

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

YSR KADAPA -35/2011-12
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**

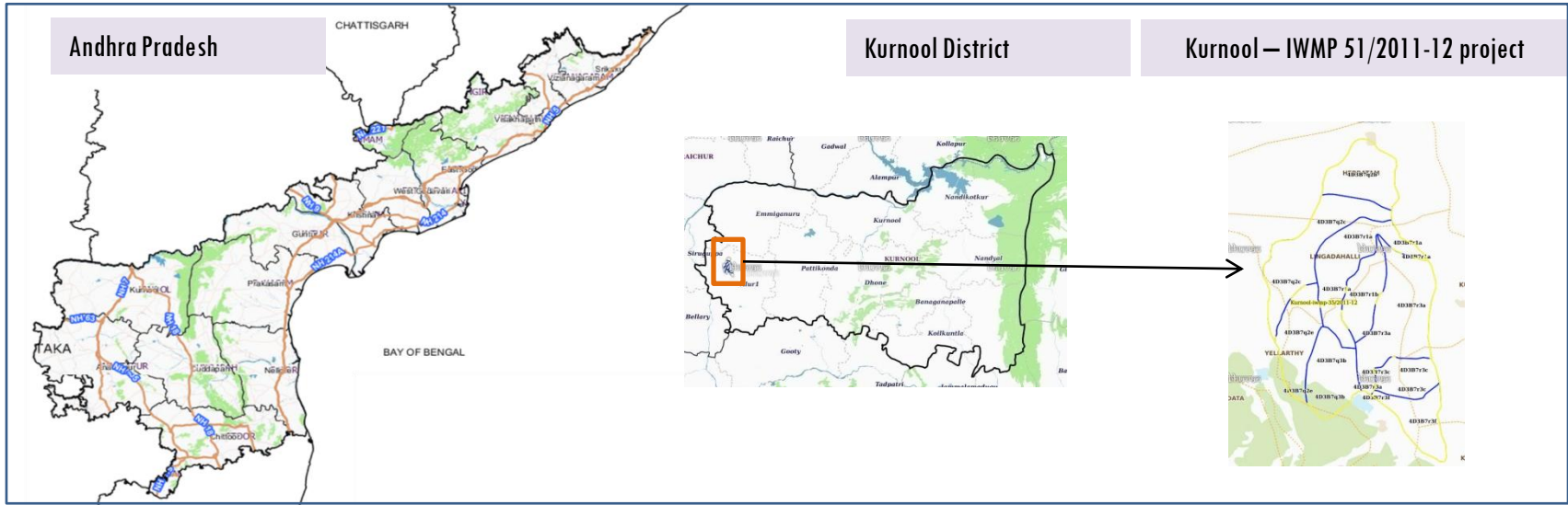
01. STUDY AREA
02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
04. CONCLUSIONS

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-35/2011-12, Kurnool District of Andhra Pradesh. The total geographical area of the project is 4,722 ha. It comprises of 9 micro watersheds.
- In the project area 508 Drishti photos were uploaded showing check dams/checks & plugins, Farm ponds, Livelihood measures and remaining showing others.
- Major percentage i.e. 81% is covered by the agriculture, 10 % is covered by scrubland, 4.3 % is covered by forest and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-35/2011-12
DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Holagunda and Alur Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 4,722 ha. It comprises of 9 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).

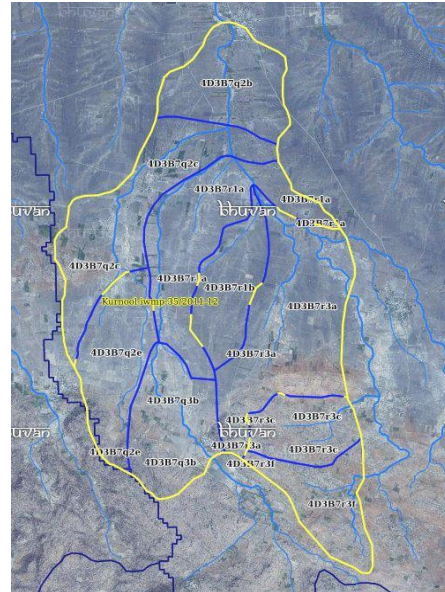
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2011-12	2019-20
LISS IV	2011-12		
SCENE 1			9-Dec-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			9-Dec-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	508
4	Detailed Project Report		

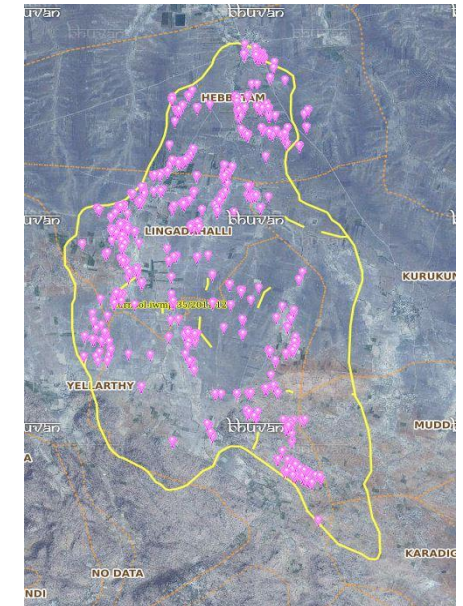
Natural Color Composite overlaid with Project boundaries and high detail stream network



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	1	1
2	Agriculture/Horticulture	8	6
3	Blockplanting	0	0
4	Bund planting	0	0
5	Drainage Treatment	0	0
6	Farm ponds/Dug out pit	88	68
7	Check dams (Civil work)	0	0
8	Checks & plugins	113	98
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	1	1
15	Capacity Building Activities	0	0
16	Entry Point Activity	0	0
17	Others	384	334
	TOTAL	595	508

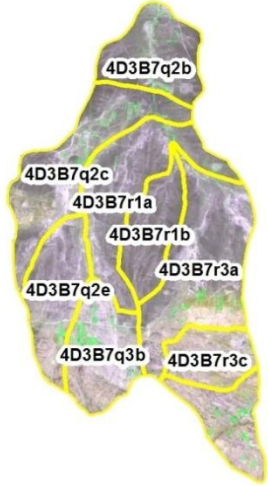
MONITORING IN THE PROJECT AREA

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.

