MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -33/2011-12
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
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

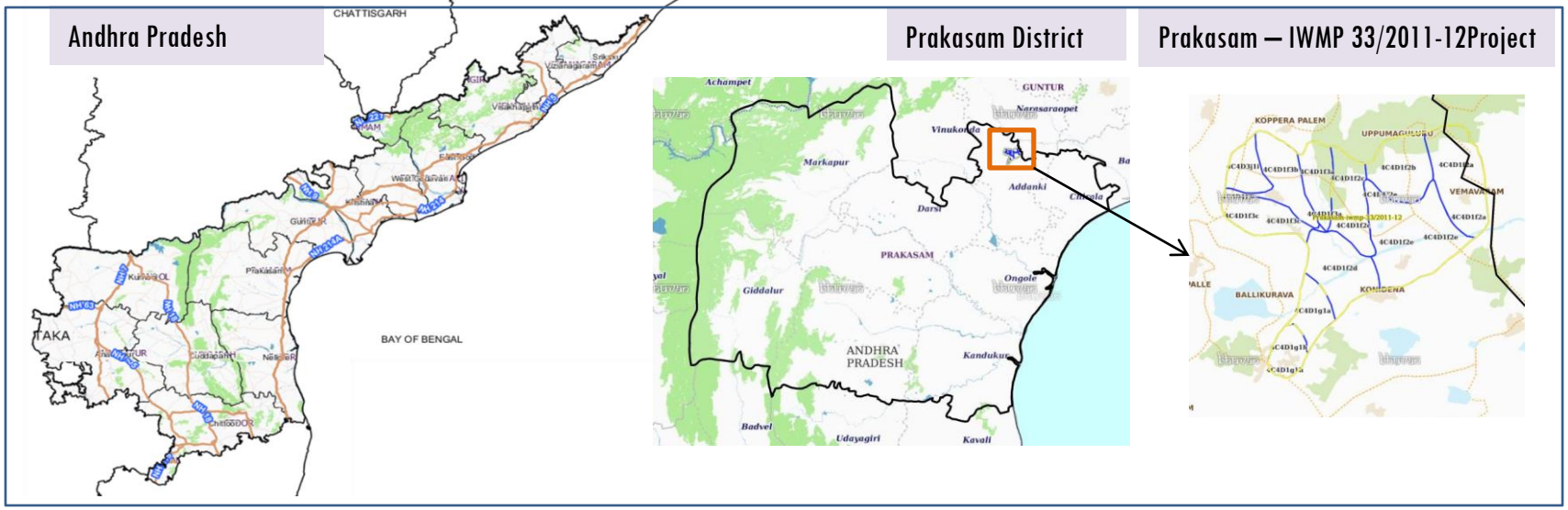
CONTENTS

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-33/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is **3079.23** ha. It comprises of 11 micro watersheds.
- In the project area 320 Drishti photos were uploaded showing 20 check dams, 1 Farm ponds/Percolation tanks, 33 agriculture, 2 entry point activity, 10 livelihood activities and 235 others.
- Major percentage i.e. 66.3 % is covered by the agriculture, 14% is covered by Plantation, 9.5% covered by scrub land and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-33/2011-12
DISTRICT : PRAKASAM, STATE : ANDHRA PRADESH

- The study area falls in Ballikurava Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is **3079.23** ha. It comprises of 11 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.

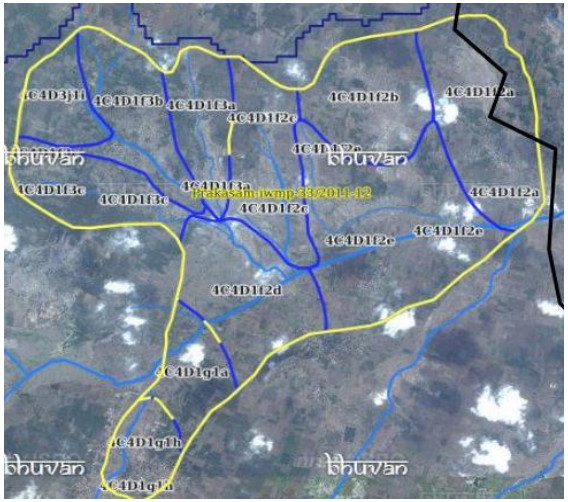
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			28-Aug-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			28-Aug-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	301
4	Detailed Project Report		

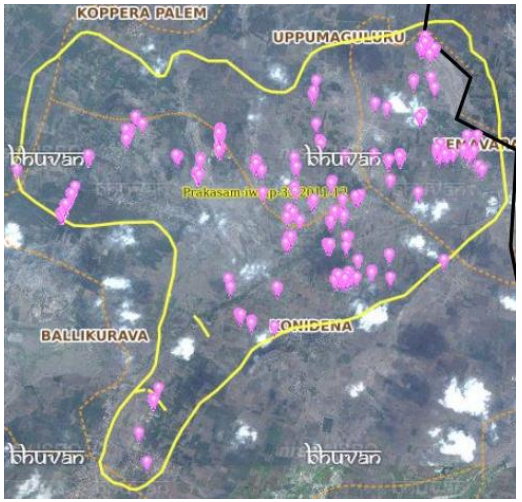
Natural Color Composite overlaid with Project boundaries and high detail stream network



Legend

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

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

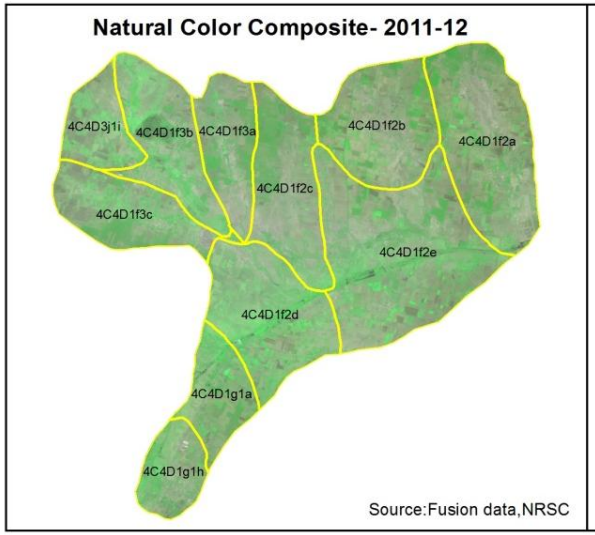
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	33	33
2	Afforestation	0	0
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	5	4
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	1	1
10	Civil work-Check dams/Rock fill dam	16	16
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	15	10
15	Capacity Building Activities	0	0
16	Entry Point Activity	2	2
17	Others	248	235
	TOTAL	**320**	**301**

