

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

PRAKASAM -6/2009-10
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad
January-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

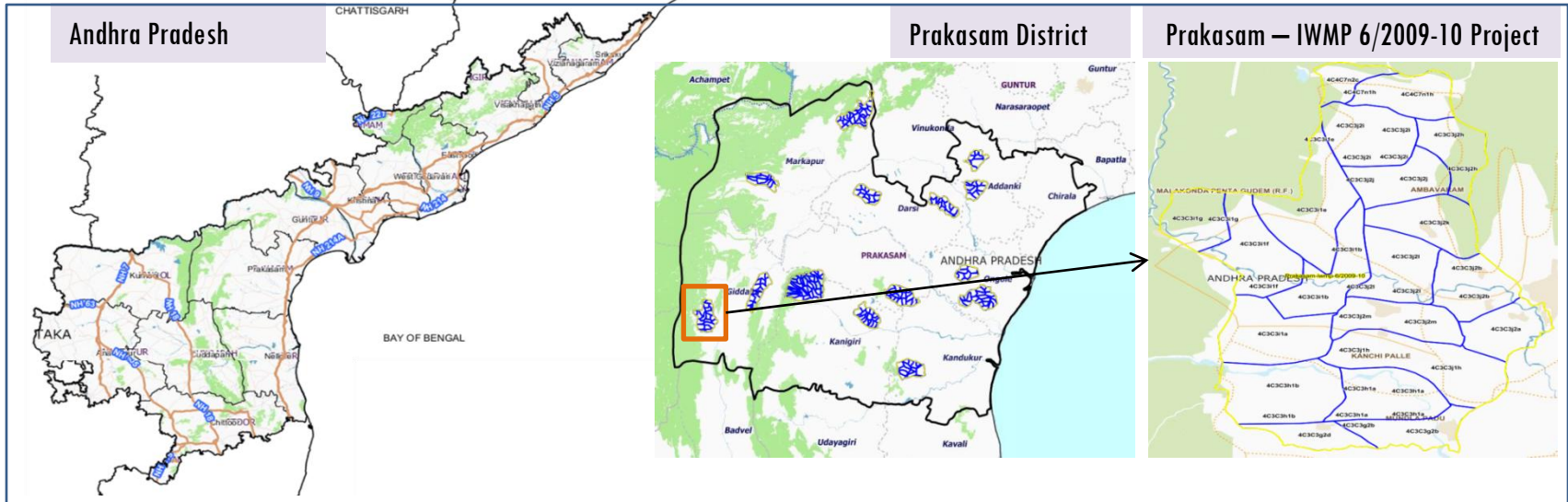
E X E C U T I V E S U M M A R Y

- 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-06/2009-10, Prakasam District of Andhra Pradesh. The total geographical area of the project is 9325.8 ha. It comprises of 20 micro watersheds.
- In the project area 34 Drishti photos were uploaded showing 19 check dams,10 Farm ponds, 1Land Development ,2 Cattle proof trench, 1 Rock fill Dam and 1 plantations.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 10 new farm ponds or dug out ponds with 1.4 ha increase in the area.
- Major percentage i.e. 73% is covered by the agriculture, 10% is covered by forest, 22% by, 7% by scrub land and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-06/2009-10

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Giddalur Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 9325.8 ha. It comprises of 20 micro watersheds. Location Map of the study area is shown in Figure below
- Analysis is done for 2009-10 (T0) period (*Batch -1*) projects taking 2017-18 (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.

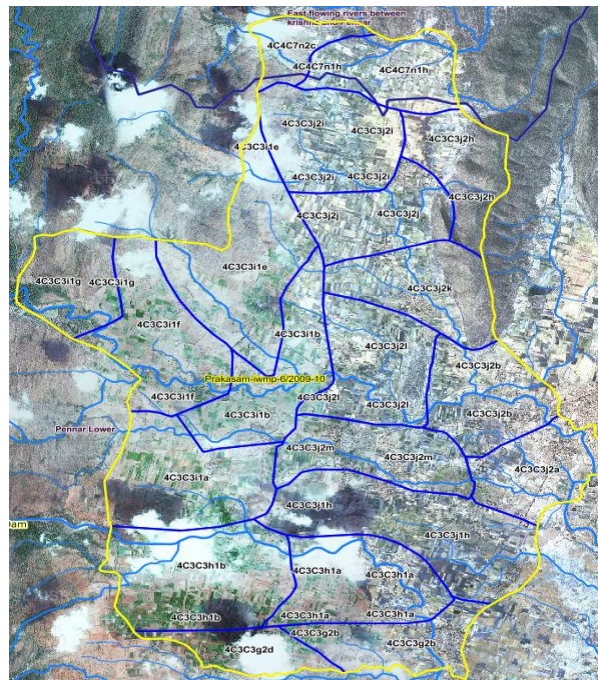
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			25-Oct-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			25-Oct-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	34
4	Detailed Project Report	

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



Legend



Drainage (1:10000 Scale)

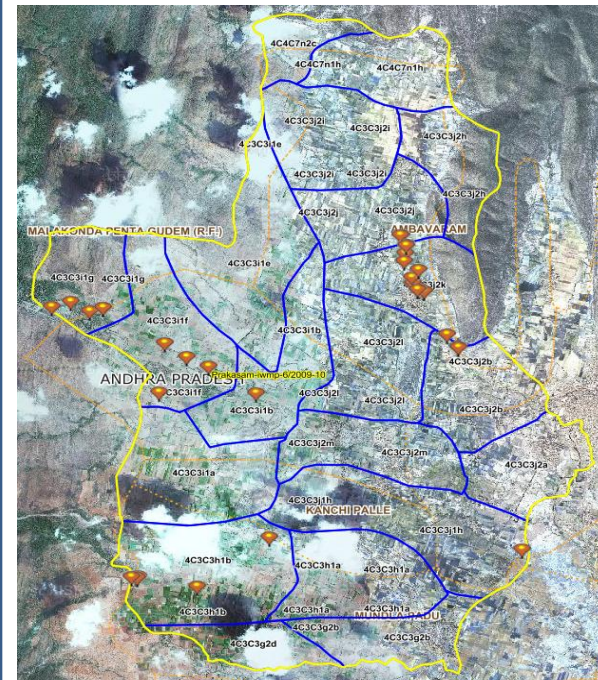


MWS Boundary



Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

	With Geo Tag	With out Geo Tag
Total	34	18
Check Dams	19	8
Farm ponds	10	8
others	5	2

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	1	1
3	Agriculture	0	0
4	Pasture	0	0
5	Cattle proof trench	2	2
6	Land development	1	1
7	Rock fill Dam	1	1
8	Checks & Plugs	0	0
9	Gabion structure	0	0
10	Farm ponds	18	10
11	Check dams	27	18
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	0	0
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	7	5
	TOTAL	57	38

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 (2009-10) and T5 is 2017-18 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.

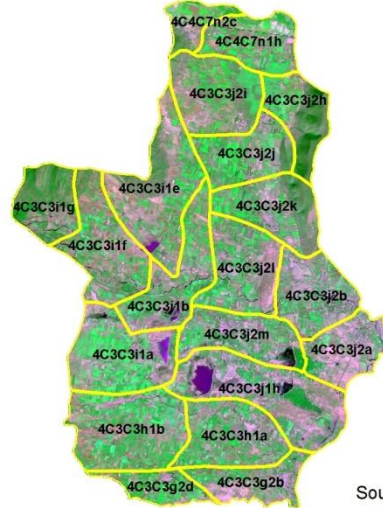
Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite- 2009-10



