MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

IWMP-Batch-IV

ANANTAPURAMU -79/2012-13
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
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

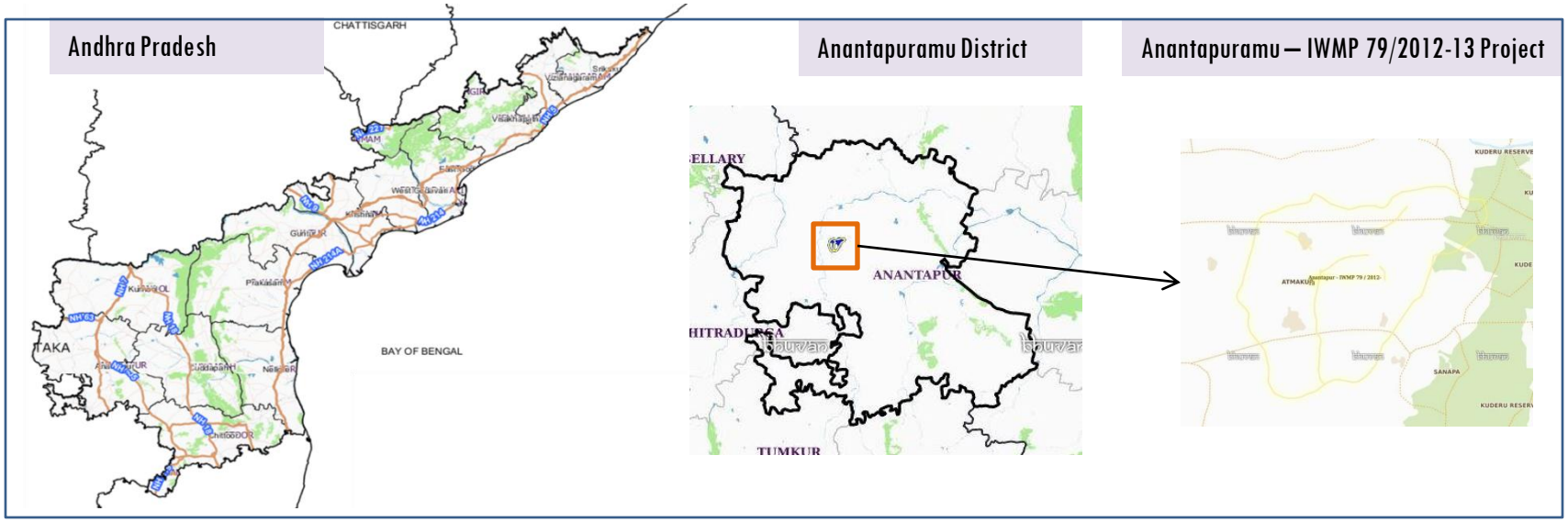
CONTENTS

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-79/2012-13, Anantapuramu District of Andhra Pradesh. The total geographical area of the project is **4,677** ha. It comprises of 10 micro watersheds.
- In the project area 220 Drishti photos were uploaded showing check dams, Farm ponds, Horticulture and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 23 new farm ponds or dug out pits with 54 ha increase in the area.
- Major percentage i.e. 73.5 % is covered by the agriculture, 7.6 % is covered by plantations , 6.5 % is covered by scrubland and remaining by other land use classes.

PROJECT : ANANTAPURAMU - IWMP-79/2012-13
DISTRICT : ANANTAPURAMU , STATE : ANDHRA PRADESH

- The study area falls in Atmakur Mandal of Anantapuramu district of Andhra Pradesh state. The total geographical area of the project is **4,677** ha. It comprises of 10 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



- Anantapuram has a semi-arid climate, with hot and dry conditions for most of the year. Summers start in late February and peak in May with average high temperatures around the 37 °C range and it reaches around 44 °C to 45 °C .
- Anantapuram gets pre-monsoon showers starting as early as March, mainly through north-easterly winds blowing in from Kerala. Monsoon arrives in September and lasts until early November with about 250 mm (9.8 in) of precipitation. A dry and mild winter starts in late November and lasts until early February; with little humidity and average temperatures in the 22–23 °C (72–73 °F) range. Total annual rainfall is about 22 in (560 mm).
- Anantapuram district receives moderate to good rainfall from July to October month.

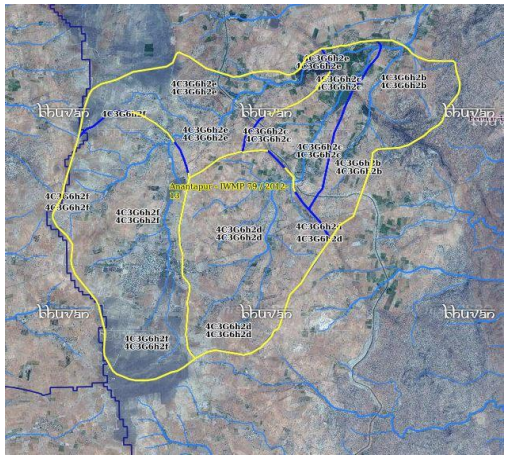
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2012-13	2012-13	2020-21
LISS IV	2012-13		
SCENE 1			19-Feb-21
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2012-13		
SCENE 1			19-Feb-21
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	220
4	Detailed Project Report		

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



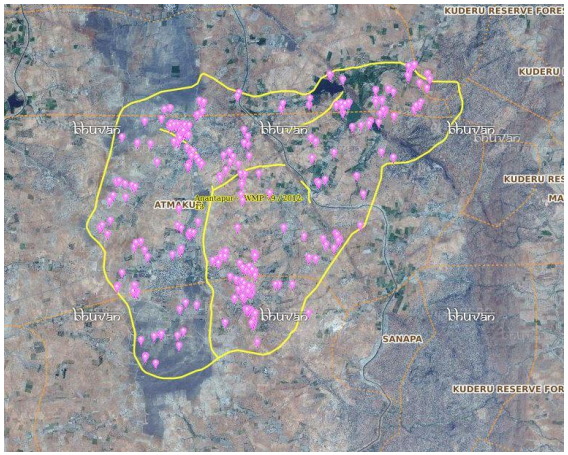
Legend

Drainage (1:10000 Scale)

MWS Boundary

Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

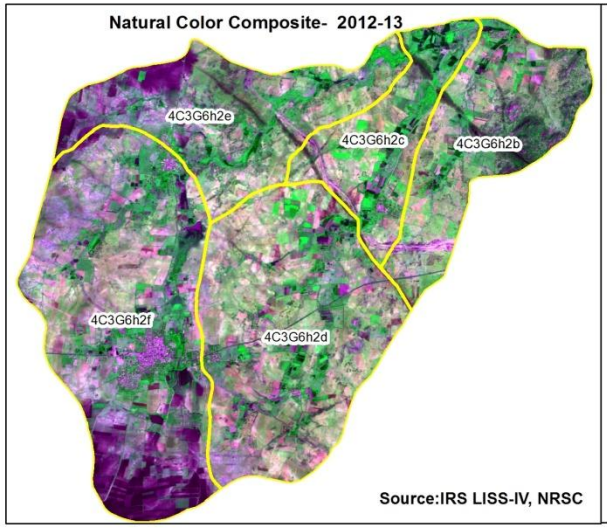
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Agriculture/Horticulture	8	8
2	Afforestation	1	1
3	Pasture	0	0
4	Trench	0	0
5	Field Bunds	0	0
6	Terrace	0	0
7	Checks & Plugs	15	15
8	Gabion structure	0	0
9	Farm ponds/Dug out pit	23	23
10	Civil work-Check dams/Rock fill dam	42	42
11	Nallah Bunds/Drainage treatment	0	0
12	Percolation tanks / Ground water recharge structure	0	0
13	Production System and Micro-Enterprises	0	0
14	Livelihood Activities	2	2
15	Capacity Building Activities	0	0
16	Entry Point Activity	9	9
17	Others	217	120
	TOTAL	**317**	**220**