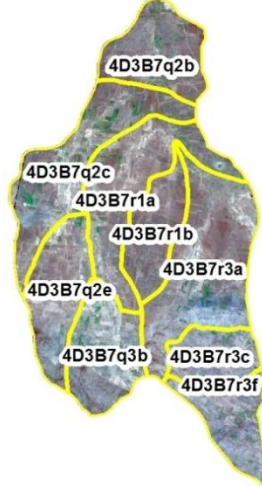
Natural Color Composite- 2011-12 to 2019-20

Natural Color Composite- 2011-12



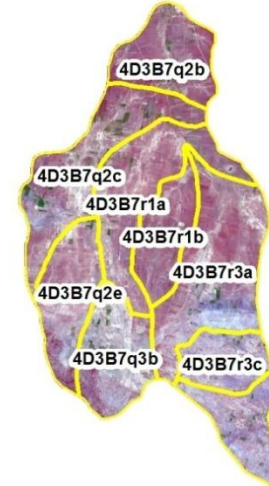
Source:LISS-IV,NRSC

Natural Color Composite - 26th November 2016



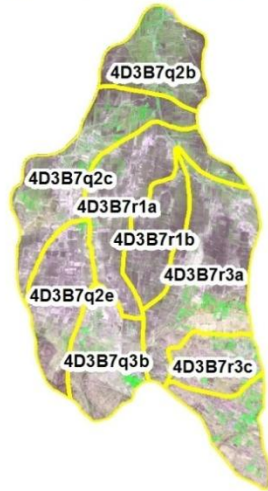
Source:NCC,NRSC

Natural Color Composite - 3rd February 2017



Source:NCC,NRSC

Natural Color Composite - 8th March 2018



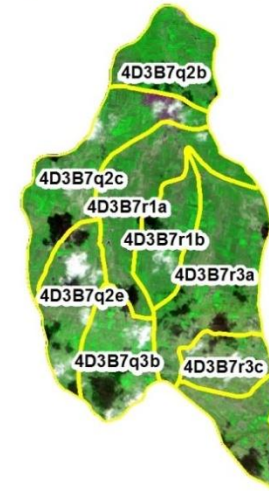
Source:LISS-IV,NRSC

Natural Color Composite - 23rd March 2019



Source:Sentinel,NRSC

Natural Color Composite - 9th December 2019



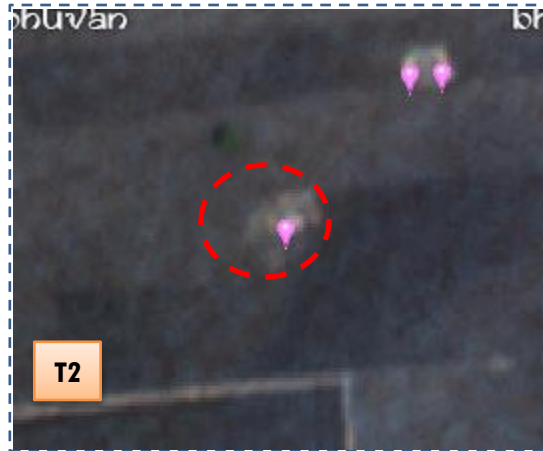
Source:LISS-IV,NRSC

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-35/2011-12



T1

T1: 26 November 2016



T2

T2: 16 September 2018



Drishti Sl no. 2457849 MWS : 4D3B7q2b

Farm pond



T1

T1: 26 November 2016



T2

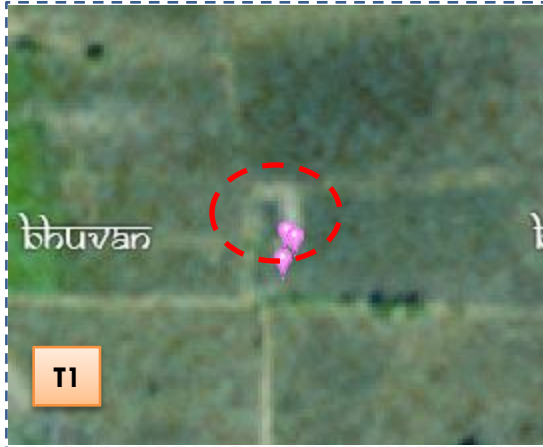
T2: 16 September 2018



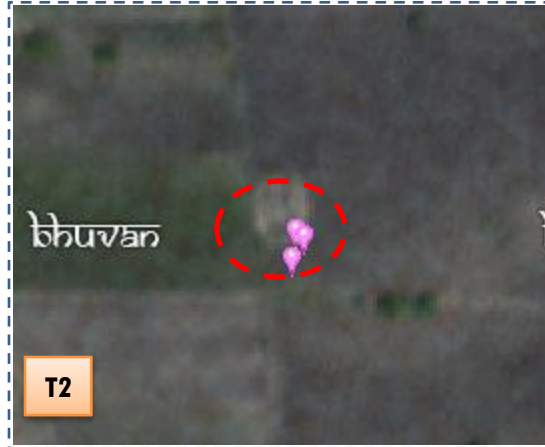
Drishti Sl no. 2459560 MWS : 4D3B7q2b

