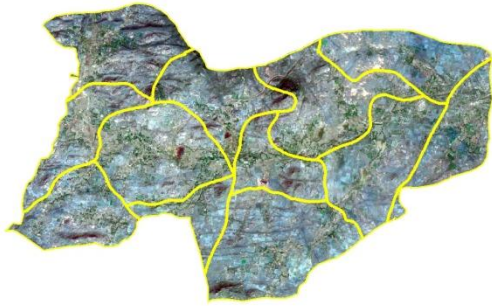
Source:NCC,NRSC

Natural Color Composite- 22nd October 2015



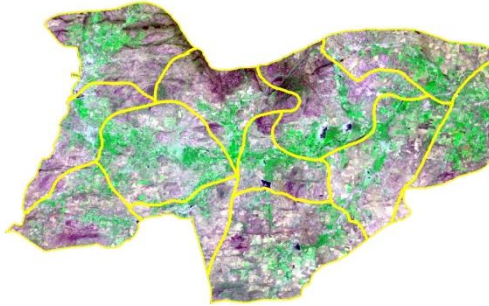
Source:NCC,NRSC

Natural Color Composite- 5th January 2017



Source:NCC,NRSC

Natural Color Composite- 30th March 2018



Source:LISS-IV,NRSC

Natural Color Composite- 25th March 2019



Sentinel-II Data

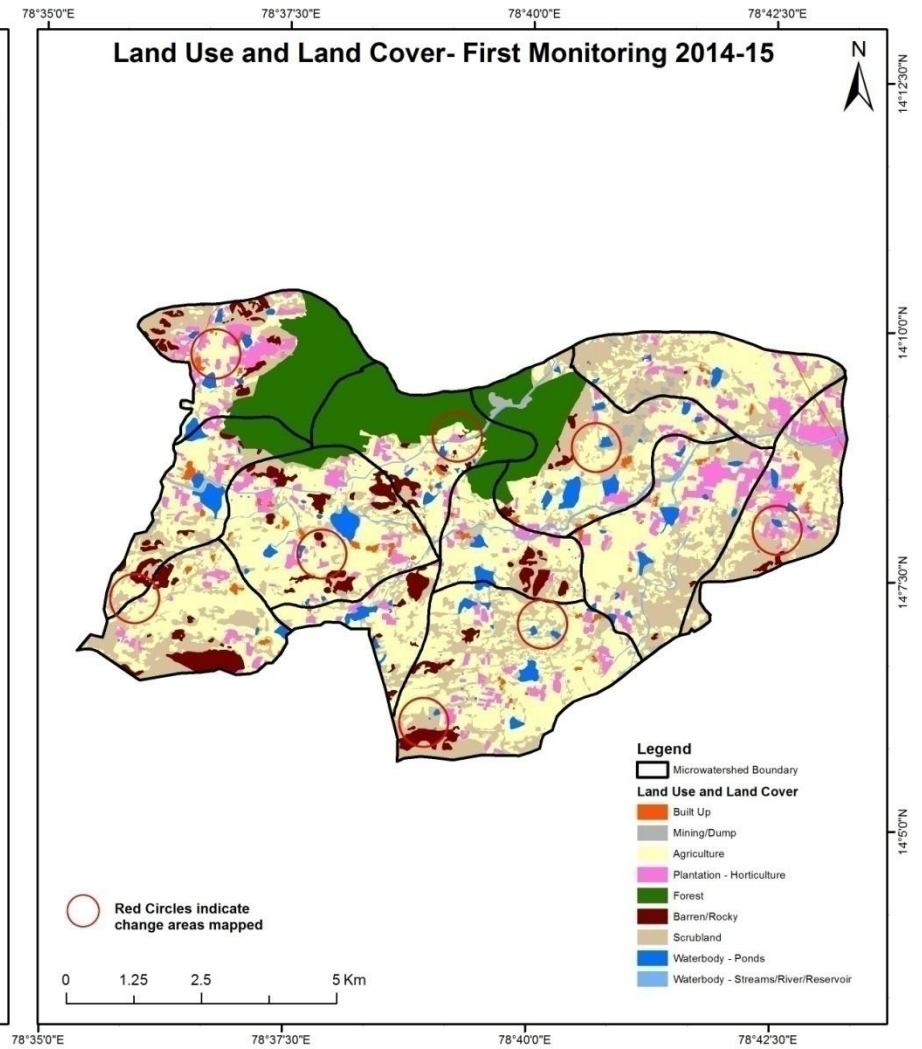
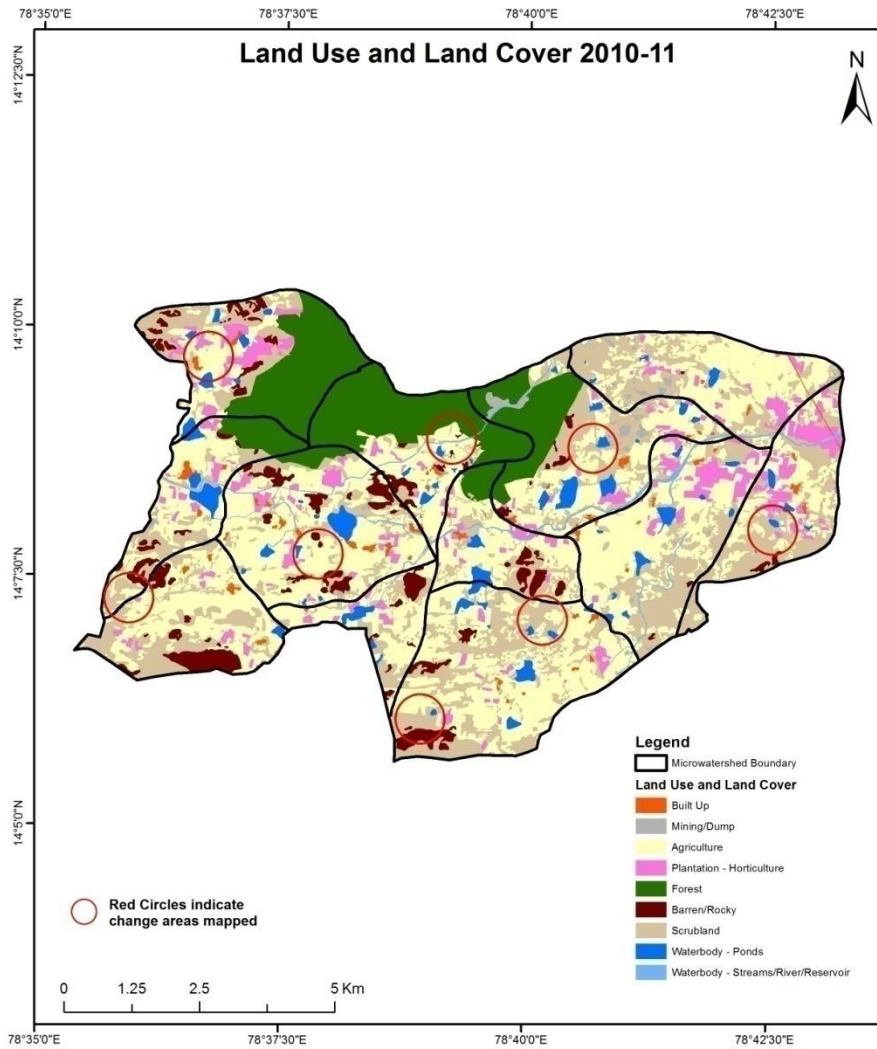
MONITORING IN THE PROJECT AREA

