MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

Prakasam-62/2012-13
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
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Remote Sensing Application Area,
National Remote Sensing Centre, ISRO

DEPARTMENT OF LAND RESOURCES
Ministry of Rural Development
Government of India

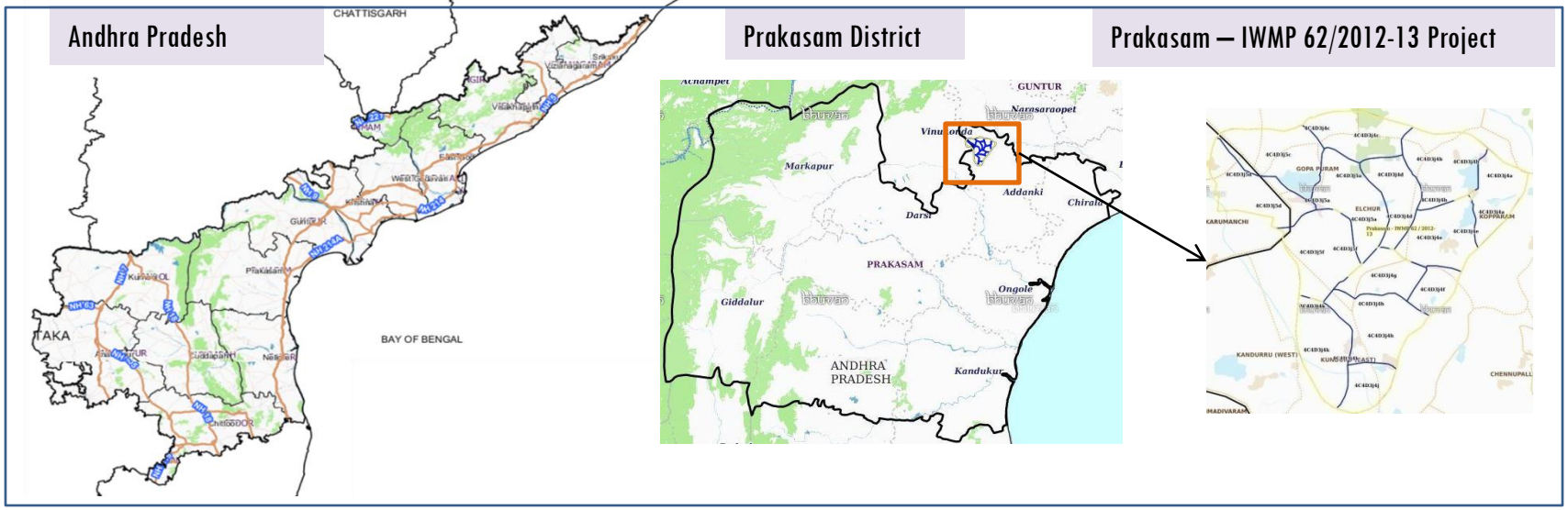
CONTENTS

EXECUTIVE SUMMARY

- 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-62/2012-13, Prakasam District of Andhra Pradesh. The total geographical area of the project is **8,230** ha. It comprises of 14 micro watersheds.
- In the project area 203 Drishti photos were uploaded showing check dams/Checks & plugins, Farm ponds/Percolation tanks, livelihood activities, Afforestation, and others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits with 49 ha increase in the area.
- Major percentage i.e. 74.7 % is covered by the agriculture, 7.3 % is covered by scrub land, 4.7 % by water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-62/2012-13
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 **8,230** ha. It comprises of 14 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.

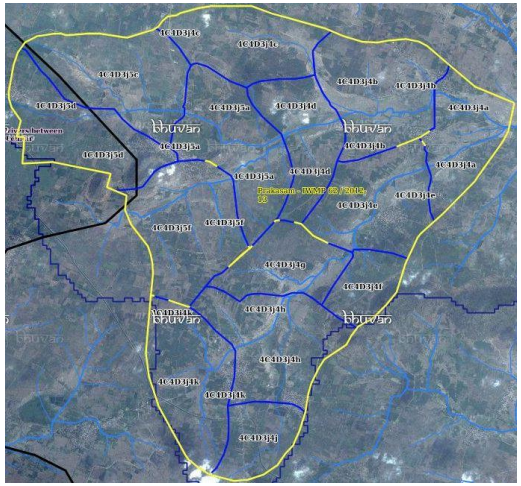
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2011-12	2020-21
LISS IV	2012-13		
SCENE 1			30-Oct-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			30-Oct-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	Drishti Photographs		
		Total	203
4	Detailed Project Report		

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



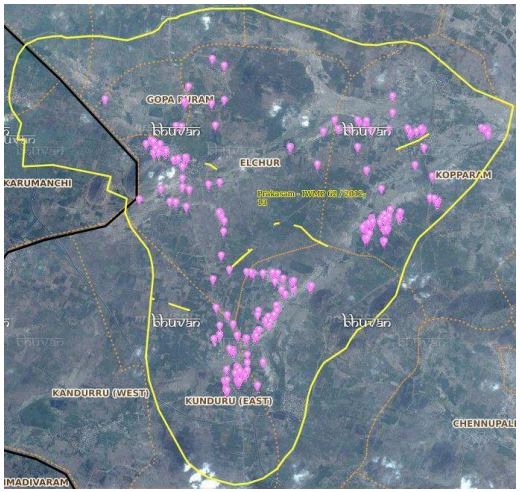
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

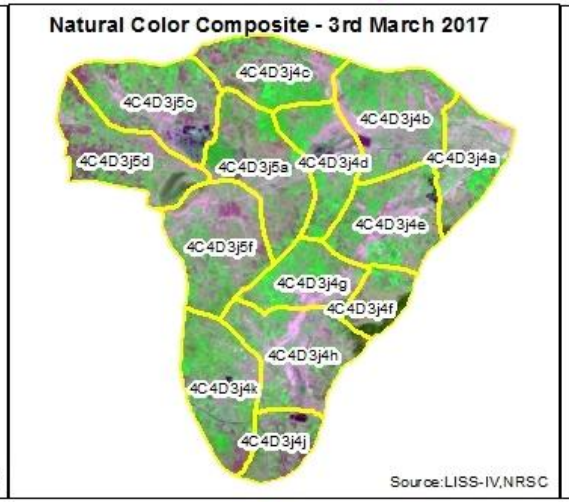
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture/Agriculture	3	3
3	Block planting	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	148	120
9	Gabion structure	0	0
10	Farm ponds	0	0
11	Check dams	0	0
12	Nallah Bunds	0	0
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Activities	0	0
16	Production system and Micro-Enterprises	0	0
17	Entry Point Activity	0	0
18	Others	138	80
	TOTAL	**289**	**203**

