

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -41/2010-11

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
March-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

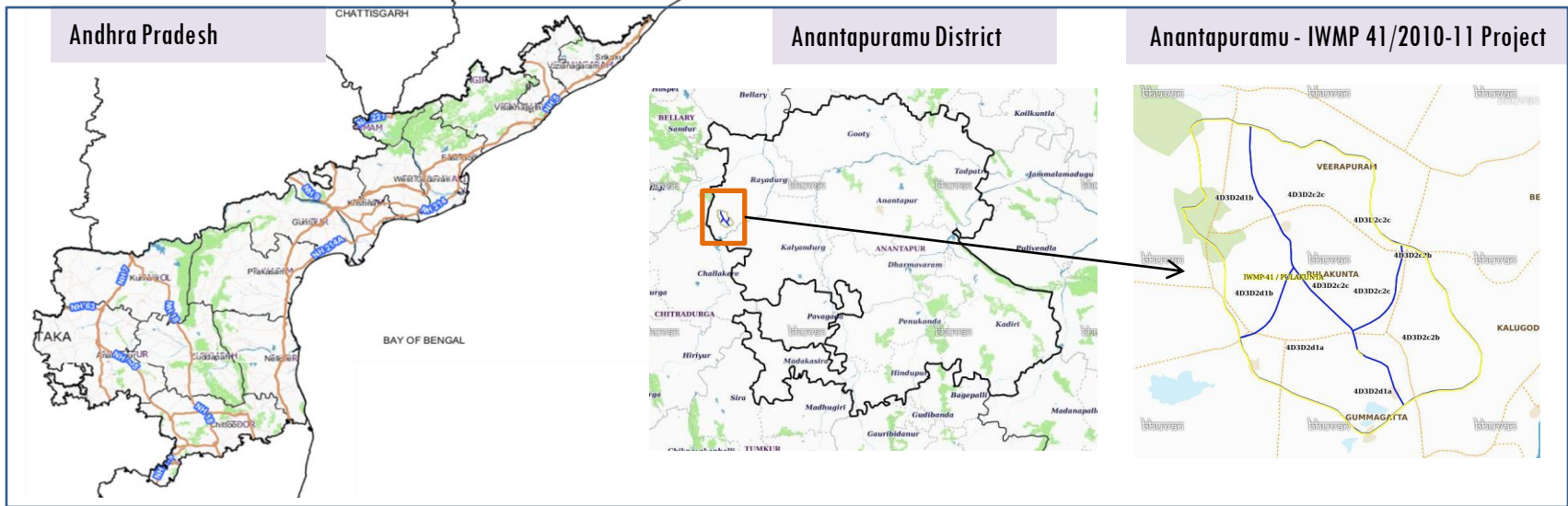
E X E C U T I V E S U M M A R Y

- 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-41/2010-11, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 4,486 ha. It comprises of 4 micro watersheds.
- In the project area 57 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.
- Water bodies have shown an decrease by 0.13 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 81 % is covered by the agriculture, 7.6 % is covered by Scrub land and remaining by other land use classes.

PROJECT : ANANTAPURAMU – IWMP-41/2010-11

DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Gummagatta Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 4,486 ha. It comprises of 4 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



- Anantapuram 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 37 °C range and it reaches around 44 °C to 45 °C.
- Anantapuram gets pre-monsoon showers starting as early as March, mainly through north-easterly winds blowing in from Kerala. Monsoon arrives in September and lasts until early November with about 250 mm (9.8 in) of precipitation. A dry and mild winter starts in late November and lasts until early February; with little humidity and average temperatures in the 22-23 °C (72-73 °F) range. Total annual rainfall is about 22 in (560 mm).
- Anantapuram district receives moderate to good rainfall from July to October month.

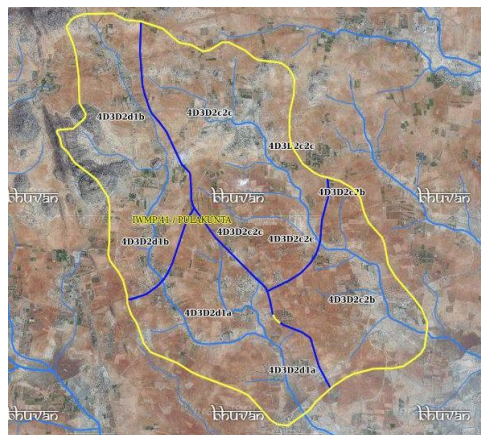
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			2-Jan-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			2-Jan-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	57
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

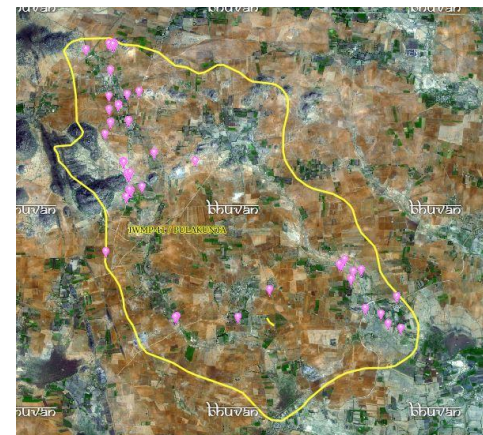


MWS Boundary



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	3	3
2	Agriculture/Horticulture	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	16	16
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	18	18
10	Civil work-Check dams/Rock fill dam	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-Plantation/Horticulture	19	15
15	Capacity Building Activities	0	0
16	Entry Point Activity	2	2
17	Others	3	3
	TOTAL	61	57

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.