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)

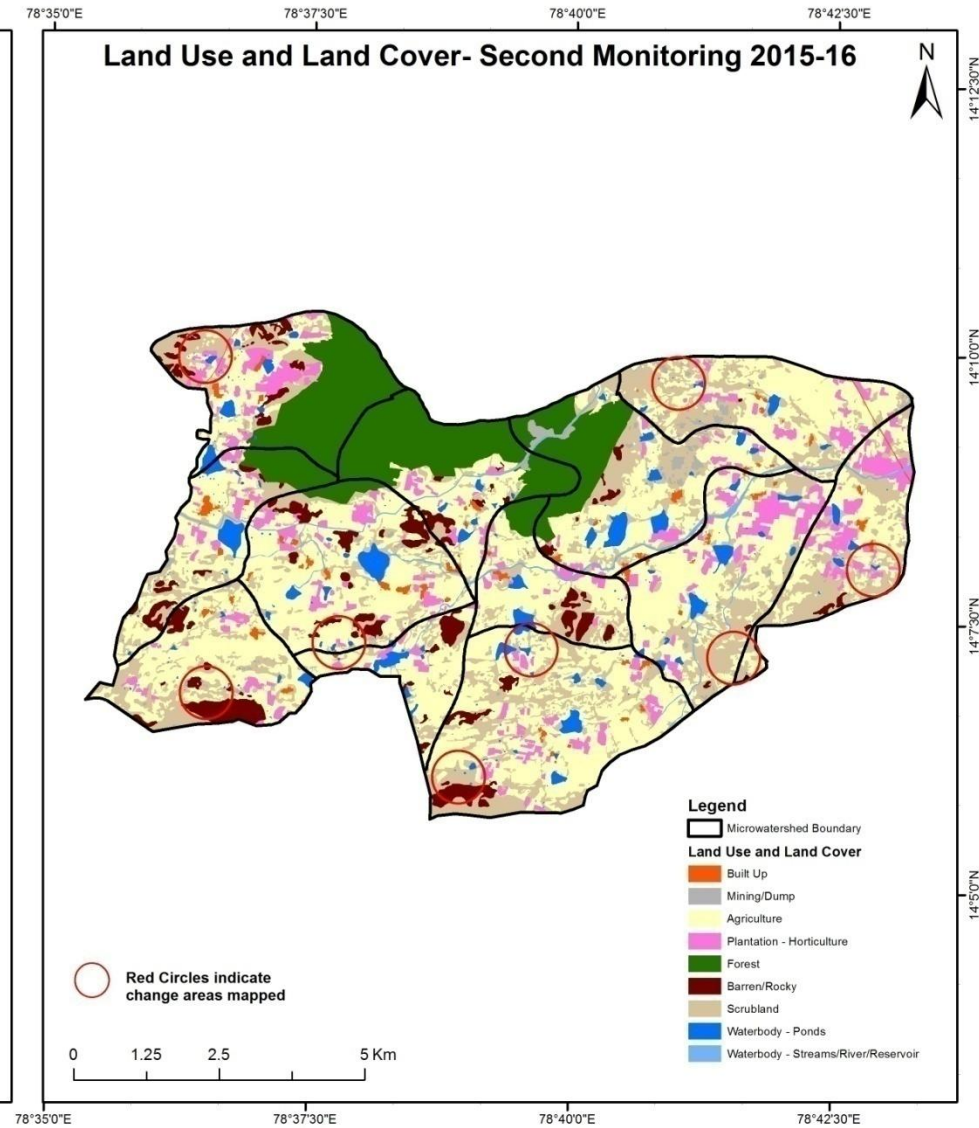
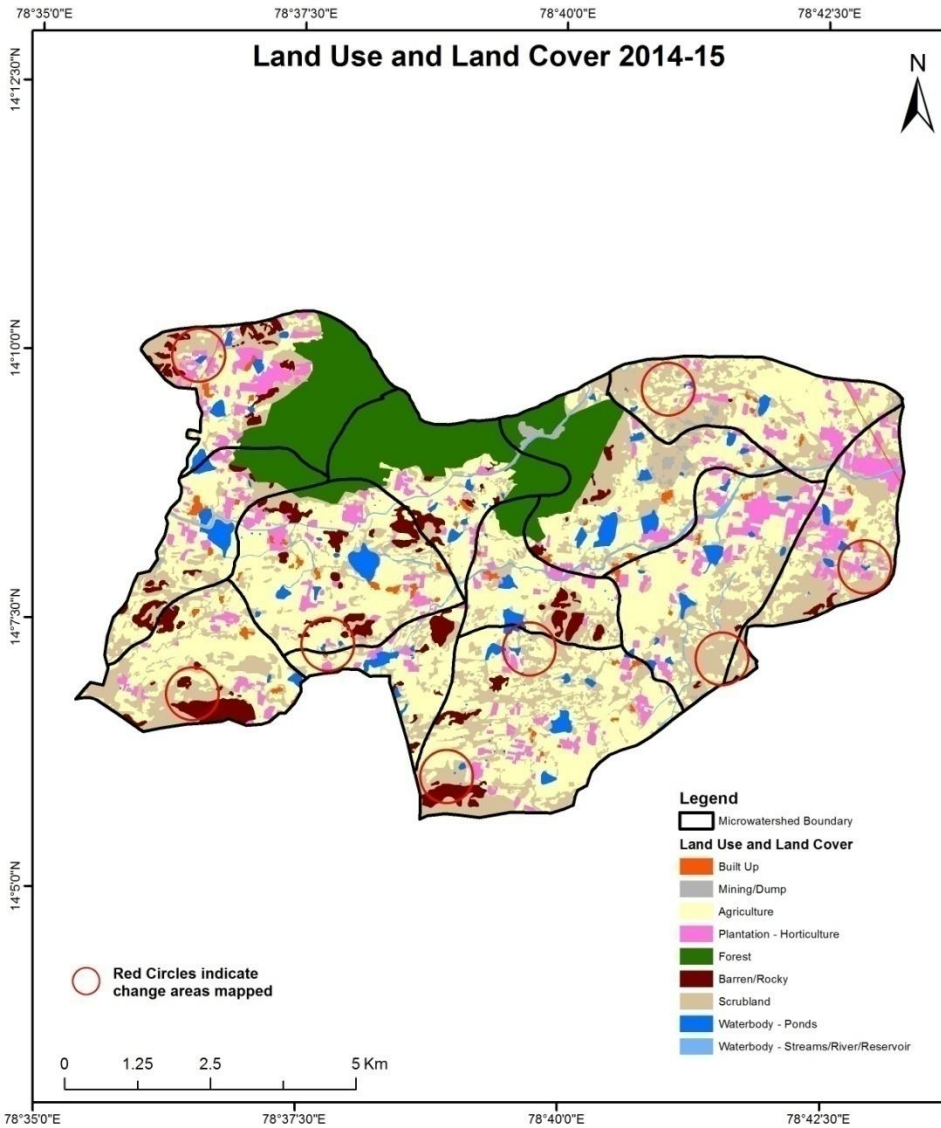
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



