

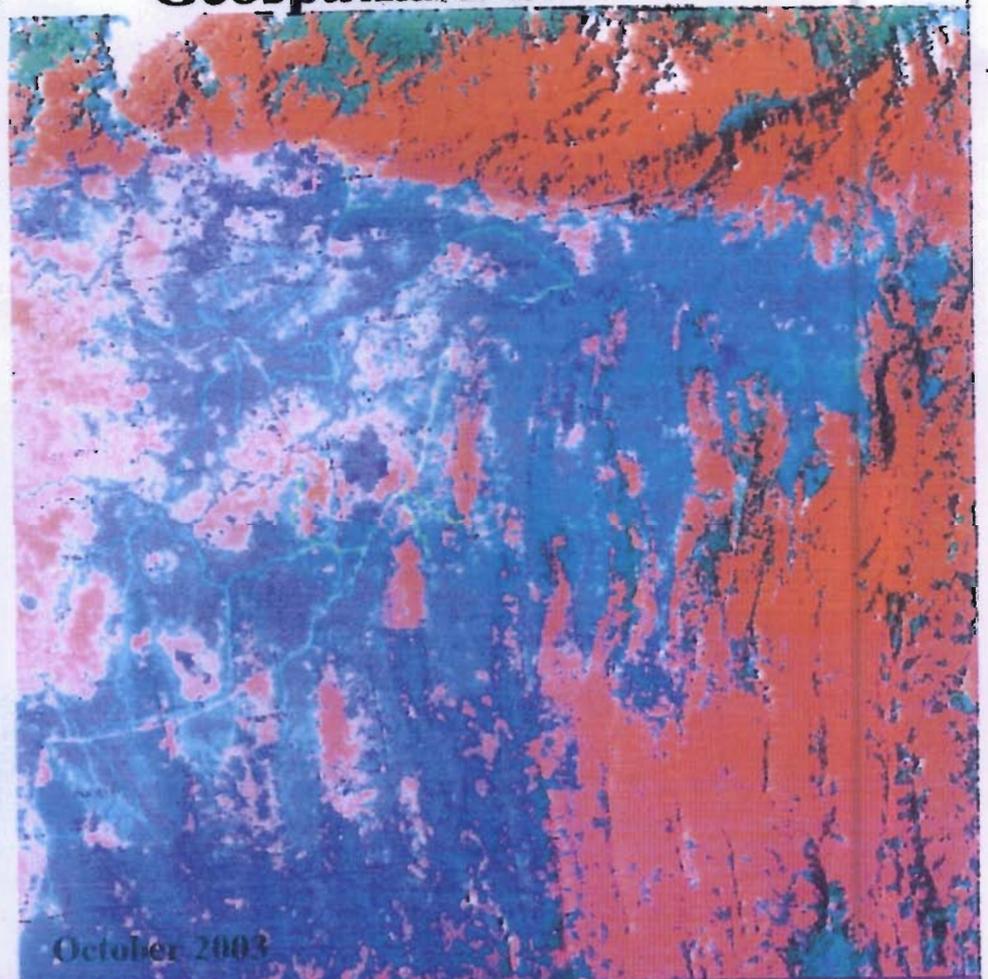
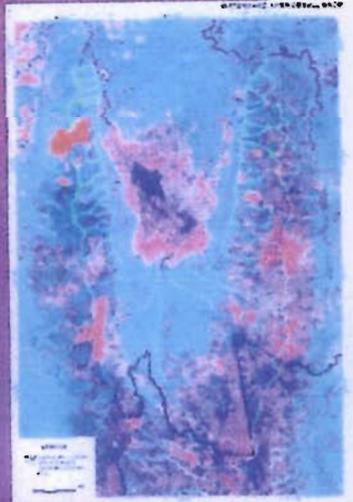
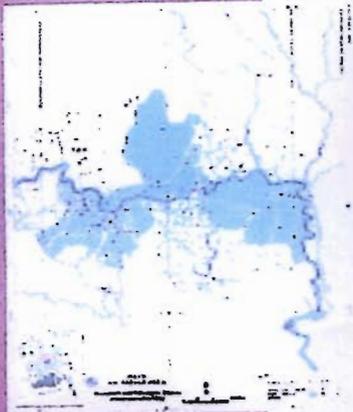
# MACH

## Completion Report

*Management of Aquatic Ecosystems through  
Community Husbandry*

**Volume 5**

## Geospatial Data Portfolio



October 2003



*A project of the Government of Bangladesh  
Supported by USAID*

*Project Partners:*

*Winrock International  
Bangladesh Centre for Advanced Studies (BCAS)*

*Center for Natural Resource Studies (CNRS)*

*CARITAS Bangladesh*



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**Volume 5**  
**Geospatial Data Portfolio**

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## Preface

The series of maps that follow are products that were created during the phase I of MACH. These maps products were used for planning, reporting and in some cases for input determination. They have also been used as the basis for the implementation of restoration schemes and for support in the establishment of government policy change in the land use areas.

These maps were created for use in MACH by MACH partner organization BCAS through their GIS division. All of the inputs and data were provided by MACH partners CNRS, CARITAS and Winrock International. The completion report series has been presented in Five (5) volumes of which this is the last. The volumes in the series are:

- Volume 1 - Main Report
- Volume 2 - Appendices to the Main Report
- Volume 3 - Fish Catch and Consumption Survey
- Volume 4 - Performance Monitoring
- Volume 5 - Geospatial Data Portfolio

# Geospatial Data and Portfolio

## 1 Overview

Geographic Information System (GIS) Division of Bangladesh Centre for Advanced Studies (BCAS) and a partner in MACH has prepared Geospatial and Non-geospatial database using Geographic Information System (GIS) and Remote Sensing (RS). Main objectives of the GIS and RS activity were to support various field level activities and facilitate decision-making processes at different levels.

Main tasks of the GIS components were to prepare baseline and monitoring databases containing biological, socio-economic, environmental and ecological information. This report presents major activities and outcomes of GIS and RS component of Phase I of MACH Project. The report provides an overview of the project areas and details on each site.

This GIS and RS component has prepared Geospatial and Non-geospatial database on three sites where MACH project is working. These are

- a) Hail Haor in Sreemangal and Maulavibazar Upazilas of Maulavibazar District,
- b) Turag-Bangshi River Basin in Kaliakoir and Mirzapur Upazilas of Gazipur and Tangail District, and
- c) Kongshaw-Malijhee River Basin in Sherpur and Jheenigati Upazilas of Sherpur District.

Considering the nature of the data, information and anticipated spatial analysis and outcome both spatial and non-spatial database management software have been used for data acquisition, storage and analysis. PC Arc/Info, widely used GIS software, is used for creating vector based geo-spatial database. ArcView and ArcView Spatial Analyst are used for carrying out spatial analysis. ArcView Image Analyst is used for extracting various types of features from IRS and Landsat images.

Map 1.1 shows three project sites in context of administrative coverage of the MACH Project. Map 1.2 shows Landsat TM Image of 1999 consist of MACH Project sites. Ground resolution of the image is (30mx30m) and provided in 3 bands (2, 3 & 4). In this image, red colors are dominated by high reflectance of vegetation. Light blue and white are associated with non-vegetated or follow land. Deep blue and dark blue are associated with water. It gives an overall impression of the project areas particularly the hydrological regime.

The average inundation and water extent of the three sites is presented in map 1.3. It is found that Hail Haor is a single sheet of water during the wet season. Turag-Bangshi Basin is made up of linear water bodies. The Kongshaw-Malijhee River Basin contains pockets of water below the foothill areas.

## 2 Hail Haor

### 2.1 Regional Setting

The Hail Haor Project is located in the North-Eastern Region of Bangladesh and is a part of the Sylhet Haor Basin. The project area is bounded by Dhaka-Sreemangal highway to the south, Sreemangal-Malvibazar highway to the east, Malvibazar-Shamsherganj road to the north and the west by Shamsherganj-Bhunbir road. Geographical location of the site is between 24°10" to 24°35" North Latitude and 91°35" to 91°47" East Longitude. This is a synclinal land formation between two mountains known as Balisira in the east and Satgaon in the west. Manu River passes over the northeast side of the project area and meets with the Kushyara River. Regional setting of Hail Haor is depicted in Map 2.1.

### 2.2 Images

The project used two types of remotely sensed images i.e. IRS Panchromatic and Landsat images. For Hail Haor area, it has acquired IRS Panchromatic image for the month of February 1999 and a Landsat Image for the month of January 1997 and March 1999.

The IRS Panchromatic image has a ground resolution of 6m x 6m and typically displayed in a gray color composition. Higher reflectance is associated with non-vegetated or fallow lands where deep gray and black are dominated by low reflectance from ground and are associated with vegetative and water area. Map 2.2 shows a full scene of an IRS image and Map 2.3 shows Hail Haor with its adjacent hills and floodplain area.

The two Landsat images have a ground resolution of 30m x 30m and are provided in bands 2, 3, and 4. It is typically displayed in a false color composition. Red colors are dominated by high reflectance of vegetation. Light blue and white are associated with non-vegetated or fallow lands. Deep blue and dark blue are associated with water areas. Visual representation of Landsat images for the year 1997 and 1999 of Hail Haor area is presented in Map 2.4. It shows changes of vegetative coverage over time. Blow-up images for the month of January 1997 and March 1999 is also presented in Map 2.5 and 2.6 respectively.

### 2.3 Administrative map

The administrative map (Map 2.7) of Hail Haor has been prepared using various layers of a GIS database. The project area is made up of 2 Upazilas i.e. Sreemangal and Maulavibazar under Maulavibazar District. There are 5 unions under Sreemangal Upazila and 4 unions under Maulavibazar Sadar Upazila. The administrative map shows key features such as road, rivers, settlement, and mouza boundary including mouza number. It also depicts the location of Upazila Headquarter and Union Parishad. A summary of administrative information of the Hail Haor project area is given in Table 2.1.

Table 2.1 Administrative Information of Hail Haor Project Site

District	Upazila	Union	Number of Mouza	Number of Villages
Maulavibazar	Sreemangal	Sreemangal	8	9
		Kalapur	13	15
		Ashidrun	3	14
		Bhunabir	10	11
		Mirzapur	11	16

District	Upazila	Union	Number of Mouza	Number of Villages
	Maulavibazar Sadar	Nazirabad	20	36
		Giashnagar	21	24
		Amtail (part)	5	17
		Kanakpur (part)	3	10

#### 2.4 Base Map

Base maps of the study area have been developed and consist of the project boundary, natural and physical features such as rivers (Monu, Gopla, Bilashi), khals and choras with their name, ponds, major and minor roads, and embankments. In addition, it also includes the union, upazila and district boundaries, and location of various important landmarks such as location of union parishad and MACH field offices. The river system and location of beels are also included in the Base Map. Map 2.8 is an example of a base map and the area of the respective upazila is given in table 2.2.

Table 2.2 Area of Project Area

District Name	Upazila Name	Area (ha.)
Maulvibazar	Sreemangal	15738
	Maulvibazar Sadar	8920

**River System:** Hail Haor is bounded by hills in the south, east and west. The Gopla is the only river draining this haor basin. There are different types of water bodies in Hail Haor. These include beels, canals, and seasonally inundated floodplains. Beels make up the predominant water feature in the Hail Haor basin. There are 133 beels spread over the project area. Most of the perennial beels are located within the central part of the Haor Basin, while seasonal beels are located mostly in and around the raised ridge of the basin.

Among the 133 Beels, 33 beels are privately owned, 17 beels have no record and the remaining are public property. Most beels are located in Sreemangal, Habibpur, Hazipur and Lamua mouzas. Map 2.8 shows spatial distribution of the beels. Detailed beel information is given in Table - 2.3 and Map 2.9 presents connectivity of beels in dry season.

Table 2.3 List of Beels

ID	Beel Name	GPS	GEOCODE	BBS Code	DISTRICT	UPAZILA	UNION	Mouza Name	OWNER	Condition
1	Dauri Beel	3	588385153	153	Maulvibazar	Srimangal	Srimangal	Dharaura (Part)	Government	NotSilted
2	Roa Ghal	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
3	Ayna Doba	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
4	Rowa	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
5	Charia	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
6	Saria Beel	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	Silted
7	Bera Gangina	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
8	Shada	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
9	Fhatagangina	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
10	Gang	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
11	Kalikazura	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
12	Agari	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
13	Maalzuria	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
14	Fulia	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
15	Garurghat	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
16	Gatua	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
17	Naiya	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
18	Golma	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
19	Gaindoba	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
20	Beri	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
21	Bhubanberi	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
22	Chapra/Koroi Doba	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
23	Lower Halkata	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
24	Bah Bakia	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
25	Khacher Duba	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
26	Napta Duba	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
27	Khara Luri	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
28	Biala	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
29	Kagaura/Beyai	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
30	Halkata	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted

ID	Beel Name	GPS	GEOCODE	BBS Code	DISTRICT	UPAZILA	UNION	Mouza Name	OWNER	Condition
31	Tinura	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
32	Nowa	1	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
33	Balla	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
34	Matar Beel	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
35	Chagibichara	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
36	Chowan	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
37	Honamua	3	588385913	913	Maulvibazar	Srimangal	Srimangal	Sreemangal	Government	NotSilted
38	Kuchbee	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
39	Gang	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
40	Agolberi	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
41	Guna	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
42	Ghalir Gul	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
43	Araigangina	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
44	Kulmara	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
45	Chandi	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
46	Agura	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
47	Ghoramara (D)	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
48	Dhigli (D)	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
49	Ralar Beel (D)	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
50	Chowdhury Doba (D)	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
51	Dolar Doba	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	Silted
52	Kunchaberi	3	588319533	533	Maulvibazar	Srimangal	Bhunabir	Laiarkul	Government	NotSilted
53	Dallduba	3	588319533	533	Maulvibazar	Srimangal	Bhunabir	Laiarkul	Government	NotSilted
54	Patradubi	3	588319533	533	Maulvibazar	Srimangal	Bhunabir	Laiarkul	Government	NotSilted
55	Pachua	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
56	Janalberi	3	588385877	877	Maulvibazar	Srimangal	Srimangal	Shahidpur	Government	NotSilted
57	Nlchardoba	3	588319533	533	Maulvibazar	Srimangal	Bhunabir	Laiarkul	NoRecord	NotSilted
58	Chatalduba	3	588319018	018	Maulvibazar	Srimangal	Bhunabir	Alisarkul	Government	NotSilted
59	Charaduba	3	588319018	018	Maulvibazar	Srimangal	Bhunabir	Alisarkul	NoRecord	NotSilted
60	Talaber doba	3	588319018	018	Maulvibazar	Srimangal	Bhunabir	Alisarkul	NoRecord	NotSilted
61	Falar Doba	3	588319018	018	Maulvibazar	Srimangal	Bhunabir	Alisarkul	Private	NotSilted

ID	Beel Name	GPS	GEOCODE	DBS Code	DISTRICT	UPAZILA	UNION	Mouza Name	OWNER	Condition
62	Phathara Doba	3	588319841	841	Maulvibazar	Srimangal	Bhunabir	Shasan	Government	NotSilted
63	Kankala	3	588319841	841	Maulvibazar	Srimangal	Bhunabir	Shasan	Government	NotSilted
64	Latua	3	588319841	841	Maulvibazar	Srimangal	Bhunabir	Shasan	Government	NotSilted
65	Paler Doba	3	588319841	841	Maulvibazar	Srimangal	Bhunabir	Shasan	Private	NotSilted
66	Dumer Beel	1	588319217	217	Maulvibazar	Srimangal	Bhunabir	Bhunabir	Government	NotSilted
67	Garur Dara	1	588319217	217	Maulvibazar	Srimangal	Bhunabir	Bhunabir	Government	NotSilted
68	Shudeer beel	1	588319171	171	Maulvibazar	Srimangal	Bhunabir	Bhimsi	Government	NotSilted
69	Fu-anna Beel	1	588328352	352	Maulvibazar	Srimangal	Kalapur	Hail Haor	Government	NotSilted
70	Magura	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
71	Koralya Doba	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	NoRecord	NotSilted
72	Chapra/Bakka	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
73	Jaduriya	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
74	Dhuilla	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
75	Boalzaan	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
76	Shaldigha	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
77	Dhalidoba	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
78	Medi	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
79	Lai Beel	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
80	Bara Andha	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
81	Kalla	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
82	Cholo Andha	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
83	Switchalla	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
84	Khangla	1	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
85	Padmadoba (D)	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
86	Dolidoba	1	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
87	Chuiyaa-Mulyaa	1	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
88	Chuch-Much	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Private	NotSilted
89	Aralla	1	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
90	Kashimpuri Haikata	3	588328343	343	Maulvibazar	Srimangal	Kalapur	Habibpur	Government	NotSilted
91	Payera Doba	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Private	NotSilted

ID	Beel Name	GPS	GEOCODE	BBS Code	DISTRICT	UPAZILA	UNION	Mouza Name	OWNER	Condition
92	Maya	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Private	NotSilted
93	Daya	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Private	NotSilted
94	HaiDhiga	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Government	NotSilted
95	Putia Kharer Doba	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Private	NotSilted
96	Chabri Doba	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
97	Nagura	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
98	Dubi Halkata	1	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Government	NotSilted
99	Rowa Beel	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Government	NotSilted
100	Bar Aalia	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	NoRecord	NotSilted
101	Kaikka	3	588328551	551	Maulvibazar	Srimangal	Kalapur	Lamua	Government	NotSilted
102	Piana	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
103	Gular Ba	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
104	Makanna	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Government	NotSilted
105	Ultanna	3	588328361	361	Maulvibazar	Srimangal	Kalapur	Hajipur	Private	NotSilted
106	Chardotu	3	588328135	135	Maulvibazar	Srimangal	Kalapur	Baruna	Private	NotSilted
107	Bargu	1	588328352	352	Maulvibazar	Srimangal	Kalapur	Hail Haor	Government	NotSilted
108	Balla	1	588319316	316	Maulvibazar	Srimangal	Dhunabir	Gandharbapur	Government	NotSilted
109	Chiruadubi	1	588347014	14	Maulvibazar	Srimangal	Mirzapur	Baulashir	Government	NotSilted
110	Alniberi	1	588328352	352	Maulvibazar	Srimangal	Kalapur	Hail Haor	Government	NotSilted
111	Laler Doba	3	588328135	135	Maulvibazar	Srimangal	Kalapur	Baruna	Government	NotSilted
112	Srimolimara	3	588328135	135	Maulvibazar	Srimangal	Kalapur	Baruna	Private	NotSilted
113	Shananda	1	588347443	443	Maulvibazar	Srimangal	Mirzapur	Jatra Pasha	Government	NotSilted
114	Katar Beel	3	587487673	673	Maulvibazar	Moulvibazar	Nazirabad	Manik Haor	NoRecord	NotSilted
115	Bayra	3	588328135	135	Maulvibazar	Srimangal	Kalapur	Baruna	Government	NotSilted
116	Balanlya	3	587487077	077	Maulvibazar	Moulvibazar	Nazirabad	Atghar	NoRecord	NotSilted
117	Laribeel	3	587487673	673	Maulvibazar	Moulvibazar	Nazirabad	Manik Haor	NoRecord	NotSilted
118	Agaree	3	587487500	500	Maulvibazar	Moulvibazar	Nazirabad	Hosampur	NoRecord	NotSilted
119	Tibri	3	587487165	165	Maulvibazar	Moulvibazar	Nazirabad	Baraibari	NoRecord	NotSilted
120	Ghoradhiga	3	587487165	165	Maulvibazar	Moulvibazar	Nazirabad	Baraibari	NoRecord	NotSilted
121	Chotokuma	3	587487445	445	Maulvibazar	Moulvibazar	Nazirabad	Gobindapur	NoRecord	NotSilted
122	Borokuma	3	587487445	445	Maulvibazar	Moulvibazar	Nazirabad	Gobindapur	NoRecord	NotSilted
123	Jhurmedehi	3	587487445	445	Maulvibazar	Moulvibazar	Nazirabad	Gobindapur	NoRecord	NotSilted

ID	Beel Name	GPS	GEOCODE	BBS Code	DISTRICT	UPAZILA	UNION	Mouza Name	OWNER	Condition
124	Sonamaya	3	587436000		Maulvibazar	Moulvibazar	Giasnagar	Srimangal Chak	NoRecord	NotSilted
125	Shilabeel	3	587436331	331	Maulvibazar	Moulvibazar	Giasnagar	Dasrail	NoRecord	NotSilted
126	Amua Beel	3	587436849	849	Maulvibazar	Moulvibazar	Giasnagar	Ranguria	NoRecord	NotSilted
127	Baldda Beel	3	588328135	135	Maulvibazar	Srimangal	Kalapur	Baruna	Private	NotSilted
128	Apna Beel	3	588328135	135	Maulvibazar	Srimangal	Kalapur	Baruna	Private	NotSilted
129	Jalbura	3	587436844	844	Maulvibazar	Moulvibazar	Giasnagar	Ranabhin	Private	NotSilted
130	Kazura Beel and Khal	3	587436062	062	Maulvibazar	Moulvibazar	Giasnagar	Anikelibuda	Government	NotSilted
131	Jhethua Beel	3	588328651	651	Maulvibazar	Srimangal	Kalapur	Nayansree	Government	NotSilted
132	Beri Beel	1	588328352	352	Maulvibazar	Srimangal	Kalapur	Hail Haor	Government	NotSilted
133	Garar Doba	1	588328352	352	Maulvibazar	Srimangal	Kalapur	Hail Haor	Government	NotSilted
133	Manik Haor	3	587487673	673	Maulvibazar	Moulvibazar	Nazirabad	Manik Haor	Government	NotSilted

## 2.5 Landuse Map

Hydrological characteristics and physiography of the area play a critical role for determining land use. A survey has been carried out to determine dry season landuse of the Hail Haor. Three broad landuse categories have been observed in the area including *Boro* and *Aman* rice cultivation, pasture and wetlands use.

It is found that *Boro* (HYV rice), cultivated in the dry season, is the dominant crop. In Hail Haor, it occupies about 25 percent of the total land area. Perennial water covers about 17 percent of the area. Mainly grass, water hyacinth and other floating aquatic vegetation cover the wetland. Settlement, pastureland, *dholkolmi*, and aquaculture accounted for seven percent, six percent, two percent and one percent, respectively. A significantly high portion of land (41 percent) is found as current fallow, of which most area is used for deepwater and transplanted *Aman* cultivation in the monsoon season. Area under landuse type is presented in Table 2.4.

Table 2.4 Landuse of Hail Haor

Landuse Type	Area (ha.)
Boro	5043
Pasture	1220
Dholkolmi	365
Pasture & Dholkolmi	158
Settlement	1826
Current Fallow	11563
Water Bodies	3416
Pond	21
Aquaculture Firm	101
Watermelon	23
Total	23734

The dry season water area of Hail Haor area has further been classified into three broader categories based on a landuse database of March-April 2001. Dry season water area and landuse maps of Hail Haor are presented in Map 2.9 and 2.10, respectively. Estimated data on dry season water area of Hail Haor is presented in Table – 2.5.

Table 2.5 Estimated dry season water area

Types of water area	Area in ha.
River and Khals (Gopla and Others Khals in project area)	462.5
Beels (having clear boundary in dry season)	467.4
Haor and Beels (beels do not have clear boundary)	2556.3
Total Area	3486.2

## 2.6 Project Activity Database and Maps

The project activity database is comprised of three general types of activity i.e. a) Wetland Resource Development and Management Activity, b) Resource Management Committee and Beneficiaries Group, and c) Location of Various Monitoring Activity.

The wetland Resource Development and Management Activity database consists of activities carried out in the project areas such as riparian reforestation, demonstration projects and re-excavation sites. The spatial distribution of resource development and management activities is presented in Map 2.11. Resource Management Committee and Beneficiaries Group database consist of boundary of Beel Resource Management Organizations and location of male and female groups. Map 2.12 presents boundary of resource management committees and location

of male and female groups. The MACH project is also monitoring environmental and social parameters, which includes river and chora discharge, rainfall, water level, household consumption, and fish catch. Map 2.13 presents the spatial distribution of monitoring locations.

## 2.7 Area Under Improved Management

The area under improved management of the Hail Haor is prepared based on various activities carried out under the MACH project in order to show progress of the project target. The area under improved management has been determined based on the RMO area of influence with its management. It is found that the project has brought 3145 ha under improvement management in 2001, 650 ha in 2002 and 4524 in 2003. Over the project period a total 7622 ha of area has brought under improved management in Hail Haor. Table 2.6 presents area under improved management in detail. Map 2.14 presents the spatial distribution of RMO boundary and area under improved management.

Table-2.6 Hail Haor Sites: Area under improved management.

RMO	LU	Year			Total
		2001	2002	2003	
Agari Beel RMO	Land	440.65		120.98	561.63
	Settlement	51.98	17.56	12.55	82.09
	Waterbody	8.94		50.09	59.03
	Road Side Plantation	1.84	7.22		9.06
	<b>Total</b>	<b>503.42</b>	<b>24.78</b>	<b>183.62</b>	<b>711.81</b>
Alia Chhora RMO	Land	48.95			48.95
	Settlement	37.53			37.53
	Chora Plantation			13.24	13.24
	<b>Total</b>	<b>86.49</b>	<b>0.00</b>	<b>13.24</b>	<b>99.72</b>
Balla Beel RMO	Land	107.71	18.01	50.16	175.89
	Settlement	150.24			150.24
	Waterbody	107.64	9.61	60.52	177.77
	Road Side Plantation		0.82		0.82
	Chora Plantation	1.23	0.65	1.82	3.70
	Kanda			0.00	0.00
<b>Total</b>	<b>366.83</b>	<b>29.08</b>	<b>112.51</b>	<b>508.42</b>	
Baula Chhora RMO	Land	166.35			166.35
	Settlement	30.00			30.00
	<b>Total</b>	<b>196.35</b>	<b>0.00</b>	<b>0.00</b>	<b>196.35</b>
Boro Gangina RMO	Land			618.25	618.25
	Settlement		35.59		35.59
	Waterbody		0.38	1292.39	1292.77
	Road Side Plantation		6.40	2.35	8.75
	Kanda			43.52	43.52
	Khal		15.31	5.95	21.25
<b>Total</b>	<b>0.00</b>	<b>57.68</b>	<b>1962.46</b>	<b>2020.13</b>	
Dumuria Beel RMO	Land	510.17			510.17
	Settlement	55.71	1.28		56.99
	Waterbody	181.68			181.68
	Road Side Plantation	2.23	3.40		5.64
	Chora Plantation			2.44	2.44

	Kanda	13.75			13.75
	Total	763.55	4.69	2.44	770.68
Jag Chhora RMO	Land	86.37			86.37
	Chora Plantation		1.38		1.38
	Total	86.37	1.38	0.00	87.75
Jethua Beel RMO	Land	247.97		428.28	676.25
	Settlement	65.18		15.23	80.41
	Waterbody	2.51		575.71	578.22
	Road Side Plantation	1.57	2.09	6.98	10.64
	Chora Plantation			2.52	
	Total	317.24	2.09	1028.82	1345.53
Joita Chhora RMO	Land	184.19			184.19
	Total	184.19	0.00	0.00	184.19
Kazura Beel RMO	Land	241.70		619.23	860.94
	Settlement	77.99	35.73		113.71
	Waterbody	9.25		7.81	17.06
	Road Side Plantation	1.96			1.96
	Total	330.90	35.73	627.05	993.67
Sananda Beel RMO	Land	87.89	191.16	391.90	670.95
	Settlement	129.77			129.77
	Waterbody	4.14	100.44	182.62	287.20
	Road Side Plantation	1.93	3.26		5.19
	Chora Plantation			2.01	2.01
	Total	223.74	294.86	576.53	1095.12
Out side of RMO but managed by RUG/MACH	Settlement	85.35	182.69		268.04
	Road Side Plantation		14.31	2.95	17.27
	Chora Plantation			3.68	
	Pineapple Demo	0.49	1.92	10.39	12.80
	Total	85.84	198.92	17.03	298.11
<b>Grand Total</b>		<b>3114.90</b>	<b>649.20</b>	<b>4523.68</b>	<b>8331.48</b>

## 2.8 Project Impact Maps

MACH-BCAS has carried out an exercise to show project impacts against baseline data. The impacts of the project activities have been shown under three broad categories based on monitoring data collected by CNRS. Impact of Catch Per Unit of Area (CPUA) is shown in Map 2.15, Fish Species Diversity is shown in Map 2.16, and Per Capita Fish Consumption is shown in Map 2.17. Catch Per Unit Area and Species Diversity have been shown according to 7 monitoring beels and Per Capita Fish Consumption has shown been according to 14 monitoring villages.

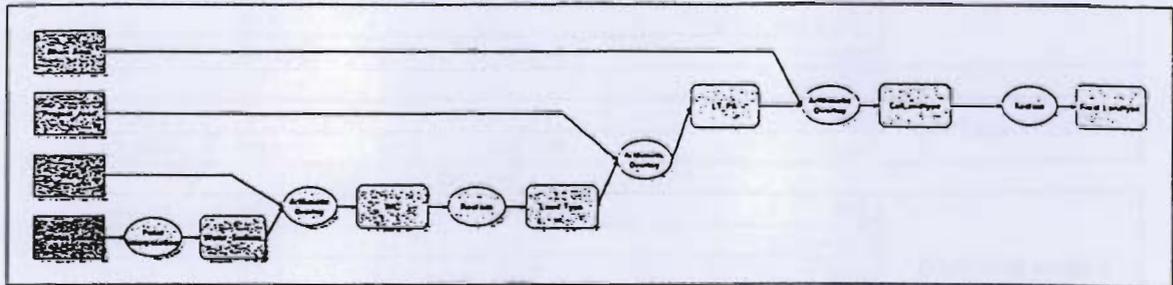
## 2.9 Watershed and Hydrology and of Hail Haor

MACH has prepared watershed maps of the foothills based on a Water Development Board map. The map helps to understand the hydrological characteristics and determine monitoring stations. The watershed boundary of different sub-catchments are presented in the Map 2.18.

### 2.9.1 Hydrological Analysis

The hydrological analysis for the Hail Haor project area has been conducted using the Digital Elevation Model (DEM) and water level data of four selected stations. The Digital Elevation Model (DEM) has been prepared for Hail Haor taking spot elevations from the contour map of Bangladesh Water Development Board and spot height of perennial and low-lying area derived through the GPS survey. It also used the project boundary and the river database during its calculation. Figure 1 describes the methodology and procedure that was used for the hydrological analysis and find the water extent of the Hail Haor project area.

Fig 1 Methods and Procedures used for Hydrological Analysis



The extent of water for the months of January to June 2001 and July to December 2001 is given in Map 2.19a and 2.19b, respectively. The water extent for the months of January to June 2002 and July to December 2002 is given in Map 2.20a and 2.20b, respectively. It has been found that the inundated area of the project site dropped suddenly in the month of December/January and became the lowest in the month of April. The highest area under water is found in the months of June/July.

### 2.9.2 Changes of Water Area

A comparative analysis of month-wise changes of water area for the year 2001 and 2002 has also been carried out and the result out comparative analysis is presented in map 2.21a to 2.21b. The area under water and water level were higher in the year 2002 compared to 2001 because of relatively higher rainfall during that year. On the other hand rainfall in the year 2001 was moderate. Total rainfall in 2002 was 1104 mm and 930 mm in 2001.

The extent of water area is almost linear with the increase of water level up to 4.5 (PWD). But small changes in water level from that point bring more area under water because a large amount of land of Baruna. Hazipur villages is more or less flat.

### 2.10 Landuse of Lawa Chhora Forest and Adjacent Area

Landuse of the Lawa Chhora forest and adjacent area of Hail Haor has been prepared. Landsat and IRS Panchromatic images have been used to prepare the Landuse database and map. Detailed landuse of the area is presented in map 2.22 and the estimated area is shown in Table 2.7.

Table-2.7 Estimated landuse area of Lawa Chhora forest and adjacent area.

Landuse	Area (ha)
Barren Land	1232.3
Boro Cultivation	301.5
Degraded Forest	1192.3
Degraded Land	327.9
Dense Forest	1847.6
Pasture	32.5
Rubber Garden	161.0
Settlement	641.4
Tea Garden	2087.4
Urban Area	312.7
Waterbody	2.4
Grand Total	8139.0

### 2.11 Map of Proposed Permanent Sanctuary

Maps on the proposed permanent sanctuary showing the present status of landuse, ownership and land records have been prepared. A field visit was made for assessing the physical and social condition of the proposed areas and then a GPS survey has been carried out to acquire a detailed land use of the proposed area. The survey has been carried out involving the local *Kanongo* and *Surveyor* and they have also been involved in collecting other relevant information related to land ownership.

In Hail Haor, there is only one site selected for permanent sanctuary and this is the Jaduria and Chapra-Magura beel complex locally known as Bikka beel complex. The present status and landuse map of Chapra-Magura, Jaduria and Khagaura Behai Beel and adjacent area is shown in map 2.23 and 2.24.

### 2.12 Detail Watershed Mapping of Joita Chora and Jag Chora

In addition to overall watershed mapping, detailed watershed mapping of Joita and Jag Chhora was carried out. This mapping exercise was done to involve different stakeholders in the chhora management. Map 2.25a, 2.25b, 2.26a and 2.26b present details of the watersheds Joita and Jag Chhora.

### 3 Turag Bangshi Site

#### 3.1 Regional Setting

The Turag Bangshi site is located in Kaliakoir Upazila of Gazipur District and Mirzapur Upazila of Tangail District. Most of the study area falls within the Pleistocene Terrace of North Central Region of Bangladesh. Geographical location of the site is between 24°00' to 24°12' North Latitude and 91°10' to 91°20' East Longitude. It is a semi-rural site and representative of Jamuna Floodplain habitats. The River Turag divides the study area into two parts, north and south. Aowla and Mokash Beel are located in the northern and southern side of the river respectively. The regional view of the project area is presented in map 3.1. In the regional viewpoint the study area falls under north central region of the country.

#### 3.2 Images

As mentioned in the Hail Haor section of the report that the project acquired IRS Panchromatic and Landsat images for the project. The project has acquired IRS Panchromatic image for the month of February 1999 and Landsat Image for the month of January 1997 and March 1999.

The IRS Panchromatic image has a ground resolution of 6m x 6m and is typically displayed in a gray color composition. Higher reflectance is associated with non-vegetated or fallow lands where deep gray and black are dominated by low reflectance from ground and are associated with vegetative and water area. Map 3.2 depicts IRS image of TB area with its adjacent area.

The two Landsat images have a ground resolution of 30m x 30m and are provided in bands 2, 3, and 4. It is typically displayed in a false color composition. Red colors are dominated by high reflectance of vegetation. Light blue and white are associated with non-vegetated or fallow lands. Deep blue and dark blue are associated with water bodies. Visual representation of Landsat images for the year 1997 and 1999 of Hail Haor area is presented in Map 3.3. It shows changes of vegetative coverage over time. Blow-up images for the month of January 1997 and March 1999 is also presented in Map 3.4 and 3.5 respectively.

#### 3.3 Administrative Map

The administrative map of Turag-Bangshi project area has been prepared using various GIS layers of database and information. The project area includes 3 upazilas (Kaliakoir, Basail and Mirzapur) under Gazipur and Tangail district. There are 8 unions under the Kaliakoir upazila and 8 unions under Mirzapur upazila. The administrative map shows key features such as roads, rivers, settlements, and mouza boundary including mouza number. It also shows the location of the Upazila Headquarter and Union Parishad. A summary of the administrative information of Turag Bangshi area is given in Table 3.1. Map 3.6 represents the administrative information of the Turag Bangshi project area.

Table 3.1. Administrative Information of the Project Sites with Activity Area

District	Upazila	Union	Number of Mouza	Number of Villages
Gazipur	Kaliakoir	Atabaha (part)	3	3
		Boali	12	27
		Chapair	17	17
		Fulbaria	7	15
		Madhyapara	6	37
		Mouchak	21	45

		Srifaltali	14	14
		Sutrapur	11	11
Tangail	Mirzapur	Ajgana	15	14
		Bhatgram	1	1
		Fatehpur	14	14
		Gorai	5	5
		Jamurki	3	3
		Mahera	14	15
		Mirzapur	4	7
		Bastail	5	4

### 3.4 Base Map

Base maps of the study areas consist of project boundary, natural and physical features such as rivers (Turag, and Bangshi), khals, beels, ponds, major and minor roads, and embankments. In addition, it also consists of the union, upazila and district boundaries. The location of various important landmarks such as the location of union parishad. Map 3.7 represents the base map of project area with the size of the project area given in Table 3.2.

Table 3.2. Basic Information of Turag-Bangshi Site

District	Upazila	Area (ha.)
Gazipur	Kaliakoir	18552
Tangail	Mirzapur	13275
Tangail	Basail	5605

**River System and Beel Catchment:** The Turag-Bangshi Basin area has been divided into two major hydrological catchments, i.e. Mokash and Aowla Beel. Hydrological zones and the catchment areas with river system and dry season water area are presented in map 3.7a, and area of each zone and catchment is given in Table 3.3.

Table 3.3. Area of Mokash and Aowla Beel Catchment

Name	Area (ha.)
Mokash Beel Catchment	5010
Aowla Beel Catchment	9566
Grand Total	14576

### 3.5 Dry Season Water Area

The dry season water area of Turag-Bangshi Site area has been estimated for the months of March-April 2001 through a GPS survey. Remote sensing image particularly Landsat and IRS Panchromatic images, have been used as a background data set. Spatial distribution of dry season water area of Turag-Bangshi is presented in map 3.8 and table 3.4 and 3.5 represents the estimated area. It is to be noted here that the dry season area may fluctuate year to year due to naturally, fluctuating floodplains.

Table 3.4. Estimated Dry Season water Area of Mokash Beel Catchment

Types of Water Area	Area in ha.
Khal and Beel (dry season) Mokesh and Kalidaha	39.70
Pond (Adjacent to Mokesh and Kalidaha beel)	9.20
Total	48.90

**Table 3.5 Estimated Dry Season Water Area of Aowla Beel Catchment**

Items	Area in ha.
Dry Season Beel	
Aowla Beel	73.50
Jogar Hari Beel	16.80
Ukonmari Beel	9.90
Abdi Beel	0.45
Total	100.65

### **3.6 Landuse Map**

Landuse maps for the Turag Bangshi project area have been prepared from field survey data and Landsat TM and IRS Panchromatic images. It is found that Boro is predominant in the dry season and a large area is found to be current fallow. Landuse of Turag-bangshi is shown in map 3.9 and details are given in table 3.6.

**Table 3.6 Landuse of Turag-Bangshi Project Area, March 2001**

Landuse	Area in ha.
Boro	4414
Settlement	5750
Forest	952
Fisheries	48
Industries	92
Khal & Beel	226
Pond	161
Current Fallow	7487
Total	19130

### **3.7 Project Activity Maps**

The Project activity database is made up of three types of activities: a) Wetland Resource Development and Management Activity, b) Resource Management Committee and Beneficiaries Group, and c) Location of Various Monitoring Activity.

The wetland Resource Development and Management Activity database consists of activities carried out in the project area such as riparian swamp reforestation, demonstration projects and re-excavation. Spatial distribution of the resource development and management activities is presented in Map 3.10. The Resource Management Committee and Beneficiaries Group database consists of boundaries of Beel Resource Management Organizations and location of male and female groups. Map 3.11 demonstrates the boundary of the resource management committee and the location of male and female groups. The MACH project is also monitoring environmental and social parameters, which include river discharge, water level, rainfall, household consumption, and fish catch. Map 3.12 presents the spatial distribution of monitoring locations.

### **3.8 Area Under Improved Management**

The area under improved management of the Turag Bangshi is prepared based on the extent of best practice use in the project site. Natural features such as rivers, water bodies, highland and physical features such as roads, settlements, and the experience of field officers have been considered in the identification RMO boundary. The area under improved management has been calculated based on the RMO area of influence with its best practice management. It is found that the project has brought 1480 ha under improved management in 2001, 1900 ha in 2002 and 900 in 2003. Over the project period a total 4,280 ha of area has brought under improved

management in Hail Haor. Table 3.7 presents area under improved management in detail. Map 2.13 presents the spatial distribution of RMO area under improved management.

Table 3.7 Turag Bangshi Site: Area under improved management

Name	Year			Total
	2001	2002	2003	
Alua Beel RMO	600	950	900	2450
Mokosh Beel RMO	725	950		1675
<i>River / Khal</i>				
Turag River RMO	155			155
Total	1480	1900	900	4280

### 3.9 Project Impact Maps:

The project has carried out an exercise to show project impacts against baseline data in the spatially. The impact of Catch Per Unit of Area (CPUA) is shown in map 3.14, Fish Species Diversity is shown in map 3.15 and Per Capita Fish Consumption is shown in map 3.16.

### 3.10 Map of Proposed Permanent Sanctuary

Maps of the proposed permanent sanctuary showing all information on present status of land use, ownership and land records have been prepared. At first a field visit has been carried out for the assessment of physical and social condition. A GPS survey was then carried out to acquire detailed land use of the proposed area. The survey has been carried out with the help of the local *Kanongo* and *Surveyor*, and they have also been involved in providing other relevant information related to land ownership.

In Turag Bangshi site, there are five locations that were selected for permanent sanctuary status. These are a) Dholi Daha in Mokash beel, b) Boro Daha in Aowla beel, and c) Three river *Kums* in Turag River namely *Golachipa Kum*, *Lalkhar Kum* and *Gabtoli-Sayedpur Kum*. Maps of these selected sites are presented in map 3.17 to 3.19.

## 4 Kongshaw-Malijhee Site

### 4.1 Regional setting

The Kongshaw-Malijhee river basin is located in Sherpur District. The area has changed dramatically in the last 15/20 years with the deforestation of large portions of the watershed within Bangladesh and India. Map 4.1 shows regional setting of the Kongshaw-Malijhee project area.

### 4.2 Images

The project acquired and used two types of images. One was the IRS Panchromatic and the other Landsat images. The IRS Panchromatic image is for the month of February 1999 and Landsat Image is for the month of January 1999 and March 1999.

The IRS Panchromatic image has a ground resolution of 6m x 6m and typically displayed in a gray color composition. Higher reflectance is associated with non-vegetated or fallow lands where the deep gray and black are dominated by low reflectance and are associated with vegetative and water areas. Map 4.2 shows the IRS Image of Kongshaw-Malijhee river basin with its adjacent hills and floodplain area.

### 4.3 Administrative Map

Kongshaw-Malijhee river basin project area includes two upazila's namely Sherpur Sadar and Jhenaigati. There are seven unions under Sadar upazila and four unions under Jhenaigati upazila. Map 4.6 represents the administrative information of the project area, and table 4.2 presents detailed information.

Table 4.2 Administrative Information of the Project Sites with Activity Area

District Name	Upazila name	Union Name
Sherpur	Sherpur Sadar	Dhala
		Bagitkhila
		Paurashava
		Ghazir Khamar
		Bhatsala
		Kamaria
		Pakuria
	Jhenigati	Hatibandha Malijhikani
		Jhenigati
		Nakura Gauripur
		Kangsha Dhansail

### 4.4 Base Map

During the months of January to December 2001, a GIS database on river, road and dry season beels have been prepared where Landsat TM image (March, 99) IRS image (February, 00) and Topographic maps were used as base materials.

Map 4.7 presents the basic data layers of the project area, which includes the present river course, road network, settlement area and dry season beels.

#### **4.5 River System and Location of Beel**

Someswari, Maroshi and Chillakhali are major rivers, originating in the Indians hills and falling through the project area. There are other rivers also flowing through with small streams connecting various parts of the project area. Examples are the Sori, Lalghosha, Dingana, Katakhal Khal, Chua Khal, and Balesher Khal.

Someswari, Sori and Kalghosha rivers meet near the village Dariarpar and jointly feed the Dholi beel complex. These rivers carry significant amounts of sediment in the rainy season and siltation rate is relatively higher in this area. The river section of Dholi beel to Sherpur-Jehnaigati road is known as Bogadobi Khal.

Maroshi river changes its name after joining with Bogadobi khal. The rivers when joined are known as Malijhee which crosses Tinani Bazar.

#### **Changes of River Course over Time**

Most of the rivers in the area have shifted their course over the period of 1965 to 2000. Significant shifting has been noticed for the lower part of the Shomeswari, Sori, Kalghosha rivers of Jhenaigati Upazila. At present, major flow of the river Malijhee is passing through Chua khal, which passed through Balughat earlier. The Chillakhali River has also changed its course. The river system and catchment boundary of Malijhee river is shown in map 4.8 and the changes of river Course are shown in map 4.9.

#### **4.6 Beel Complexes**

In order to carry out project activities the Kongshaw-Malijhee River Basin area has been divided into four areas known as Beel Complexes. These four beel complexes are a.) Dholi Beel Complex, b.) Malijhee Beel Complex, c.) Aowra Bowra Beel Complex, and d.) Rewa Beel Complex. A brief description of each beel complex is given below.

##### **Dholi Beel Complex**

The beel complex is located on the western side of Sherpur-Jheenaigati road. The beel complex is made up of 10 different beels of which Dholi, Baila and Bailsha are the larger beels among them. The beel complex is surrounded by earthen roads and villages. The nearest villages are in the southern side. These are Konagaon and Balinagar, and in the northern side Dariapur, Kallapara and Nayapara. The beel complex is accessible by rural road in the dry season and through country boat in monsoon from Bogadobi Bridge. Map 4.10 illustrates the location of the beel complex with other relevant information such as beel and village names.

##### **Malijhee Beel Complex**

This beel complex is located in between the Malijhee River and Kalibari Bazar, and eastern side of the Malijhee River. The beel complex is made up of several beels of which Malijhee, Dakai and Baidabhanga are the larger beels among them. The west, northwest and northern side of the beel complex is surrounded by paved roads and the eastern and southern sides are surrounded by villages. The beel complex is accessible by rural road in dry season and through country boat in monsoon from Tinani Bazar. Map 4.11 presents location of the beel complex with other relevant information such as beel and village names.