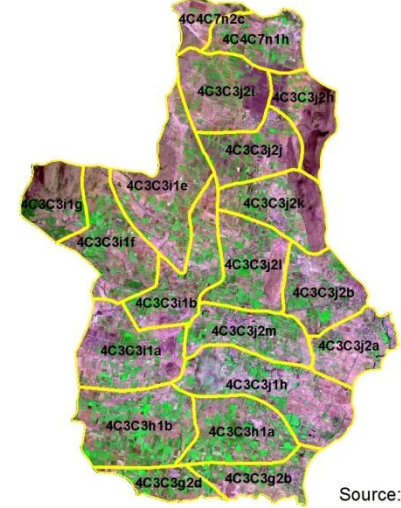
Source:Fusen data,NRSC

Natural Color Composite-2013-2014



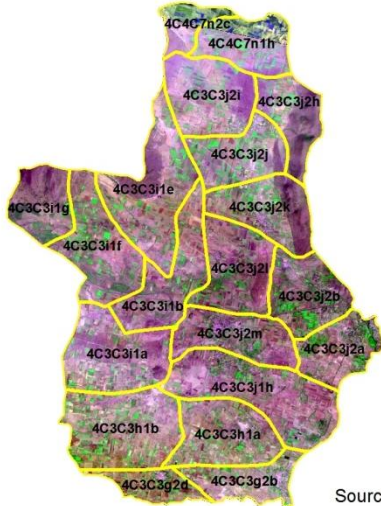
Source:LISS-IV,NRSC

Natural Color Composite- 2014-2015



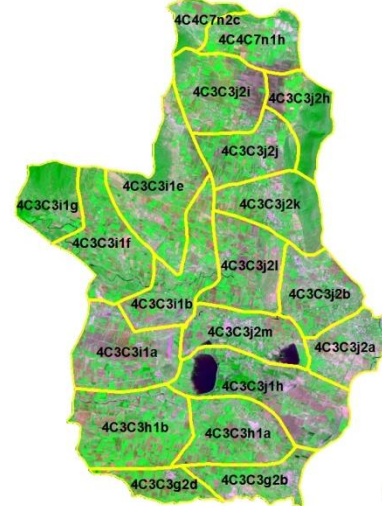
Source:LISS-IV,NRSC

Natural Color Composite-2015-2016



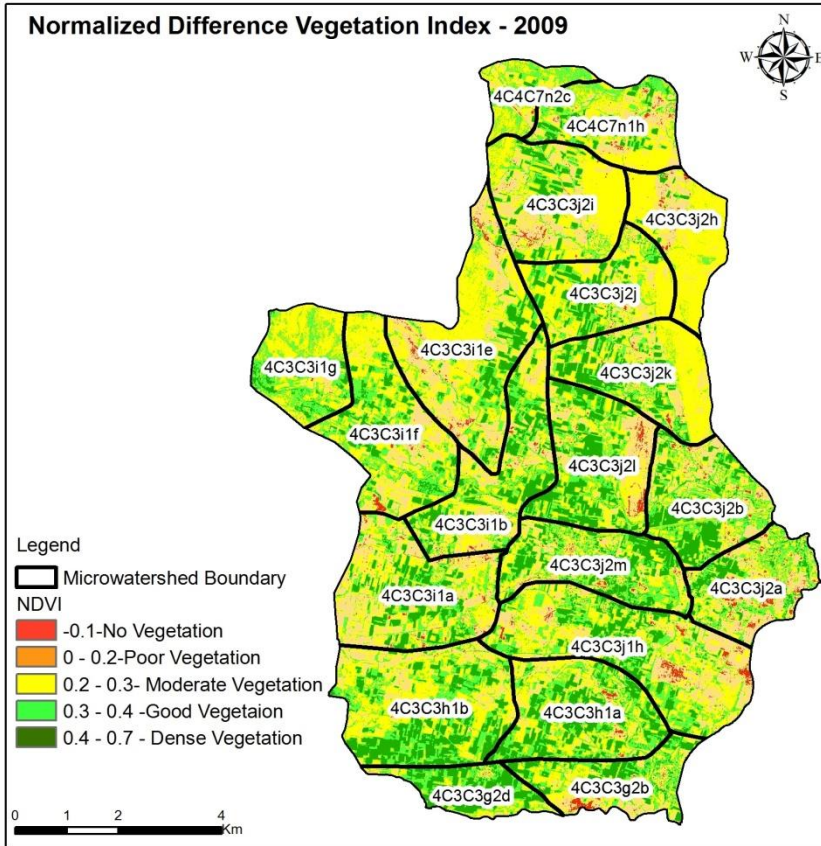
