

# MONITORING OF IWMP WATERSHED PROJECTS USING GEO-INFORMATION

## SUMMARY REPORT

PRAKASAM -25/2010-11  
Andhra Pradesh

Submitted to NRSC, Balanagar, Hyderabad  
February-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

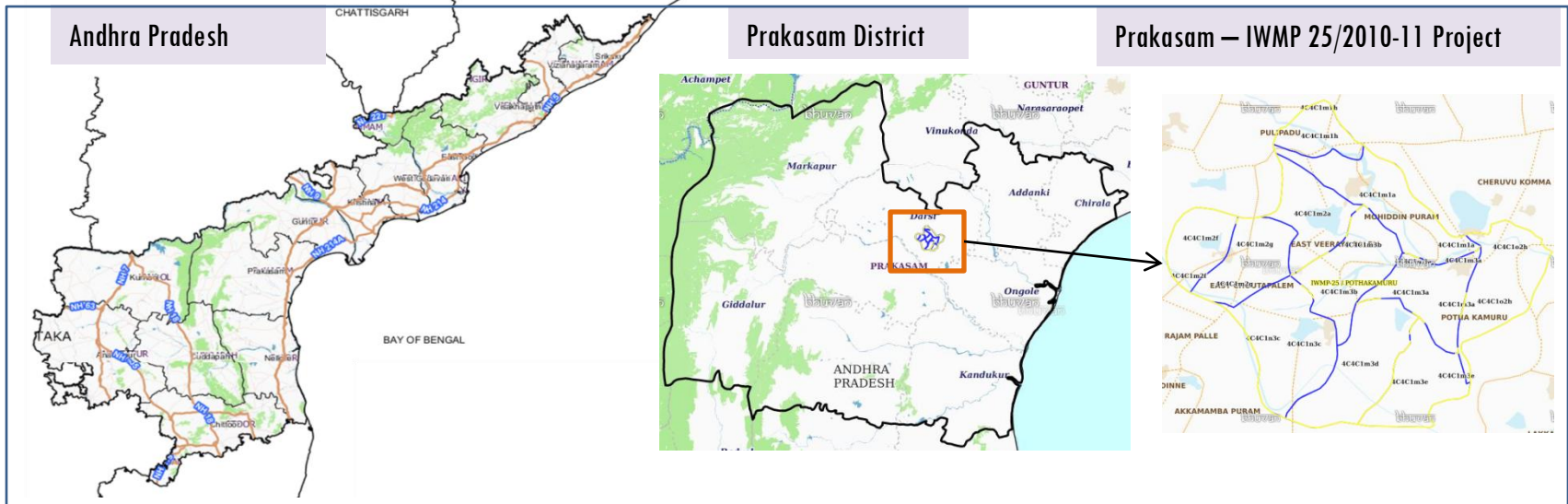
## **E X E C U T I V E   S U M M A R Y**

- 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, Prakasam District of Andhra Pradesh. The total geographical area of the project is 6563.85 ha. It comprises of 11 micro watersheds.
- In the project area 94 Drishti photos were uploaded showing 19 check dams/Checks & plugins, 21 Farm ponds/Percolation tanks, 7 Production system and micro-enterprises 6 afforestation and 40 others.
- Major percentage i.e. 80.63% is covered by the agriculture, 8.24% is covered by scrub land, 6.82% is covered by water body and remaining by other land use classes.

# PROJECT : PRAKASAM - IWMP-25/2010-11

## DISTRICT : PRAKASAM , STATE : ANDHRA PRADESH

- The study area falls in Darsi Mandal of Prakasam district of Andhra Pradesh state. The total geographical area of the project is 6563.85 ha. It comprises of 11 micro watersheds. Location Map of the study area is shown in Figure below Analysis is done for 2010-11 (T0) period (*Batch -1*) projects taking 2018-19 (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.

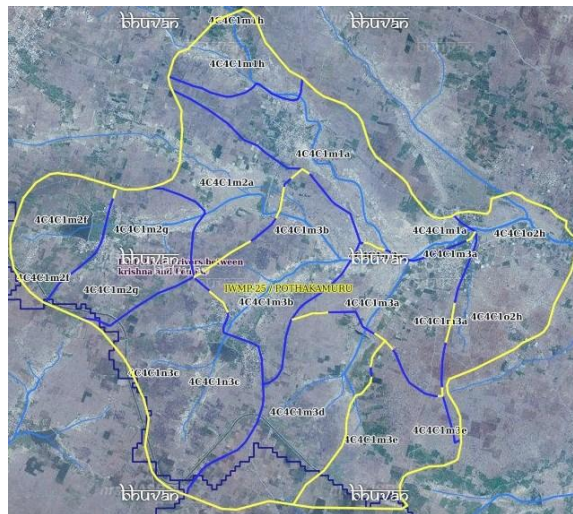
# Satellite Data and Ancillary Data

Satellite data*	T0-A**	T0-B**	T5
	2010-11	2011-12	2018-19
LISS IV	2010-11		
SCENE 1			22-Feb-19
SCENE2			
SCENE 3			
SCENE 4			
CARTO	2010-11		
SCENE 1			22-Feb-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	94
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	6	6
2	Horticulture	0	0
3	Agriculture	0	0
4	Pasture	0	0
5	Trench	0	0
6	Field Bunds	0	0
7	Terrace	0	0
8	Checks & Plugs	2	2
9	Gabion structure	0	0
10	Farm ponds	21	21
11	Check dams	17	17
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	Production system and Micro-Enterprises	7	7
17	Entry Point Activity	1	1
18	Others	62	40
	<b>TOTAL</b>	<b>116</b>	<b>94</b>