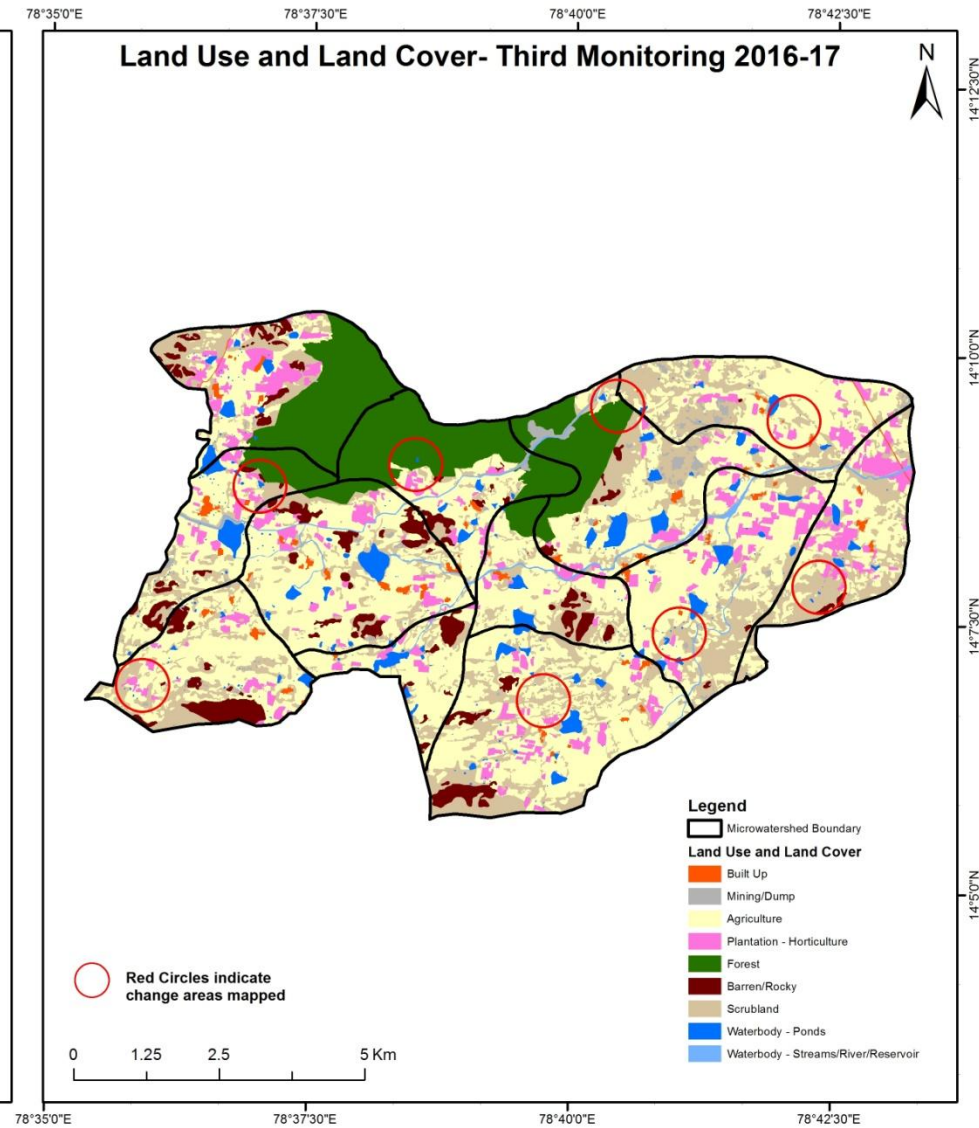
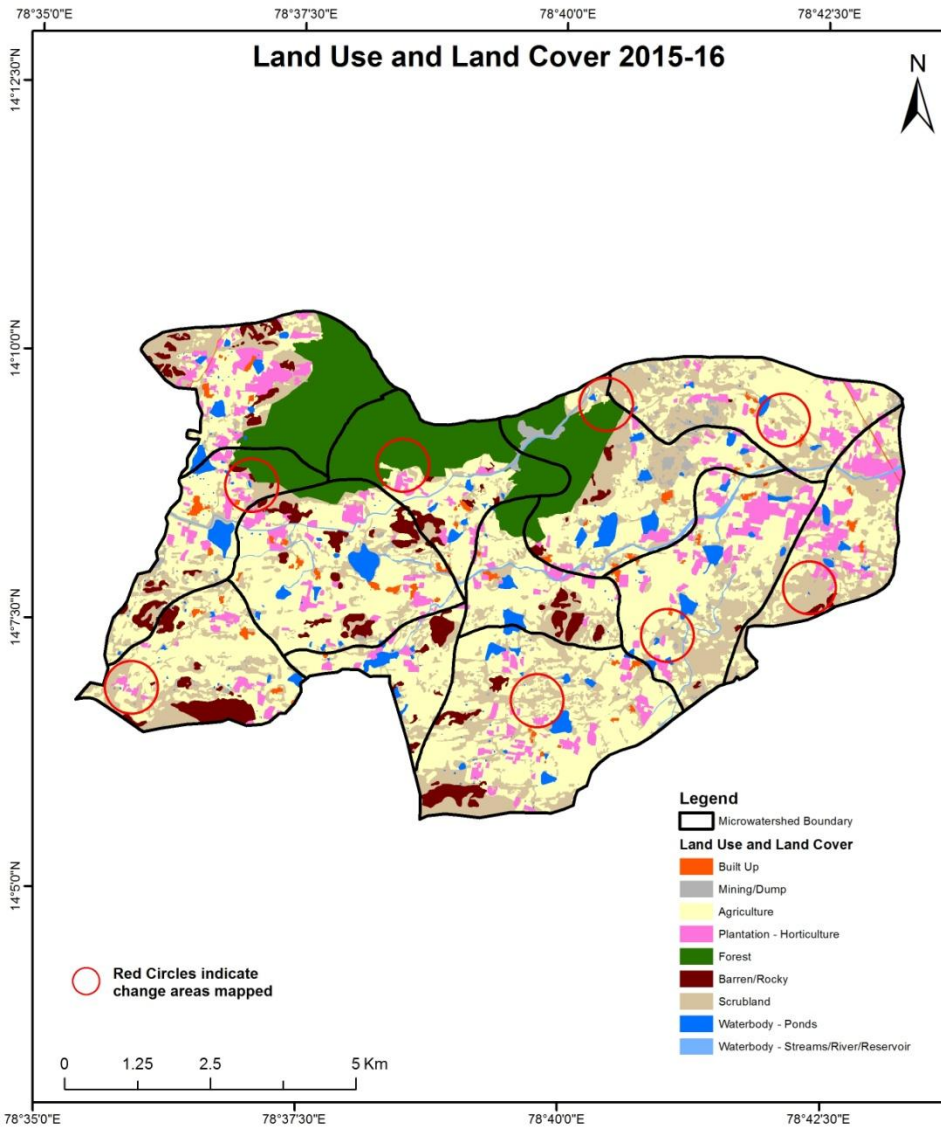
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



