

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

CHITTOOR -25/2010-11

Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
March-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

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

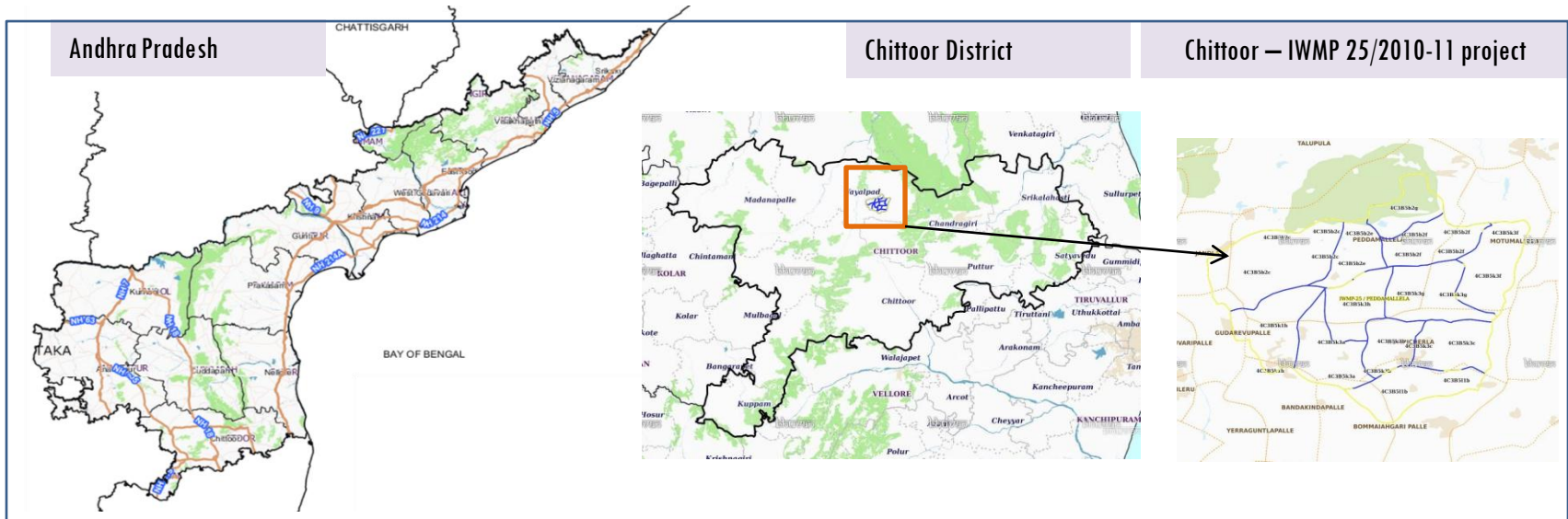
E X E C U T I V E S U M M A R Y

- 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-25/2010-11, Chittoor District of Andhra Pradesh. The total geographical area of the project is 7,271 ha. It comprises of 12 micro watersheds.
- In the project area 321 Drishti photos were uploaded showing all water harvesting structures of check dams/Rock fill dam, recharge pits etc,.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing new farm ponds or dug out pits and check dams and drainage treatments with 30 ha increase in the area.
- Major percentage i.e. 67.25 % is covered by the agriculture, 12.6 % is covered by scrubland and 6.8 % is covered by plantation and remaining by other land use classes.

PROJECT : CHITTOOR – IWMP-25/2010-11

DISTRICT : CHITTOOR , STATE : ANDHRA PRADESH

- The study area falls in Rompicherla1 Mandal of Chittoor district of Andhra Pradesh state. The total geographical area of the project is 7,271 ha. It comprises of 12 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2010-11 (T0) period (*Batch -II*) projects taking 2018-19 (T5) period satellite images



- The climate of the district is dry and healthy. Out of 66 mandals in the district, 31 are upland mandals which are located in Madanapalle division and are comparatively cooler than the eastern mandals except Chittoor mandal where the climate is moderate. December and January are the coldest months when the mean maximum temperature will be around 26.40 °C, May is the hottest month with the mean daily maximum temperature rising above 40 °C.
- The district receive 83.62 percent of rainfall during South-West monsoon and North-West monsoon period, the rainfall is nominal in summer. On an average the district receives more than 50 percent of rainfall during North- East monsoon.

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			25-Mar-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			25-Mar-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	321
4	Detailed Project Report		

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



Legend



Drainage (1:10000 Scale)

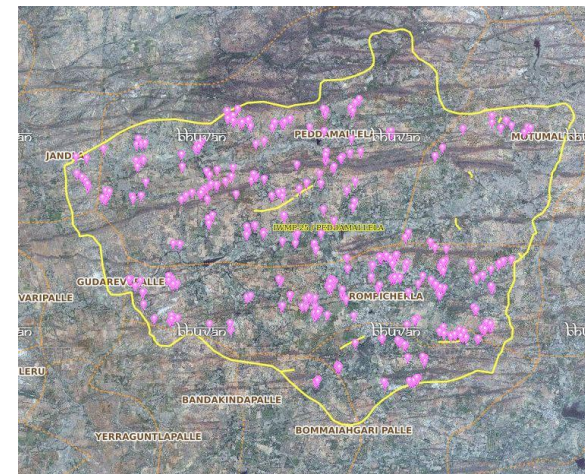


MWS Boundary



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	35	30
3	Black planting	0	0
4	Bund Planting/Horticulture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Existing activity	0	0
8	Checks & Plugs	21	20
9	New activity (boulder removal, farm ponds, dug out pits etc.,)	0	0
10	Farm ponds/Dug out pit	26	26
11	Civil work-Check dams /Rock fill dam	81	60
12	Drainage treatment /Nala Revetment, loose boulder structure, gully check	0	0
13	Land Developments (afforestation, horticulture and bund plantation of teak)	0	0
14	Lm (fodder development, varmi compost)	0	0
15	Livelihood Activities	1	1
16	Water harvesting structures (recharge pits and check dams)	0	0
17	Entry Point Activity (Cattle thought)	4	4
18	Others	207	180
	TOTAL	375	321

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.

