MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -49/2011-12
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-2022

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

AGRICULTURE & SOIL DIVISION
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

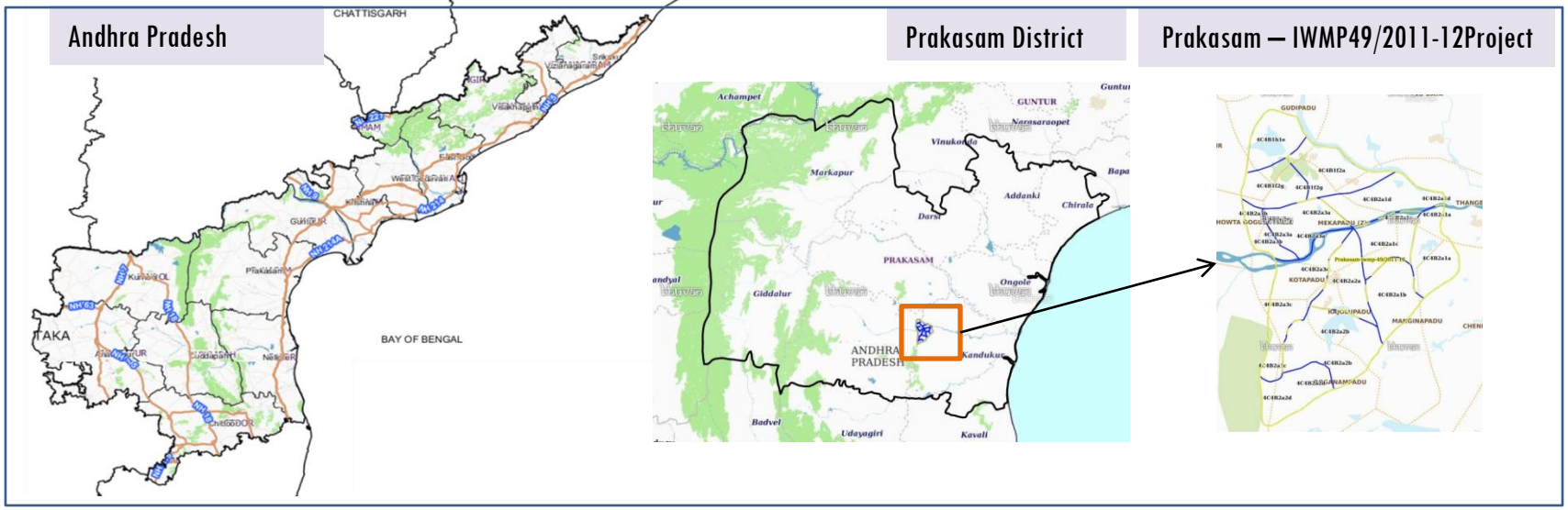
CONTENTS

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-49/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is **5,681** ha. It comprises of 13 micro watersheds.
- In the project area 329 Drishti photos were uploaded showing 31 check dams, 4 Farm ponds/Percolation tanks, 2 checks & plugins and 292 others.
- Water bodies have shown an increased by 82 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 % is covered by the Agriculture, 16% is covered by Scrub, 7 % covered by Water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-49/2011-12
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Ponnaluru Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is **5,681** ha. It comprises of 13 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			05-Feb-20
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			05-Feb-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	329
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

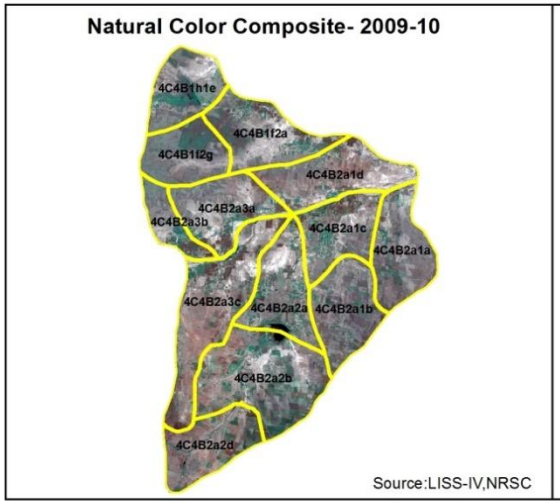
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	0	0
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	2	2
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	4	4
10	Civil work-Check dams/Rock fill dam	31	31
11	Nallah Bunds/Drainage 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	0	0
17	Others	304	292
	TOTAL	**341**	**329**

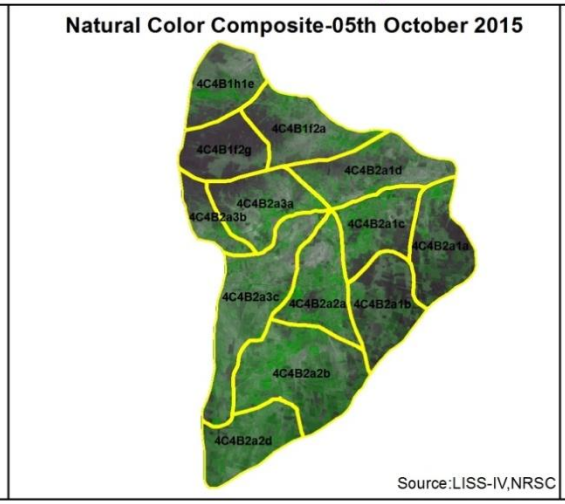
MONITORING IN THE PROJECT AREA

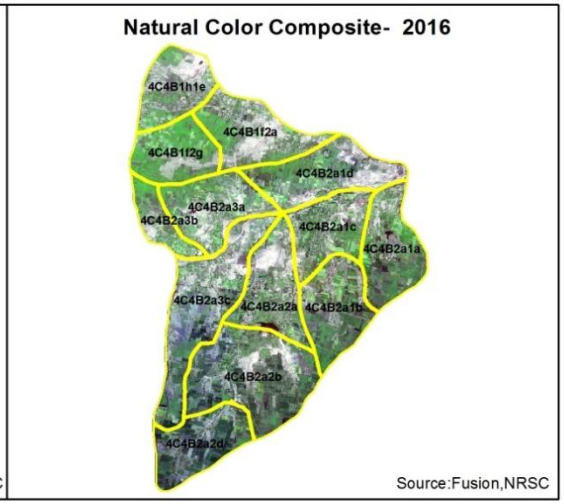
Site Wise Changes in the Project

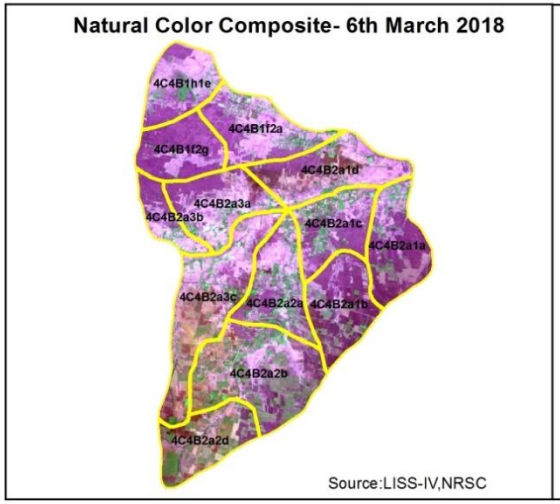
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T0 is the baseline period before implementation (2011-12) and T5 is 2019-20 period for monitoring
- Captures are also provided wherever changes are observed in satellite images, that may match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