Anantapuramu-IWMP-41/2010-11

2009-10



Feb-2015



Oct-2016



Feb-2017



Jan-2019

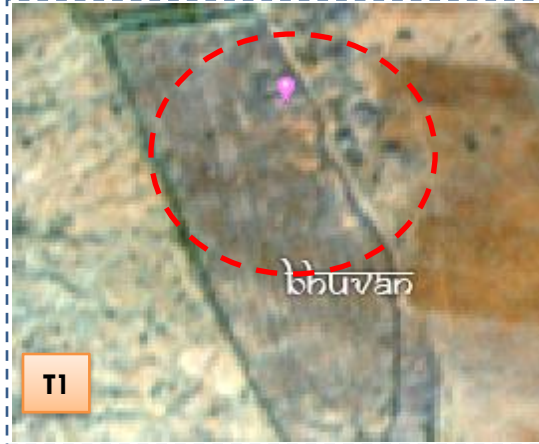


Activity : Horticulture

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-41/2010-11



T0:2010-11

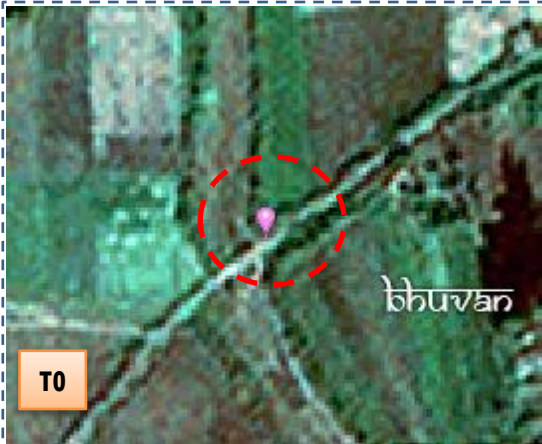


T1: 01 February 2015

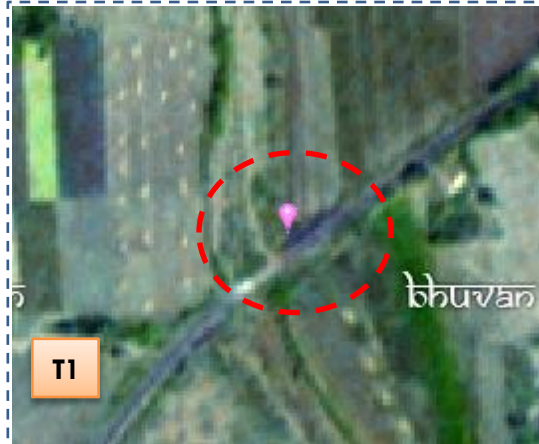


Drishti SI no. 148673 MWS : 4D3D2c2b

Block planting



T0:2010-11



T1: 01 February 2015



Drishti SI no. 788602 MWS : 4D3D2c2b

Cattle trough

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-41/2010-11



T0

T0:2010-11



T1

T1: 01 February 2015



Drishti Sl no. 152951 MWS : 4D3D2c2b

Farm pond



T0

T0:2010-11



T1

T1: 01 February 2015

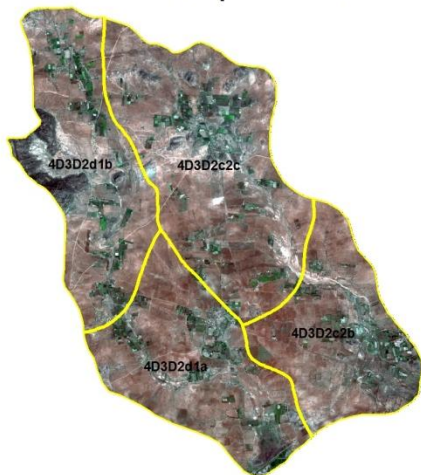


Drishti Sl no. 788578 MWS : 4D3D2c2b

Check dam

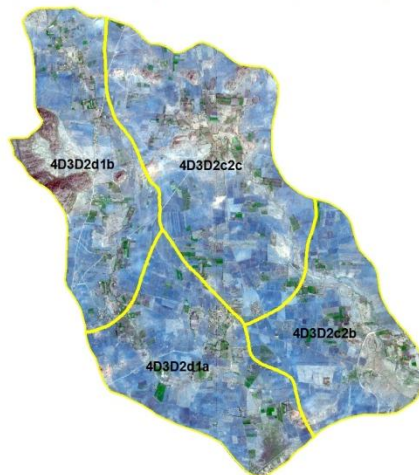
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2010-11