##### **Aowra Bowra Beel Complex**

This beel complex is located in the northwestern side of Sherpur-Nalitabari road, and is a large beel, semi-closed in nature. The beel complex is surrounded by rural roads. The beel complex is accessible by road in both in the dry and monsoon season. Map 4.12 shows location of the beel complex with other relevant information such as beel and village names.

#### Rewa Beel Complex

The beel complex is located on the western side of Sherpur town and northern side of the Nakal-Sherpur road. This is also a semi-closed beel surrounded by rural roads and villages. The beel complex is accessible by rural road in the dry and monsoon seasons. Map 4.13 shows the location of the beel complex with other relevant information such as beel and village names.

#### 4.7 Landuse Map

Landuse of the Sherpur site has been prepared to allow the project to plan resources management activities. Landsat TM and IRS Panchromatic images have been used to prepare the landuse database and map. Landuse of Kangshaw-Malijhee is shown in map 4.14 and landuse details given in table 4.3.

Table 4.3 Landuse of Kangshaw-Malijhee Project Area, March 2000

Landuse Type	Area (ha)
Current Fallow	7169.06
Settlement	4032.07
Forest	2176.89
Boro	9835.07
Waterbody	513.95
Total	23727.04

#### 4.8 Project Activity Maps

The project activity database is made up of three sets of data: a) Wetland Resource Development and Management Activity, b) Resource Management Committee and Beneficiaries Group, and c) Location of Various Monitoring Activity.

The wetland resource development and management activity database consists of various activities carried out in the project area such as different types of reforestation, demonstrations, and restoration activities. Spatial distribution of the resource development and management activities is presented in Map 4.15. The resource management committee and Beneficiaries Group database consist of the boundary of the Beel Resource Management Organizations and location of the male and female groups. Map 4.16 presents boundary of resource management committee and location of male and female group. The MACH project is also monitoring environmental and social parameters, which include river discharge, water level, rainfall, household consumption, and fish catch. Map 4.17 presents spatial distribution of monitoring locations.

#### 4.9 Area Under Improved Management

The area under improved management of the Kangshaw-Malijhee is prepared based on various activities carried out under the MACH project. Area under improved management has been determined based on the RMO area of influence with its management. It is found that the project has brought 1655 ha under improvement management in 2001, 880 ha in 2002 and 3740 in 2003. Over the project period a total 6275 ha of area has been brought under improved

management in Hail Haor. Table 4.4 presents area under improved management in detail. Map 4.18 presents the spatial distribution of the RMO boundary and area under improved management.

Table 4.4 Kongshaw Malijhee Site: Area under improved management.

SITE	AREA (ha)			TOTAL
	2001	2002	2003	
<b>Beel</b>				
Aourabaura Village Committee	65	205	15	285
Bailsha Beel RMO	300		330	630
Dholi-Baila Beel RMO	430	15	125	570
Kewta Beel RMO	170	270	780	1220
Takimari-Dharabasia Beel RMO	690		950	1640
<b>River/Jhora</b>				
Bogdubi-Paglarmukh River Section			10	10
Kalghosha Chhora Committee		330		330
Nakshi Jhora Committee		60		60
Someswari River Committee			10	10
Gaimara Kur Committee			1520	1520
<b>Grand Total</b>	<b>1655</b>	<b>880</b>	<b>3740</b>	

#### 4.10 Project Impact Maps:

The project has carried out an exercise to show project impacts against baseline data in a spatial context. Impact of Catch Per Unit of Area (CPUA) is shown in map 4.19, Fish Species Diversity is shown in map 4.20 and Per Capita Fish Consumption is shown in map 4.21.

#### 4.11 Map of proposed permanent sanctuary

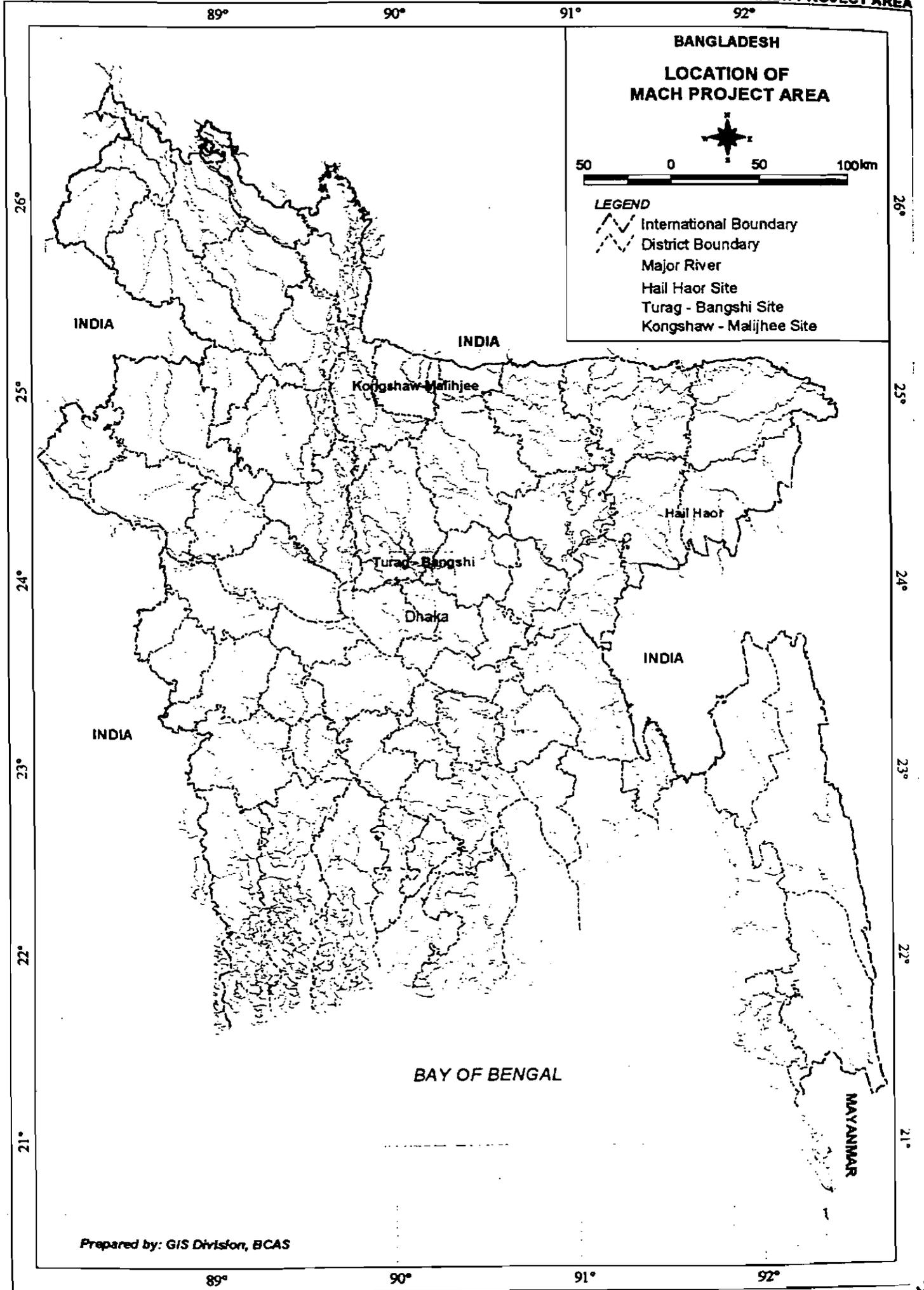
Maps of the proposed permanent sanctuaries with the present status of land use, ownership and land records has been prepared. At first a field visit has been carried out for assessment of physical, and social conditions of the survey. This was followed by a GPS survey to acquire detailed land use of the proposed area. The survey has been carried out involving the support of the *Kanongo* and *Surveyor*. They have also been involved in collecting other relevant information related to land ownership.

In the Kangsha Malijhee site, a River *Kur* is selected for permanent sanctuary in Malijhee River, *Dainnar kur*. Map 4.22 presents the location of permanent sanctuary.

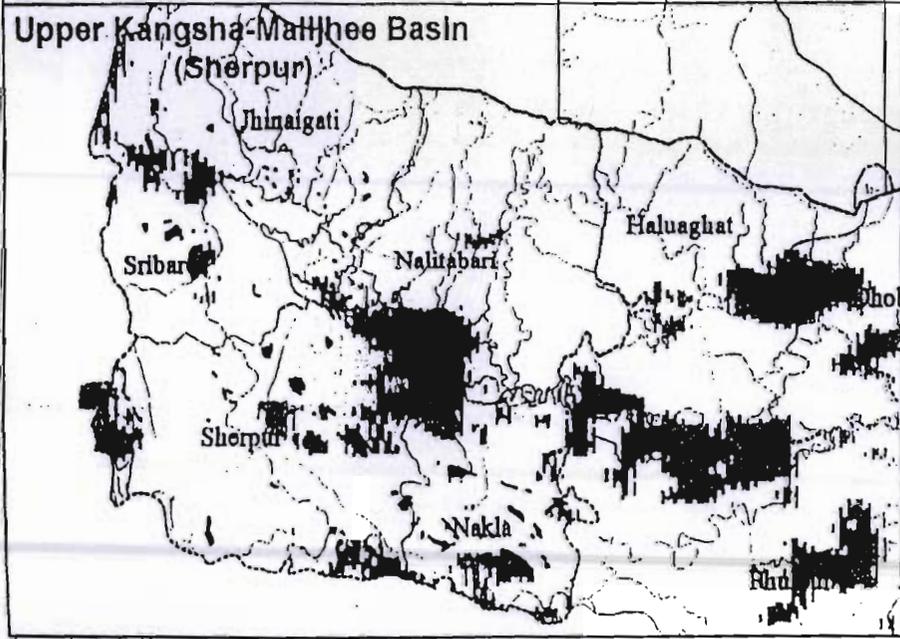
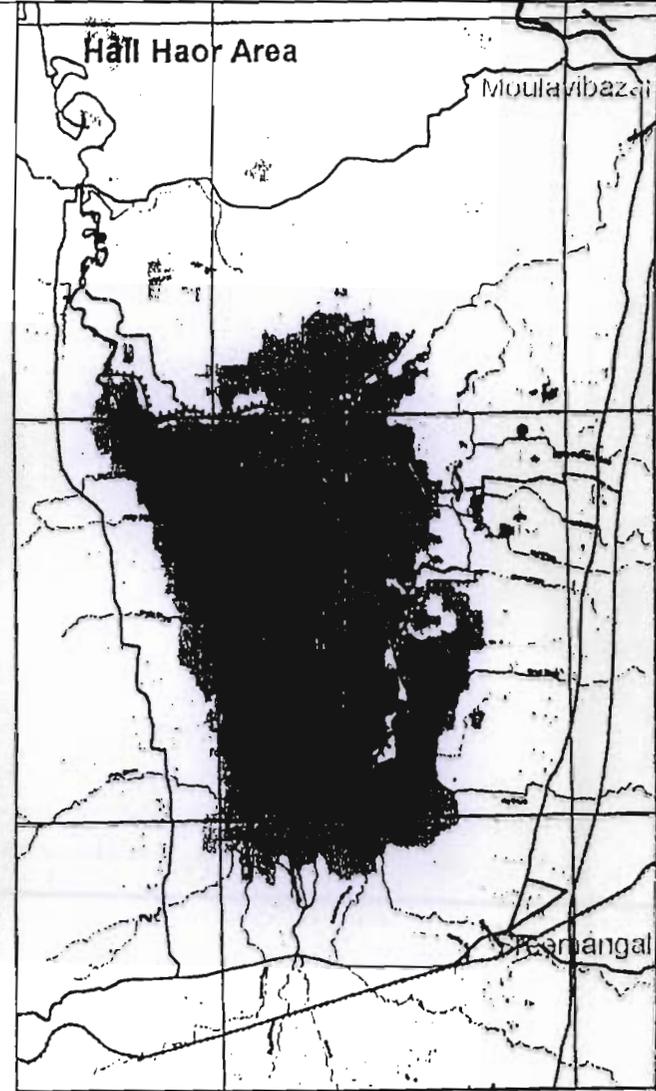
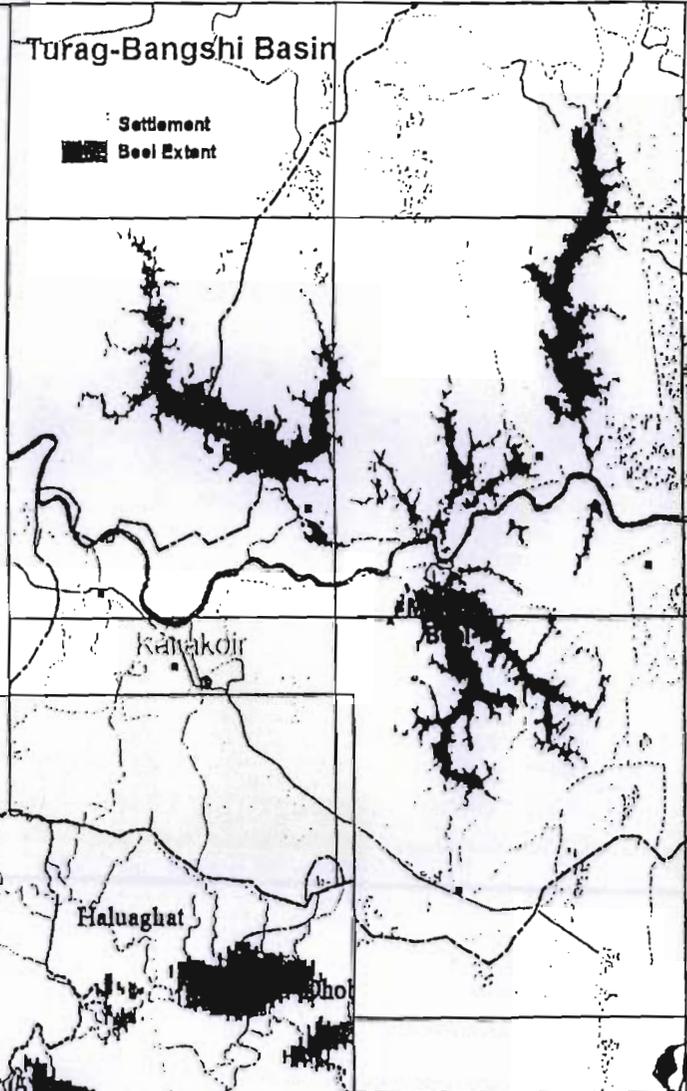
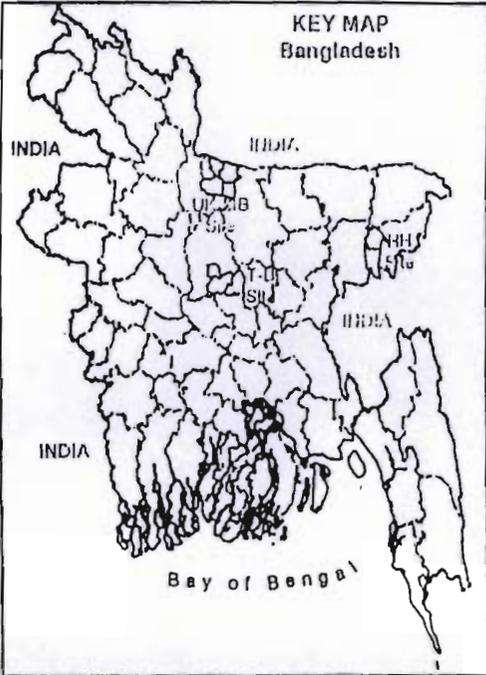
# MACH Map Portfolio

map: 1.1

LOCATION OF MACH PROJECT AREA







**Management of Aquatic Ecosystem through Community Husbandry (MACH)**

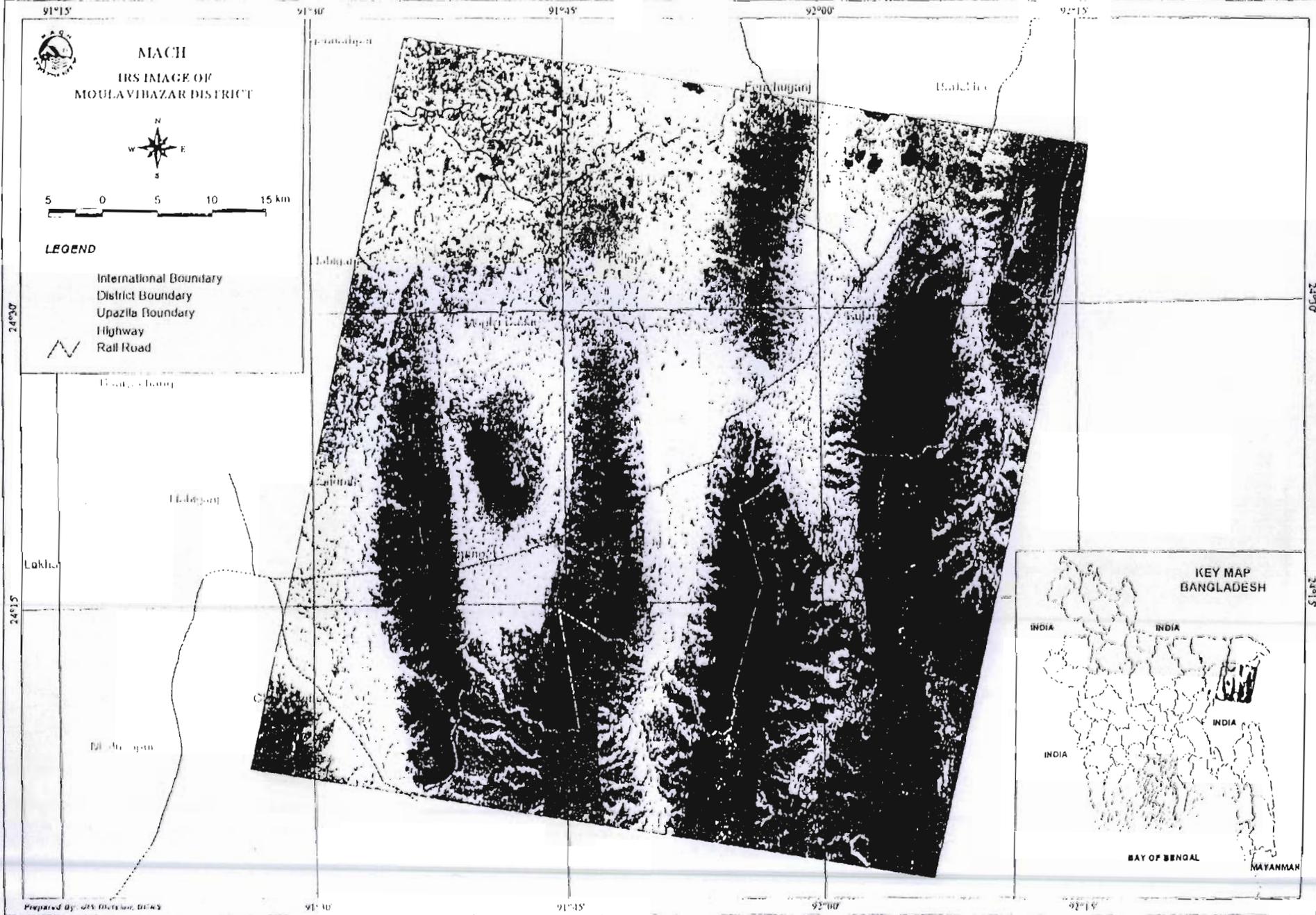
**Project Sites**

BEST AVAILABLE COPY



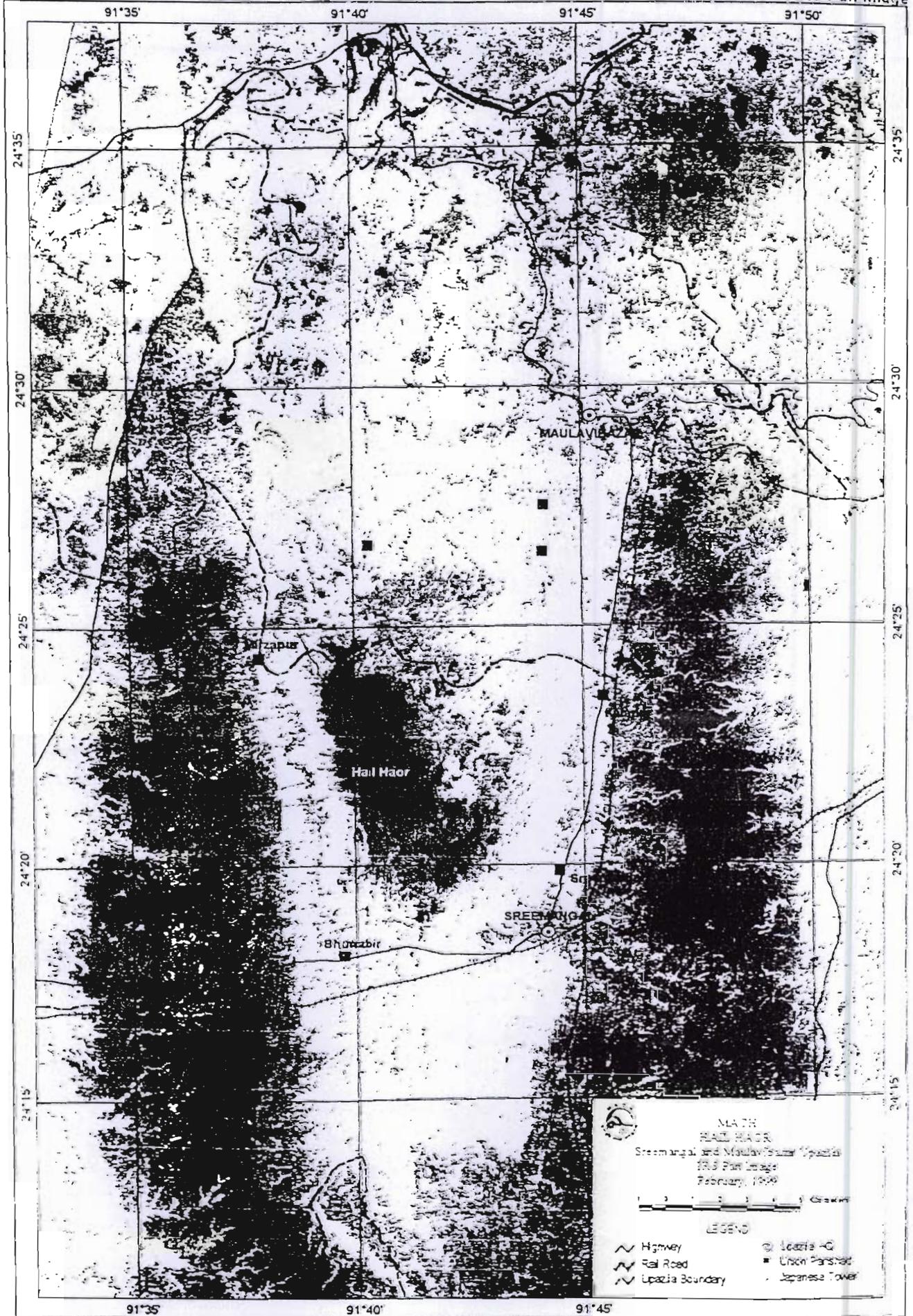
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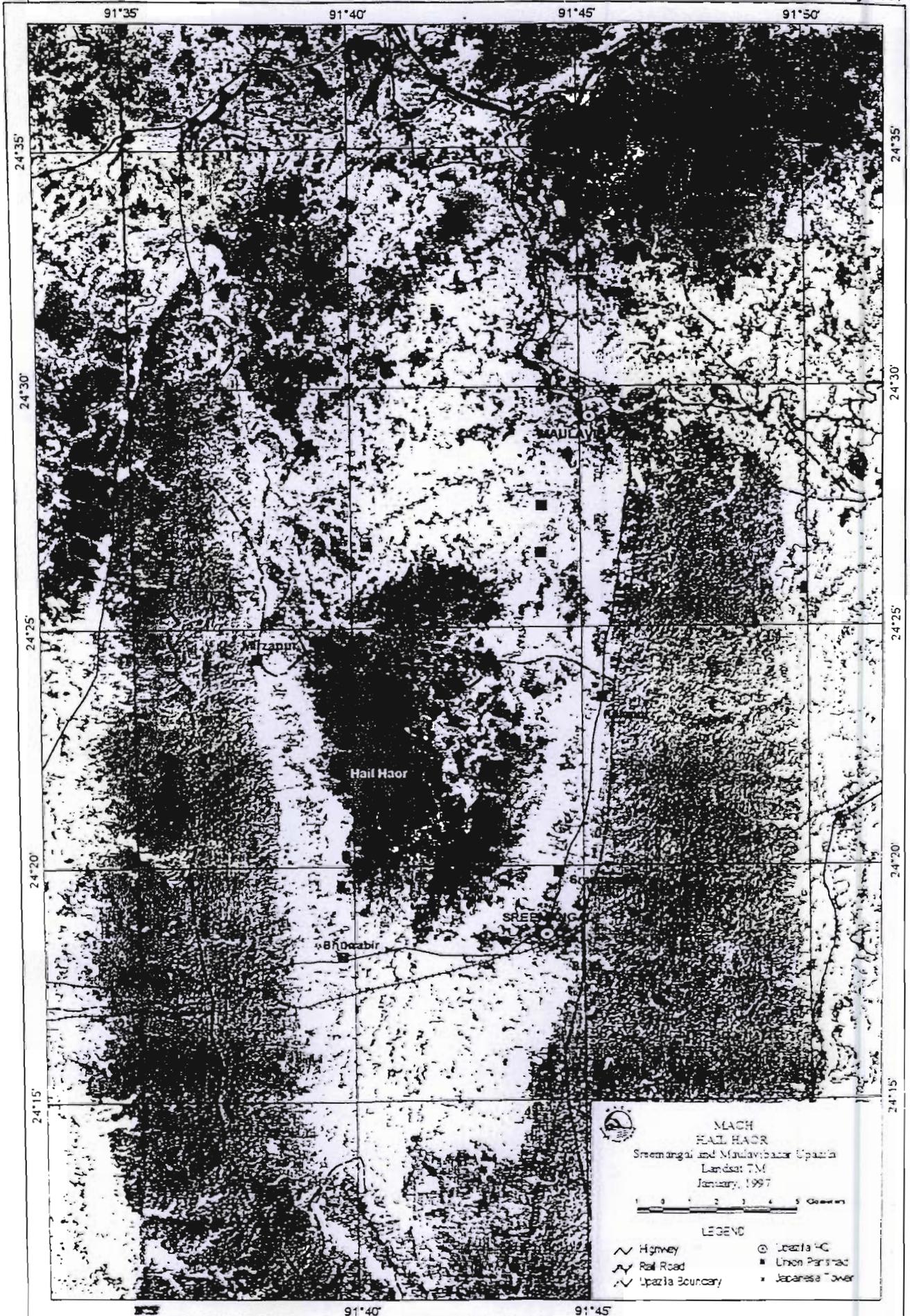
IRS IMAGE OF MOULAVIBAZAR DISTRICT, February 1999



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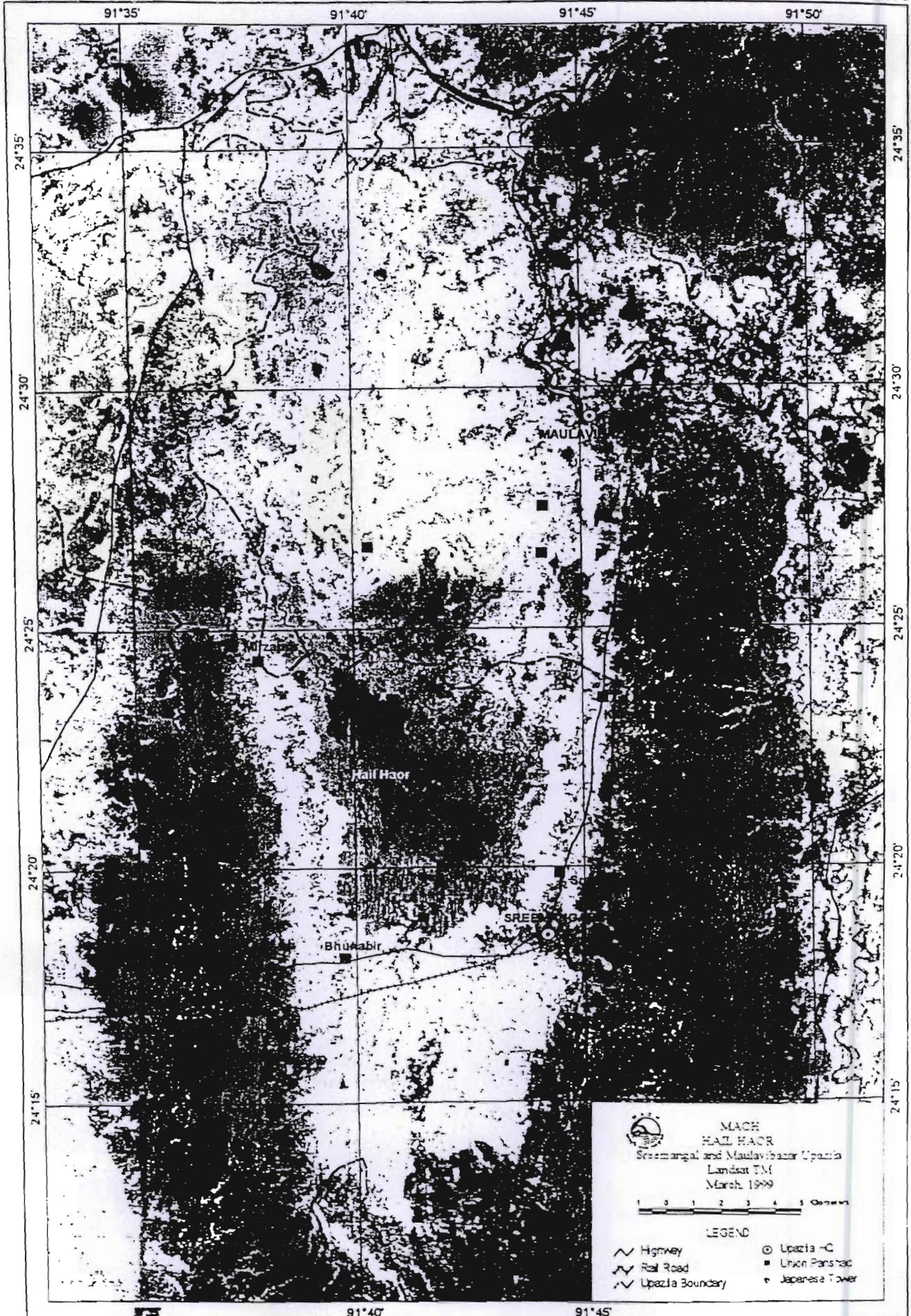
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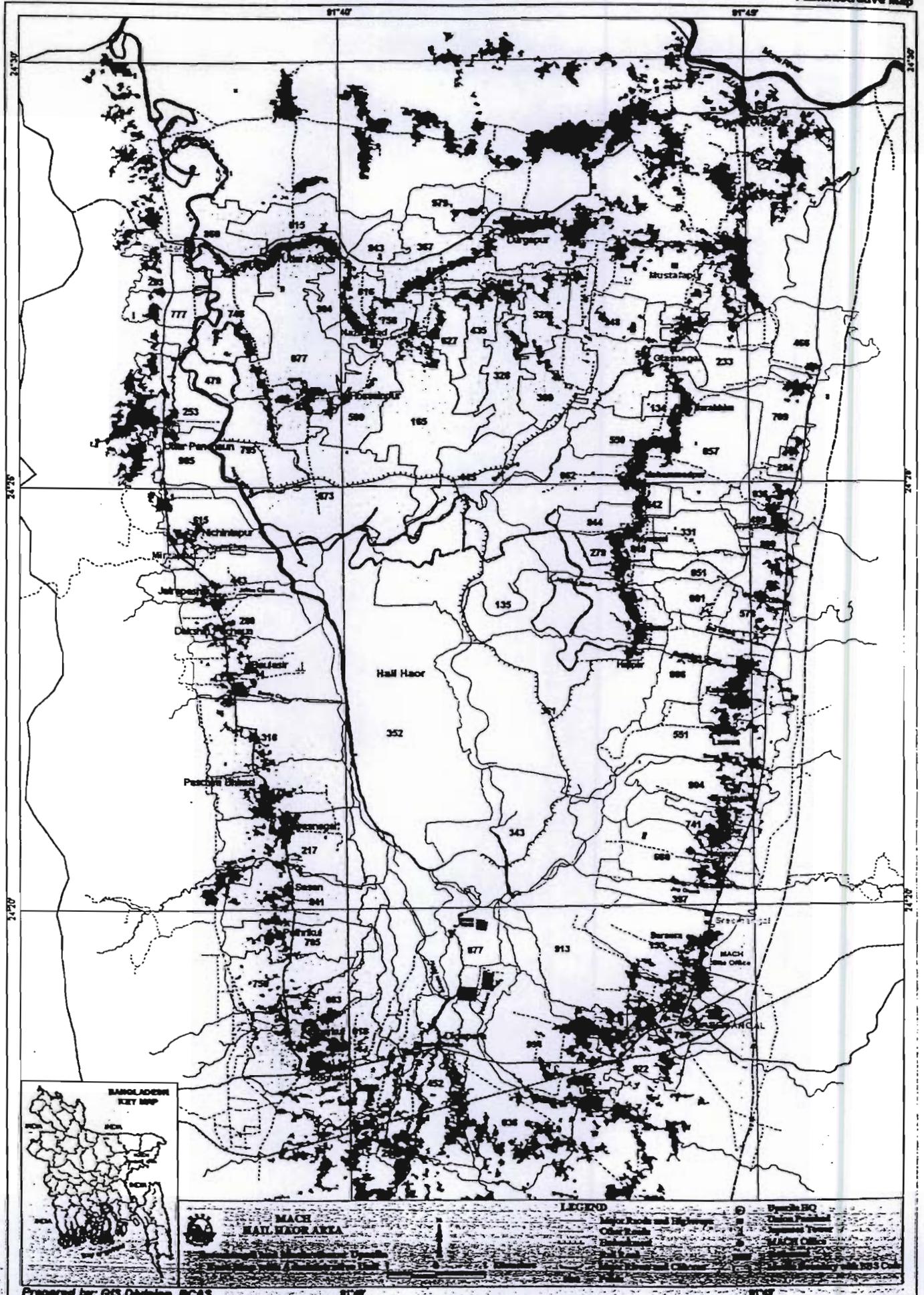


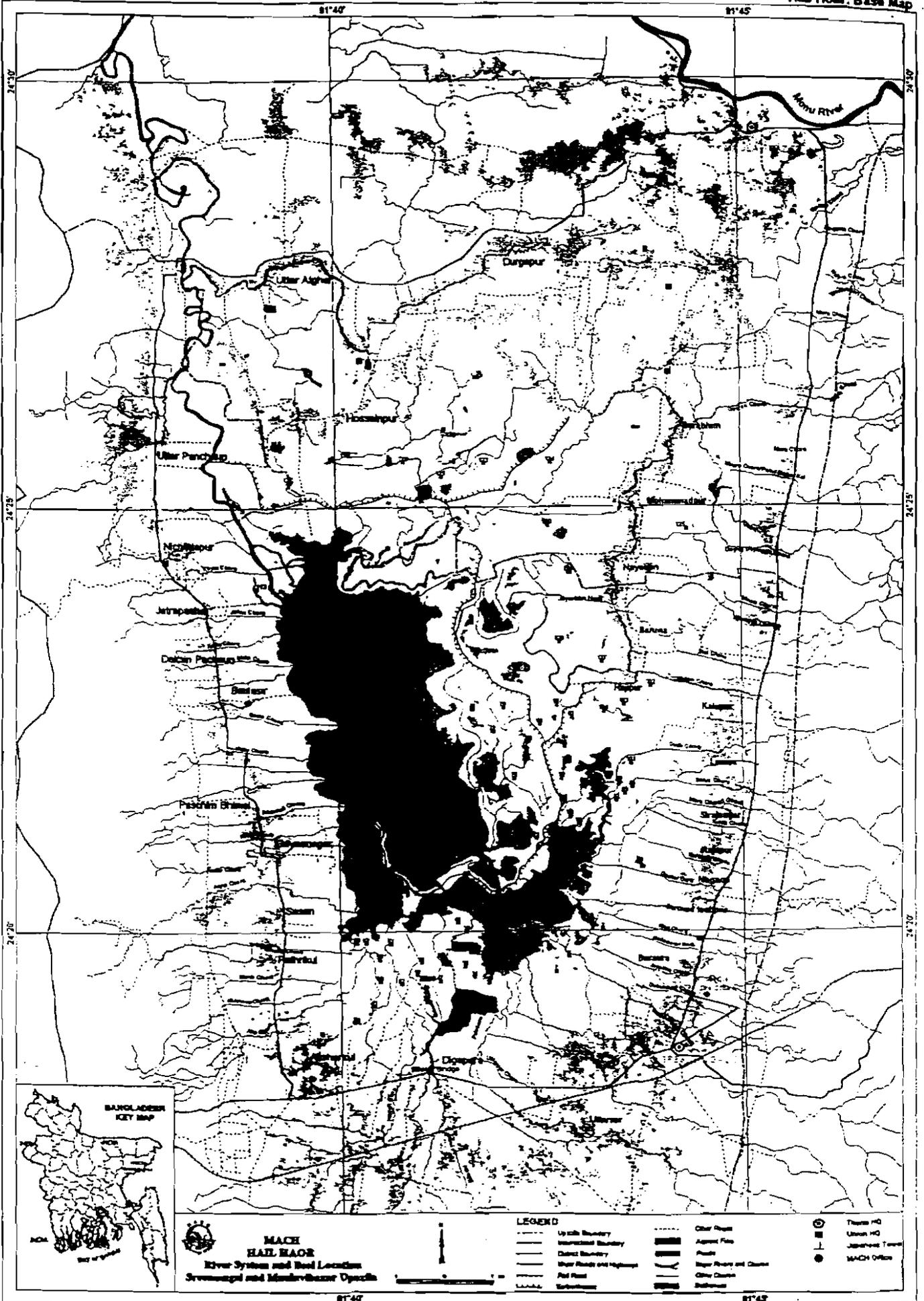
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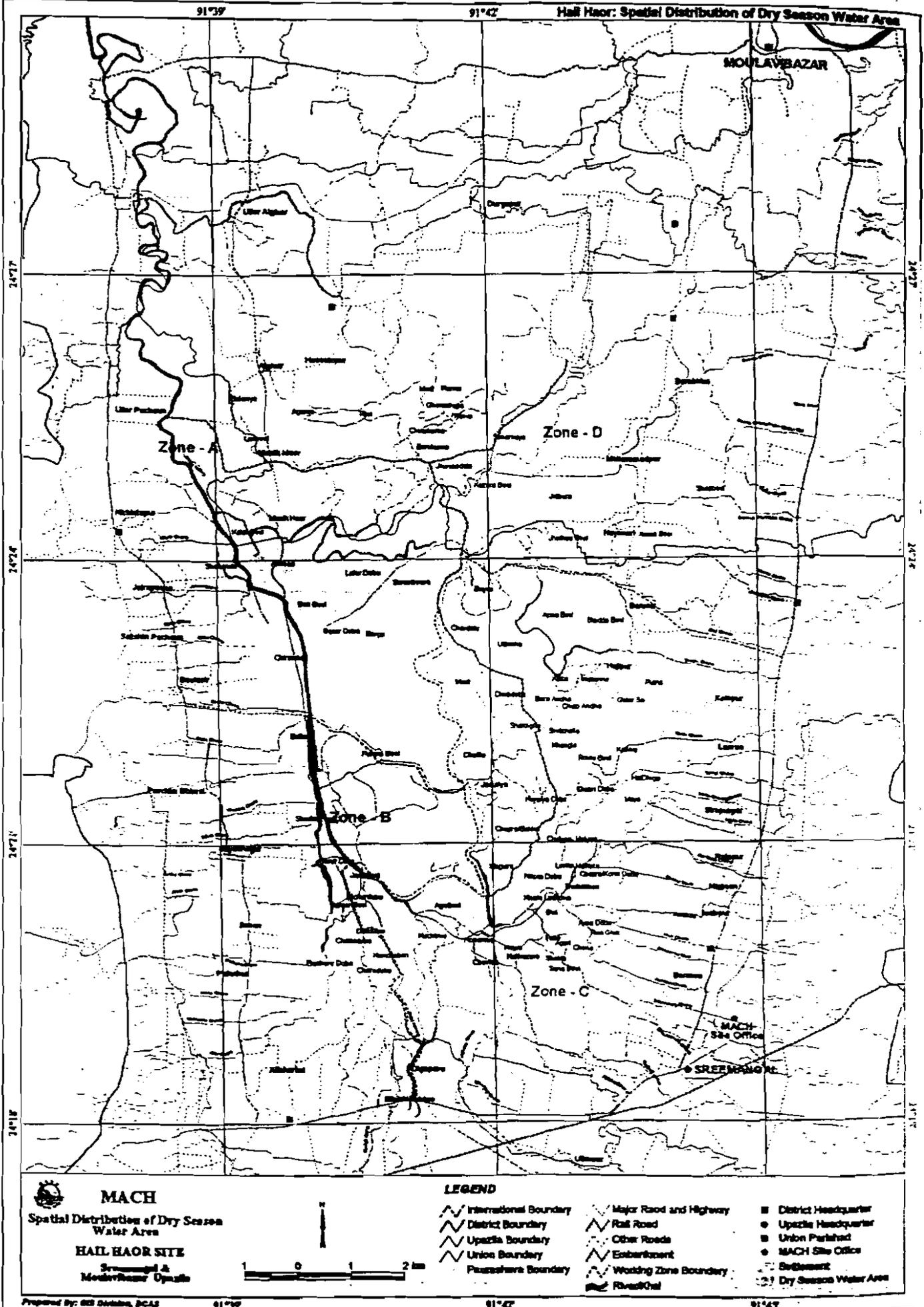


