

MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION SUMMARY REPORT

PRAKASAM -12/2009-10
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

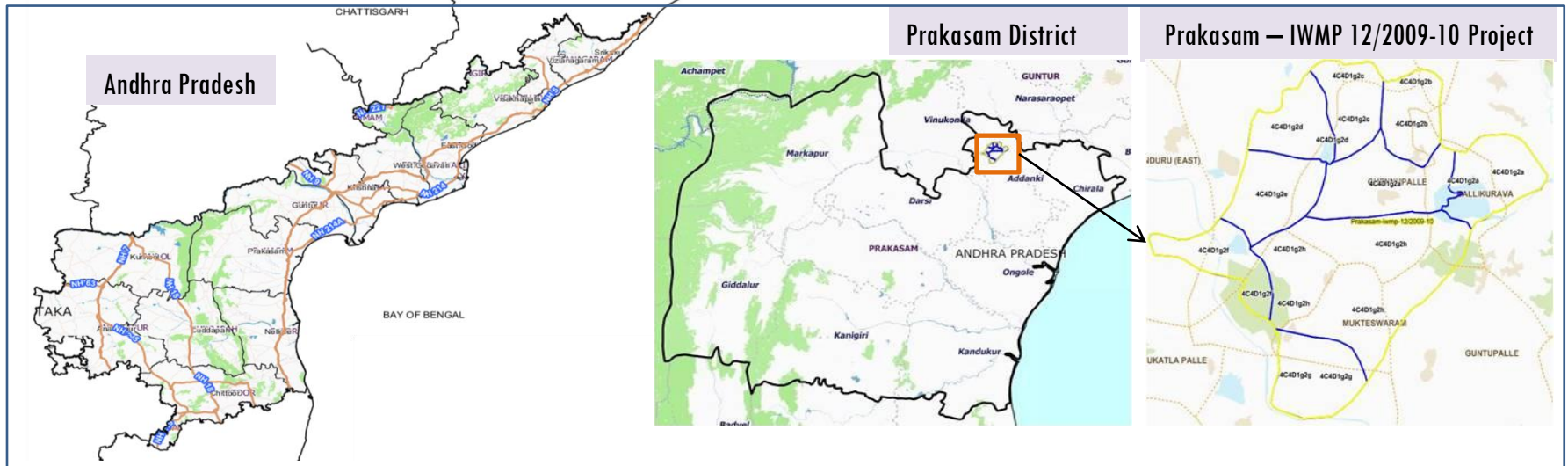
E X E C U T I V E S U M M A R Y

- 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-12/2009-10, Prakasam District of Andhra Pradesh. The total geographical area of the project is 4,966.77 ha. It comprises of 9 micro watersheds.
- In the project area 19 Drishti photos were uploaded showing 19 Farm ponds/Dug out pits.
- Project area as per image analysis has witnessed distinguishable increase in farm ponds, showing 19 new farm ponds or dug out ponds with 3.26 ha increase in the area.
- Major percentage i.e. 70.20% is covered by the agriculture, 13.80% is covered by scrubland, 4.79% by water bodies, 4.44% by plantations and remaining by other land use classes.

PROJECT : PRAKASAM - IWMP-12/2009-10

DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Ballikurava Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 4,966.77 ha. It comprises of 20 micro watersheds. Location Map of the study area is shown in Figure below. Analysis is done for 2015-16 (T3) period (*Batch -1*) projects taking 2016-17 (T4) 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
	2015-16	2011-12	2017-18
LISS IV	2015-16		
SCENE 1			16-Apr-18
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2015-16		
SCENE 1			16-Apr-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	19
4	Detailed Project Report		

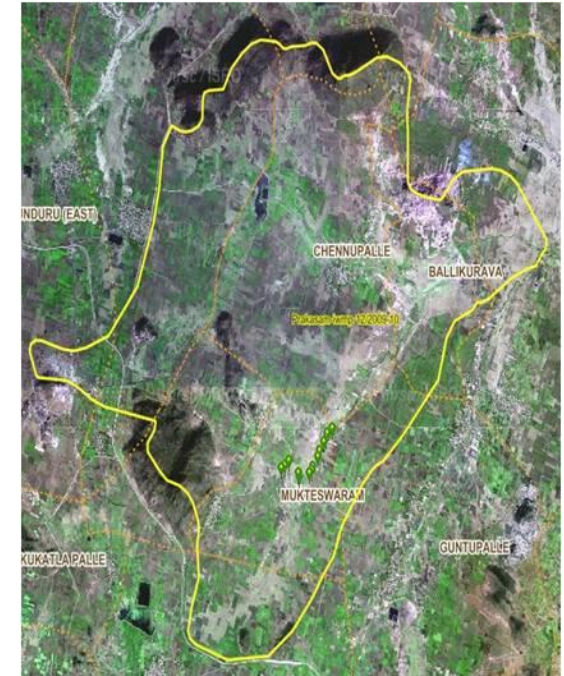
Natural Color Composite overlaid with Project boundaries and high detail stream network



Legend

-  Drainage (1:10000 Scale)
-  MWS Boundary
-  Project Boundary

Natural Color Composite overlaid with Drishti Points



Drishti Upload Status

Classification of the Activities

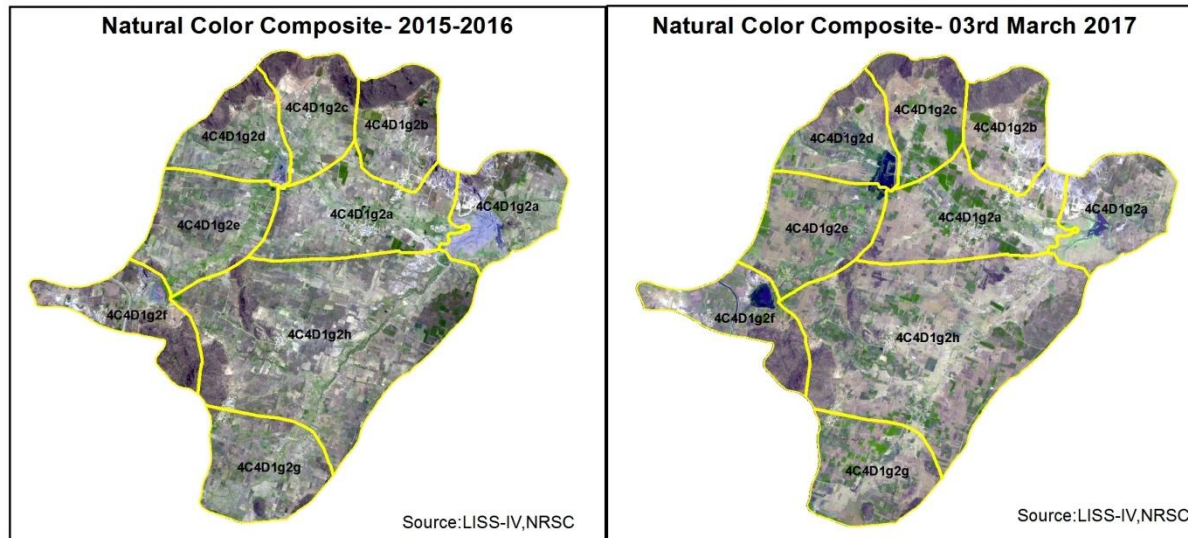
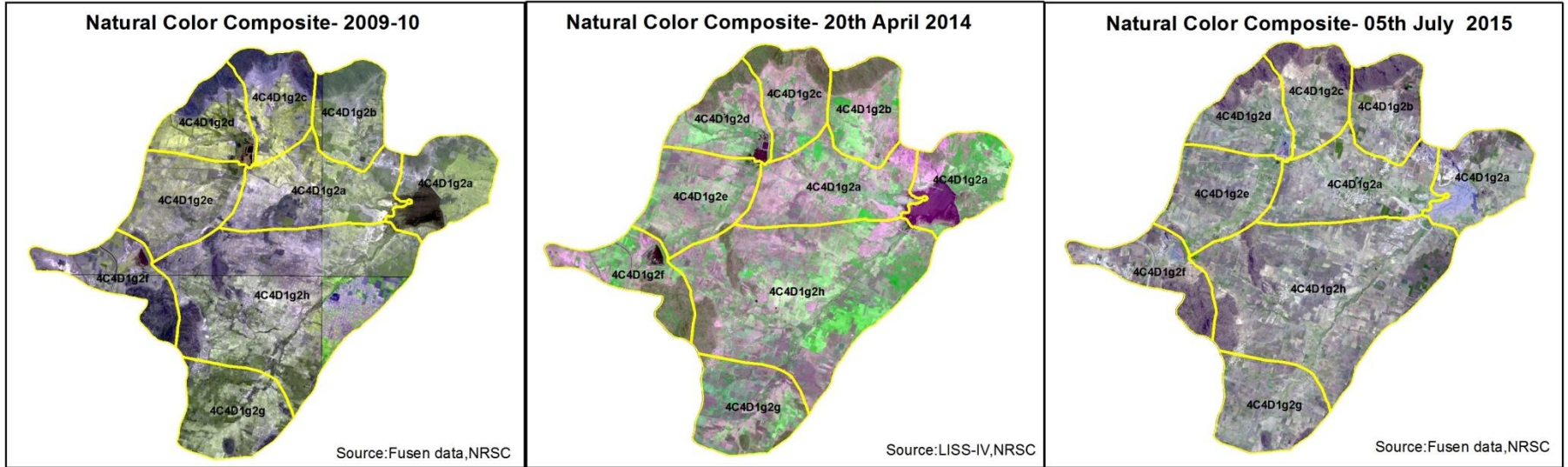
Sr. No	Activity	Drishti Photo	Visible on satellite
1	Afforestation	0	0
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Drainage Treatment	13	13
8	Checks & Plugs	0	0
9	Gabion structure	0	0
10	Farm ponds /Dugout pit	10	6
11	Check dams	0	0
12	Nallah Bunds	0	0
13	Percolation 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	5	0
	TOTAL	28	19