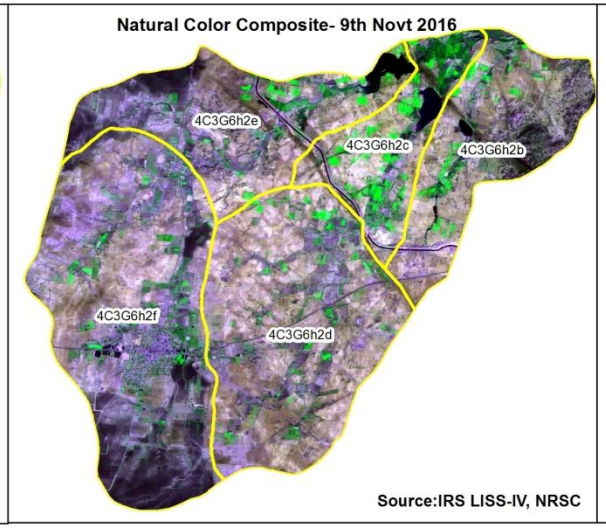
MONITORING IN THE PROJECT AREA

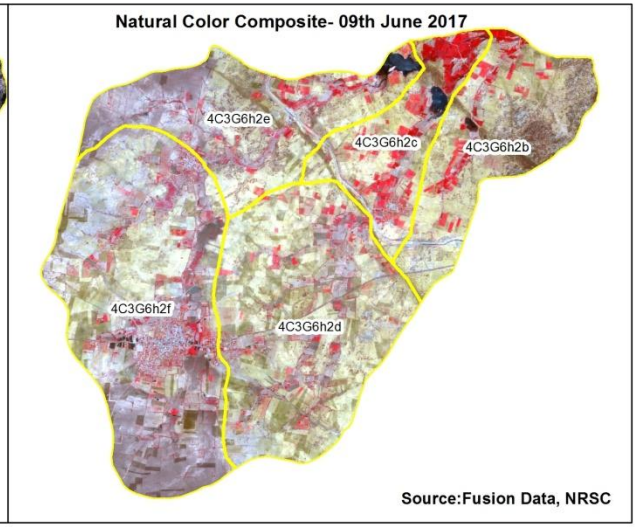
Site Wise Changes in the Project

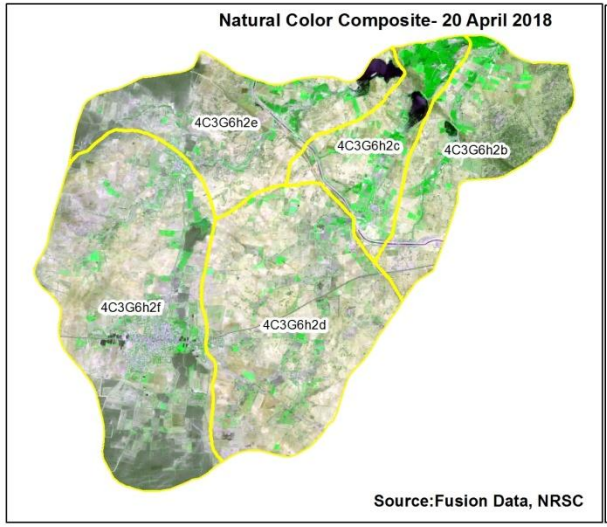
- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2012-13) and T5 is 2020-21 period for monitoring.
- Captures are also provided wherever changes are observed in satellite images, that may match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

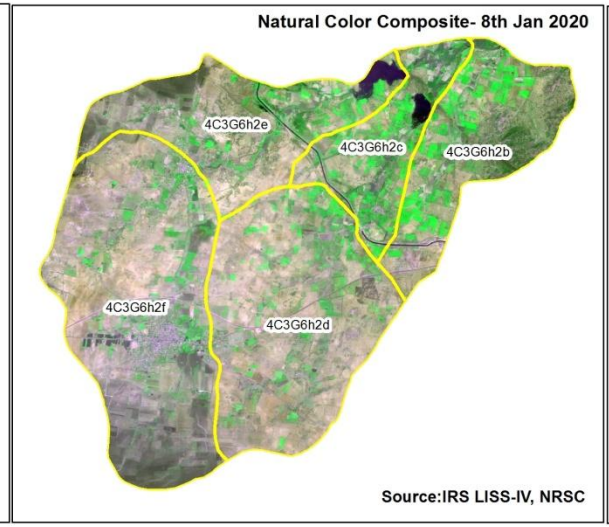
Natural Colour Composite (NCC)

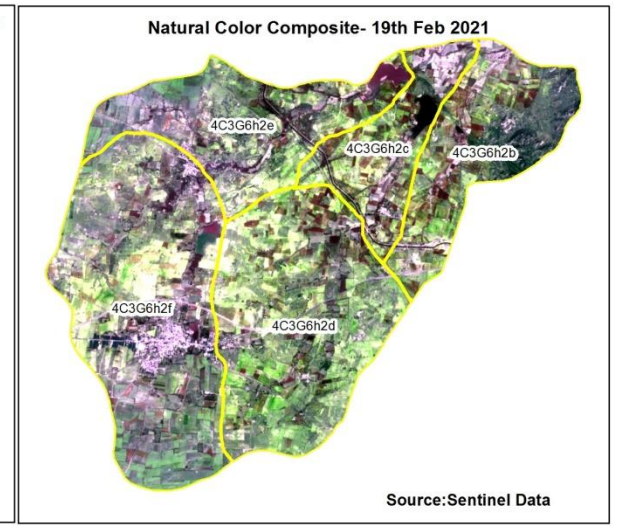












Monitoring of activities in Ananthapuram District Andhra Pradesh. IWMP-79/2012-13