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-35/2011-12



T0: 26 November 2016

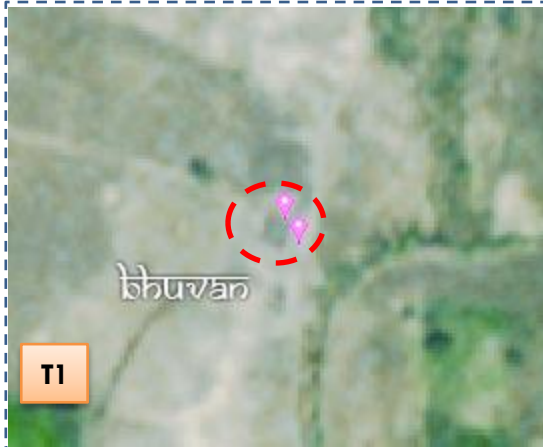


T1: 16 September 2018

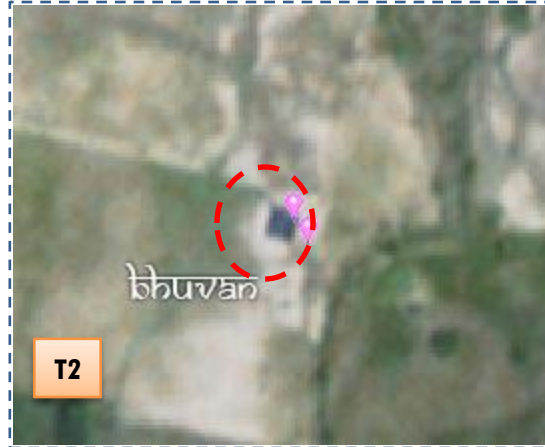


Drishti SI no. 2475474 MWS :4D3B7q2b

Farm pond



T0: 26 November 2016



T1: 16 September 2018



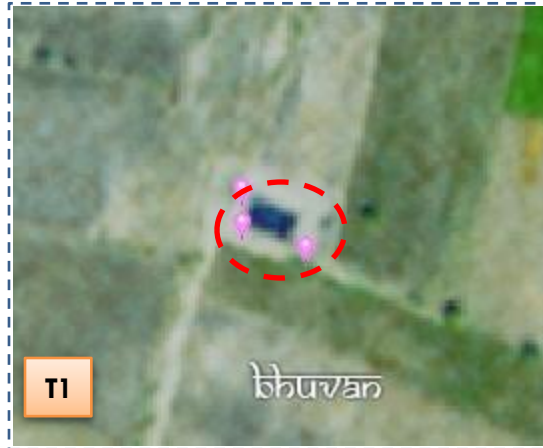
Drishti SI no. 2498310 MWS :4D3B7r3a

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-35/2011-12



T1:2010-11



T2: 16 September 2015



Drishti Sl no. 154315 MWS :4D3B7r1a

Farm pond



T1: 2010-11



T2: 16 September 2015



Drishti Sl no. 1854611 MWS :4D3B7r1a

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-35/2011-12



T0

T0: 2010-11



T1

T1: 16 September 2015



Drishti Sl no. 2498322 MWS :4D3B7q2e

Farm pond



T0

T0: 2010-11



T1

T1: 16 September 2015



Drishti Sl no. 2475520 MWS : 4D3B7q2c

Farm pond

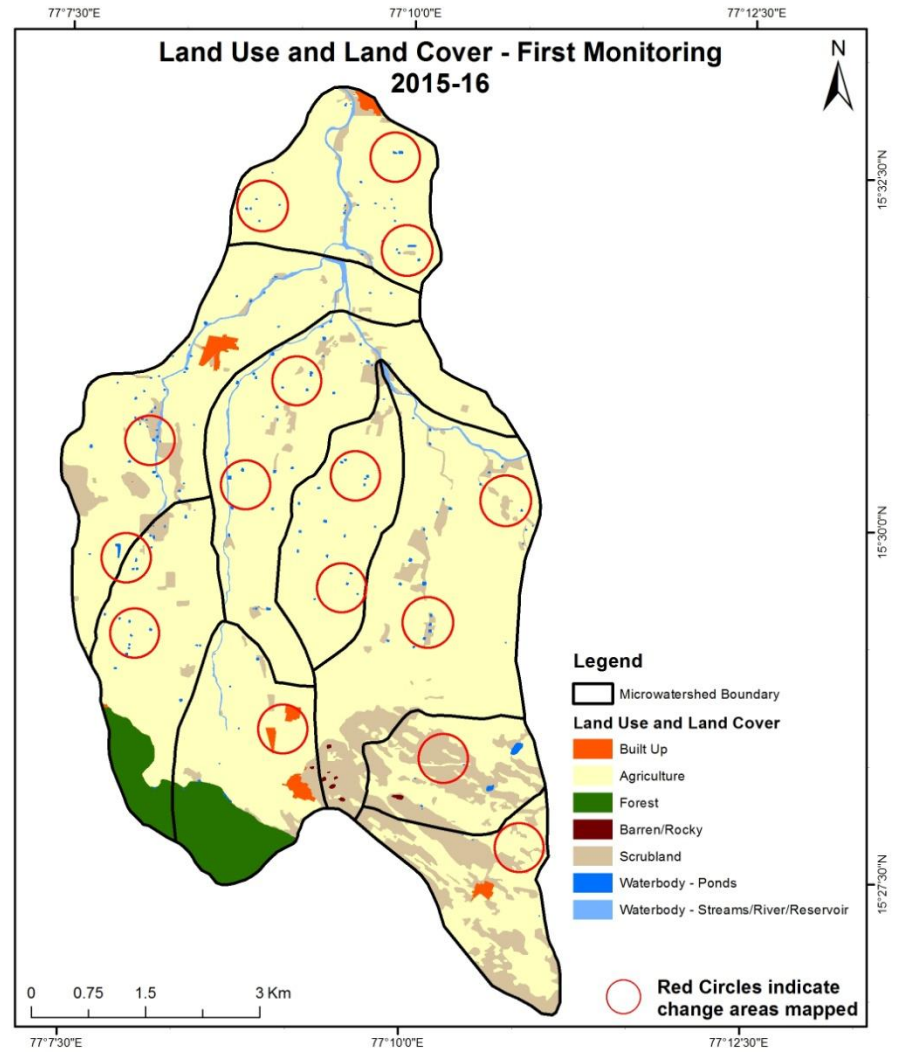
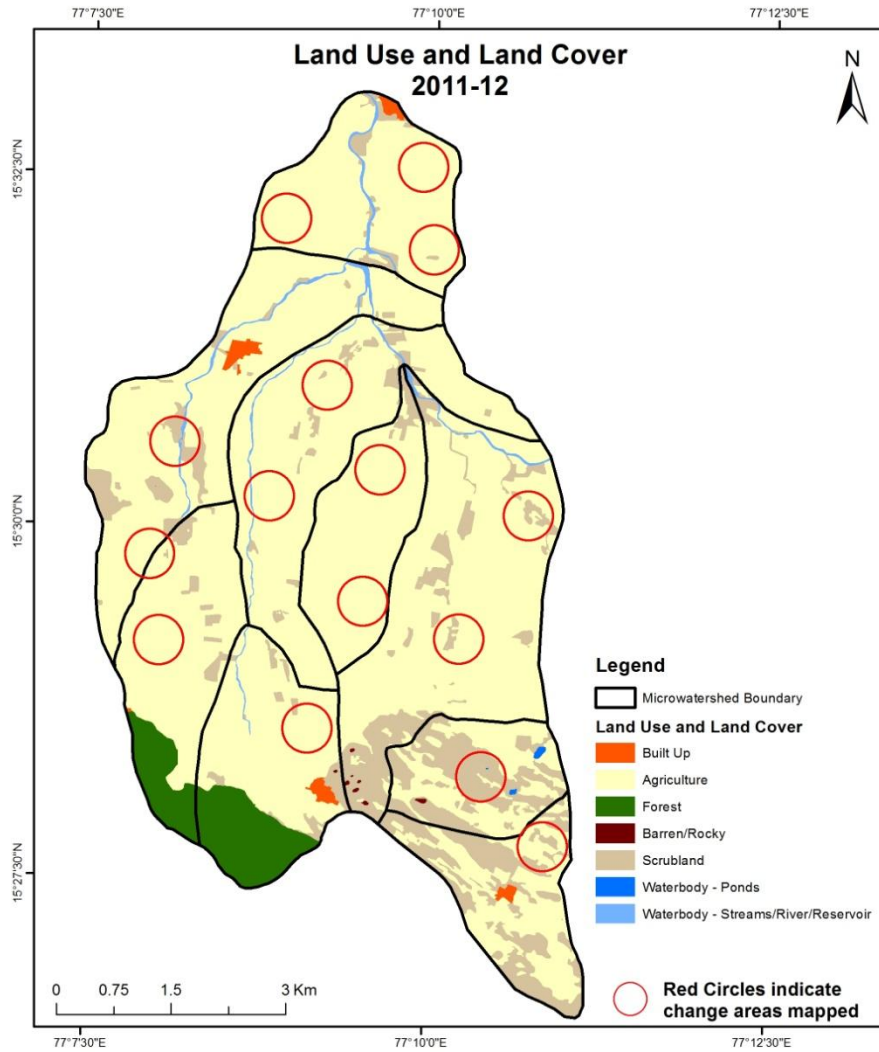
MONITORING IN THE PROJECT AREA

