

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

KURNOOL -04/2009-10
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

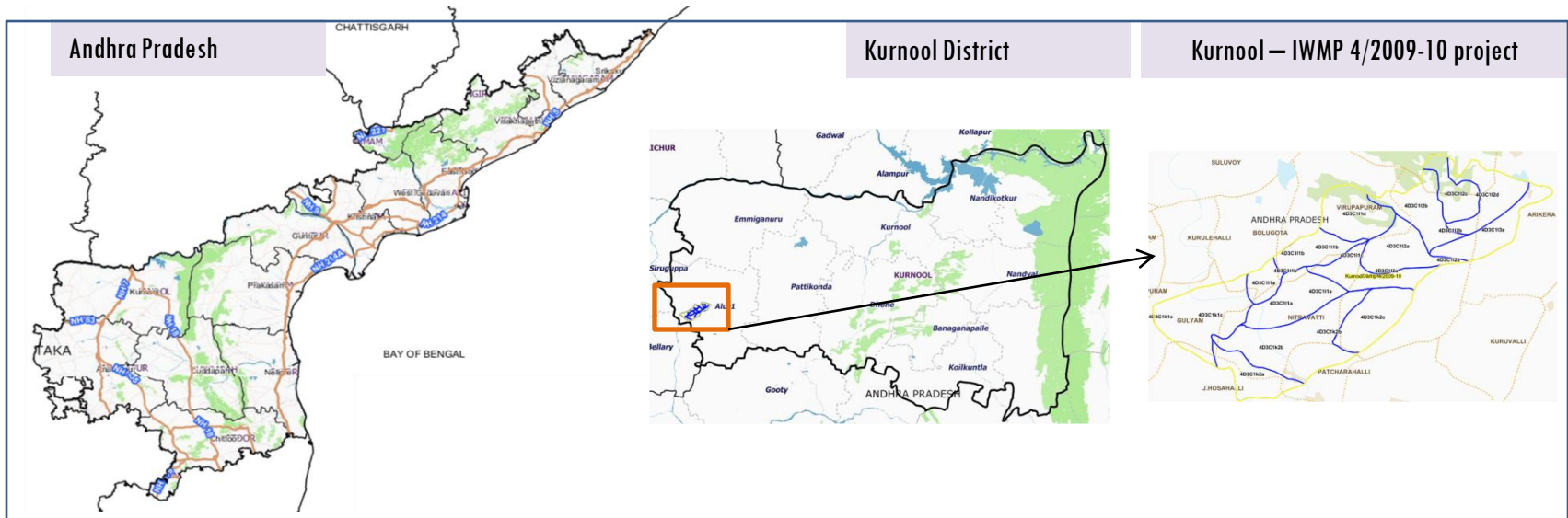
E X E C U T I V E S U M M A R Y

- 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-04/2009-10, Kurnool District of Andhra Pradesh. The total geographical area of the project is 5559.68 ha. It comprises of 14 micro watersheds.
- In the project area 204 Drishti photos were uploaded showing 50 check dams, 25 Farm ponds, 127 Livelihood measurements and remaining showing others.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 53 new farm ponds or dug out pits with 6.21 ha increase in the area.
- Major percentage i.e. 82.02% is covered by the agriculture, 6.70 % is covered by Scrub land, 8.32 % is covered by forest and remaining by other land use classes.

PROJECT : KURNOOL - IWMP-04/2009-10

DISTRICT : KURNOOL , STATE : ANDHRA PRADESH

- The study area falls in Allagadda Mandal of Kurnool district of Andhra Pradesh state. The total geographical area of the project is 8,958 ha. It comprises of 16 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



- The climate is tropical with temperatures ranging from 26 °C to 46 °C in the summer and 12 °C to 31 °C in the winter. The average annual rainfall is about 705 millimeters (28 in).
- The average annual rainfall of the district is 665.5mm, which ranges from nil rainfall in January and December to 139.6 mm in September. August and September are the wettest months. The mean seasonal rainfall distribution is 459.1mm in southwest monsoon (June September), 133.7mm in northeast monsoon (Oct-Dec), 1.9 mm rainfall in Winter (Jan Feb) and 70.8 mm in summer (March–May).

Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			8-Mar-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			8-Mar-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	Drishiti Photographs		
		Total	194
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 Drishiti Points



Drishiti Upload Status

Classification of the Activities

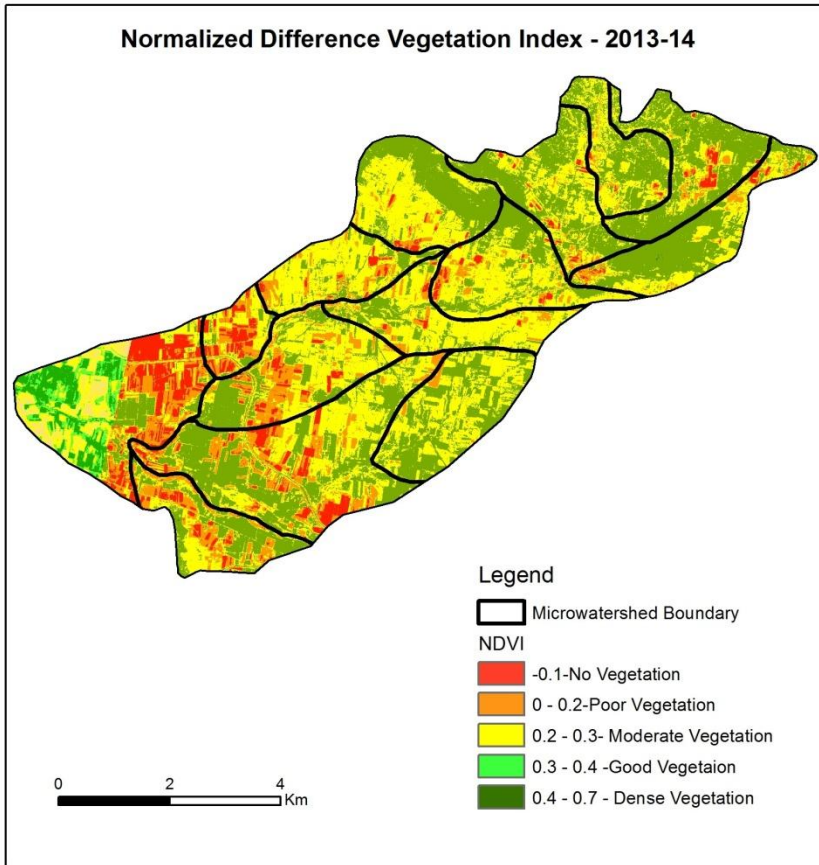
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Block planting	2	0
8	Checks & Plugs	0	0
9	Gabion structure	0	0
10	Farm ponds/Dug out pit	0	0
11	Civil work- Rockfill dam, Check dams etc.	78	75
12	Nallah Bunds/Drainage treatment	2	2
13	Percolation tanks / Ground water recharge structure	0	0
14	Production System and Micro-Enterprises	0	0
15	Livelihood Measure	127	117
16	Capacity Building Activities	0	0
17	Entry Point Activity	0	0
18	Others	0	0
	TOTAL	209	194