MONITORING IN THE PROJECT AREA

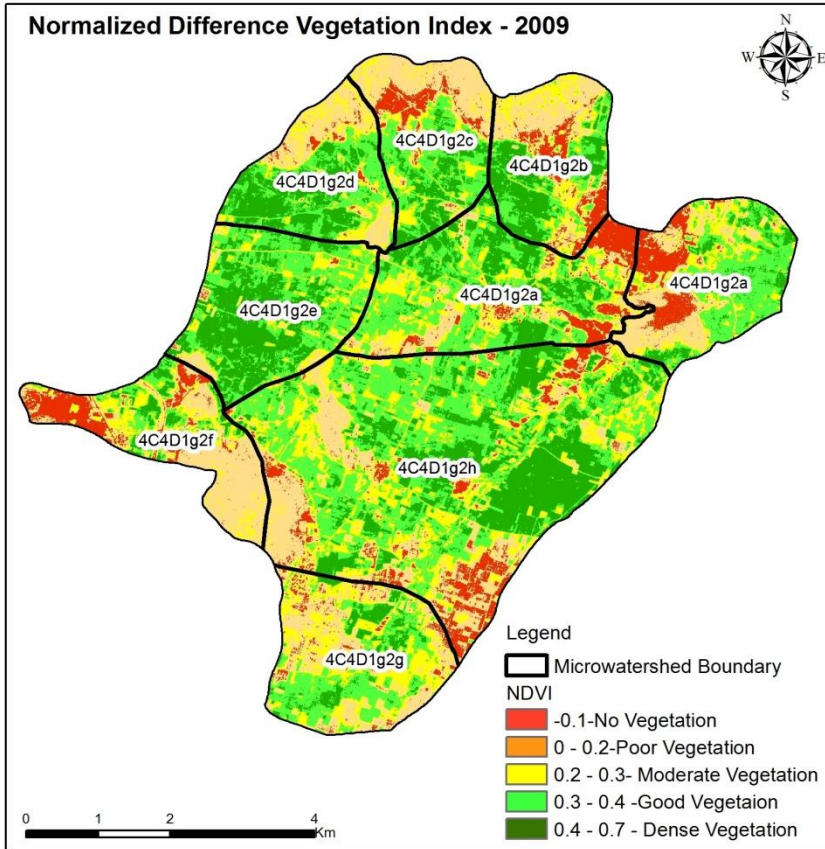
Site Wise Changes in the Project

- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures
- T3 is the baseline period before implementation (2015-16) and T4 is 2016-17 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.

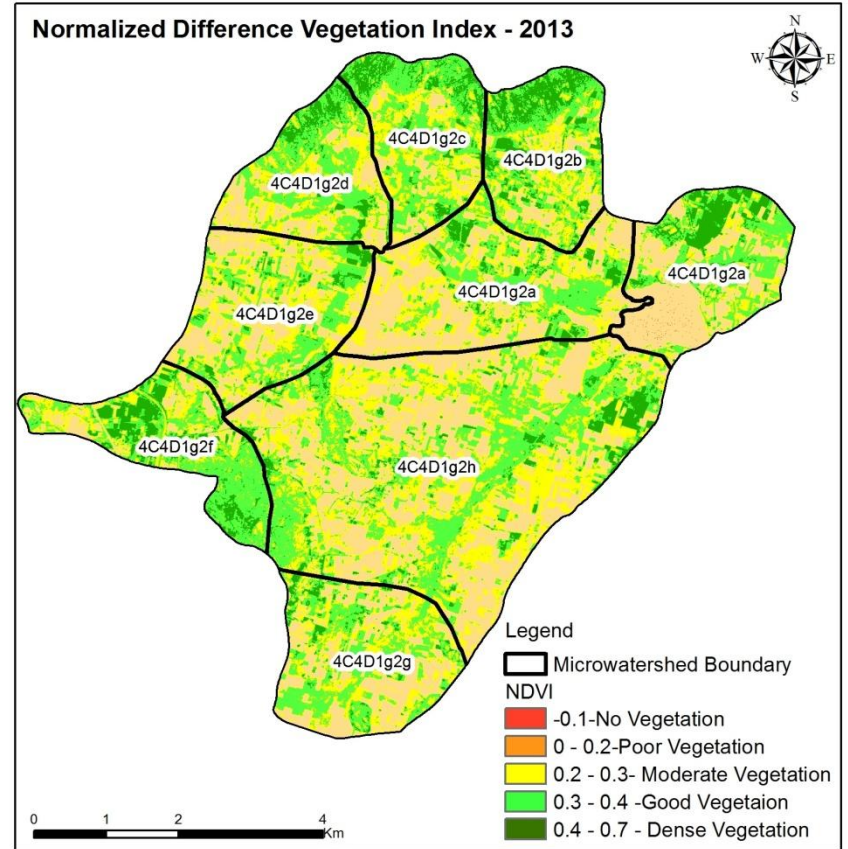
Natural Color Composite- 2009-10 to 2017-18