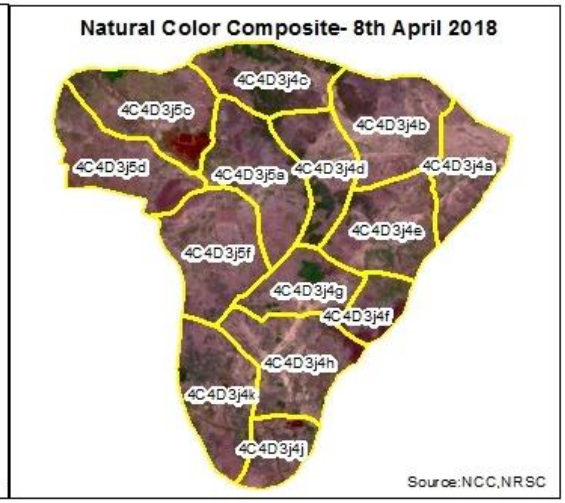
MONITORING IN THE PROJECT AREA

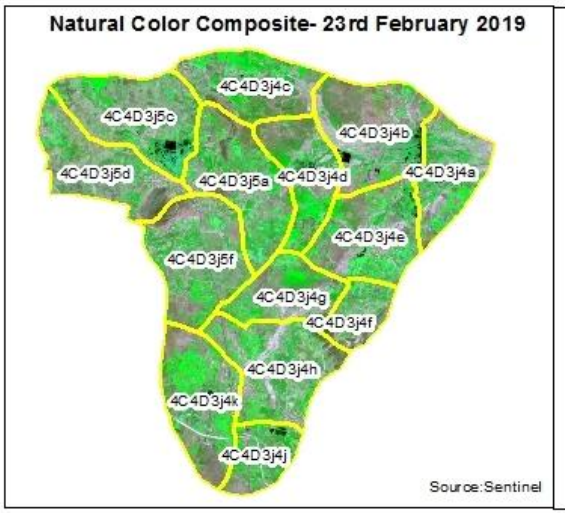
Site Wise Changes in the Project

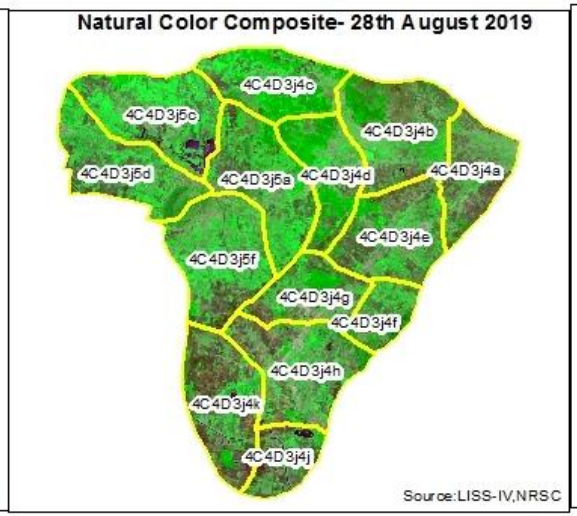
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T0 is the baseline period before implementation (2012-13) and T5 is 2020-21 period for monitoring
- Captures are also provided wherever changes are observed in satellite images, that may match expected activity related impact, even though they don't have Drishti report yet.

Natural Color Composite (NCC)









Monitoring of activities in Srikakulam Dt Andhra Pradesh. IWMP-62/2012-13

T0 Satellite data 2010

T1 Satellite data 2016

T2 Satellite data 2017

T3 Satellite data 2018

T4 Satellite data 2019

T5 Satellite data 2020

Drishti Id. 818421

Dugout pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-62/2012-13

T1:2012-13

T2: 03 March 2017

Drishti Sl no. 695774 MWS :4C4D3j4g

Farm pond

T1:2012-13

T2: 03 March 2017

Drishti Sl no. 695823 MWS :4C4D3j4h

Farm pond

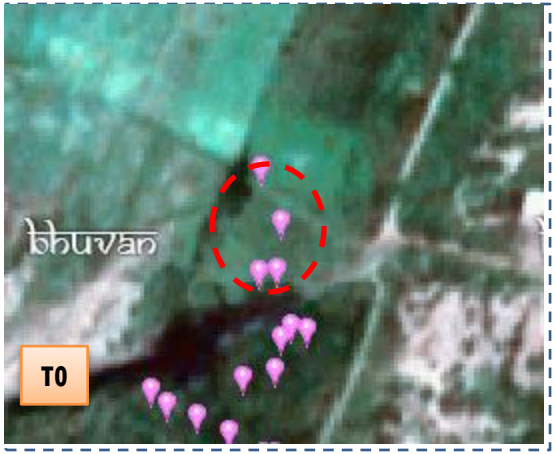
Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-62/2012-13