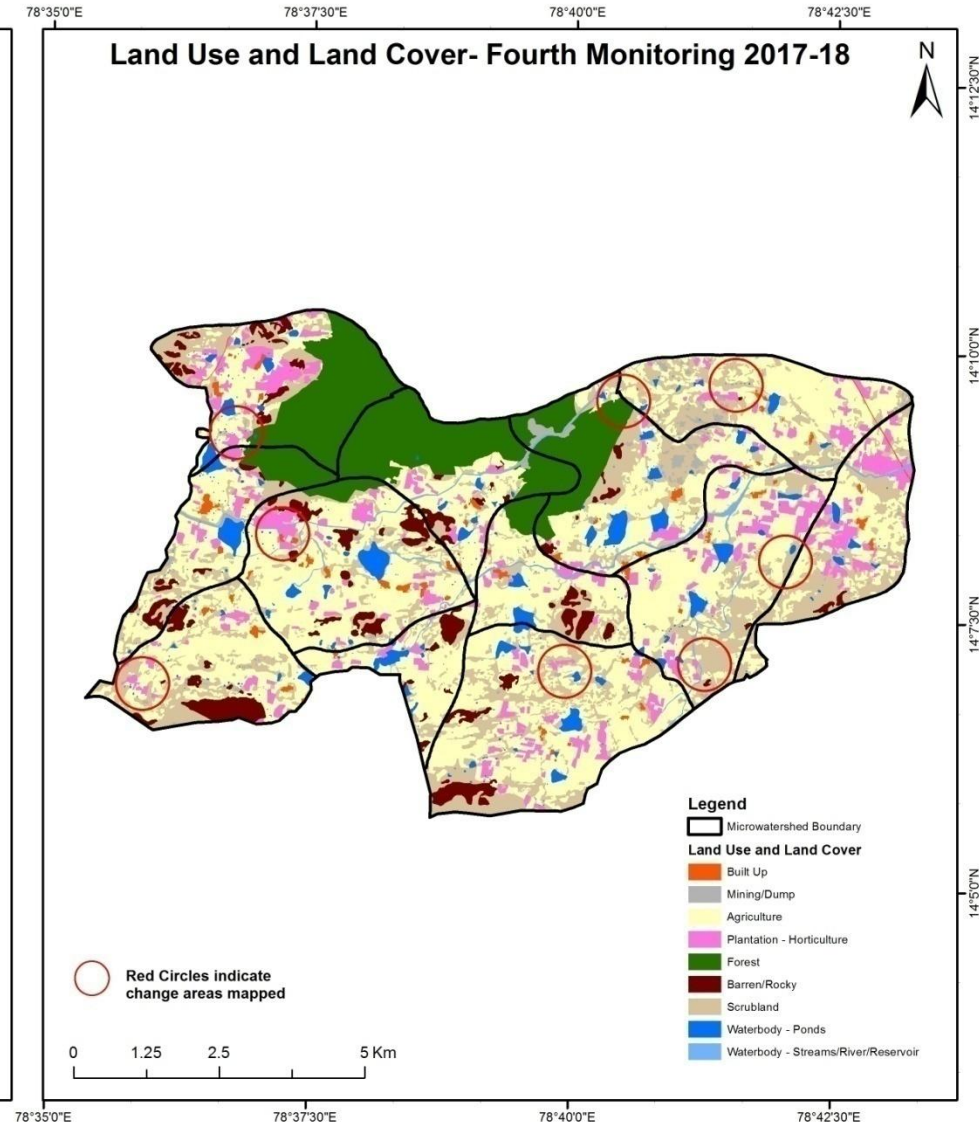
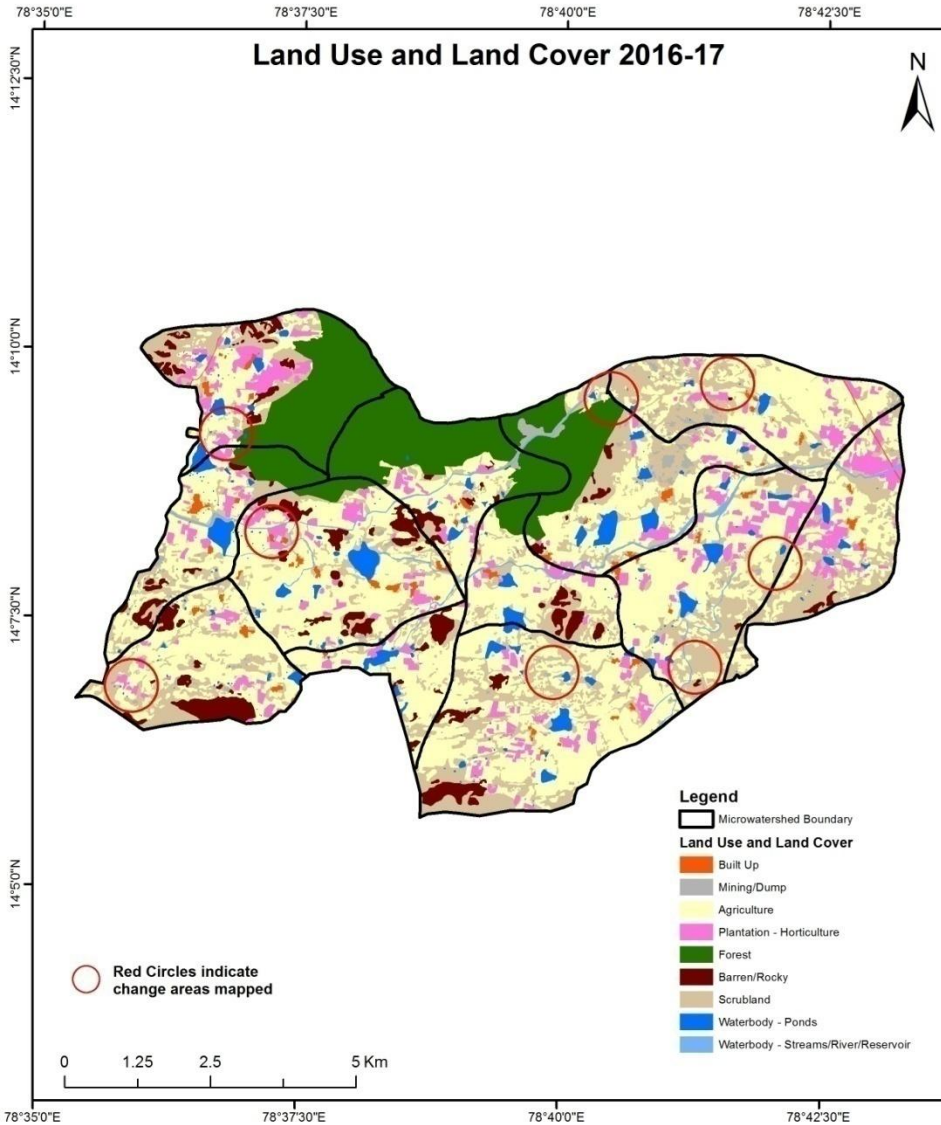
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