T0 Satellite data 2013

T1 Satellite data 2015

T2 Satellite data 2016

T3 Satellite data 2016

T4 Satellite data 2018

T5 Satellite data 2020

Drishti Id. 2492337

Farm Ponds

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-79/2012-13

T0:2012-13

T1: 09 November 2016

Drishti SI no. 1715667- MWS :4C3G6h2f

Check dam

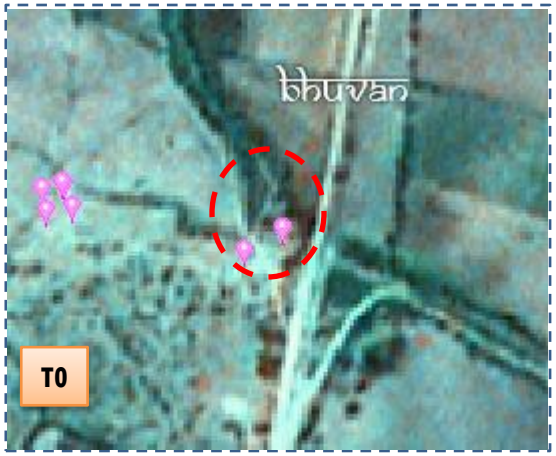
T0:2012-13

T1: 09 November 2016

Drishti SI no. 135660- MWS : 4D3C4c2e

Check dam

Monitoring of activities in Anantapuram Dt Andhra Pradesh. IWMP-79/2010-11

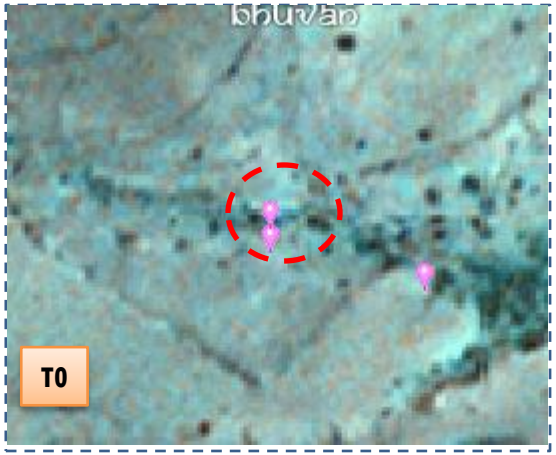


T0: 2012-13

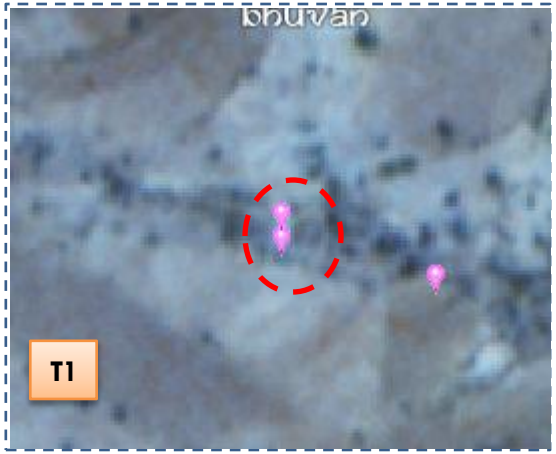
T1: 09 November 2016

Drishti SI no. 7076473 - MWS :----------

Check dam



T0: 2012-13



T1: T1: 09 November 2016

Drishti SI no. 7076848- MWS :4C3G6h2f

Check dam

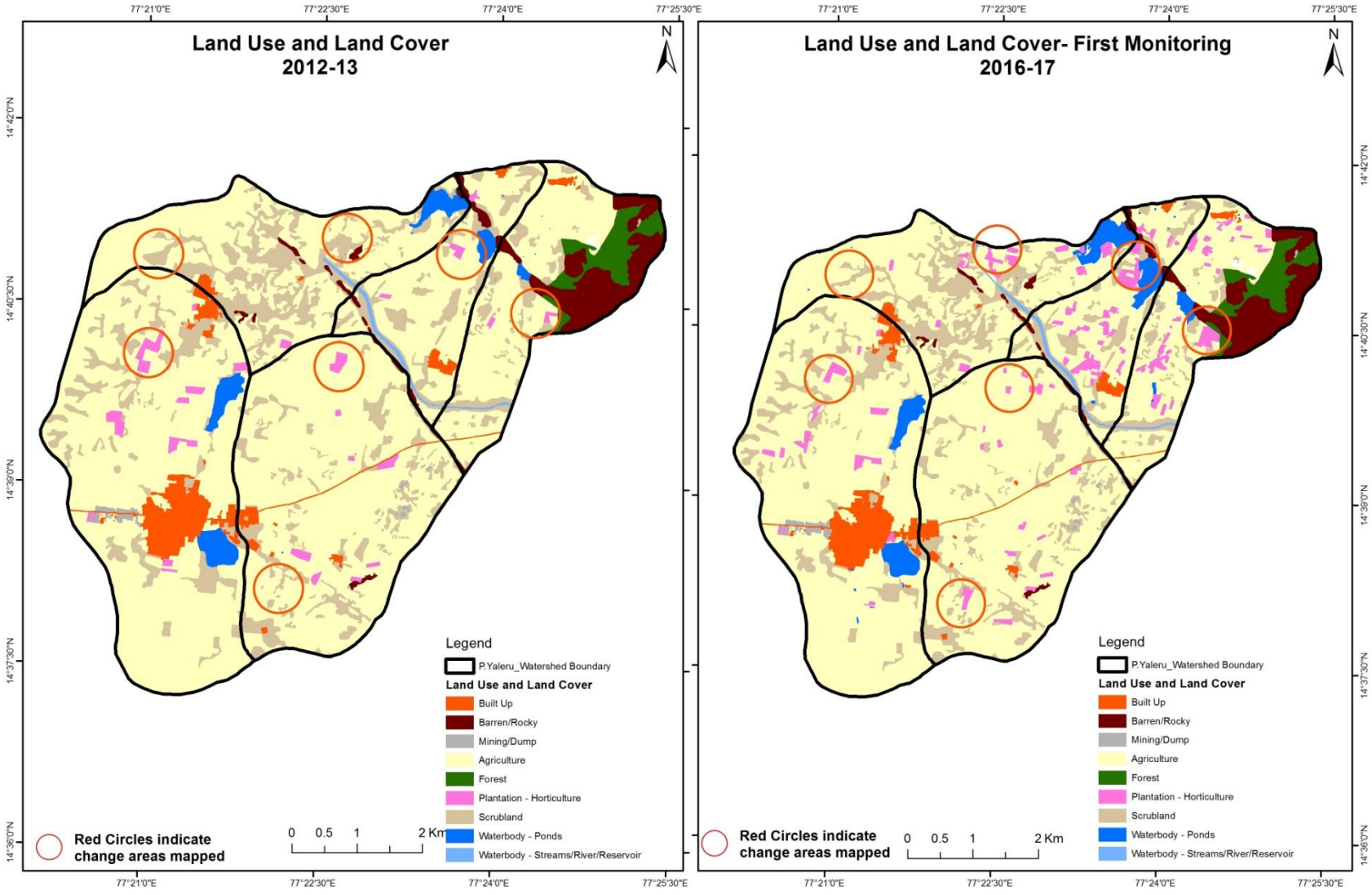
MONITORING IN THE PROJECT AREA

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 T0 (2012-13) and row represents the T5 (2020-21)

