

Monitoring and Evaluation of IWMP Watershed Project Using Geospatial Technologies

Summary Report

T0-T1-T2-T3-T4-T5

BARPETA-IWMP-2 (2009-10)

Assam

Batch 1



Assam State Space Application
Centre
Science Technology and Climate
Change dept.
Govt. of Assam
Bigyan Bhawan, ABC
Guwahati-05



Rural Development and Watershed
Monitoring Division, LURMG-RSA
National Remote Sensing Centre –ISRO
Hyderabad



North Eastern Space
Applications Centre
Government of India,
Department of Space, Umiam,
Shillong, Meghalaya



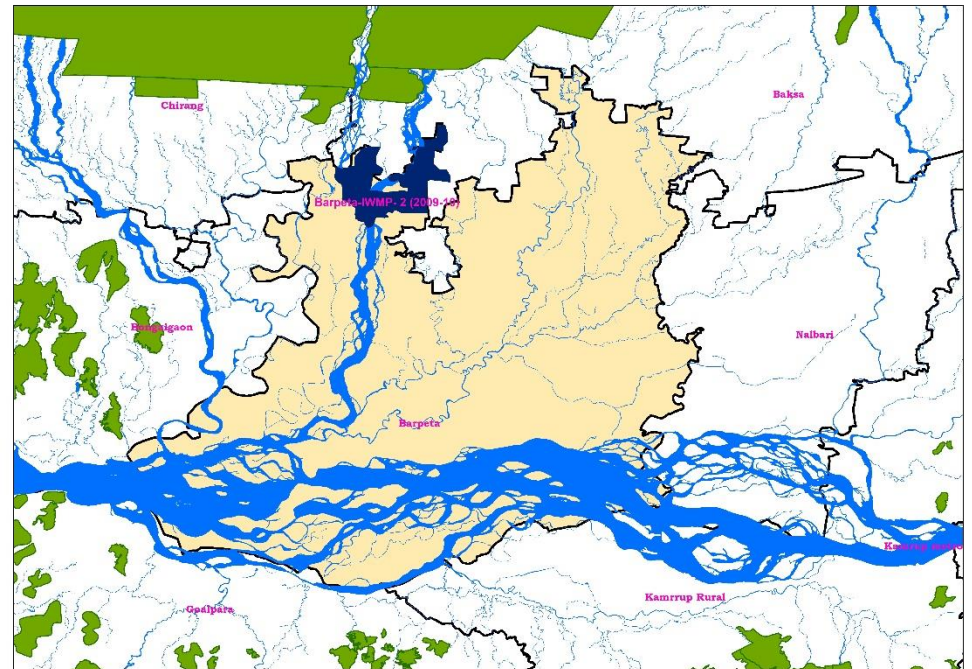
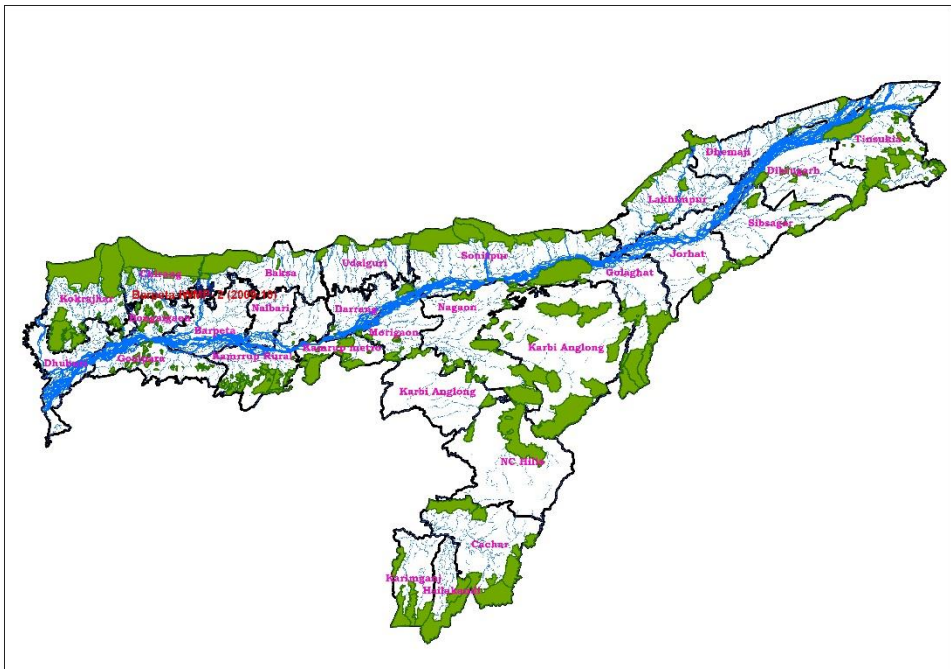
Department of Land Resources,
Ministry of Rural Development,
Government of India
New Delhi

CONTENTS

1. Study Area
2. Satellite Data and Ancillary Data
3. Monitoring in the Project Area
4. Conclusion

PROJECT : BARPETA-IWMP-2 (2009-10)
DISTRICT : Barpeta- STATE : Assam

The study area falls in Barpeta district of Assam. The total geographical area of the project is 6471.14 Ha. The Location map of the study area is as shown below. It comprises of two (02) micro watersheds. Analysis is done for 2009-10 period (Batch-1) projects taking 2017 period satellite images. The Project area witness the winter w.e.f October and continues till February. The summer season starts from the month of March and extends till the end of June. As a part of the upper Assam valley the climate of the study area is tropical humid mostly effected by southwest monsoon which begins from the middle of June. The total annual rainfall in Barpeta district, Assam as recorded by Indian Meteorological Department (IMD) for the year 2017 is 3139.5 mm.



Location Map of the study area

Satellite Data and Ancillary Data

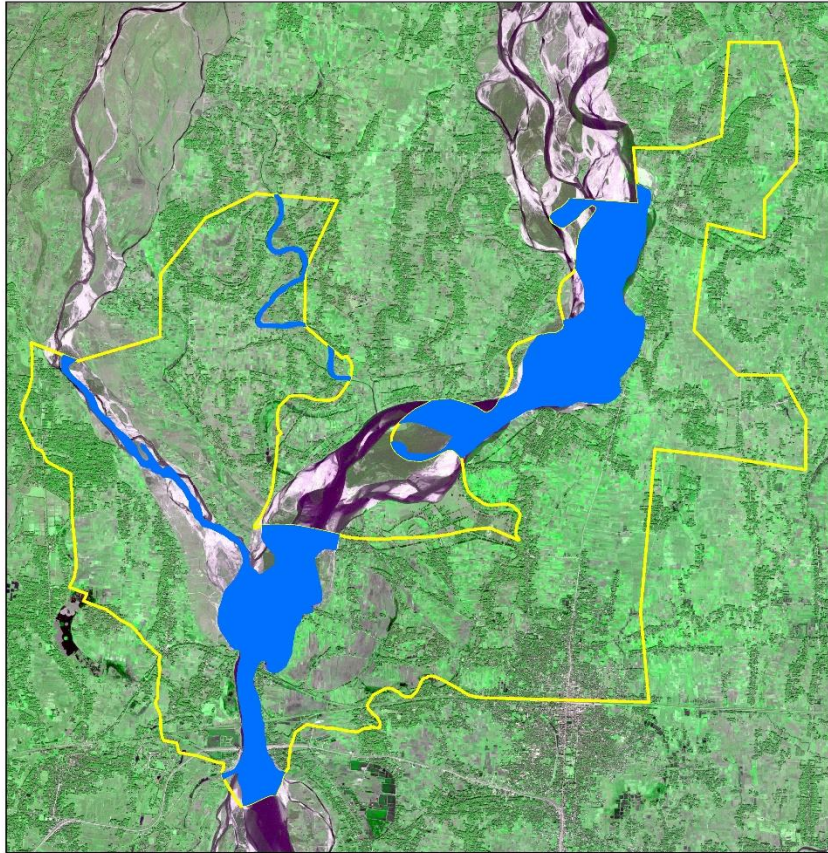
Satellite data	T0	T1	T2	T3	T4	T5
Bhuvan IWMP Portal	2009-10	NA	NA	NA	17-02-2016	13-02-2017
LISS 4	026968_102_039_2 7-12-2008 026968_102_040_2 7-12-2008	2051886821-598-275-20-11-2013	20280802151-598-275-24-10-2014	1986305171-599-275-04-02-2015	S2A_OPER_P RD_MSIL1C _PDMC_2016 1103T122333 _R133_V2016 1103T043812 _20161103T0 43812.tif (Sentinel-2)	T46RBQ_20170502T042711_ B02_C1.tif (Sentinel-2)
Cartosat-1/Sentinel-2	NA	2051886821-598-275-20-11-2013C1	20280802151-598-275-24-10-2014-C1	1986305171-599-275-04-02-2015-C1	NA	NA

Ancillary data	
Settlement	Yes
Roads	Yes
Drainage	Yes
LULC(1:50000)	
First Cycle	Yes
Second Cycle	Yes
Activity plan Map	
Dristi Photographs	Yes
Detail project Report	Yes



