

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

IWMP-Batch-IV

**KURNOOL -57/2012-13
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

- **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

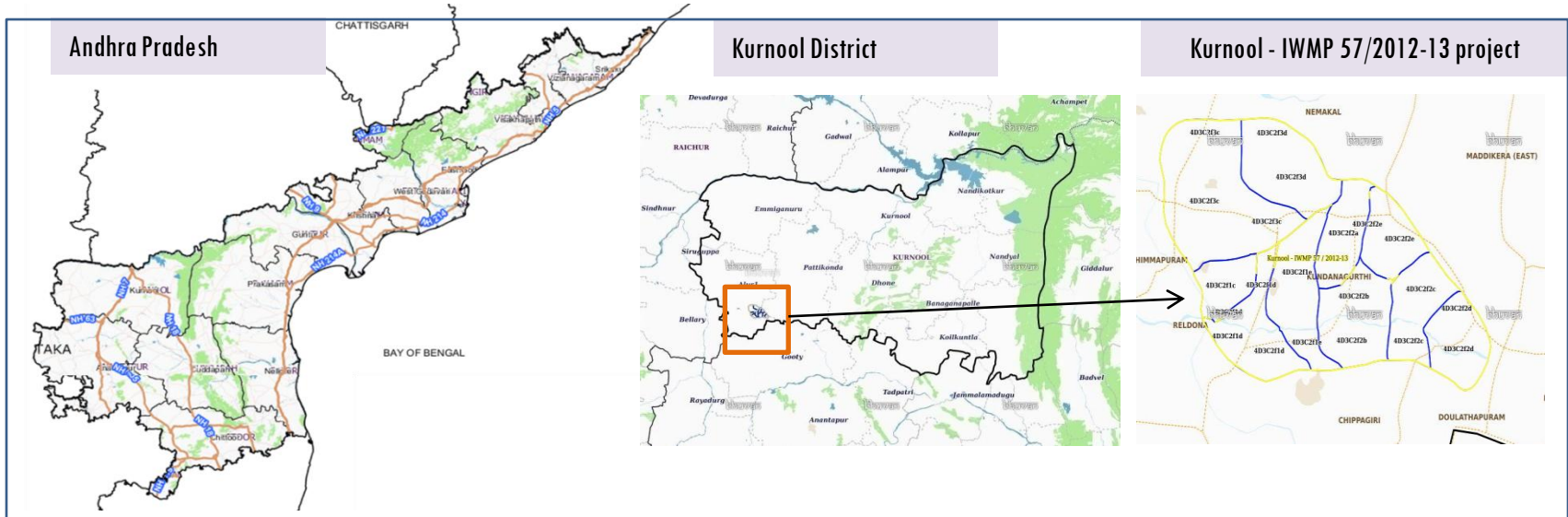
EXECUTIVE SUMMARY

- 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-57/2012-13, Kurnool District of Andhra Pradesh. The total geographical area of the project is **5,448** ha. It comprises of 10 micro watersheds.
- In the project area 178 Drishti photos were uploaded showing checks & plugins, Field bunds and remaining showing others.
- Water bodies have shown an increase by 35 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 93 % is covered by the agriculture, 3.2 % is covered by scrubland and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-57/2012-13

DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Chippagiri Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 5,448 ha. It comprises of 10 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).

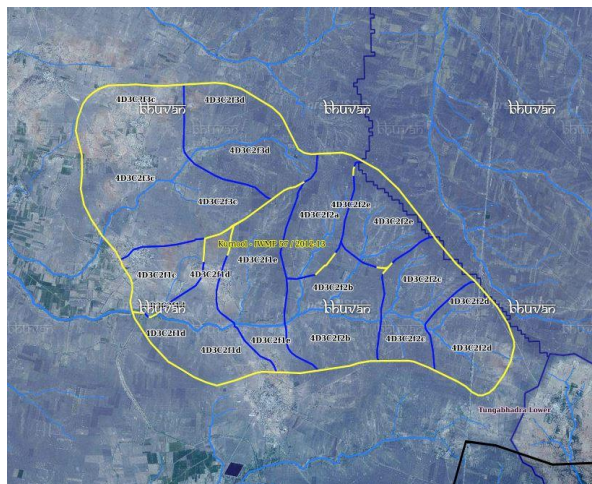
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			20-Nov-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			20-Nov-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	Drishiti Photographs		
		Total	150
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

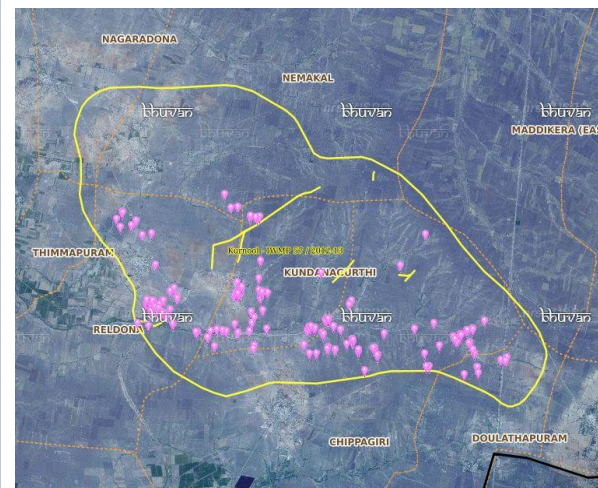


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishiti Points



Drishiti Upload Status

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Checks & plugins	30	30
3	Agriculture	0	0
4	Blockplanting	0	0
5	Bund planting	0	0
6	Drainage Treatment	0	0
7	Farm ponds/Dug out pit	39	30
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	90
	TOTAL	178	150

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 (2012-13) 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.