T0: 2012-13

T1: 03 March 2017

Drishti Sl no. 701282 MWS :4C4D3j5d

Farm pond



T0: 2012-13

T2: 03 March 2017

Drishti Sl no. 703382 MWS :4C4D3j4e

Farm pond

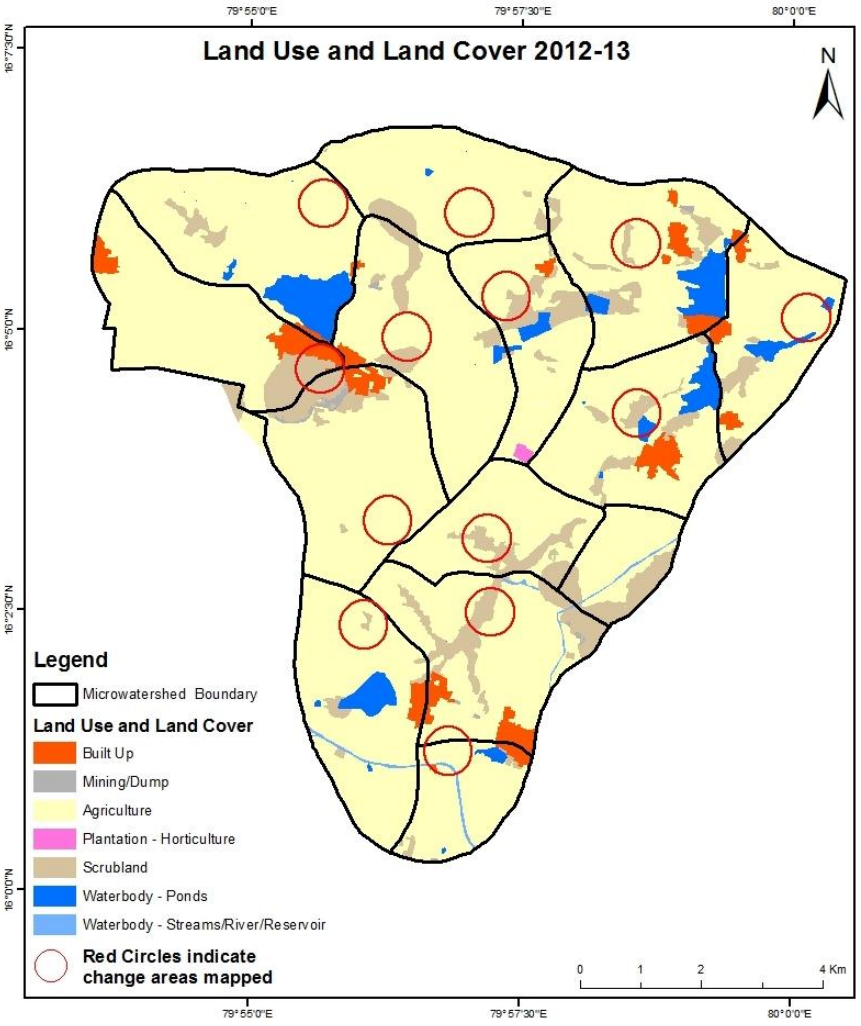
MONITORING IN THE PROJECT AREA

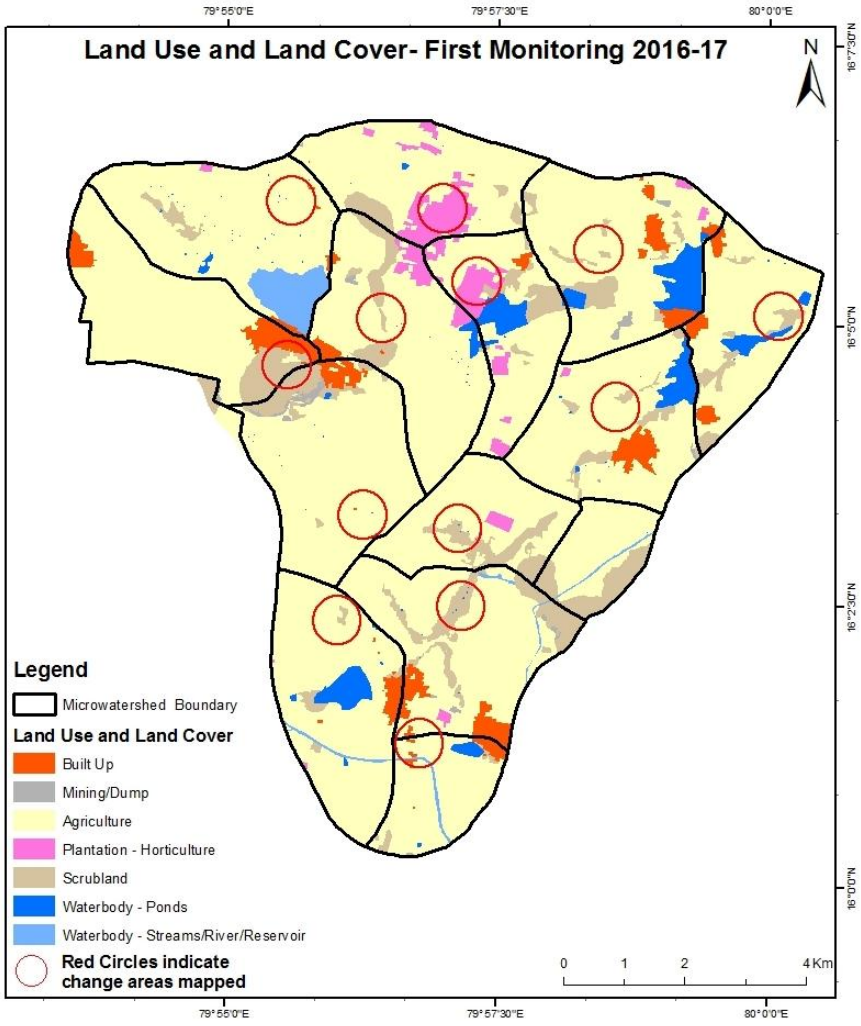
Land use and Land cover Changes in the Project

- 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)