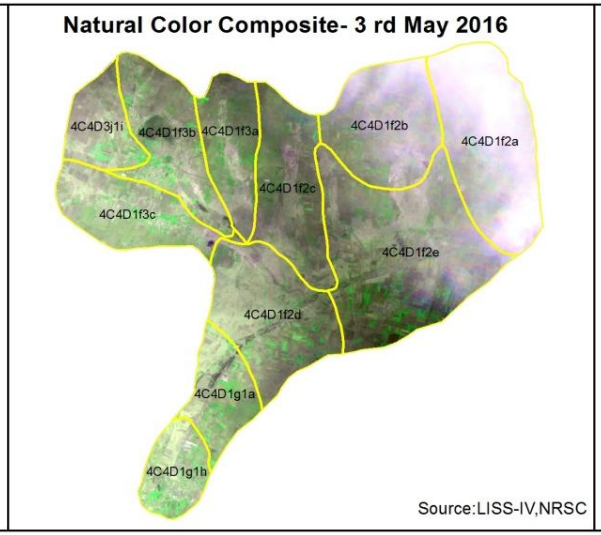
MONITORING IN THE PROJECT AREA

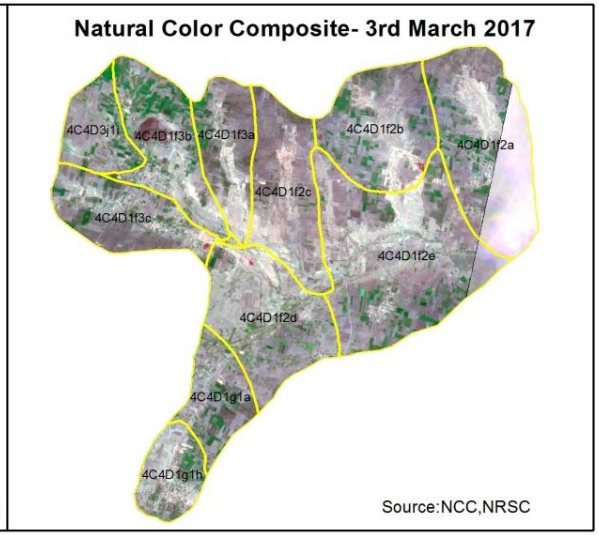
Site Wise Changes in the Project

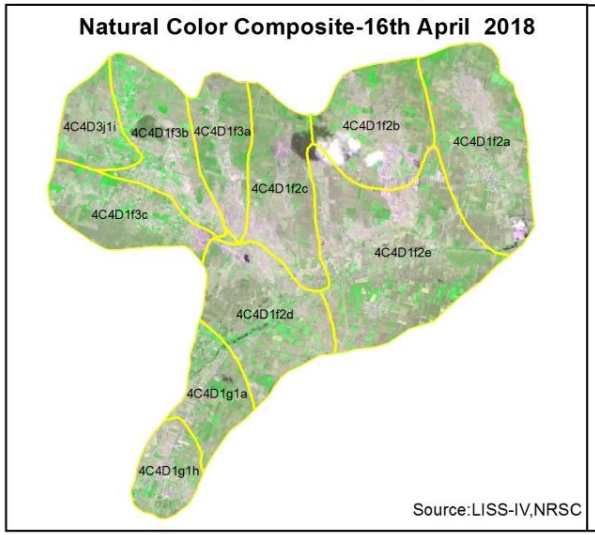
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T0 is the baseline period before implementation (2011-12) and T5 is 2019-20 period for monitoring
- Captures are also provided wherever changes are observed in satellite images, that may match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

