

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -43/2011-12

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

C O N T E N T S

- **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

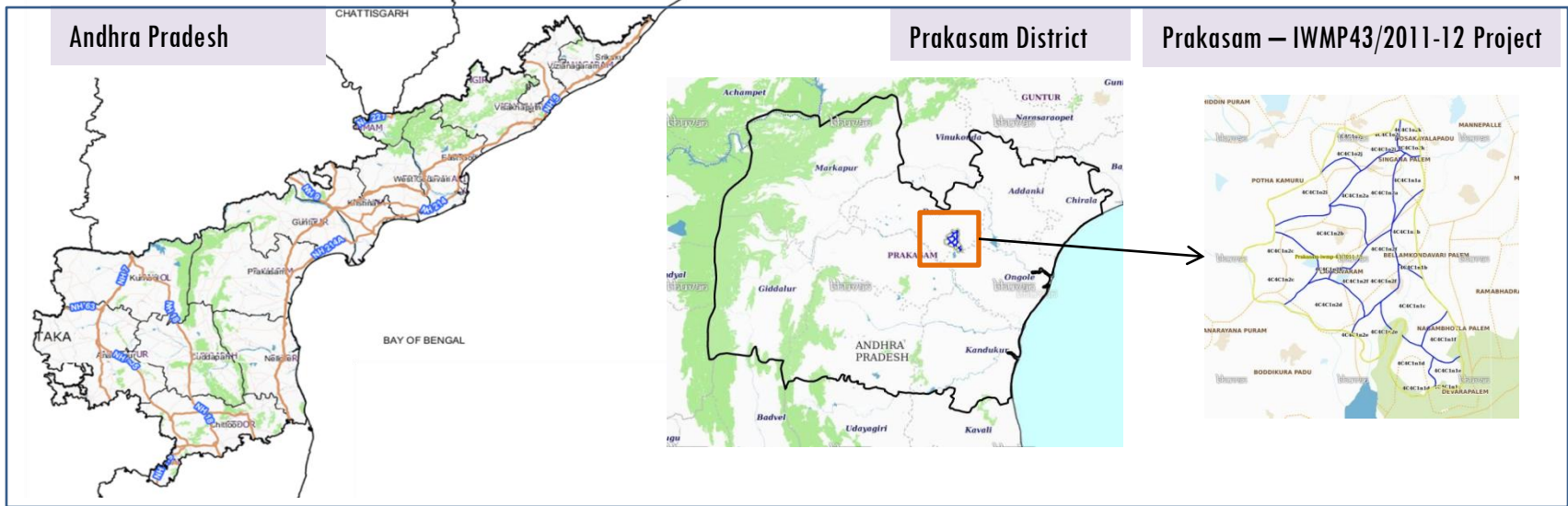
E X E C U T I V E S U M M A R Y

- 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-43/2011-12, Prakasam District of Andhra Pradesh. The total geographical area of the project is 5095.16 ha. It comprises of 15 micro watersheds.
- In the project area 218 Drishti photos were uploaded showing 17 check dams, 2 Farm ponds/Percolation tanks, 30 checks & plugins and remaining others.
- Major percentage i.e. 77.10% is covered by the agriculture, 10.30% is covered by scrub land, 3.72% covered by Water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-43/2011-12

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Thalluru Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 5095.16 ha. It comprises of 15 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.

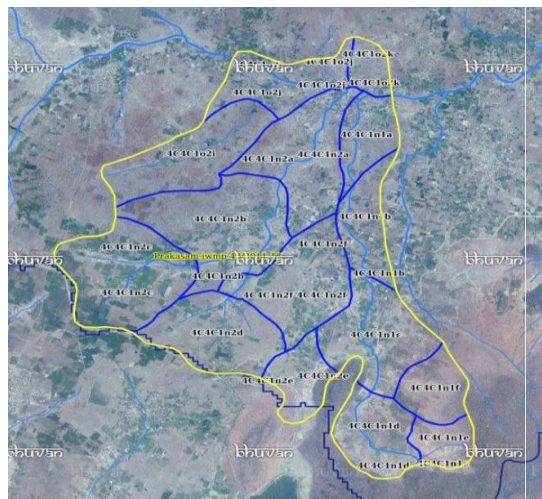
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2011-12	2012-13	2019-20
LISS IV	2011-12		
SCENE 1			10-Nov-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2011-12		
SCENE 1			10-Nov-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	218
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

