MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

ANANTAPURAMU -49/2011-12
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

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

01.   STUDY AREA

02.   SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS

03.   MONITORING IN THE PROJECT AREA : Site wise changes in the project

04.   CONCLUSIONS

EXECUTIVE SUMMARY

- 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-49/2011-12, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is 9,270 ha. It comprises of 10 micro watersheds.

- In the project area 111 Drishti photos were uploaded showing check dams/Rock fill dam, livelihood activities, and remaining showing other activities.

- Water bodies have shown an decreased by 10.6 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.

- Major percentage i.e. 71.4 % is covered by the agriculture, 10.7 is forest, 7.6 % is scrubland, 4.4 % is covered by plantation and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-49/2011-12
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Kundurpi Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is 9,270 ha. It comprises of 10 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
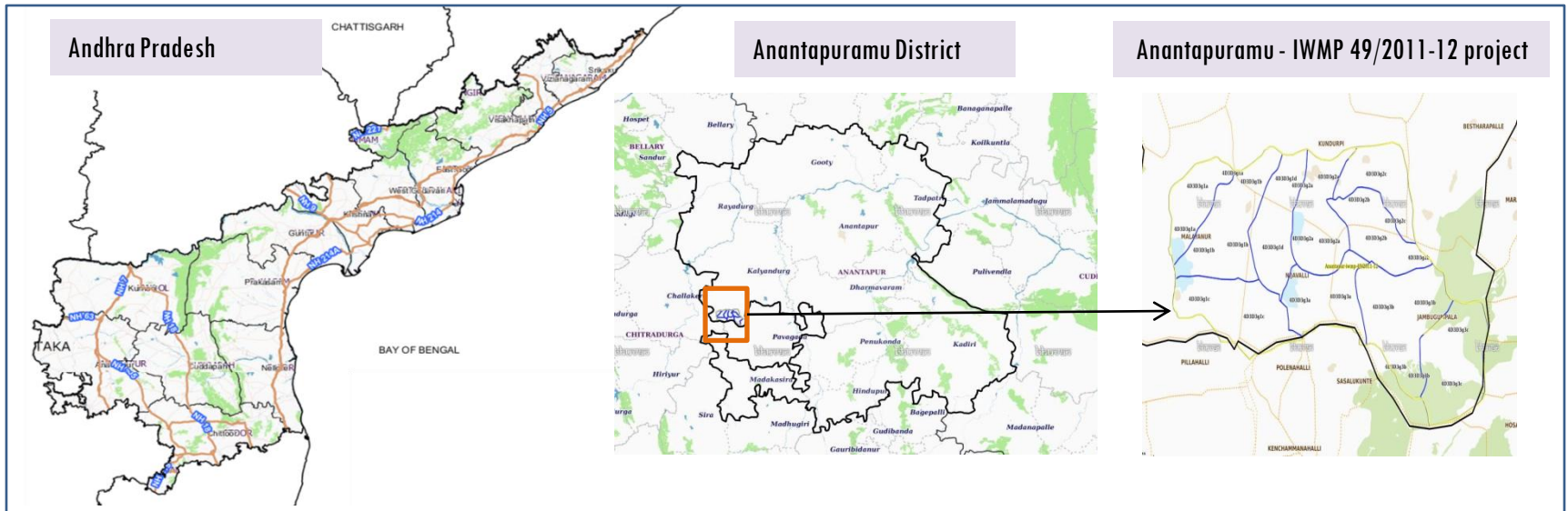
- Anantapuram has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 37 °C range and it reaches around 44 °C to 45 °C .

- 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.

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Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2013-14	2019-20
LISS IV	2011-12		
SCENE 1			19-Feb-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			19-Feb-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	111
4	Detailed Project Report		

Natural Color Composite overlaid with Project boundaries and high detail stream network
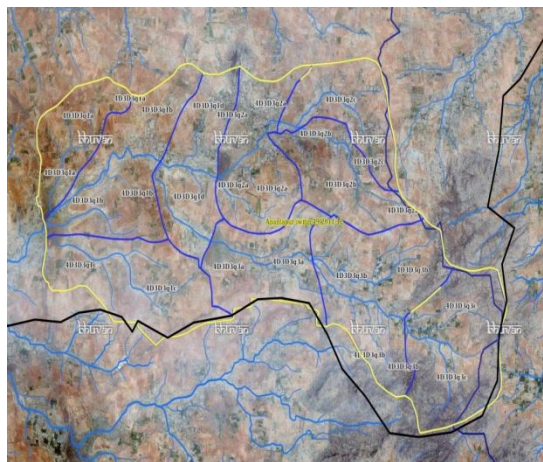
Legend
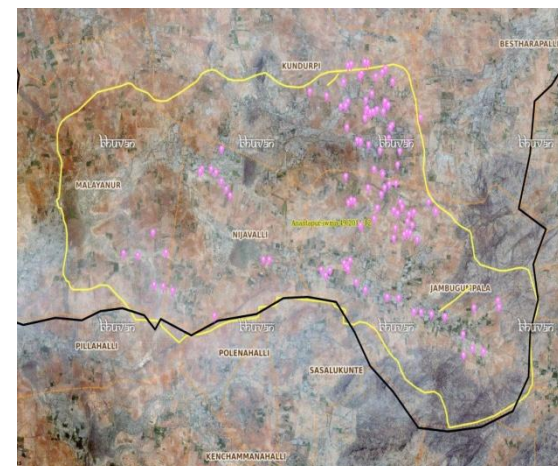
 Drainage (1:10000 Scale)

 MWS Boundary

 Project Boundary

Natural Color Composite overlaid with Drishti Points
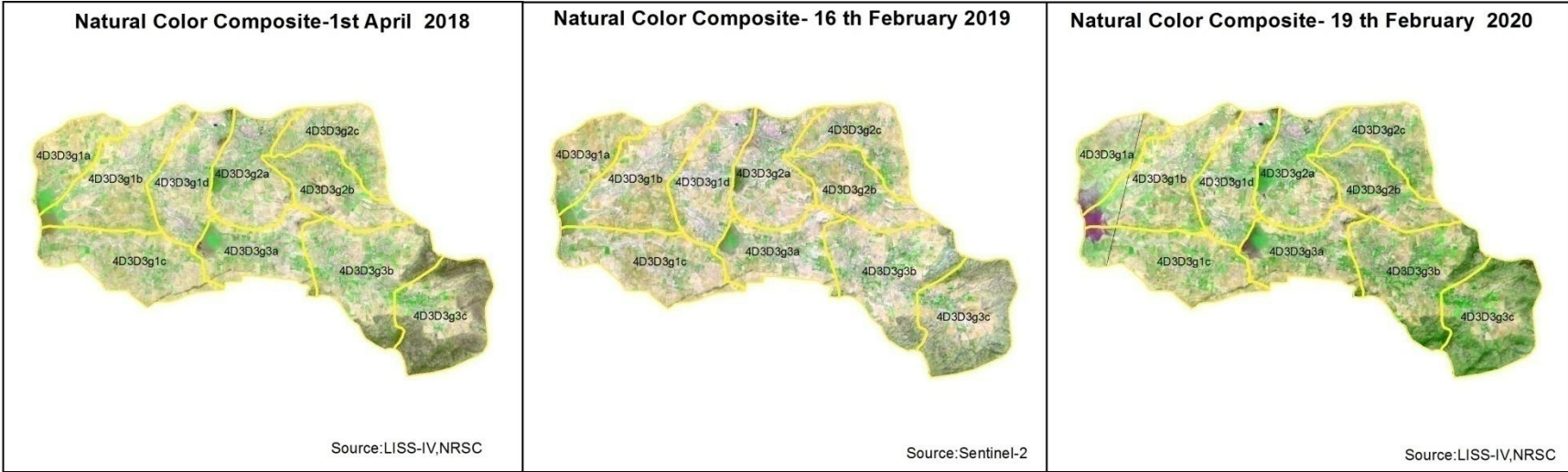

