

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

SUMMARY REPORT

PRAKASAM -2/2009-10
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**

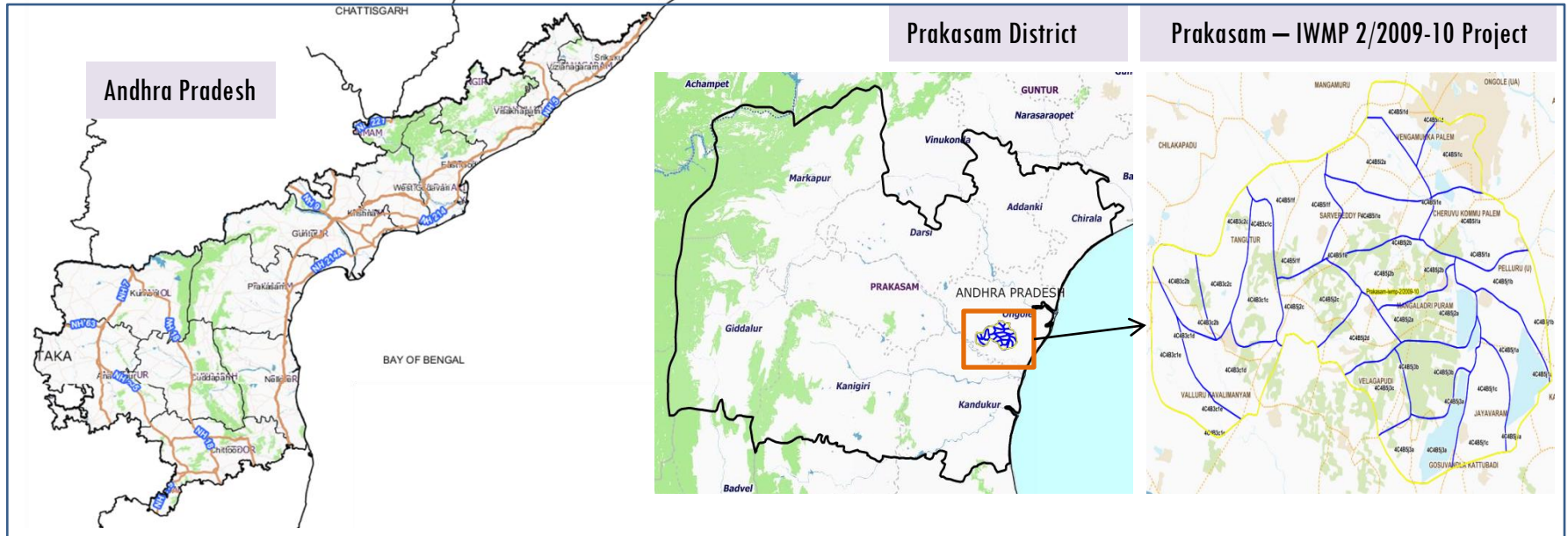
01. STUDY AREA
02. SATELLITE & ANCILLARY DATA INCLUDING DRISHTI STATUS
03. MONITORING IN THE PROJECT AREA : Site wise changes in the project
04. CONCLUSIONS

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-02/2009-10, Prakasam District of Andhra Pradesh. The total geographical area of the project is 11,072.81 ha. It comprises of 21 micro watersheds.
- In the project area 35 Drishti photos were uploaded showing 22 solar lights, 4 plantations, 3 percolation tanks,1 check dams,1 dug out pit, 1 fodder and 2 others.
- Major percentage i.e. 61.02 % is covered by the agriculture, 15.47% is covered by Plantation/Horticulture, 9.61 % by water bodies, 6.73% by scrub land, 6.01 % by Built-up land and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-02/2009-10
DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Ongole and Tangutur Mandals of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 11072.82 ha. It comprises of 21 micro watersheds. Location Map of the study area is shown in Figure below
- Analysis is done for 2009-10 period (*Batch -1*) projects taking 2017-18 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.
- 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.

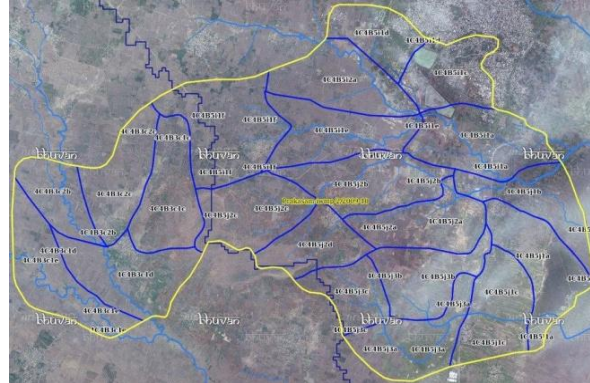
Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2009-10	2011-12	2017-18
LISS IV	2009-10		
SCENE 1			2-Oct-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2009-10		
SCENE 1			2-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

Classification of the Activities

Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture plantation-acid lime	3	3
3	Agriculture	0	0
4	Block Plantation	2	1
5	Solar street light	24	20
6	Field Bunds	0	0
7	Fodder	1	1
8	Varmicompost pit	1	1
9	Avenue plantation	1	1
10	Farm ponds	0	0
11	Check dams	3	1
12	Nallah Bunds	0	0
13	Percolation tanks / Ground water recharge structure	3	3
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	3	2
	TOTAL	41	32

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 T1 is 2013-14 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.

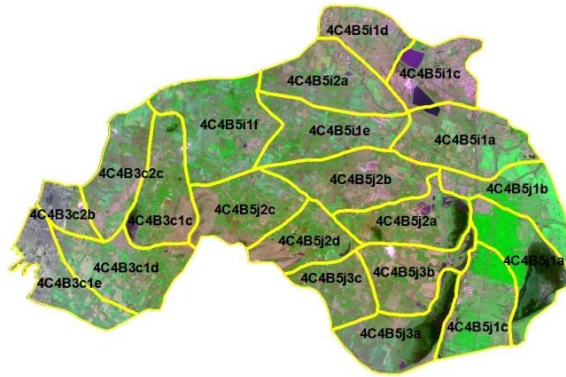
Natural Color Composite – 2009-10 to 2017-18