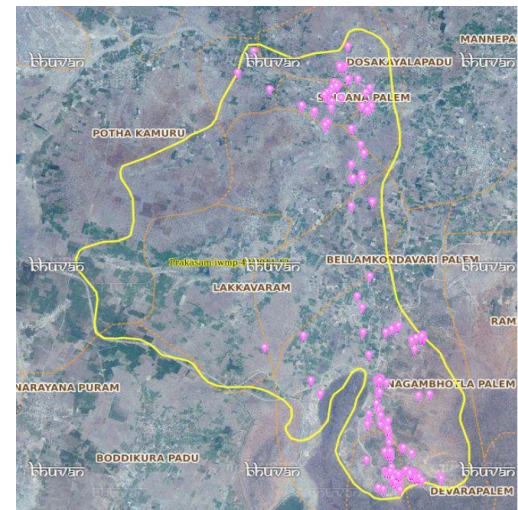


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

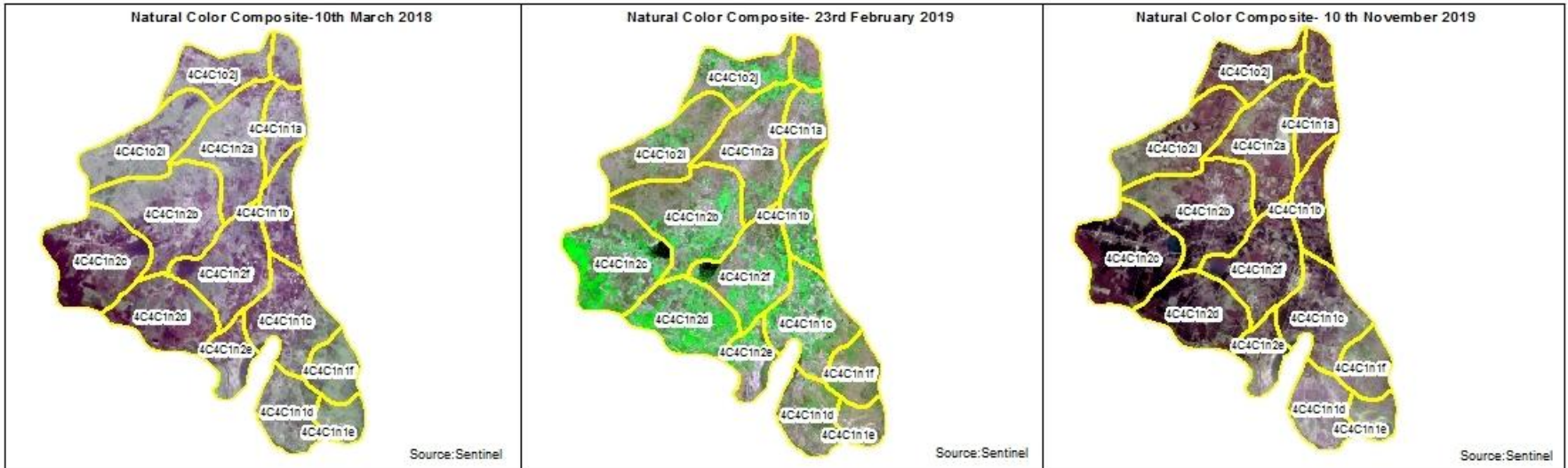
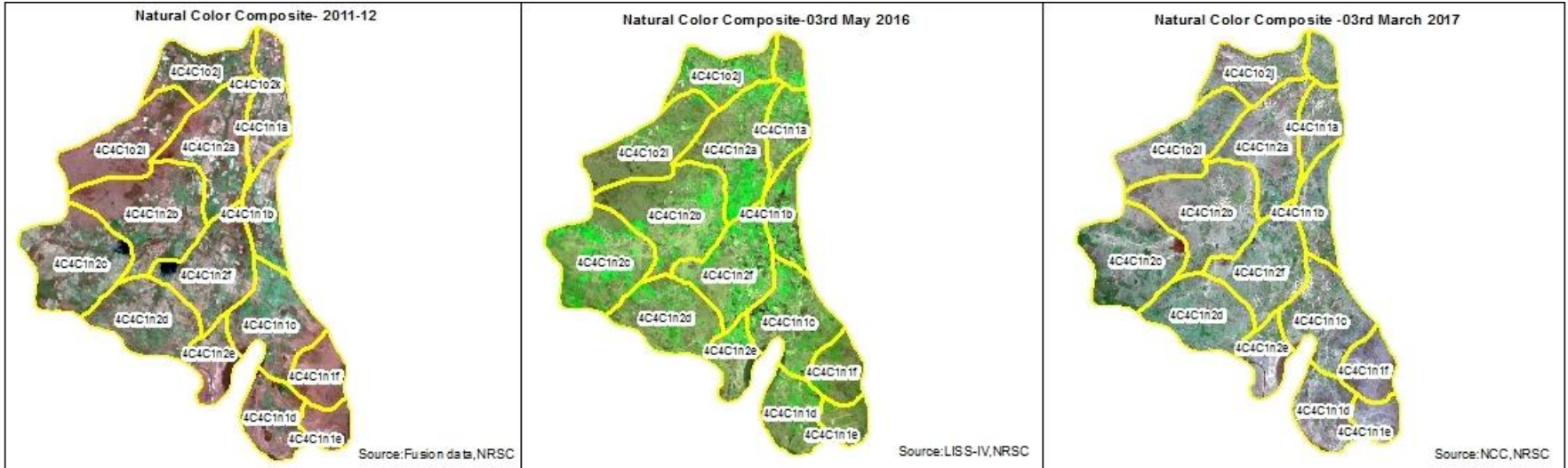
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	45	45
2	Afforestation	2	2
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	30	30
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	2	2
10	Civil work-Check dams/Rock fill dam	17	17
11	Nallah Bunds/Drainage 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	6	6
17	Others	120	120
	TOTAL	222	218