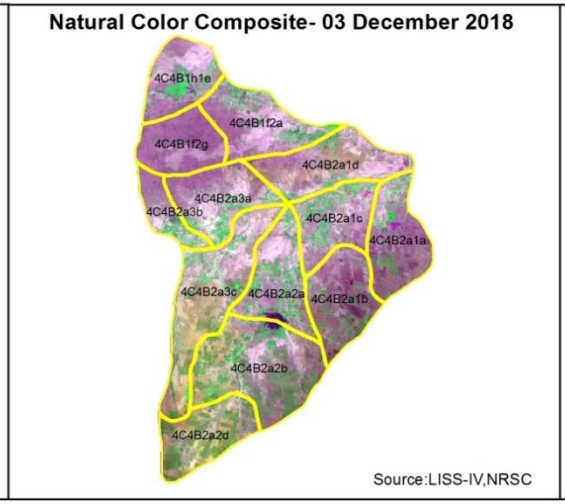
Natural Color Composite

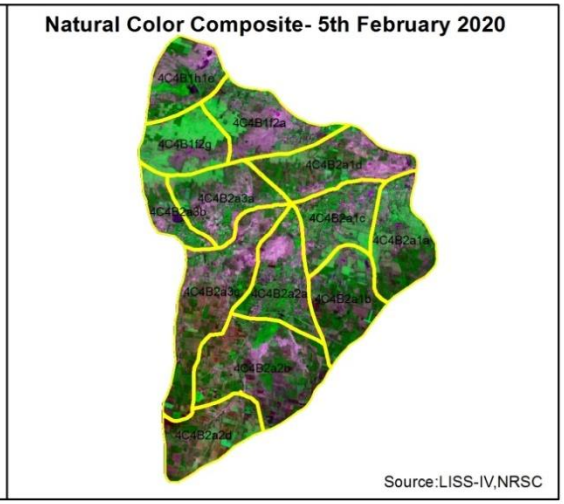






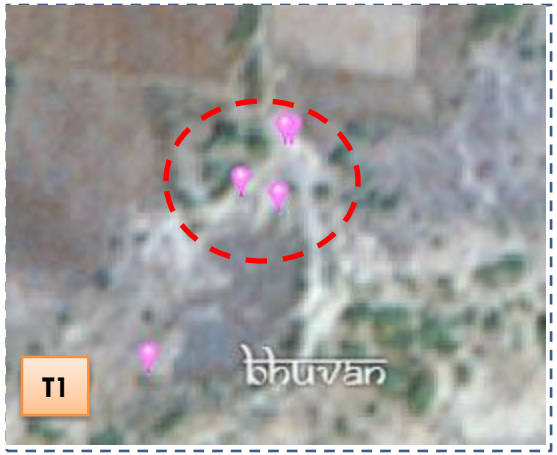






Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-49/2011-12

T0:2011-12



T1: 05 June 2016

Drishti Sl no. 1752646 MWS : 4C4B2a1d

Percolation tank

T0:2011-12

T1: 05 June 2016

Drishti Sl no. 1752651 MWS :4C4B2a1d

Percolation tank

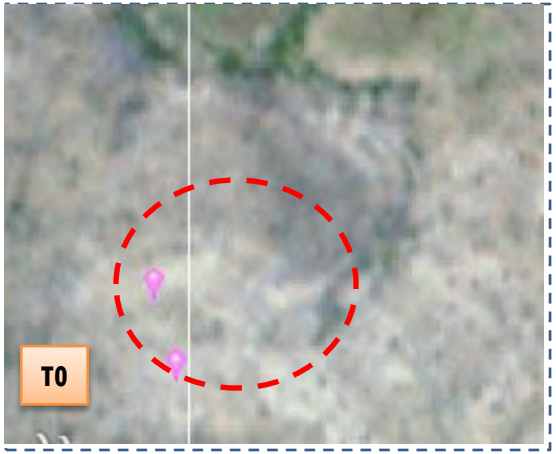
Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-49/2011-12