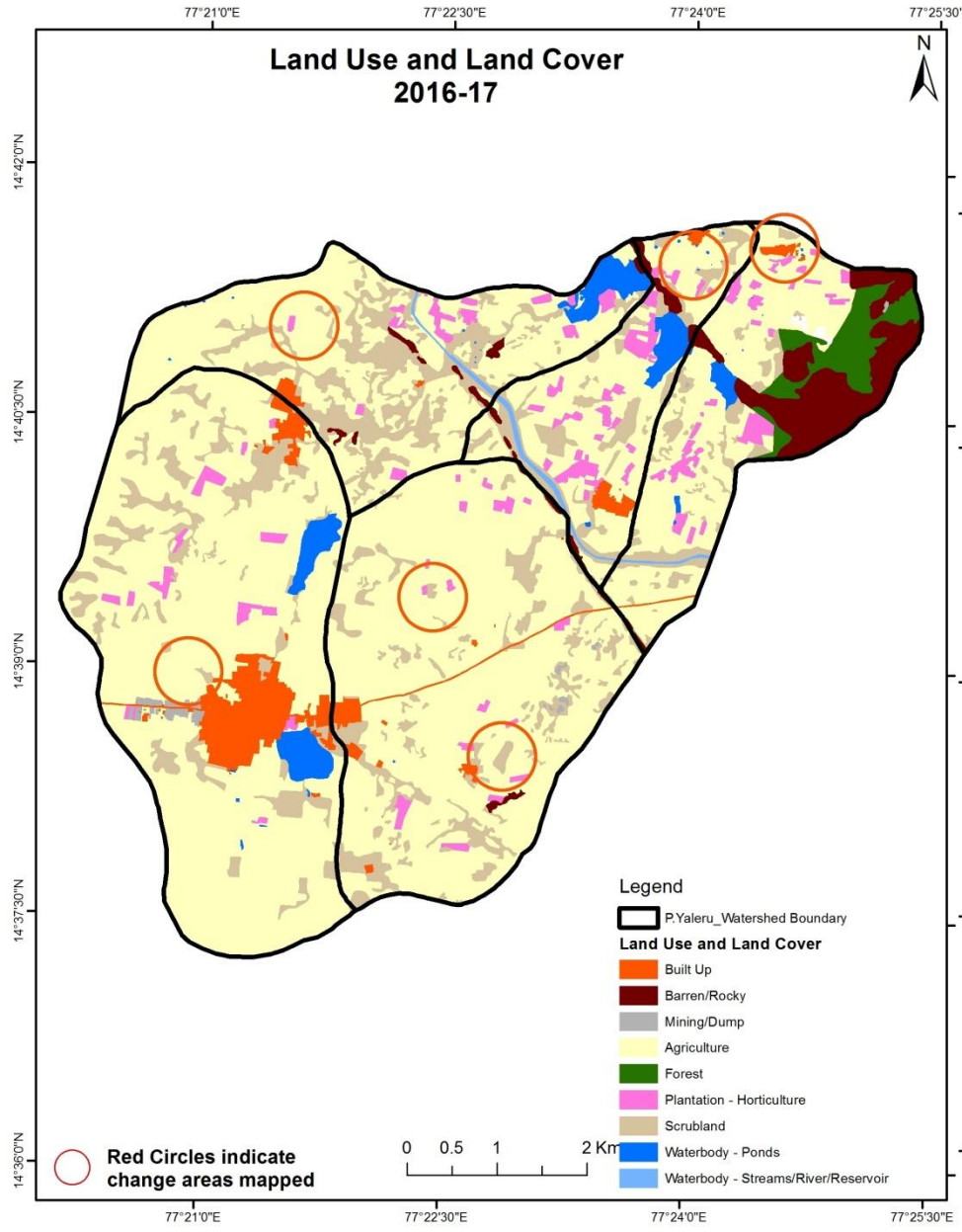
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2012-13 to 2016-17)

