

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -44/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-2022

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

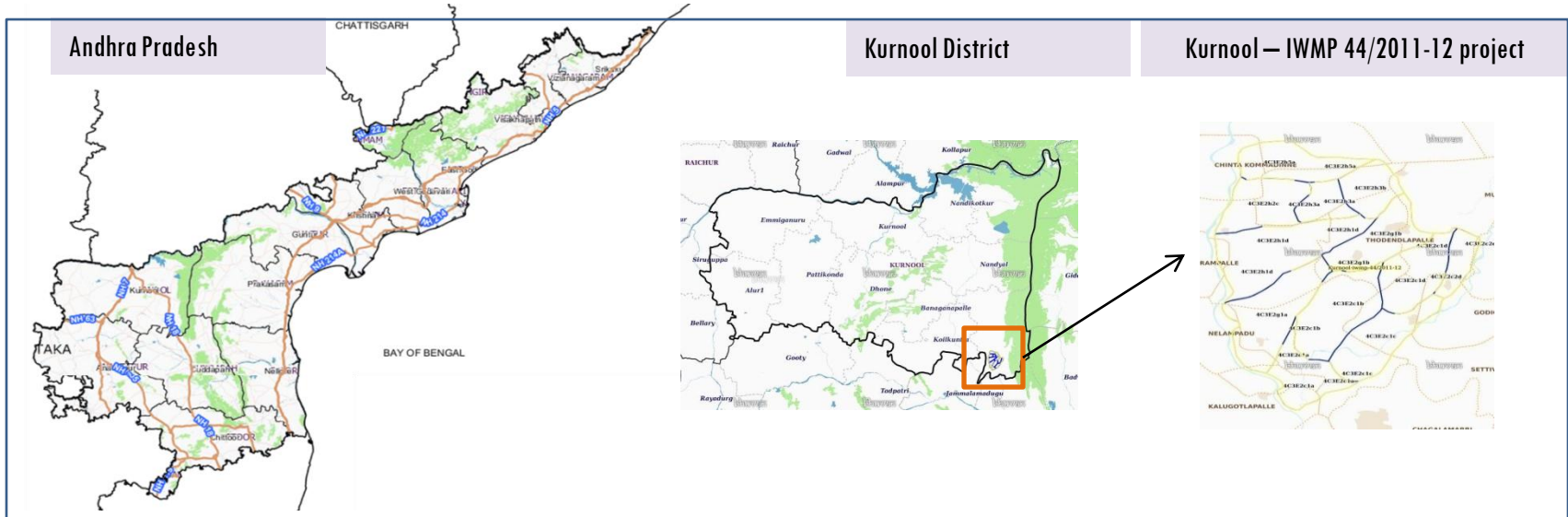
E X E C U T I V E S U M M A R Y

- 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-44/2011-12, Kurnool District of Andhra Pradesh. The total geographical area of the project is 6498.60 ha. It comprises of 12 micro watersheds.
- In the project area 457 Drishti photos were uploaded showing check dams/checks & plugins, Farm ponds, Livelihood measures and remaining showing others.
- Major percentage i.e. 92.7% is covered by the agriculture, 2.4 % is covered by scrub land, 2.1 % is covered by water body and remaining by other land use classes.

PROJECT : KURNOOL – IWMP-44/2011-12

DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Chagalamarri Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 6498.60 ha. It comprises of 12 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2011-12 (T0) period (*Batch -1*) projects taking 2019-20 (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).

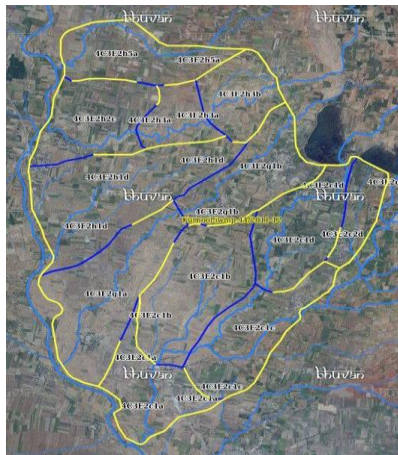
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2011-12	2015-16
LISS IV	2011-12		
SCENE 1			14-Jan-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			14-Jan-20
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	457
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

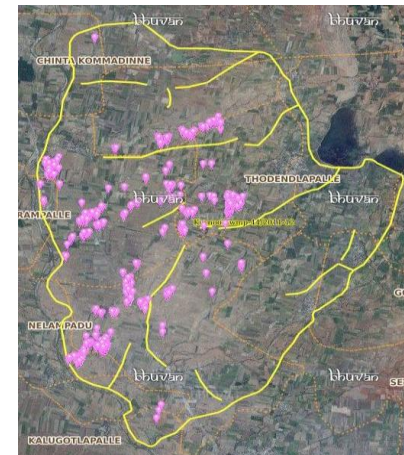


MWS Boundary



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	Afforestation	0	0
2	Agriculture/Horticulture	41	41
3	Blockplanting	0	0
4	Bund planting	0	0
5	Drainage Treatment	0	0
6	Farm ponds/Dug out pit	2	2
7	Check dams (Civil work)	102	102
8	Checks & plugins	22	22
9	Om (Other measurement)	0	0
10	LM (Livelihood Measures)	0	0
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	0	0
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	320	290
	TOTAL	487	457

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 (2011-12) and T5 is 2019-20 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 Kurnool Dt Andhra Pradesh. IWMP-44/2011-12