DRAINAGE MAP



0 1.25 2.5 5 Kilometers



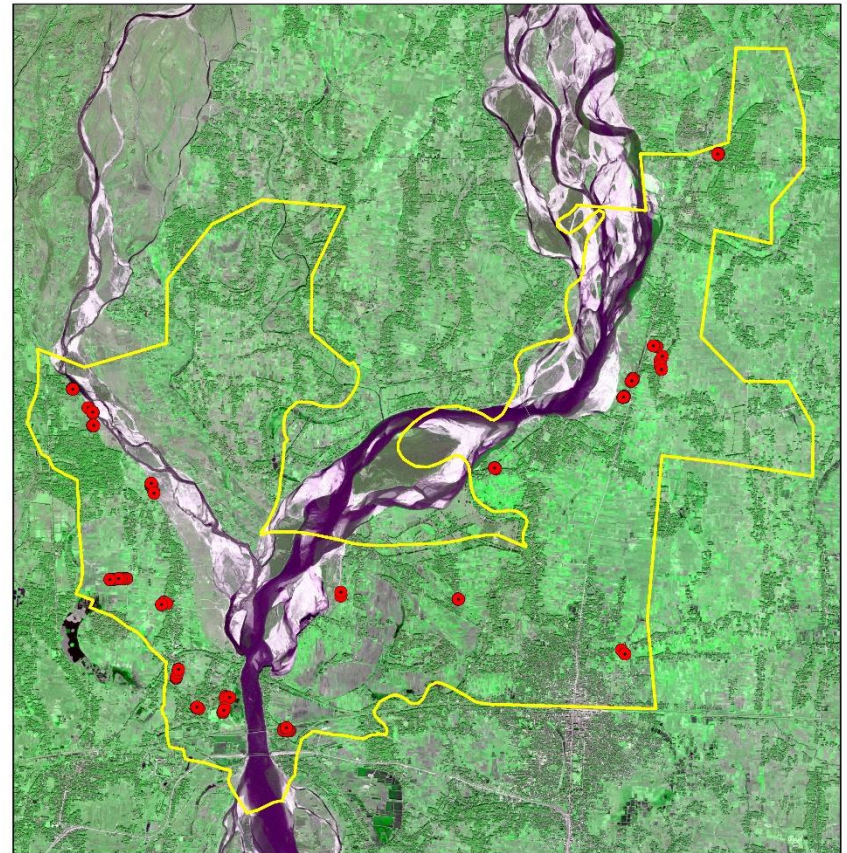
Legend

-  River
-  Project Boundary



DRISHTI POINT



0 1.25 2.5 5 Kilometers



Legend

-  Drishti Point
-  Project Boundary

Drishti Upload Status

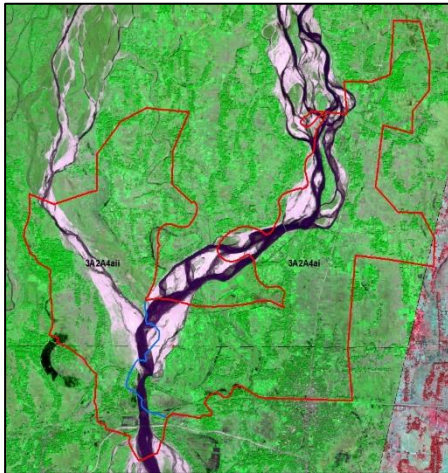
CATEGORY	TOTAL POINTS COLLECTED IN DRISHTI	REMARKS
Check Dams	30	Thirty point uploaded against five Check Dam
Farm Pond	21	Twenty one point uploaded against two Farm pond
Field Bunds	77	Seventy Seven point uploaded against Twelve field bundhs.
Others:- Boulder spur	18	Eighteen point uploaded against Two intervention
Others:- Drainage channel	7	1
Gabion Structure	1	1
Total	154	

Monitoring in the Project Area

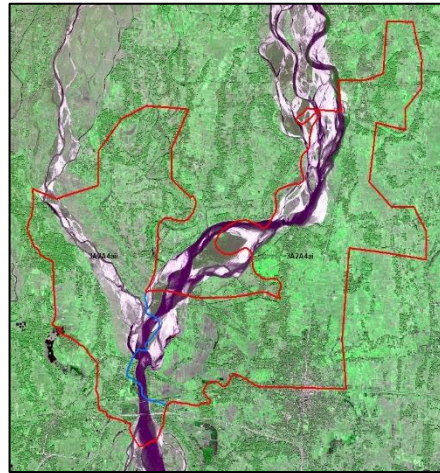
Site Wise Changes in the Project

- Impacts of the activities carried out are presented through combination of Drishti and Srishti captures.
- T0 is the baseline period before implementation (2009-10), T1 is 2013, T2 is 2014, T3 is 2015, T4 is 2016 and T5 is 2017 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.

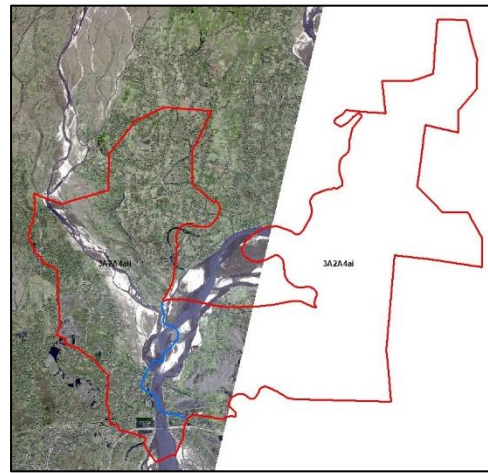
Natural colour composite overlaid with project Boundaries



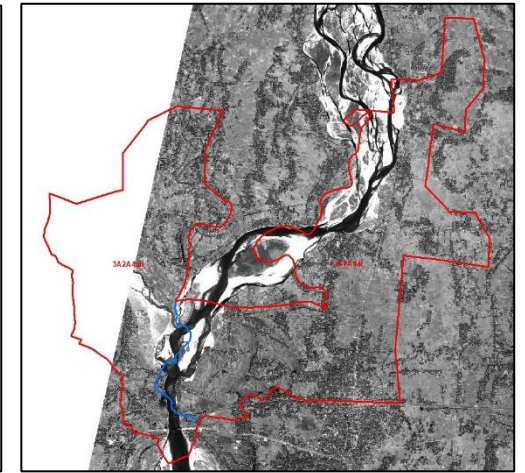
T0-27-12-2008,Source-LISS -IV



T1-20-11-2013,Source-LISS -IV

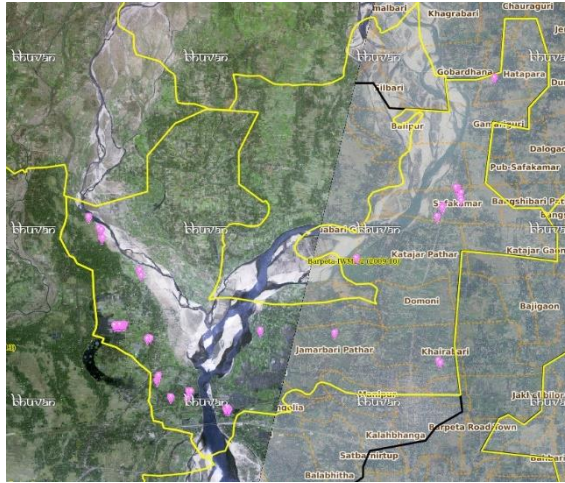


T2-24-10-2014,Source-LISS -IV

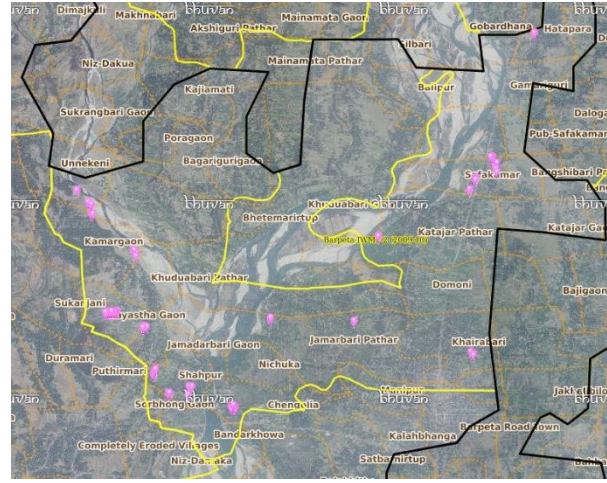


T3-04-02-2015,Source-LISS -IV

Natural color composite overlaid with project Boundaries



T4-17-06-2016,Source-Bhuvan portal



T5-13-02-2017,Source-Bhuvan portal

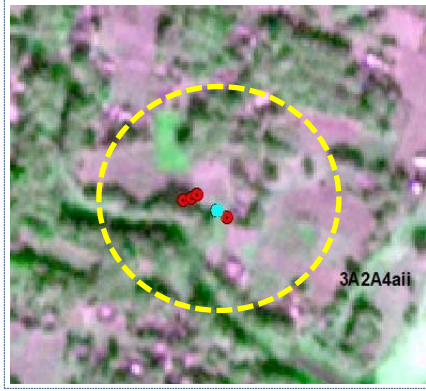
Classification of Drishti Activities			
Sr No	Activity	Drishti Photo	Visible in Satellite Image
1	Check Dams	30	30
2	Farm Pond	21	21
3	Field Bunds	77	71
4	Others:- Boulder spur	18	--
5	Others:- Drainage channel	7	7
6	Gabion Structure	1	--
	Total	154	129

