MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -27/2010-11
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
February-2021

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

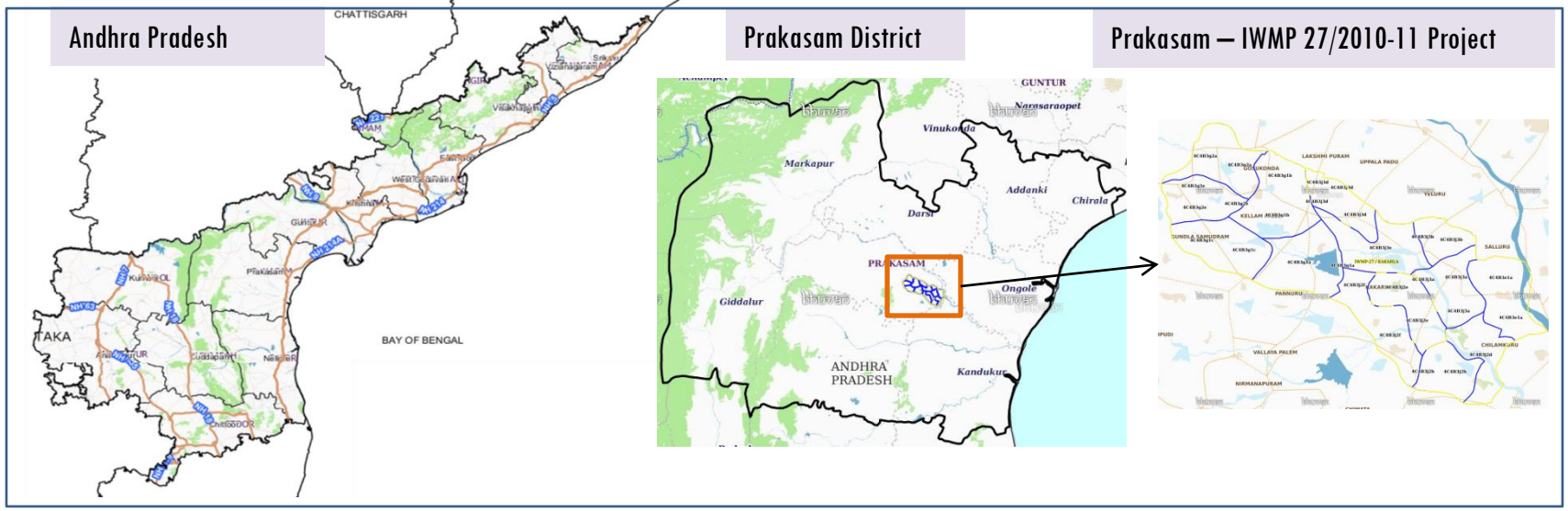
CONTENTS

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-27/2010-11, Prakasam District of Andhra Pradesh. The total geographical area of the project is 9876.06 ha. It comprises of 14 micro watersheds.
- In the project area 130 Drishti photos were uploaded showing 42 check dams/Checks & plugins, 53 Farm ponds/Percolation tanks, 8 livelihood activities, 6 Afforestation, and 21 others.
- Major percentage i.e. 70.59 % is covered by the agriculture, 17.57 % is covered by scrub land, 6.80 % by water body and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-27/2010-11
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Marripudi Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 9876.06 ha. It comprises of 14 micro watersheds. Location Map of the study area is shown in Figure below Analysis is done for 2010-11 (T0) period (***Batch -1***) projects taking 2018-19 (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.

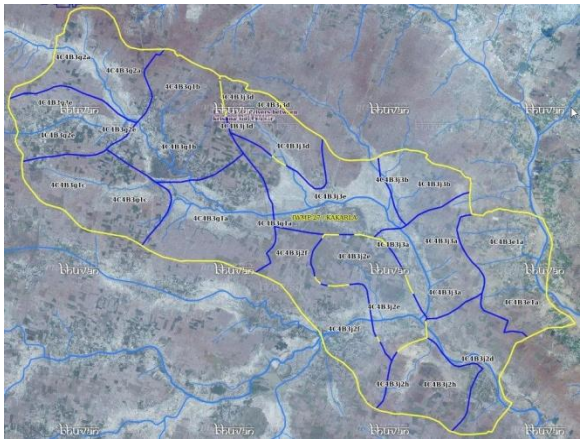
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			26-Dec-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			26-Dec-18
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	130
4	Detailed Project Report		

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



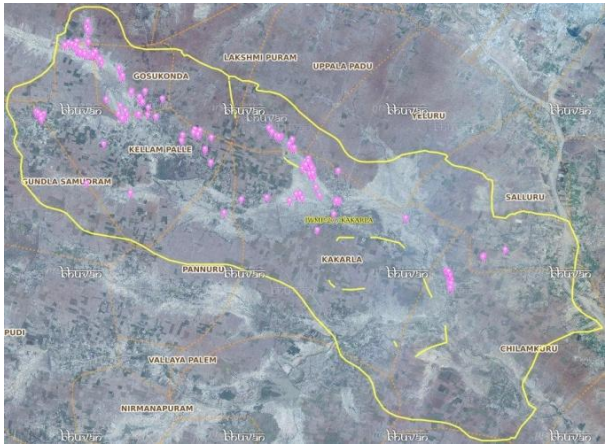
Legend

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	6	6
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	9	9
9	Gabion structure	0	0
10	Farm ponds	53	53
11	Check dams	33	33
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	44	21
	TOTAL	**153**	**130**

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 (2010-11) and T5 is 2018-19 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.