T1:2015



T2: 2018

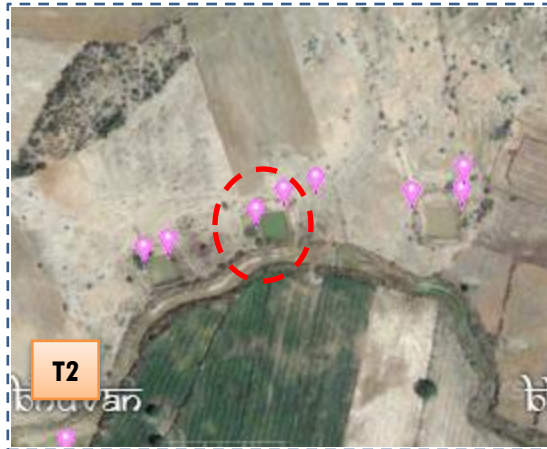


Drishti Sl no. 1668359 MWS :4C3E2h3a

Check dam



T1:2015



T2: 2018



Drishti Sl no. 144397 MWS :4C3E2h3a

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-44/2011-12



T1: 2015



T2: 2018



Drishti Sl no. 1664661 MWS : 4C3E2h1d

Farm pond



T1: 2015



T2: 2018



Drishti Sl no. 2433371 MWS : 4C3E2h1d

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-44/2011-12



T0:2010-11

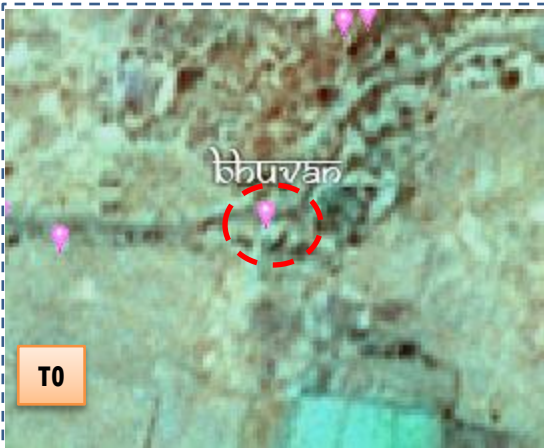


T1: 24 December 2015

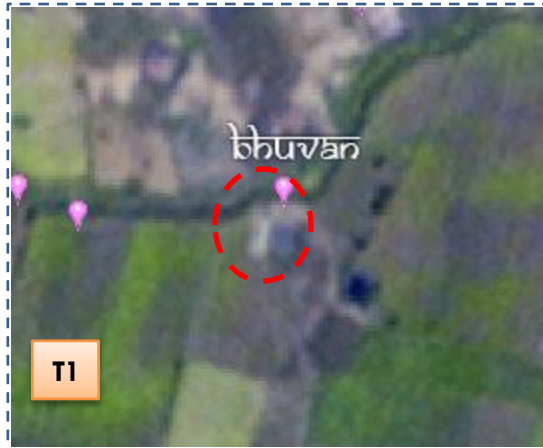


Drishti Sl no. 143364 MWS :4C3E2h3b

Farm pond



T0:2010-11



T1: 24 December 2015



Drishti Sl no. 144241 MWS :4C3E2h3b

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-44/2011-12



T0: 2010-11



T1: 24 December 2015



Drishti Sl no. 244828 MWS : 4C3E2h1d

Farm pond



T0: 2010-11



T1: 24 December 2015

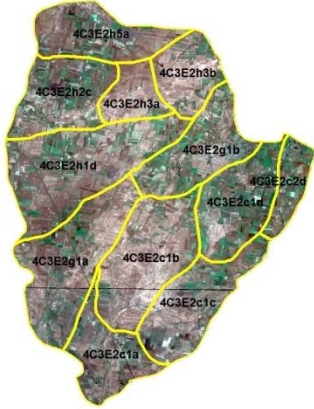


Drishti Sl no. 2433928 MWS : 4C3E2g1a

Farm pond