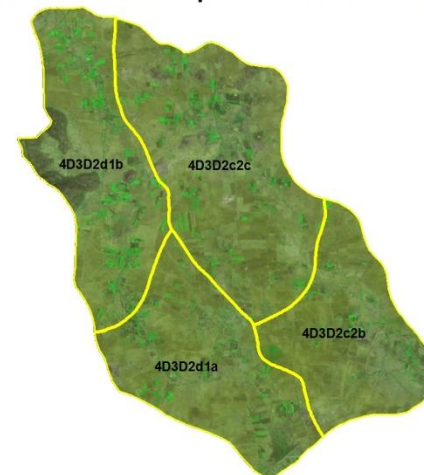
Source:Fusion data,NRSC

Natural Color Composite- 01st February 2015



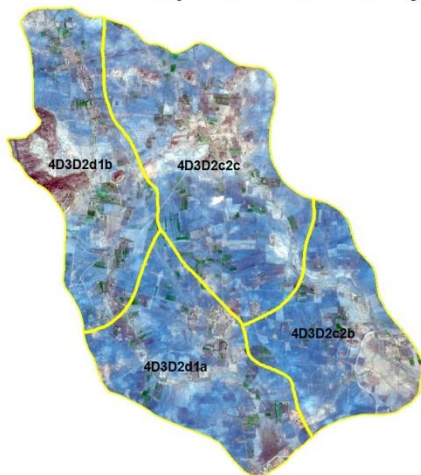
Source:NCC,NRSC

Natural Color Composite- 30th March 2016



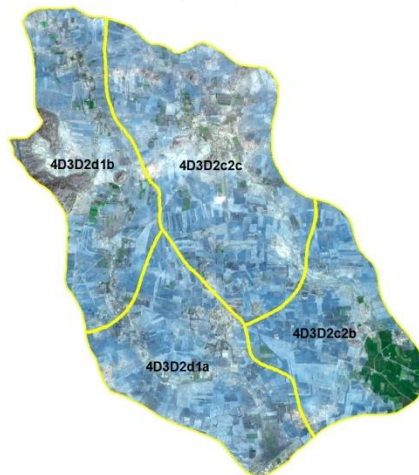
Source:LISS-IV,NRSC

Natural Color Composite- 26th February 2017



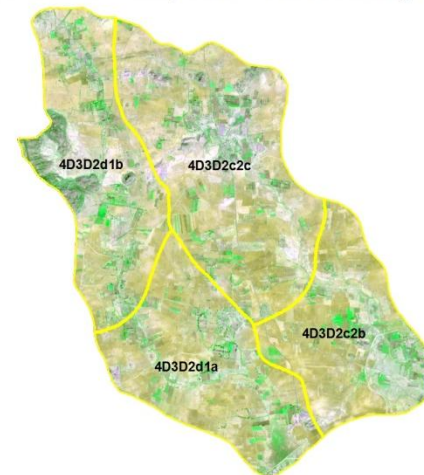
Source:NCC,NRSC

Natural Color Composite- 11th March 2018



Source:NCC,NRSC

Natural Color Composite- 02nd January 2019



Source:Sentinel,NRSC

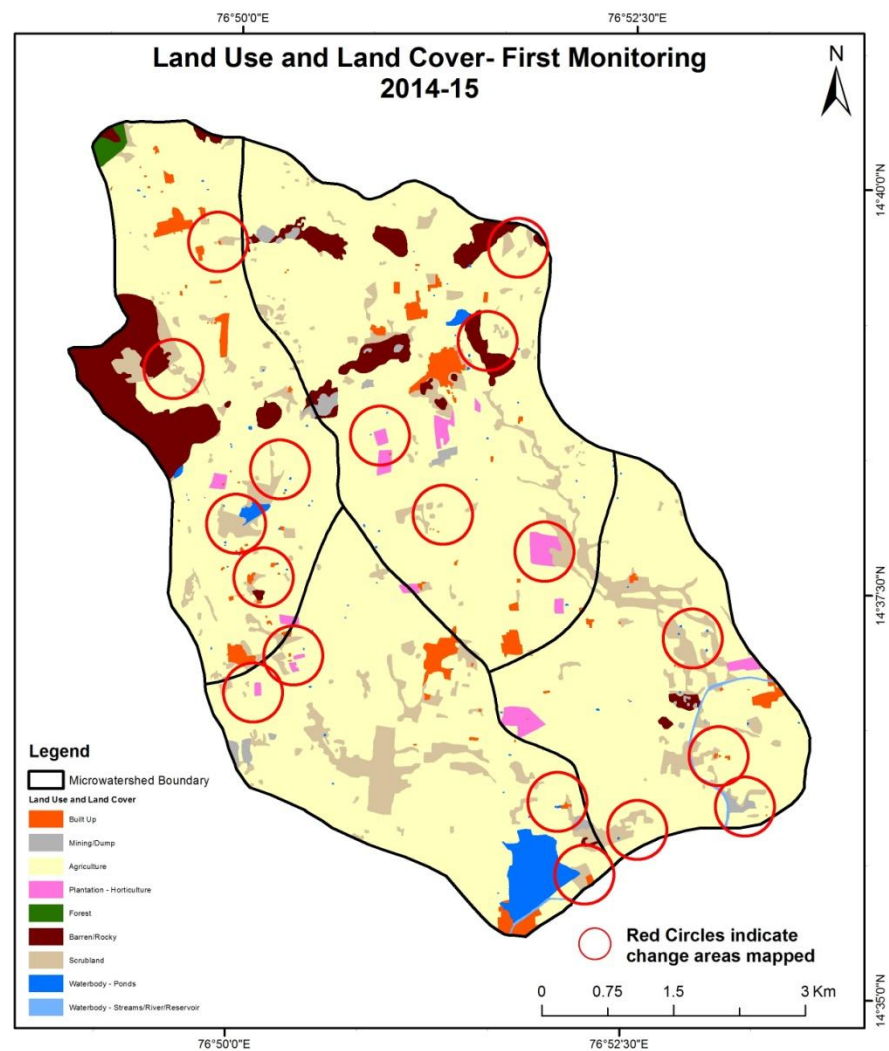
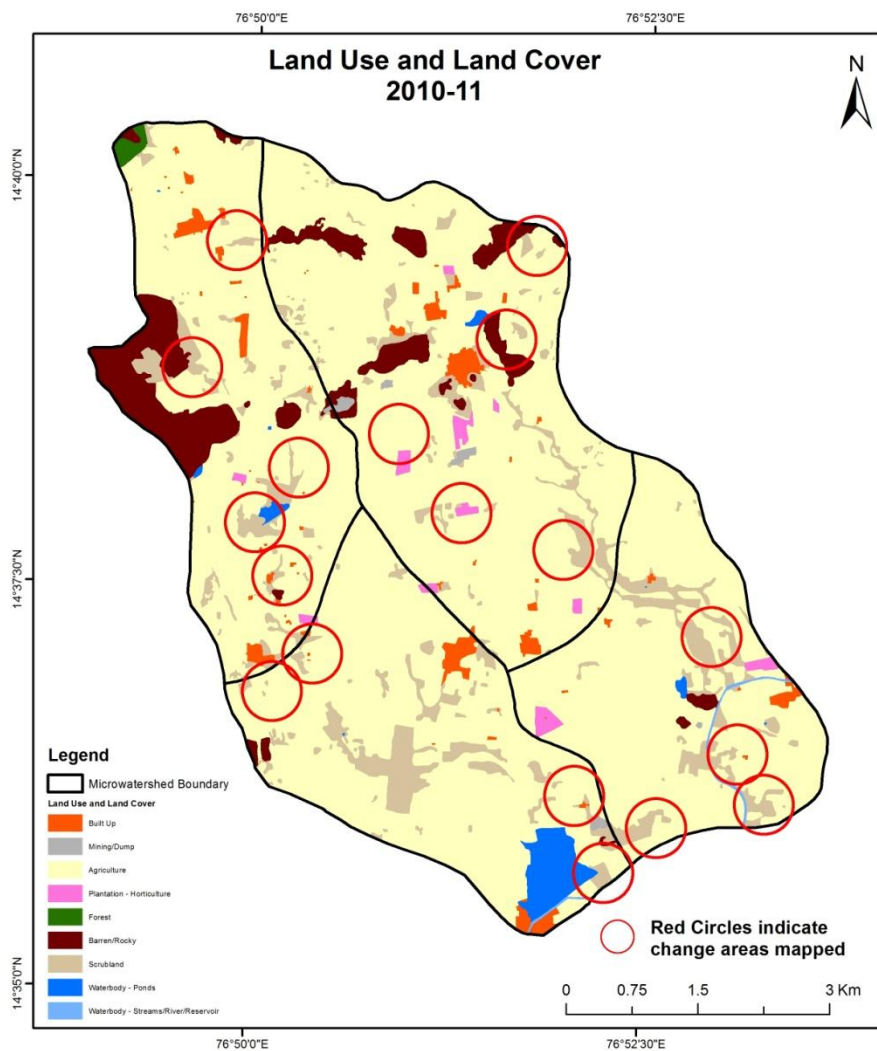
MONITORING IN THE PROJECT AREA

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)