MONITORING IN THE PROJECT AREA

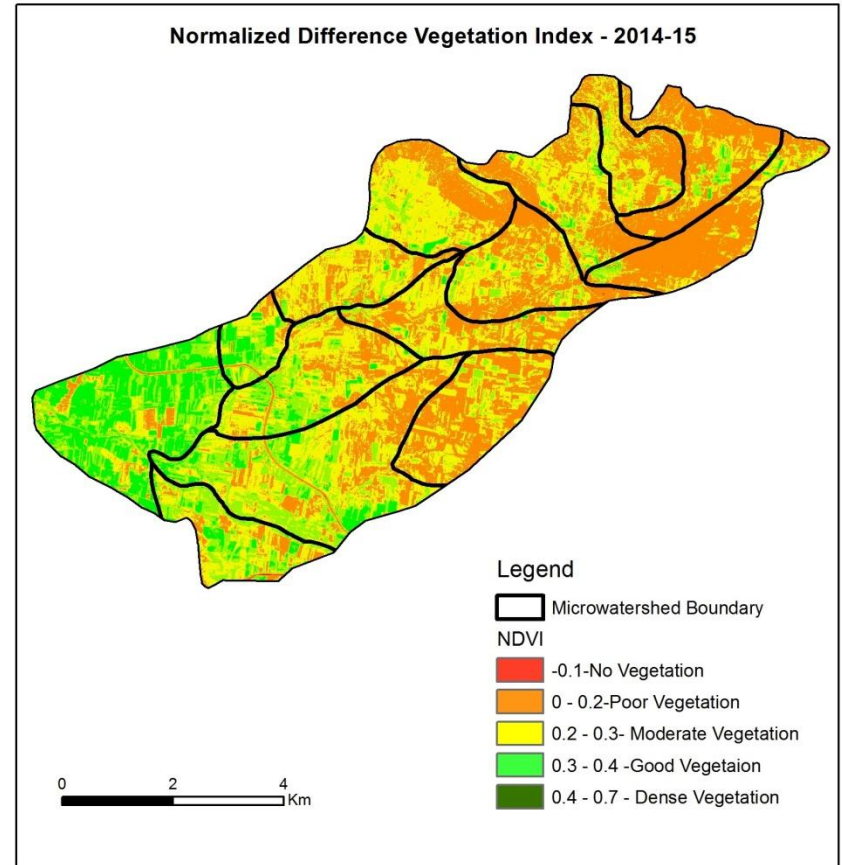
Site Wise Changes in the Project

- 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.

Changes in Vegetation Cover



NDVI (2013-14)



NDVI (2014-15)

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-04/2009-10



T0

T0:2009-10



T1

T1: 27 December 2013



Drishti SI no. 154845 MWS :4D3C111c

Check dam



T0:2009-10



T1

T1: 27 December 2013



Drishti SI no.155580 MWS : 4D3C111a

Checkdam

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-04/2009-10



T0: 2009-10

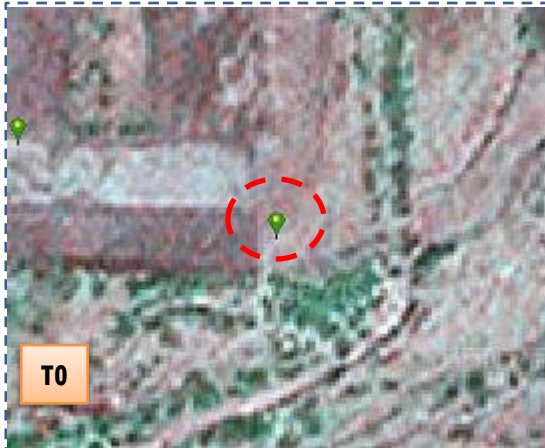


T1: 27 December 2013



Drishti Sl no. 142433 MWS :4D3C1k2b

Farm pond



T0: 2009-10



T1: 27 December 2013



Drishti Sl no. 189491 MWS :4D3C1k2b

Farm pond

Monitoring of activities in Kurnool Dt Andhra Pradesh. IWMP-04/2009-10



T0: 2009-10

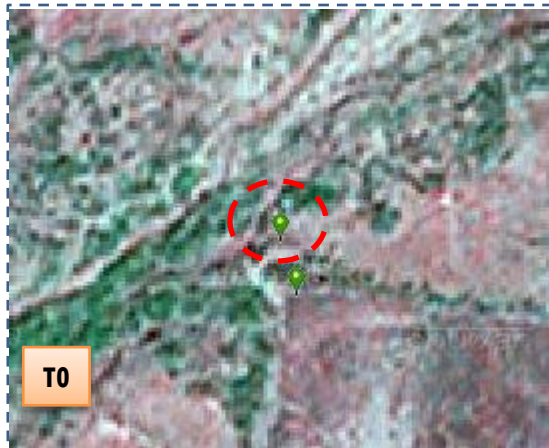


T1: 27 December 2013



Drishti Sl no. 199868 MWS :4D3C111c

Checkdam



T0: 2009-10



T1: 27 December 2013



Drishti Sl no. 219018 MWS :4D3C1k2b

Farm pond

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 (2009-10) and row represents the T5 (2017-18)

