MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

Prakasam-60/2012-13
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**

01. STUDY AREA

02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS

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

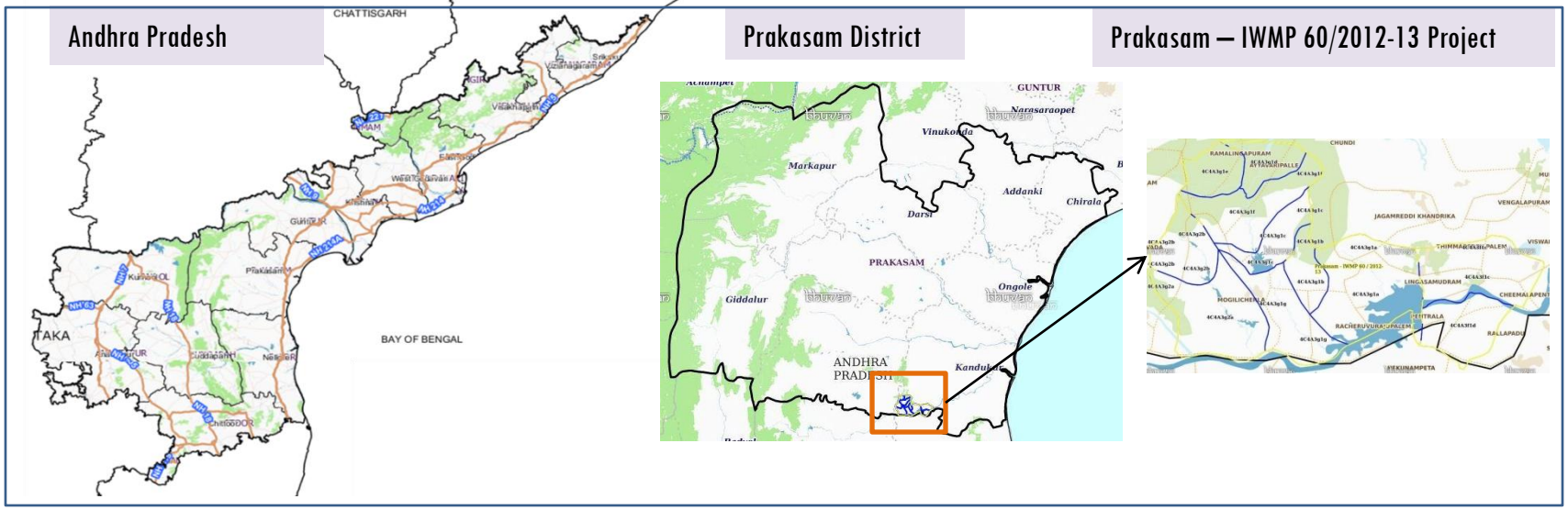
04. CONCLUSIONS

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-60/2012-13, Prakasam District of Andhra Pradesh. The total geographical area of the project is **8,173** ha. It comprises of 11 micro watersheds.
- In the project area 109 Drishti photos were uploaded showing 1 check dams/Checks & plugins, 30 Farm ponds/Percolation tanks, 8 livelihood activities, 10 Afforestation, and remaining others.
- Major percentage i.e. 52.7 % is covered by the agriculture, 18.5 % is covered by forest, 13.6 % by scrub land, 8.6% by water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-60/2012-13
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Lingasamudram Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 8,173 ha. It comprises of 11 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.

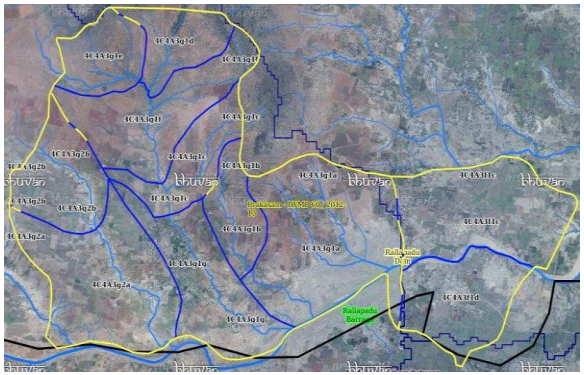
Satellite Data and Ancillary Data

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	109
4	Detailed Project Report		

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



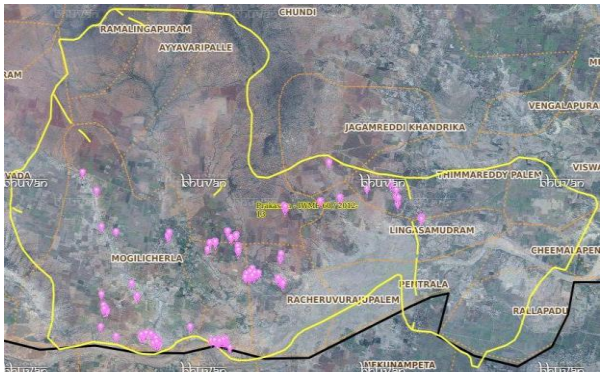
Legend

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	14	106
2	Horticulture/Agriculture	0	0
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	1	1
9	Gabion structure	0	0
10	Farm ponds	38	30
11	Check dams	0	0
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	8	8
16	Production system and Micro-Enterprises	0	0
17	Entry Point Activity	0	0
18	Others	132	60
	TOTAL	**193**	**109**

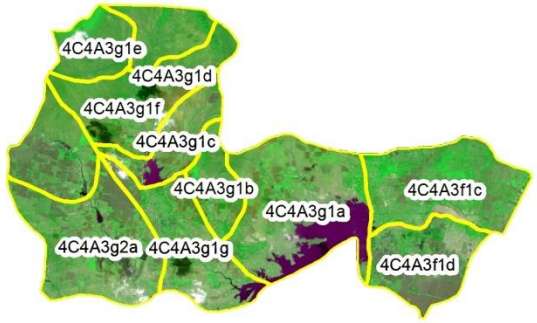
MONITORING IN THE PROJECT AREA

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.