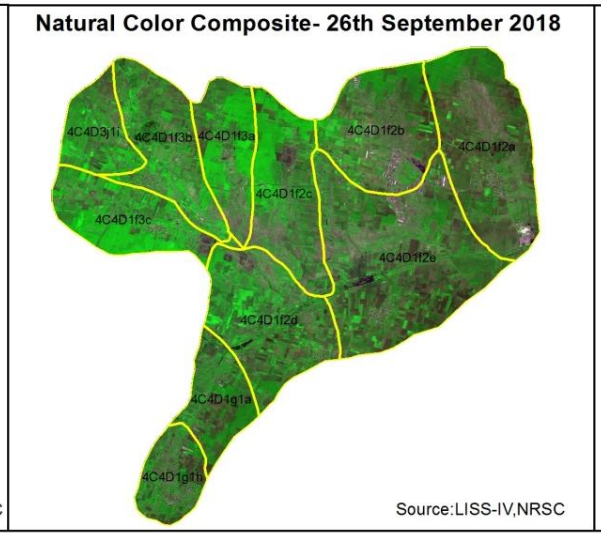
Natural Color Composite

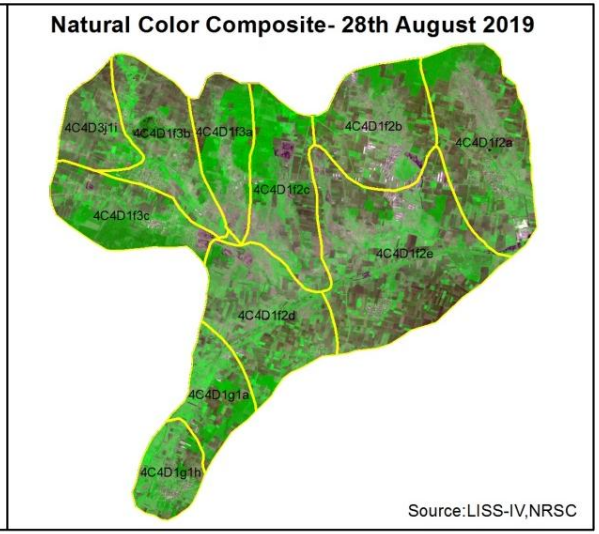












Monitoring of activities in Prakasam District , Andhra Pradesh. IWMP-33/2011-12

T0:2011-12

T1: 03 May 2016

Drishti Sl no. 7013326 MWS :4C4D1f2b

Farm pond

T0:2011-12

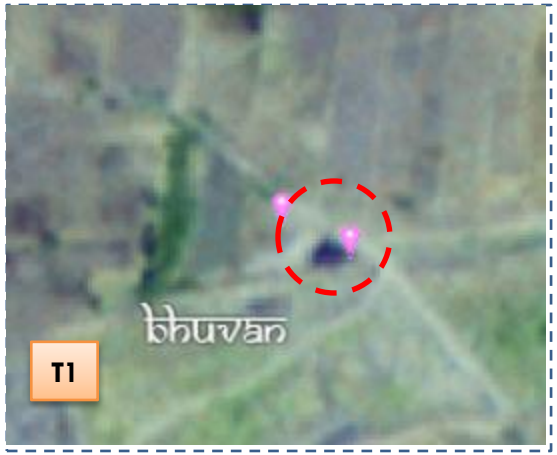
T1: 03 May 2016

Drishti Sl no. 7028345 MWS : 4C4D1l2e

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-33/2011-12

T0: 2011-12



T1: 03 May 2016

Drishti Sl no. 2486460_ MWS :4C4D1l2e

Mini Percolation tank

T0: 2011-12

T1: 03 May 2016

Drishti Sl no. 692707 MWS :4C1C2d3g

Percolation tank

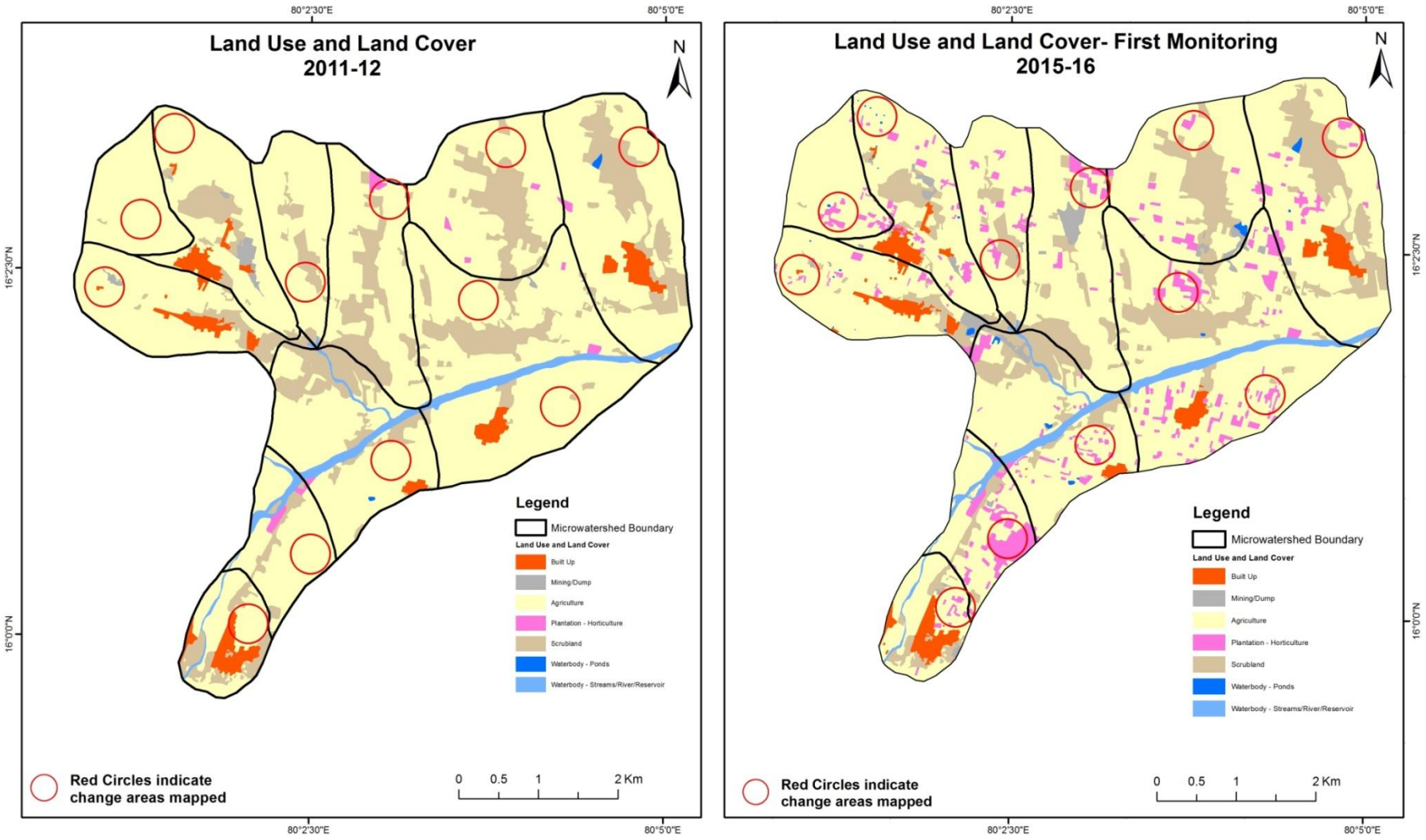
MONITORING IN THE PROJECT AREA

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) .

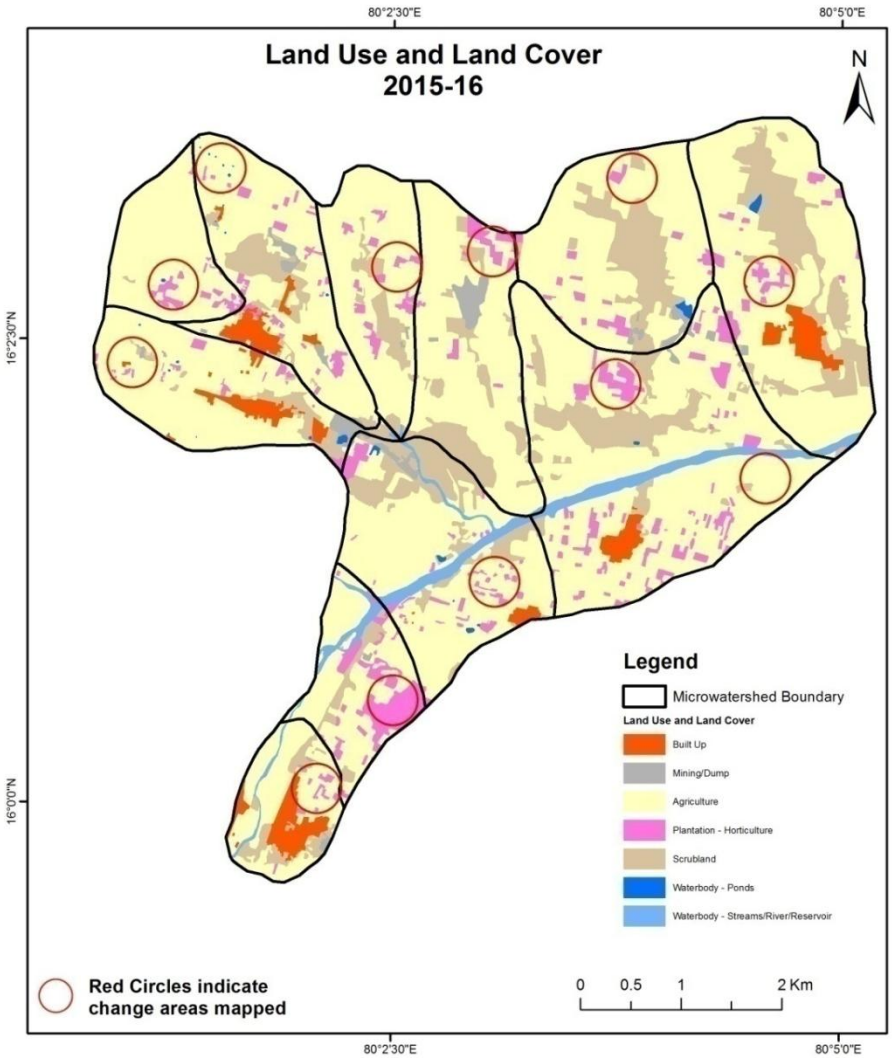
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