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 (2011-12) and row represents the T5 (2019-20)

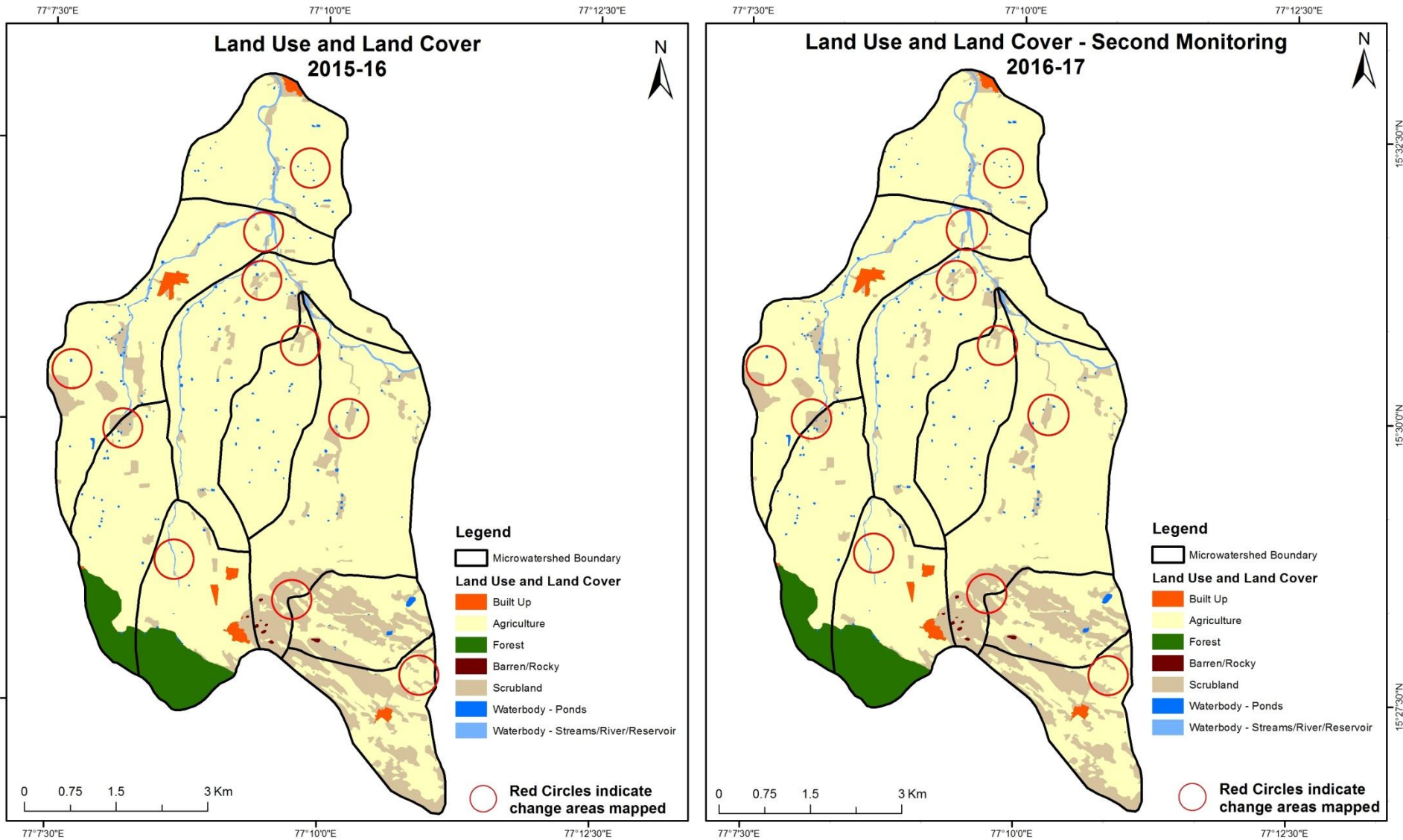
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