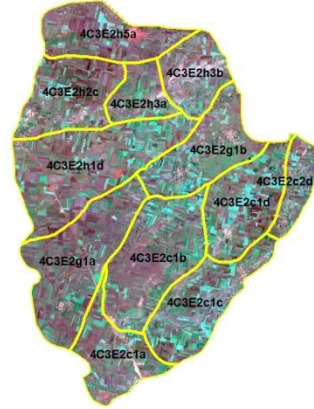
Natural Color Composite

Natural Color Composite- 2011-12



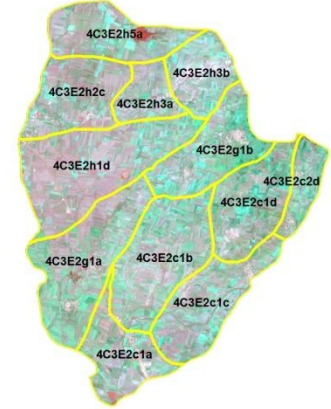
Source:Fusion data,NRSC

Natural Color Composite- 24th December 2015



Source:NCC,NRSC

Natural Color Composite- 05th January 2017



Source:NCC,NRSC

Natural Color Composite- 09th December 2017



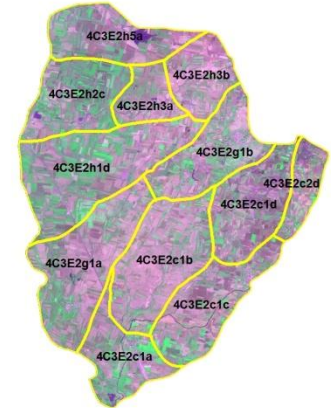
Source:NCC,NRSC

Natural Color Composite- 14th April 2018



Source:NCC,NRSC

Natural Color Composite- 14th January 2020



Source:LISS-IV,NRSC

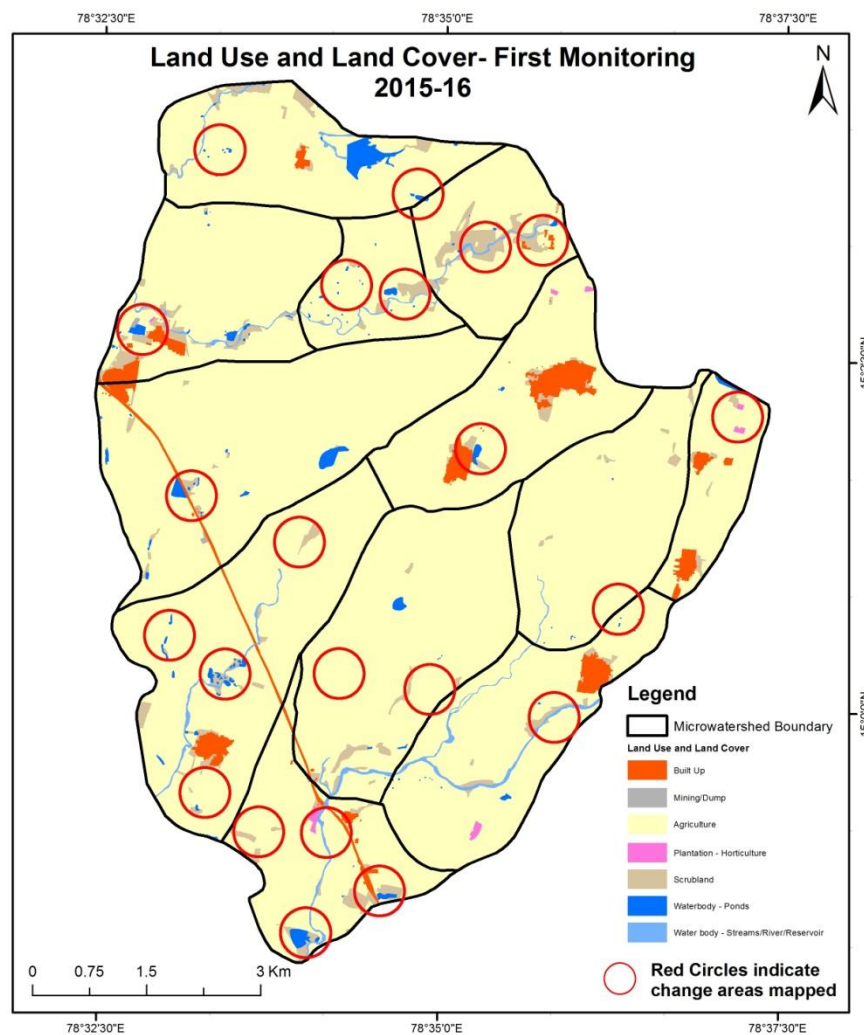
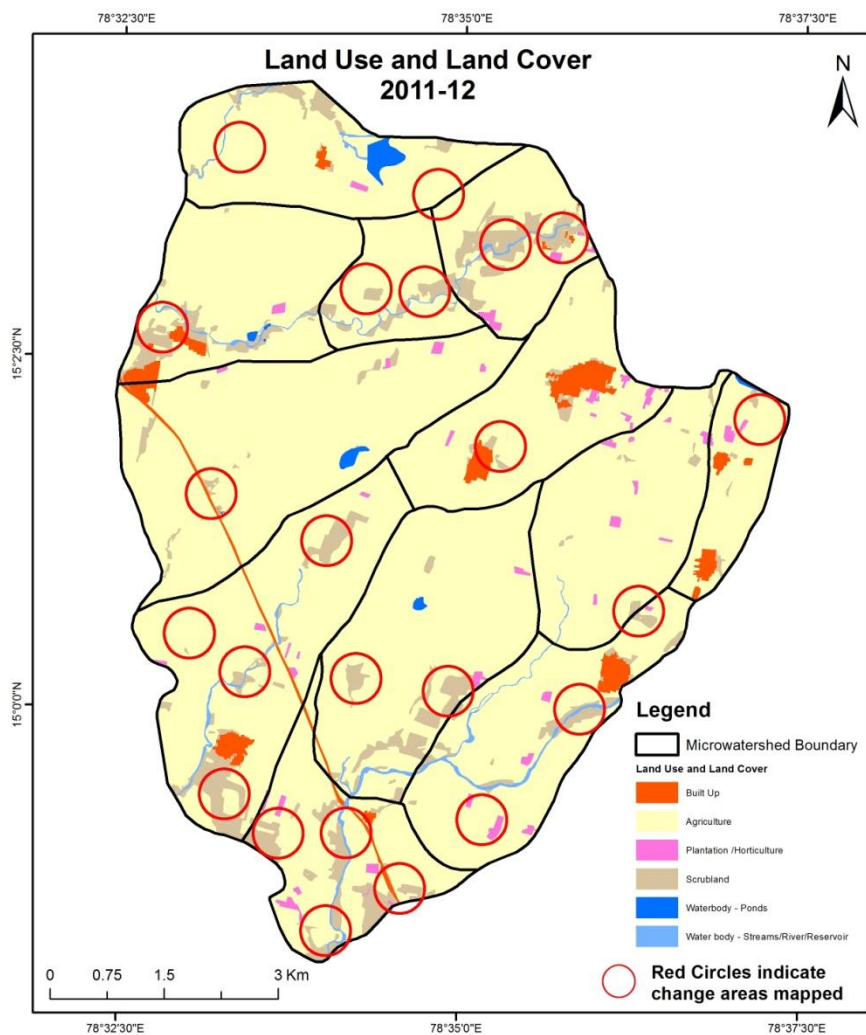
MONITORING IN THE PROJECT AREA

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 of T0 to T5 are given in the change matrix table.
- In matrix table column represents the T0 (2011-12) and row represents the T5 (2019-20)

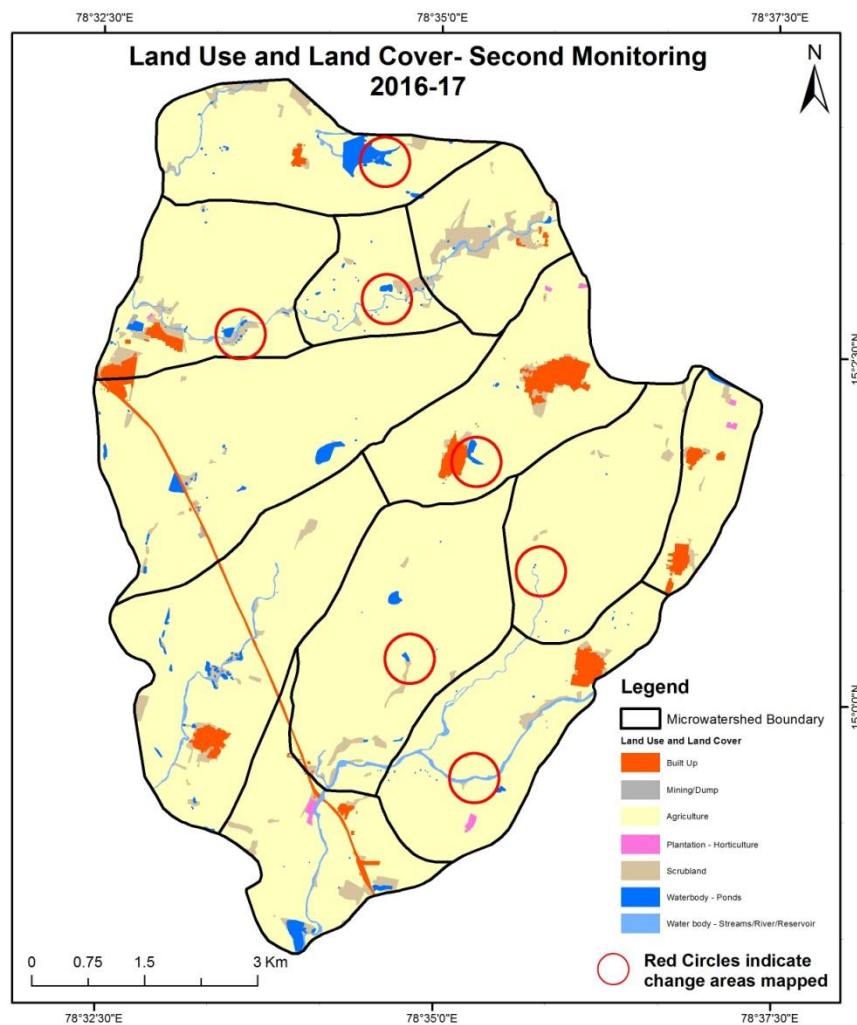
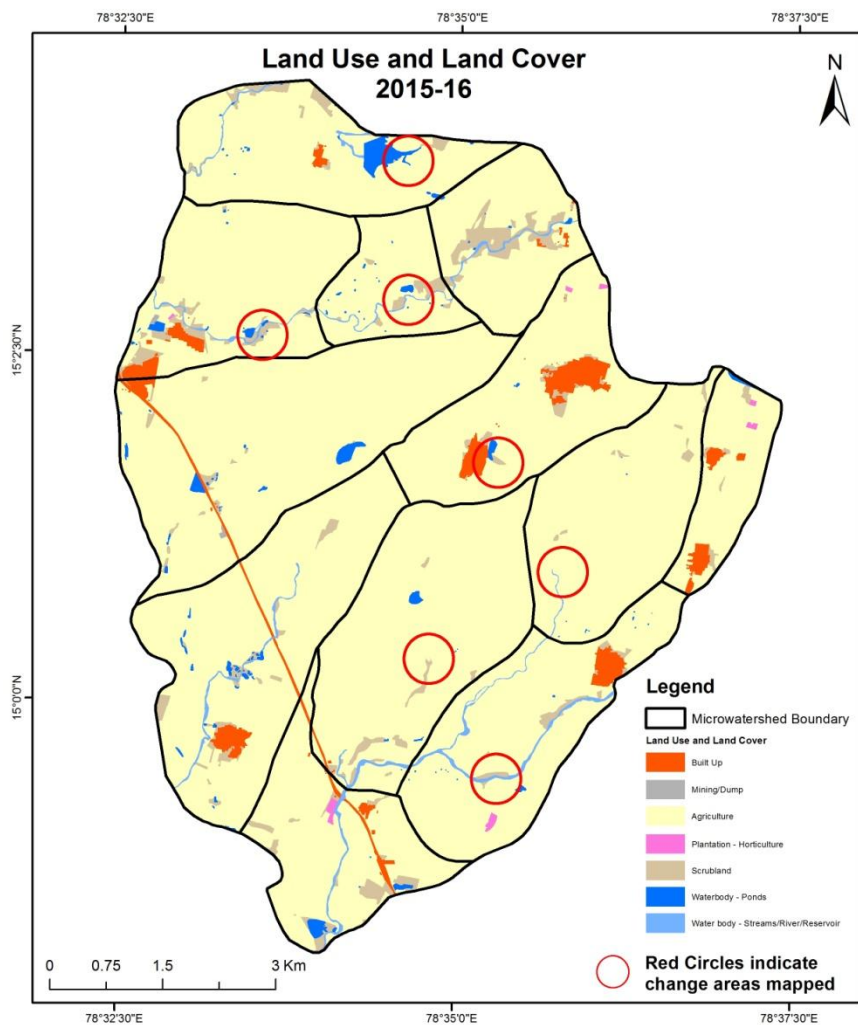
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