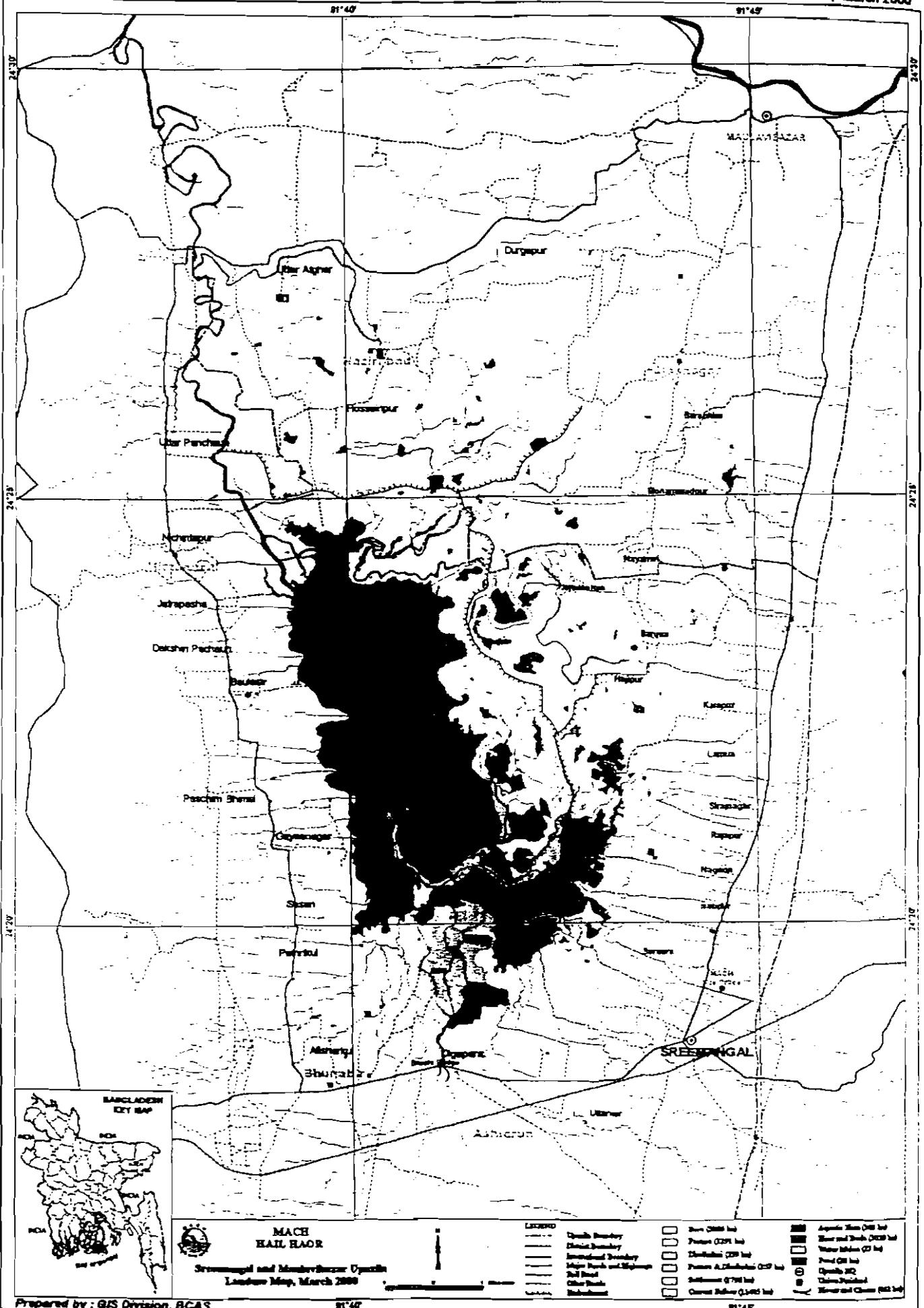
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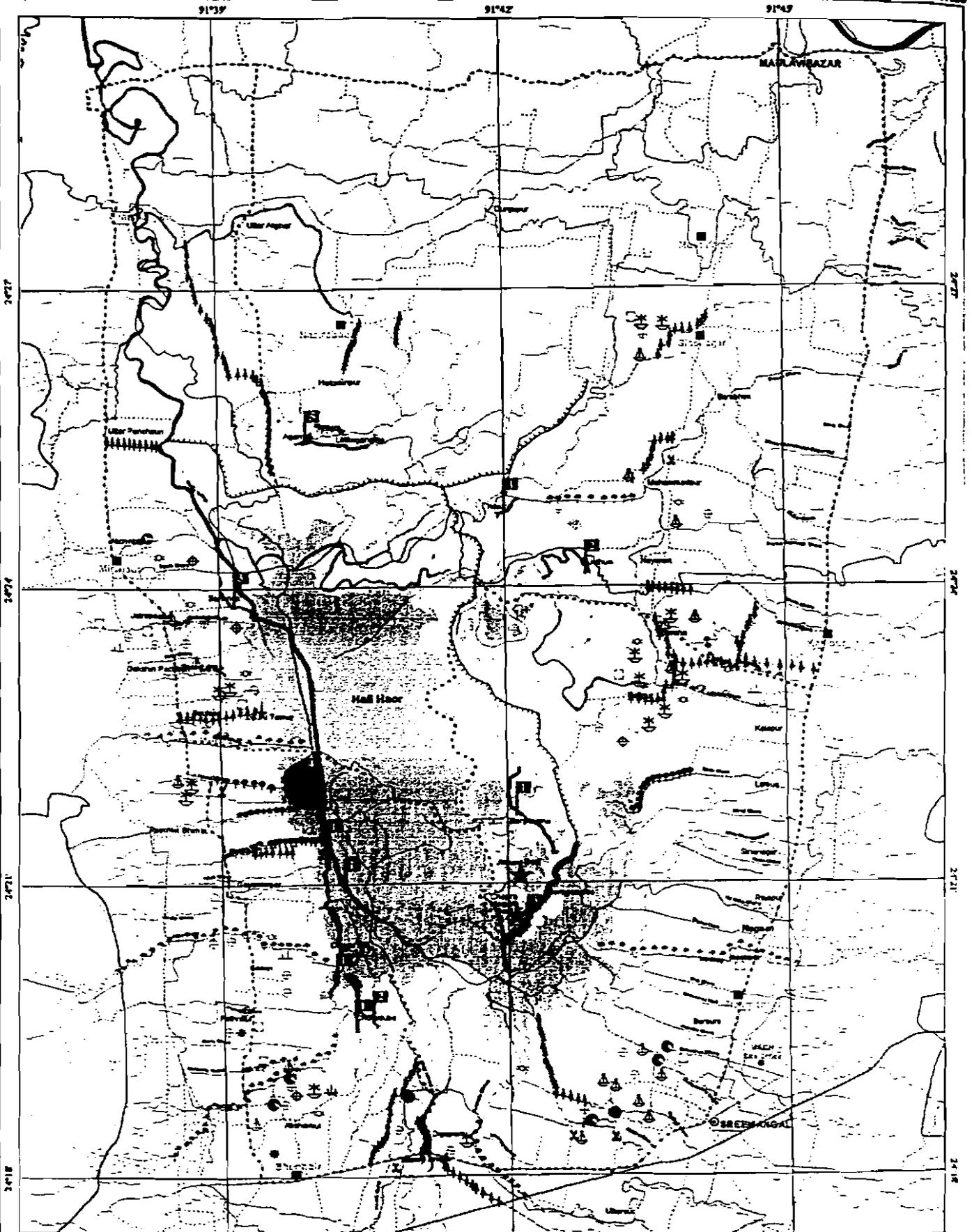




Map 2.9

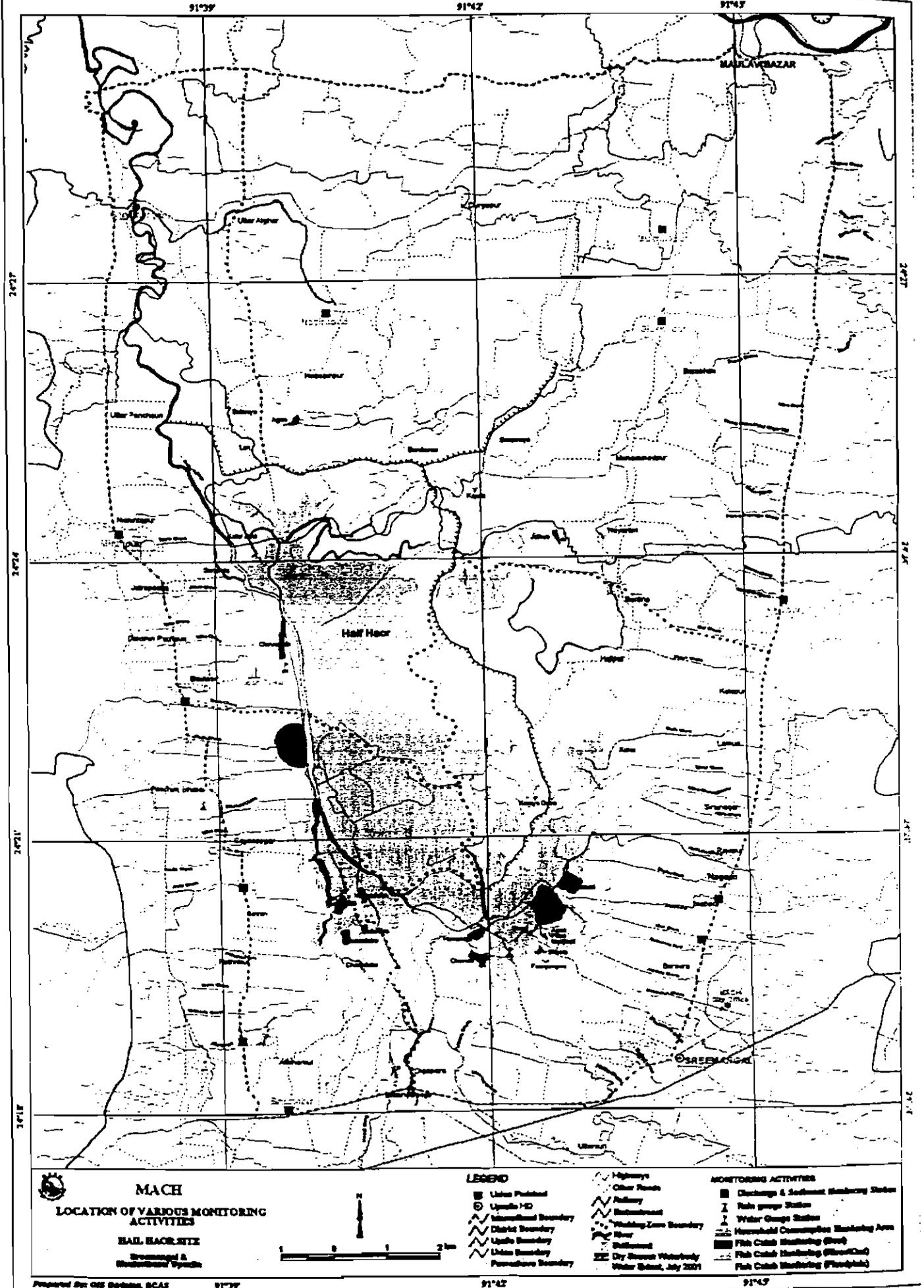


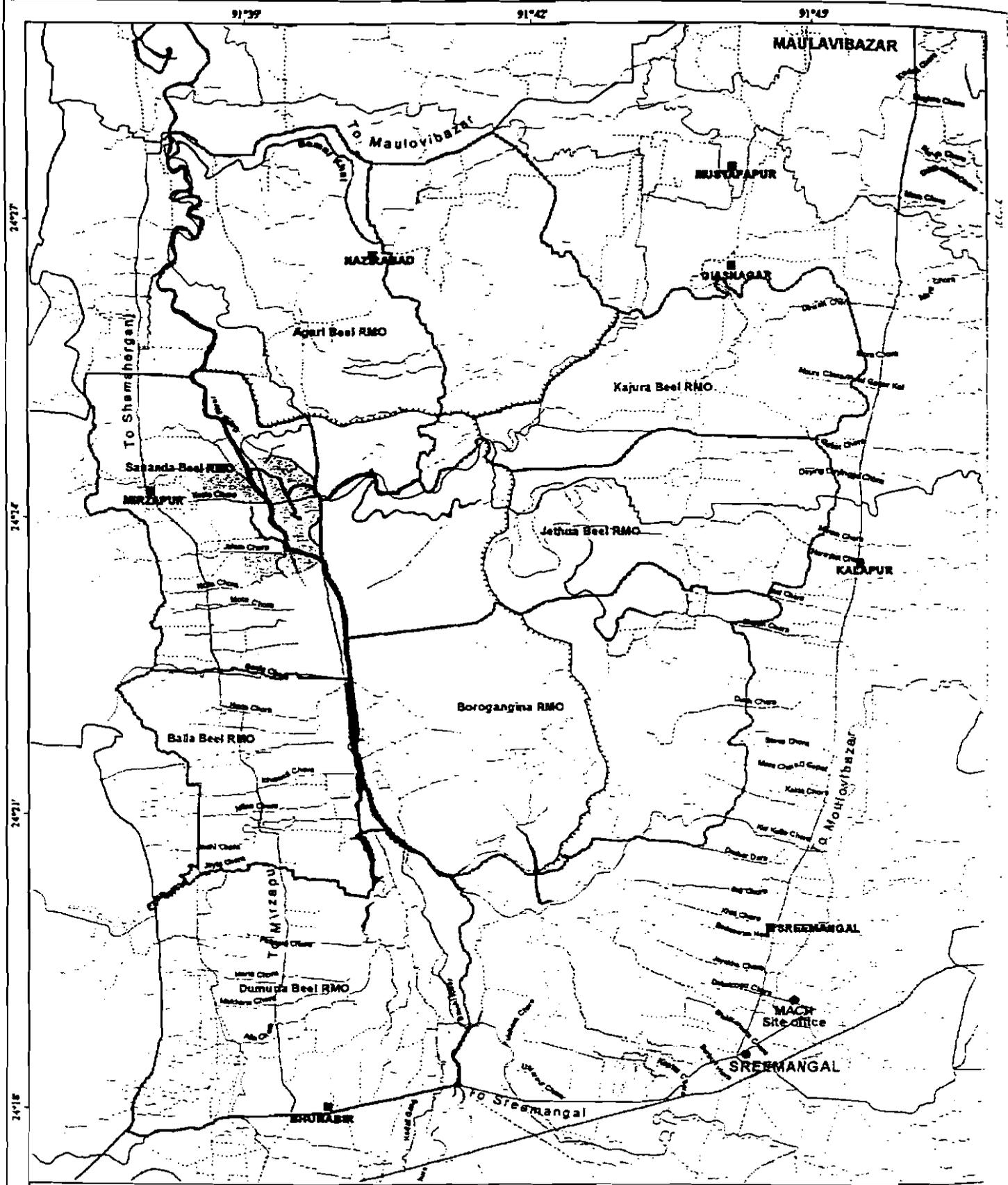




<p><b>MACH</b> WETLAND RESOURCE DEVELOPMENT &amp; MANAGEMENT ACTIVITIES HAIL HAOR SITE Development &amp; Management Symbols</p> <p>1 0 1 2 km</p>	<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li>Urban Perimeter</li> <li>Upazila HQ</li> <li>Intersector Boundary</li> <li>District Boundary</li> <li>Upazila Boundary</li> <li>Union Boundary</li> <li>Paradepara Boundary</li> <li>Highways</li> <li>Other Roads</li> <li>Railway</li> <li>Embankment</li> <li>Working Zone Boundary</li> <li>River</li> <li>Canal</li> <li>Dry Season Waterbody</li> <li>Water Canal, July 2001</li> </ul>	<p><b>MANAGEMENT ACTIVITIES</b></p> <ul style="list-style-type: none"> <li>Perennial Boundary</li> <li>Location and Numbers of Boundary</li> <li>Re-enclosed Canal</li> <li>Re-enclosed Bed</li> <li>Agrofore Plantation</li> <li>Savory Plantation</li> <li>Road Side Plantation</li> <li>Adopted Cattle Area</li> <li>Adopted Village</li> <li>Cow Raising</li> <li>Sheep Raising</li> <li>Cattle Area Disaggregation</li> <li>Hybrid Paddy</li> <li>Pasture</li> <li>Pond Culture</li> <li>Prison Construction</li> <li>Poultry Raising</li> <li>Tanning</li> <li>Vegetable Cultivation</li> <li>Wheat Cultivation</li> <li>Urban Development</li> </ul>







**MACH**

**AREA UNDER IMPROVED  
MANAGEMENT IN HAIL HAOR**

**HAIL HAOR SITE**

Sreemangal and  
Maulavibazar Upazila

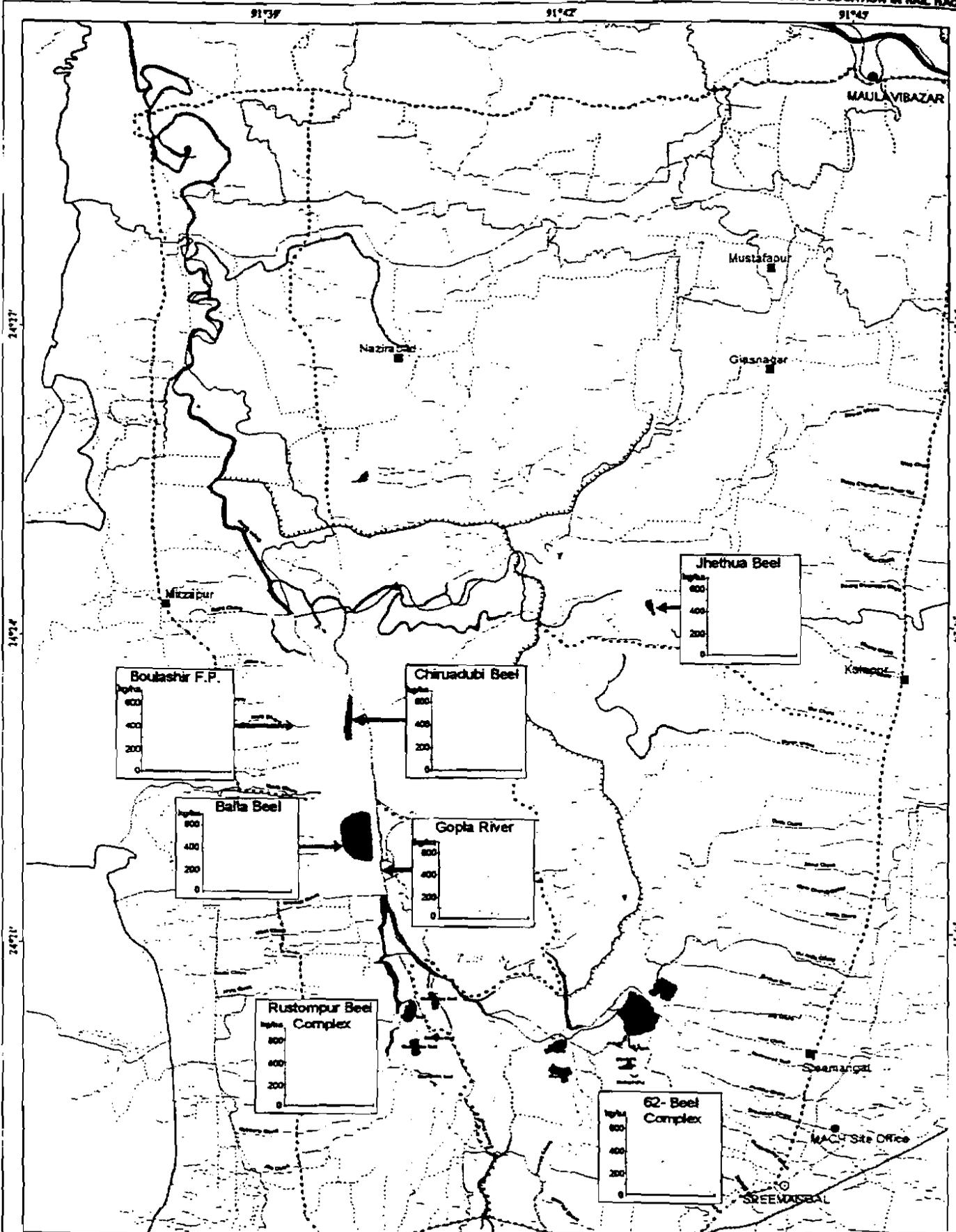


**LEGEND**

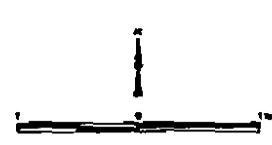
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- Upazila Headquarter
- Union Parishad
- MACH Site Office
- District Boundary
- Upazila Boundary
- Union Boundary
- Paureshava Boundary
- Major Roads
- Rail Road
- Other Roads
- Embankment
- RMO Working Area
- River

**ACHIEVEMENT**

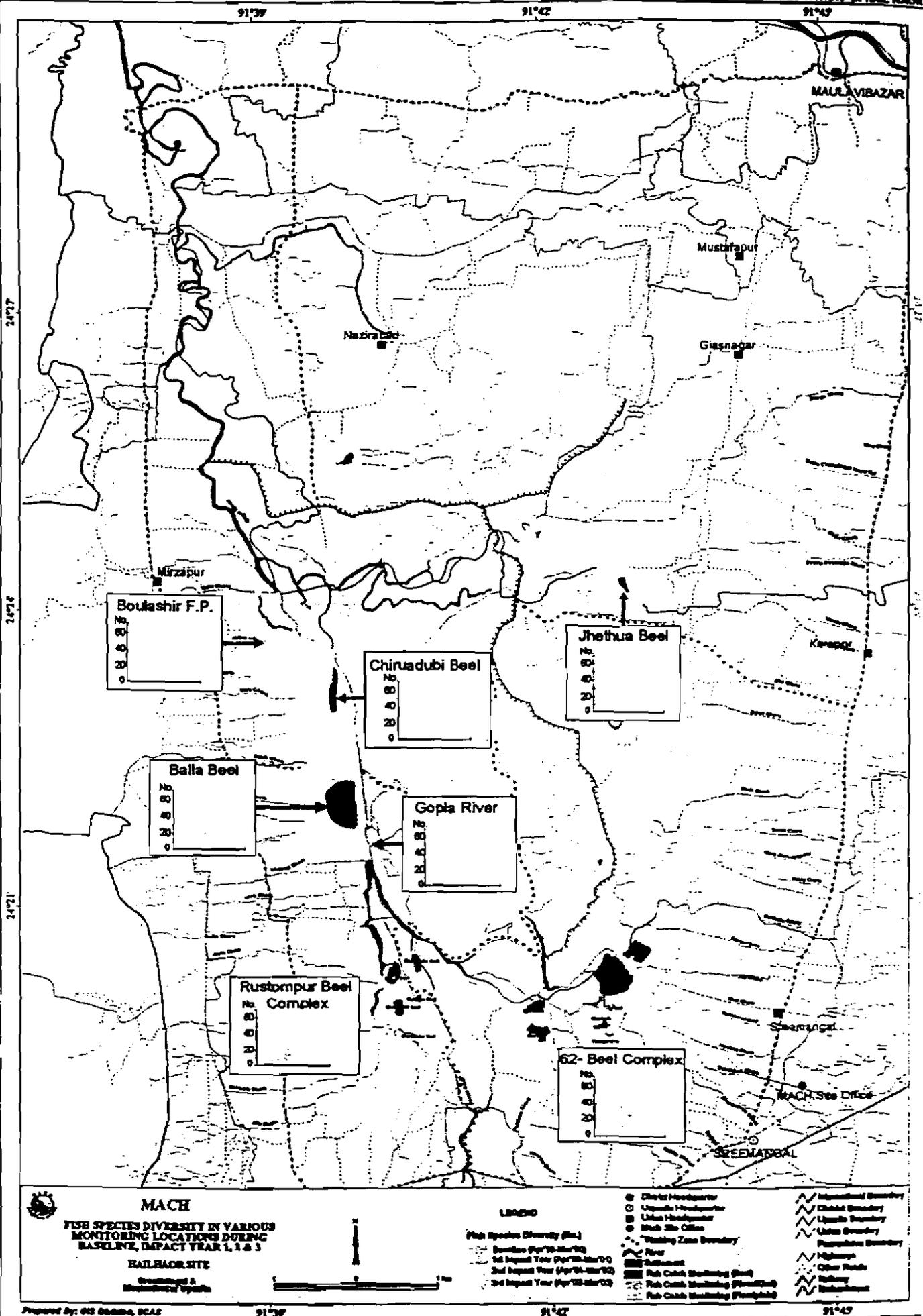
- Achievement of 2001
- Achievement of 2002
- Achievement of 2003

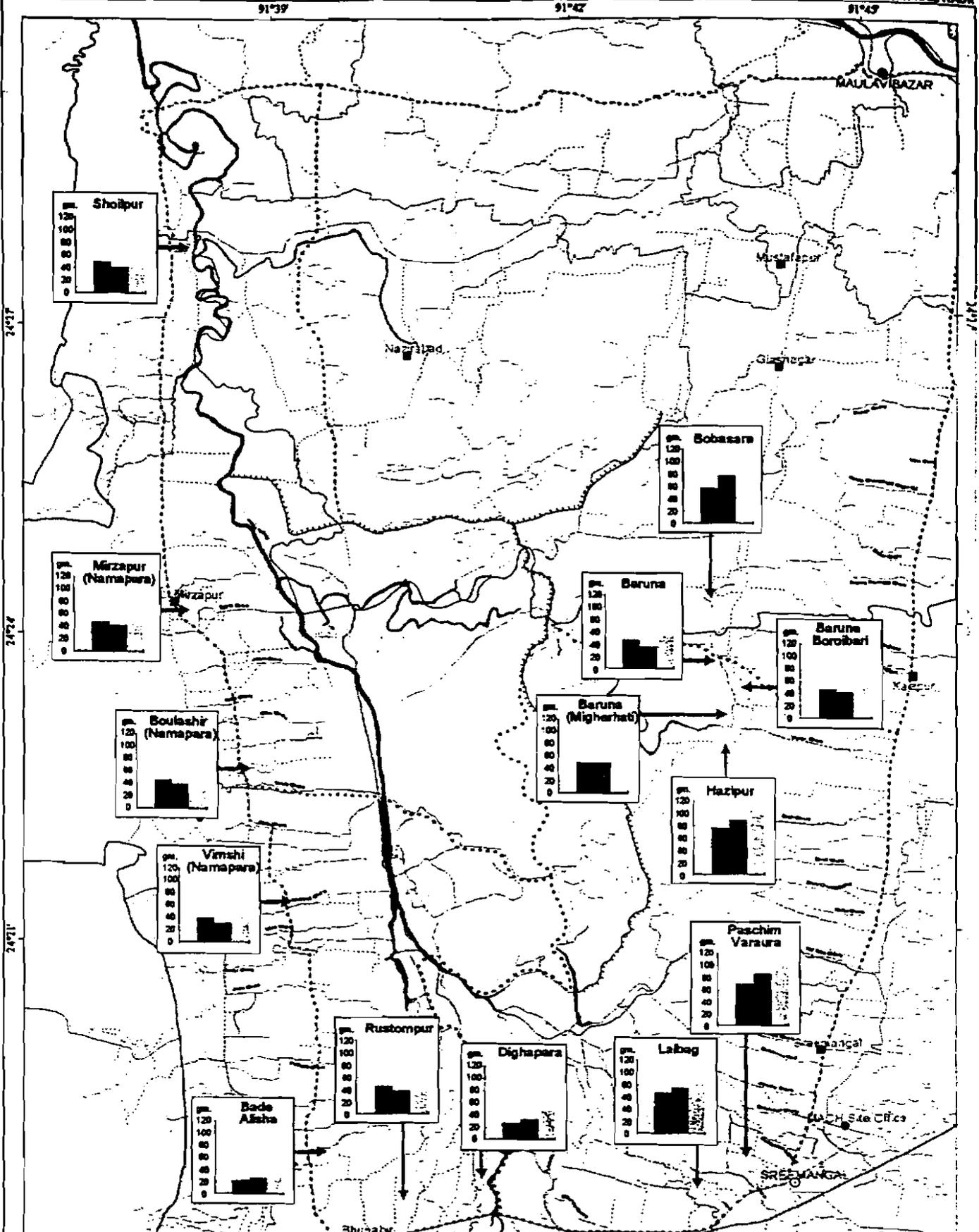


**MACH**  
**CATCH PER UNIT OF AREA (CPUA)**  
**BY LOCATION DURING**  
**BASELINE, IMPACT YEAR 1, 2 & 3**  
**HAIL HAOR SITE**  
 Prepared & Monitored by  
 MACH



- Legend**
- District Headquarters
  - Upazila Headquarters
  - Union Panchayat
  - Main Site Office
  - Working Zone Boundary
  - River
  - Subchannel
  - ▨ Fish Catch Monitoring (Beel)
  - ▨ Fish Catch Monitoring (River/Canal)
  - ▨ Fish Catch Monitoring (Pond/pond)
  - ▨ International Boundary
  - ▨ District Boundary
  - ▨ Upazila Boundary
  - ▨ Union Boundary
  - ▨ Permutation Boundary
  - ▨ Highways
  - ▨ Other Roads
  - ▨ Railway
  - ▨ Subchannel





MACH

PER CAPITA FISH CONSUMPTION BY VILLAGE DURING BASELINE, IMPACT YEAR 1, 2 & 3

HAIL HAOR SITE

Development & Rehabilitation Project

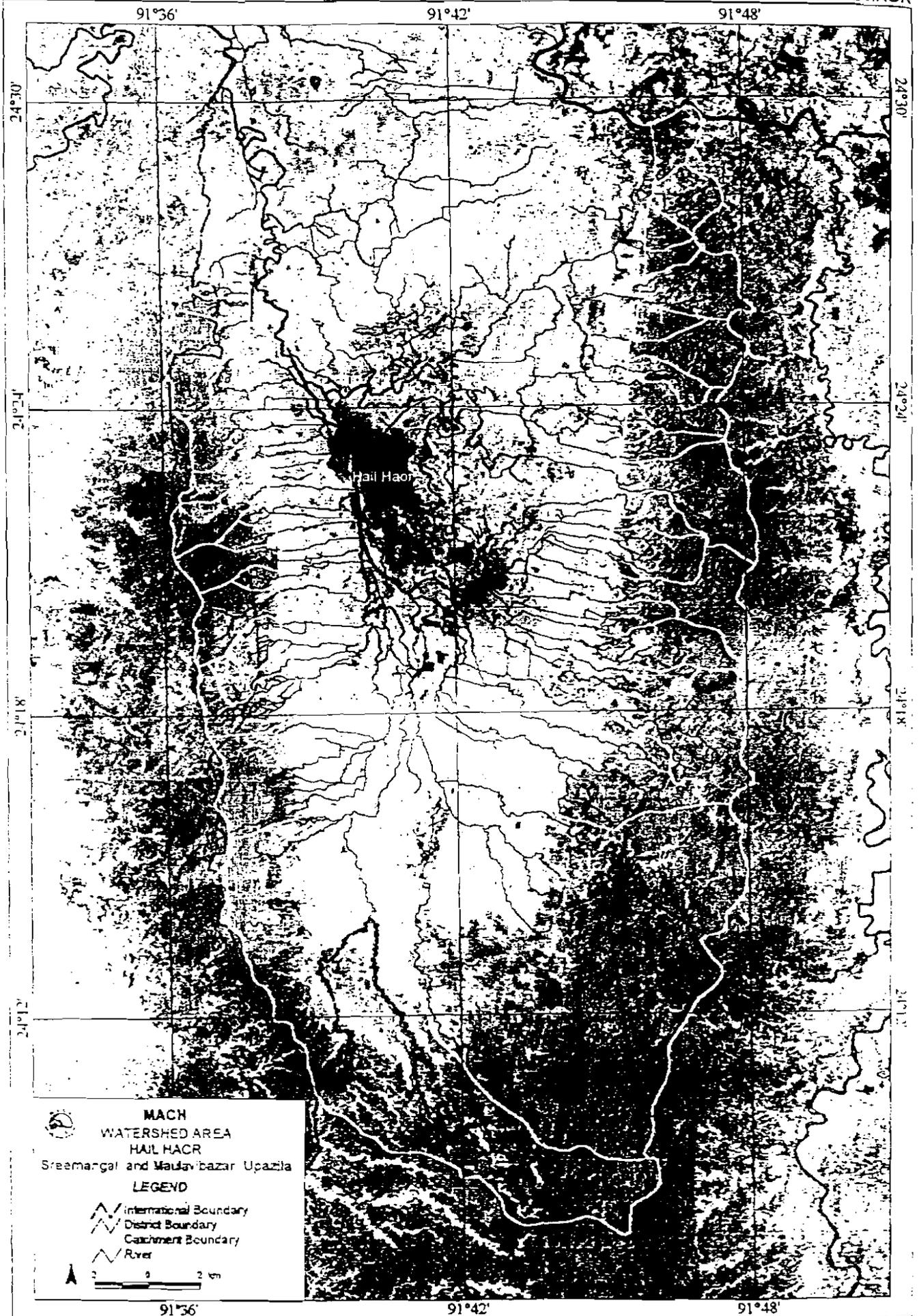
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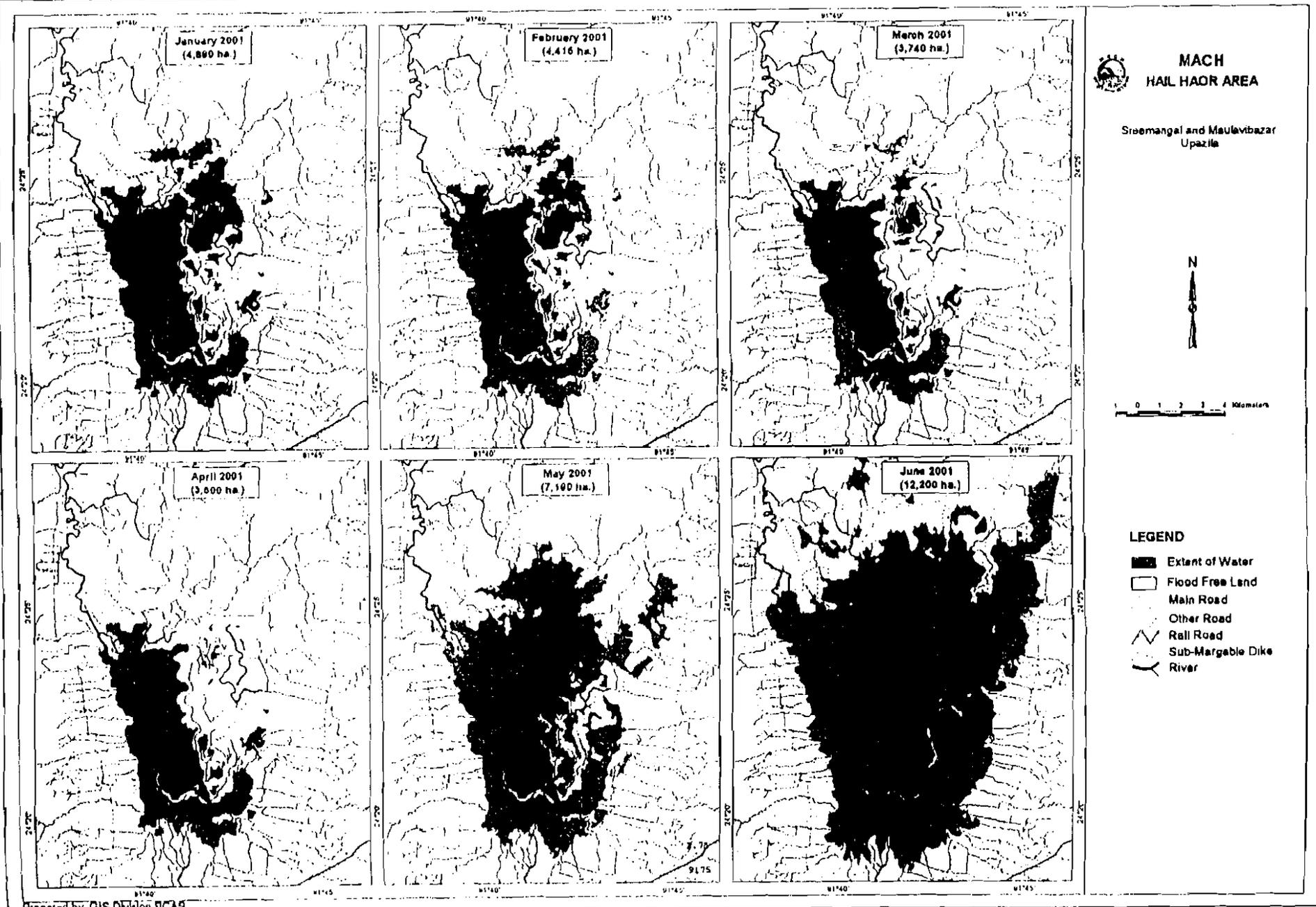
Per Capita Fish Consumption (gm)

- Baseline (Sep'98-Apr'99)
- 1st Impact Year (Sep'00-Apr'01)
- 2nd Impact Year (Sep'01-Apr'02)
- 3rd Impact Year (Sep'02-Apr'03)

- District Headquarter
- Upazila Headquarter
- Union Headquarter
- Mark Site Office
- Working Zone Boundary
- River
- Submerged
- Dryseason Bed
- International Boundary
- District Boundary
- Upazila Boundary
- Union Boundary
- National Boundary
- Highway
- Other Road
- Railway
- Substation