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-27/2010-11

T1:2010-11

T2: 26 May 2014

Drishti Sl no. 161683 MWS : 4C4B3j3e

Farm pond

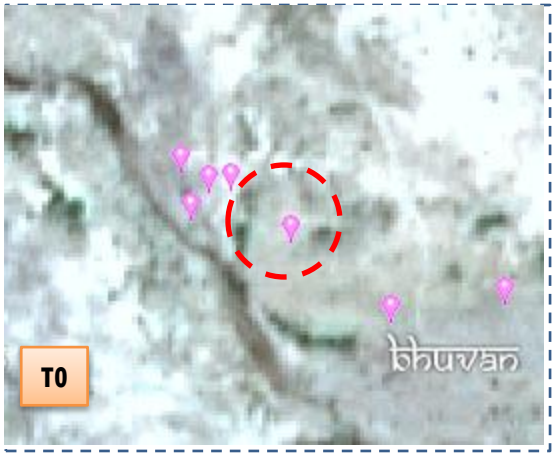
T1:2010-11

T2: 26 May 2014

Drishti Sl no. 161692 MWS : 4C4B3j3e

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-27/2010-11



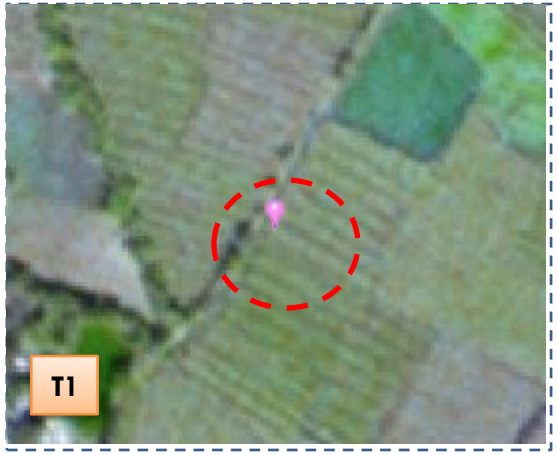
T0: 2010-11

T1: 26 May 2014

Drishti Sl no. 161697 MWS : 4C4B3j3a

Farm pond

T0: 2010-11



T2: 26 May 2014

Drishti Sl no. 101551 MWS : 4C4B3j2d