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

Agriculture to Water body

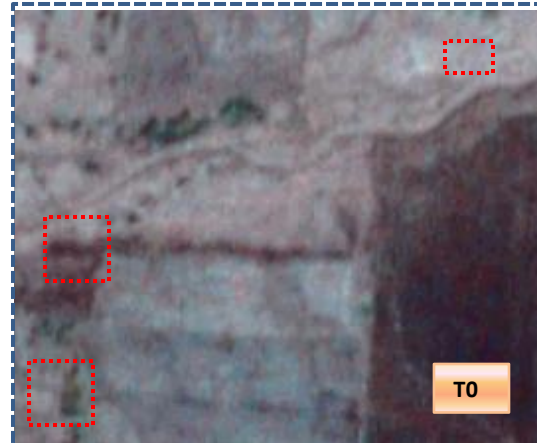


T0: 2009-10



T1: 27 December 2013

Scrub to water body



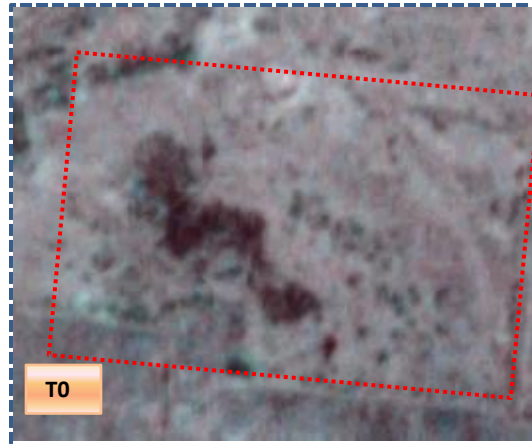
T0: 2009-10



T1: 27 December 2013

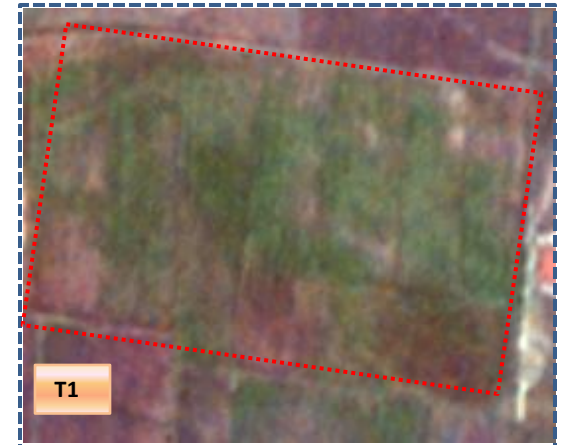
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

T0: 2009-10



T1

T1: 27 December 2013

Scrub to Agriculture



T0

T0: 2009-10

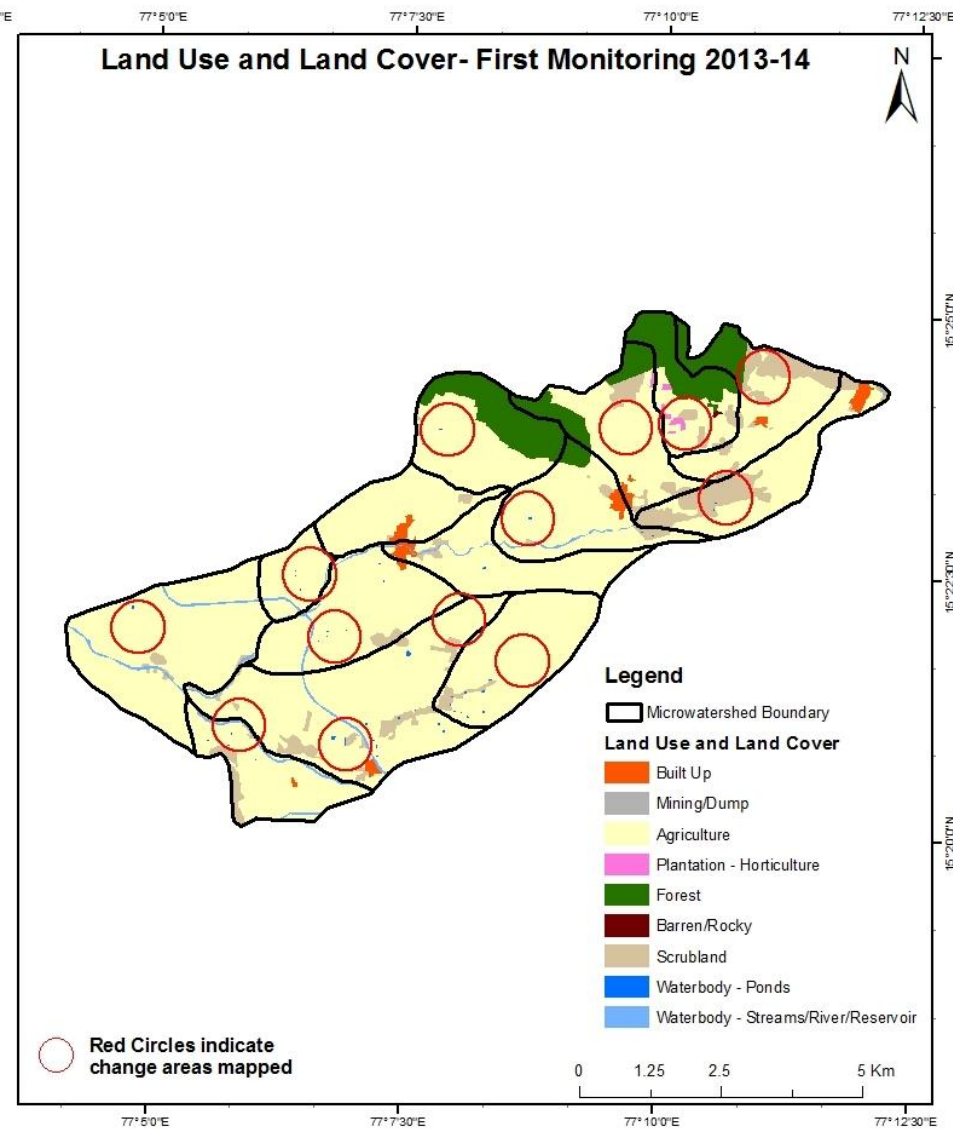
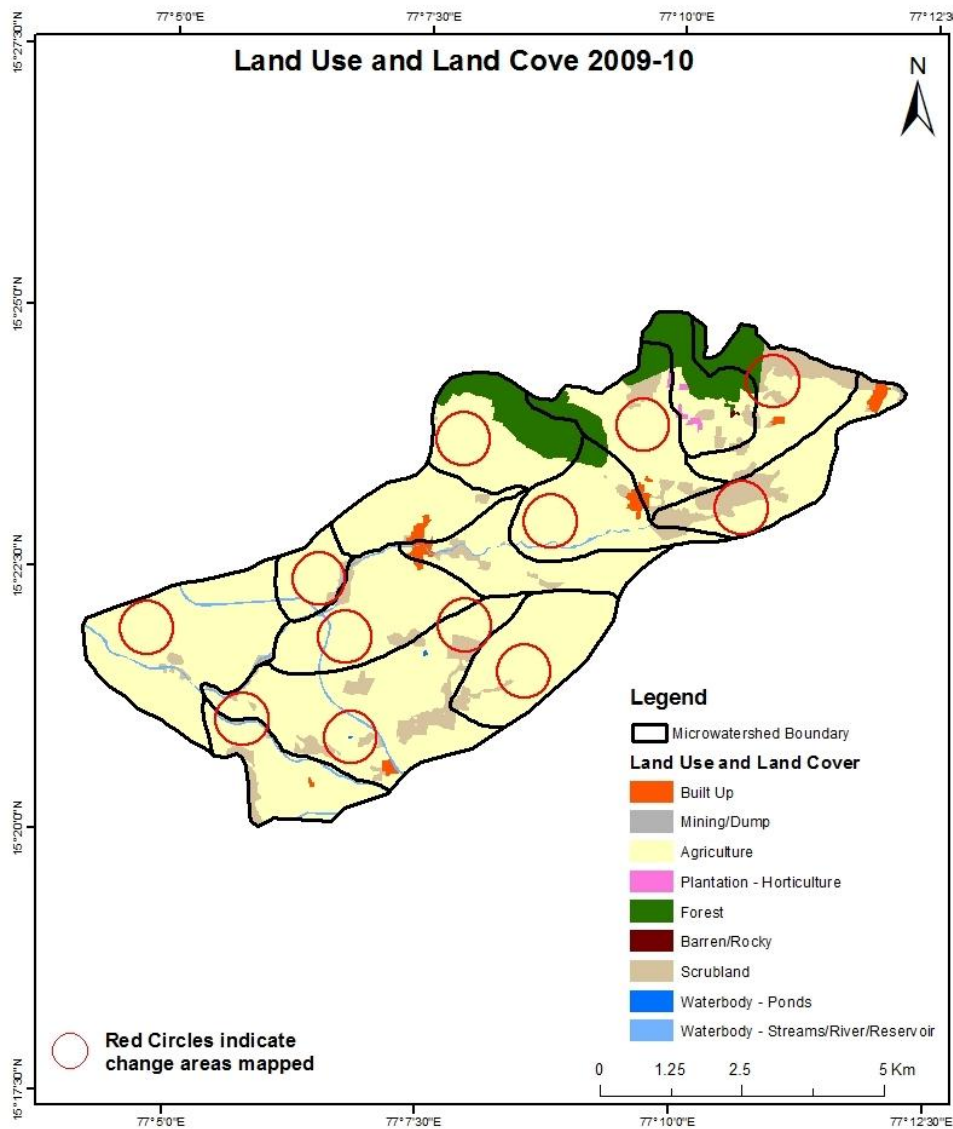


