MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

Prakasam-53/2012-13
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

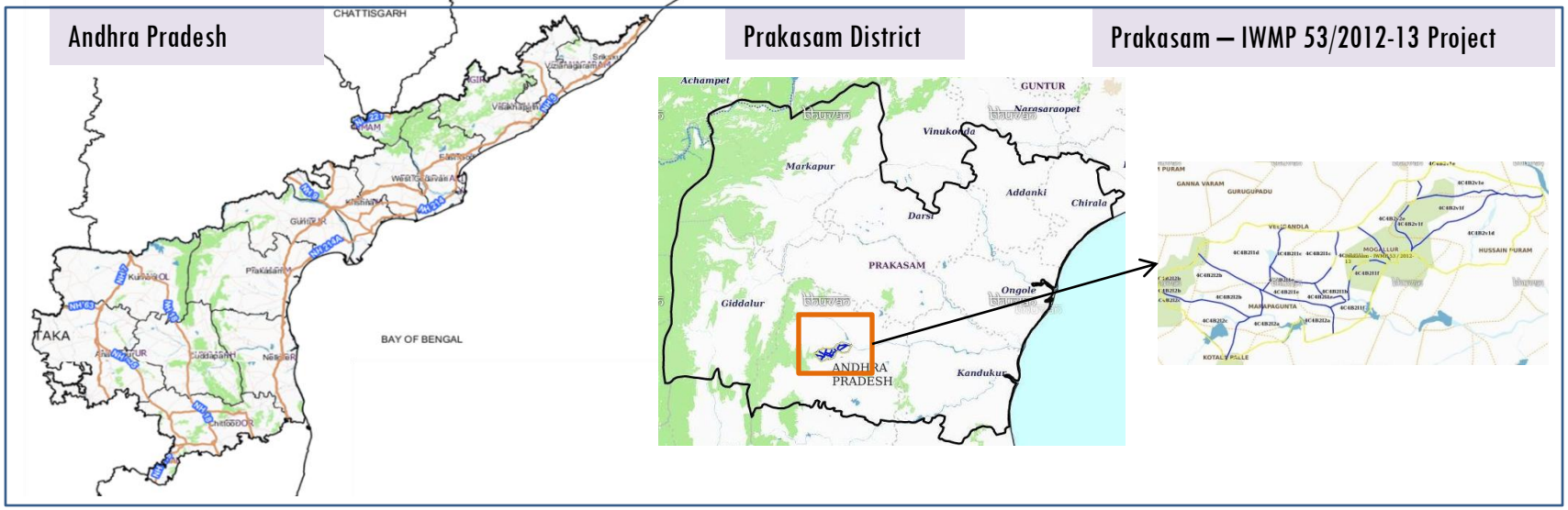
CONTENTS

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-53/2012-13, Prakasam District of Andhra Pradesh. The total geographical area of the project is **5,291** ha. It comprises of 12 micro watersheds.
- In the project area 120 Drishti photos were uploaded showing 30 check dams/Checks & plugins, 2 Farm ponds/Percolation tanks, 15 livelihood activities and remaining others.
- Water bodies have shown an increase by 29 ha , which correspond to the other land use classes that have been converted into various water bodies in this period.
- Major percentage i.e. 65.5 % is covered by the agriculture, 16 % is covered by forest, 10.9 % by scrubland and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-53/2012-13
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Veligandla Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is **5,291** ha. It comprises of 12 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.



- 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.

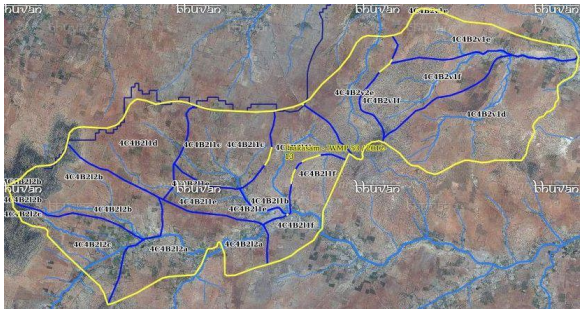
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			27-Feb-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			27-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	120
4	Detailed Project Report		

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



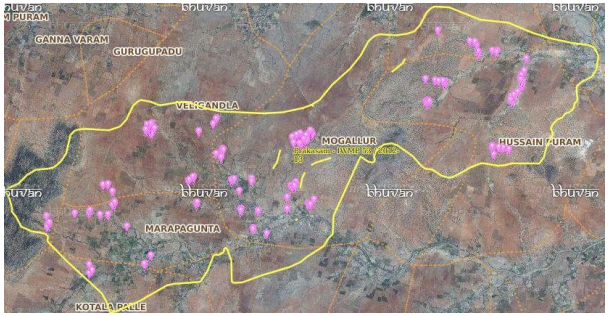
Legend

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/Agriculture	4	4
3	Block planting	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	12	10
9	Gabion structure	0	0
10	Farm ponds	2	2
11	Check dams	44	30
12	Nallah Bunds	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities	15	15
16	Production system and Micro-Enterprises	3	3
17	Entry Point Activity	6	6
18	Others	77	50
	TOTAL	**163**	**120**

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 (NCC)

