

CHAPTER-IV
PRESENT USE OF WETLANDS

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4.1. Introduction:

From the dawn of the human civilization, wetlands encompass all aspects of livelihood. Wetlands have been recognized as one of the key life-support systems on the earth in addition to the agricultural lands and forestlands. They form a vital element of national and global ecosystems and economies (Senaratna, 2011). Wetlands are important natural resources and significant for the biodiversity stock and its preservation. They are significant in environmental functions and important in all food chains (Rouvalis, 1998). At present wetlands are the most exploited and threatened ecosystem. The common use of wetland comprises fishing, cultivation, irrigation, jute retting, fodder collection, bathing, washing clothes and utensils, duck rearing and other household activities. The survival of these wetlands and their resources are not only important for human sustenance and economy but also perform ecological functions by preserving the endemic species.

4.2. Common Use of Wetlands in the Study Area:

The common use wetlands of the study area are summarized below-

4.2.1. Agriculture:

With the advent of 20th century, agricultural practices were marked by technological innovations; demographic changes and new varieties of crops like the boro paddy, which is now under the agricultural practice in the shallow water areas and the dry areas of the wetlands (Photo Plate 4.2). Owing to the high nutrient value of wetland soil and water, the cultivation in the wetland is a common practice (boro paddy and other dry-season crops) where farmers expect a higher yield of paddy. Cultivation starts in the month of January every year. When the wetland bed starts drying up, the farmers having ownership of the wetland bed convert them into agricultural lands. It is observed that once wetland beds are converted, they can never regain their original status. In the study area, most of the surveyed wetlands are converted into agricultural lands during pre-monsoon season for the cultivation of boro paddy. The present trend of farmers is using fertile wetland soil as seedbed for boro crops. During monsoon, these lands are engulfed by rising water of the wetlands during which essential nutrients are restored making it ready for cultivation in the next year. Among the 6 selected wetlands, Baiganbari Chhara is predominately used for agriculture

during the post-monsoon period, which amounts to about 77.35% of the wetland area (Table 4.17).



4.2.2. Irrigation:

The water from the wetlands are being used for irrigation in the surrounding agricultural fields and in the edges of wetland, which dry up during the pre pre-monsoon and are consequently converted into arable lands. They are irrigated mostly using the wetland water because the nutrient content of the water is comparatively higher than the ground and river water and it helps the farmers to cut down their costs on fertilizers. However, practising seasonal agriculture in and around wetlands or withdrawing larger amounts of water for irrigation risk the ecological character of the wetlands which may be altered to the point where the essential regulating and supporting services are lost. Wetlands are also used for irrigation purpose in the study area. 29 lift Irrigation were found around the Rasik Beel, 23 lift irrigation in Baiganbari Chhara and 6 lift irrigation observed in Dhangdhar Chhara (Table 4.1). A huge amount of water was withdrawn during the Boro cultivation (Winter Season).

Table 4.1: Lift Irrigation from Sample Wetland

Sample site	No. of Lift Irrigation
Rasik Beel wetland complex	29
Dhangdhar Chhara	6
Rasomati Jheel	0
Baiganbari Chhara	23
Chandan Dighi	0
Sagar Dighi	0
Total	58

Source: Field survey, 2017



Photo Plate 4.3: Withdrawal of Water for Irrigation, Rasik Beel, Tufanganj-II



Photo Plate 4.4: Jute Retting in Bochamari Beel, Tufanganj-II

4.2.3. Jute Retting:

Jute (White Jute –*Corchorus capsularis* and Tossa Jute –*Corchorus olitorius*) is one of the most important commercial crops in the study area. During monsoon, almost all of the wetlands are used for jute retting by a large number of farmers from surrounding areas. Jute is a commercial crop, and jute sticks (*pat kathi*) are of immense value for the indigenous people, they are used for house walling, fencing, as fire wood, and also for various religious purposes. There are mainly three methods of jute retting: chemical, biological and instrumental. In the study area biological jute retting is mostly practiced due to low cost and the fact that they hardly require to pay rent to the wetland owners. Traditionally farmers use the beel water for jute retting; however, some farmers prefer to use their own pond or *Doba*. The largest area employed in jute retting, among the surveyed wetlands, is in Baiganbari Chhara (350 bigha) followed by Haripur Beel (130 bigha), Kankanguri-Naya Chhara (120 bigha), Bara Bochamari Beel (80 bigha), choto Bochamari Beel (60 bigha), Bherbheri (50 bigha) (Table 4.2).

Table 4.2: Amount of Jute Retting in Different Wetlands

Sample site	Jute retting Site	Amount in Bigha
Bara Bochamari Beel	1	80
Bherbheri	1	50
Choto Bochamari Beel	1	60
Baiganbari Chhara	1	350
Haripur Beel	1	130
Kankanguri-Naya Chhara	1	120

Source-Field Survey, 2017

4.2.4. Fish Hunting:

Koch Bihar is gifted with many water bodies commonly known as *beels/chhara* that are the only source of fish for the poor people in the surrounding villages. Historically there have been three distinct groups of people involved in organized Fish hunting in the *beels*: (i) those that fish for their daily consumption; (ii) the fishing community who depend on fishing for their livelihood; and (iii) rural entrepreneurs (leaseholders) who hardly spare fry or fingerlings of any variety in the wetlands during any season. Ordinary people usually catch fish for consumption, while fishermen are full-time operators working independently or under the lease. Fishing is very common in Rasik Beel where 86% surveyed household practice fishing followed by Baiganbari Chhara (58.75%)(Table 4.4).



Photo Plate 4.5: Fishing in Baiganbari Chara, Koch Bihar-II



Photo Plate 4.6: Fishing in Dhangdhar Chhara, Tufanganj-I

4.2.5. Pisciculture:

The breeding, rearing, and transplantation of fish by artificial means is called pisciculture or fish farming. It involves raising fish commercially in tanks, beels, dead river etc. usually for human consumption. As fish is common and important nutrient source of people, the demand for fish is much higher than the local fish supply, which makes pisciculture a profitable business. Pisciculture is practiced mainly in the ponds, quasi-natural oxbow and quasi-natural riverine wetlands in the study area. Fish species raised by the fish farms include katla, tilapia etc

Table 4.3: Particulars of Fisheries in the Blocks of Koch Bihar for the Year 2012-13

Name of Block	Area available for pisciculture (Ha)	% of Area available for Pisciculture	Area under effective pisciculture (Ha)	% of Area under effective pisciculture	% of Effective Pisciculture
Koch Bihar-I	858.17	38.56	410.88	34.79	47.88
Koch Bihar-II	461.21	20.73	290.50	24.60	62.99
Tufanganj-I	527.36	23.70	297.06	25.15	56.33
Tufanganj-II	378.55	17.01	182.49	15.45	48.21
Total	2225.29	100.00	1180.93	100.00	

Source: Hand Book on Fisheries Statistics, 2015-16

Fig- 4.1 depicts Koch Bihar-I (858.17) having the highest area under pisciculture followed by Tufanganj-I (527.36 Ha). Tufanganj-II (378.55 Ha) has the least amount of area available for pisciculture. However, in terms of highest percentage of effective pisciculture, Kochbihar-II ranks the highest (62.99%).

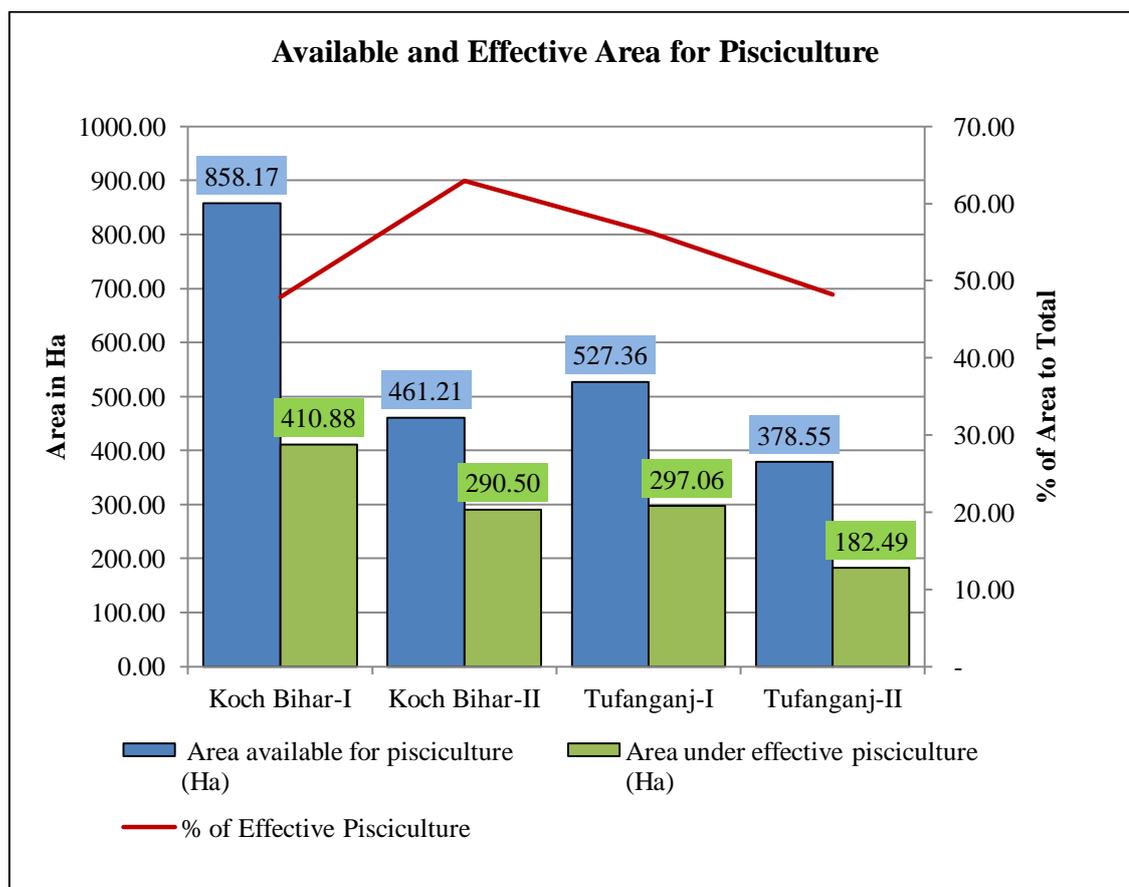


Fig 4.1: Available and Effective Area for Pisciculture

4.2.6. Fodder Collection:

Fodder collection is also an important activity in rural wetlands of the study area. Farmers collect various water-born vegetation and supplement fodder for their livestock in monsoon and post-monsoon periods. In the dry season when the grasses dry up wetlands become the only source of fodder. Households who don't have any agricultural land collect fodder from the wetlands all throughout the year. The important fodder plants (aquatic and climber) are *Saccharum spontaneum* (kash), *Cynodon dactylon*, *Alternanthera paronychioides*, *Alternanthera sessilis*, *Coix lachryma-jobi*, *Eichhornia crassipes*, *Enydra fluctuans*, *Hygroryza aristata*, *Ipomoea aquatica*, *Monochoria hastate*.