T1

T1: 27 December 2013

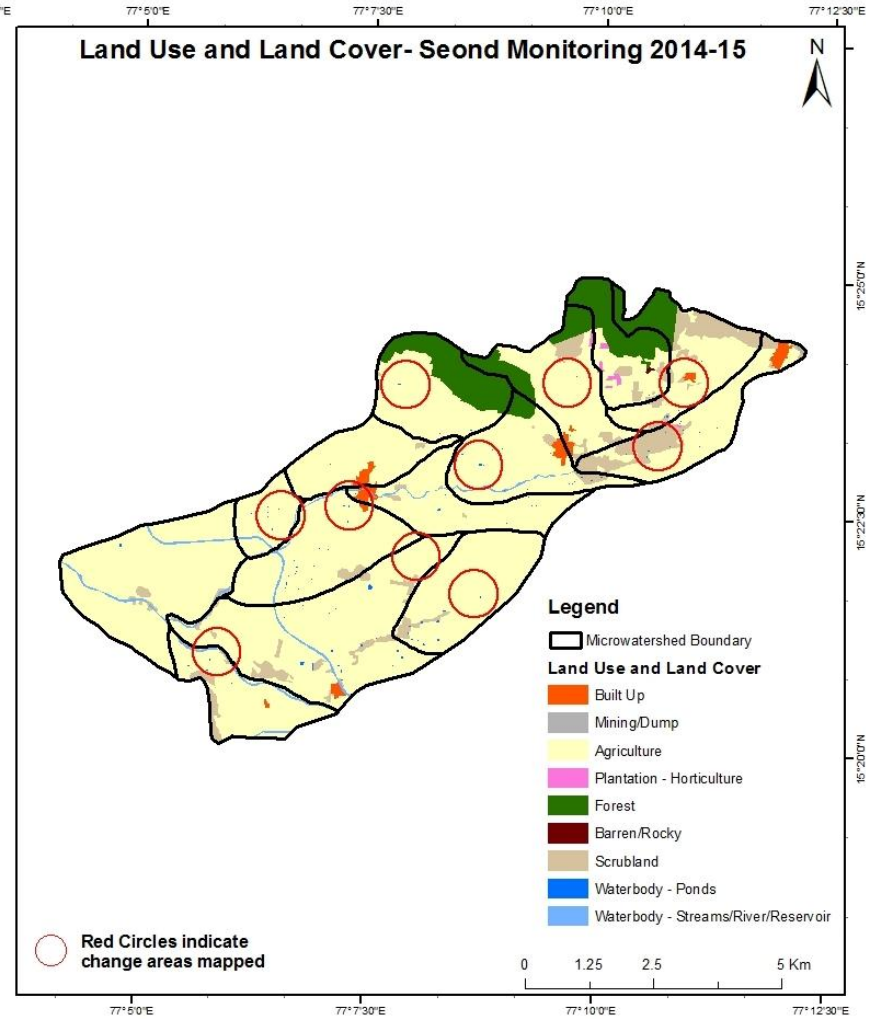
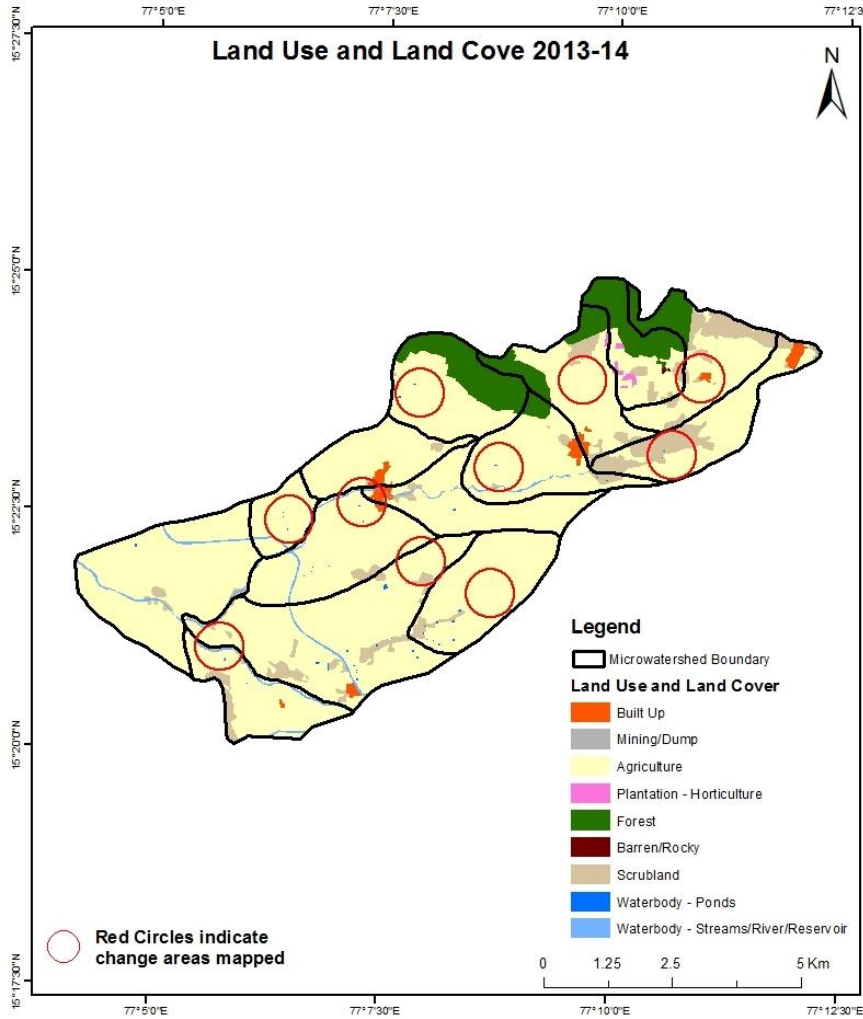
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



