MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

KURNOOL -56/2012-13
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
December-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**

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-56/2012-13, Kurnool District of   Andhra Pradesh.   The total geographical area of the project is **6,010** ha.   It comprises of 08 micro watersheds.

- In the project area 168 Drishti photos were uploaded showing checks & plugins, Field bunds and remaining showing others.

- Water bodies have shown an decrease by 13.1 ha , which correspond to the various water bodies that have been converted into other land use classes in this period.

- Major percentage i.e. 84.6 % is covered by the agriculture, 8.9 % is covered by scrubland and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-56/2012-13
DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Pedda Kadubur Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is **6,010** ha. It comprises of 08 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2012-13 (T0) period (***Batch -1***) projects taking 2020-21 (T5) period satellite images
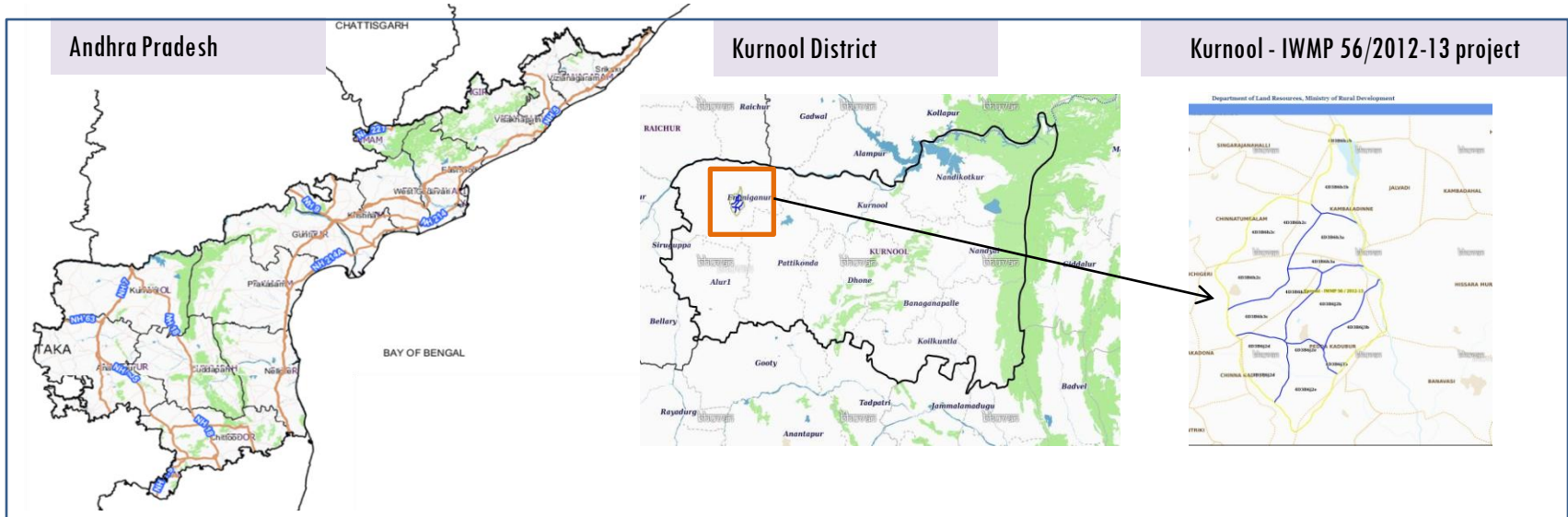
- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).

- 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
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			25-Feb-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			25-Feb-21
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	168
4	Detailed Project Report		

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

Legend

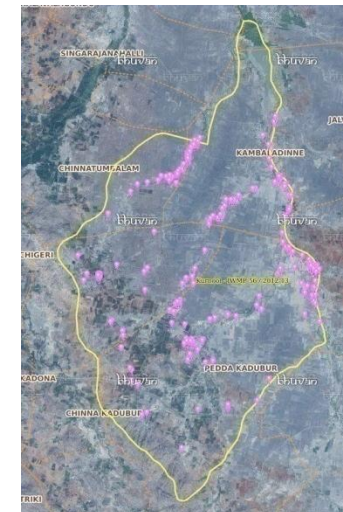 Drainage (1:10000 Scale)

 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	Agriculture/Horticulture	0	0
2	Afforestation	2	2
3	Checks & plugins	6	6
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	124	80
8	Check dams (Civil work)	0	0
9	Field bunds	0	0
10	Om (Other measurement)	0	0
11	LM (Livelihood Measures)	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	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	109	80
	TOTAL	**241**	**168**

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 2020-21 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

T0 Satellite data 2013
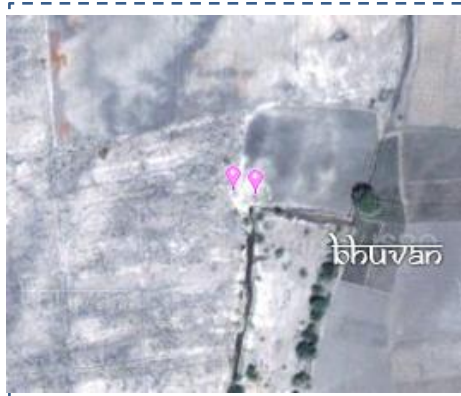

T1 Satellite data 2015

T2 Satellite data 2016

T3 Satellite data 2017

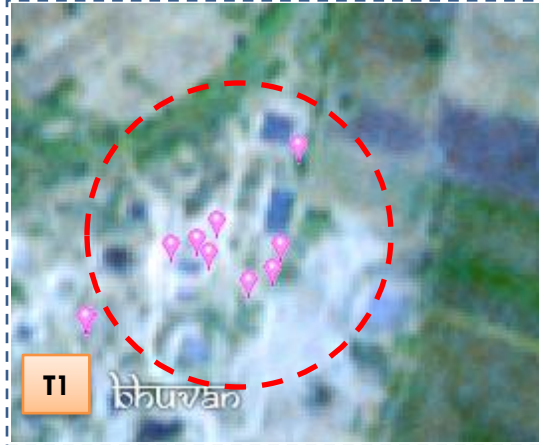**T4** Satellite data 2018

T5 Satellite data 2020

Drishti Id. 720006

Dug Out Seepage Pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-56/2012-13
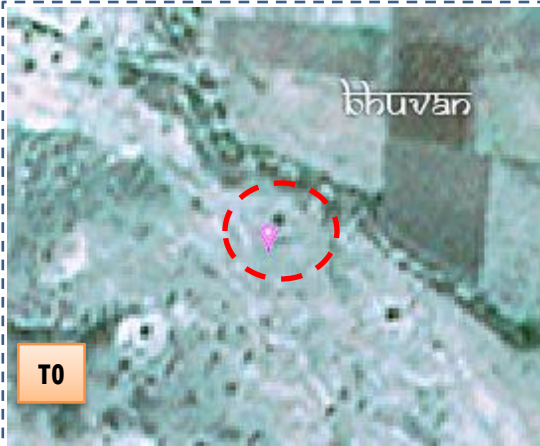