Chittoor-IWMP-25/2010-11

2009-10



May-2014



Jan-2017



Dec-2017



Jan-2019



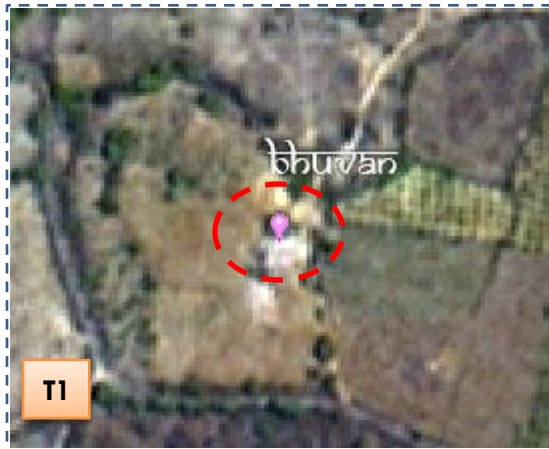
Activity : Farm pond

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-25/2010-11



T0

T0:2010-11



T1

T1: 13 May 2014



Drishti Sl no. 1723543 MWS :4C3B5k3b

Farm pond



T0:2010-11



T1: 13 May 2014



Drishti Sl no. 7041570 MWS : 4C3B5b2c

Farm pond

Monitoring of activities in Chittoor Dt Andhra Pradesh. IWMP-25/2010-11



T0

T0: 2010-11



T1

T1: 13 May 2014



Drishti Sl no. 7033921 MWS : 4C3B5b2c

Percolation tank



T0

T0: 2010-11



T1

T1: 13 May 2014



Drishti Sl no. 2474746 MWS : 4C3B5k3f

Farm pond

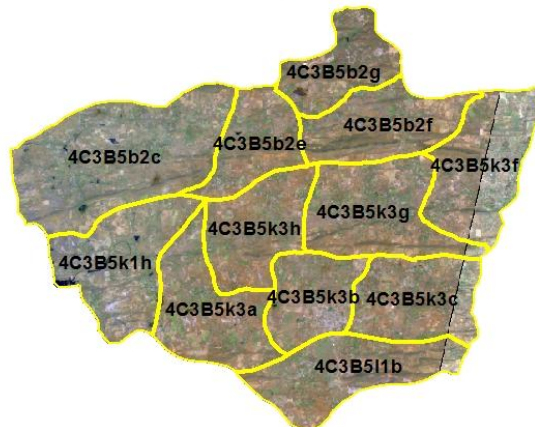
Natural Color Composite – 2010-11 to 2018-19