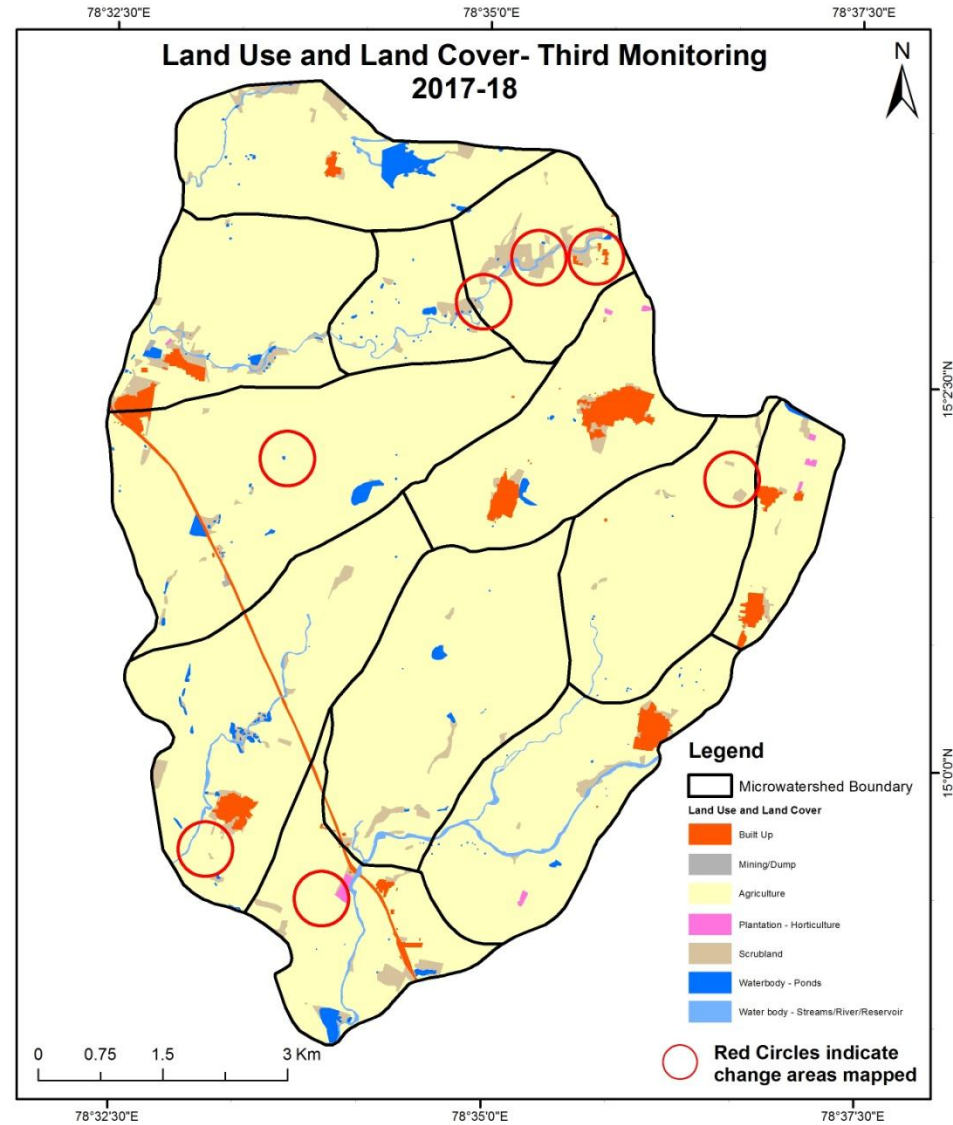
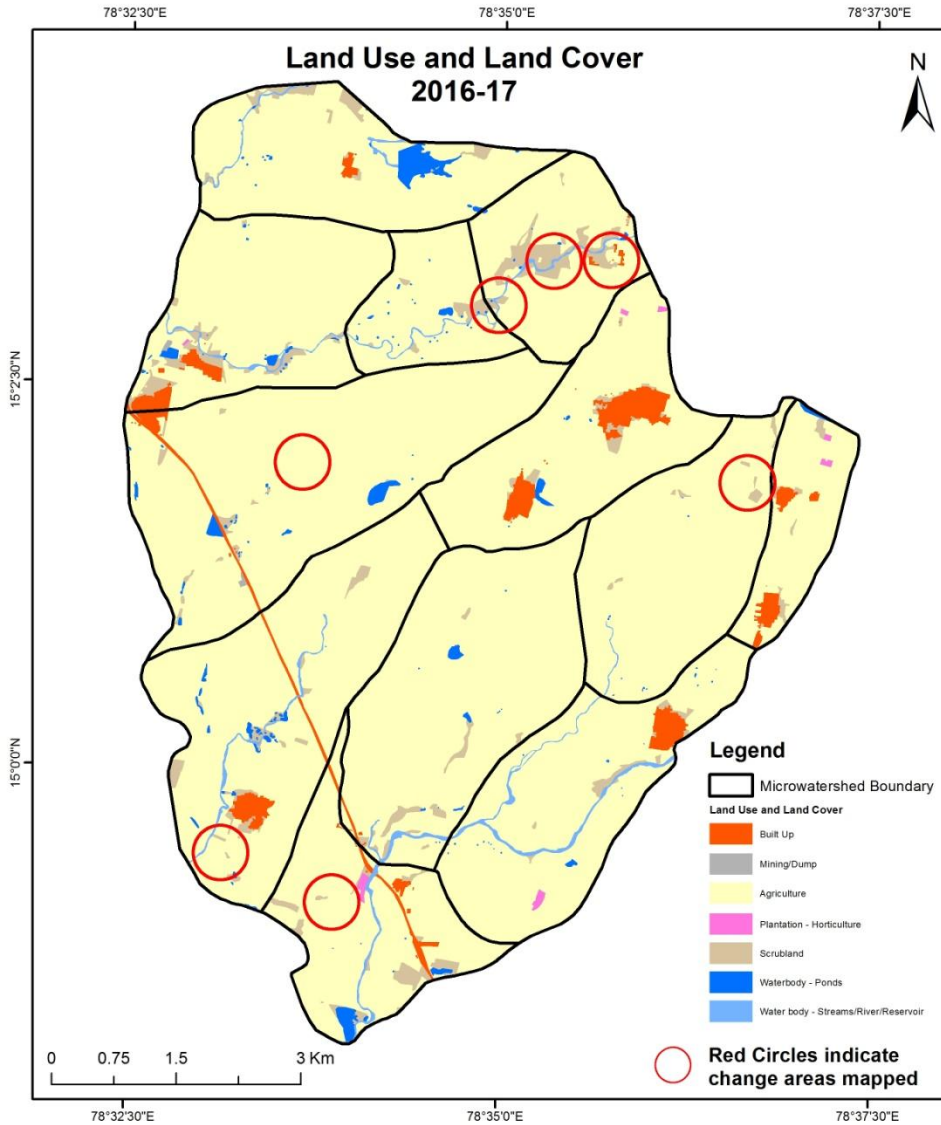
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