Source:LISS-IV,NRSC

Natural Color Composite-2016-2017

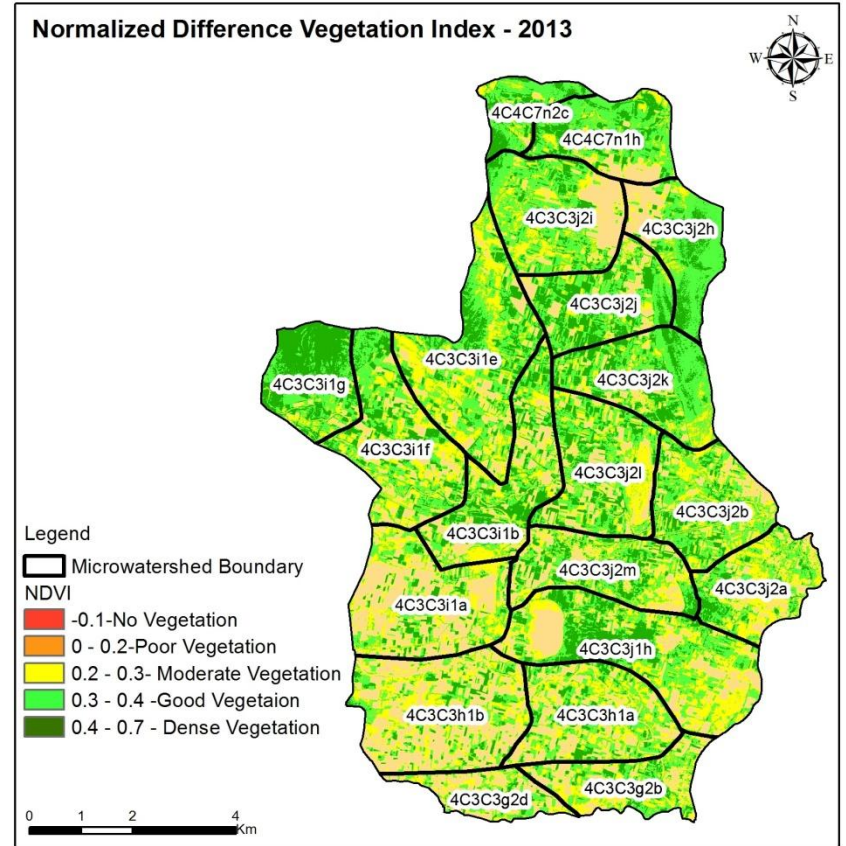


Source:LISS-IV,NRSC

Changes in Vegetation Cover-2009-10 to 2013-14

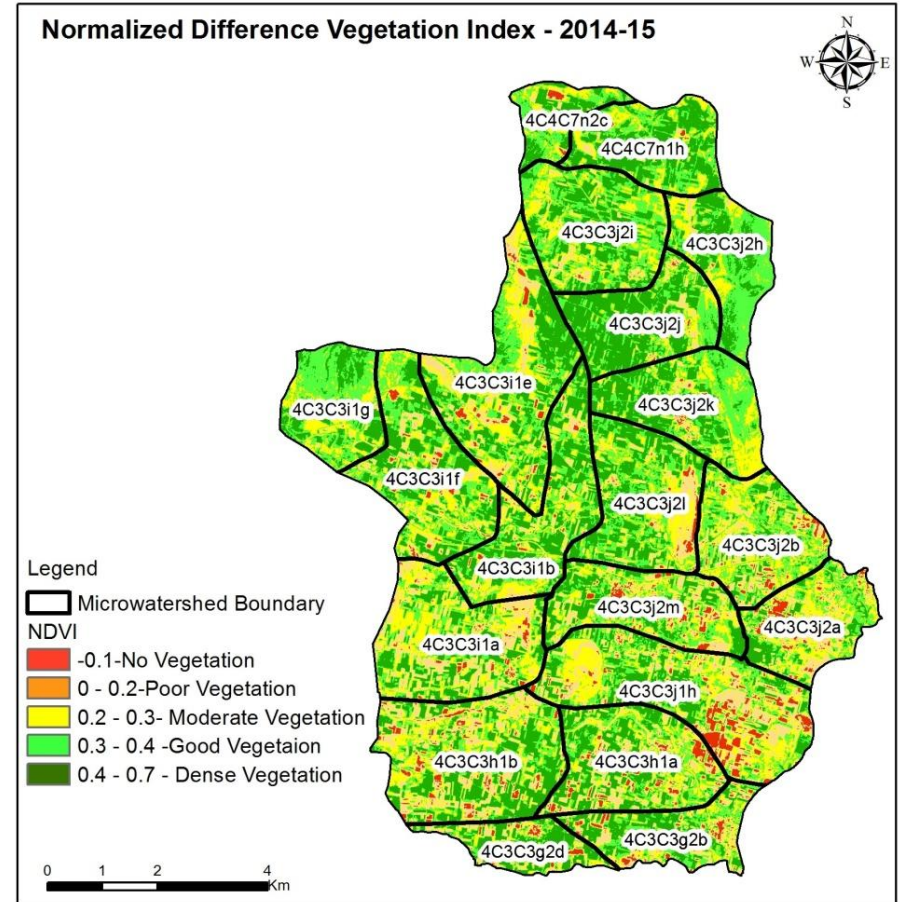
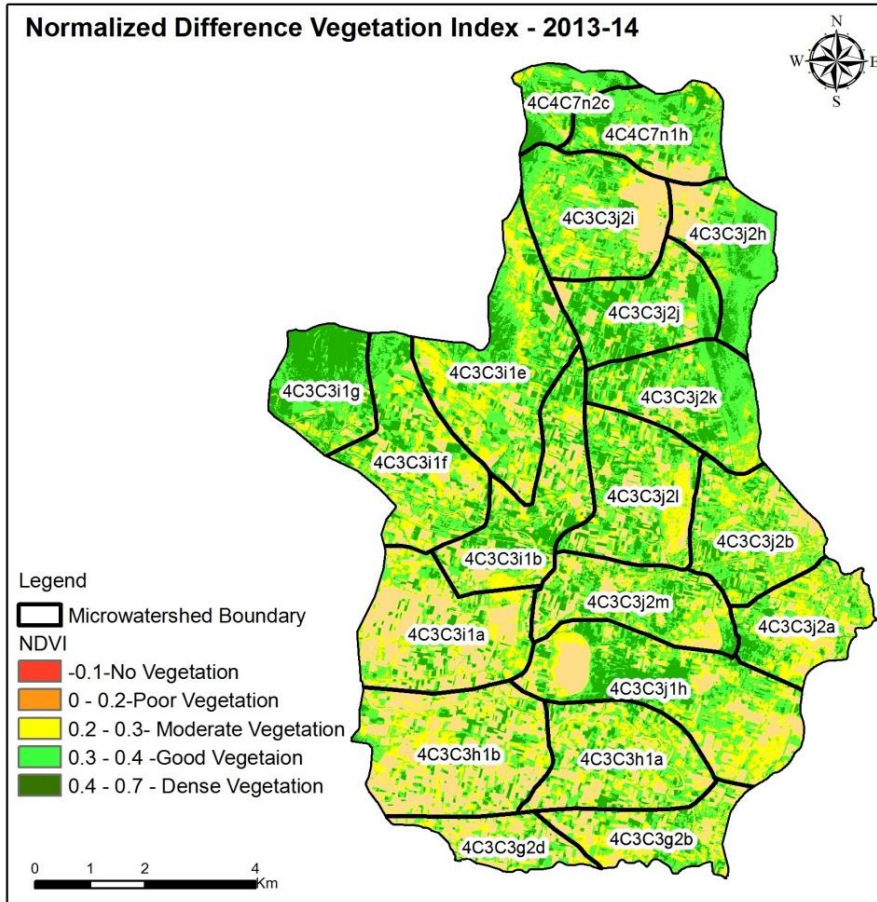


NDVI (2009-10)

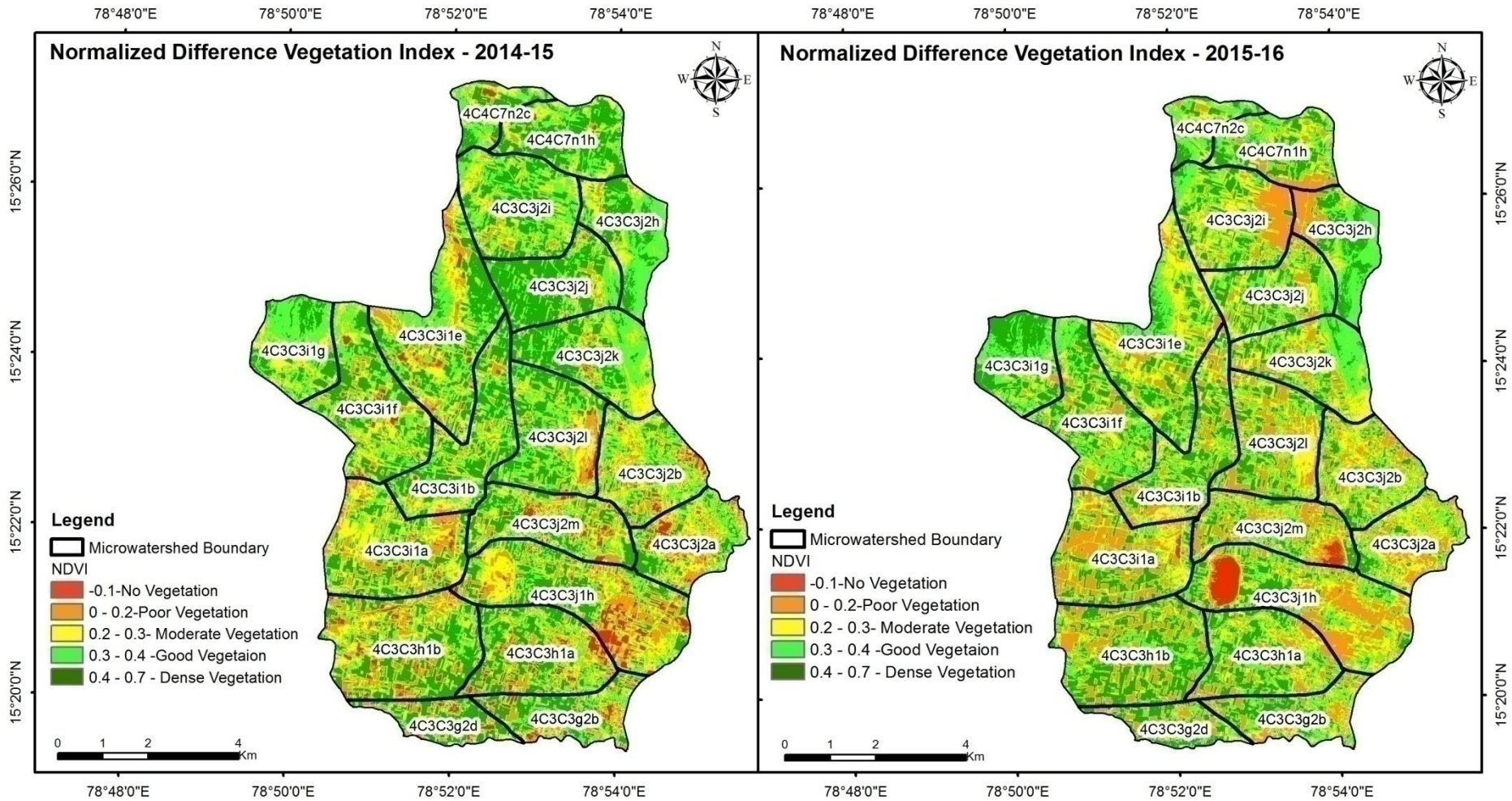


NDVI (2013-14)