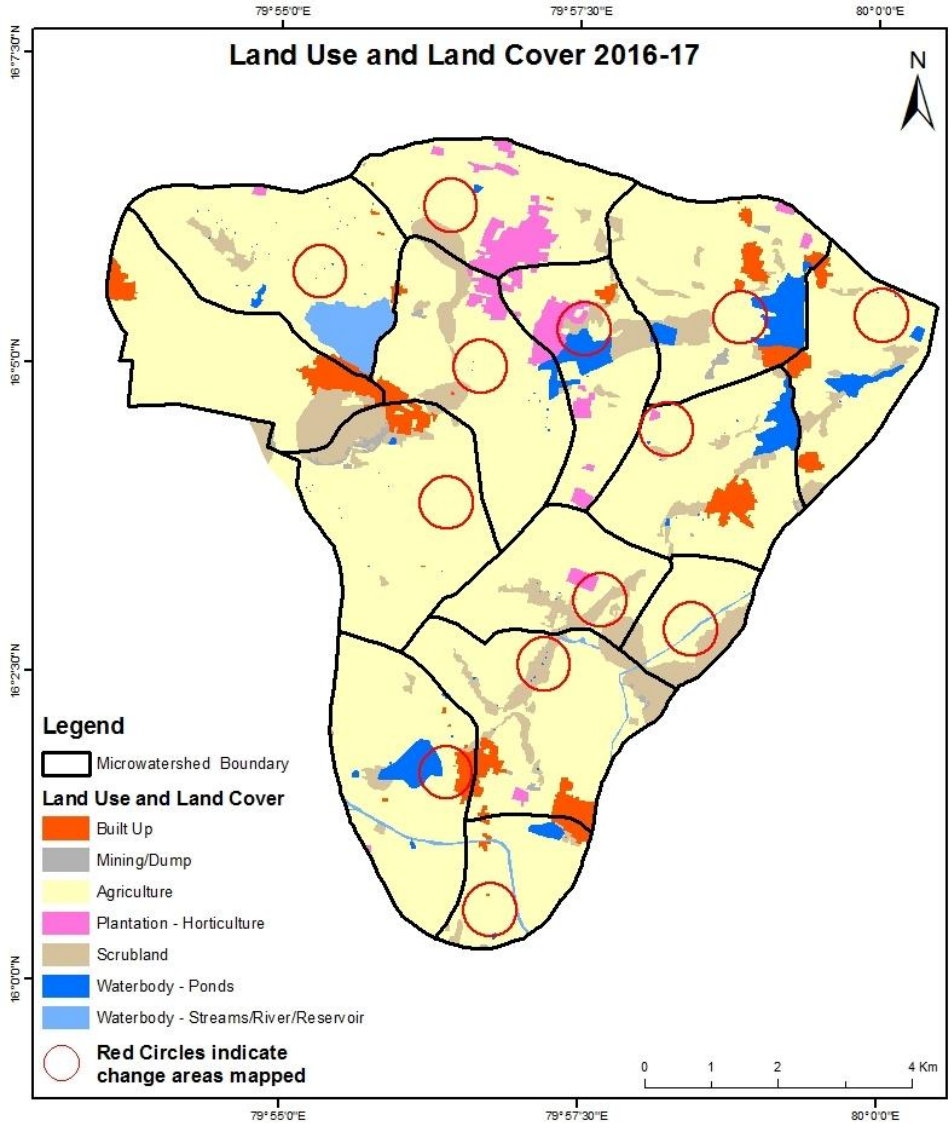
Scale: 1:10000

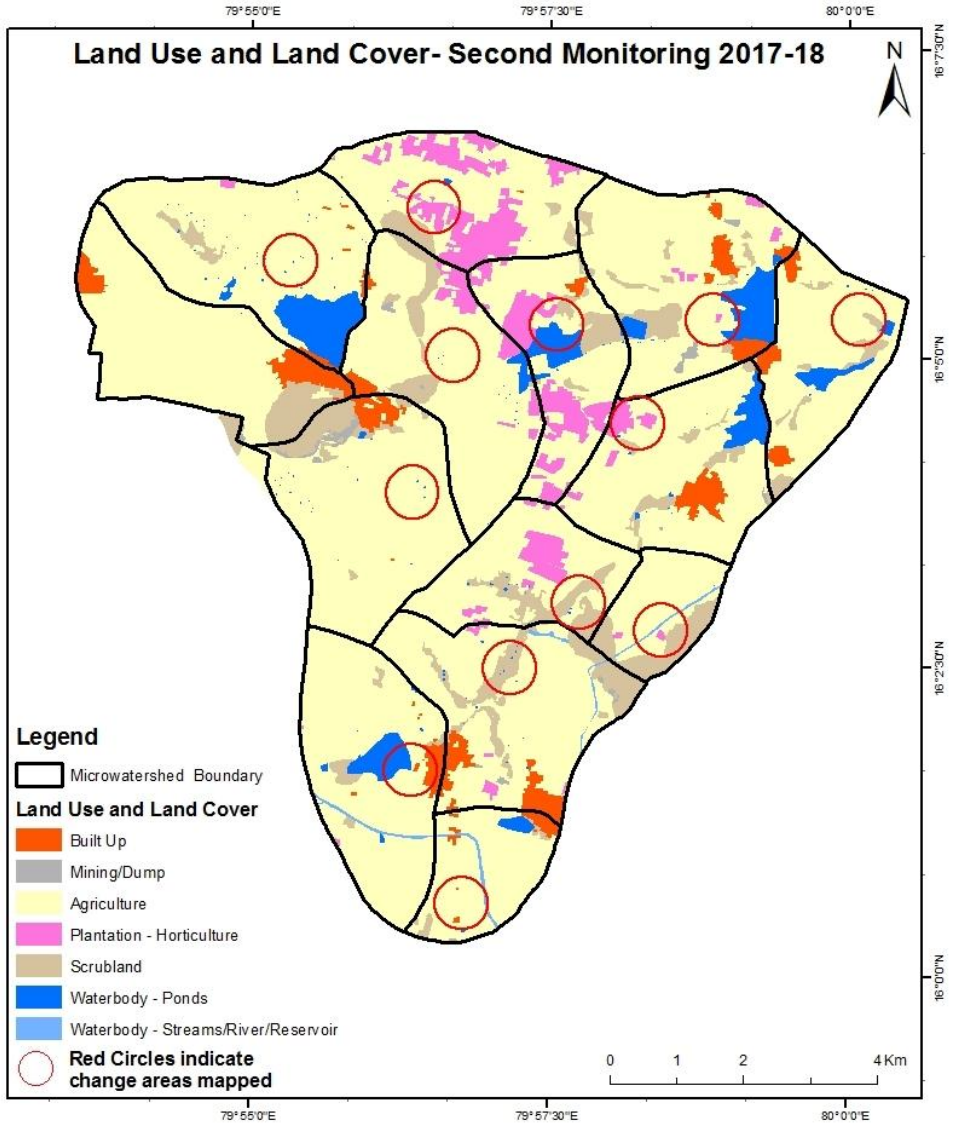




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