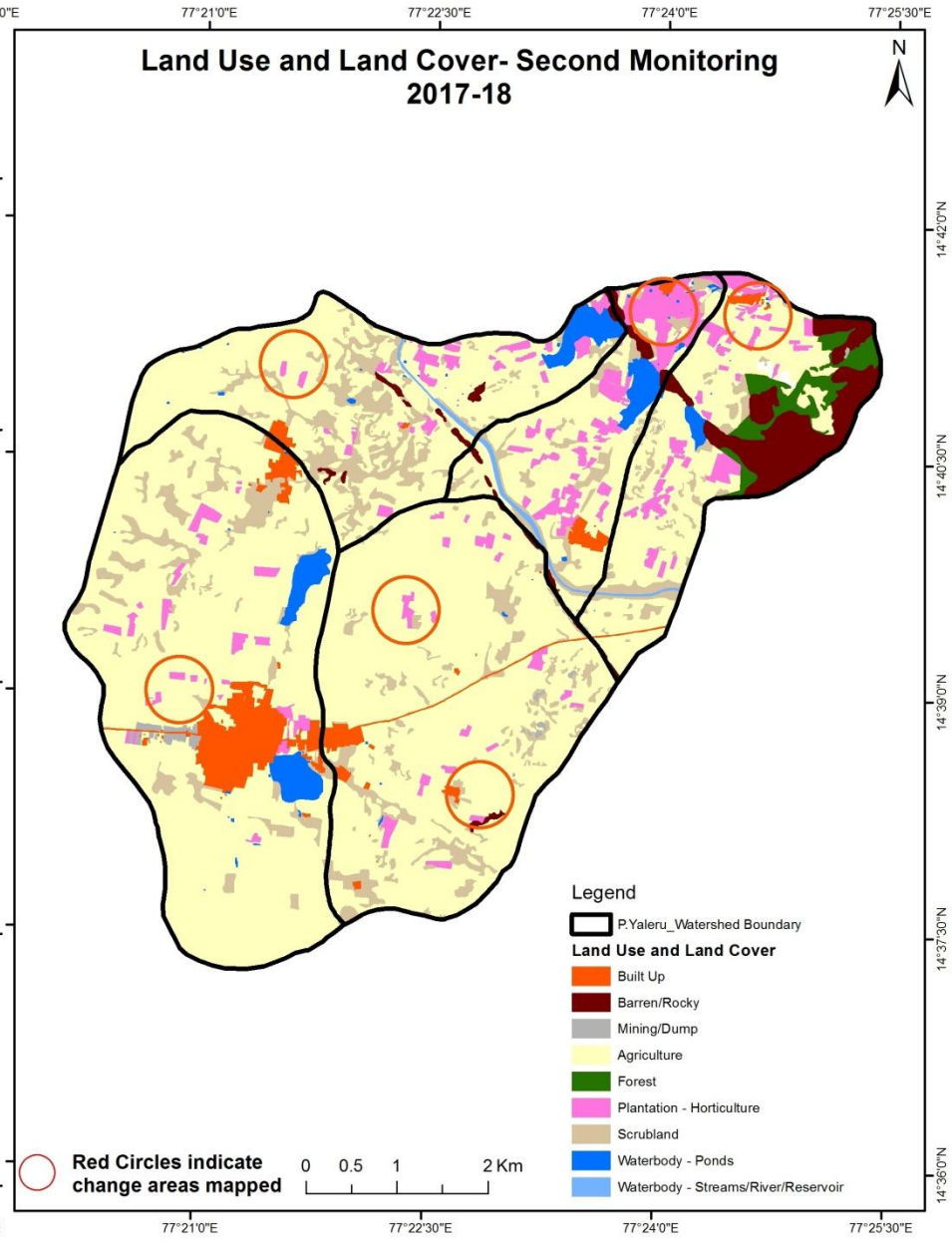
Scale: 1:10000



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

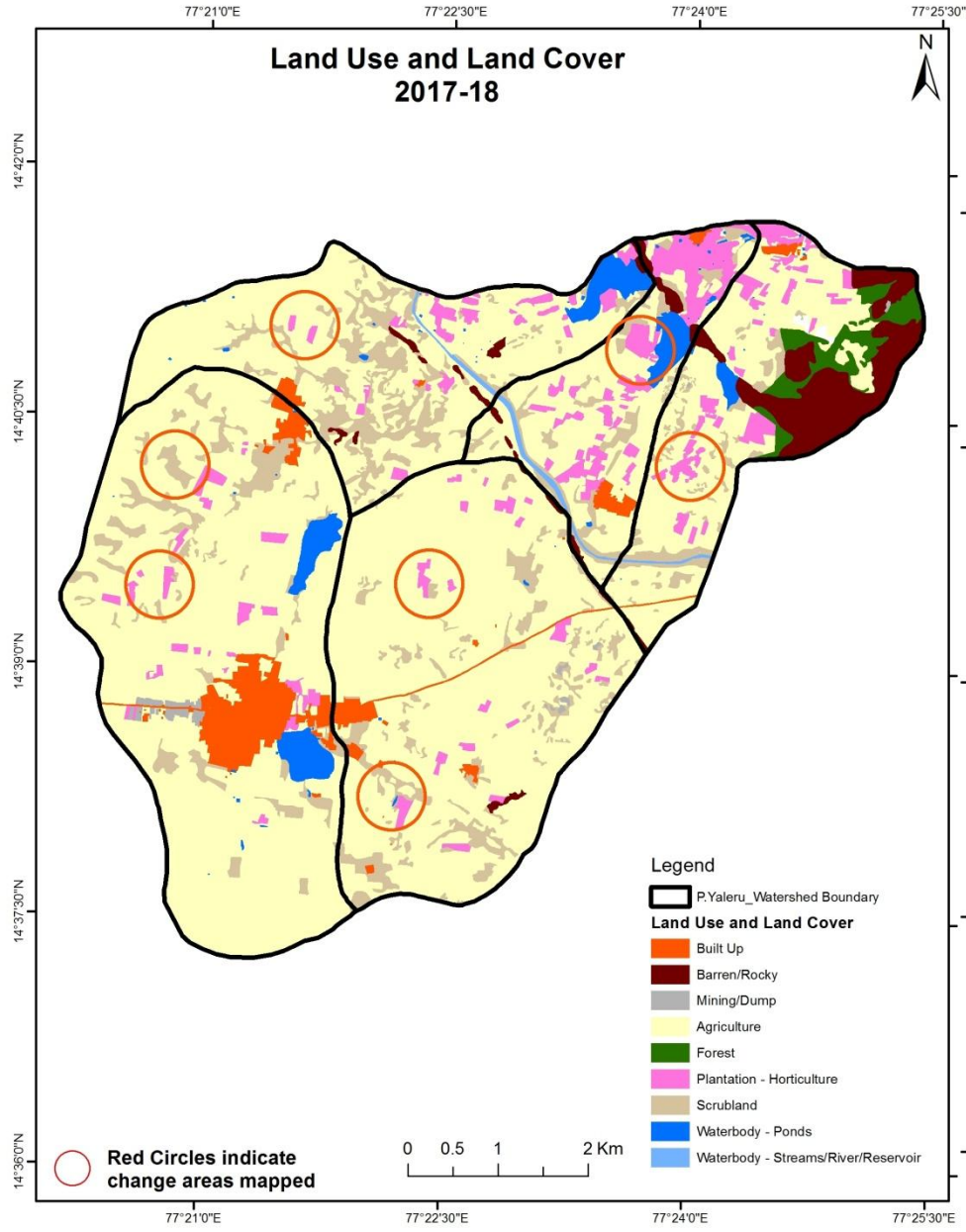
Scale: 1:10000

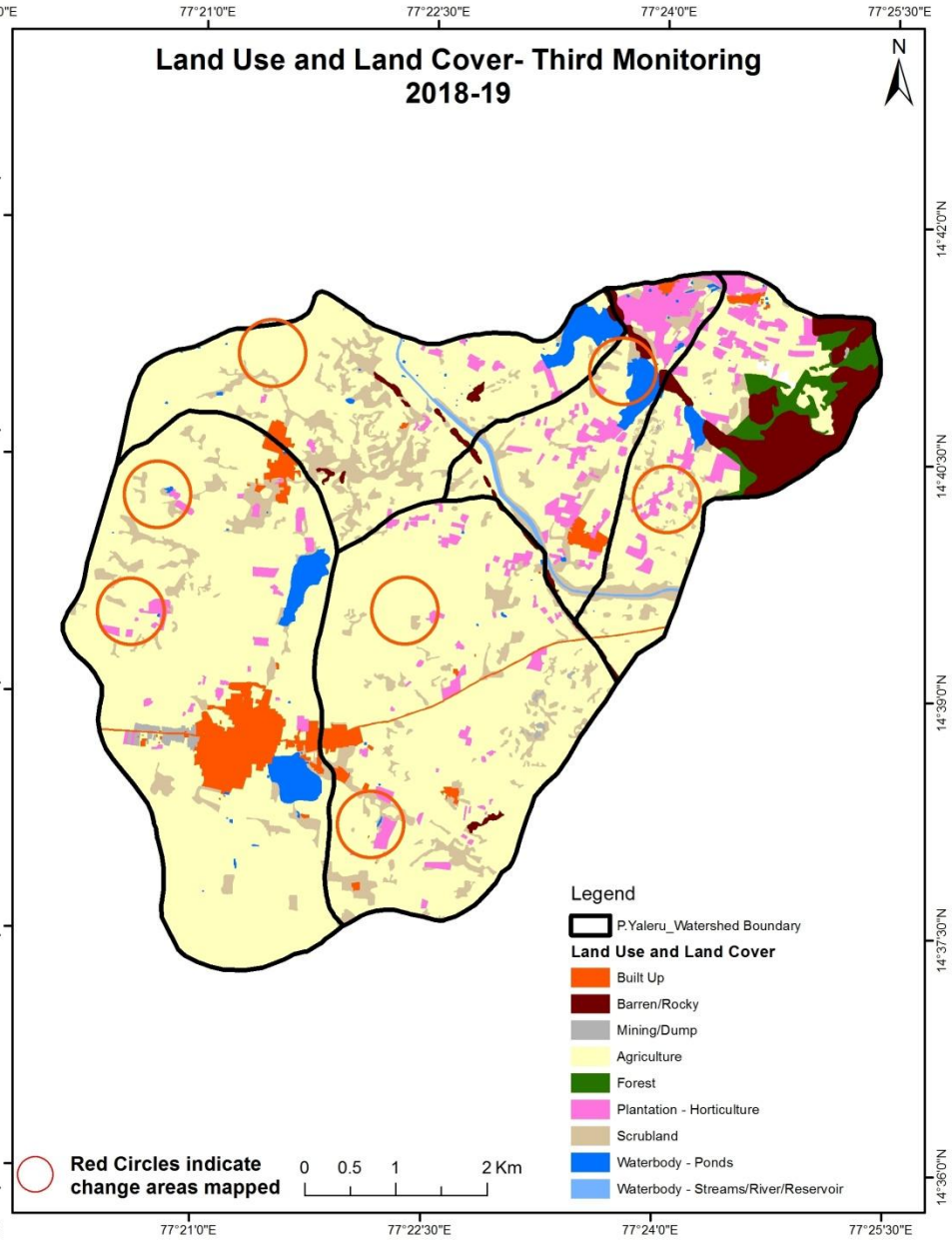




Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2017-18 to 2018-19)