Photo Plate 4.7: Fodder Collection in Rasomati Jheel, Koch Bihar-II



Photo Plate 4.8: Soil Quarrying in Baiganbari Chara, Koch Bihar-II

4.2.7. Grazing:

Grazing on wetland and wetland surrounding areas is practiced for four to twelve months in a year. Due to a low slope in the edges of the wetland and low depth of water, it becomes easy for cattle population to access grass and other fodder plants. The water level in the wetlands remains low during winter and summer season with huge spaces in and around the wetlands which makes grazing on wetlands a vital occupation. In the study area Baiganbari Chhara (56% household), Dhangdhar Chhara (34% household), Rasik Beel (23% household), and Rasomati Jheel (15% household) play a vital role for grazing (Table 4.4).



Photo Plate 4.9: Grazing in Rasomoti Jheel, Koch Bihar-II



Photo Plate 4.10: Grazing in Rashik Beel Complex, Tufanganj-II

4.2.8. Edible Plant Collection:

Apart from small fishes and various shellfishes, the surrounding households collect various edible plants (*Kalmi, Hinchha, Sushni, etc.*) from wetlands for their own consumption. Collection of the edible plants for own consumption is the highest in Rasik Beel (93% household, Table 4.6) followed by Baiganbari Chhara (36% household), Rasomati Jheel (35% household) and Chandan Dighi (10% household). Discussing with the local people revealed that some households surrounding the Wetlands collect various leafy vegetables throughout the year for selling in the local market. Collection of edible plants for selling is the highest in Rasomati Jheel (5% household) followed by Rasik Beel (4% household) and Baiganbari Chhara (2.5% household) (Table 4.4).



Photo Plate 4.11: Collection of the Edible Plant in Baiganbari Chhara, Koch Bihar-II



Photo Plate 4.12: Duck Keeping Dhangdhar Chhara, Tufanganj-I

Table 4.4: Use of Selected Wetlands of the Study Area

use of wetlands	Rasik Beel(N=180)		Dhangdhar Chhara (N-50)		Rasomati Jheel (N-20)		Baiganbari Chhara (N-80)		Chandan Dighi (N-20)		Sagar Dighi (N-20)	
	f	%	f	%	f	%	f	%	f	%	f	%
Wetland Cultivation:	20	11.1	NIL	Nil	NIL	NIL	32	40	NIL	NIL	NIL	NIL
Pisciculture:	Nil	Nil	3	6	NIL	NIL	7	8.75	NIL	NIL	NIL	NIL
Fishing for selling:	37	20.6	NIL	Nil	NIL	NIL	9	11.25	NIL	NIL	NIL	NIL
Fishing for Own consumption:	118	65.6	nil	Nil	2	10	38	47.5	1	5	NIL	NIL
Irrigation from Wetland:	26	14.4	6	12	NIL	NIL	17	21.25	NIL	NIL	NIL	NIL
Jute Retting:	19	10.6	19	38	NIL	NIL	19	23.75	NIL	NIL	NIL	NIL
Duck Keeping:	33	18.3	13	26	NIL	NIL	27	33.75	3	15	2	10
Fodder Collection:	82	45.6	22	44	5	25	32	40	1	5	NIL	NIL
Grazing:	42	23.3	17	34	3	15	45	56.25	NIL	NIL	NIL	NIL
Hunting	NIL	NIL	1	2	NIL	NIL	3	3.75	NIL	NIL	NIL	NIL
Collection of the edible plant for selling:	7	3.89	NIL	NIL	1	5	2	2.5	NIL	NIL	NIL	NIL
Collection of the edible plant for own consumption:	168	93.3	13	26	7	35	29	36.25	2	10	NIL	NIL
Fuel Wood Collection:	28	15.6	2	4	6	30	8	10	NIL	NIL	NIL	NIL
Collection of building and handcraft materials:	2	1.11	NIL	NIL	4	20	NIL	Nil	NIL	NIL	NIL	NIL
Bathing & Swimming:	68	37.8	24	48	NIL	NIL	28	35	NIL	NIL	14	70
Washing Clothes & Other Utensils:	11	6.11	13	26	NIL	NIL	13	16.25	1	5	5	25
Total	180	100	50	100	20	100	80	100	20	100	20	100

Source: Field Survey, 2016-17, N= No. of Household Surveyed, f= frequency

4.2.9. Duck- Keeping:

Duck keeping is a reducing practice in the study area as greater impetus is now being paid to agriculture and pisciculture owing to greater monetary returns. But duck keeping coupled with agriculture and pisciculture may give better benefit to the farmers. Duck keeping is the

highest in Baiganbari Chhara (34% household) followed by Dhangdhar Chhara (26% household), Rasik Beel (18% household), Chandan Dighi (15% household) and Sagar Dighi(10% household) (Table 4.4).

4.2.10. Soil Quarrying:

Soil Quarrying is a common practice in the wetlands during the dry season when the whole or a part of wetland is dry. Clayey soil is excavated mainly by brick kiln industries and for filling up the lowland areas. Sandy soil is required mainly for creating the base of new buildings. Though soil quarrying is an illegal activity, it is increasing day by day in the study area. In the time of field survey, it has been found that a non-restricted government wetland (baiganbari Chhara) experiences more soil squaring than the restricted government wetland (Rasik Beel), whereas fully restricted government wetland (Rasomati Jheel) is free from soil quaring.

4.2.11. Bathing& Swimming:

Bathing and swimming in the wetland are the common practices of the rural and urban house holds nieghbouring the wetlands. However, pollution renders bathing and swimming impossible in the wetlands of the study area. In Koch Bihar municipality itself, out of 27 wetlands, only 14 can be used for bathing. Bathing and swimming activities are the highest in Sagar Dighi (70% household) followed by Dhangdhar Chhara (48% household), Rasik Beel(38% household) and Baiganbari Chhara (35% household) (Table 4.4).



Photo Plate 4.13: Bathing and Swimming in Sagar Dighi, Koch Bihar-I



Photo Plate 4.14: Washing of Cloth in Sagar Dighi, Koch Bihar-I

4.2.12. Dumping of Solid Waste:

Generally, wetlands are treated as unproductive landscape and inhabitants of the surrounding of the wetlands dump their waste in wetlands or on the side of the wetlands. Even the municipality or panchayet authorities dump organic and inorganic solid waste in the wetlands. Solid waste disposal has become one of the major environmental threats to the wetlands. Un-decomposed solid wastes like plastic and thermocols pose a major problem for the urban wetlands of the study area (Photo Plate 4.15).



Photo Plate 4.15: Dumping of Solid Waste in Chandan Dighi, Koch Bihar-I



Photo Plate 4.16: Washing of Cloth in Chandan Dighi, Koch Bihar-I

4.2.13. Fuel Wood:

Fuelwood collection from wetlands is an important practice in post-monsoon and winter season. Generally, female members of the family (belonging to households below poverty level) collect twigs and branches from wetland and wetland edges which are subsequently dried for firewood. Fuelwood collection is the highest in Rasomati Jheel (30% household) followed by Rasik Beel(16% household), Baiganbari Chhara (10% household), Dhangdhar Chhara (4% household) (Table 4.4).

4.2.14. Ritual Activities:

Religious rituals like cremation of dead bodies, immersion of idols, remnants and by-products of puja (wooden idol-frames, earthen pots, *diyas*, flowers etc) affect the water bodies to a great extent. Fairs like *chat puja*, *Annapurna puja*, *basantipuja* etc (Photo Plate 4.20). which are traditionally organised near the wetland thus leading to the accumulation of non-biodegradable wastes in the wetlands. On the contrary, utilizing wetland water for the marriage ceremony, first feeding ceremony (*annoprason*), funeral and some other rituals do

not have any adverse effect on wetlands; rather they protect wetland by attaching socio-cultural significance (Photo Plate 4.19).



Photo Plate 4.17: Fuel Wood Collection in Rasomati Jheel, Koch Bihar-II



Photo Plate 4.18: Fuel Wood Collection in Rashik Beel Complex, Tufanganj-II



Photo Plate 4.19: Ritual Activities in Dhangdhar Chhara, Tufanganj-I



Photo Plate 4.20: Basanti puja & Fair in Baiganbari Chhara, Koch Bihar-II

4.3. Specific Use of Some Selected Wetlands:

To investigate the present use of wetlands in the study area, some selected wetland have been thoroughly examined.

4.3.1. Rasik Beel Wetland Complex:

Rasik Beel is the most important wetland included in the National Wetland Conservation Programme (updated NWCP as on June 26, 2009). Rasik Beel, one of the most potential biodiversity capitalising the study area, is a huge natural lake with a total area of 178

hectares. The Rasik Beel wetland area constitutes of water bodies of varying sizes namely Bochamari Beel, Raichangmari Beell, Nildoba Beel, Satwabhangra Nadi, Salmara Beel, Atiamochar Beel and Bherbhiri Beel that are collectively known as Rasik Beel Wetland Complex. The Rasik Beel wetland complex lies between BurhaRaidak River in the west and Ghoramara River east. It originated from different cut-off meander of Raidak River and its tributaries in course of time. Rasik Beel wetland complex was undoubtedly formed from the river Raidak now known as Bura Raidak, the oldest major Raidak River or from its tributaries the Ghoramara, and/or Satwabhangra N. The lake Bochamari is now known as Dhakeswari and Raichanmari might have been formed from the course of either Bura Raidak or Satyabhama N. But the Beel Salmara, Batikata, Satwabhangra were certainly formed from the river Satwabhangra. The position and the shape indicates that the Atiamochar Beel, Pukipara-I and Pukipara-II, and the Nildoba Beel might have been formed from the course of the river Ghoramara. All these beels except the Bochamari Beel might have been formed during the second half of the 18th century. (Das D., Sen A. and Mitra P., 2013)

According to the report of Y. S. Ahmad, IFS, DFO, Buxa Division, Bengal in 1939, “the Rasik Beel was a block under Gadarhat Reserve with sandy soil and formed due to the changes in the course of Raidak River. The block area had a number of active beels which are connected with the Chakwabhangra Nadi, locally known as Bochamari. These beels give shelter to the enormous wild ducks in the winter season and to the wild buffaloes in summer. At that time it was principally a dense grass forest with an elephant traction the Atiamochar beat”.

The Rasik Beel wetland complex is surrounded by Chengmari, Bara Salmari, Atiamochar and Takoamari protected forest. The adjacent forests of the beels are very immature, about 20-22 years old. The present distribution of forest in and around Rasik Beel under the Koch Bihar Division is given in Table-4.5.

Table 4.5: Distribution of Forest in and Around Rasik Beel

Name of Range	Beat	Mouza	J.L. No.	Total area in Ha.
Koch Bihar-I	Nagurhat	BaroSalbari	27	383.92
		Dorko	13	60.97
		ChotoSalbari	28	32.10
		Chengtimari	14	351.95
		Natabari	115	2.40
		Charalijani	35	0.88
		DebatterCharalijani	36	3.71
	Rasik Beel	Rasik Beel	26	136.38
	Atiamochar	Bansraja	55	63.20
		Part III	27	0.88
		Paglirkuti	16	30.65
		Mahiskuchi	62	33.32
		Atiamochar	15	238.47
		Madhurbasa	18	5.53
		Chat Bhalka	21	53.28
		Garbhanga	22	170.20
		Takuamari	25	254.42
		Falimari	64	67.31
		laldhoa	23	12.55
		Kharibari	17	258.33
NajiramDeotikhata		20	46.67	

Source: Zoological Survey of India, Kolkata, 2013

Among the beels of Rasik Beel Wetland Complex, five important wetlands are selected for study namely Bochamari Beel, Raichanmari Beel, Atiamochar Beel, Nildoba Beel and Satwabhangha Nadi.