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- 2011-12 to 2019-20



Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-43/2011-12



T0:2011-12



T1: 03 May 2016

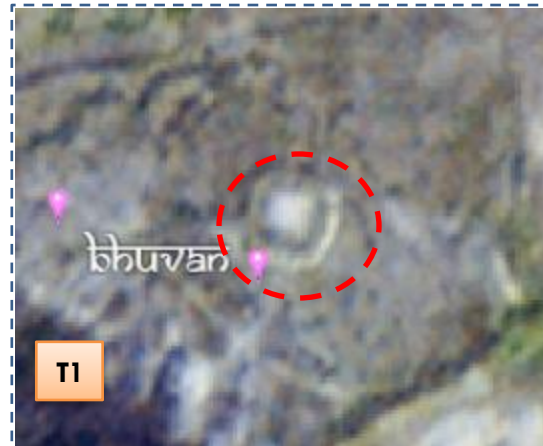


Drishti Sl no. 161712 MWS :4C4C1n1c

Check dam



T0:2011-12



T1: 03 May 2016



Drishti Sl no. 698192 MWS : 4C4C1n1d

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-43/2011-12



T0

T0: 2011-12



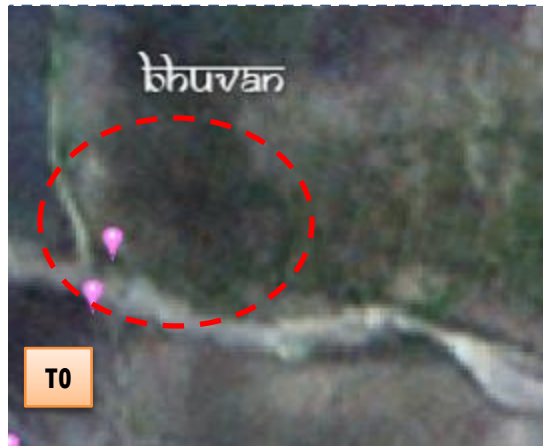
T1

T1: 03 May 2016



Drishti Sl no. 2530668 MWS :4C4C1n1d

Horticulture



T0

T0: 2011-12



T1

T1: 03 May 2016



Drishti Sl no. 7017262 MWS :4C4B3k2f

Horticulture

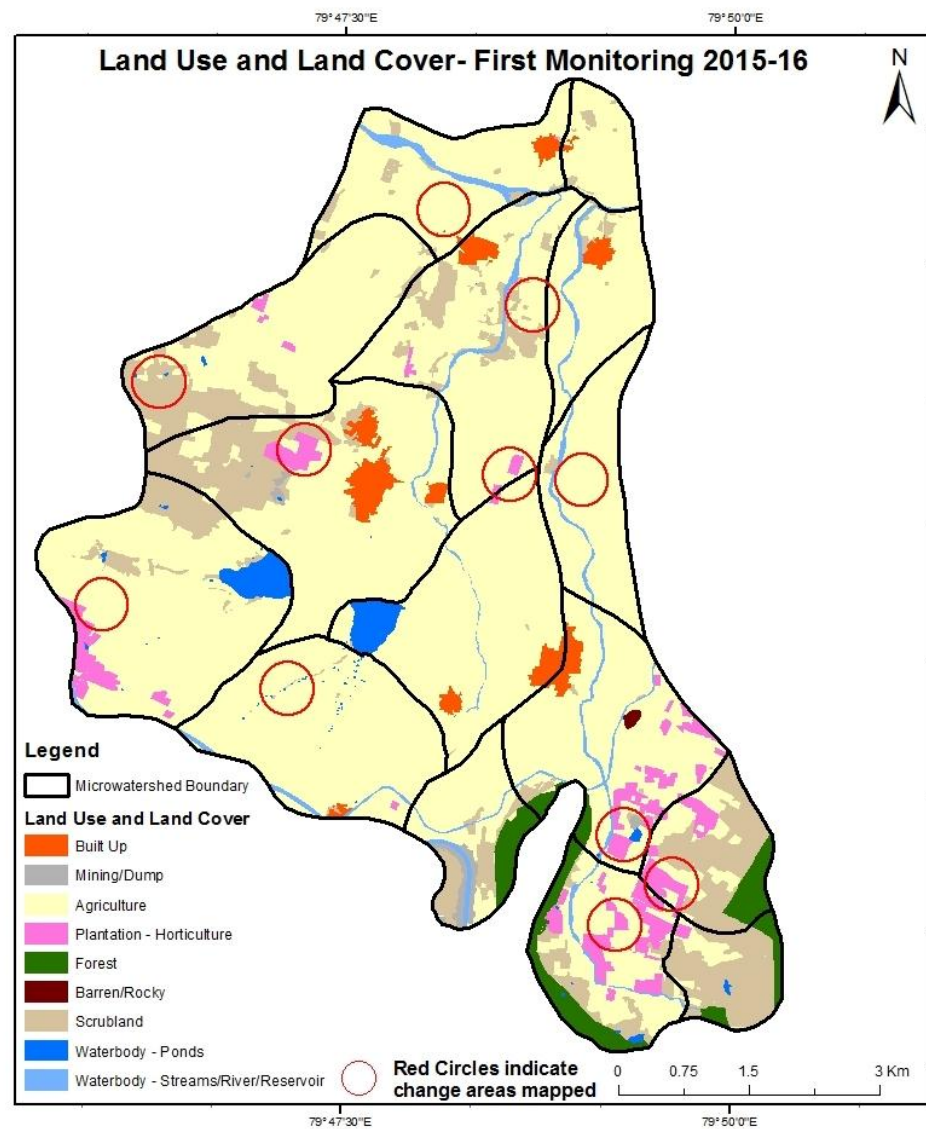
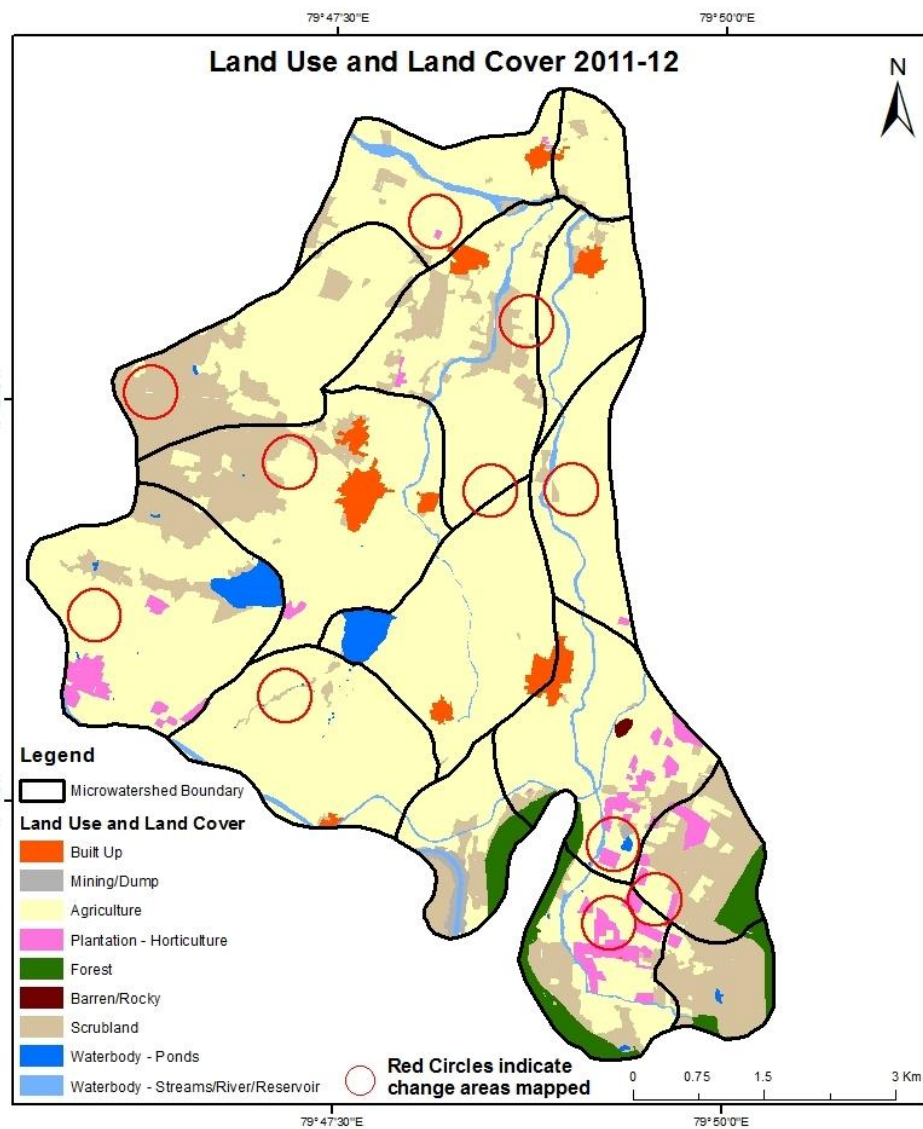
MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

- Change in land use and land cover from 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) .