Changes in Vegetation Cover 2013-14 to 2014-15



Changes in Vegetation Cover 2014-15 to 2015-16



Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-06/2009-10



T0:2009-10



T1: 23 May 2013



Drishti SI no. 103615 MWS :4C3C3i1g

Check Dam



T0:2009-10



T1: 23 May 2013



Drishti SI no.685832 MWS : 4C3C3j2k

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-06/2009-10



T0: 2009-10

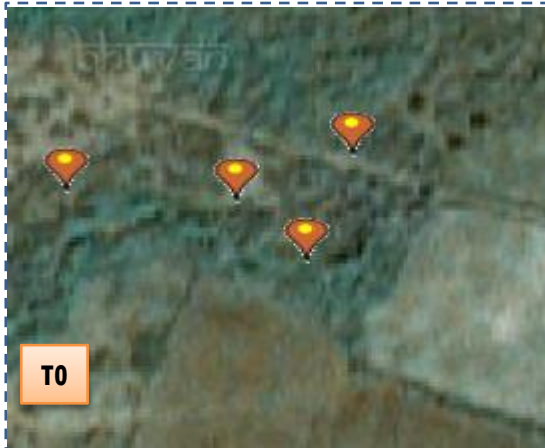


T1: 23 May 2013



Drishti SI no. 10360 MWS :4C3Ci1f

Checkdam



T0: 2009-10



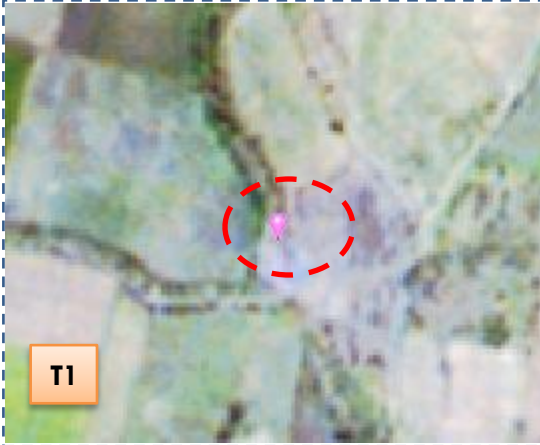
T1: 23 May 2013



Drishti SI no. 713428 MWS :4C3Ch1b

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-06/2009-10



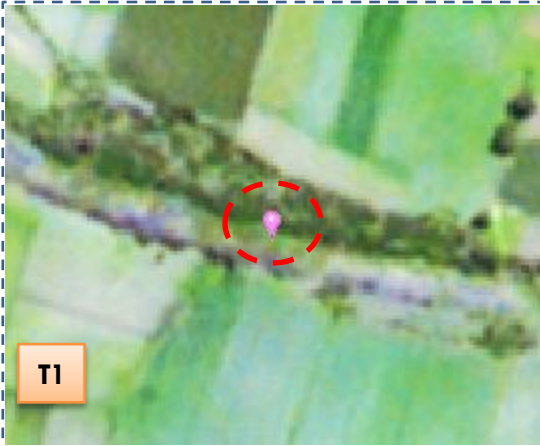
T1: 23 May 2013



T2: 12 February 2015



Check Dam



T1: 23 May 2013



T2: 12 February 2015



Check Dam

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-06/2009-10



T1: 23 May 2013



T2: 12 February 2015



Drishti SI no. 716187 MWS :4C3C3j1h

Check Dam



T1: 23 May 2013



T2: 12 February 2015



Drishti SI no. 103812 MWS :4C3C3i1f

Check Dam

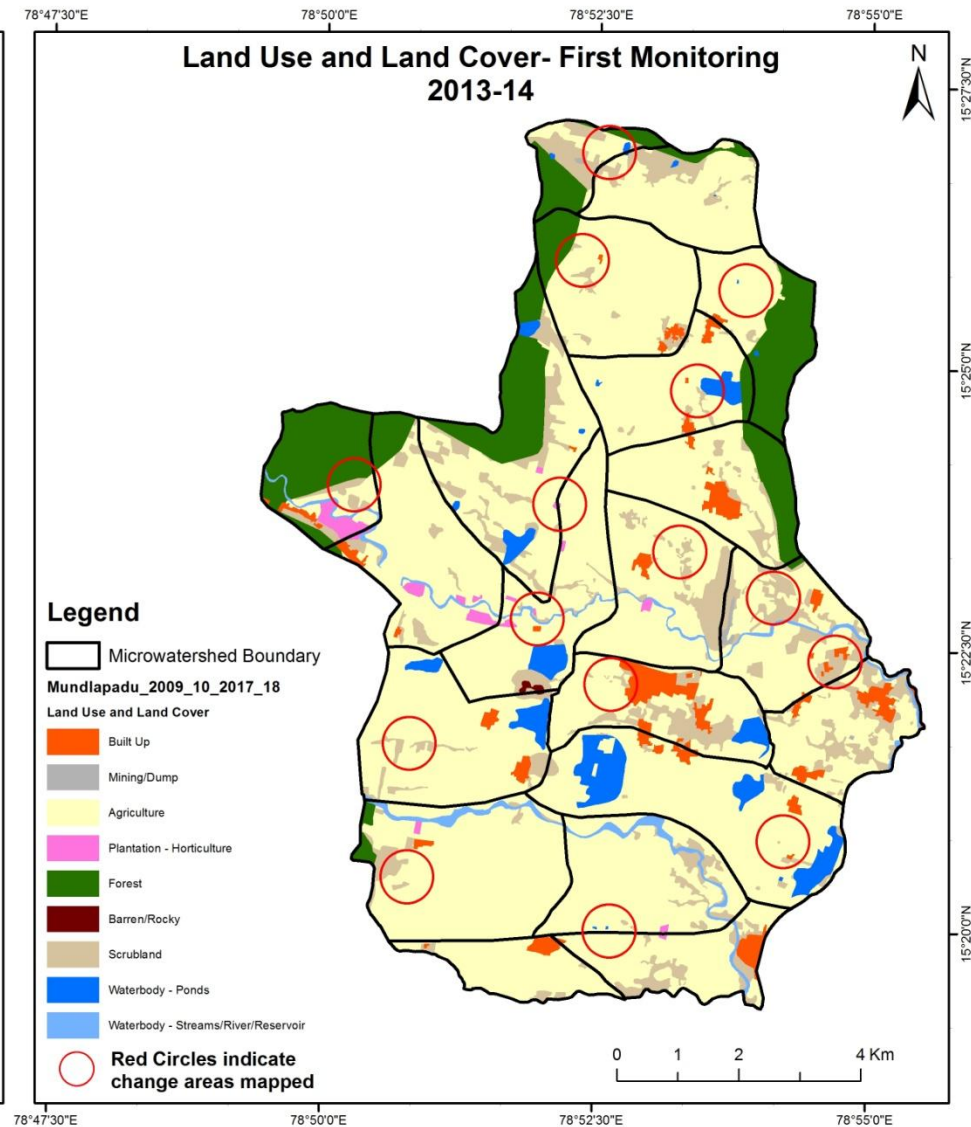
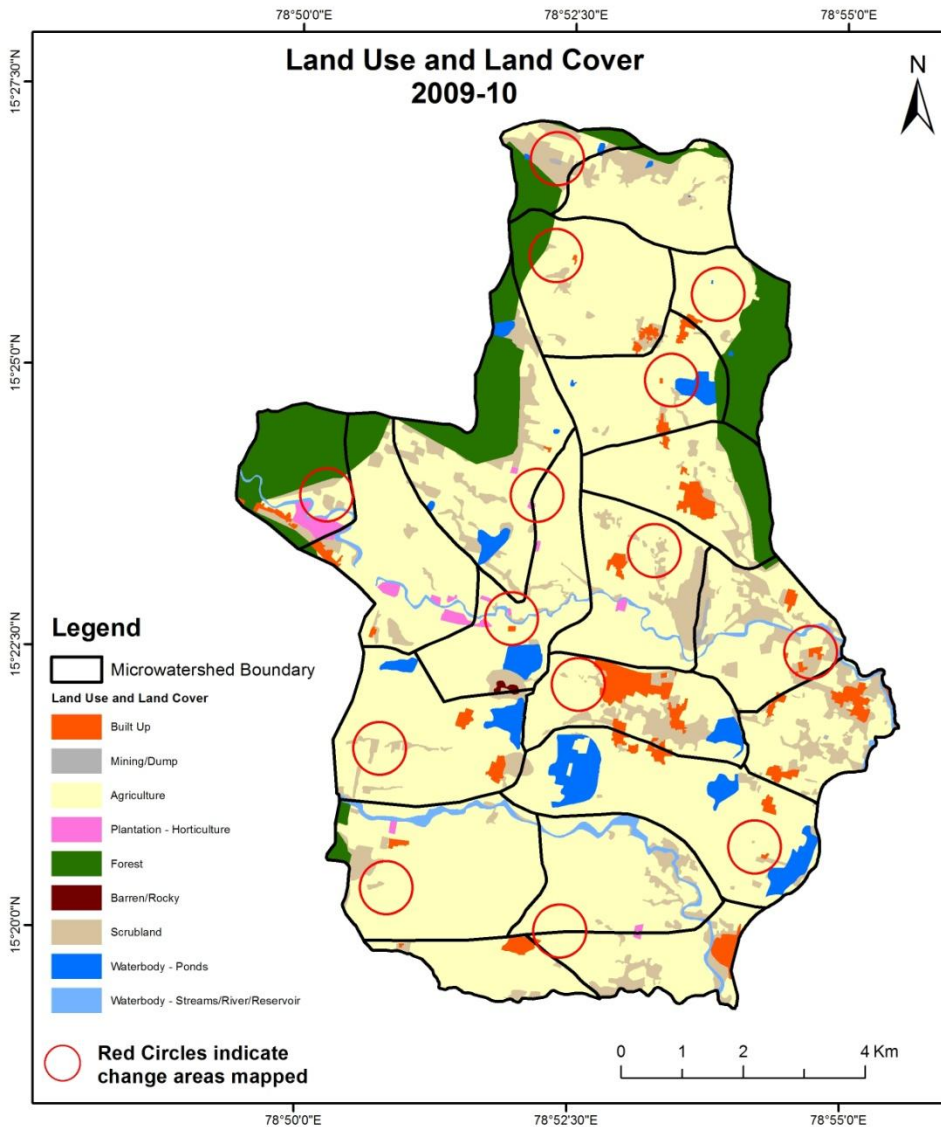
MONITORING IN THE PROJECT AREA