Natural Color Composite- 2009-10



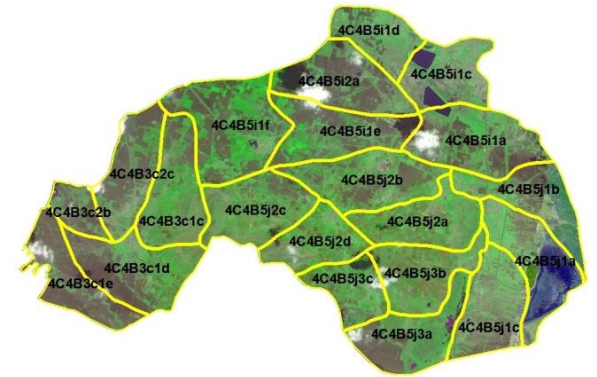
Source:Fusen data,NRSC

Natural Color Composite- 28th March 2014



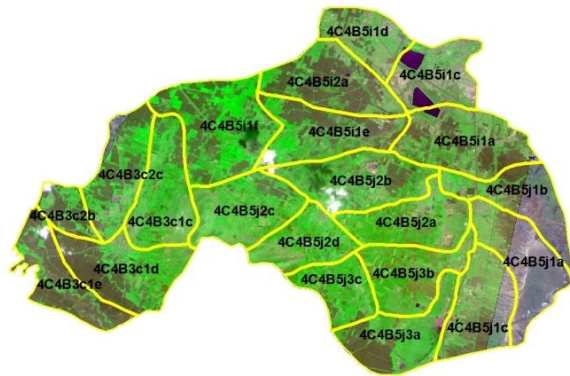
Source:Fusen data,NRSC

Natural Color Composite- 05th October 2014



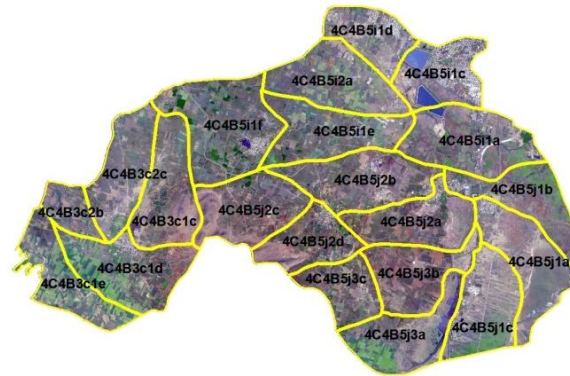
Source:Fusen data,NRSC

Natural Color Composite- October-2015-16



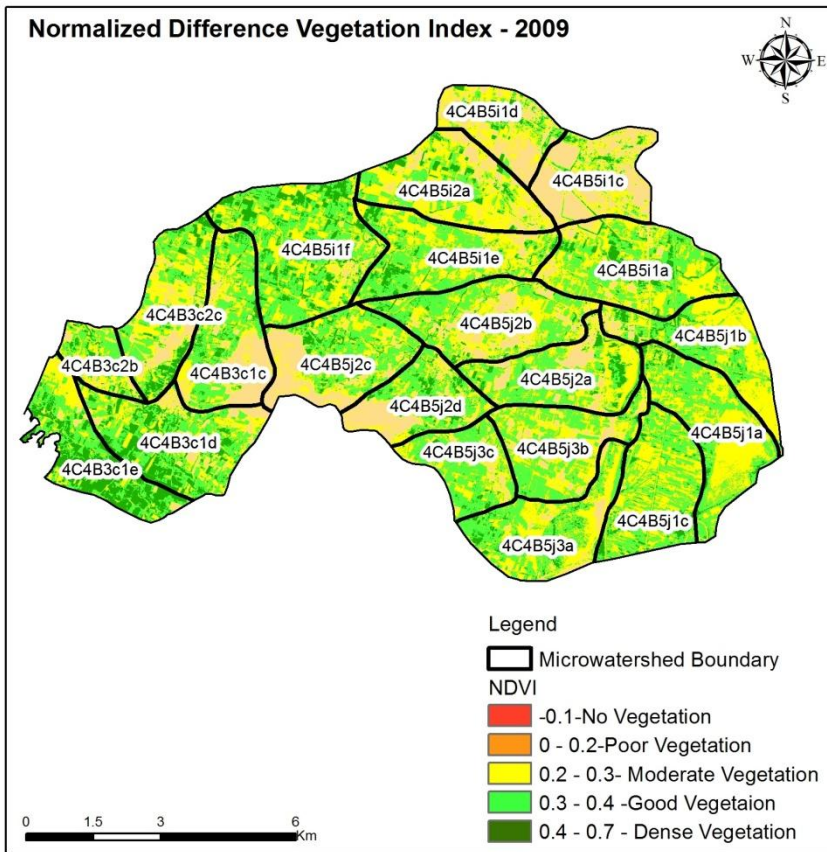
Source:LISS-IV,NRSC

Natural Color Composite- 03rd March 2017

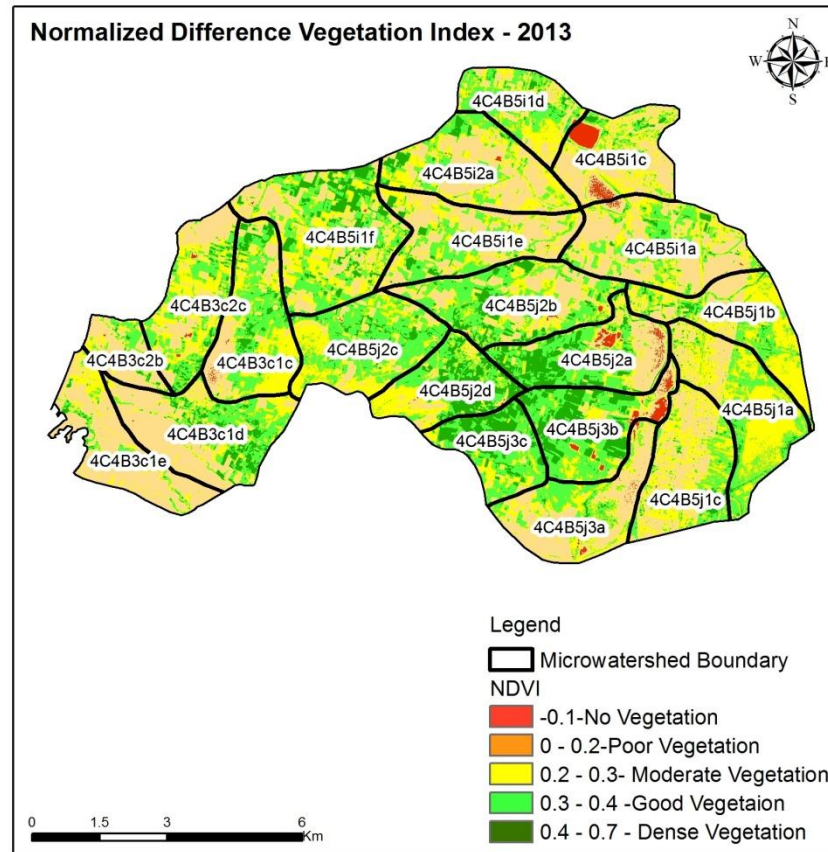


Source:Fusen data,NRSC

Changes in Vegetation Cover

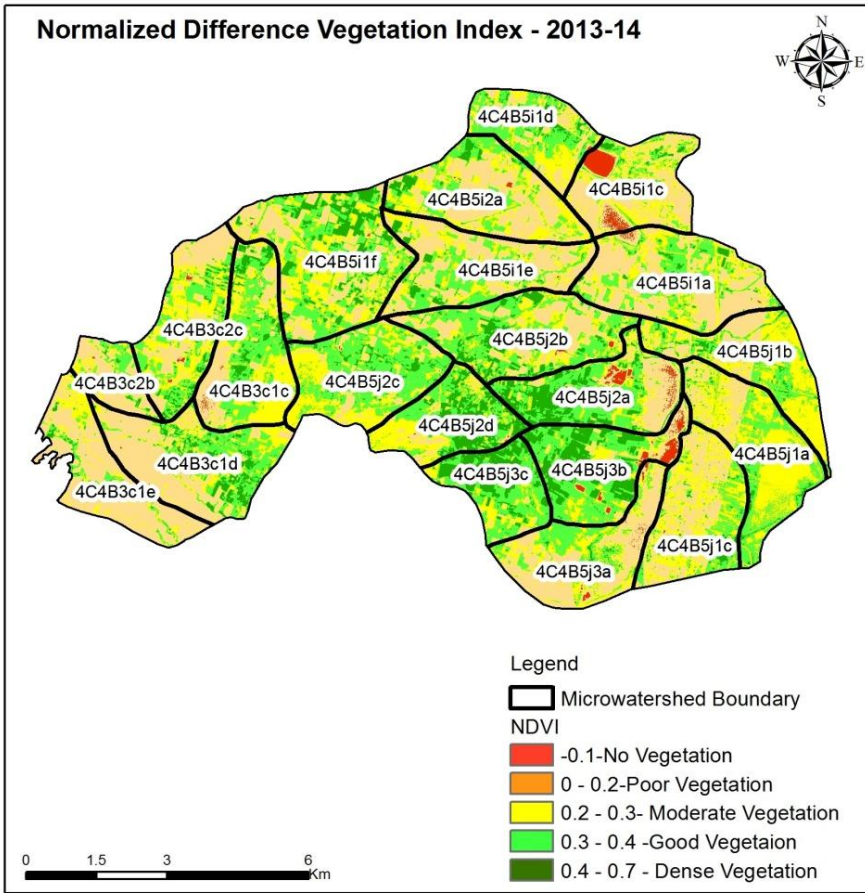


NDVI (2009-10)

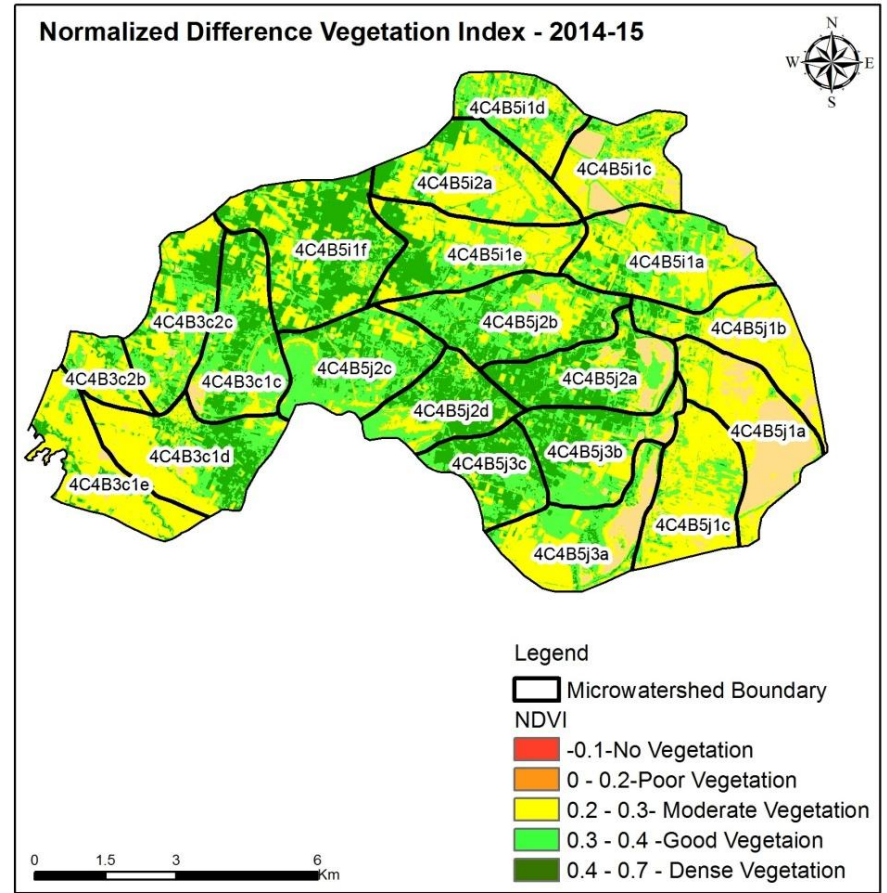


NDVI (2013-14)