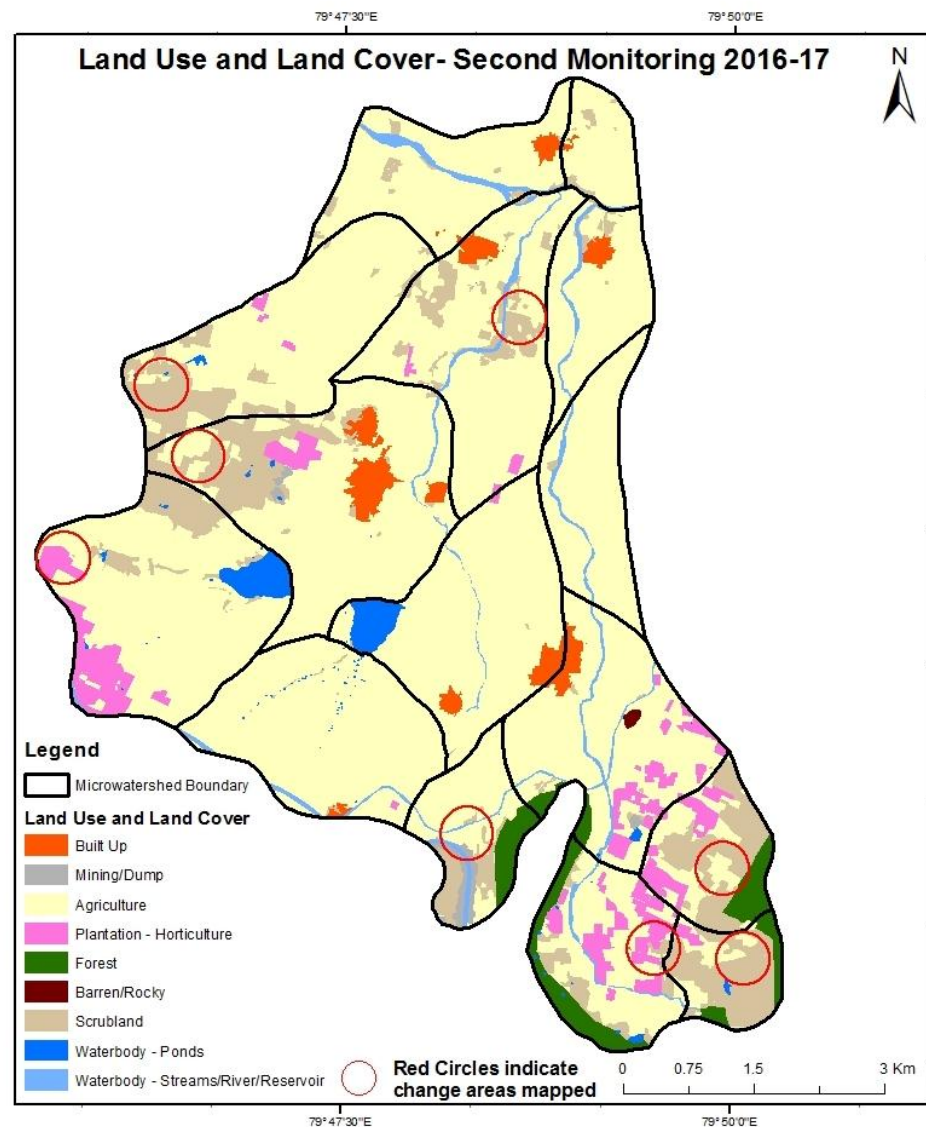
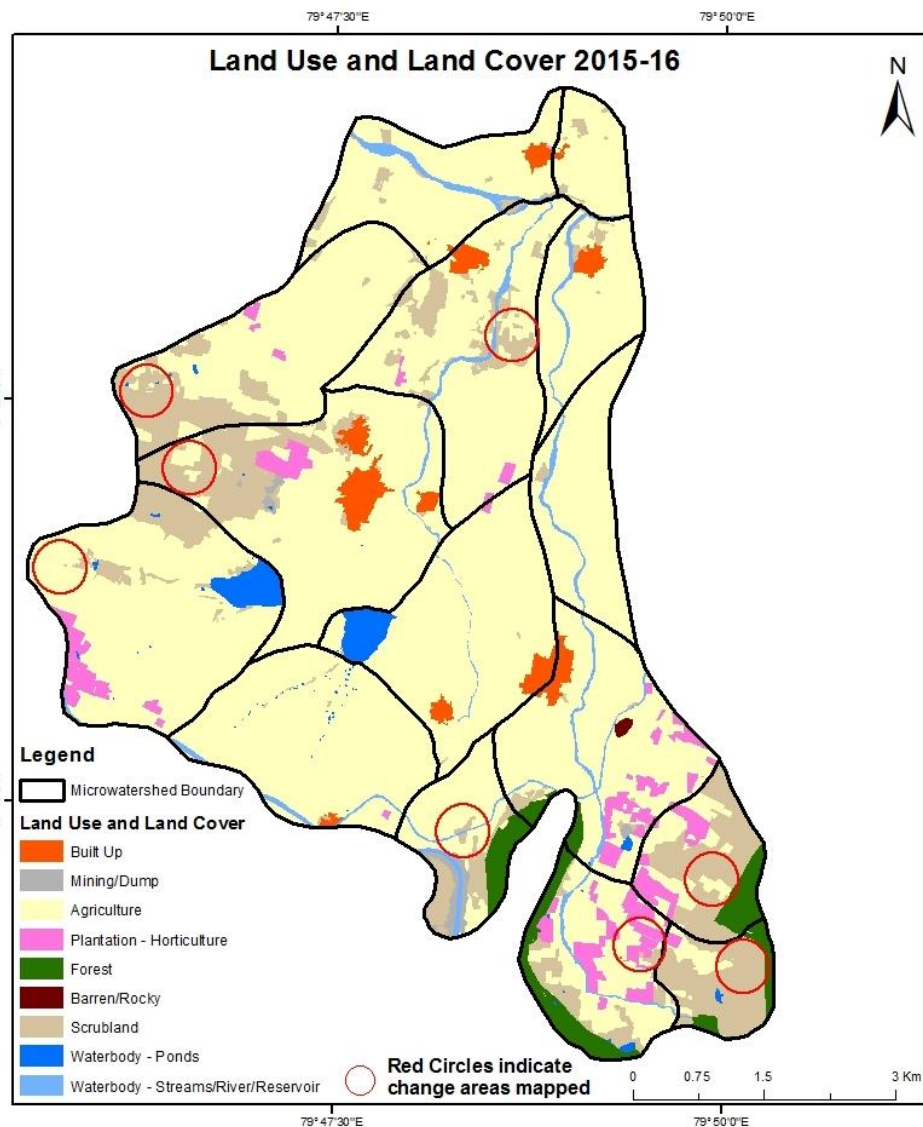
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2011-12 to 2015-16)