Drishti Upload Status
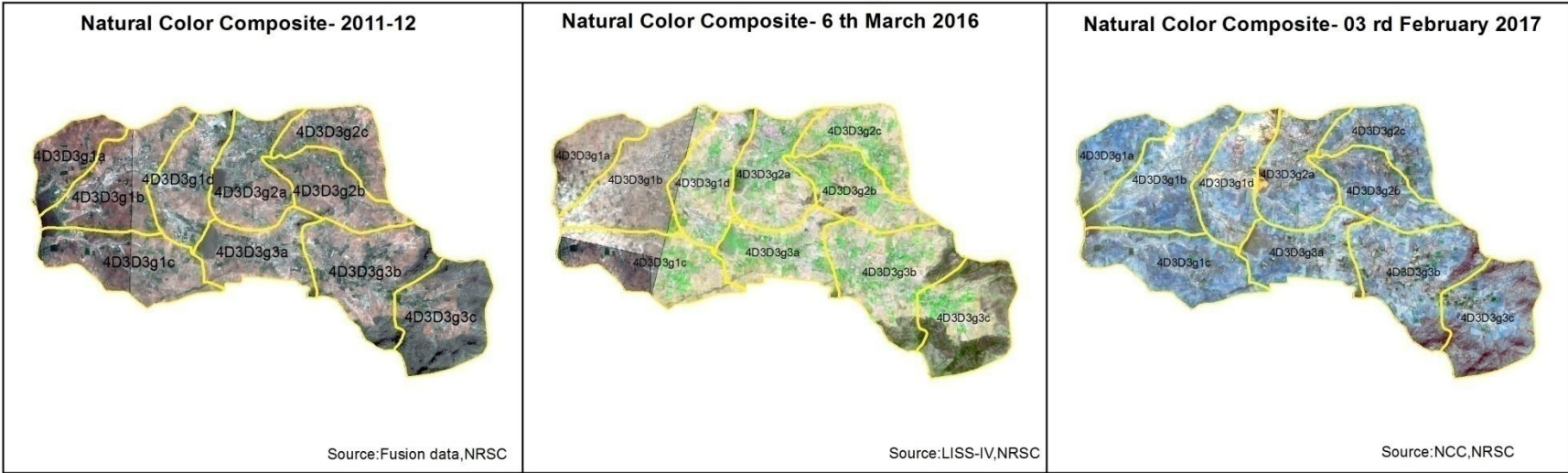
Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	31	31
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	0	0
11	Civil work-Check dams/Rock fill dam	0	0
12	Nallah Bunds/Drainage treatment	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities-Plantation/Horticulture	3	2
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	83	78
	TOTAL	**117**	**111**

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 Colour Composite (NCC)

Natural Color Composite- 2011-12

Source:Fusion data,NRSC

Natural Color Composite- 6 th March 2016

Source:LISS-IV,NRSC

Natural Color Composite- 03 rd February 2017

Source:NCC,NRSC

Natural Color Composite-1st April 2018

Source:LISS-IV,NRSC

Natural Color Composite- 16 th February 2019

Source:Sentinel-2

Natural Color Composite- 19 th February 2020

Source:LISS-IV,NRSC

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-49/2011-12

T0	T1	

| T0: 2011-12 | T1: 03 February 2017 | Drishti Sl no. 133462   MWS : 4D3D3g3a |

Check dam

| T0: 2011-12 | T1: 03 February 2017 | Drishti Sl no. 2494436   MWS : 4D3D3g1c |

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-49/2011-12
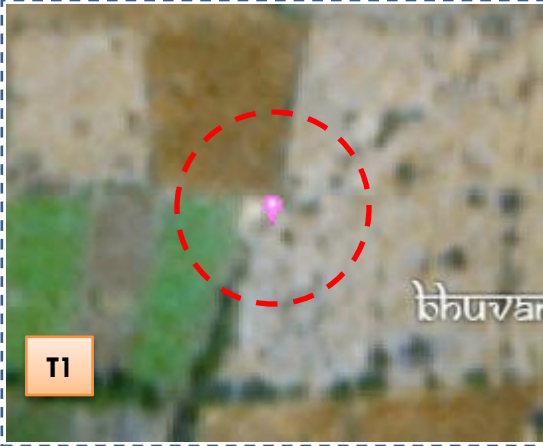