| T0:2012-13 | T1: 03 February 2017 | Drishti Sl no. 136356   MWS : 4D3B6h3c |

Farm pond

| T0:2012-13 | T1: 03 February 2017 | Drishti Sl no. 150237   MWS : 4D3B6j3b |

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-56/2012-13

T0	T1	
T0: 2012-13	T1: 03 February 2017	Drishti Sl no. 150255 MWS : 4D3B6j2b

Farm pond

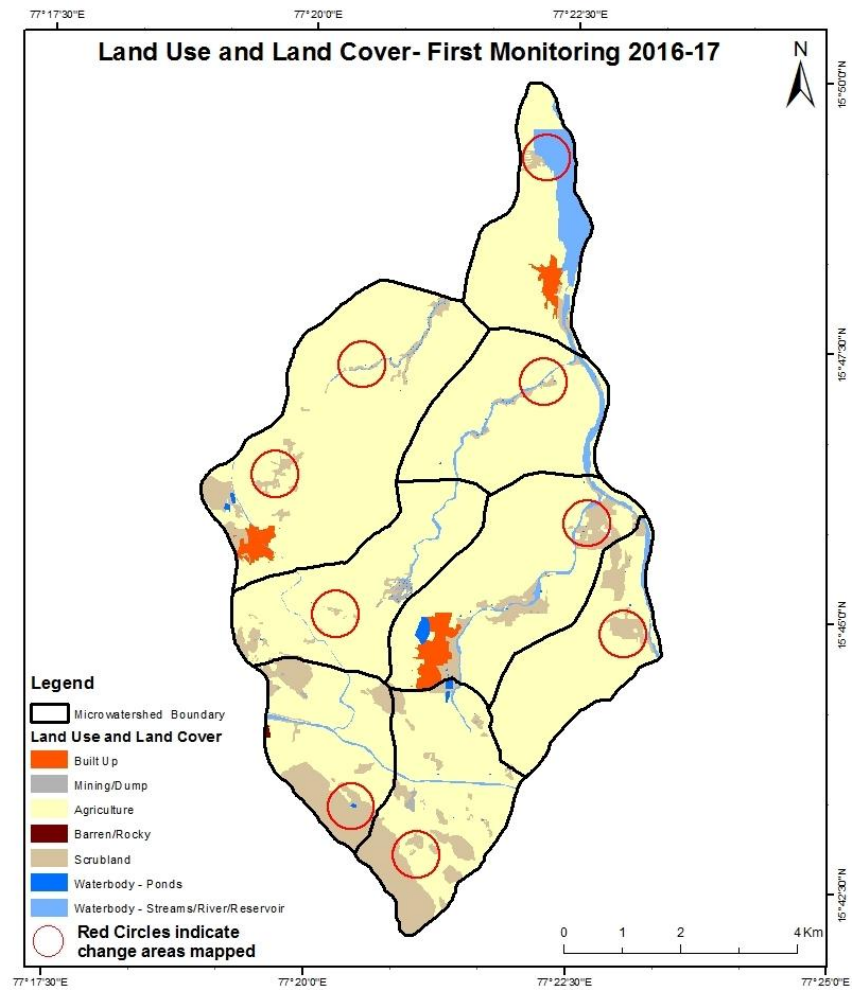| T0	T1	
T0: 2012-13	T1: 03 February 2017	Drishti Sl no. 129098 MWS : 4D3B6j3b

Farm pond

MONITORING IN THE PROJECT AREA

> **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 (2012-13) and row represents the T5 (2020-21)

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)
Scale: 1:10000

Land Use and Land Cover 2012-13

Legend

☐ Microwatershed Boundary

Land Use and Land Cover

- 🟧 Built Up
- 🟨 Agriculture
- 🟫 Barren/Rocky
- 🟫 Scrubland
- 🟦 Waterbody - Ponds
- 🟦 Waterbody - Streams/River/Reservoir
- ⭕ **Red Circles indicate change areas mapped**

