MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -44/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-2022

T 0 - T 1 - T 2 - T 3 - T 4 - T 5

AGRICULTURE & SOIL DIVISION
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ITE&C Department Govt. of Andhra Pradesh

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Remote Sensing Application Area,
National Remote Sensing Centre, ISRO

DEPARTMENT OF LAND RESOURCES
Ministry of Rural Development
Government of India

CONTENTS

- **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-44/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is **4,978.64** ha. It comprises of 9 micro watersheds.
- In the project area 476 Drishti photos were uploaded showing 196 check dams, 49 Farm ponds/Percolation tanks, 11 entry point activities, 3 checks & plugins and 172 others.
- Water bodies have shown an increased by 57 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 73.07% is covered by the agriculture, 18.3% is covered by scrub land, 5.8% covered by Water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-44/2011-12
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Donakonda Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is **4,978.64** 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.

- Project area witnesses tropical wet and dry climate characterized by year round high temperatures. Prakasam has a record of reaching more than 46°C.
- The average annual rainfall of the district is 798.6 mm, monthly rainfall ranges from nil in March to 182.9 mm in October. October is the wettest month of the year. Southwest monsoon contributes significant rainfall in southern part of the district and Northeast monsoon contributes more than 70% of the rainfall.
- December is the coldest month with normal mean maximum temperature of about 27.1°c and mean minimum temperature of 19.2°C. Temperature begins to rise after February. May is the hottest month with mean daily maximum temperature of about 36.1°C and the mean daily minimum temperature of about 27.7°C. During May and early June the maximum temperature rises occasionally to 46°C and with the onset of SW monsoon by about second week of June, temperature begins to drop rapidly.

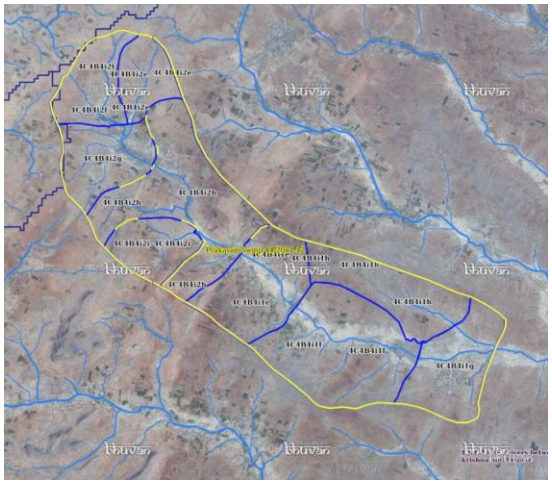
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			10-Nov-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			10-Nov-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	476
4	Detailed Project Report		

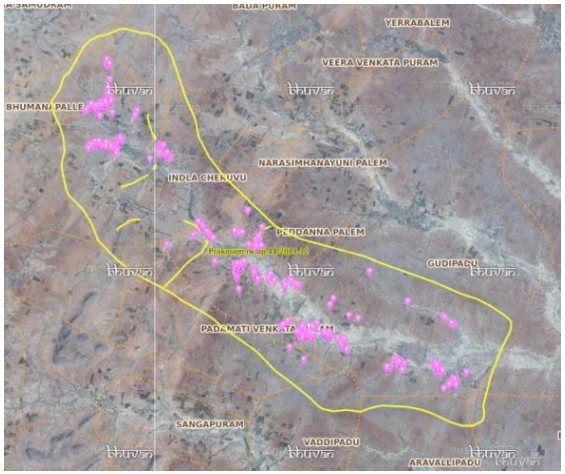
Natural Color Composite overlaid with Project boundaries and high detail stream network



Legend

- Drainage (1:10000 Scale)
- MWS Boundary
- Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

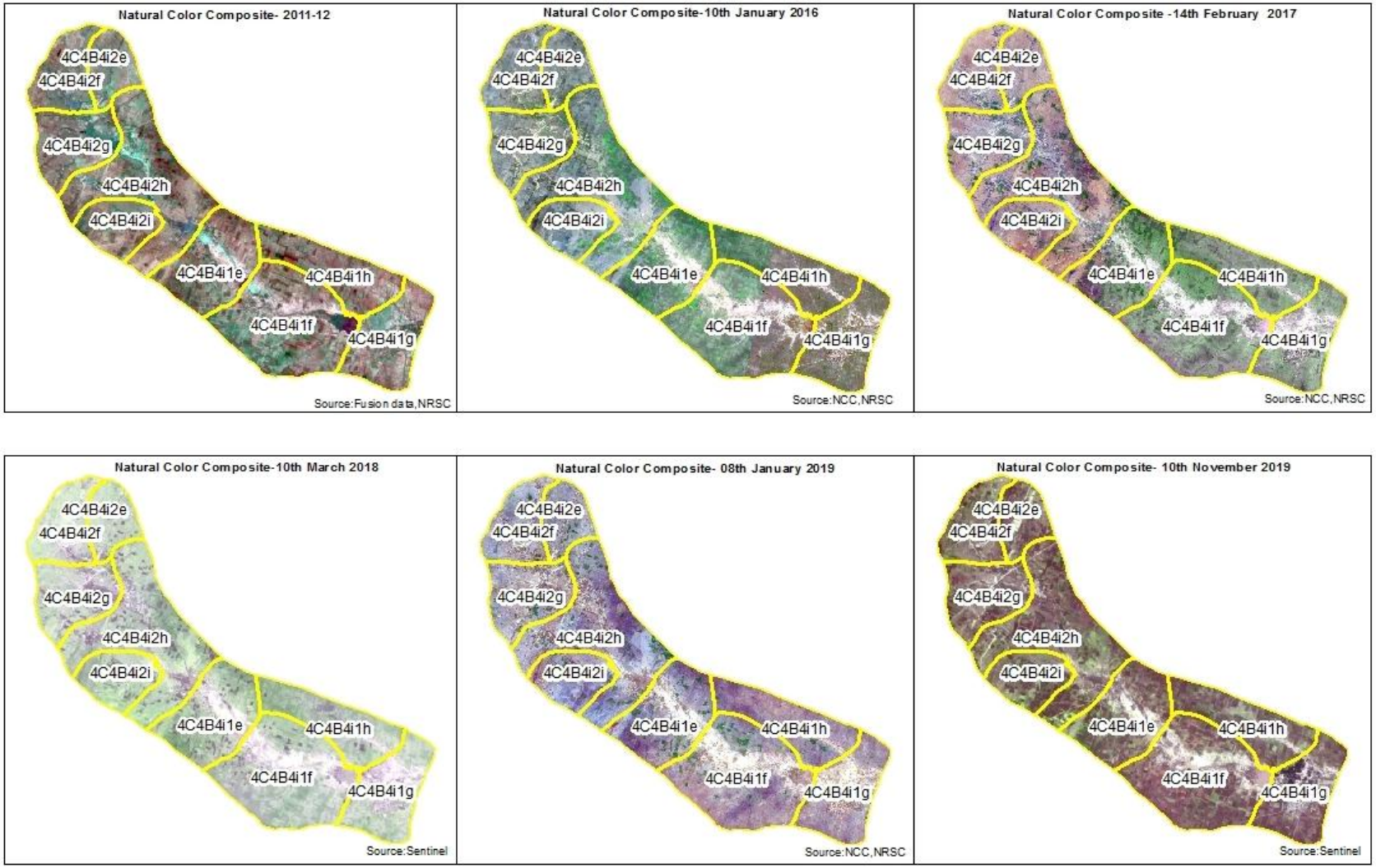
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	45	45
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	3	3
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	49	49
10	Civil work-Check dams/Rock fill dam	201	196
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	0	0
15	Capacity Building Activities	0	0
16	Entry Point Activity	13	11
17	Others	180	172
	TOTAL	**491**	**476**