| T0: 2011-12 | T1: 03 February 2017 | Drishti Sl no. 7009290   MWS : 4D3D3g1d |

Check dam

| T0: 2011-12 | T1: 03 February 2017 | Drishti Sl no. 2569530   MWS : 4D3D3g2c |

Farm pond

Land use and Land cover Changes in the Project

- Change in land use and land cover form 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)
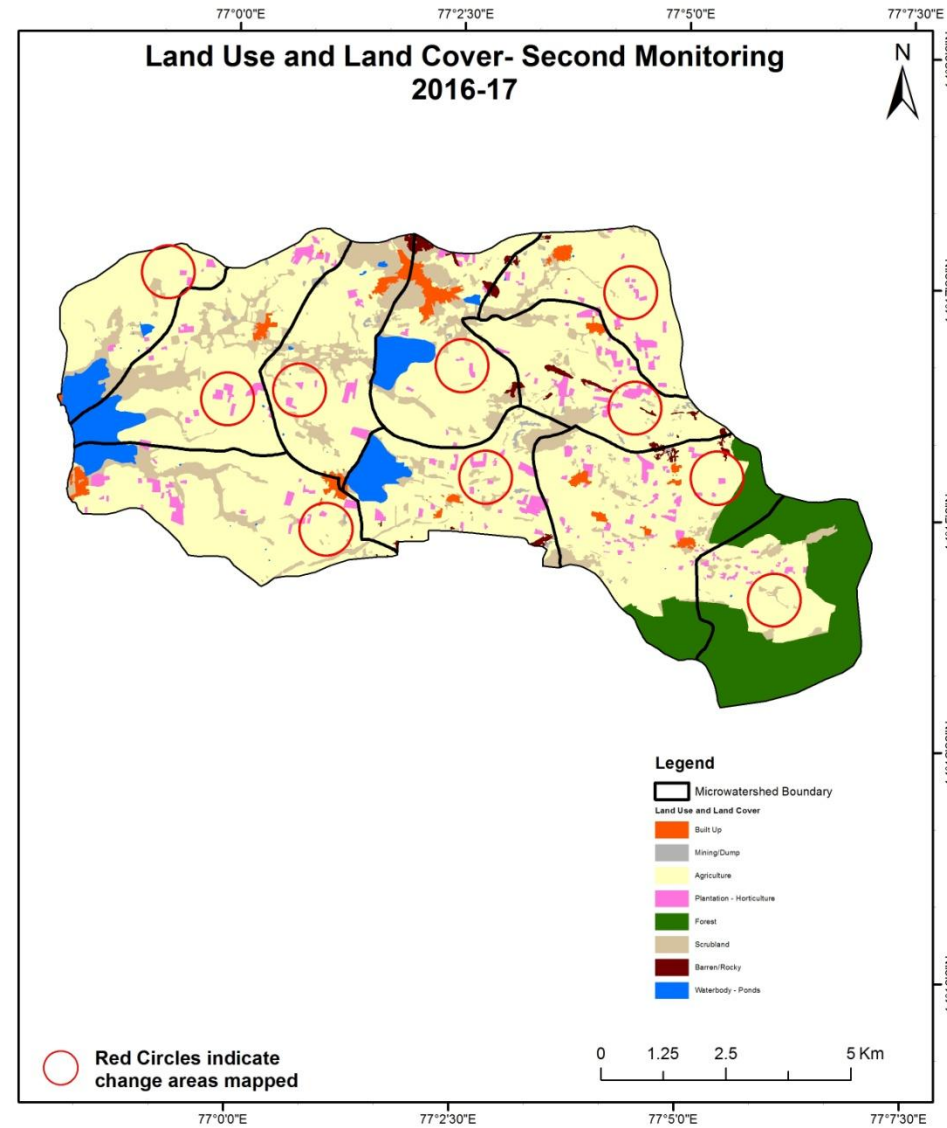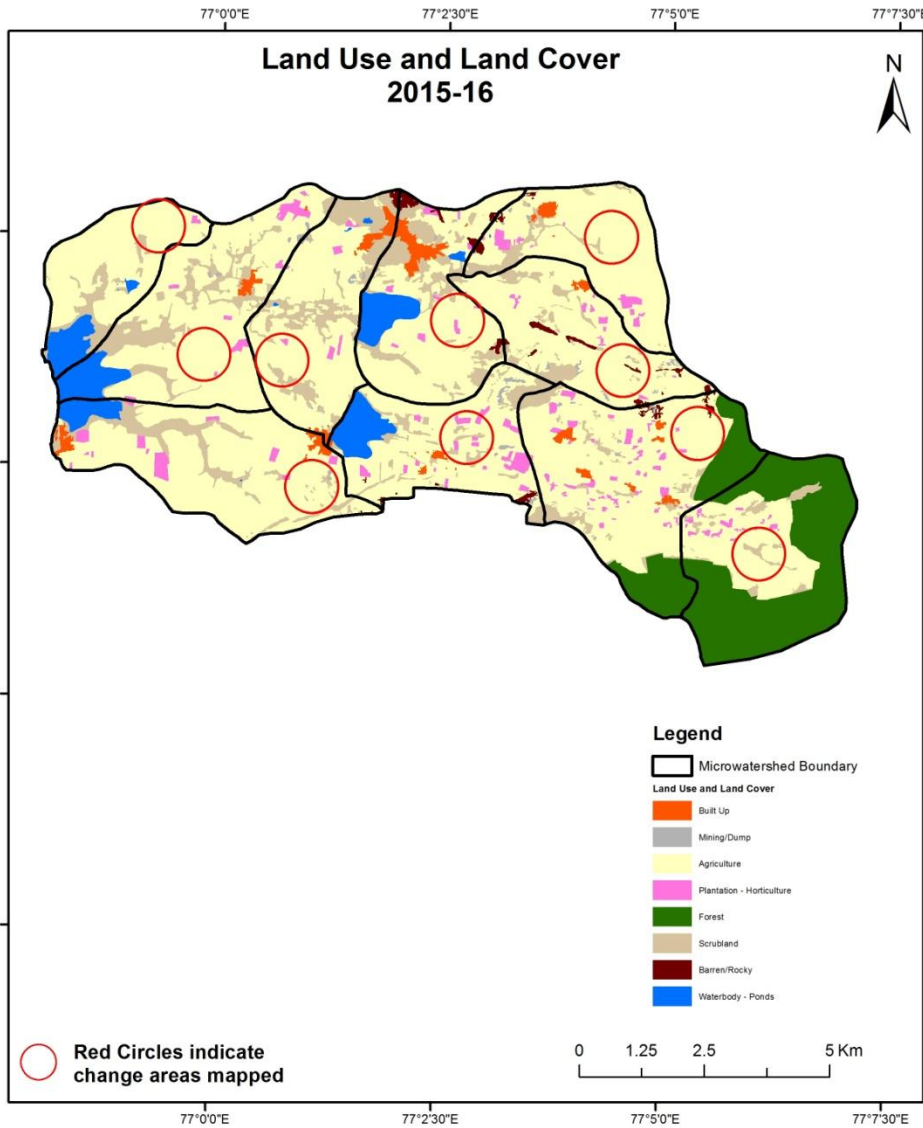
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)
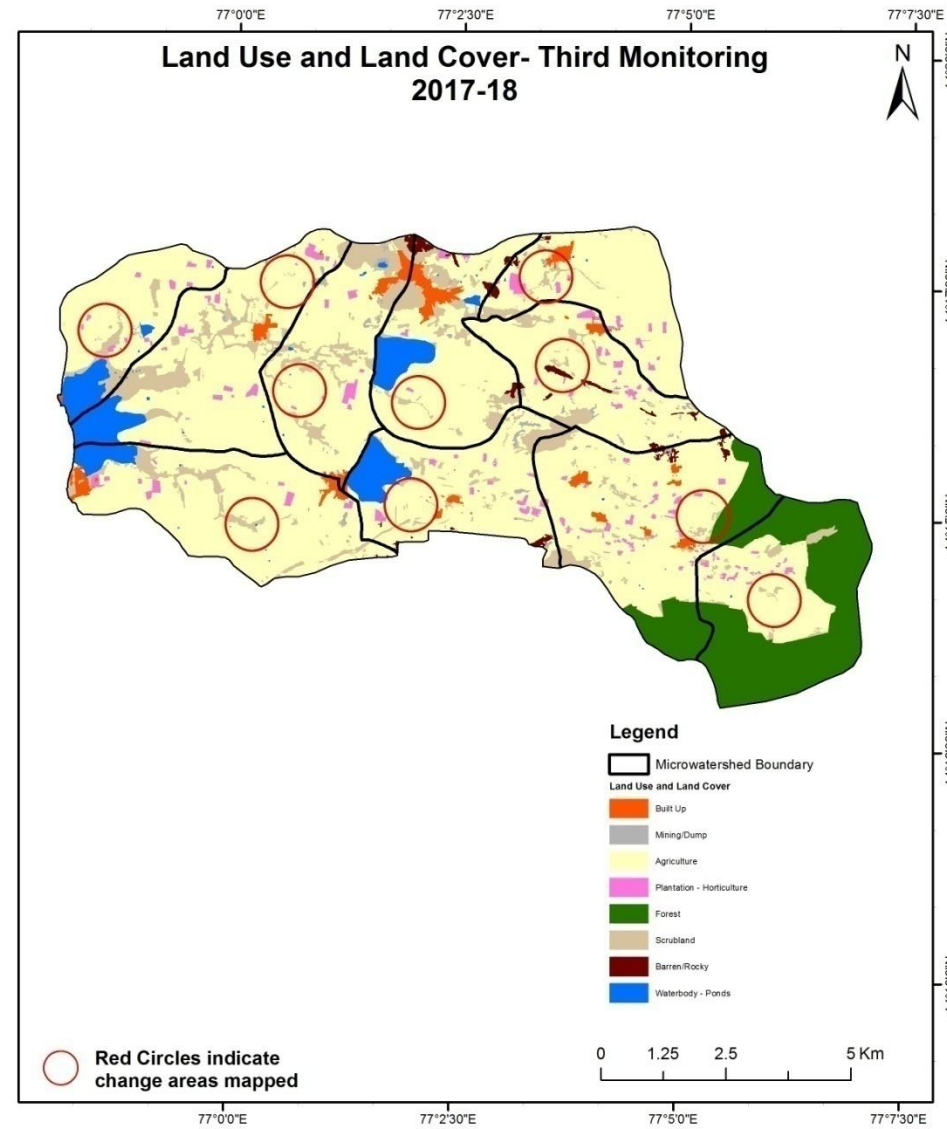
Scale: 1:10000
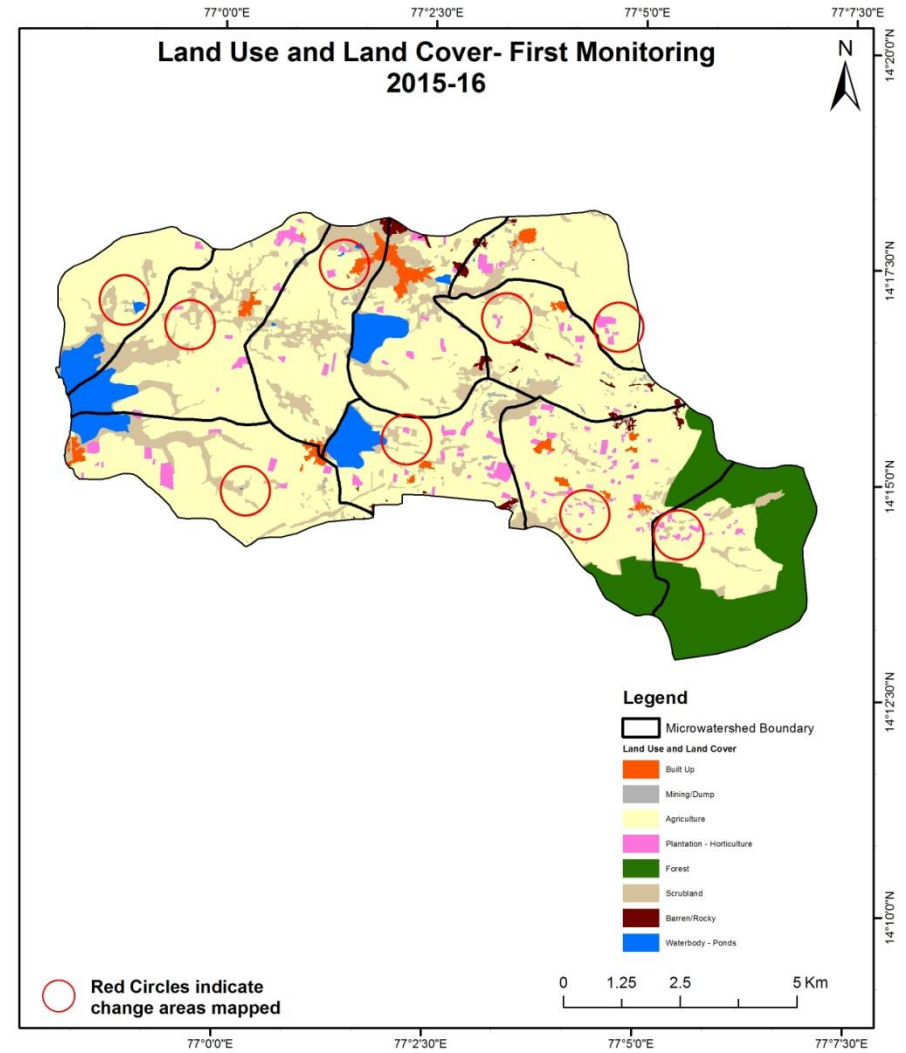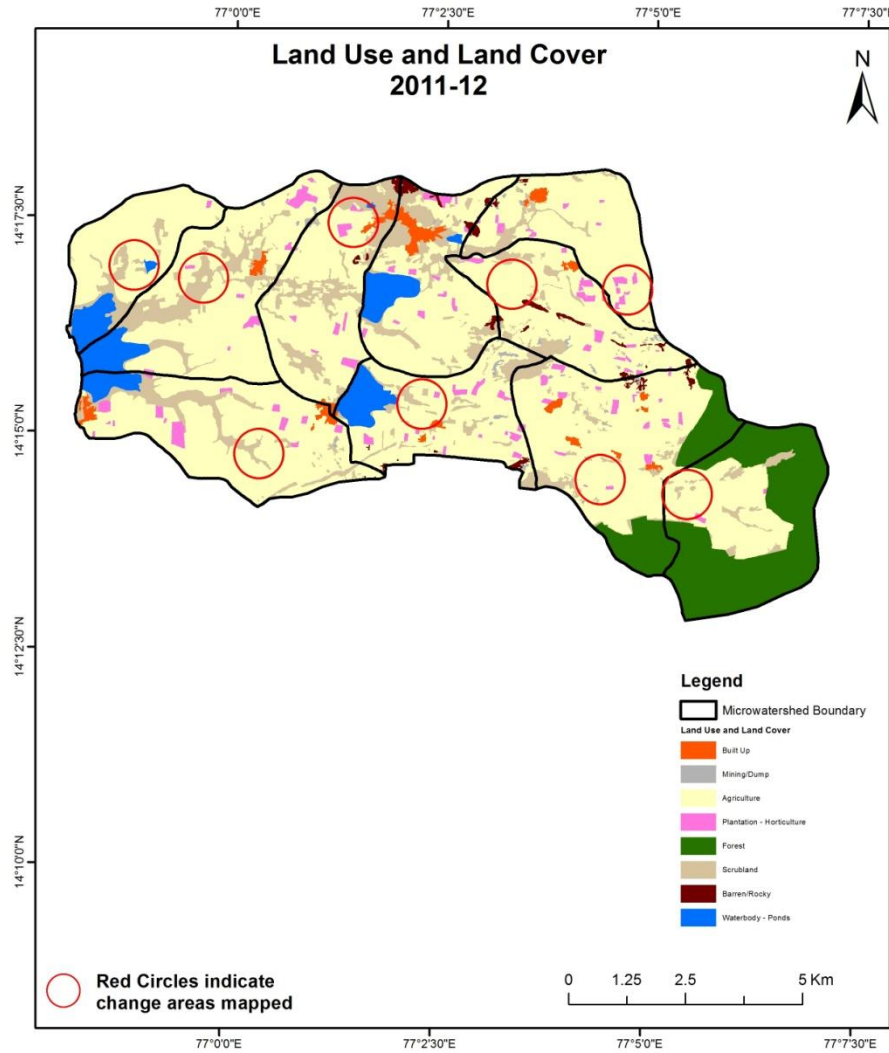
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