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

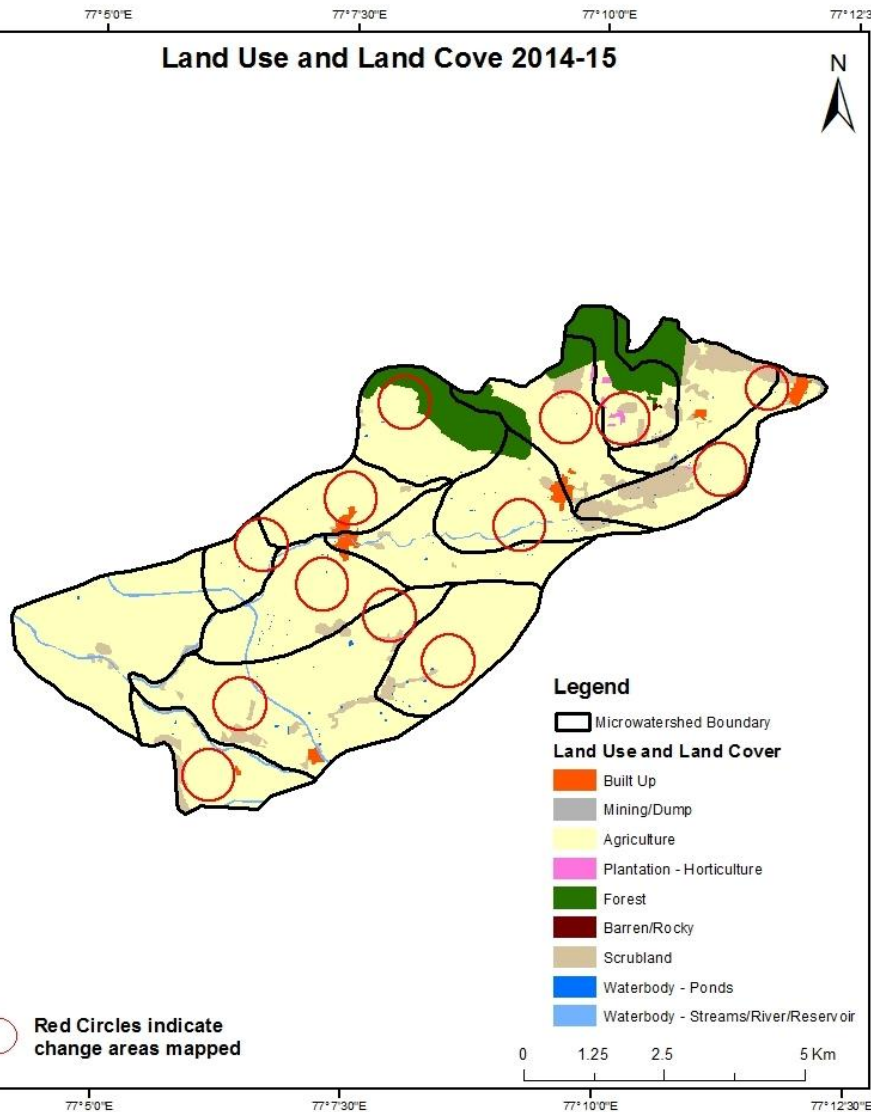
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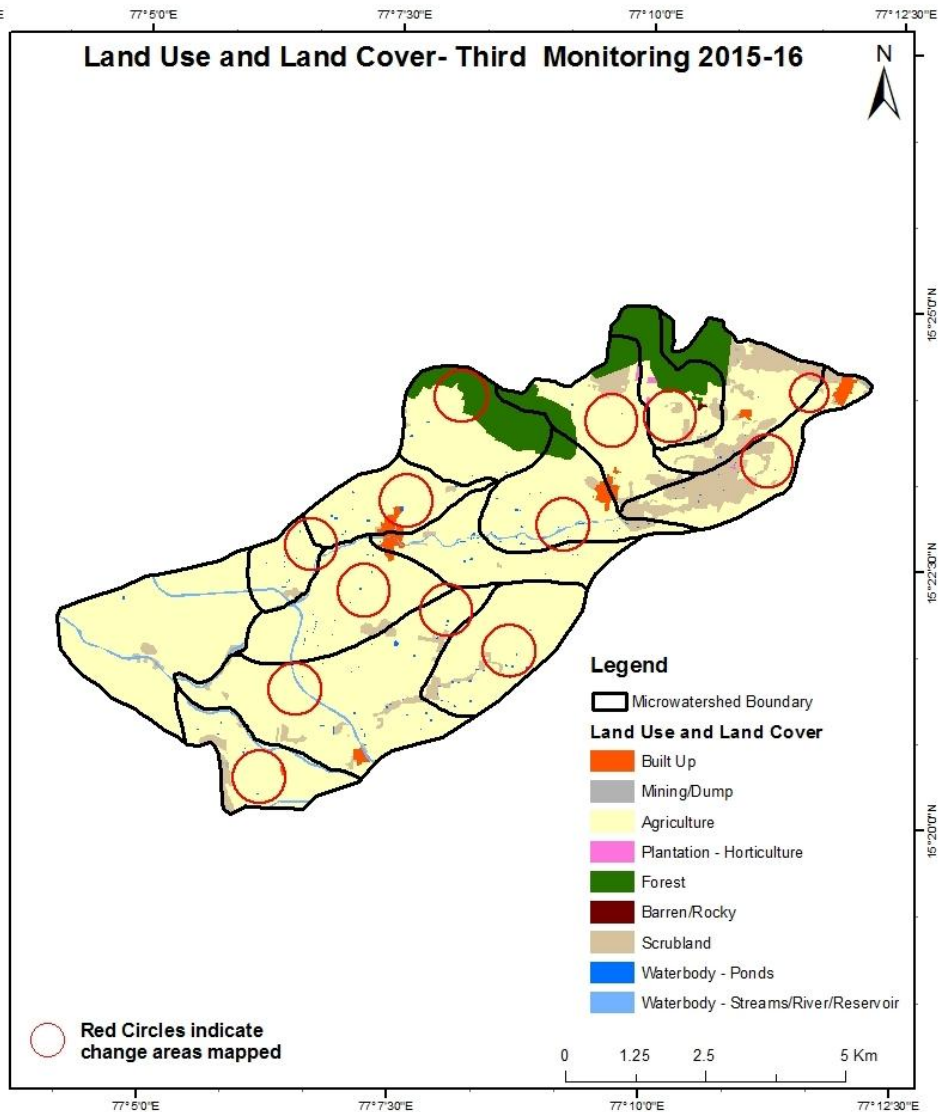
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000