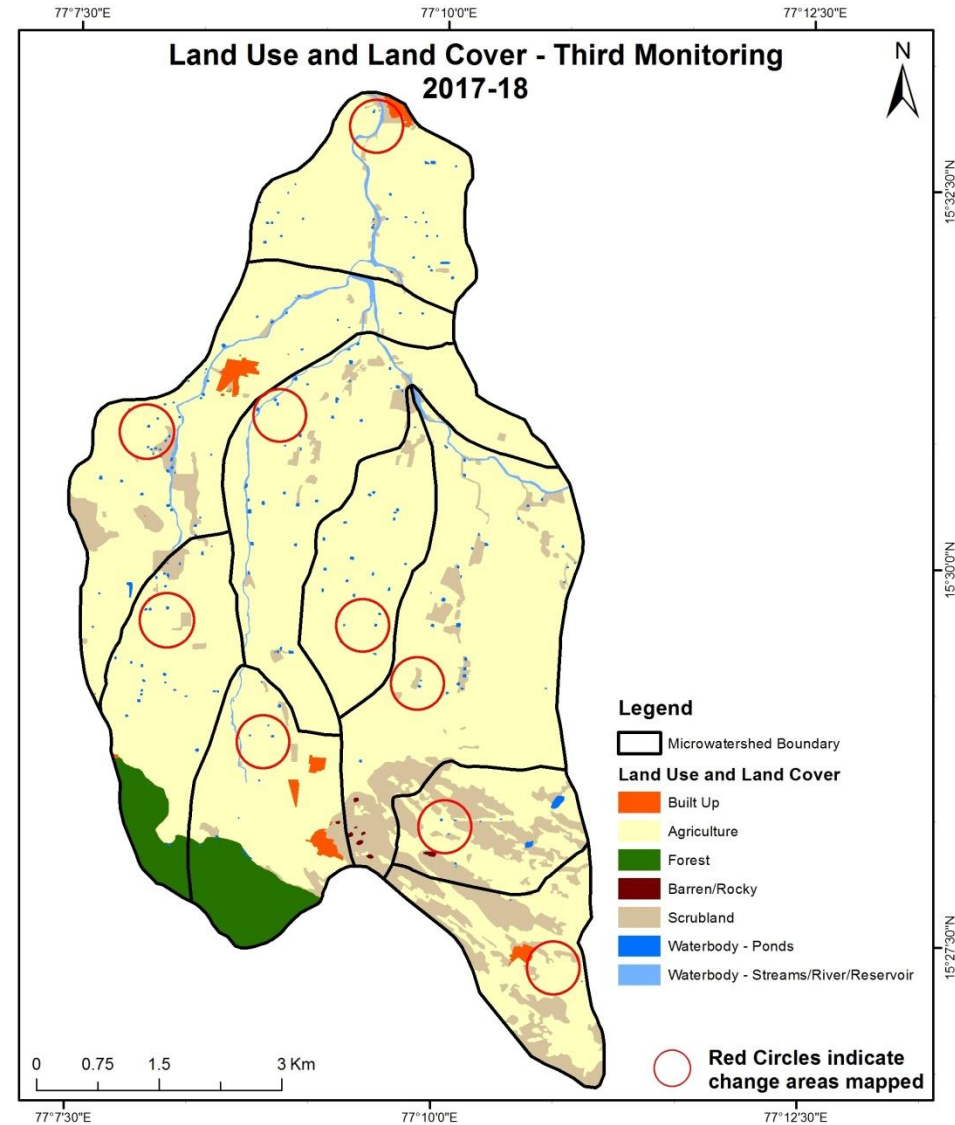
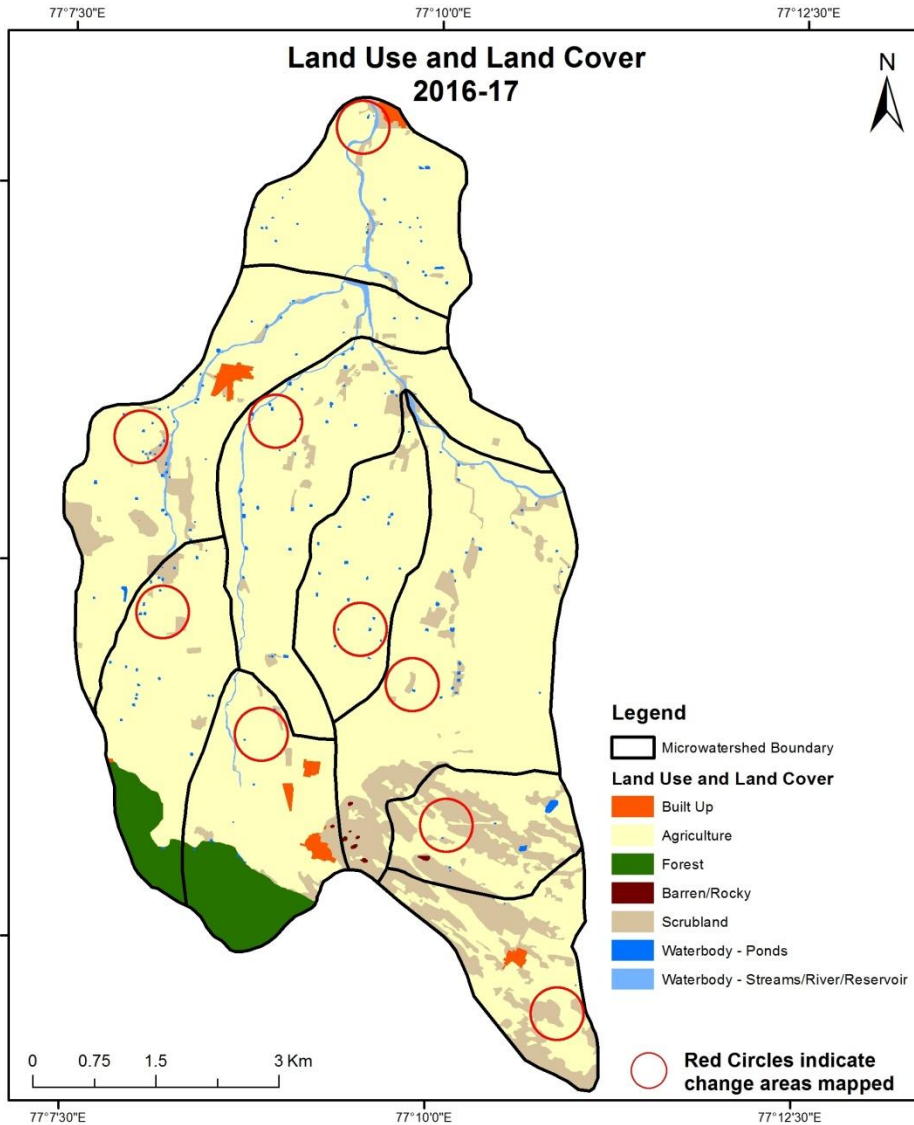
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