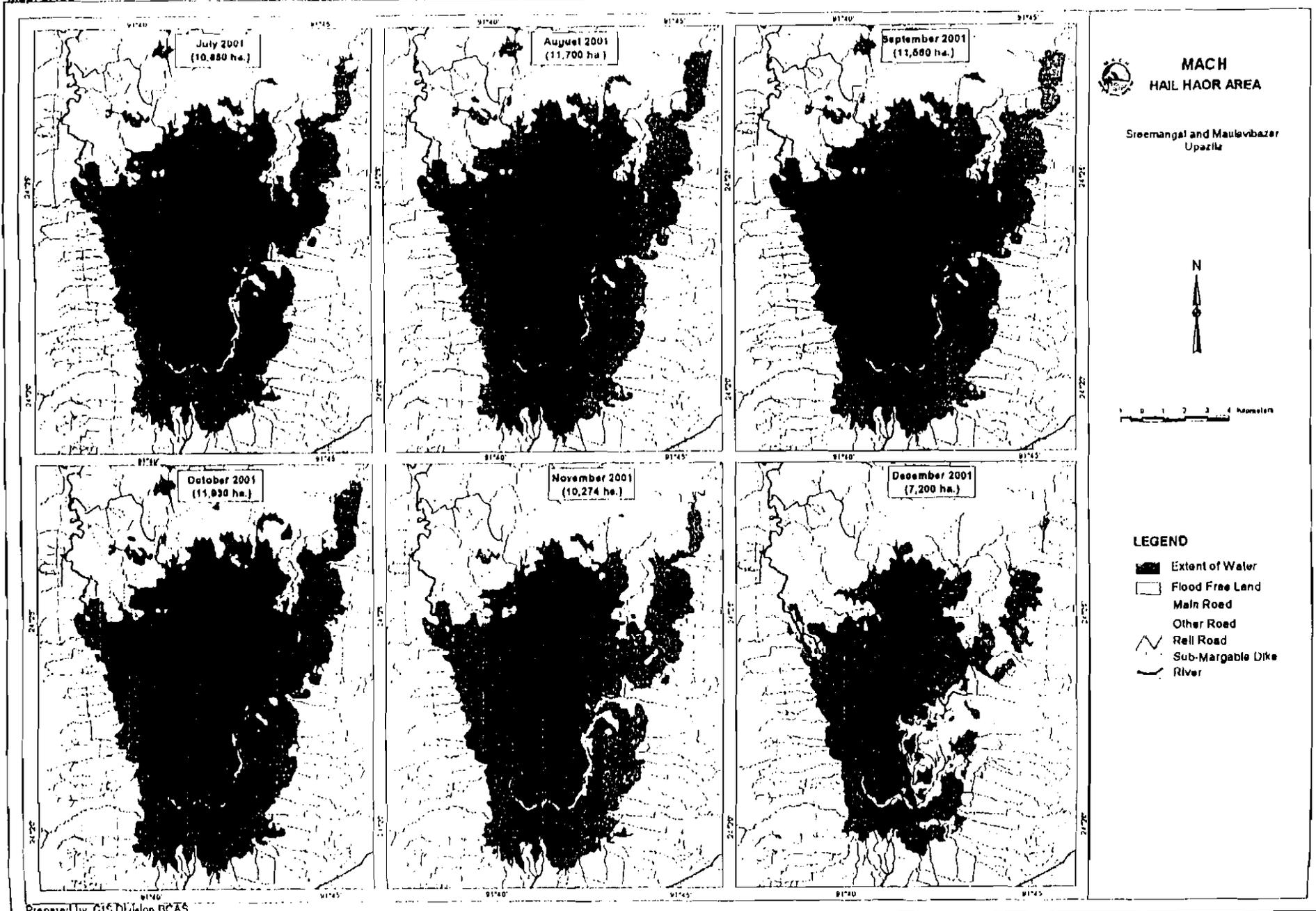


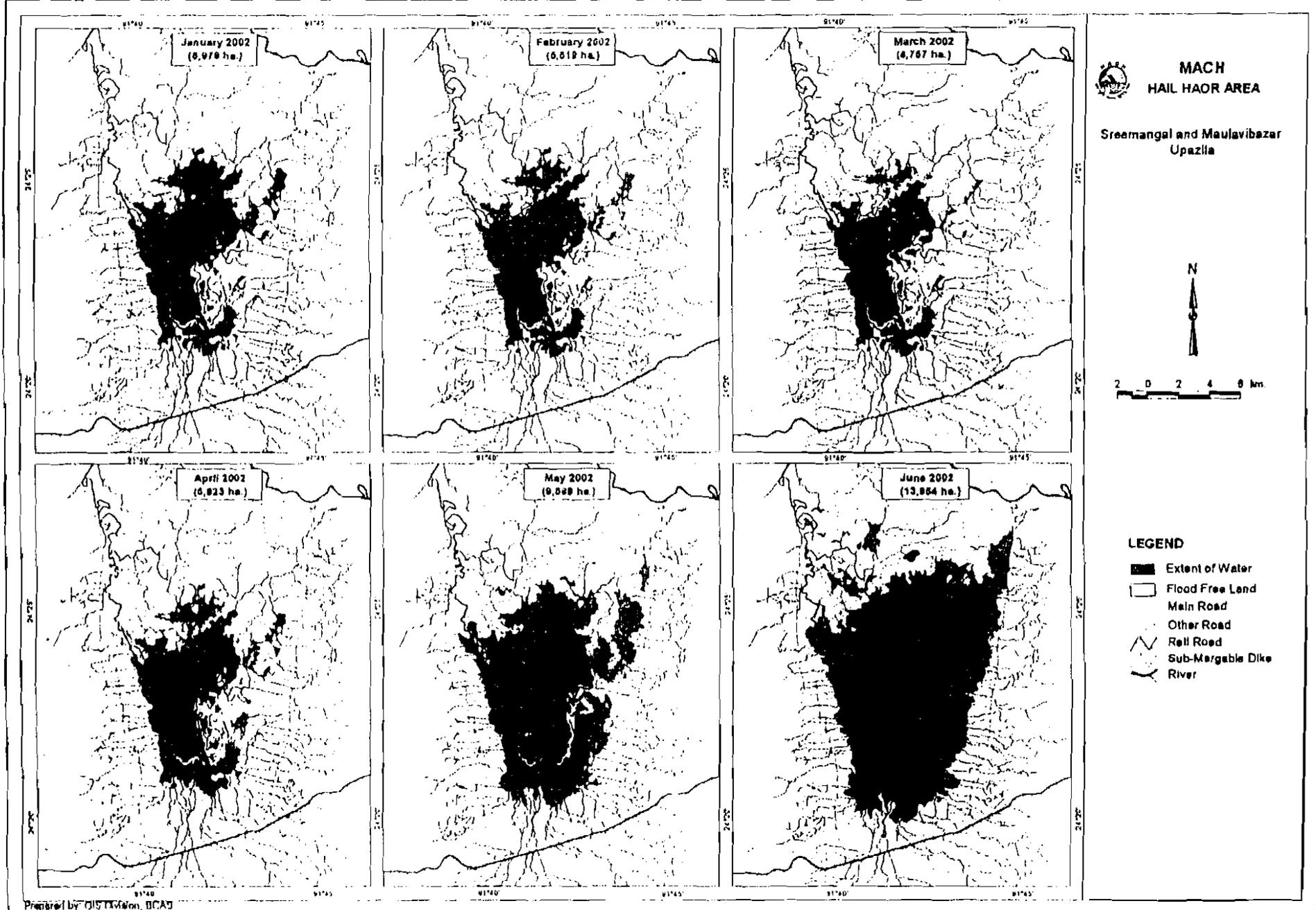


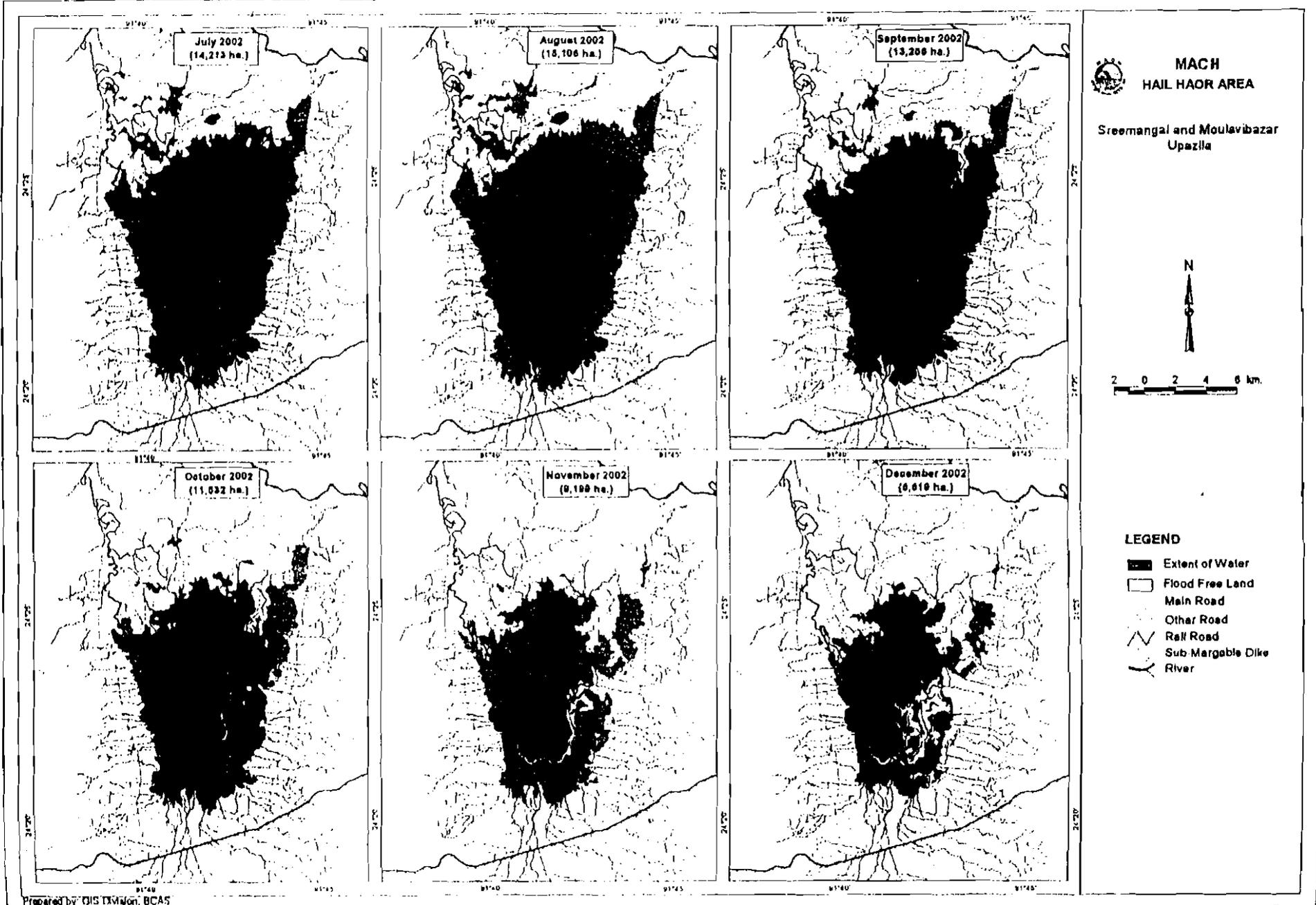


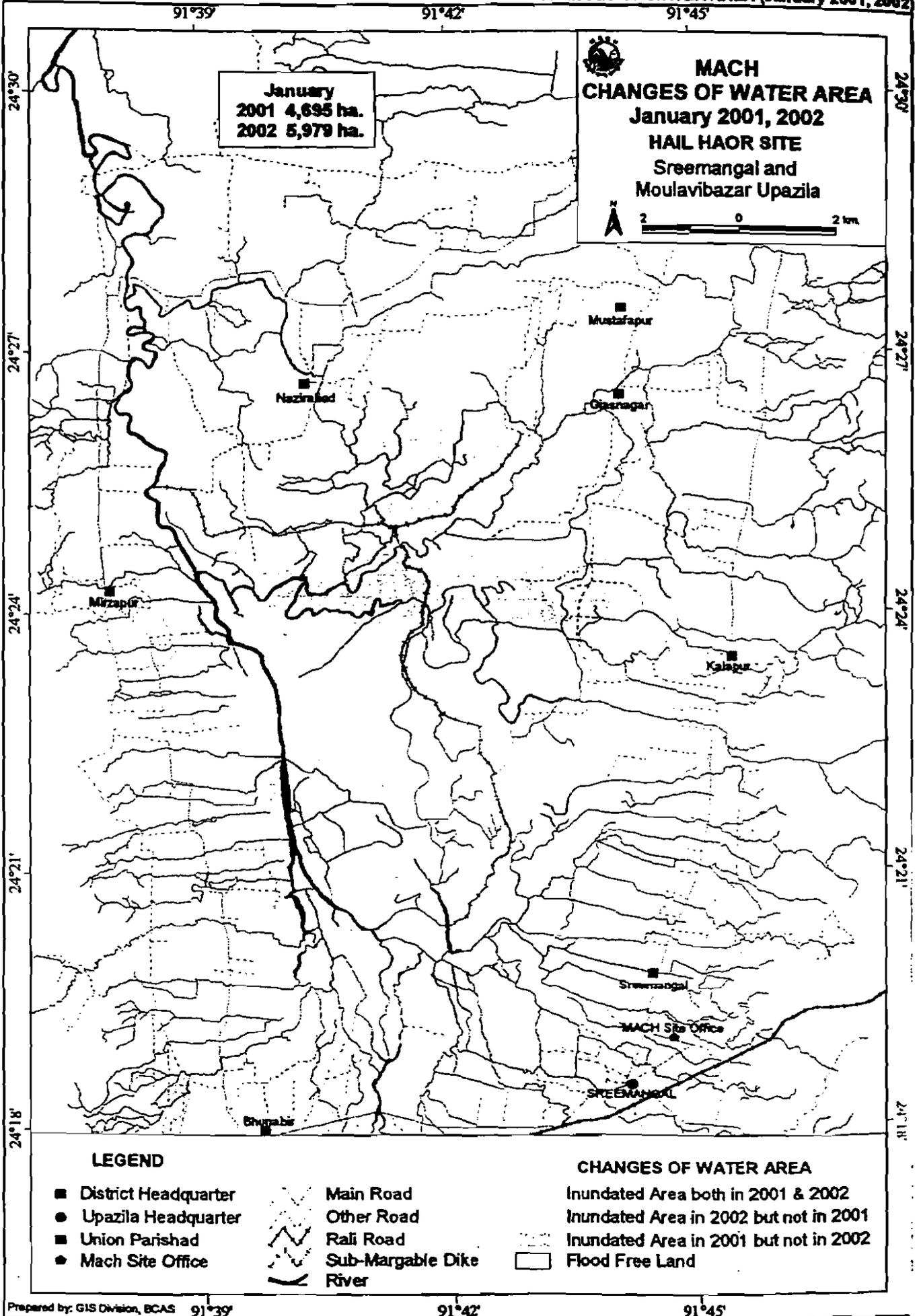
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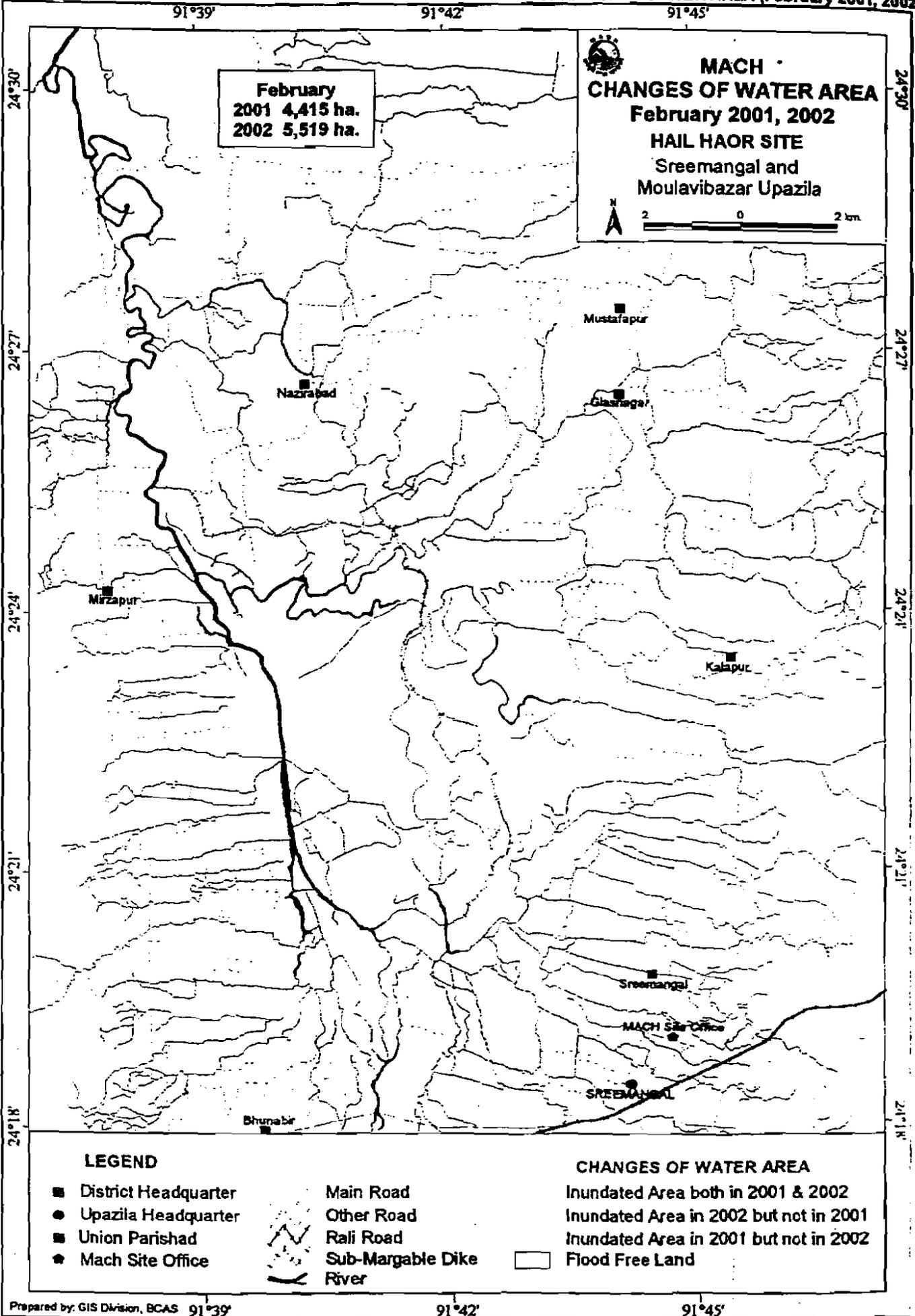
Map: 2.19b