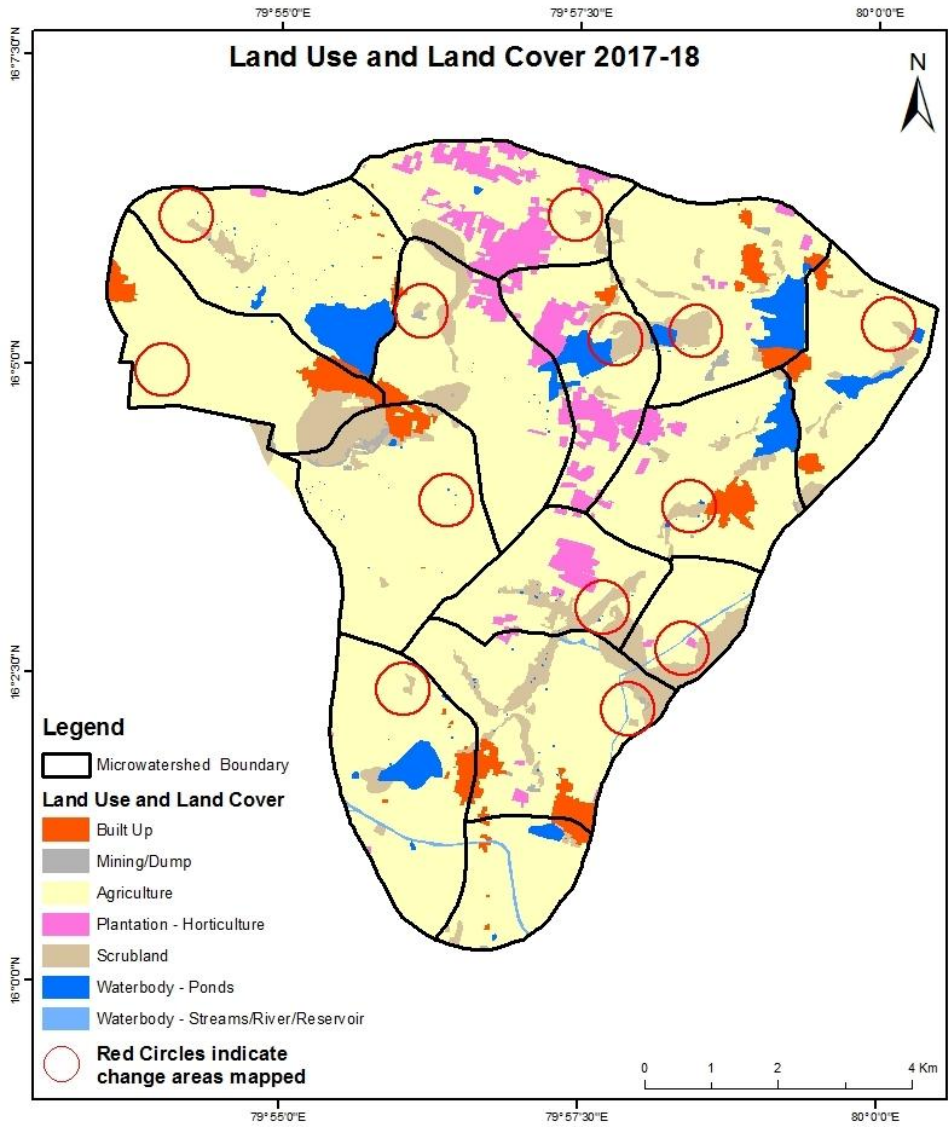
Scale: 1:10000

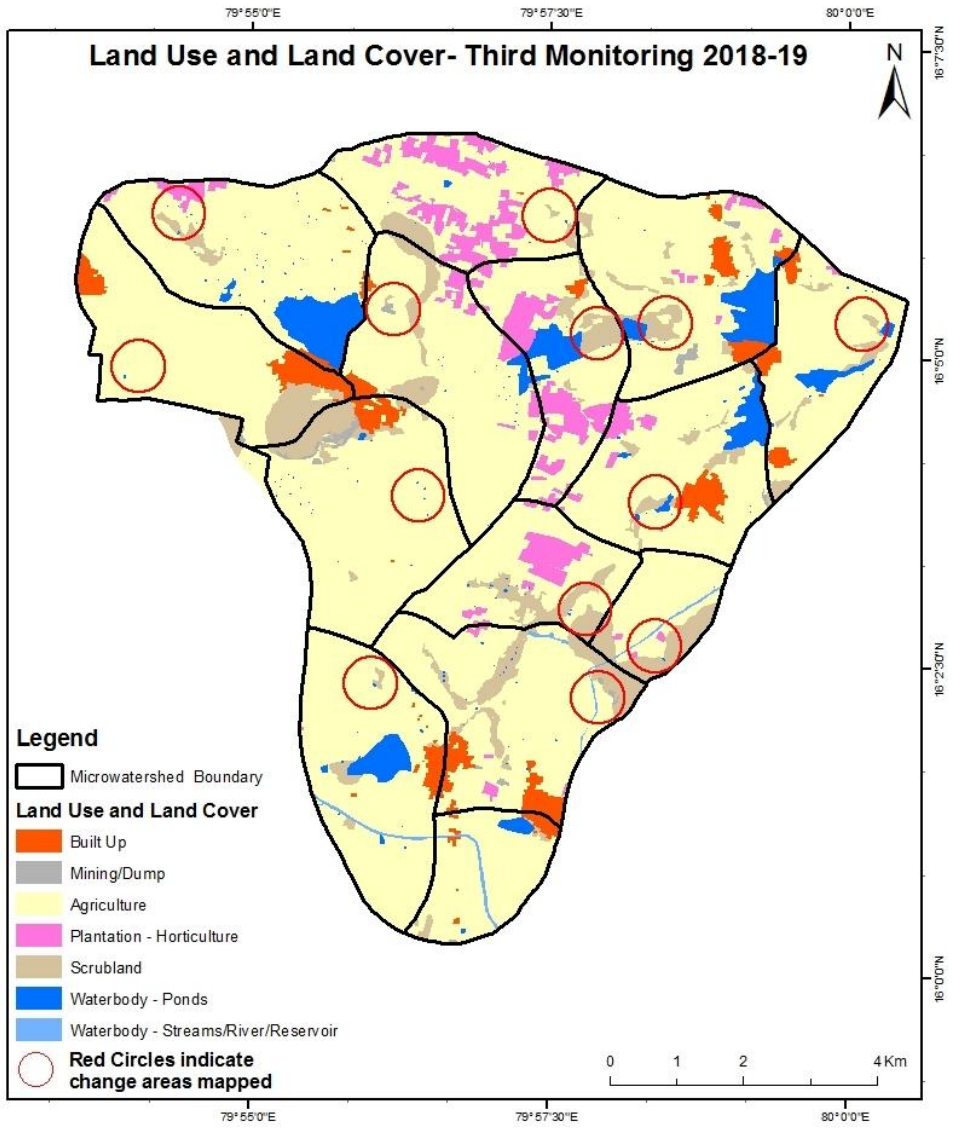




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