MONITORING IN THE PROJECT AREA

Site Wise Changes in the Project

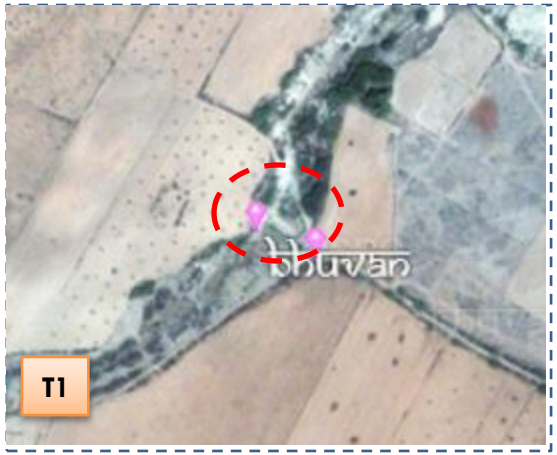
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T0 is the baseline period before implementation (2011-12) and T5 is 2019-20 period for monitoring
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Natural Color Composite



Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-44/2011-12

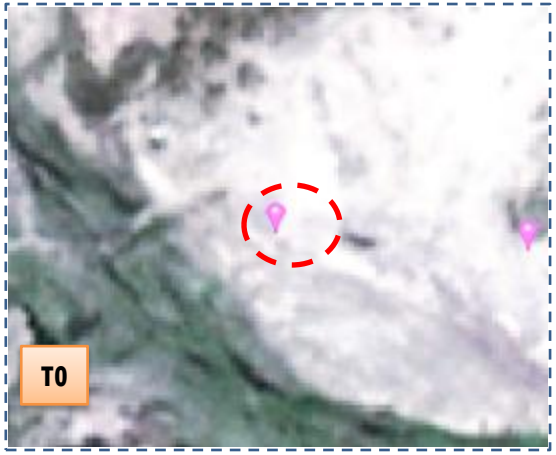
T0:2011-12



T1: 10 January 2016

Drishti Sl no. 647309 MWS :4C4B4i1e

Check dam



T0:2011-12

T1: 10 January 2016

Drishti Sl no. 647045 MWS : 4C4B4i1f

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-44/2011-12

T0: 2011-12

T1: 10 January 2016

Drishti Sl no. 932150 MWS :4C4B4i1f

Farm pond

T0: 2011-12

T1: 10 January 2016

Drishti Sl no. 7011200- MWS :4C4B4i2i

Percolation tank

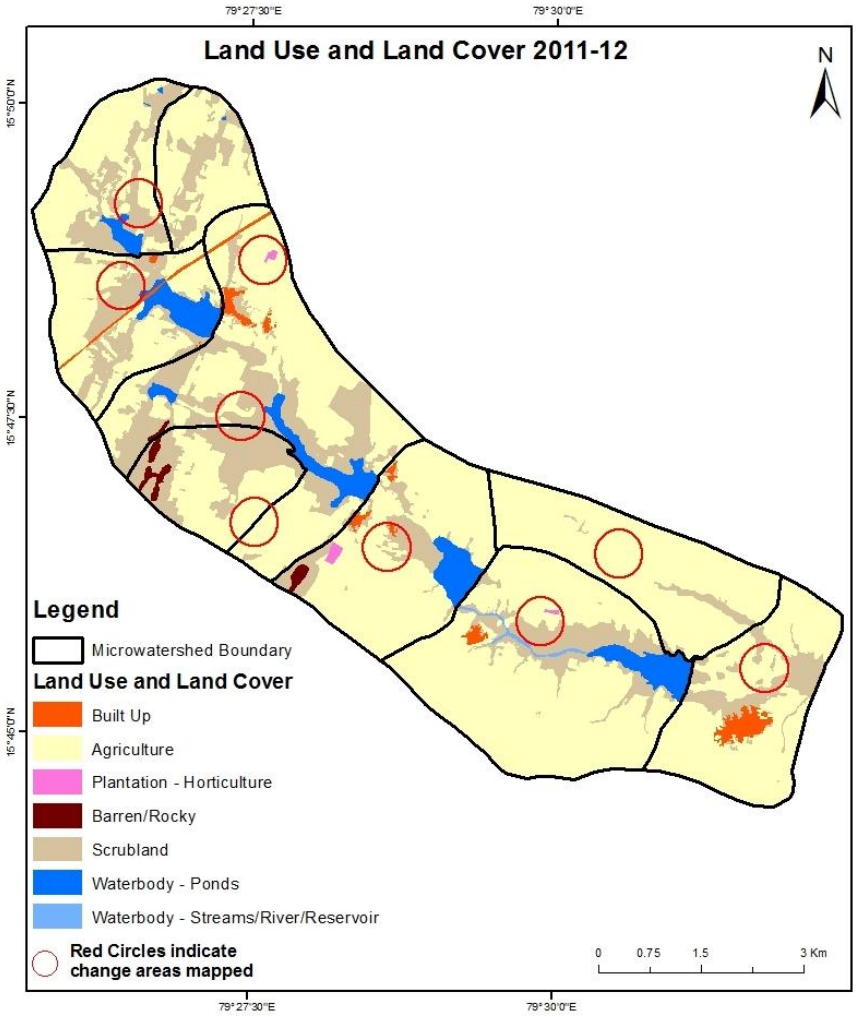
MONITORING IN THE PROJECT AREA

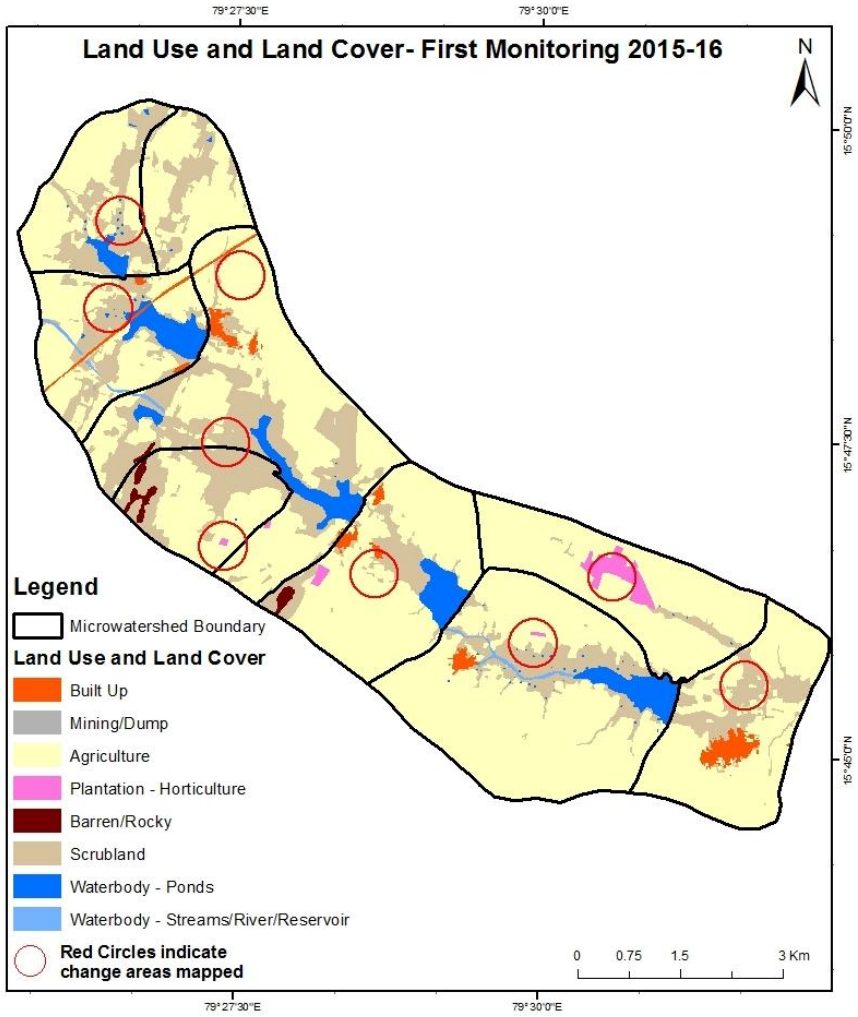
Land use and Land cover Changes in the Project

- 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 pre implementation period as T0 (2011-12) and row represents the post implementation period as T5 (2019-20) .