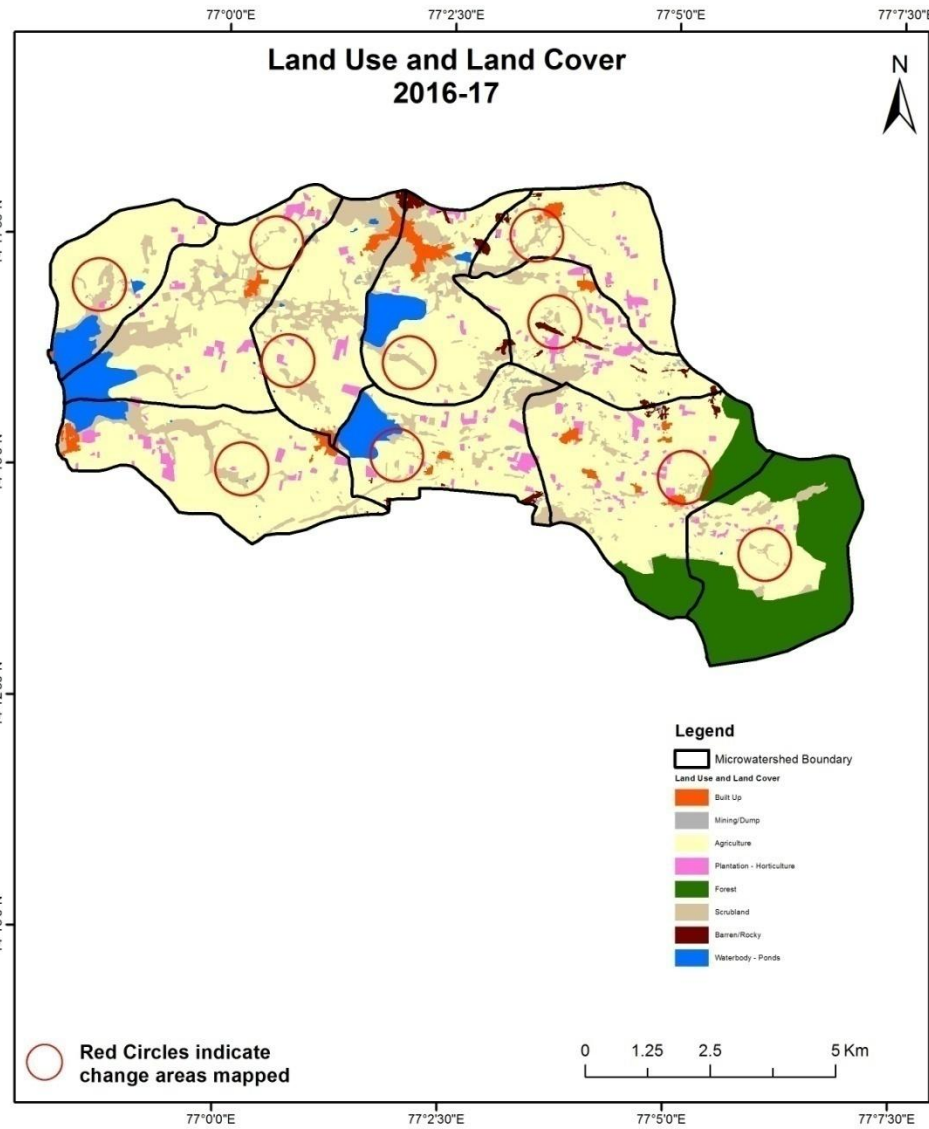**Scale: 1:10000**

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)
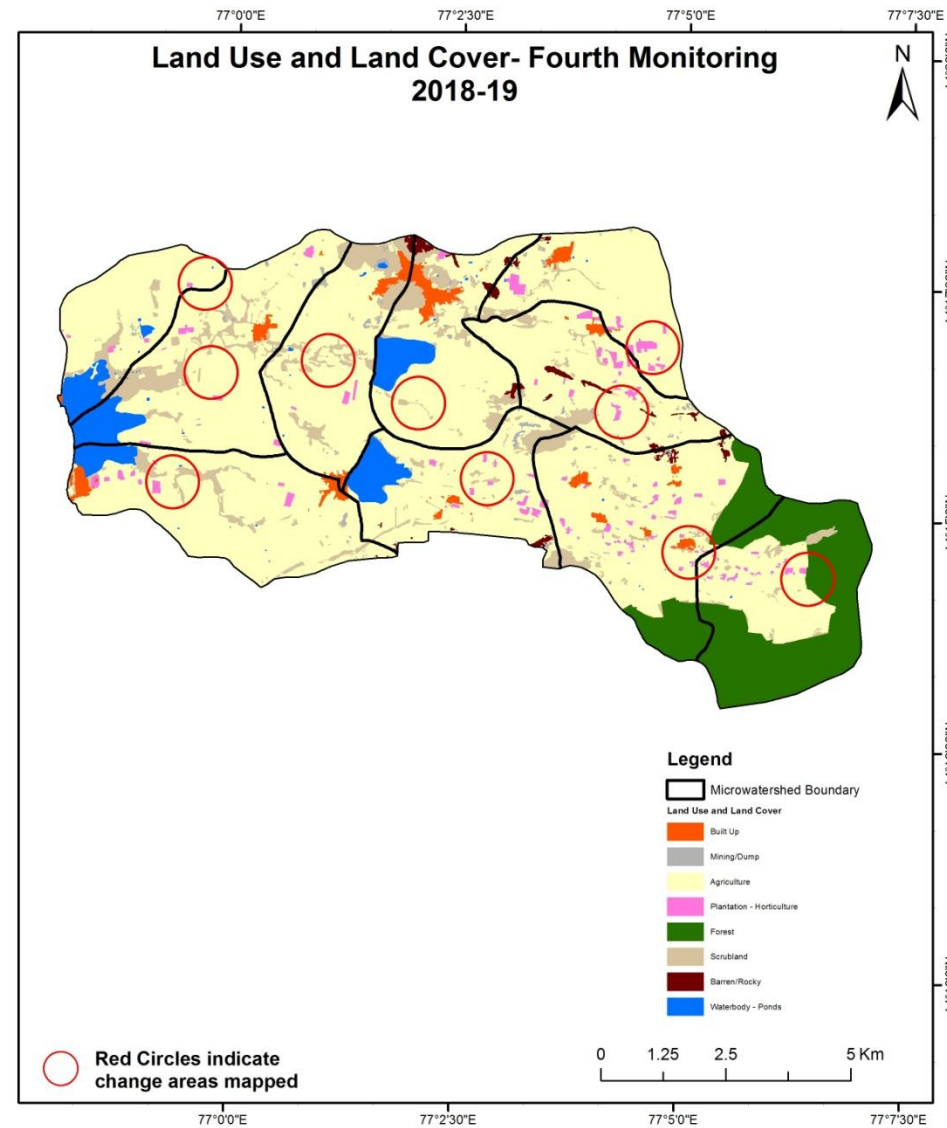## Scale: 1:10000