Changes in Vegetation Cover

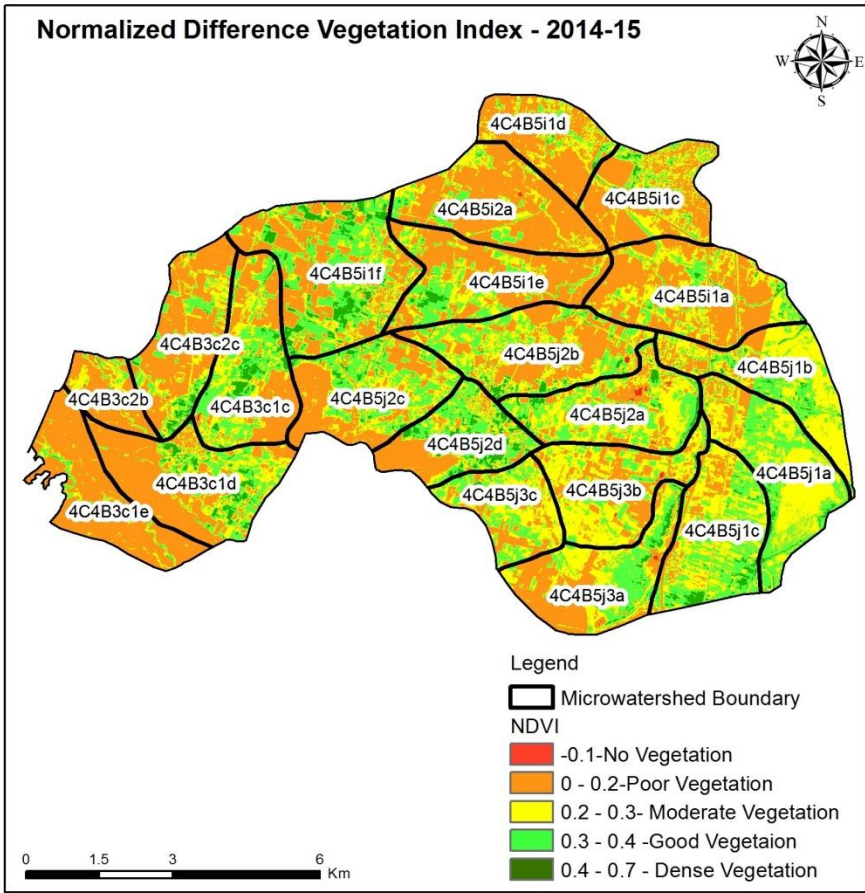


NDVI (2013-14)

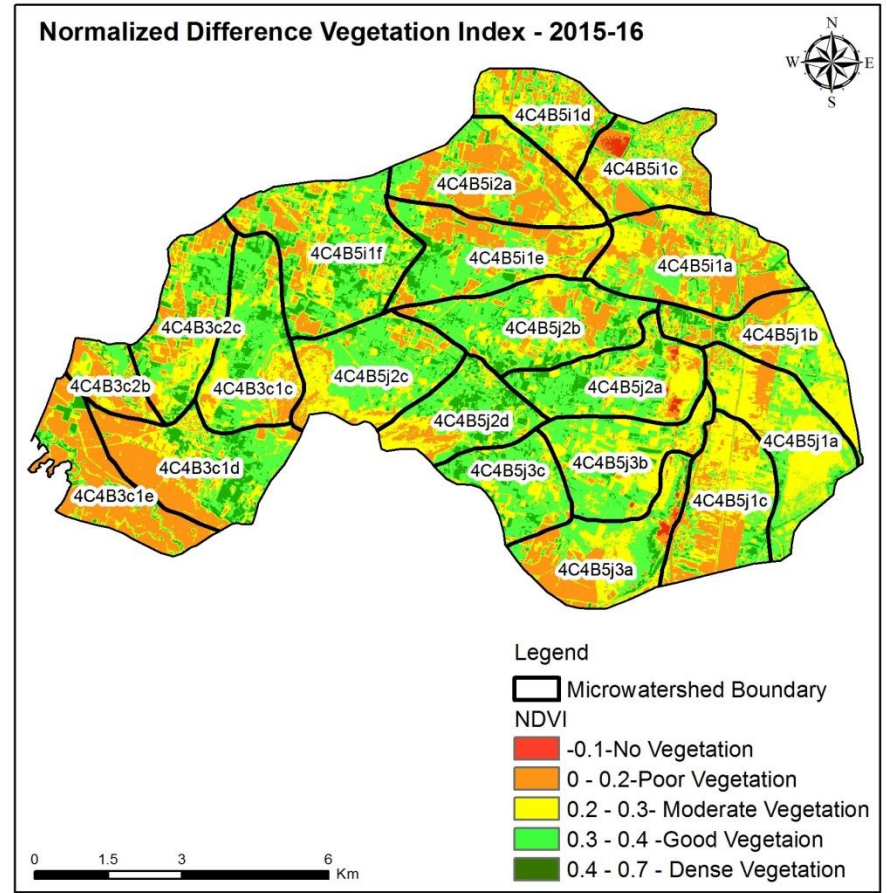


NDVI (2014-15)

Changes in Vegetation Cover



NDVI (2014-15)



NDVI (2015-16)