FARM POND

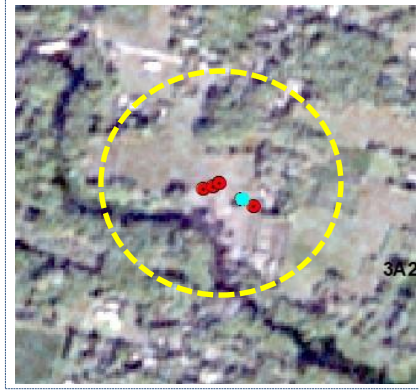
DRISHTI POINT -1



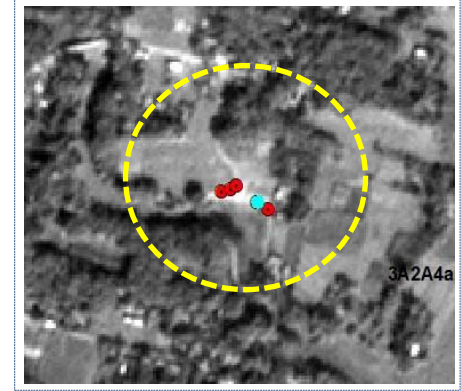
T0 :27-12-2008



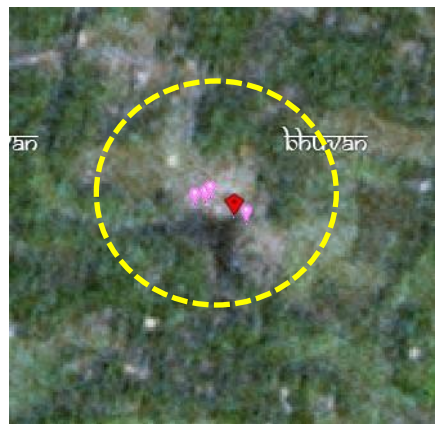
T1 :01-12-2013



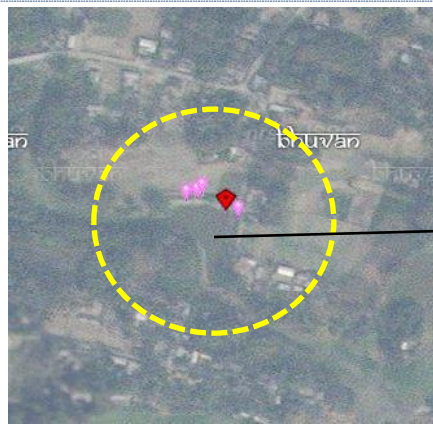
T2 :09-02-2014



T3:25-10-2015



T4:17-02-2016



T5:13-02-2017

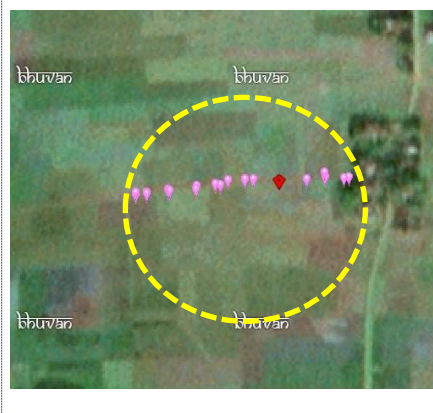


Drishhti Sl. no. 7069771
MWS:3A2A4aii
Status of activity:11022015
Creation time:2019-9-10

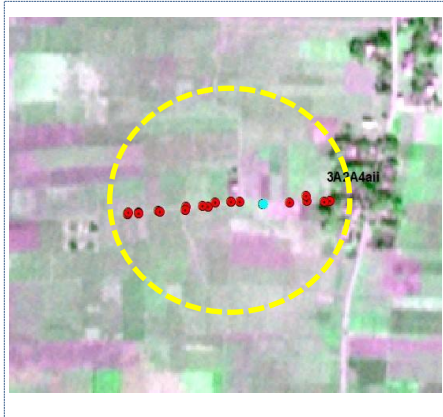
Remarks: Farm pond bank is renovated its bank and visible in satellite image.

FIELD BUNDS

DRISHTI POINT -2



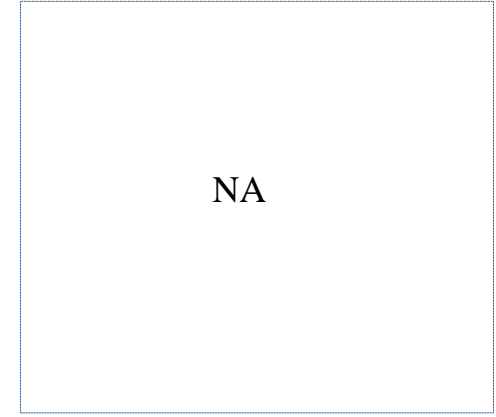
T0 :27-12-2008



T1 :01-12-2013



T2 :09-02-2014



T3:25-10-2015



T4:17-02-2016



T5:13-02-2017



Drishti Sl. no. 7068848
MWS:3A2A4aii
Status of activity:25052015
Creation time:2019-9-10

Remarks: Field Bunds is visible in satellite image of 2017

DRISHTI POINT -3

FARM POND



T0 :27-12-2008



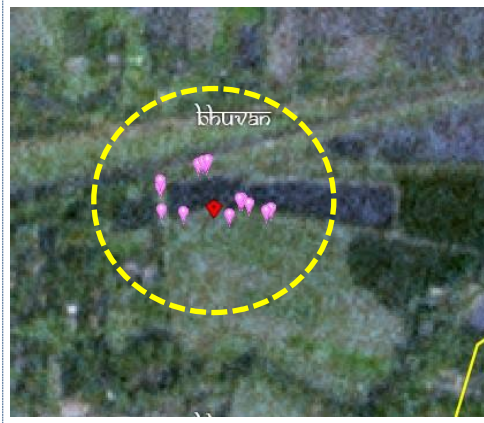
T1 :01-12-2013



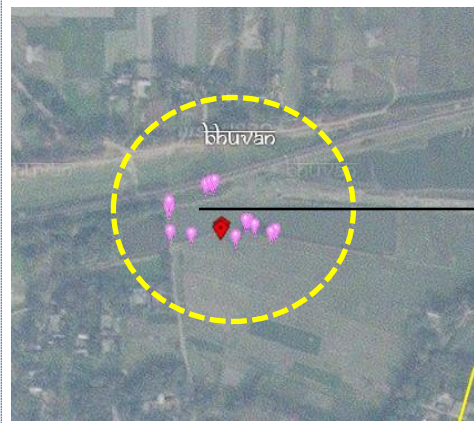
T2 :09-02-2014



T3:25-10-2015



T4:17-02-2016



T5:13-02-2017

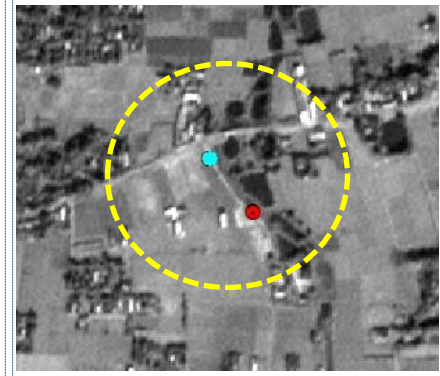
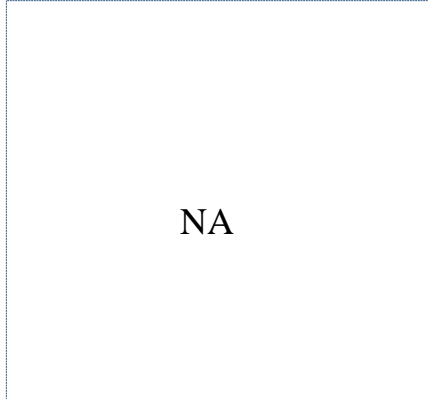
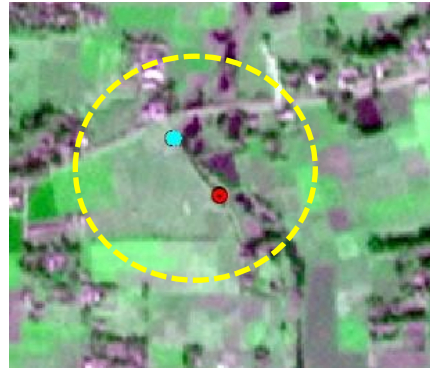


Drishti Sl. No-7069341
MWS:3A2A4ai
Status of activity: 21112014
Creation time:2019-9-11

Remarks: Farm pond bank is renovated its bank and visible in satellite image.