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 (2009-10) and row represents the post implementation period as T5 (2017-18) .

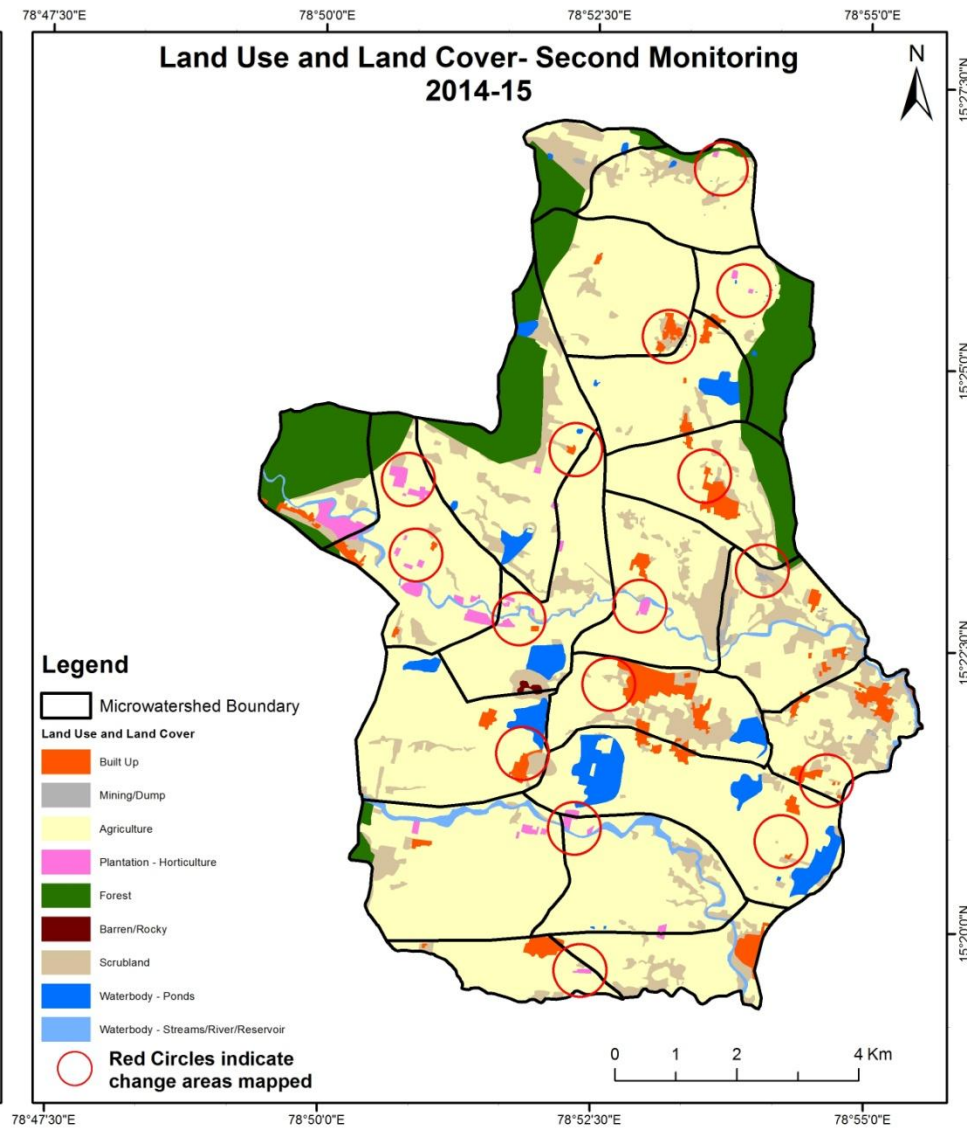
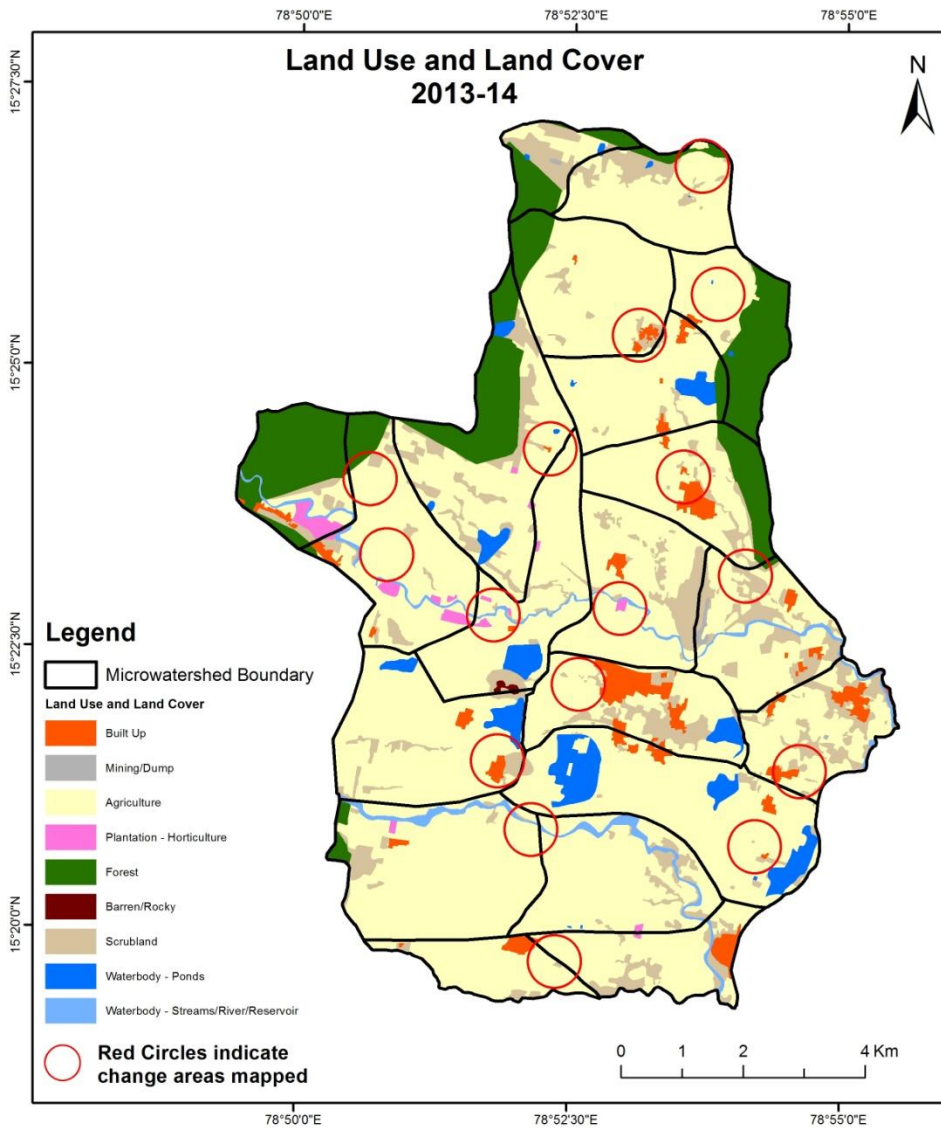
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