Land Use and Land Cove 2014-15

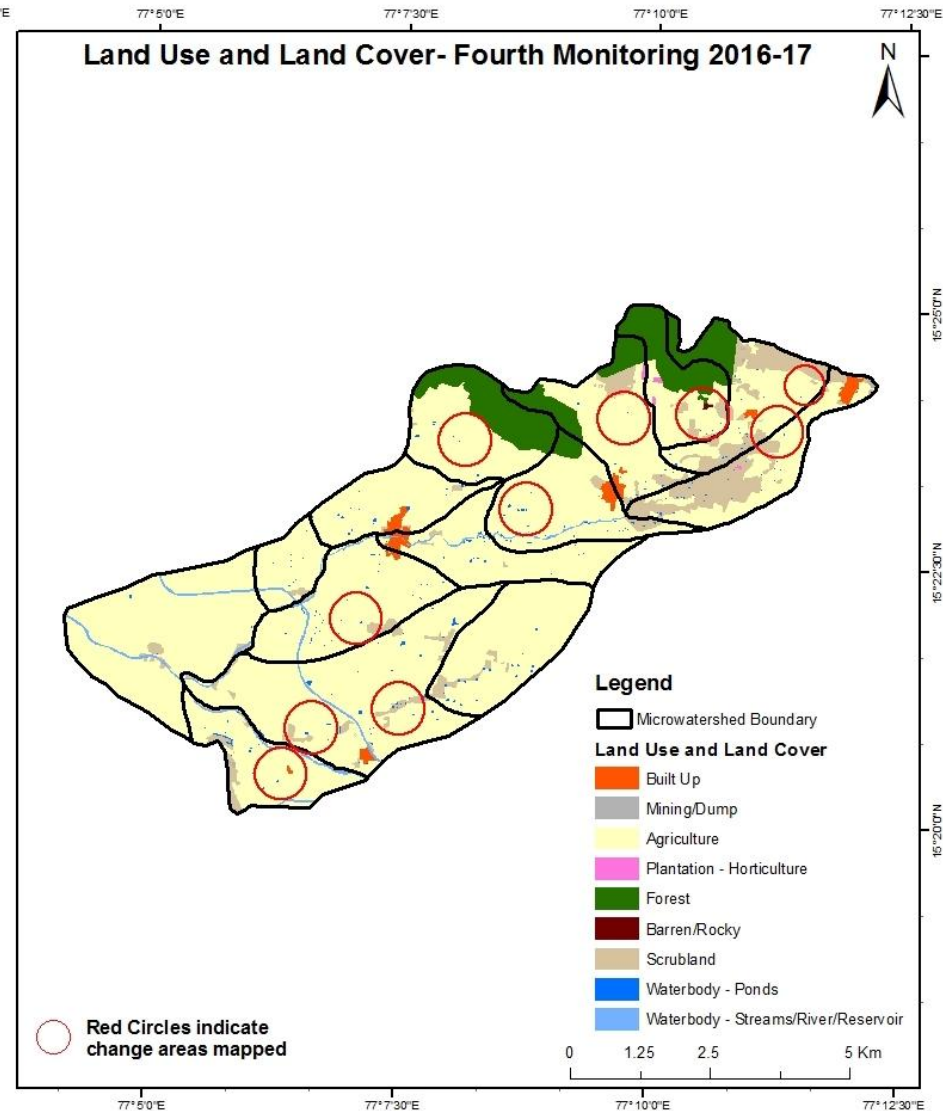
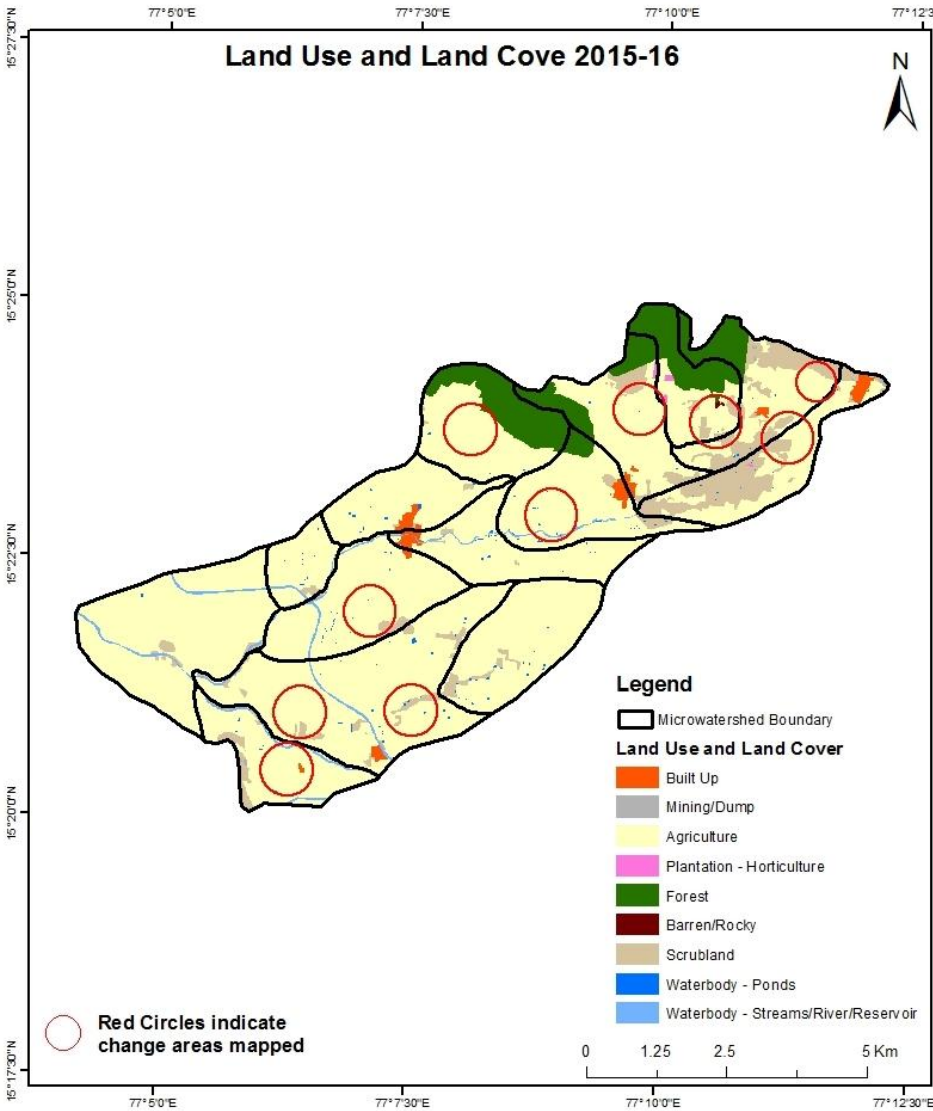