Scale: 1:10000



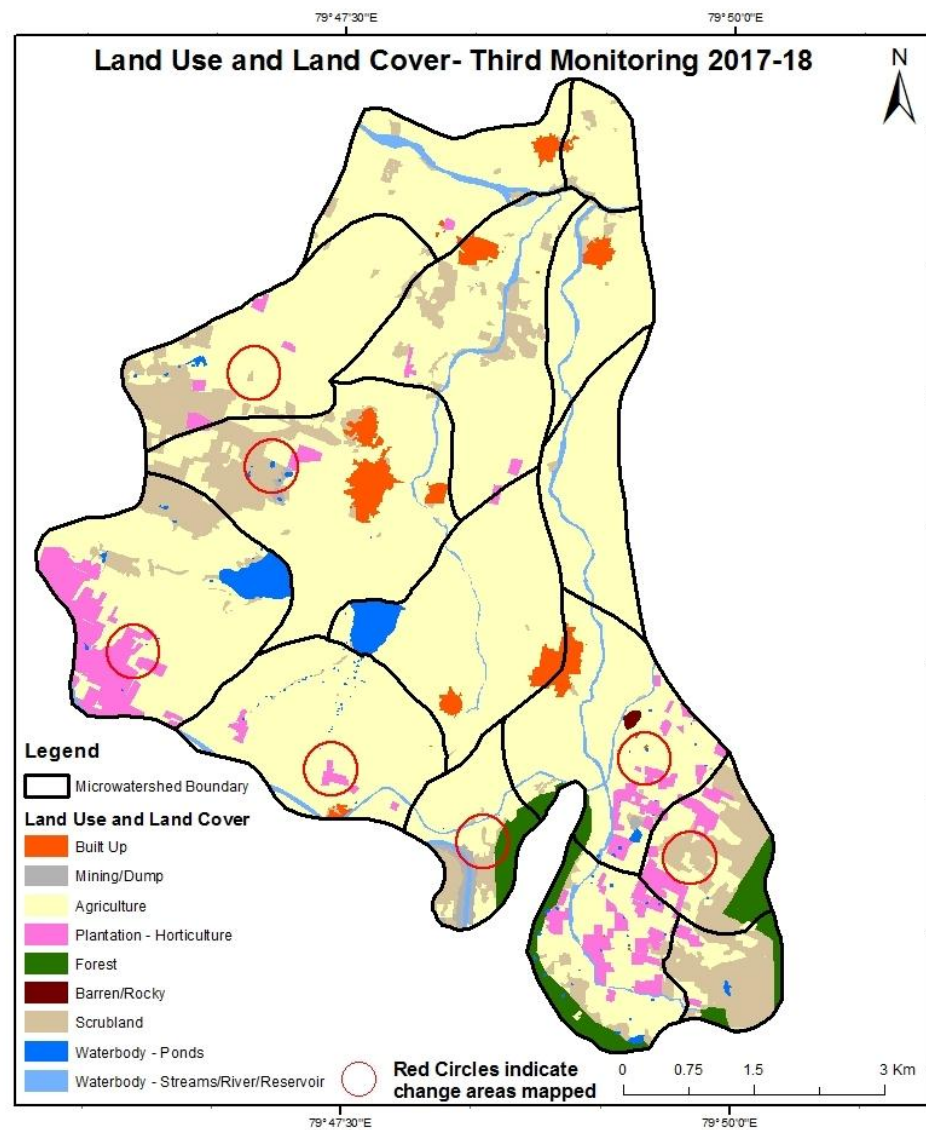
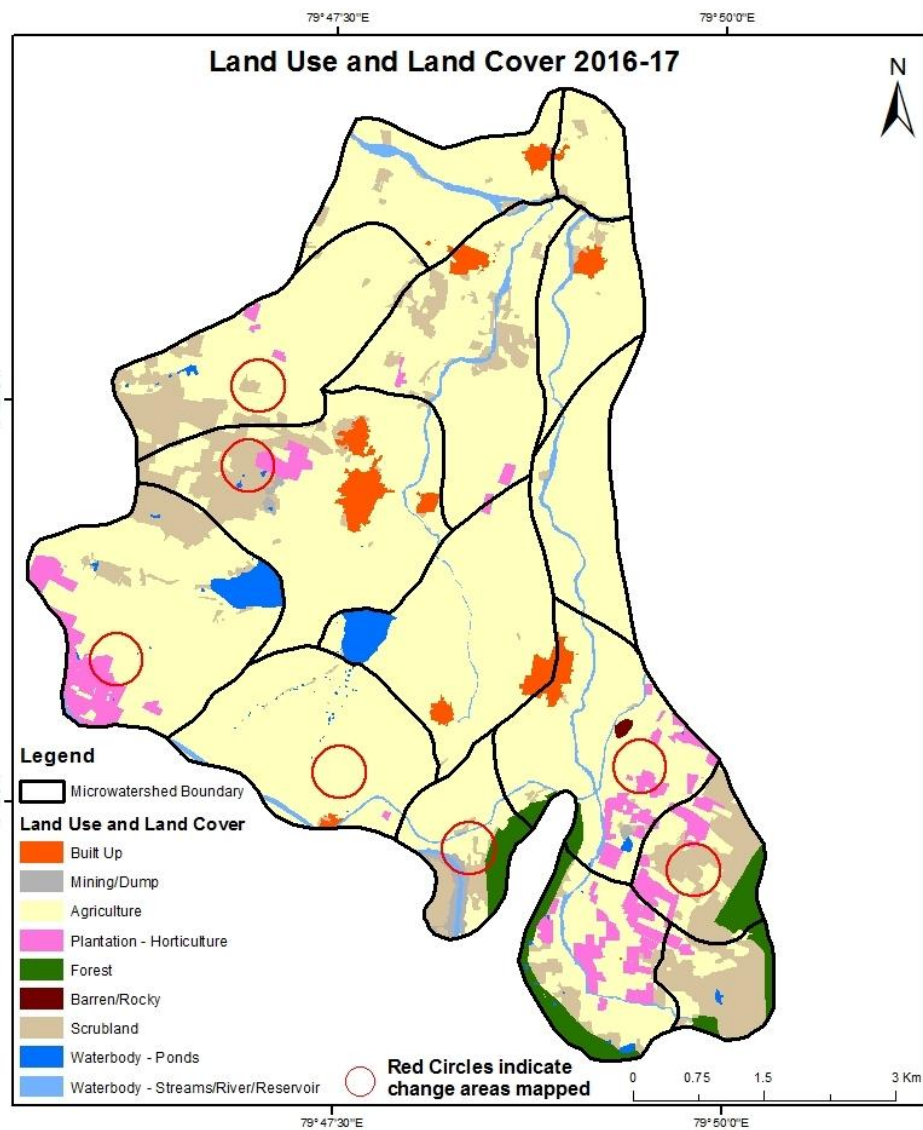
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