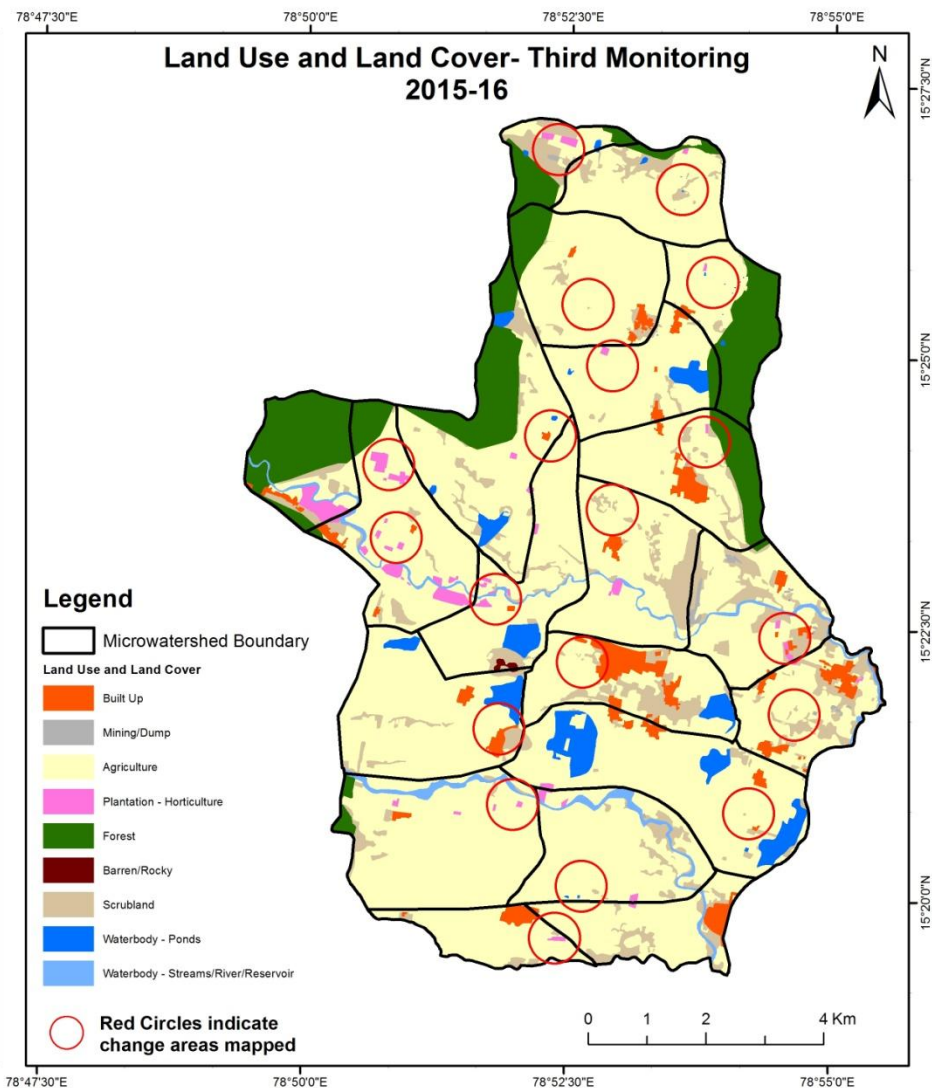
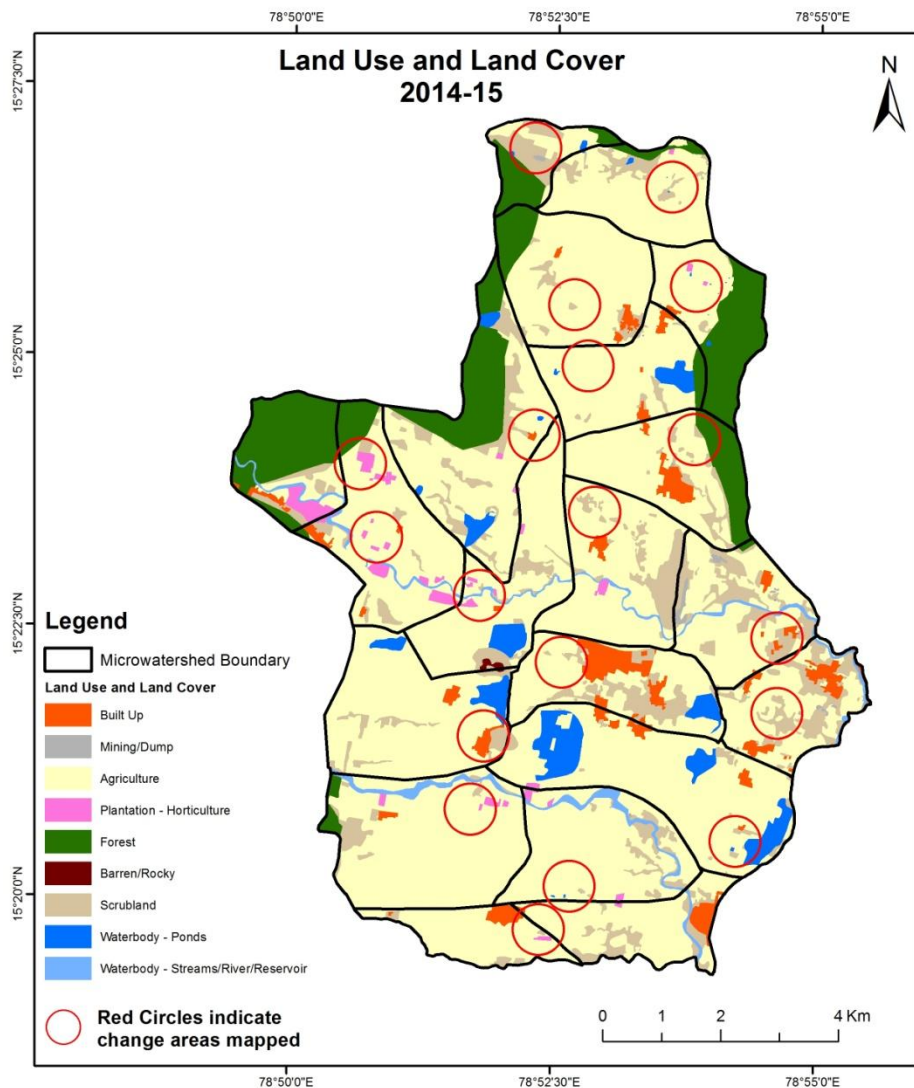
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

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

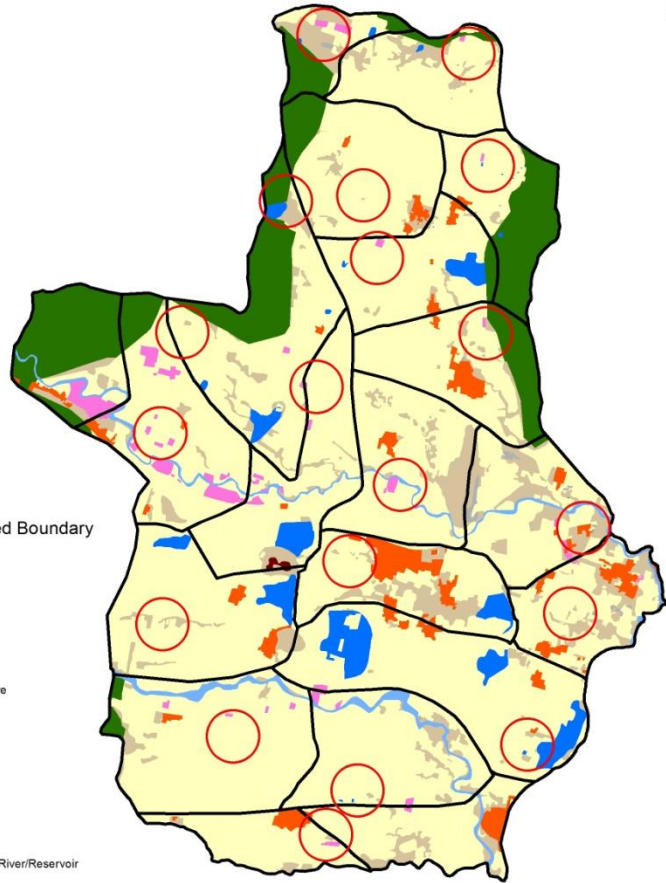


Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000

78°50'0"E 78°52'30"E 78°55'0"E

Land Use and Land Cover 2015-16



Legend

- Microwatershed Boundary
- Land Use and Land Cover**
- Built Up
- Mining/Dump
- Agriculture
- Plantation - Horticulture
- Forest
- Barren/Rocky
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