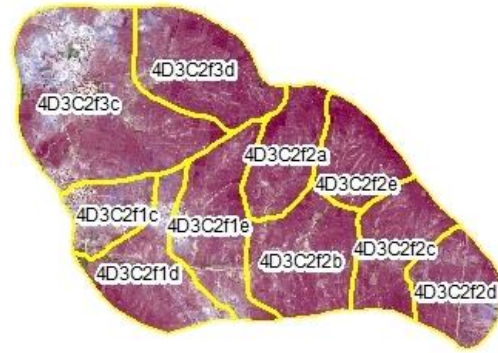
Natural Color Composite

Natural Color Composite- 2012-13



Source:Fusen data,NRSC

Natural Color Composite- 03rd February 2017



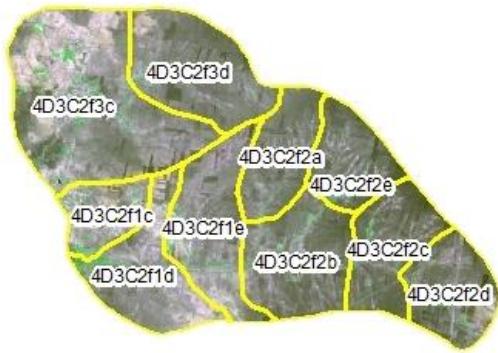
Source:NCC,NRSC

Natural Color Composite- 01st April 2018



Source:LISS-IV,NRSC

Natural Color Composite- 16th February 2019



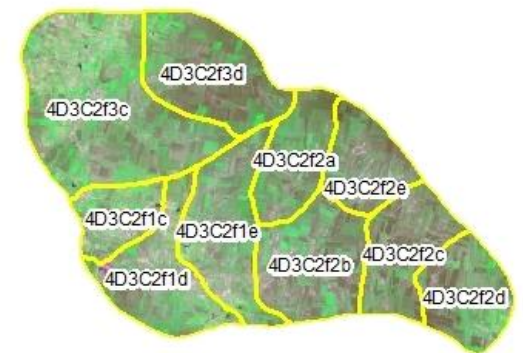
Source:Sentinel

Natural Color Composite- 19th February 2020



Source:LISS-IV,NRSC

Natural Color Composite- 20th November 2020



Source:Sentinel

Monitoring of activities in Kurnool District Andhra Pradesh. IWMP-57/2012-13



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. 2918840

Check dam