DRISHTI POINT -4

FIELD BUNDS

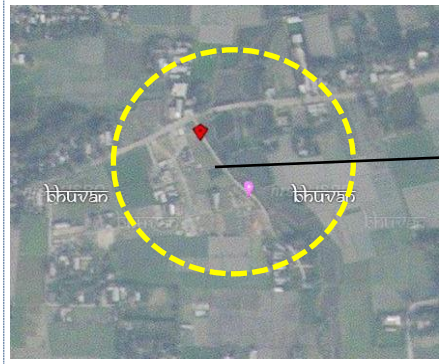
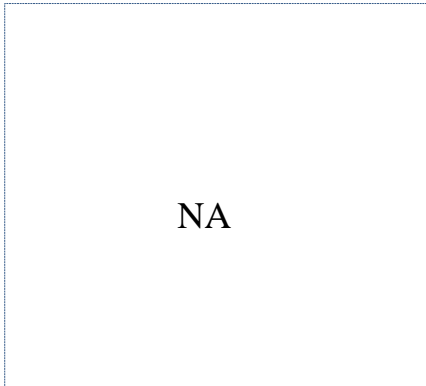


T0 :27-12-2008

T1 :01-12-2013

T2 :09-02-2014

T3:25-10-2015



T4:17-02-2016

T5:13-02-2017

Remarks: Field bunds work is completed and visible in image.

Drishti Sl. No:7069287
MWS:3A2A4ai
Status of activity:29-11-2015
Creation time:11-9-2019

DRISHTI POINT -5

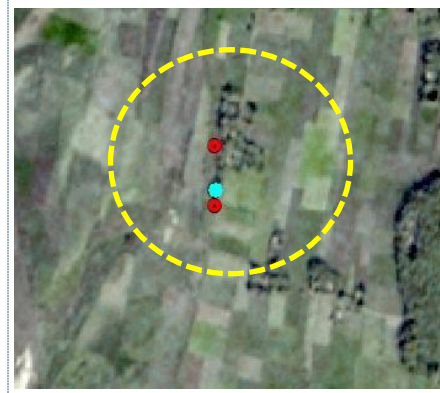
FIELD BUND



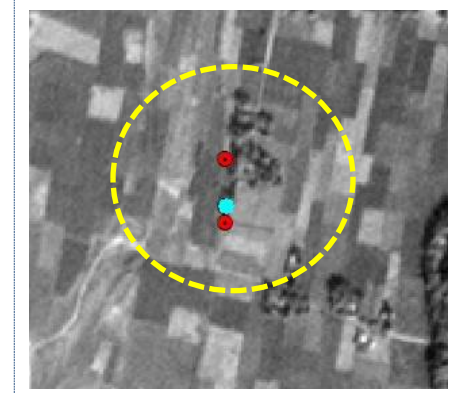
T0 :29-02-2008



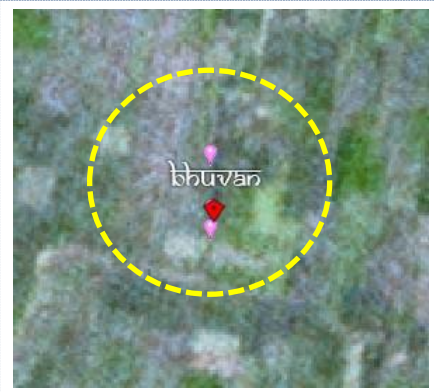
T1 :01-12-2013



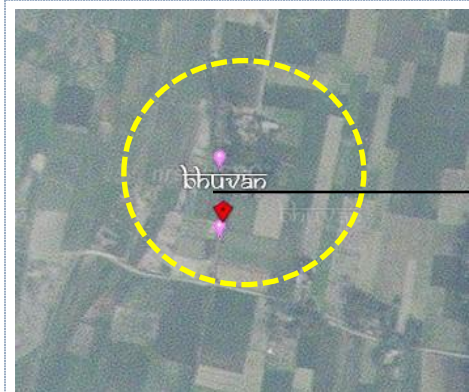
T2 :09-02-2014



T3:25-10-2015



T4:19-01-2016



T5:01-11-2017

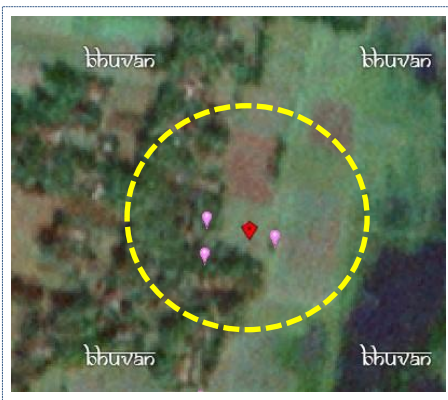


Drishti Sl. No-7069285
MWS:3A2A4ai
Status of activity:19012016
Creation time:2019-9-11

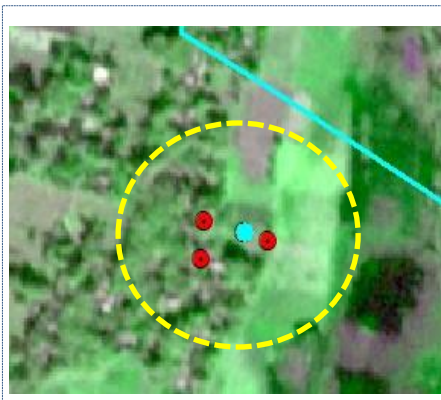
Remarks:Field bund is visible in satellite image in 2017

DRISHTI POINT -6

FIELD BUNDH



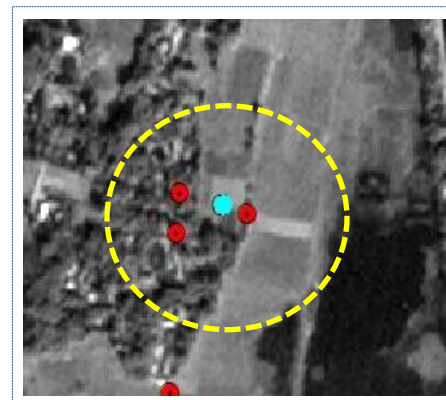
T0:29-02-2008



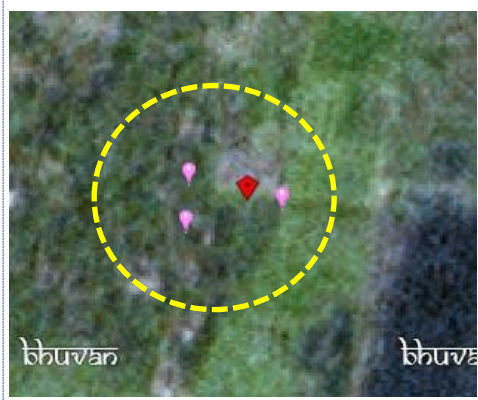
T1:01-12-2013



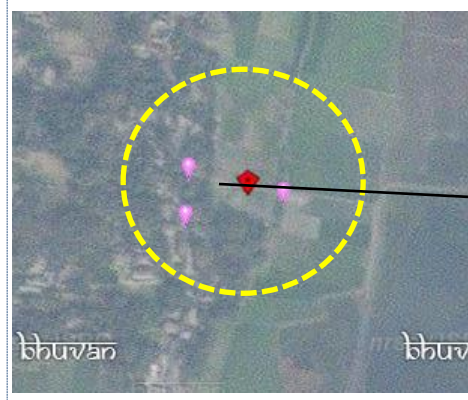
T2:09-02-2014



T3:25-10-2015



T4:19-01-2016



T5:01-11-2017

Remarks: Field bund is visible in satellite image in 2017



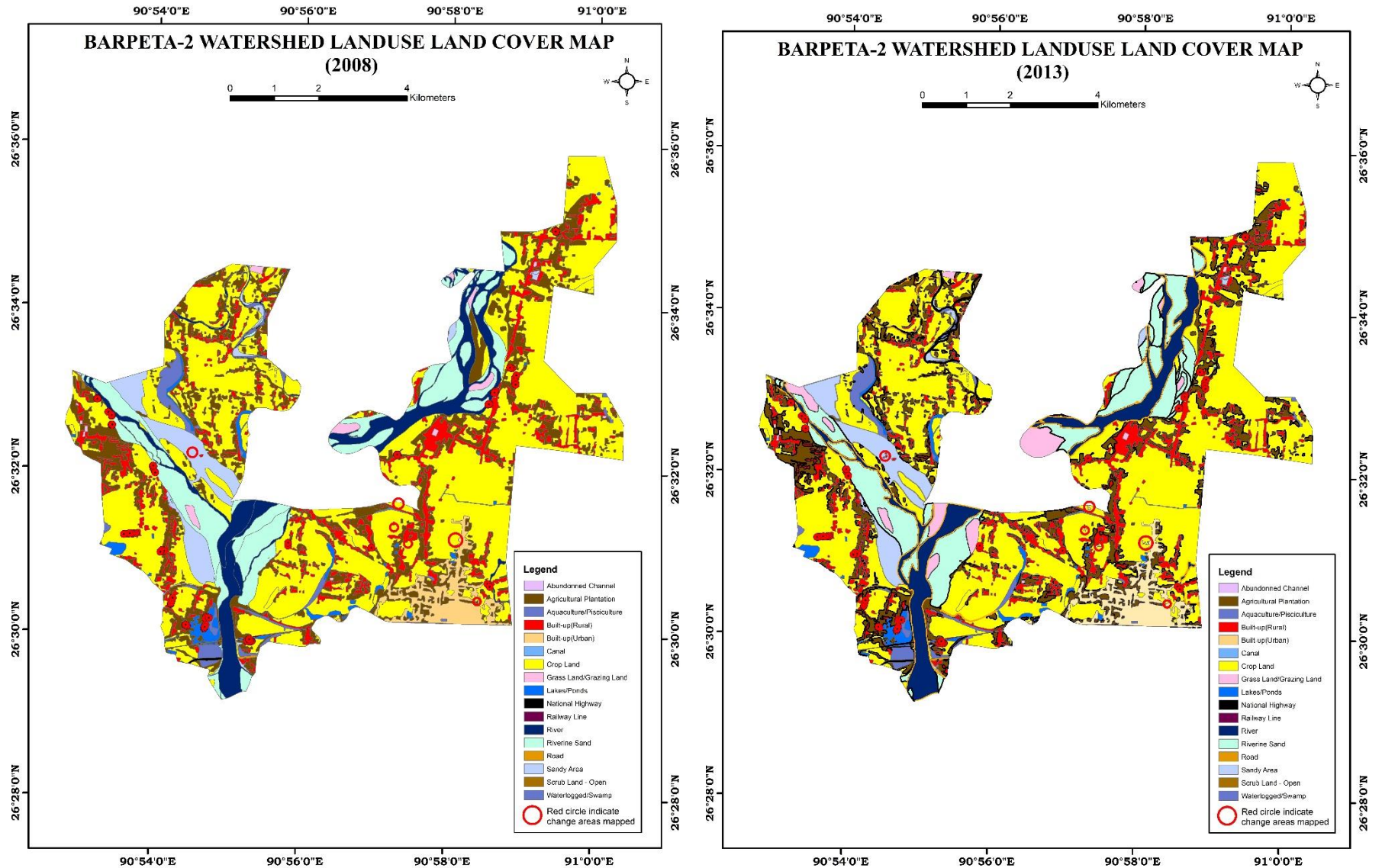
Drishti Sl. No-7075438
MWS:3A2A4aii
Status of activity: Completed
Creation time:2019-9-10