0 1 2 4 Km

Land Use and Land Cover- First Monitoring 2016-17

Legend

☐ Microwatershed Boundary

Land Use and Land Cover

- 🟧 Built Up
- 🟫 Mining/Dump
- 🟨 Agriculture
- 🟫 Barren/Rocky
- 🟫 Scrubland
- 🟦 Waterbody - Ponds
- 🟦 Waterbody - Streams/River/Reservoir
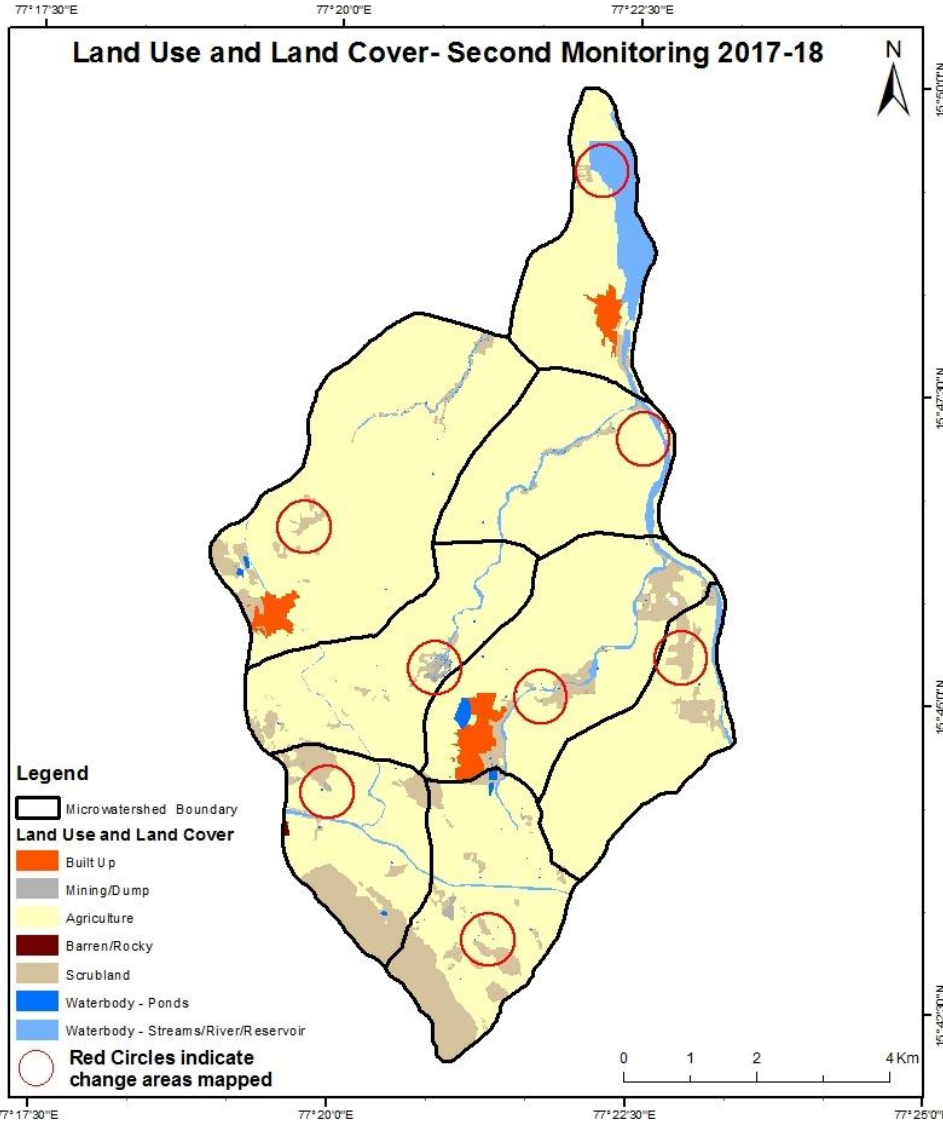- ⭕ **Red Circles indicate change areas mapped**