Table 4.6: Number of Beneficiaries of Rasik Beel according to Use of Wetland

Different Uses of Wetland	Beneficiaries (N=180)
Wetland Cultivation:	20
Pisciculture:	Nil
Fishing for selling:	37
Fishing for Own consumption:	118
Irrigation from Wetland:	26
Jute Retting:	19
Duck Keeping:	33
Fodder Collection:	82
Grazing:	42
Hunting	NIL
Collection of the edible plant for selling:	7
Collection of the edible plant for own consumption:	168
Fuel Wood Collection:	28
Collection of building and handcraft materials:	2
Bathing & Swimming:	68
Washing Clothes & Other Utensils:	11

Source: Field Survey, 2016 & 2017, N= No. of Household Surveyed

Table 4.7: Average Wetland Service of Rasik Beel According to Observation Method

Wetland service	Time & duration	Degree of wetland service
Wetland Cultivation:	Occasionally- except rainy season	*
Pisciculture:	NIL	-
Fishing for selling:	All over the year	***
Fishing for Own consumption:	All over the year	**
Irrigation from Wetland:	Pre-monsoon	*
Jute Retting:	Monsoon	*
Duck:	All over the year	*
Fodder Collection:	All over the year	*
Grazing:	All over the year	*
Hunting	NIL	-
Collection of edible plant for selling:	All over the year	*
Collection of edible plant for own consumption:	All over the year	**
Fuel Wood Collection:	Post monsoon	*
Collection of building and handcraft materials:	Post monsoon	*
Bathing & Swimming:	All over the year	*
Washing Clothes & Other Utensils:	All over the year	*
Boating and other recreational use:	Occasionally- except rainy season	**
Mining:	Pre-monsoon	*
Eco-tourism:	Occasionally- except rainy season	***
Picnic :	Occasionally- winter	**
Religious use :	All over the year	*
Cultural use:	All over the year	*
Educational use:	Occasionally- except rainy season	*
Garbage dumping:	All over the year	*
The release of sewage:	All over the year	*
Morning/evening walk:	NIL	-
Burning Ghat	NIL	-

Source: Field Survey, 2016 & 2017 N.B.: ***= very Common, ** = Fairly Common, * =

Rare(on the verge of extinction), - =not found

Table 4.8: Land Use and Land Cover of Rasik Beel and its Surroundings

Sl no.	Land use	Area in sq km	Area in %
1	Forest Area	5.02	42.76
2	Agricultural Land	2.87	24.45
3	Planted Vegetation	0.39	3.32
4	Grazing Land and Other	1.14	9.71
5	Settlement	1.11	9.45
6	Playground	0.03	0.26
7	Wetland	0.31	2.64
8	Rasik Beel	0.87	7.41

Source: Calculated by Researcher

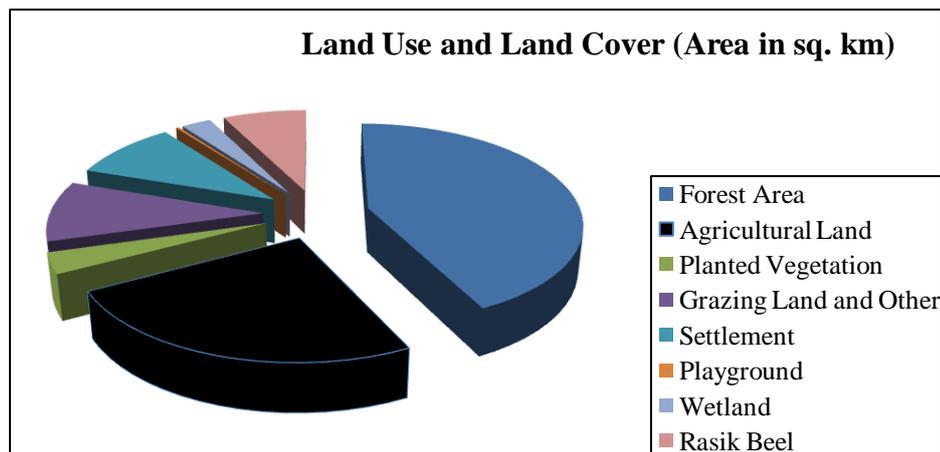
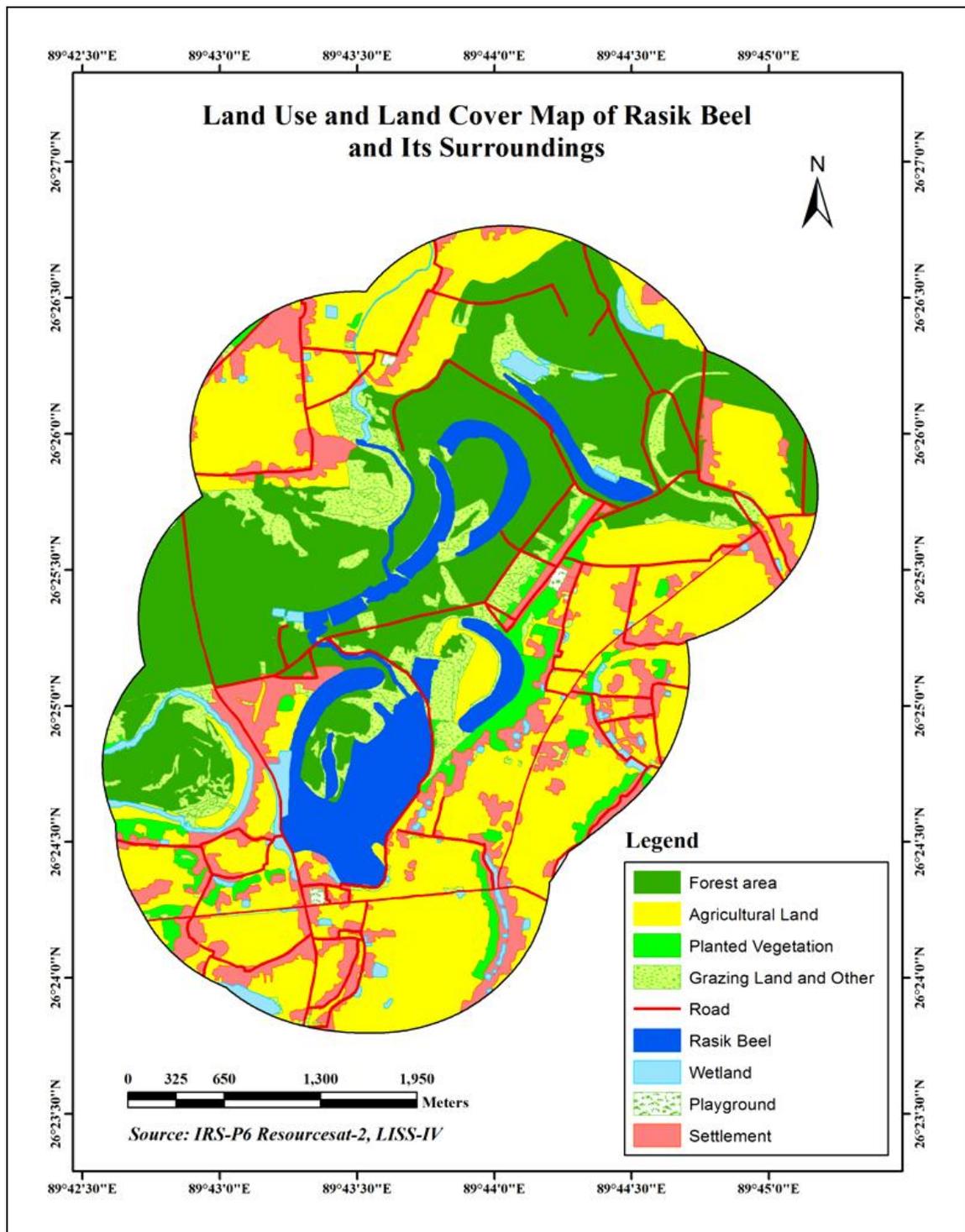


Fig 4.2: Land Use and Land Cover of Rasik Beel and its Surroundings

Land use and land cover within one km of the surrounding area of the Rasik Beel wetland complex reveal the following land use setup. The forest covers the highest area i.e.5.02 sq.km (42.76%) followed by Agricultural Land (24.45%), Grazing Land and Other (9.71%), Settlement (9.45%). Rasik Beel wetland area comprises of 0.87 sq. km and 0.31 sq. km water cover is in the surrounding area (Table 4.8). Though wetlands have a number of utility, with the passing time most of the wetland services have steadily diminished. In the Rasik Beel region fishing and eco-tourism is the important wetland service though fishing intensity and scope has goes down. The collection of edible plants for consumption, boating and other recreational uses are moderately important (Table 4.7). Other uses of Rasik Beel are rarely found there due to unavailability of the component, which provides the specific services.



Map 4.1: Land Use and Land Cover Map of Rasik Beel and its Surroundings

Source: Prepared by the Researcher on the Basis of Satellite Imagery & Field Verification

4.3.2. Dhangdhar Chhara:

Dhangdhar Chhara is situated in the brick kiln industrial zone of Maruganj Mouza of Tufanganj-I. It is the extension of Maradanga Beel which generated from Ghargharia River. It is a meander cut-off of Ghargharia River. Dhangdhar Chhara is the deepest part of the Maradanga Beel. The beel lies in between river Kaljani and River Ghargharia. This beel is

partly Culturable by the Maradanga Primary Fishermen Cooperative Society. There are 9 brick kilns within the 1 km radius of the beel. It is one of the natural beels which is most affected by the industrial effluents. The industrial wastes are drained into this beel. Moreover, the beel is leased for pisciculture.