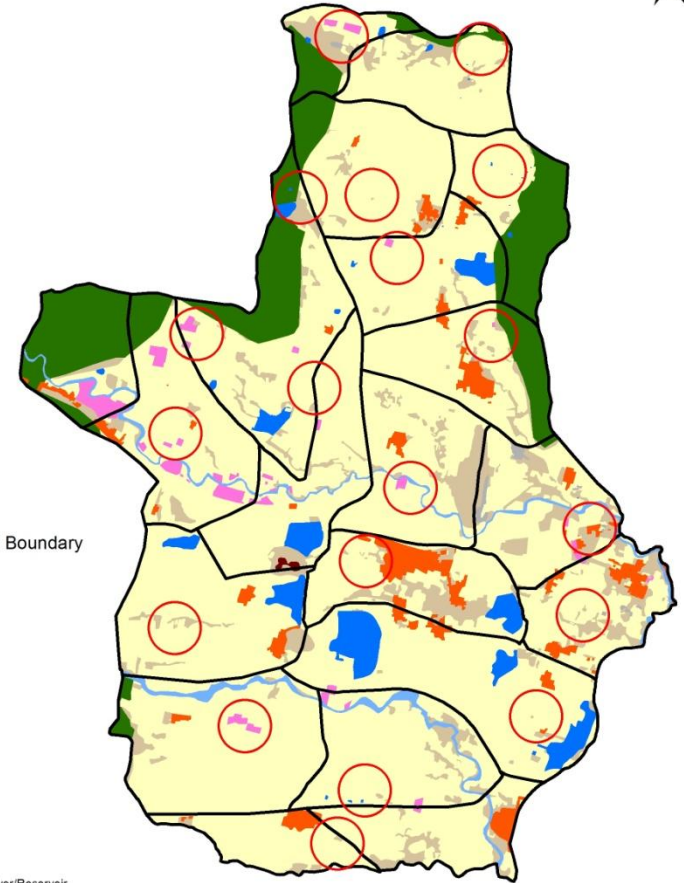
Red Circles indicate change areas mapped

0 1 2 4 Km

78°50'0"E 78°52'30"E 78°55'0"E

78°47'30"E 78°50'0"E 78°52'30"E 78°55'0"E

Land Use and Land Cover- Fourth Monitoring 2016-17



Legend

- Microwatershed Boundary
- Land Use and Land Cover**
- Built Up
- Mining/Dump
- Agriculture
- Plantation - Horticulture
- Forest
- Barren/Rocky
- Scrubland
- Waterbody - Ponds
- Waterbody - Streams/River/Reservoir

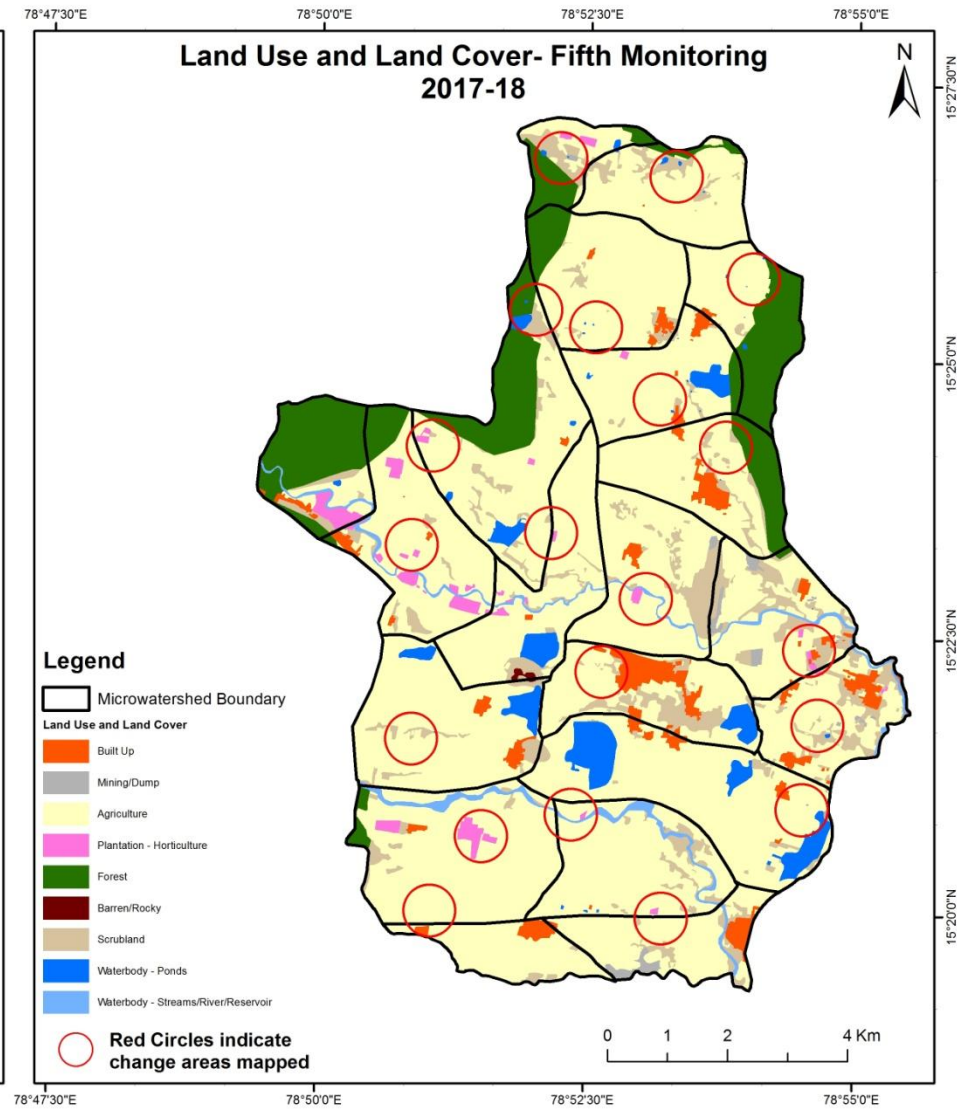
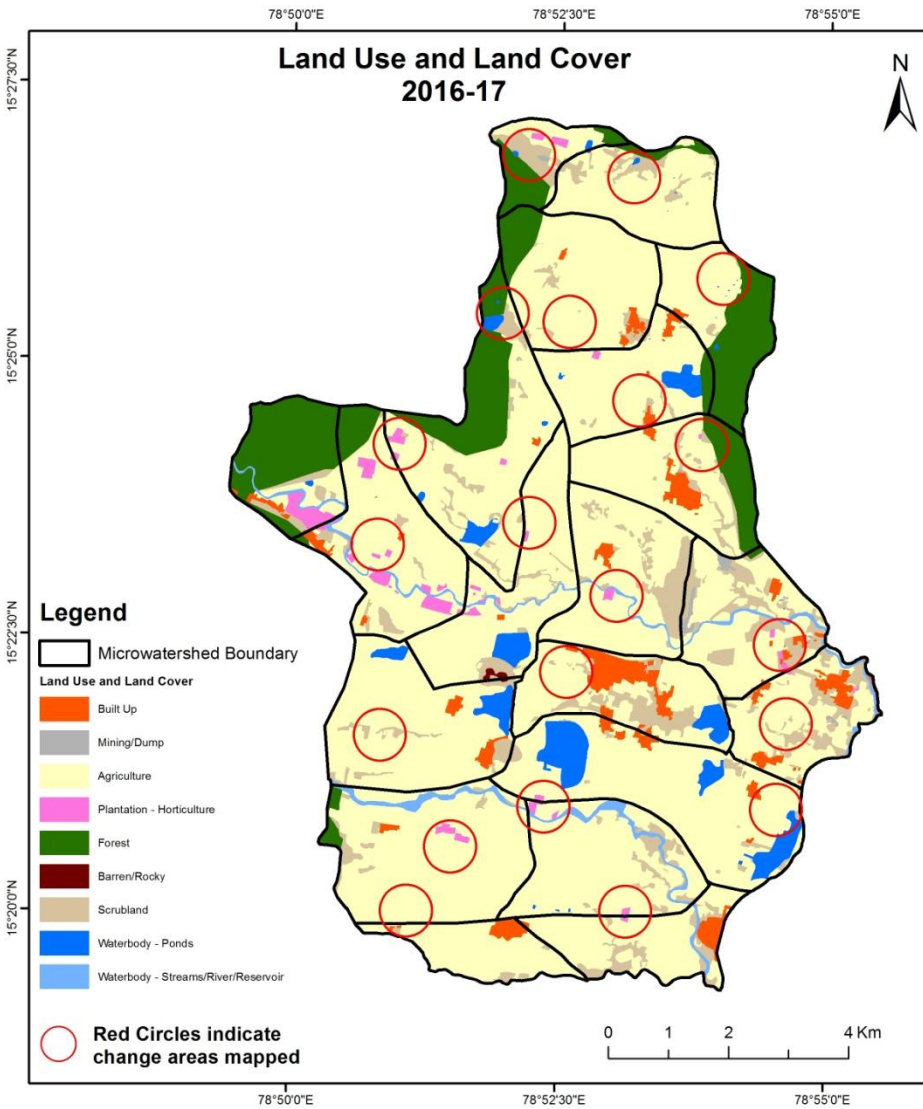
Red Circles indicate change areas mapped