Natural Color Composite- 2010-11



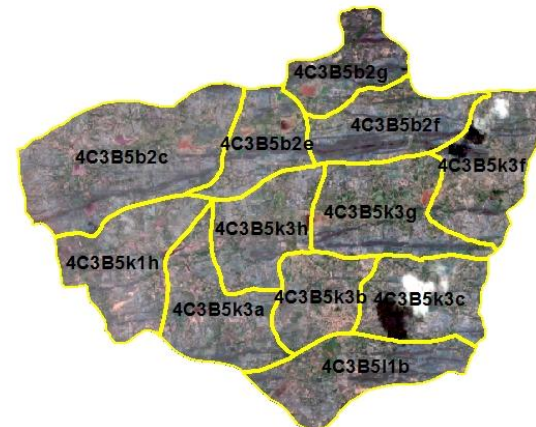
Source: NCC, NRSC

Natural Color Composite-15th Dec 2013



Source: NCC, NRSC

Natural Color Composite- 15th may 2016



Source: NCC, NRSC

Natural Color Composite- 26 Dec 2017



Source: NCC, NRSC

Natural Color Composite- 6th March 2018



Source: LISS-IV, NRSC

Natural Color Composite- 25th March 2019



Source: LISS-IV, NRSC

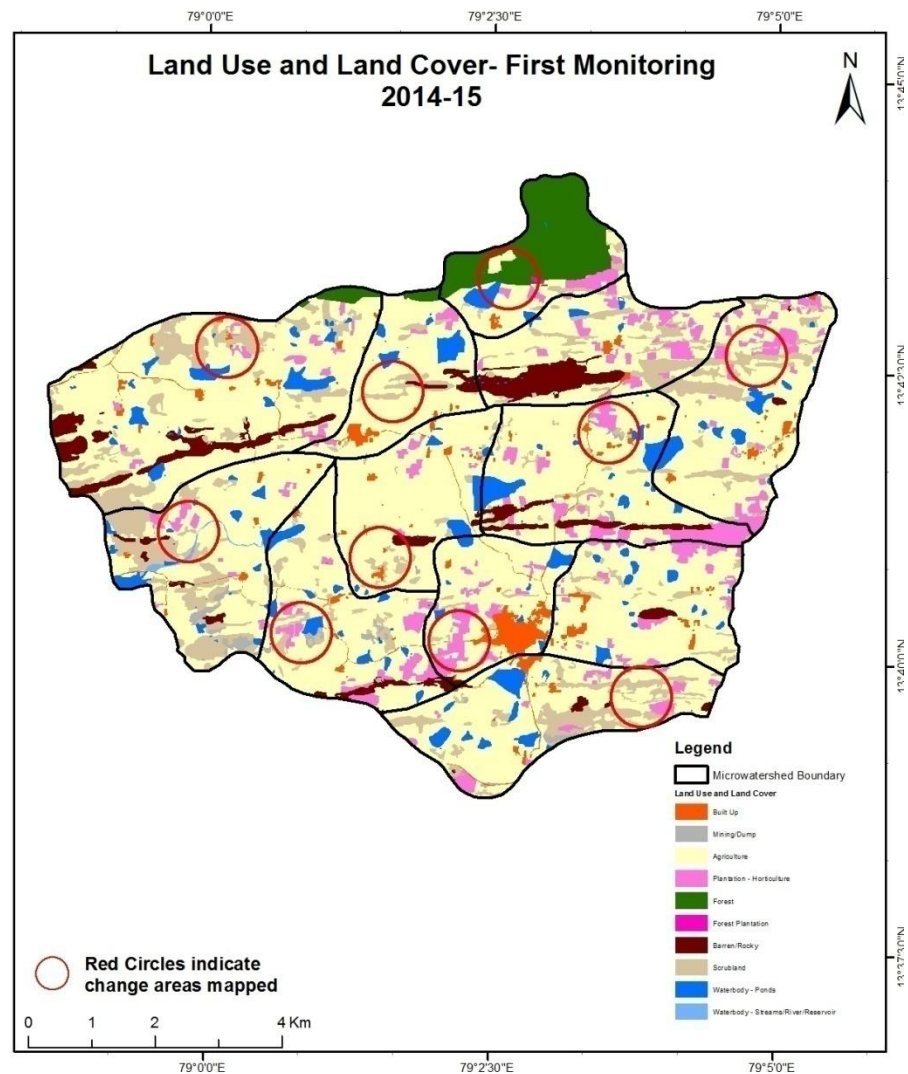
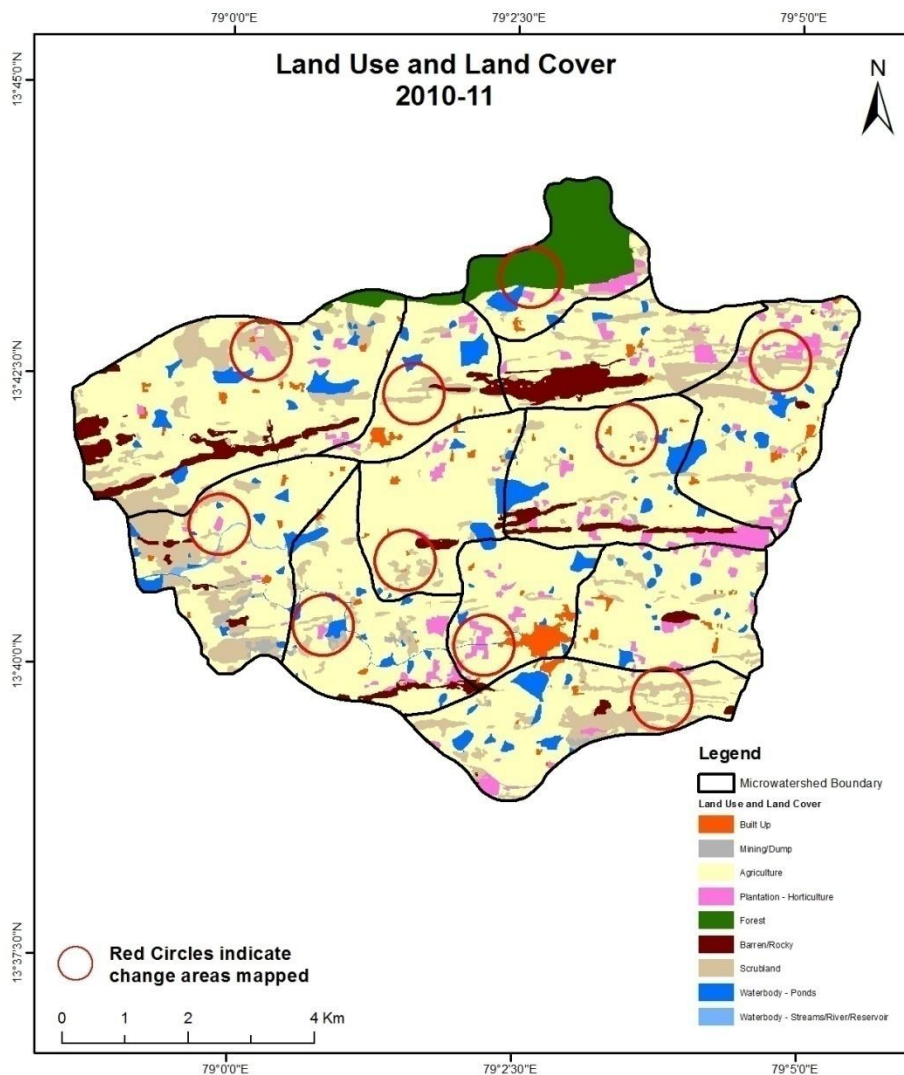
MONITORING IN THE PROJECT AREA

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 T0 (2010-11) and row represents the T5 (2018-19)