Horticulture

2009-10

April-2014

January-2016

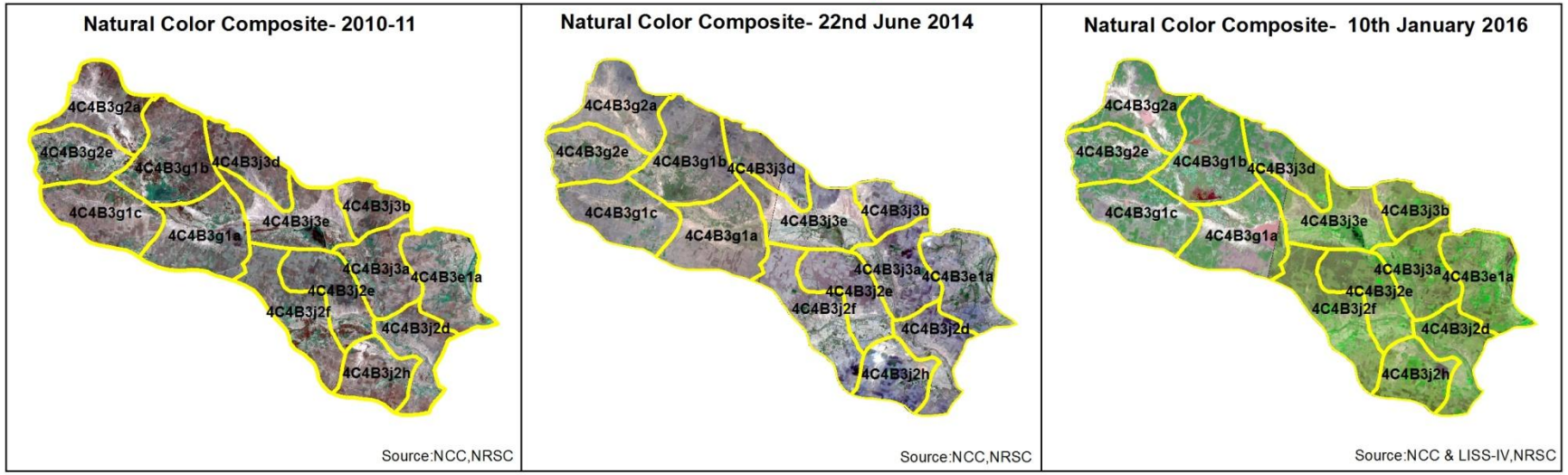
March-2017

February-2019

Activity : Dug out Pit

Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite



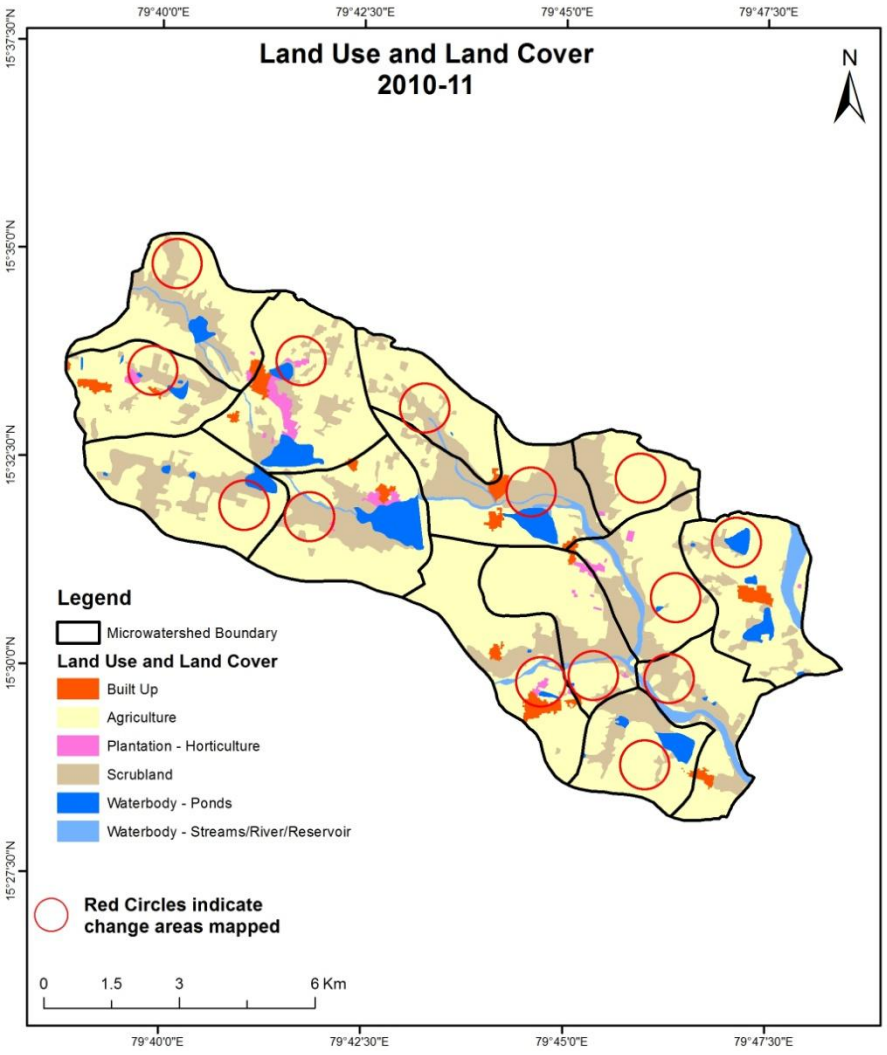
MONITORING IN THE PROJECT AREA

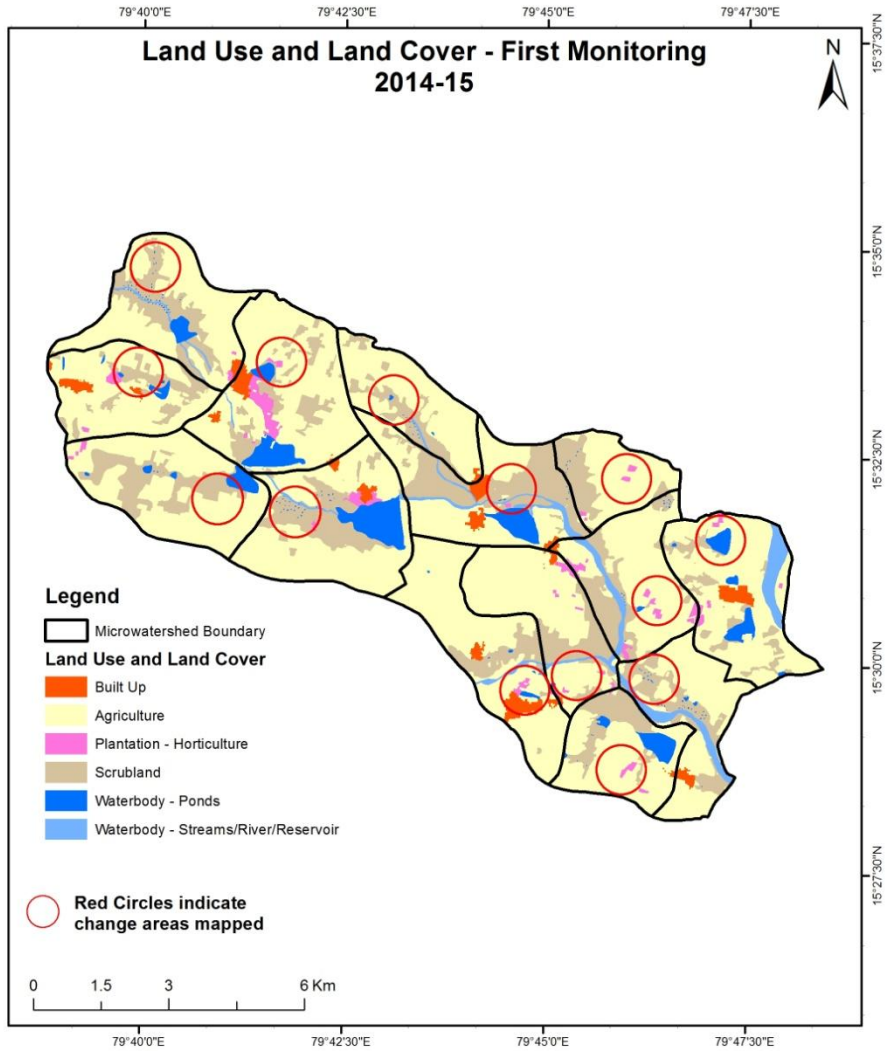
Land use and Land cover Changes in the Project

- 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 (2010-11) and row represents the post implementation period as T5 (2018-19) .

Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

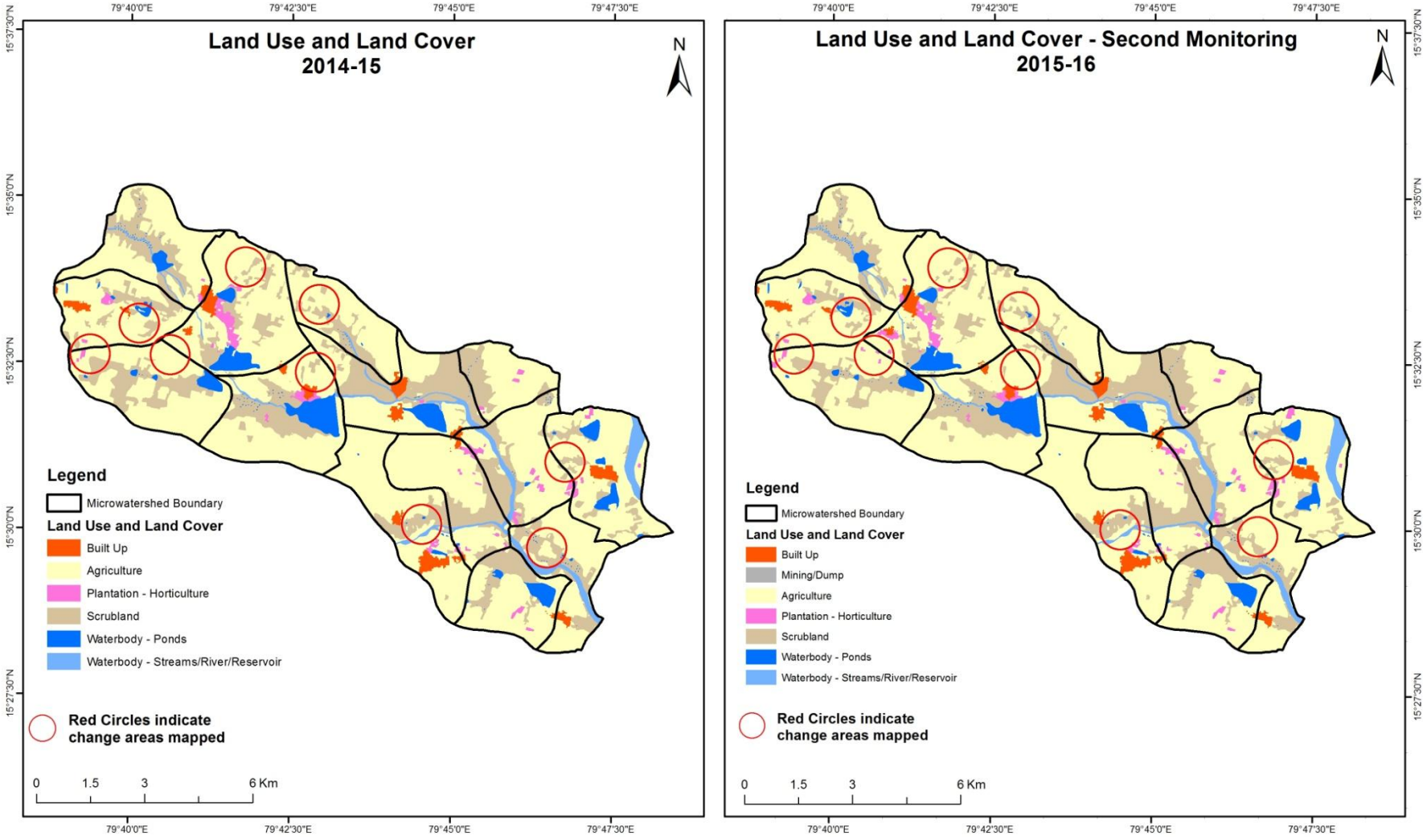
Scale: 1:10000





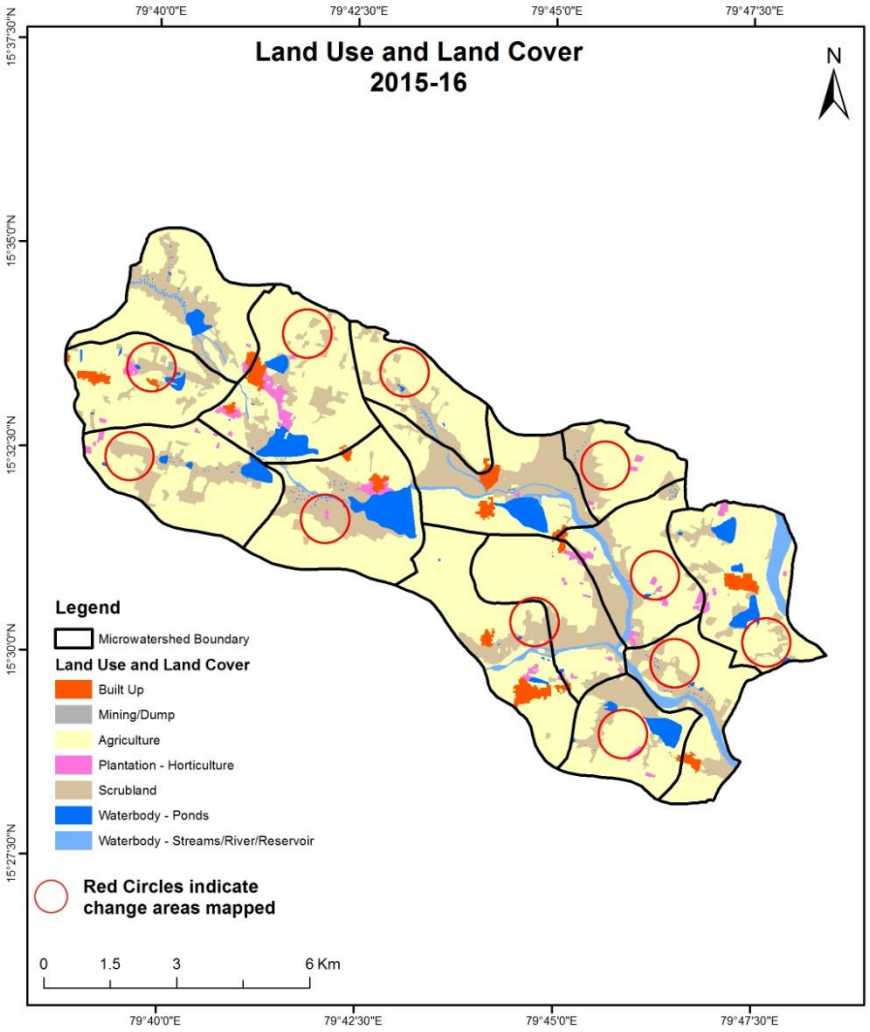
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