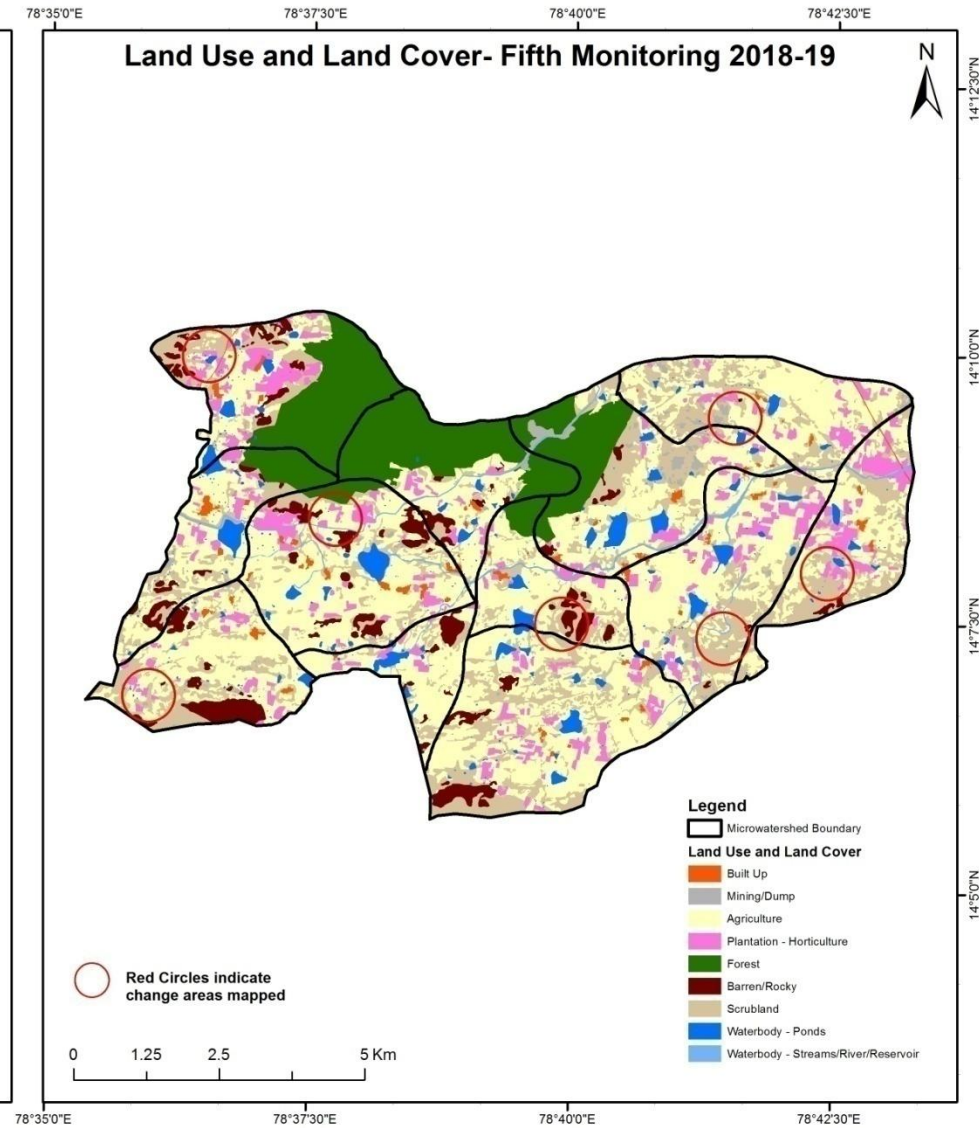
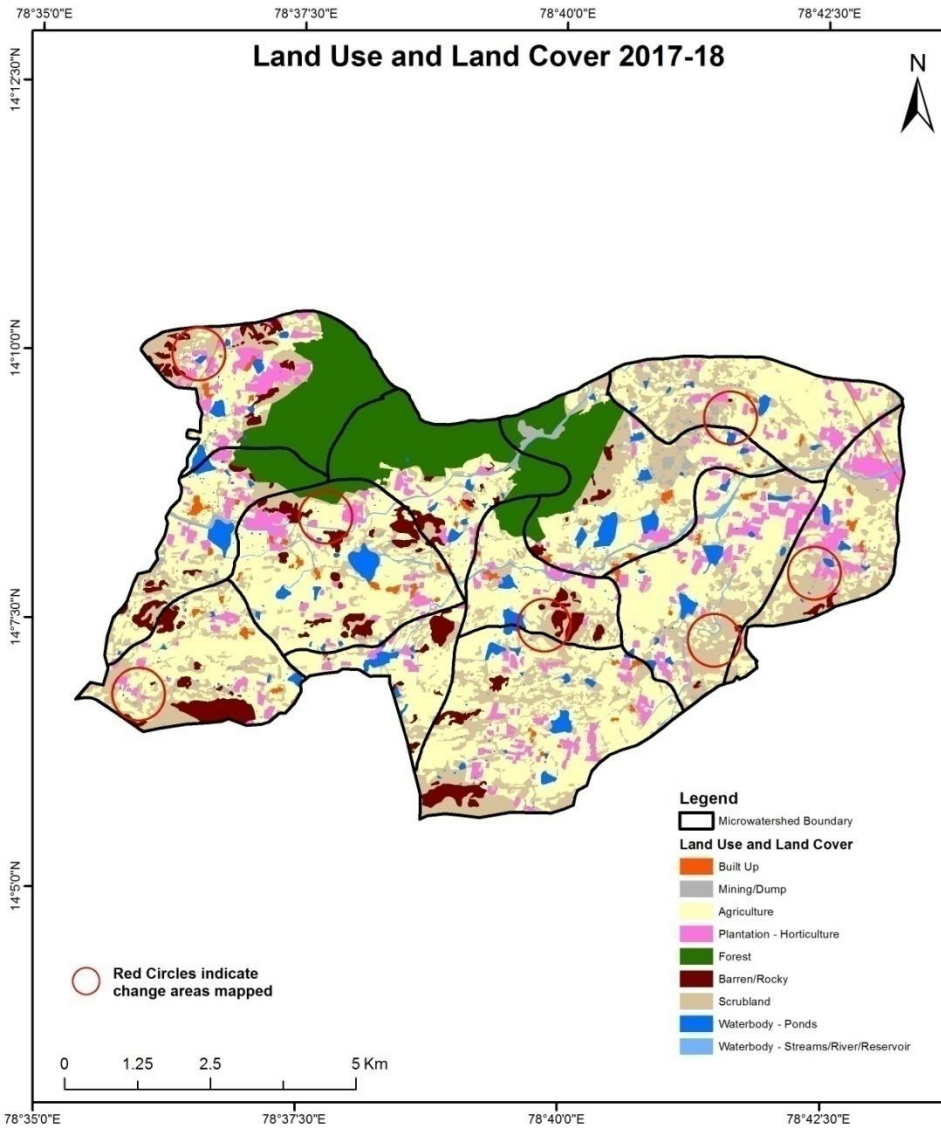
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