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

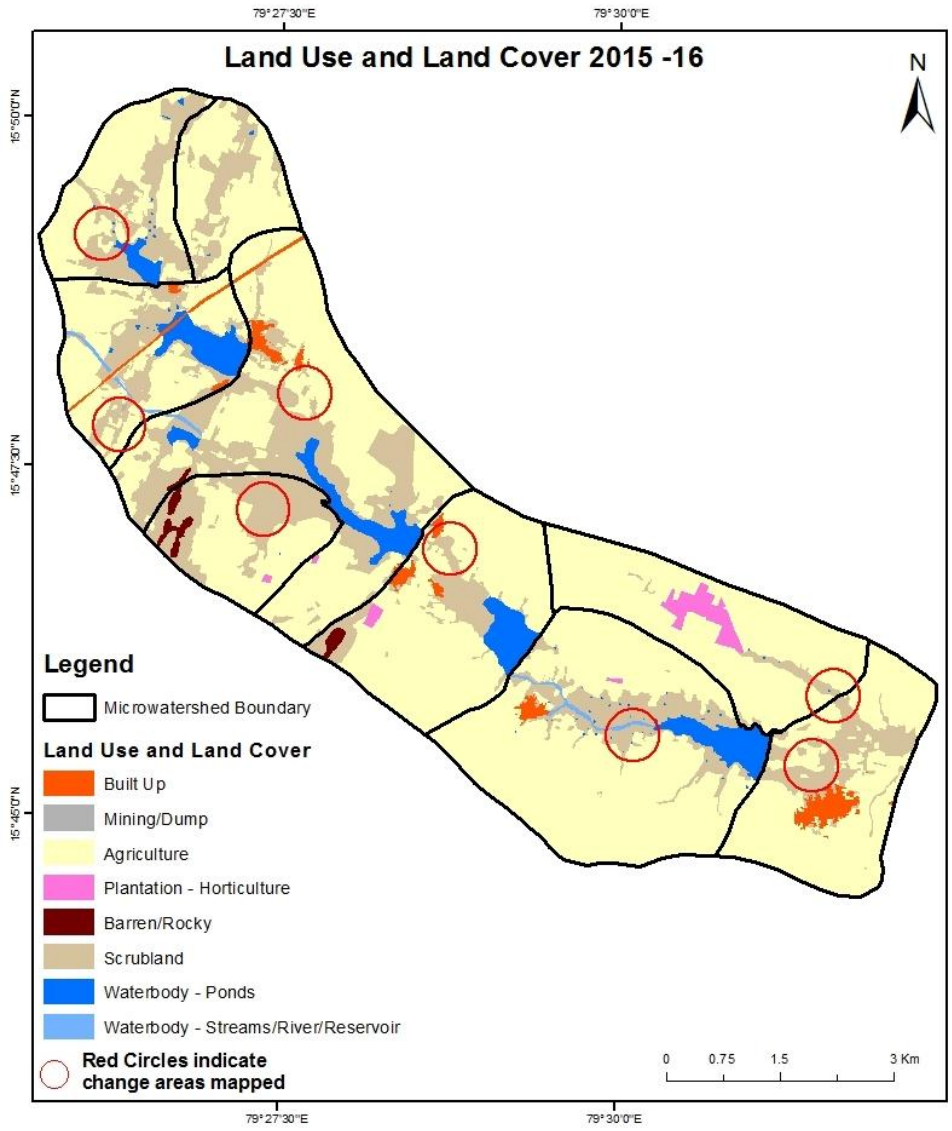
Scale: 1:10000

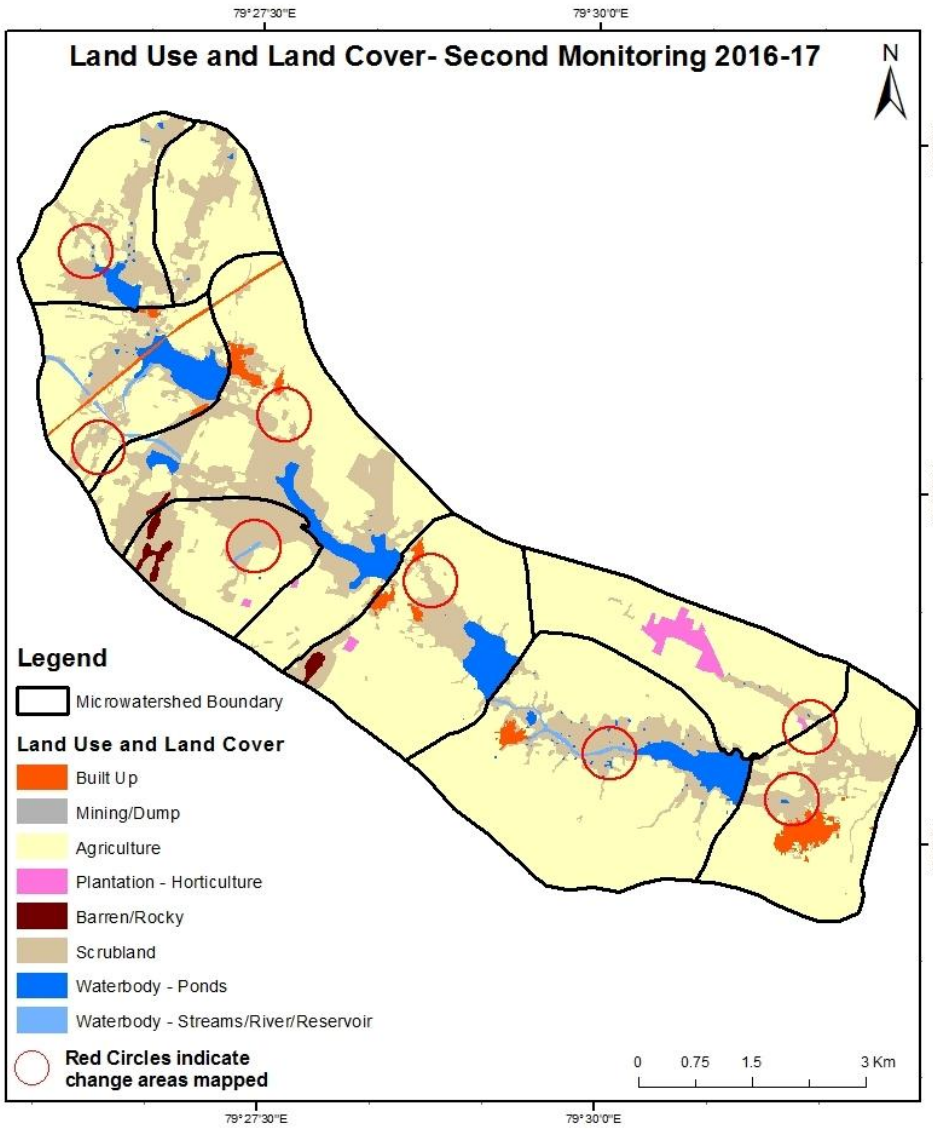




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