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-57/2012-13



T0:2012-13



T1: 03 February 2017

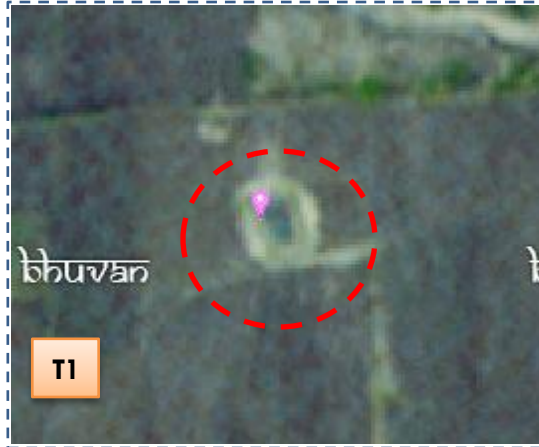


Drishti Sl no. 132648 MWS : 4D3C2f2b

Farm pond



T0:2012-13



T1: 03 February 2017



Drishti Sl no. 132721 MWS : 4D3C2f2b

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-57/2012-13



T0

T0: 2012-13



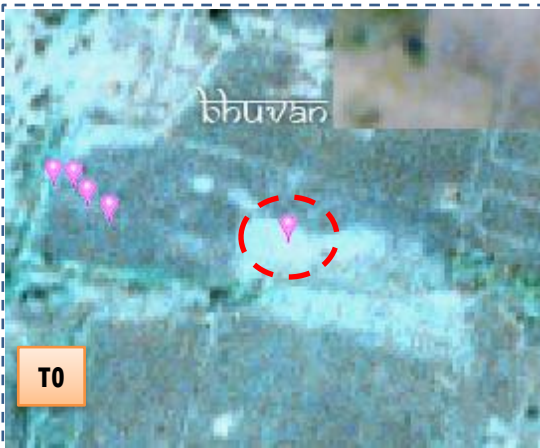
T1

T1: 03 February 2017



Drishti Sl no. 2455430 MWS : 4D3C2f1e

Farm pond



T0

T0: 2012-13



T1

T1: 03 February 2017



Drishti Sl no. 2485933 MWS : 4D3C2f1c

Farm pond

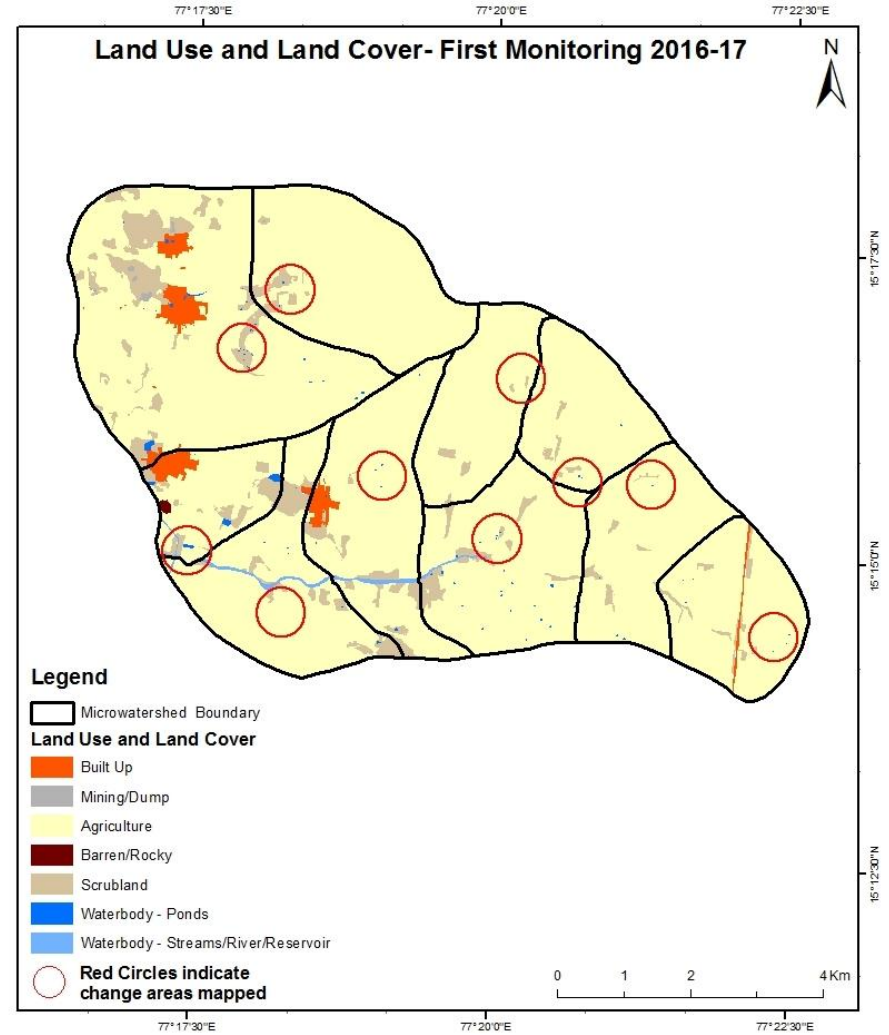
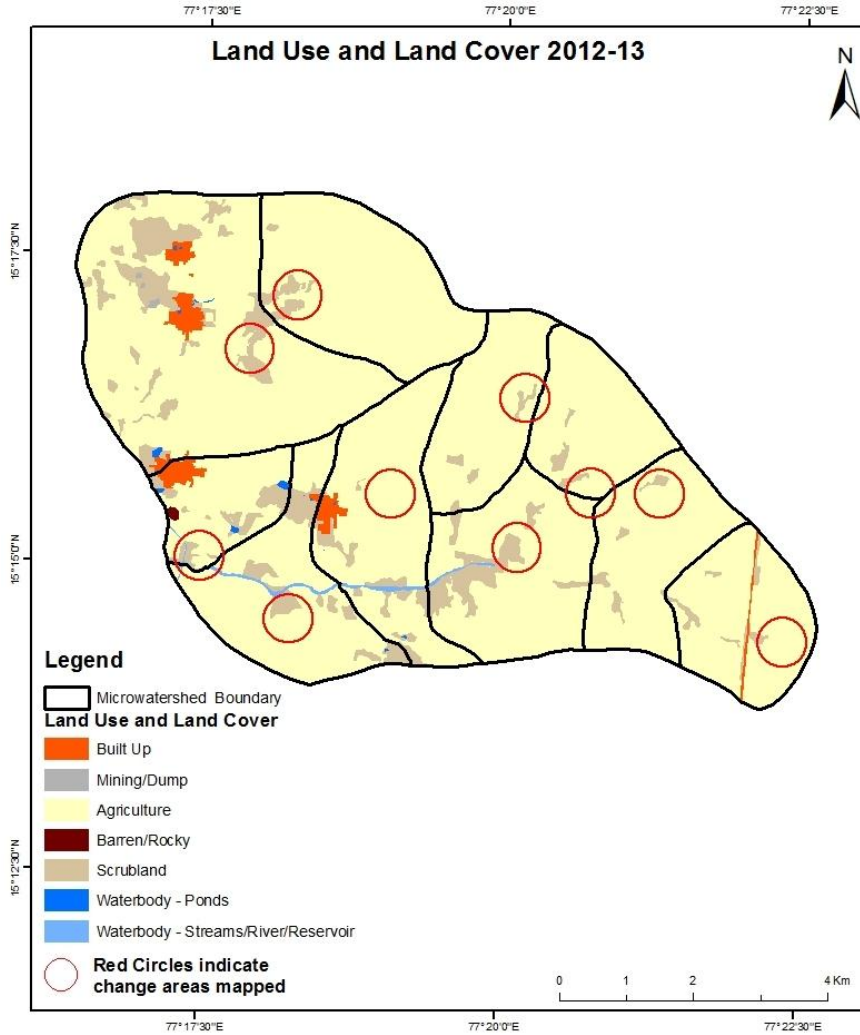
MONITORING IN THE PROJECT AREA