## 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.

Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-25/2010-11



T0

T1:2010-11



T1

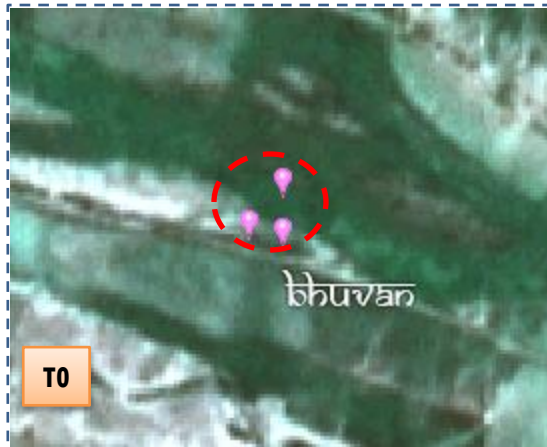
T2: 13 May 2014



Drishti SI no. 7012244

MWS :4C4C1m3b

Check dam



T0

T1:2010-11



T1

T2: 13 May 2014



Drishti SI no. 7019186

MWS :4C4C1m1h

Check dam



Monitoring of activities in Prakasam District Andhra Pradesh. IWMP-25/2010-11



T0: 2010-11

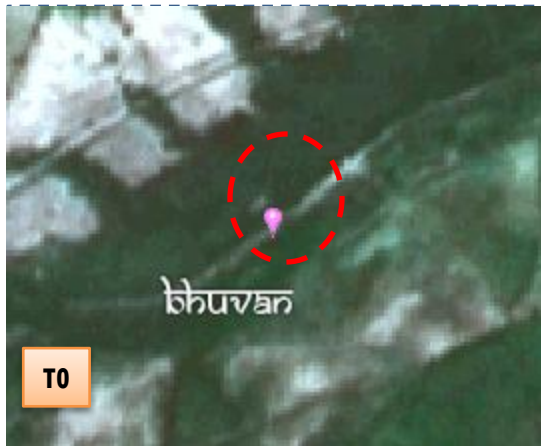


T1: 13 May 2014



Drishti SI no. 698186 MWS :4C4C1o2h

Farm pond