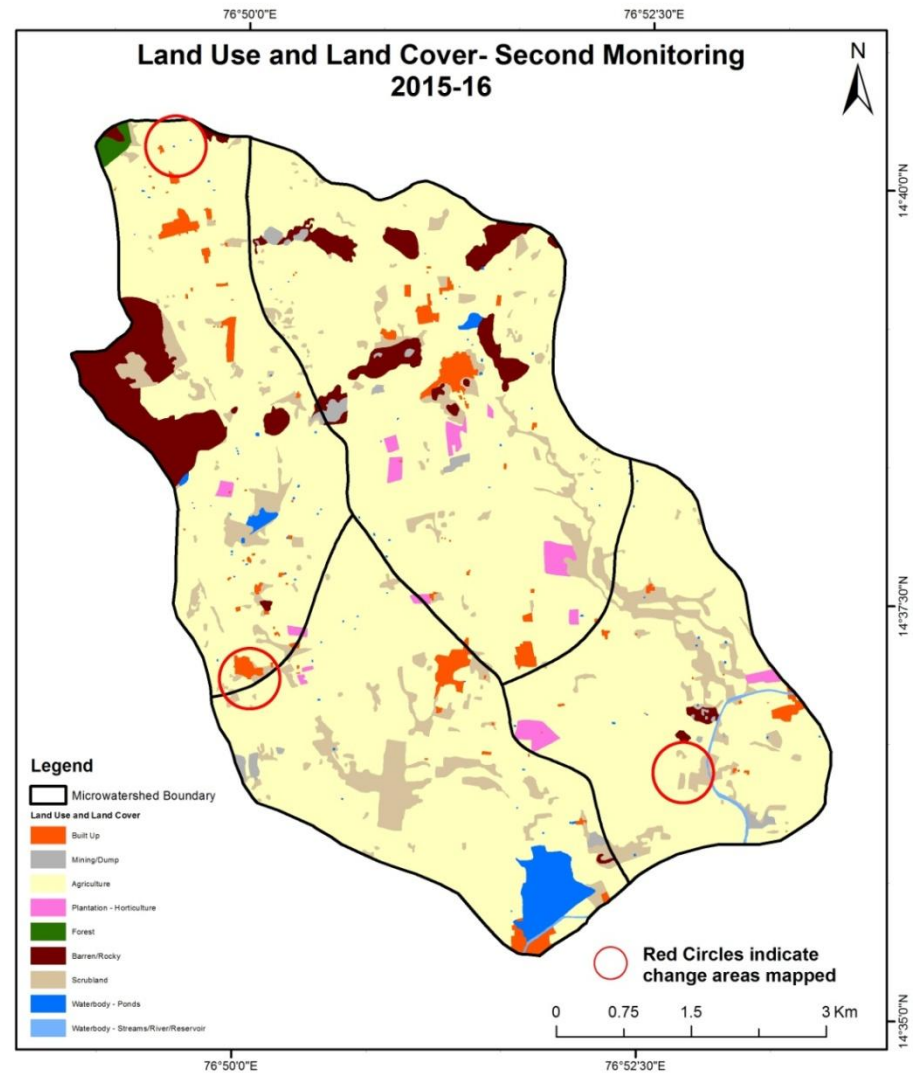
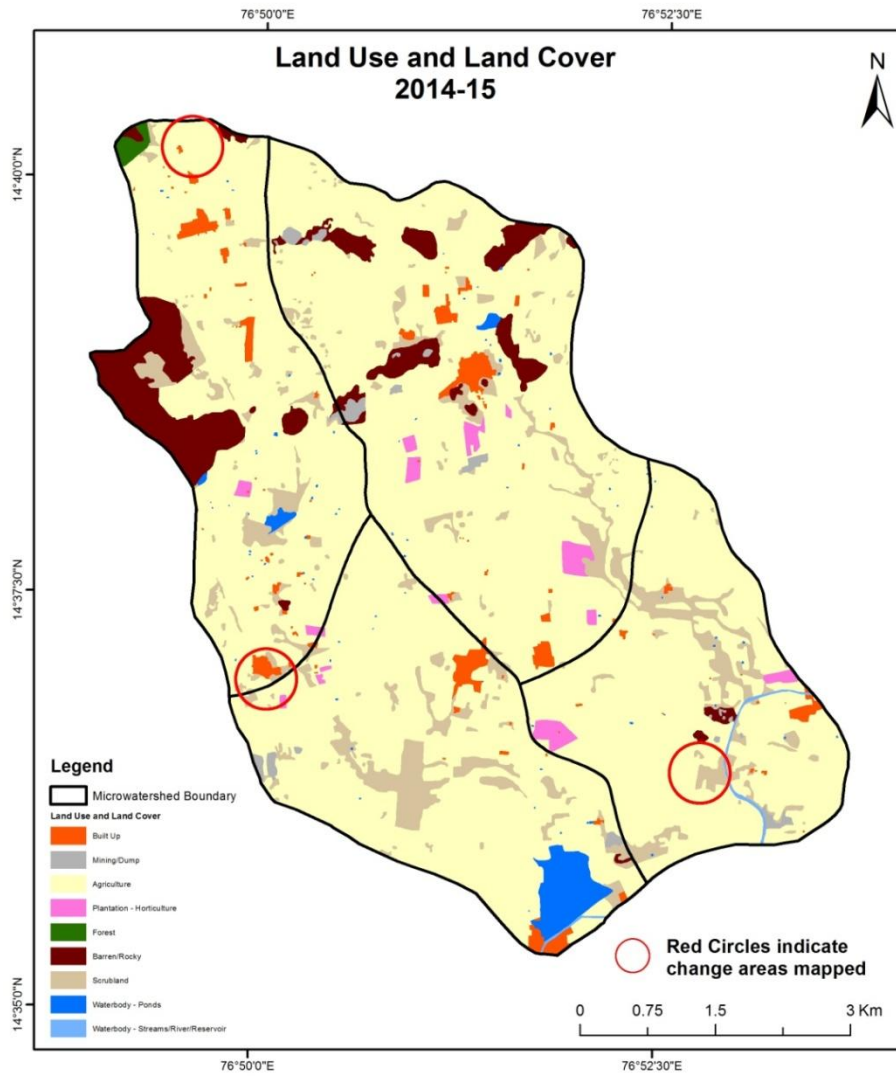
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