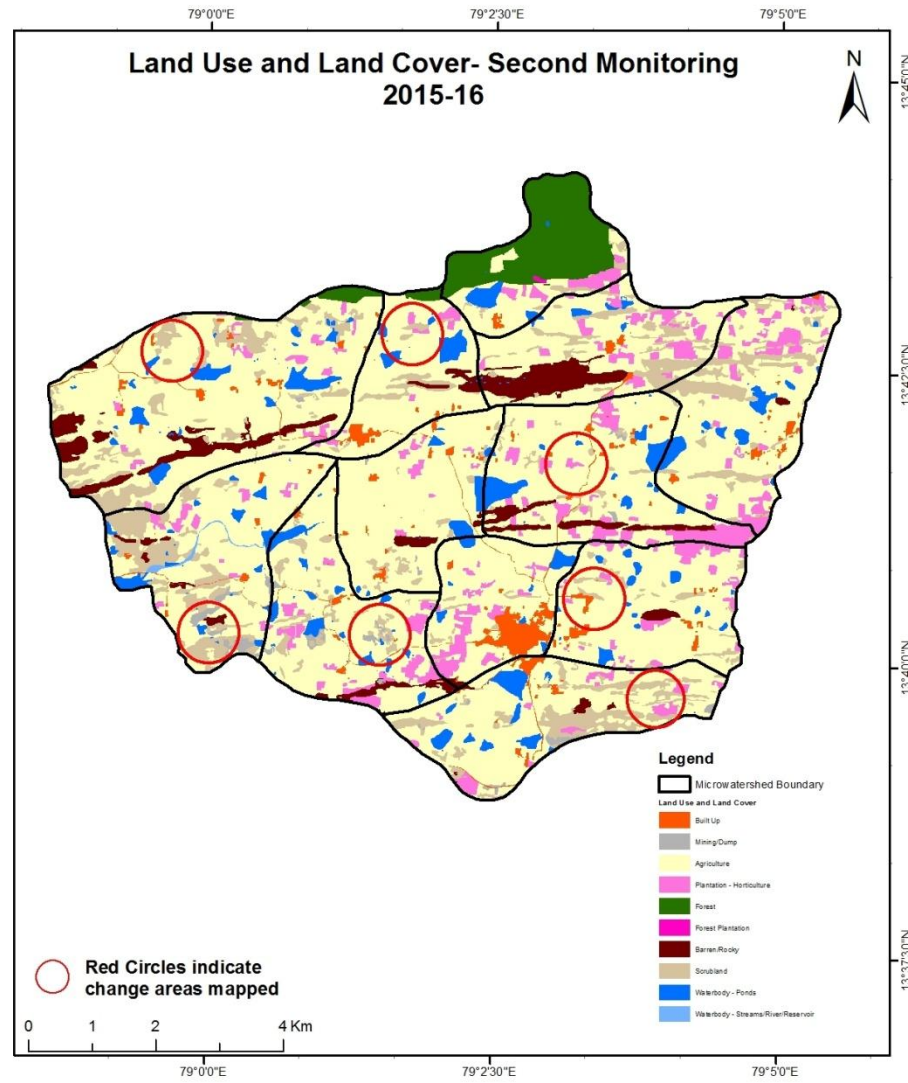
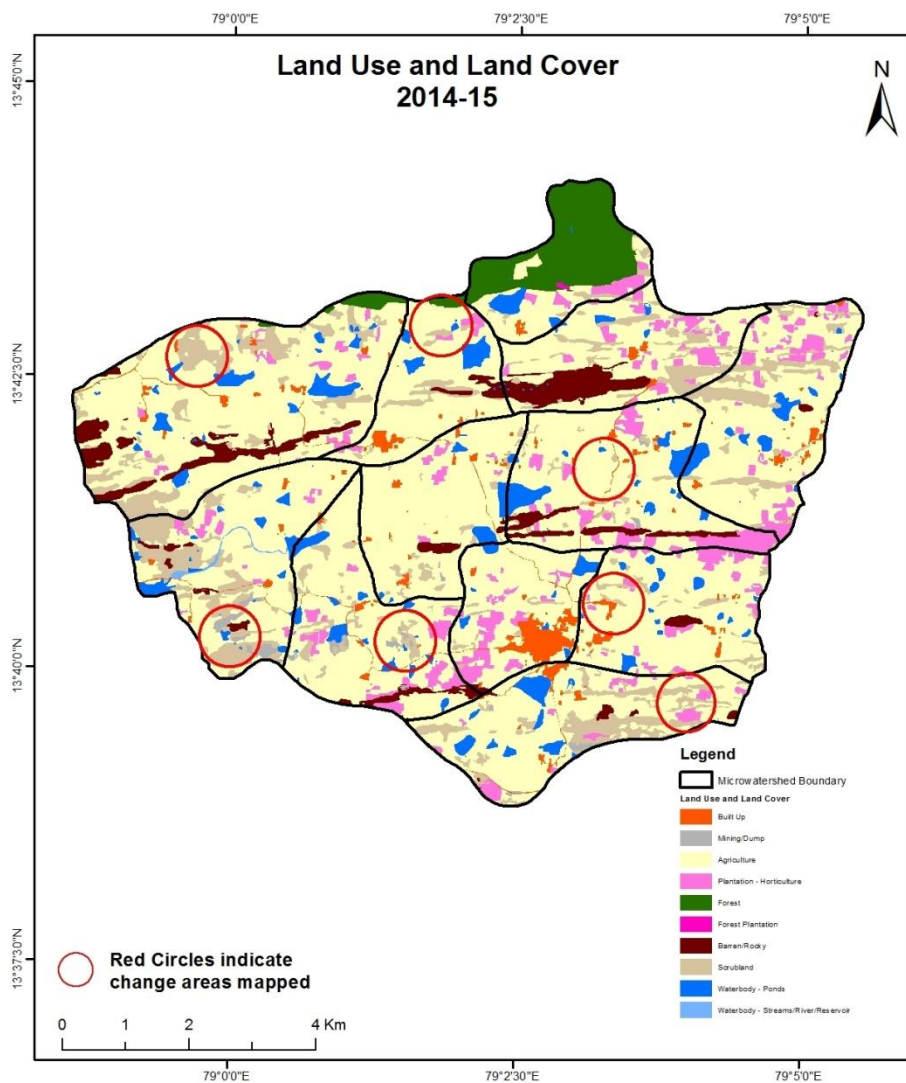
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