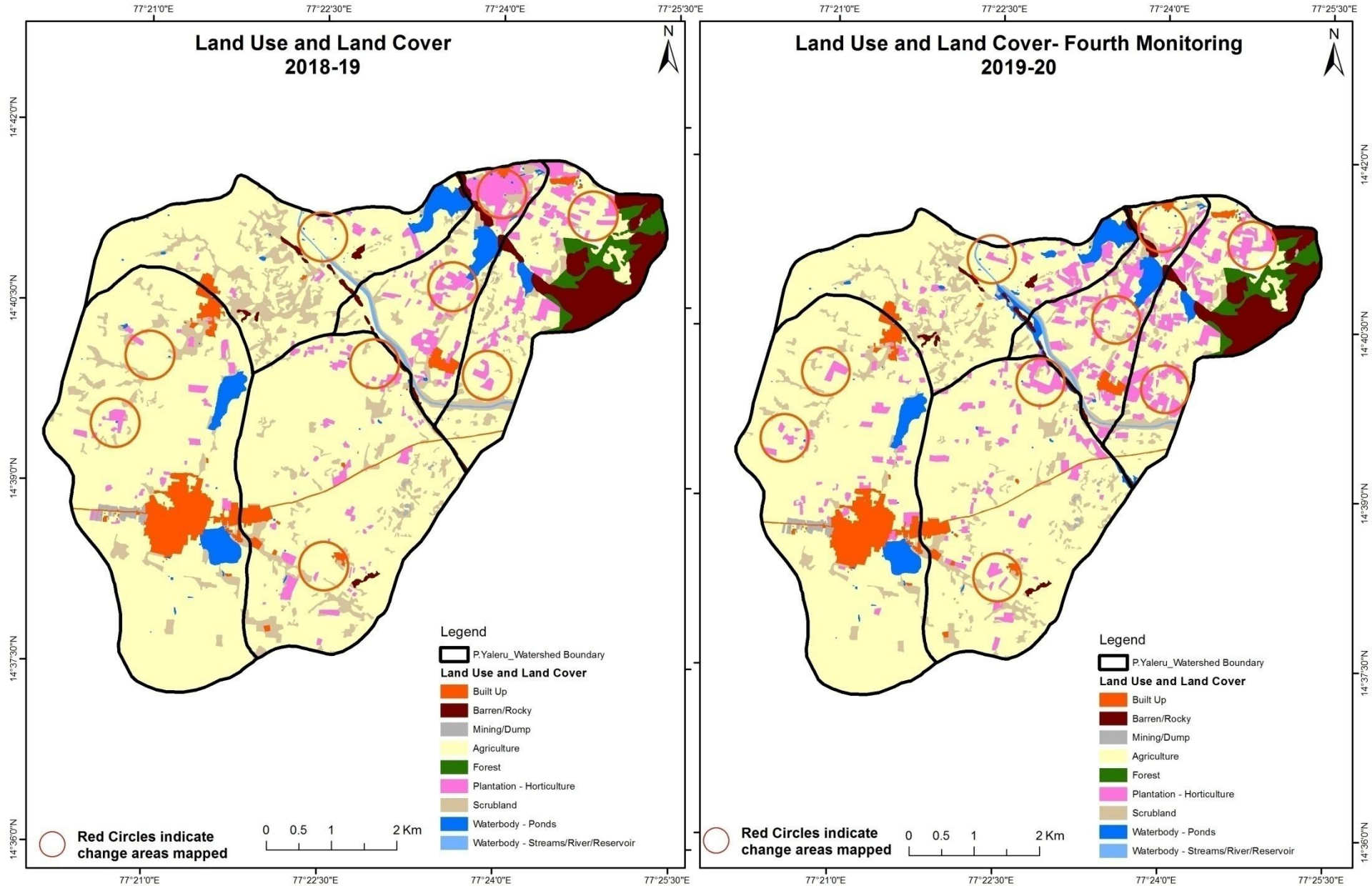
Scale: 1:10000





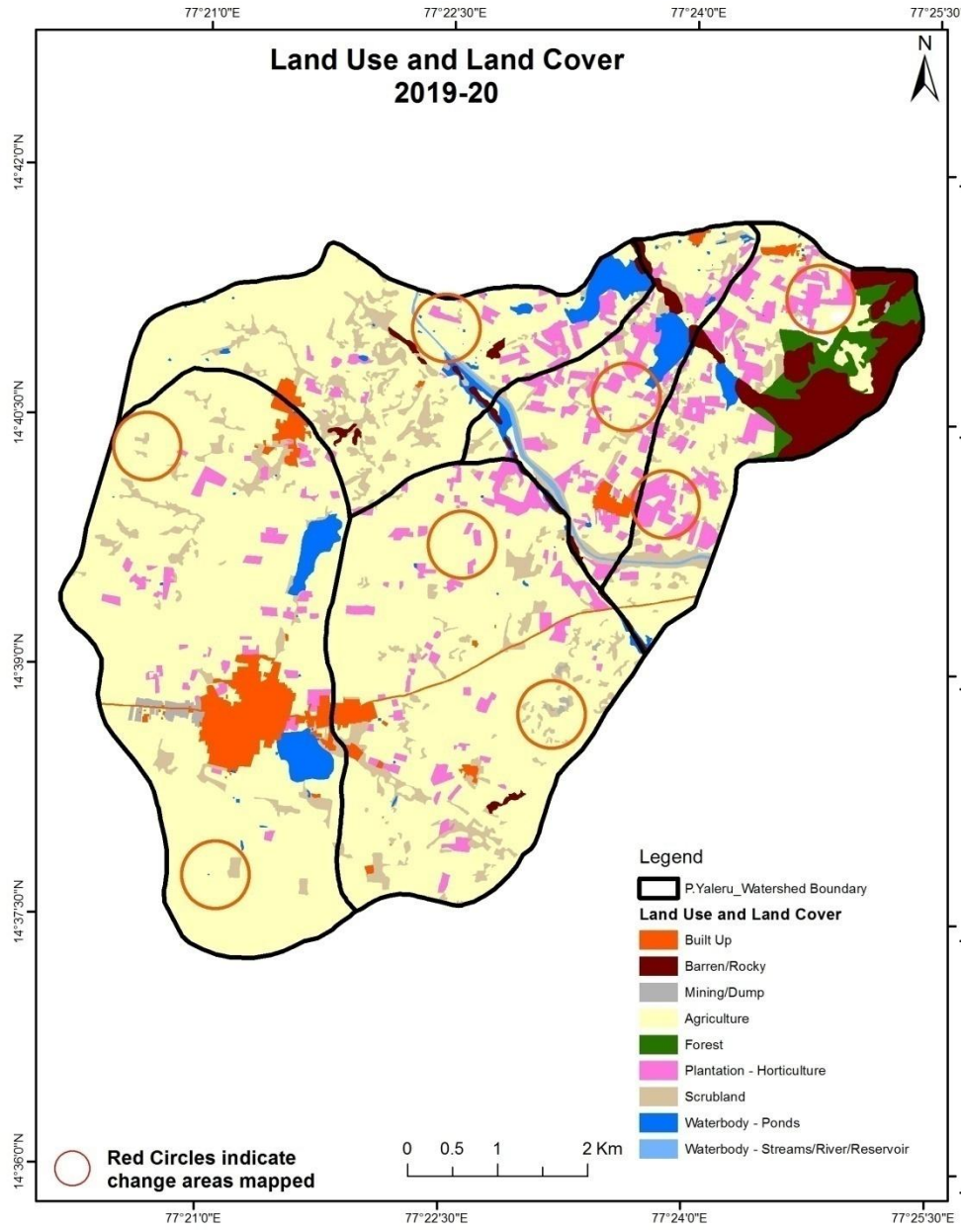
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2018-19 to 2019-20)