Changes in Vegetation Cover

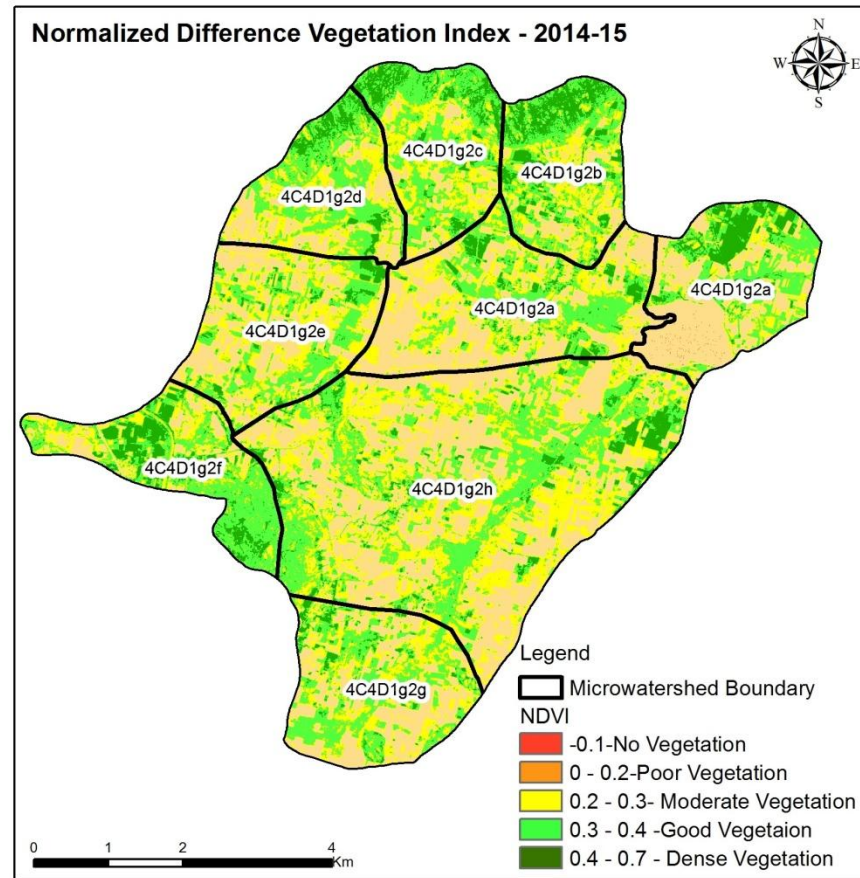
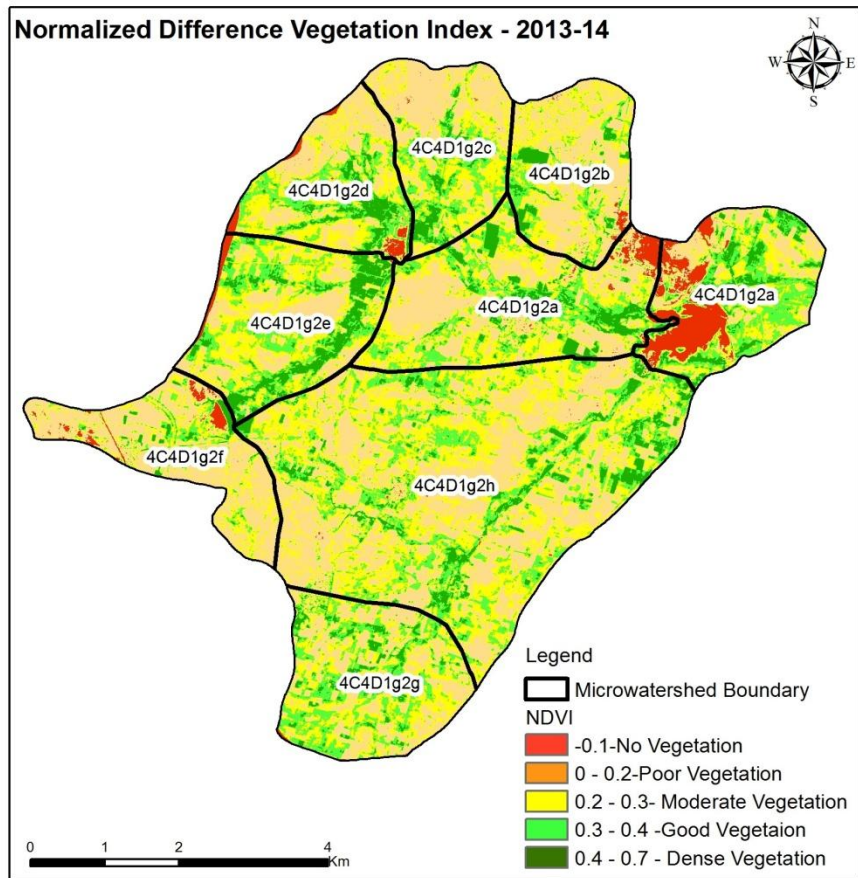


NDVI (2009-10)

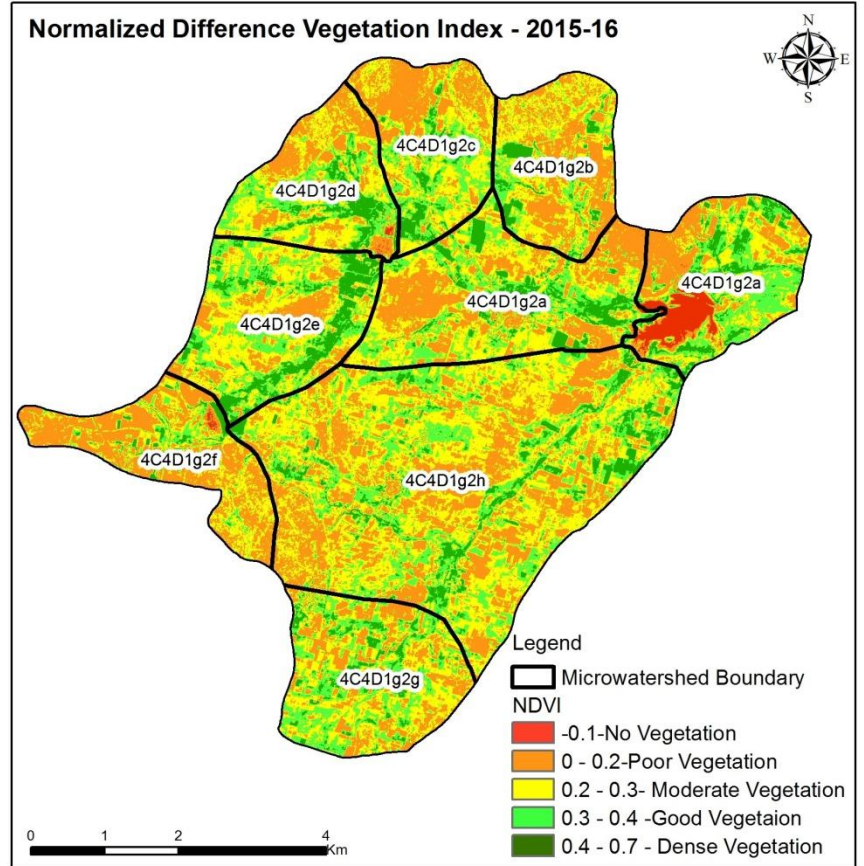
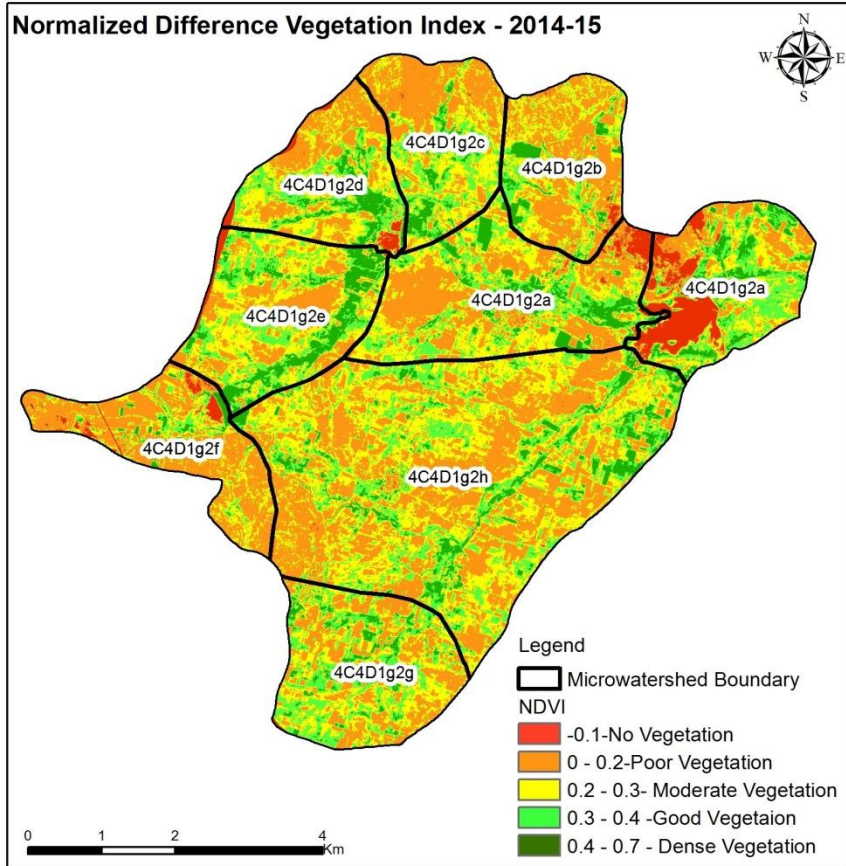


NDVI (2013-14)