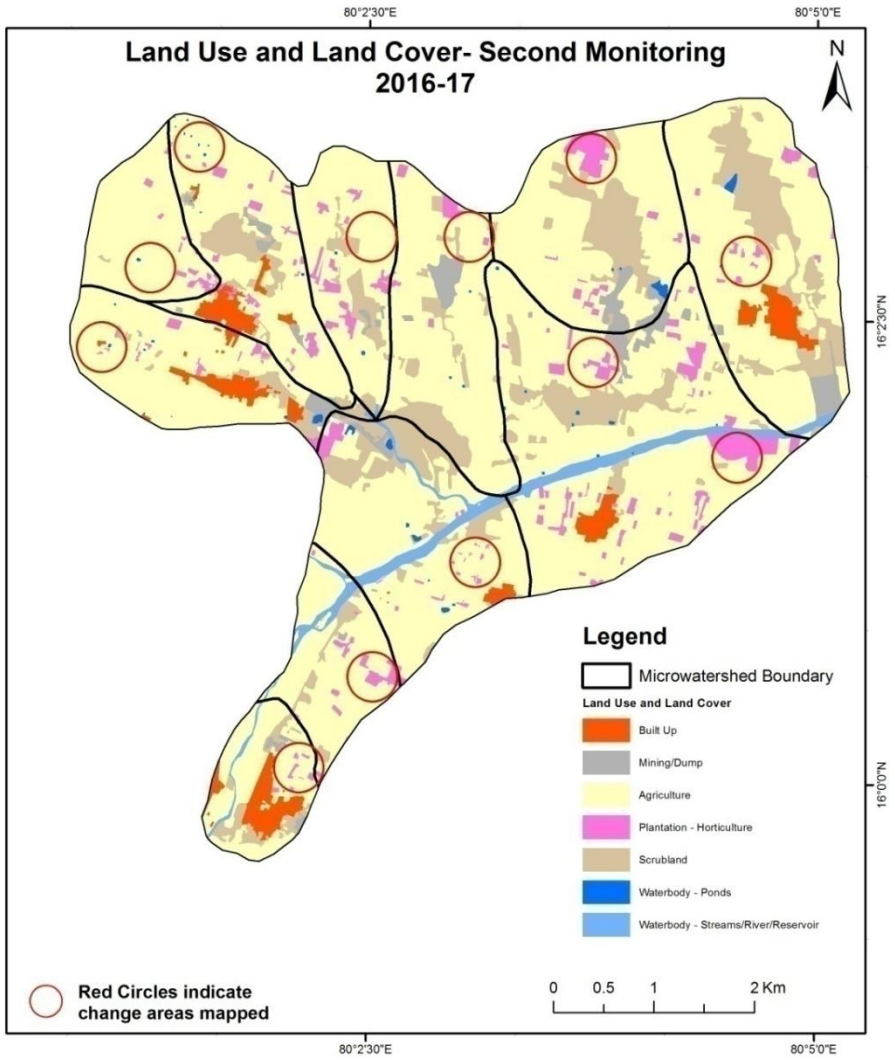
Scale: 1:10000



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

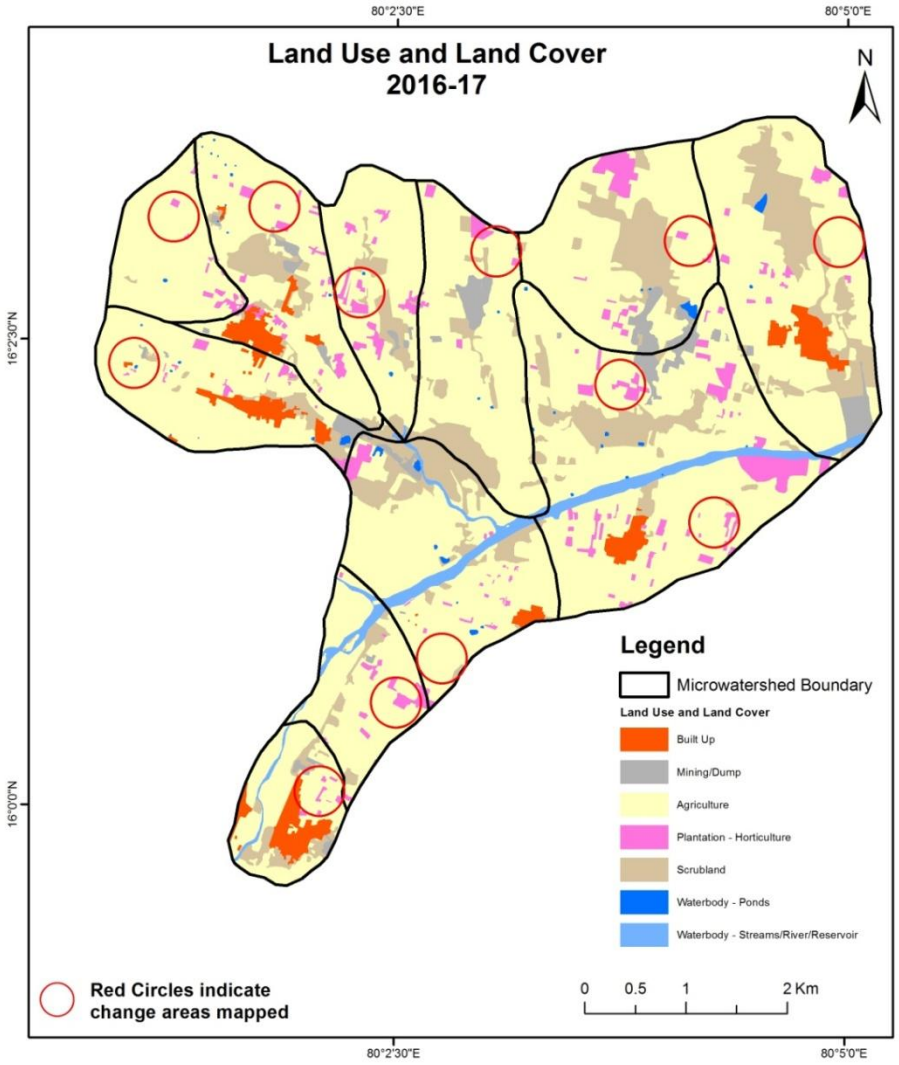
Scale: 1:10000

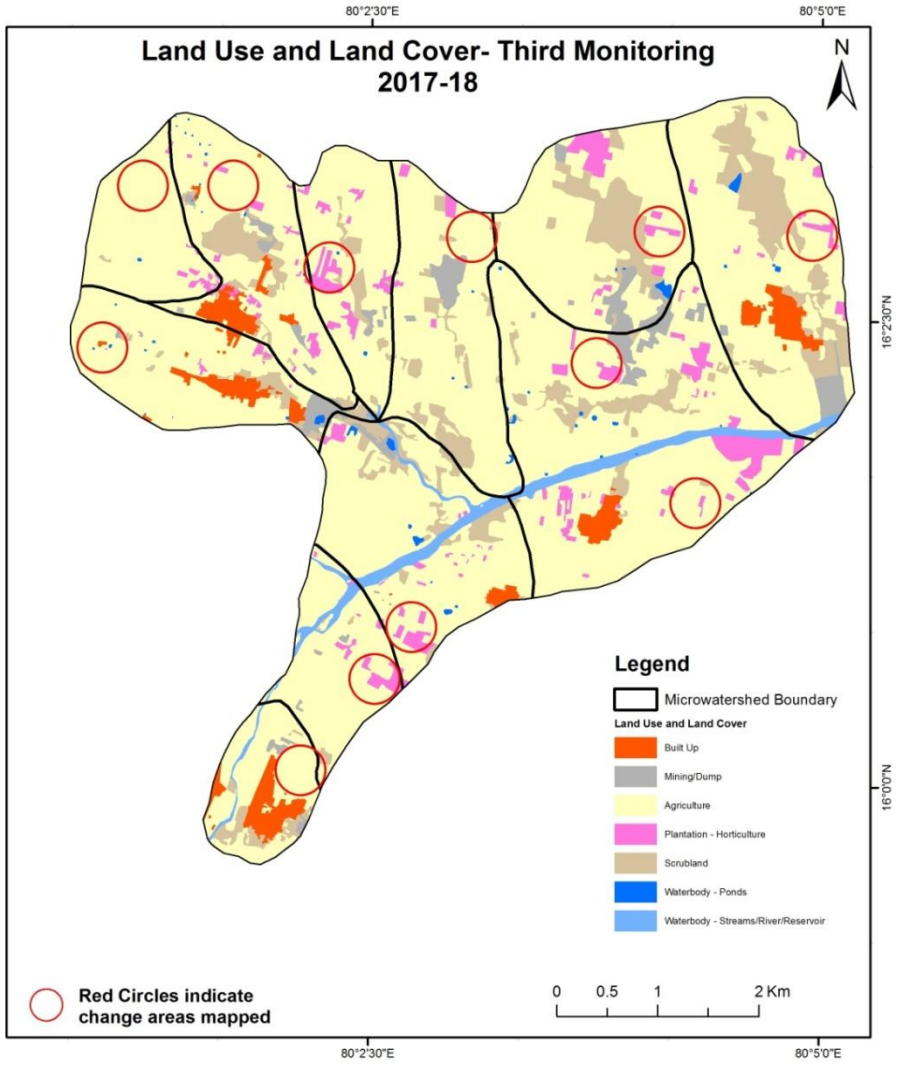




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

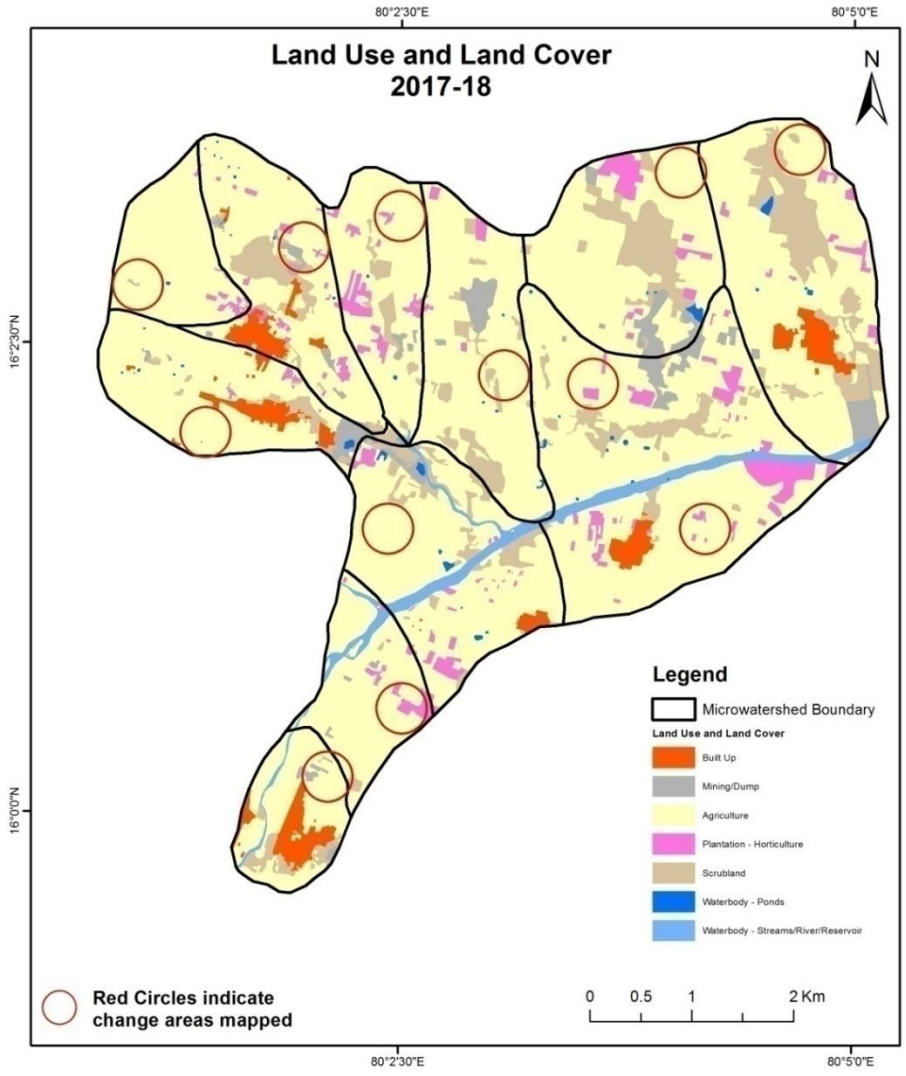
Scale: 1:10000