Natural Color Composite- 8th November 2012

Source:LISS-IV,NRSC

Natural Color Composite - 2016

Source:Fusiondata,NRSC

Natural Color Composite- 27th February 2018

Source:LISS-IV,NRSC

Natural Color Composite- 23rd February 2019

Source:NCC,NRSC

Natural Color Composite- 31st March 2020

Source:LISS-IV,NRSC

Natural Color Composite- 27th February 2021

Source:Sentinel

Monitoring of activities in Prakasam Dt Andhra Pradesh. IWMP-53/2012-13

T0 Satellite data 2013

T1 Satellite data 2014

T2 Satellite data 2016

T3 Satellite data 2017

T4 Satellite data 2019

T5 Satellite data 2020

Drishti Id. **7029946**

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-53/2012-13

T1:2012-13

T2: 22 January 2017

Drishti Sl no. 7029946 MWS : 4C4B2v1d

Farm pond

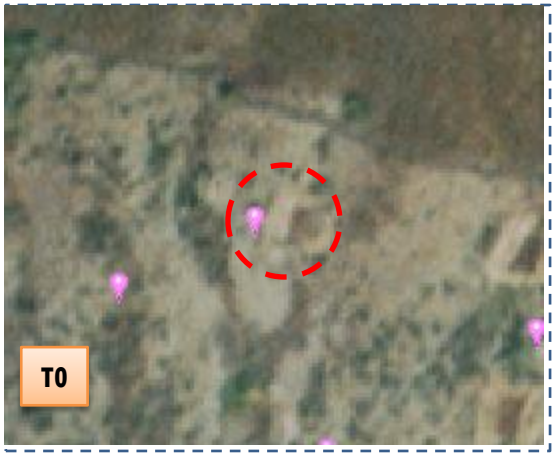
T1:2012-13

T2: 22 January 2017

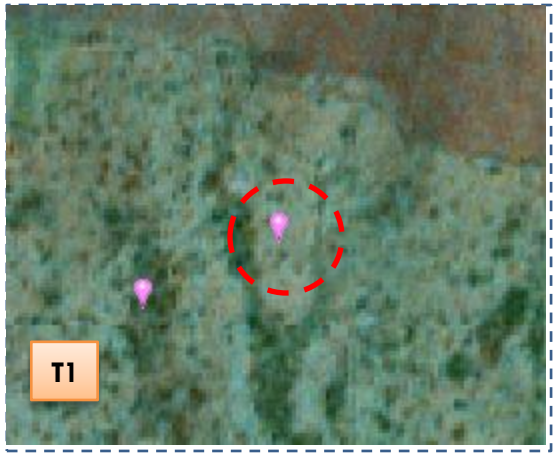
Drishti Sl no. 1647597 MWS :4C4B2l1c

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-53/2012-13



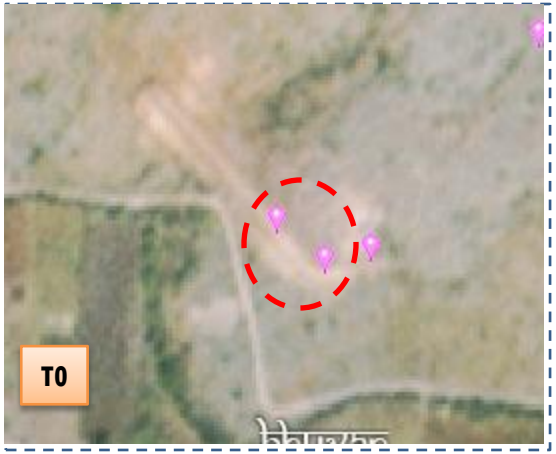
T0: 2012-13



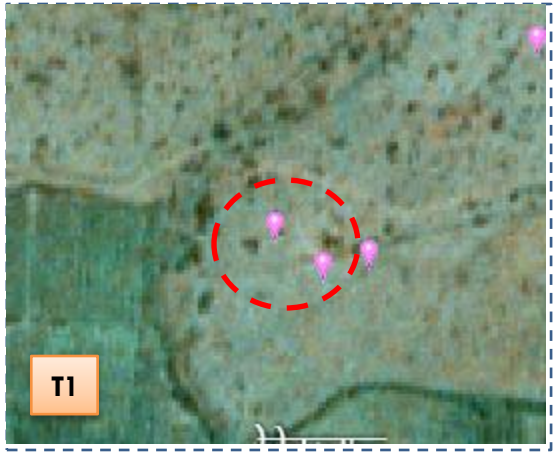
T1: 22 January 2017

Drishti Sl no. 7016044 MWS :4C4B2l1b

Percolation tank



T0: 2012-13



T2: 22 January 2017

Drishti Sl no. 7036789 MWS :4C4B2l1f

Percolation tank

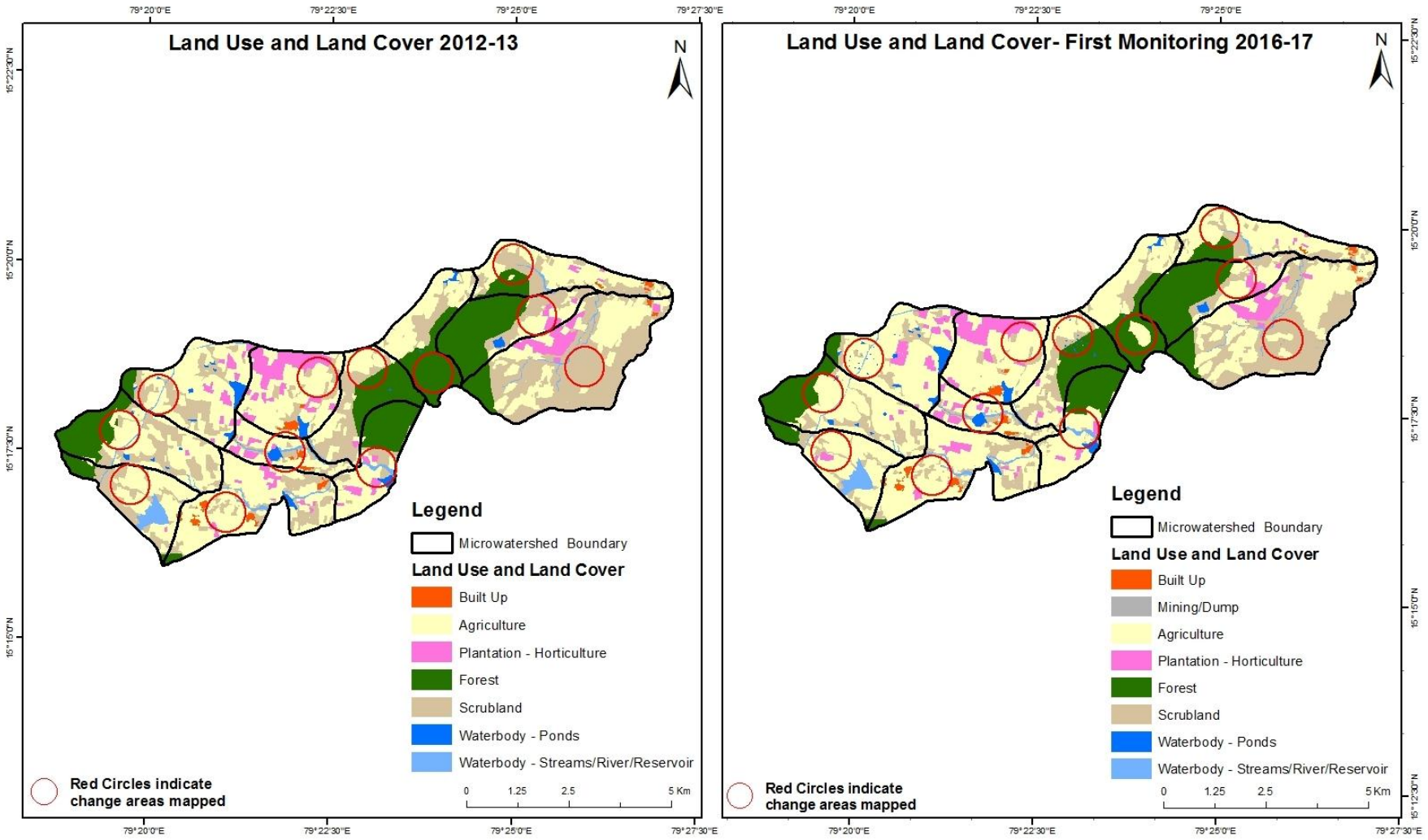
MONITORING IN THE PROJECT AREA

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 (2012-13) and row represents the post implementation period as T5 (2020-21) .

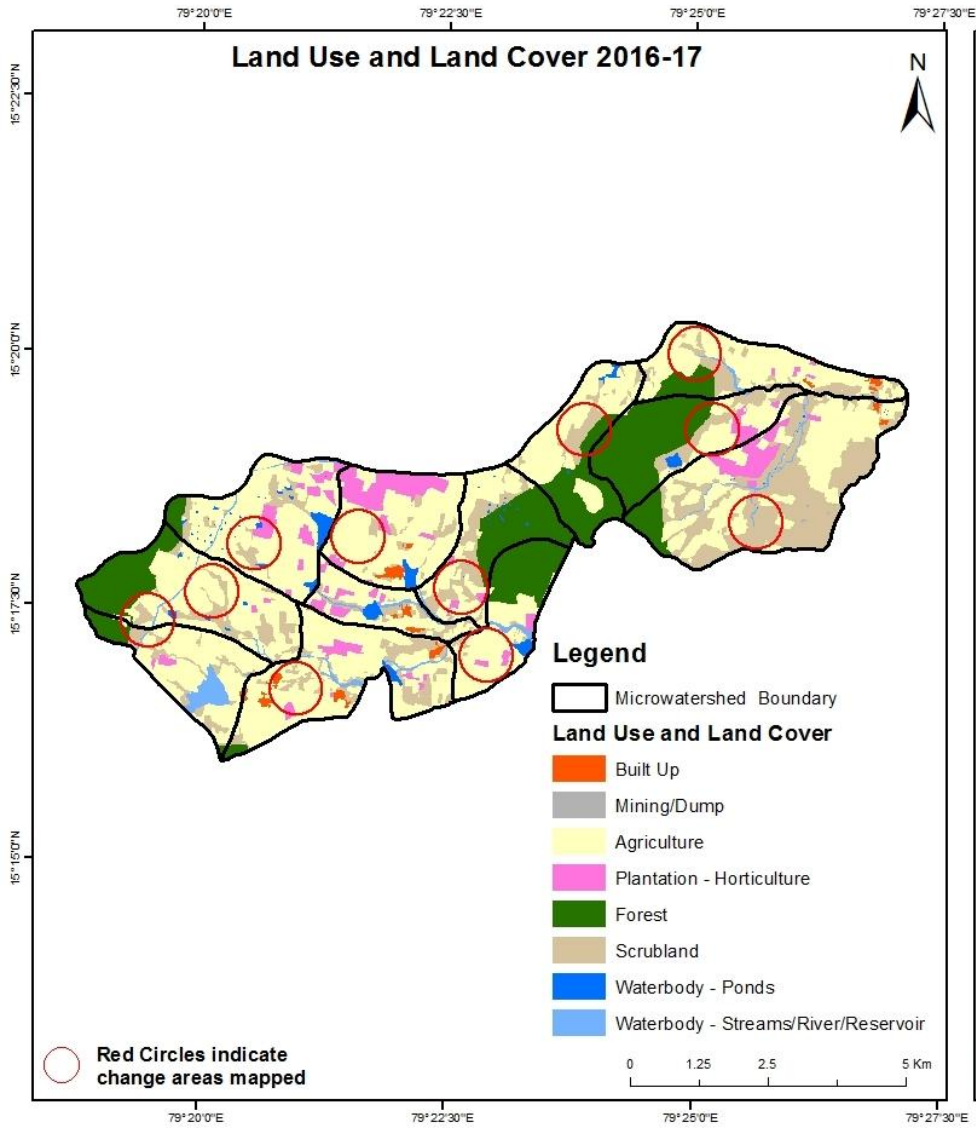
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