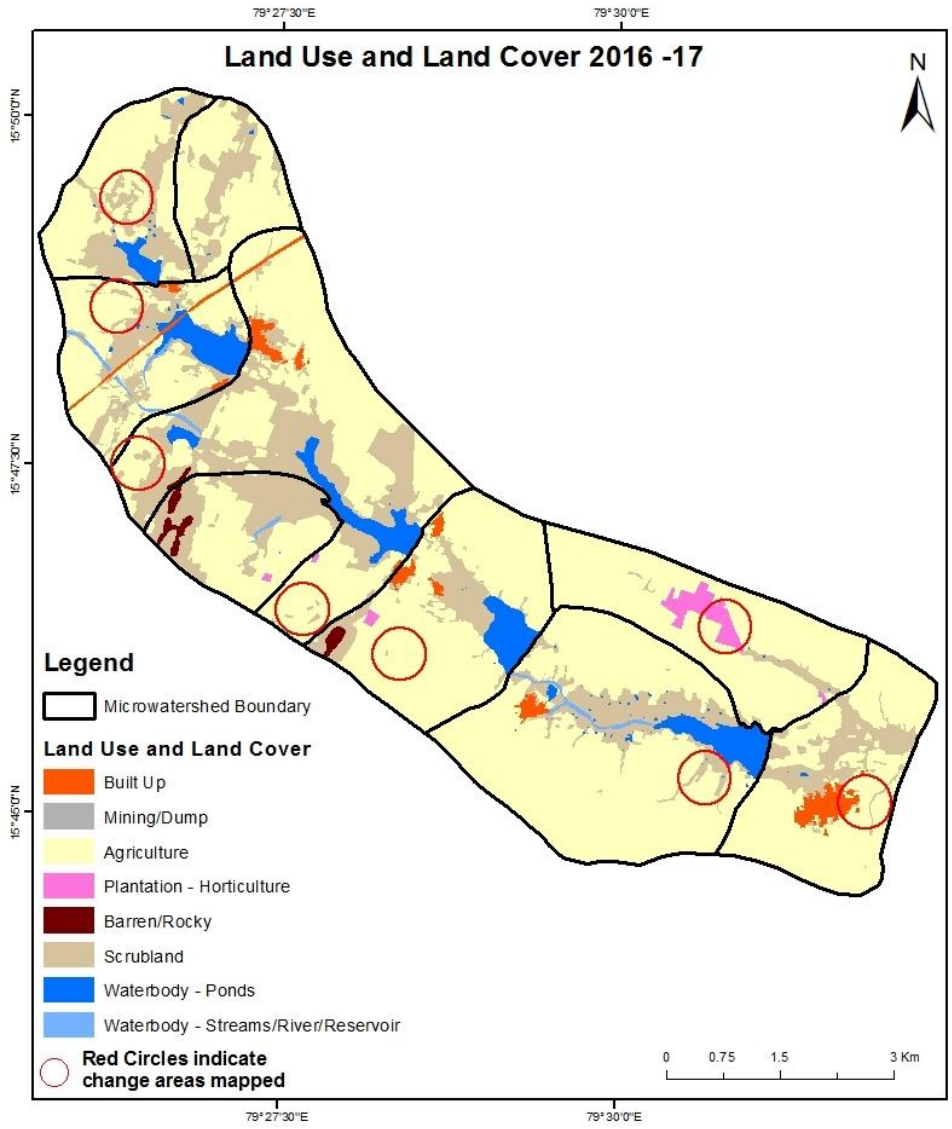
Scale: 1:10000

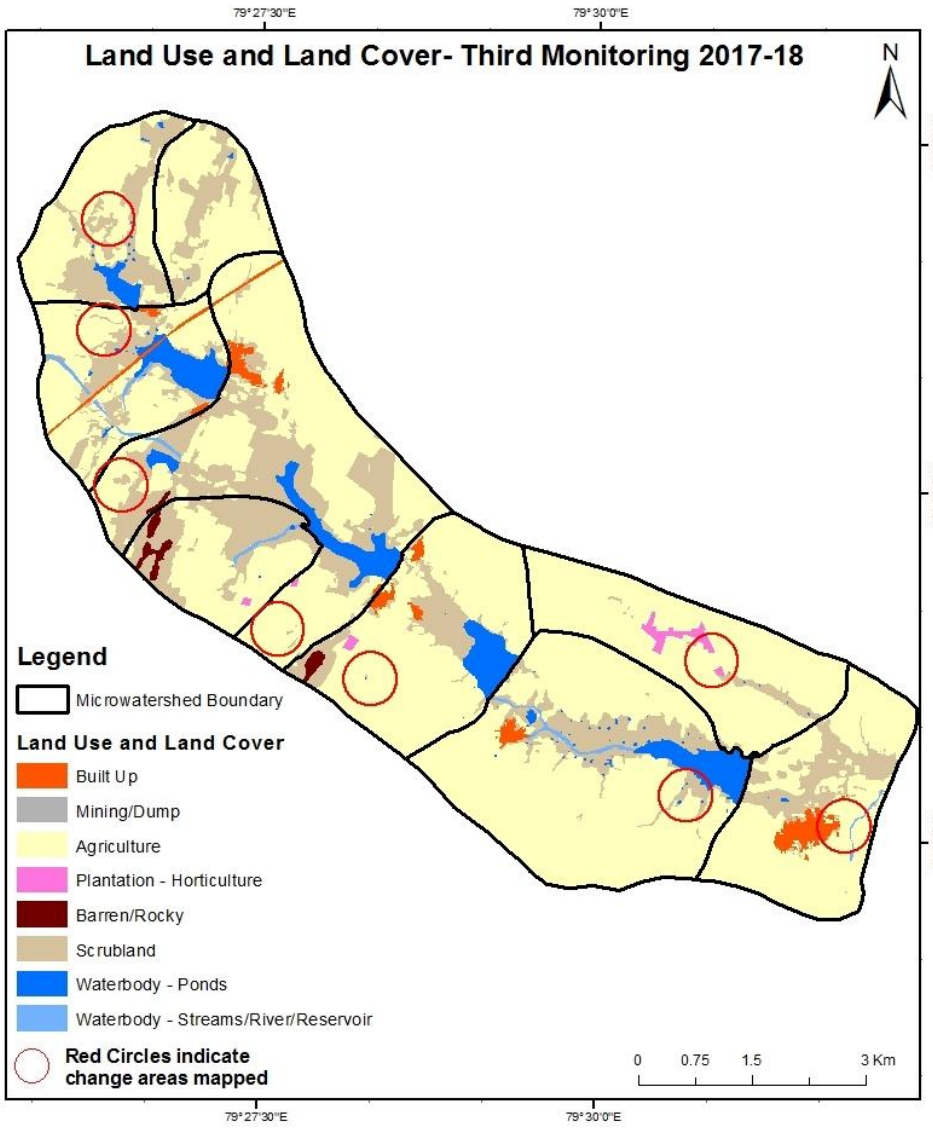




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