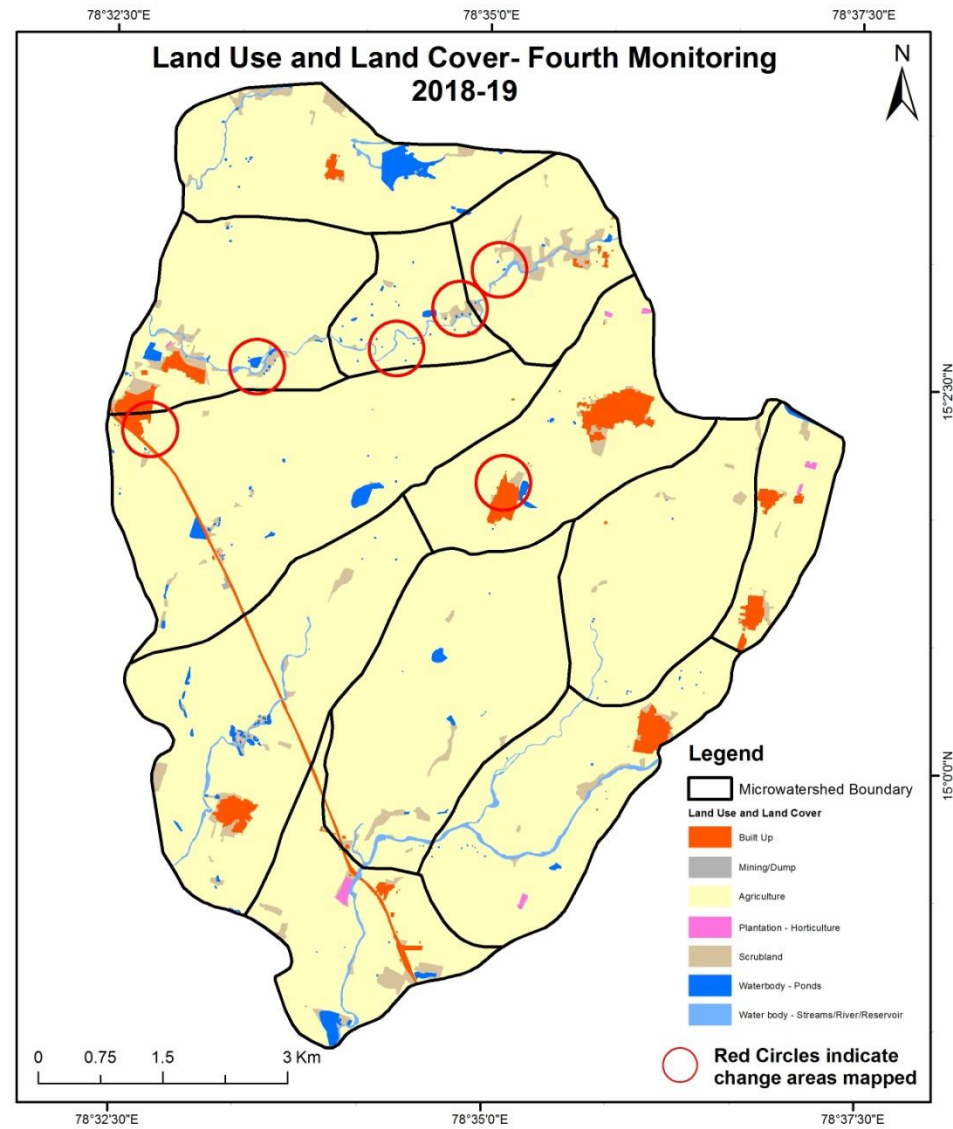
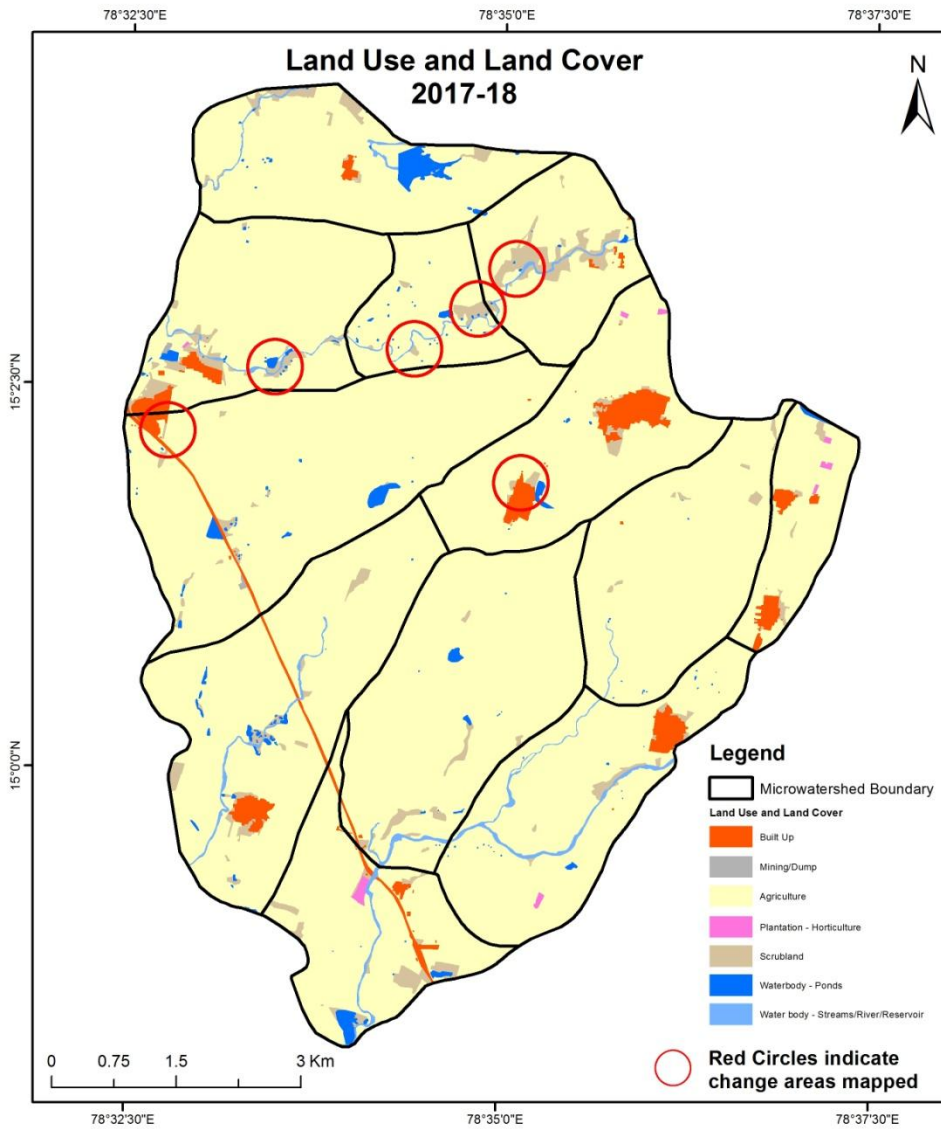
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