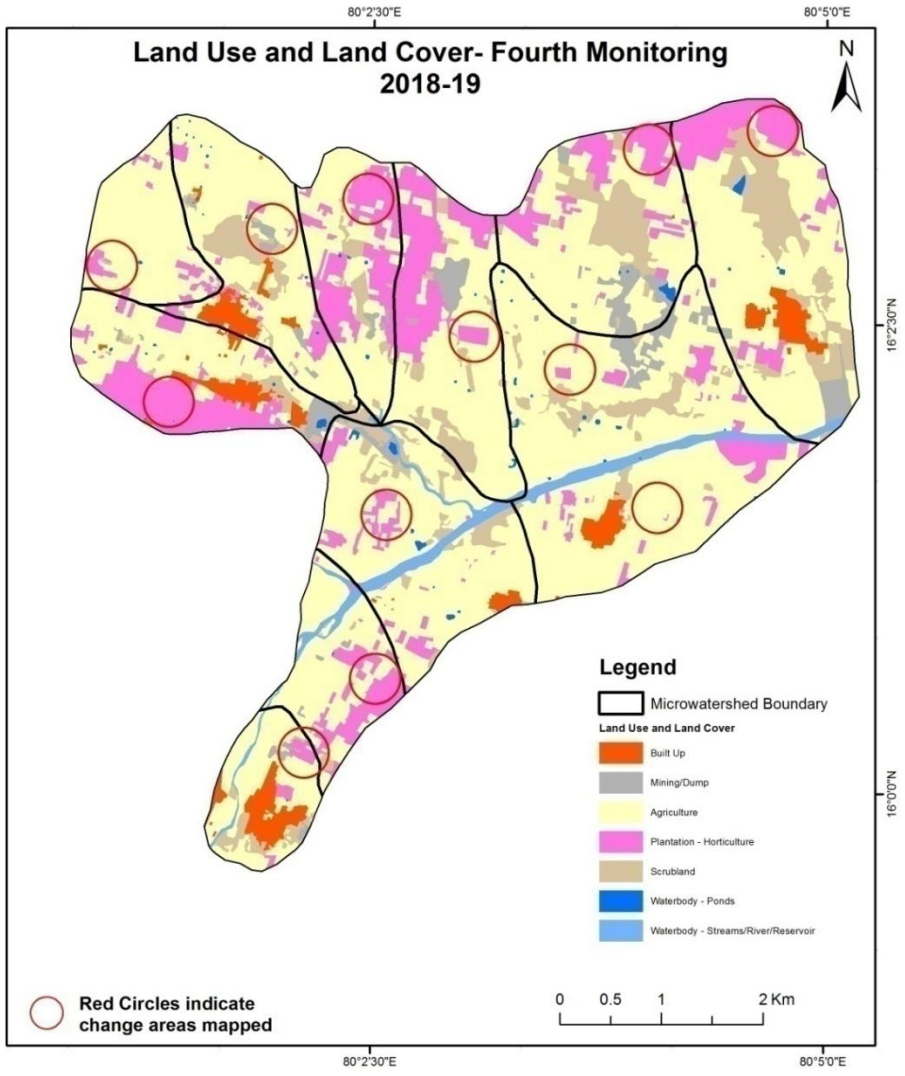




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

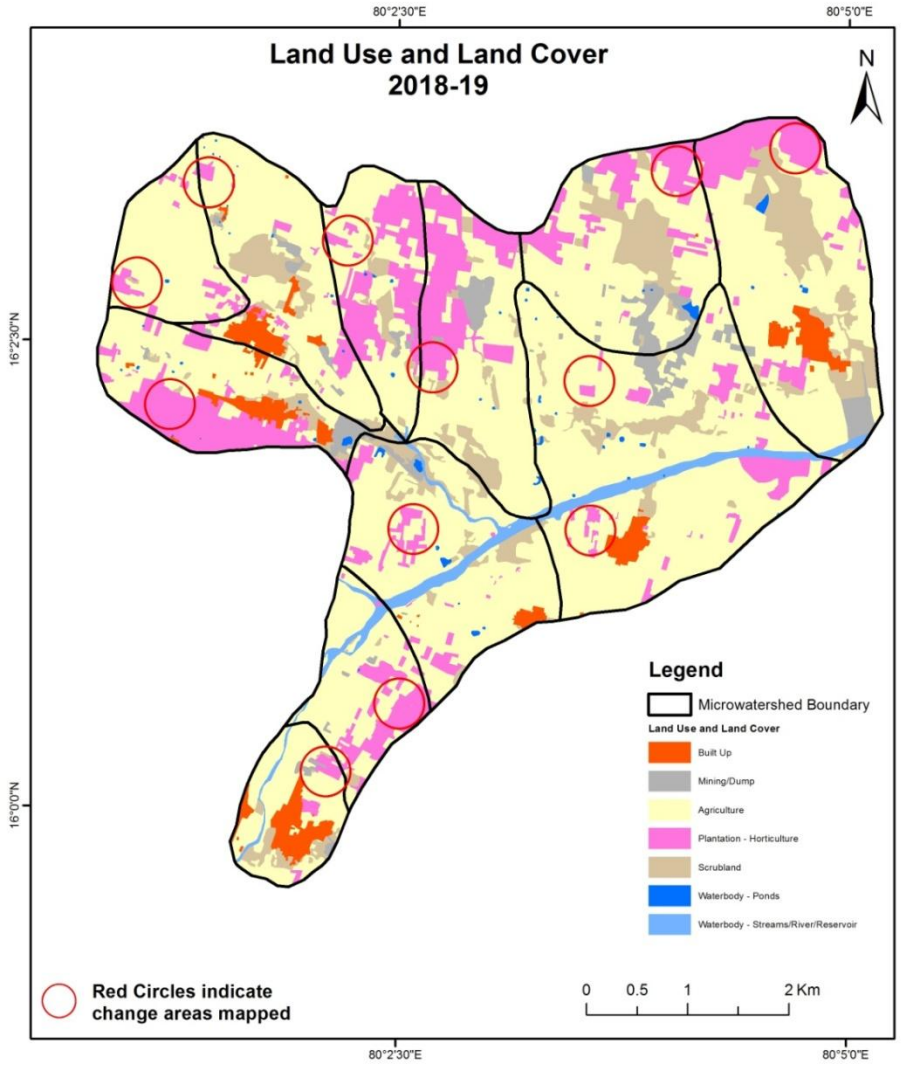
Scale: 1:10000

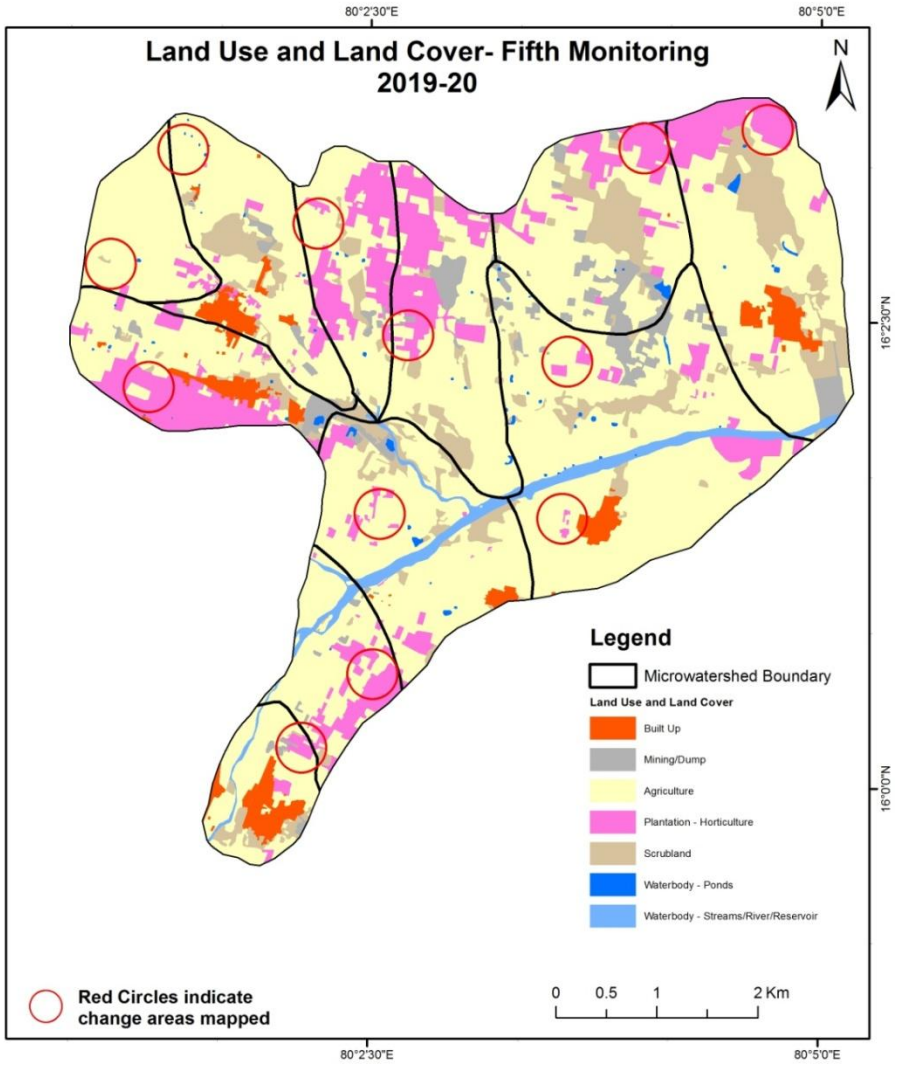




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

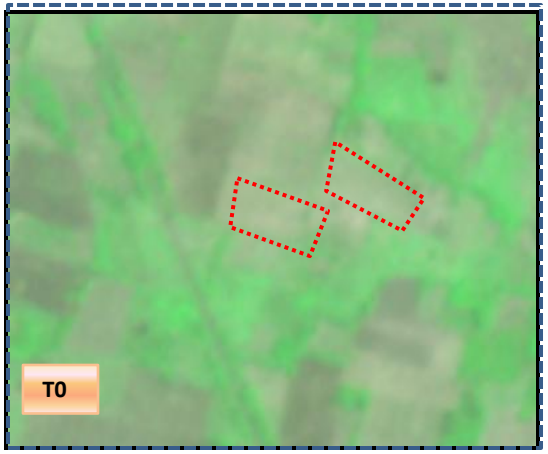
Scale: 1:10000