T0: 2011-12

T1: T1: 05 June 2016

Drishti Sl no1643236 MWS :4C4B2a2b

Farm pond



T0: 2011-12

T1: 05 June 2016

Drishti Sl no. 2261735 MWS : 4C4B2a2b

Tank

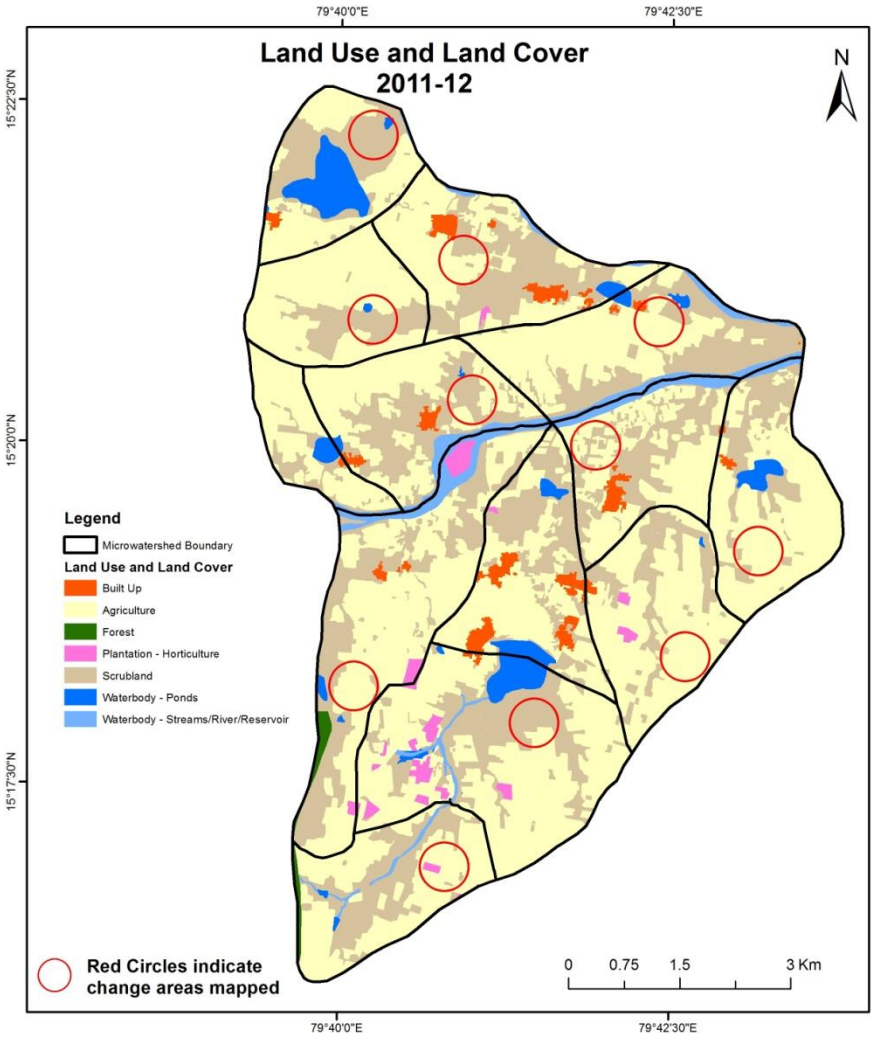
MONITORING IN THE PROJECT AREA

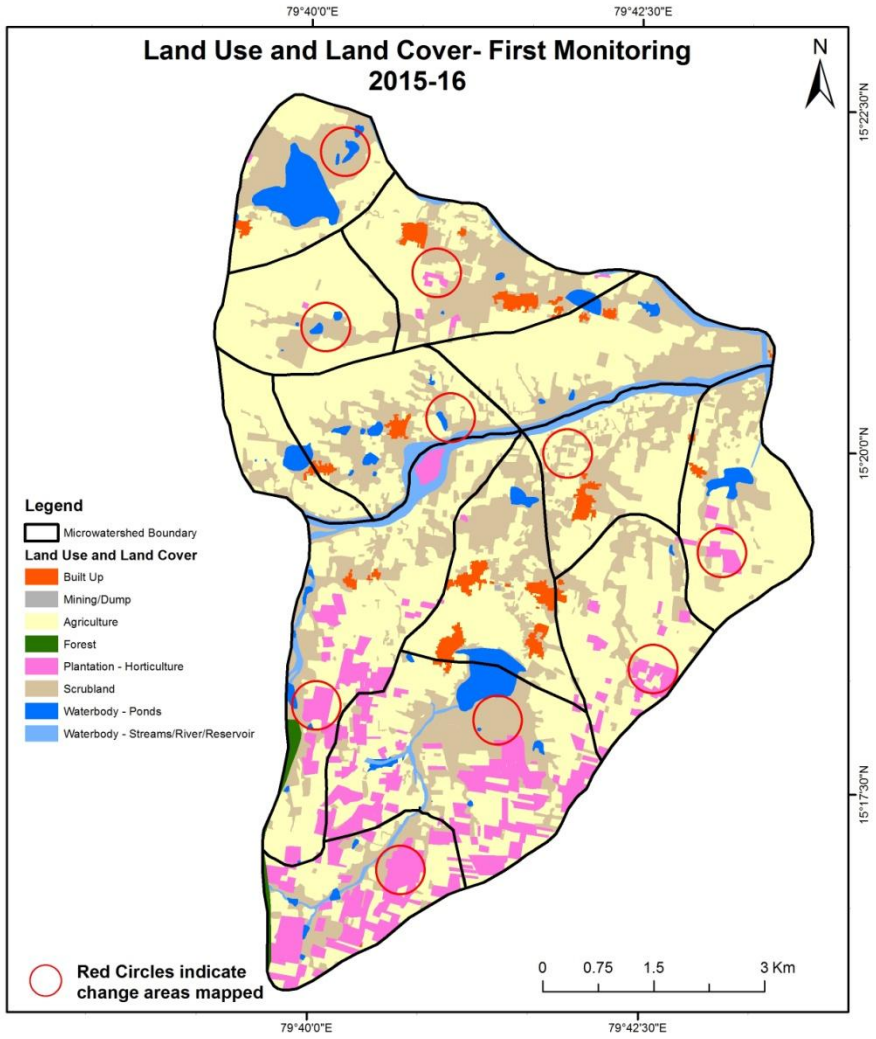
Land use and Land cover Changes in the Project

- 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)