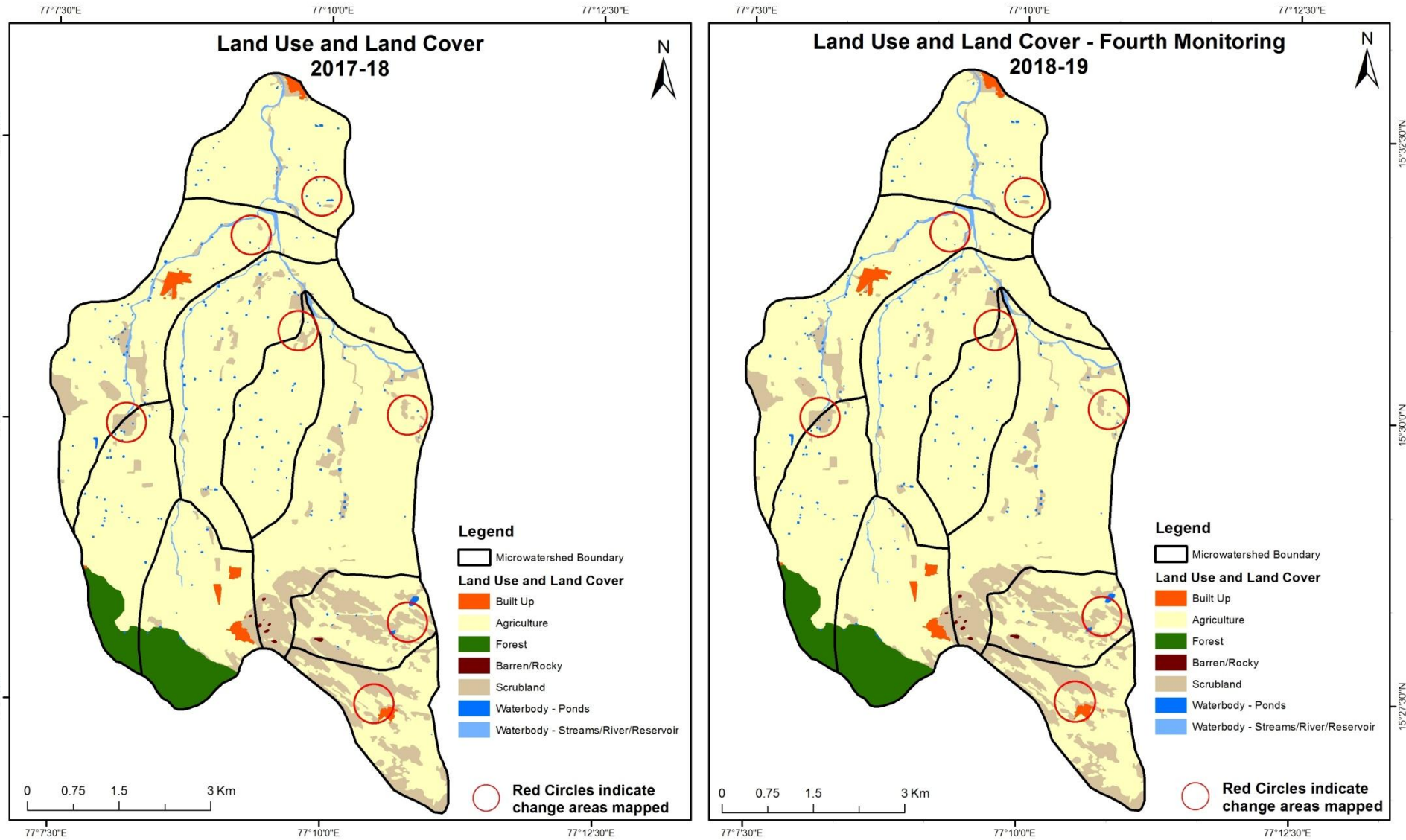
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



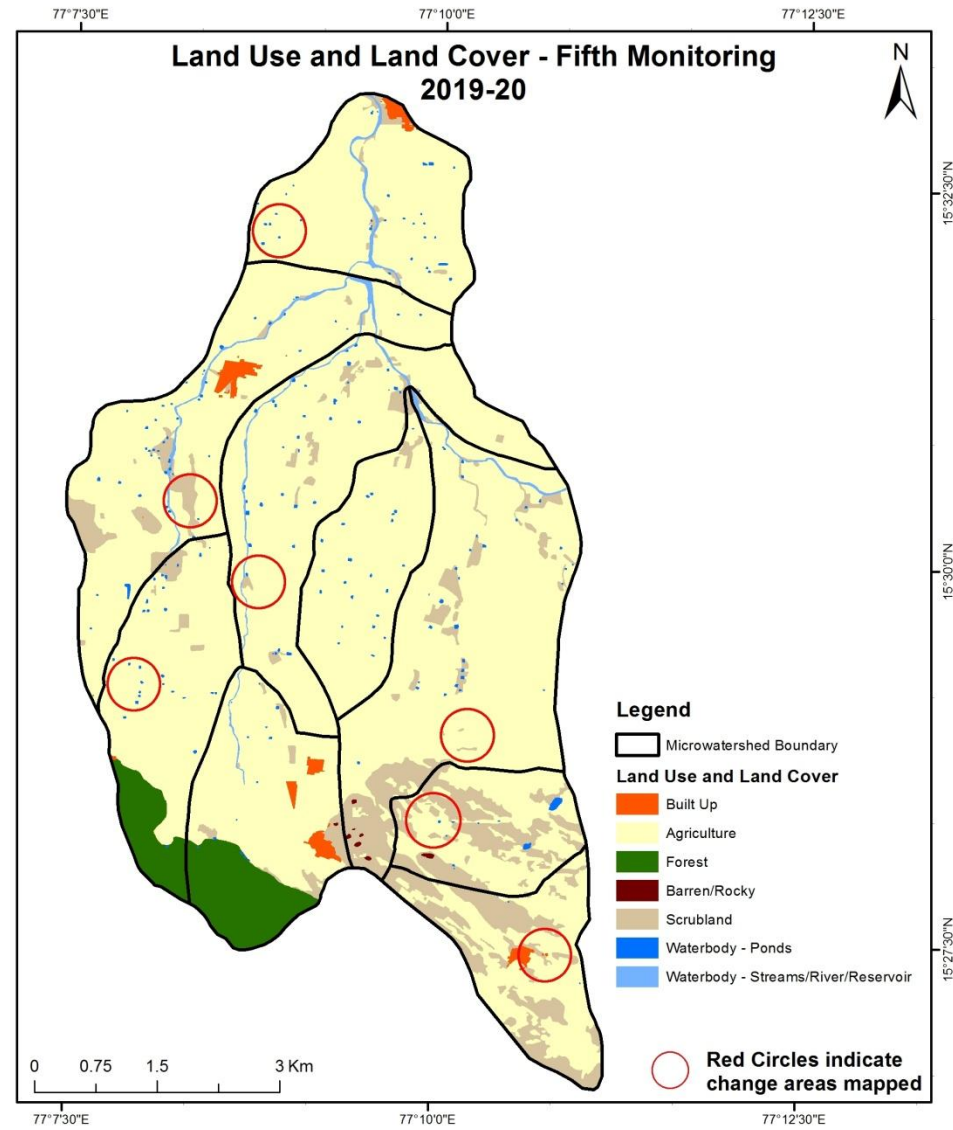
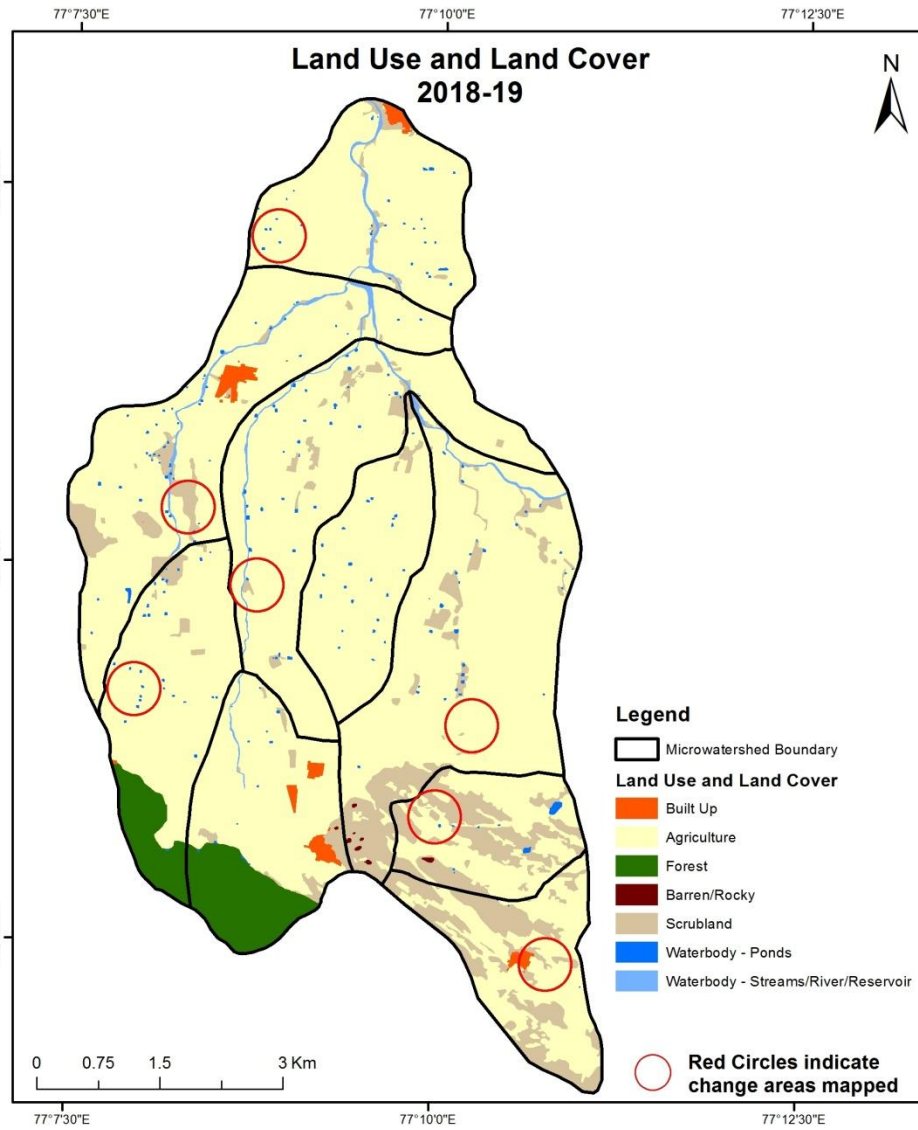
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