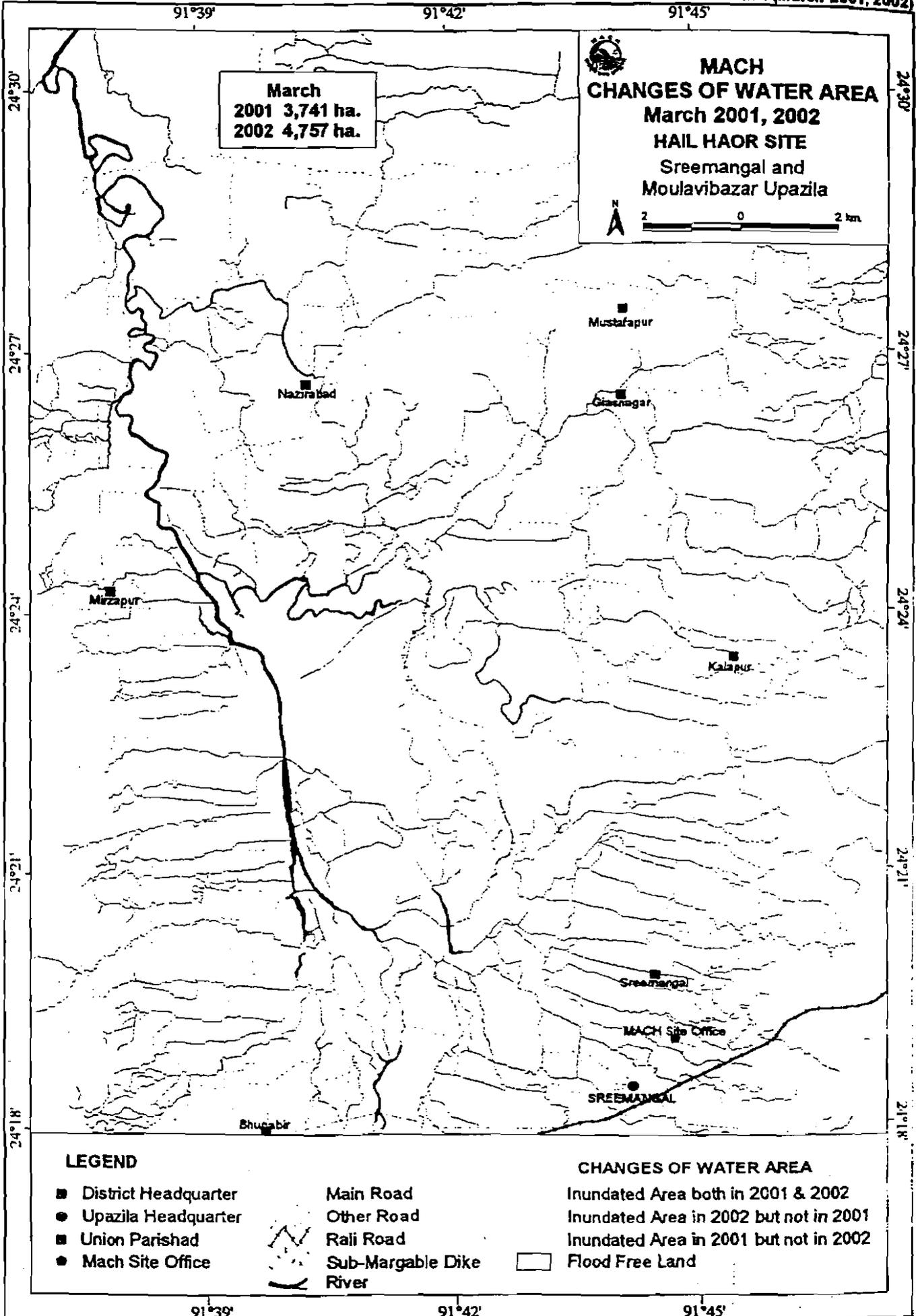


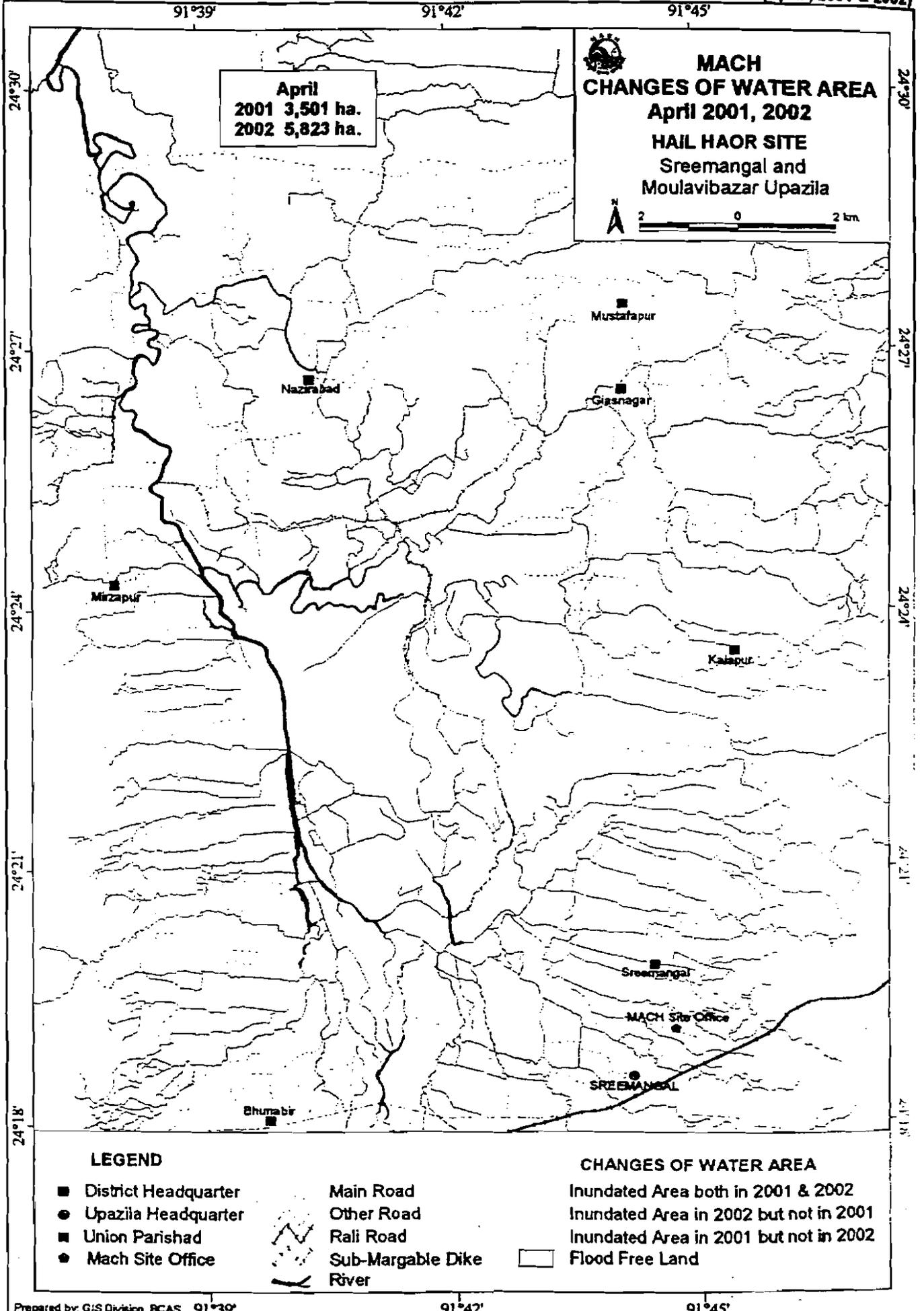


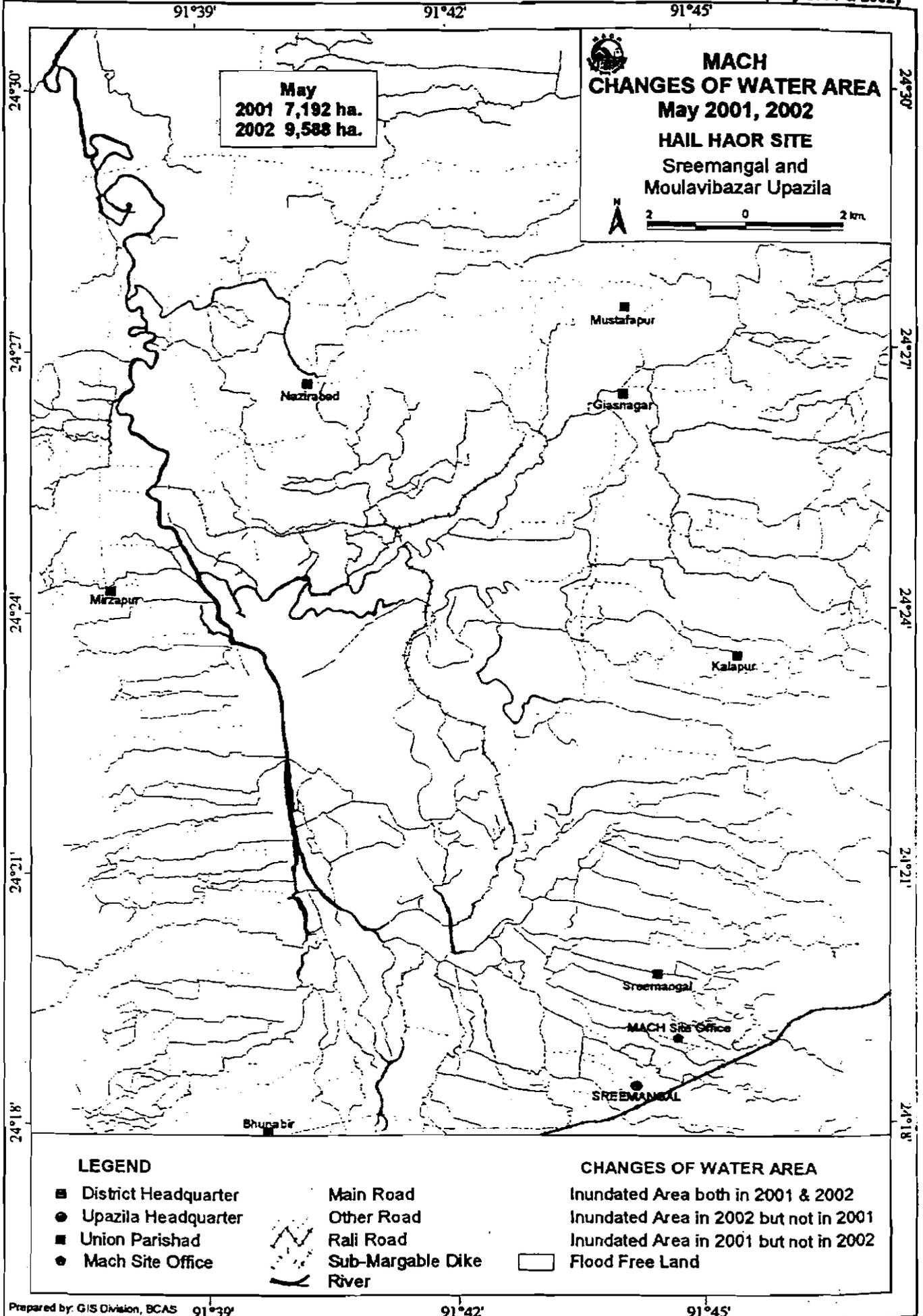


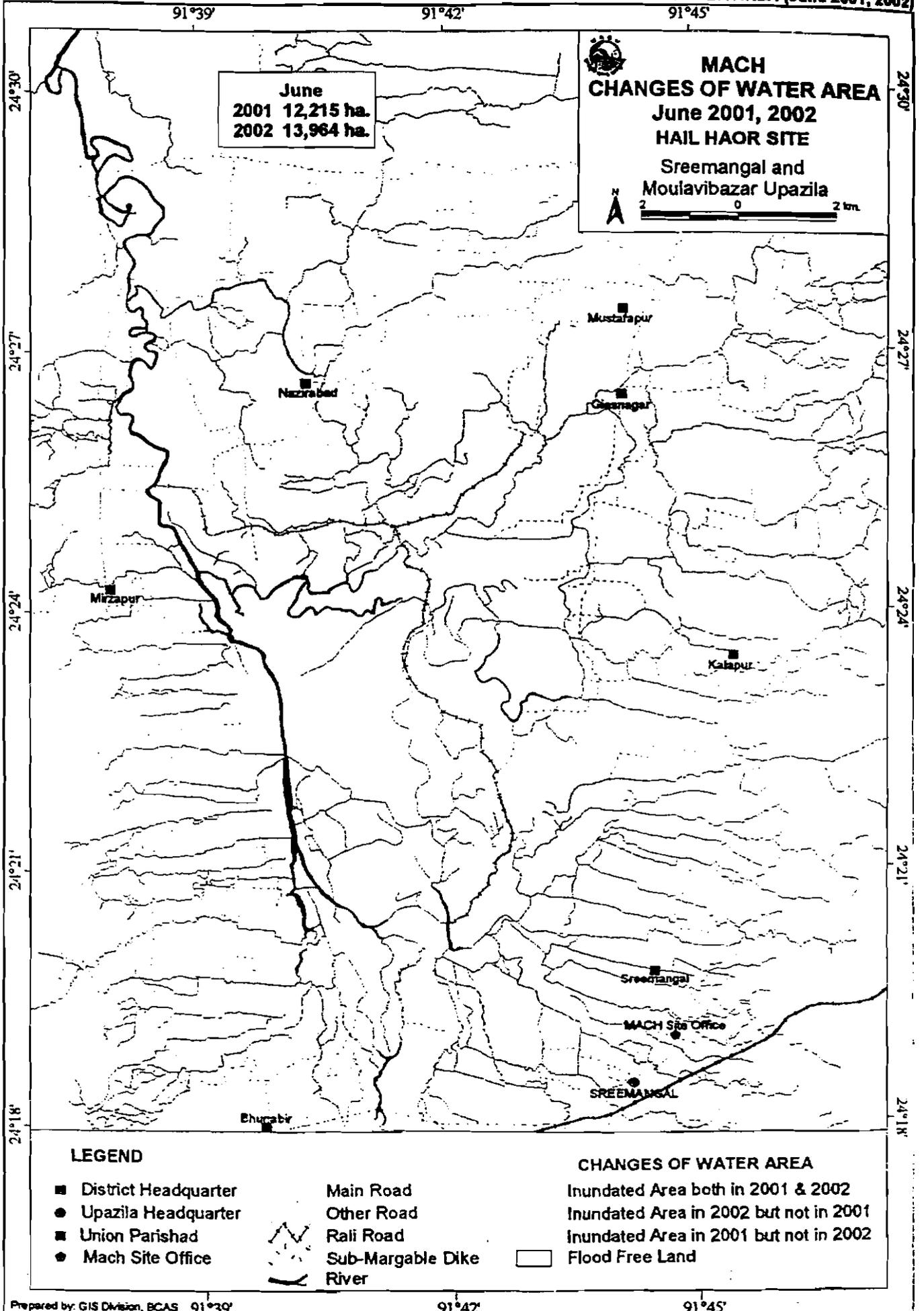


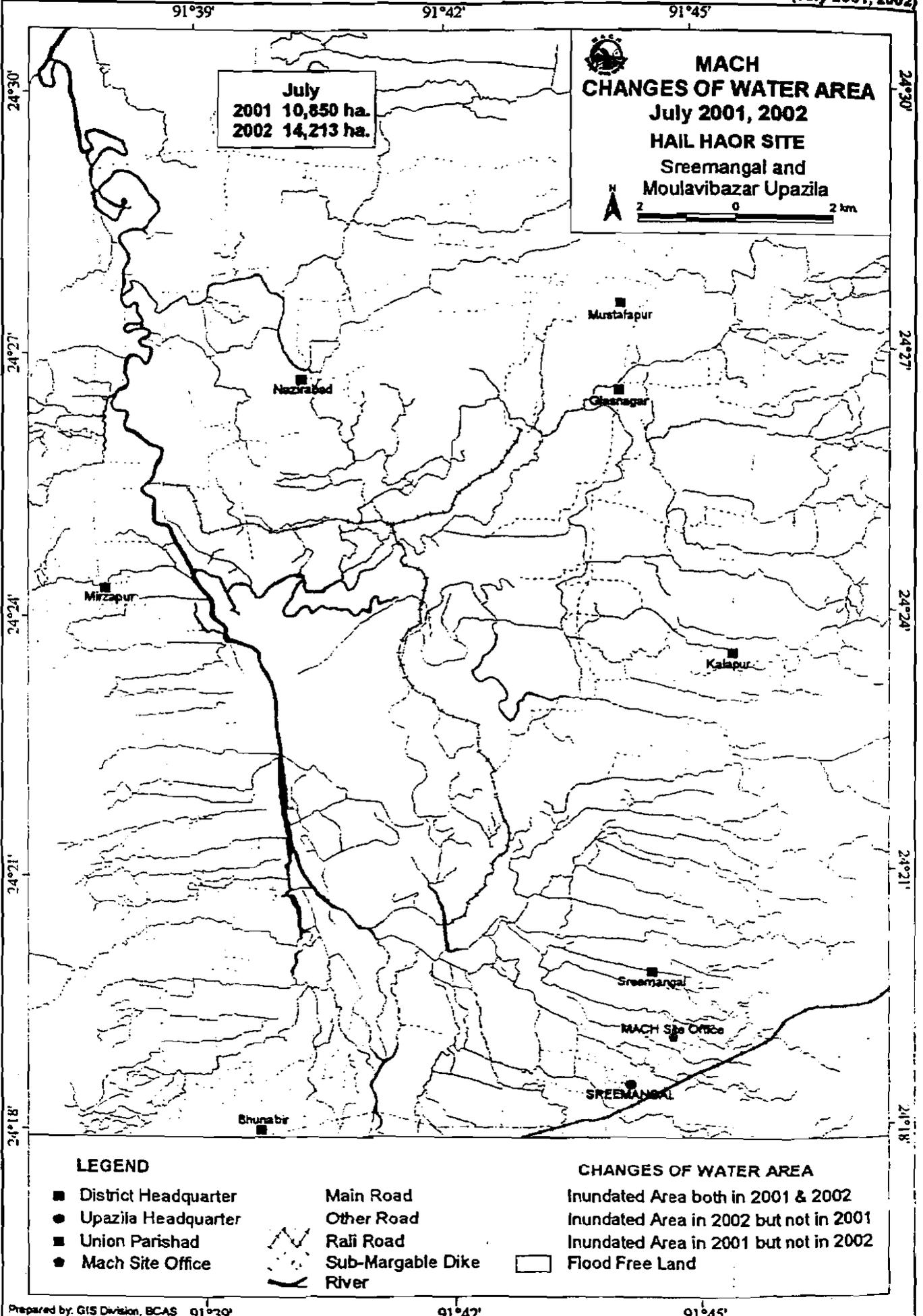


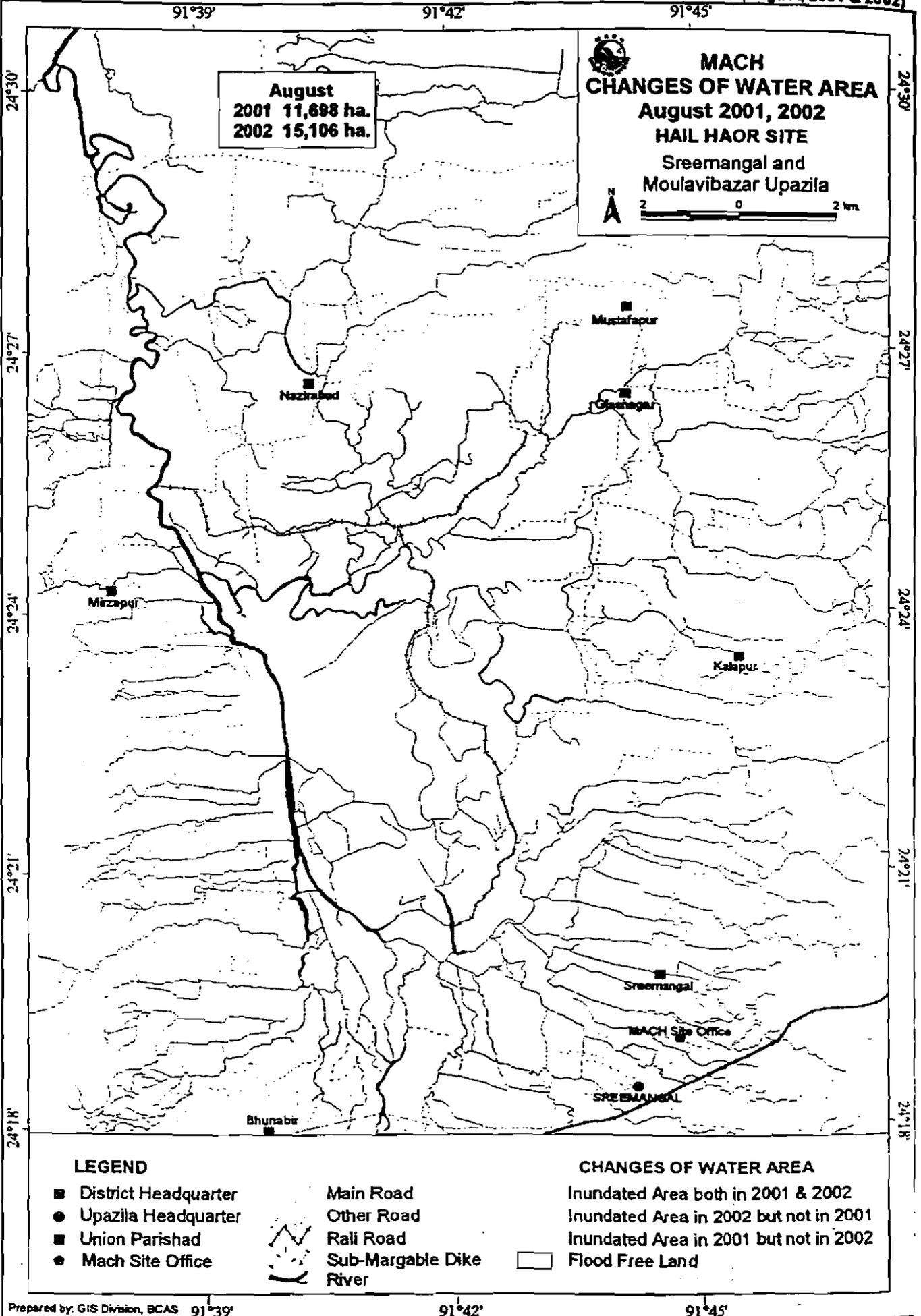


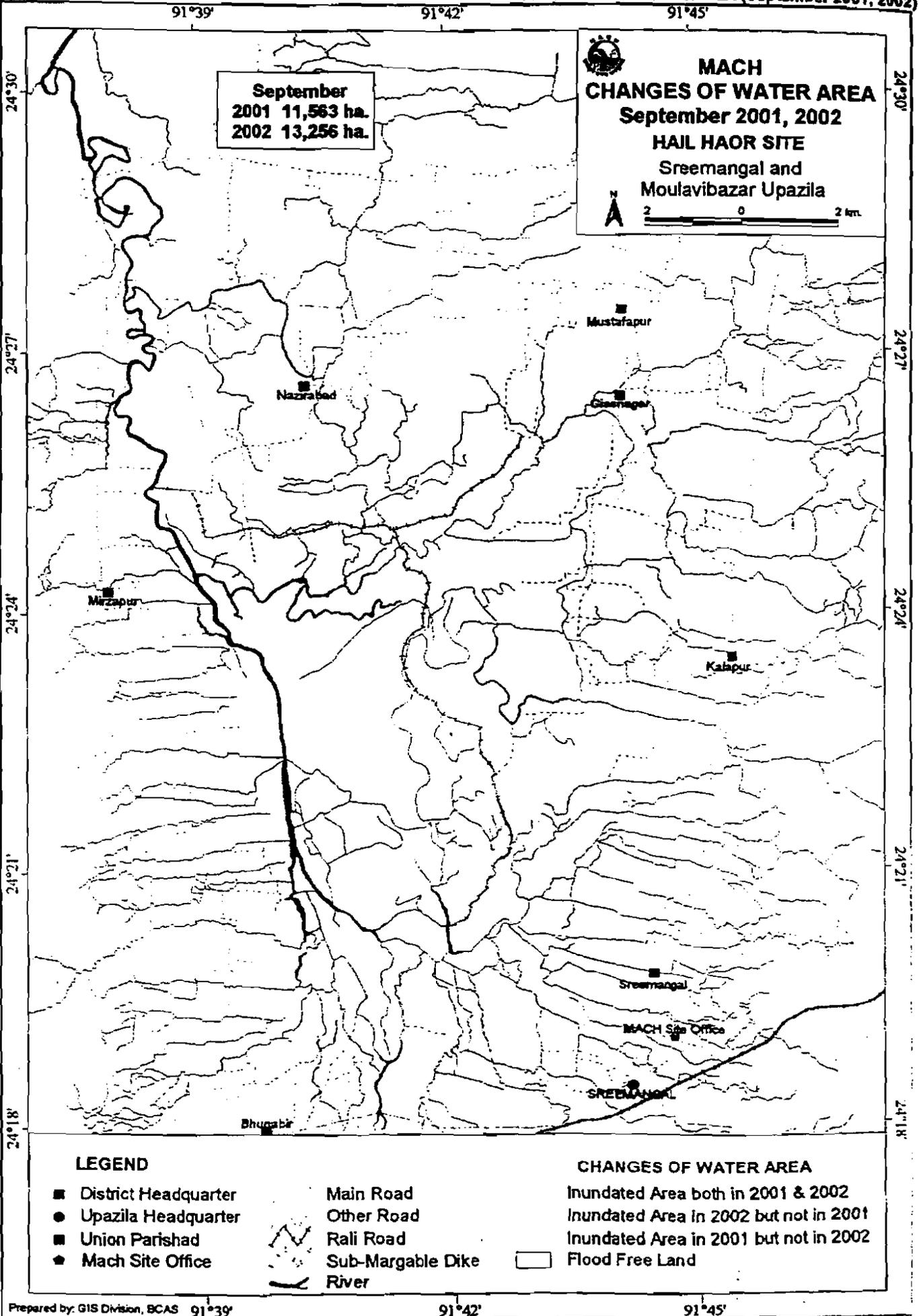


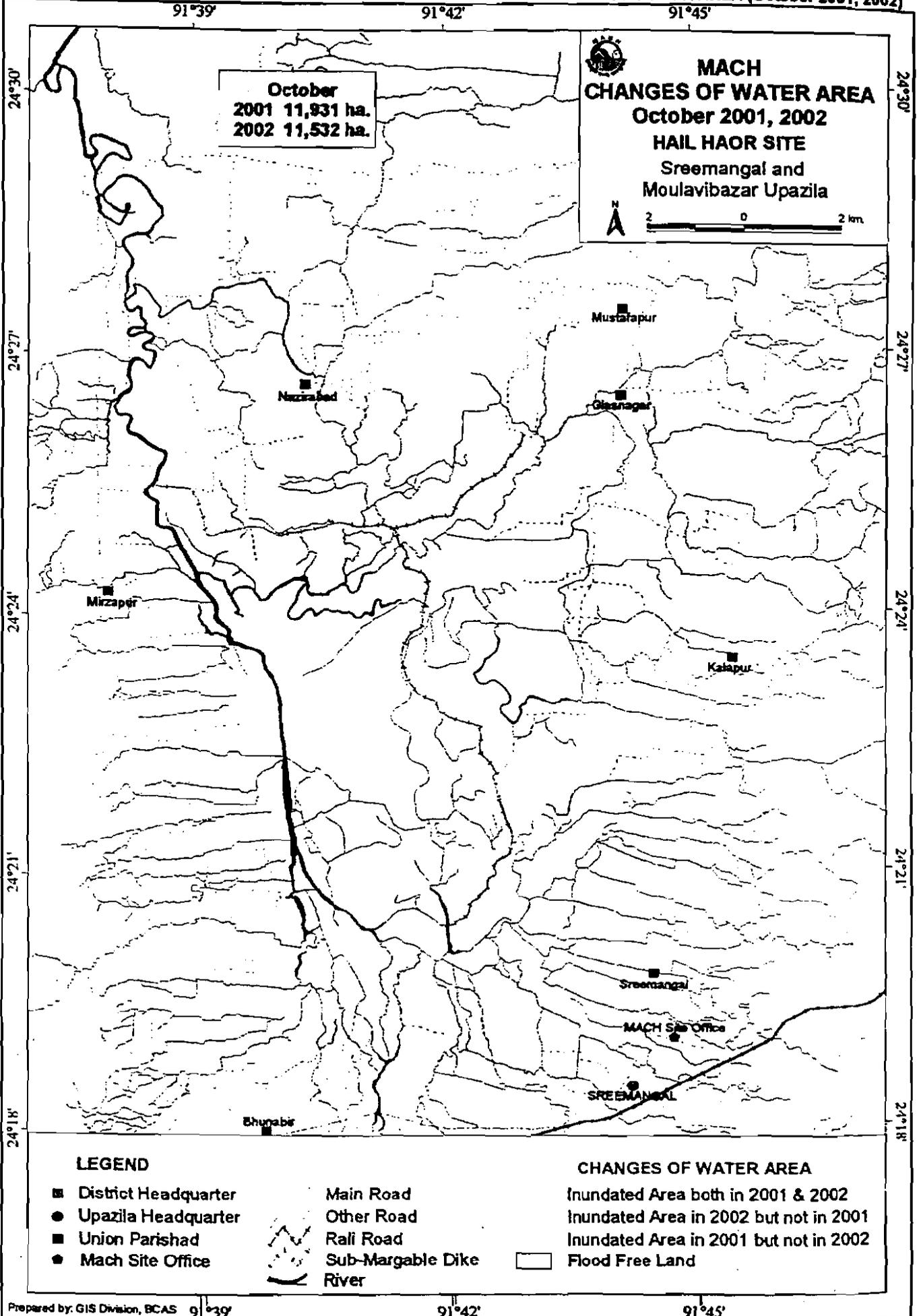


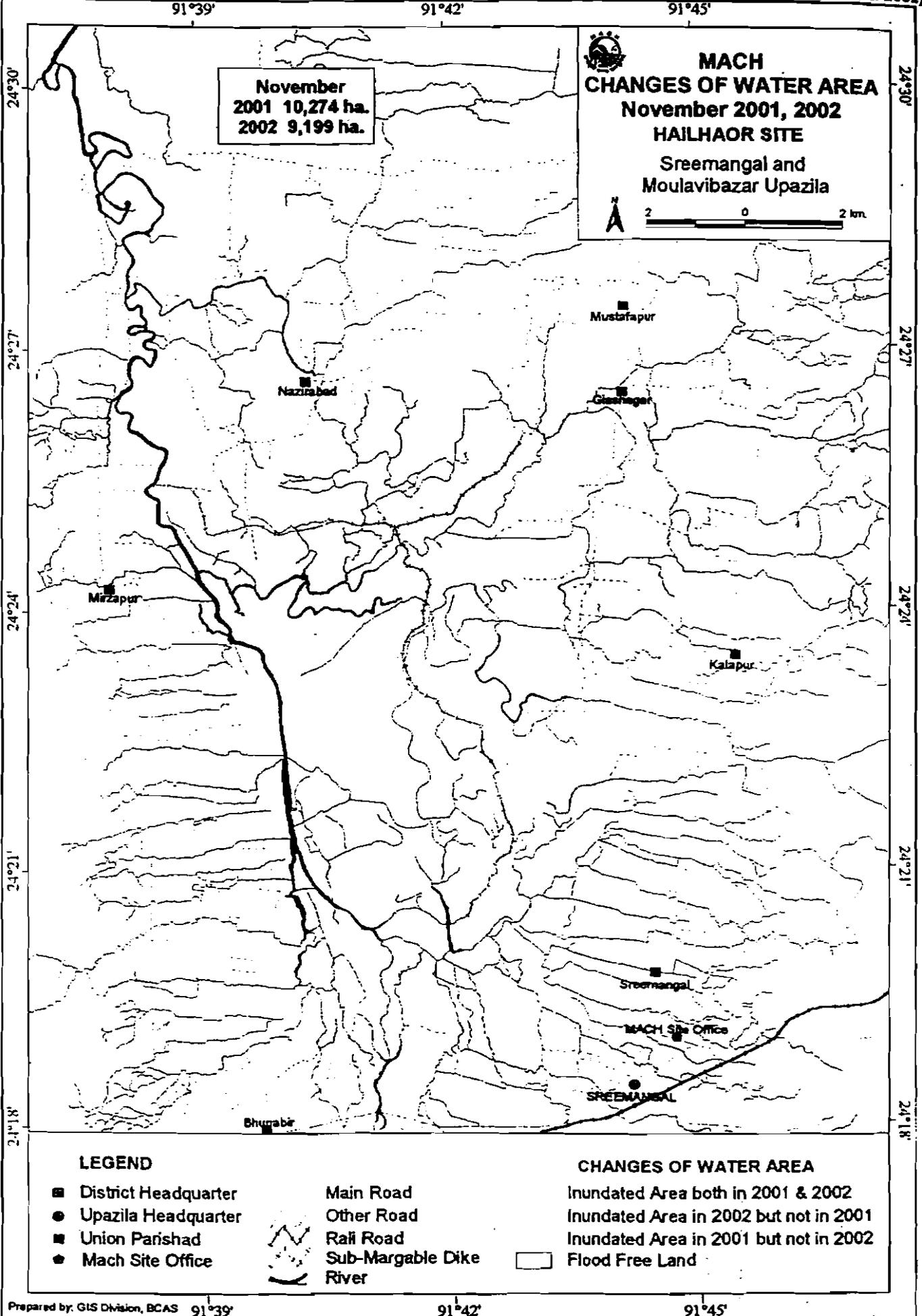


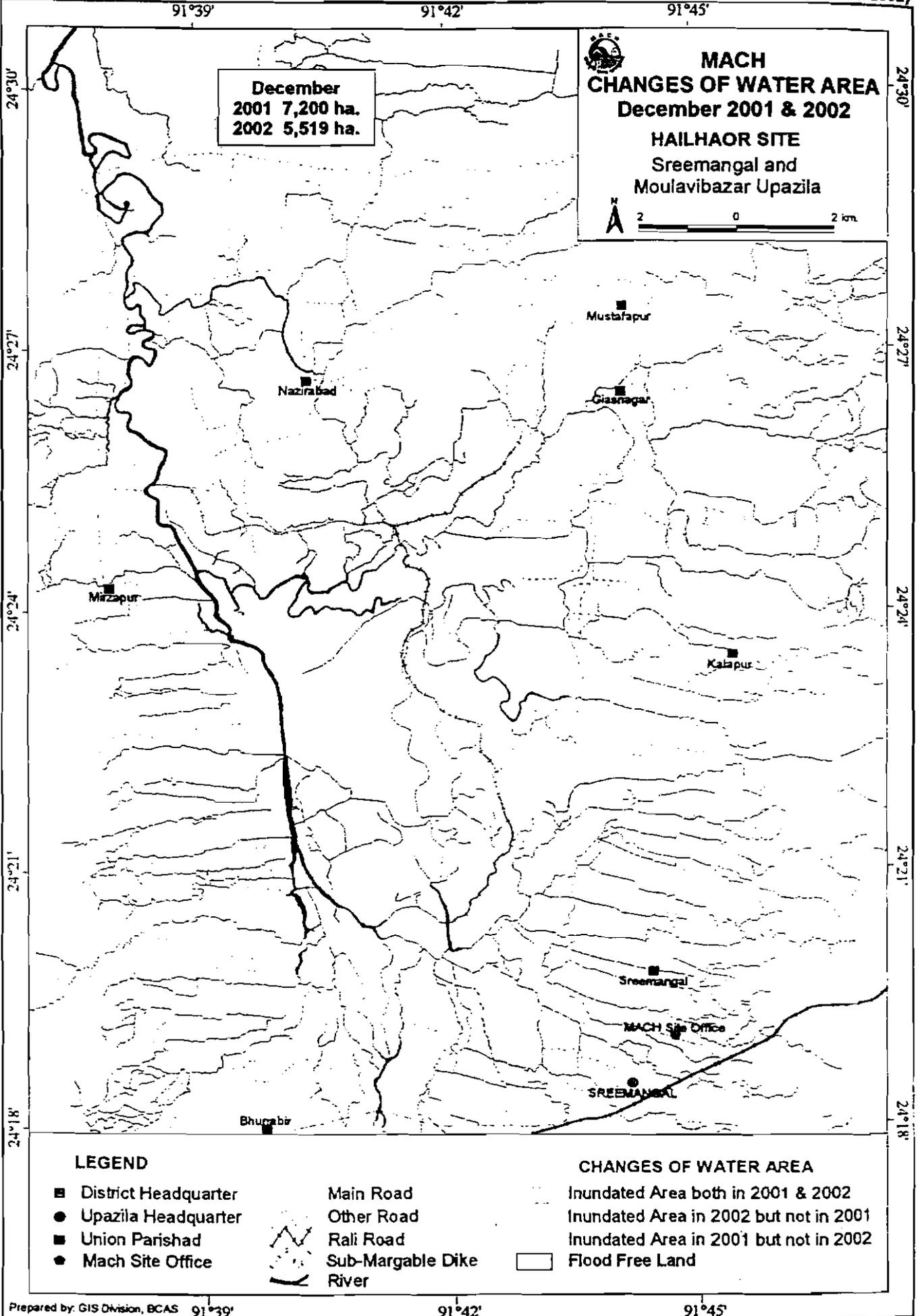




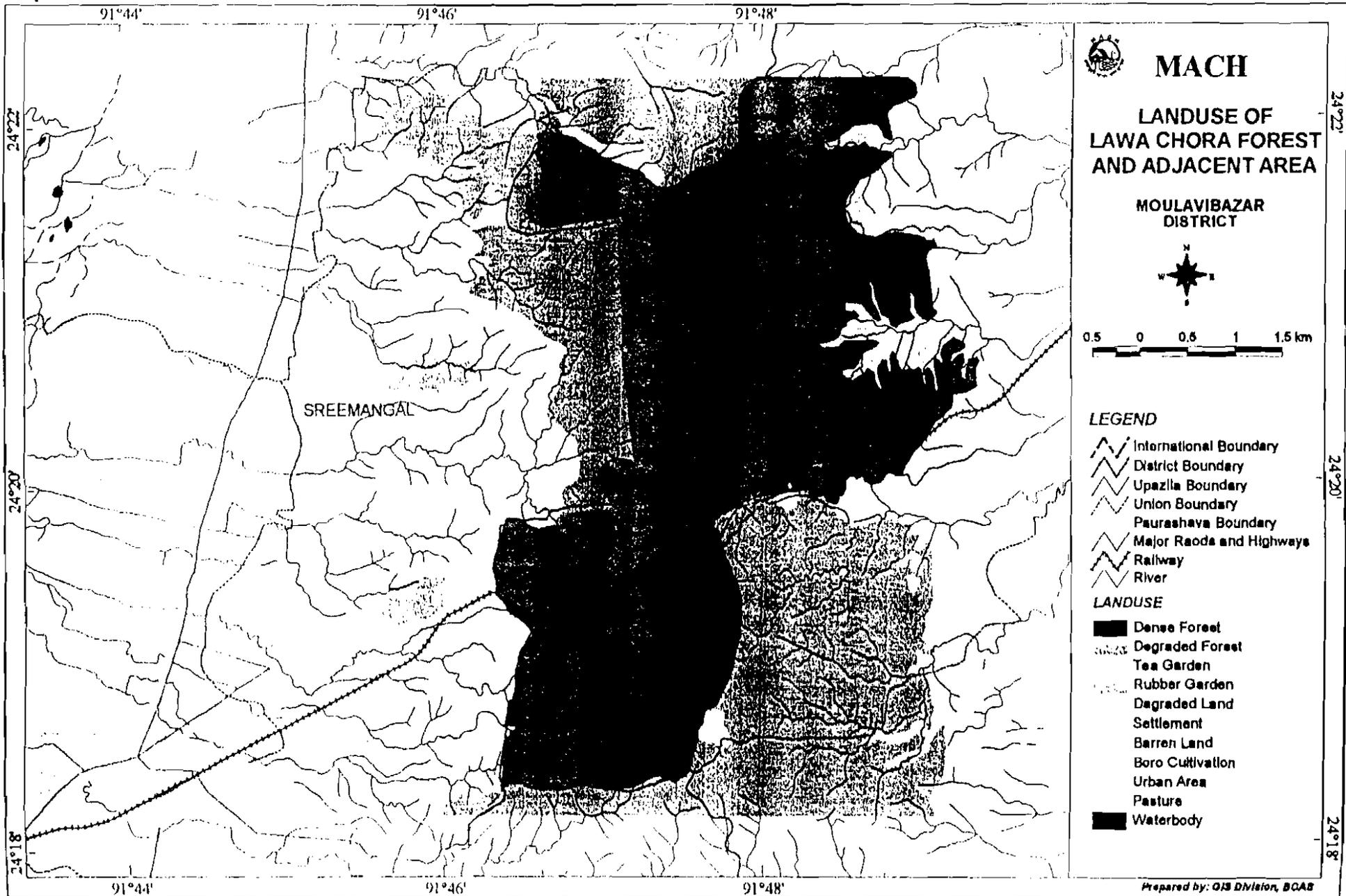




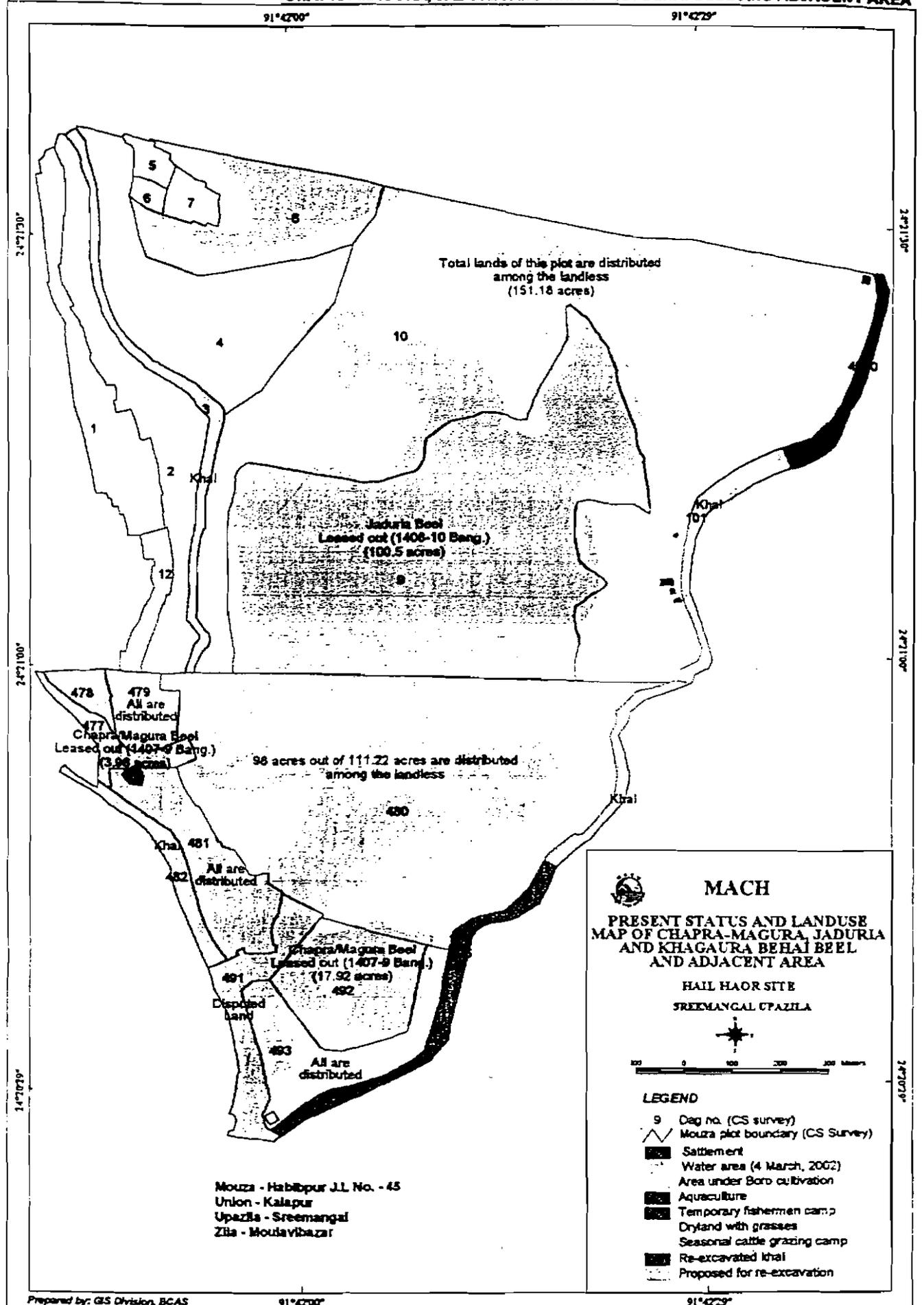


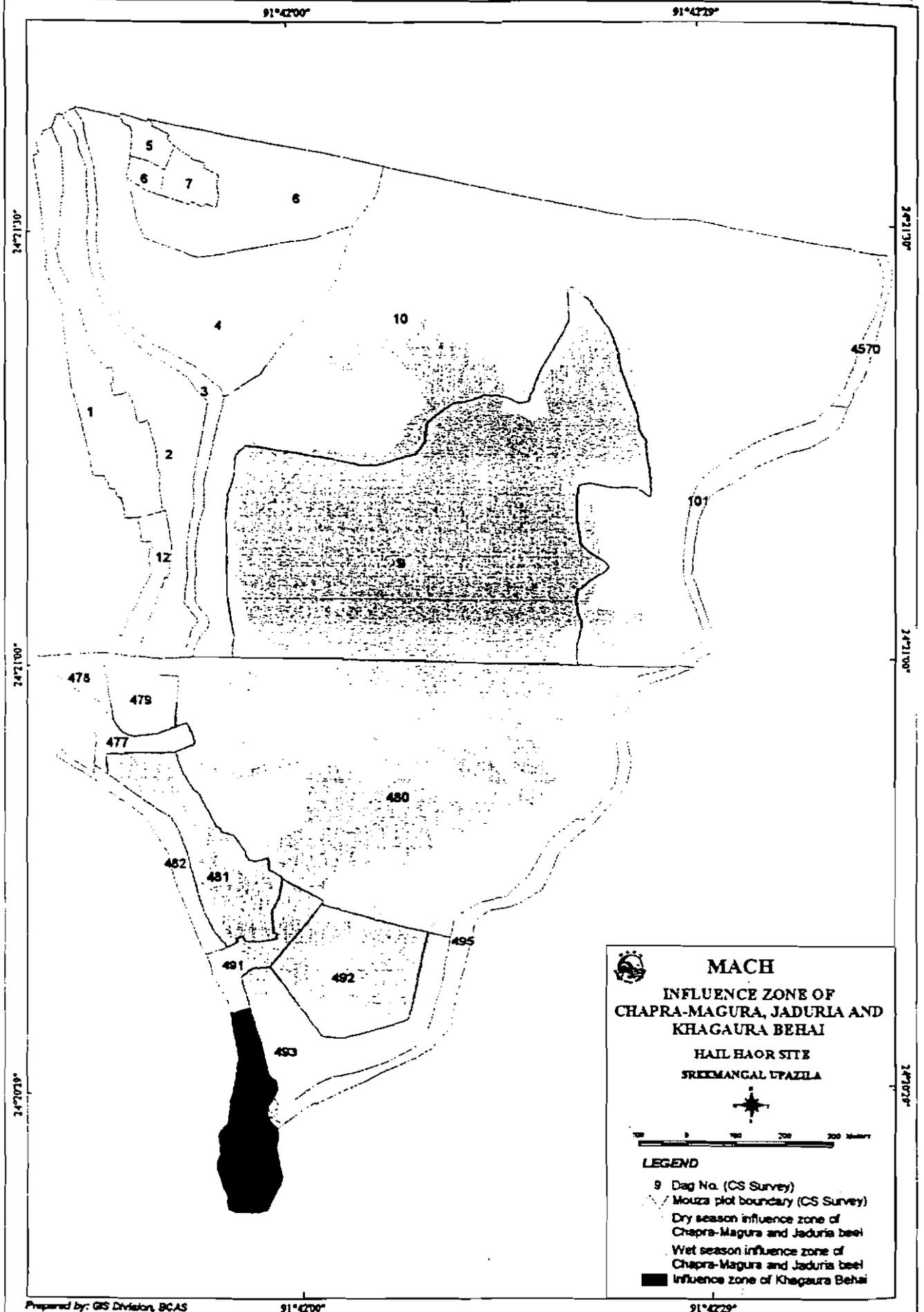


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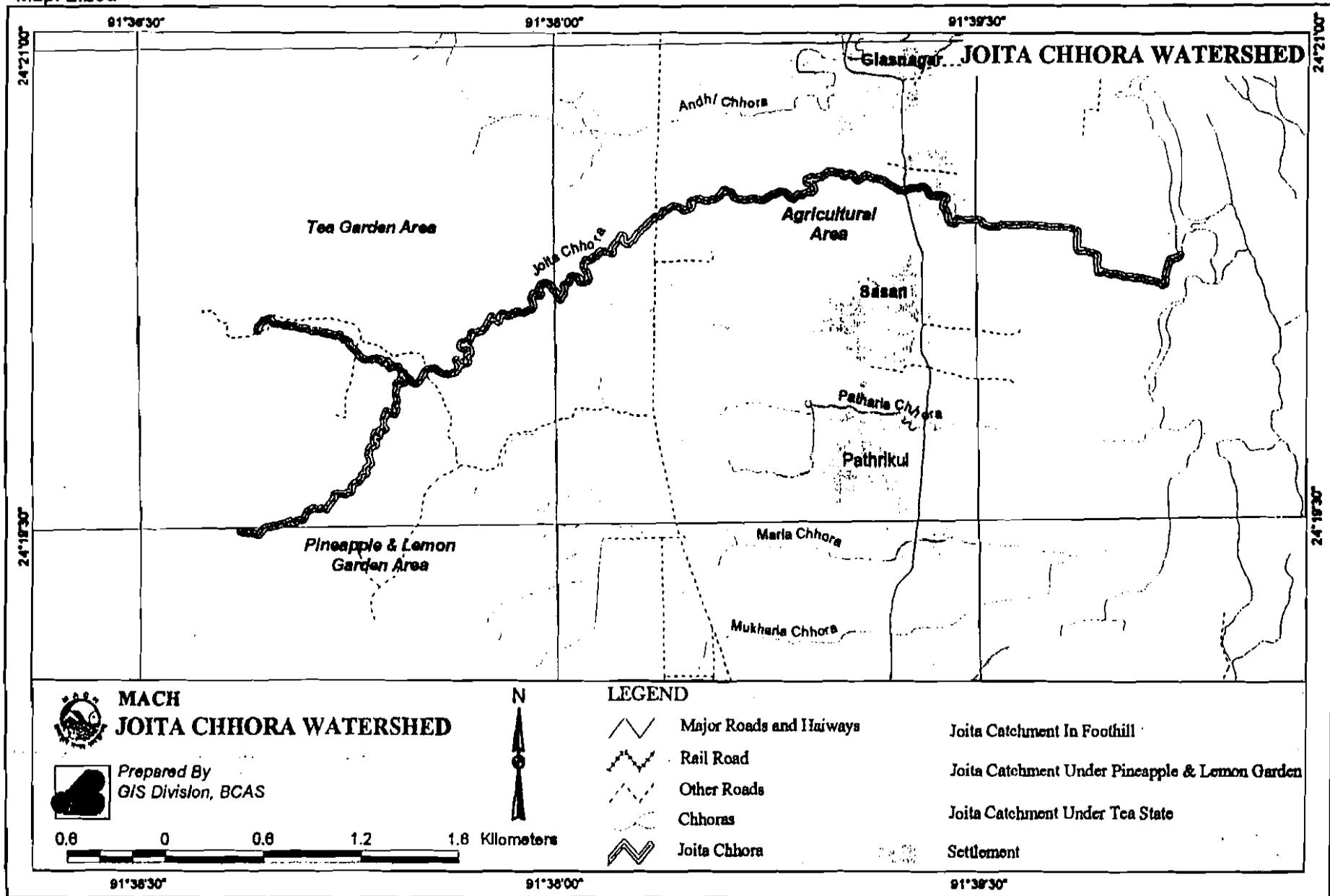


**PRESENT STATUS AND LANDUSE MAP OF  
CHAPRA-MAGURA, JADURIA AND KHAGURA BEHAL BEEL AND ADJACENT AREA**

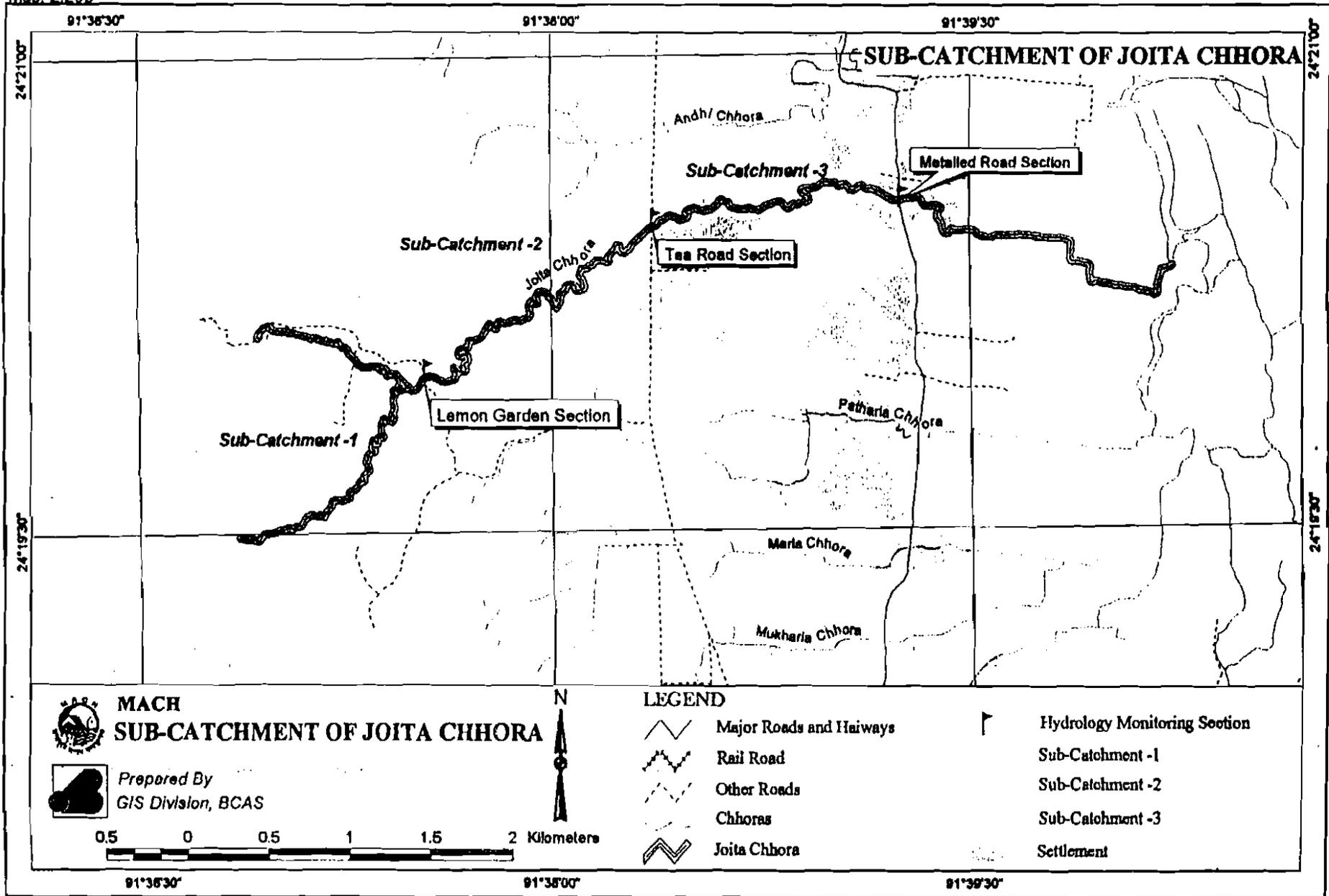




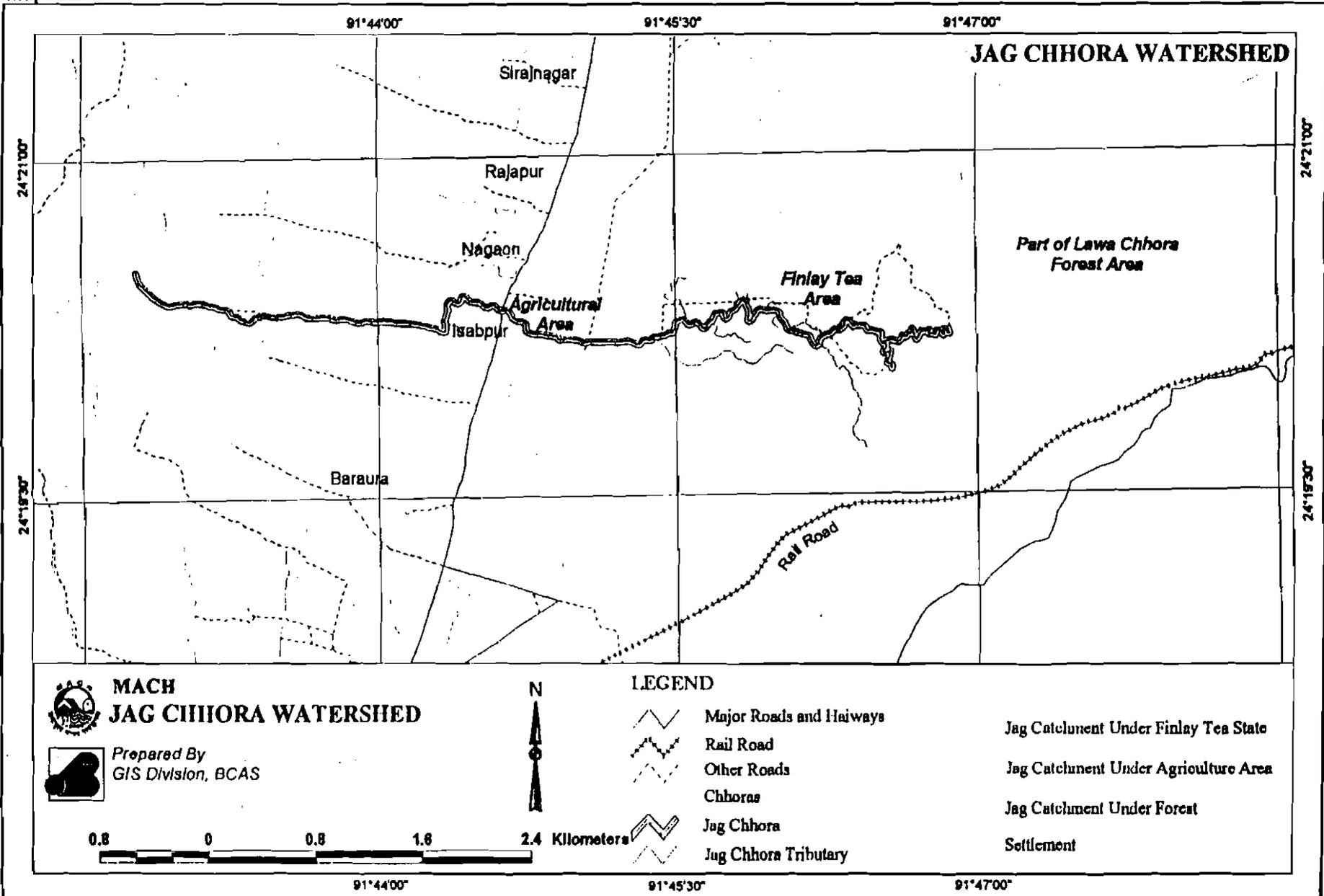
Map: 2.25a



Map: 2.25b



Map: 2.26a



**MACH  
JAG CHHORA WATERSHED**



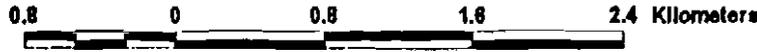
Prepared By  
GIS Division, BCAS



**LEGEND**

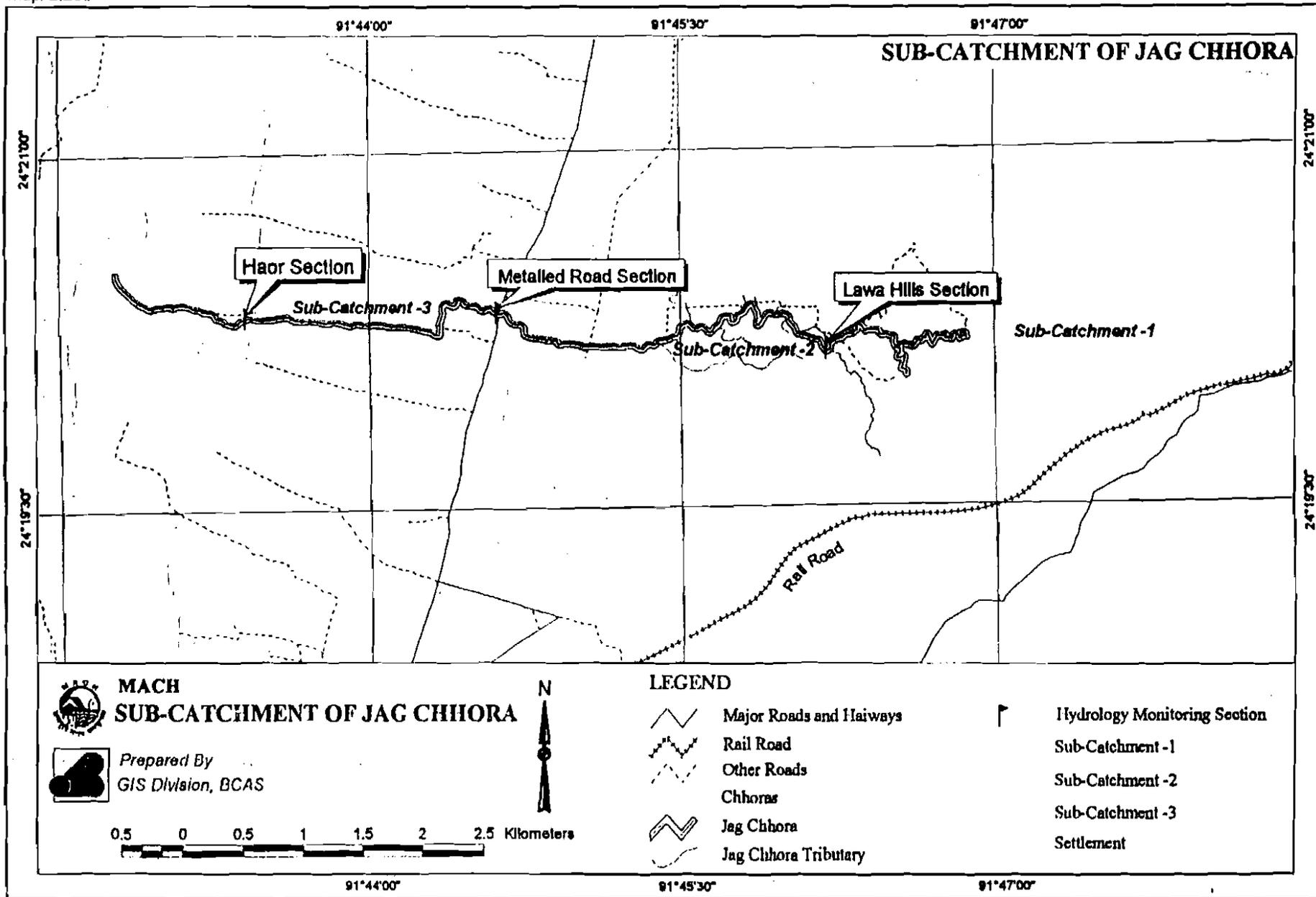
- Major Roads and Haiways
- Rail Road
- Other Roads
- Chhoras
- Jag Chhora
- Jag Chhora Tributary

- Jag Catchment Under Finlay Tea State
- Jag Catchment Under Agriculture Area
- Jag Catchment Under Forest
- Settlement



91°44'00"                      91°45'30"                      91°47'00"

Map: 2.28b

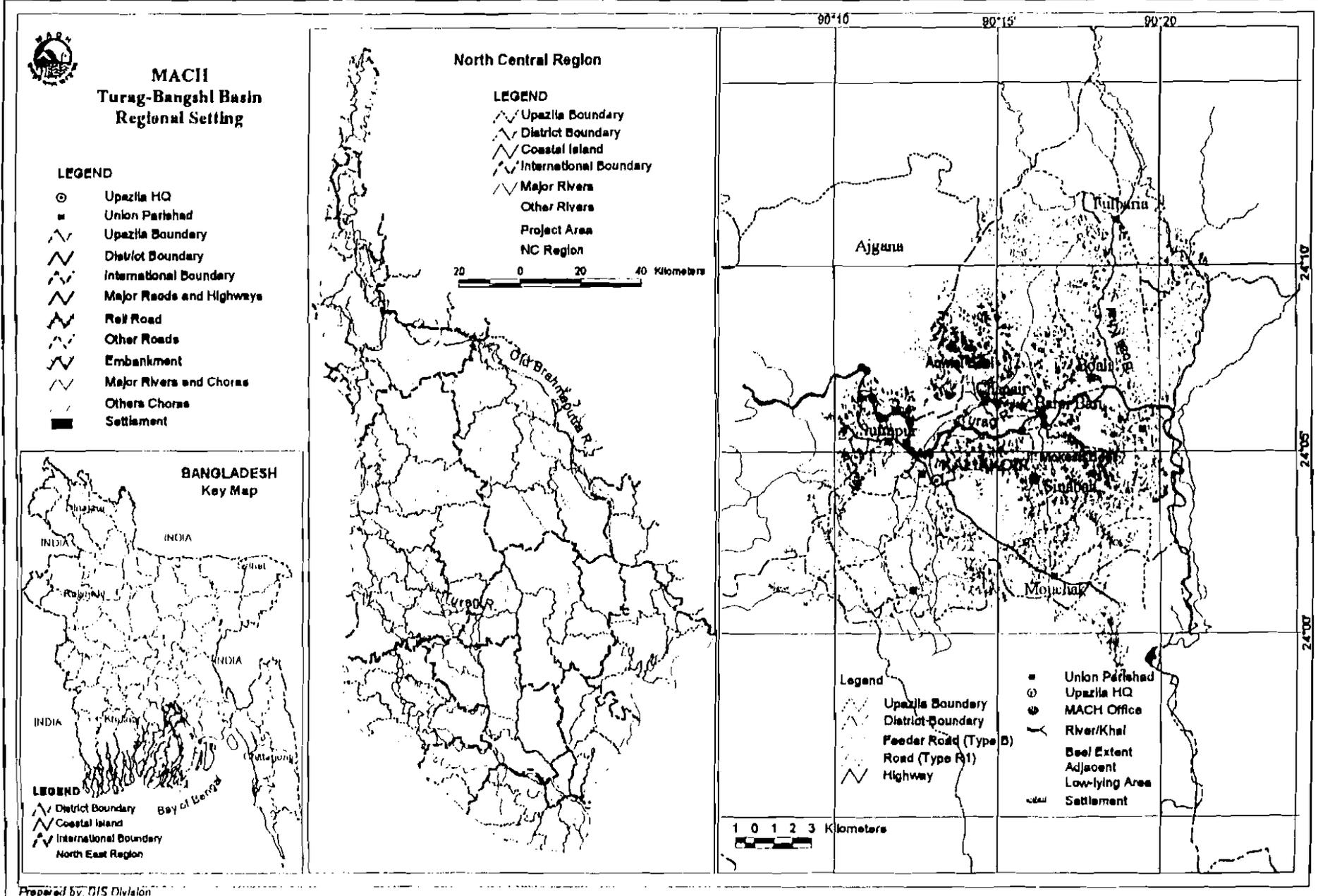


27

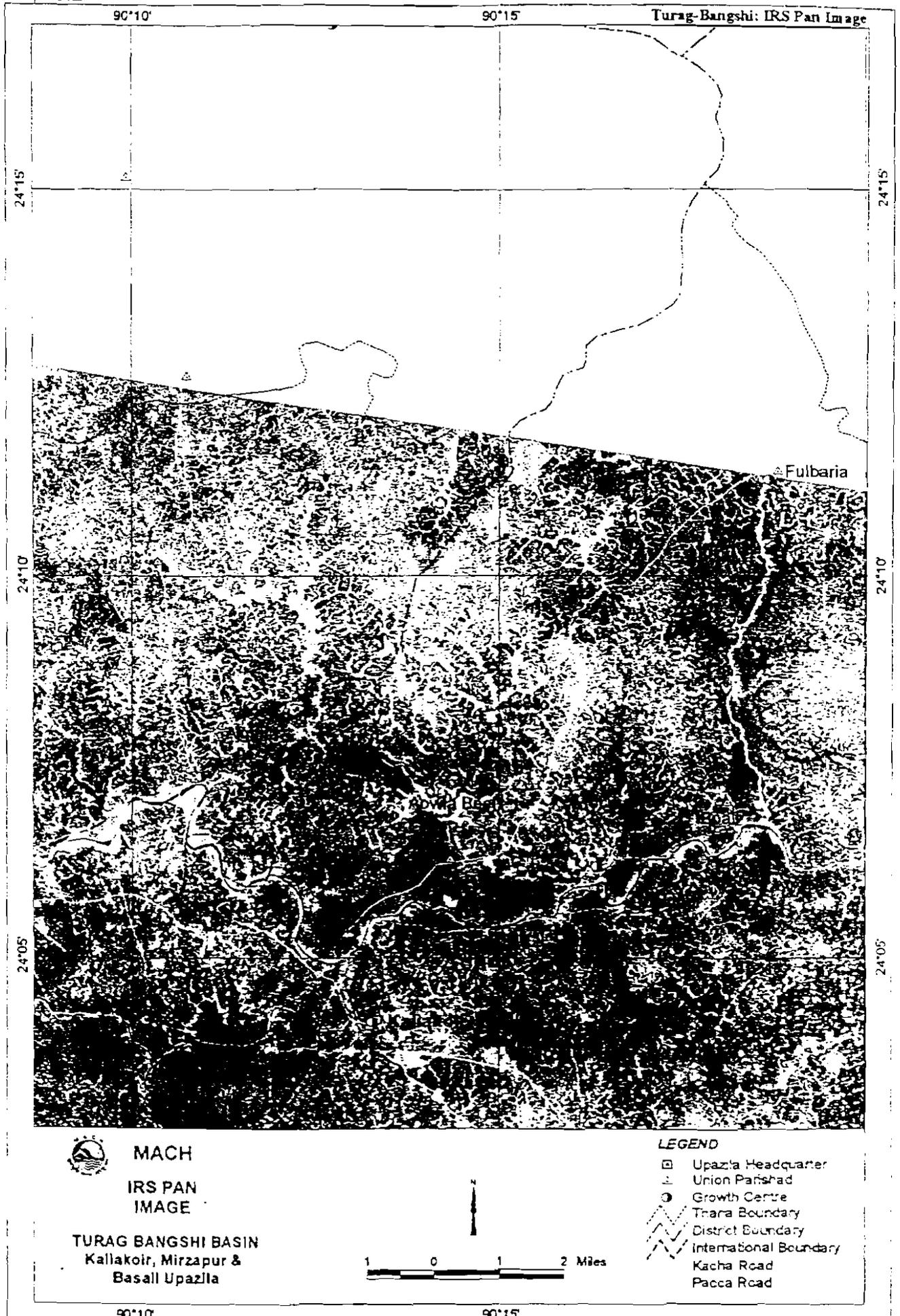
**Turag-Bangshi Site  
Kaliakoir**

Map: 3.1

Turag-Bangshi Basin: Regional Setting



Map: 3.2



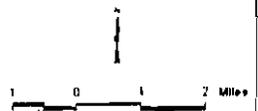
Map: 3.3



1 Mouchak

Prepared by OIS Division, DACS

**MACH**  
**TURAG-BANGSHI BASIN**  
 Kallakuli, Mirzapur &  
 Barail Upazila

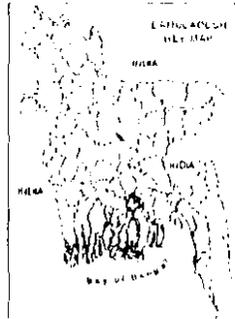


**LEGEND**

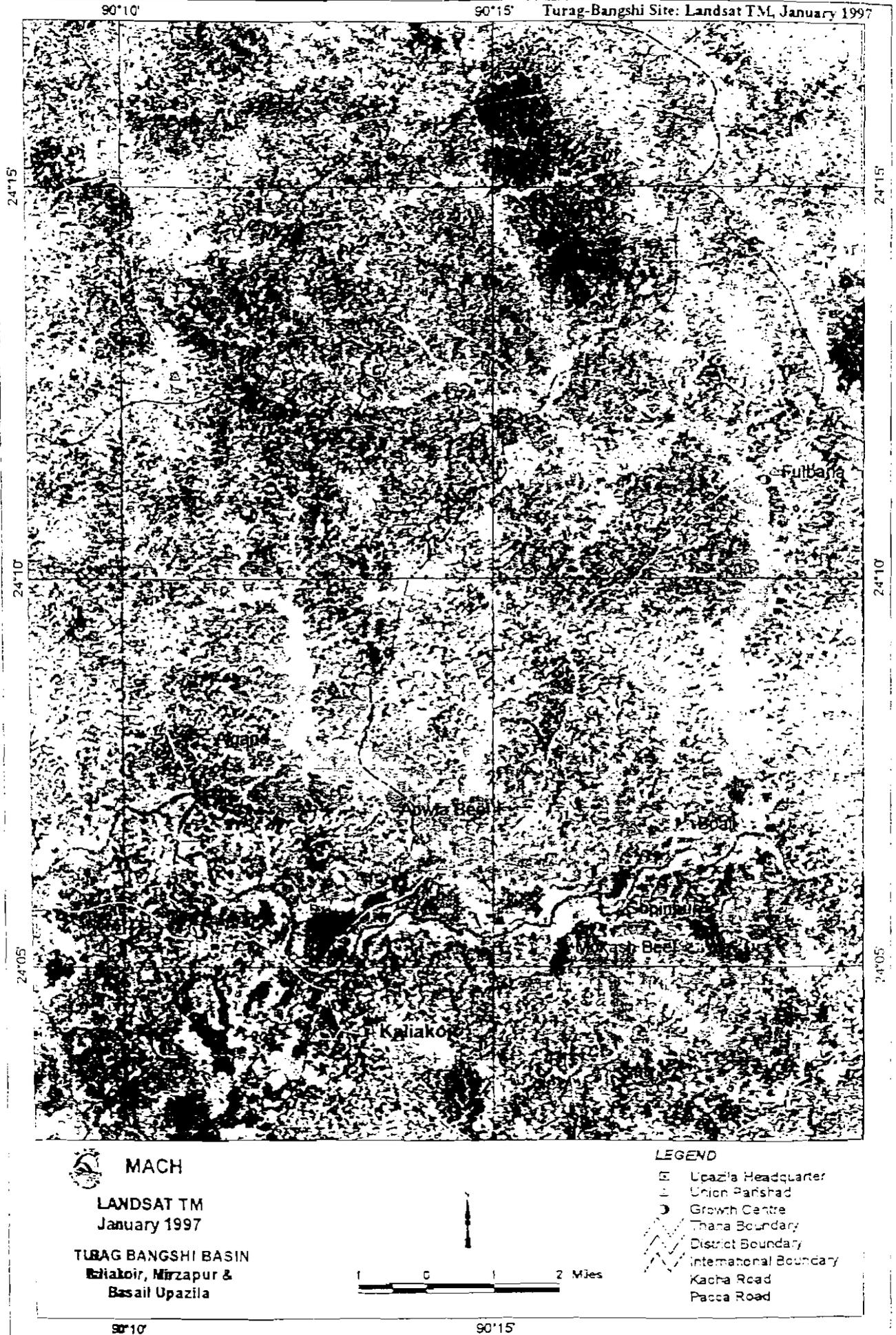
- Upazila Headquarters
- △ Union Parishad
- Growth Centre
- Upazila Boundary
- - - District Boundary
- - - International Boundary
- Kalia Road
- Pacca Road

**Note**

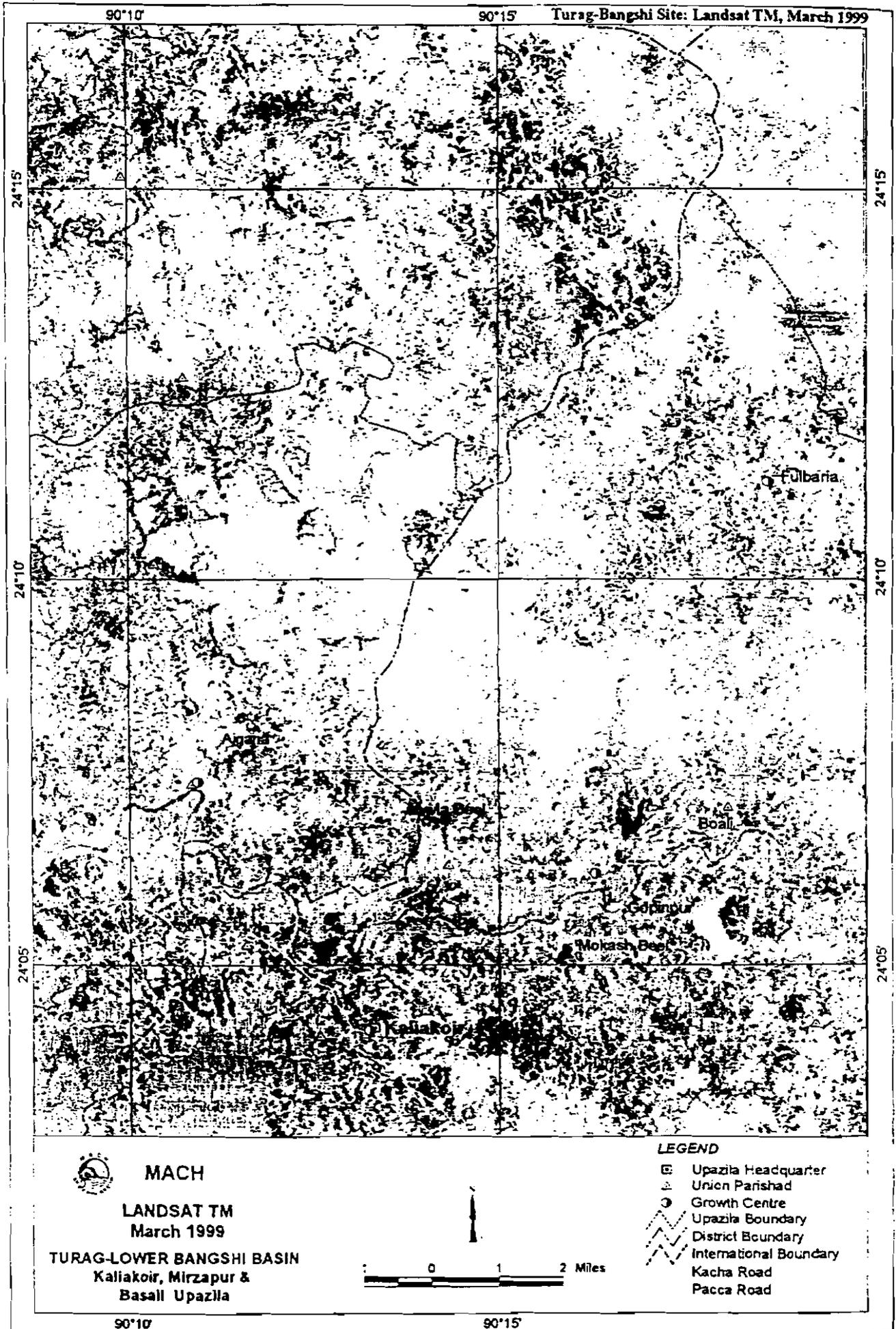
These two Landsat TM images have a ground resolution of 30m x 30m and are provided in Band 2, 3 and 4. It is typically displayed in a false colour composition. Red colours are dominated by high reflectance of vegetation. Light blue and white are associated with non-vegetated or fallow lands. Deep blue and dark blue are associated with water bodies.