T0: 2010-11



T2: 13 May 2014



Drishti SI no. 7012258 MWS :4C4C1m3b

Check dam

Prakasam-IWMP-25/2010-11

2009-10



May-2013



Jan-2016



March-2017



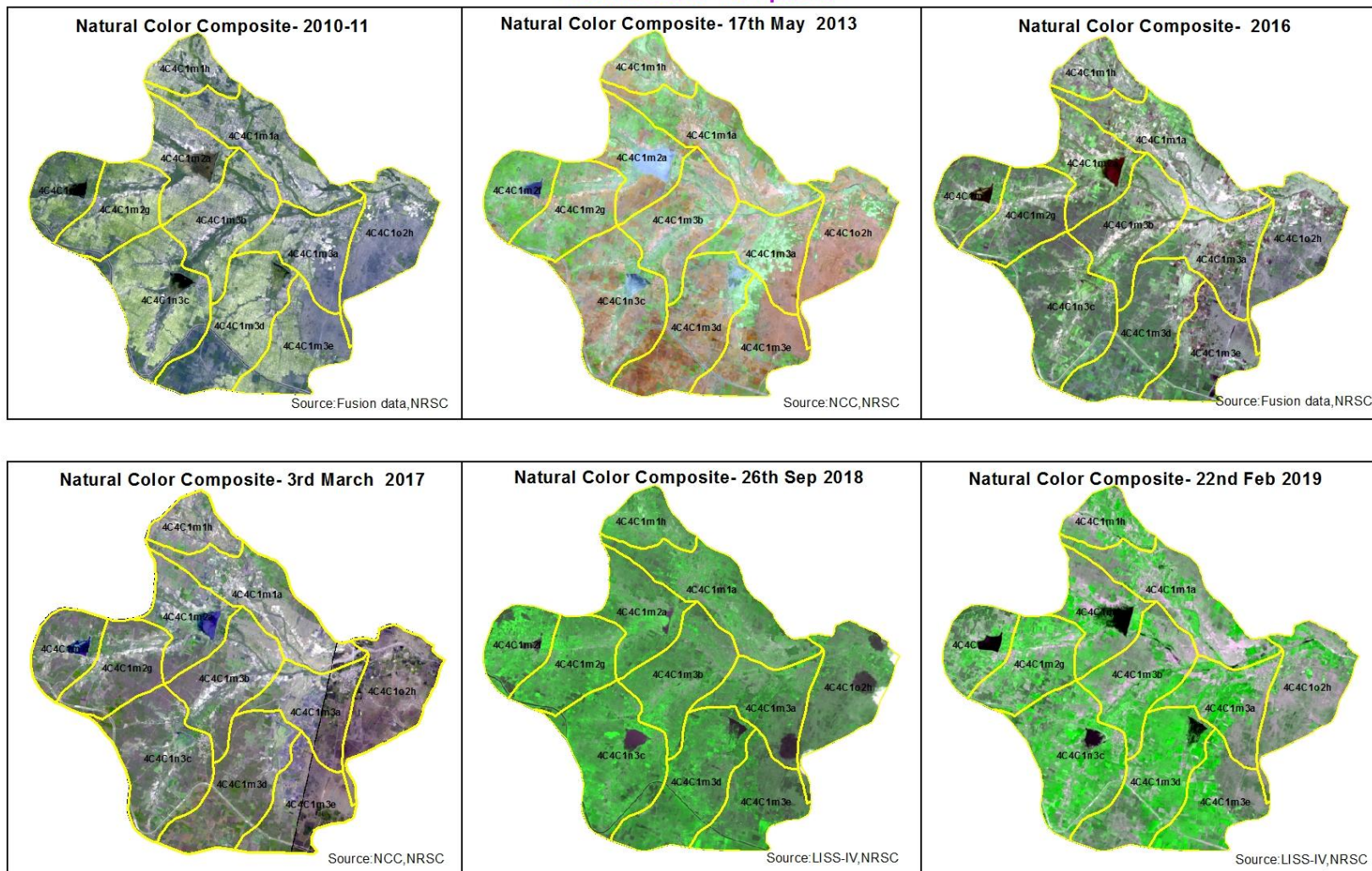
May-2018



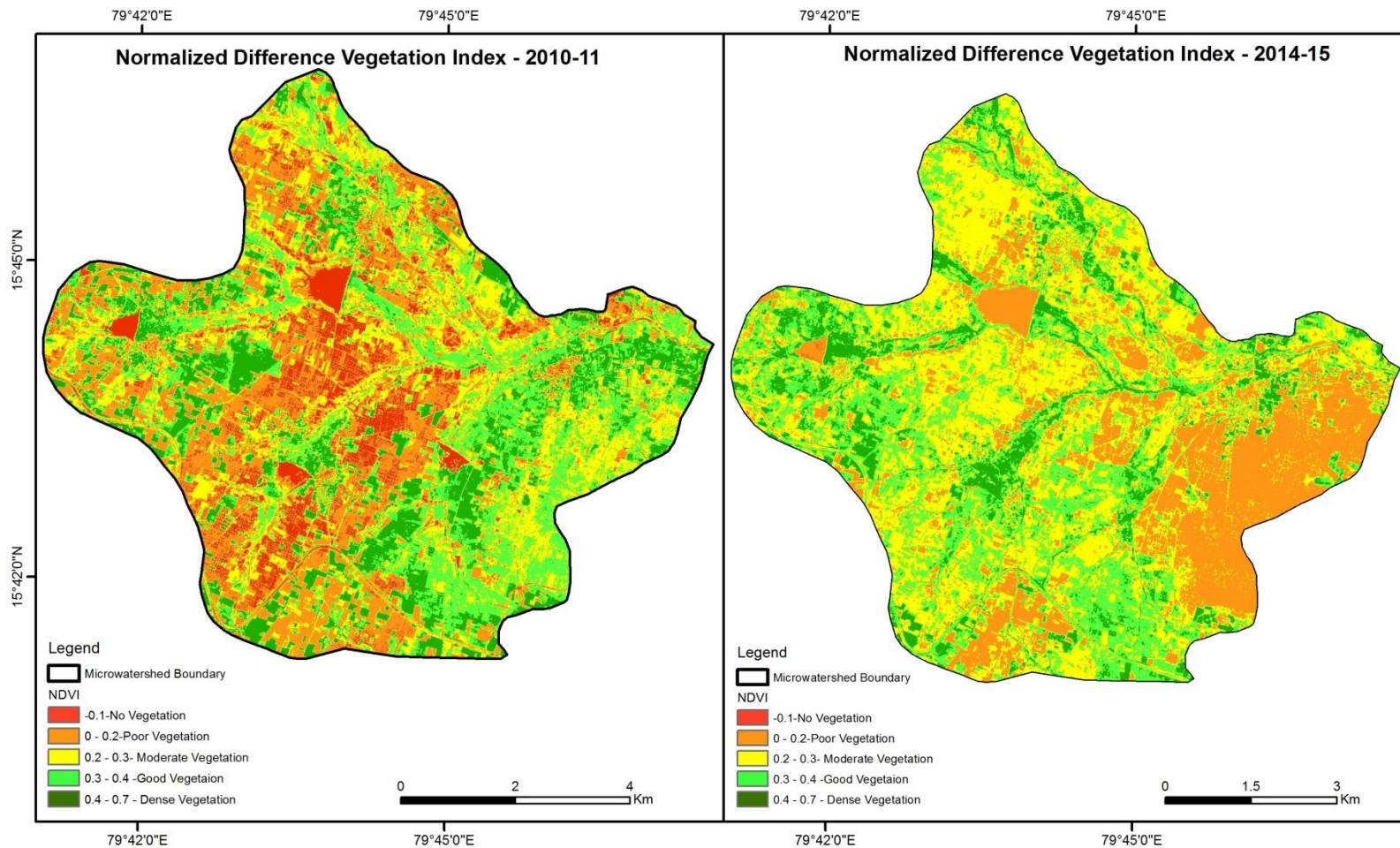
Activity : Dug out pit or sunken pond

# Natural Color Composite – 2009-10 to 2017-18

## Natural Color Composite



# Normalized Differential Vegetation Index



NDVI-2010-11

NDVI-2014-15

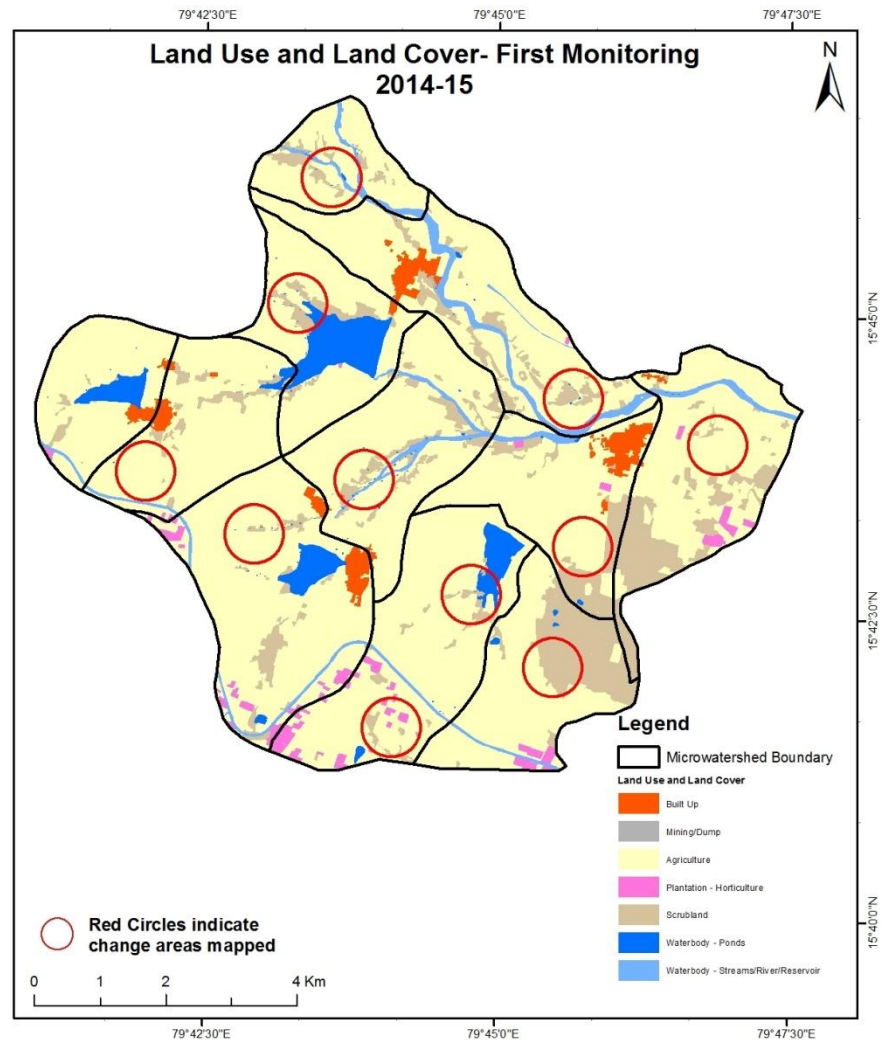
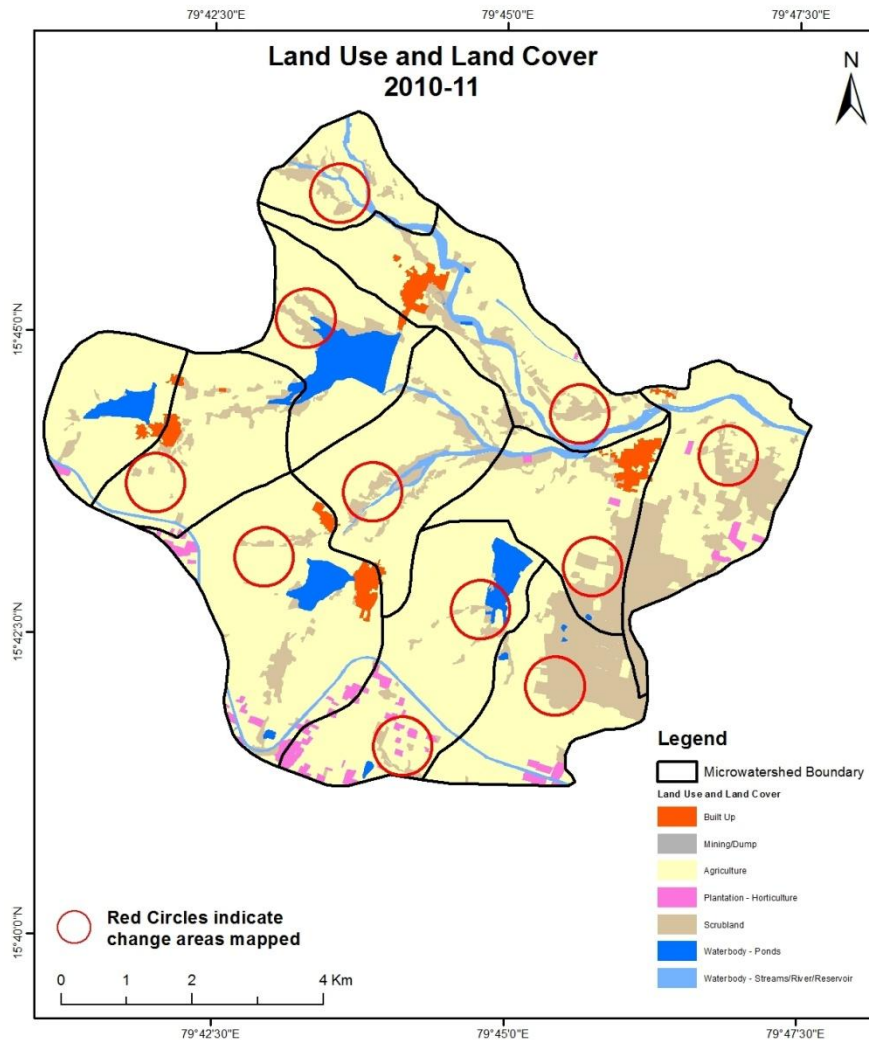
## MONITORING IN THE PROJECT AREA