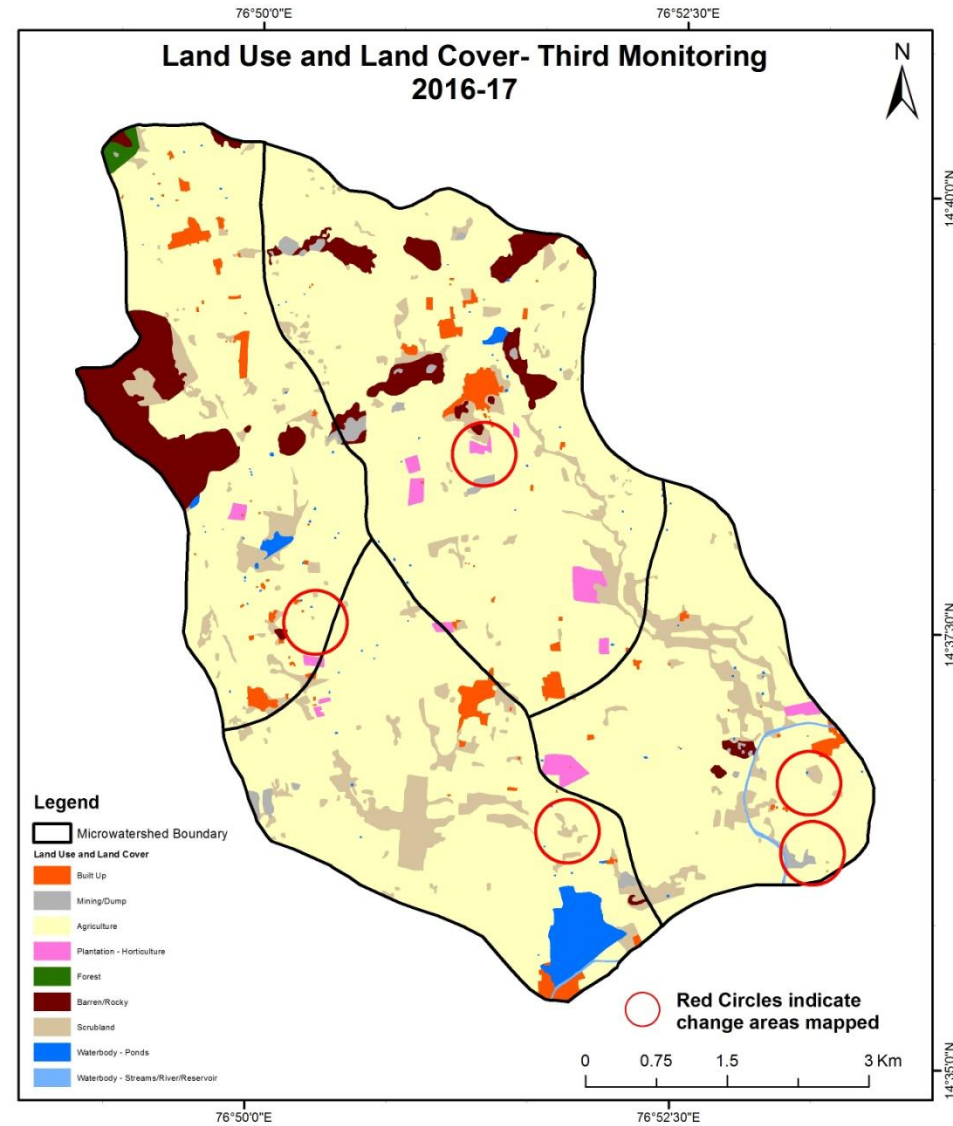
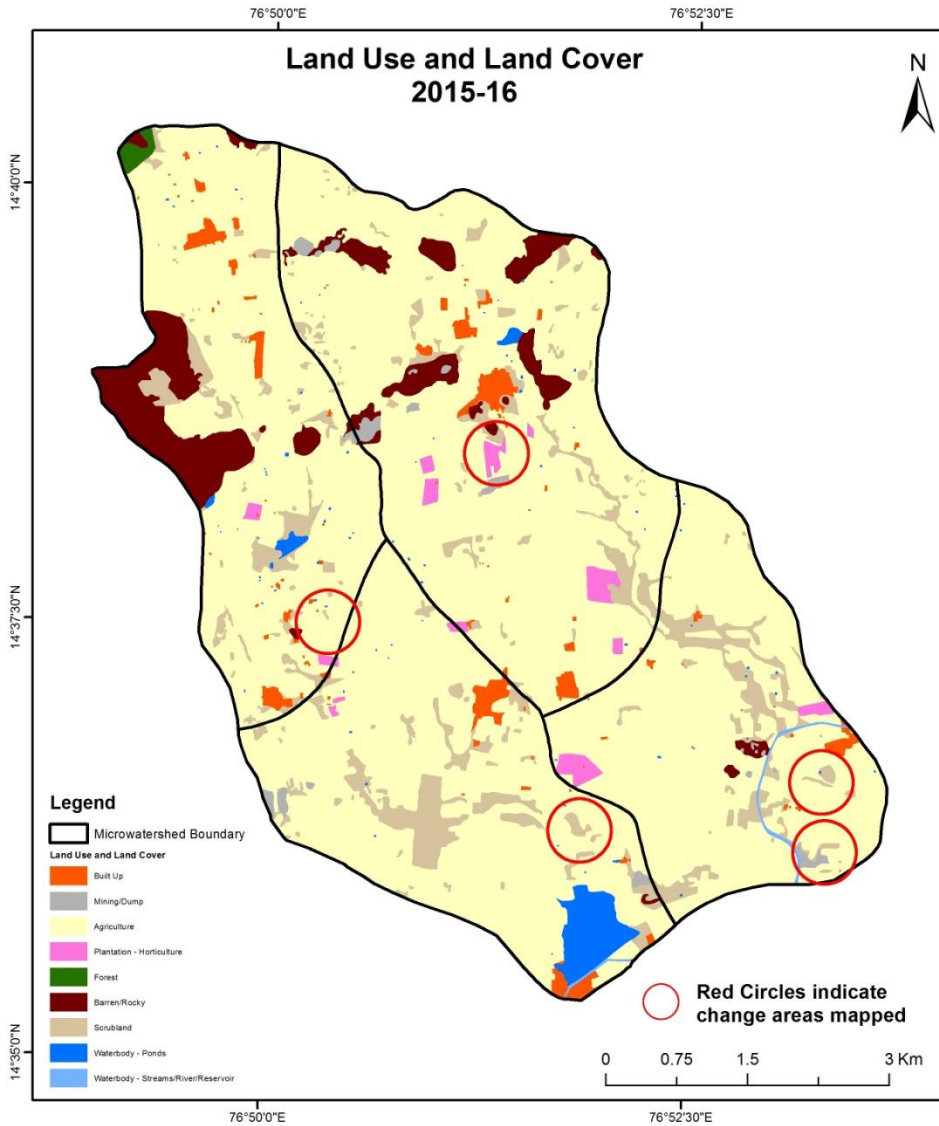
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