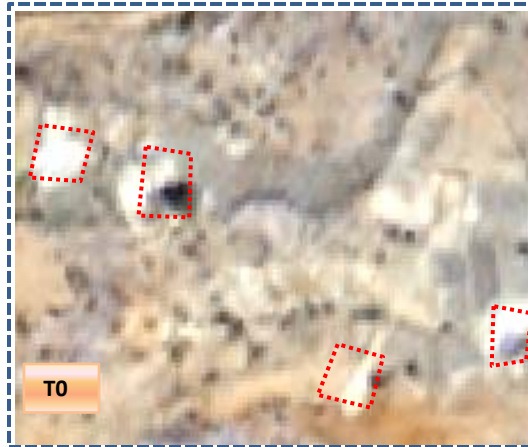
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000

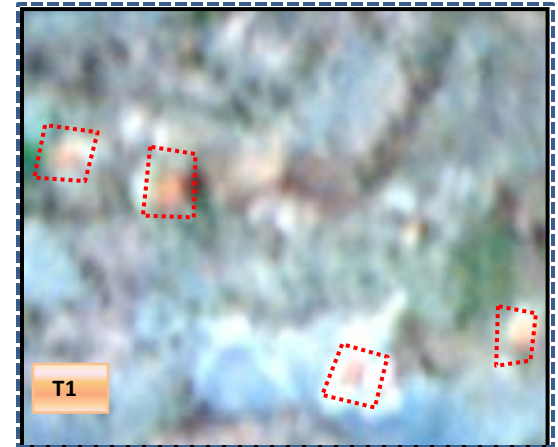


Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Water body

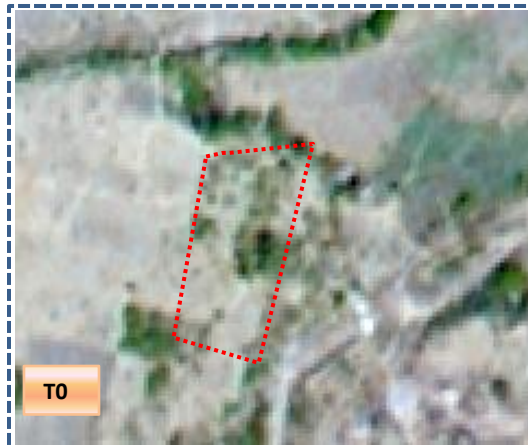


T0: 2015-16(78°36'15.559E 14°7'41.762N)

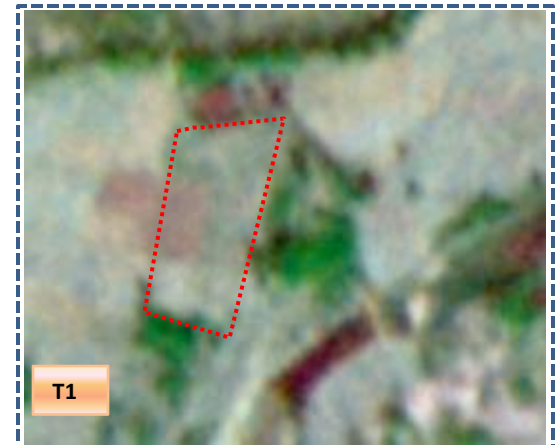


T1: 05 January 2017

Scrub to Agriculture



T0: 2015-16(78°40'24.063E 14°8'9.443N)



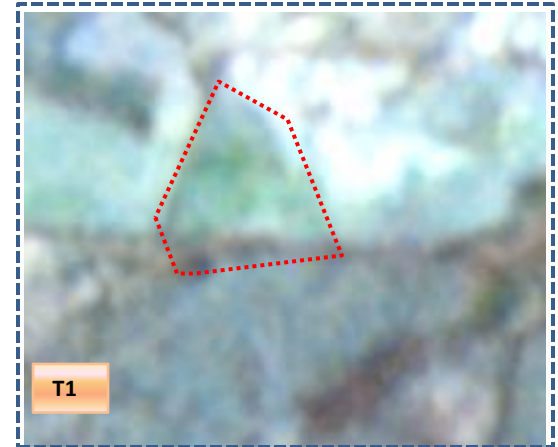
T1: 05 January 2017

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

Scrub to Agriculture



T0: 2015-16(78°59'11.416"E 15°7'52.989"N)