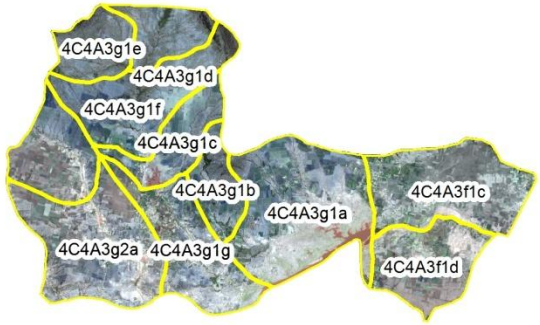
Natural Color Composite (NCC)

Natural Color Composite-2nd December 2012



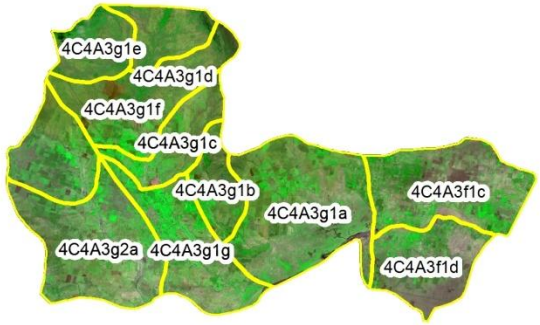
Source: LISS-IV,NRSC

Natural Color Composite- 3rd March 2017



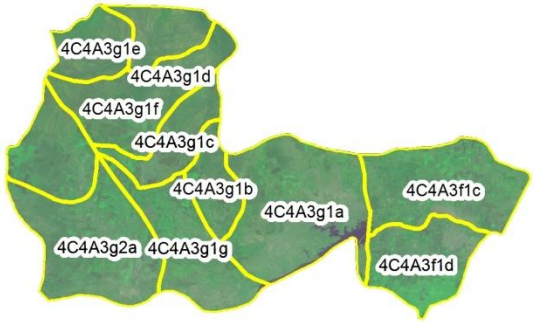
Source:NCC,NRSC

Natural Color Composite- 21st July 2017



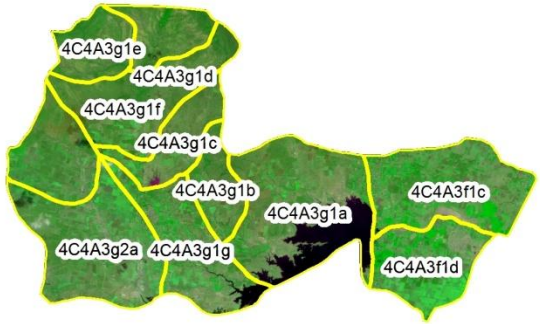
Source:LISS-IV,NRSC

Natural Color Composite- 31st December 2018



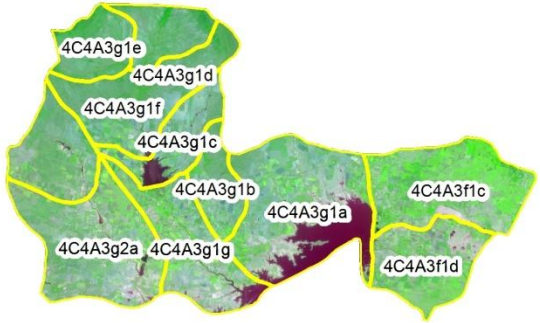
Source:LISS-IV,NRSC

Natural Color Composite-5th February 2020



Source:LISS-IV,NRSC

Natural Color Composite- 27th February 2021



Source:LISS-IV,NRSC

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-60/2012-13

T0 Satellite data 2011

T1 Satellite data 2014

T2 Satellite data 2016

T3 Satellite data 2015

T4 Satellite data 2016

T5 Satellite data 2017

Drishti Id. 2423713

Percolation Tank or Ground Water Recharge Structure

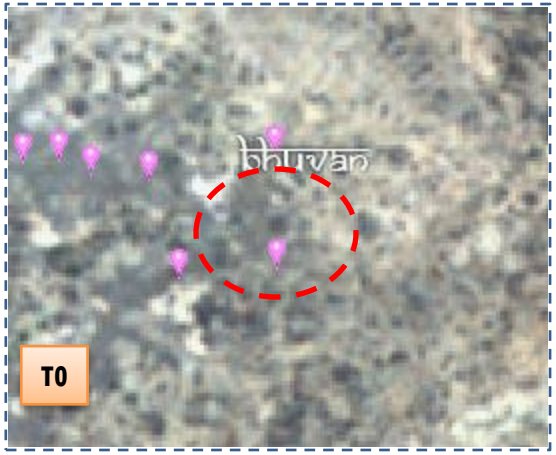
Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-60/2012-13