MONITORING IN THE PROJECT AREA

Land use and Land cover Changes in the Project

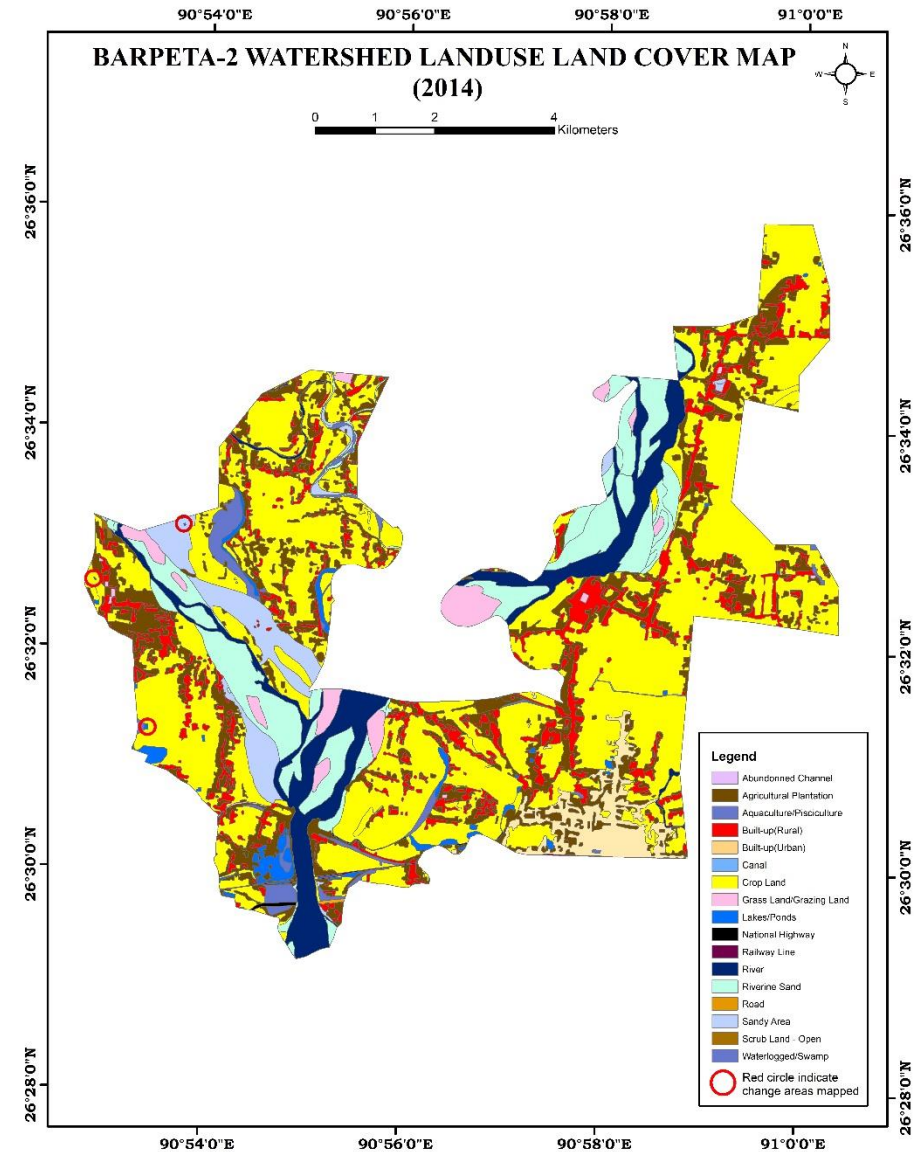
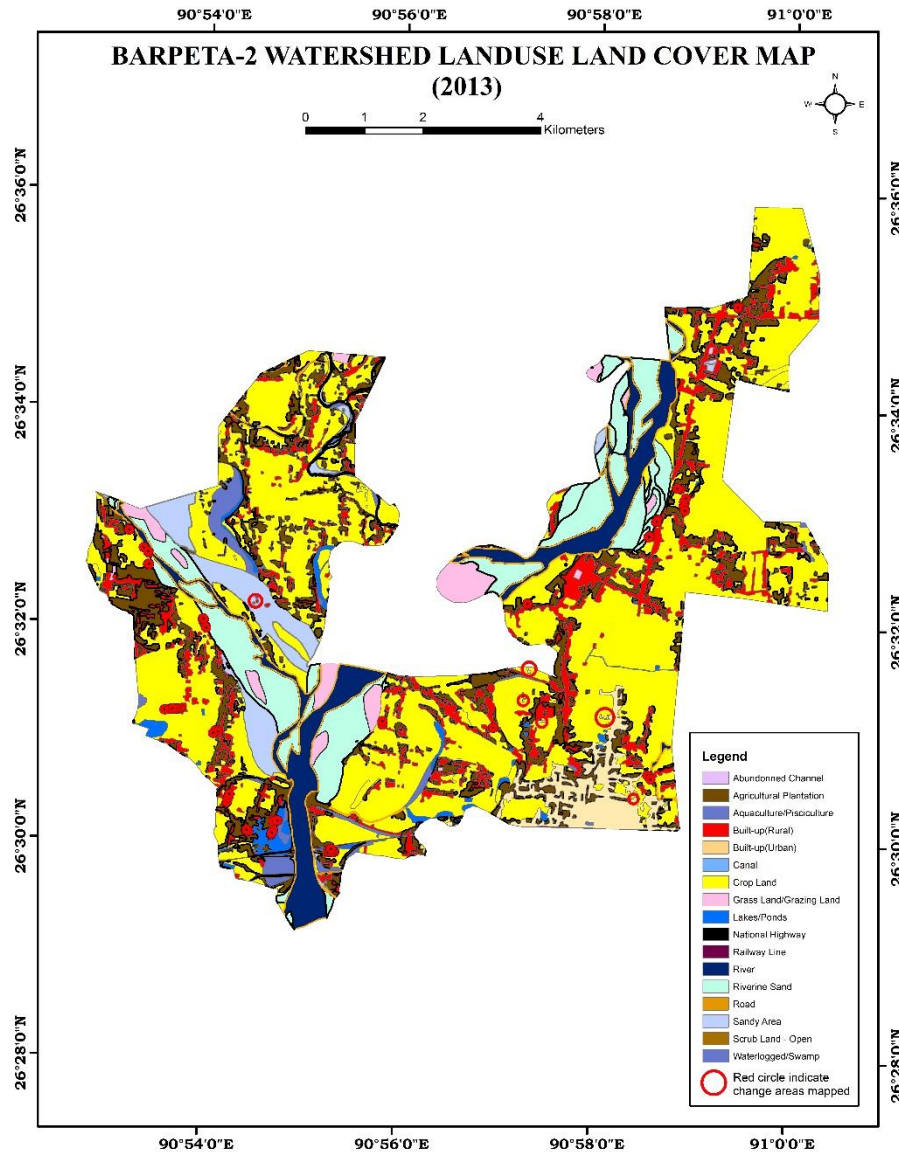
- Change in land use and land cover from T0 to T1 are analyzed in terms of Abandoned Channel Agricultural Plantation Aquaculture/Pisciculture Built-up(Rural) Built-up(Urban) Canal Crop Land Grass Land/Grazing Land Lakes/Ponds National Highway Railway Line River Riverine Sand Road Sandy Area Scrub Land - Open Waterlogged/Swamp
- 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 T1 are given in the change matrix table.
- In matrix table row represents the pre implementation period as T0 (2008) and column represents the post implementation period as T1 (2013)