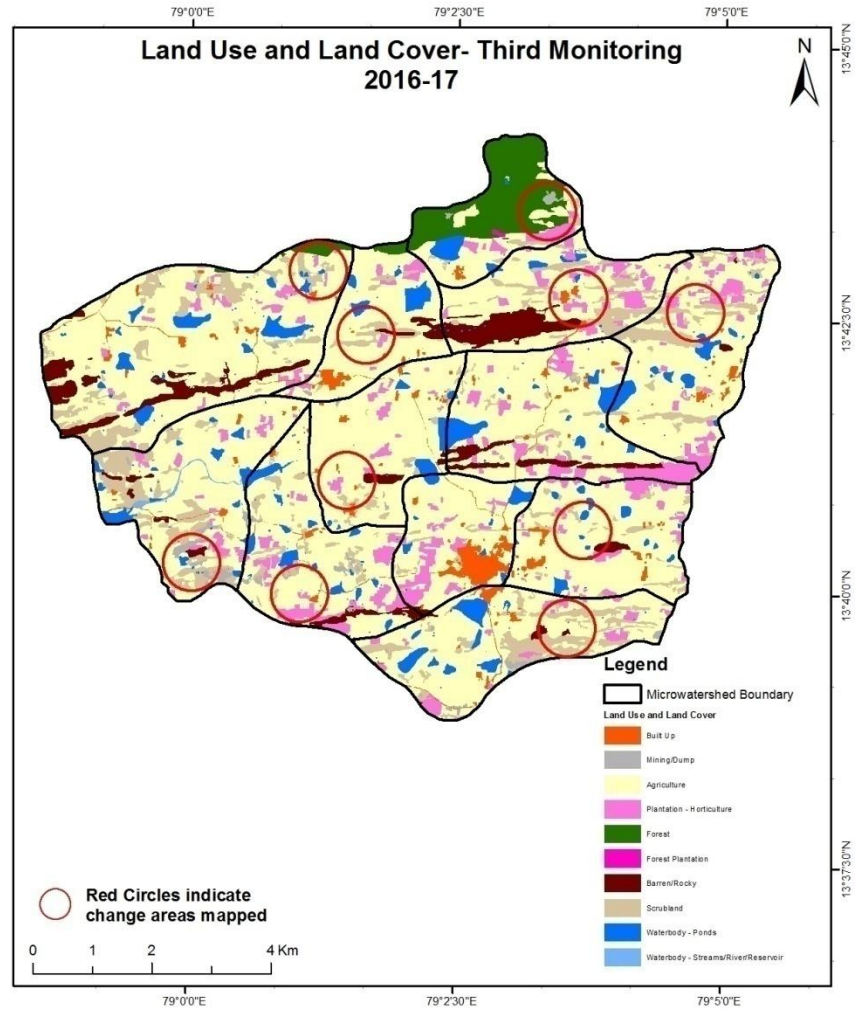
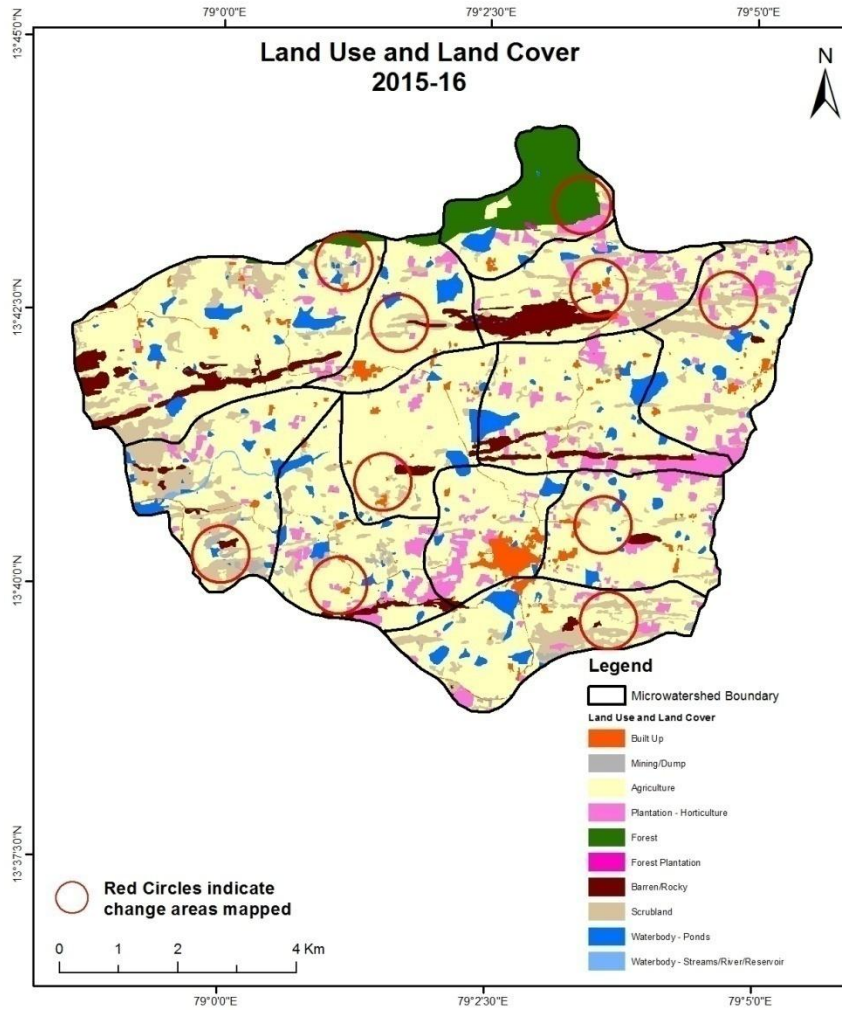
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