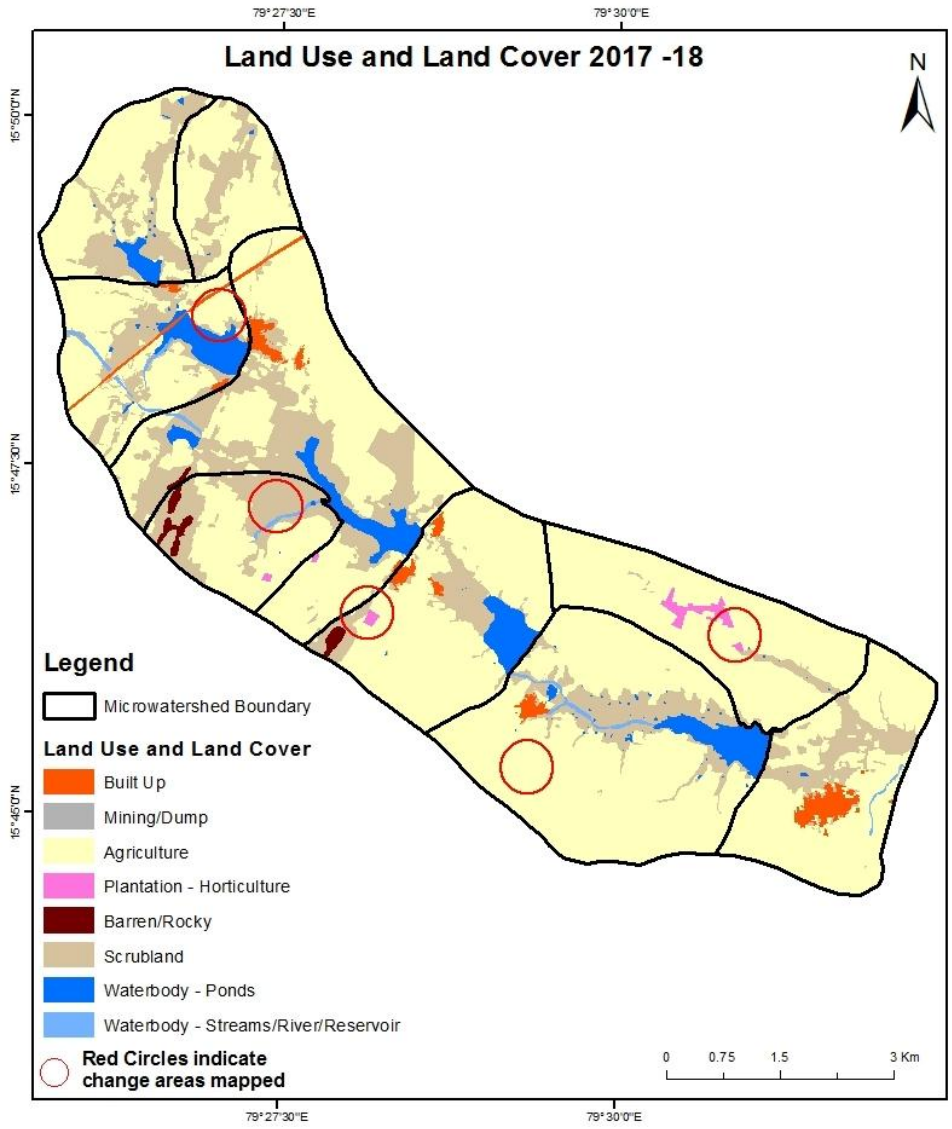
Scale: 1:10000

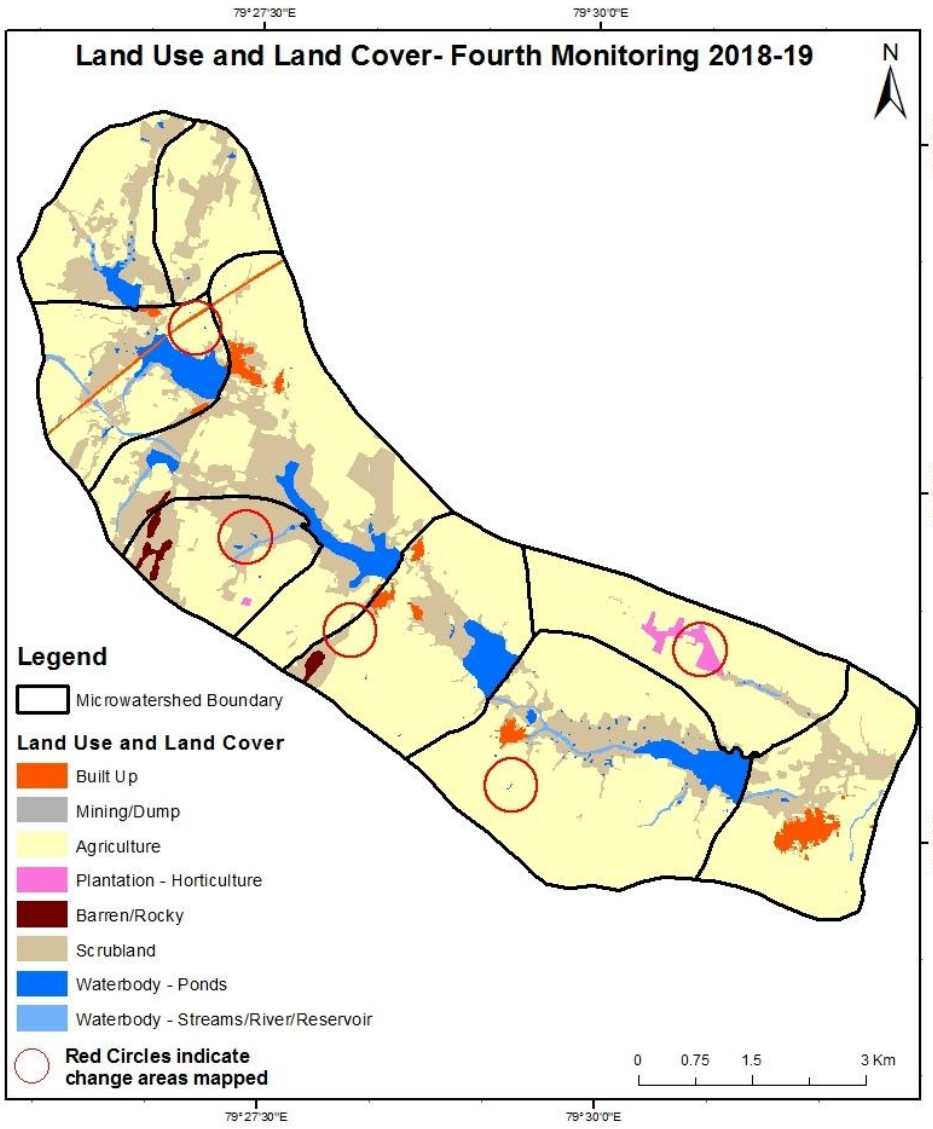




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

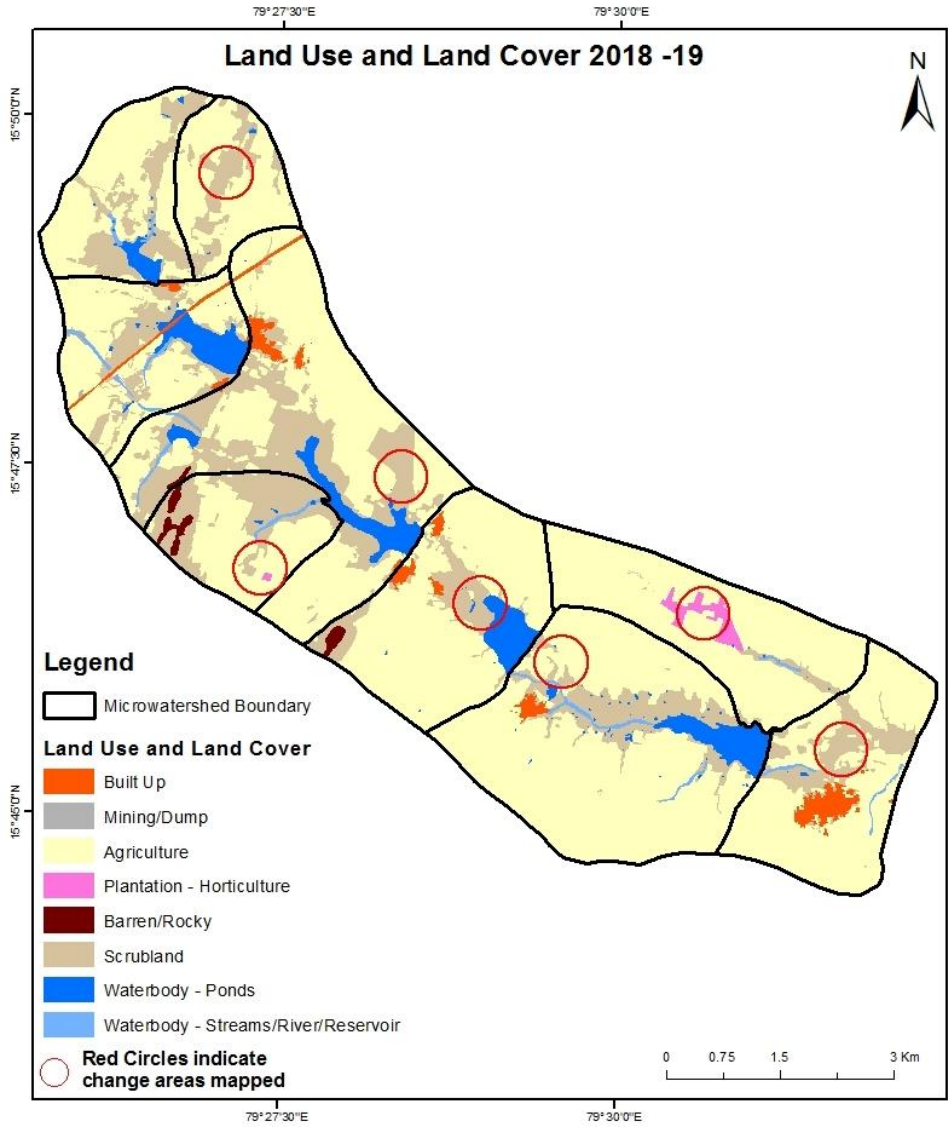