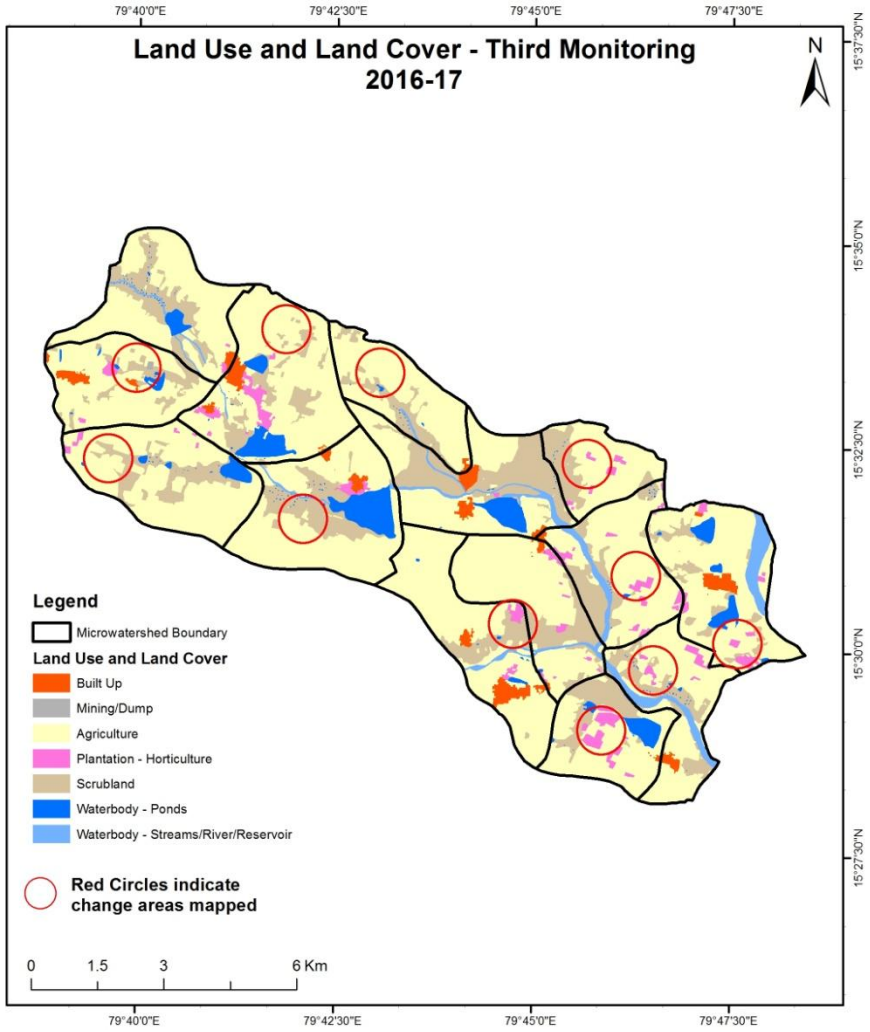
Scale: 1:10000



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

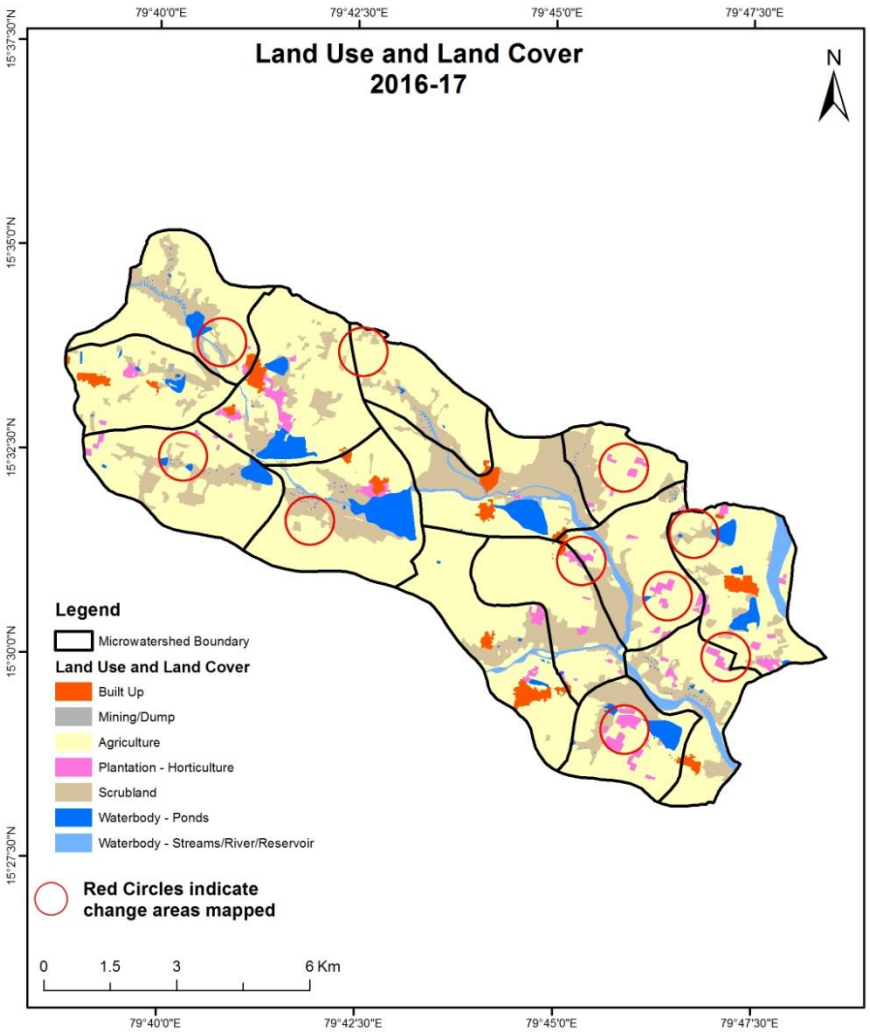
Scale: 1:10000

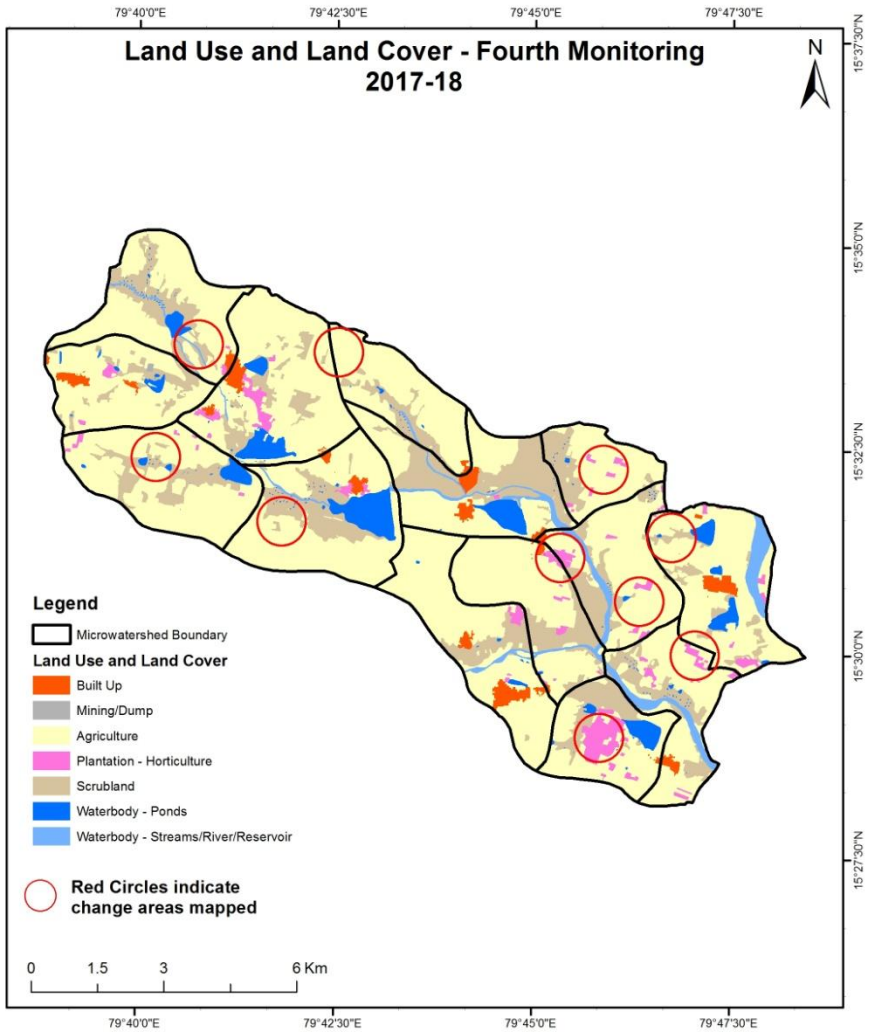




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