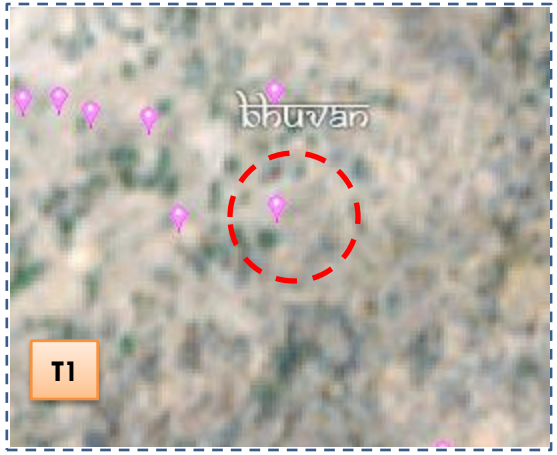
T1:2012-13

T2: 03 March 2017

Drishti SI no. 717645 MWS :4C4A3g2b

Farm pond





T1:2012-13

T2: 03 March 2017

Drishti SI no. 1781853 MWS :4C4A3g2a

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-60/2012-13

T0: 2012-13

T1: 03 March 2017

Drishti Sl no. 89821 MWS :4C4B4p2e

Farm pond

T0: 2012-13

T2: 03 March 2017

Drishti Sl no. 662919 MWS :4C4A3g1b

Farm pond

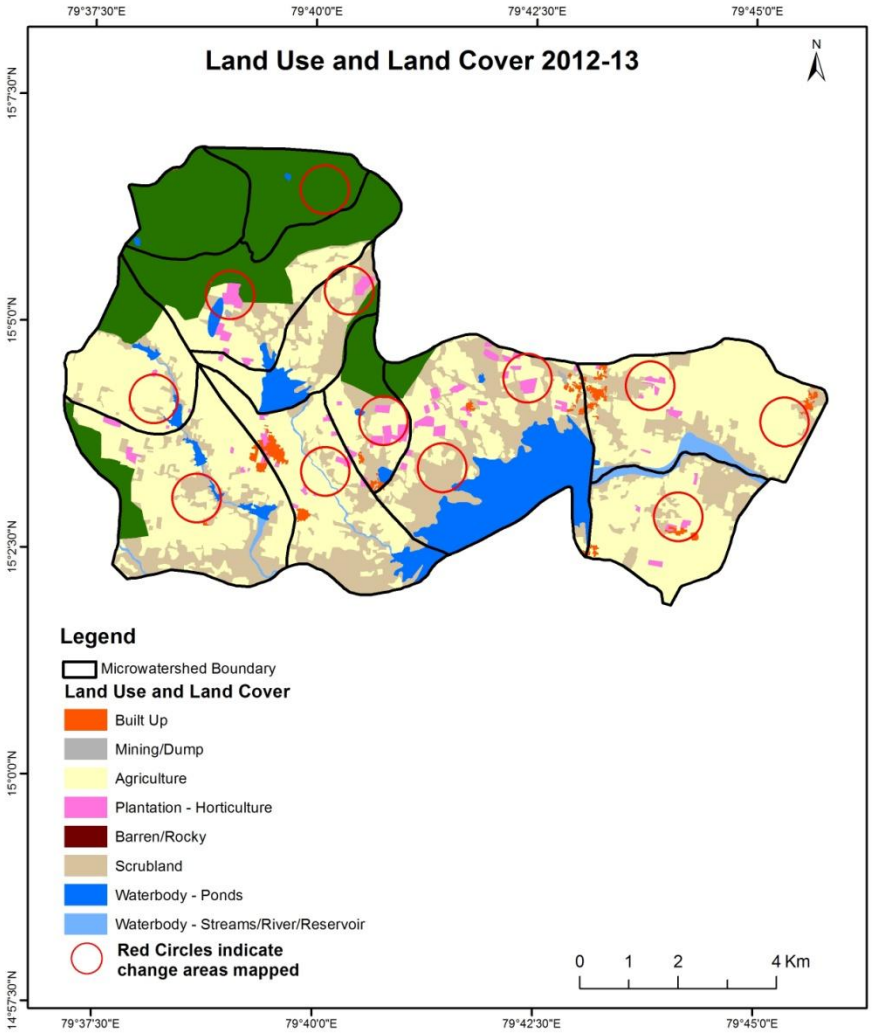
MONITORING IN THE PROJECT AREA

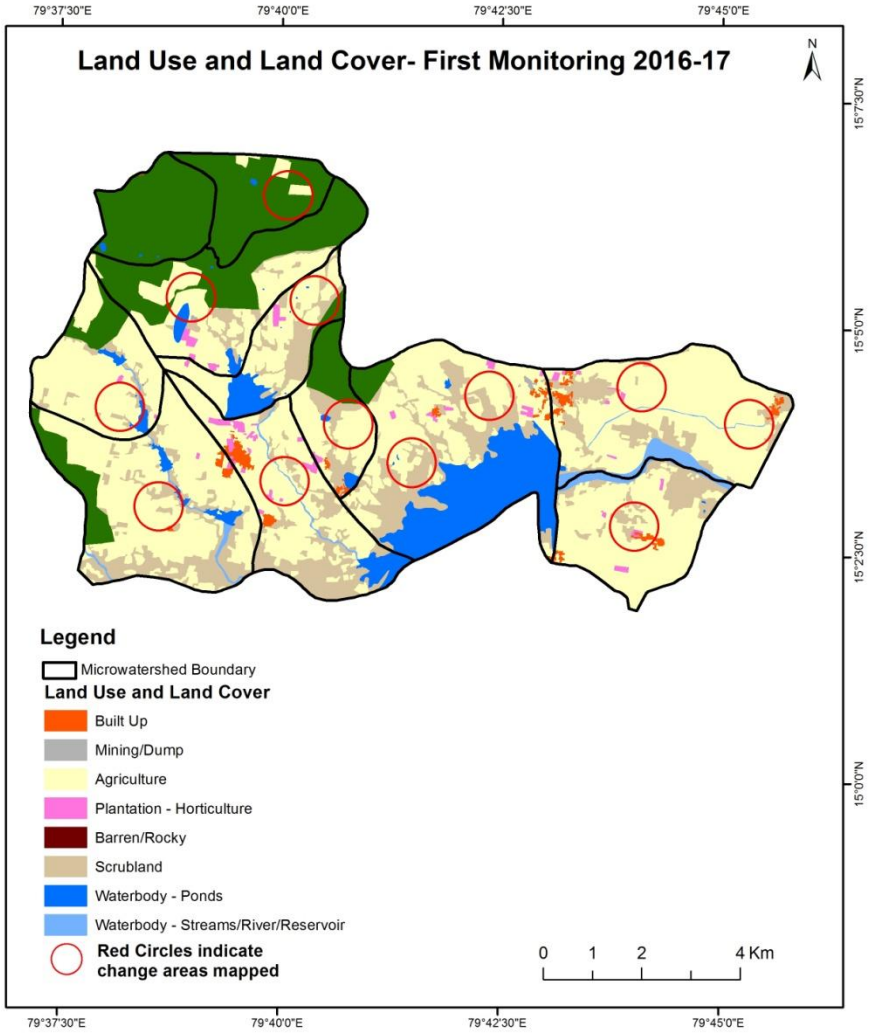
Land use and Land cover Changes in the Project

- 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 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)