Scale: 1:10000

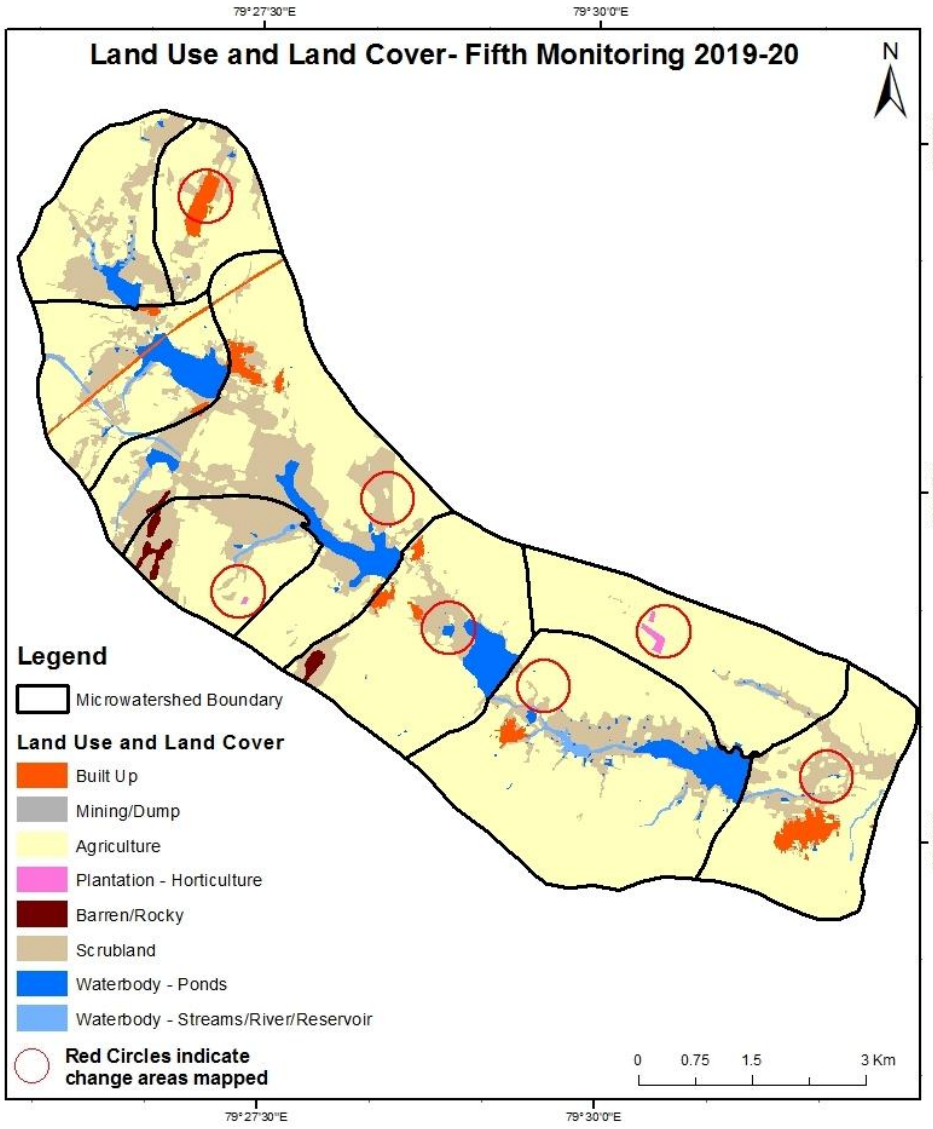




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

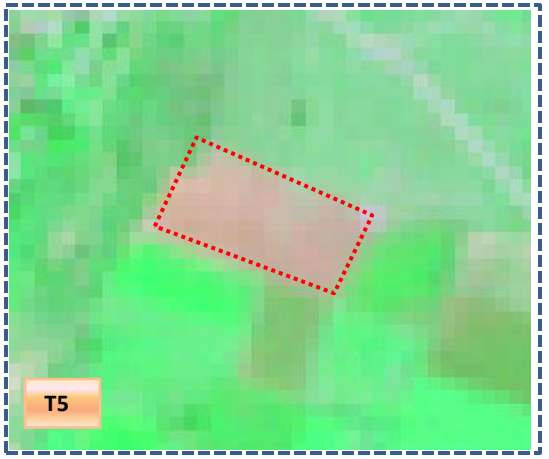
Scale: 1:10000