Changes in Vegetation Cover



Changes in Vegetation Cover



Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-12/2015-16



T0

T0:2015-16



T1

T1: 03 March 2017



Drishti SI no. 650161 MWS :4C4D1g2h

Farm pond



T0:2015-16



T1

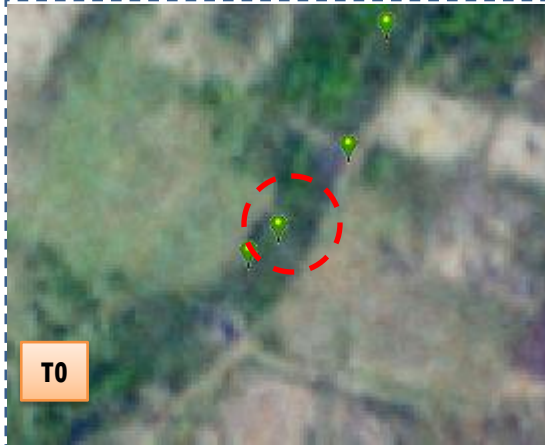
T1: 03 March 2017



Drishti SI no.650077 MWS : 4C4D1g2h

Farm pond

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-12/2015-16



T0: 2015-16



T1: 03 March 2017



Drishti Sl no. 649412 MWS : 4C4D1g2h

Farm pond



T0: 2015-16



T1: 03 March 2017



Drishti Sl no. 649387 MWS : 4C4D1g2h

Farm pond

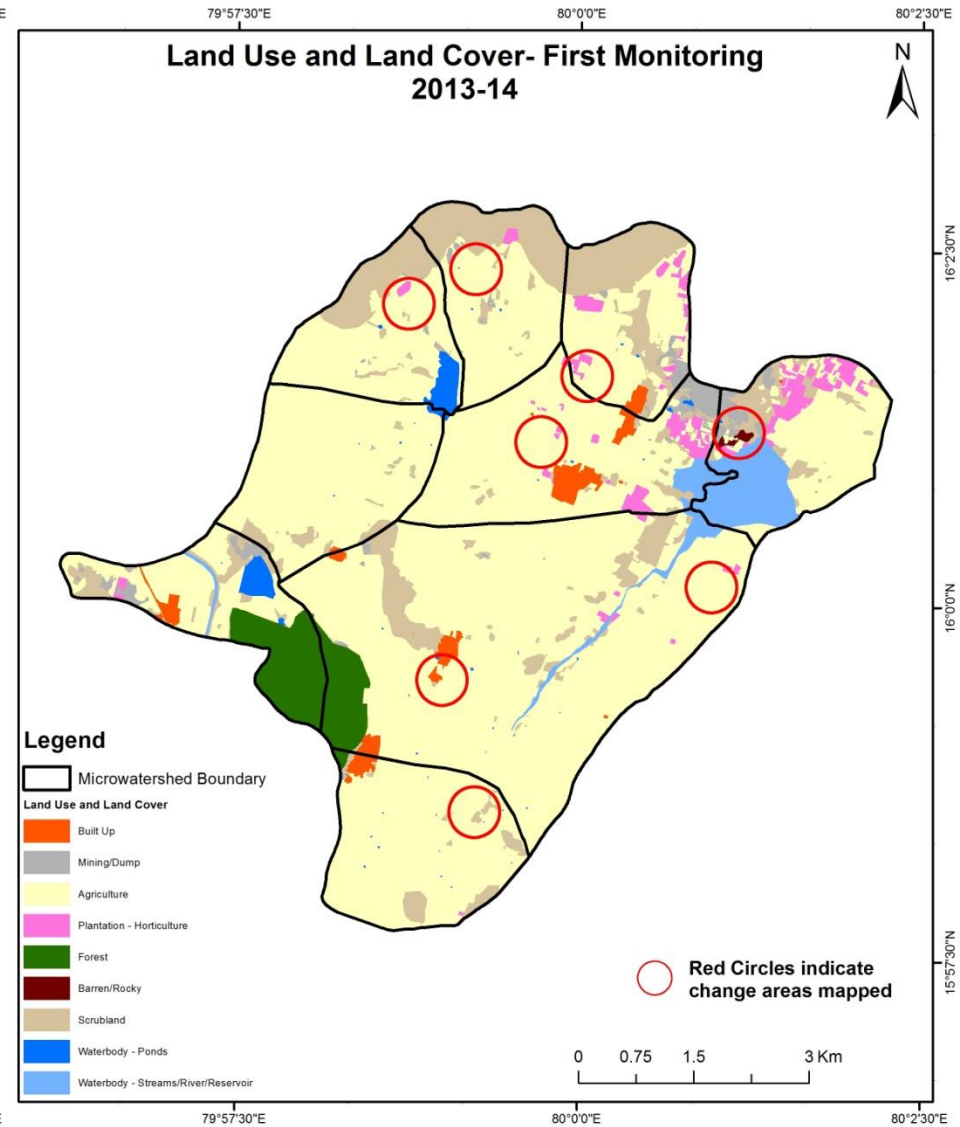
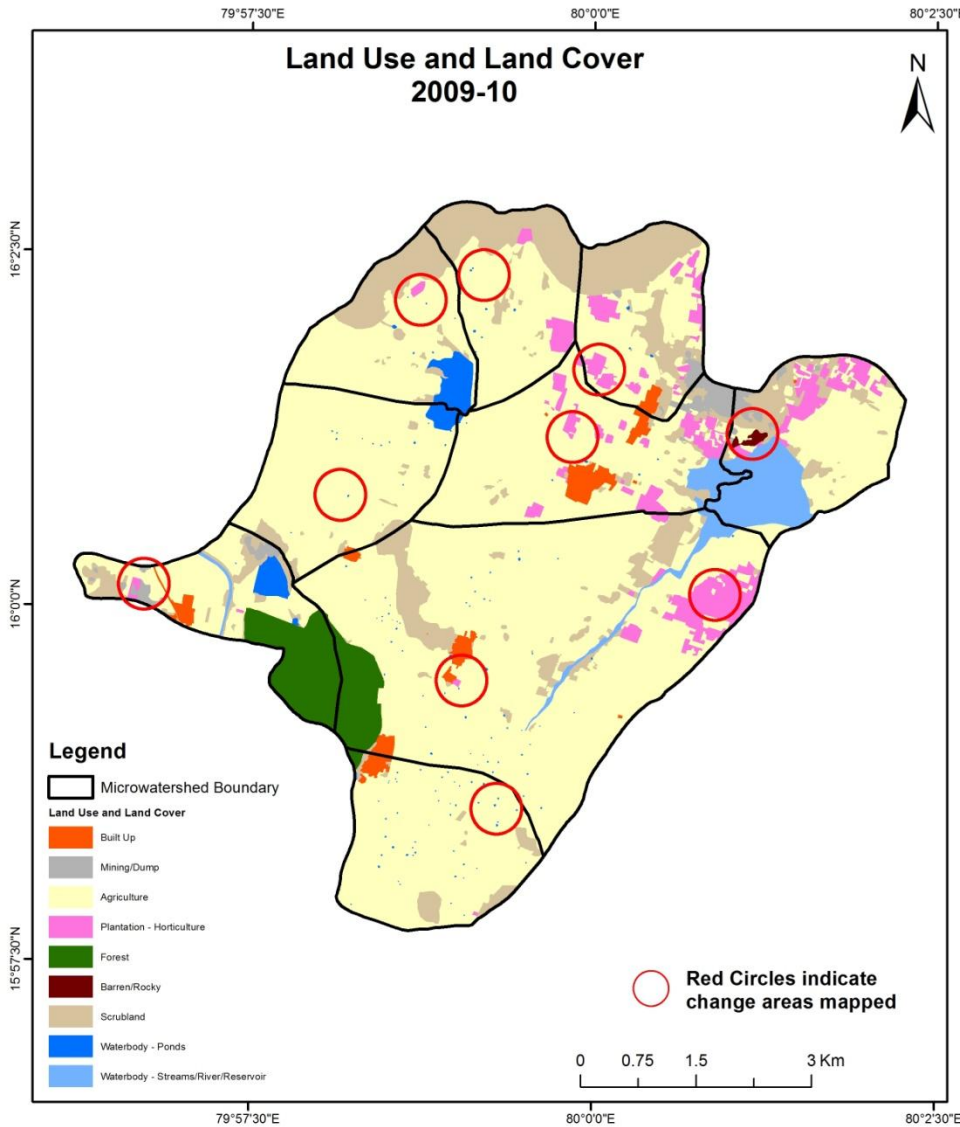
MONITORING IN THE PROJECT AREA

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 pre implementation period as T0 (2009-10) and row represents the post implementation period as T5 (2017-18) .