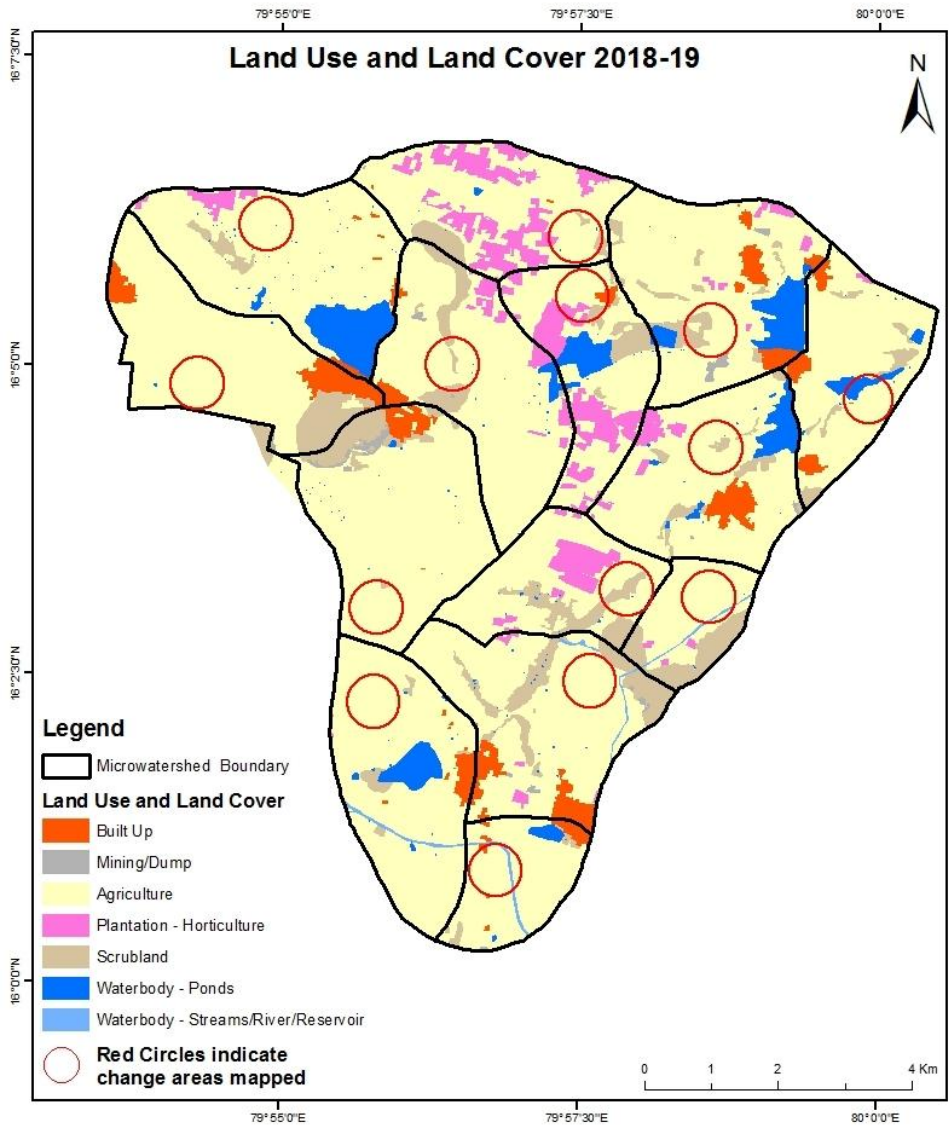
Scale: 1:10000

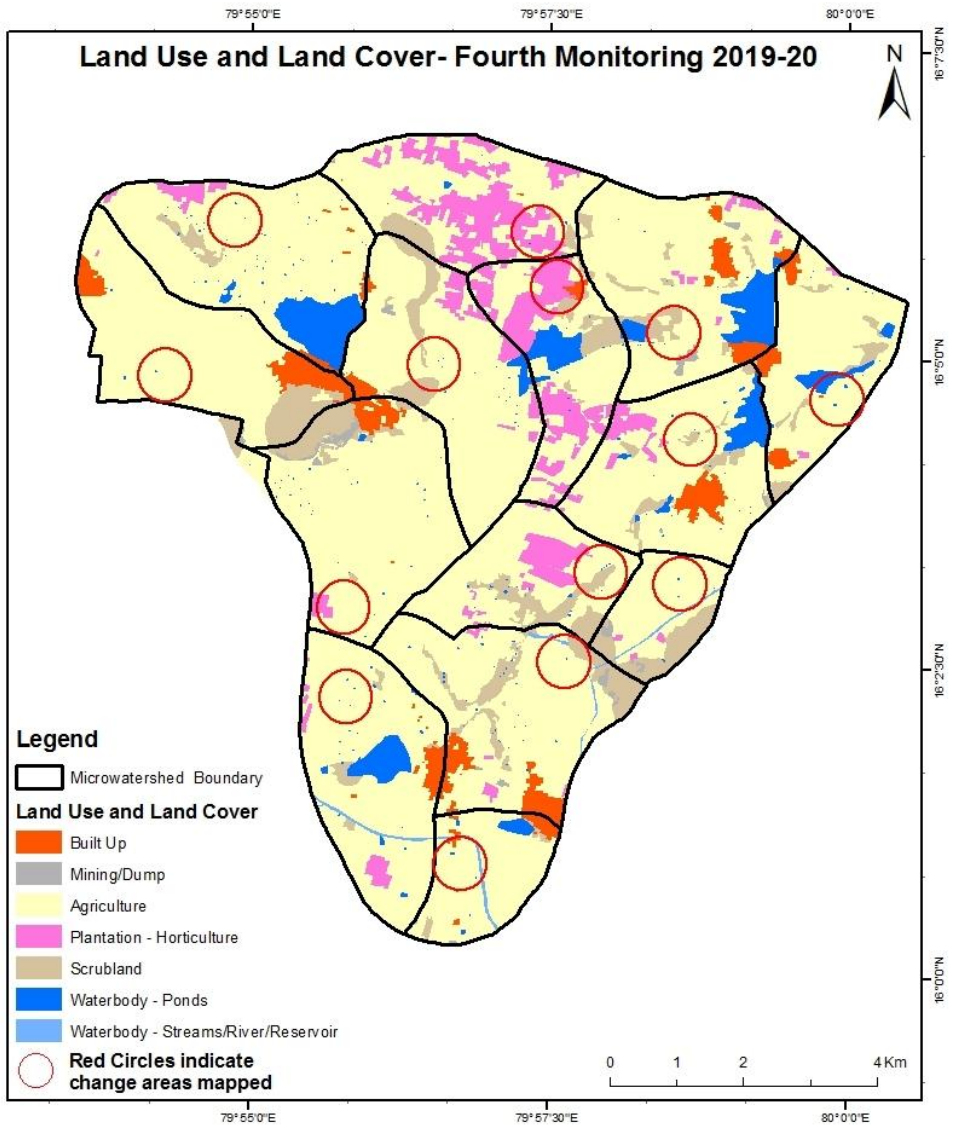




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