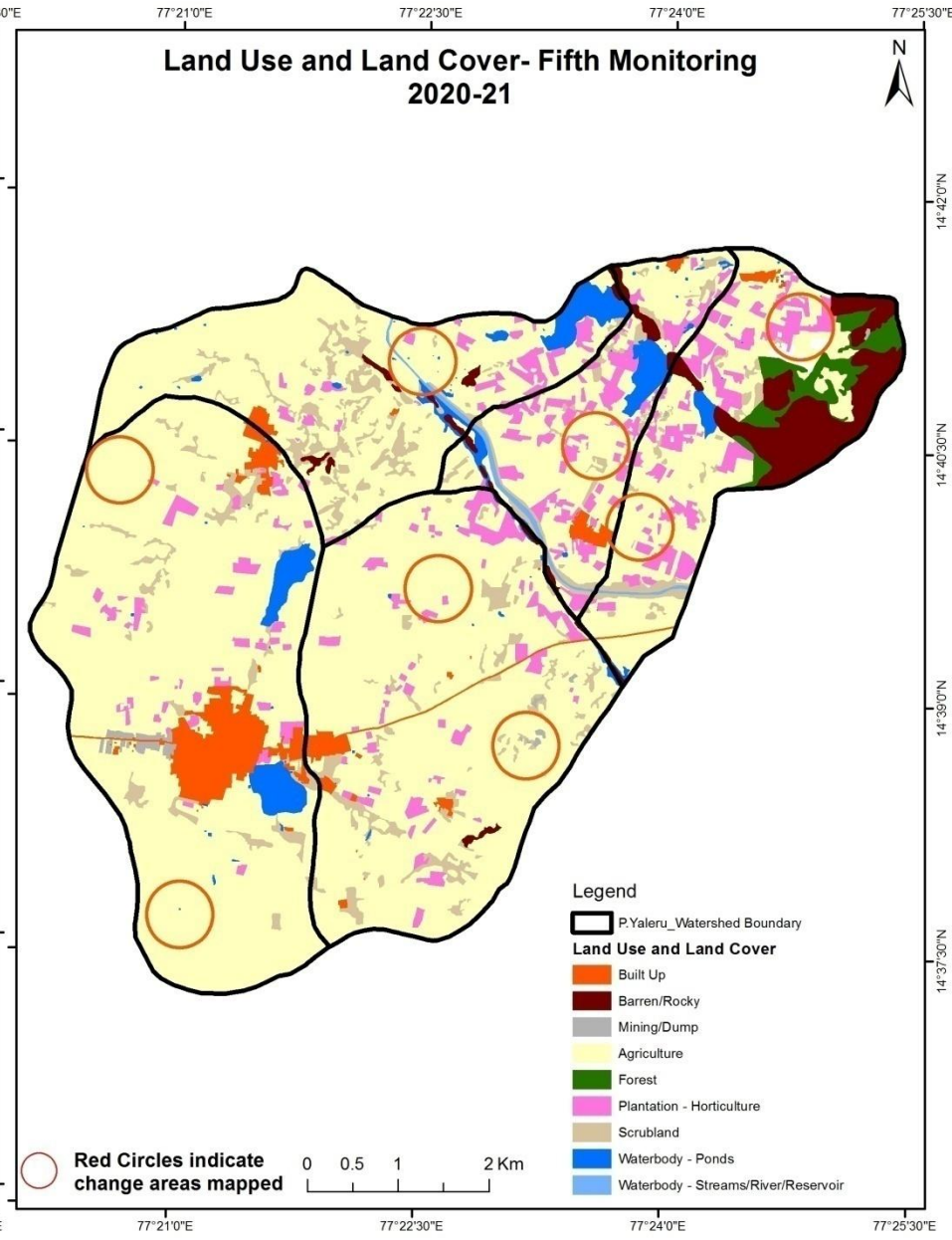
Scale: 1:10000



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

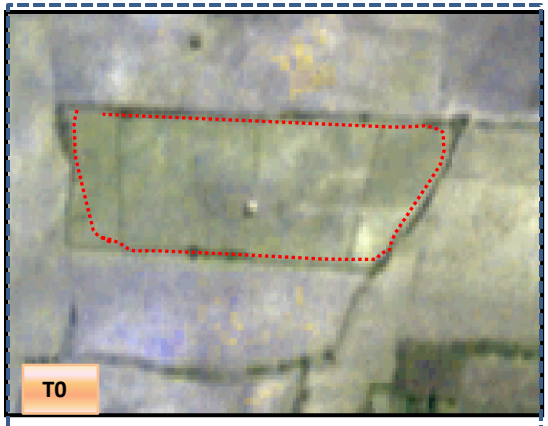
Scale: 1:10000



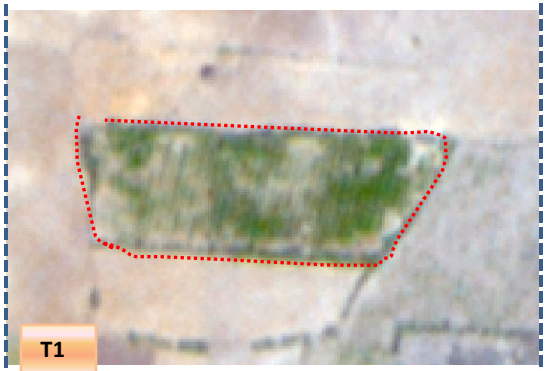


Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation

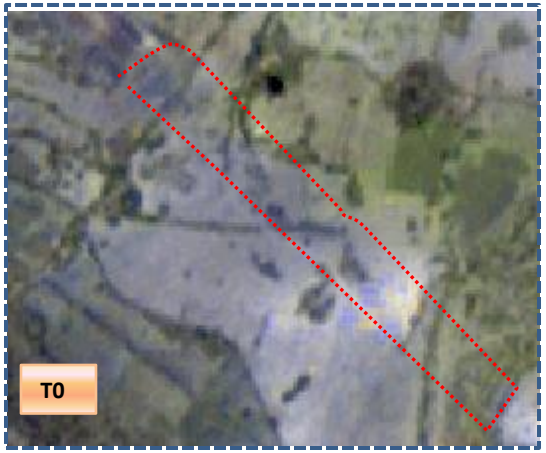


T0: 2012-13(77°21'25.849"E 14°39'45.844"N)

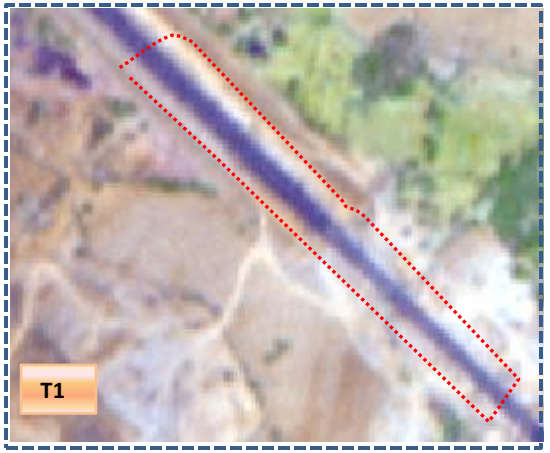


T1: 09 November 2016

Agriculture to Water body (Canal)