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-02/2009-10



T0:2009-10

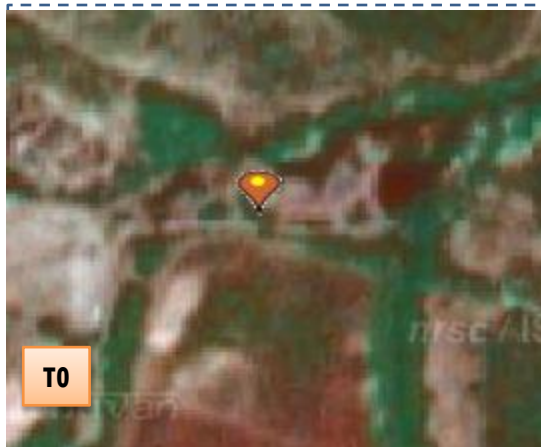


T1: 28 March 2014



Drishti Sl no. 560086 MWS :4C4B5j2c

Check Dam



T0:2009-10



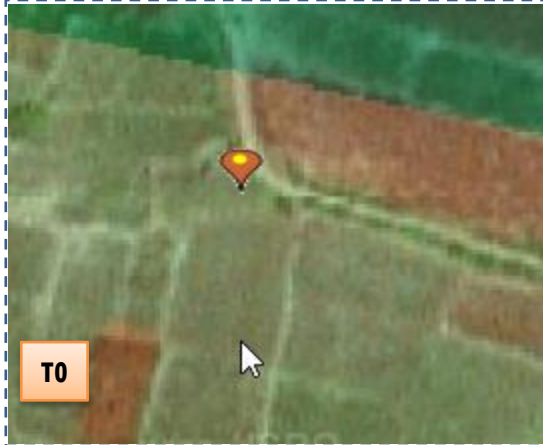
T1: 28 March 2014



Drishti Sl no.560084 MWS : 4C4B5j2c

Percolation Tank

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-02/2009-10



T0: 2009-10

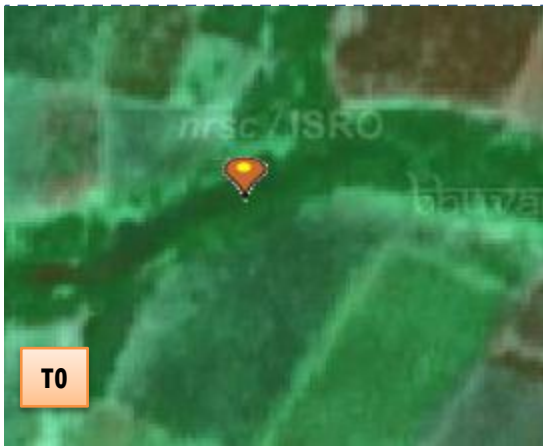


T1: 28 March 2014



Drishti Sl no. 560073 MWS :4C4b5j3b

Percolation Tank



T0: 2009-10



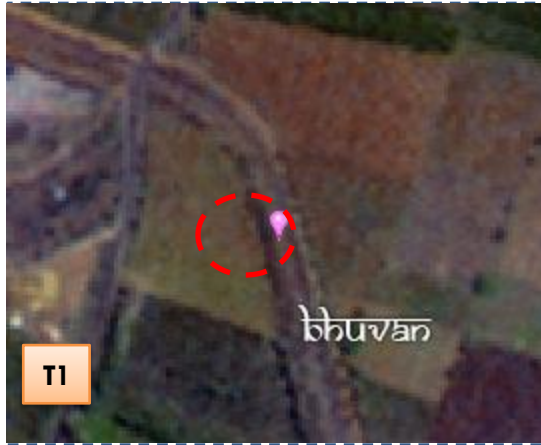
T1: 28 March 2014



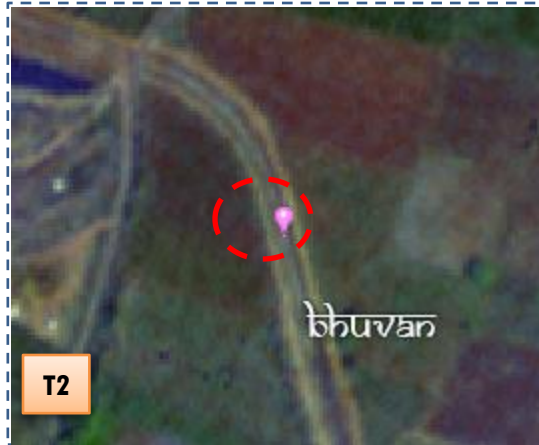
Drishti Sl no. 560083 MWS :4C4B5j2b

Check Dam

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-02/2009-10



T1:2009-10



T2: 28 March 2014



Drishti Sl no. 560076 MWS :4C4B5j2c

Block planting



T1:2009-10



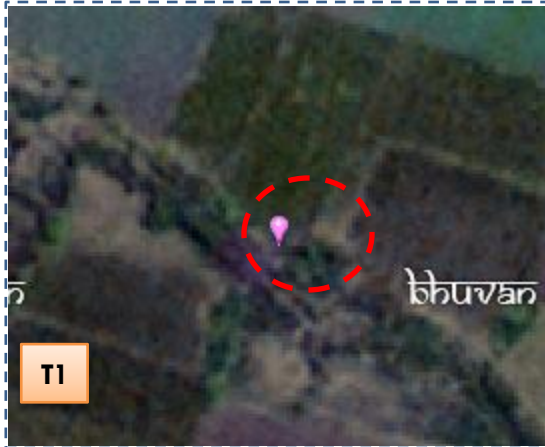
T2: 28 March 2014



Drishti Sl no.560084 MWS : 4C4B5j2c

Block planting

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-02/2009-10



T1

T1: 2009-10



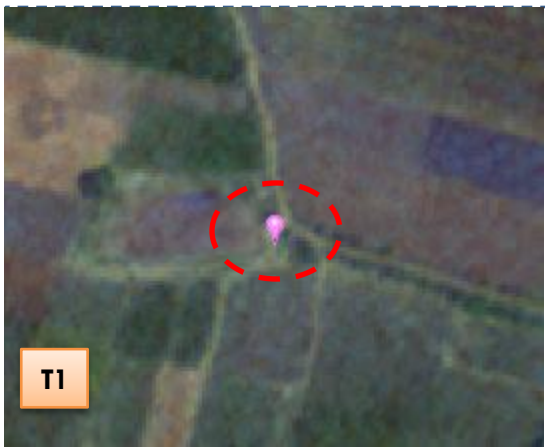
T2

T2: 28 March 2014



Drishti Sl no. 560073 MWS :4C4b5j3b

Check dam



T1

T1: 2009-10



T2

T2: 28 March 2014



Drishti Sl no. 560073 MWS :4C4B5j2b

Percolation tank

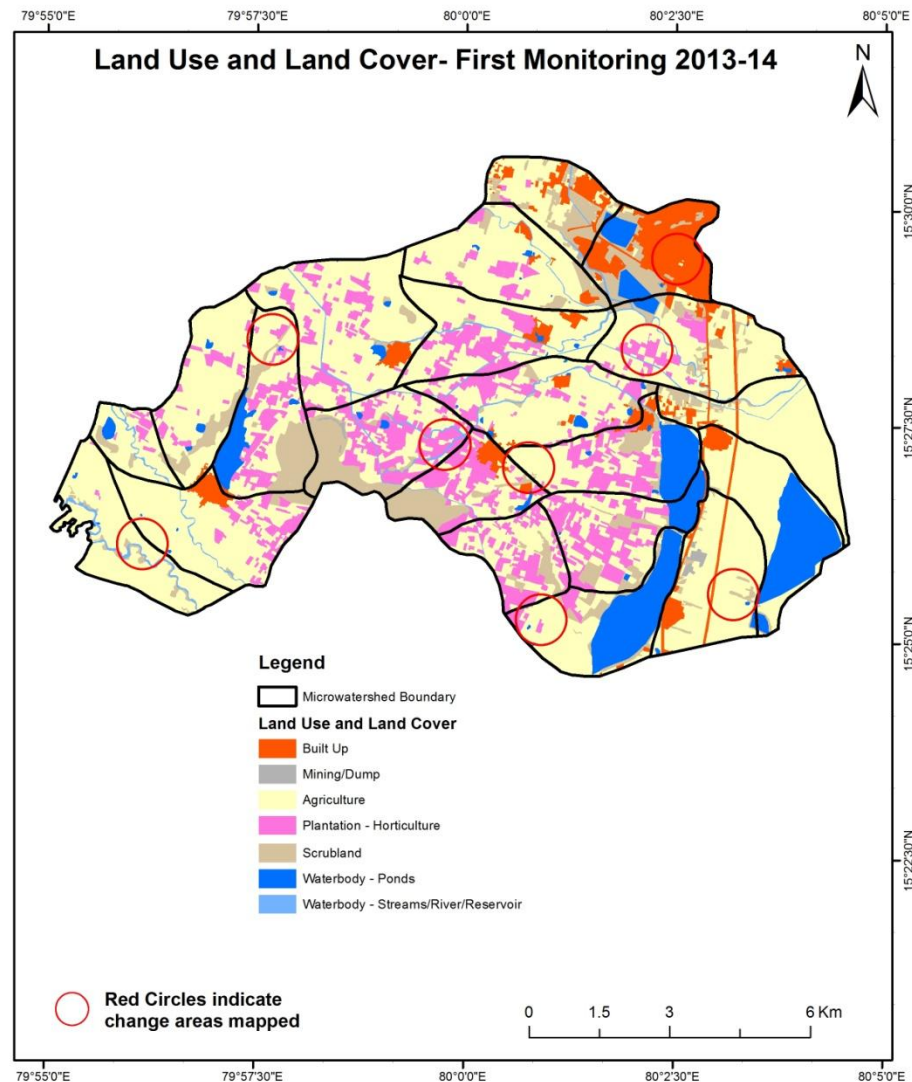
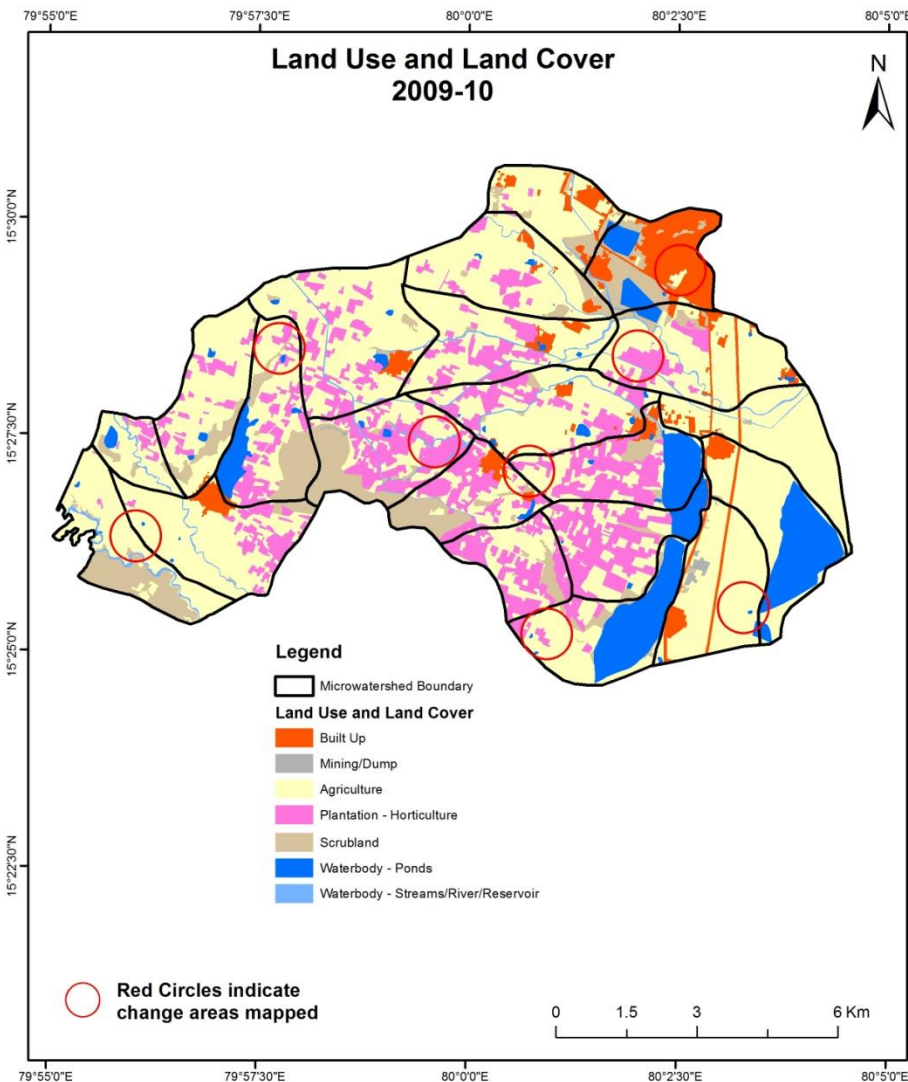
MONITORING IN THE PROJECT AREA

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.