Land Use and Land Cover- Third Monitoring 2015-16



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

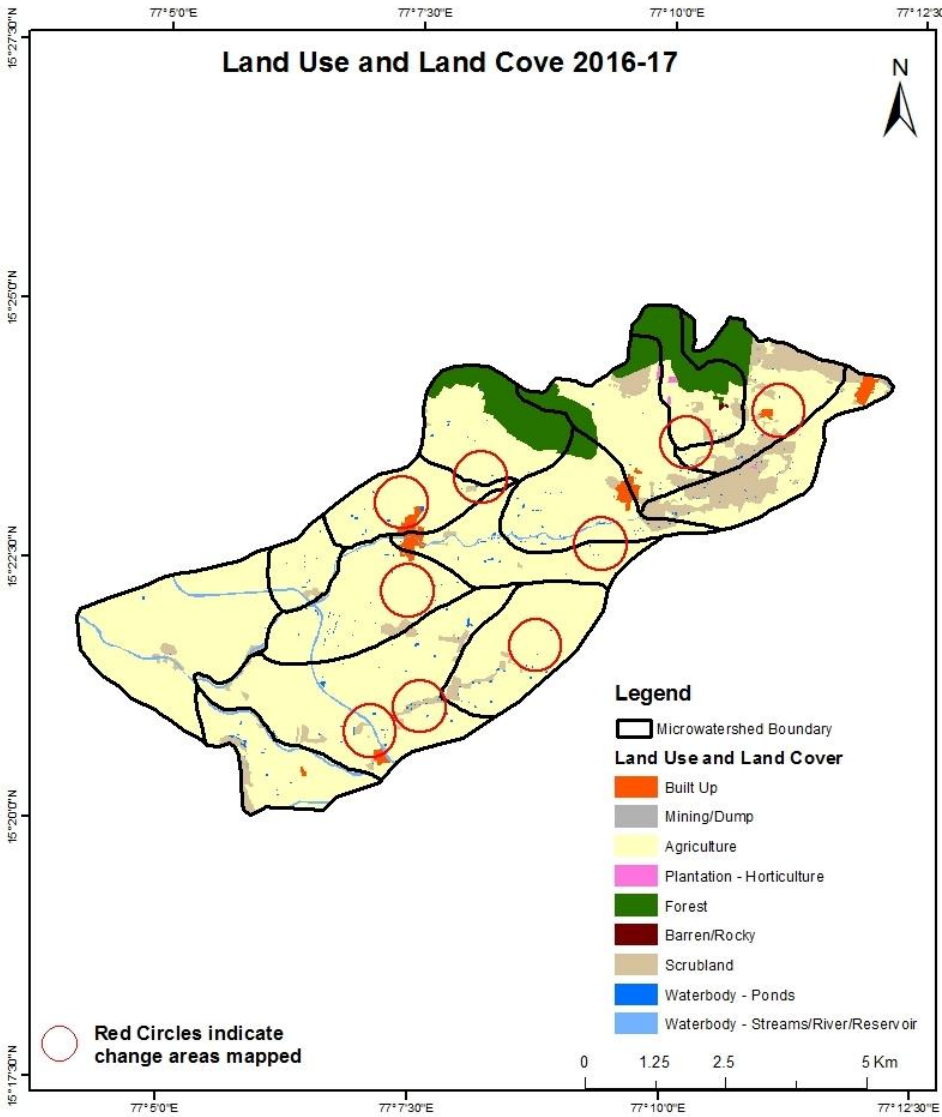
Scale: 1:10000



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

Scale: 1:10000

Land Use and Land Cove 2016-17



Land Use and Land Cover- Fifth Monitoring 2017-18

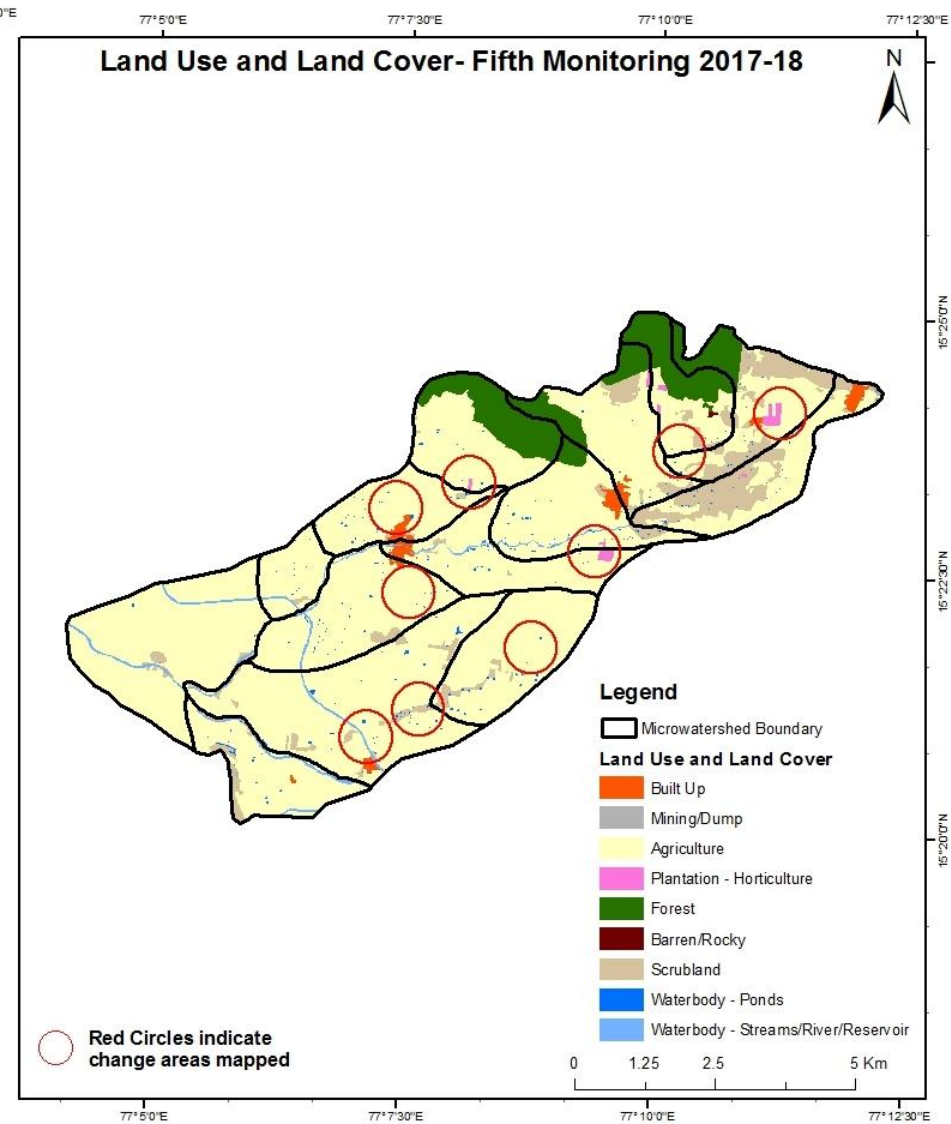


Table showing change matrix depicting Land cover transitions during study period-2009-10 to 2013-14

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	62.34										62.34	
Mining/dump		1.70									1.70	
Agriculture	0.36		4422.86	0.70				4.06		4.05	4432.02	
Plantation Horticulture				10.32							10.32	
Forest					464.88						464.88	
Forest Plantation												
Barren Rocky							1.23				1.23	
Scrub			97.86					409.74		0.78	508.39	
Waterbody- Streams/River									77.54		77.54	
Waterbody – Ponds										1.26	1.26	
Grand Total	62.69	1.70	4520.72	11.02	464.88		1.23	413.80	77.54	6.09	5559.68	

- 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 9.16 ha of the agriculture area has decreased and it is converted into plantation, scrubland and water body in T1.
- In T1 97.86 ha of the agriculture area has increased from 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-2013-14 to 2014-15

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	62.69												62.69
Mining/dump		1.70											1.70
Agriculture	0.88		4513.59					3.64			2.60		4520.72
Plantation Horticulture			1.35	9.67									11.02
Forest			1.50		463.39								464.88
Forest Plantation													
Barren Rocky							1.23						1.23
Scrub			38.50	0.46				374.25			0.58		413.80
Waterbody- Streams/River									77.50		0.03		77.54
Waterbody – Ponds											6.09		6.09
Grand Total	63.58	1.70	4554.94	10.13	463.39		1.23	377.90	77.50		9.31		5559.68

- 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 7.13 ha of the agriculture area has decreased and it is converted into built up, plantation, scrubland and water body in T2.
- In T2 41.35 ha of the agriculture area has increased from plantation, forest 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-2014-15 to 2015-16

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	63.58												63.58
Mining/dump		1.70											1.70
Agriculture	1.26		4447.25					99.70			6.73		4554.94
Plantation Horticulture			4.68	5.46									10.13
Forest			0.86		462.52								463.39
Forest Plantation													
Barren Rocky							1.23						1.23
Scrub	0.14	1.77	23.02					352.00			0.97		377.90