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

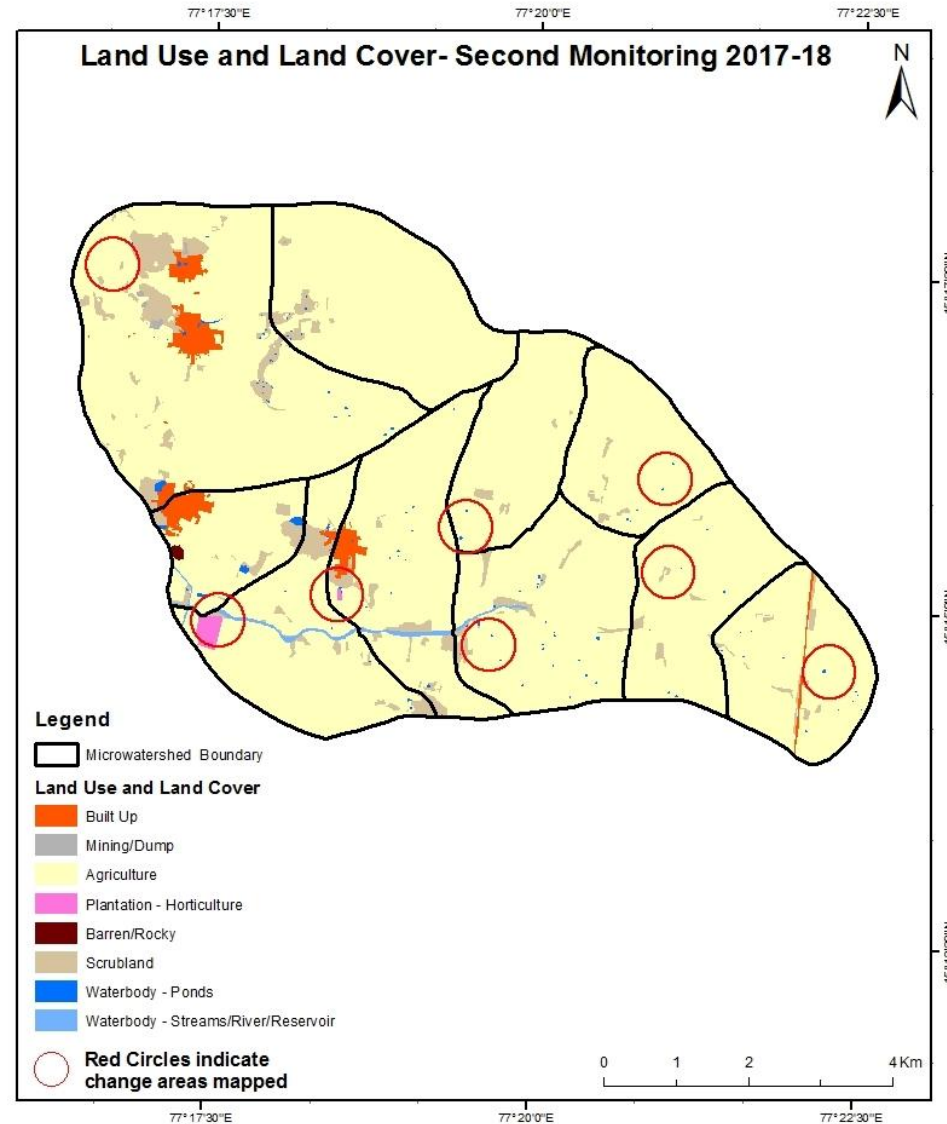
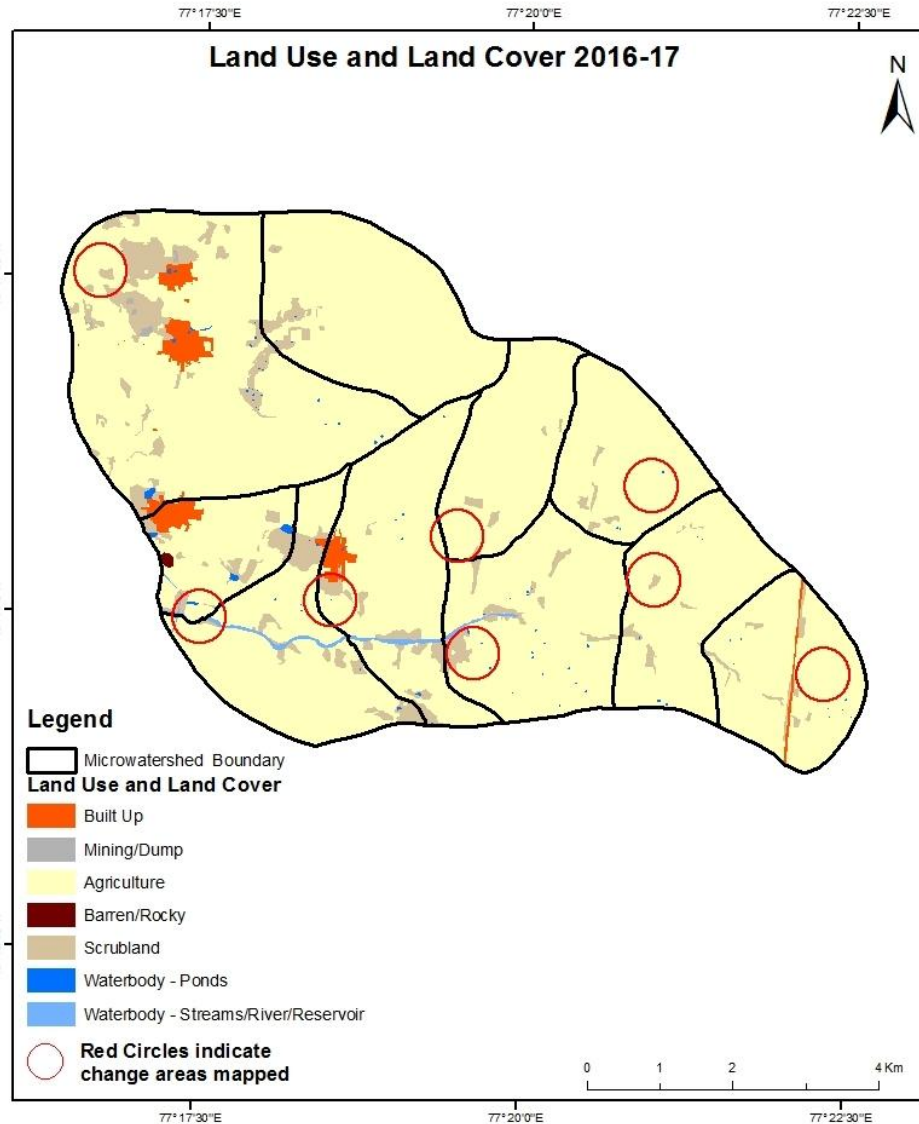
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