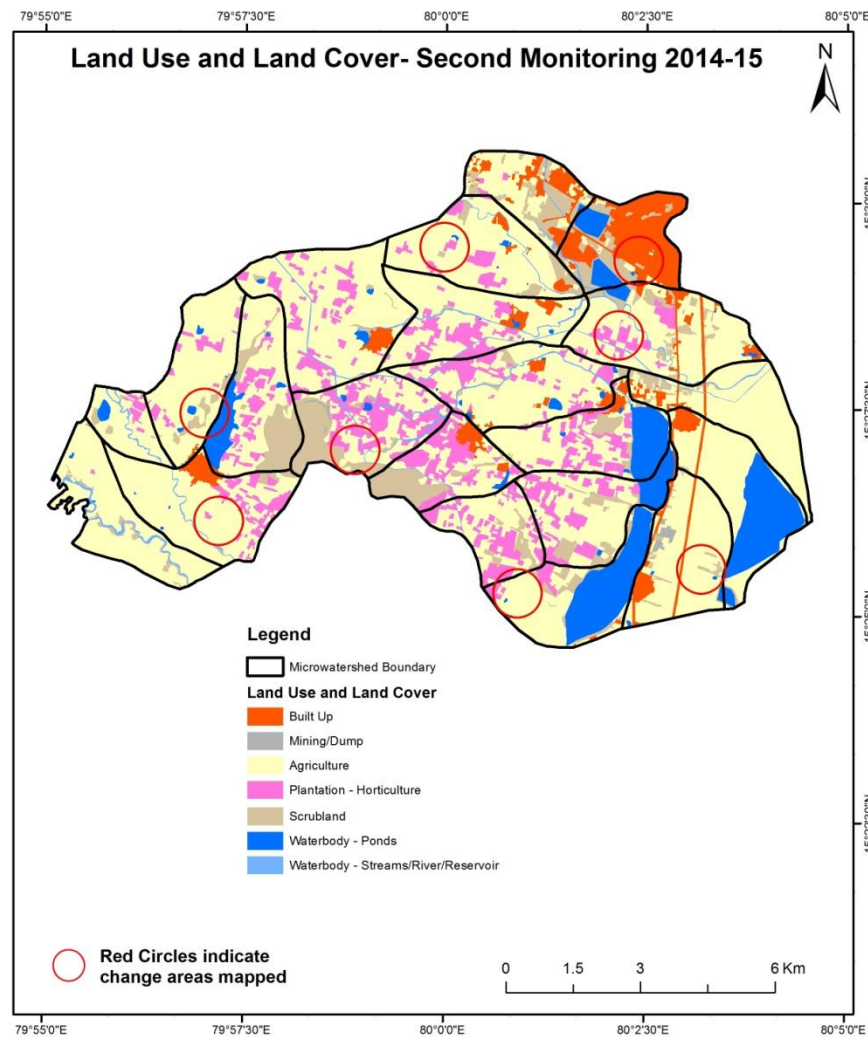
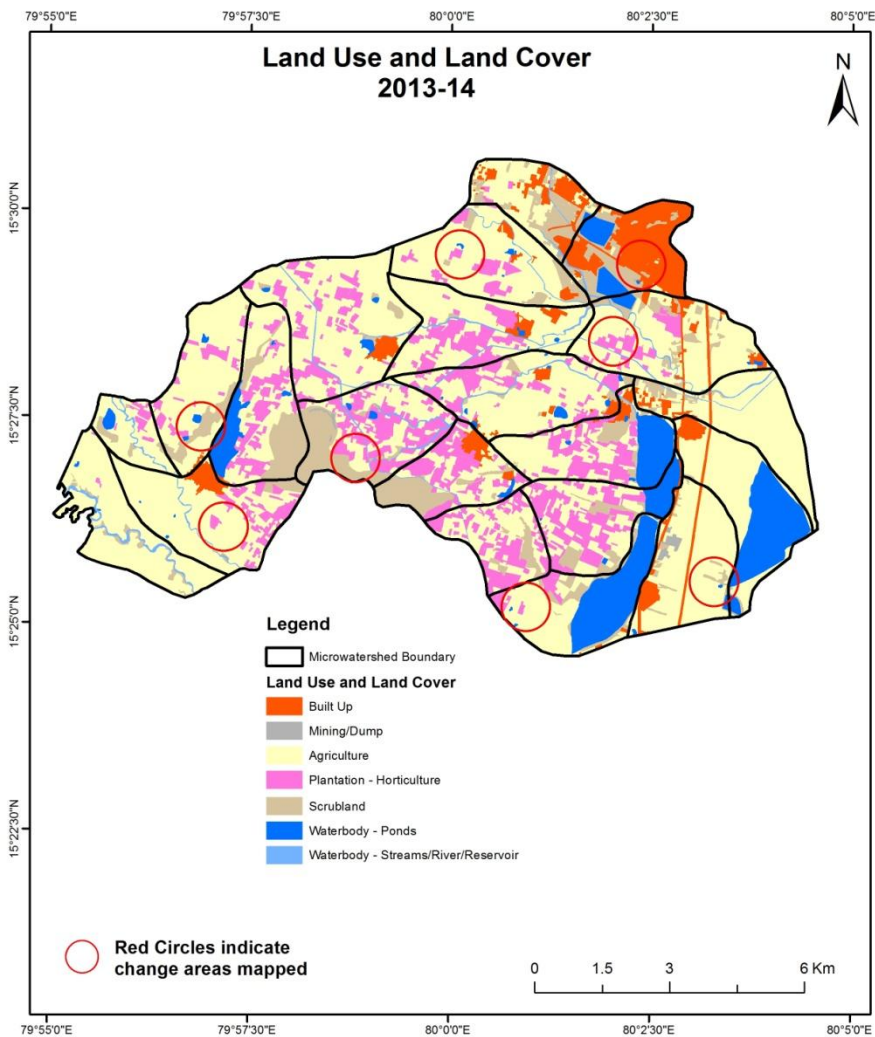
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