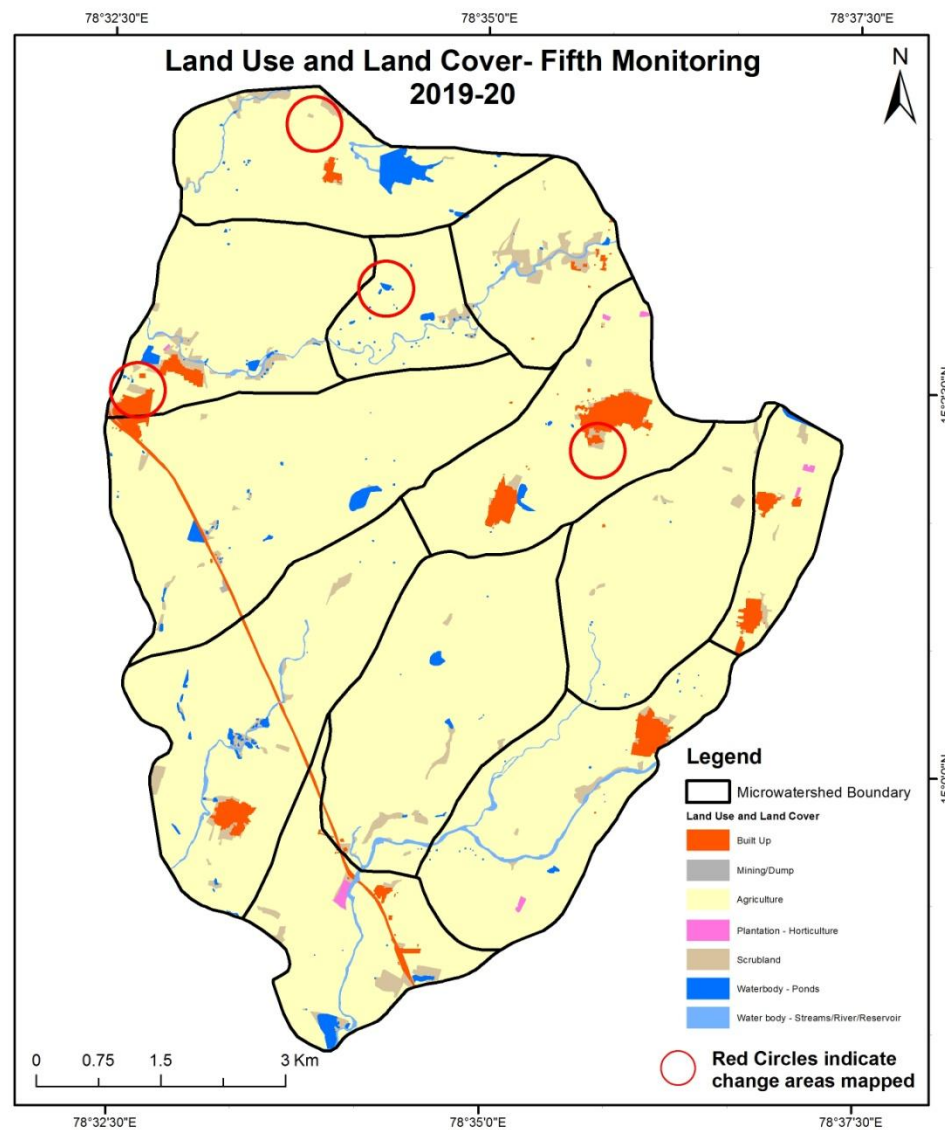
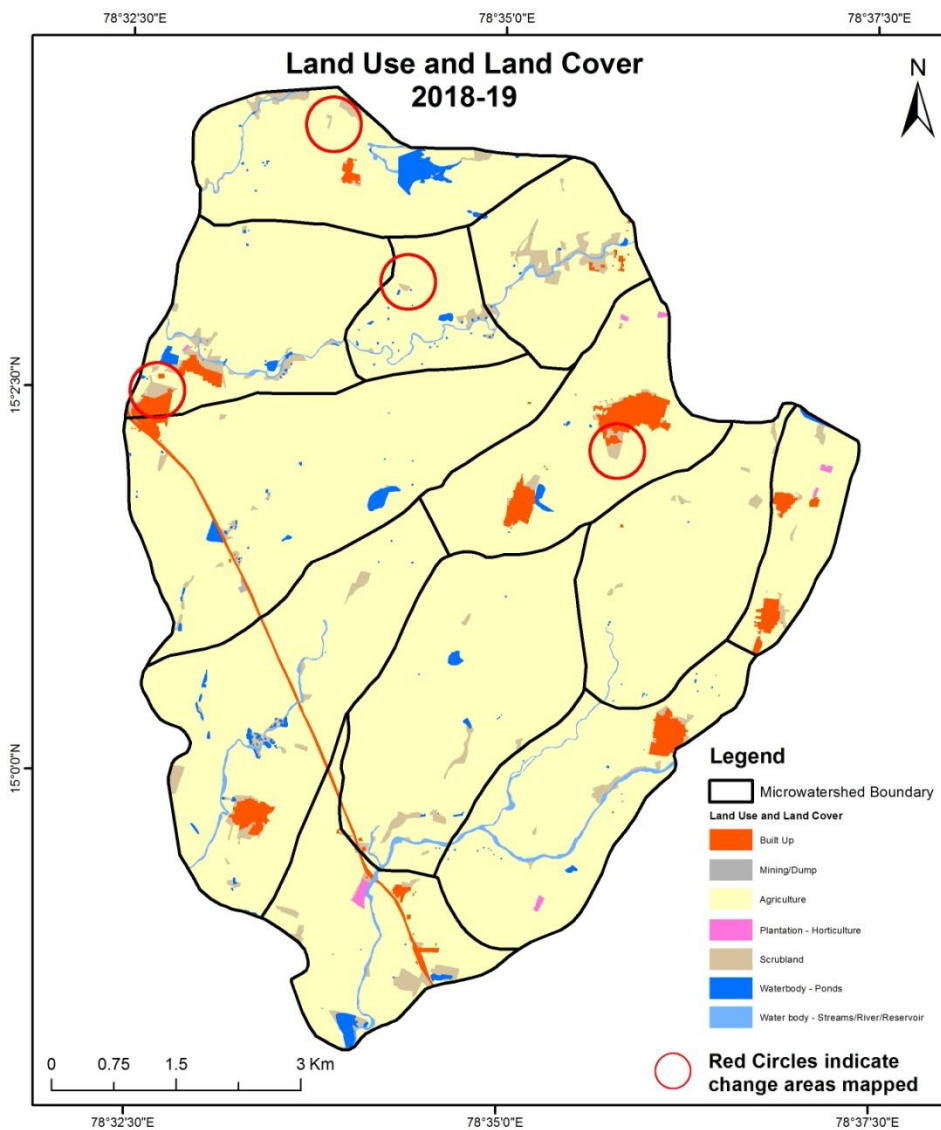
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