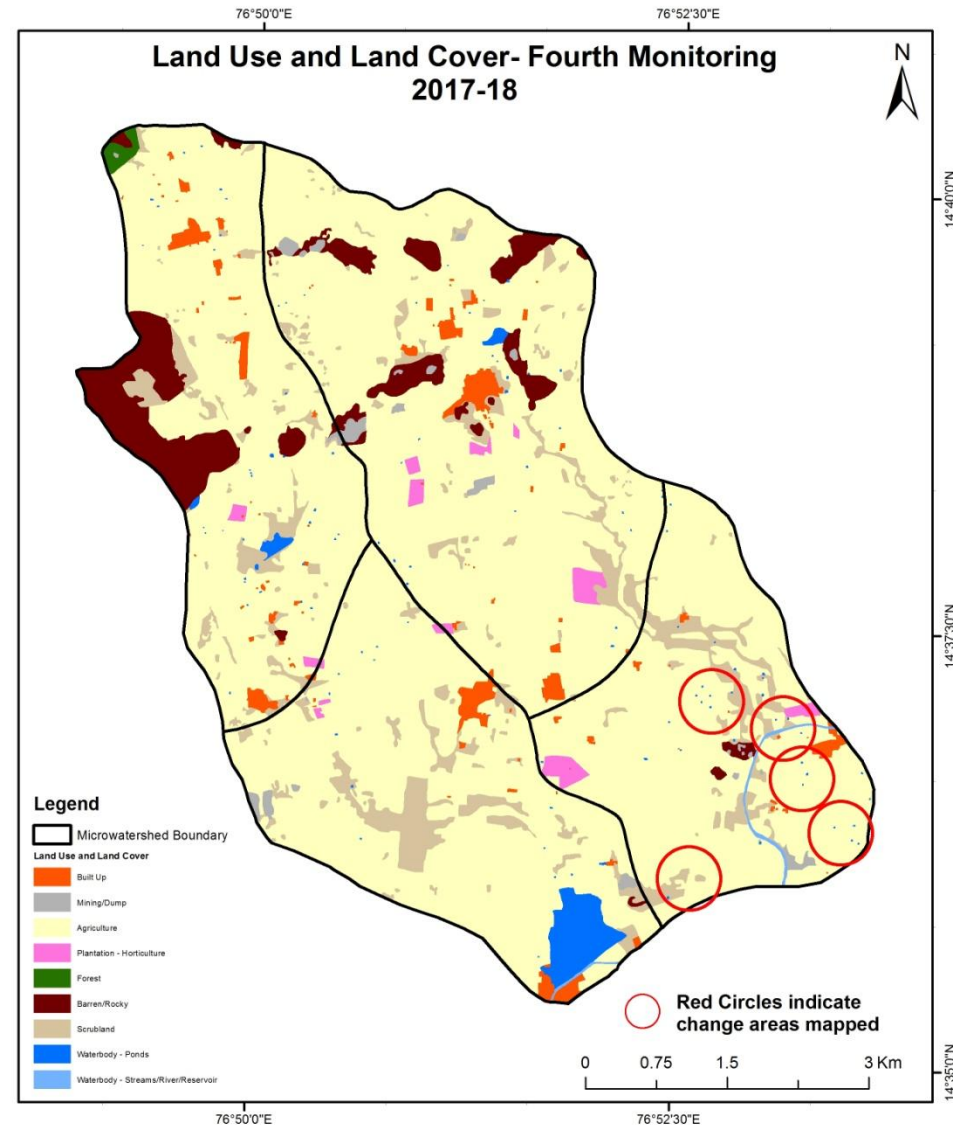
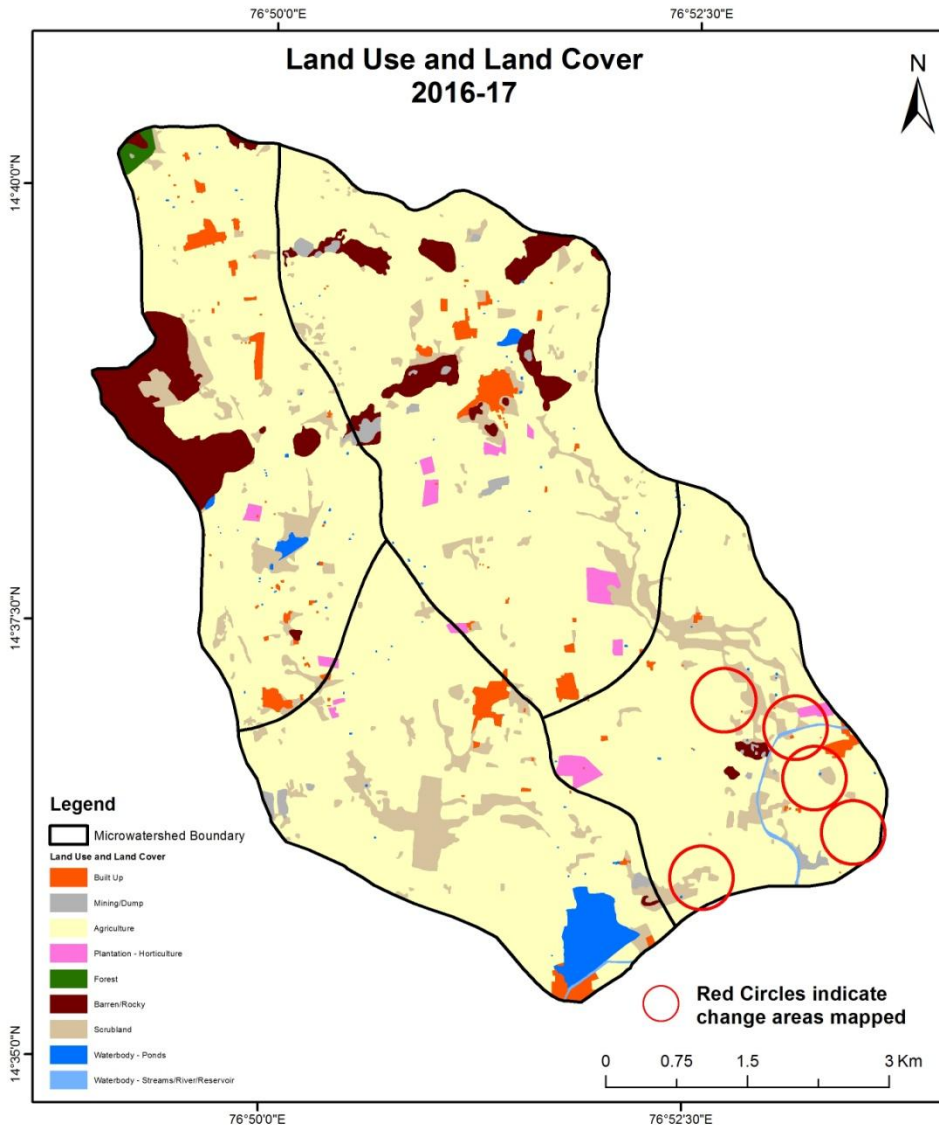
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