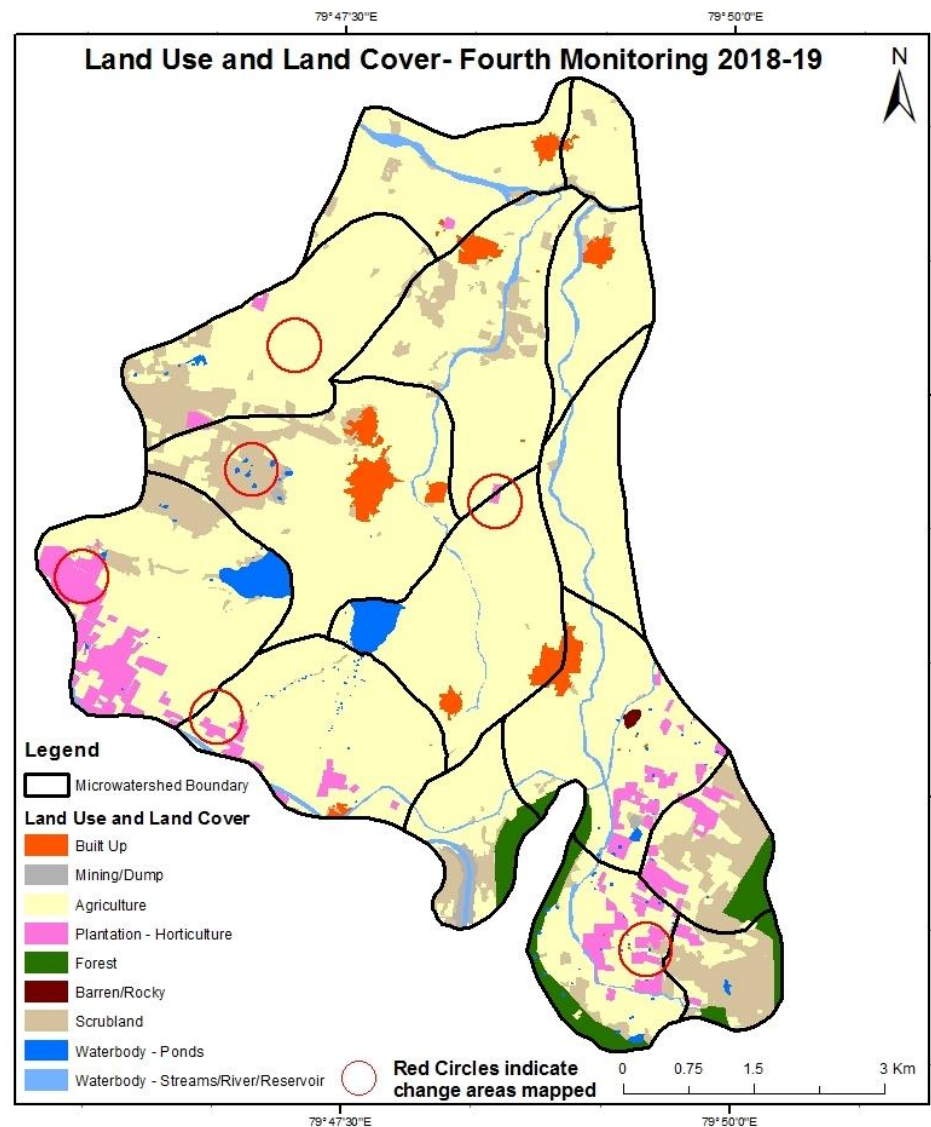
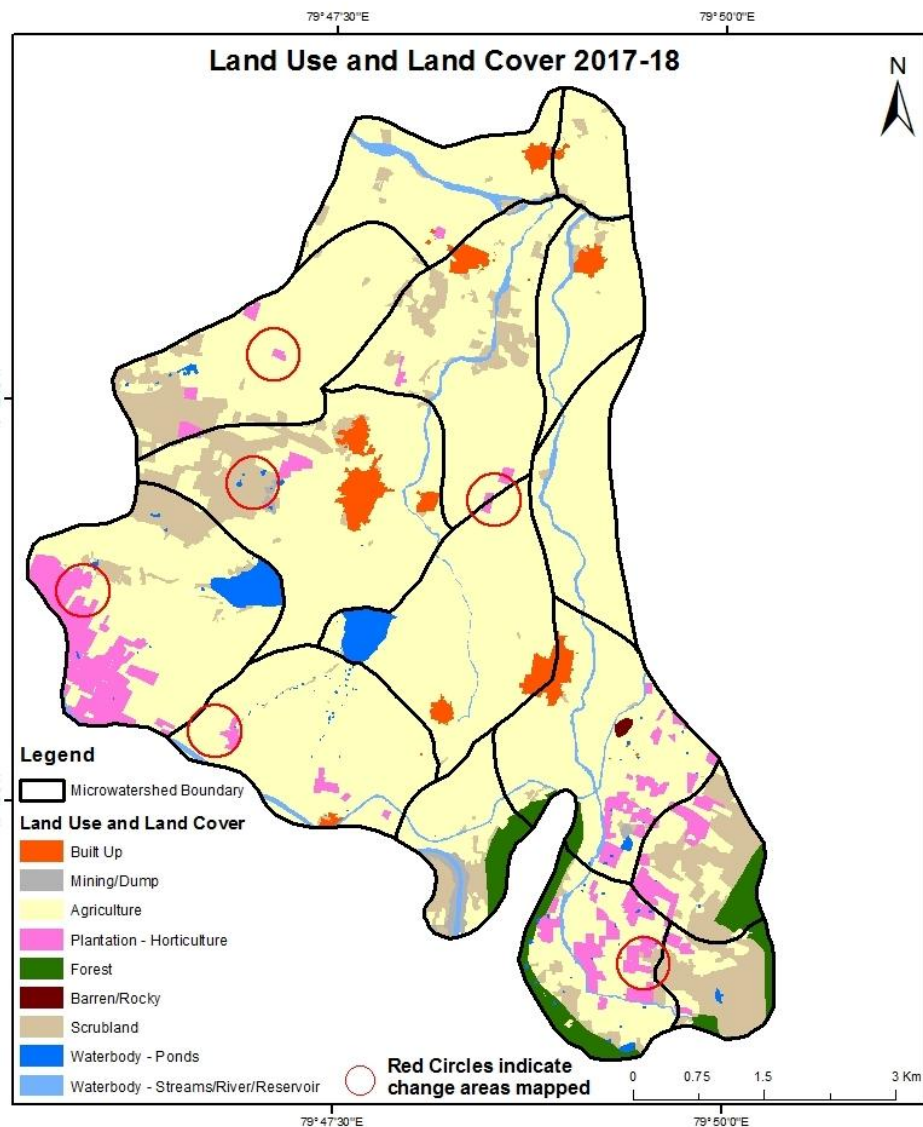
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