### 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 (2010-11) and row represents the post implementation period as T5 (2018-19).

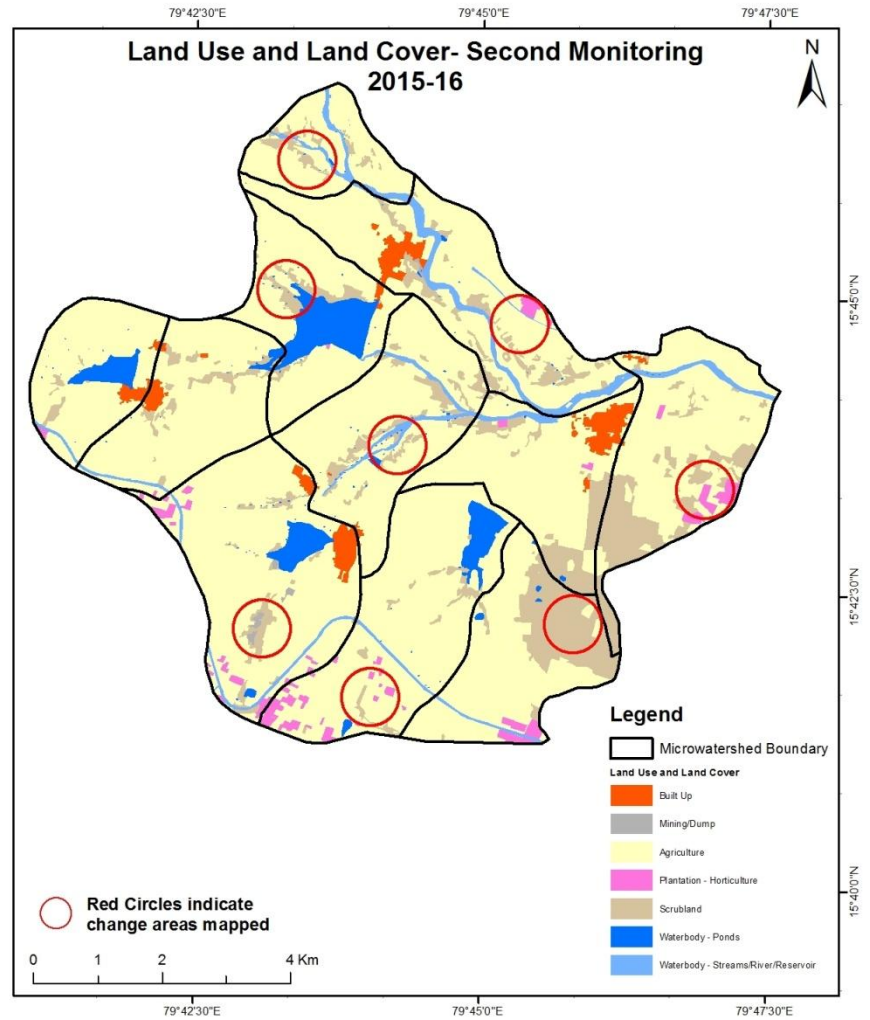
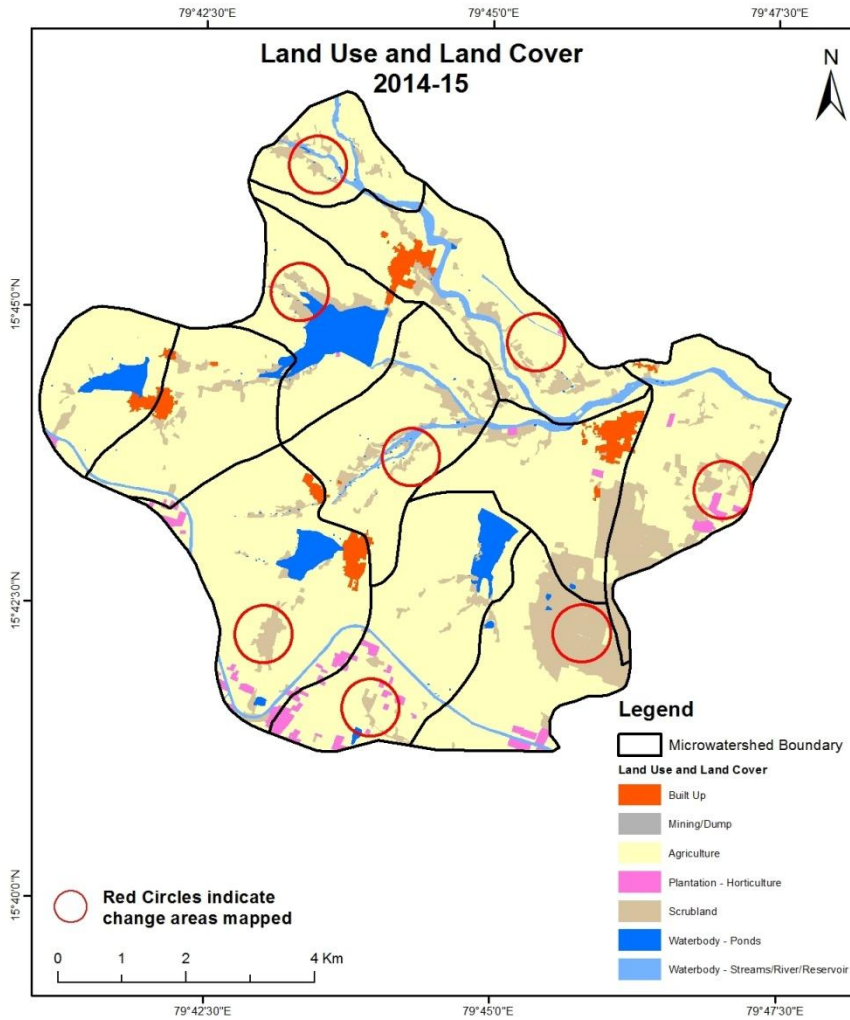
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2010-11 to 2014-15)