Table 4.9: Number of Beneficiaries of Dhangdhar Chhara According to Use of Wetland

Different Uses of Wetland	Beneficiaries (N=50)
Wetland Cultivation:	NIL
Pisciculture:	3
Fishing for Own consumption:	NIL
Irrigation from Wetland:	6
Jute Retting:	19
Duck Keeping:	13
Fodder Collection:	22
Grazing:	17
Hunting	1
Collection of edible plant for selling:	NIL
Collection of edible plant for own consumption:	13
Fuel Wood Collection:	2
Collection of building and handcraft materials:	NIL
Bathing & Swimming:	24
Washing Clothes & Other Utensils:	13

Source: Field Survey, 2016 & 2017

Table 4.10: Wetland Service of Dhangdhar Chhara According to Observation Method

Wetland service	Time & duration	Degree of wetland service
Wetland Cultivation:	Pre-monsoon	*
Pisciculture:	All over the year	**
Fishing for selling:	All over the year	**
Fishing for Own consumption:	NIL	-
Irrigation from Wetland:	Pre-monsoon	*
Jute Retting:	monsoon	**
Duck Keeping:	All over the year	*
Fodder Collection:	All over the year	*
Grazing:	All over the year	*
Hunting	NIL	-
Collection of edible plant for selling:	NIL	-
Collection of edible plant for own consumption:	All over the year	*
Fuel Wood Collection:	Post-monsoon	*
Collection of building and handcraft materials:	NIL	-
Bathing & Swimming:	All over the year	**
Washing Clothes & Other Utensils:	All over the year	**
Boating and other recreational use:	NIL	-
Mining:	Occasionally- except rainy season	*
Eco-tourism:	NIL	-
Picnic :	NIL	-
Religious use :	NIL	-
Cultural use:	NIL	-
Educational use:	NIL	-
Garbage dumping:	All over the year	*

Release of sewage:	All over the year	*
Morning / evening walk:	NIL	-
Burning ghat	NIL	-

Source: Field Survey, 2016 & 2017***= Very Common, ** = Fairly Common, * = Rare (on the verge of extinction), - =not found

Table 4.11: Land Use and Land Cover of Dhangdhar Chhara and its Surroundings

Sl no.	Land Use	Area in sq km	Area in %
1	Settlement	1.17	24.27
2	Agricultural Land	1.81	37.55
3	Waste Land & Other	0.43	8.92
4	Brick Kiln Industry Site	0.47	9.75
5	Planted Vegetation	0.28	5.81
6	River	0.03	0.62
7	Roads	0.04	0.83
8	Wetlands	0.54	11.20
9	Dhangdhar Chhara	0.05	1.04

Source: Calculated by Researcher

Land use and land cover within one km surrounding area of the Dhangdhar Chhara reveals the following land-use setup. The Agricultural Land covers the highest area about 1.81sqkm (37.55%) followed by Settlement area (24.27%), Brick Kiln Industrial Site (9.75%), Waste Land & Others (8.92%). Dhangdhar Chhara wetland area stretches across 0.05sq km. it also has0.54 sq. km water cover in its surrounding area (Table 4.11). In the Dhangdhar Chhara region fishing is the moderately important wetland service through the intensity and scope are rapidly reducing. Jute Retting, washing clothes and utensils, bathing & swimming are other moderately important wetland services of Dhangdha Chhara(Table 4.10).

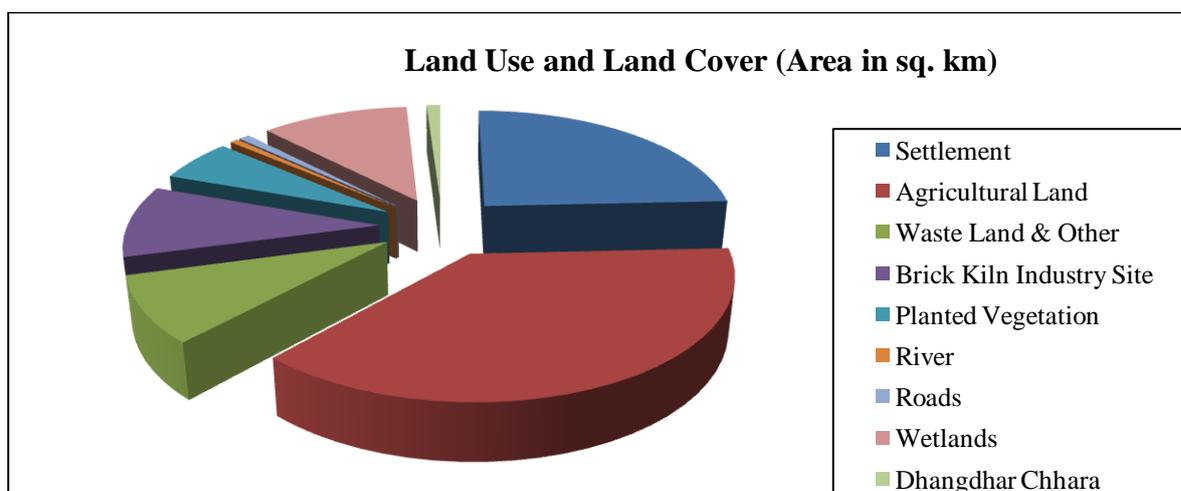
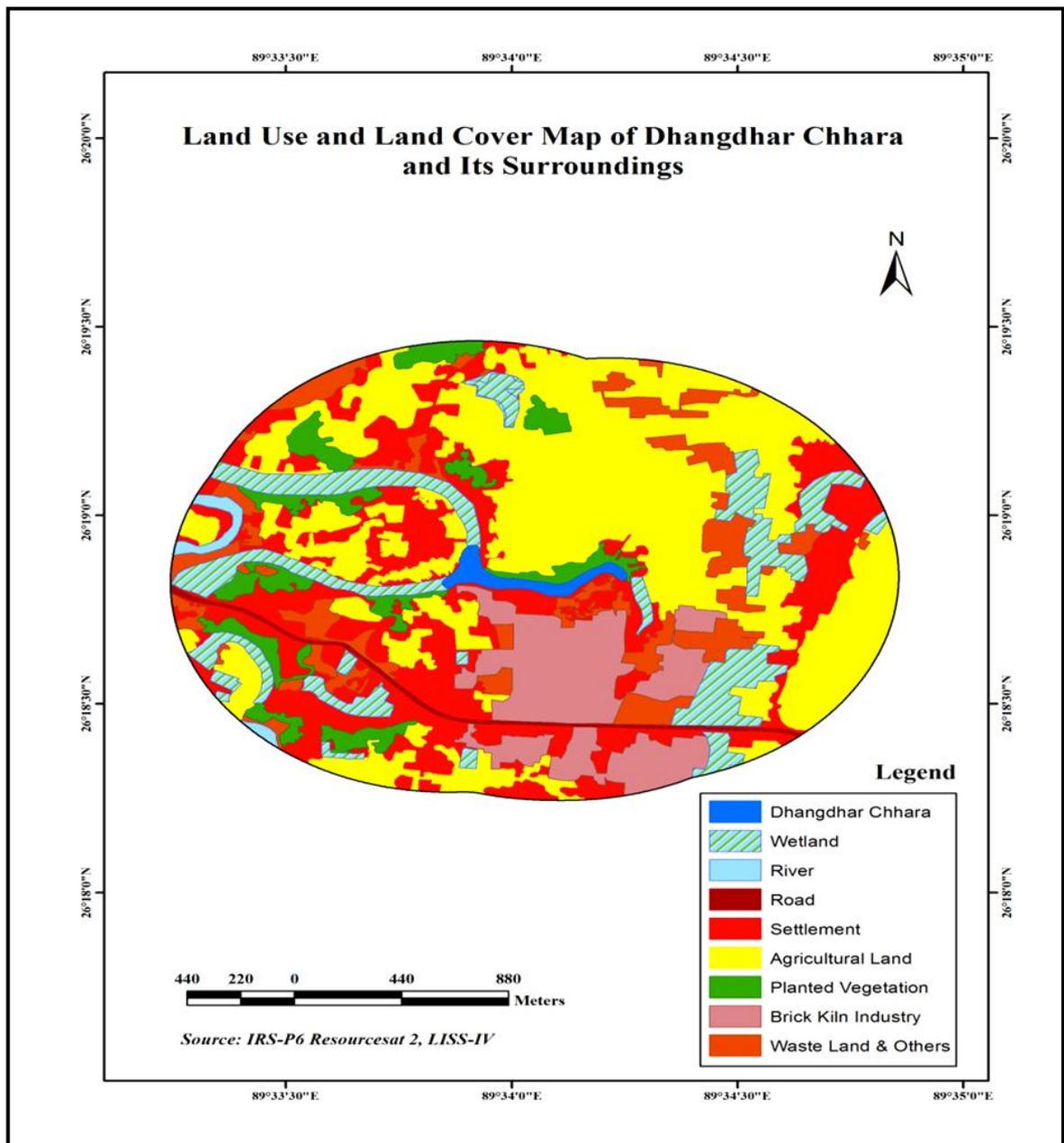


Fig 4.3: Land Use and Land Cover of Dhangdhar Chhara and its Surroundings



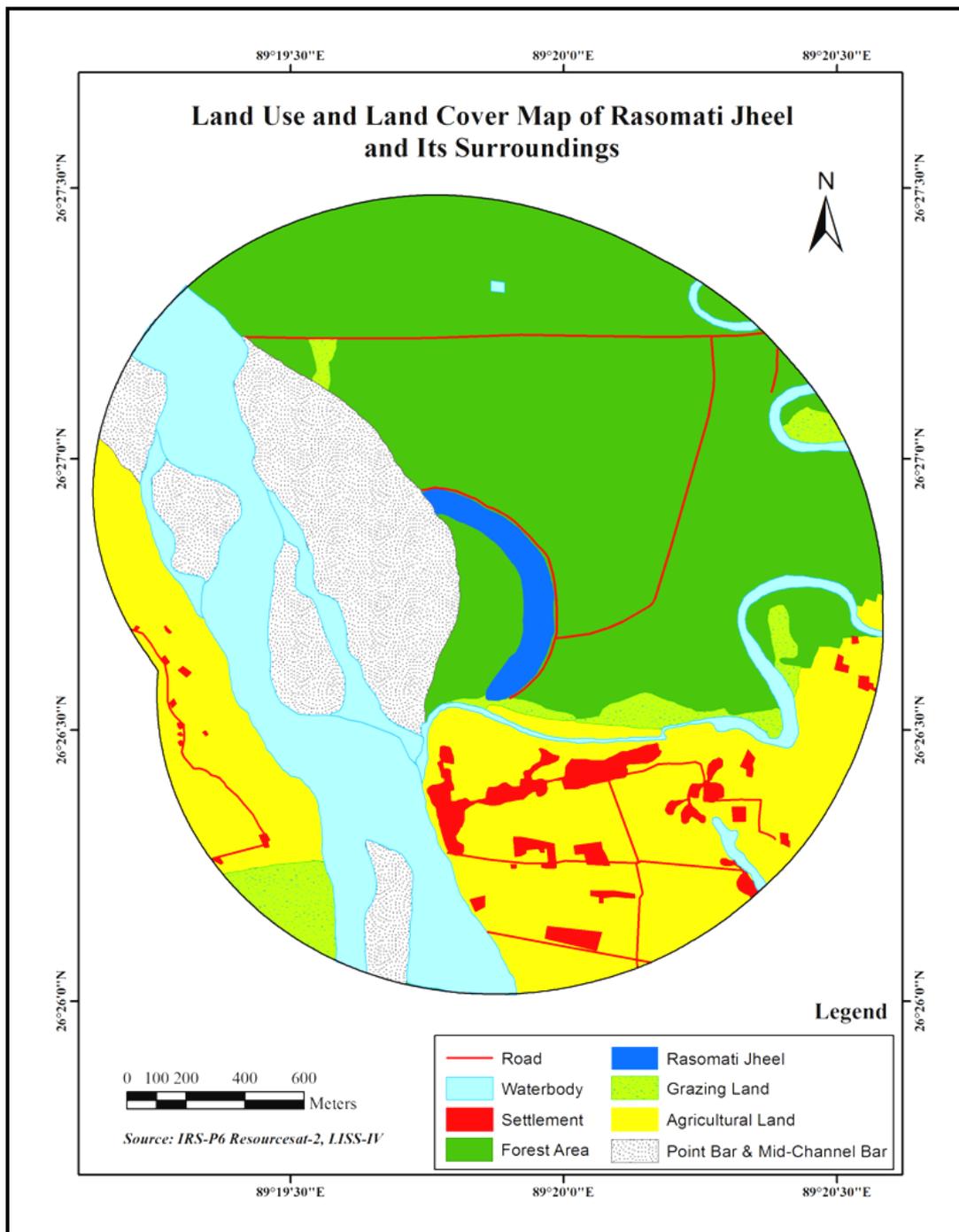
Map 4.2: Land Use and Land Cover Map of Dhangdhar Chhara and its Surroundings