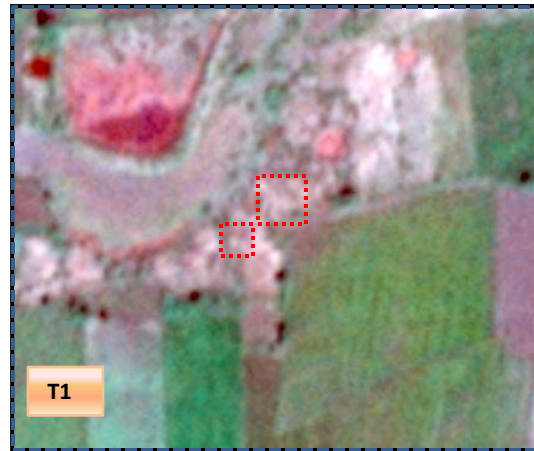
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



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

Scrub to water body



T1: 2015-16(78°33'31.34"E 15°2'35.505"N)



T2: 05 January 2017

Agriculture to water body



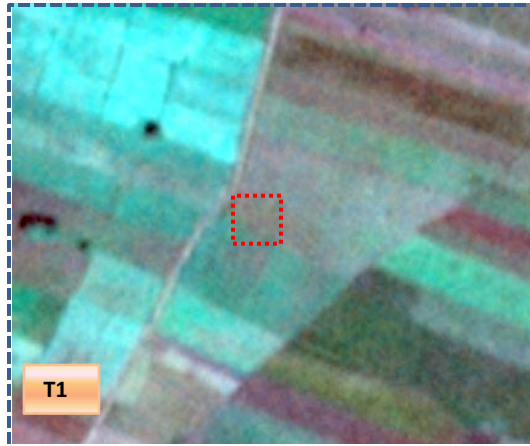
T1: 2015-16 (78°34'30.336"E 15°2'46.625"N)



T2: 05 January 2017

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

Agriculture to water body



T1

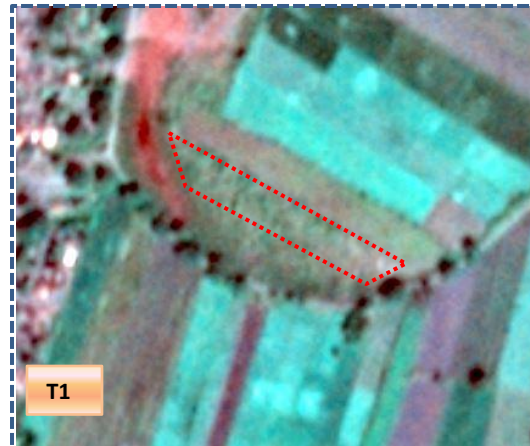
T1: 2015-16(78°35'1.83"E 15°1'9.364"N)



T2

T2: 05 January 2017

Scrub to Agriculture



T1

T1: 2015-16(78°35'18.339"E 15°1'44.894"N)