Scale: 1:10000



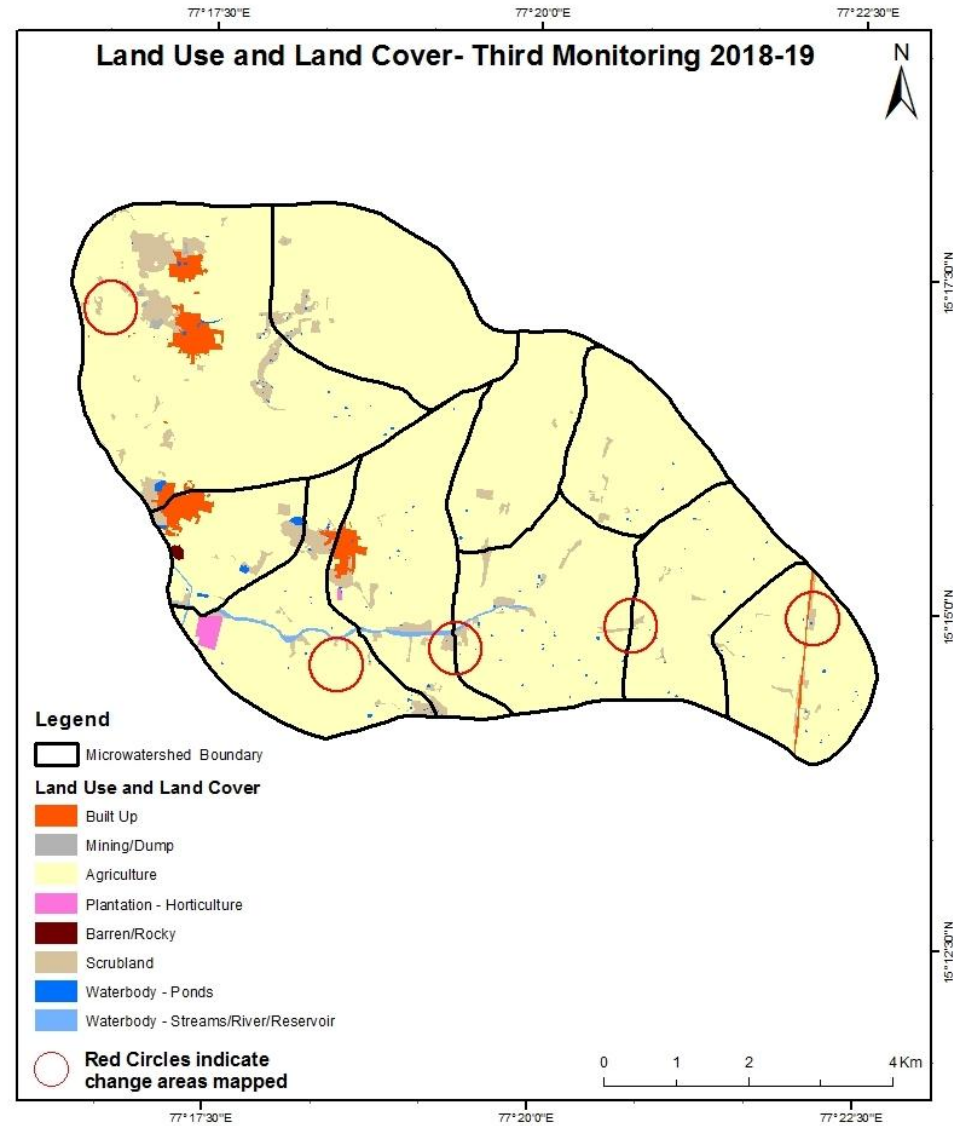
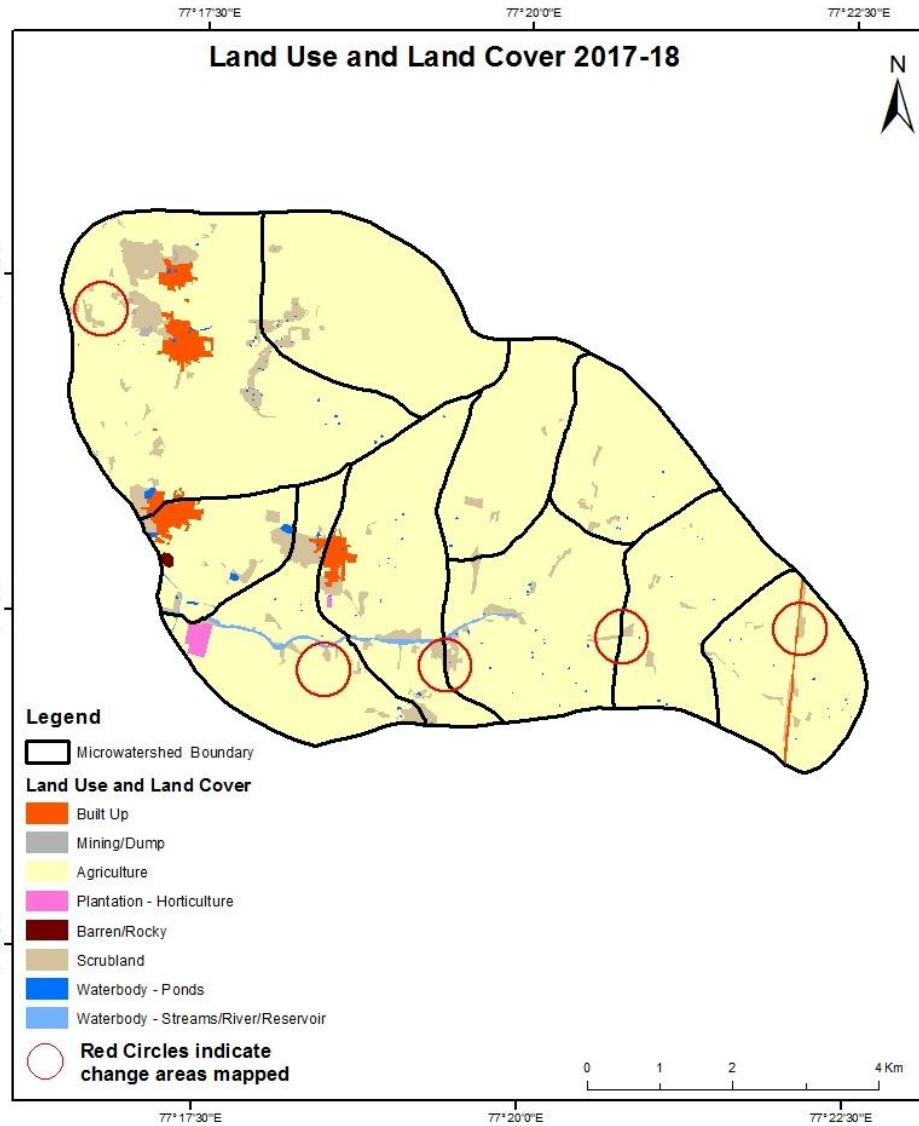
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016 -17 to 2017-18)