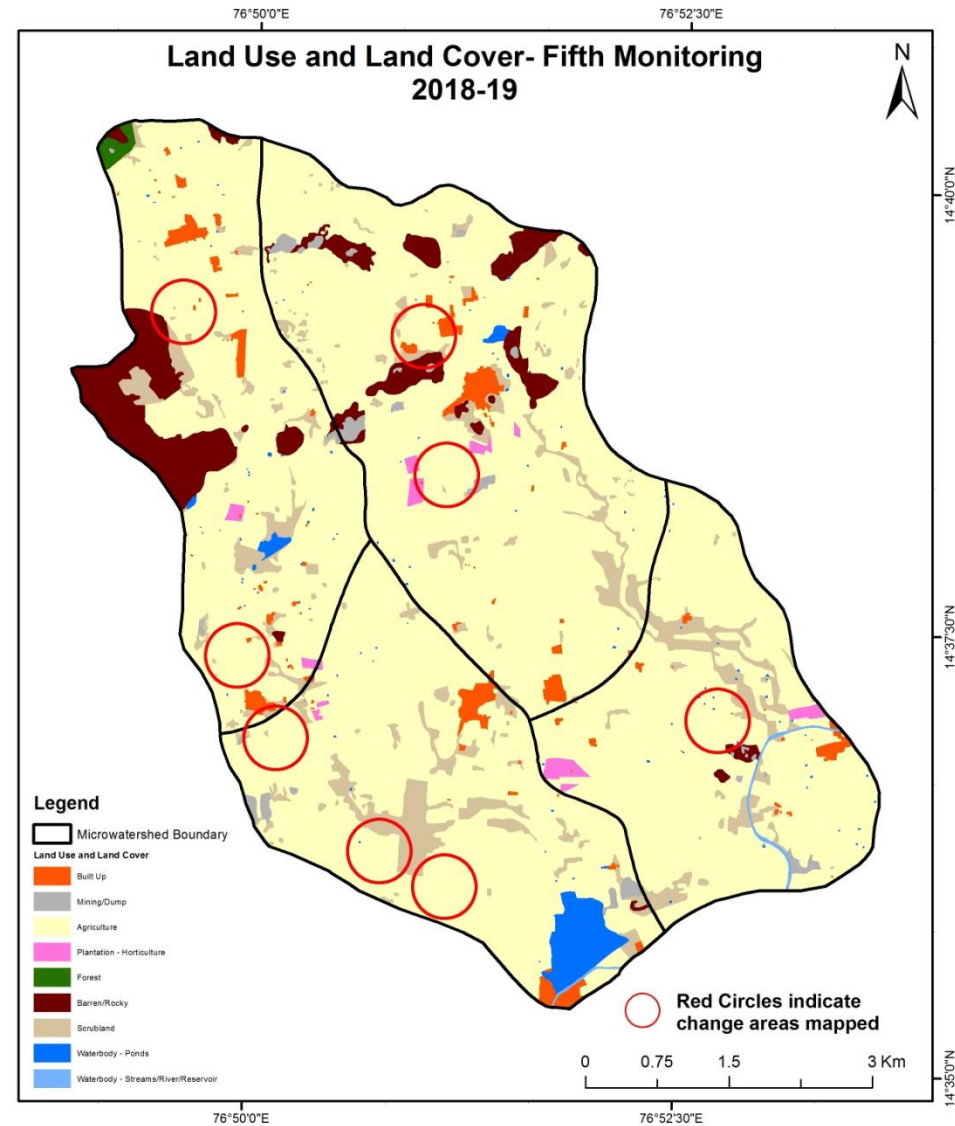
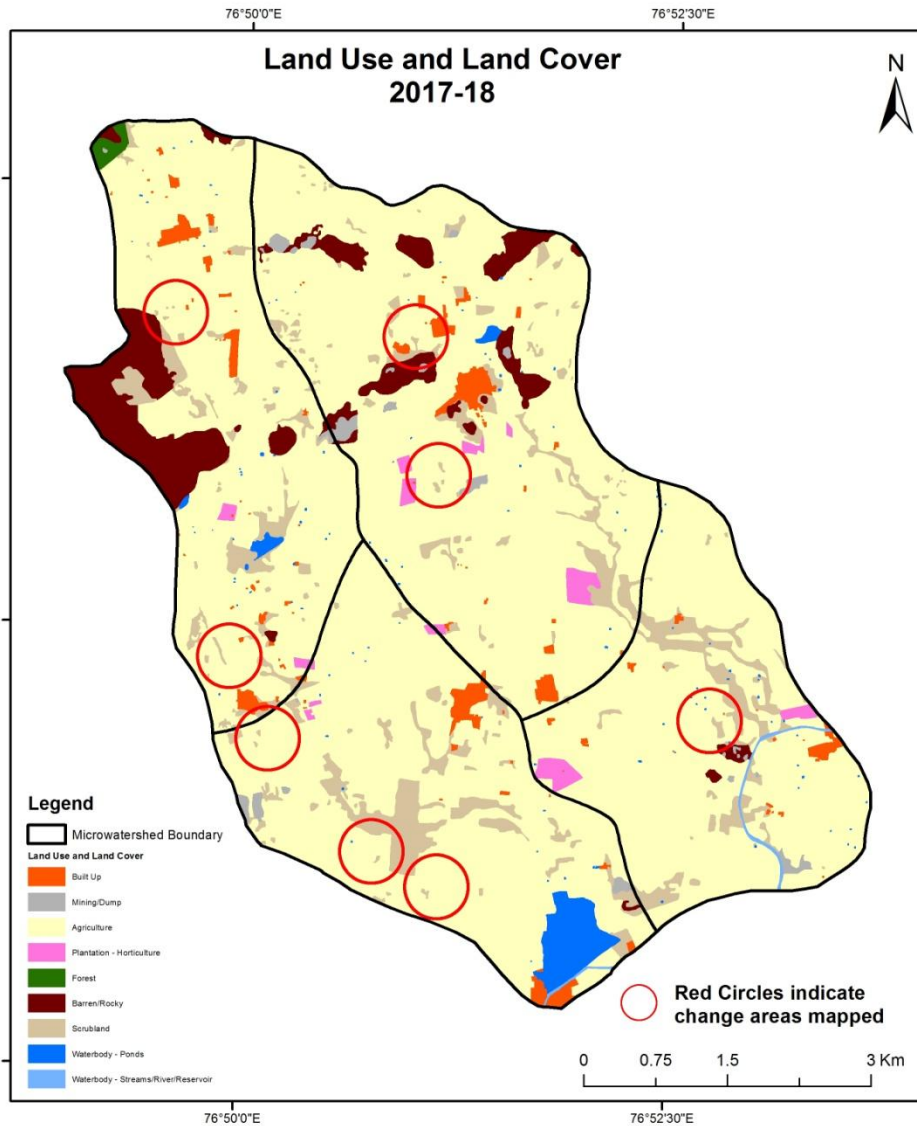
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



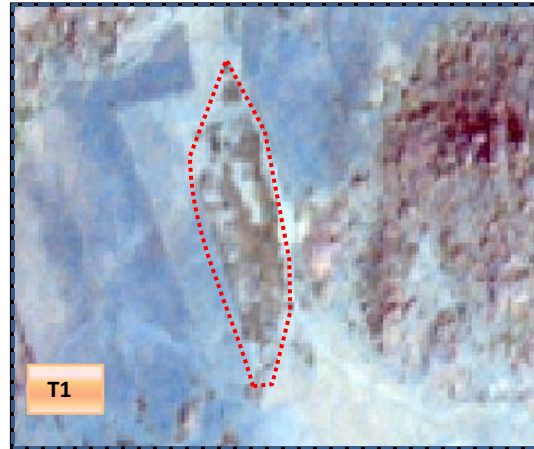
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