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

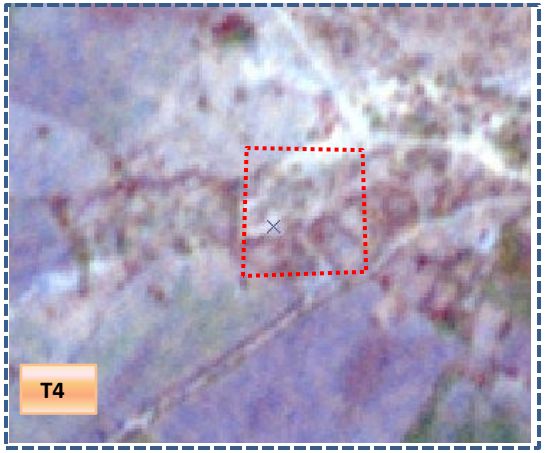
Scrub to Agriculture

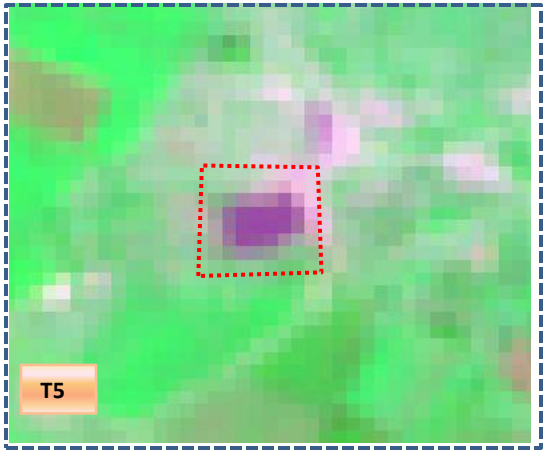


T4: 2018-19 (79°27'10.542"E 15°48'1.907"N)