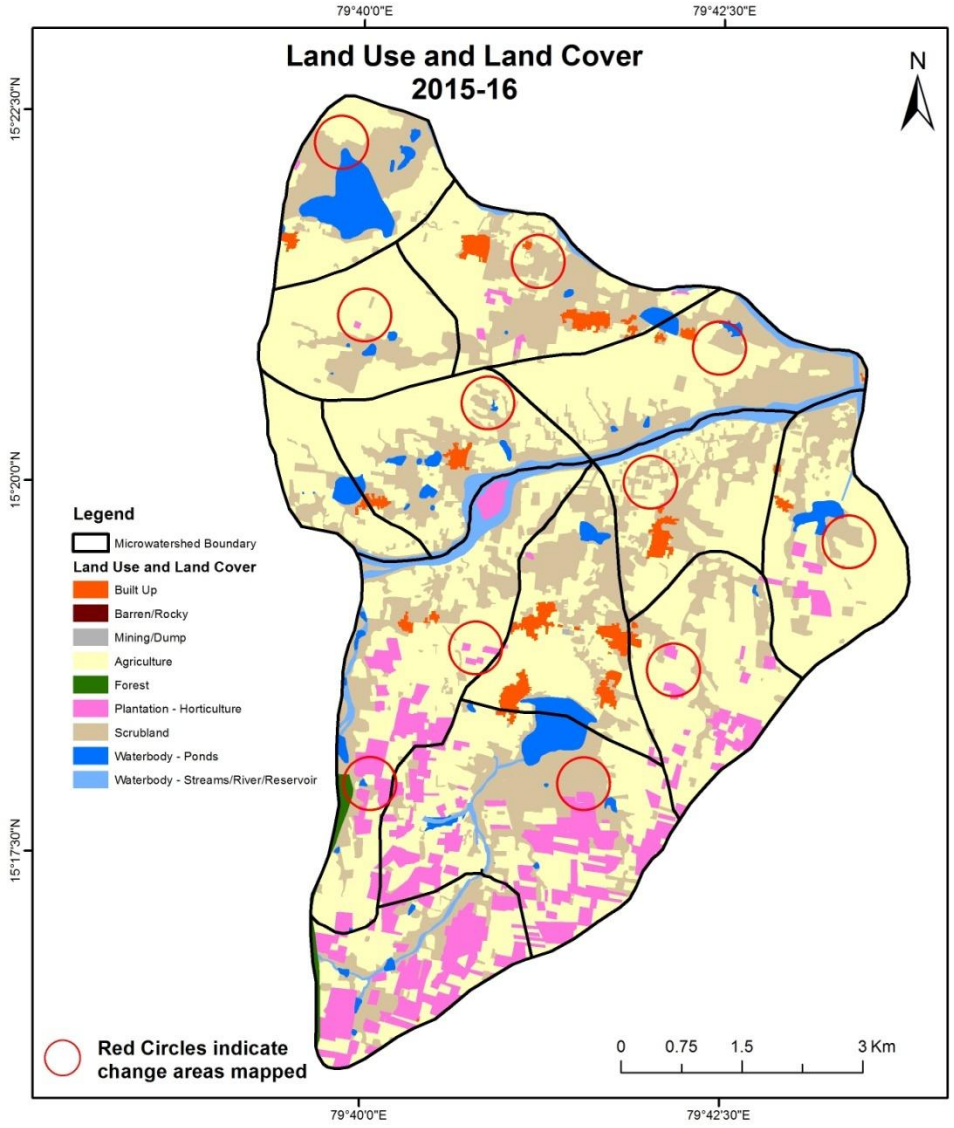
Scale: 1:10000

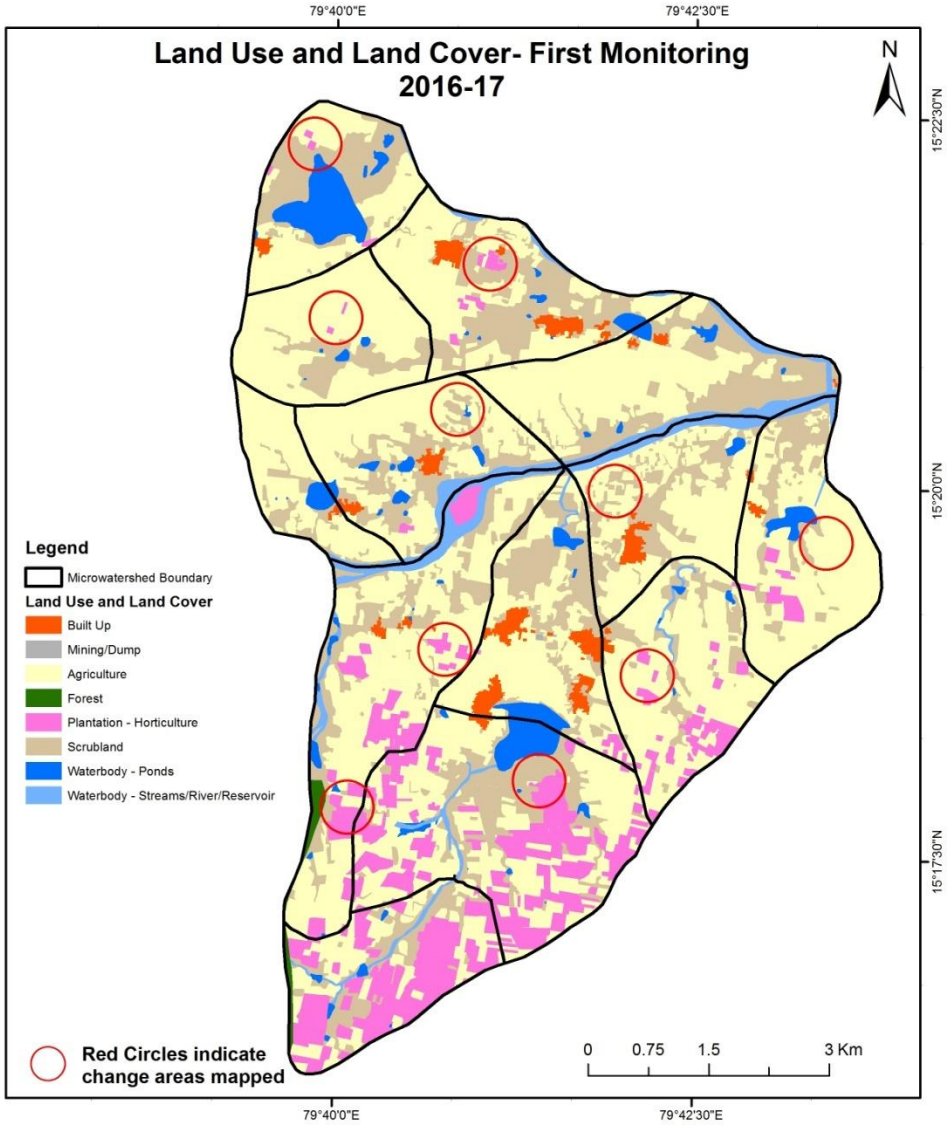




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

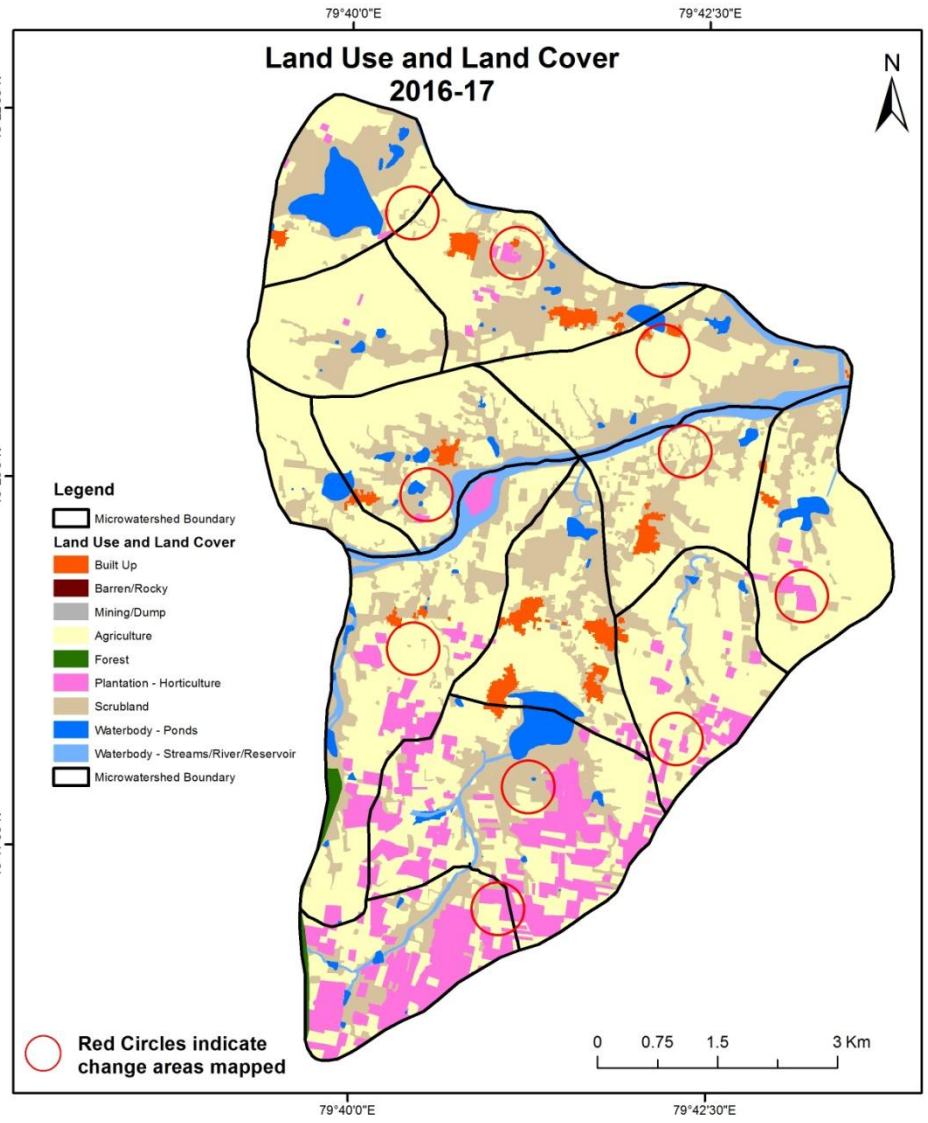
Scale: 1:10000

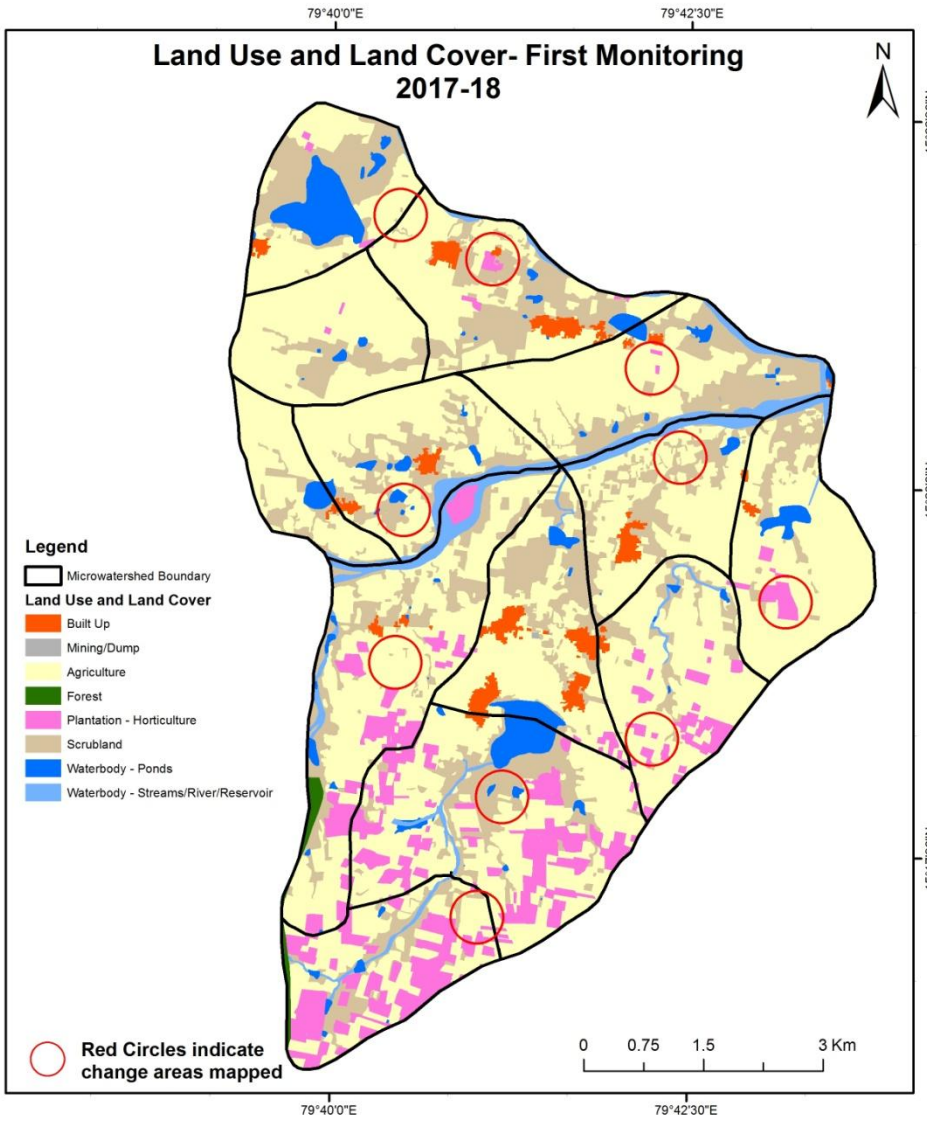




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

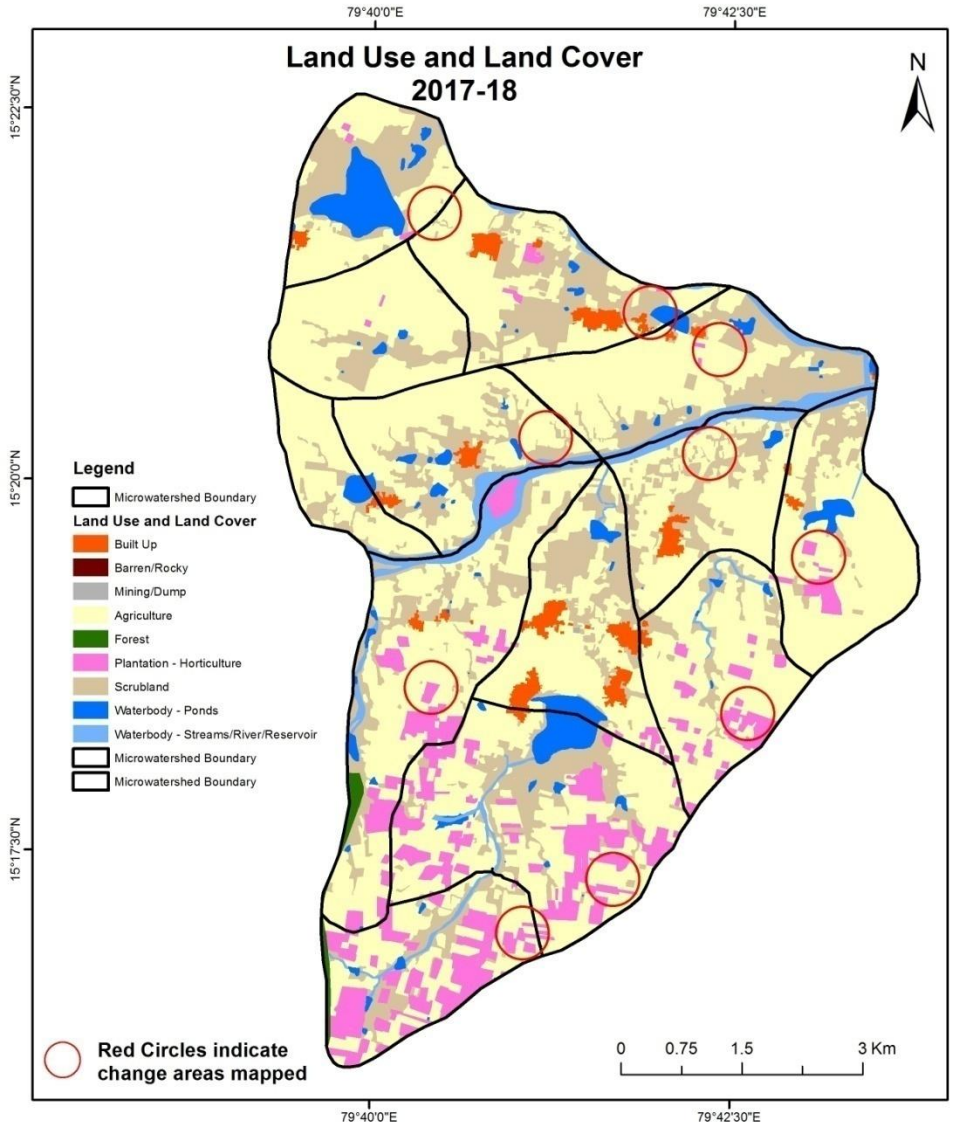
Scale: 1:10000

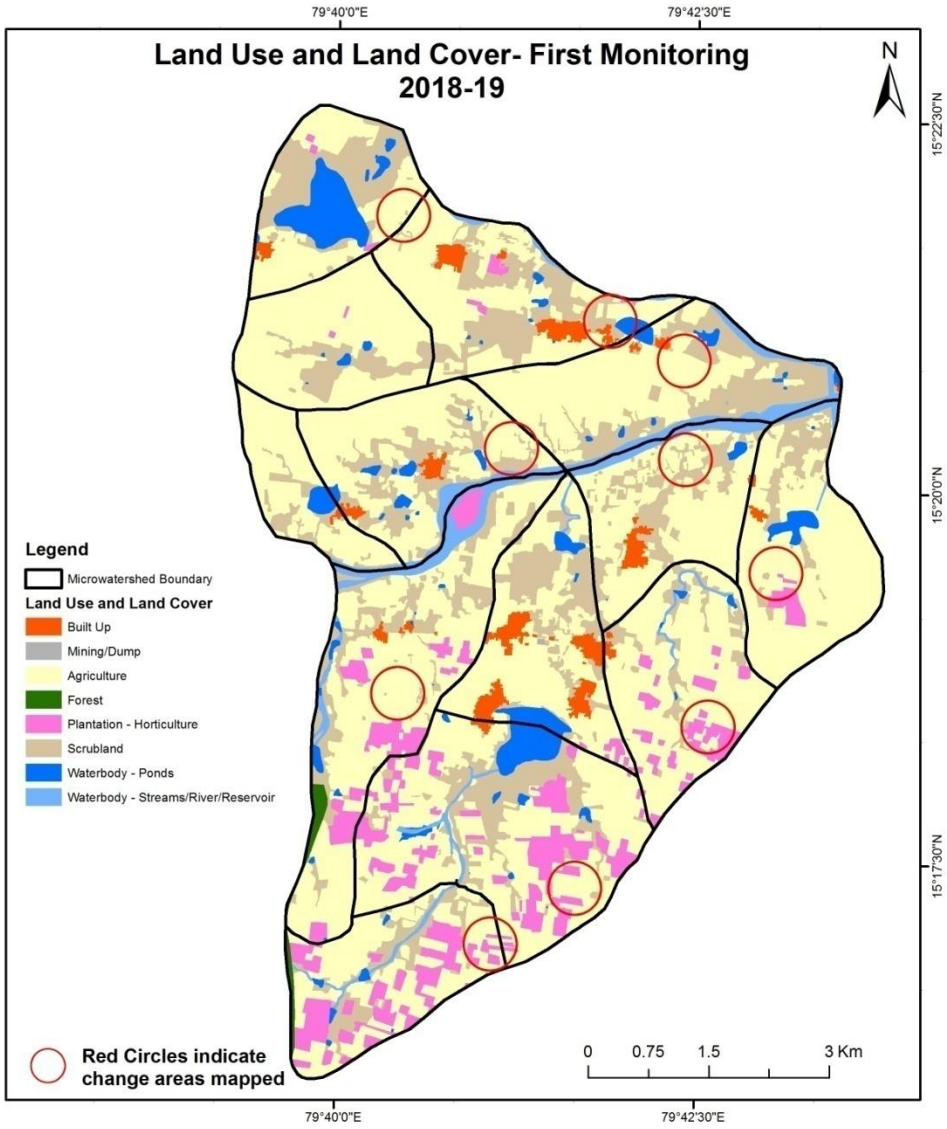




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

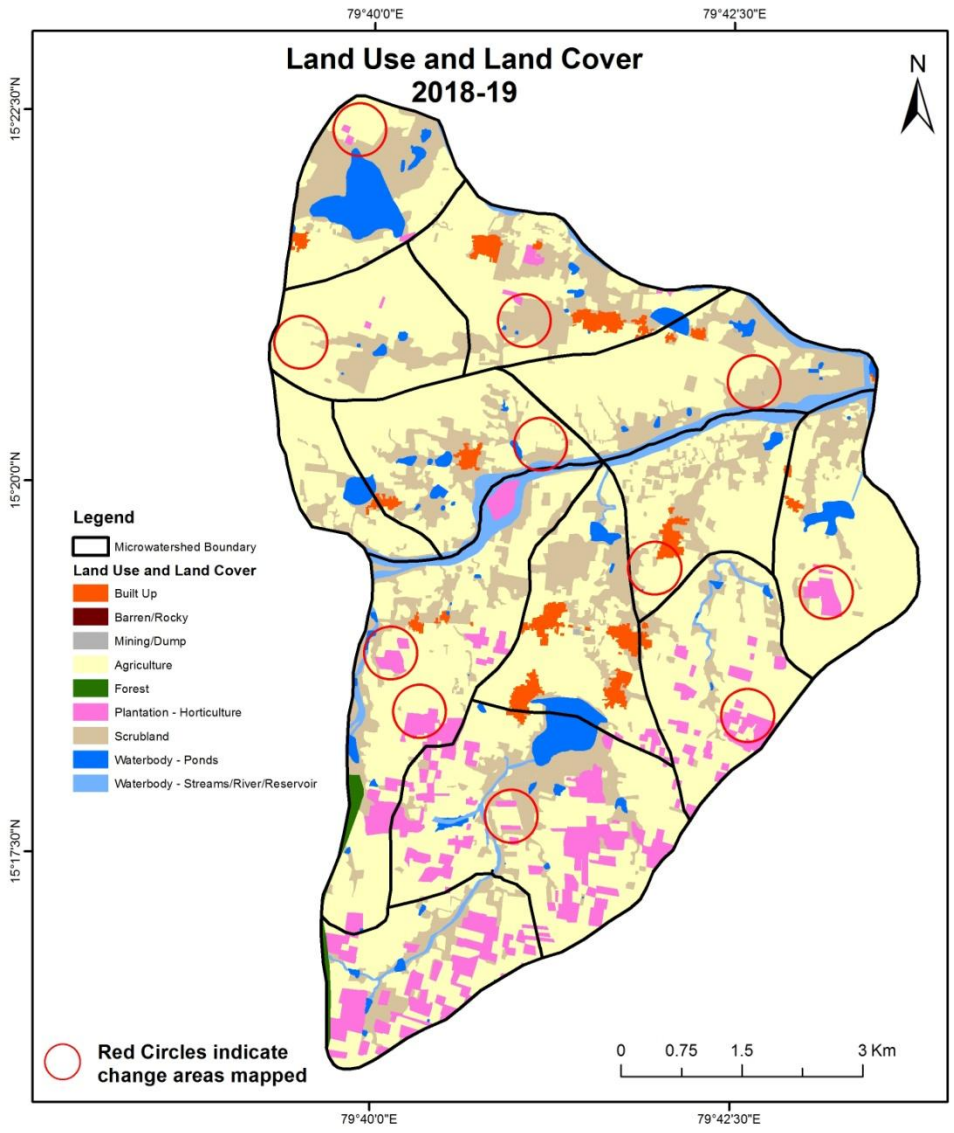
Scale: 1:10000

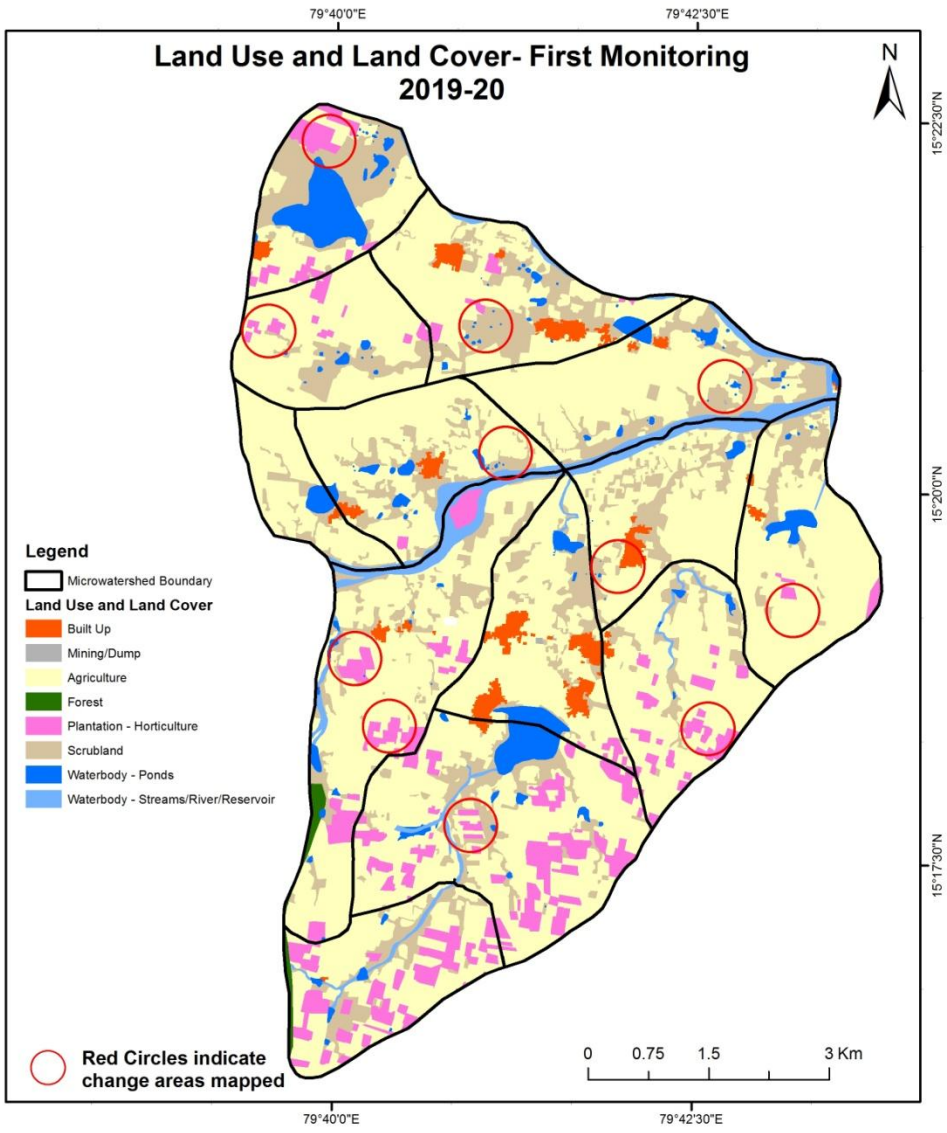




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

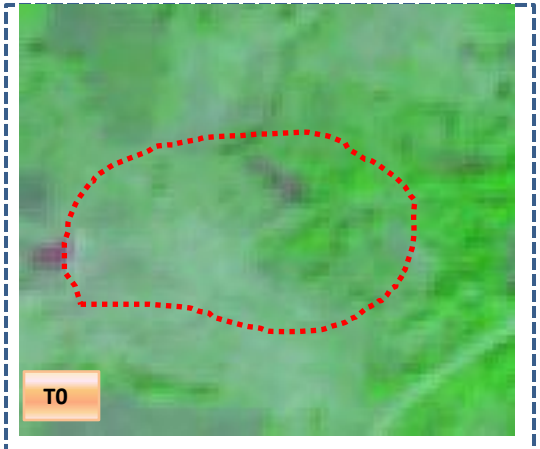
Scale: 1:10000





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

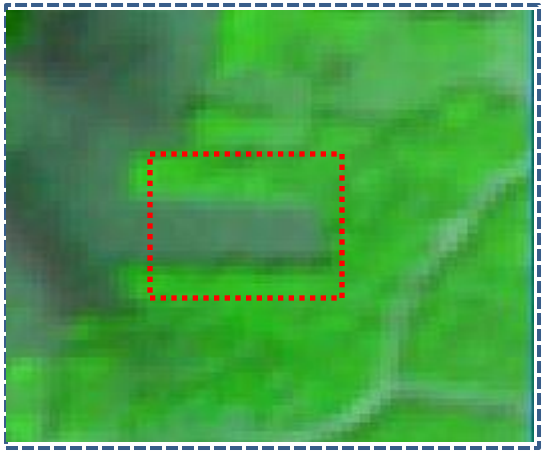
Agriculture to Waterbody



T1: 2011-12 (79°2'2.726"E 15°19'35.389"N)

T2: 05 July 2015

Scrub to Agriculture

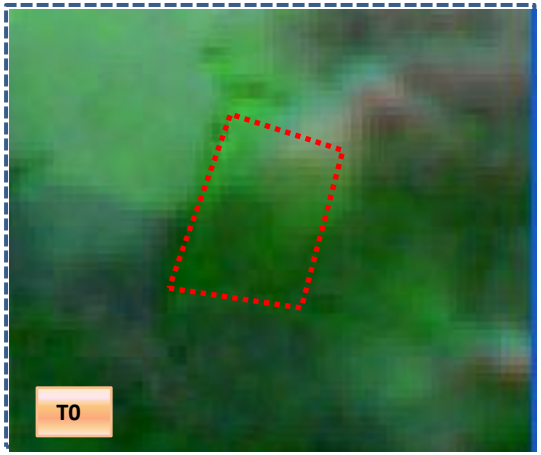


T0: 2011-12 (79°42'4.783"E 15°19'53.1"N)

T1: 05 July 2015

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

Agriculture to Plantation



T0: 2011-12(79°41'0.364"15°17'17.6"N)