Waterbody- Streams/River									77.50				77.50
Waterbody – Ponds			0.34								8.97		9.31
Grand Total	64.98	3.48	4476.15	5.46	462.52		1.23	451.70	77.50		16.67		5559.68

- 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 107.69 ha of the agriculture area has decreased and it is converted into built up, scrubland and water body in T3.
- In T3 28.90 ha of the agriculture area has 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-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	64.98										64.98	
Mining/dump		3.48									3.48	
Agriculture	0.90		4464.48					1.86	0.79	8.13	4476.15	
Plantation Horticulture				5.46							5.46	
Forest					462.47					0.05	462.52	
Forest Plantation												
Barren Rocky							1.23				1.23	
Scrub			8.04					440.10		3.56	451.70	
Waterbody- Streams/River									77.50		77.50	
Waterbody – Ponds			0.34							16.33	16.67	
Grand Total	65.87	3.48	4472.86	5.46	462.47		1.23	441.96	78.29	28.07	5559.68	

- 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 11.67 ha of the agriculture area has decreased and it is converted into built up, scrubland and water body in T4.
- In T4 8.38 ha of the agriculture area has increased from 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-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	65.87										65.87	
Mining/dump		3.41								0.07	3.48	
Agriculture	1.75		4452.40	16.67						2.03	4472.86	
Plantation Horticulture				5.46							5.46	
Forest			0.11		462.36						462.47	
Forest Plantation												
Barren Rocky							1.23				1.23	
Scrub	0.90		9.14					431.56		0.36	441.96	
Waterbody- Streams/River									78.29		78.29	
Waterbody – Ponds			0.28							27.78	28.07	
Grand Total	68.53	3.41	4461.93	22.13	462.36		1.23	431.56	78.29	30.25	5559.68	

- 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 20.46 ha of the agriculture area has decreased and it is converted into built up, plantation and water body in T5.
- In T5 9.53 ha of the agriculture area has increased from forest, 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 29.74 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 88.70 & 34.22 Hectares From T0-T1 & T1-T2 respectively and overall increase of 122.92 Hectares in Crop land area as compared between baseline LU/LC data 2009-10 (T0) & 2017-18 (T5) years.
5. There is a increase of 11 Hectares in Plantation/Horticulture area as compared between 2009-10 (T0) & 2017-18 (T5) years.
6. There is a decrease of 76.83 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.