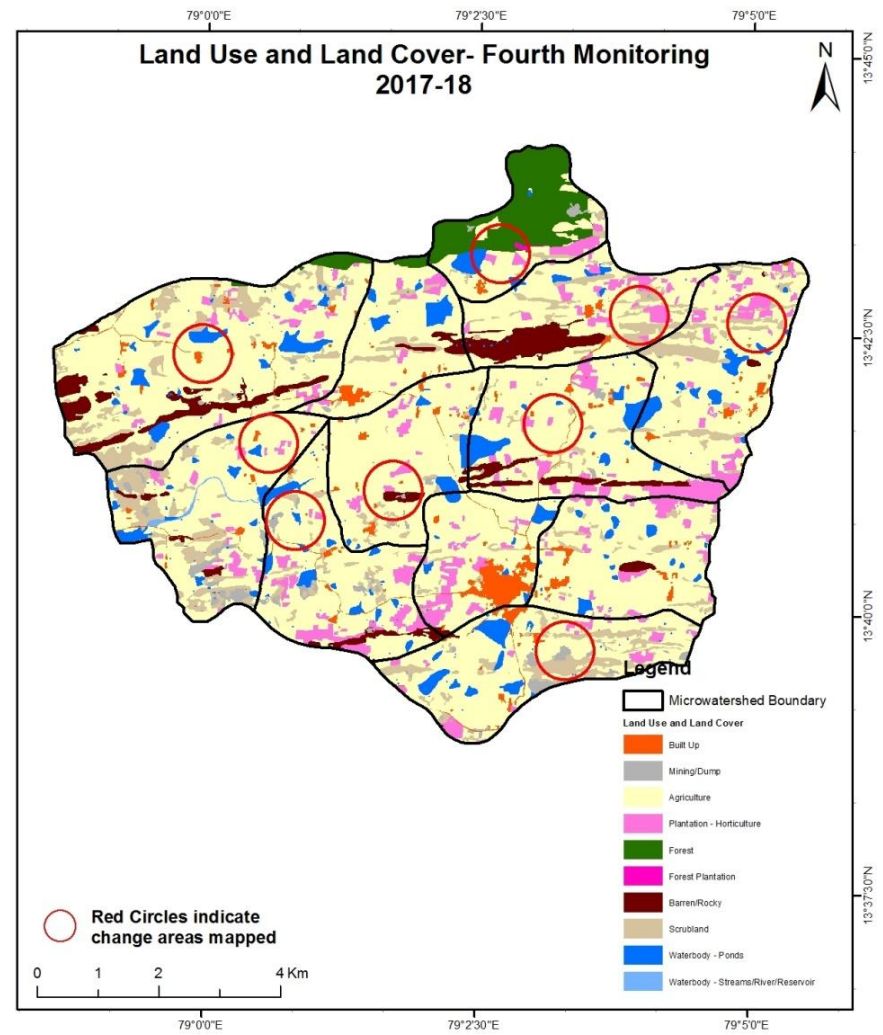
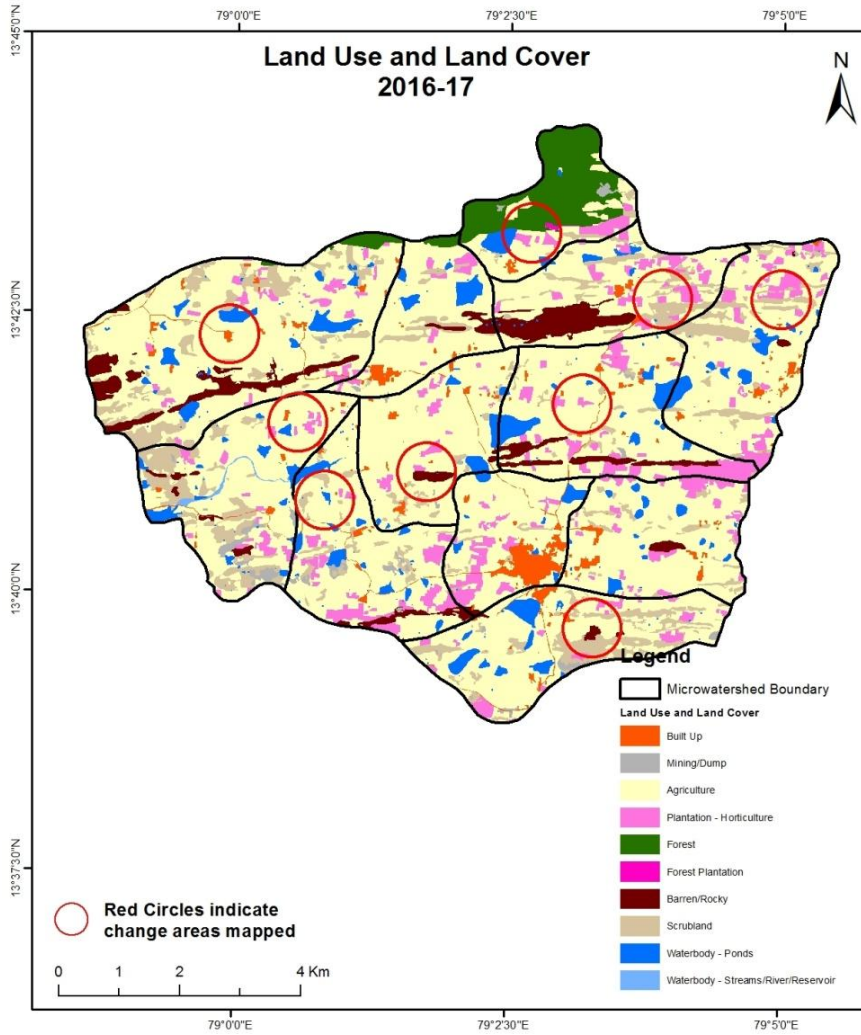
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