Source: Prepared by the Researcher on the basis of Satellite Imagery & Field Verification

4.3.3. Rasomati Jheel:

Rasomati Jheel is the most important wetland included in the National Wetland Conservation Programme (updated NWCP as on June 26, 2009). Rasomati river originated in Torsha and also drained in it, forming a Yazoo river i.e. a tributary and also a distributary, however presently it is no longer a tributary or distributary of Torsha and has reduced into a wetland known as “Rasomati Jheel”. It is disconnected from Torsha both of its source or

estuary. Source of Rasomati Jheel has been closed artificially by constructing embankment on the edge of the lake and on the other hand the estuary choked naturally by the



Map 4.3: Land Use and Land Cover Map of Rasomati Jheel and its Surroundings

Source: Prepared by the Researcher on the basis of Satellite Imagery & Field Verification

deposition of Torsa River over time. It floods during the monsoon and drains in Buri Torsha. Then the combined stream of Rasomati and Buri Torsha drains into the Torsha at Bansdaha Natibari. Every year the river bank at the estuary of Rasomati Jheel collapses

which leads to the shrinkage of the area of the Rasomati Jheel. The origin of Rasomati is in Hogla forest of Patlakhawa forest. It moves towards the east and gradually arches towards the south and south-west. After covering some distance (almost 2km) the *jheel* ends in Buri Tosha at Natibari. The course of this miniature river, which is now a *jheel* mainly runs through the forest, however, after the construction of a dam at the entrance of the river along with excavation procedures to increase the depth of the river, the Government, has made the provisions for tourism and nature observation. A ‘watch tower’ is situated in the eastern part of the Rasomati Jheel. The beautiful dense forests of Torsha in the west are a feast for the eyes of the nature lovers.

Rasomati jeel is located 30 km from the town of Koch Bihar. It has a historic significance as it was the game reserve for the Koch dynasty. The forest consists of Sal, Sishu, Teak, Mehogany, Groundnut, Babla and Devdaru trees. It is a beautiful semi-lunar wetland flanked by lush green forests. Rasomati Jheel is an ideal place for bird watchers and photographers. Several resident bird species like hornbill, parrots, bulbul and myna are also spotted in the area. There is a 56-feet high watchtower for bird watching. Over the past several years a number of animal species have been introduced. The department’s report says that Rasomati houses around 200 spotted deer, 20 leopards and six bisons. According to a forest official, Rasomati with a good forest cover is an ideal habitat for wild animals. “The Chilapata forest is 15km away and animals often walk down the banks of the Torsa to come here in search of food during the nights. We have been observing that some of these animals, particularly deer and bison, are not returning to where they came from,” the official said. According to the department of forestry, three Indian one-horned rhinos will be introduced before the 2018 *durgha pujas*, making this wetland the third habitat of the mammal in the state.

Table 4.12: Number of Beneficiaries of Rasomati Jheel According to Use of Wetland

Different Uses of Wetland	Beneficiaries (N= 20)
Wetland Cultivation:	NIL
Pisciculture:	NIL
Fishing for selling:	NIL
Fishing for Own consumption:	2
Irrigation from Wetland:	NIL
Jute Retting:	NIL
Duck Keeping:	NIL
Fodder Collection:	5
Grazing:	3
Hunting	NIL

Collection of edible plant for selling:	1
Collection of edible plant for own consumption:	7
Fuel Wood Collection:	6
Collection of building and handcraft materials:	4
Bathing & Swimming:	NIL
Washing Clothes & Other Utensils:	NIL

Source: Field Survey, 2016 & 2017

Table 4.13: Wetland Service of Rasomati Jheel according to Observation Method

Wetland service	Time & duration	Degree of wetland service
Wetland Cultivation:	NIL	-
Pisciculture:	NIL	-
Fishing for selling:	NIL	-
Fishing for Own consumption:	NIL	-
Irrigation from Wetland:	NIL	-
Jute Retting:	NIL	-
Duck Keeping:	NIL	-
Fodder Collection:	All over the year	*
Grazing:	All over the year	***
Hunting	NIL	-
Collection of edible plant for selling:	All over the year	*
Collection of edible plant for own consumption:	All over the year	**
Fuel Wood Collection:	Occasionally- winter	*
Collection of building and handcraft materials:	Occasionally- winter	*
Bathing & Swimming:	NIL	-
Washing Clothes & Other Utensils:	NIL	-
Boating and other recreational use:	NIL	-
Mining:	NIL	-
Eco-tourism:	All over the year	***
Picnic :	Occasionally- winter	**
Religious use :	NIL	-
Cultural use:	NIL	-
Educational use:	Occasionally- except rainy season	*
Garbage dumping:	NIL	-
Release of sewage:	NIL	-
Morning/evening walk:	NIL	-
Burning Ghat	NIL	-

***= very Common, ** = Fairly Common, * = Rare(on the verge of extinction), - =not found

Source: Field Survey, 2016 & 2017

Table 4.14: Land Use and Land Cover of Rasomati Jheel and its Surroundings

Sl no.	Land use	Area in sq km	Area in %
1	Forest Area	1.91	37.38
2	Agricultural Land	1.31	25.64
3	Grazing Land	0.17	3.33
4	Point Bar & Mid-channel Bar	0.70	13.70
5	Settlement	0.15	2.94
6	Water bodies	0.79	15.46
7	Rasomati Jheel	0.08	1.57
8	total	5.105	100

Source: Calculated by Researcher

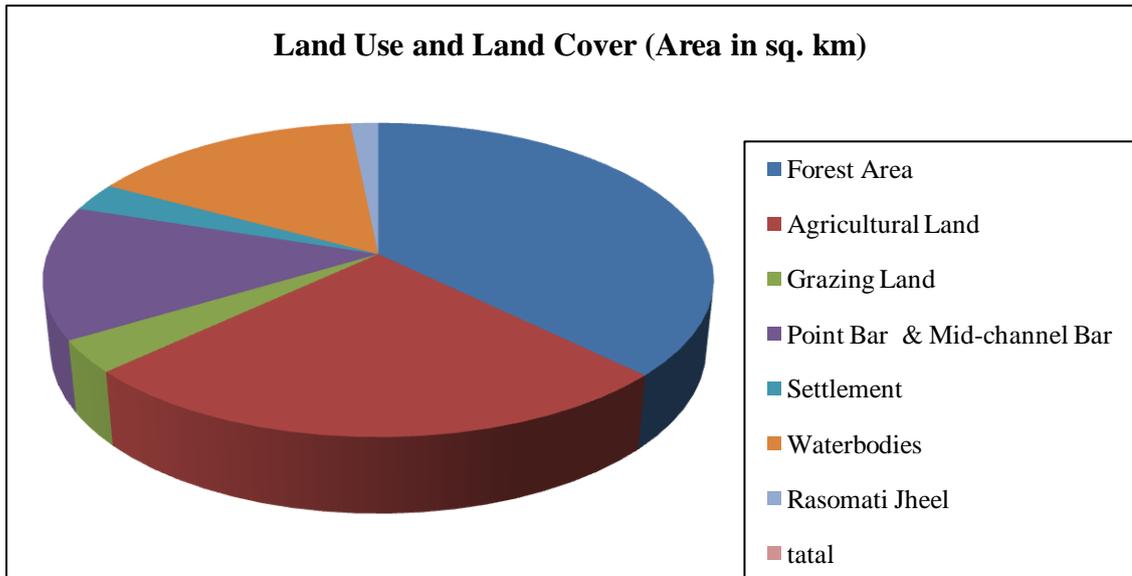


Fig 4.4: Land Use and Land Cover of Rasomati Jheel and its Surroundings

Land use and land cover of one km surrounding area of the Rasomati Jheel reveals the following land use setup. The forests cover the highest area i.e. 1.91sq km (37.38%) followed by Agricultural Land (25.64%), Water bodies (15.46%), Point Bar & Mid-channel Bar (13.70%). Rasomati Jheel wetland area stretches across 0.08 sq km. and having 0.79 sq. km water cover in the mapped area (Table-4.14). With the passage of time, most of the wetland services dwindled into just grazing and eco-tourism. Collection of the edible plant for local sale and consumption and monetary benefits from Picnic groups are moderately important (Table 4.13). Other services are rarely found due to unavailability of the specific component which is required for those specific services.

4.3.4. Baiganbari Chhara:

Baiganbari Chhara is located in Dewanbash Mouza of Koch Bihar-I. This beel is under the department of L.R., where fishing is done by Satmile Primary Fishermen Co-operative Society (PFCS) Ltd in 11.75 acre area of the beel. It is a meander cut-off of Mansai or Jaldhaka River. Beginning from its source to the estuary of this wetland it has various names in various places. Local senior citizens also have different opinions about the name of the wetland. Not a while ago this wetland had carried huge amounts of water but now it is reduced.

This wetland, situated in the left bank of Jaldhaka, is named as Amtali by few people, Balabari by few and Baiganbari by the rest. However is no doubt that in the

downstream it is named as Baiganbari. During the monsoon through the east of Nishiganj market, a stream is seen flowing from north to south direction, but recently the upstream of the river is blocked due to a number of causes.

According to some, the tributary originated from Bura Mansai River or buri Torsha. From this point, Baiganbari Chhara is a tributary of Torsha. Now it is Mansai's abandoned channel. For different reasons, this ancient river stream is about to go extinct. In brief, it can be said that a small stream originating from the Bura Mansai flowed through chatt chhitkibari and Runibari towards the south and the east direction. There is a connection between the aforesaid stream and Paddama stream which has hardly maintained its existence in the south-western Dumniguri. Presently the connection Bura Mansai and Baiganbari Chhara have severed. Paddama chhara which originated because of the change in Bura Mansai's direction and was once connected with the so-called Amtali or the Balabari River or Baiganbari Chhara but now this connection has also severed.

In the north and mid Deoanbose this wetland meets with a local drainage stream called Houser Dara. This two combined streams then zigzags towards the south. During monsoon, a strong river current is seen in the northern part of Ashmani Ghat and Chhat Dumniguri. However, after meeting with Houser Dara it is called Baiganbari stream at Deoanbose. Most of the wetland area remains dry except in monsoon. Throughout the year, there is a low level of water mostly stagnant and motionless. But in monsoon the water level rises up, leading to flooding.