0 1 2 4 Km

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)
Scale: 1:10000

Land Use and Land Cover 2016-17

Land Use and Land Cover- Second Monitoring 2017-18

Legend

Microwatershed Boundary

Land Use and Land Cover

Built Up

Mining/Dump

Agriculture

Barren/Rocky

Scrubland

Waterbody - Ponds

Waterbody - Streams/River/Reservoir

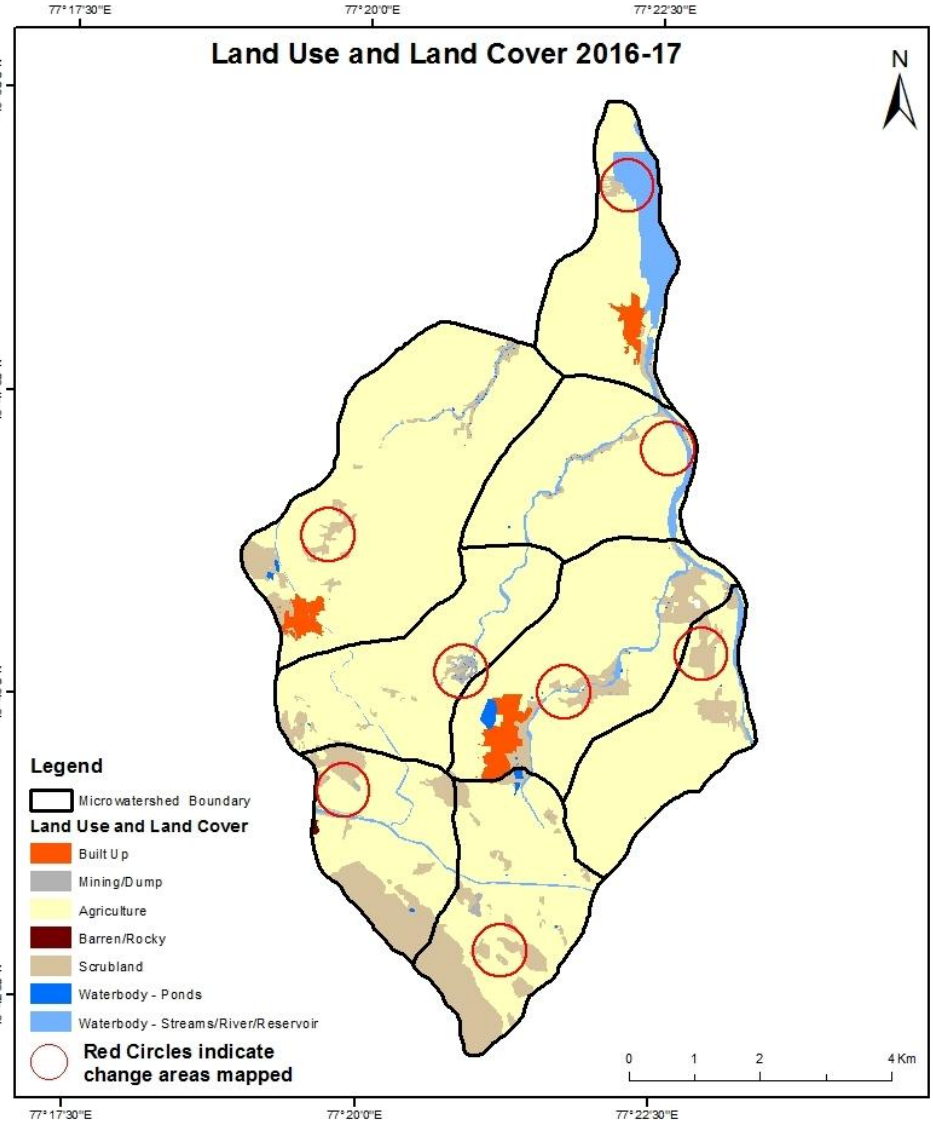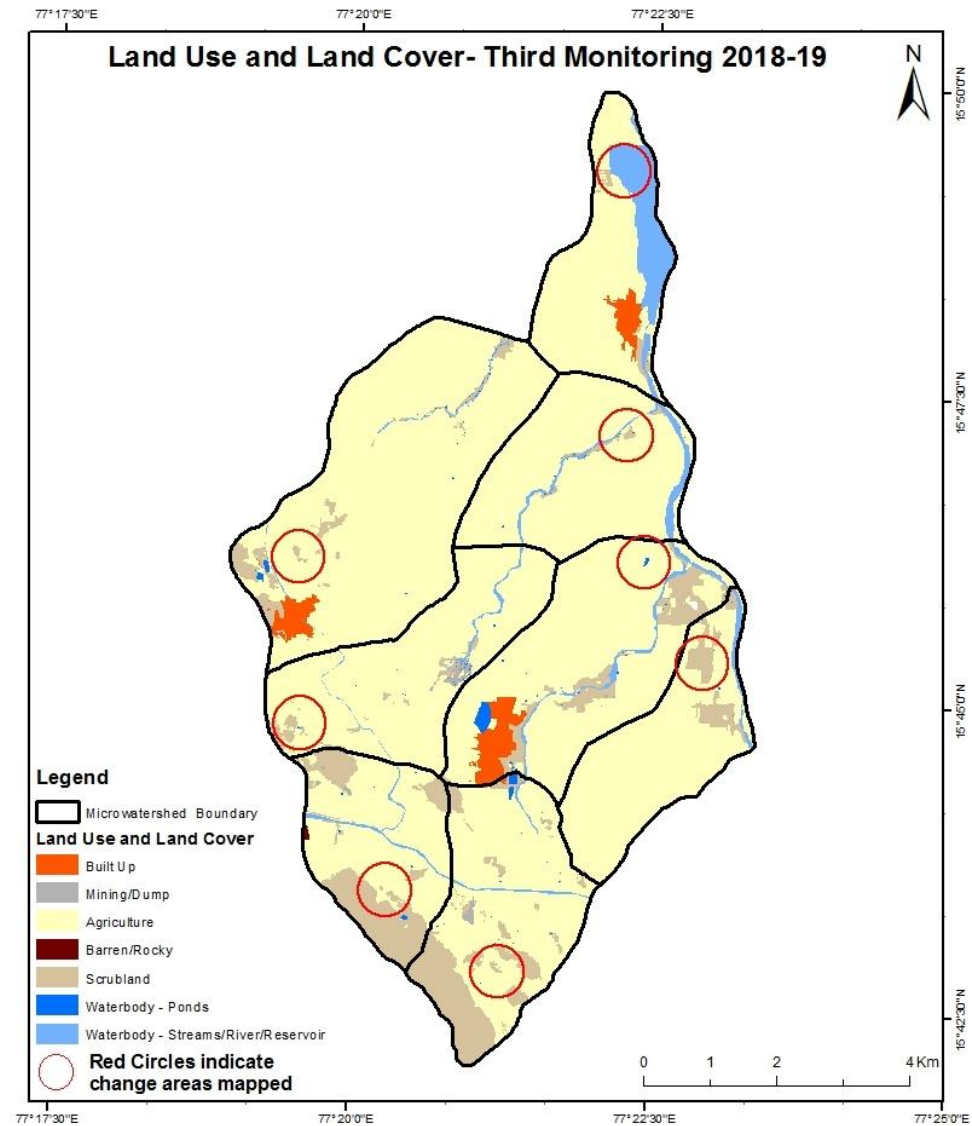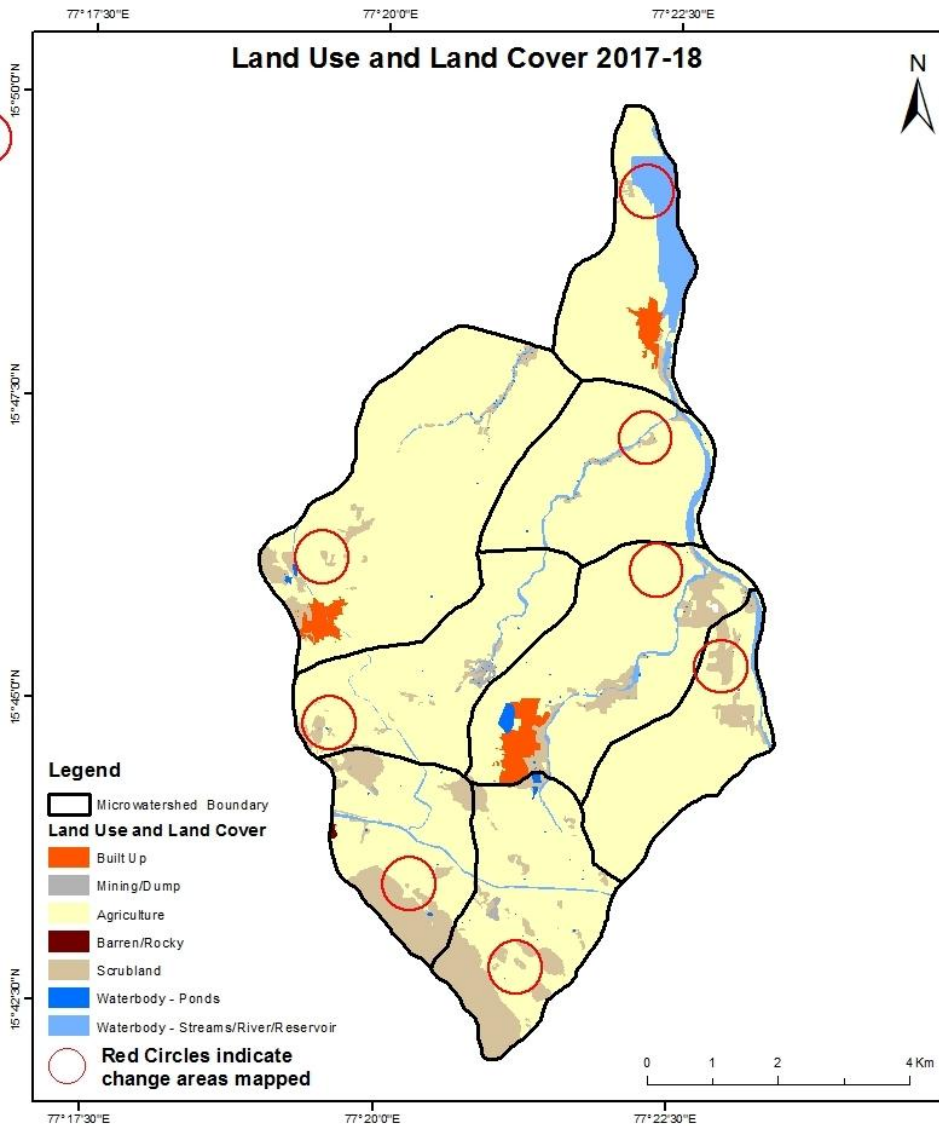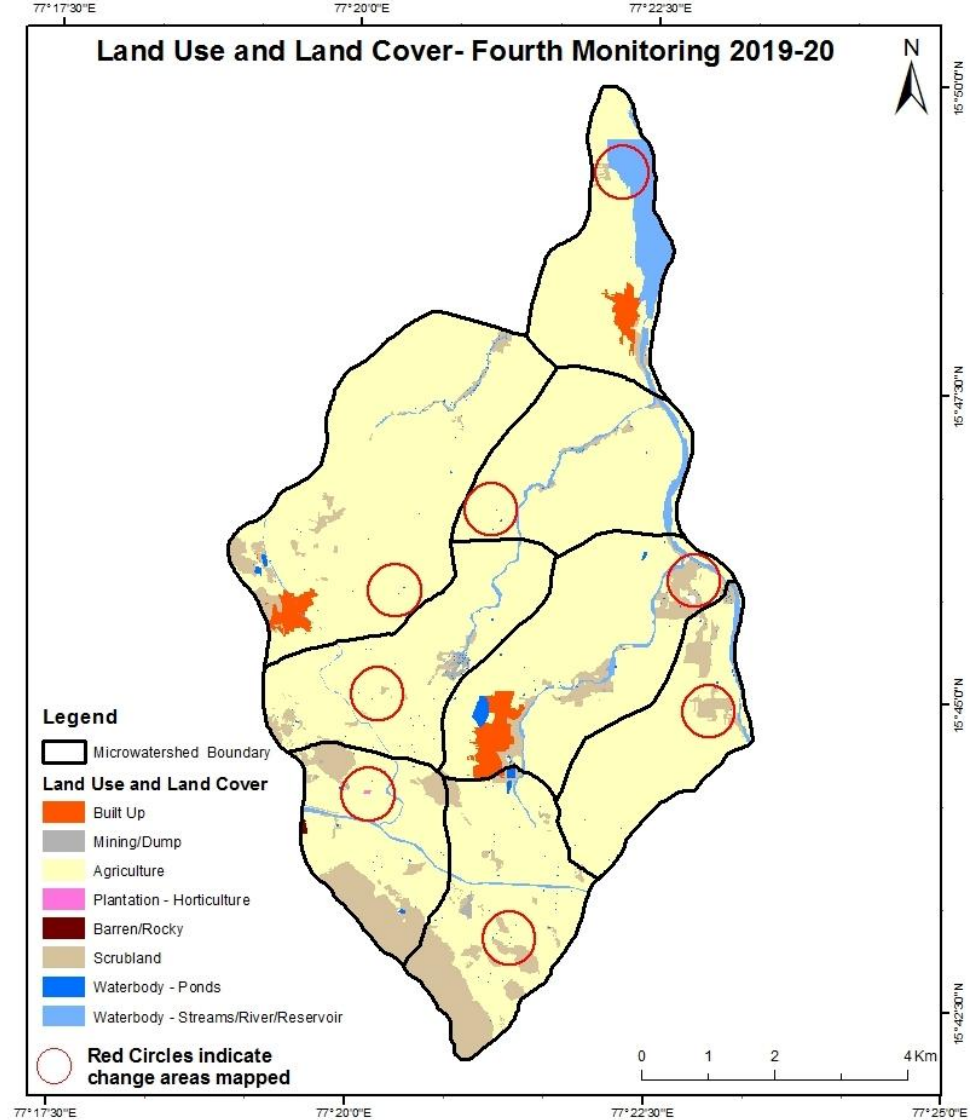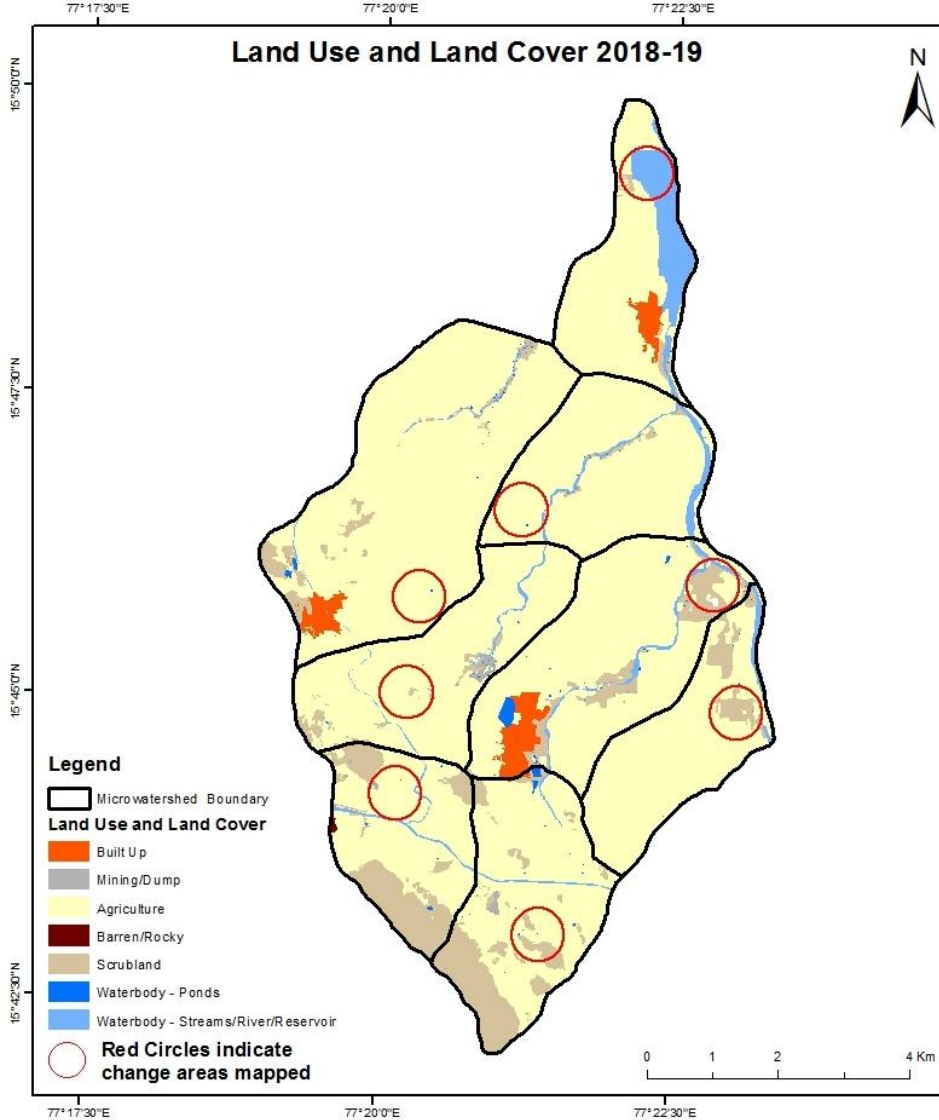**Red Circles indicate change areas mapped**