Map 3.4

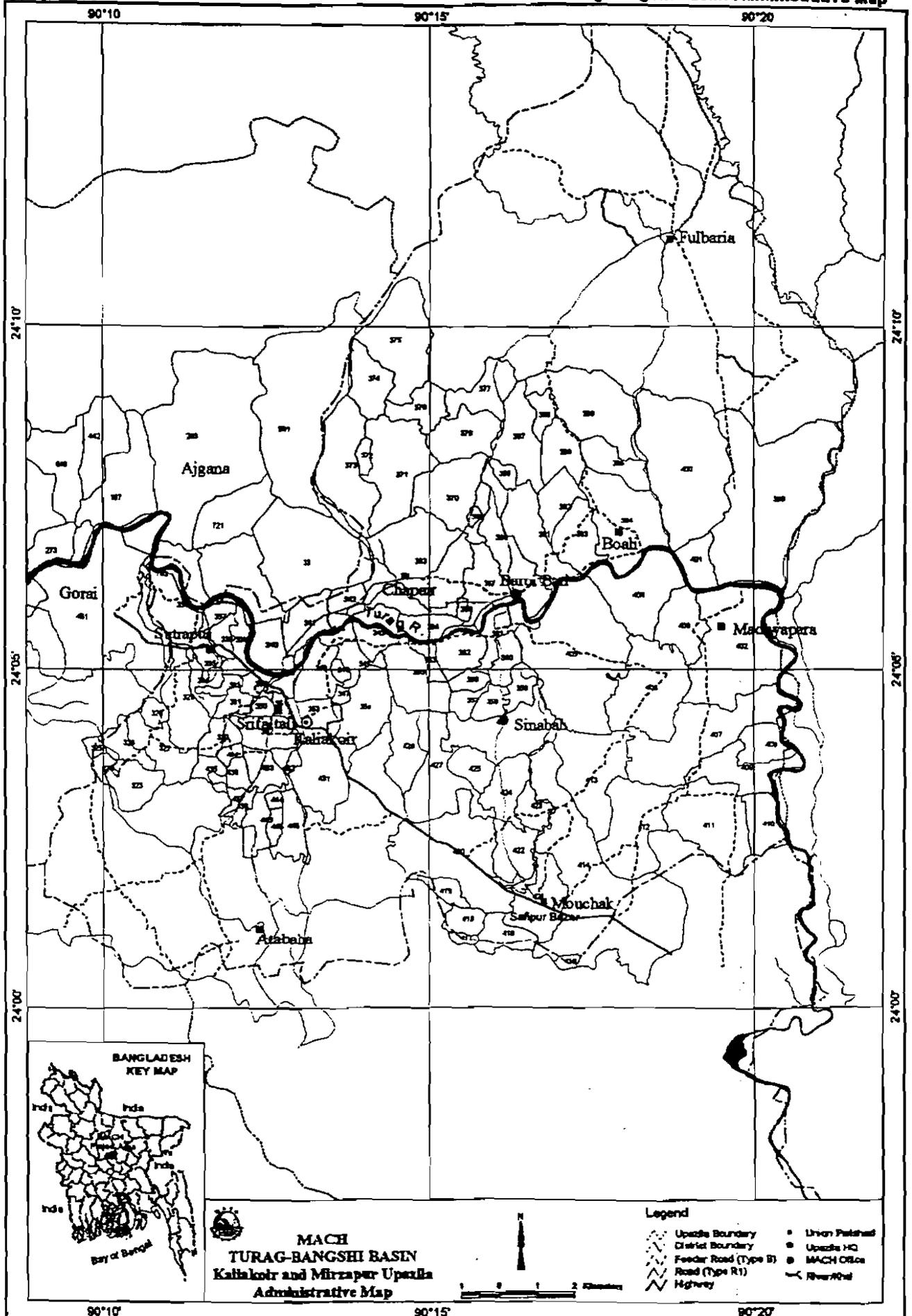


Map: 3.5



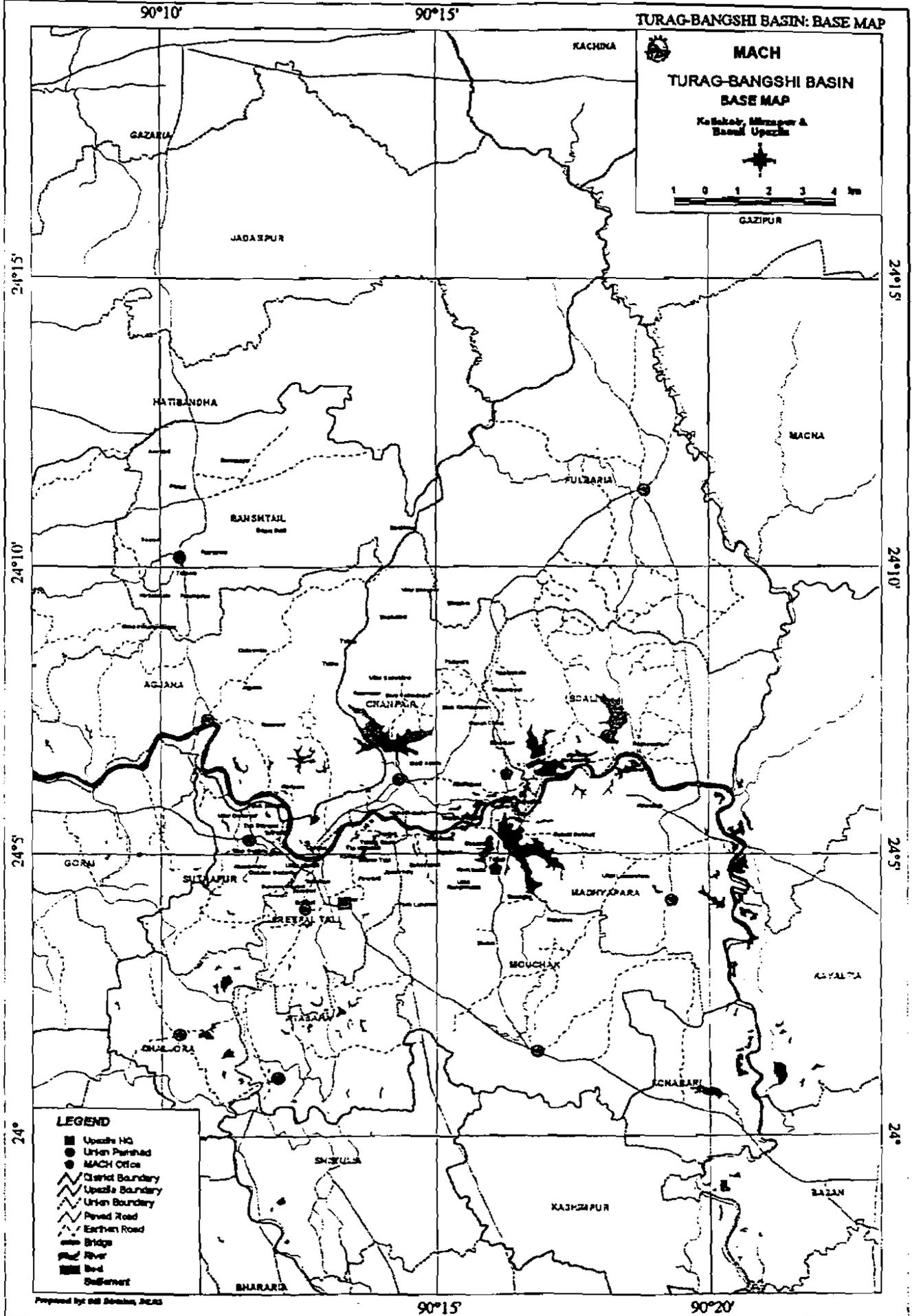
Map: 3.6

Turag Bangshi Basin: Administrative Map



Prepared by: GIS Division, BCAS

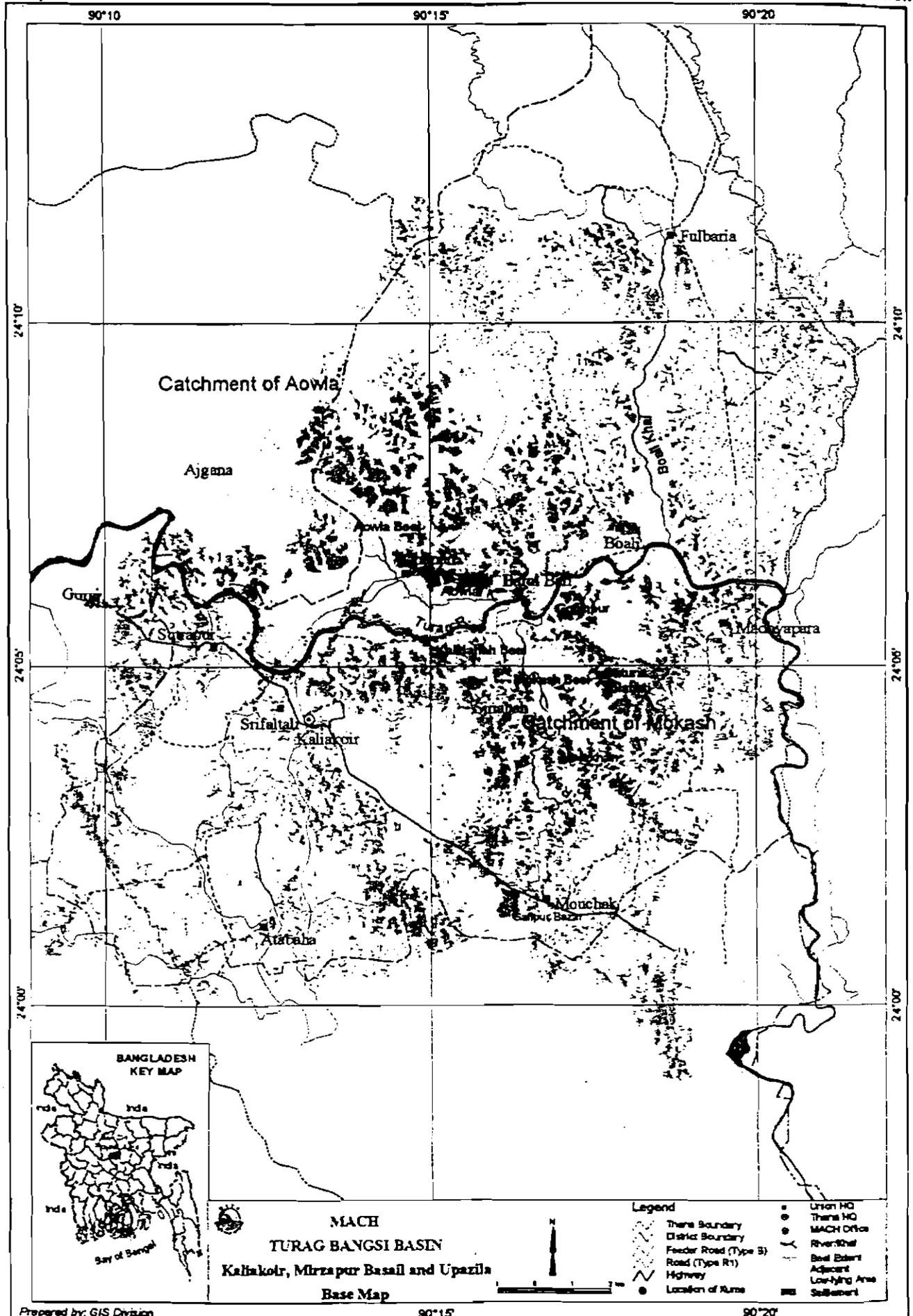
Map: 3.7



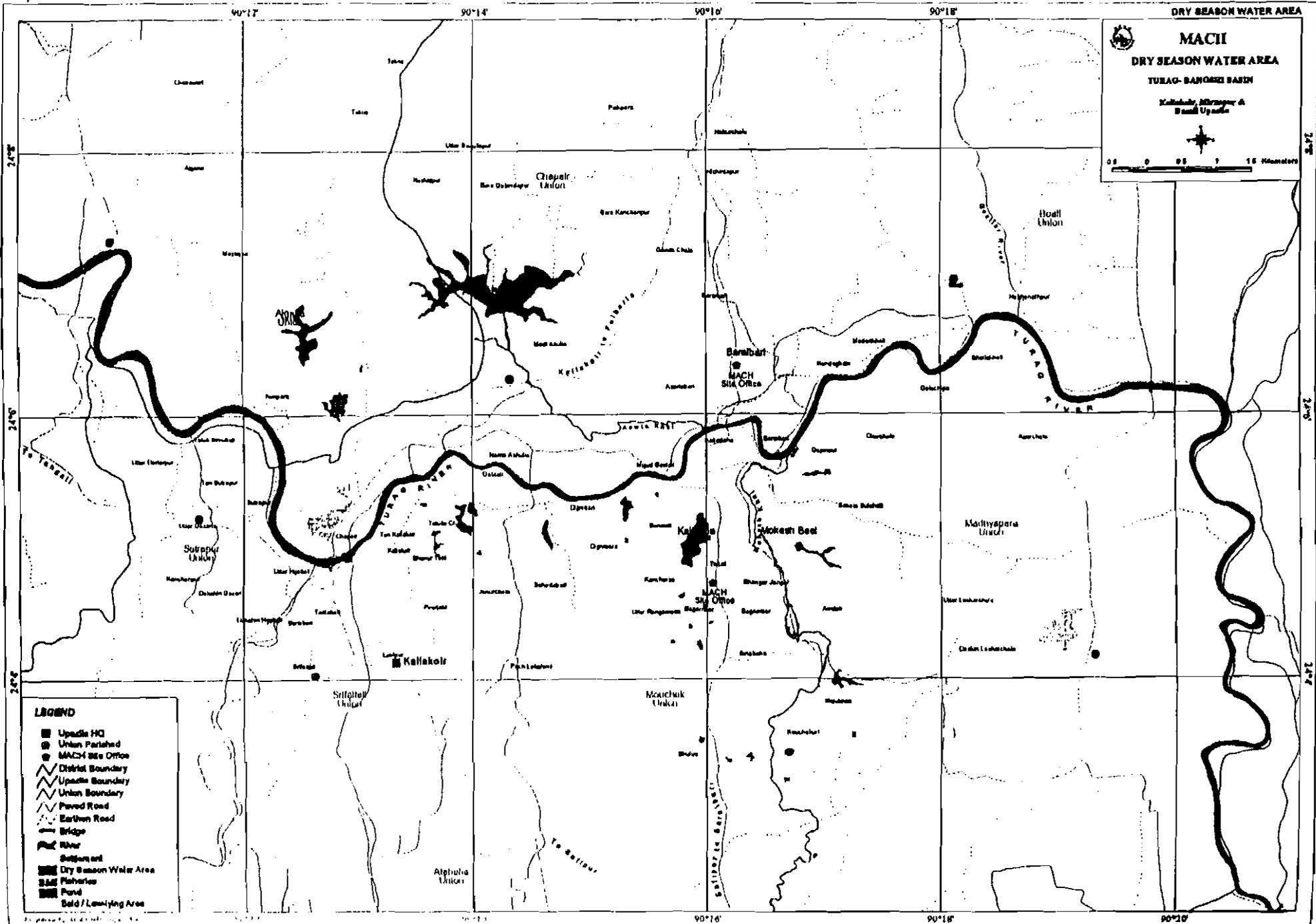
24

Map: 3.7a

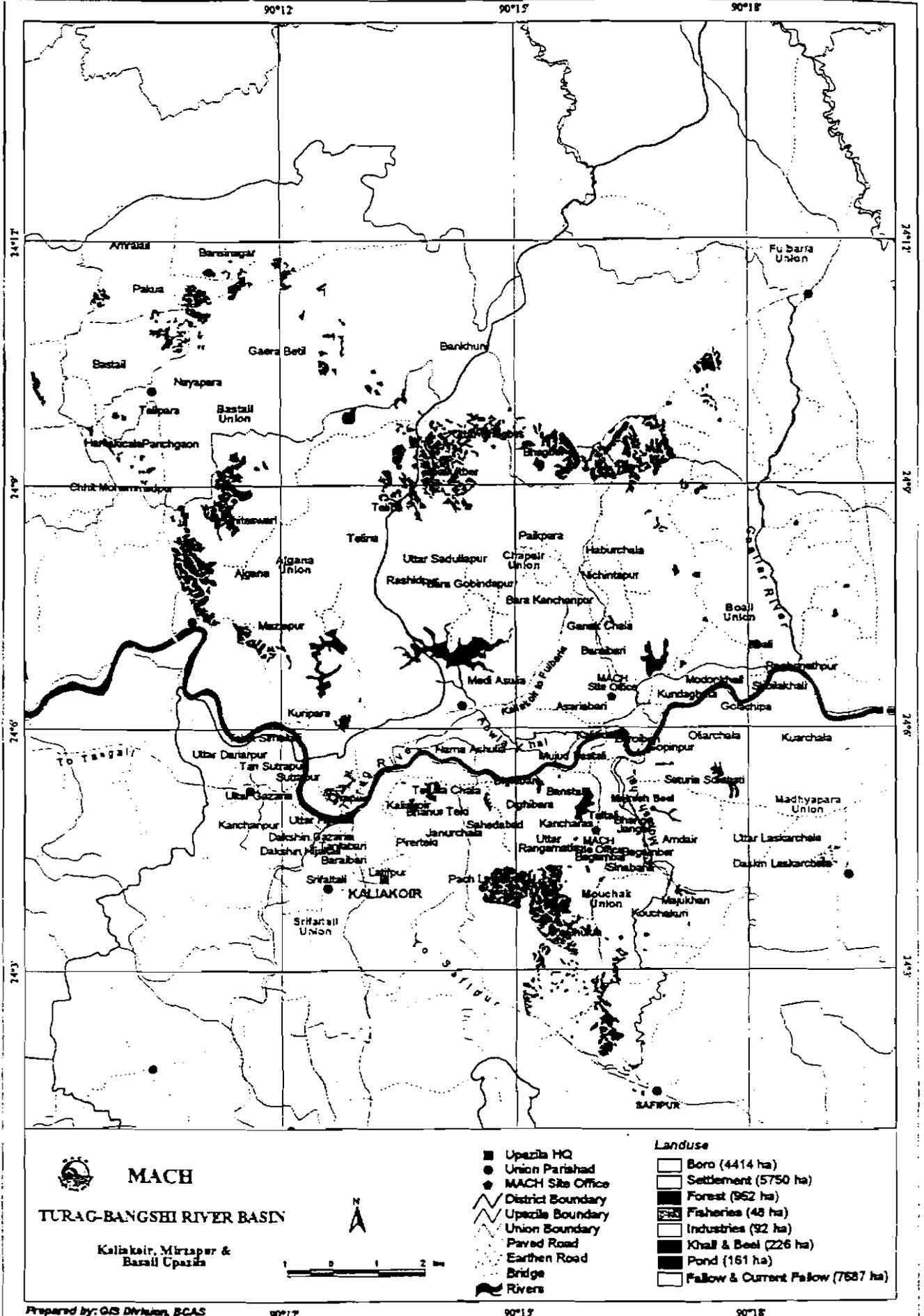
Turag-Bangshi Site: River System with Beel Catchment

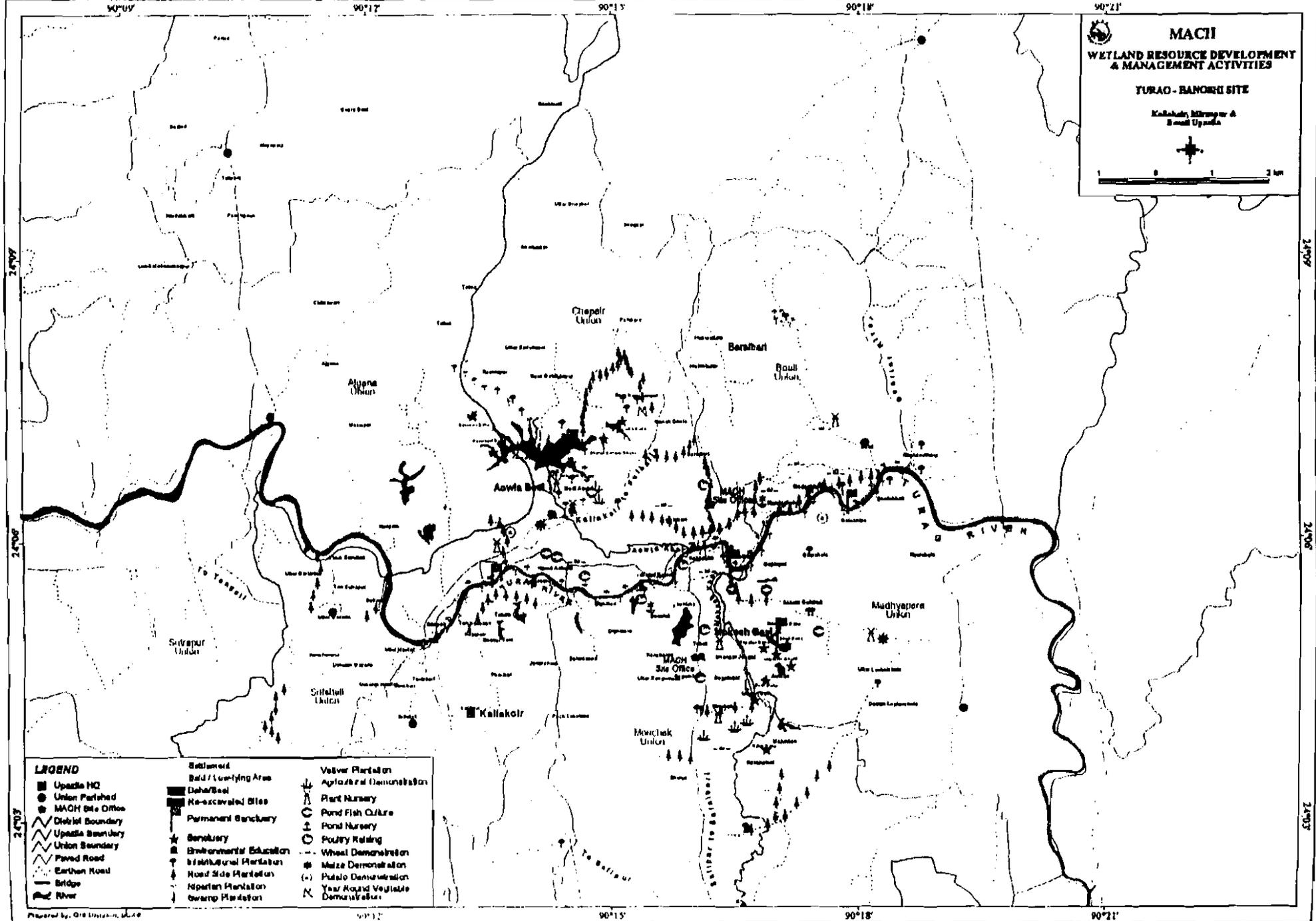


Map: 3.8

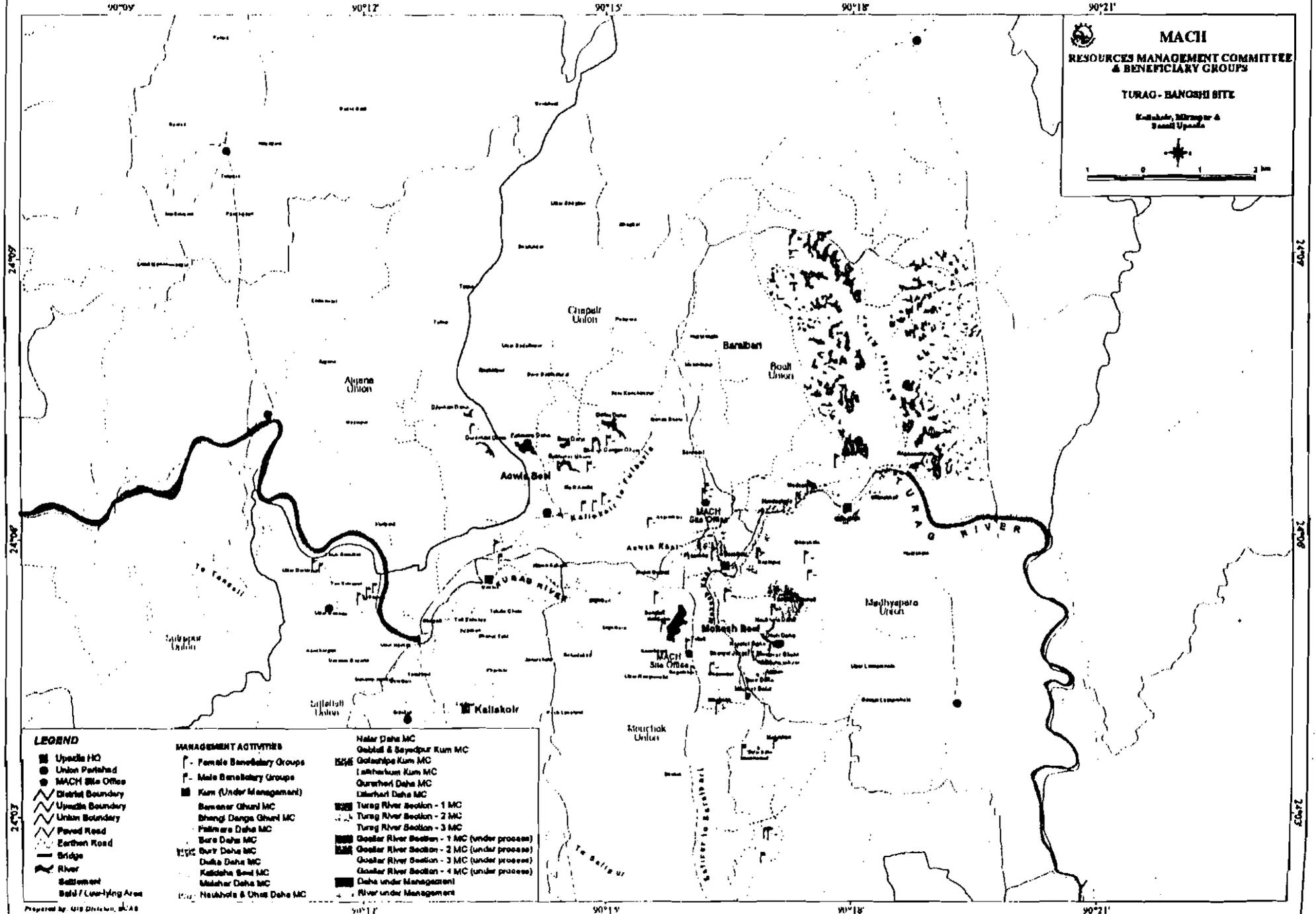


6





18



**MACH**  
**RESOURCES MANAGEMENT COMMITTEE & BENEFICIARY GROUPS**  
**TURAG-BANGSHI BITE**  
 Kailasha, Mirzapur & Said Upada

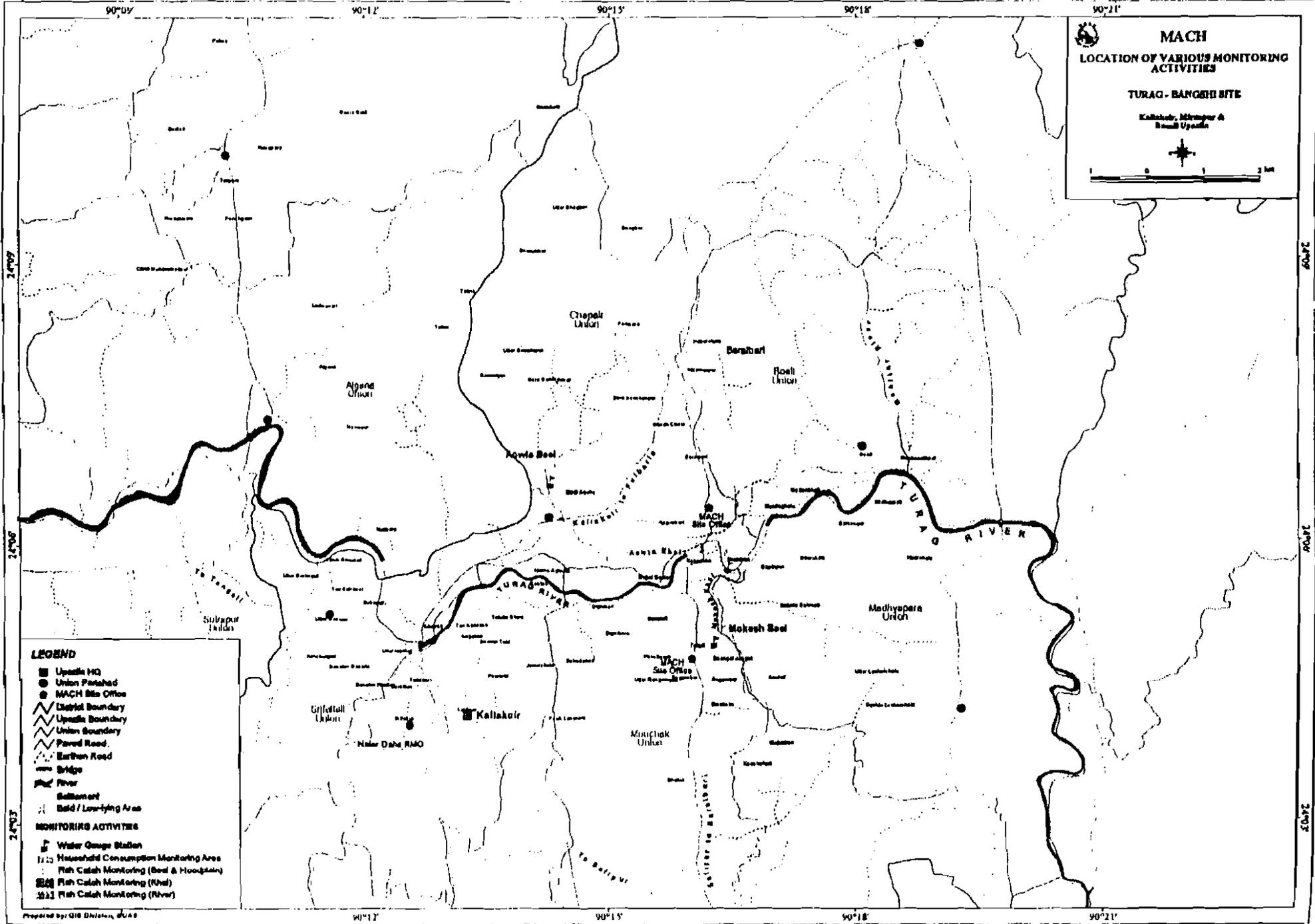
0 1 2 km

- LEGEND**
- Upada MC
  - Union Parishad
  - MACH Site Office
  - District Boundary
  - Union Boundary
  - Paved Road
  - Earthen Road
  - Bridge
  - River
  - Settlement
  - Sand/Low-lying Area

- MANAGEMENT ACTIVITIES**
- Female Beneficiary Groups
  - Male Beneficiary Groups
  - Kum (Under Management)
  - Bawoner Ghuni MC
  - Bhongi Danga Ghuni MC
  - Fakira Dahi MC
  - Sara Dahi MC
  - Surf Dahi MC
  - Daka Dahi MC
  - Katsaha Bani MC
  - Malar Dahi MC
  - Nakhola & Uhat Dahi MC

- Natar Dahi MC
- Gabbal & Sayedpur Kum MC
- Golanaha Kum MC
- Iakhanum Kum MC
- Gurnahar Dahi MC
- Lalarhar Dahi MC
- Turag River Section - 1 MC
- Turag River Section - 2 MC
- Turag River Section - 3 MC
- Goslar River Section - 1 MC (under process)
- Goslar River Section - 2 MC (under process)
- Goslar River Section - 3 MC (under process)
- Goslar River Section - 4 MC (under process)
- Dahi under Management
- River under Management

79

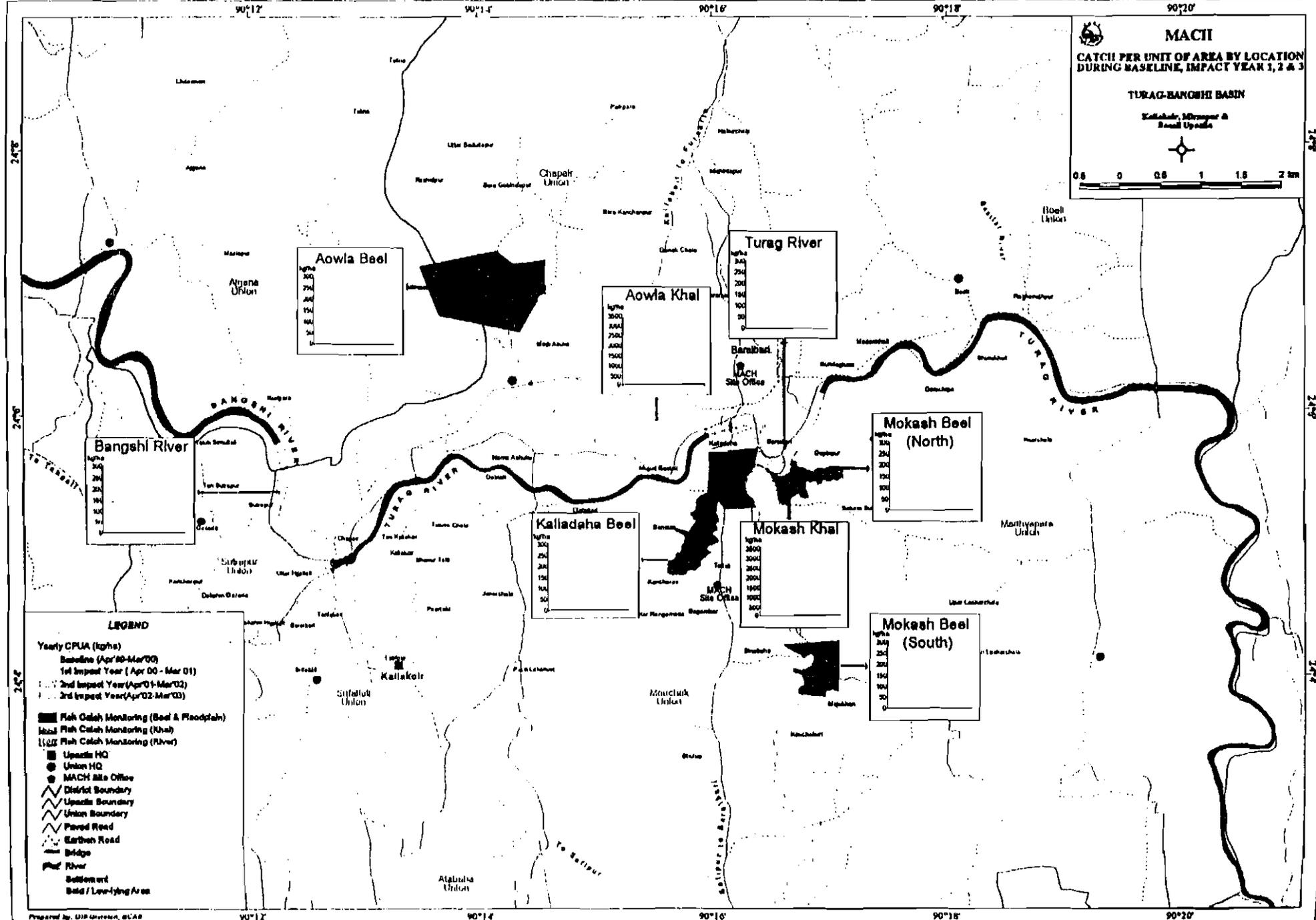


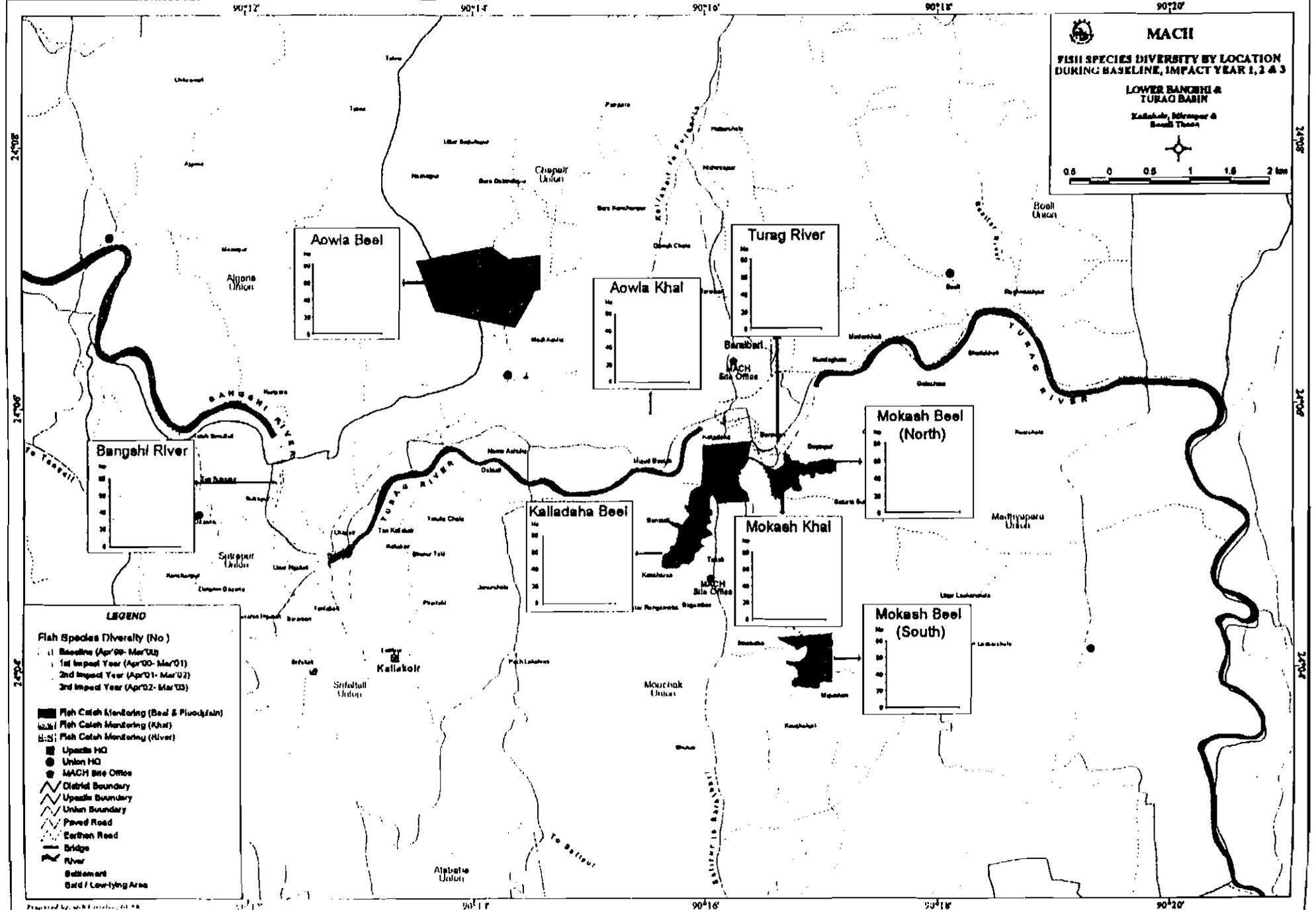
**MACH**  
**LOCATION OF VARIOUS MONITORING ACTIVITIES**  
**TURAG - BANGSHI SITE**  
 Kallachur, Mirpur & Bhalu Upazila

Scale: 0 to 2 km

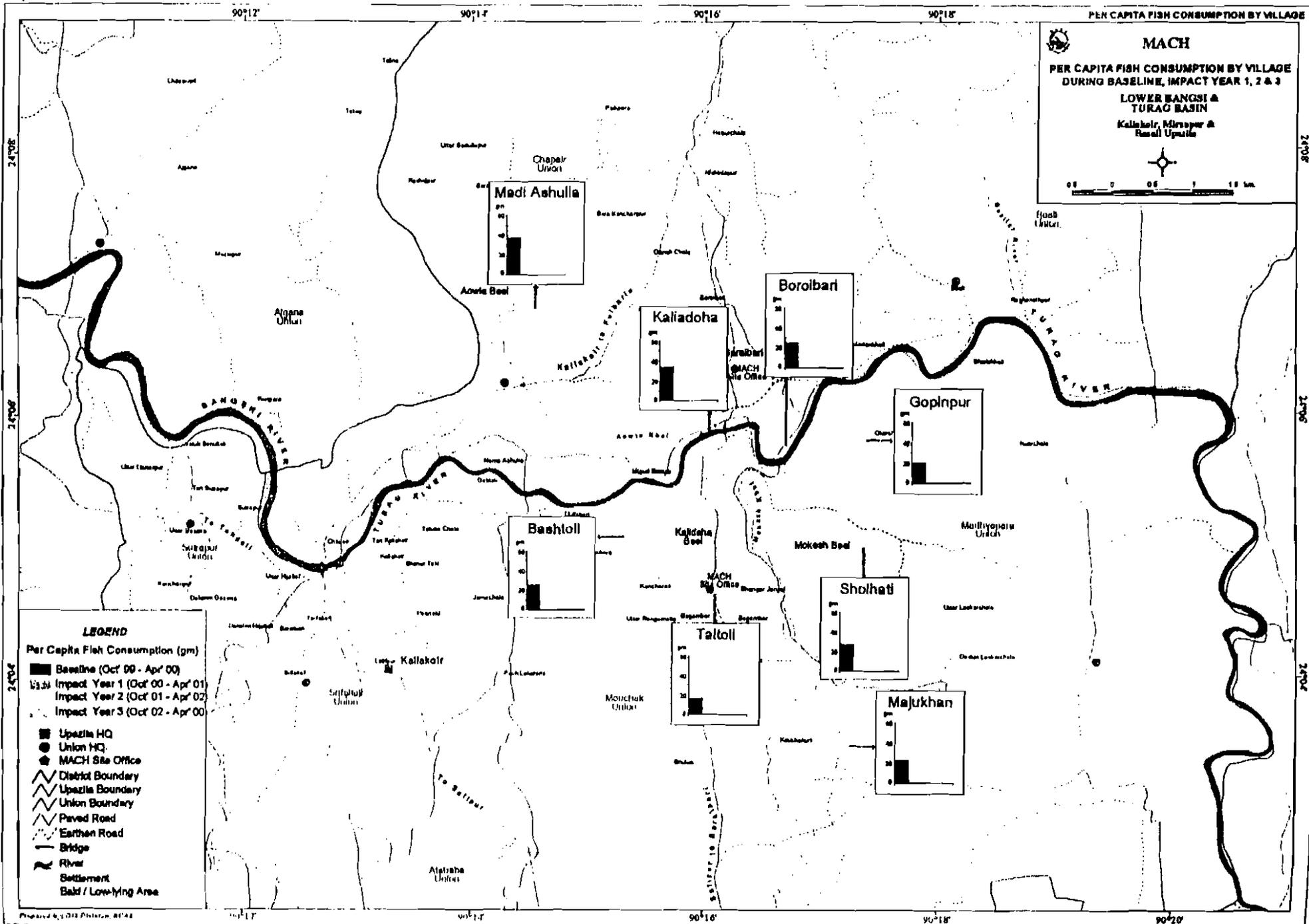
8

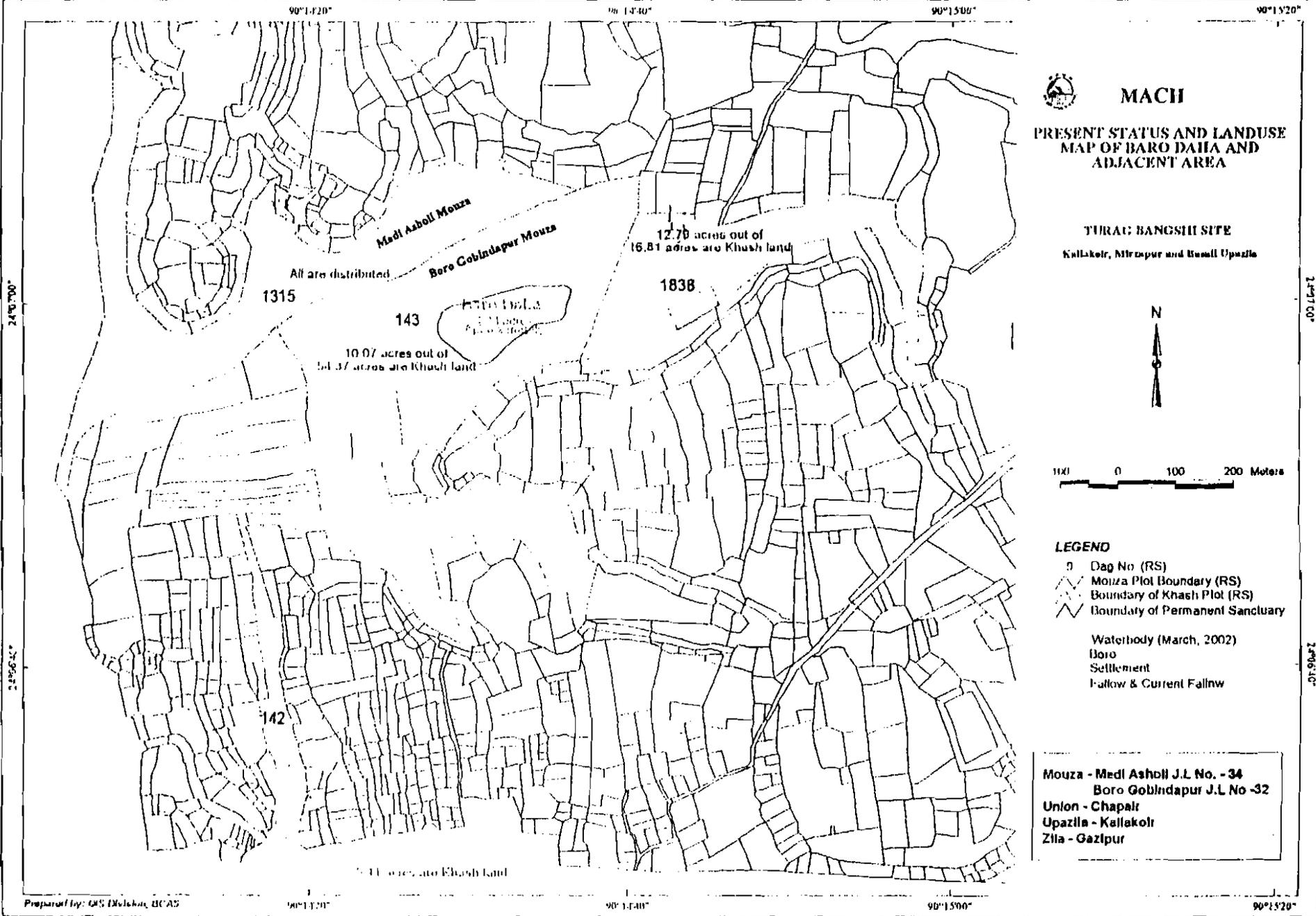






83





**MACH**  
**PRESENT STATUS AND LANDUSE**  
**MAP OF BARO DAHA AND**  
**ADJACENT AREA**

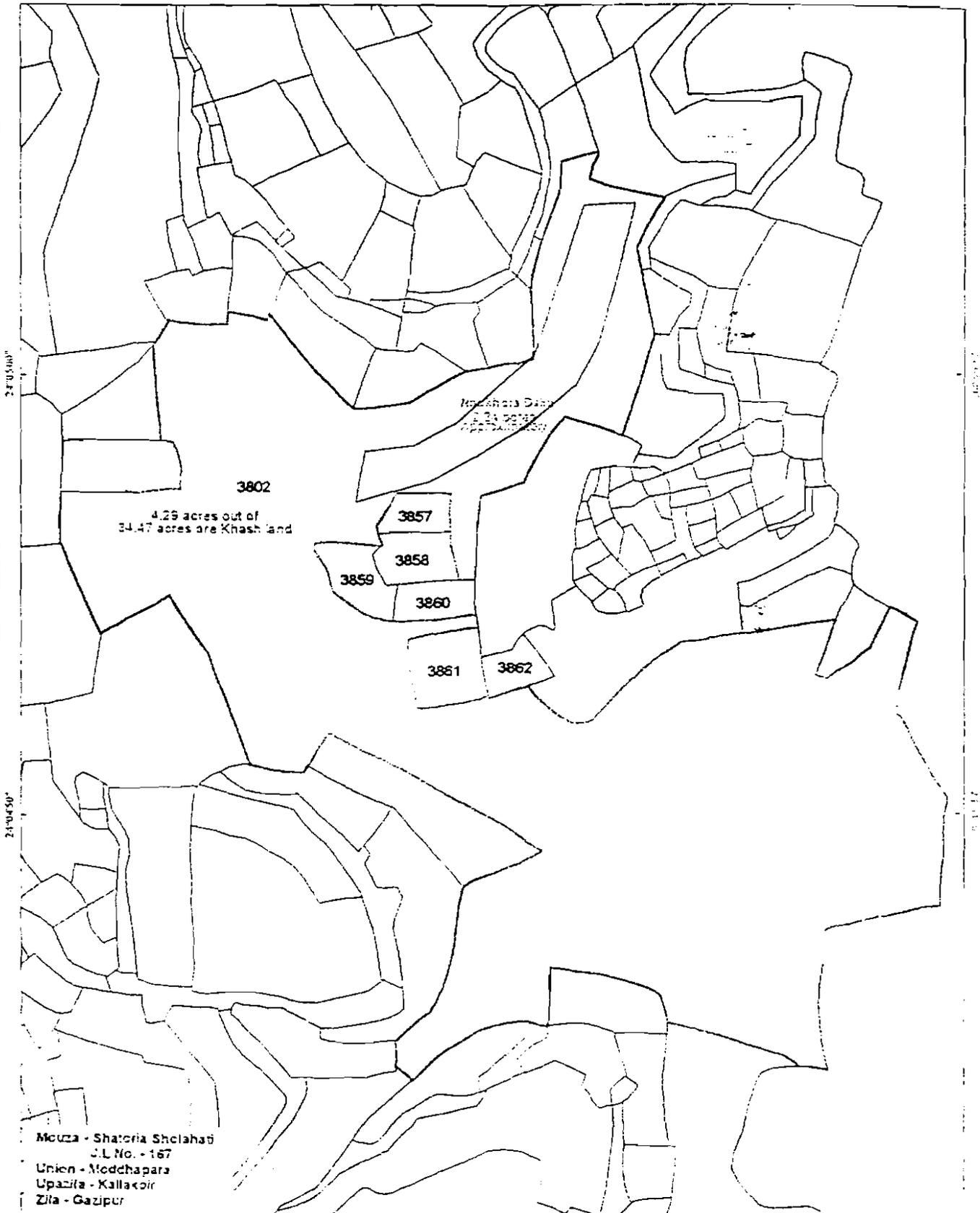
**TURAG BANGSHI SITE**  
 Kallakoti, Mirzapur and Basuli Upazila