Scale: 1:10000



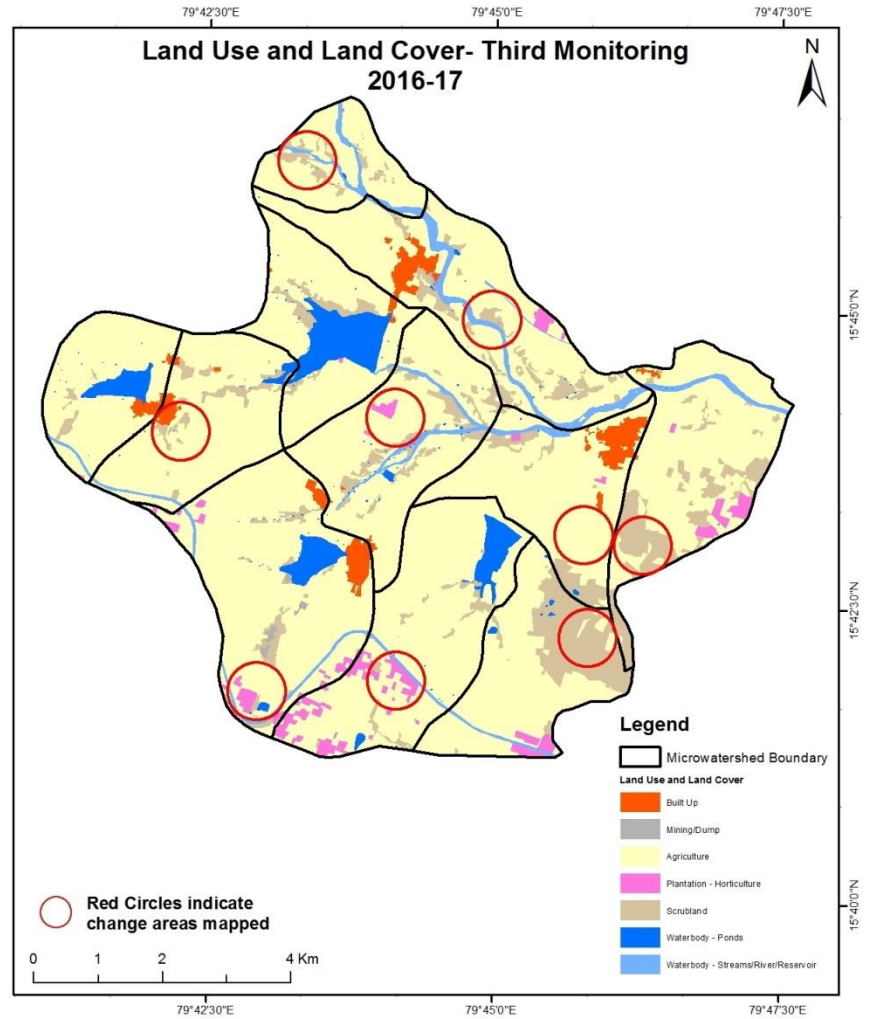
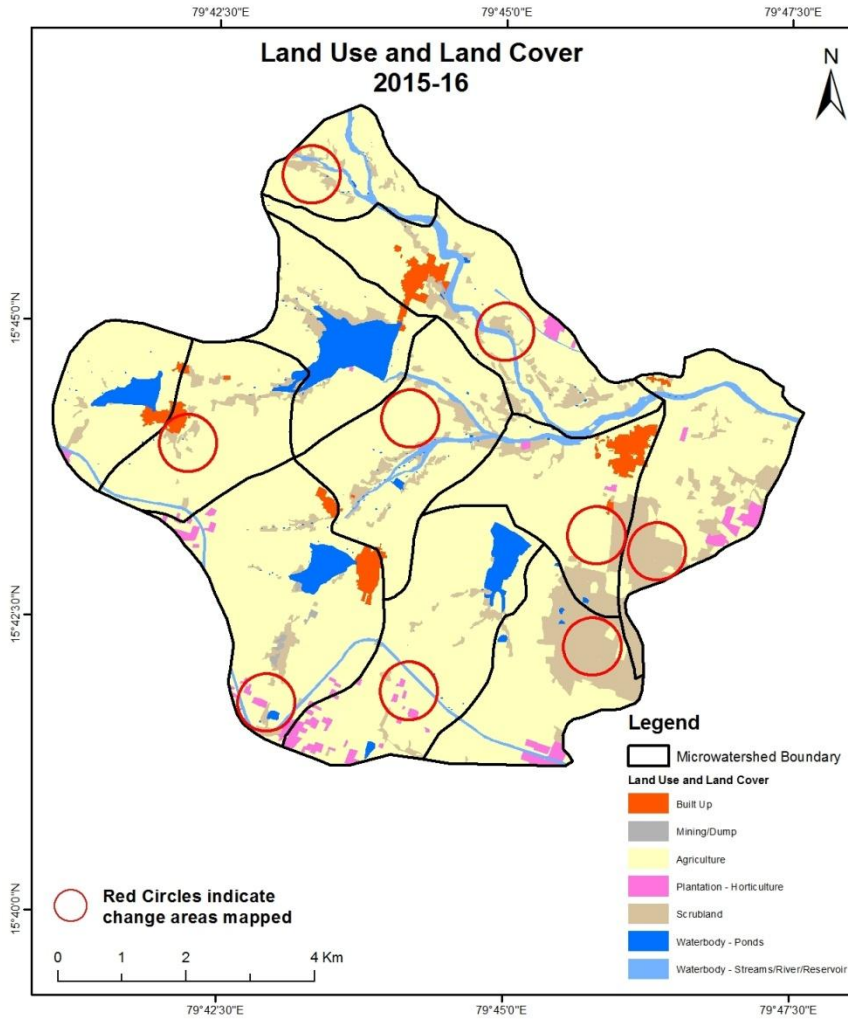
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2014-15 to 2015-16)