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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 2018-19

Legend

Microwatershed Boundary

Land Use and Land Cover

- Built Up
- Mining/Dump
- Agriculture
- Barren/Rocky
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

Red Circles indicate change areas mapped

0   1   2   4 Km

Land Use and Land Cover- Fourth Monitoring 2019-20

Legend

Microwatershed Boundary

Land Use and Land Cover

- Built Up
- Mining/Dump
- Agriculture
- Plantation - Horticulture
- Barren/Rocky
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir
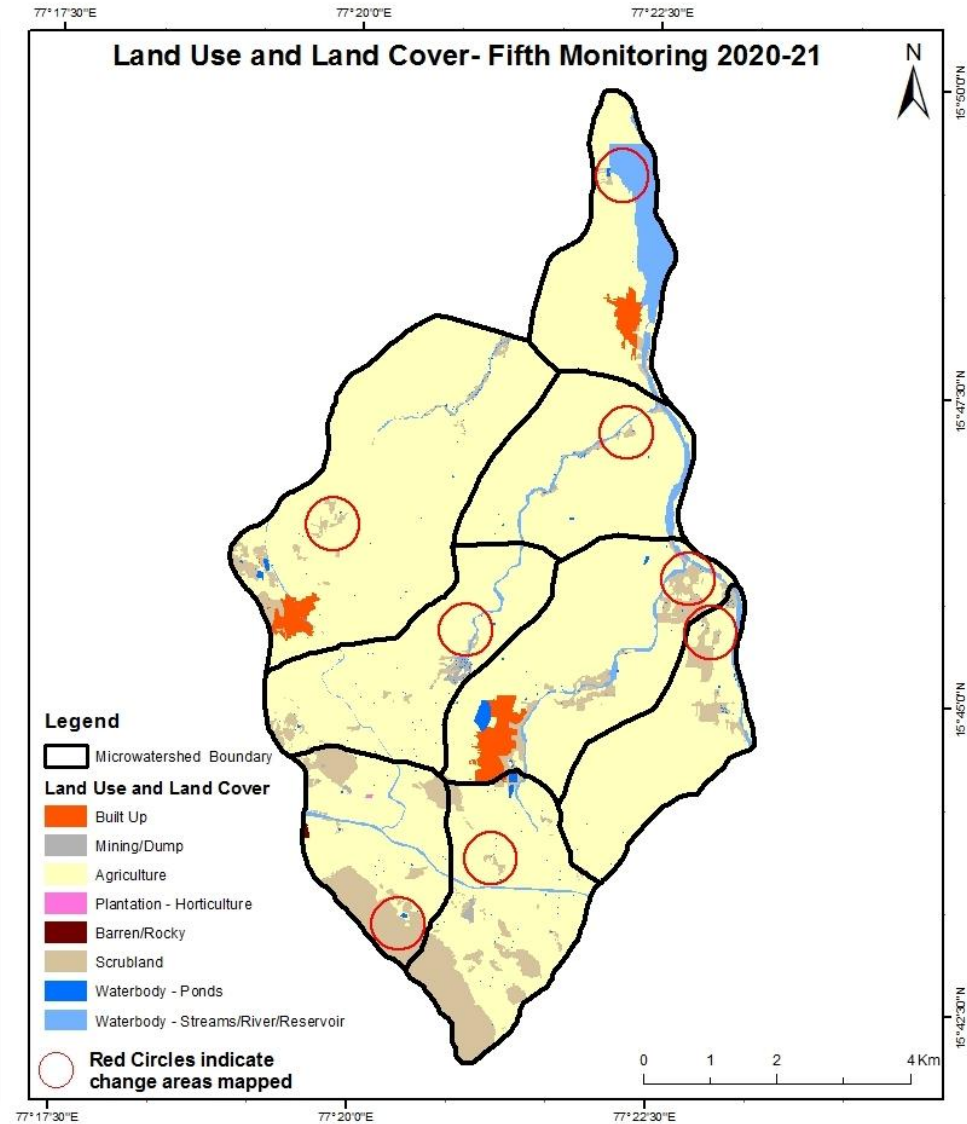
Red Circles indicate change areas mapped