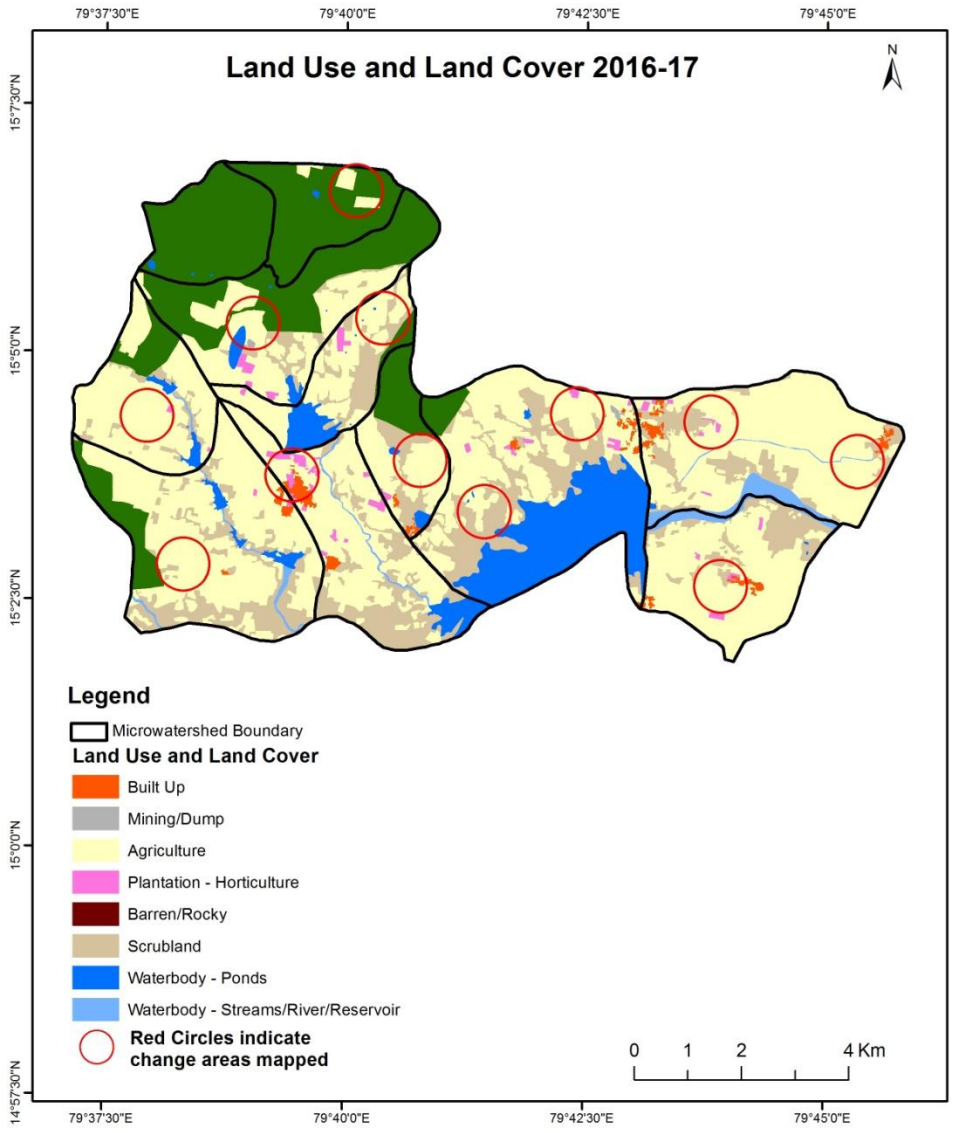
Scale: 1:10000

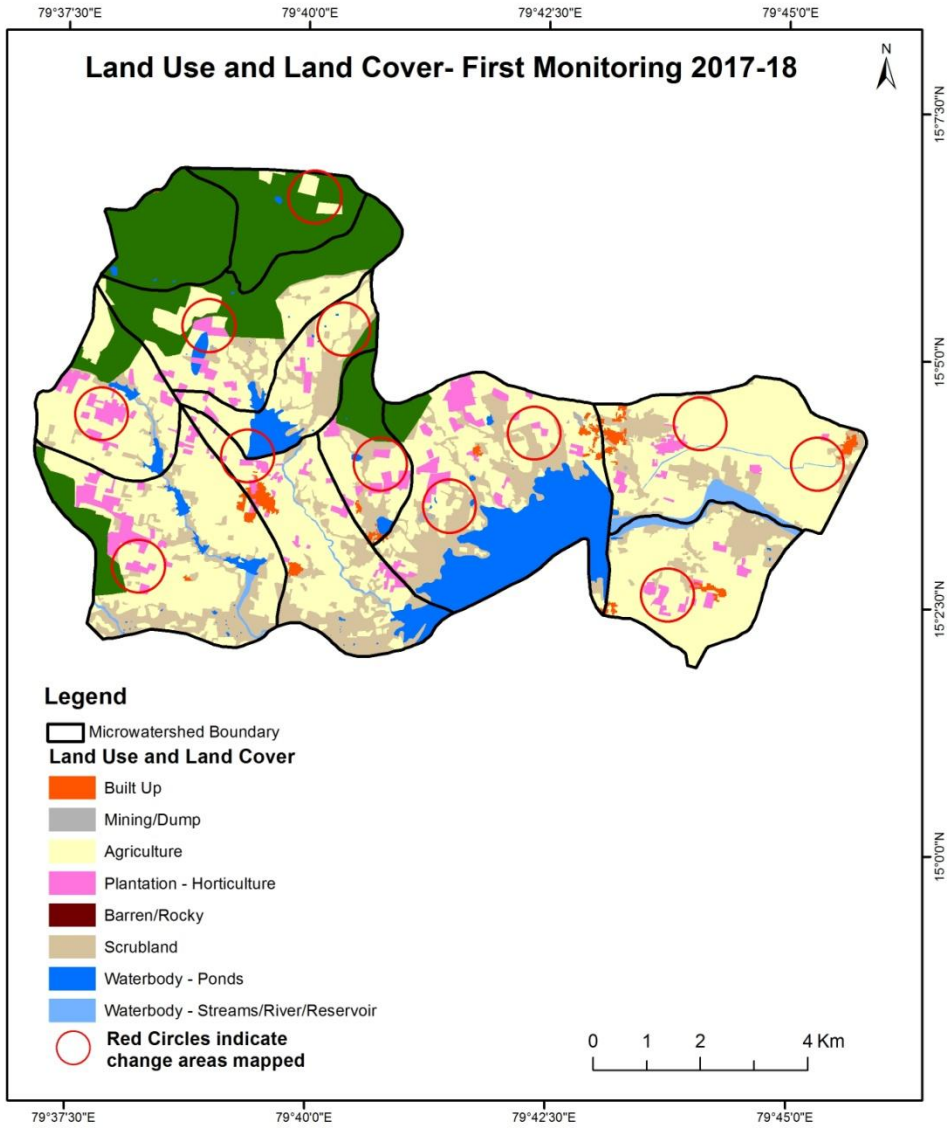




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

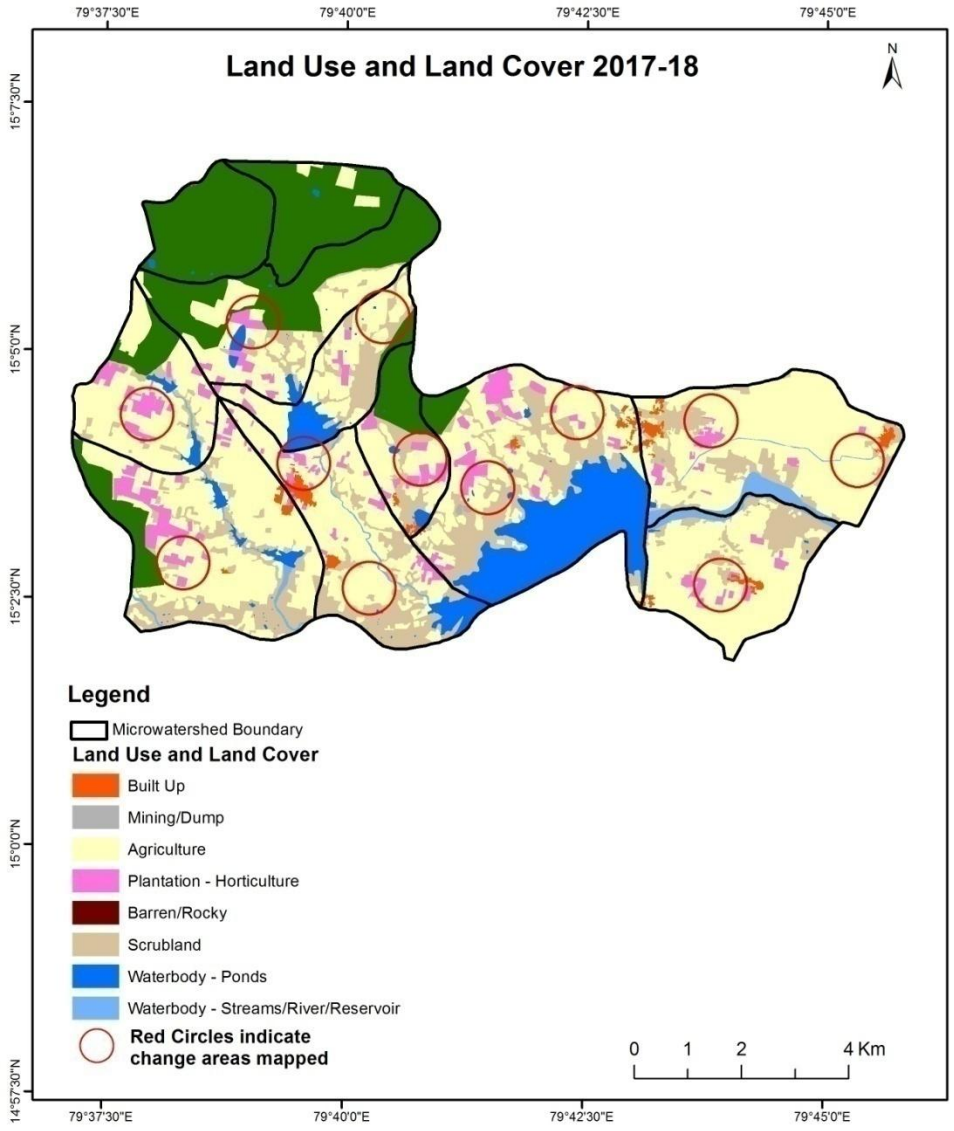
Scale: 1:10000

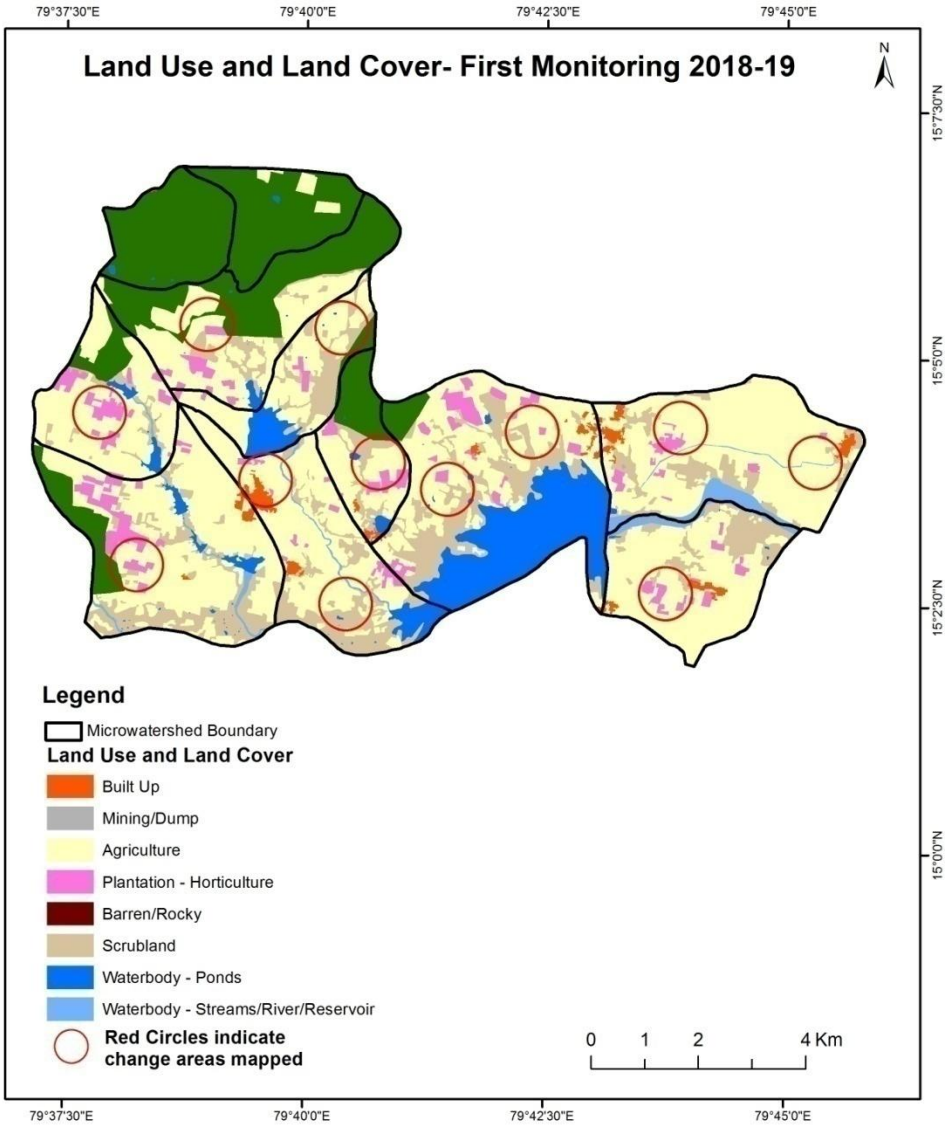




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

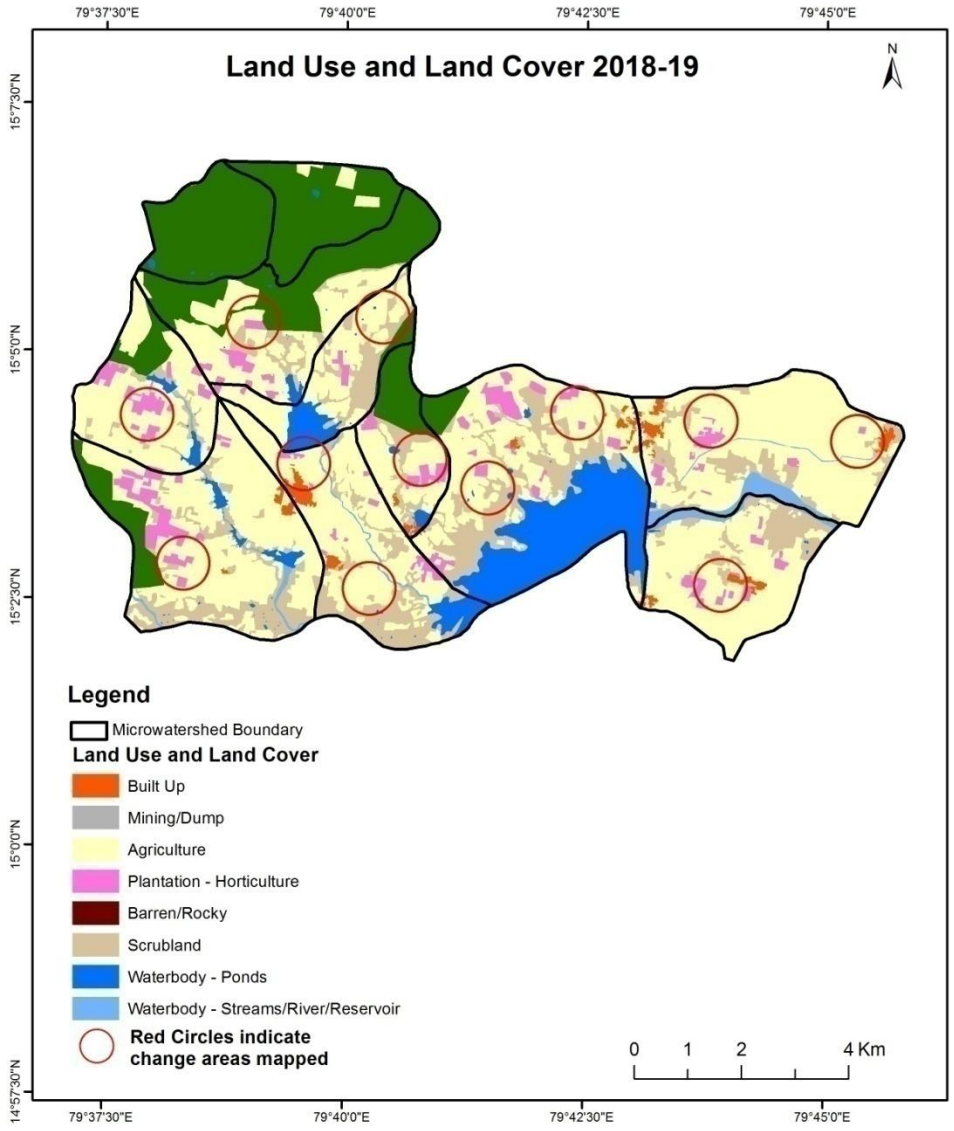
Scale: 1:10000

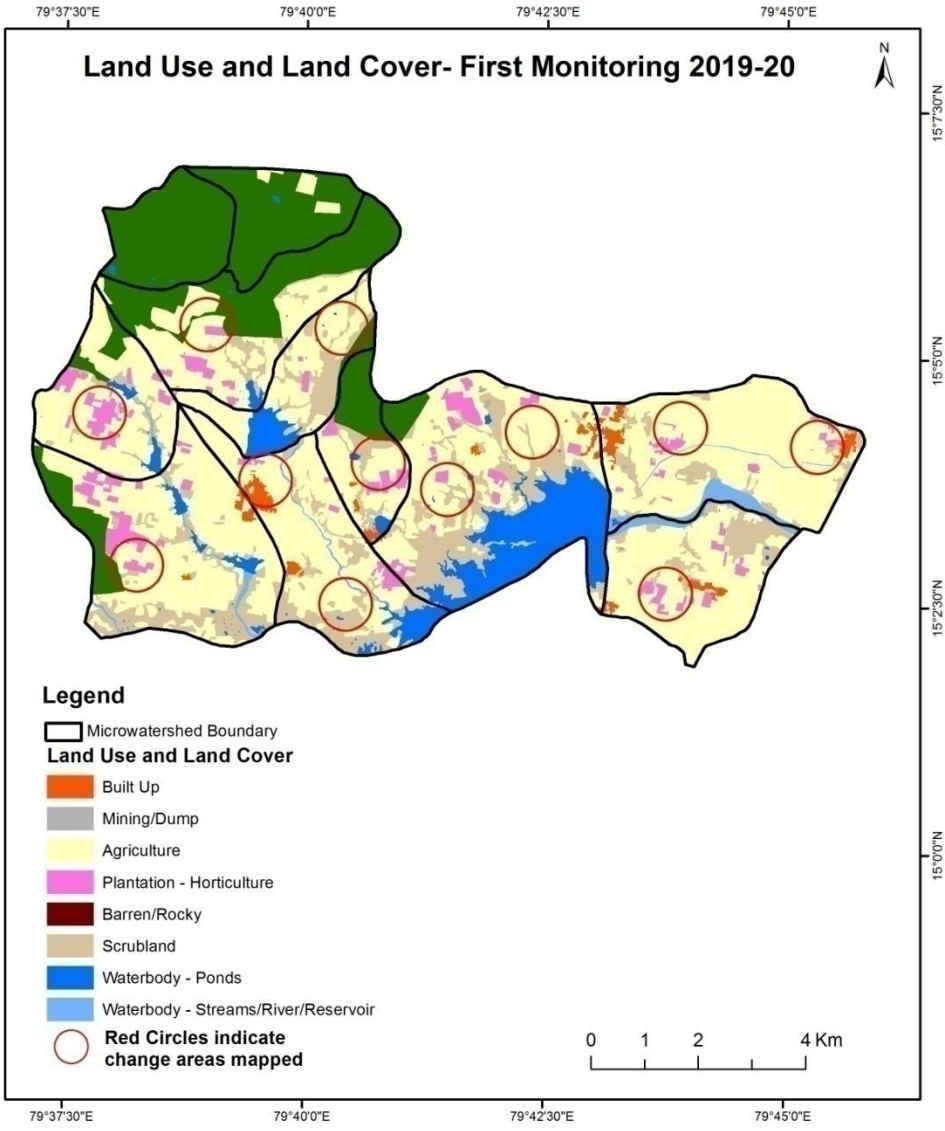




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

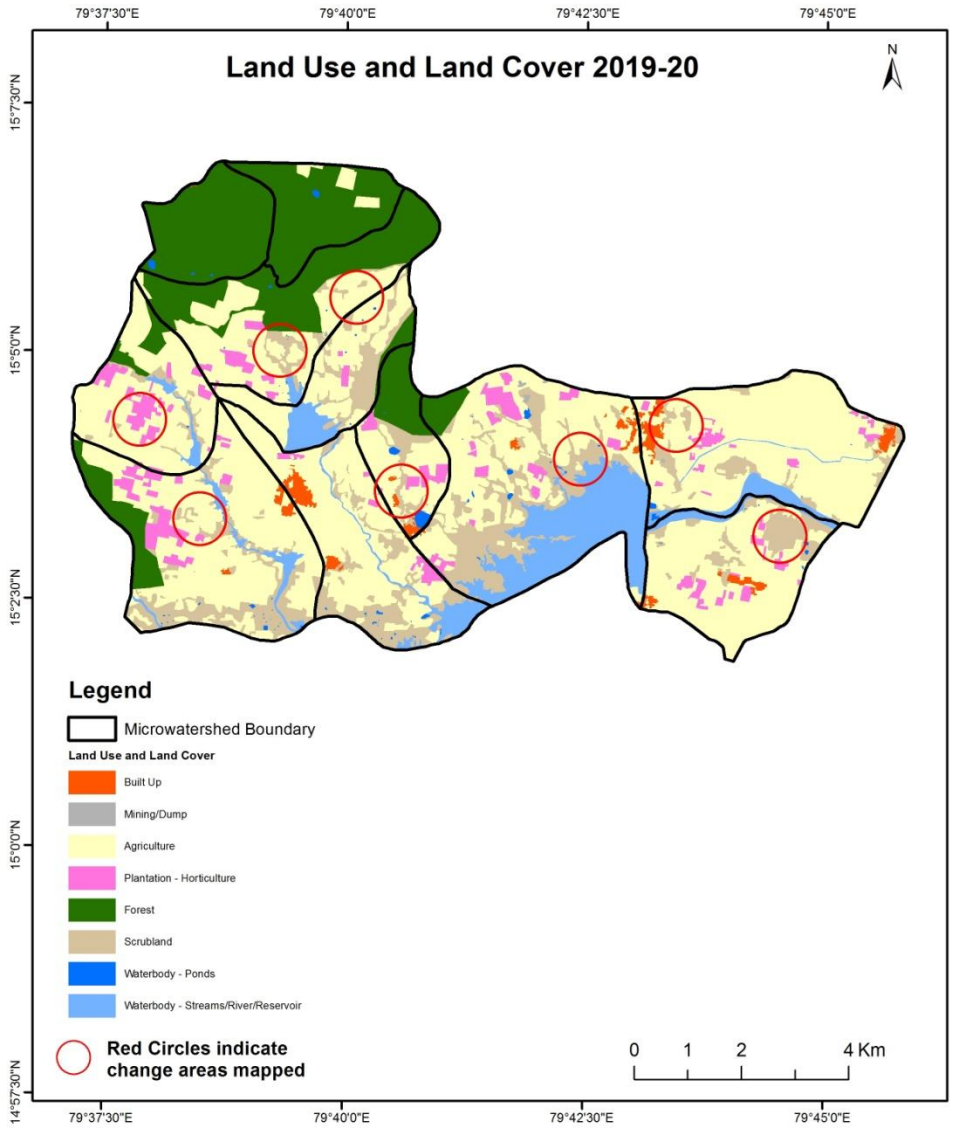
Scale: 1:10000

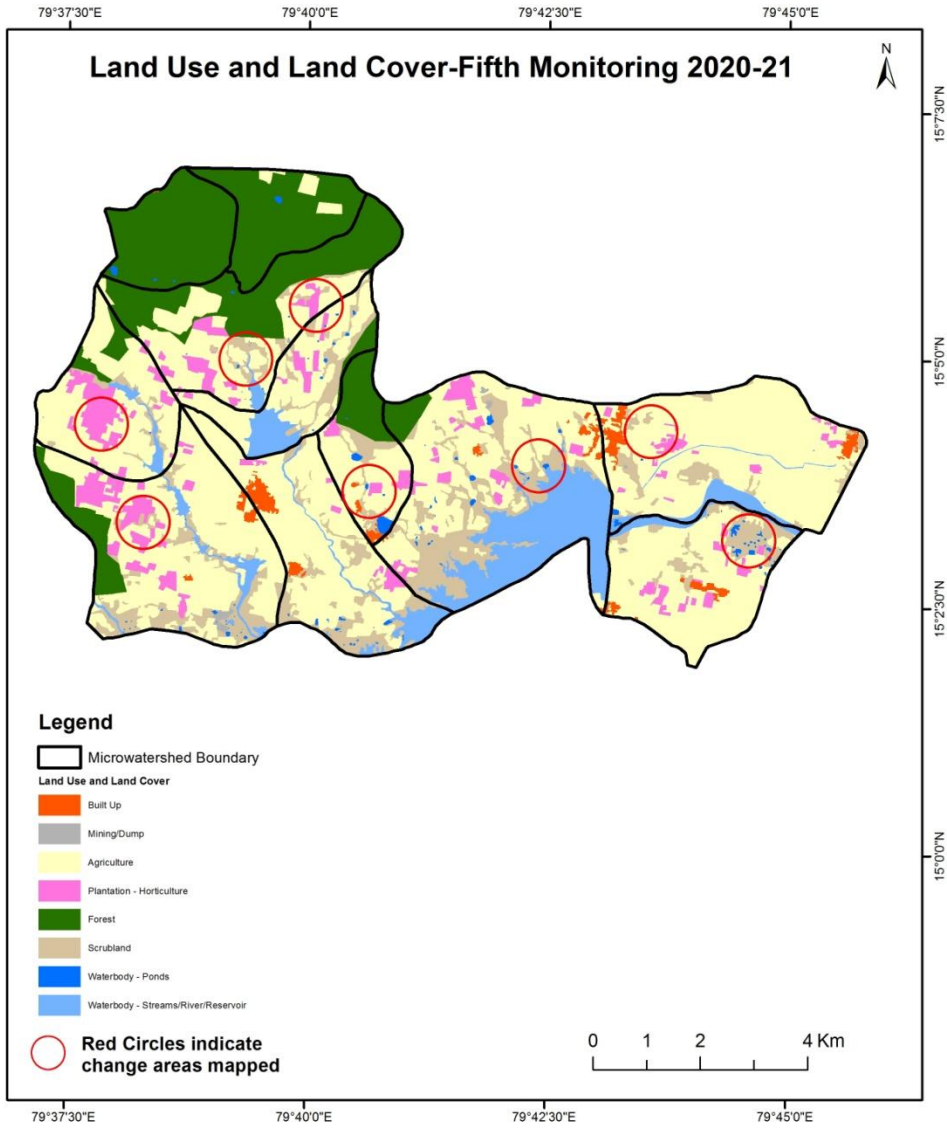




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

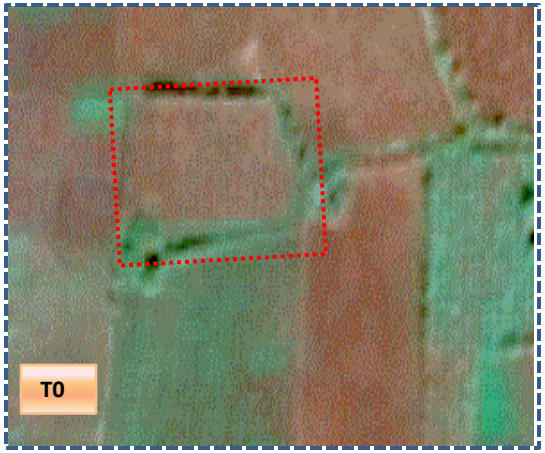
Scale: 1:10000



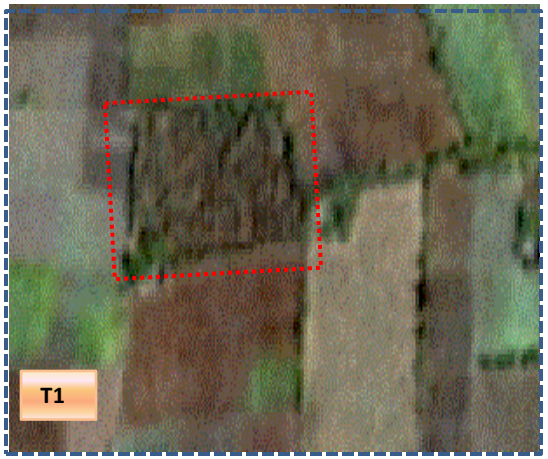


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

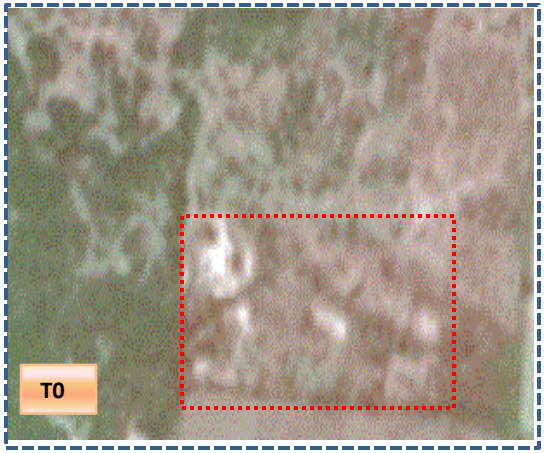


T0: 2012-13(79°40'15.13"E 15°3'45.479"N)

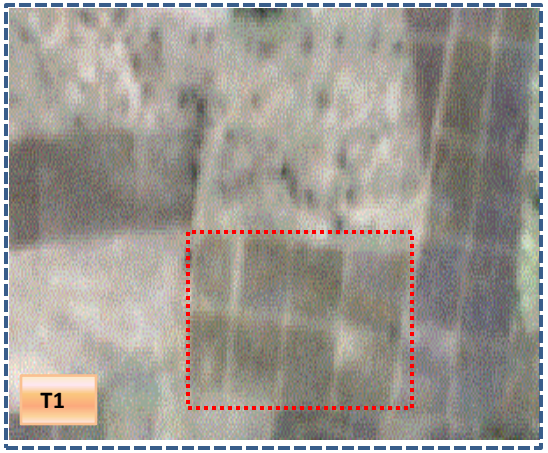


T2: 03 March 2017

Scrub to Agriculture



T0: 2012-13(79°44'9.695"E 15°4'34.428"N)



T2: 03 March 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
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody-Streams/River	Water body Ponds	Grand Total