- LEGEND**
- Dag No (RS)
  - Mouza Plot Boundary (RS)
  - - - Boundary of Khush Plot (RS)
  - Boundary of Permanent Sanctuary
  - Waterbody (March, 2002)
  - Boro
  - Settlement
  - Fallow & Current Fallow

Mouza - Medi Asholi J.L No. - 34  
 Boro Gobindapur J.L No -32  
 Union - Chapair  
 Upazila - Kallakoti  
 Zila - Gazipur

90°17'00"

90°17'10"



Mouza - Shatoria Sholahati  
 S.L. No. - 167  
 Union - Modchapara  
 Upazila - Kallakoir  
 Zila - Gazipur



**MACH**

**PRESENT STATUS AND LANDUSE MAP OF  
 NAKHOLA & DHOLI DAHA AND  
 ADJACENT AREA**

**TURAG BANGSHI SITE**

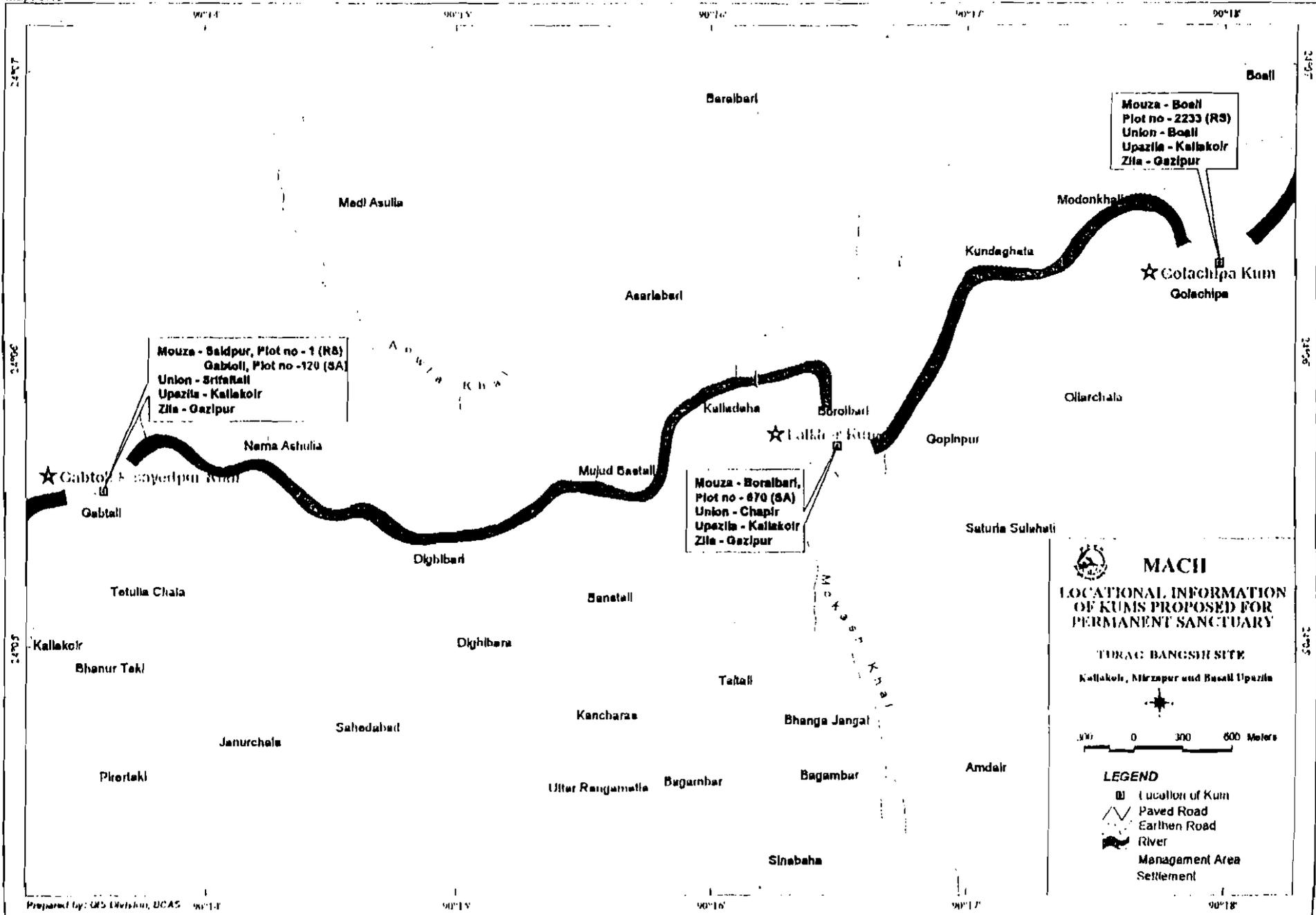
Kalkabir, Mirzapur and Bamal Upazila

**LEGEND**

- Dag No. (RS)
- Mouza plot boundary (RS)
- Boundary of khesh plot (RS)
- Boundary of proposed permanent sanction
- Waterbody (31 march 2002)
- BOP
- Settlement
- Fallow & Current Fallow



TURAG-BANGSHI: LOCATIONAL INFORMATION OF KUMS PROPOSED FOR PERMANENT SANCTUARY

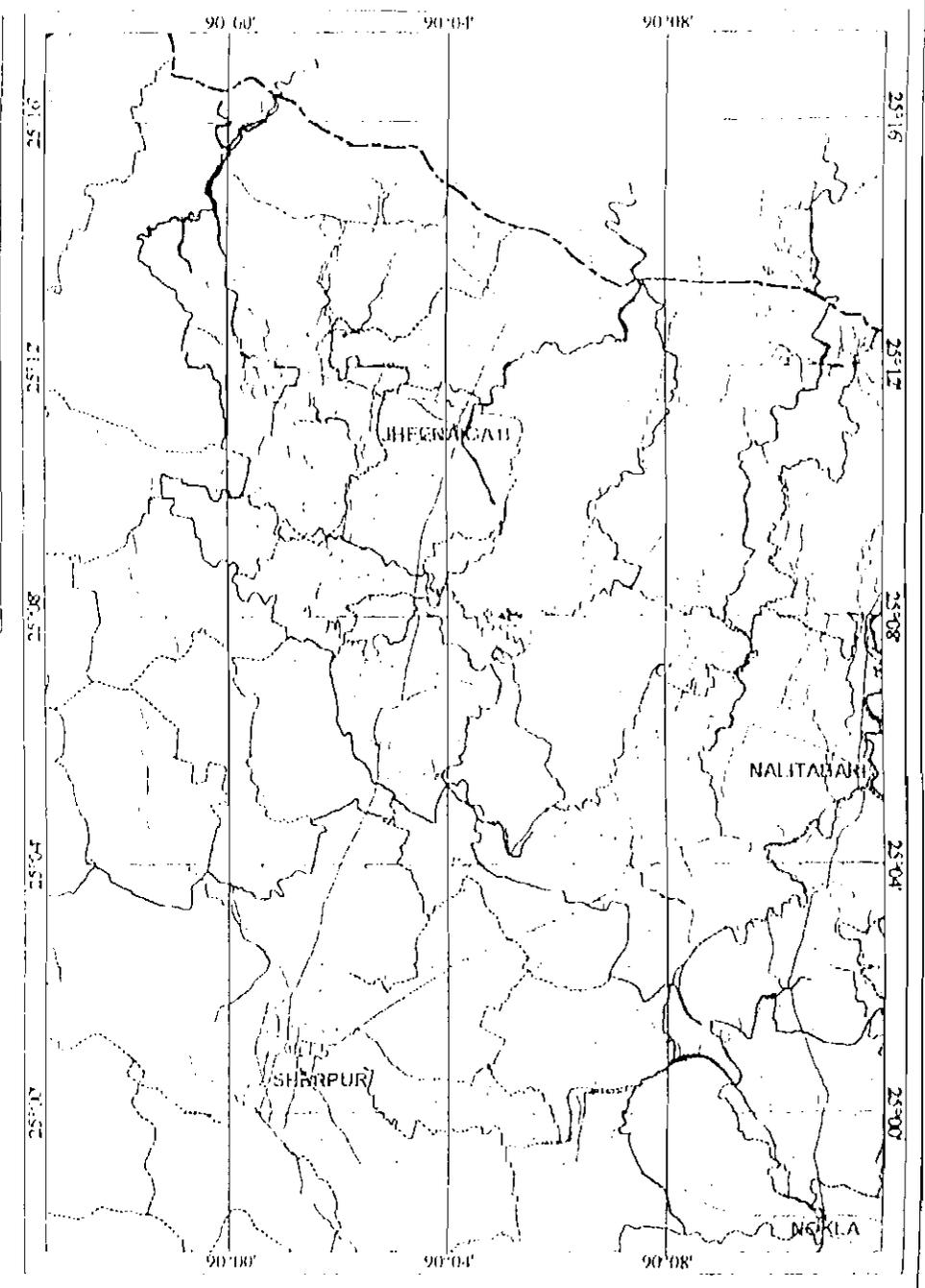
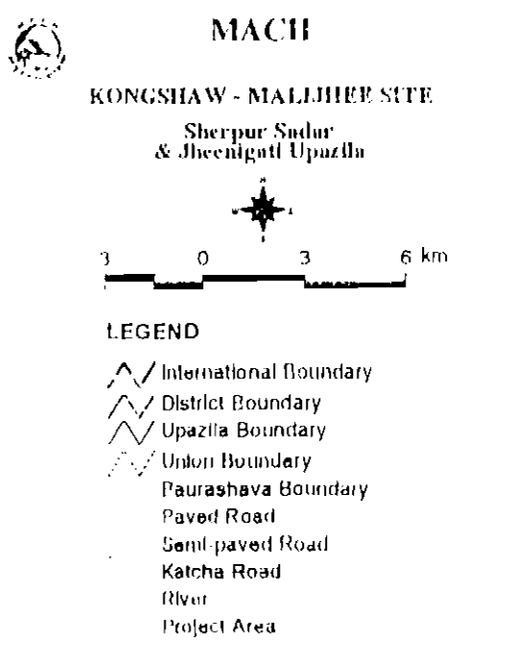
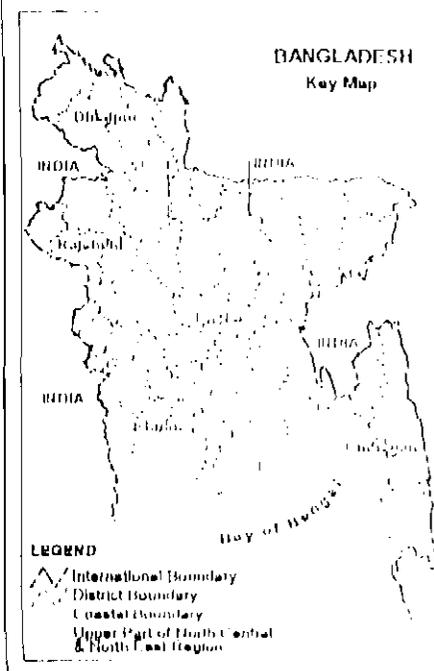
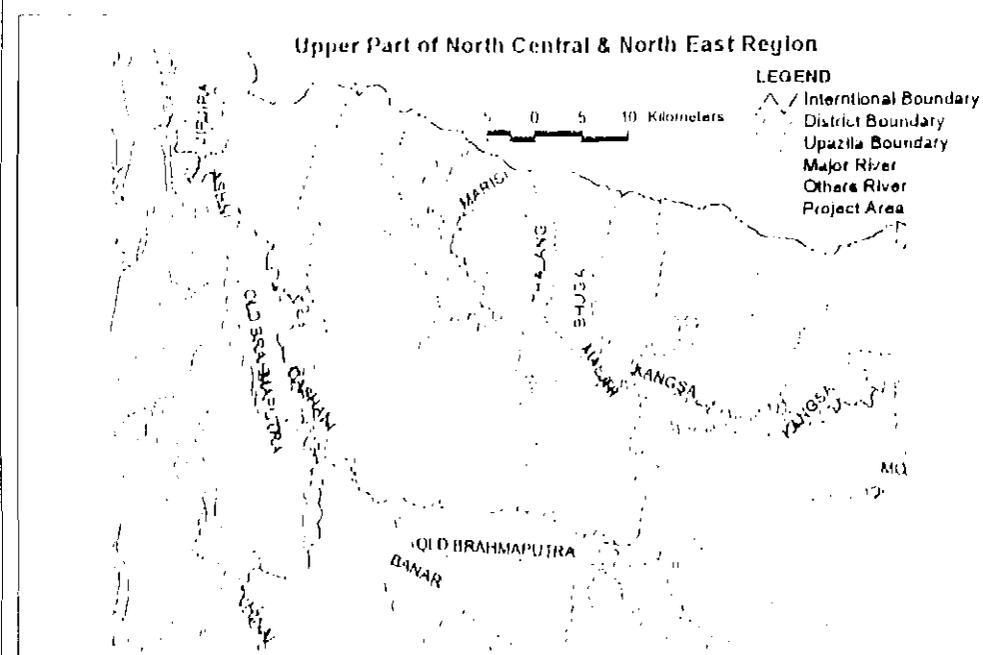


Prepared by: GIS Division, DGAS

Prepared by: GIS Division, DGAS. Actual KUM area is 200 meters on the site.

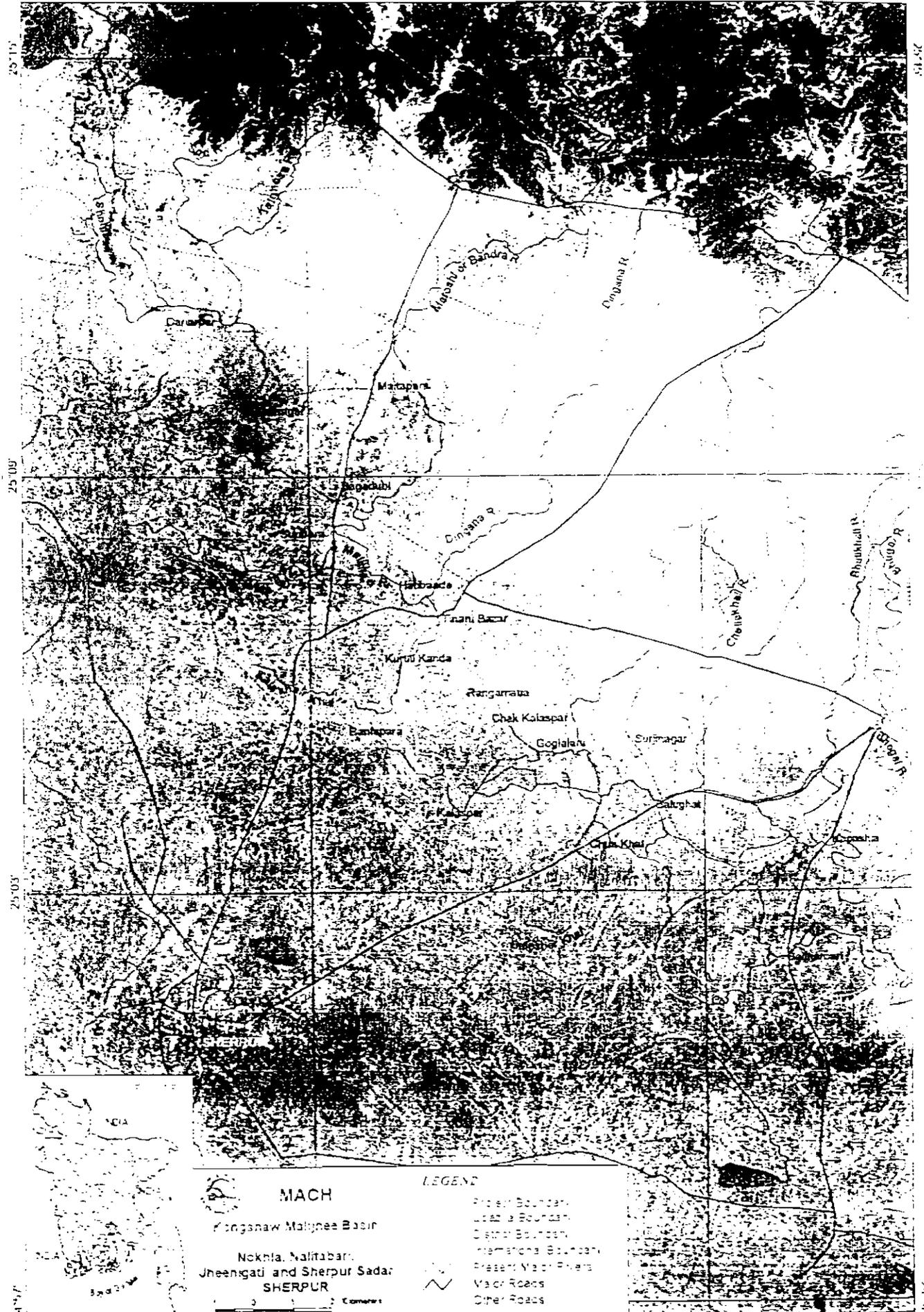
51

**Kangshaw-Malijhee Site  
Sherpur**



90°03'

90°05'



25°15'

25°15'

25°09'

25°03'

24°57'

24°57'

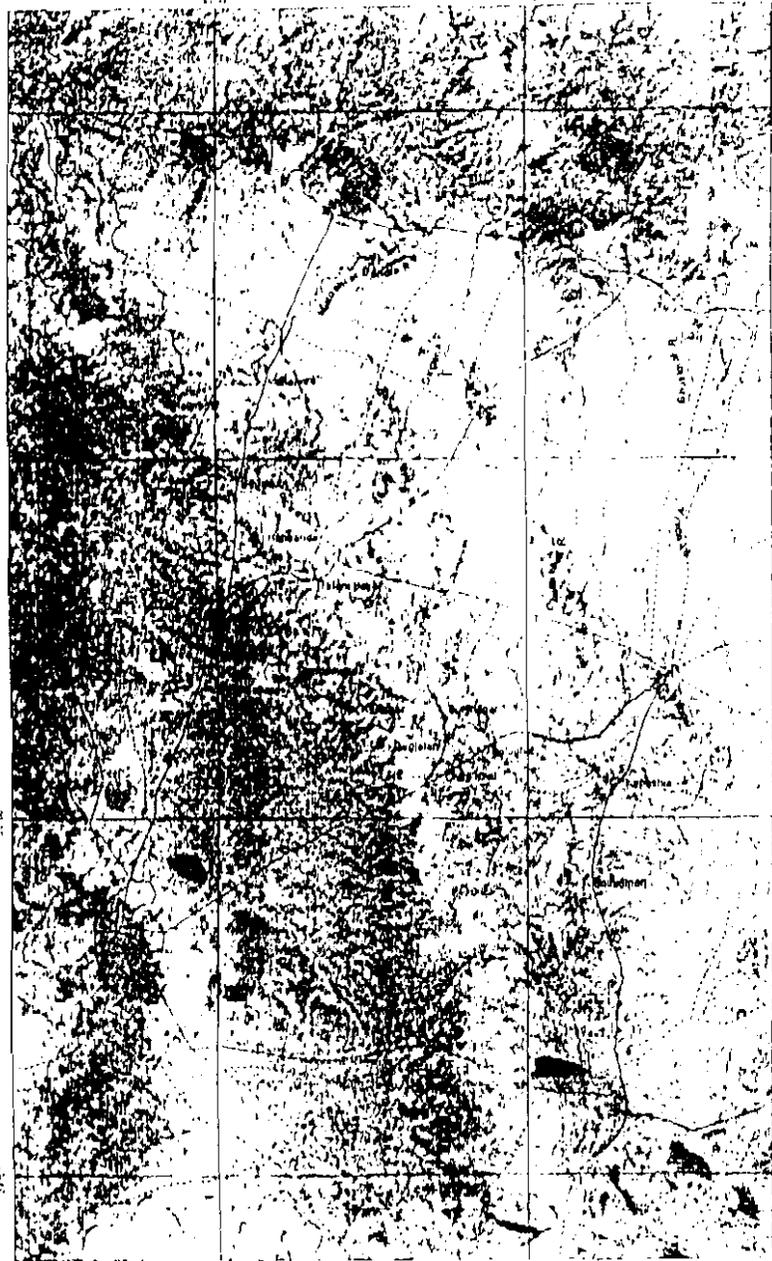
**MACH**

Mangrove Mangrove Basin  
 Nakhla, Nalitalbari,  
 Jheengati and Sherpur Sadar  
**SHERPUR**

**LEGEND**

- Panchayat Boundary
- Local Boundary
- - - District Boundary
- ..... International Boundary
- ~ Present Water Rivers
- Major Roads
- Other Roads

London 14 January 1959



MAOF

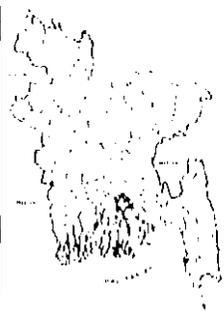
Kungshw-Mallhee Basin  
 Bukit, Tambora,  
 Uluwang and Uluwang under  
 SIKAPUK



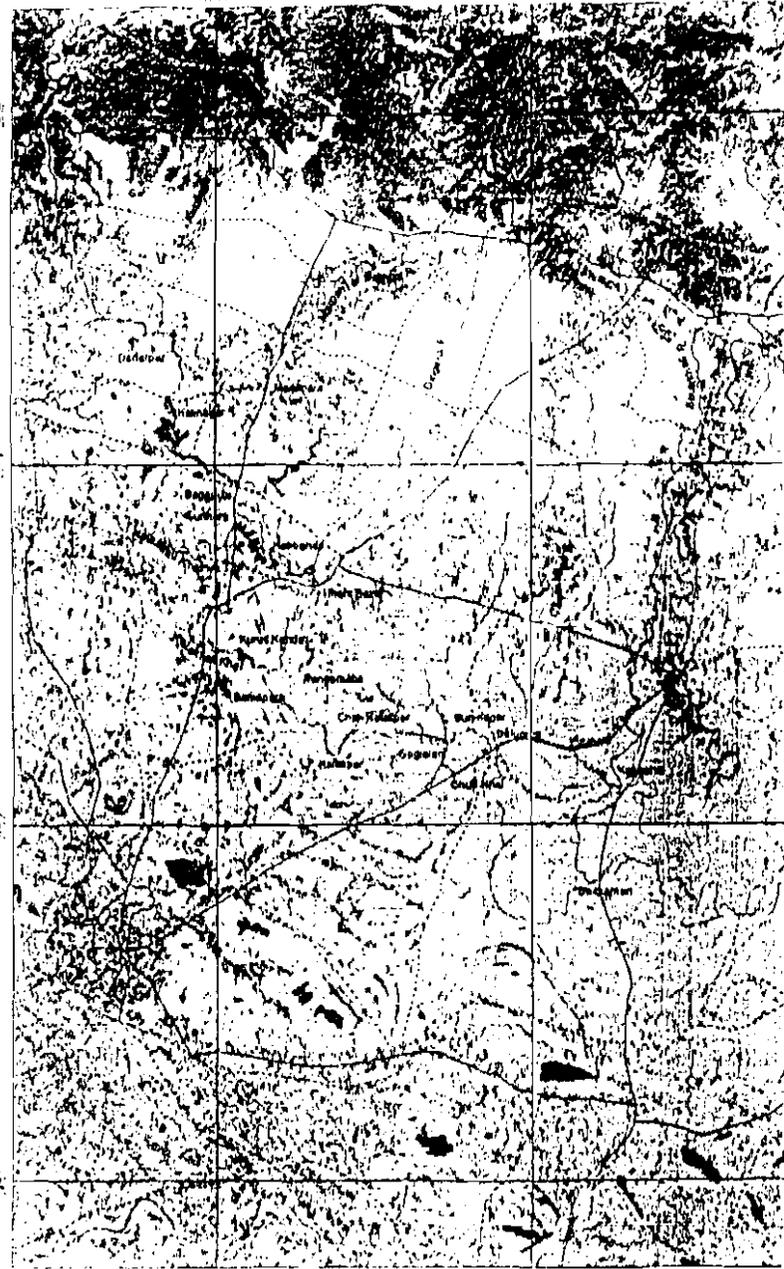
Legend

- Upstate Boundary
- District Boundary
- International Boundary
- Pressed State Lines
- Aboriginal
- Other Lines

This map is based on the survey data in the  
 report of the Survey of Malaya, 1958, and  
 other sources. It is a preliminary map and  
 is subject to change. The map is not  
 to be used for navigation. The map is  
 not to be used for any other purpose  
 without the permission of the  
 Director of Survey, Malaya.



London 14 March 1959

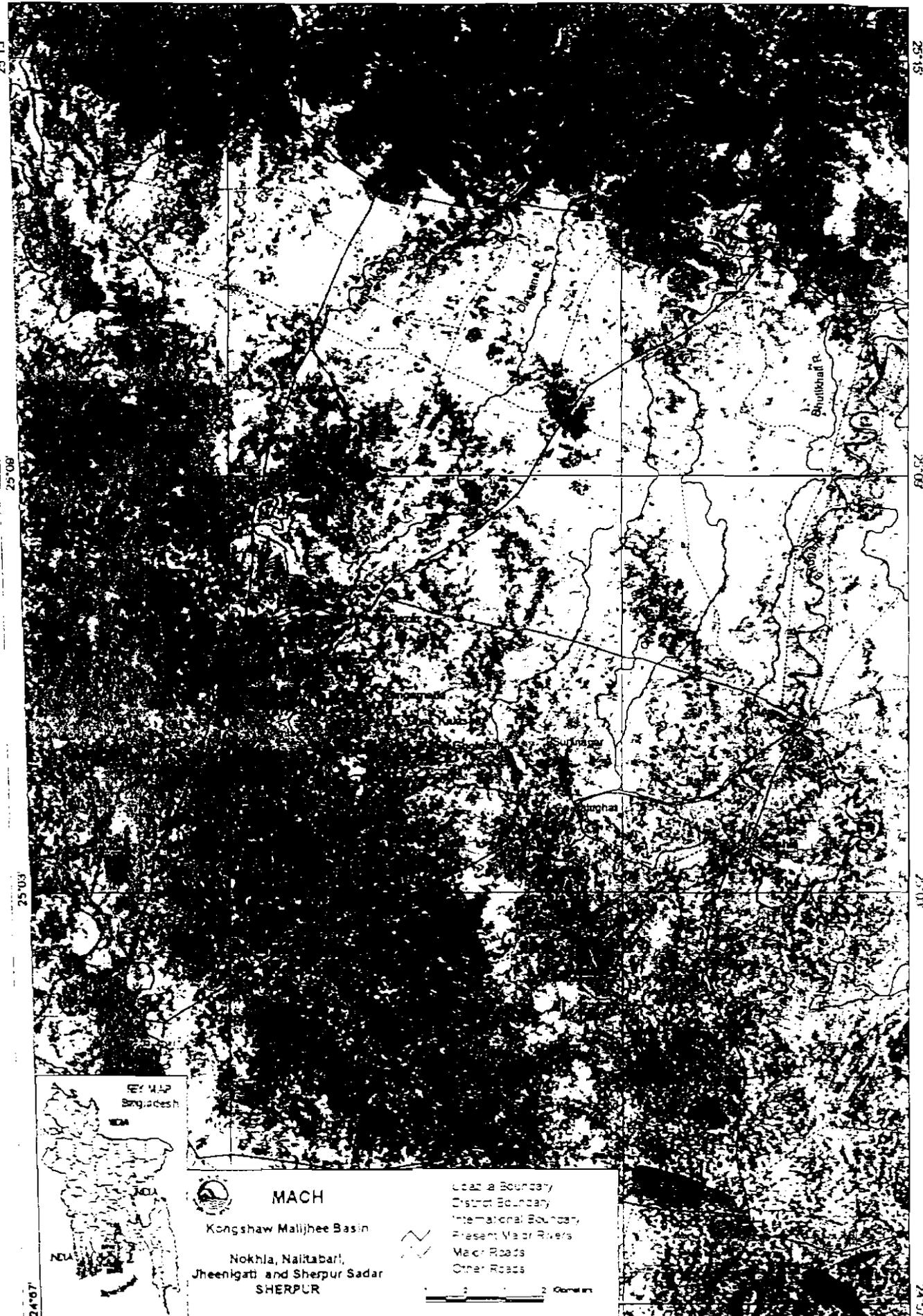


90°03'

90°09'

25°15'

25°15'

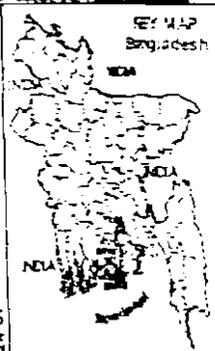


25°08'

25°08'

25°03'

25°03'



**MACH**  
 Kongshaw Malijhee Basin  
 Nokhla, Nalitabari,  
 Jheenigati and Sherpur Sadar  
 SHERPUR

Local Boundary  
 District Boundary  
 International Boundary  
 Present Major Rivers  
 Major Roads  
 Other Roads

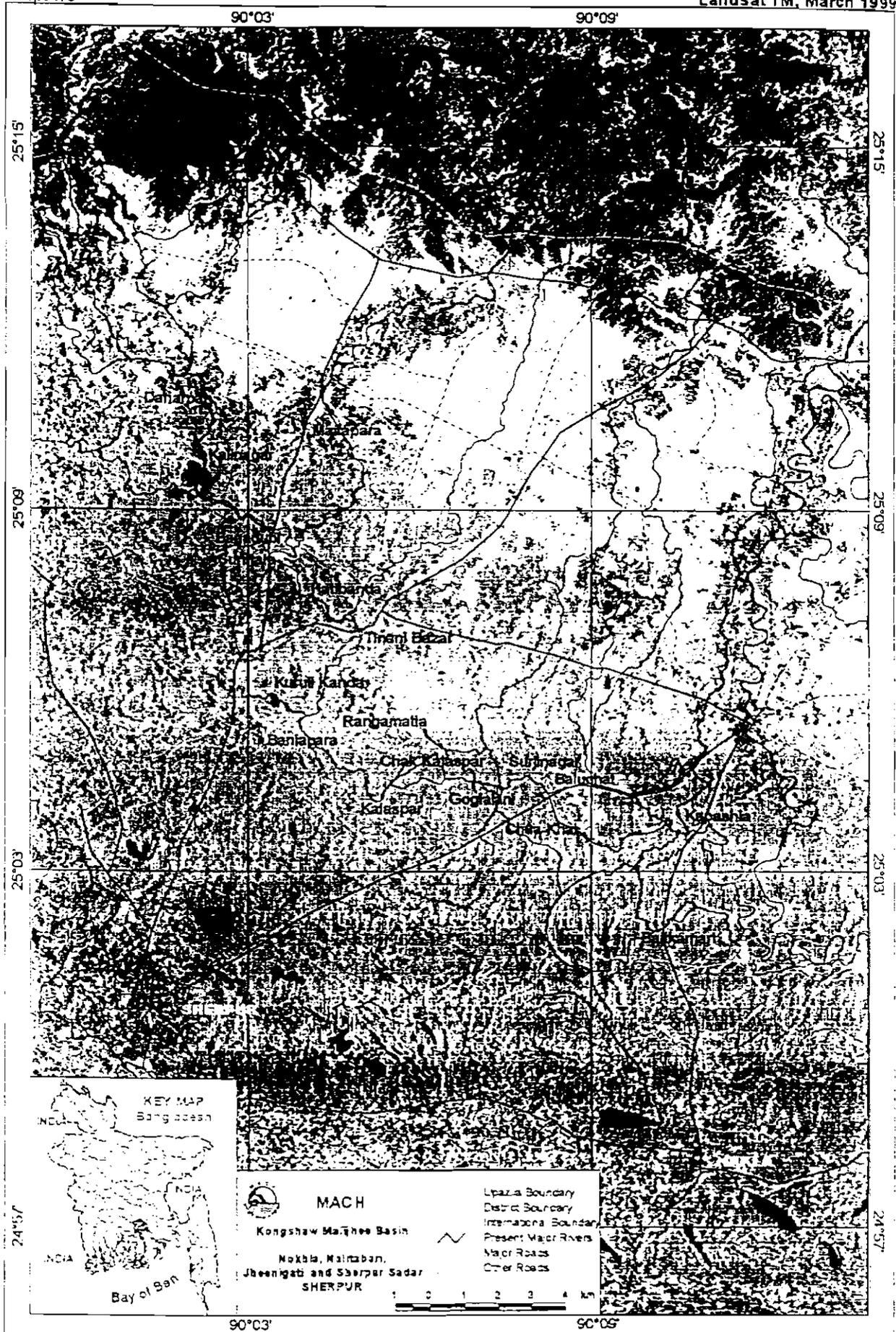
0 1 2 Kilometers

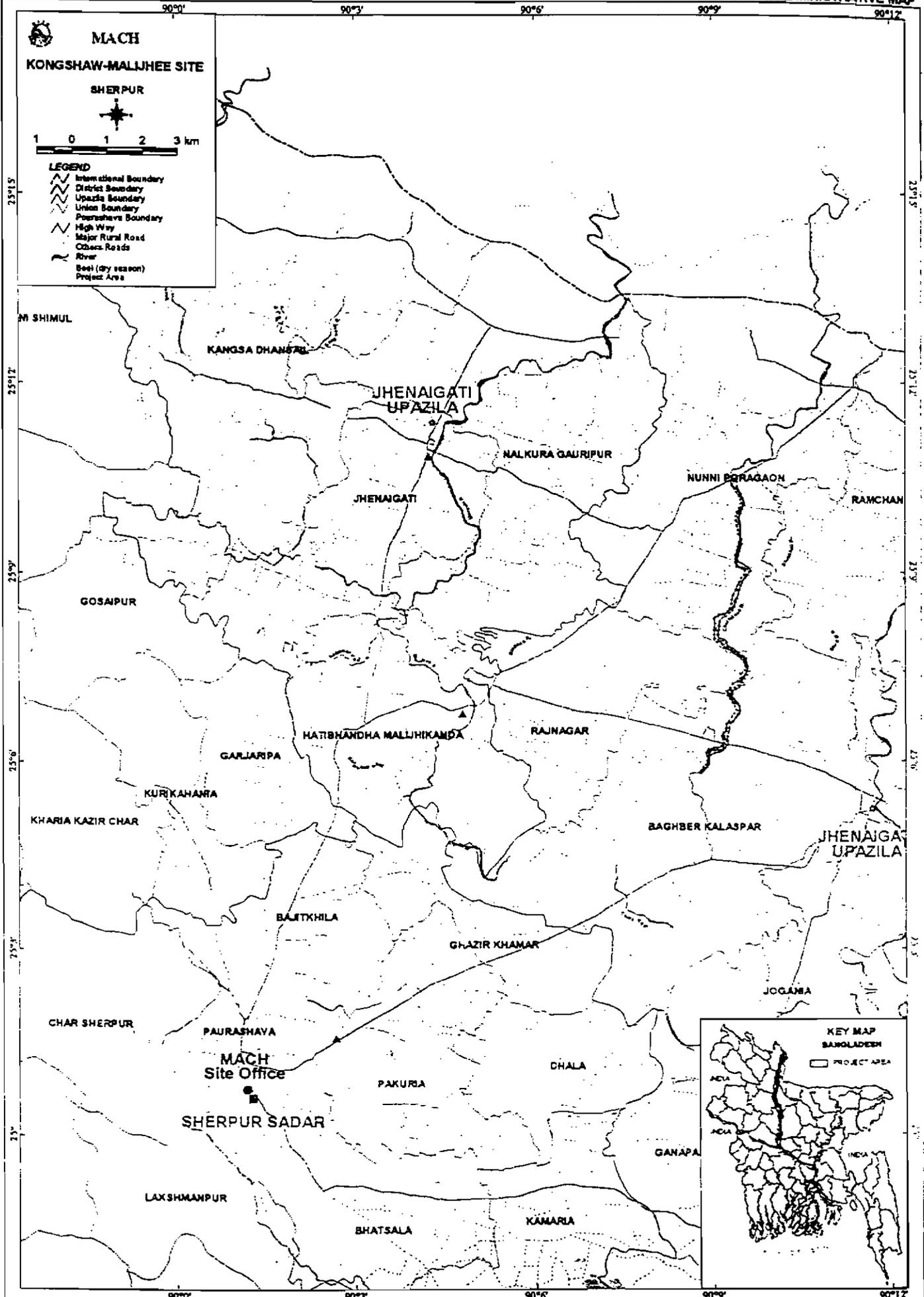
90°03'

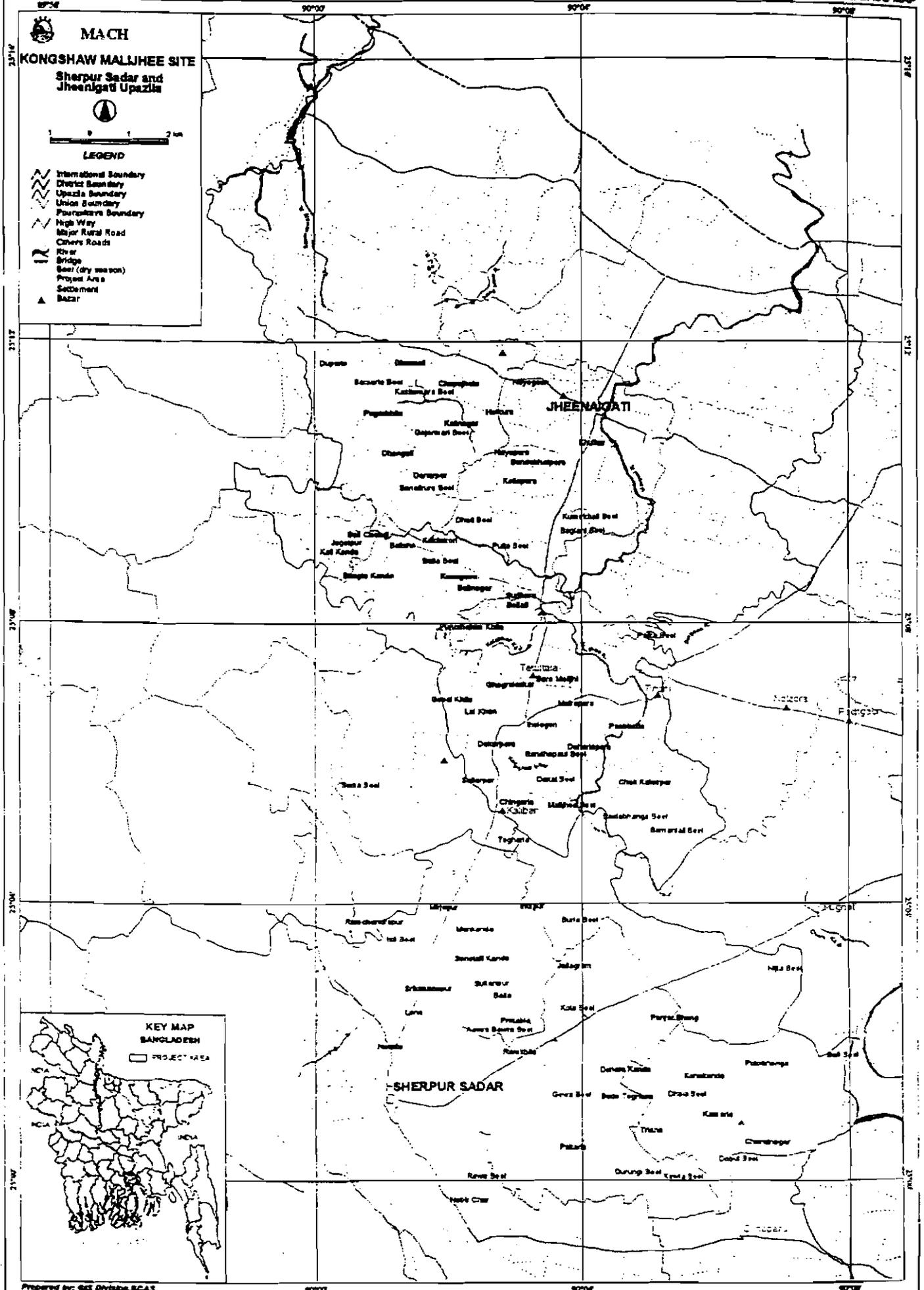
90°09'

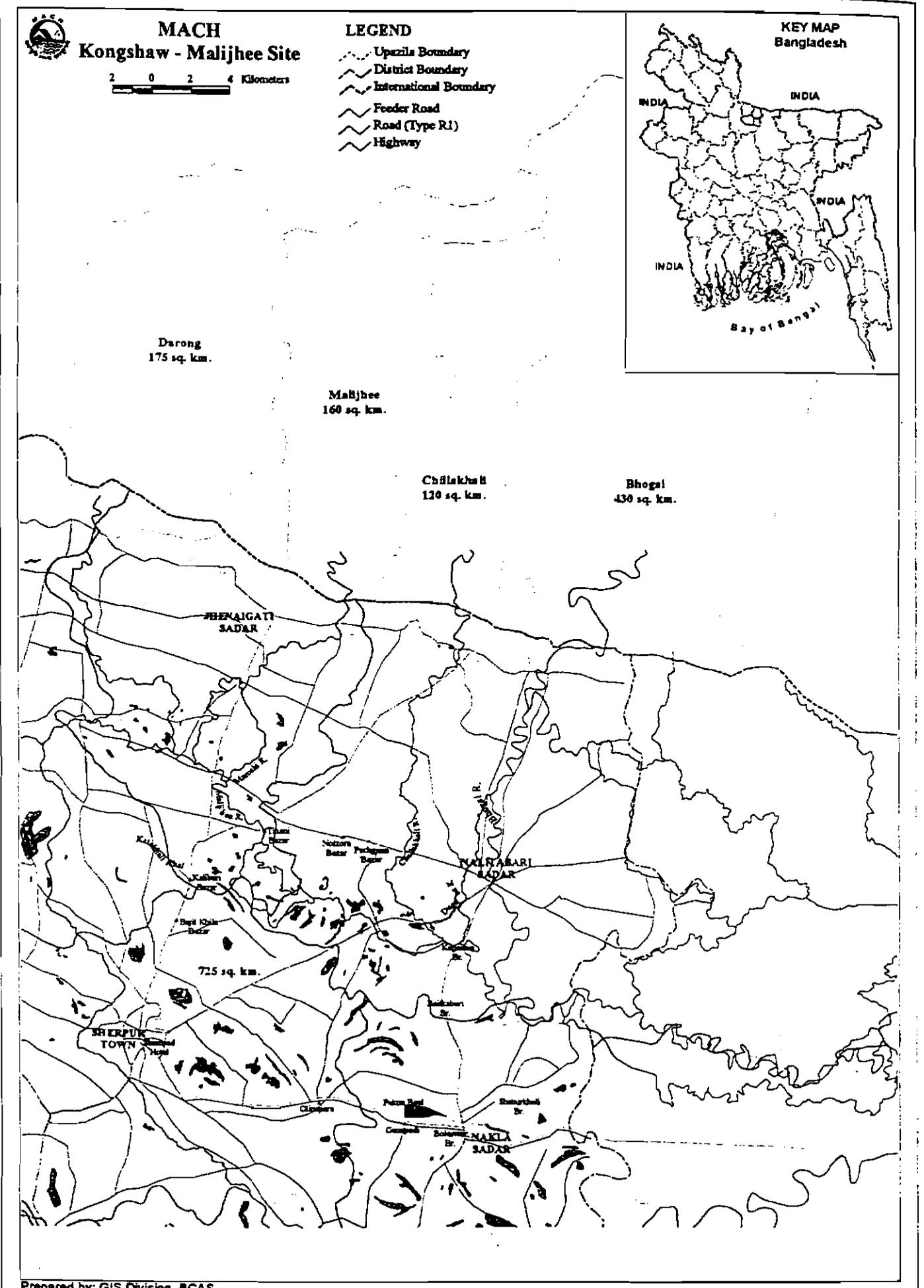
24°07'

24°07'