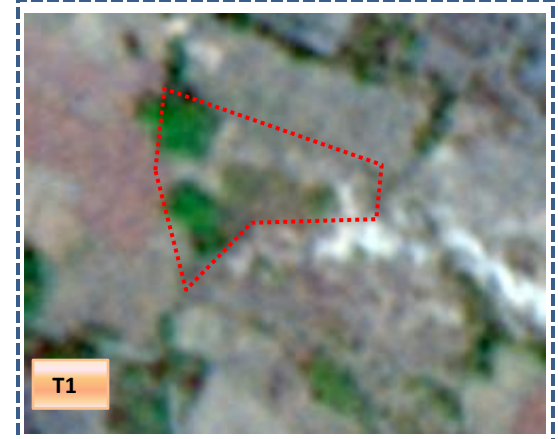


T1: 05 January 2017

Scrub to Agriculture



T0: 2015-16(78°42'4.448E 14°9'26.148N)



T1: 05 January 2017

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

Agriculture to Plantation



T0: 2010-11



T0: 22 October 2015

Agriculture to Plantation



T0: 2010-11



T0: 22 October 2015

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

Agriculture to Plantation



T0

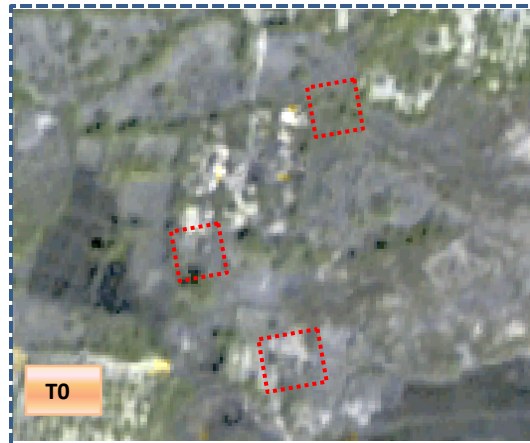
T0: 2010-11



T1

T1: 22 October 2015

Agriculture to Built-up



T0

T0: 2010-11



T1

T1: 22 October 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	73.56												73.56
Mining/dump		59.48									0.04		59.52
Agriculture	5.28		3126.12	162.96							3.85		3298.22
Plantation Horticulture	0.30		16.57	469.40									486.26
Forest		1.62	12.38		1009.14								1023.14
Forest Plantation													
Barren Rocky							339.35						339.35
Scrub	3.54	3.13	195.24	12.88				1895.59			0.96		2111.33
Waterbody- Streams/River									72.62				72.62
Waterbody – Ponds			2.80	0.13							235.36		238.30
Grand Total	82.67	64.23	3353.11	645.37	1009.14		339.35	1895.59	72.62		240.21		7702.30

- 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 172 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 226 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		
Built up	82.67												82.67
Mining/dump		64.07									0.15		64.23
Agriculture	0.60	0.68	3336.63	5.94							9.27		3353.11
Plantation Horticulture			38.56	606.13							0.68		645.37
Forest	0.03	2.15	1.84		1004.79						0.34		1009.14
Forest Plantation													
Barren Rocky		0.17					339.18						339.35
Scrub	0.52	16.85	117.19	0.51				1751.91			8.61		1895.59
Waterbody- Streams/River			0.15						72.48				72.62
Waterbody – Ponds	0.09		7.34								232.79		240.21
Grand Total	83.92	83.92	3501.70	612.58	1004.79		339.18	1751.91	72.48		251.83		7702.30

- 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 16 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T2.
- In T2 165 ha of the agriculture area has increased from plantations, forest, 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-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	83.92										83.92	
Mining/dump		83.92									83.92	
Agriculture	0.18	0.87	3488.91	10.12						1.62	3501.70	
Plantation Horticulture			30.25	582.26						0.06	612.58	
Forest					1004.42					0.37	1004.79	
Forest Plantation												
Barren Rocky		0.09					339.09				339.18	
Scrub		5.02	17.34					1728.44		1.11	1751.91	
Waterbody- Streams/River									72.48		72.48	
Waterbody – Ponds										251.83	251.83	
Grand Total	84.10	89.90	3536.50	592.38	1004.42		339.09	1728.44	72.48	254.99	7702.30	

- 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 12 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T3.
- In T3 47 ha of the agriculture area has increased from plantation 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-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	84.10										84.10	
Mining/dump		89.87								0.03	89.90	
Agriculture			3500.27	34.32						1.91	3536.50	
Plantation Horticulture			4.07	587.98						0.33	592.38	
Forest			1.28		1003.04					0.10	1004.42	
Forest Plantation												
Barren Rocky							339.09				339.09	
Scrub	0.06		22.28	0.84				1703.04		2.22	1728.44	
Waterbody- Streams/River									72.48		72.48	
Waterbody – Ponds										254.99	254.99	
Grand Total	84.16	89.87	3527.90	623.14	1003.04		339.09	1703.04	72.48	259.59	7702.30	

- 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 36 ha of the agriculture area has decreased and it is converted into plantation and water body in T4.
- In T4 27 ha of the agriculture area has increased from plantation, forest 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-2017-18 to 2018-19

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	84.16										84.16	
Mining/dump		89.87									89.87	
Agriculture			3520.01	7.89							3527.90	
Plantation Horticulture			1.80	621.33							623.14	
Forest					1003.04						1003.04	
Forest Plantation												
Barren Rocky							339.09				339.09	
Scrub	0.04		22.48					1680.48		0.04	1703.04	
Waterbody- Streams/River									72.48		72.48	
Waterbody – Ponds										259.59	259.59	
Grand Total	84.20	89.87	3544.29	629.22	1003.04		339.09	1680.48	72.48	259.63	7702.30	

- 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 7.8 ha of the agriculture area has decreased and it is converted into plantations in T4.
- In T5 24.2 ha of the agriculture area has increased from 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 21 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 54, 148, 34 & 16 Hectares From T0 to T1, T1-T2, T2 to T3 & T4-T5 respectively and overall increase of 252 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 142 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 430 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (8) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (8) verified from the portal.