Built up	85.28										**85.28**
Mining/dump		5.06									**5.06**
Agriculture	1.98		3708.08	25.31				40.18	7.75	0.88	**3784.18**
Plantation Horticulture			111.41	74.48							**185.88**
Forest			136.55		1568.01					0.84	**1705.40**
Forest Plantation											
Barren Rocky											
Scrub	0.30		316.85					1292.41		1.45	**1611.01**
Waterbody-Streams/River									680.09		**680.09**
Waterbody – Ponds			1.07							115.77	**116.84**
Grand Total	**87.56**	**5.06**	**4273.96**	**99.79**	**1568.01**			**1332.59**	**687.84**	**118.94**	**8173.74**

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

• In T1 565 ha of the agriculture area has increased from plantations, forest, scrubland and water body 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	87.56										**87.56**
Mining/dump		5.06									**5.06**
Agriculture	1.78		3930.22	341.27				0.35		0.34	**4273.96**
Plantation Horticulture			26.63	73.16							**99.79**
Forest					1567.87					0.13	**1568.01**
Forest Plantation											
Barren Rocky											
Scrub	3.73	4.24	29.14					1289.57		5.91	**1332.59**
Waterbody-Streams/River									687.84		**687.84**
Waterbody – Ponds				2.30						116.65	**118.94**
Grand Total	**93.08**	**9.29**	**3985.98**	**416.73**	**1567.87**			**1289.91**	**687.84**	**123.03**	**8173.74**

- 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 343 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrub and water body in T2.
- In T2 55 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-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	92.88		0.20								**93.08**
Mining/dump	0.35	0.45						8.50			**9.29**
Agriculture	5.01		3951.81	29.04						0.11	**3985.98**
Plantation Horticulture	2.52		71.95	342.26							**416.73**
Forest			33.29		1534.59						**1567.87**
Forest Plantation											
Barren Rocky											
Scrub	2.13		110.26	1.23				1176.28		0.01	**1289.91**
Waterbody-Streams/River									686.92	0.92	**687.84**
Waterbody – Ponds				3.17				10.19		109.67	**123.03**
Grand Total	**102.89**	**0.45**	**4166.70**	**375.71**	**1534.59**			**1194.97**	**686.92**	**110.72**	**8173.74**

- 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 34 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T3.