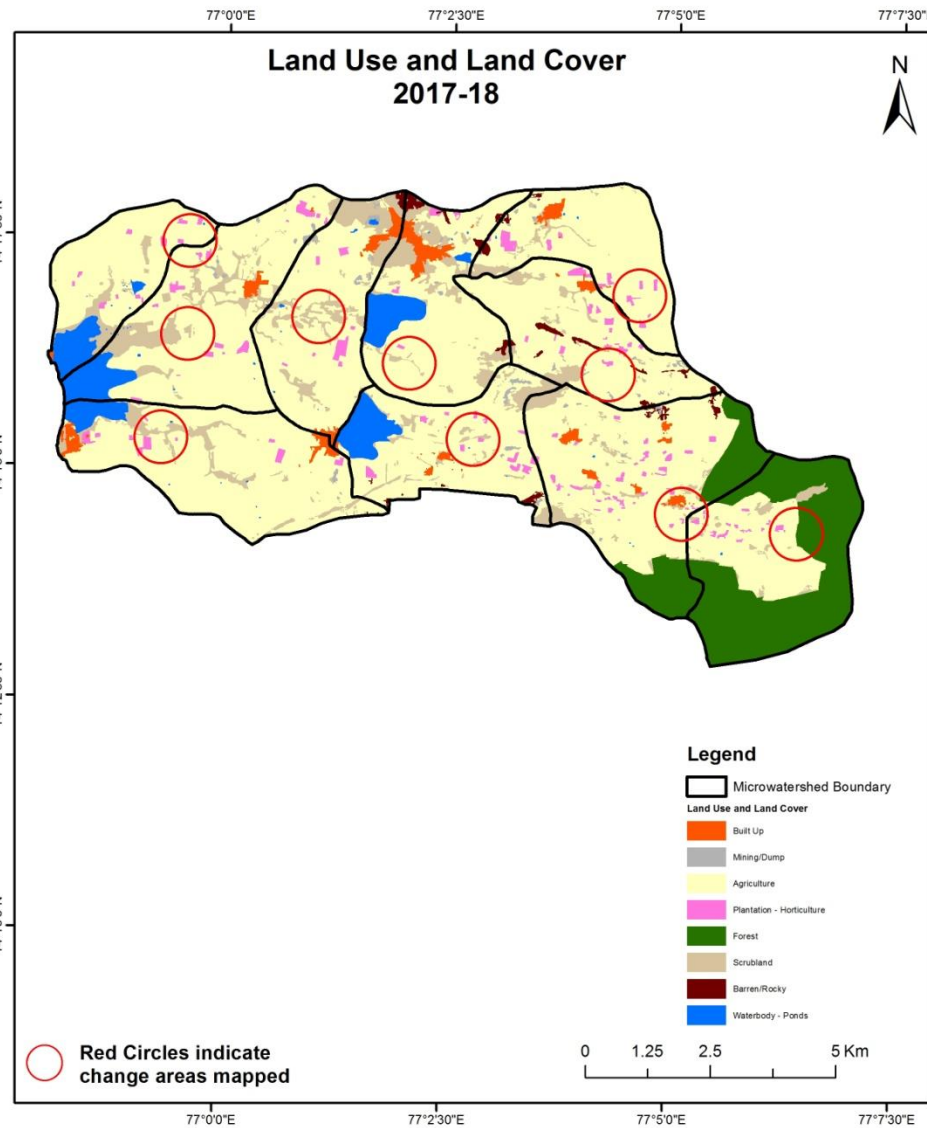# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)
Scale: 1:10000
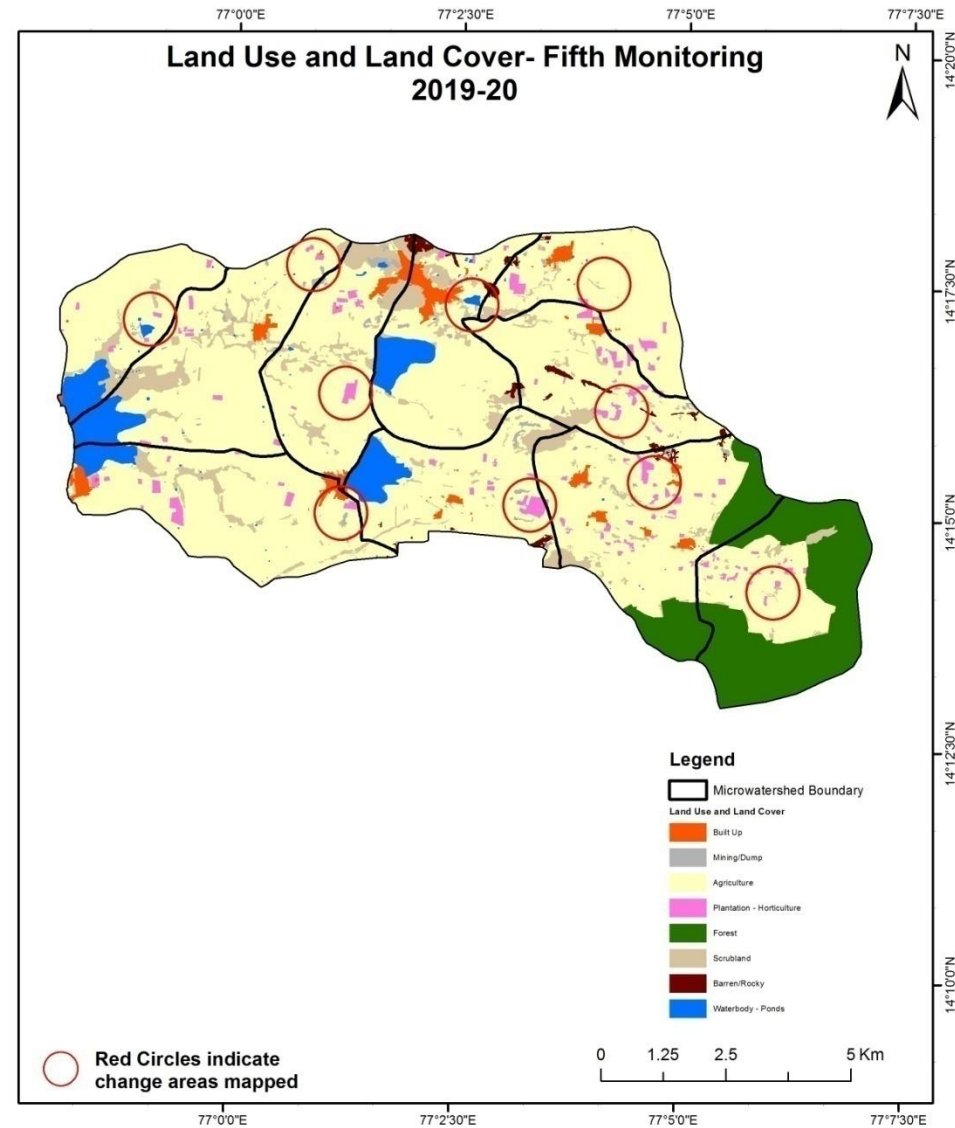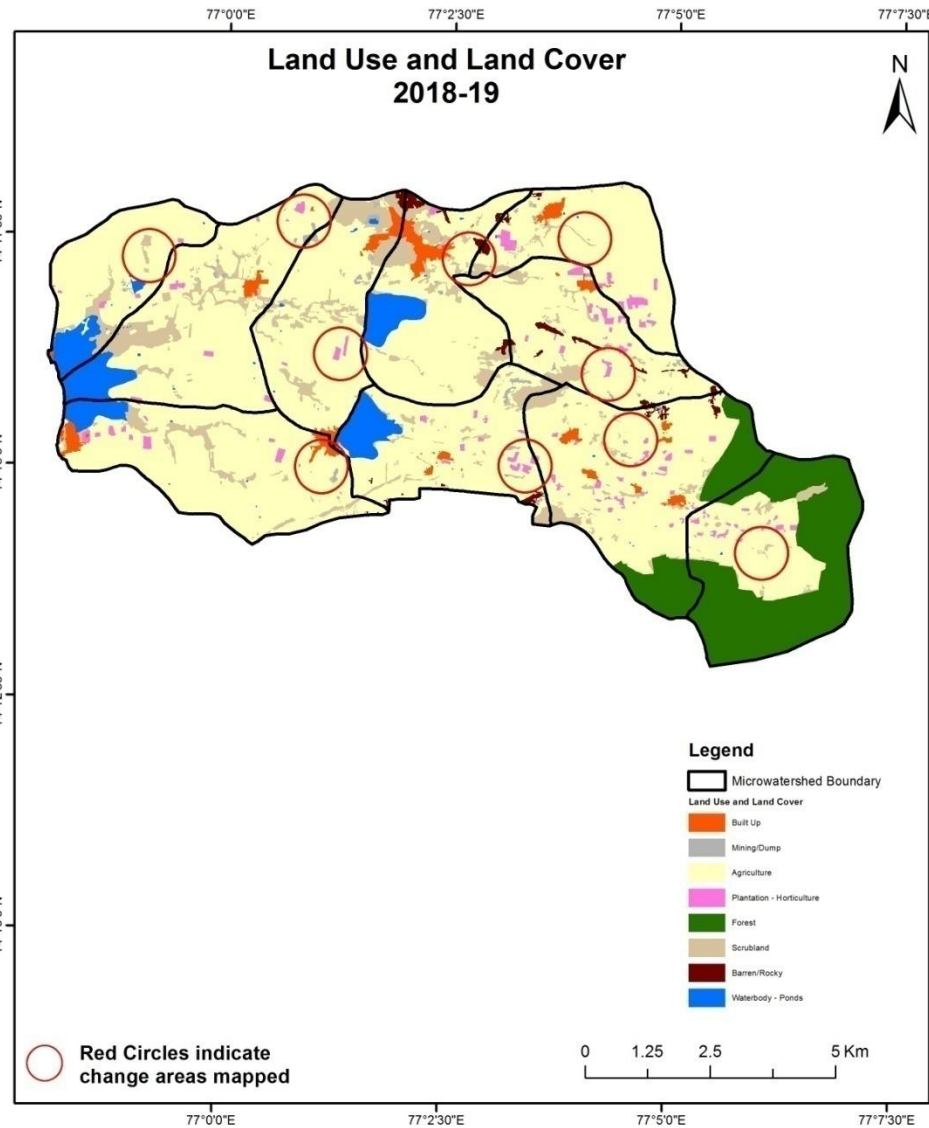
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

T0: 2011-12 (77°3'4.628"E 14°17'32.414"N)
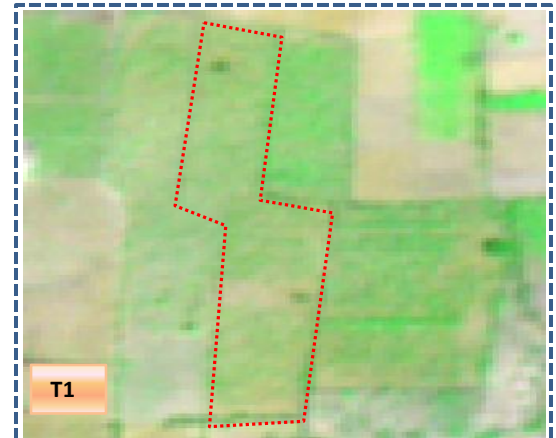
T1: 06 March 2016