T2

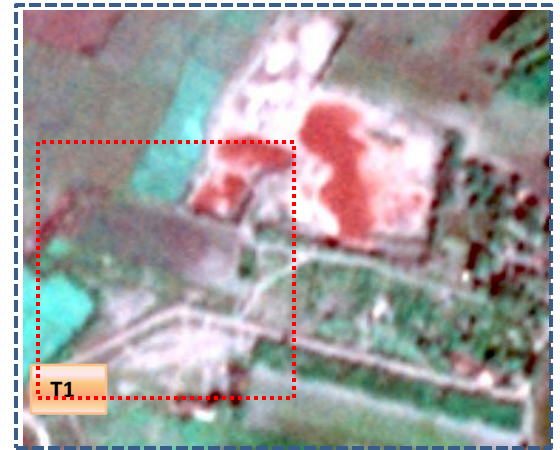
T2: 05 January 2017

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

Scrub to Agriculture

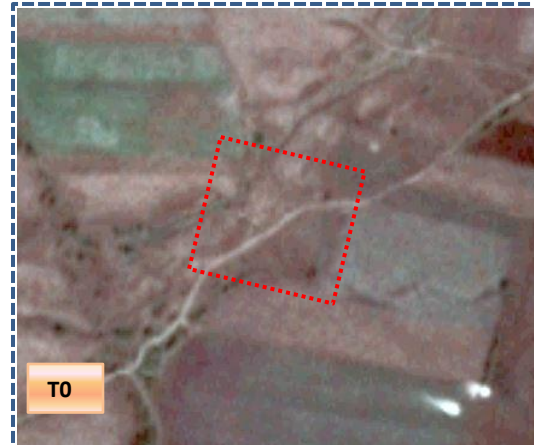


T0: 2011-12 (78°32'41.373"E 15°2'38.241"N)



T1: 24 Dec 2015

Agriculture to water body



T0: 2011-12 (78°33'33.82"E 15°1'31.408"N)



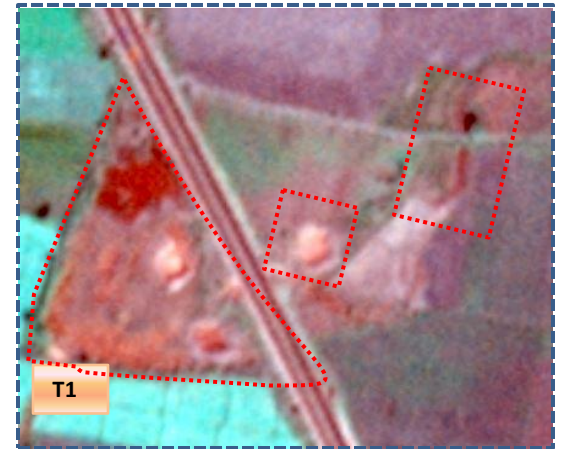
T1: 24 Dec 2015

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

Scrub to water body



T0: 2011-12 (78°33'3.736"E 15°1'31.63"N)



T1: 24 Dec 2015

Agriculture to Built-up



T0: 2011-12 (78°35'47.435"E 15°3'21.599"N)



T1: 24 Dec 2015

Table showing change matrix depicting Land cover transitions during study period-2011-12 to 2015-16

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		
T0													
Built up	147.26												147.26
Mining/dump													
Agriculture	5.58	1.80	5676.41	6.00				6.94		30.27			5727.00
Plantation Horticulture	0.18		63.77	2.14				0.82		0.22			67.13
Forest													
Forest Plantation													
Barren Rocky													
Scrub	0.73		248.94					207.07		5.02			461.77
Waterbody- Streams/River									67.01				67.01
Waterbody – Ponds			0.50					0.22		27.71			28.43
Grand Total	153.75	1.80	5989.62	8.14				215.06	67.01	63.22			6498.60

- 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 T0 43 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 313 ha of the agriculture area has increased from plantations, 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-2015-16 to 2016-17

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	153.75												153.75
Mining/dump		1.80											1.80
Agriculture	0.81		5984.42					0.68	3.53	0.18			5989.62
Plantation Horticulture				8.14									8.14
Forest													
Forest Plantation													
Barren Rocky													
Scrub	0.22		6.27					205.03	3.54				215.06
Waterbody- Streams/River										67.01			67.01
Waterbody – Ponds									63.22				63.22
Grand Total	154.77	1.80	5990.69	8.14				205.71	70.30	67.19			6498.60

- 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 4.5 ha of the agriculture area has decreased and it is converted into Built-up, scrubland and water body in T2.
- In T2 6.2 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-2016-17 to 2017-18

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	154.77												154.77
Mining/dump		1.80											1.80
Agriculture	0.52		5988.51	1.39				0.07		0.20			5990.69
Plantation Horticulture			0.92	7.22									8.14
Forest													
Forest Plantation													
Barren Rocky													
Scrub	1.53		8.58					195.60					205.71
Waterbody- Streams/River									67.19				67.19
Waterbody – Ponds			0.72								69.57		70.30
Grand Total	156.82	1.80	5998.74	8.61				195.67	67.19	69.77			6498.60

- 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 2.1 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrubland and water body in T3.
- In T3 10.2 ha of the agriculture area has increased from plantations, 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-2017-18 to 2018-19

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	156.82										156.82	
Mining/dump		0.88								0.92	1.80	
Agriculture	0.22		5998.17							0.34	5998.74	
Plantation Horticulture			0.59	8.02							8.61	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	2.19		23.10					170.19		0.19	195.67	
Waterbody- Streams/River			0.10						67.10		67.19	
Waterbody – Ponds			0.34							69.43	69.77	
Grand Total	159.24	0.88	6022.30	8.02				170.19	67.10	70.88	6498.60	

- 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 0.5 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.
- In T4 24.1 ha of the agriculture area has increased from plantations, 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-2018-19 to 2019-20

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		
T4													
Built up	159.24												159.24
Mining/dump		0.88											0.88
Agriculture	0.58	0.55	6019.95							1.22			6022.30
Plantation Horticulture				8.02									8.02
Forest													
Forest Plantation													
Barren Rocky													
Scrub	0.46		9.29					158.87	0.26	1.31			170.19
Waterbody- Streams/River									67.10				67.10
Waterbody – Ponds										70.88			70.88
Grand Total	160.28	1.43	6029.24	8.02				158.87	67.35	73.41			6498.60

- 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 2.3 ha of the agriculture area has decreased and it is converted into Built-up mining/dump and water body in T5.
- In T5 9.2 ha of the agriculture area has increased from 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 45 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
4. There is an increase of 262, 01, 08, 23 & 06 Hectares From T0 to T1, T1-T2, T2 – T3, T3-T4 & T4-T5 respectively and overall increase of 302 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is a decrease of 302 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
6. Farm ponds (2) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (2) verified from the portal.