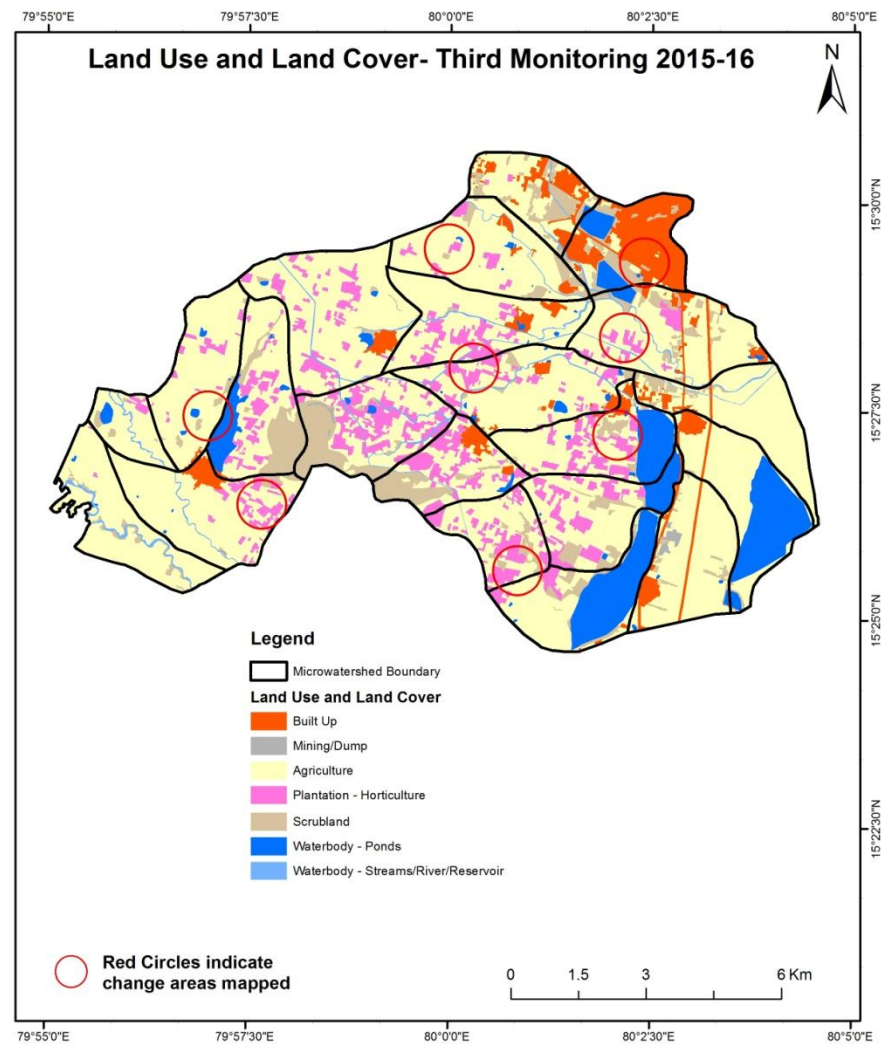
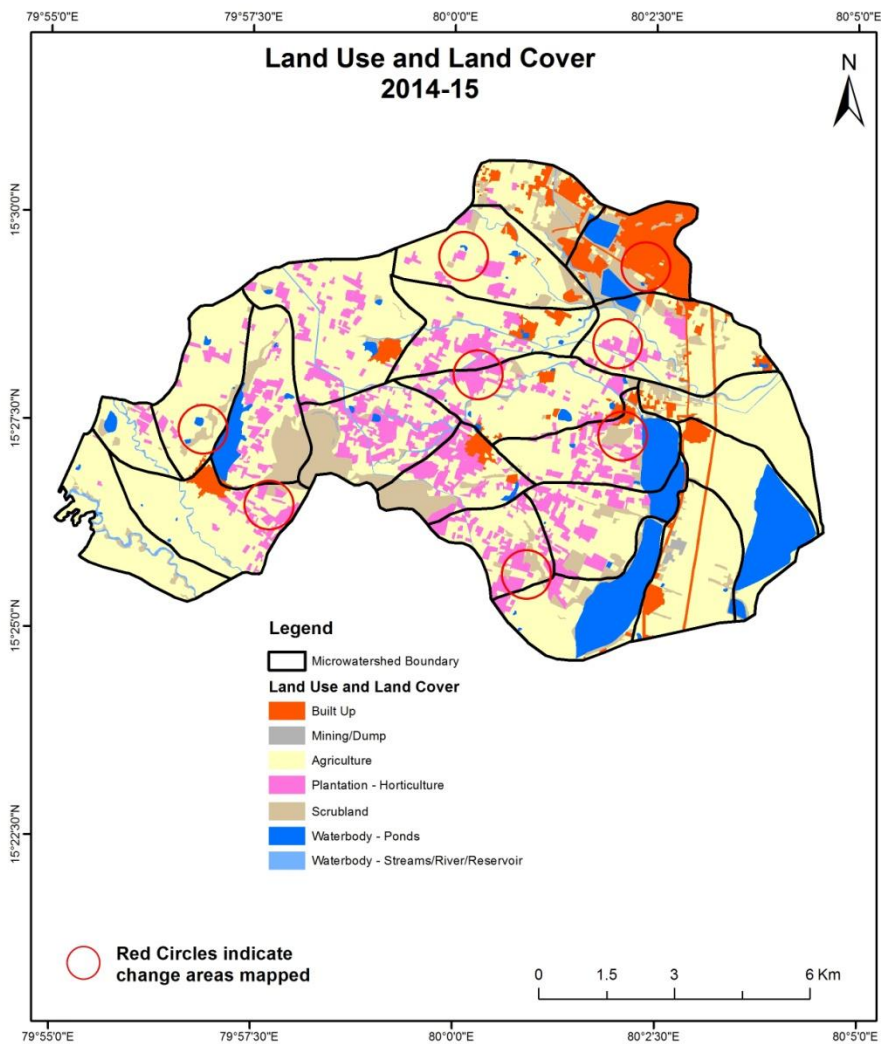
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

Scale: 1:10000



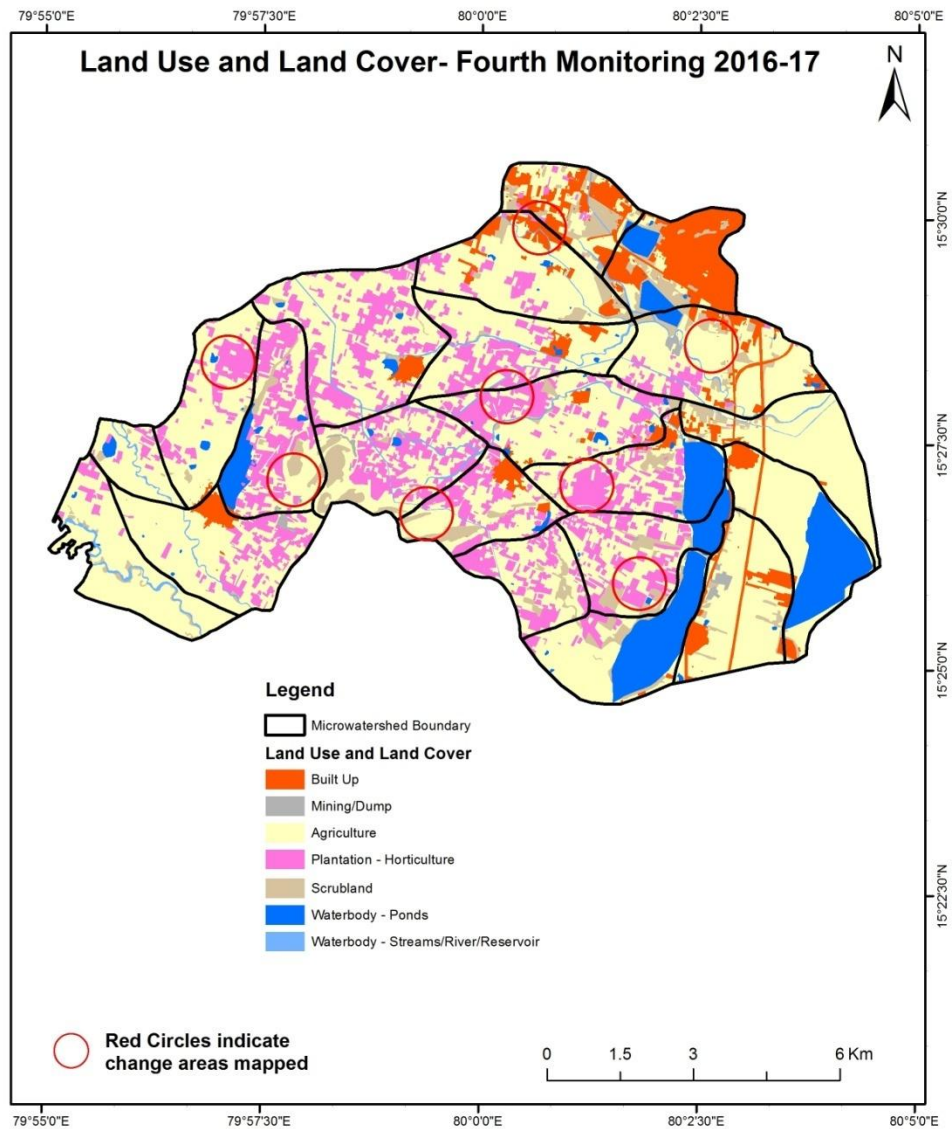
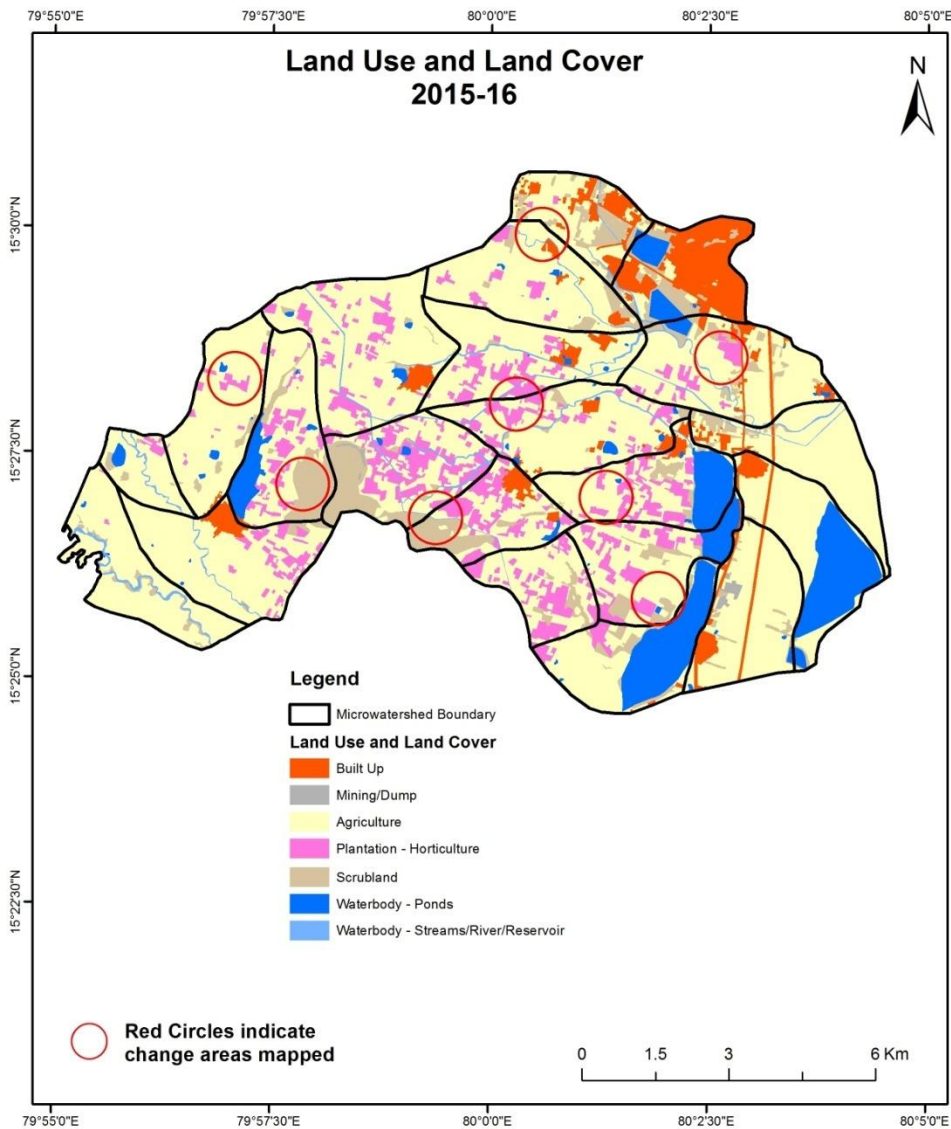
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