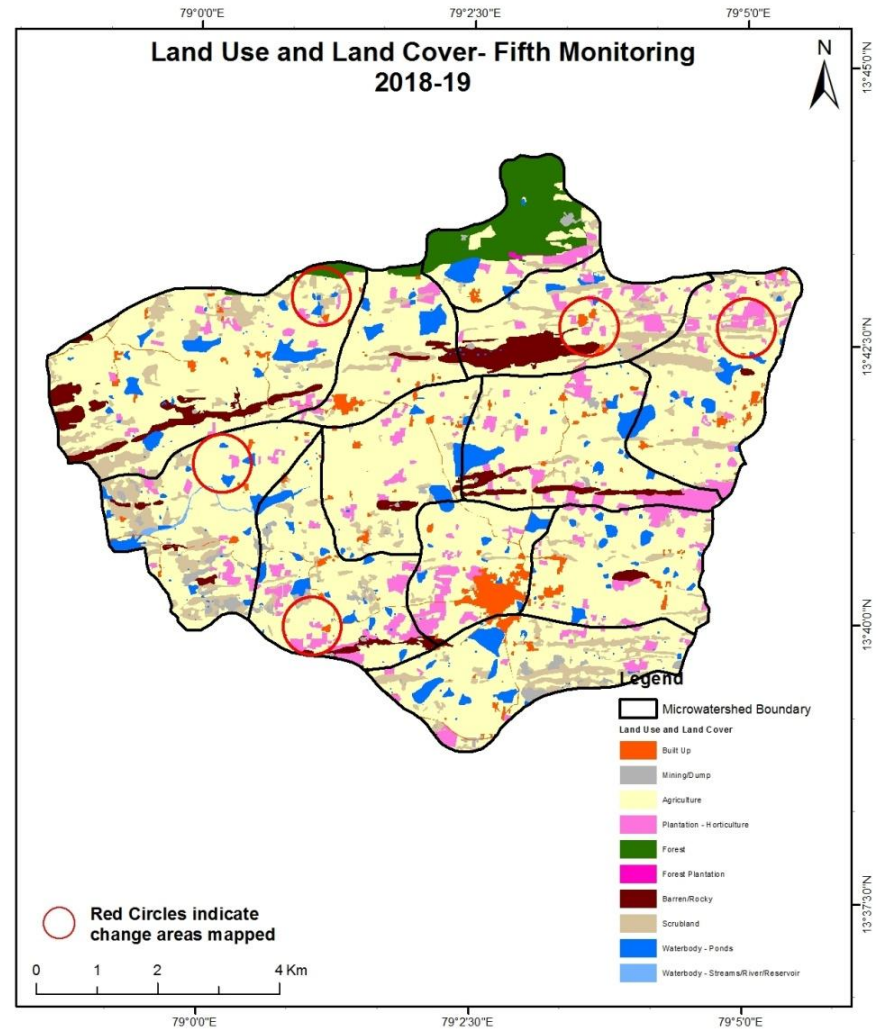
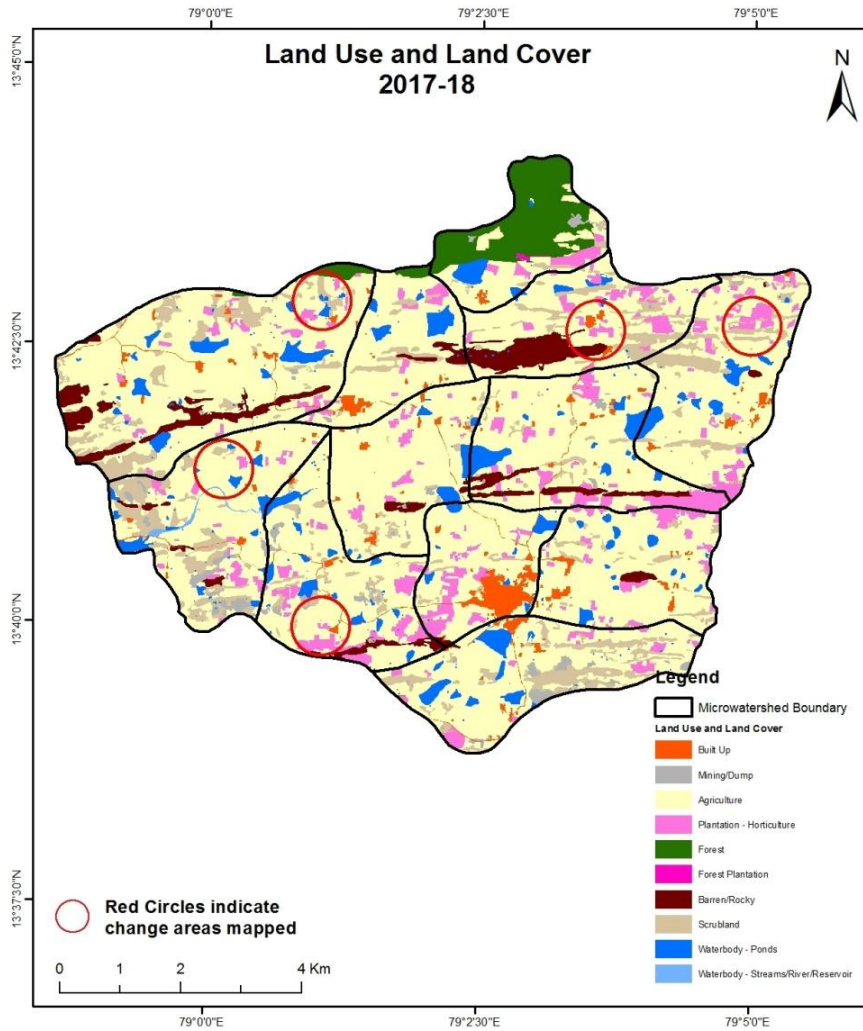
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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 Water body



T2: 2014-15 (79°2'27.71"E 13°39'50.584"N)