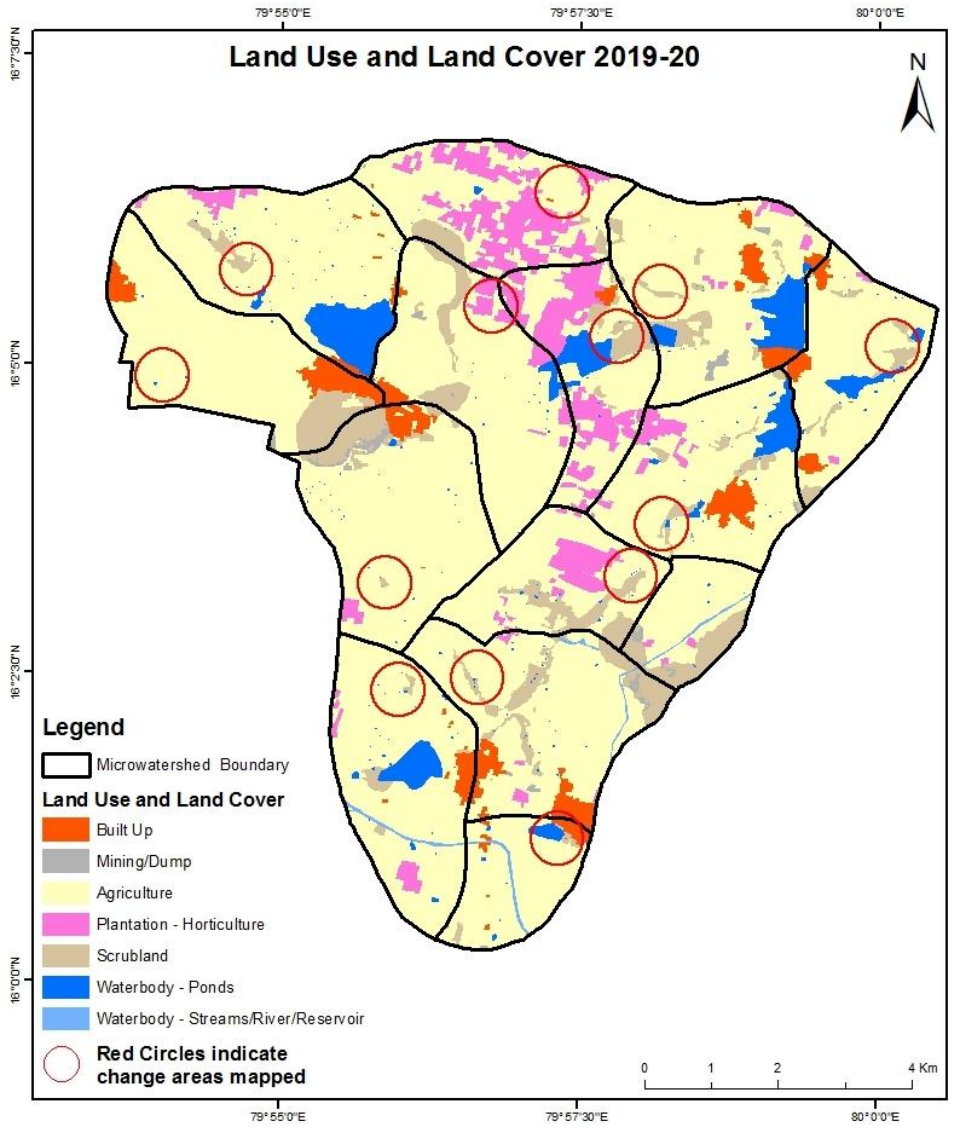
Scale: 1:10000

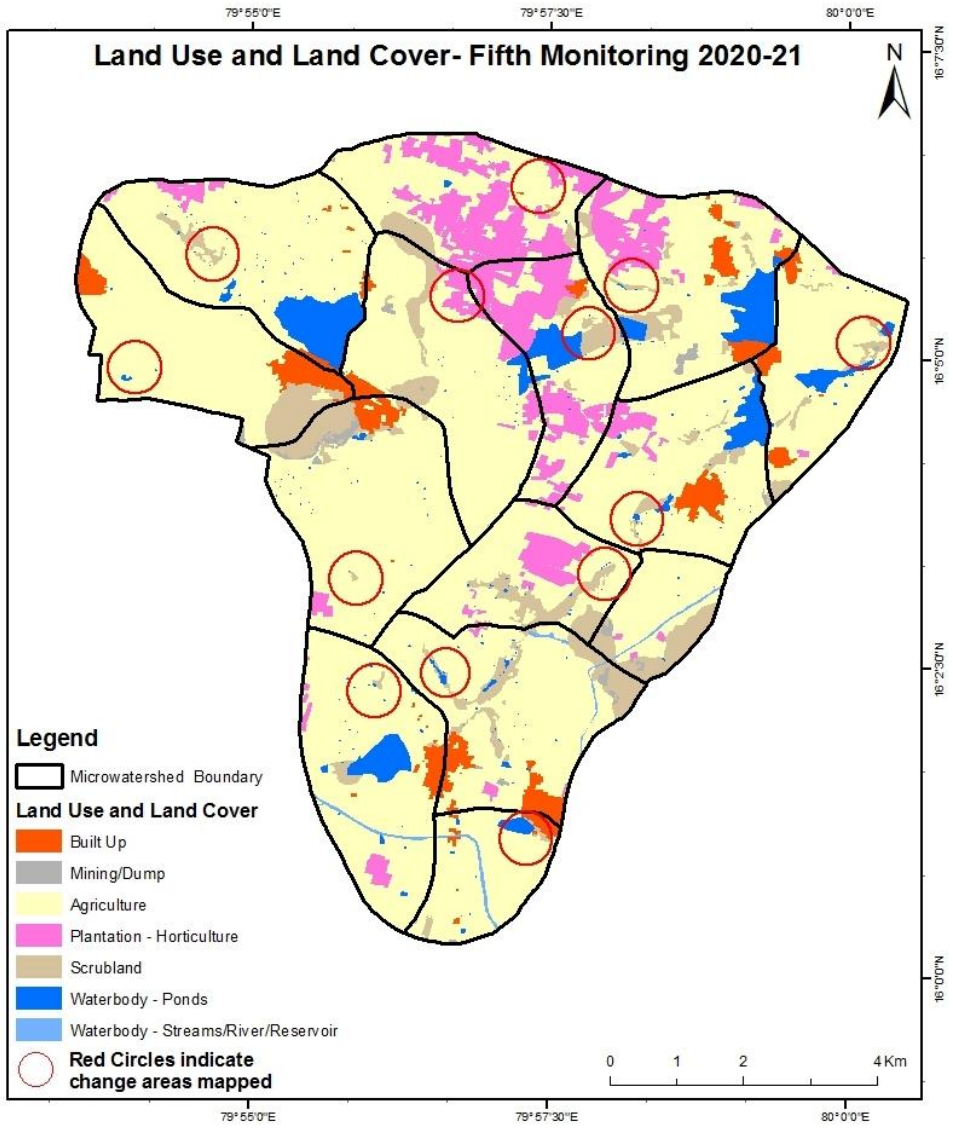




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2019-20 to 2020-21)