Scale: 1:10000



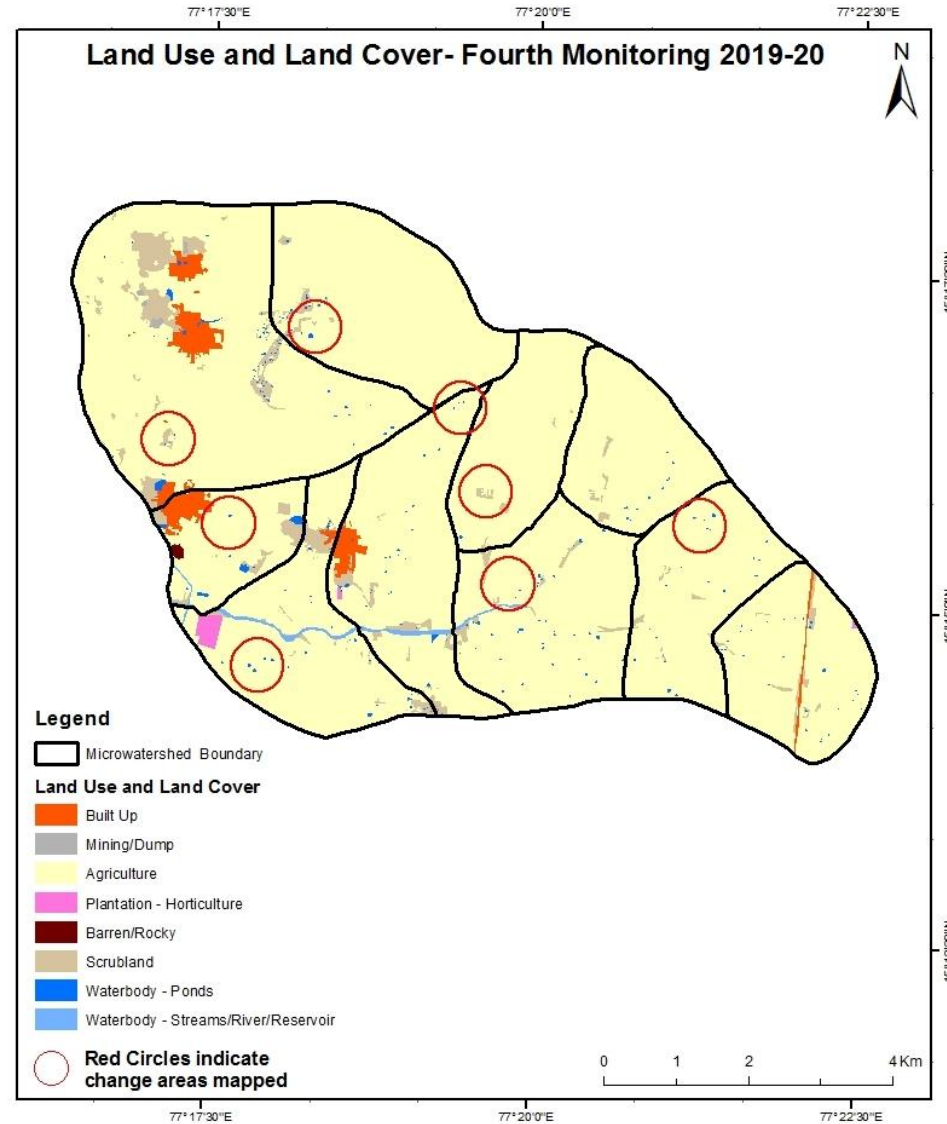
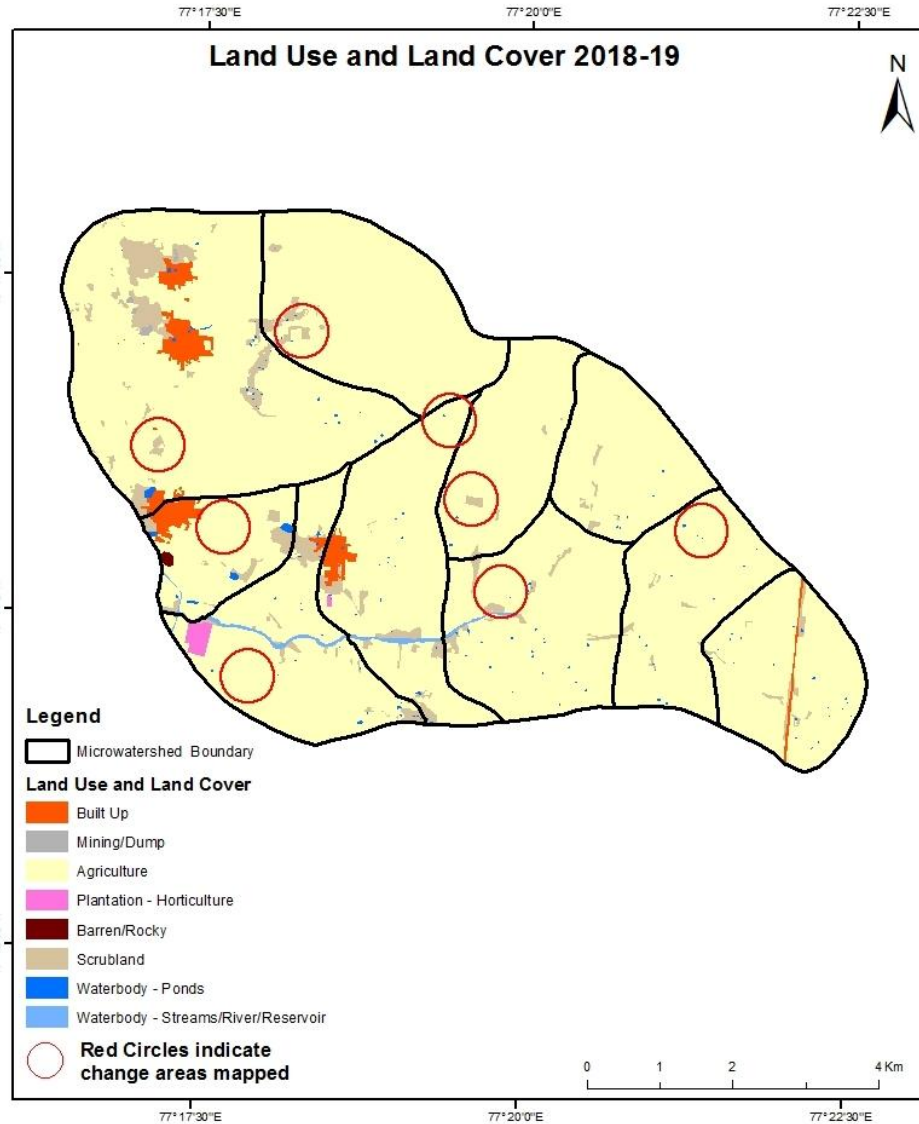
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