Table 4.15: Number of Beneficiaries of Baiganbari Chhara according to Use of Wetland

Different Uses of Wetland	Beneficiaries (N=80)
Wetland Cultivation:	32
Pisciculture:	7
Fishing for selling:	9
Fishing for Own consumption:	38
Irrigation from Wetland:	17
Jute Retting:	19
Duck Keeping:	27
Fodder Collection:	32
Grazing:	45
Hunting	3
Collection of edible plant for selling:	5
Collection of edible plant for own consumption:	29
Fuel Wood Collection:	8
Collection of building and handcraft materials:	NIL
Bathing & Swimming:	28
Washing Clothes & Other Utensils:	13

Source: Field Survey, 2016 & 2017

Table 4.16:Wetland Service of Baiganbari Chhara According to Observation Method

Wetland service	Time & duration	Degree of wetland service
Wetland Cultivation:	All over the year- except rainy season	***
Pisciculture:	All over the year	**
Fishing for selling:	All over the year	***
Fishing for Own consumption:	All over the year	**
Irrigation from Wetland:	Winter	*
Jute Retting:	Monsoon and post-monsoon	***
Duck Keeping:	All over the year	**
Fodder Collection:	All over the year	*
Grazing:	All over the year	*
Hunting	Winter	*
Collection of edible plant for selling:	All over the year	*
Collection of edible plant for own consumption:	All over the year	*
Fuel Wood Collection:	Winter	*
Collection of building and handcraft materials:	NIL	-
Bathing & Swimming:	All over the year	*
Washing Clothes & Other Utensils:	All over the year	*
Boating and other recreational use:	NIL	-
Mining:	Winter	*
Eco-tourism:	NIL	-
Picnic :	NIL	-
Religious use :	All over the year	*
Cultural use:	All over the year	*
Educational use:	NIL	-
Garbage dumping:	All over the year	**
Release of sewage:	All over the year	**
Morning/evening walk:	NIL	-
Burning Ghat	All over the year	**

Source: Field Survey, 2016 & 2017***= Very Common, ** = Fairly Common, * = Rare(on the verge of extinction), - =not found

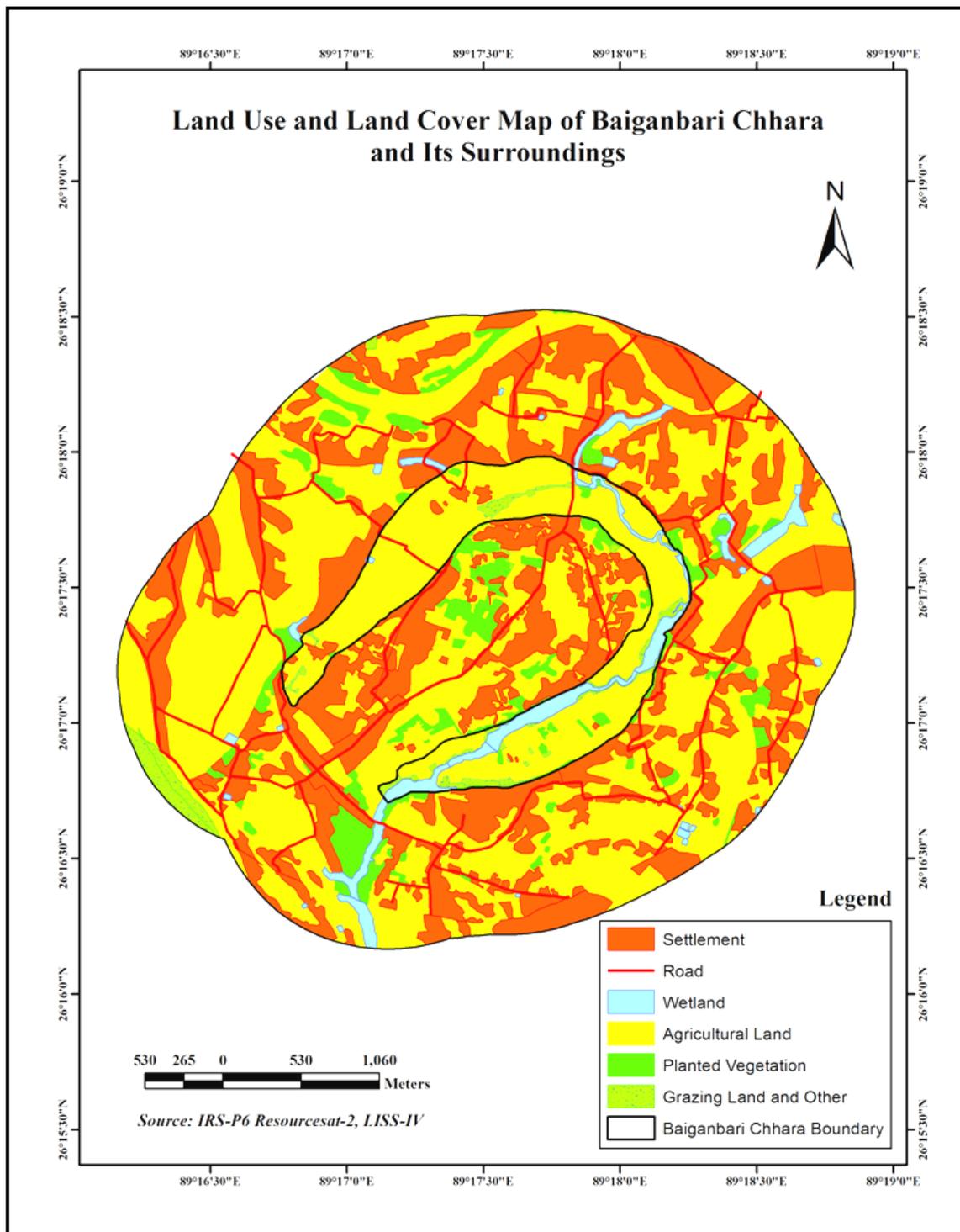
Table 4.17: Land Use and Land Cover of Baiganbari Chhara and its Surroundings

Sl no.	Land use	Area in sq km	Area in %	wetland area in %
1	Agricultural Land around the wetland	4.71	38.14	
2	Grazing Land and Other around the wetland	0.12	0.97	
3	Planted Vegetation around the wetland	0.72	5.83	
4	Settlement around wetland	4.77	38.62	
5	Wetlands around wetland	0.22	1.78	
6	Agricultural Land in the Wetland	1.40	11.34	77.35
7	Grazing Land and Other in the wetland	0.12	0.97	6.63
8	Planted Vegetation in the Wetland	0.05	0.40	2.76
9	Settlement in the Wetland	0.04	0.32	2.21
10	Water Cover in the Wetland	0.20	1.62	11.05

Source: Field Survey, 2016 & 2017

Land use and land cover of one km surrounding area of the Baiganbari Chhara reveals the following land use setup. It is intensively used for agriculture, grazing, settlement and pisciculture. Therefore land use pattern of Baiganbari Chhara and its

surrounding areas are divided into two categories – around the wetland and in the wetland. It is very clear from the table 4.13 that during the pre-monsoon three fourth area (77.35%) of the wetland is used for cultivation mainly boro paddy, the water cover area (11.05%) is used for Fishing, 6.63% for Grazing Land and Others, 2.76% for Planted Vegetation and 2.21% for Settlement. On the other hand in the surrounding area of Baiganbari Chhara, agricultural land and settlement cover 38.14% & 38.62% respectively (Table 4.17). According to the elders of Baiganbari Chhara area, this wetland was the centre of activity even in the recent past, however presently many of these wetland services are rendered useless and others steadily decreasing. While fishing, wetland cultivation and jute retting are the important wetland services their intensity and scope has been decreasing (Table 4.16). Other services of Baiganbari Chhara are rarely initiated due to unavailability of the specific component necessary for a specific service.



Map 4.4: Land Use and Land Cover Map of Baiganbari Chhara and its Surroundings

Source: Prepared by the Researcher on the Basis of Satellite Imagery & Field Verification

4.3.5. Chandan Dighi:

Chandan Dighi is situated in Koch Bihar Municipality of Sadar Koch Bihar with Plot No-5291 of Sahar Koch Bihar Mouza. It is under the Dept. of Fisheries and covers an area of 2.31 acres which is undertaken by Takagachh Fisheries Cooperative Society Ltd for pisciculture. The pond is surrounded by Koch Bihar MJN hospital in the West, Jenkins

School in the south and ABN Seal College hostel & 4 houses in the East. Moreover, the pond is surrounded by more than 39 shops and commercial places in the west and north.

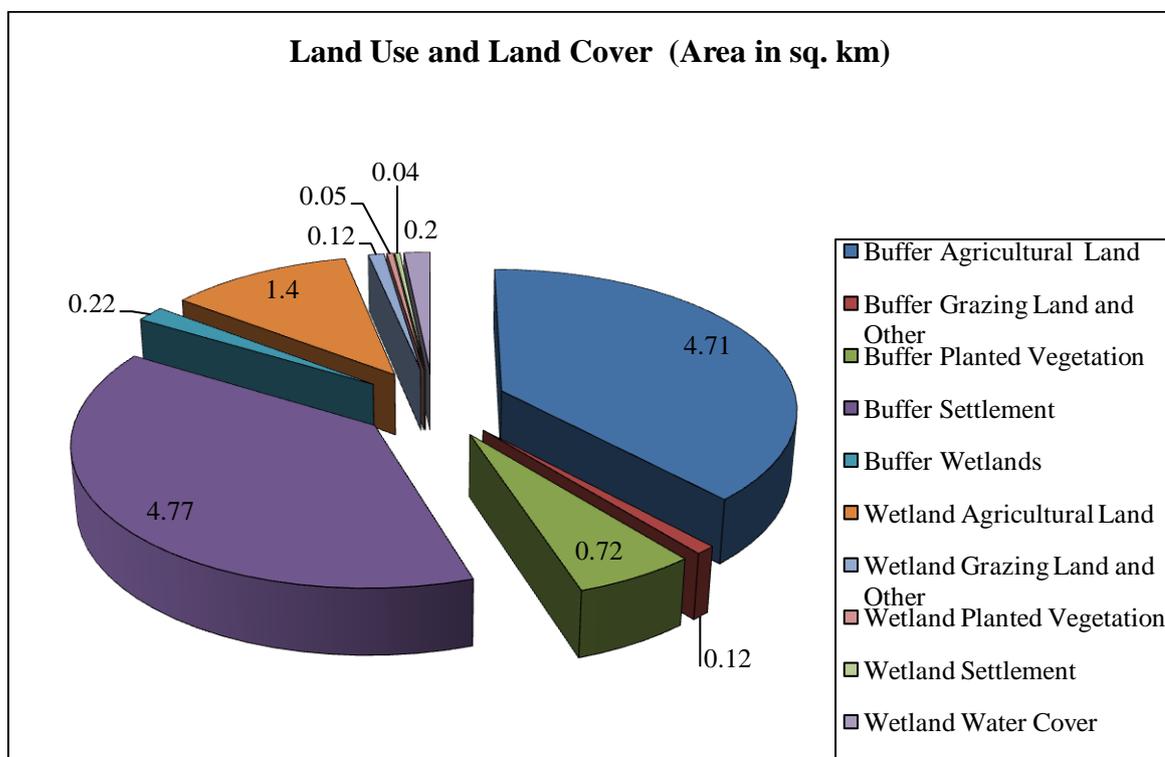


Fig4.5: Land Use and Land Cover of Chandan Dighi and its Surroundings

Table 4.18: Number of Beneficiaries of Chandan Dighi According to Use of Wetland

Different Uses of Wetland	Beneficiaries (N=20)
Wetland Cultivation:	NIL
Pisciculture:	NIL
Fishing for selling:	NIL
Fishing for Own consumption:	1
Irrigation from Wetland:	NIL
Jute Retting:	NIL
Duck Keeping:	3
Fodder Collection:	1
Grazing:	NIL
Hunting	NIL
Collection of edible plant for selling:	NIL
Collection of edible plant for own consumption:	2
Fuel Wood Collection:	NIL
Collection of building and handcraft materials:	NIL
Bathing & Swimming:	NIL
Washing Clothes & Other Utensils:	1