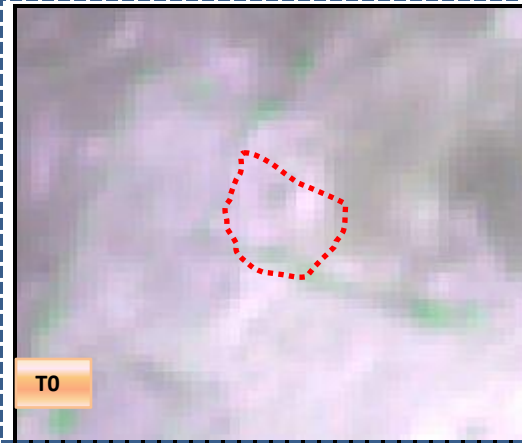
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



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

Agriculture to Water body



T0

T0: 2011-12 (77°10'1.884"E 15°29'44.816"N)



T1

T1: 26th November 2016

Scrub and Agriculture



T1

T1: 2015-16 (77°9'47.556"E 15°32'51.611"N)

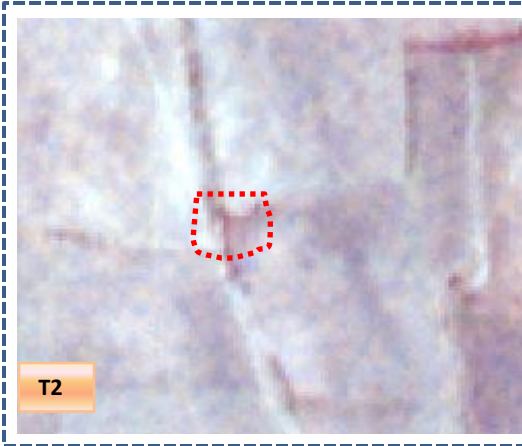


T2

T2: 3rd February 2017

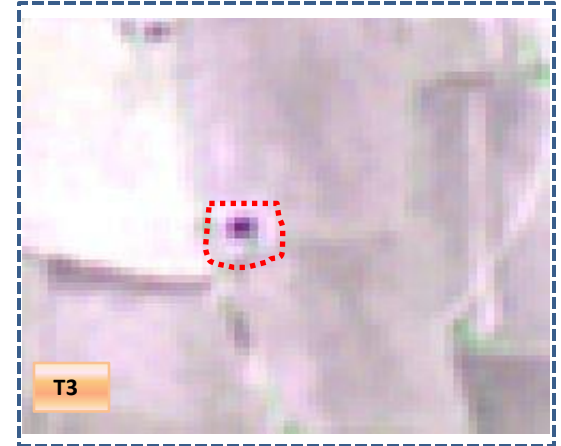
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body



T2

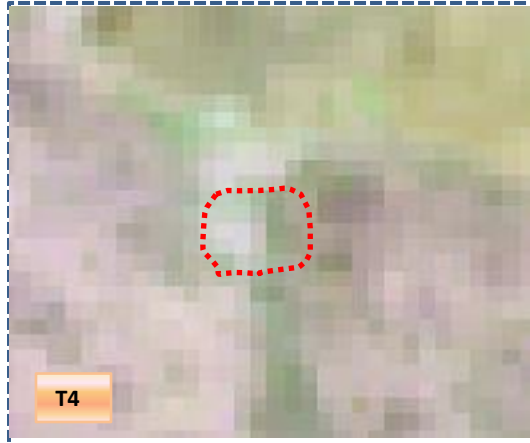
T2: 2016-17 (77°8'53.26"E 15°28'49.8"N)