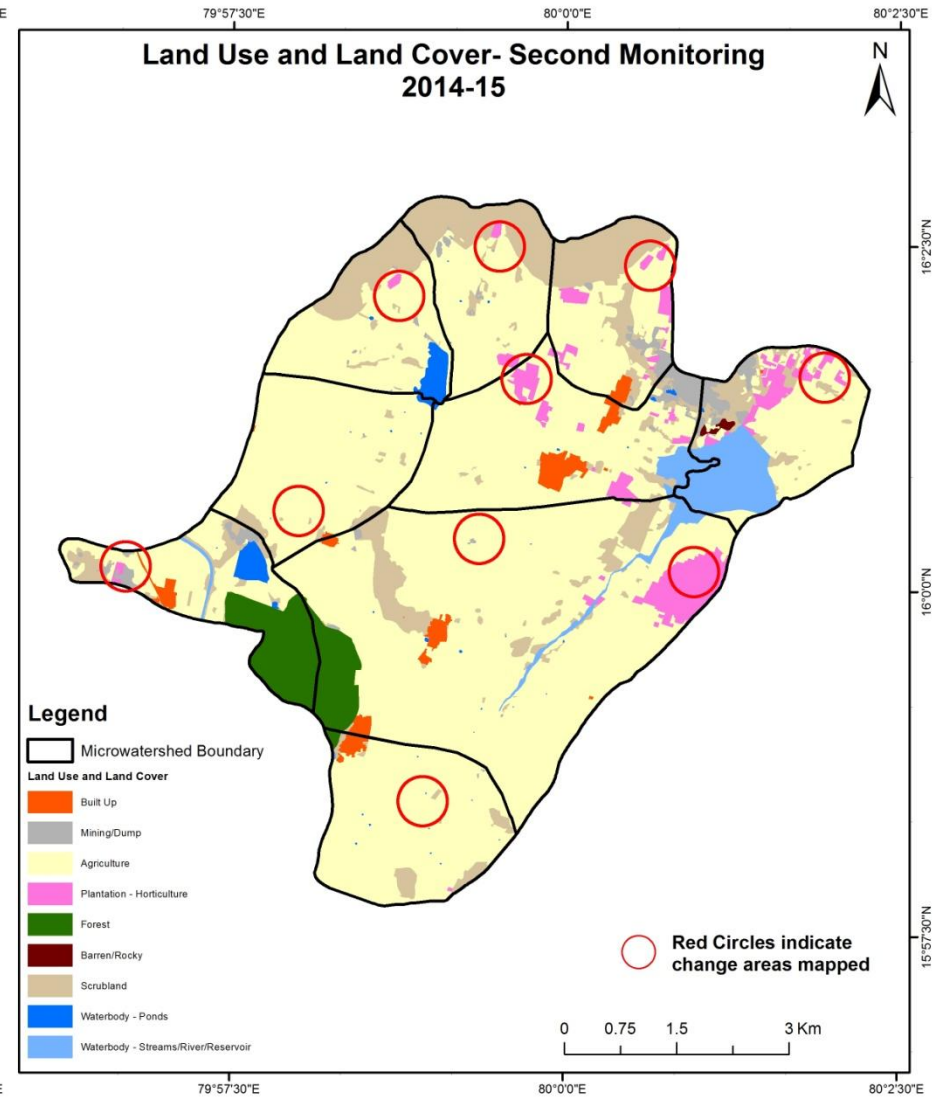
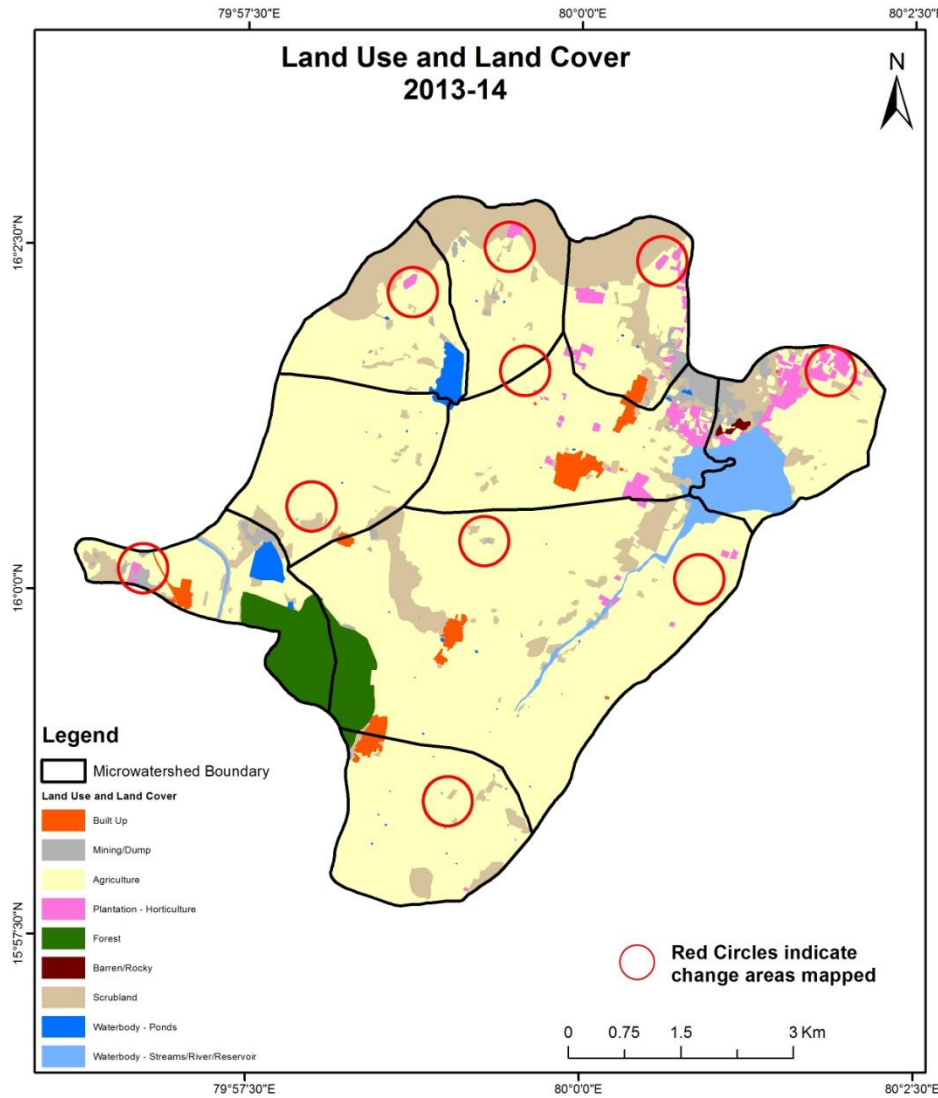
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2009-10 to 2013-14)