0   1   2   4 Km

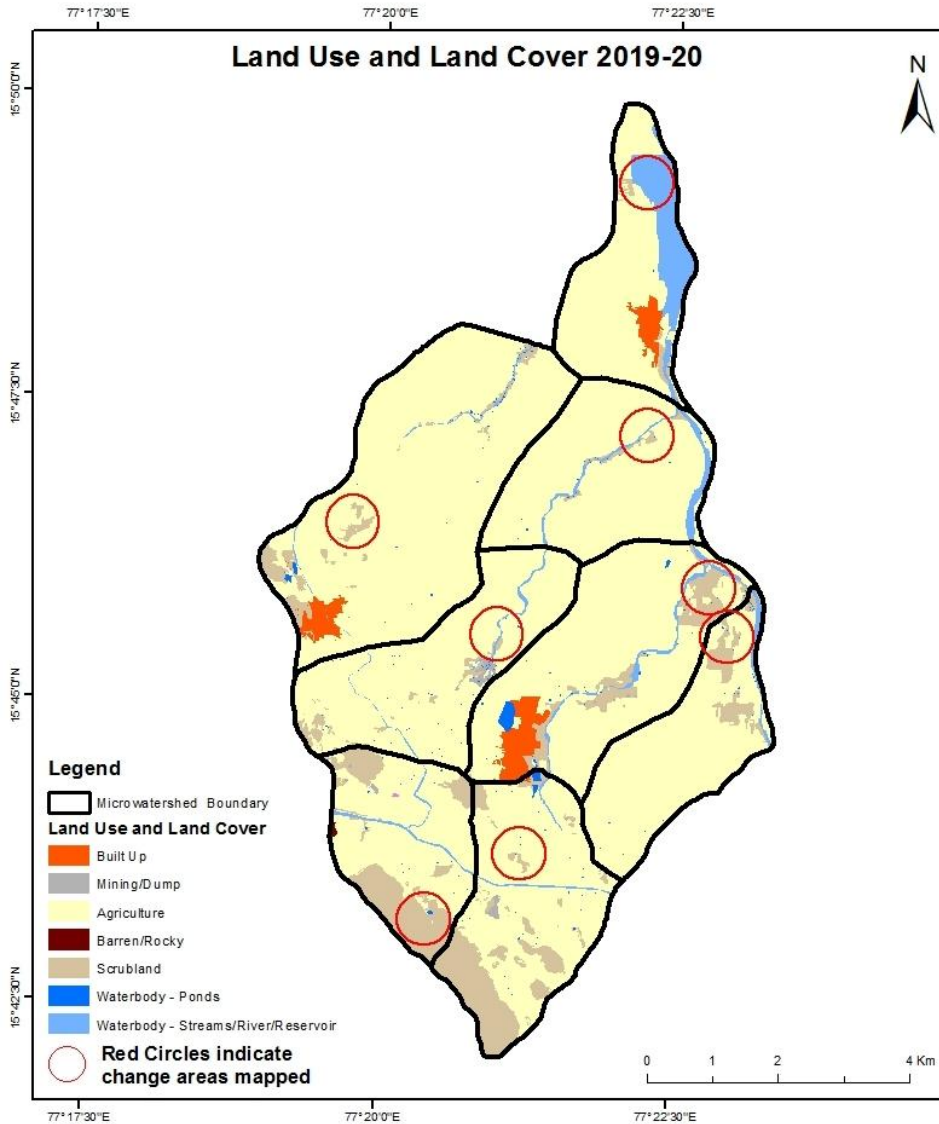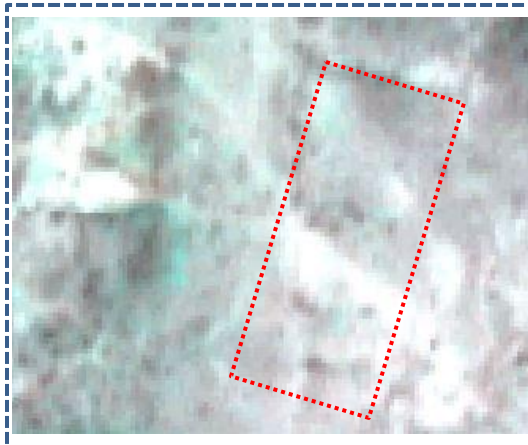# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)
Scale: 1:10000

17

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

Scrub to Agriculture

T0: 2012-13(77°22'40.664"E 15°45'48.654"N)

T1: 03 February 2017

Scrub to Mining/dump

T0

T1
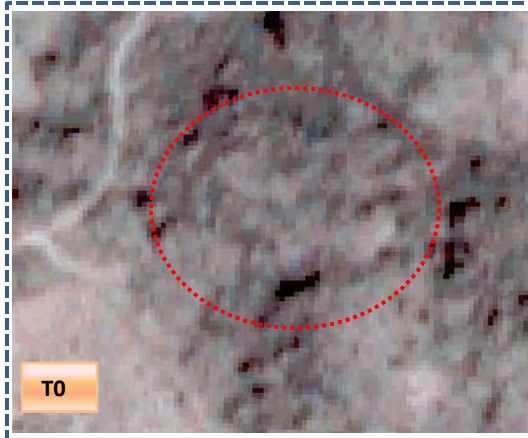
T0: 2012-13(77°19'46.189"E 15°44'27.039"N)
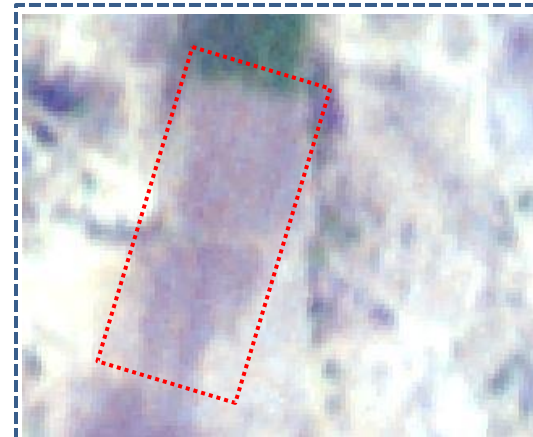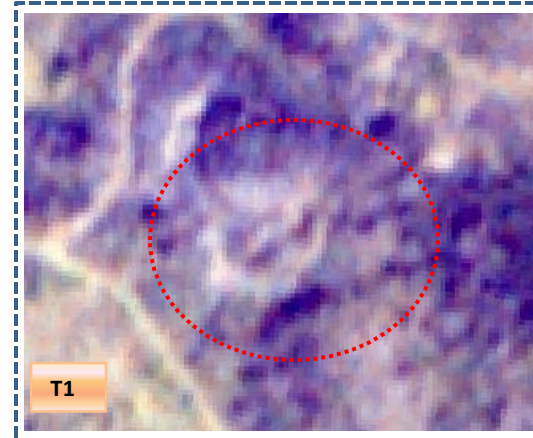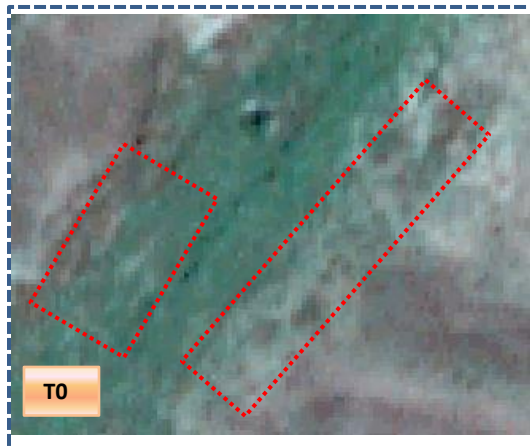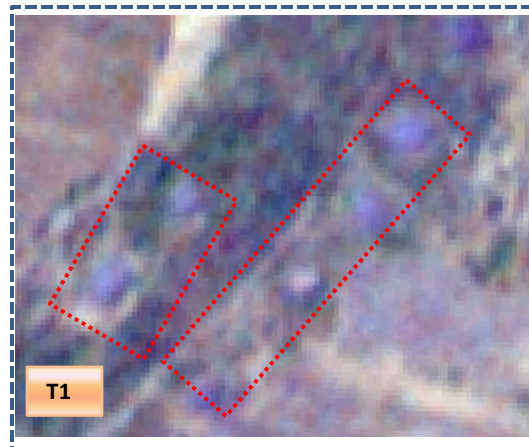
T1: 03 February 2017