0 1 2 4 Km

78°47'30"E 78°50'0"E 78°52'30"E 78°55'0"E

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

Scale: 1:10000



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

Agriculture to Built up



T0: 2009-10



T1: 23 May 2013

Scrub to Agriculture



T0: 2009-10



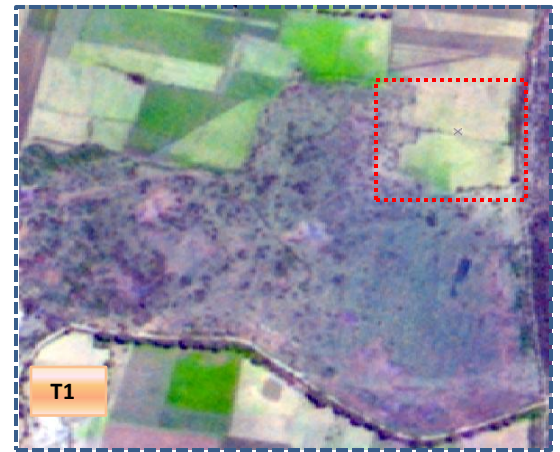
T1: 23 May 2013

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

Waterbody to Agriculture



T0: 2009-10



T1: 23 May 2013

Agriculture to Waterbody



T0: 2009-10



T1: 23 May 2013

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

Agriculture to Plantation



T1

T1: 2013-14



T2

T2: 2014-15

Plantation to Agriculture



T1

T1: 2013-14

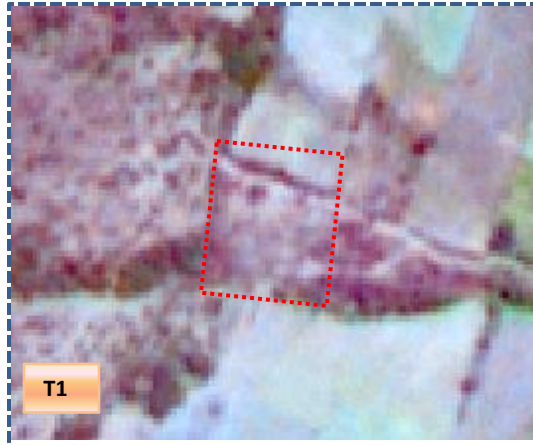


T2

T2: 2014-15

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

Scrub to Agriculture



T1

T1: 2013-14



T2

T2: 2014-15

Scrub to Agriculture



T1

T1: 2013-14



T2

T2: 2014-15

Table showing change matrix depicting Land cover transitions during study period-2009-10 to 2013-14

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	262.72												262.72
Mining/dump		9.76											9.76
Agriculture	0.29		6681.96								0.84		6683.09
Plantation Horticulture				58.88									58.88
Forest					961.82								961.82
Forest Plantation													
Barren Rocky							4.89						4.89
Scrub			1.16					957.05					958.22
Waterbody- Streams/River									141.55				141.55
Waterbody – Ponds			0.74								261.88		262.62
Grand Total	263.01	9.76	6683.86	58.88	961.82		4.89	957.05	141.55		262.72		9343.55

- 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 1.1 ha of agriculture are decreased and it is converted into water body and Built-up in T1.
- In T1 1.9 ha of agriculture are increased from 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-2013-14 to 2014-15

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	263.01										263.01					
Mining/dump		9.76									9.76					
Agriculture	14.95	6.78	6589.05	33.05	0.31			39.31		0.43	6683.86					
Plantation Horticulture				58.88							58.88					
Forest			9.79		952.03						961.82					
Forest Plantation																
Barren Rocky							4.89				4.89					
Scrub		0.26	33.97					922.82			957.05					
Waterbody- Streams/River									141.55		141.55					
Waterbody – Ponds			1.07							261.65	262.72					
Grand Total	277.96	16.80	6633.87	91.93	952.35		4.89	962.13	141.55	262.08	9343.55					

- 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 94 ha of agriculture are decreased and it is converted into plantation, mining/dump, Built-up, forest and water body in T2.
- In T2 44 ha of agriculture are increased from scrub land, forest and waterbody 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-2014-15 to 2015-16

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	277.96										277.96
Mining/dump		16.80									16.80
Agriculture	1.52		6614.78	15.99					1.54	0.05	6633.87
Plantation Horticulture			5.47	86.46							91.93
Forest					952.35						952.35
Forest Plantation											
Barren Rocky							4.89				4.89
Scrub			143.50	4.34				814.29			962.13
Waterbody- Streams/River									141.55		141.55
Waterbody – Ponds			8.71							253.37	262.08
Grand Total	279.48	16.80	6772.46	106.78	952.35		4.89	814.29	143.09	253.42	9343.55

- 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 19 ha of agriculture are decreased and it is converted into plantation, Built-up and water body in T3.
- In T3 157 ha of agriculture are increased from scrub land, plantation and waterbody 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-2015-16 to 2016-17

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	279.48												279.48
Mining/dump		16.80											16.80
Agriculture	2.01		6739.79	12.76				5.56		12.33			6772.46
Plantation Horticulture			17.66	89.12									106.78
Forest					952.06						0.28		952.35
Forest Plantation													
Barren Rocky							4.89						4.89
Scrub	4.74	2.91	27.64					775.43			3.57		814.29
Waterbody- Streams/River			1.09						142.00				143.09
Waterbody – Ponds			5.56								247.86		253.42
Grand Total	286.24	19.70	6791.75	101.88	952.06		4.89	780.99	142.00		264.04		9343.55

- 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 32 ha of agriculture are decreased and it is converted into plantation, Built-up and water body in T4.
- In T4 51 ha of agriculture are increased from scrub land, plantation and waterbody 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-2016-17 to 2017-18

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	286.24												286.24
Mining/dump		19.61										0.09	19.70
Agriculture	2.78	0.12	6768.66	19.85								0.35	6791.75
Plantation Horticulture			10.73	91.15									101.88
Forest			1.85		950.21								952.06
Forest Plantation													
Barren Rocky							4.89						4.89
Scrub	4.38	26.24	21.70					727.11				1.56	780.99
Waterbody- Streams/River									142.00				142.00
Waterbody – Ponds			0.16									263.88	264.04
Grand Total	293.40	45.96	6803.09	111.01	950.21		4.89	727.11	142.00		265.88		9343.55

- 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 23 ha of agriculture are decreased and it is converted into plantation, Built-up, mining and water body in T5.
- In T5 34 ha of agriculture are increased from scrub land, plantation and waterbody 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 3 Hectares in Reservoir / Tanks area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
4. There is an increase of 07, 138, 19 & 11 Hectares From T0 to T1, T2-T3, T3 to T4 & T4-T5 respectively and overall increase of 120 Hectares in Crop land area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
5. There is an increase of 52 ha of the Plantation/Horticulture area has been increased between 2009-10 (t0) & 2017-18 (T5) years.
6. There is a decrease of 231 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
7. Farm ponds (0) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.