Scale: 1:10000



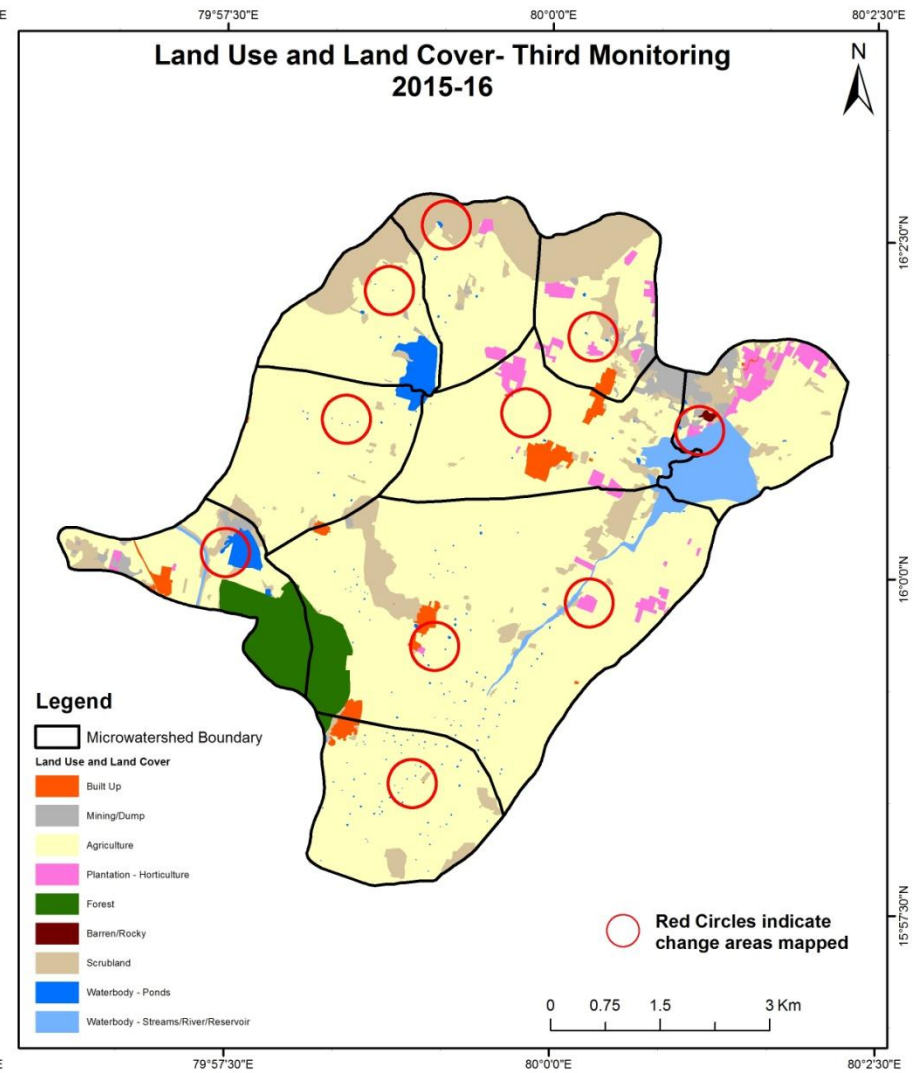
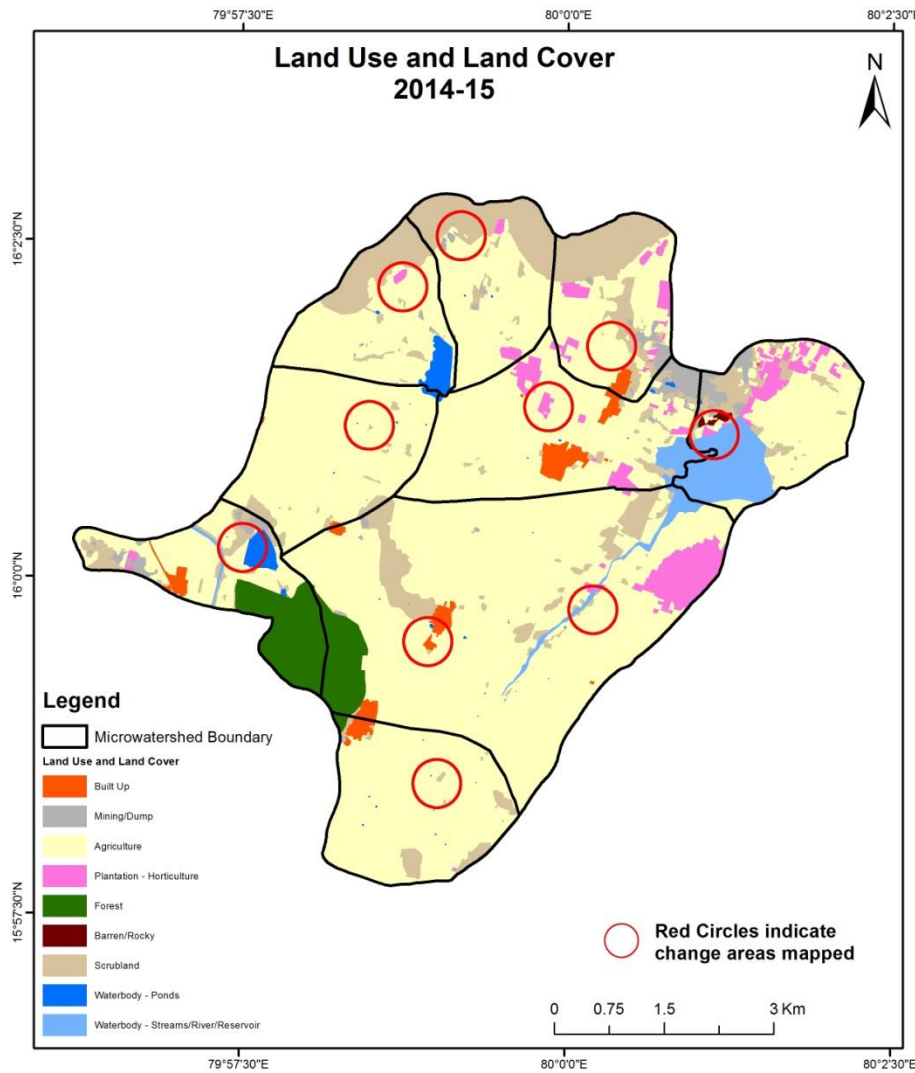
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2013-14 to 2014-15)