T1: 05 July 2015

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	104.00										**104.00**
Mining/dump											
Agriculture	3.63	0.88	2961.30	434.54				1.74	1.94	0.63	**3404.65**
Plantation Horticulture			13.15	48.70							**61.85**
Forest					21.81						**21.81**
Forest Plantation											
Barren Rocky											
Scrub	2.55		175.70	31.76				1485.13	14.04	28.86	**1738.04**
Waterbody-Streams/River									174.41		**174.41**
Waterbody – Ponds			2.22							174.70	**176.92**
Grand Total	**110.18**	**0.88**	**3152.37**	**515.01**	**21.81**			**1486.86**	**190.39**	**204.19**	**5681.69**

- 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 441 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 188 ha of the agriculture area has increased from plantations, scrubland and water body 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	110.05									0.13	**110.18**
Mining/dump		0.88									**0.88**
Agriculture	3.00		3060.87	87.37						1.12	**3152.37**
Plantation Horticulture			42.26	472.75							**515.01**
Forest					21.81						**21.81**
Forest Plantation											
Barren Rocky											
Scrub	1.52		91.09	20.57				1353.32	11.69	8.67	**1486.86**
Waterbody-Streams/River									190.39		**190.39**
Waterbody – Ponds										204.19	**204.19**
Grand Total	**114.57**	**0.88**	**3194.22**	**580.69**	**21.81**			**1353.32**	**202.08**	**214.11**	**5681.69**

• 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 91 ha of the agriculture area has decreased and it is converted into Built-up, plantation and water body in T2.

• In T2 133 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	114.57										**114.57**
Mining/dump		0.88									**0.88**
Agriculture	0.96		3156.84	35.51				0.68		0.23	**3194.22**
Plantation Horticulture			135.99	443.28				1.42			**580.69**
Forest					21.81						**21.81**
Forest Plantation											
Barren Rocky											
Scrub	4.57	0.37	111.69	1.05				1228.06	1.57	6.01	**1353.32**
Waterbody-Streams/River									202.08		**202.08**
Waterbody – Ponds			0.13							213.98	**214.11**
Grand Total	**120.10**	**1.25**	**3404.66**	**479.83**	**21.81**			**1230.17**	**203.65**	**220.22**	**5681.69**