Scrub to Agriculture
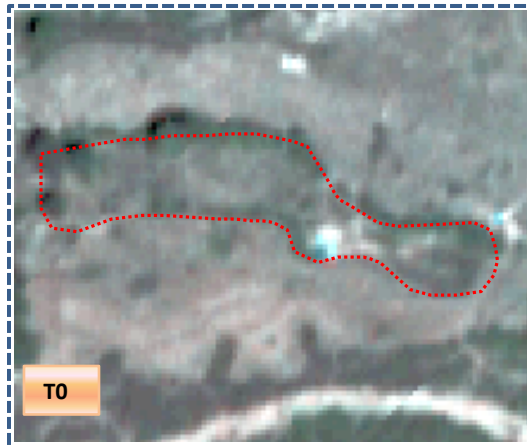
T0: 2011-12 (77°2'47.782"E 14°15'26.549"N)

T1: 06 March 2016

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

Scrub to Agriculture

T0

T1

T0: 2011-12 (77°3'31.461"E 14°16'34.674"N)

T1: 06 March 2016

Scrub to Agriculture

T0

T1

T0: 2011-12 (77°0'43.942"E 14°15'58.746"N)

T1: 06 March 2016

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

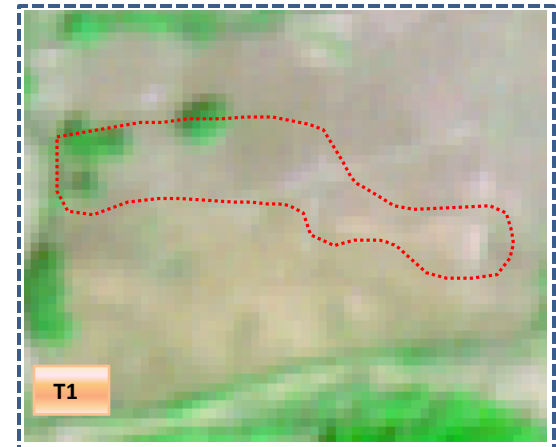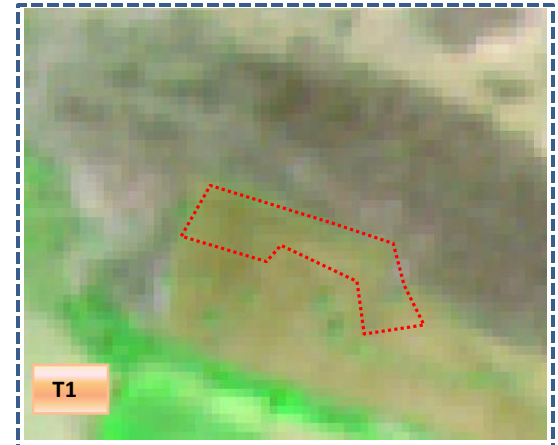| Land cover / T0	Monitoring period (T1) Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total (Units in Hectares)
Built up	136.45										136.45
Mining/dump		34.80									34.80
Agriculture	10.57	0.36	6127.70	81.69						1.53	6221.85
Plantation Horticulture	0.52		74.56	165.22							240.30
Forest					998.04					0.30	998.34
Forest Plantation											
Barren Rocky		2.67					73.29				75.95
Scrub	6.68	1.33	37.46					1115.28		0.24	1161.00
Waterbody-Streams/River											
Waterbody – Ponds										401.28	401.28
Grand Total	154.22	39.15	6239.72	246.91	998.04		73.29	1115.28		403.35	9269.96

• 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 94 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.

• In T1 112 ha of the agriculture area has increased from plantations 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-2015-16 to 2016-17

Land cover / T1	Monitoring period (T2) Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	154.22										**154.22**
Mining/dump		39.15									**39.15**
Agriculture	6.59	0.77	6082.11	148.89						1.36	**6239.72**
Plantation Horticulture			62.74	184.17							**246.91**
Forest			0.33		997.72						**998.04**
Forest Plantation											
Barren Rocky							73.29				**73.29**
Scrub	5.78		73.12					1036.05		0.34	**1115.28**
Waterbody- Streams/River											
Waterbody – Ponds										403.35	**403.35**
Grand Total	**166.59**	**39.92**	**6218.30**	**333.06**	**997.72**		**73.29**	**1036.05**		**405.04**	**9269.96**

Units in Hectares

- 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 157 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T2.

- In T2 136 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-2016-17 to 2017-18

Land cover / T2	Monitoring period (T3) Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total (Units in Hectares)
Built up	166.59										**166.59**
Mining/dump		39.92									**39.92**
Agriculture	3.85	0.19	6176.02	37.06						1.18	**6218.30**
Plantation Horticulture	0.54		183.35	149.03						0.14	**333.06**
Forest					997.72						**997.72**
Forest Plantation											
Barren Rocky		1.02					72.27				**73.29**
Scrub	5.15	8.22	190.78					830.88		1.02	**1036.05**
Waterbody- Streams/River											
Waterbody – Ponds										405.04	**405.04**
Grand Total	**176.13**	**49.35**	**6550.15**	**186.09**	**997.72**		**72.27**	**830.88**		**407.38**	**9269.96**

• 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 42 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T3.

• In T3 374 ha of the agriculture area has increased from plantations 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-2017-18 to 2018-19

Land cover	Monitoring period (T4)										Units in Hectares
T3	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	176.13										**176.13**
Mining/dump		49.35									**49.35**
Agriculture	0.75	0.54	6520.87	26.85						1.15	**6550.15**
Plantation Horticulture			58.73	127.35							**186.09**
Forest					997.72						**997.72**
Forest Plantation											
Barren Rocky		0.72					71.55				**72.27**
Scrub	0.16	0.27	75.67					754.78			**830.88**
Waterbody-Streams/River											
Waterbody – Ponds			7.34							400.04	**407.38**
Grand Total	**177.03**	**50.88**	**6662.62**	**154.20**	**997.72**		**71.55**	**754.78**		**401.19**	**9269.96**

• 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 29 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T4.

• In T4 134 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 T4	Monitoring period (T5) Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total (Units in Hectares)
Built up	177.03										**177.03**
Mining/dump		50.88									**50.88**
Agriculture	8.40	0.45	6567.56	76.21						10.01	**6662.62**
Plantation Horticulture			21.67	132.53							**154.20**
Forest					997.49					0.23	**997.72**
Forest Plantation											
Barren Rocky		1.87					69.67				**71.55**
Scrub	1.36	7.47	34.64	0.79				710.03		0.49	**754.78**
Waterbody-Streams/River											
Waterbody – Ponds										401.19	**401.19**
Grand Total	**186.80**	**60.66**	**6623.86**	**209.53**	**997.49**		**69.67**	**710.03**		**411.92**	**9269.96**

• 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 95 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T5.

•In T5 56 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 increase of 10 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 331 & 112 hectares from T2-T3 & T3 to T4 and there is a decrease of 115, 21 & 38 ha from T0 to T1, T1-T2 & T4-T5 respectively and overall increase of 402 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 450 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.

6. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (0) verified from the portal.