Scale: 1:10000



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

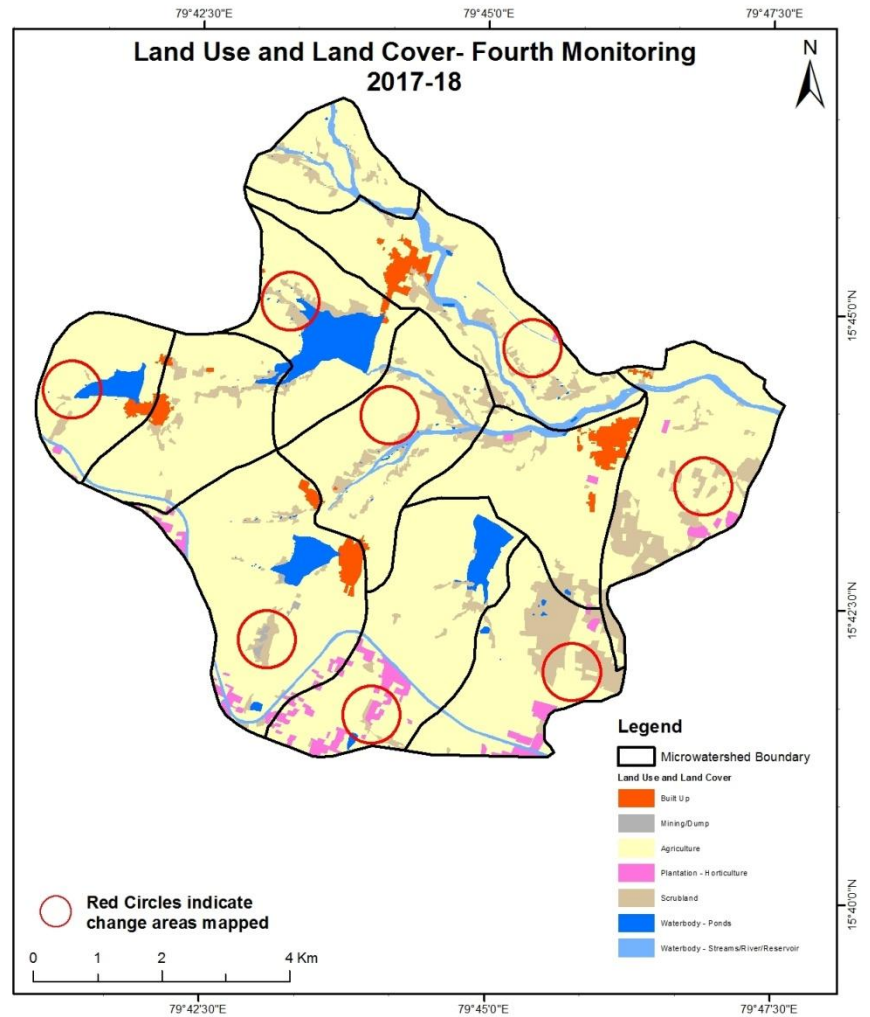
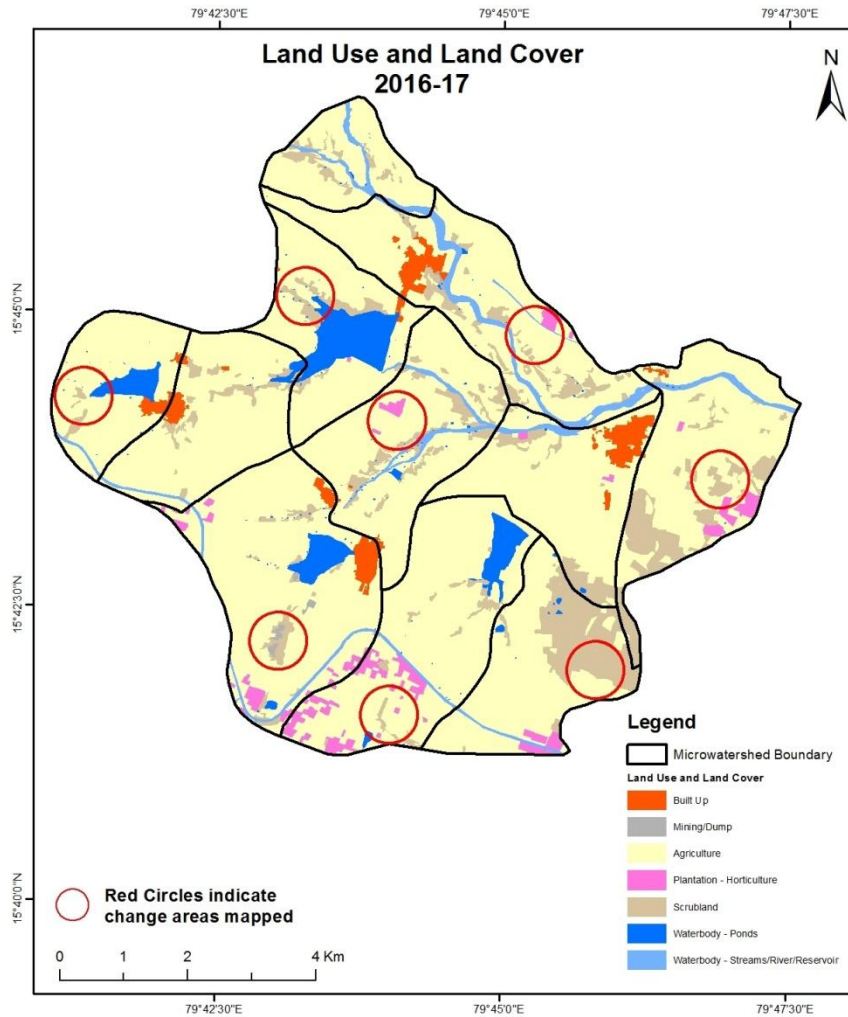
Scale: 1:10000