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

Scrub to Agriculture

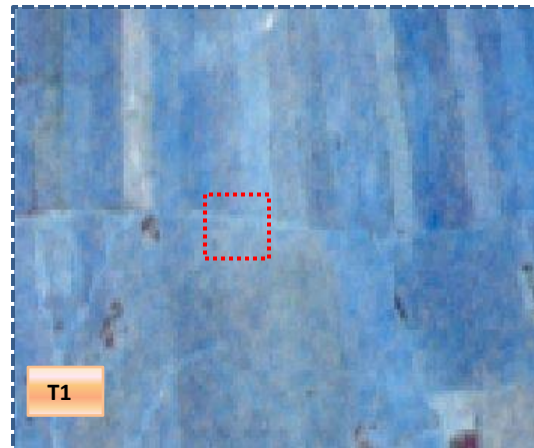


T1: 2014-15 (76°51'50.633"E 14°39'40.558"N)



T2: 30 March 2016

Agriculture to Water body



T1: 2014-15 (76°50'44.181"E 14°37'58.549"N)



T2: 30 March 2016

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

Agriculture to Plantation



T0: 2010-11(76°51'8.833E 14°37'39.755N)

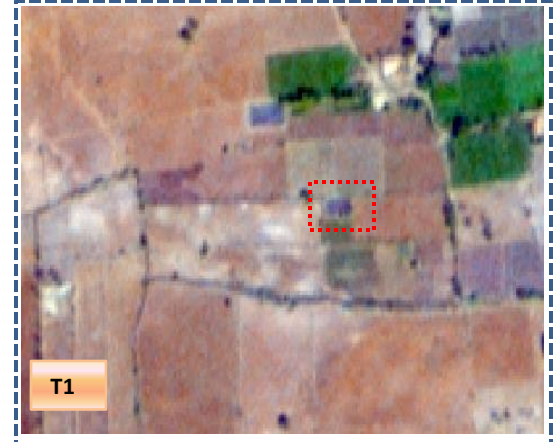


T1: 01 February 2015

Agriculture to Farm pond



T0: 2010-11(76°49'20.673E 14°39'51.815N)



T1: 01 February 2015

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

Agriculture to Farm pond



T0: 2010-11(76°50'2.066E 14°37'38.825N)



T1: 01 February 2015

Scrub to Agriculture



T0: 2010-11(76°51'51.514E 14°36'10.185N)



T1: 01 February 2015

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

Land cover	Monitoring period (T1)										Area 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	84.55										84.55	
Mining/dump		11.14									11.14	
Agriculture	2.14		3595.62	19.90				2.46		2.94	3623.06	
Plantation Horticulture	0.05		4.03	29.84							33.92	
Forest					9.78						9.78	
Forest Plantation												
Barren Rocky		15.37					234.95				250.32	
Scrub	4.18	4.94	16.66					374.36		0.48	400.62	
Waterbody- Streams/River									9.37		9.37	
Waterbody – Ponds			3.78							59.57	63.35	
Grand Total	90.93	31.46	3620.09	49.73	9.78		234.95	376.82	9.37	62.98	4486.12	

- 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 27 ha of the agriculture area has decreased and it is converted into built up, plantation, scrubland and water body in T1.
- In T1 24 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-2014-15 to 2015-16

Land cover	Monitoring period (T2)										Area 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	90.93												90.93
Mining/dump		31.46											31.46
Agriculture	0.08		3619.77								0.25		3620.09
Plantation Horticulture			1.14	48.60									49.73
Forest					9.78								9.78
Forest Plantation													
Barren Rocky							234.95						234.95
Scrub			5.01					371.59			0.22		376.82
Waterbody- Streams/River									9.37				9.37
Waterbody – Ponds											62.98		62.98
Grand Total	91.01	31.46	3625.92	48.60	9.78		234.95	371.59	9.37		63.45		4486.12

- 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 0.3 ha of the agriculture area has decreased and it is converted into built up and water body in T2.
- In T2 6 ha of the agriculture area has increased from plantations 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)										Area 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	91.01										91.01	
Mining/dump		31.46									31.46	
Agriculture	0.40		3625.46							0.05	3625.92	
Plantation Horticulture			3.04	45.56							48.60	
Forest		0.21			9.57						9.78	
Forest Plantation												
Barren Rocky		0.83					234.12				234.95	
Scrub		0.87	6.28					364.38		0.07	371.59	
Waterbody- Streams/River									9.37		9.37	
Waterbody – Ponds			1.36							62.09	63.45	
Grand Total	91.41	33.37	3636.14	45.56	9.57		234.12	364.38	9.37	62.20	4486.12	

- 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 0.4 ha of the agriculture area has decreased and it is converted into built up and water body in T3.
- In T3 10 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-2016-17 to 2017-18

Land cover	Monitoring period (T4)										Area 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	91.41										91.41	
Mining/dump		33.37									33.37	
Agriculture	0.74		3634.57							0.84	3636.14	
Plantation Horticulture			1.83	43.73							45.56	
Forest					9.57						9.57	
Forest Plantation												
Barren Rocky							234.12				234.12	
Scrub	0.23	0.14	5.92					357.92		0.18	364.38	
Waterbody- Streams/River									9.37		9.37	
Waterbody – Ponds										62.20	62.20	
Grand Total	92.37	33.51	3642.32	43.73	9.57		234.12	357.92	9.37	63.22	4486.12	

- 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 1.5 ha of the agriculture area has decreased and it is converted into built up and water body in T4.
- In T4 7 ha of the agriculture area has increased from plantations 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)										Area 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	92.37										92.37	
Mining/dump		33.51									33.51	
Agriculture	0.62	2.02	3639.68								3642.32	
Plantation Horticulture			14.39	29.34							43.73	
Forest					9.57						9.57	
Forest Plantation												
Barren Rocky		1.24					232.88				234.12	
Scrub		2.75	13.68					341.48			357.92	
Waterbody- Streams/River									9.37		9.37	
Waterbody – Ponds										63.22	63.22	
Grand Total	92.99	39.52	3667.75	29.34	9.57		232.88	341.48	9.37	63.22	4486.12	

- 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 2.6 ha of the agriculture area has decreased and it is converted into built up and mining/dump in T5.
- In T5 28 ha of the agriculture area has increased from plantations 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 decrease of 0.13 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 05, 10, 06 & 25 Hectares From T1 to T2, T2-T3, T3 -T4 & T4-T5 respectively and overall increase of 44 Hectares in Crop land area as compared between baseline LU/LC data 2009-10 (T0) & 2018-19 (T5) years.
5. There is a decrease of 59 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
6. Farm ponds (18) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (18) verified from the portal.