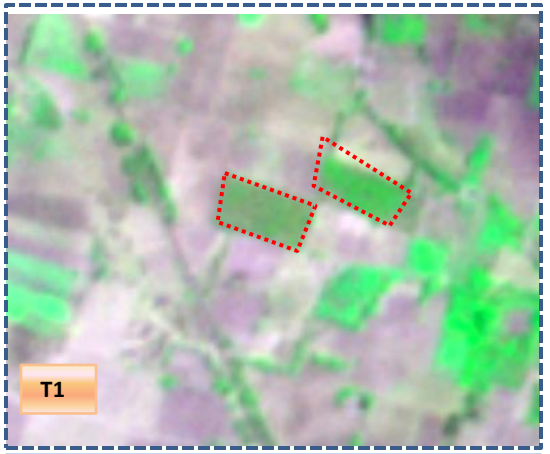


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

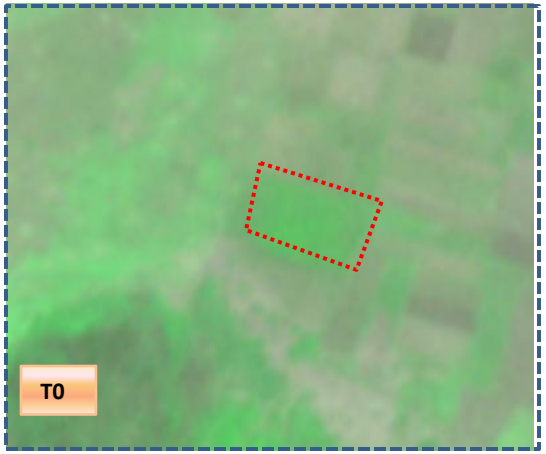


T0: 2011-12(80°1'24.647"E 16°2'43.382"N)

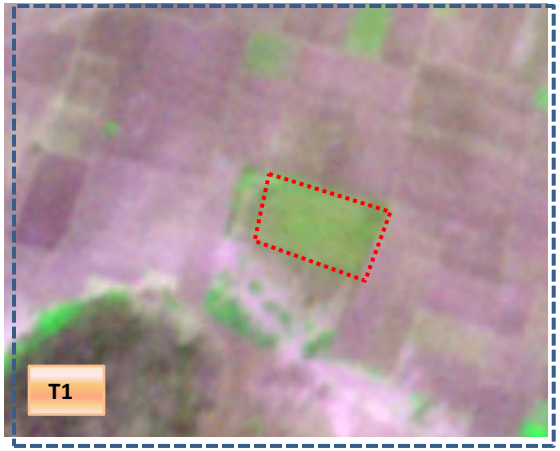


T1: 03rd May 2016

Agriculture to Plantation



T0: 2011-12 (80°1'51.517"E 16°3'5.803"N)

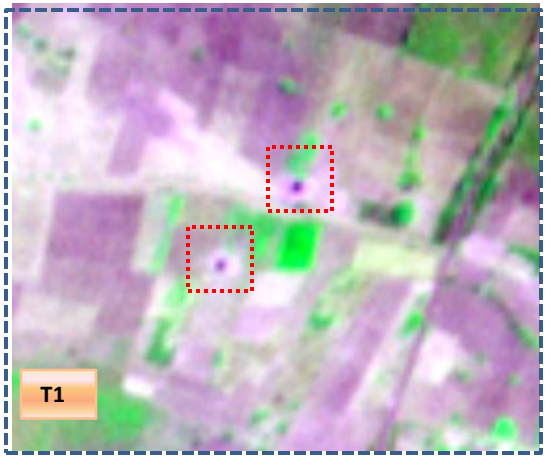