Source: Field Survey, 2016 & 2017

Table 4.19: Wetland Service of Chandan Dighi according to Observation Method

Wetland service	Time & duration	Degree of wetland service
Wetland Cultivation:	NIL	-
Pisciculture:	All over the year	*
Fishing for selling:	NIL	-
Fishing for Own consumption:	NIL	-
Irrigation from Wetland:	NIL	-
Jute Retting:	NIL	-
Duck Keeping:	All over the year	*
Fodder Collection:	NIL	-
Grazing:	NIL	-
Hunting	NIL	-
Collection of edible plant for selling:	All over the year	*
Collection of edible plant for own consumption:	All over the year	*
Fuel Wood Collection:	NIL	-
Collection of building and handcraft materials:	NIL	-
Bathing & Swimming:	Nil	-
Washing Clothes & Other Utensils:	All over the year	**
Boating and other recreational use:	Nil	-
Mining:	Nil	-
Eco-tourism:	Nil	-
Picnic :	Nil	-
Religious use :	Nil	-
Cultural use:	Nil	-
Educational use:	Nil	-
Garbage damping:	All over the year	**
Release of sewage:	All over the year	**
Morning/evening walk:	Nil	-
Burning Ghat	Nil	-

Source: Field Survey, 2016 & 2017***= very Common, ** = Fairly Common, * = Rare (on the verge of extinction), - =not found

Table 4.20: Land Use and Land Cover of Chandan Dighi and its Surroundings

Sl no.	Land use	Area in sq km	Area in %
1	Pond	0.0689	7.47
2	Planted Vegetation	0.1152	12.50
3	Park & Playground	0.1389	15.06
4	Chandan Dighi	0.0077	0.83
5	Fallow Land	0.0514	5.57
6	Settlement and other buildings	0.5400	58.56

Source: Calculated by Researcher

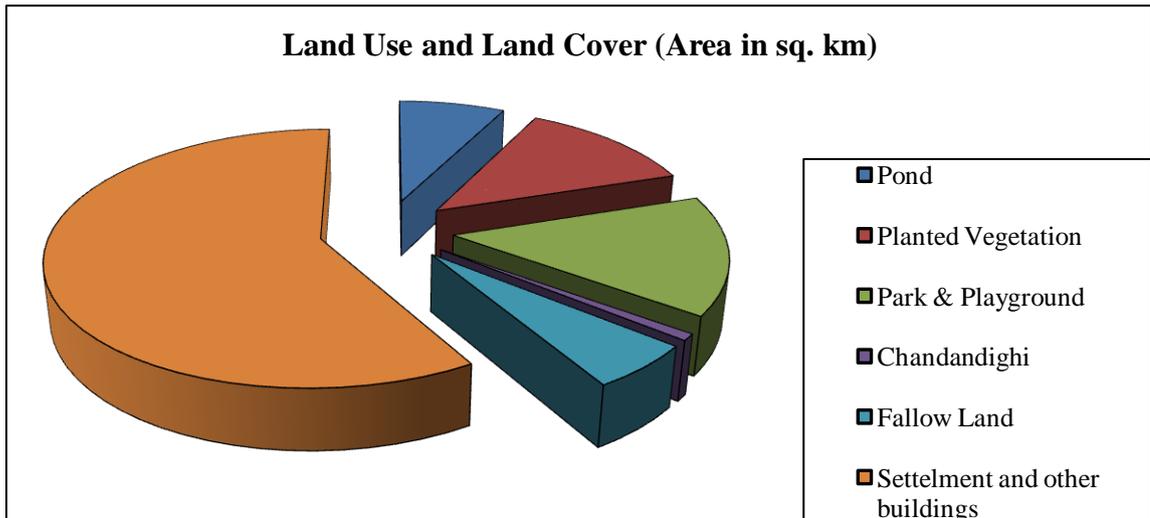
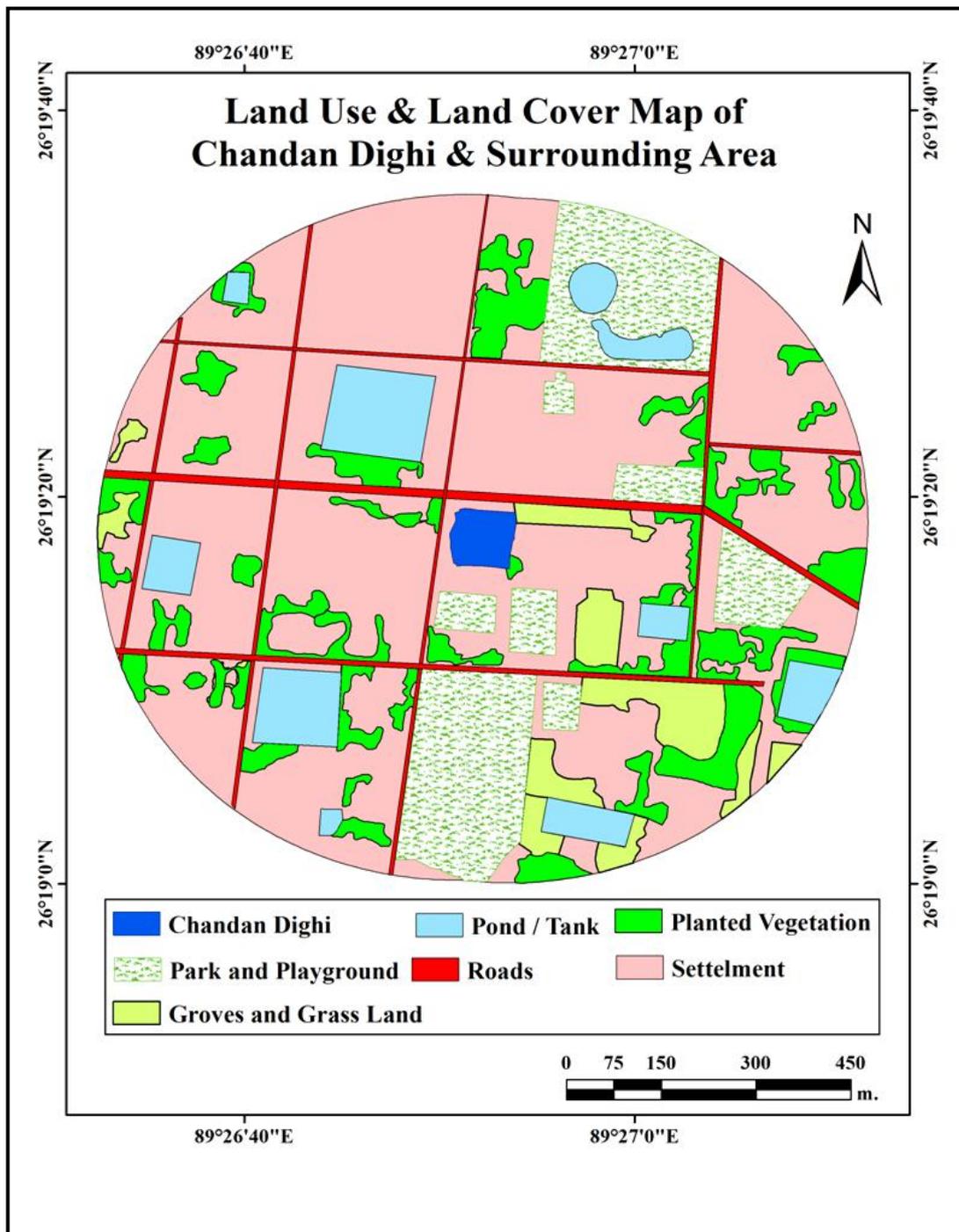


Fig4.6: Land Use and Land Cover of Chandan Dighi and its Surroundings

Land use and land cover of 500m surrounding area of the Chandan Dighi reveals the following land use setup. The Settlement and other buildings cover the highest area i.e. 0.54 sq km(58.56%) followed by Park & Playground (15.06%), Planted Vegetation (12.50%) and Fallow Land (5.57%). The total area of ofChandan Dighi is 0.0077sq. Km. and it has 0.0689 sq. km water cover in the surrounding area (Table 4.20). According to the aged locals, even 30-40 years ago the water of Chandan Dighi was very clear, generally used for drinking, bathing, swimming, washing clothes & utensils etc. However now, due to people's and administration's indifferent attitude, it has become the most degraded and polluted dighi in the Koch Bihar municipality, People treat it as a wasteland and Garbage is dumped and sewage is released by the inhabitants, hostellers, hotels, flower shops, and others. Thus, in a nutshell, it can be said that wetland service of Chandan Dighi is very less(Table 4.19).



Map4.5: Land Use and Land Cover Map of Chandan Dighi and its Surroundings

Source: Prepared by the Researcher on the Basis of Satellite Imagery & Field Verification

4.3.6. Sagar Dighi:

Koch Bihar Lake or Sagar Dighi is the most important freshwater body which is situated in the heart of Koch Behar town. It extends between 26°19'12"N to 26°19'21"N and 89°26'21"E to 89°26'28"E and the total surface area of this lake is 14.60 acres which were excavated by Maharaja Harendra Narayan in 1807 AD. It commonly attracts various

migratory birds during the winter season. Among all ponds in Koch Bihar town, the most spectacular is Sagar Dighi, with grand structures arrayed all around it. These buildings built mostly between 1880 to 1920, are now offices of the district administration like Office of the District Magistrate, Administrative Building of North Bengal State Transport Corporation, BSNL Office on the West; Office of the Superintendent of Police, District Library, Municipality Building on the South, Office of the BLRO, State Bank of India (Koch Bihar Main Branch) etc on the East and RTO office, Foreigner's enrollment office, District Court and so on the North. Although this *dighi* was excavated for drinking water supply and flood control, now it is used for bathing, swimming, washing clothes, fishing, morning and evening walk around the lake, resting or gossiping place, boating etc. Capture Fishery or catching fish is done by leaseholder SNCADA. This pond is under the Department of Fisheries.