- In T3 215 ha of the agriculture area has increased from plantations, forest 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	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	102.89										**102.89**
Mining/dump		0.45									**0.45**
Agriculture	5.46	2.04	4116.35	40.97					1.73	0.95	**4166.70**
Plantation Horticulture	0.05		42.22	333.44							**375.71**
Forest			22.13		1512.46						**1534.59**
Forest Plantation											
Barren Rocky											
Scrub	7.10	1.50	133.40	1.19				1029.23	19.25	3.30	**1194.97**
Waterbody-Streams/River									683.95	2.97	**686.92**
Waterbody – Ponds			0.50					84.28		25.94	**110.72**
Grand Total	**115.49**	**4.00**	**4314.60**	**375.60**	**1512.46**			**1113.51**	**704.93**	**33.16**	**8173.74**

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

•In T4 198 ha of the agriculture area has increased from plantations, forest, 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-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	115.49										**115.49**
Mining/dump		4.00									**4.00**
Agriculture	2.56		4154.21	155.58					0.79	1.46	**4314.60**
Plantation Horticulture			45.28	330.32							**375.60**
Forest					1512.46						**1512.46**
Forest Plantation											
Barren Rocky											
Scrub		8.37	106.03	2.74				971.98	11.19	13.21	**1113.51**
Waterbody-Streams/River									704.93		**704.93**
Waterbody – Ponds										33.16	**33.16**
Grand Total	**118.05**	**12.36**	**4305.52**	**488.64**	**1512.46**			**971.98**	**716.91**	**47.83**	**8173.74**

- 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 160 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 151 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 decrease of 58 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 489, 180 & 147 Hectares from T0 to T1, T2-T3 & T3-T4 respectively, there is a decrease of 287 & 09 Hectares from T1-T2 & T4-T5 and overall increase of 530 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. **About 189 Hectares of the plantation/horticulture area has been increased** in during the monitoring period of 2012-13 (T0) & 2020-21 (T5) years.
6. There is a decrease of 497 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 (38) verified from the portal.