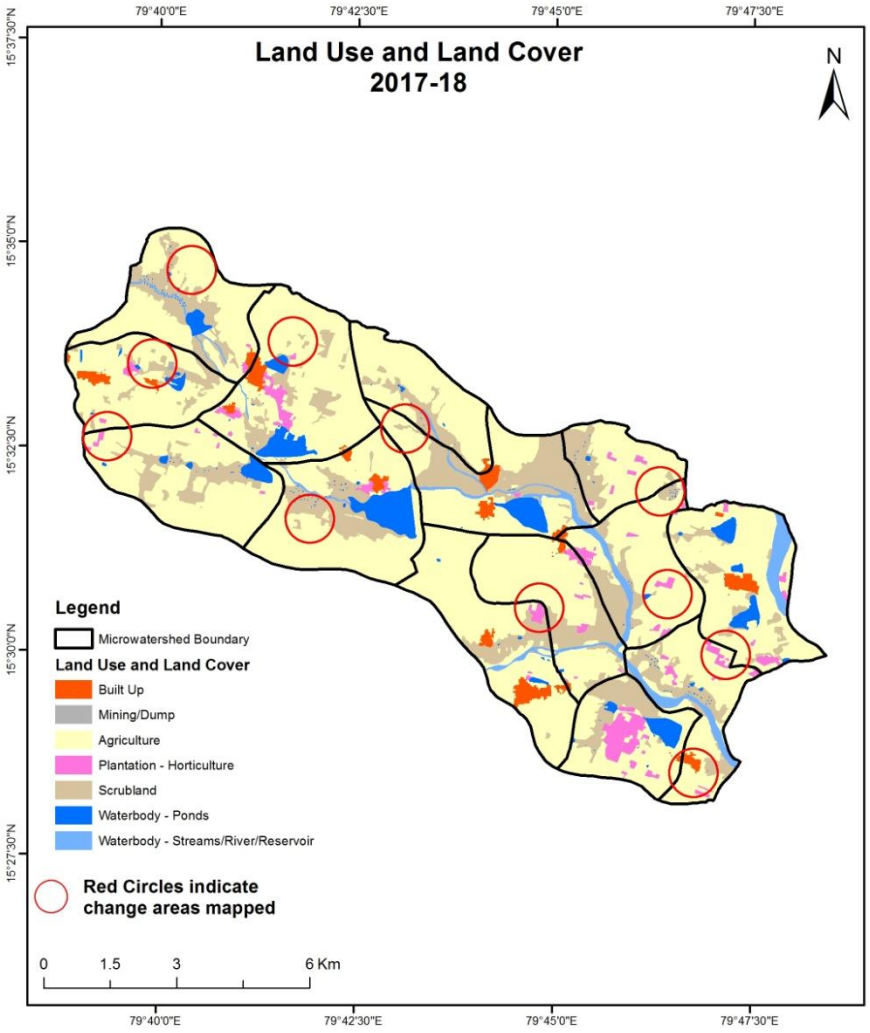
Scale: 1:10000

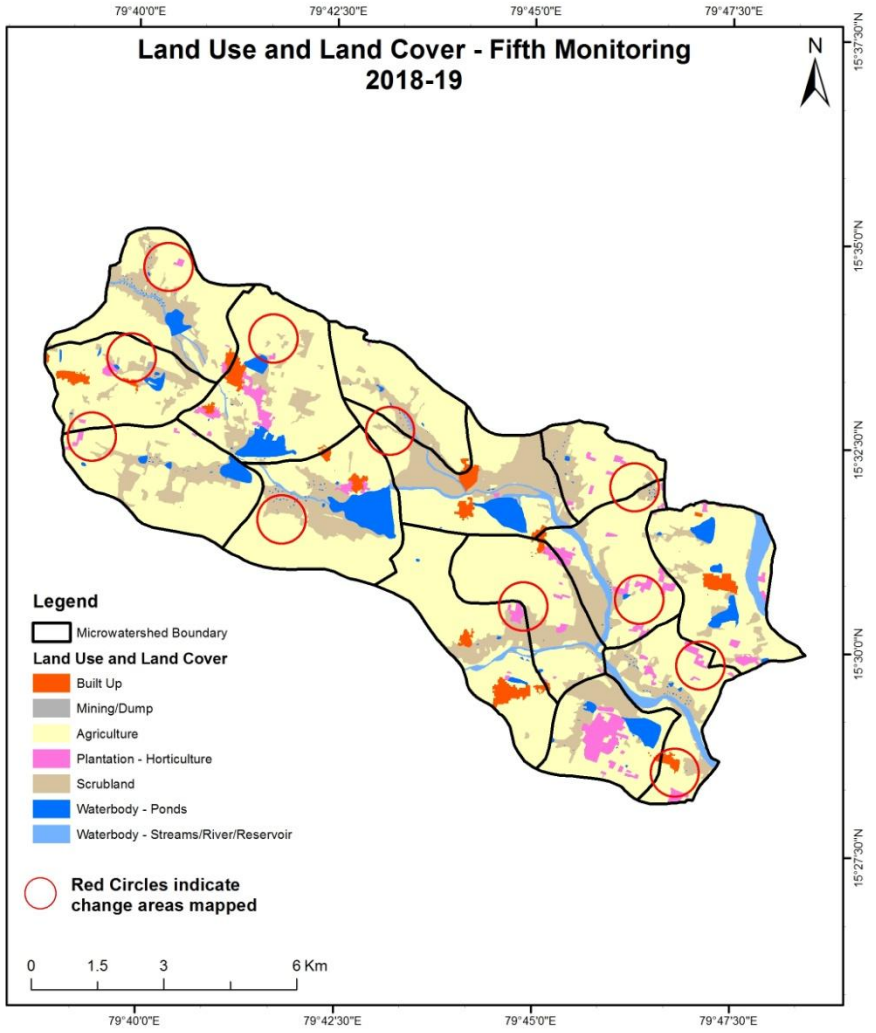




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

Scale: 1:10000





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

Agriculture to Plantation

T0: 2010-11

T1: 26 May 2014

Agriculture to Water body

T0: 2010-11

T1: 26 May 2014

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

Agriculture to Plantation

T0: 2010-11 (79°47'6.208"E 15°31'48.548"N)