T1: 03rd May 2016

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

Agriculture to water body

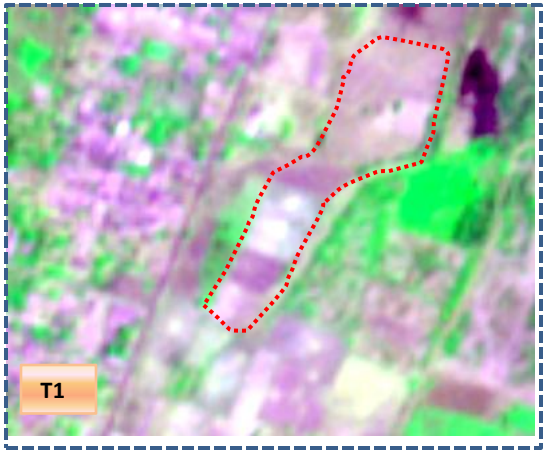
T0: 2011-12(80°1'18.887"E 16°2'19.592"N)



T1: 03rd May 2016

Scrub to Agriculture

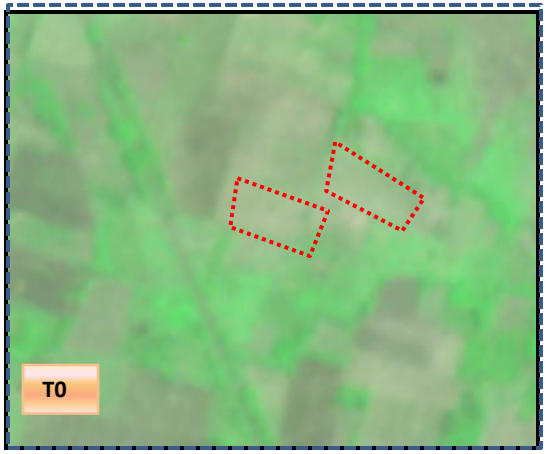
T0: 2011-12(80°1'16.479"E 16°2'20.442"N)