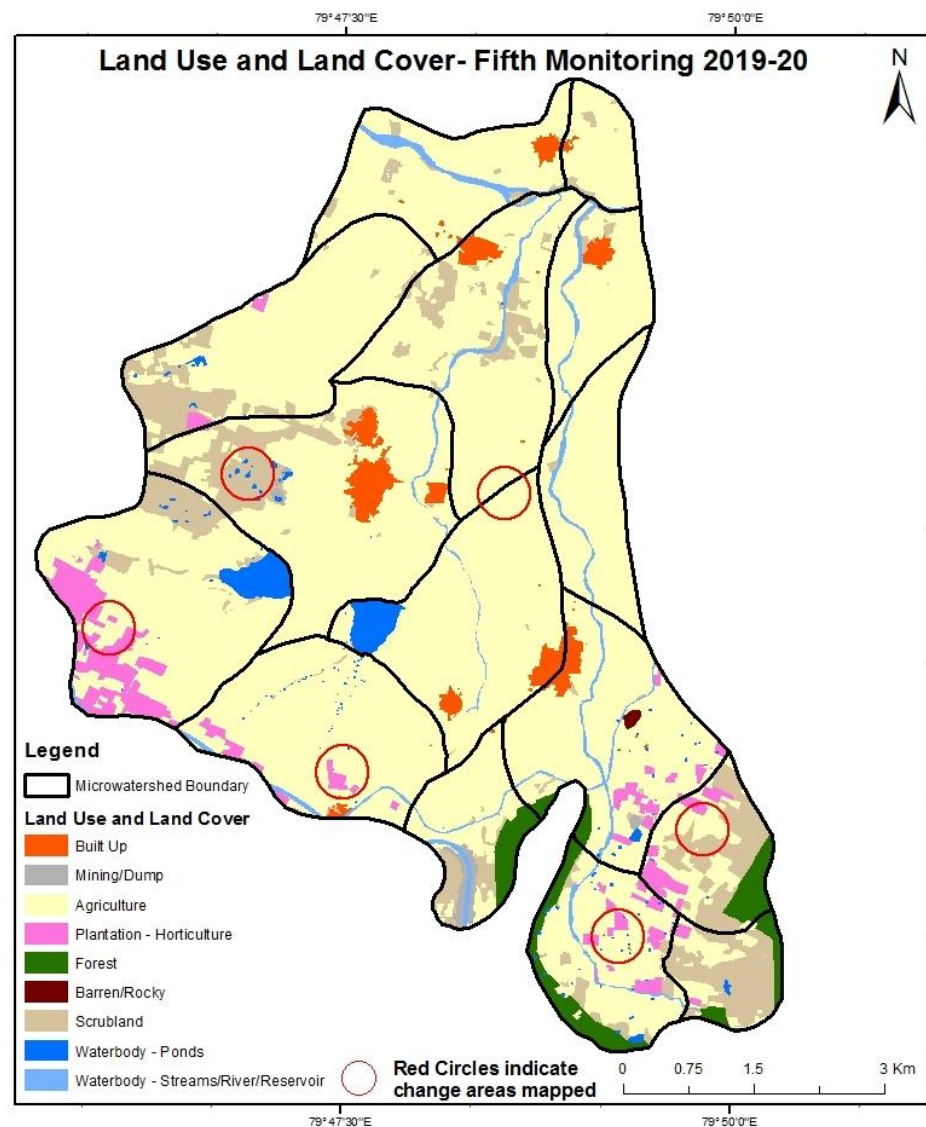
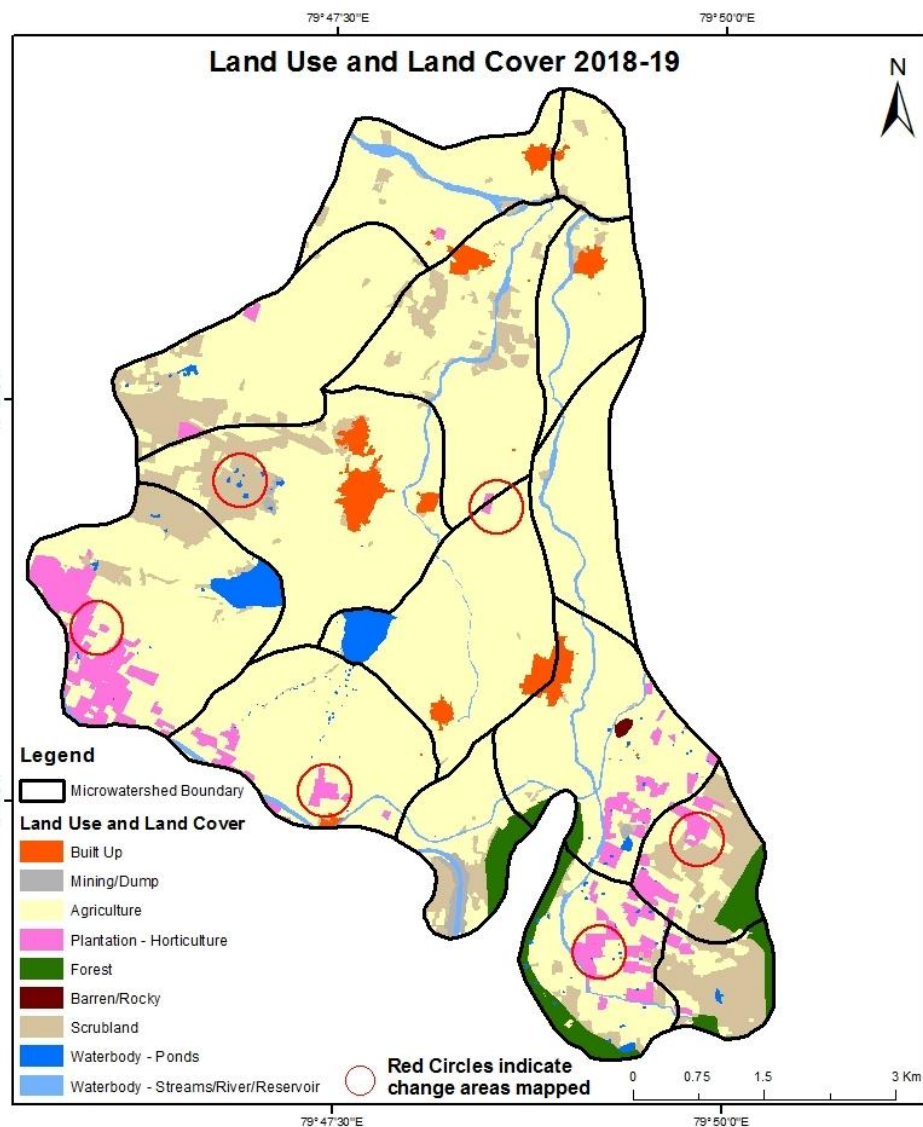
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000



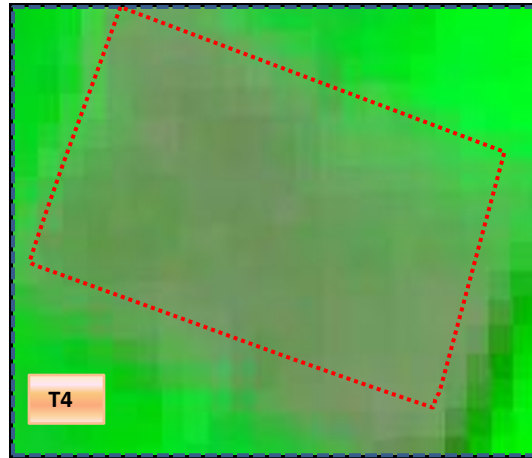
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

Scale: 1:10000

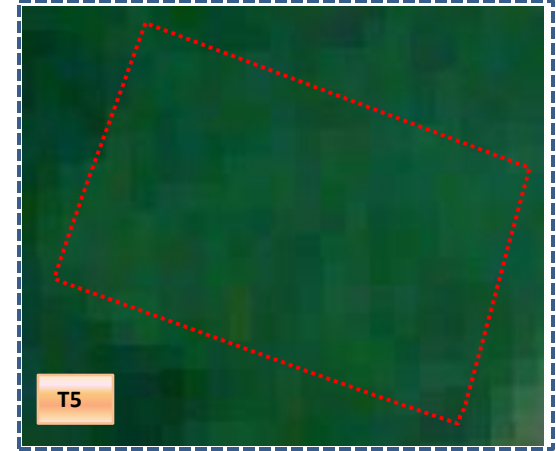


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

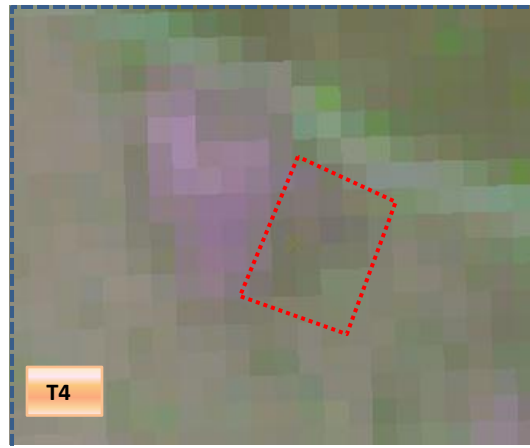


T4: 2018-19 (79°45'46.746"E 15°41'9.37"N)