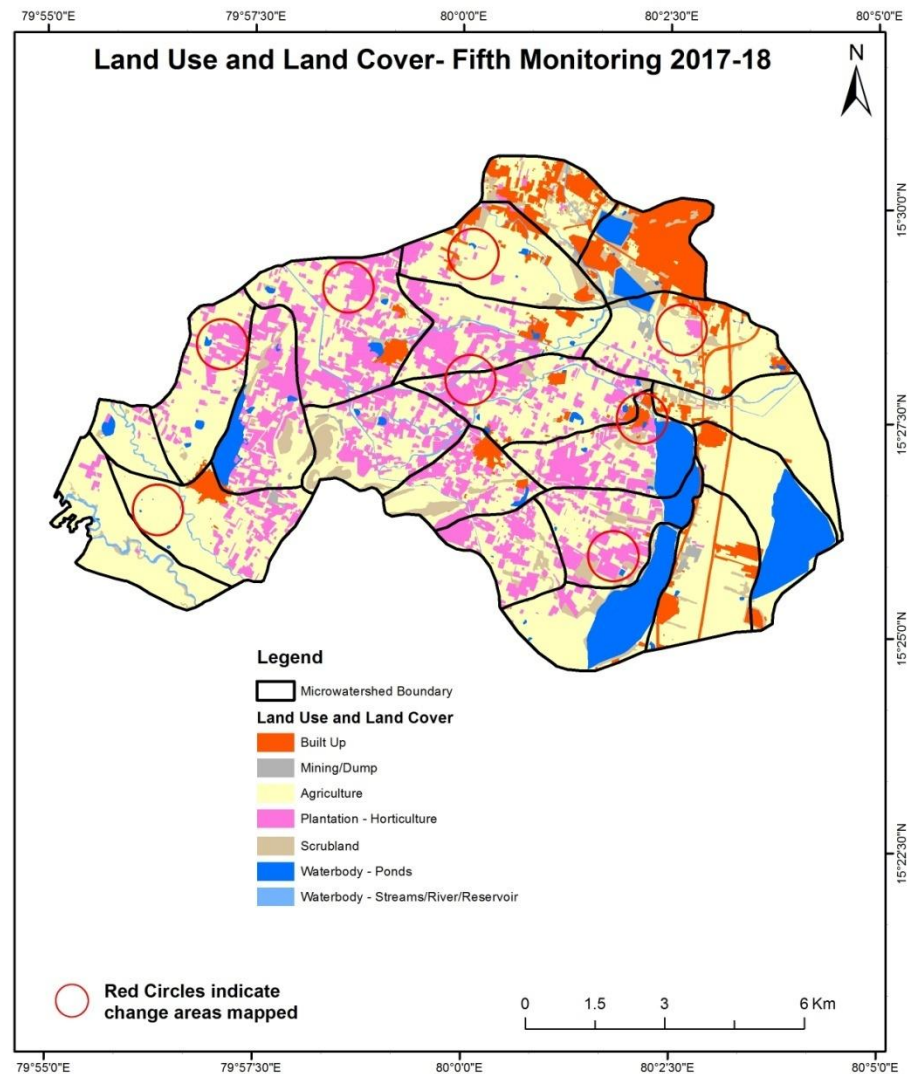
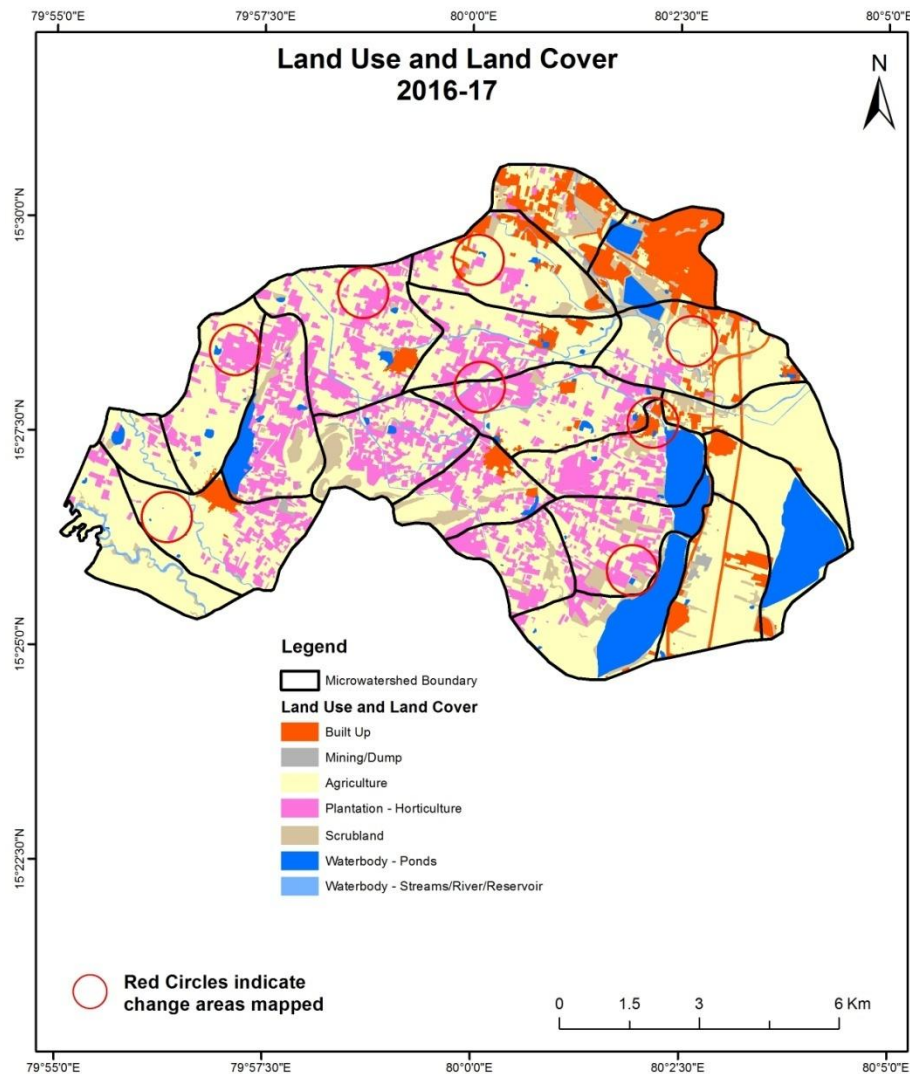
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



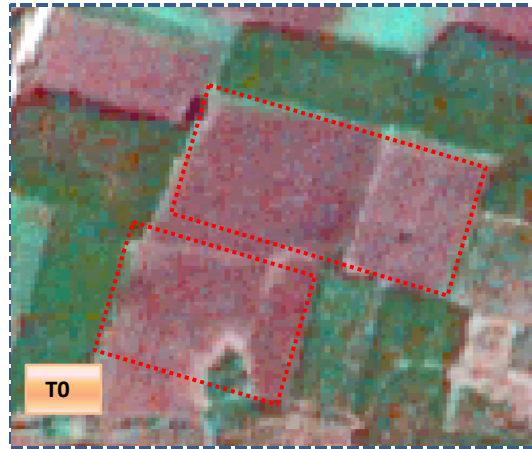
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

Scale: 1:10000



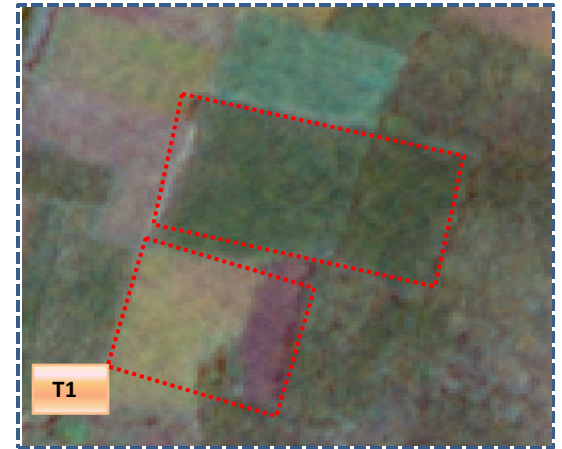
Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Plantation