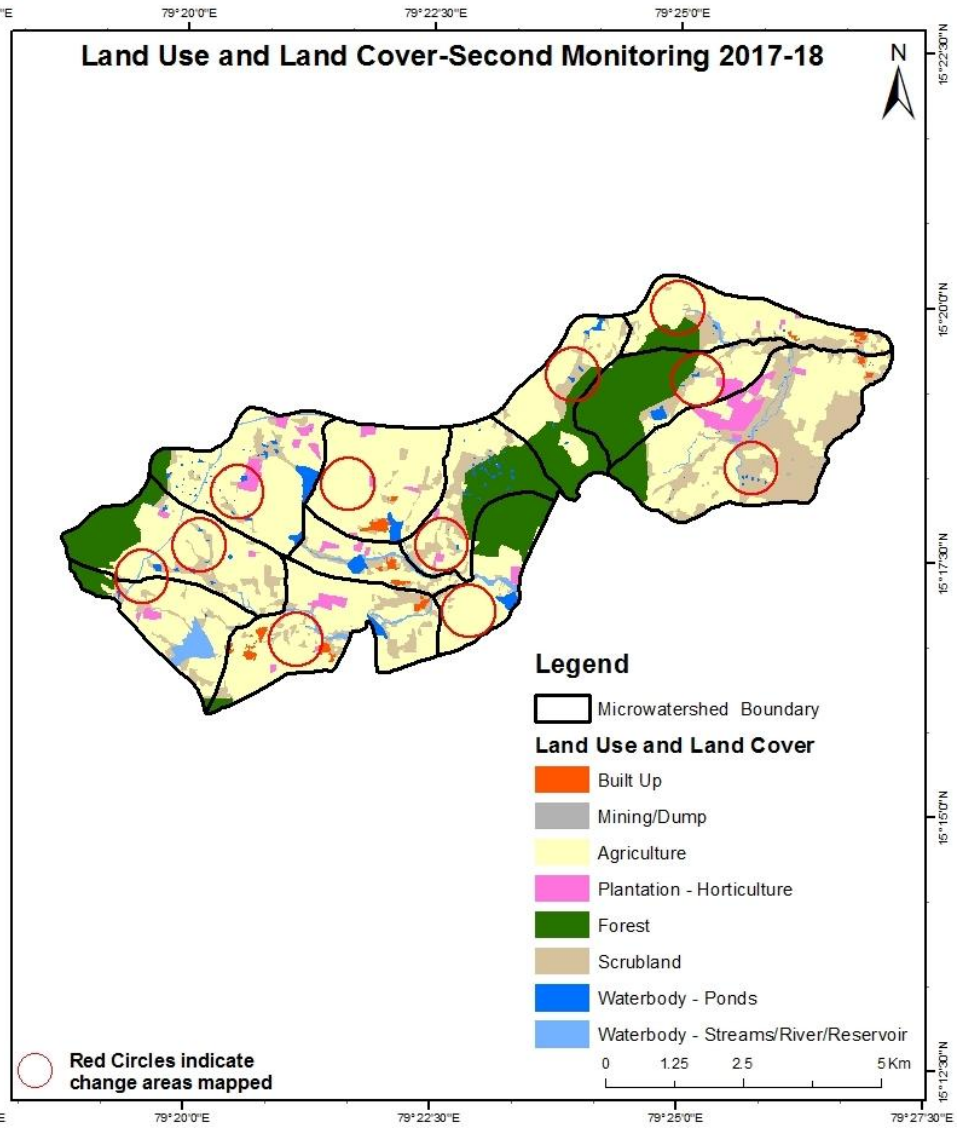
Scale: 1:10000



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

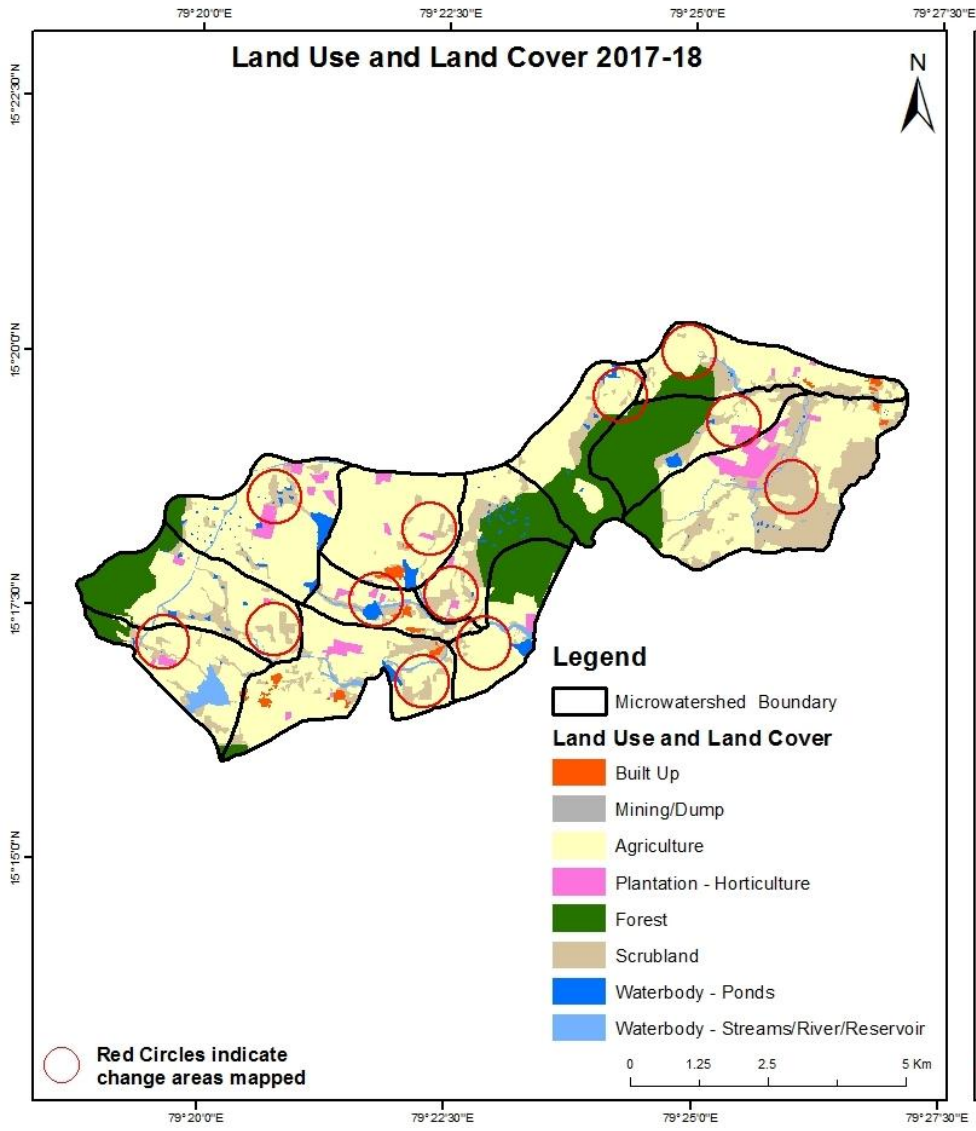
Scale: 1:10000

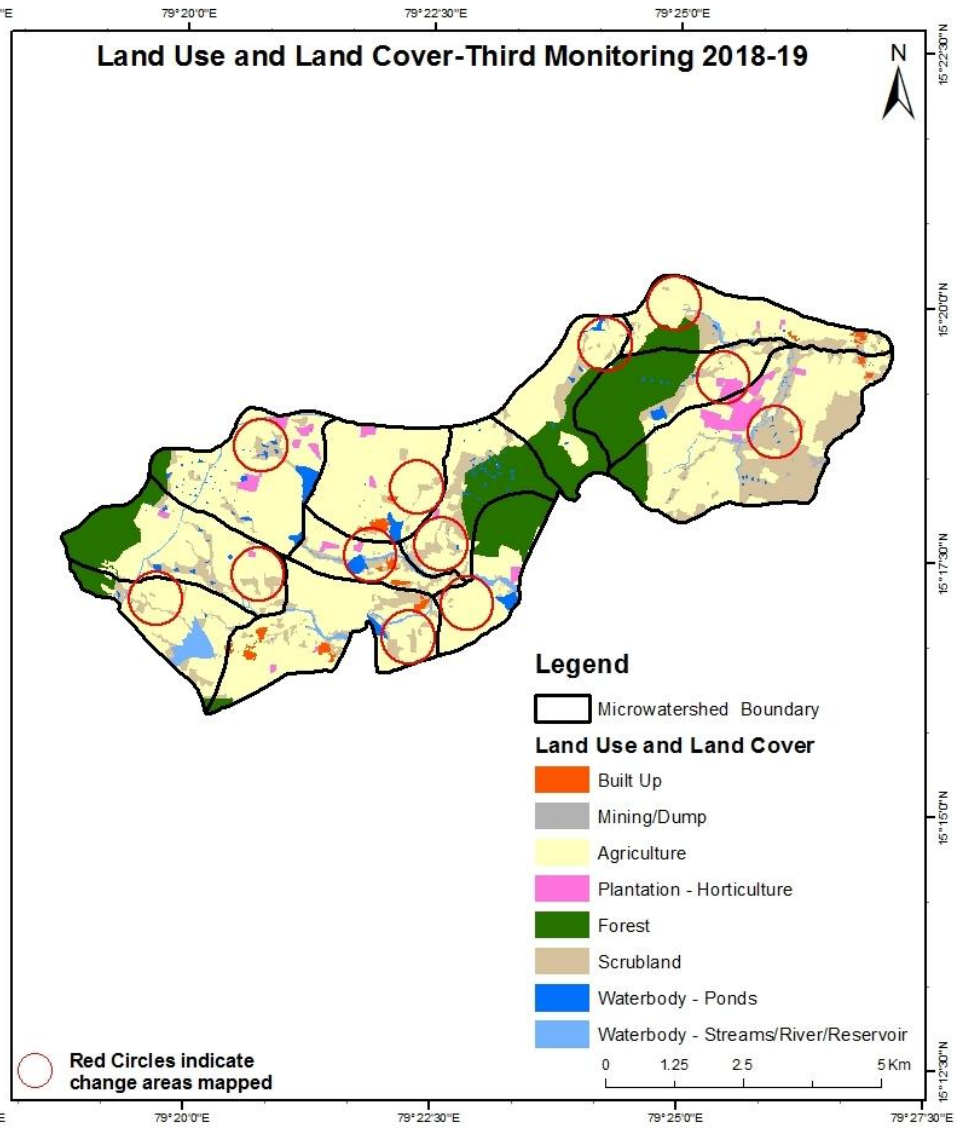




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

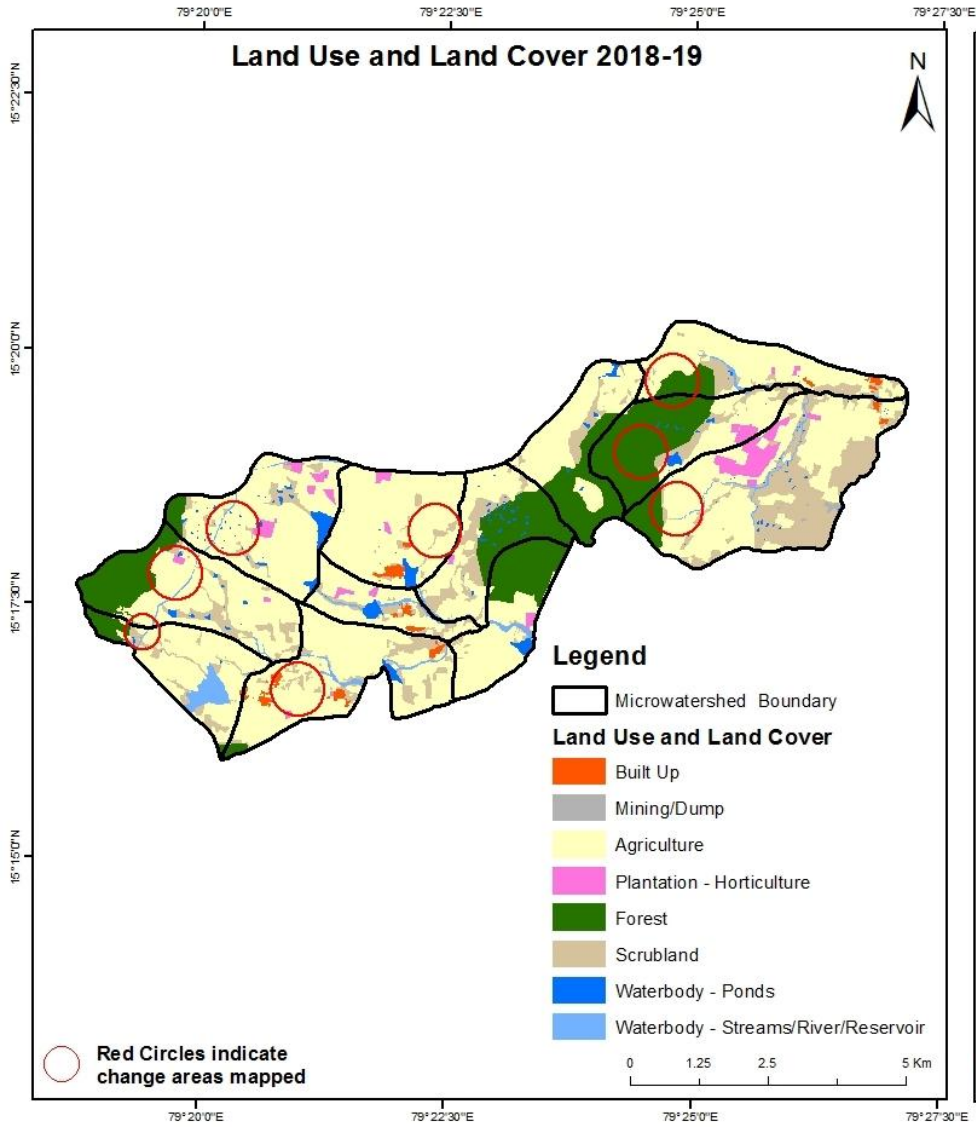
Scale: 1:10000

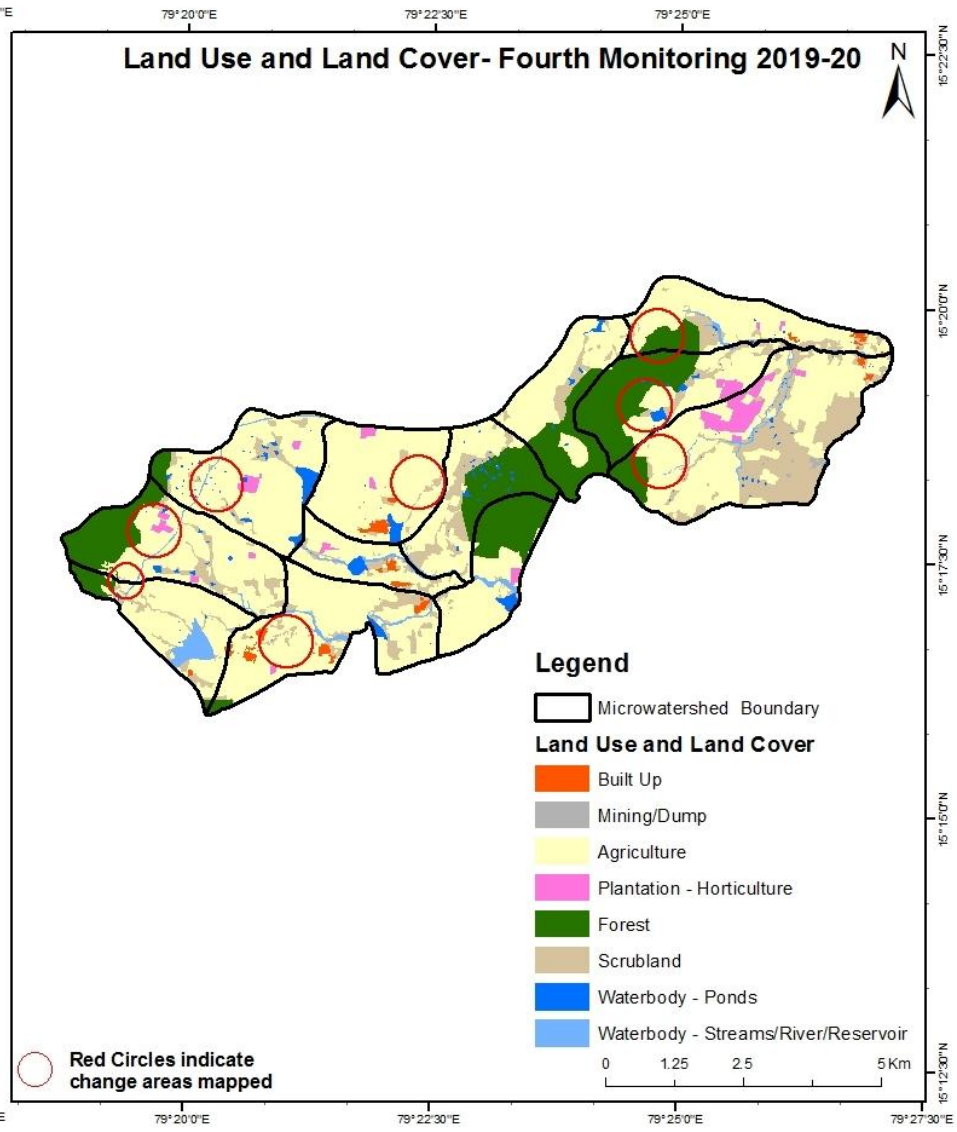




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

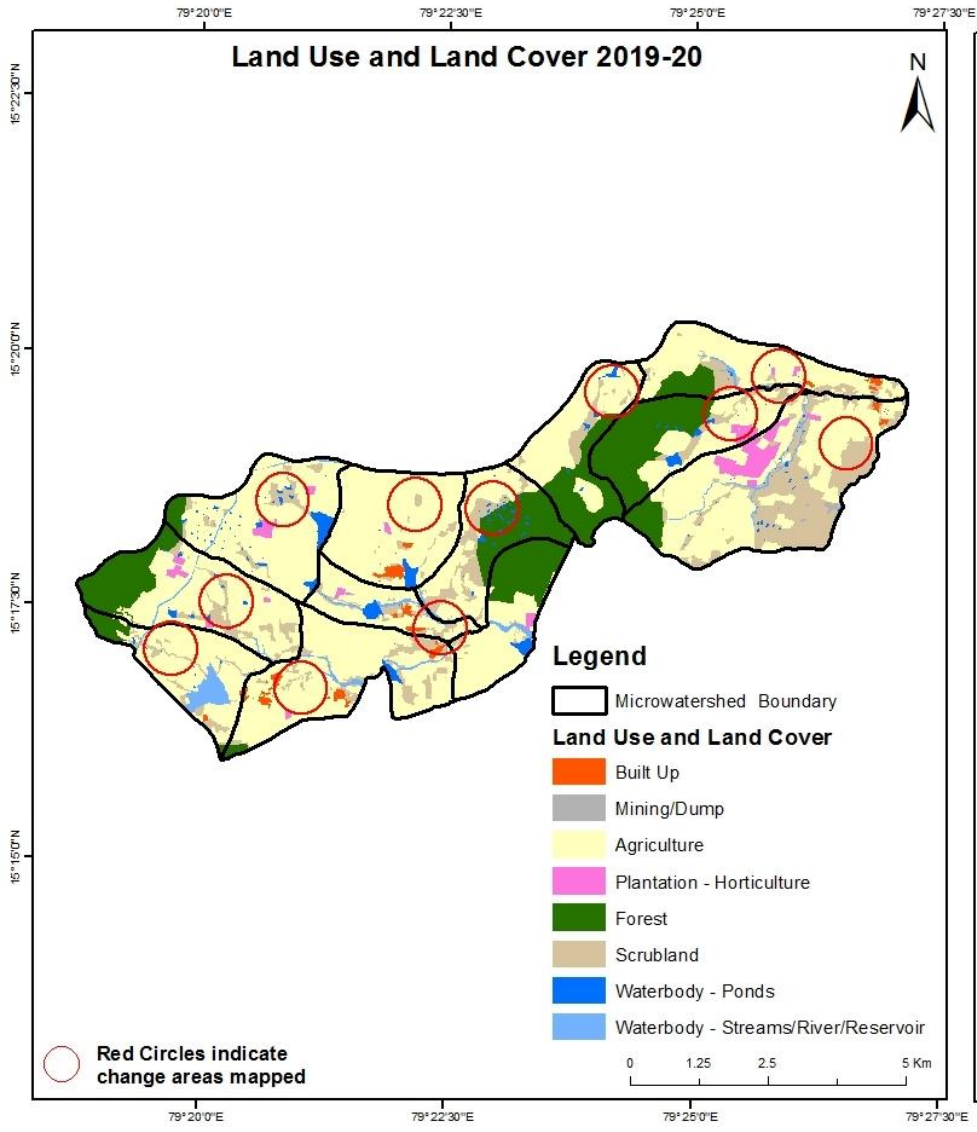
Scale: 1:10000

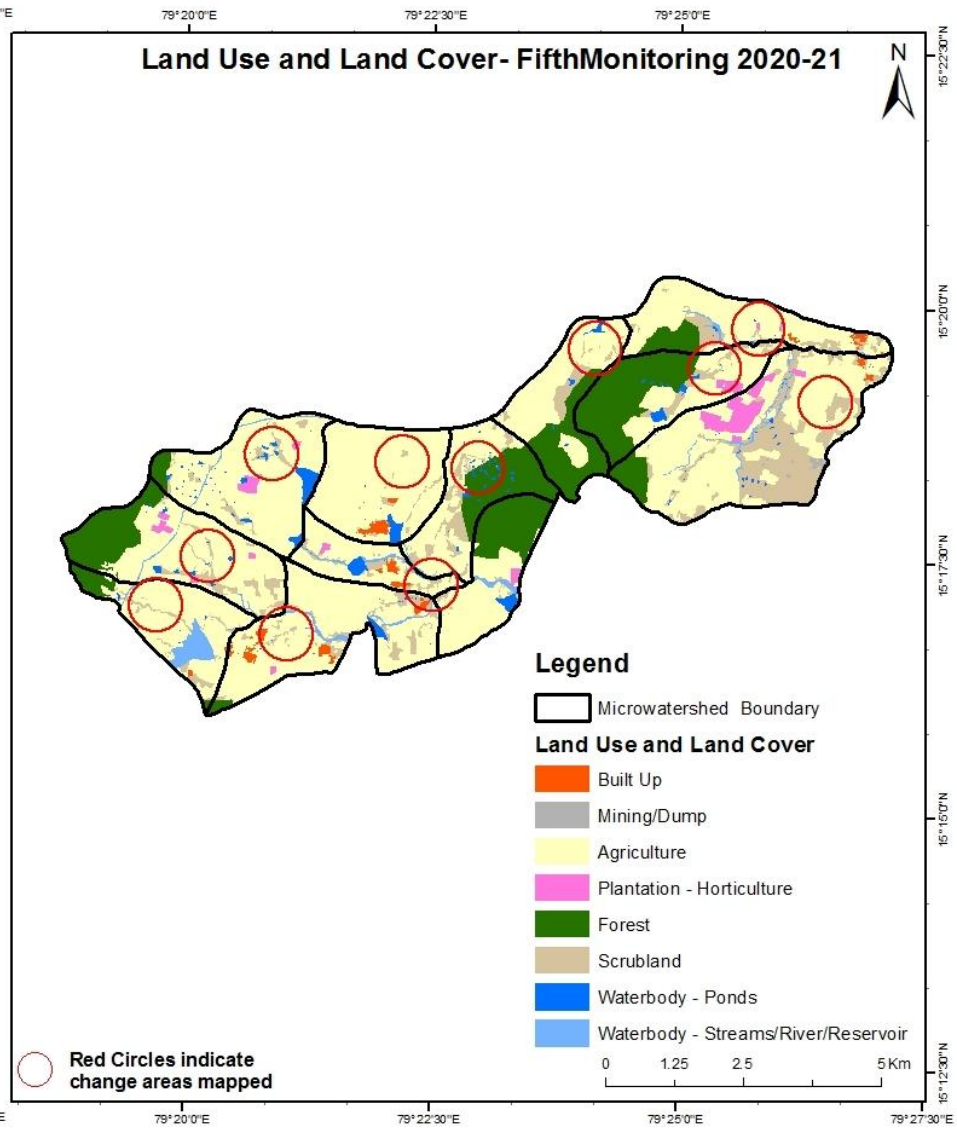




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

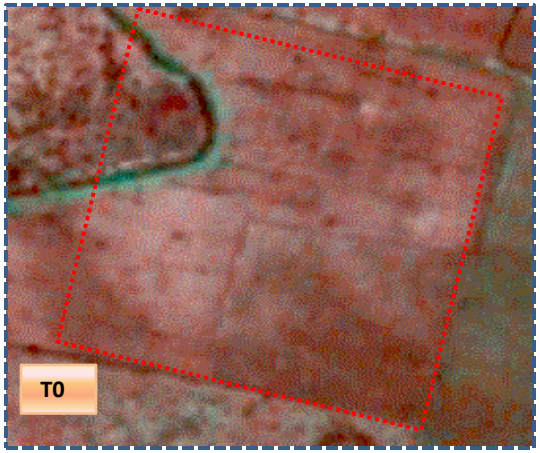
Scale: 1:10000



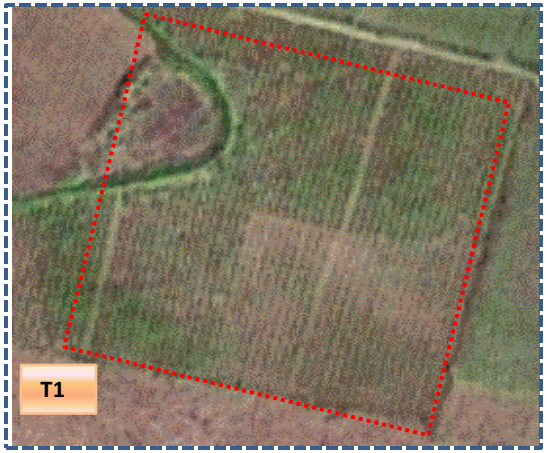


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

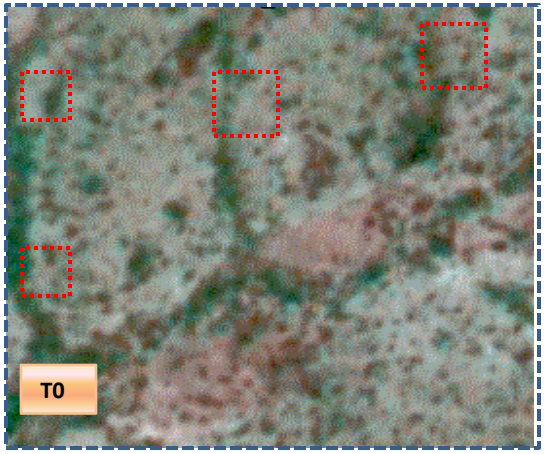


T0: 2012-13(79°20'42.651"E 15°18'10.526"N)

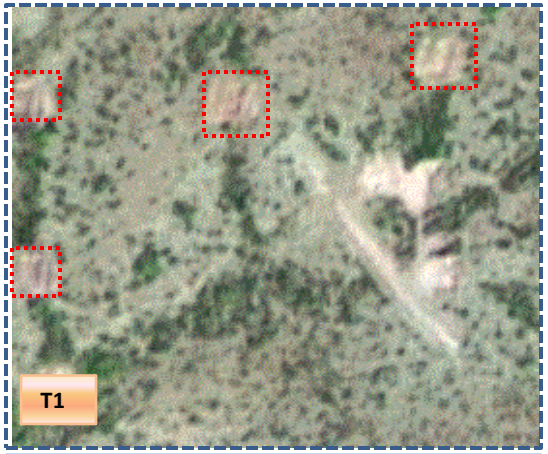


T2: 26 May 2014

Scrub to Water body



T0: 2012-13(79°23'0.276"E 15°18'25.487"N)



T2: 26 May 2014

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

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	42.69										**42.69**