Scale: 1:10000



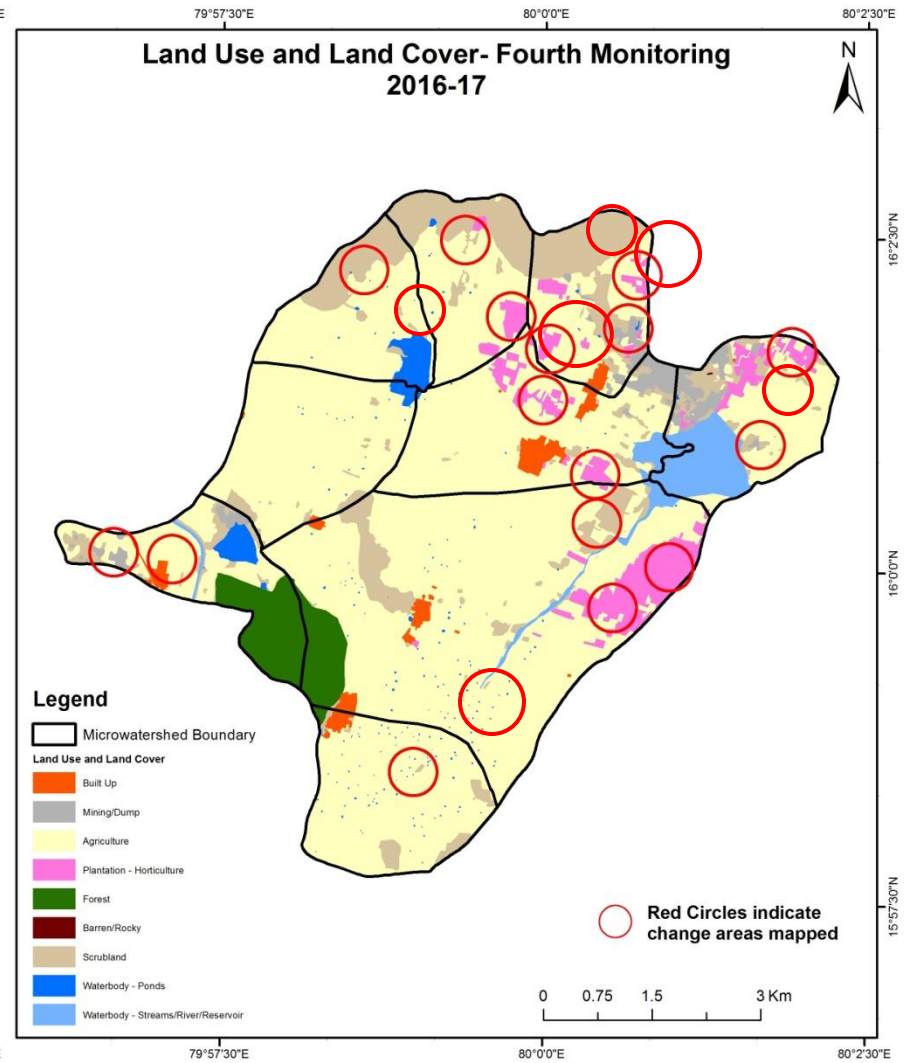
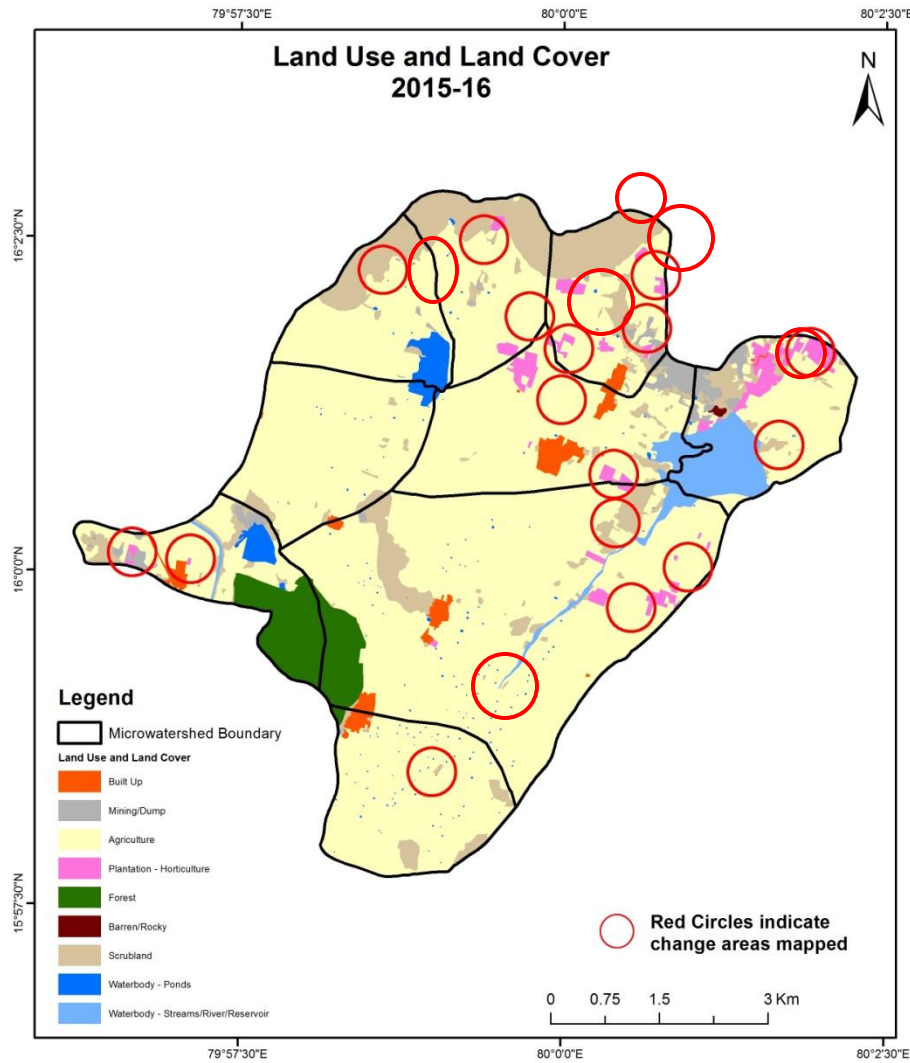
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



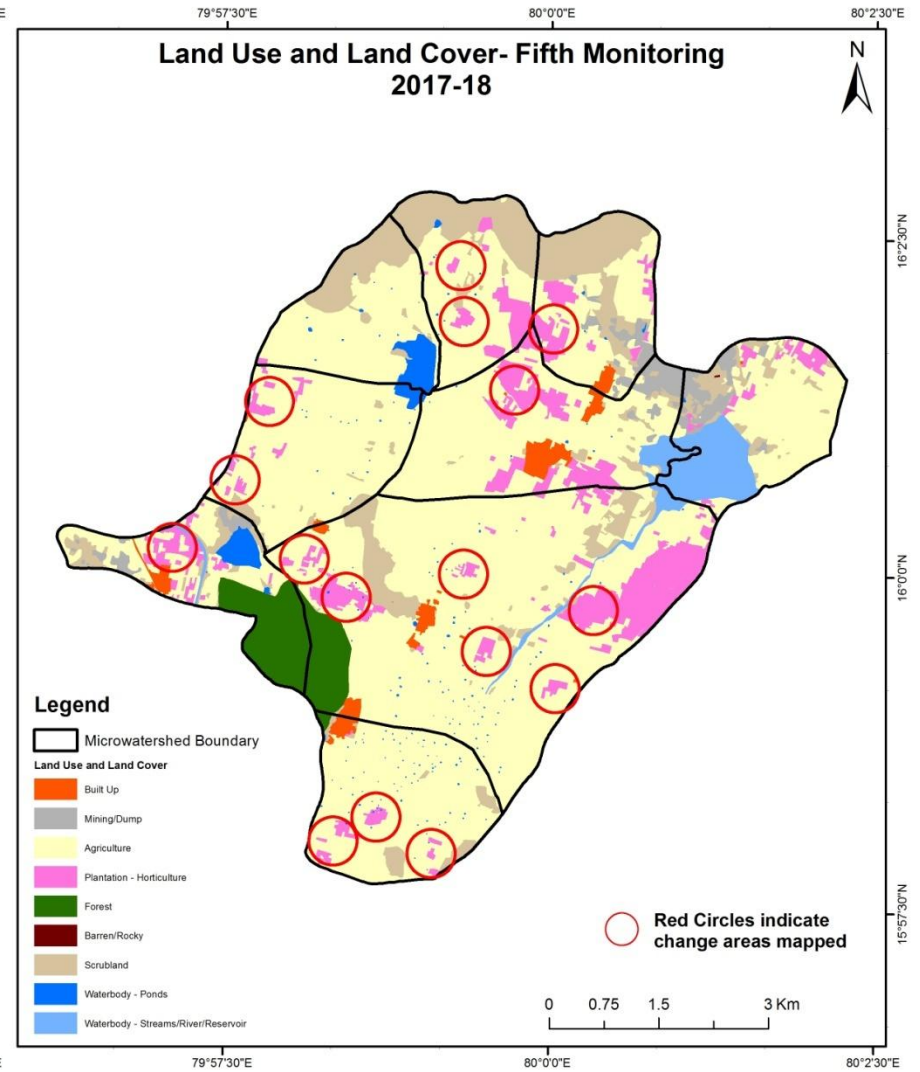
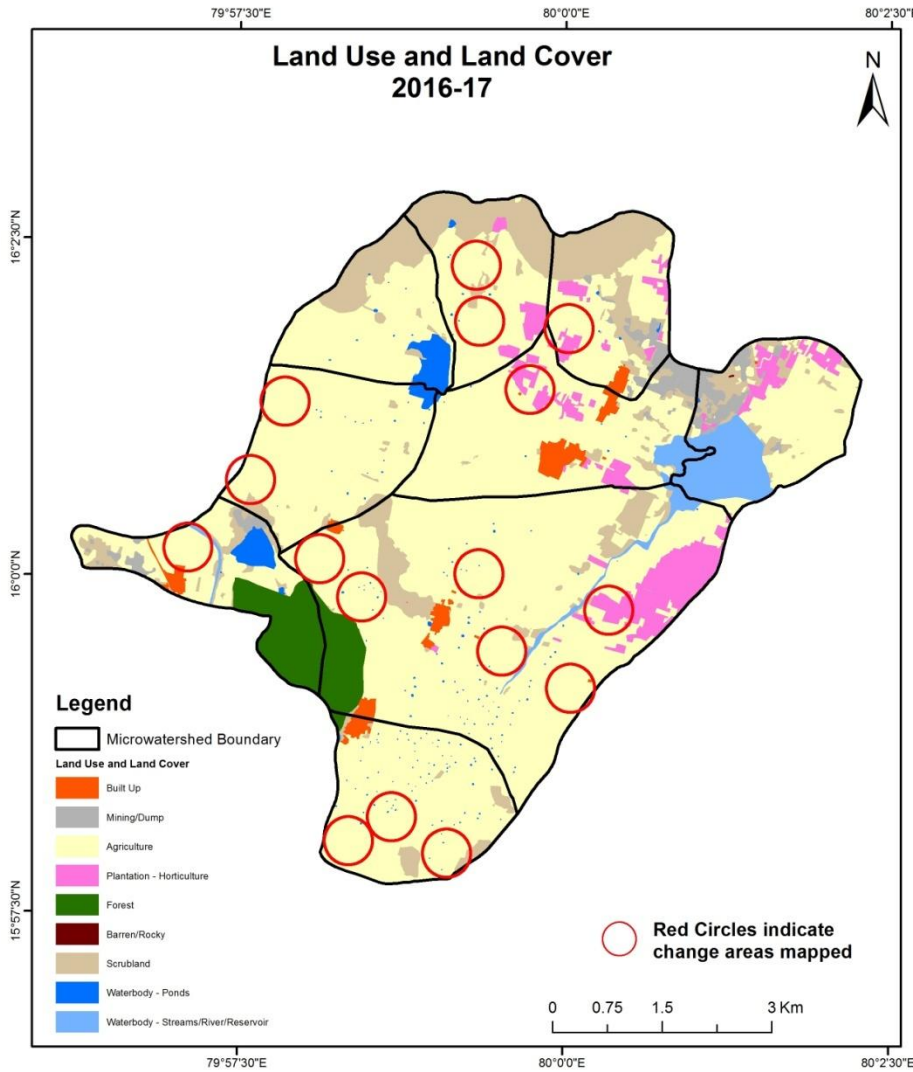
Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2015-16 to 2016-17)