Comparative assessment of LULC for pre and post IWMP implementation (2007 to 2013)



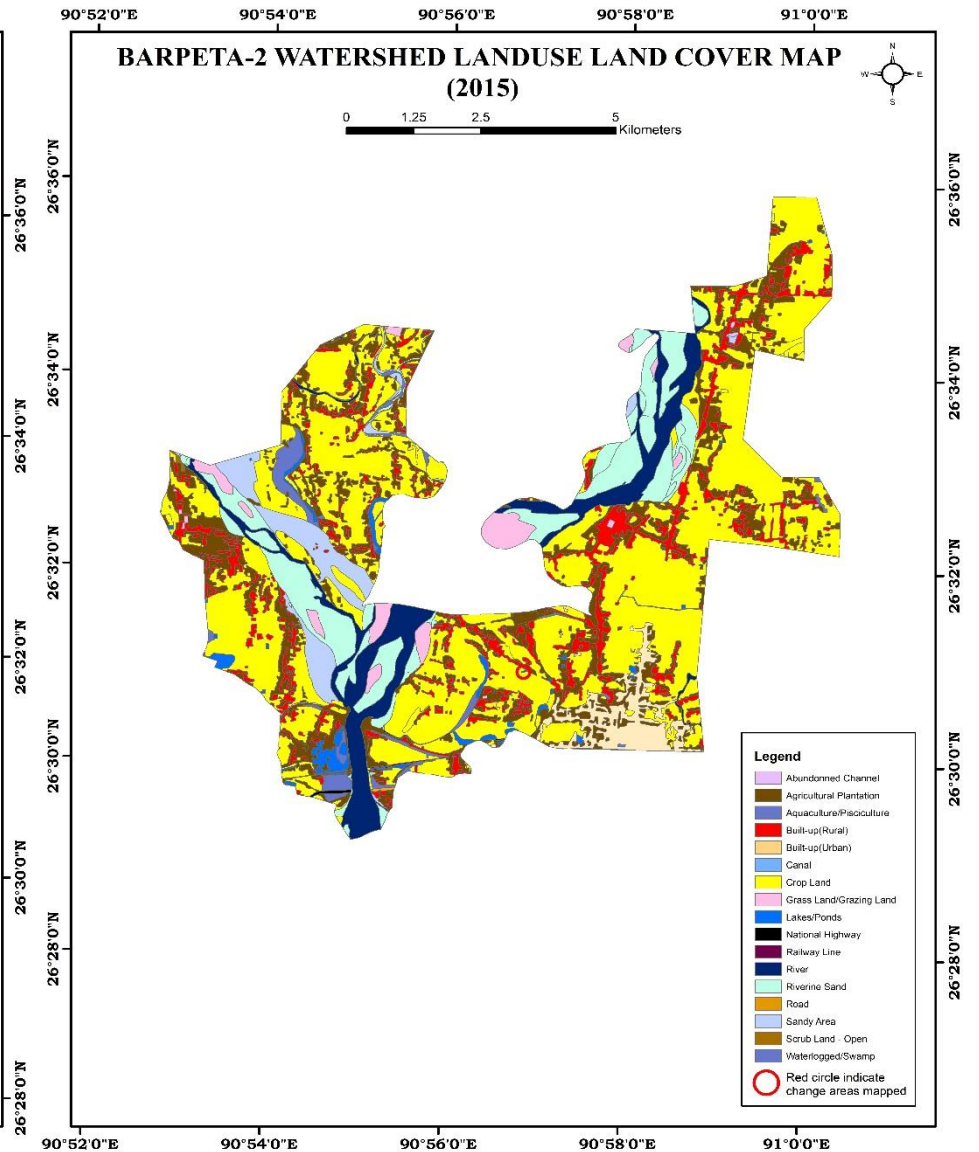
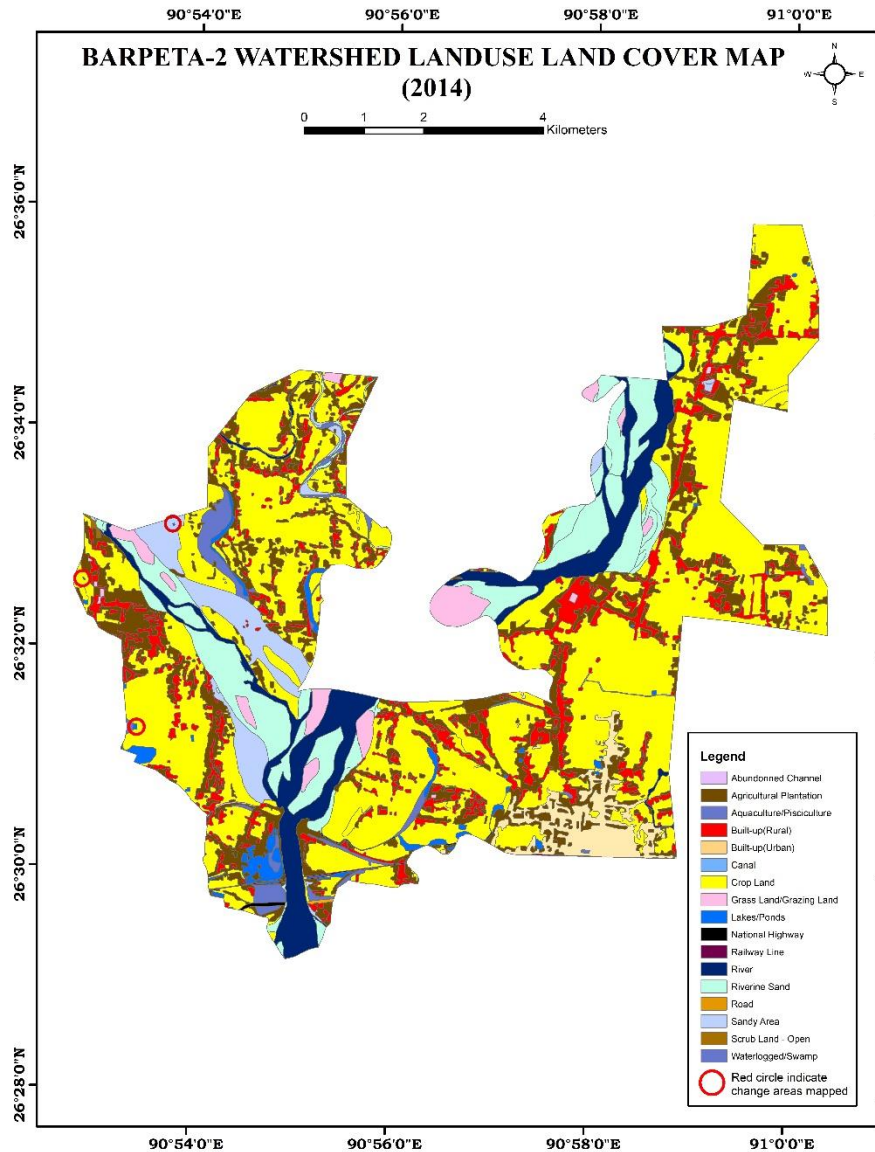
N.B. Agricultural Plantation which includes household plantations in rural areas. This includes horticulture and other mixed plantations.

Comparative assessment of LULC for pre and post IWMP implementation (2013 to 2014)