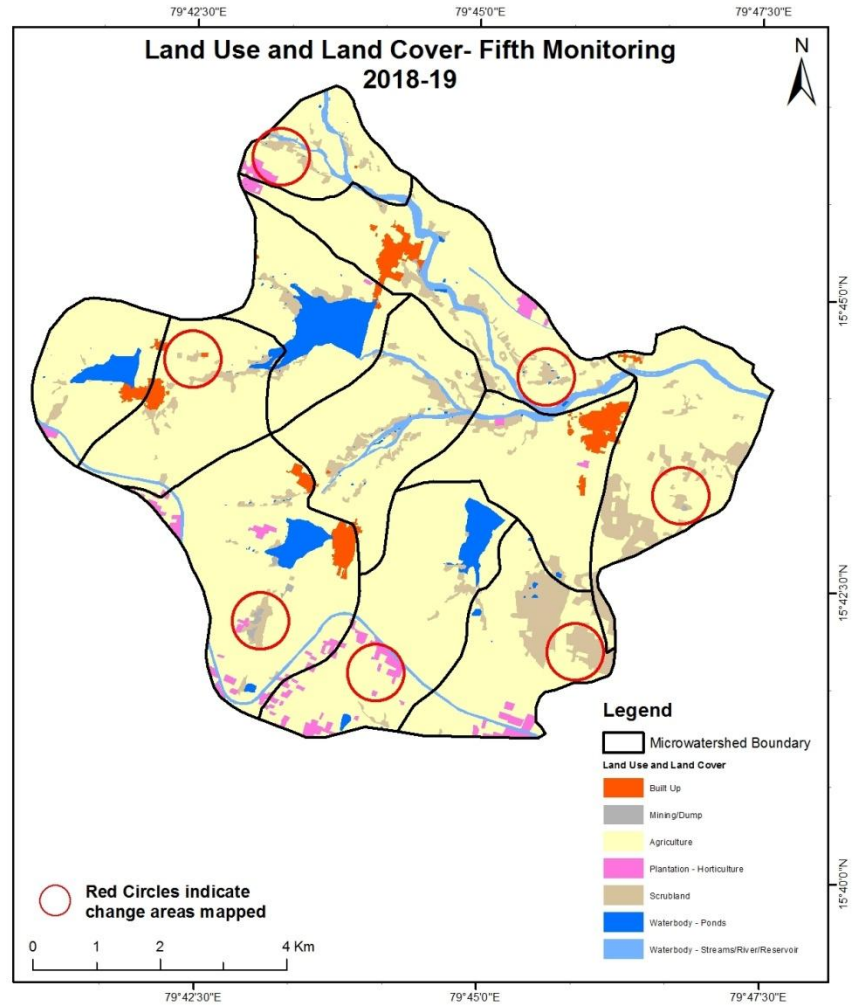
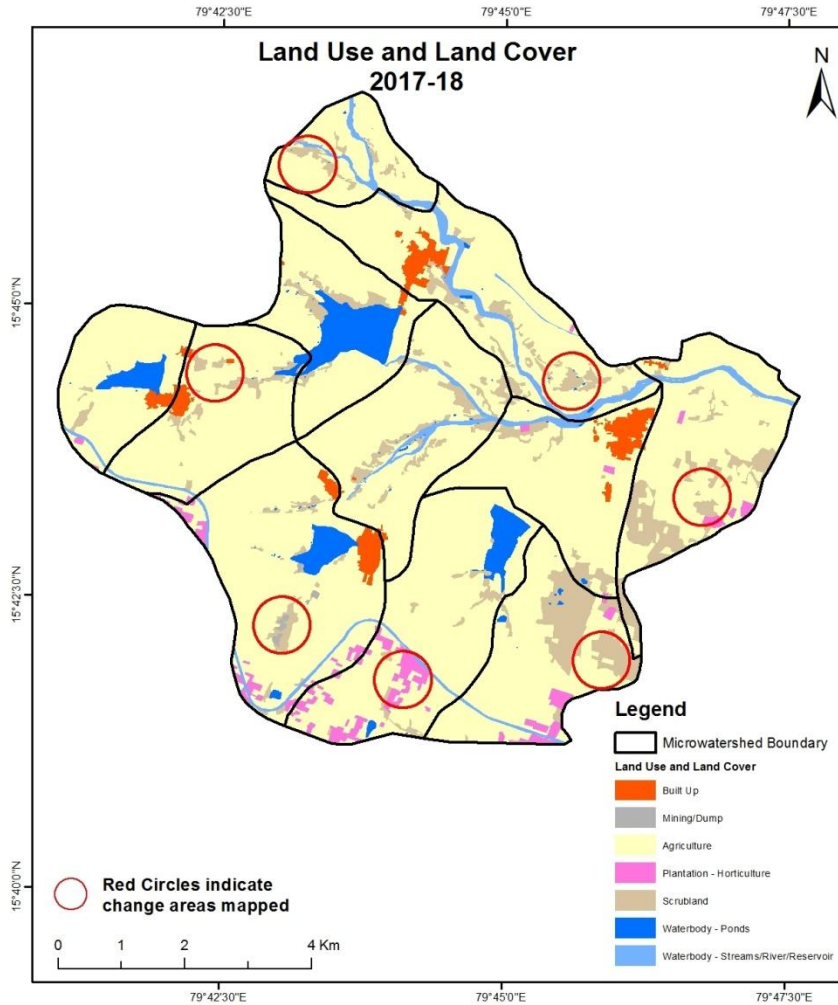
# Comparative assessment of Land Use and Land Cover for Pre and Post IWMP implementation (2016-17 to 2017-18)

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



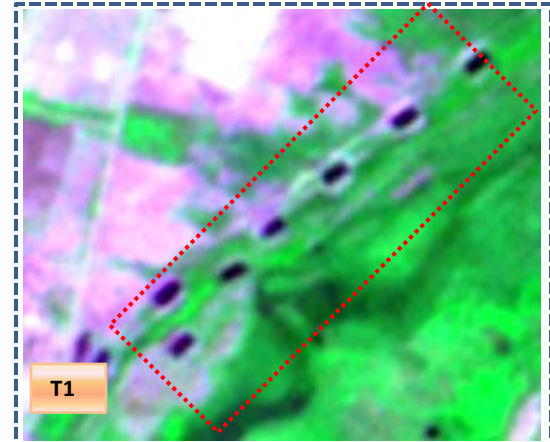
## Land Use and Land Cover changes for Pre and Post treatment dates