Mining/dump											
Agriculture	0.36		2378.01	52.48				1.81		1.64	**2434.3**
Plantation Horticulture	0.04		57.18	137.78						0.15	**195.15**
Forest			47.21		921.96					1.07	**970.24**
Forest Plantation											
Barren Rocky											
Scrub	0.12	1.81	464.6					983.02		2.57	**1452.12**
Waterbody-Streams/River									127.05		**127.05**
Waterbody – Ponds										69.58	**69.58**
Grand Total	**43.21**	**1.81**	**2947**	**190.26**	**921.96**			**984.83**	**127.05**	**75.01**	**5291.13**

• 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 54 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrub and water body in T1.

• In T1 568 ha of the agriculture area has increased from plantations, forest and 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
T1	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	43.21										**43.21**
Mining/dump		1.81									**1.81**
Agriculture	0.7		2939.16	2.74				3.13		1.27	**2947**
Plantation Horticulture			60.48	129.73						0.05	**190.26**
Forest			10.99		906.65					4.32	**921.96**
Forest Plantation											
Barren Rocky											
Scrub			158.47					818.01		8.35	**984.83**
Waterbody-Streams/River									127.05		**127.05**
Waterbody – Ponds										75.01	**75.01**
Grand Total	**43.91**	**1.81**	**3169.1**	**132.47**	**906.65**			**821.14**	**127.05**	**89**	**5291.13**

- 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 7.8 ha of the agriculture area has decreased and it is converted into Built-up, plantations, scrubland and water body in T2.
- In T2 229 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-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	43.91										43.91
Mining/dump		1.81									1.81
Agriculture	0.69	0.19	3167.76							0.46	3169.1
Plantation Horticulture			27.98	104.49							132.47
Forest			1.89		903.71					1.05	906.65
Forest Plantation											
Barren Rocky											
Scrub	0.83	3.73	82.63					732.32		1.63	821.14
Waterbody-Streams/River									127.05		127.05
Waterbody – Ponds			0.91							88.09	89
Grand Total	**45.43**	**5.73**	**3281.17**	**104.49**	**903.71**			**732.32**	**127.05**	**91.23**	**5291.13**

- 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 1.3 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump and water body in T3.