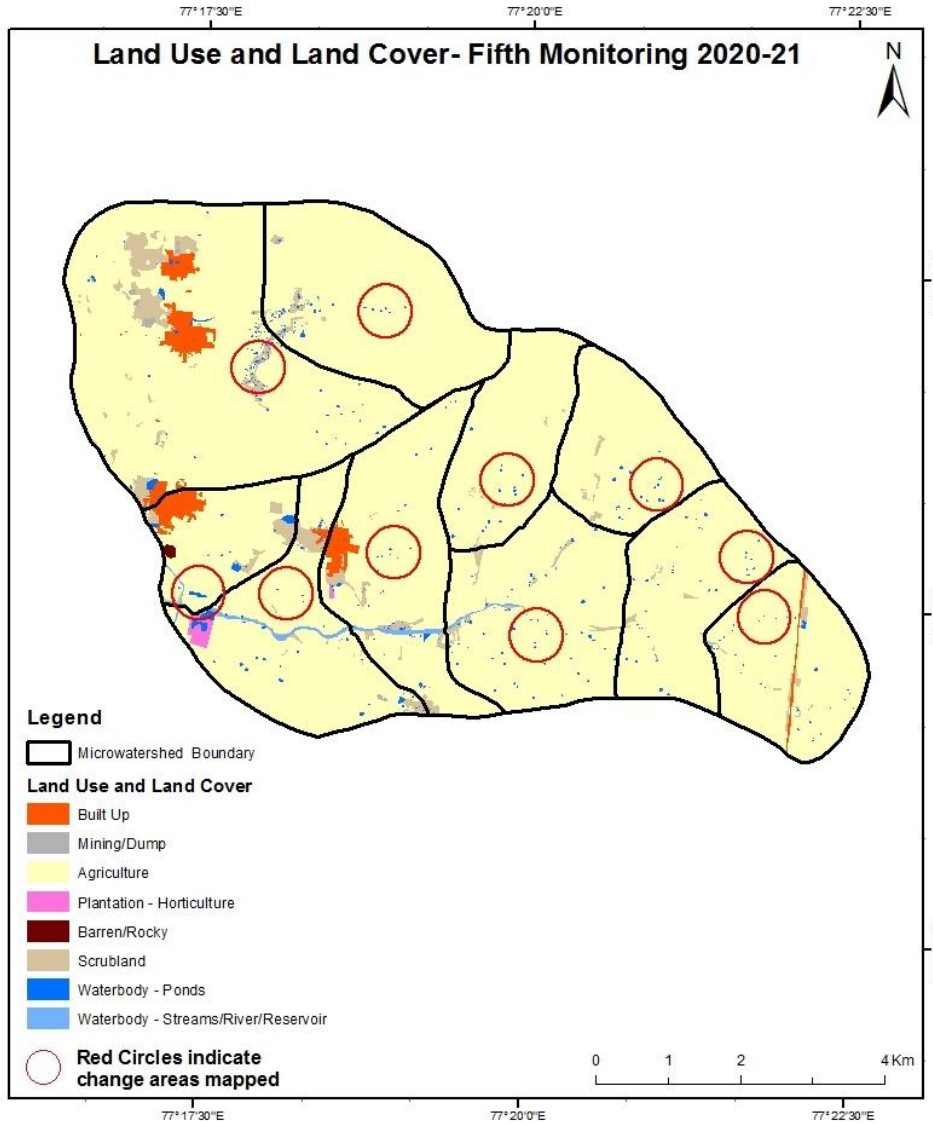
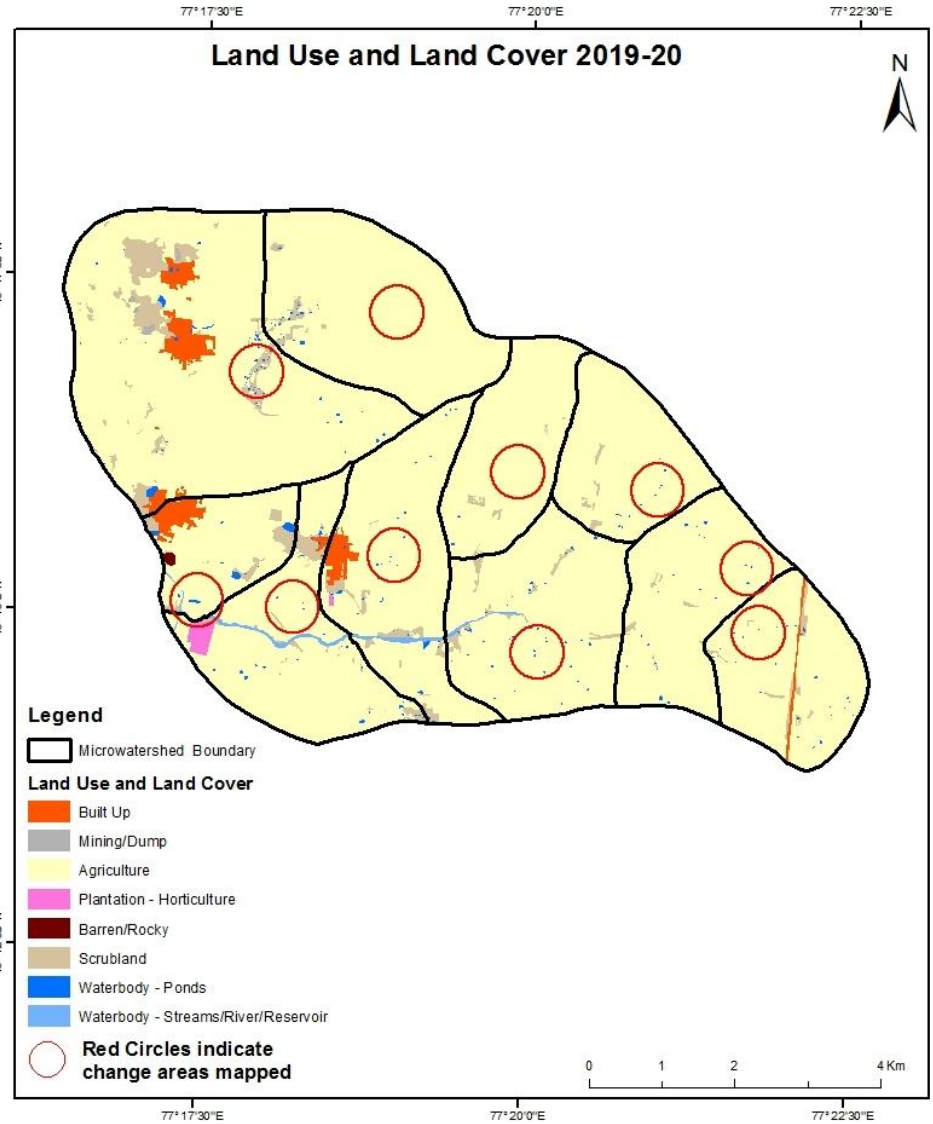
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000



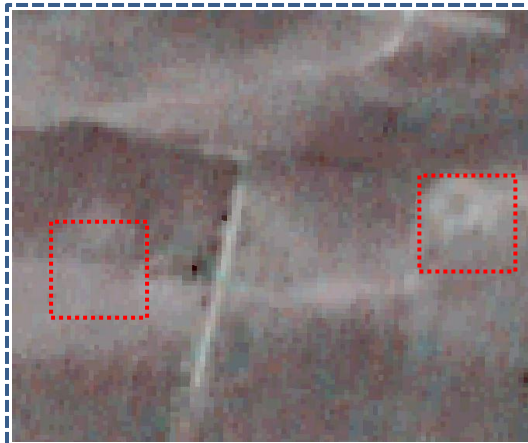
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

Scale: 1:10000

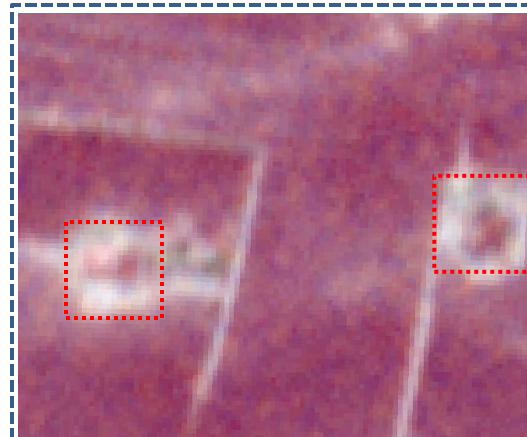


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Farm pond



T0: 2012-13(77°18'32.977"E 15°16'25.855"N)