Agriculture to Water body



T0

T0: 2010-11



T1

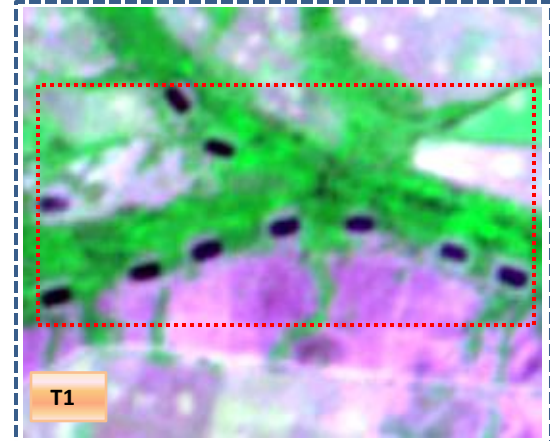
T1: 13 May 2014

Agriculture to Water body



T0

T0: 2010-11



T1

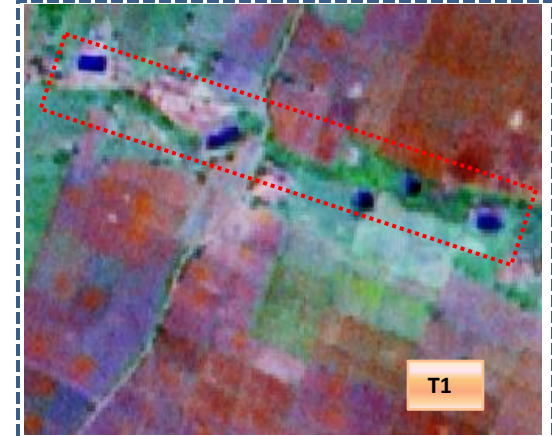
T1: 13 May 2014

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

Agriculture to Water body



T1: 2010-11



T1: 13 May 2014

Agriculture to Water body



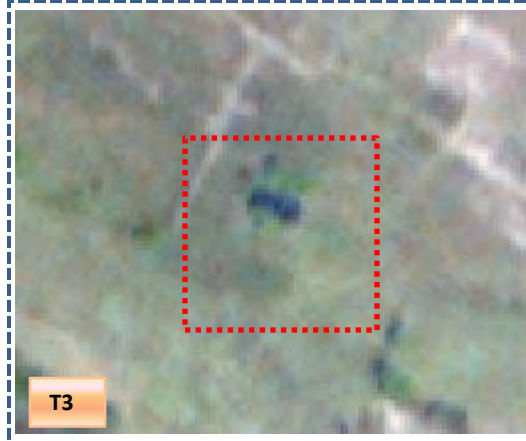
T1: 2010-11



T1: 13 May 2014

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

water body to Agriculture



T3: 2016-17 (79°44'40.482"E 15°44'23.666"N )



T4: 26 September 2018

Agriculture to Plantation



T3: 2016-17 (79°43'54.128"E 15°42'8.397"N )



T4: 26 September 2018

**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	126.93										126.93
Mining/dump		1.50									1.50
Agriculture	3.91		4923.35	2.48						4.16	4933.89
Plantation Horticulture			10.75	96.84							107.59
Forest											
Forest Plantation											
Barren Rocky											
Scrub	6.73		169.50					775.30		1.97	953.49
Waterbody- Streams/River									201.90		201.90
Waterbody – Ponds			1.27							237.27	238.55
<b>Grand Total</b>	<b>137.56</b>	<b>1.50</b>	<b>5104.88</b>	<b>99.32</b>				<b>775.30</b>	<b>201.90</b>	<b>243.40</b>	<b>6563.85</b>

- 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 10.54 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T5.
- In T5 181.52 ha of agriculture are increased from plantation, scrubland and water body of T4. 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	
<b>T1</b>												
<b>Built up</b>	137.56										137.56	
<b>Mining/dump</b>		1.50									1.50	
<b>Agriculture</b>	1.51		5070.74	27.43				0.98	4.22		5104.88	
<b>Plantation Horticulture</b>			17.66	81.66							99.32	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>	1.74	7.51	22.83					742.05		1.17	775.30	
<b>Waterbody- Streams/River</b>									201.90		201.90	
<b>Waterbody – Ponds</b>			1.75							241.65	243.40	
<b>Grand Total</b>	<b>140.81</b>	<b>9.01</b>	<b>5112.98</b>	<b>109.09</b>				<b>742.05</b>	<b>202.87</b>	<b>247.04</b>	<b>6563.85</b>	

- 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 34.14 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T2.
- In T2 42.24 ha of agriculture are increased from plantation, scrubland and water body 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	140.81										140.81
Mining/dump		9.01									9.01
Agriculture	1.25		5063.58	47.65						0.50	5112.98
Plantation Horticulture			16.29	92.80							109.09
Forest											
Forest Plantation											
Barren Rocky											
Scrub	2.12		75.00					664.49		0.43	742.05
Waterbody- Streams/River									202.87		202.87
Waterbody – Ponds			2.55							244.49	247.04
<b>Grand Total</b>	<b>144.19</b>	<b>9.01</b>	<b>5157.42</b>	<b>140.45</b>				<b>664.49</b>	<b>202.87</b>	<b>245.42</b>	<b>6563.85</b>

- 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 49.40 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T3.
- In T3 93.84 ha of agriculture are increased from plantation, 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	
	Built up	Mining/ dump	Agriculture	Plantation Horticulture	Forest	Forest Plantation	Barren Rocky	Scrub	Waterbody- Streams/River	Water body Ponds	Grand Total	
<b>T3</b>												
<b>Built up</b>	144.19										144.19	
<b>Mining/dump</b>		9.01									9.01	
<b>Agriculture</b>	0.55		5094.91	55.67						6.29	5157.42	
<b>Plantation Horticulture</b>			60.91	79.54							140.45	
<b>Forest</b>												
<b>Forest Plantation</b>												
<b>Barren Rocky</b>												
<b>Scrub</b>	0.21		69.77					594.13		0.38	664.49	
<b>Waterbody- Streams/River</b>			0.04						202.83		202.87	
<b>Waterbody – Ponds</b>			7.59							237.83	245.42	
<b>Grand Total</b>	<b>144.95</b>	<b>9.01</b>	<b>5233.22</b>	<b>135.21</b>				<b>594.13</b>	<b>202.83</b>	<b>244.50</b>	<b>6563.85</b>	

- 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 62.51 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T4.
- In T4 138.31 ha of agriculture are increased from plantation, 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-2017-18 to 2018-19**

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		
<b>Built up</b>	144.95												144.95
<b>Mining/dump</b>		9.01											9.01
<b>Agriculture</b>	1.97		5191.49	38.84							0.92		5233.22
<b>Plantation Horticulture</b>			48.13	87.08									135.21
<b>Forest</b>													
<b>Forest Plantation</b>													
<b>Barren Rocky</b>													
<b>Scrub</b>	0.55	0.70	52.26					540.63					594.13
<b>Waterbody- Streams/River</b>									202.83				202.83
<b>Waterbody – Ponds</b>			0.72								243.78		244.50
<b>Grand Total</b>	<b>147.47</b>	<b>9.71</b>	<b>5292.60</b>	<b>125.92</b>				<b>540.63</b>	<b>202.83</b>		<b>244.70</b>		<b>6563.85</b>

- 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 41.73 ha of agriculture are decreased and it is converted into built-up, plantation and water body of T5.
- In T5 101.10 ha of agriculture are increased from plantation, 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 7.09 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 170.98, 8.10, 44.44, 75.80 & 59.38 Hectares From T0 to T1, T1 to T2 , T2 to T3, T3 to T4 & T4 to T5 and overall increase of 358.70 Hectares in Crop land area as compared between baseline LU/LC data 2010-11 (T0) & 2018-19 (T5) years.
5. There is increase of 18.33 ha of the Plantation/Horticulture area has been increased between 2010-11 (T0) & 2018-19 (T5) years.
6. There is a decrease of 412.86 Hectares in Scrubland area as compared between 2010-11 (T0) & 2018-19 (T5) years.
7. Farm ponds (21) is visible on IWMP Bhuvan Srishti portal out of Bhuvan Drishti photo of Farm ponds (21) verified from the portal.