• 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 36 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrubland and water body in T3.

• In T3 247 ha of the agriculture area has increased from plantations, 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-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	120.10										**120.10**
Mining/dump		1.25									**1.25**
Agriculture	0.91		3403.57							0.18	**3404.66**
Plantation Horticulture			77.47	402.37							**479.83**
Forest					21.81						**21.81**
Forest Plantation											
Barren Rocky											
Scrub			52.00					1178.17			**1230.17**
Waterbody-Streams/River									203.65		**203.65**
Waterbody – Ponds										220.22	**220.22**
Grand Total	**121.01**	**1.25**	**3533.03**	**402.37**	**21.81**			**1178.17**	**203.65**	**220.39**	**5681.69**

- 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 1.09 ha of the agriculture area has decreased and it is converted into Built-up and water body in T4.
- In T4 129 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	120.98									0.03	**121.01**
Mining/dump		1.25									**1.25**
Agriculture	0.88	1.53	3443.94	85.03						1.65	**3533.03**
Plantation Horticulture			62.26	340.05						0.05	**402.37**
Forest					21.40					0.41	**21.81**
Forest Plantation											
Barren Rocky											
Scrub	3.28		210.98	0.59				955.50		7.82	**1178.17**
Waterbody-Streams/River									203.65		**203.65**
Waterbody – Ponds										220.39	**220.39**
Grand Total	**125.14**	**2.78**	**3717.19**	**425.67**	**21.40**			**955.50**	**203.65**	**230.36**	**5681.69**

• 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 89 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantations and water body in T5.

•In T5 273 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 82 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 41, 210, 128 & 184 Hectares From T1 to T2, T2-T3, T3-T4 & T4-T5 respectively and overall increase of 312 Hectares in Crop land area as compared between baseline LU/LC data 2011-12 (T0) & 2019-20 (T5) years.
5. There is an increase of 363 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 782 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (7) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (7) verified from the portal.