Table4.21: Number of Beneficiaries of Sagar Dighi According to Use of Wetland

Different Uses of Wetland	Beneficiaries (N=20)
Wetland Cultivation:	NIL
Pisciculture:	NIL
Fishing for selling:	NIL
Fishing for Own consumption:	NIL
Irrigation from Wetland:	NIL
Jute Retting:	NIL
Duck Keeping:	2
Fodder Collection:	NIL
Grazing:	NIL
Hunting:	NIL
Collection of edible plant for selling:	NIL
Collection of edible plant for own consumption:	NIL
Fuel Wood Collection:	NIL
Collection of building and handcraft materials:	NIL
Bathing & Swimming:	14
Washing Clothes & Other Utensils:	5

Source: Field Survey, 2016 & 2017

Table4.22: Wetland Service of Sagar Dighi According to Observation Method

Wetland service	Time & duration	Degree of wetland service
Wetland Cultivation:	NIL	-
Pisciculture:	All over the year	*
Fishing for selling:	NIL	-
Fishing for Own consumption:	NIL	-
Irrigation from Wetland:	NIL	-
Jute Retting:	NIL	-
Duck Keeping:	All over the year	*
Fodder Collection:	NIL	-
Grazing:	NIL	-
Hunting	NIL	-
Collection of edible plant for selling:	NIL	-
Collection of edible plant for own consumption:	NIL	-
Fuel Wood Collection:	NIL	-

Collection of building and handcraft materials:	NIL	-
Bathing & Swimming:	All over the year	***
Washing Clothes & Other Utensils:	All over the year	**
Boating and other recreational use:	All over the year	***
Mining:	NIL	-
Eco-tourism:	All over the year	**
Picnic :	NIL	-
Religious use :	All over the year	**
Cultural use:	All over the year	**
Educational use:	All over the year	*
Garbage dumping:	All over the year	*
Release of sewage:	All over the year	*
Morning/evening walk:	All over the year	***
Burning Ghat	NIL	-

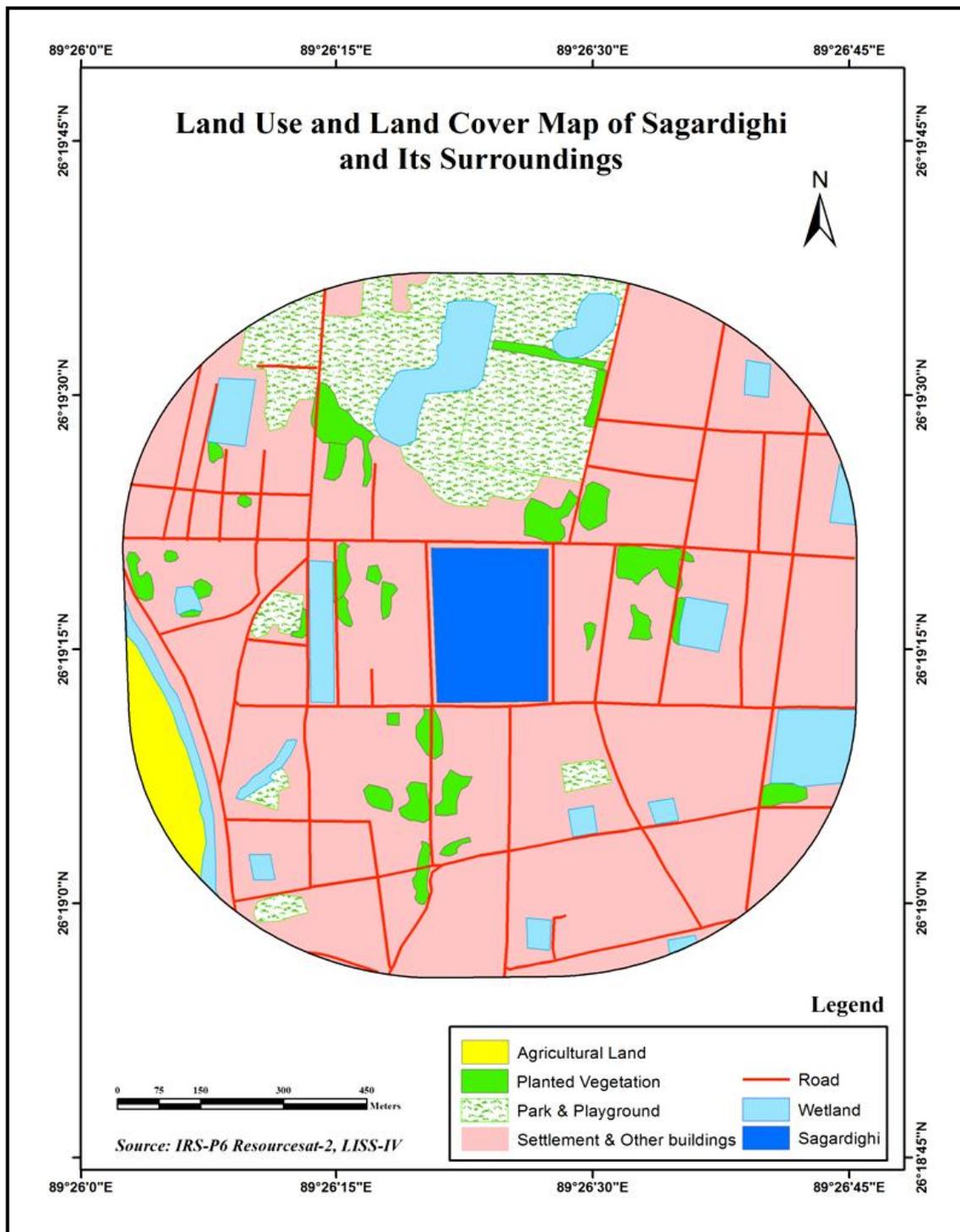
Source: Field Survey, 2016 & 2017 ***= very Common, ** = Fairly Common, * = Rare(on the verge of extinction), - =not found

Table4.23: Land Use and Land Cover of Sagar Dighi and its Surroundings

Sl no.	Land use	Area in sq km	Area in %
1	Settlement and Other Buildings	0.9327	67.72
2	Park & Playground	0.1611	11.70
3	Planted Vegetation	0.0561	4.07
4	Agricultural Land	0.0270	1.96
5	Wetland	0.1485	10.78
6	Sagar Dighi	0.0518	3.76

Source: Calculated by Researcher

Land use and land cover of 500m surrounding area of the Sagar Dighi reveals the following land use setup. The Settlement and other buildings cover the maximum area i.e. 0.9327 sq km (67.72%) followed by Park & Playground (11.70%), Planted Vegetation (4.07%) and Agricultural Land (1.96%). The total area of Sagar Dighi is 0.0518 sq km with 0.1485sq Km water covers in the surrounding area (Table 4.23). It is an urban wetland maintained by the Dept. of Fisheries as well as by the municipality. Comparatively, Sagar Dighi is more functional than Chandan Dighi and in the Sagar Dighi bathing & swimming, boating and other recreational activities are the important wetland service along with morning and evening walks around the cemented path surrounding the Dighi. The Eco-tourism, Religious use, Washing Clothes & Other Utensils, Cultural use are moderately important (Table 4.22). Other uses of sagar dighi are rarely found there due to unavailability of the specific component which provides the specific services.



Map4.6: Land Use and Land Cover Map of Sagar Dighi and its Surroundings

Source: Prepared by the Researcher on the Basis of Satellite Imagery & Field Verification

Table 4.24: Use of wetlands

Wetland Use	Rasik Beel Complex	Dhangdhar Chhara	Rasomati Beel	Baiganbari Chhara	Chandan Dighi	Sagar Dighi	Total	%
Very Common	2	0	2	3	0	3	10	6.17
Fairly Common	4	5	3	6	3	4	25	15.43
Rare(on the verge of extinction)	17	10	4	12	4	5	52	32.10
Not Found	4	12	18	6	20	15	75	46.30
Total	27	27	27	27	27	27	162	100

Source: Computed by the Researcher on the basis of Primary Survey

Table 4.25: Chi-Square (χ^2) of the Use of Wetlands

Chi-square (Observed value)	39.917
Chi-square (Critical value)	24.996
df	15
p-value	0.0005
alpha	0.05

H₀: The Each wetland’s use is independent i, e. there is no difference in the use of the wetlands.

H_a: There is a link between and among the use of the wetlands.

As the computed p-value is lower than the significance level alpha (α) =0.05, the researcher rejects the null hypothesis H₀ and accepts the alternative hypothesis H_a. Thus, it may be concluded that the use of different wetlands differs significantly. The risk to reject the null hypothesis H₀ while it is true is lower than 0.05%.

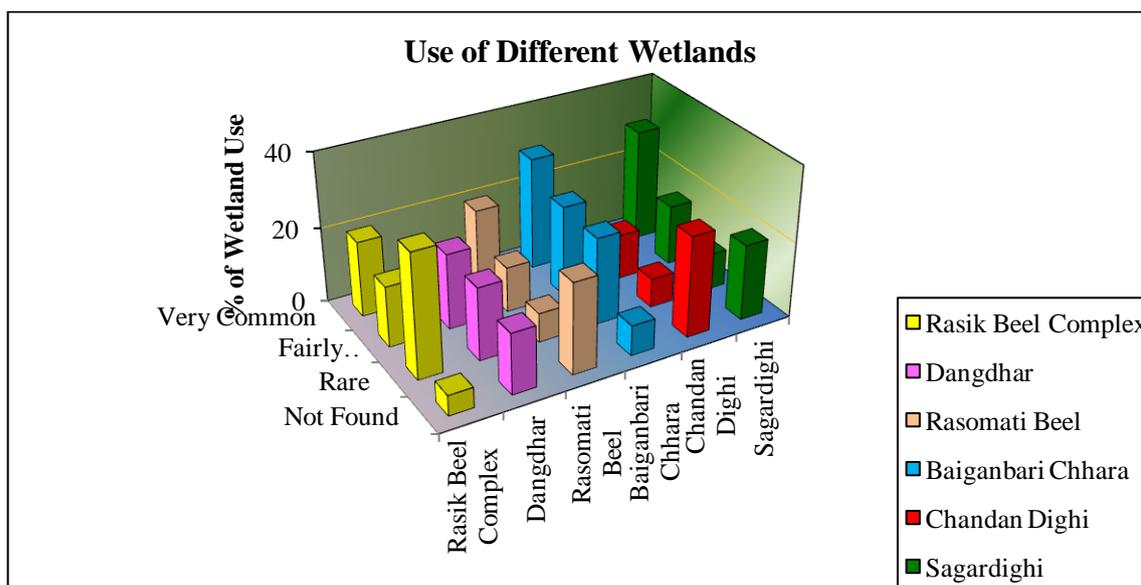


Fig 4.7: Use of selected Wetlands in the Study Area

4.4. Conclusion:

Wetlands are among the world's most productive and valuable ecosystems which directly influence human existence and well-being. Climate regulation, water supply, water purification, flood regulation, tourism and human sustenance and economic support are some of the important services provided by the wetland ecosystems. This wide range of economic, social, environmental and cultural benefits – in recent times is classified as ecosystem services (Costanza et al. 1997). Despite covering only 1.5% of the Earth's surface, wetlands provide a disproportionately high 40% of global ecosystem services (Zedler and Kercher 2005). However, wetlands are the most threatened of all ecosystems today. A study by the Wildlife Institute of India reveals that around 70-80% of freshwater marshes and lakes in the Ganga & Brahmaputra floodplain region have been lost in the last 50 years. The intensive study of the wetlands in the study area reveals that the wetland use and services are rapidly dwindling with time. It is clear from the survey that 46.30% of the wetland services were not found, in the study area. About 32.10% of the services were on the verge of extinction, 15.43% of the services were on moderate situations (fairly common) and only 6.17% services were very common in the wetlands of the study area (Table 7.24 & fig 4.7). Both urban, as well as rural wetlands, are degrading speedily affecting the wetland utility and services to the surrounding inhabitants. From the field survey, it is obvious that though wetlands provide a great and diversified service, it is now transformed into the wasteland with a negligible importance to the surrounding inhabitants.

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