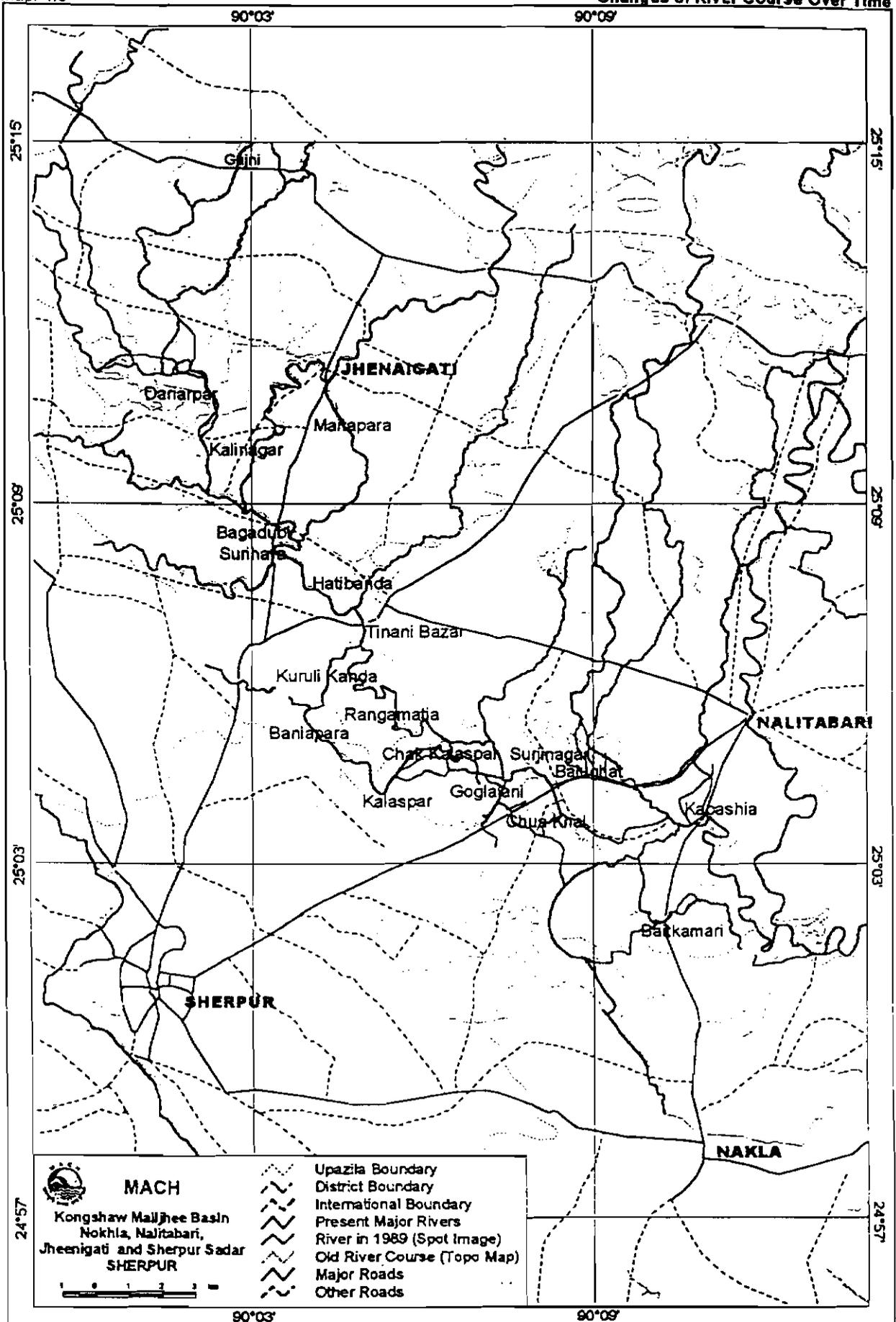






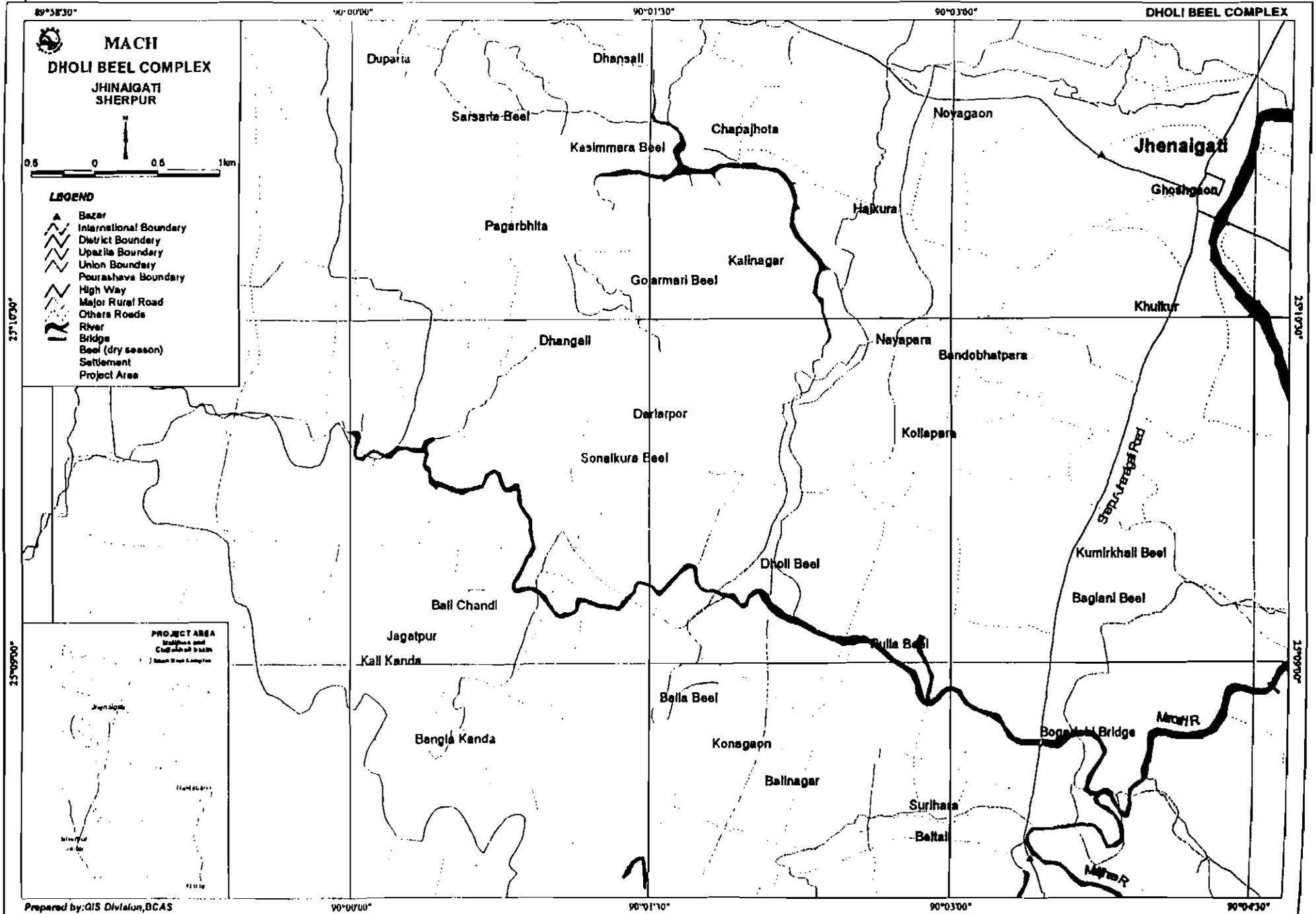
Map: 4.9

Changes of River Course Over Time



Prepared by: GIS Division, BCAS

Map: 4.10



Prepared by: GIS Division, BCAS



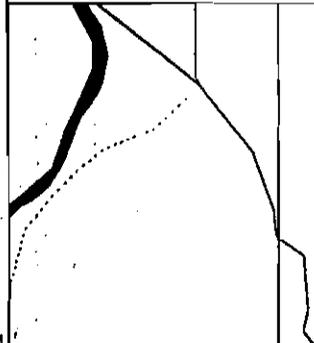


**MACH**  
**AURABURA BEEL COMPLEX**  
**SHERPUR SADAR**  
**SHERPUR**



**LEGEND**

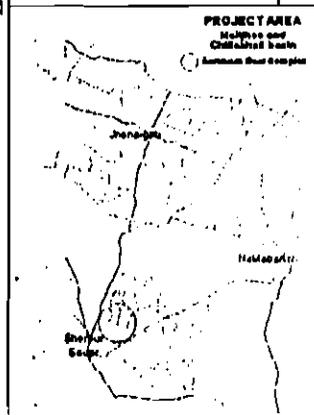
- International Boundary
- District Boundary
- Upazila Boundary
- Union Boundary
- Pourashava Boundary
- High Way
- Major Rural Road
- Others Roads
- River
- Bridge
- Beel (dry season)
- Settlement
- Project Area



**PROJECT AREA**

Machpur and Chalkhati Beels

(Aowra Bowra Beel Complex)



Prepared by: GIS Division, ICAS 90°01'

90°02'

90°03'

25°03'

25°02'

25°03'

25°02'

Sonatal Kanda

Mankanda

Srikrishnapur

Sultanpur

Balla

Tatolpur

Protabia

Lonia

Aowra Bowra Beel

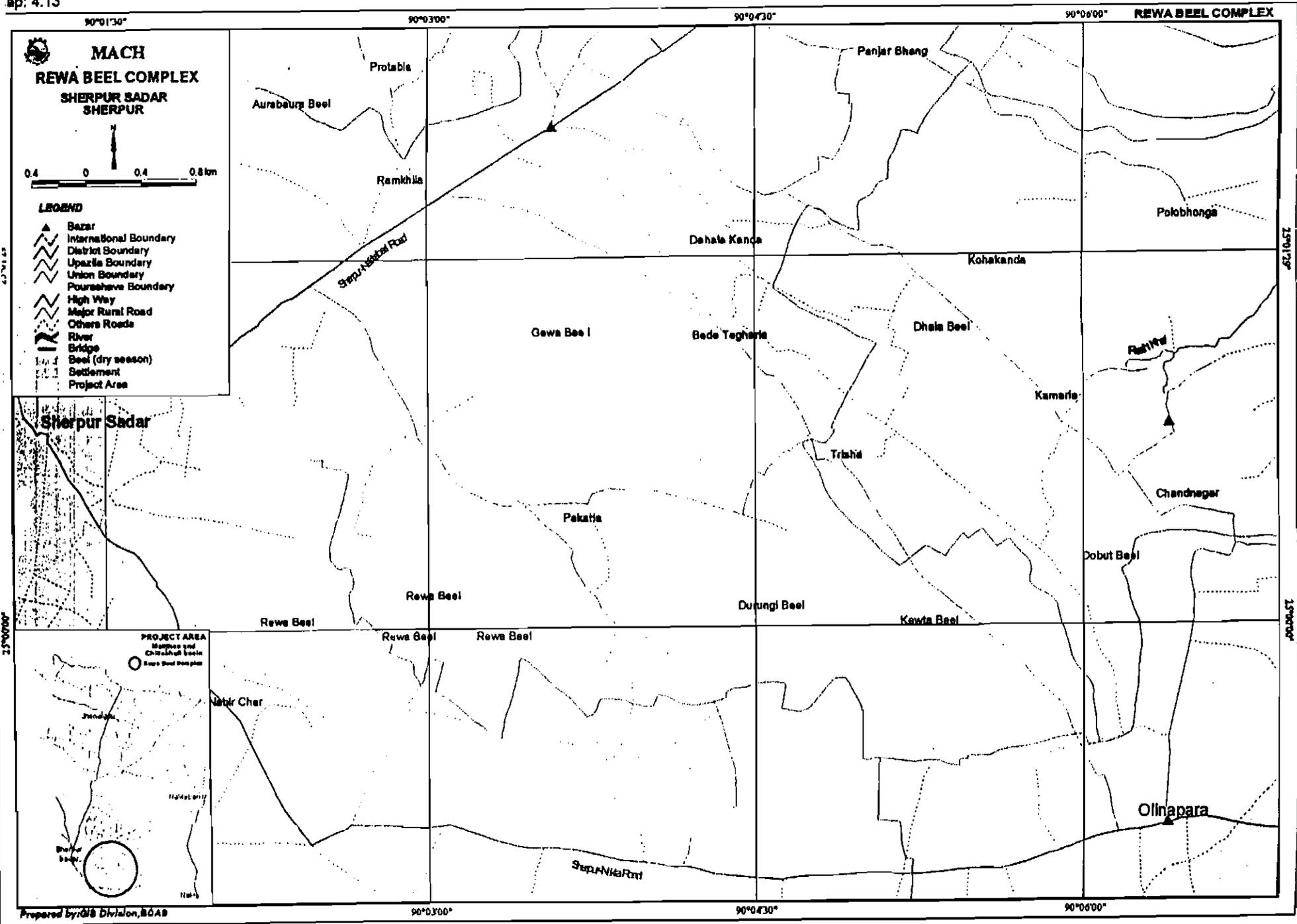
Shalkh Hati

Dhawalpar

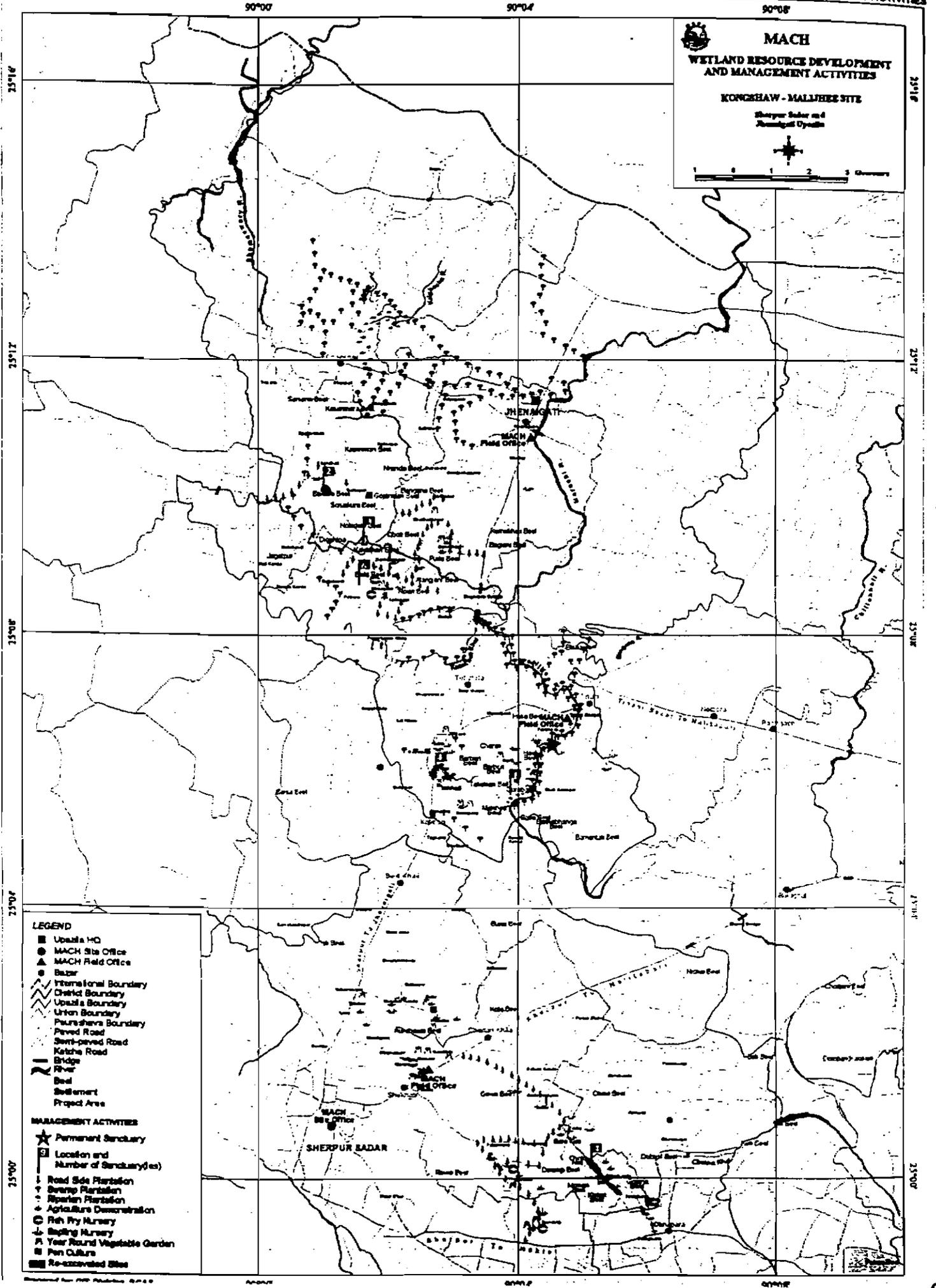
Ramkhila

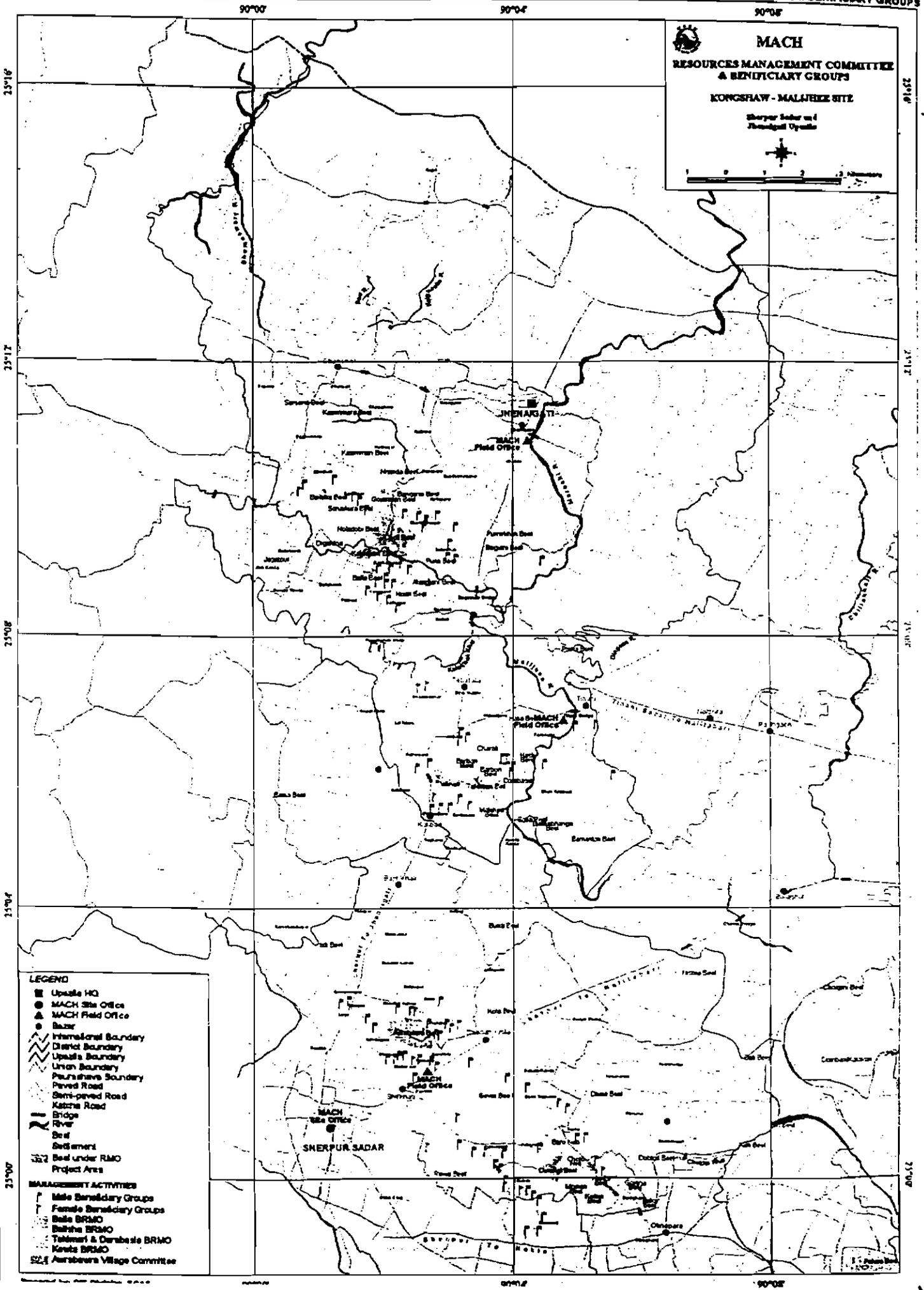
Sherpur-Jhenaigati Road

Sherpur-Nailtabari Road



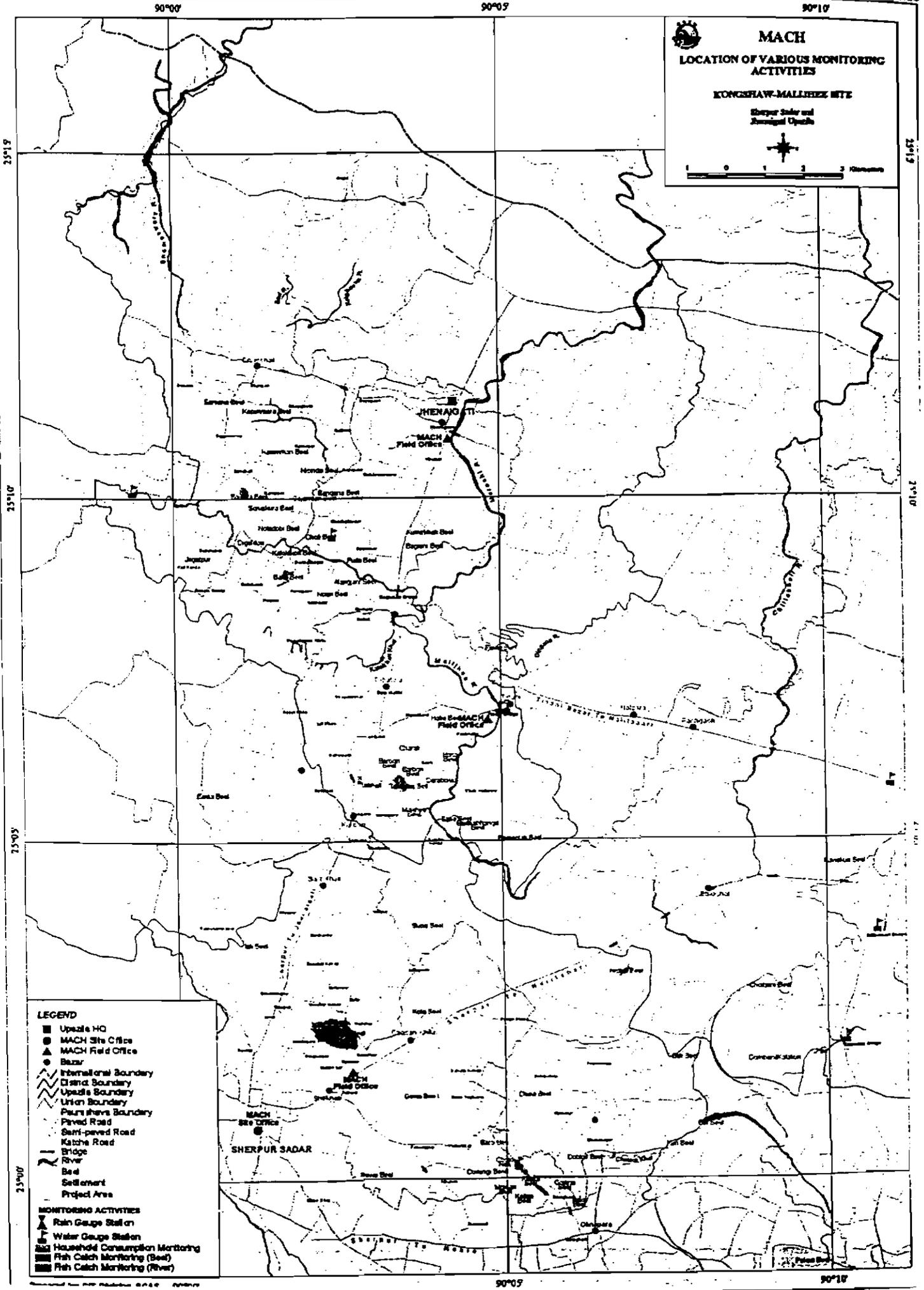


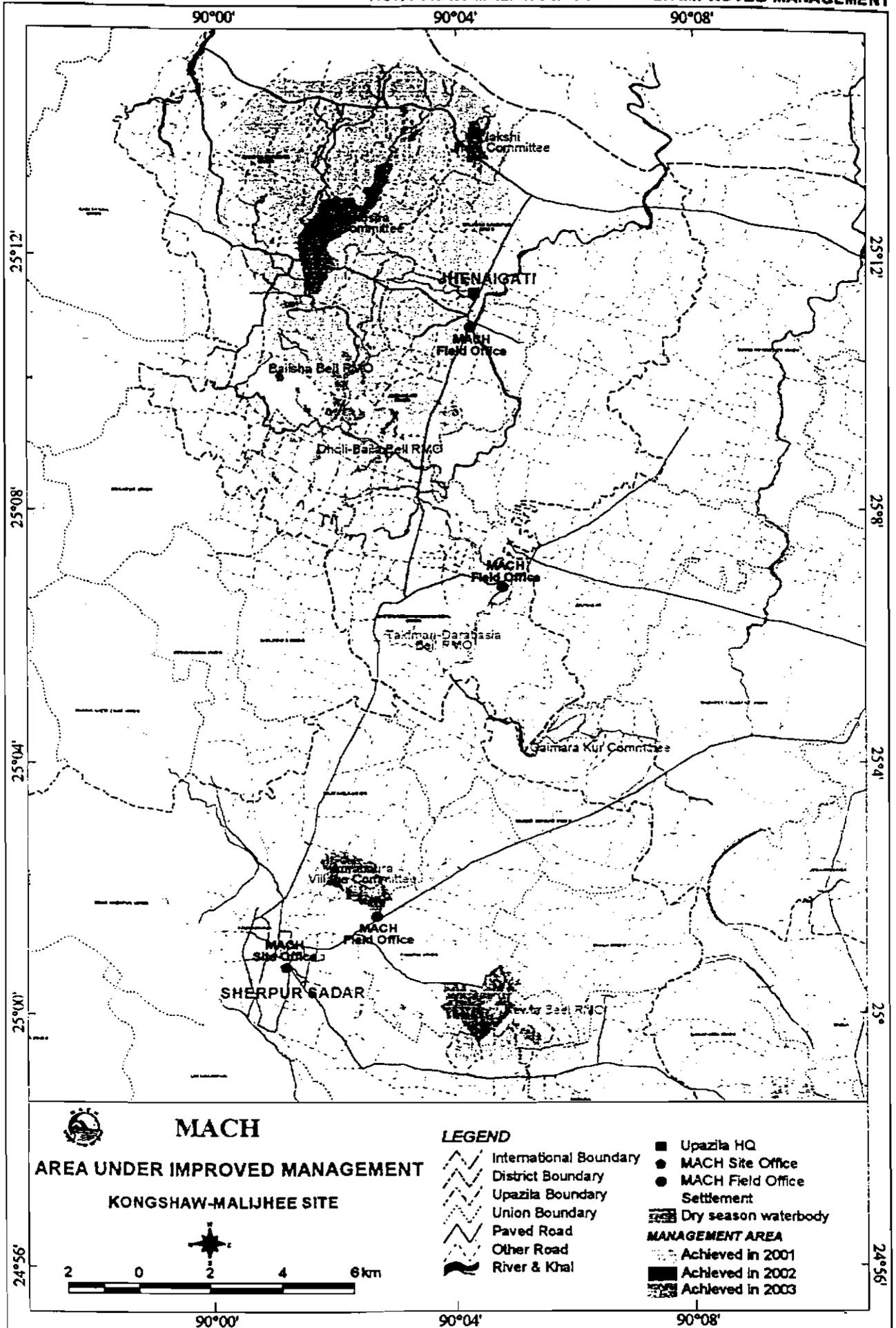




**MACH**  
**RESOURCES MANAGEMENT COMMITTEE**  
**& BENEFICIARY GROUPS**  
**KONGSHAW - MALJHEE SITE**  
 Sherpur Sadar and  
 Jhenagati Upale

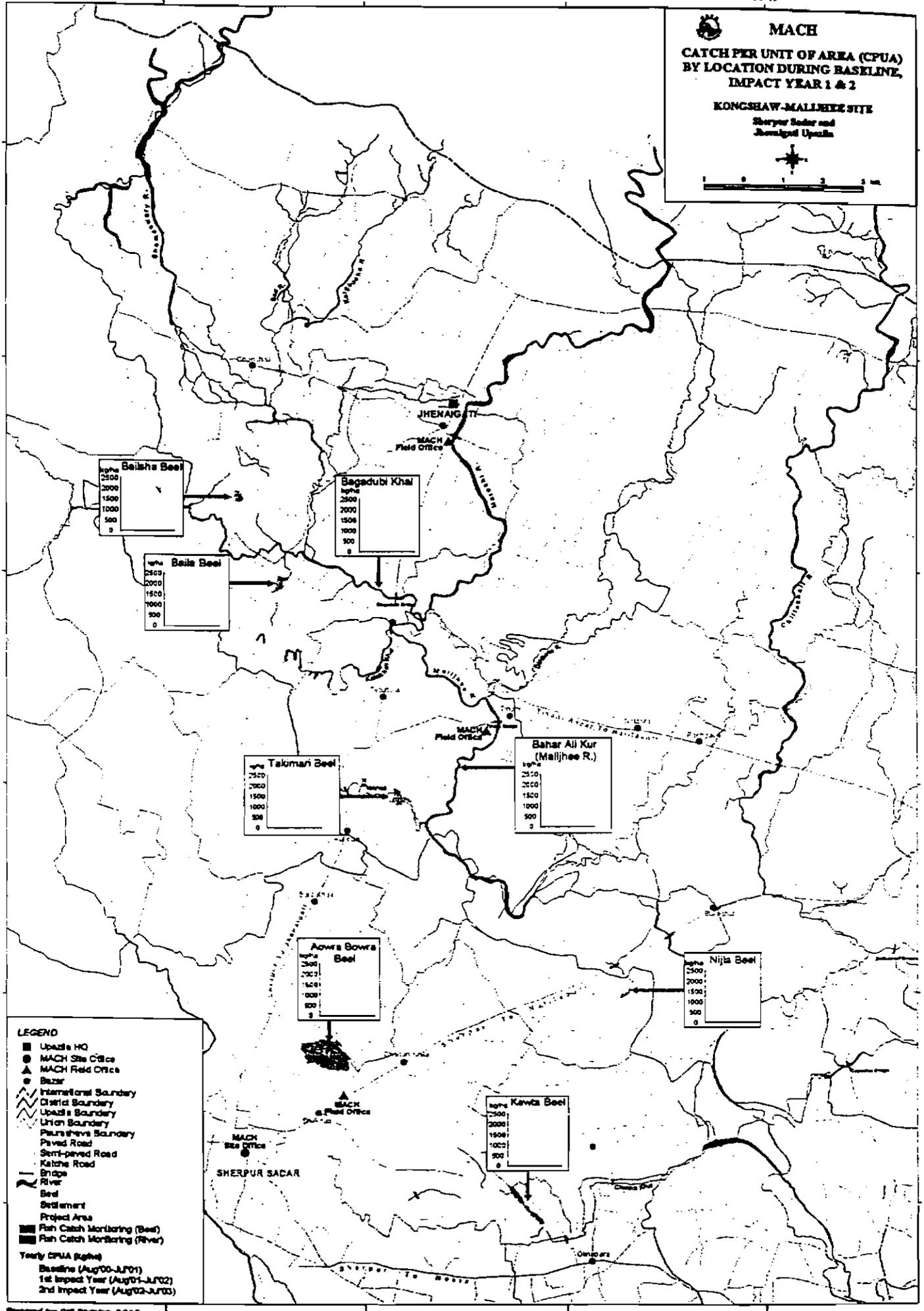
- LEGEND**
- Upale HQ
  - MACH Site Office
  - ▲ MACH Field Office
  - Bazar
  - International Boundary
  - District Boundary
  - Upale Boundary
  - Union Boundary
  - Panchayat Boundary
  - Paved Road
  - Semi-paved Road
  - Kutcha Road
  - Bridge
  - River
  - Dam
  - Settlement
  - Dam under RMO
  - Project Area
- MANAGEMENT ACTIVITIES**
- Male Beneficiary Groups
  - Female Beneficiary Groups
  - Baliya BRMO
  - Talwar BRMO
  - Kaur's BRMO
  - Kaur's Village Committee





**MACH**  
**CATCH PER UNIT OF AREA (CPUA)**  
**BY LOCATION DURING BASELINE,**  
**IMPACT YEAR 1 & 2**

**KONGSHAW-MALLHEE SITE**  
 Sherpur Sadar and  
 Jhenagiti Upazila

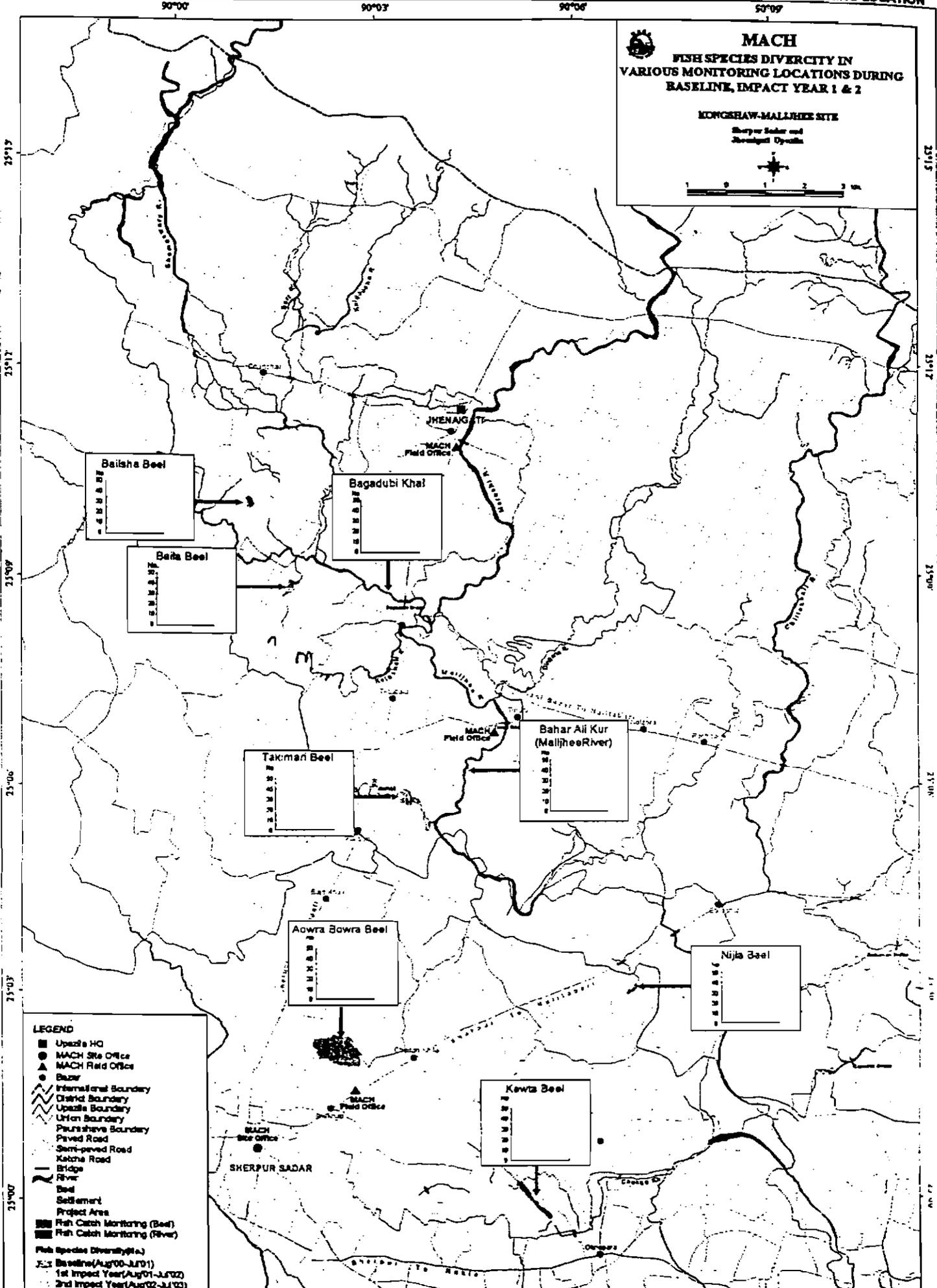


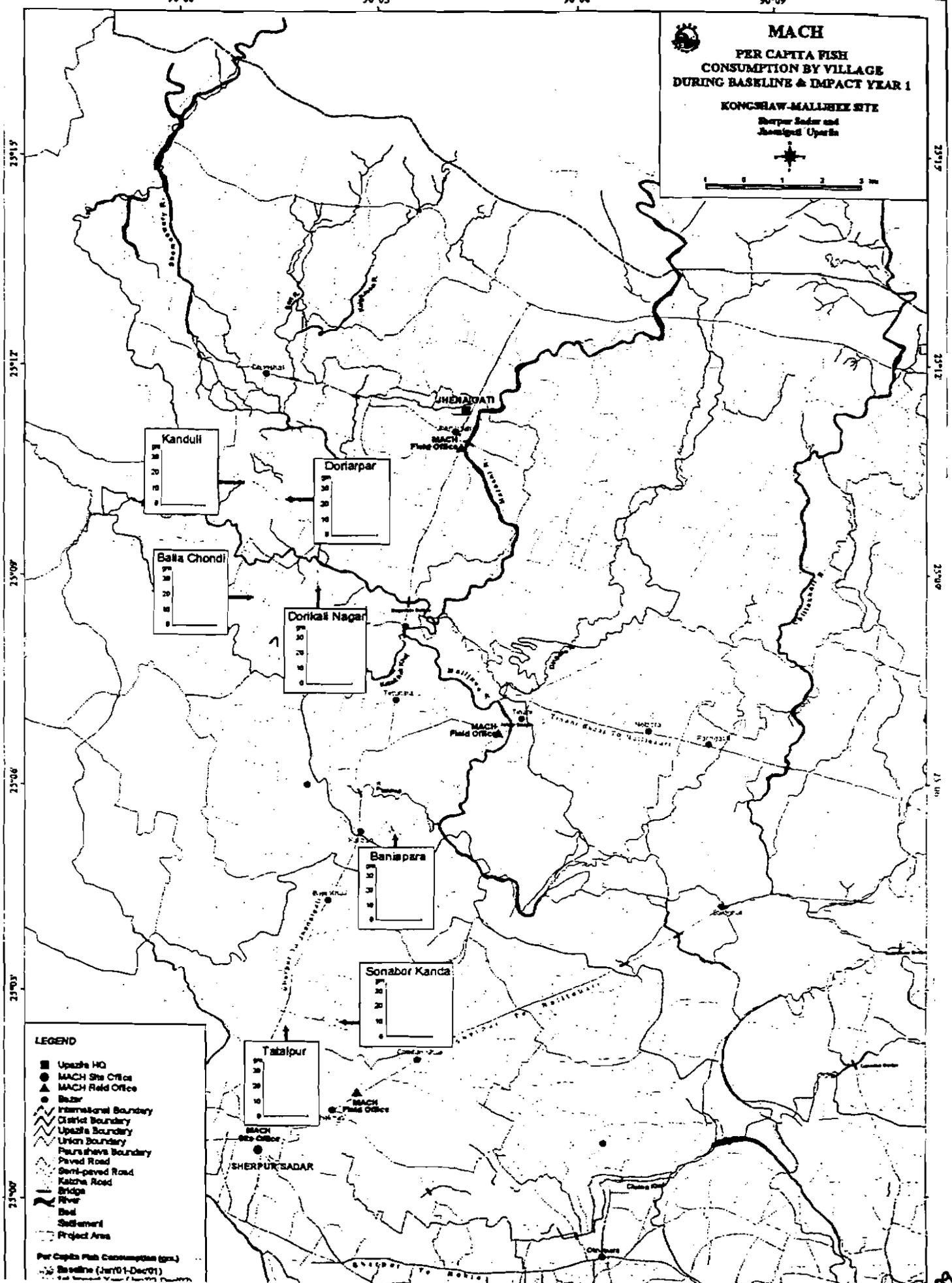
**LEGEND**

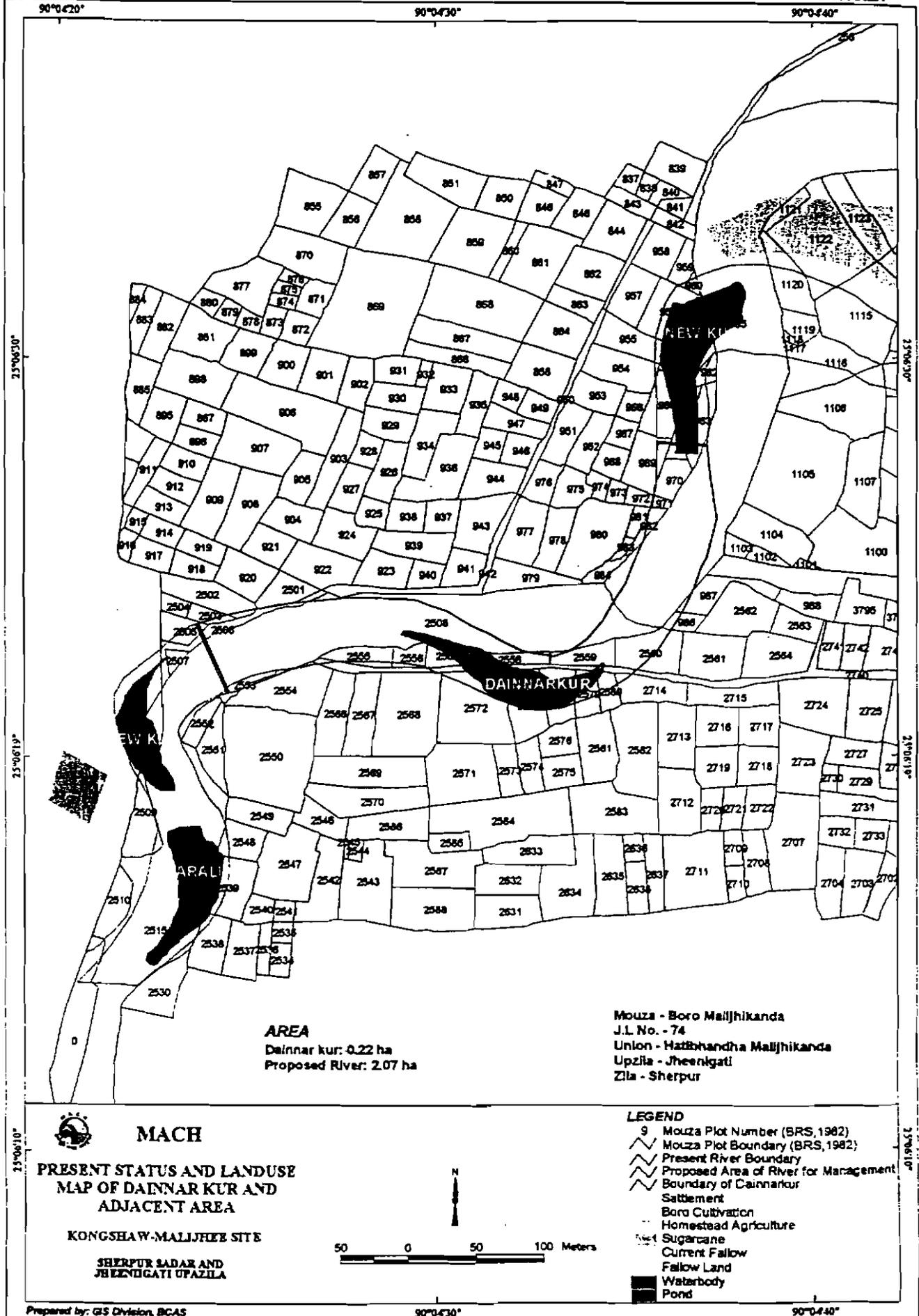
- Upazila HQ
- MACH Site Office
- ▲ MACH Field Office
- Bazar
- International Boundary
- District Boundary
- Upazila Boundary
- Union Boundary
- Paurasava Boundary
- Paved Road
- - - Semi-paved Road
- · - Katcha Road
- Bridge
- River
- Beel
- Settlement
- Project Area
- Rain Catch Monitoring (Beel)
- Rain Catch Monitoring (River)

**Yearly CPUA (kg/ha)**

- Baseline (Aug'00-Ju'01)
- 1st Impact Year (Aug'01-Ju'02)
- 2nd Impact Year (Aug'02-Ju'03)



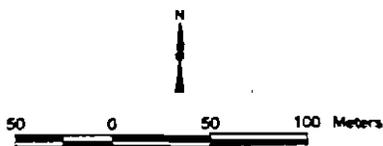




**AREA**  
 Dainnar kur: 0.22 ha  
 Proposed River: 2.07 ha

Mouza - Boro Malljhikanda  
 J.L. No. - 74  
 Union - Hatibhandha Malljhikanda  
 Upzila - Jheengati  
 Zila - Sherpur

**MACH**  
 PRESENT STATUS AND LANDUSE  
 MAP OF DAINNAR KUR AND  
 ADJACENT AREA  
 KONGSHAW-MALLJHEE SITE  
 SHERPUR SADAR AND  
 JHEENGATI UPAZILA



- LEGEND**
- 9 Mouza Plot Number (BRS, 1982)
  - ~ Mouza Plot Boundary (BRS, 1982)
  - ~ Present River Boundary
  - ~ Proposed Area of River for Management
  - ~ Boundary of Dainnar Kur
  - Sattlement
  - Boro Cultivation
  - Homestead Agriculture
  - Sugarcane
  - Current Fallow
  - Fallow Land
  - Waterbody
  - Pond



**A project of the Government of Bangladesh**

**Supported by USAID**

**Project Partners:**

**Winrock International  
Bangladesh Centre for Advanced Studies (BCAS)  
Center for Natural Resource Studies (CNRS)  
CARITAS Bangladesh**



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Gulshan 1, Dhaka 1212  
Bangladesh