T3: 15May 2016

Agriculture to Plantation



T2: 2014-15 (79°4'32.501"E 13°40'34.539"N)



T3: 15May 2016

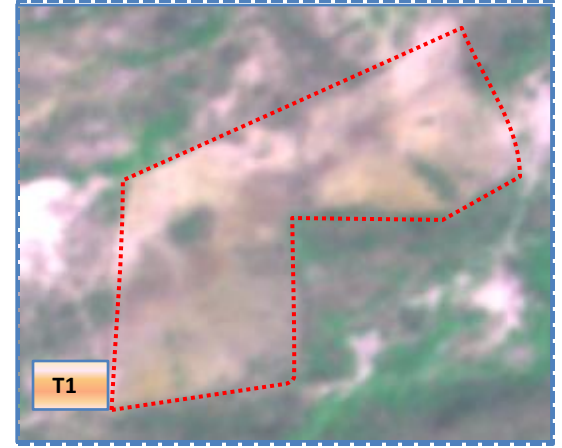
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

T0: 2010-11



T1

T1: 13 May 2014

Scrub to Agriculture



T0

T0: 2010-11



T1

T1: 13 May 2014

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

Scrub to Water body



T0

T0: 2010-11



T1

T1: 13 May 2014

Agriculture to Plantation



T0

T0: 2010-11



T1

T1: 13 May 2014

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

Land cover	Monitoring period (T1)										
	Units in Hectares										Grand Total
T0	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	
Built up	115.89										115.89
Mining/dump		37.01									37.01
Agriculture	52.70		4760.68	208.89						3.24	5025.51
Plantation Horticulture	1.61		5.28	277.48							284.37
Forest			12.65		291.52	1.53				0.32	306.02
Forest Plantation											
Barren Rocky							301.77				301.77
Scrub	3.87	0.70	42.11	0.21				799.19		4.02	850.10
Waterbody- Streams/River									7.99		7.99
Waterbody – Ponds	7.11		2.03							334.04	343.18
Grand Total	181.17	37.72	4822.75	486.59	291.52	1.53	301.77	799.19	7.99	341.62	7271.85

- 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 264.83 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T1.
- In T1 62.06 ha of agriculture are increased from plantation, forest, scrubland and water body of T0. The additional agriculture are coming from water body in T5 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period-2014-15 to 2015-16

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	
T1												
Built up	181.17										181.17	
Mining/dump		37.72									37.72	
Agriculture	2.12	1.13	4782.33	26.89						10.27	4822.75	
Plantation Horticulture	0.06		5.01	481.43						0.09	486.59	
Forest					291.34					0.18	291.52	
Forest Plantation						1.53					1.53	
Barren Rocky		1.95					299.82				301.77	
Scrub	0.17	5.72	45.06					747.89		0.35	799.19	
Waterbody- Streams/River									7.99		7.99	
Waterbody – Ponds										341.62	341.62	
Grand Total	183.52	46.52	4832.41	508.33	291.34	1.53	299.82	747.89	7.99	352.52	7271.85	

- 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 40.41 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation and water body of T2.
- In T2 50.07 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	183.52										183.52
Mining/dump		46.52									46.52
Agriculture	4.60	1.47	4749.29	62.64				5.27		9.13	4832.41
Plantation Horticulture			12.95	495.27						0.10	508.33
Forest		4.91	16.56		269.01	0.71				0.15	291.34
Forest Plantation						1.53					1.53
Barren Rocky		0.21					299.61				299.82
Scrub	0.16	3.86	34.23					708.56		1.09	747.89
Waterbody- Streams/River									7.99		7.99
Waterbody – Ponds			0.53							351.99	352.52
Grand Total	188.27	56.97	4813.56	557.91	269.01	2.24	299.61	713.83	7.99	362.46	7271.85

- 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 83.11 ha of agriculture are decreased and it is converted into built-up, mining/dump, plantation, scrubland and water body of T3.
- In T3 64.27 ha of agriculture are increased from plantation, forest, 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	188.27										188.27
Mining/dump		56.97									56.97
Agriculture	3.48	0.27	4807.35					0.19		2.27	4813.56
Plantation Horticulture			26.24	531.56						0.11	557.91
Forest					269.01						269.01
Forest Plantation						2.24					2.24
Barren Rocky		8.20					291.41				299.61
Scrub		23.31	10.94					679.12		0.46	713.83
Waterbody- Streams/River									7.99		7.99
Waterbody – Ponds										362.46	362.46
Grand Total	191.76	88.75	4844.54	531.56	269.01	2.24	291.41	679.31	7.99	365.29	7271.85

- 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 6.21 ha of agriculture are decreased and it is converted into built-up, mining/dump, scrubland and water body of T4.
- In T4 37.18 ha of agriculture are increased from plantation 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-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	191.76										191.76
Mining/dump		88.75									88.75
Agriculture	0.56	1.26	4833.75	1.08						7.88	4844.54
Plantation Horticulture			31.09	500.13						0.35	531.56
Forest					269.01						269.01
Forest Plantation						2.24					2.24
Barren Rocky		1.71					289.70				291.41
Scrub		4.54	25.48					649.28			679.31
Waterbody- Streams/River									7.99		7.99
Waterbody – Ponds										365.29	365.29
Grand Total	192.32	96.26	4890.32	501.21	269.01	2.24	289.70	649.28	7.99	373.52	7271.85

- 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 10.79 ha of agriculture are decreased and it is converted into built-up, mining/dump and water body of T5.
- In T5 56.57 ha of agriculture are increased from plantation 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 30.34 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 9.66, 30.98 & 45.78 Hectares From T1 to T2, T3 to T4 & T4 to T5 and There is an decrease of 202.77 & 18.85 Hectares From T0 to T1 & T2 to T3 . The overall decrease of 135.20 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 216.83 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 200.82 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (26) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (26) verified from the portal.