- In T3 113 ha of the agriculture area has increased from plantations, forest, 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-2018-19 to 2019-20

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	45.43										**45.43**
Mining/dump		5.73									**5.73**
Agriculture	0.74		3272.41	7.09						0.93	**3281.17**
Plantation Horticulture			8.64	95.85							**104.49**
Forest			35.88		867.36					0.47	**903.71**
Forest Plantation											
Barren Rocky											
Scrub	0.92		40.67					687.46	1.02	2.25	**732.32**
Waterbody-Streams/River									127.05		**127.05**
Waterbody – Ponds										91.23	**91.23**
Grand Total	**47.09**	**5.73**	**3357.6**	**102.94**	**867.36**			**687.46**	**128.07**	**94.88**	**5291.13**

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

•In T4 85 ha of the agriculture area has increased from plantations, forest 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	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	47.09										**47.09**
Mining/dump		5.73									**5.73**
Agriculture	1.85		3355.65							0.1	**3357.6**
Plantation Horticulture			6.95	95.99							**102.94**
Forest			1.24		866.12						**867.36**
Forest Plantation											
Barren Rocky											
Scrub	0.93		103.15					580.3	1.61	1.47	**687.46**
Waterbody-Streams/River									128.07		**128.07**
Waterbody – Ponds									0.07	94.81	**94.88**
Grand Total	**49.87**	**5.73**	**3466.99**	**95.99**	**866.12**			**580.3**	**129.75**	**96.38**	**5291.13**

- 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 1.9 ha of the agriculture area has decreased and it is converted into Built-up and water body in T5.
- In T5 113 ha of the agriculture area has increased from plantations, forest 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 29 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 512, 222, 112, 76 & 109 Hectares from T0-T1, T1-T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 1,032 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 871 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
6. Farm ponds (02) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (02) verified from the portal.