T1: 03 February 2017

Scrub to Farm pond



T0

T0: 2012-13(77°18'45.947"E 15°14'39.073"N)

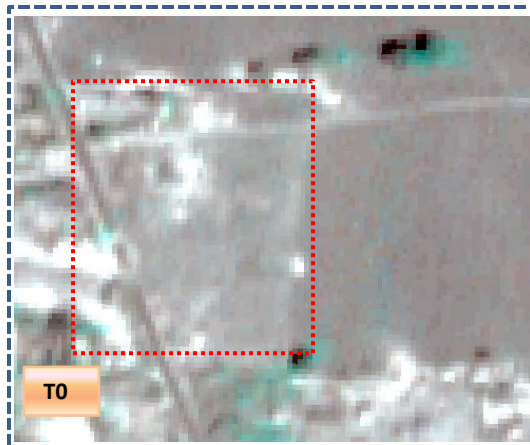


T1

T1: 03 February 2017

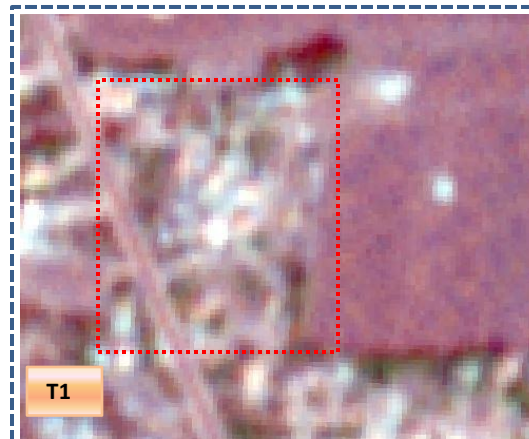
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Built Up



T0

T0: 2012-13(77°17'25.603"E 15°15'48.395"N)



T1

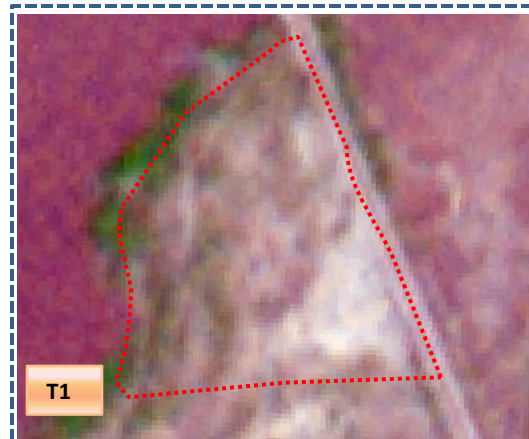
T1: 03 February 2017

Agriculture to Scrub



T0

T0: 2012-13(77°17'9.88"E 15°16'13.801"N)



T1

T1: 03 February 2017

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

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		
Built up	85.15												85.15
Mining/dump		3.12											3.12
Agriculture	5.92		4810.15					10.93			3.42		4830.42
Plantation Horticulture													
Forest													
Forest Plantation													
Barren Rocky							2.76						2.76
Scrub	5.75	1.57	130.99					353.87			1.85		494.02
Waterbody- Streams/River									26.12				26.12
Waterbody – Ponds											7.38		7.38
Grand Total	96.82	4.68	4941.14				2.76	364.79	26.12		12.65		5448.97

- 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 9.3 ha of the agriculture area has decreased and it is converted into Built-up, scrub and water body in T1.
- In T1 130 ha of the agriculture area has increased from scrubland 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

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	96.82												96.82
Mining/dump		4.18	0.50										4.68
Agriculture	2.79		4922.42	13.79					2.15				4941.14
Plantation Horticulture													
Forest													
Forest Plantation													
Barren Rocky							2.76						2.76
Scrub	6.46		84.33					272.97	1.04				364.79
Waterbody- Streams/River											26.12		26.12
Waterbody – Ponds									12.65				12.65
Grand Total	106.06	4.18	5007.25	13.79			2.76	272.97	15.83		26.12		5448.97

- 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 18 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T2.
- In T2 84 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	106.06												106.06
Mining/dump		4.18											4.18
Agriculture			5005.74						1.51				5007.25
Plantation Horticulture				13.79									13.79
Forest													
Forest Plantation													
Barren Rocky							2.76						2.76
Scrub			37.76					234.42	0.79				272.97
Waterbody- Streams/River											26.12		26.12
Waterbody – Ponds									15.83				15.83
Grand Total	106.06	4.18	5043.51	13.79			2.76	234.42	18.13		26.12		5448.97

- 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 1.5 ha of the agriculture area has decreased and it is converted into water body in T3.
- In T3 37 ha of the agriculture area has increased from scrubland area 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	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	106.06												106.06
Mining/dump		4.18											4.18
Agriculture	0.54		5036.82						6.15				5043.51
Plantation Horticulture				13.79									13.79
Forest													
Forest Plantation													
Barren Rocky							2.76						2.76
Scrub	0.53		35.66					196.11	2.12				234.42
Waterbody- Streams/River										26.12			26.12
Waterbody – Ponds									18.13				18.13
Grand Total	107.12	4.18	5072.48	13.79			2.76	196.11	26.39	26.12			5448.97

- 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 6.6 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 35 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-2019-20 to 2020-21

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	107.12												107.12
Mining/dump		4.18											4.18
Agriculture	0.26	0.71	5061.18								10.33		5072.48
Plantation Horticulture				10.64							3.16		13.79
Forest													
Forest Plantation													
Barren Rocky							2.76						2.76
Scrub	0.52	0.18	18.06					174.25			3.09		196.11
Waterbody- Streams/River									26.12				26.12
Waterbody – Ponds											26.39		26.39
Grand Total	107.90	5.08	5079.25	10.64			2.76	174.25	26.12		42.97		5448.97

- 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 11 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and water body in T5.
- In T5 18 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 35 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 110, 66, 36, 28 & 06 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 248 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. There is an **increase of 10.6 Hectares in plantation/horticulture** area from 2012-13 (T0) to 2020-21 (T5) years.
6. There is a decrease of 319 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (30) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (39) verified from the portal.