T0

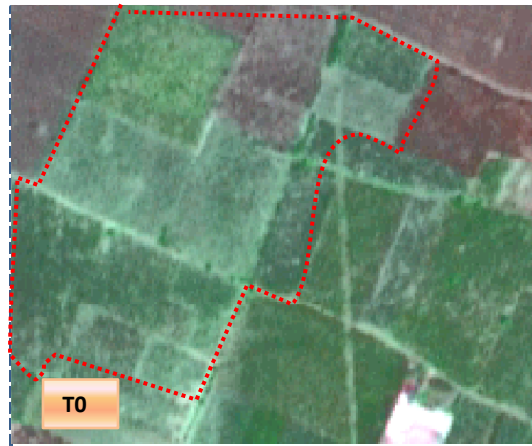
T0: 2009-10



T1

T1: 28 March 2014

Plantation to Agriculture



T0

T0: 2009-10

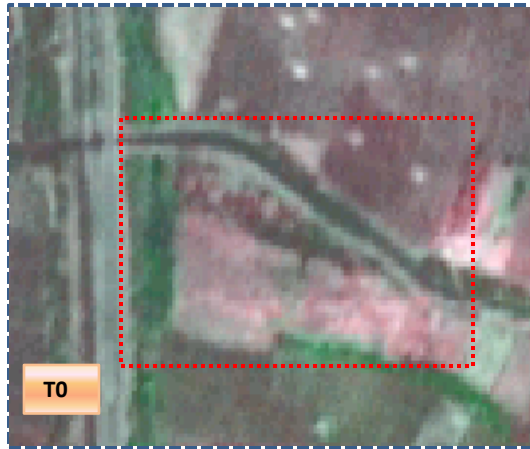


T1

T1: 28 March 2014

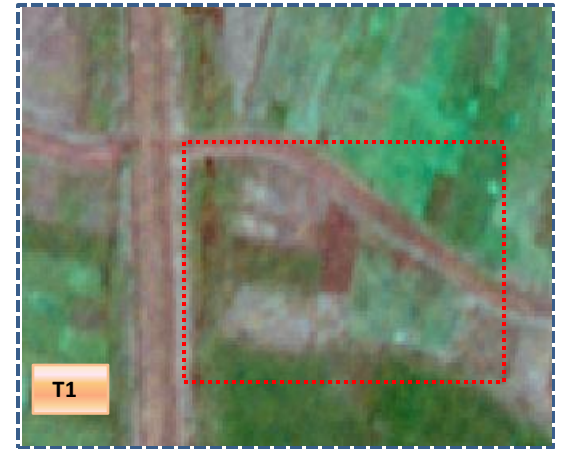
Land Use and Land Cover changes for Pre and Post treatment dates

Scrub to Agriculture



T0

T0: 2009-10



T1

T1: 28 March 2014

Water body to Agriculture



T0

T0: 2009-10

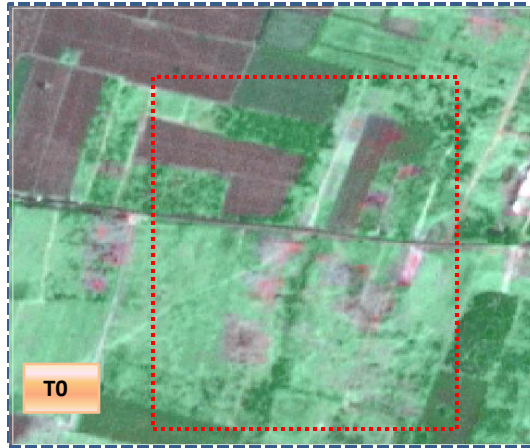


T1

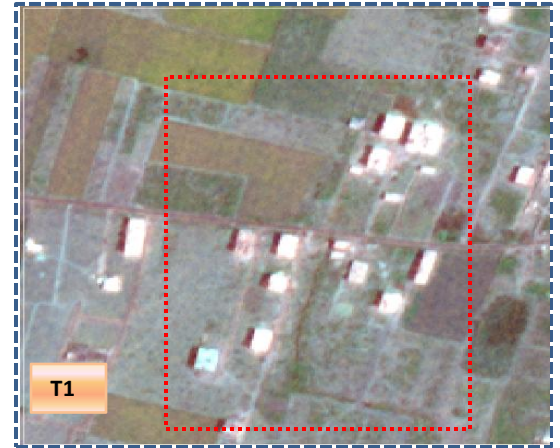
T1: 28 March 2014

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

Agriculture to Built up



T0: 2009-10

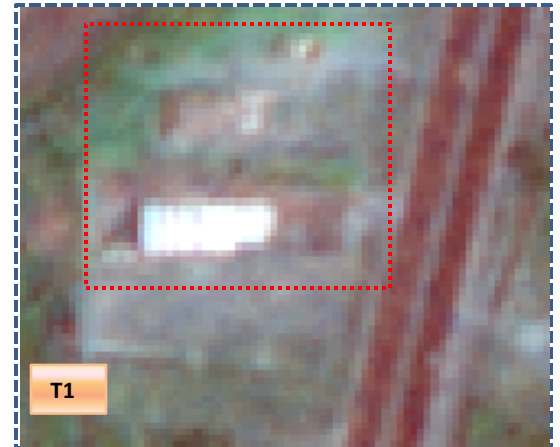


T1: 28 March 2014

Scrub to Built up



T0: 2009-10



T1: 28 March 2014

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

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	677.71										677.71
Mining/dump		18.41									18.41
Agriculture	50.19	1.07	5818.82	177.63				234.67	0.05	0.44	6282.86
Plantation Horticulture	0.22	0.38	467.98	1492.61				10.35	0.18		1971.72
Forest											
Forest Plantation											
Barren Rocky											
Scrub	22.26	2.81	148.31					866.22			1039.60
Waterbody- Streams/River									170.33		170.33
Waterbody – Ponds	0.10		0.76	0.79						895.91	897.56
Grand Total	750.48	22.67	6435.86	1671.03				1111.23	170.55	896.35	11058.18

- 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 464 ha of agriculture are decreased and it is converted into Built-up, mining, plantation, scrub and water body and in T1.
- In T1 617 ha of agriculture are increased from plantation, forest and 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	750.48												750.48
Mining/dump		22.44									0.24		22.67
Agriculture	0.31		6434.57								0.98		6435.86
Plantation Horticulture			277.78	1393.15							0.10		1671.03
Forest													
Forest Plantation													
Barren Rocky													
Scrub			100.66					1010.39			0.18		1111.23
Waterbody- Streams/River									170.55				170.55
Waterbody – Ponds											896.35		896.35
Grand Total	750.79	22.44	6813.02	1393.15				1010.39	170.55		897.84		11058.18

- 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 1.3 ha of agriculture are decreased and it is converted into Built-up and water body in T2.
- In T2 378 ha of agriculture are increased from plantation and scrub land 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	750.79												750.79
Mining/dump		22.44											22.44
Agriculture			6811.66	1.36									6813.02
Plantation Horticulture			212.59	1180.55									1393.15
Forest													
Forest Plantation													
Barren Rocky													
Scrub			73.04					937.35					1010.39
Waterbody- Streams/River									170.55				170.55
Waterbody – Ponds											897.84		897.84
Grand Total	750.79	22.44	7097.30	1181.91				937.35	170.55		897.84		11058.18

- 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 1.3 ha of agriculture are decreased and it is converted into plantation area in T3.
- In T3 285 ha of agriculture are increased from scrub land and plantation 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	750.79										750.79	
Mining/dump		22.44									22.44	
Agriculture	167.71	10.82	5794.22	1122.78						1.77	7097.30	
Plantation Horticulture	8.75	0.26	213.34	959.55							1181.91	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	4.18	6.16	239.40	7.31				679.68		0.61	937.35	
Waterbody- Streams/River	0.17								170.38		170.55	
Waterbody – Ponds	12.30		1.87	5.68						878.00	897.84	
Grand Total	943.90	39.68	6248.84	2095.32				679.68	170.38	880.38	11058.18	

- 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 1303 ha of agriculture are decreased and it is converted into Built-up, mining, plantation, and water body in T4.
- In T4 454 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	943.29		0.61								943.90	
Mining/dump		39.68									39.68	
Agriculture	21.81	0.21	5763.93	462.16						0.73	6248.84	
Plantation Horticulture	1.92		471.47	1621.74						0.20	2095.32	
Forest												
Forest Plantation												
Barren Rocky												
Scrub	1.66		85.38					591.88		0.75	679.68	
Waterbody- Streams/River	0.12								170.27		170.38	
Waterbody – Ponds	0.11		0.91	1.19						878.16	880.38	
Grand Total	968.90	39.89	6322.29	2085.10				591.88	170.27	879.84	11058.18	

- 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 484 ha of agriculture are decreased and it is converted into built-up, mining, plantation, and water body in T5.
- In T5 558 ha of agriculture are increased from scrub land, plantation, forest 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 decrease of 17 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 153, 377, 284 & 73 Hectares From T0-T1, T1-T2, T2-T3 & T4-T5 respectively and overall increase of 39 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 113 ha of the Plantation/Horticulture area has been increased between 2009-10 (t0) & 2017-18 (T5) years.
6. There is a decrease of 447 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
7. Farm ponds (3) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (3) verified from the portal.