T0: 2012-13 (77°22'27.285"E 14°40'55.454"N)

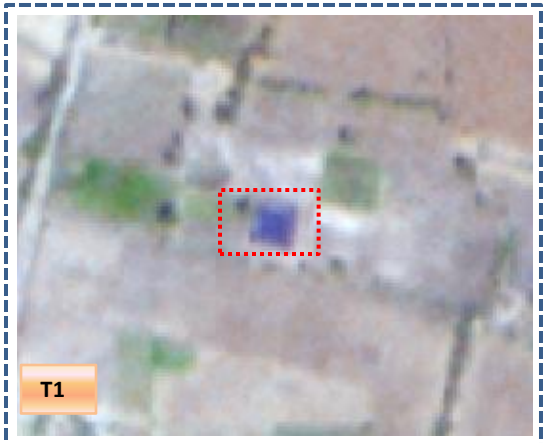


T1: T1: 09 November 2016

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

Agriculture to Water body

T0: 2012-13(77°21'14.326"E 14°38'11.233"N)



T1: 09 November 2016

Plantation to Agriculture

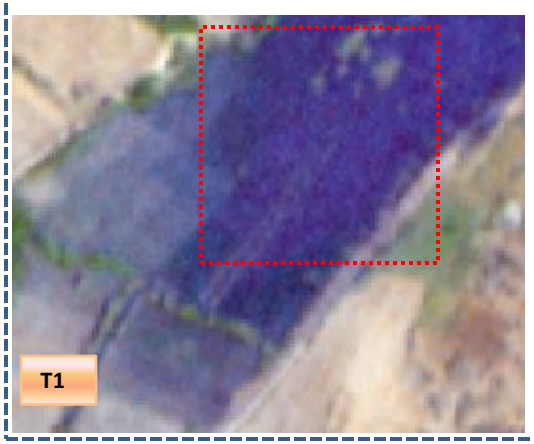
T0: 2012-13( )

T1: 09 November 2016

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

Scrubland to Water body

T0: 2012-13(77°23'48.562"E 14°40'50.308"N)



T1: 09 November 2016

Scrubland to Built-up

T0: 2012-13(77°22'27.285"E 14°40'55.454"N)

T1: 09 November 2016

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	160.63										**160.63**
Mining/dump		13.89									**13.89**
Agriculture	2.46	1.65	3170.61	124.73		2.07		2.27	1.25	15.43	**3320.48**
Plantation Horticulture			34.04	32.46						0.16	**66.66**
Forest					81.33						**81.33**
Forest Plantation						2.16					**2.16**
Barren Rocky							178.92				**178.92**
Scrub	2.30	0.13	44.05	1.85				687.22	1.05	15.35	**751.96**
Waterbody-Streams/River									16.46		**16.46**
Waterbody – Ponds										84.89	**84.89**
Grand Total	**165.39**	**15.67**	**3248.71**	**159.03**	**81.33**	**4.24**	**178.92**	**689.49**	**18.76**	**115.83**	**4677.37**

- 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 147 ha of the agriculture area has decreased and it is converted into Built-up, mining/dump, plantation, forest plantation, scrubland and water body in T1.
- In T1 78 ha of the agriculture area has increased from plantations and scrubland 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	131.24										**131.24**
Mining/dump		16.08									**16.08**
Agriculture	2.98		3143.18	120.72				1.06		1.18	**3269.12**
Plantation Horticulture			19.89	143.56							**163.45**
Forest			18.57		61.11						**79.68**
Forest Plantation											
Barren Rocky							184.78				**184.83**
Scrub			174.46	5.56				511.00		2.86	**693.88**
Waterbody-Streams/River									32.62		**32.62**
Waterbody – Ponds			0.29					0.89		105.69	**106.87**
Grand Total	**134.22**	**16.08**	**3356.40**	**269.84**	**61.11**		**184.78**	**512.96**	**32.62**	**109.78**	**4677.78**

- 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 125 ha of the agriculture area has decreased and it is converted into Built-up , plantations, scrubland and water body in T2.
- In T2 213 ha of the agriculture area has increased from plantations, forest , 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-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	134.22										**134.22**
Mining/dump		16.08									**16.08**
Agriculture			3236.17	118.31				1.40		0.52	**3356.40**
Plantation Horticulture			133.32	134.71				1.81			**269.84**
Forest					61.11						**61.11**
Forest Plantation											
Barren Rocky							184.78				**184.78**
Scrub			66.12	2.60				444.24			**512.96**
Waterbody-Streams/River									32.62		**32.62**
Waterbody – Ponds										109.78	**109.78**
Grand Total	**134.22**	**16.08**	**3435.61**	**255.62**	**61.11**		**184.78**	**447.45**	**32.62**	**110.30**	**4677.78**

- 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 120 ha of the agriculture area has decreased and it is converted into plantations and scrubland in T3.
- In T3 199 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	134.22										**134.22**
Mining/dump		16.08									**16.08**
Agriculture			3140.80	294.80							**3435.61**
Plantation Horticulture			161.54	94.07							**255.62**
Forest					61.11						**61.11**
Forest Plantation											
Barren Rocky							184.78				**184.78**
Scrub			92.31	1.81				353.29		0.04	**447.45**
Waterbody-Streams/River									32.62		**32.62**
Waterbody – Ponds										110.30	**110.30**
Grand Total	**134.22**	**16.08**	**3394.65**	**390.69**	**61.11**		**184.78**	**353.29**	**32.62**	**110.34**	**4677.78**

• 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 294 ha of the agriculture area has decreased and it is converted into plantations in T4.

•In T4 253 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-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	168.36										**168.36**
Mining/dump		15.54									**15.54**
Agriculture			3354.92	1.82						1.03	**3357.77**
Plantation Horticulture			28.02	355.15		0.78					**383.96**
Forest					62.37						**62.37**
Forest Plantation						7.59					**7.59**
Barren Rocky							180.24				**180.24**
Scrub			57.58	0.98				287.76		0.89	**347.20**
Waterbody-Streams/River									18.76		**18.76**
Waterbody – Ponds										135.57	**135.57**
Grand Total	**168.36**	**15.54**	**3440.52**	**357.95**	**62.37**	**8.37**	**180.24**	**287.76**	**18.76**	**137.49**	**4677.37**

- 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 2.8 ha of the agriculture area has decreased and it is converted into plantations and water body area in T5.
- In T5 85 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 54 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 87, 79 & 82 Hectares from T1 to T2, T2-T3 & T4-T5 respectively, there is a decrease 71 & 40 Hectares from T0-T1 & T3-T4 and overall increase of 120 Hectares in Crop land area as compared between baseline LU/LC data 2012-13 (T0) & 2020-21 (T5) years.
5. **There is a increase of 291 Hectares in plantation/horticulture area** as compared between 2012-13 (T0) & 2020-21 (T5) years
6. There is a decrease of 464 Hectares in Scrubland area as compared between 2012-13 (T0) & 2020-21 (T5) years.
7. Farm ponds (23) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (23) verified from the portal.