T5: 10 November 2019

Scrub to Waterbody



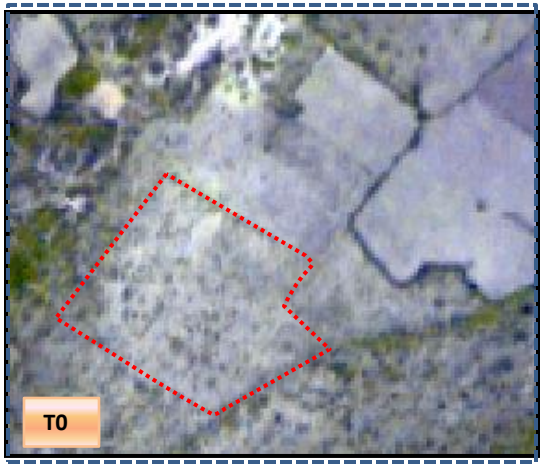


T4: 2018-19 (79°28'3.578"E 15°46'47.261"N)

T5: 10 November 2019

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

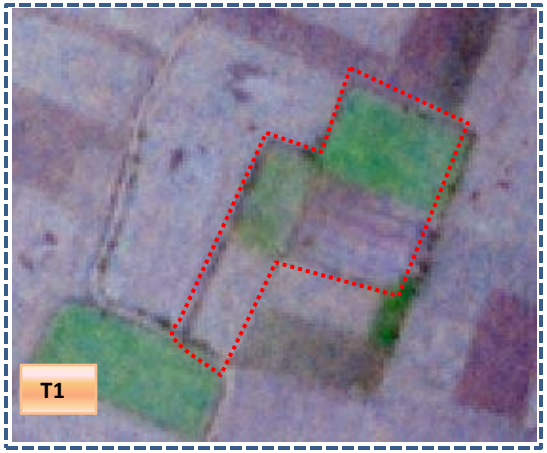
Scrub To Agriculture



T0: 2011-12 (79°26'38.27"E 15°47'30.445"N)

T1: 10 January 2016

Plantation to Agriculture

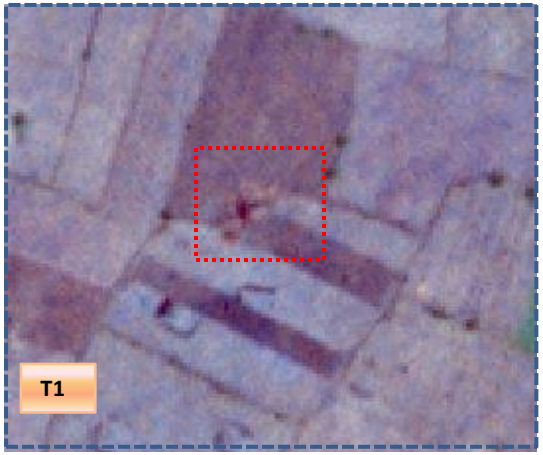


T0: 2011-12 (79°27'39.506"E 15°48'49.562"N)

T1: 10 January 2016

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

Agriculture to Water body



T1: 2011-12 (79°26'40.924"E 15°49'20.296"N)

T1: 10 January 2016

Scrub to Water body

T0: 2011-12(79°26'14.518"E 15°49'14.167"N)

T1: 10 January 2016

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

Land cover	Monitoring period (T1)										Units in Hectares
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	67.09										**67.09**
Mining/dump											
Agriculture	6.74		3413.41	37.30				85.90	6.62	0.54	**3550.52**
Plantation Horticulture			1.90	5.46							**7.36**
Forest											
Forest Plantation											
Barren Rocky							21.73				**21.73**
Scrub	6.72	0.42	65.43					1019.41	2.80	5.04	**1099.83**
Waterbody-Streams/River									10.15		**10.15**
Waterbody – Ponds										221.96	**221.96**
Grand Total	**80.56**	**0.42**	**3480.74**	**42.76**			**21.73**	**1105.31**	**19.58**	**227.54**	**4978.64**

- 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 137 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T1.
- In T1 67 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	Monitoring period (T2)										Units in Hectares
T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	80.56										**80.56**
Mining/dump		0.42									**0.42**
Agriculture	1.55		3467.23	1.18				9.89		0.89	**3480.74**
Plantation Horticulture			2.93	39.83							**42.76**
Forest											
Forest Plantation											
Barren Rocky							21.73				**21.73**
Scrub	2.12		39.04					1057.10	4.28	2.76	**1105.31**
Waterbody-Streams/River									19.58		**19.58**
Waterbody – Ponds									1.32	226.22	**227.54**
Grand Total	**84.22**	**0.42**	**3509.20**	**41.01**			**21.73**	**1066.99**	**25.18**	**229.88**	**4978.64**

- 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 13 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T2.
- In T2 41 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-2016-17 to 2017-18

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	84.22										**84.22**
Mining/dump		0.42									**0.42**
Agriculture			3503.25					5.96			**3509.20**
Plantation Horticulture			19.76	21.25							**41.01**
Forest											
Forest Plantation											
Barren Rocky							21.73				**21.73**
Scrub	0.26	1.40	28.11					1030.51	5.40	1.30	**1066.99**
Waterbody-Streams/River									25.18		**25.18**
Waterbody – Ponds										229.88	**229.88**
Grand Total	**84.49**	**1.83**	**3551.12**	**21.25**			**21.73**	**1036.47**	**30.58**	**231.18**	**4978.64**

- 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 05 ha of the agriculture area has decreased and it is converted into scrubland area in T3.
- In T3 47 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	84.49										**84.49**
Mining/dump		1.83									**1.83**
Agriculture	0.10	0.61	3540.89	7.97				0.73	0.15	0.66	**3551.12**
Plantation Horticulture			3.56	17.66						0.03	**21.25**
Forest											
Forest Plantation											
Barren Rocky							21.73				**21.73**
Scrub	0.68	0.55	10.01					1008.73	14.46	2.03	**1036.47**
Waterbody-Streams/River		1.08							29.50		**30.58**
Waterbody – Ponds									0.88	230.30	**231.18**
Grand Total	**85.27**	**4.06**	**3554.46**	**25.64**			**21.73**	**1009.46**	**44.99**	**233.02**	**4978.64**

- 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 10 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations, scrubland and water body in T4.
- In T4 13 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-2018-19 to 2019-20

Land cover	Monitoring period (T5)										Units in Hectares
T4	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	85.27										**85.27**
Mining/dump		4.06									**4.06**
Agriculture	0.59		3552.79							1.07	**3554.46**
Plantation Horticulture			19.90	5.74							**25.64**
Forest											
Forest Plantation											
Barren Rocky							21.73				**21.73**
Scrub	18.02		65.44					915.24	5.54	5.22	**1009.46**
Waterbody-Streams/River									44.99		**44.99**
Waterbody – Ponds										233.02	**233.02**
Grand Total	**103.88**	**4.06**	**3638.14**	**5.74**			**21.73**	**915.24**	**50.54**	**239.31**	**4978.64**

• 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 1.6 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.

•In T5 85 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 57 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 28, 41, 3 & 83 Hectares From T1 to T2, T2-T3, T3 to T4 & T4-T5 respectively and overall increase of 87 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 184 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.