T1: 03rd May 2016

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

Agriculture to Plantation



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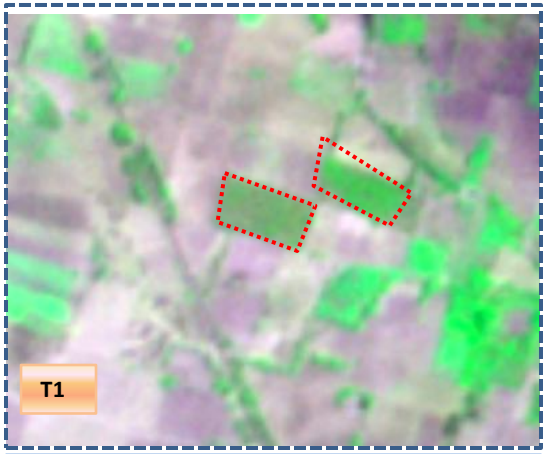

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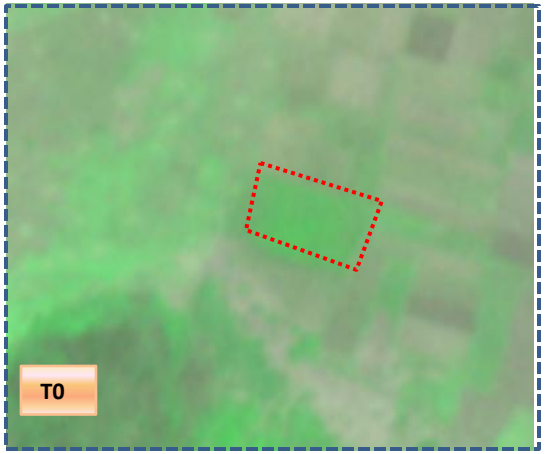

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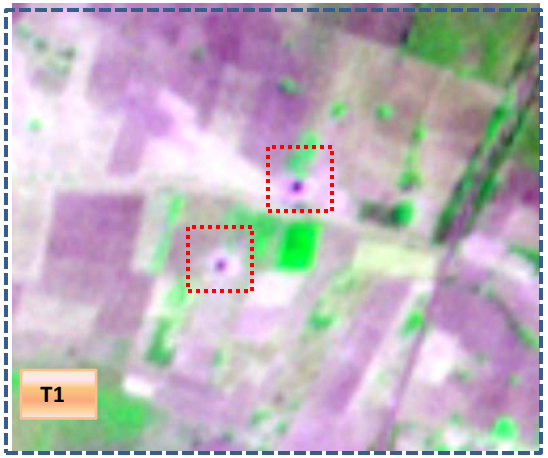

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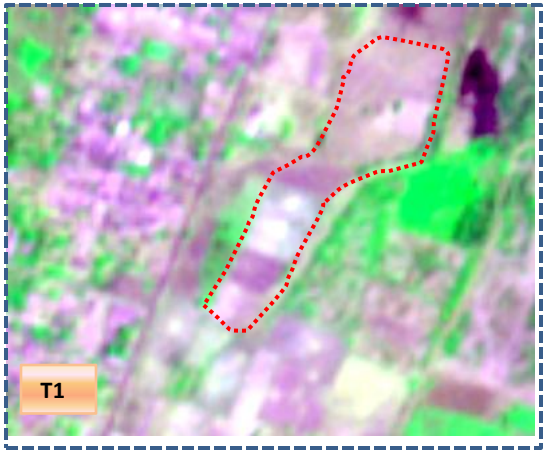

T1: 03rd May 2016

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	92.89								0.04		**92.94**
Mining/dump		4.16	7.04					1.36			**12.57**
Agriculture	3.40	9.38	2164.70	171.00					1.70		**2350.18**
Plantation Horticulture		0.49	1.83	12.83							**15.15**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.50	28.86	43.08	0.46				461.31	3.04		**537.24**
Waterbody-Streams/River			0.95	0.30						68.30	**69.56**
Waterbody – Ponds									1.71		**1.71**
Grand Total	**96.79**	**42.89**	**2217.60**	**184.59**				**462.67**	**6.49**	**68.30**	**3079.34**

- 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 185 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T1.
- In T1 52 ha of the agriculture area has increased from mining/dump, 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	96.79										**96.79**
Mining/dump		42.89									**42.89**
Agriculture	1.23	18.11	2157.65	38.22					1.21	1.13	**2217.60**
Plantation Horticulture	0.15	0.39	94.55	89.50							**184.59**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	1.12	17.07	30.81					412.71	0.96		**462.67**
Waterbody-Streams/River									0.03	68.27	**68.30**
Waterbody – Ponds									6.49		**6.49**
Grand Total	**99.29**	**78.47**	**2283.00**	**127.73**				**412.71**	**8.70**	**69.40**	**3079.34**

- 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 59 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation and water body in T2.
- In T2 125 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	99.29										**99.29**
Mining/dump		78.47									**78.47**
Agriculture	1.98	7.36	2242.34	30.47						0.85	**2283.00**
Plantation Horticulture			33.34	94.22							**127.73**
Forest											
Forest Plantation											
Barren Rocky											
Scrub		3.97	91.46	0.53				315.63		1.11	**412.71**
Waterbody-Streams/River									69.40		**69.40**
Waterbody – Ponds										8.70	**8.70**
Grand Total	**101.27**	**89.80**	**2367.15**	**125.22**				**315.63**	**69.40**	**10.66**	**3079.34**

- 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 40 ha of the agriculture area has decreased and it is converted into Built-up , plantations and water body in T3.
- In T3 124 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	101.27										**101.27**
Mining/dump		89.80									**89.80**
Agriculture	2.27	4.77	1983.60	375.91						0.59	**2367.15**
Plantation Horticulture			17.79	107.43							**125.22**
Forest											
Forest Plantation											
Barren Rocky											
Scrub		4.70	1.34	9.06				300.35		0.17	**315.63**
Waterbody-Streams/River									69.40		**69.40**
Waterbody – Ponds										10.66	**10.66**
Grand Total	**103.54**	**99.28**	**2002.73**	**492.41**				**300.35**	**69.40**	**11.42**	**3079.34**

- 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 383 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 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	103.54										**103.54**
Mining/dump		98.75						0.53			**99.28**
Agriculture	0.78	20.52	1961.23	18.86					1.34		**2002.73**
Plantation Horticulture	0.07	0.65	77.88	413.81							**492.41**
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.21	3.40	3.50					293.13	0.10		**300.35**
Waterbody-Streams/River										69.40	**69.40**
Waterbody – Ponds									11.42		**11.42**
Grand Total	**104.60**	**123.32**	**2042.78**	**432.67**				**293.66**	**12.87**	**69.40**	**3079.34**

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

•In T5 81 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 11 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 65, 84 & 40 Hectares From T1 to T2, T2-T3 & T4-T5 respectively and there is a decrease of 132 and 364 ha from T0 to T1 & T3-T4 and overall decrease of 307 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 417 ha of the Plantation/Horticulture** area in between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 243 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (1) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.