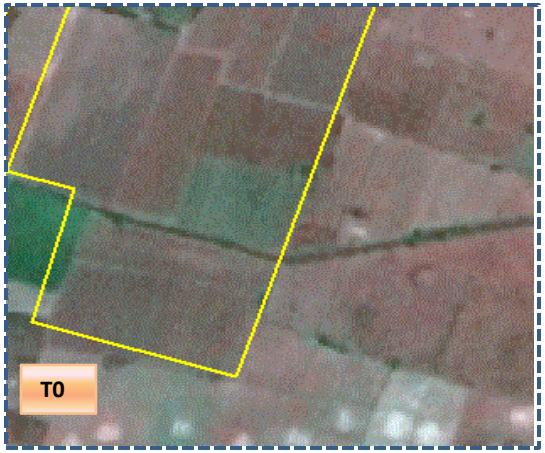
Scale: 1:10000



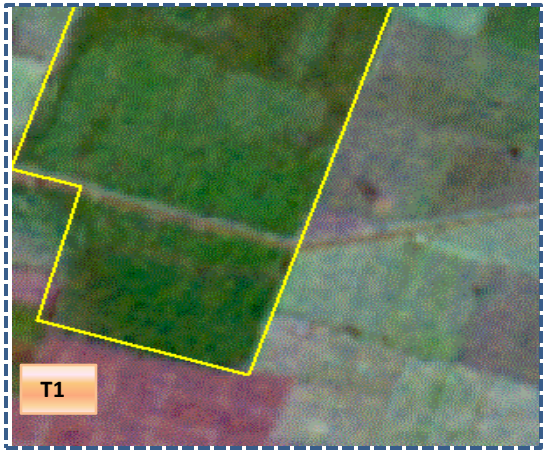


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

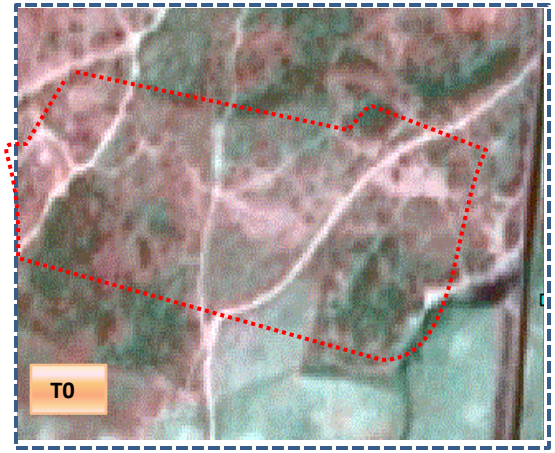


T0: 2012-13(79°55'33.339"E 16°1'49.266"N)

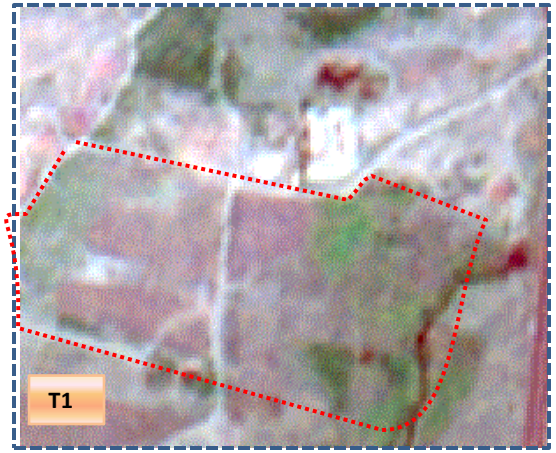


T2: 03 March 2017

Scrub to Agriculture



T0: 2012-13 (79°55'54.084"E 16°4'19.092"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	288.15										**288.15**
Mining/dump		19.54									**19.54**
Agriculture	12.41	8.67	6511.23	211.31				19.59		5.72	**6768.94**
Plantation Horticulture				6.90							**6.90**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.66	3.99	88.96					683.49		28.98	**807.08**
Waterbody-Streams/River									29.46		**29.46**
Waterbody – Ponds			11.56						89.48	209.76	**310.80**
Grand Total	**302.22**	**32.20**	**6611.75**	**218.21**				**703.08**	**118.94**	**244.46**	**8230.86**

- 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 257 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, scrubland and water body in T1.
- In T1 100 ha of the agriculture area has increased from 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	301.87	0.35									**302.22**
Mining/dump		32.20									**32.20**
Agriculture	6.27		6385.91	209.24				7.49		2.83	**6611.75**
Plantation Horticulture				218.21							**218.21**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.28		17.34					683.74		0.73	**703.08**
Waterbody-Streams/River									29.46	89.48	**118.94**
Waterbody – Ponds										244.46	**244.46**
Grand Total	**309.42**	**32.55**	**6403.25**	**427.46**				**691.23**	**29.46**	**337.50**	**8230.86**

- 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 225 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrubland and water body in T2.
- In T2 17 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	309.42										**309.42**
Mining/dump		32.55									**32.55**
Agriculture	1.72	0.97	6356.63	39.91						4.02	**6403.25**
Plantation Horticulture			37.92	389.48						0.06	**427.46**
Forest											
Forest Plantation											
Barren Rocky											
Scrub			33.65					654.51		3.08	**691.23**
Waterbody-Streams/River										337.50	**337.50**
Waterbody – Ponds									29.46		**29.46**
Grand Total	**311.14**	**33.52**	**6428.20**	**429.38**				**654.51**	**29.46**	**344.66**	**8230.86**

- 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 46 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T3.
- In T3 71 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-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	311.14										**311.14**
Mining/dump		33.35	0.17								**33.52**
Agriculture	0.40	0.19	6270.07	152.01						5.53	**6428.20**
Plantation Horticulture	0.03		7.51	421.73						0.11	**429.38**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.04	6.79	16.18					630.66		0.83	**654.51**
Waterbody-Streams/River									29.46		**29.46**
Waterbody – Ponds										344.66	**344.66**
Grand Total	**311.61**	**40.33**	**6293.92**	**573.74**				**630.66**	**29.46**	**351.14**	**8230.86**

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

•In T4 23 ha of the agriculture area has increased from plantations, 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	311.61										**311.61**
Mining/dump	0.99	39.34									**40.33**
Agriculture	1.99	0.44	6106.87	183.16						1.46	**6293.92**
Plantation Horticulture			30.32	543.43							**573.74**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.58	0.51	18.37					603.91		7.31	**630.66**
Waterbody-Streams/River										351.14	**351.14**
Waterbody – Ponds									29.46		**29.46**
Grand Total	**315.17**	**40.28**	**6155.55**	**726.59**				**603.91**	**29.46**	**359.91**	**8230.86**

- 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 187 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T5.
- In T5 48 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 49 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 24 Hectares from T2-T3, there is a decrease of 157, 208, 134 & 138 Hectares from T0-T1, T1-T2, T3-T4 & T4-T5 respectively and overall decrease of 613 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. About **719 Hectares of 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 203 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (13) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (13) verified from the portal.