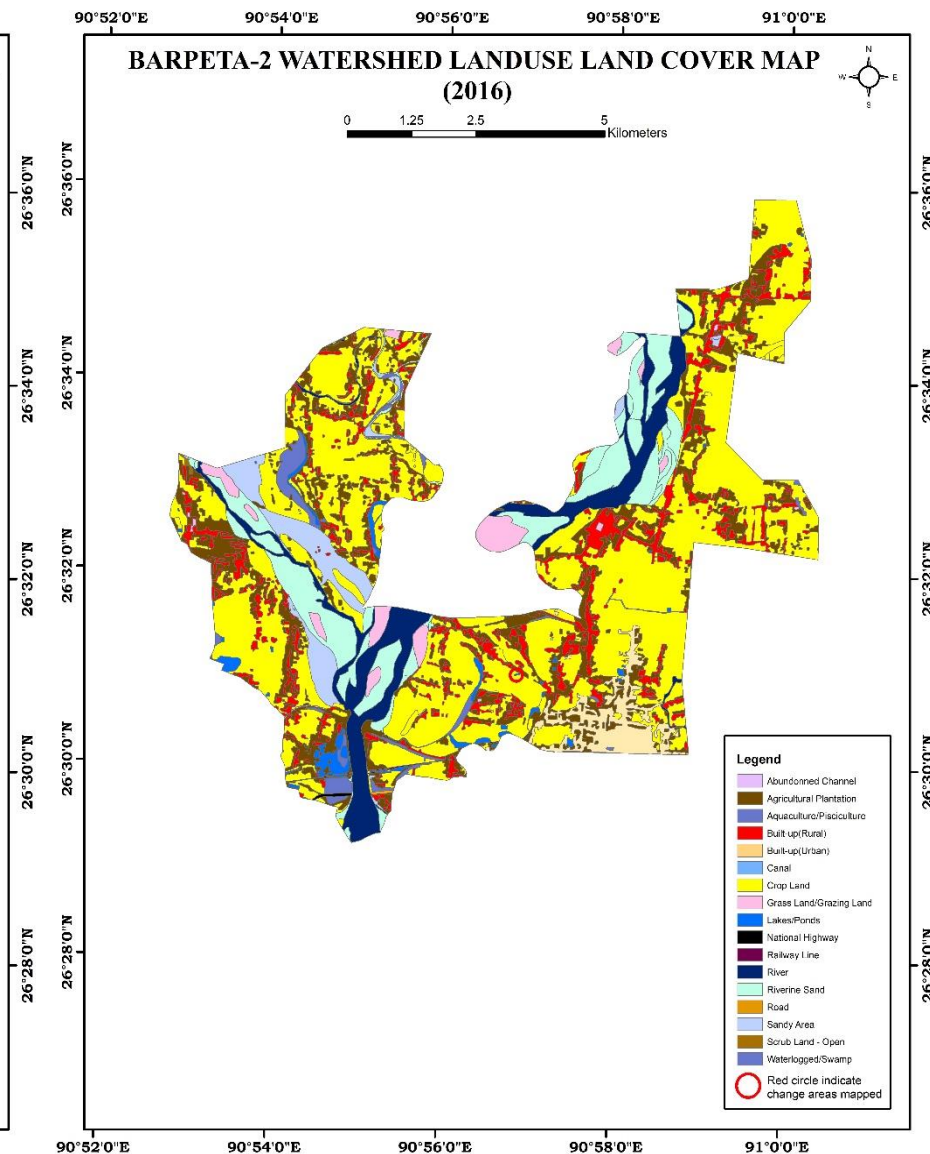
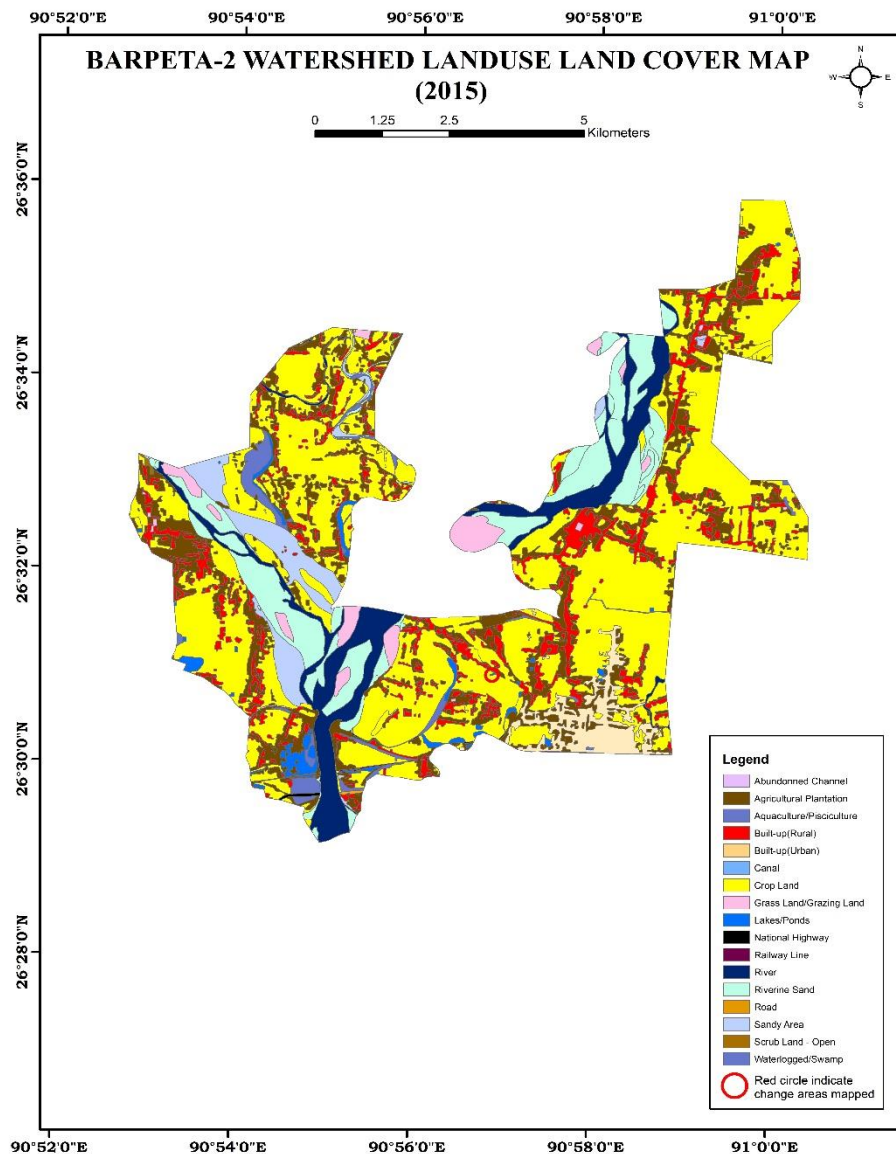
N.B. Agricultural Plantation which includes household plantations in rural areas. This includes horticulture and other mixed plantations.

Comparative assessment of LULC for pre and post IWMP implementation (2014 to 2015)



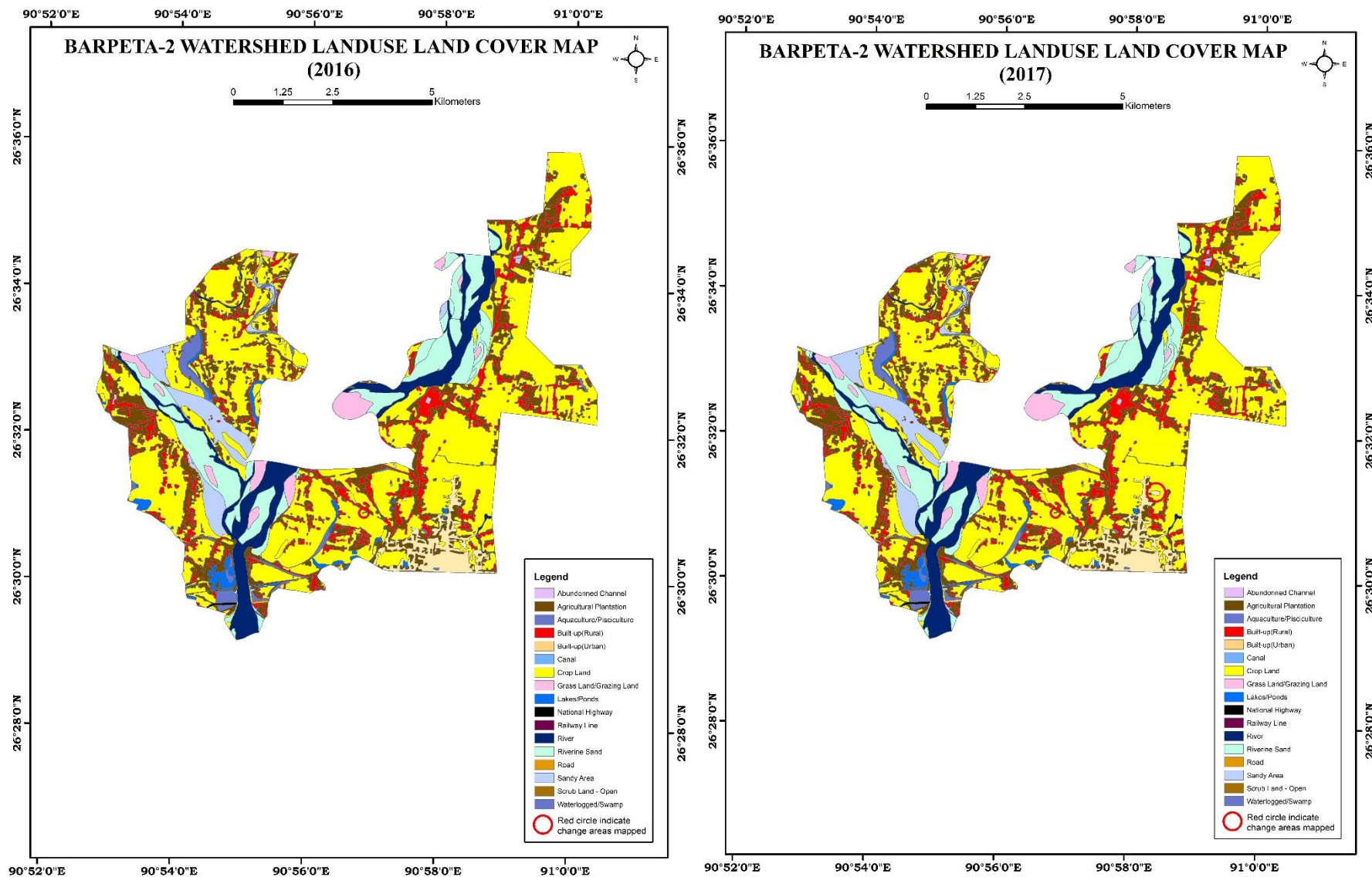
N.B. Agricultural Plantation which includes household plantations in rural areas. This includes horticulture and other mixed plantations.

Comparative assessment of LULC for pre and post IWMP implementation (2015 to 2016)



N.B. Agricultural Plantation which includes household plantations in rural areas. This includes horticulture and other mixed plantations.