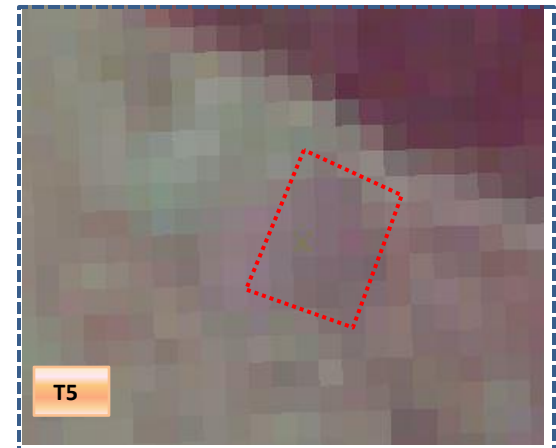


T5: 10 November 2019

Agriculture to Water body



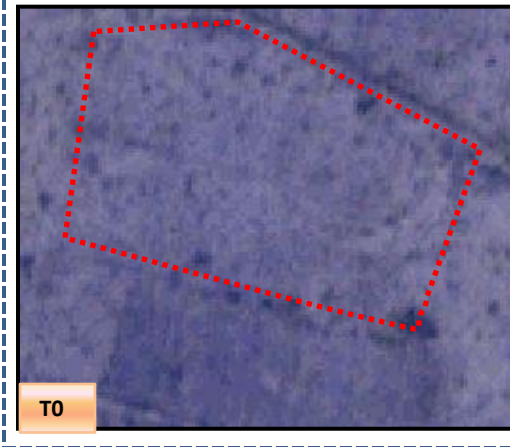
T4: 2018-19 (79°47'3.936"E 15°42'2.096"N)



T5: 10 November 2019

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

Scrub to Agriculture



T0: 2011-12 (79°46'32.894"E 15°42'18.187"N)



T1: 03 May 2016

Scrub to Water body



T0: 2011-12 (79°46'39.524"E 15°41'19.137"N)



T1: 03 May 2016

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

Agriculture to Plantation



T0: 2011-12 (79°47'14.819"E 15°42'7.53"N)



T1: 03 May 2016

Plantation to Agriculture



T0: 2011-12(79°46'37.129"E 15°40'33.613"N)



T1: 03 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	101.47												101.47
Mining/dump		16.52	0.91										17.43
Agriculture	4.12		3563.98	83.73				7.83			1.00		3660.66
Plantation Horticulture			42.32	90.67									132.99
Forest			1.08		138.97								140.06
Forest Plantation													
Barren Rocky							3.14						3.14
Scrub	0.52	5.40	200.96	3.40				652.34			2.46		865.08
Waterbody- Streams/River									110.31				110.31
Waterbody – Ponds											63.81		63.81
Grand Total	106.11	21.93	3809.25	177.81	138.97		3.14	660.17	110.31		67.27		5094.96

- 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 88.85 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T1.
- In T1 244.36 ha of the agriculture area has increased from plantations, forest and scrubland 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	106.11												106.11
Mining/dump		21.58									0.35		21.93
Agriculture	2.04		3749.47	51.14				5.42			1.18		3809.25
Plantation Horticulture	0.11		3.50	174.19									177.81
Forest			1.46		136.96						0.55		138.97
Forest Plantation													
Barren Rocky							3.14						3.14
Scrub	0.16		84.53					575.10			0.39		660.17
Waterbody- Streams/River			0.14						110.17				110.31
Waterbody – Ponds											67.27		67.27
Grand Total	108.42	21.58	3839.10	225.33	136.96		3.14	580.52	110.17		69.74		5094.96

- 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 54.36 ha of the agriculture area has decreased and it is converted into Built-up, plantation, scrubland and water body in T2.
- In T2 89.49 ha of the agriculture area has increased from plantations, scrubland, and water body 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		
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total		
Built up	108.42												108.42
Mining/dump		21.06									0.52		21.58
Agriculture	0.91		3766.16	67.97				2.68			1.38		3839.10
Plantation Horticulture	0.03		26.68	197.68							0.94		225.33
Forest			0.64		136.10						0.22		136.96
Forest Plantation													
Barren Rocky							3.14						3.14
Scrub		0.09	25.58					554.65			0.20		580.52
Waterbody- Streams/River									110.17				110.17
Waterbody – Ponds											69.74		69.74
Grand Total	109.36	21.15	3819.06	265.65	136.10		3.14	557.34	110.17		72.99		5094.96

- 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 70.25 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrubland and water body in T3.
- In T3 52.89 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	109.36										109.36	
Mining/dump		19.34	1.82								21.15	
Agriculture	0.98		3795.05	22.11						0.92	3819.06	
Plantation Horticulture			40.95	224.30						0.40	265.65	
Forest			1.73		134.37						136.10	
Forest Plantation												
Barren Rocky							3.14				3.14	
Scrub			12.13					544.38		0.82	557.34	
Waterbody- Streams/River									110.17		110.17	
Waterbody – Ponds										72.99	72.99	
Grand Total	110.33	19.34	3851.68	246.41	134.37		3.14	544.38	110.17	75.14	5094.96	

- 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 24.01 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T4.
- In T4 54.81 ha of the agriculture area has increased from mining/dump, 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-2018-19 to 2019-20

Land cover	Monitoring period (T5)										Units in Hectares	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
Built up	110.33										110.33	
Mining/dump		18.88								0.46	19.34	
Agriculture	2.08		3838.33	10.23				0.29		0.74	3851.68	
Plantation Horticulture			71.94	174.40						0.06	246.41	
Forest			1.52		132.86						134.37	
Forest Plantation												
Barren Rocky							3.14				3.14	
Scrub			16.64					524.66	0.97	2.10	544.38	
Waterbody- Streams/River									110.17		110.17	
Waterbody – Ponds										75.14	75.14	
Grand Total	112.41	18.88	3928.43	184.64	132.86		3.14	524.96	111.14	78.50	5094.96	

- 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 13.05 ha of the agriculture area has decreased and it is converted into Built-up, plantations and water body in T5.
- In T5 90.10 ha of the agriculture area has increased from plantations, scrubland and water body 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 15.5 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 148, 29, 32 & 76 Hectares From T0 to T1, T1-T2, T3 to T4 & T4-T5 respectively and overall increase of 267 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 51.6 ha of the Plantation/Horticulture area has been increased between 2011-12 (T0) & 2019-20 (T5) years.
6. There is a decrease of 340 Hectares in Scrubland area as compared between 2011-12 (T0) & 2019-20 (T5) years.
7. Farm ponds (2) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (2) verified from the portal.