Scale: 1:10000



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



T3

T0: 2015-16



T4

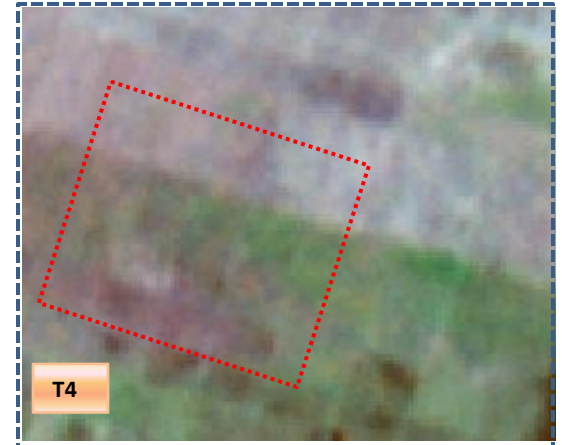
T1: 03 March 2017

Scrub to Agriculture



T3

T0: 2015-16

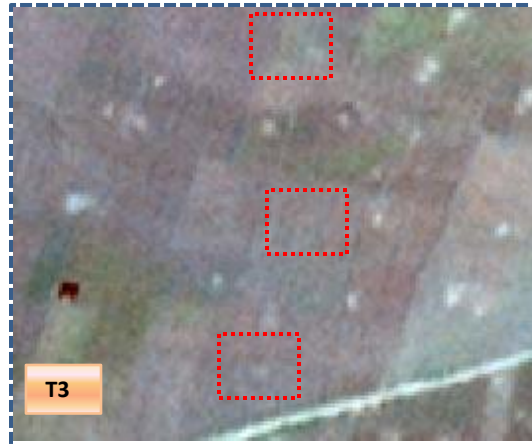


T4

T1: 03 March 2017

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

Agriculture to Water body



T3

T0: 2015-16



T4

T1: 03 March 2017

Scrub to Water body



T3

T0: 2015-16



T4

T1: 03 March 2017

Table showing change matrix depicting Land cover transitions during study period

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	77.14										77.14
Mining/dump		61.64									61.64
Agriculture		9.71	3481.66	2.12				13.50	0.08	0.22	3507.30
Plantation Horticulture			116.76	110.76							227.52
Forest					193.90						193.90
Forest Plantation											
Barren Rocky							4.91				4.91
Scrub	0.30	14.13	33.07	0.47				618.45	1.12	0.37	667.92
Waterbody- Streams/River									160.45		160.45
Waterbody – Ponds			20.61							45.39	66.00
Grand Total	77.44	85.47	3652.10	113.36	193.90		4.91	631.95	161.66	45.99	4966.78

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T0 25 ha of the agriculture area has decreased and it is converted into plantation, mining, scrub and water bodies in T1.
- In T1 149 ha of agriculture area has been increased from scrubland, plantations and waterbody of T0. The additional agriculture are coming from waterbody in T0 represents seasonal agriculture.

Table showing change matrix depicting Land cover transitions during study period

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	77.44										77.44
Mining/dump		84.10						1.38			85.47
Agriculture	0.34		3559.44	92.08				0.23			3652.10
Plantation Horticulture			25.76	87.60							113.36
Forest					193.90						193.90
Forest Plantation											
Barren Rocky							4.91				4.91
Scrub		7.32	19.76					604.88			631.95
Waterbody- Streams/River									161.66		161.66
Waterbody – Ponds			0.48							45.51	45.99
Grand Total	77.79	91.41	3605.44	179.68	193.90		4.91	606.49	161.66	45.51	4966.78

- 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 92 ha of the agriculture area has decreased and it is converted into plantations, Built-up, and scrubland in T2.
- In T2 70.55 ha of agriculture area has been increased from scrubland, plantations 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

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	77.79										77.79
Mining/dump		84.05	7.37								91.41
Agriculture	0.92		3552.99	28.25				1.25		22.03	3605.44
Plantation Horticulture			91.41	88.27							179.68
Forest			0.39		193.52						193.90
Forest Plantation											
Barren Rocky		1.94					2.97				4.91
Scrubland		1.07	29.78					573.76		1.88	606.49
Waterbody- Streams/River			1.91						159.74		161.66
Waterbody – Ponds			0.23							45.27	45.51
Grand Total	78.70	87.05	3684.08	116.52	193.52		2.97	575.01	159.74	69.19	4966.78

- 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 52 ha of the agriculture area has decreased and it is converted into Built-up, plantations, scrubland and water body in T3.
- In T3 128 ha of agriculture area has been increased from mining/dump, plantations, forest, scrubland 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)										
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
T3											
Built up	77.32		1.38								78.70
Mining/dump		78.97	0.21					7.87			87.05
Agriculture	0.84	9.73	3483.76	150.65	1.63			31.69	0.93	4.87	3684.08
Plantation Horticulture		1.44	13.78	100.98				0.32			116.52
Forest					193.52						193.52
Forest Plantation											
Barren Rocky		2.97									2.97
Scrub		9.42	7.20					557.88	0.35	0.17	575.01
Waterbody- Streams/River								2.09	157.65		159.74
Waterbody – Ponds			1.16					0.74		67.29	69.19
Grand Total	78.15	102.53	3507.48	251.63	195.14			600.58	158.93	72.33	4966.78

- 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 198 ha of the agriculture area has decreased and it is converted into Built-up, mining, plantations, scrubland and water body in T4.
- In T4 23 ha of agriculture area has been increased from Built-up, mining/dump, plantations, scrubland 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)										
T4	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total
Built up	78.15										78.15
Mining/dump		102.53									102.53
Agriculture	0.08	5.70	3270.22	230.68						0.80	3507.48
Plantation Horticulture			20.05	231.58							251.63
Forest					195.14						195.14
Forest Plantation											
Barren Rocky											
Scrub		4.22	5.92					590.44			600.58
Waterbody- Streams/River									158.93		158.93
Waterbody – Ponds			0.01	0.02						72.30	72.33
Grand Total	78.23	112.45	3296.20	462.28	195.14			590.44	158.93	73.10	4966.78

- In matrix table diagonal elements represent the both periods in the same class and off diagonal elements represents change in between the classes.
- In T4 237 ha of the agriculture area has decreased and it is converted into Built-up, mining, plantations and water body in T5.
- In T5 25 ha of agriculture area has been increased from plantations, scrubland 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 5.5 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 144 & 78 Hectares From T0-T1 & T2-T3 and there is a decrease of 46, 176 & 211 ha from T1 to T2, T3 to T4 & T4 to T5 respectively and overall decrease of 211 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 234 ha of the Plantation/Horticulture area has been increased between 2009-10 (t0) & 2017-18 (T5) years.
6. There is a decrease of 77 Hectares in Scrubland area as compared between 2009-10 (T0) & 2017-18 (T5) years.
7. Farm ponds (1) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (1) verified from the portal.