Comparative assessment of LULC for pre and post IWMP implementation (2016 to 2017)



N.B. Agricultural Plantation which includes household plantations in rural areas. This includes horticulture and other mixed plantations.

Table showing change matrix depicting land cover transitions between baseline 2008 (T0) and 2013 (T1)

LAND COVER CLASSES	MONITORING PERIOD (T1) 2013																	
	*Units in Hectares																	
(T0-2008)	Abandoned Channel	Agricultural Plantation	Aquaculture/Pisciculture	Built-up(Rural)	Built-up(Urban)	Canal	Crop Land	Grass Land/Grazing Land	Lakes/Ponds	National Highway	Railway Line	River	Riverine Sand	Road	Sandy Area	Scrub Land - Open	Waterlogged/Swamp	Grand Total
Abandoned Channel	1.79																	1.79
Agricultural Plantation		1025.66			0.34							37.52	9.82					1073.35
Aquaculture/Pisciculture			33.57															33.57
Built-up(Rural)				598.05								1.07						599.11
Built-up(Urban)					177.74													177.74
Canal						2.42												2.42
Crop Land					2.01		2957.41	5.45				34.60	13.17					3012.64
Grass Land/Grazing Land								37.69				1.76	4.85					44.30
Lakes/Ponds									90.70									90.70
National Highway										4.20								4.20
Railway Line											7.10							7.10
River								45.69				266.29	159.51					471.49
Riverine Sand								56.82				101.92	464.51					623.25
Road														2.14				2.14
Sandy Area				0.37								7.17	2.55		235.90			245.99
Scrub Land - Open																2.73		2.73
Waterlogged/Swamp																	78.63	78.63
Grand Total	1.79	1025.66	33.57	598.41	180.09	2.42	2957.41	145.65	90.70	4.20	7.10	450.33	654.41	2.14	235.90	2.73	78.63	6471.15

Table showing change matrix depicting land cover transitions between baseline (T1-2013) and (T2-2014)

Land cover Classes (T12013)	MONITORING PERIOD (T22014)																	
	Abandoned Channel	Agricultural Plantation	Aquaculture/Pisciculture	Built-up(Rural)	Built-up(Urban)	Canal	Crop Land	Grass Land/Grazing Land	Lakes/Ponds	National Highway	Railway Line	River	Riverine Sand	Road	Sandy Area	Scrub Land - Open	Waterlogged/Swamp	Grand Total
Abandoned Channel	1.79																	1.79
Agricultural Plantation		1025.66																1025.66
Aquaculture/Pisciculture			33.57															33.57
Built-up(Rural)				598.41														598.41
Built-up(Urban)					180.09													180.09
Canal						2.42												2.42
Crop Land							2956.75		0.66									2957.41
Grass Land/Grazing Land								145.65										145.65
Lakes/Ponds									90.70									90.70
National Highway										4.20								4.20
Railway Line											7.10							7.10
River												443.45	6.88					450.33
Riverine Sand												39.30	615.11					654.41
Road														2.14				2.14
Sandy Area									0.13						235.77			235.90
Scrub Land - Open																2.73		2.73
Waterlogged/Swamp									0.32								78.31	78.63
Grand Total	1.79	1025.66	33.57	598.41	180.09	2.42	2956.75	145.65	91.82	4.20	7.10	482.75	621.99	2.14	235.77	2.73	78.31	647.15

Table showing change matrix depicting land cover transitions between baseline and (T2-2014) and (T3-2015)

LAND COVER CLASSES	MONITORING PERIOD (T3)2015																	
	*Units in Hectares																	
T2(2014)	Abandoned Channel	Agricultural Plantation	Aquaculture/Pisciculture	Built-up(Rural)	Built-up(Urban)	Canal	Crop Land	Grass Land/Grazing Land	Lakes/Ponds	National Highway	Railway Line	River	Riverine Sand	Road	Sandy Area	Scrub Land - Open	Waterlogged/Swamp	Grand Total
Abandoned Channel	1.79																	1.79
Agricultural Plantation		1025.66																1025.66
Aquaculture/Pisciculture			33.57															33.57
Built-up(Rural)				598.41														598.41
Built-up(Urban)					180.09													180.09
Canal						2.42												2.42
Crop Land							2956.44		0.31									2956.75
Grass Land/Grazing Land								145.65										145.65
Lakes/Ponds									91.82									91.82
National Highway										4.20								4.20
Railway Line											7.10							7.10
River												482.75						482.75
Riverine Sand													621.99					621.99
Road														2.14				2.14
Sandy Area															235.77			235.77
Scrub Land - Open																2.73		2.73
Waterlogged/Swamp																	78.31	78.31
Grand Total	1.79	1025.66	33.57	598.41	180.09	2.42	2956.44	145.65	92.12	4.20	7.10	482.75	621.99	2.14	235.77	2.73	78.31	6471.15

Table showing change matrix depicting land cover transitions between baseline and (T3-2015) and (T4-2016)

LAND COVER CLASSES	MONITORING PERIOD (T4)2016																		
	*Units in Hectares																		
T3(2015)	Abandoned Channel	Agricultural Plantation	Aquaculture/Pisciculture	Built-up(Rural)	Built-up(Urban)	Canal	Crop Land	Grass Land/Grazing Land	Lakes/Ponds	National Highway	Railway Line	River	Riverine Sand	Road	Sandy Area	Scrub Land - Open	Waterlogged/Swamp	Grand Total	
Abandoned Channel	1.79																	1.79	
Agricultural Plantation		1025.66																1025.66	
Aquaculture/Pisciculture			33.57															33.57	
Built-up(Rural)				598.41														598.41	
Built-up(Urban)					180.09													180.09	
Canal						2.42												2.42	
Crop Land							2956.44											2956.44	
Grass Land/Grazing Land								145.65										145.65	
Lakes/Ponds									92.12									92.12	
National Highway										4.20								4.20	
Railway Line											7.10							7.10	
River												482.75						482.75	
Riverine Sand													621.99					621.99	
Road														2.14				2.14	
Sandy Area															235.77			235.77	
Scrub Land - Open																2.73		2.73	
Waterlogged/Swamp																	78.31	78.31	
Grand Total	1.79	1025.66	33.57	598.41	180.09	2.42	2956.44	145.65	92.12	4.20	7.10	482.75	621.99	2.14	235.77	2.73	78.31	6471.15	

Table showing change matrix depicting land cover transitions between baseline (T4-2016) and (T5-2017)

LAND COVER CLASSES	MONITORING PERIOD for (T5-2017)																	
	*Units in Hectares																	
T4-2016	Abandoned Channel	Agricultural Plantation	Aquaculture/Pisciculture	Built-up(Rural)	Built-up(Urban)	Canal	Crop Land	Grass Land/Grazing Land	Lakes/Ponds	National Highway	Railway Line	River	Riverine Sand	Road	Sandy Area	Scrub Land - Open	Waterlogged/Swamp	Grand Total
Abandoned Channel	1.79																	1.79
Agricultural Plantation		1025.66																1025.66
Aquaculture/Pisciculture			33.57															33.57
Built-up(Rural)				598.41														598.41
Built-up(Urban)					180.09													180.09
Canal						2.42												2.42
Crop Land					2.45		2953.99											2956.44
Grass Land/Grazing Land								145.65										145.65
Lakes/Ponds									92.12									92.12
National Highway										4.20								4.20
Railway Line											7.10							7.10
River												482.75						482.75
Riverine Sand													621.99					621.99
Road														2.14				2.14
Sandy Area															235.77			235.77
Scrub Land - Open																2.73		2.73
Waterlogged/Swamp																	78.31	78.31
Grand Total	1.79	1025.66	33.57	598.41	182.54	2.42	2953.99	145.65	92.12	4.20	7.10	482.75	621.99	2.14	235.77	2.73	78.31	6471.15

CONCLUSIONS

Major intervention adopted under this project are

Check Dams

Farm Pond

Field Bunds

Others:- Boulder spur

Others:- Drainage channel

Gabion Structure

Total number of Drishti points uploaded is 154.

- 1.Total Thirty (30) no of Check Dam have been uploaded which Thirty intervention of Check Dam can be identified in satellite imagery.
- 2.Total Twenty one (21) *Farm Pond* constructed under this project and Twenty one farm pond intervention can be identified in satellite image.
3. Total Seventy (77) Field Bunds built under this project and seventy One field bunds visible in satellite image.
4. Total Seven (7) Others:- Drainage channel built under this project where all Drishti point is visible in satellite image.
5. Total Eighteen (18) no's of Others:- Boulder spur built under this project but unable to identify in satellite image due to small aerial extent.
6. One Gabion Structure is uploaded under this project which is not available in satellite image
7. Built-up(Rural) decreases from 599.11 hectares to 598.41 hectares. Lakes/Ponds increases from 90.70 hectares to 92.12 hectares. Crop Land decreases from 3012.64 hectares to 2953.99 hectares. River classes increases from 471.49 hectares to 482.75 hectares. Riverine Sand decreases from 623.25 hectares to 621.99 hectares. Built up Urban increases from 177.74 hectares to 182.54 hectares during T0-T5.
8. There is no significant changes in terms of other land use landcover classes in between T0-T5.