Land Use and Land Cover changes for Pre and Post treatment dates
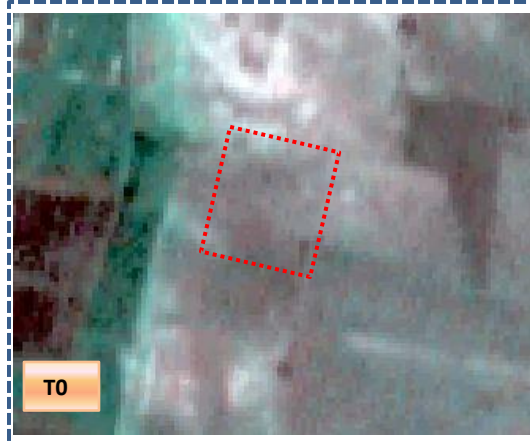
Scrub to Farm ponds

T0

T1

T0: 2012-13(77°21'1.492"E 15°47'31.25"N)

T1: 03 February 2017

Agriculture to Farm pond

T0

T1

T0: 2012-13(77°21'10.947"E 15°45'37.465"N)
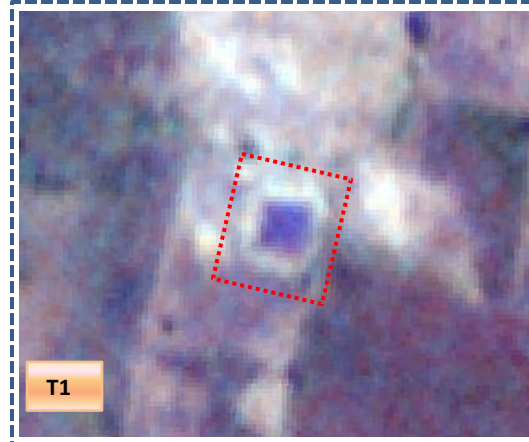
T1: 03 February 2017

Table showing change matrix depicting Land cover transitions during study period-2012-13 to 2016-17

T0	Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	96.32										96.32
Mining/dump											
Agriculture	8.70		4912.24					16.20		1.78	4938.91
Plantation Horticulture											
Forest											
Forest Plantation											
Barren Rocky							1.98				1.98
Scrub	0.23	14.89	66.28					641.66		3.50	726.56
Waterbody-Streams/River									233.01		233.01
Waterbody – Ponds										13.33	13.33
Grand Total	**105.26**	**14.89**	**4978.52**				**1.98**	**657.86**	**233.01**	**18.61**	**6010.12**

Monitoring period (T1) — 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 T0 26 ha of the agriculture area has decreased and it is converted into Built-up, scrubland and water body in T1.
- In T1 66 ha of the agriculture area has increased from scrubland area of T2. The additional agriculture are coming from waterbody in T1 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2016-17 to 2017-18

T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Monitoring period (T2)										Units in Hectares	
Built up	105.26										**105.26**
Mining/dump		14.84								0.04	**14.89**
Agriculture	3.80		4971.87					1.41		1.44	**4978.52**
Plantation Horticulture											
Forest											
Forest Plantation											
Barren Rocky							1.98				**1.98**
Scrub	0.54		54.97					602.03		0.32	**657.86**
Waterbody-Streams/River									233.01		**233.01**
Waterbody – Ponds										18.61	**18.61**
Grand Total	**109.59**	**14.84**	**5026.84**				**1.98**	**603.44**	**233.01**	**20.41**	**6010.12**

• 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 06 ha of the agriculture area has decreased and it is converted into Built-up, scrubland and water body in T2.

• In T2 54 ha of the agriculture area has increased from scrubland area 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-2017-18 to 2018-19

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	109.59										**109.59**
Mining/dump		14.38	0.46								**14.84**
Agriculture	0.86	0.07	5024.13					1.20		0.58	**5026.84**
Plantation Horticulture											
Forest											
Forest Plantation											
Barren Rocky							1.98				**1.98**
Scrub	1.04		24.36					577.89		0.16	**603.44**
Waterbody-Streams/River									233.01		**233.01**
Waterbody – Ponds										20.41	**20.41**
Grand Total	**111.49**	**14.45**	**5048.95**				**1.98**	**579.09**	**233.01**	**21.15**	**6010.12**

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

• In T3 24 ha of the agriculture area has increased from mining/dump 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-2018-19 to 2019-20

Land cover / T3	Monitoring period (T4) Built up	Mining/dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	111.49										**111.49**
Mining/dump		14.19	0.11							0.15	**14.45**
Agriculture	0.20		5044.09	0.59				1.31		2.76	**5048.95**
Plantation Horticulture											
Forest											
Forest Plantation											
Barren Rocky							1.98				**1.98**
Scrub		0.09	7.84					570.34		0.82	**579.09**
Waterbody-Streams/River									233.01		**233.01**
Waterbody – Ponds										21.15	**21.15**
Grand Total	**111.69**	**14.28**	**5052.04**	**0.59**			**1.98**	**571.65**	**233.01**	**24.88**	**6010.12**

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 T3 4.8 ha of the agriculture area has decreased and it is converted into Built-up, plantations, scrubland and water body in T4.

• In T4 7.8 ha of the agriculture area has increased from mining/dump 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-2019-20 to 2020-21

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
Built up	111.69										**111.69**
Mining/dump		14.27								0.01	**14.28**
Agriculture	0.24		5050.34							0.47	**5051.05**
Plantation Horticulture				0.59							**0.59**
Forest											
Forest Plantation											
Barren Rocky							1.98				**1.98**
Scrub	0.79		35.38					535.90		1.33	**573.41**
Waterbody-Streams/River			0.19						232.81		**233.01**
Waterbody – Ponds										24.88	**24.88**
Grand Total	**111.69**	**14.28**	**5052.04**	**0.59**			**1.98**	**571.65**	**233.01**	**24.88**	**6010.12**

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 T4 0.7 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.
- In T5 35 ha of the agriculture area has increased from scrubland and water body 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 13.7 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.

4. There is an increase of 39, 48, 22, 3 & 0.9 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 147 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.

5. There is a decrease of 191 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.

6. Farm ponds (80) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (124) verified from the portal.