T3

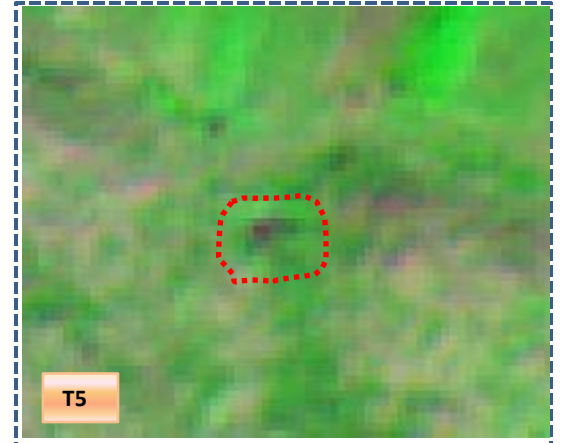
T3: 8th March 2018

Scrub to Water body



T4

T4: 2018-19 (77°7'32.032"E 15°30'20.425"N)

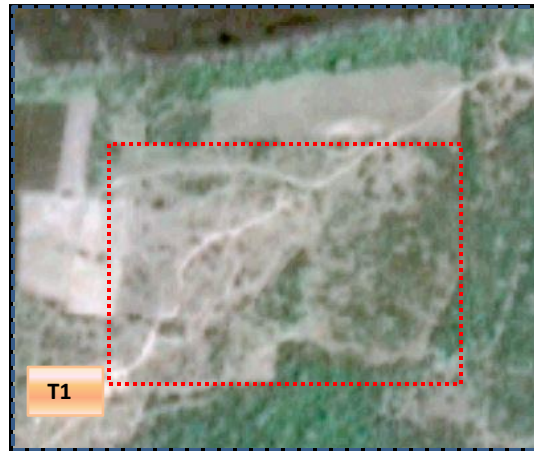


T5

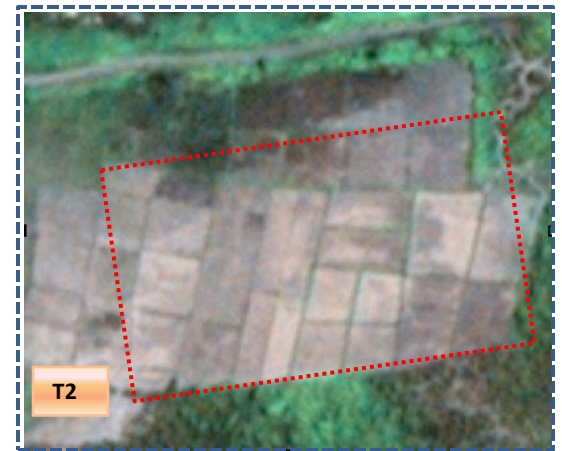
T5: 9th December 2019

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

Scrub to Agriculture



T1: 2015-16 (lat long)



T2: 09 May 2015

Agriculture to water body



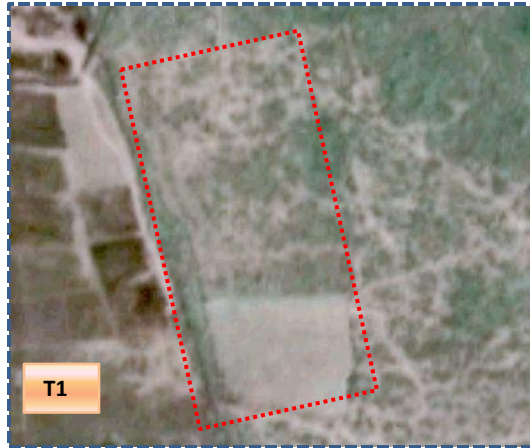
T1: 2015-16 (lat long)



T2: 09 May 2015

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

Forest to Plantation



T1: 2015-16 (lat long)



T2: 09 May 2015

Agriculture to Built-up



T1: 2015-16 (lat long)



T2: 09 May 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	29.02												29.02
Mining/dump													
Agriculture	7.72		3777.84							15.82			3801.38
Plantation Horticulture													
Forest					205.92						0.43		206.34
Forest Plantation													
Barren Rocky							2.51						2.51
Scrub	0.31		83.12					545.59			2.86		631.89
Waterbody- Streams/River									49.37				49.37
Waterbody – Ponds											2.33		2.33
Grand Total	37.06		3860.97		205.92		2.51	545.59	49.37		21.44		4722.85

- 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 and water body in T1.
- In T1 83 ha of the agriculture area has increased from 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-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	37.06												37.06
Mining/dump													
Agriculture	0.06		3860.82								0.08		3860.97
Plantation Horticulture													
Forest					205.92								205.92
Forest Plantation													
Barren Rocky							2.51						2.51
Scrub	0.07		13.97					531.38			0.17		545.59
Waterbody- Streams/River									49.37				49.37
Waterbody – Ponds											21.44		21.44
Grand Total	37.19		3874.79		205.92		2.51	531.38	49.37		21.69		4722.85

- 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 0.14 ha of the agriculture area has decreased and it is converted into Built-up and water body in T2.
- In T2 13.9 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	37.19												37.19
Mining/dump													
Agriculture	0.83		3872.07							1.90			3874.79
Plantation Horticulture													
Forest					205.92								205.92
Forest Plantation													
Barren Rocky							2.51						2.51
Scrub	0.41		21.20					509.67		0.10			531.38
Waterbody- Streams/River									49.37				49.37
Waterbody – Ponds										21.69			21.69
Grand Total	38.43		3893.27		205.92		2.51	509.67	49.37	23.69			4722.85

- 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 2.7 ha of the agriculture area has decreased and it is converted into Built-up and water body in T3.
- In T3 21.2 ha of the agriculture area has increased from 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-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	
T3												
Built up	38.43										38.43	
Mining/dump												
Agriculture	0.90		3892.37								3893.27	
Plantation Horticulture												
Forest					205.92						205.92	
Forest Plantation												
Barren Rocky							2.51				2.51	
Scrub	0.45		5.53					503.69			509.67	
Waterbody- Streams/River									49.37		49.37	
Waterbody – Ponds										23.69	23.69	
Grand Total	39.77		3897.90		205.92		2.51	503.69	49.37	23.69	4722.85	

- 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 0.9 ha of the agriculture area has decreased and it is converted into Built-up area in T4.
- In T4 5.5 ha of the agriculture area has increased from scrubland area 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	39.77												39.77
Mining/dump													
Agriculture	0.85		3842.89							54.16			3897.90
Plantation Horticulture													
Forest					205.90						0.02		205.92
Forest Plantation													
Barren Rocky							2.51						2.51
Scrub	0.35							498.92			4.42		503.69
Waterbody- Streams/River									49.37				49.37
Waterbody – Ponds											23.69		23.69
Grand Total	40.97		3842.89		205.90		2.51	498.92	49.37		82.29		4722.85

- 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 55 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.
- 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 79 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 59, 13, 18 & 04 Hectares From T0 to T1, T1-T2, T2-T3 & T3-T4 respectively and overall increase of 41 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 132 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
6. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.