T1: 22nd June 2014

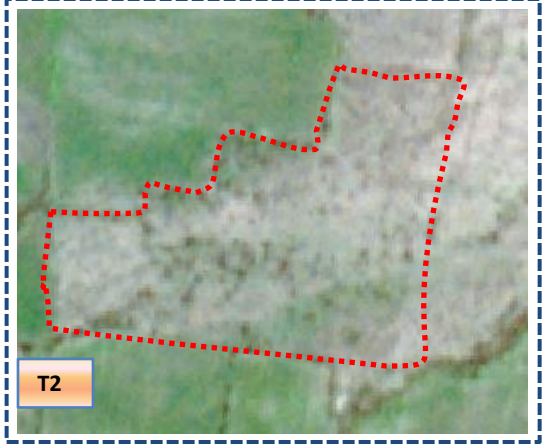
Scrubland to Agriculture

T1: 2014-15 (79°42'54.62"E 15°32'31.22"N)

T2: 10th January 2016

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

Scrubland to Agriculture

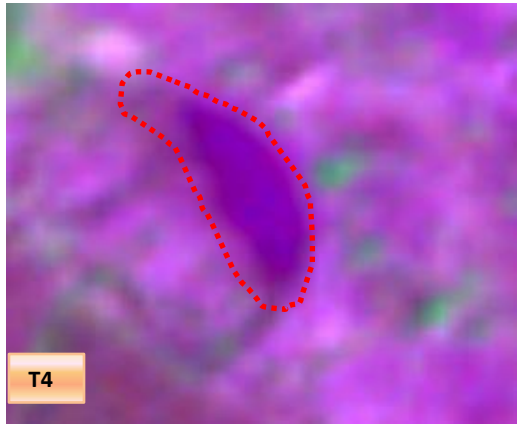


T2: 2015-16 (79°41'32.809"E 15°31'44.418"N)

T3: 20th March 2017

Scrubland to Water body

T3: 2016-17 (79°43'11.411"E 15°33'2.094"N)



T4: 6th March 2018

Table showing change matrix depicting Land cover transitions during study period-2010-11 to 2014-15

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	196.33										196.33
Mining/dump											
Agriculture	4.69		6674.69	45.23						0.90	6725.51
Plantation Horticulture	0.08		10.39	93.52							103.99
Forest											
Forest Plantation											
Barren Rocky											
Scrub	0.58		77.25	6.70				2093.45		10.78	2188.76
Waterbody-Streams/River									268.06		268.06
Waterbody – Ponds			3.47							389.95	393.43
Grand Total	**201.68**		**6765.81**	**145.44**				**2093.45**	**268.06**	**401.63**	**9876.06**

• 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 50.81 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T1.

• In T1 91.12 ha of agriculture are increased from plantation, scrubland and waterbody 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-20114-15 to 2015-16

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	201.68										201.68
Mining/dump											
Agriculture	0.78	1.70	6748.27	14.53						0.53	6765.81
Plantation Horticulture			9.13	136.32							145.44
Forest											
Forest Plantation											
Barren Rocky											
Scrub		0.84	96.82					1991.96		3.82	2093.45
Waterbody-Streams/River									268.06		268.06
Waterbody – Ponds										401.63	401.63
Grand Total	**202.45**	**2.55**	**6854.22**	**150.85**				**1991.96**	**268.06**	**405.98**	**9876.06**

- 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 17.54 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 105.95 ha of agriculture are increased from plantation 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-2015-16 to 2016-17

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	202.45										202.45
Mining/dump		2.55									2.55
Agriculture	0.58		6741.41	111.68						0.55	6854.22
Plantation Horticulture	0.94		16.50	133.40							150.85
Forest											
Forest Plantation											
Barren Rocky											
Scrub			171.01					1820.72		0.24	1991.96
Waterbody-Streams/River									268.06		268.06
Waterbody – Ponds			2.68							403.30	405.98
Grand Total	**203.98**	**2.55**	**6931.60**	**245.08**				**1820.72**	**268.06**	**404.09**	**9876.06**

• 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 112.81 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.

• In T3 190.19 ha of agriculture are increased from plantation, 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-2016-17 to 2017-18

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	203.98										203.98
Mining/dump		2.55									2.55
Agriculture	1.65		6862.70	66.87						0.38	6931.60
Plantation Horticulture			48.69	196.39							245.08
Forest											
Forest Plantation											
Barren Rocky											
Scrub			55.24					1763.22		2.26	1820.72
Waterbody-Streams/River									268.06		268.06
Waterbody – Ponds			1.58							402.51	404.09
Grand Total	**205.63**	**2.55**	**6968.20**	**263.26**				**1763.22**	**268.06**	**405.15**	**9876.06**

• 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 68.90 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T4.

• In T4 105.50 ha of agriculture are increased from plantation, 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-2017-18 to 2018-19

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	205.63										205.63
Mining/dump		2.55									2.55
Agriculture			6933.37	34.74						0.10	6968.20
Plantation Horticulture			8.67	254.59							263.26
Forest											
Forest Plantation											
Barren Rocky											
Scrub			27.71					1735.02		0.49	1763.22
Waterbody-Streams/River									268.06		268.06
Waterbody – Ponds			1.87							403.28	405.15
Grand Total	**205.63**	**2.55**	**6971.62**	**289.33**				**1735.02**	**268.06**	**403.87**	**9876.06**

- 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 34.84 ha of agriculture are decreased and it is converted into plantation and water body of T5.
- In T5 38.25 ha of agriculture are increased from plantation, 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 10.44 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
4. There is an increase of 40.30, 88.40, 77.38, 36.61 & 3.41 Hectares From T0 to T1, T1 to T2, T2 to T3, T3 to T4 & T4 to T5 and overall increase of 246.11 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is an increase of 185.34 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 453.74 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (53) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (53) verified from the portal.