Government of the People's Republic of Bangladesh
Bangladesh Water Development Board
Flood Plan Coordination Organisation

FLOOD ACTION PLAN

NORTHEAST REGIONAL WATER MANAGEMENT PROJECT (FAP 6)

SPECIALIST STUDY
WETLAND RESOURCES
Annexes

Final Report

October 1995

SNC ♦ Lavalin International
Northwest Hydraulic Consultants

in association with

Engineering and Planning Consultants Ltd.
Bangladesh Engineering and Technological Services
Institute For Development Education and Action
Nature Conservation Movement

Canadian International Development Agency

COVER PHOTO: A typical village in the deeply flooded area of the Northeast Region. The earthen village platform is created to keep the houses above water during the flood season which lasts for five to seven months of the year. The platform is threatened by erosion from wave action; bamboo fencing is used as bank protection but often proves ineffective. The single *hijal* tree in front of the village is all that remains of the past lowland forest. The houses on the platform are squeezed together leaving no space for courtyards, gardens or livestock. Water surrounding the platform is used as a source of drinking water and for waste disposal by the hanging latrines. Life in these crowded villages can become very stressful especially for the women, because of the isolation during the flood season. The only form of transport from the village is by small country boats seen in the picture. The Northeast Regional Water Management Plan aims to improve the quality of life for these people.

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STUDY SITES

ANNEX A: STUDY SITES

A.1 Sites Visited During Wetland Appraisal and Main Ornithology Surveys

Wetland Types

1. River
2. Large, deep beel; mostly open water with abundant aquatic vegetation around margins
3. Large, shallow beel with rich aquatic vegetation; mostly overgrown with floating plants
4. Medium to small beel with little floating/emergent aquatic plants, generally surrounded by rice
5. Small shallow beel with large areas of floating/emergent plants
6. Small pools and muddy areas in rice fields
7. Man-made fish ponds

SITE NAME	HAOR SYSTEM	DISTRICT	COORDINATES	AREA (HA)	TYPE
Old Brahmaputra River	-	Mymensingh	24.27-24.45N 90.33-90.26E	(30 km)	1
Lower Baulai River	-	Netrakona Kishorganj	24.11-24.50N 91.00-91.09E	?	1
Lower Kalni River	-	Kishorganj Sunamganj	24.11-24.45N 91.00-91.41E	?	1
Sankardanga Beel	-	Habiganj	24.23N, 91.17E	100	4
Ratna Beel	-	Habiganj	24.23N, 91.21E	100	4
Khowai River	-	Habiganj	24.23N, 91.23E	50	6
Hail Haor	Hail	Moulvibazar	24.22N, 91.41E	2,800	3
Hail Haor Fish Ponds	Hail	Moulvibazar	24.19N, 91.41E	50	7
Petangi Beel	Kawadighi	Moulvibazar	24.34N, 91.47E	350	3
Majherbanda/Ulauli	Kawadighi	Moulvibazar	24.35N, 91.48E	900	3
Patachatal Beel	Maijeil	Sylhet	24.40N, 91.50E	50	4
Borachatal Beel	Maijeil	Sylhet	24.40N, 91.51E	80	4
Dubriar Beel	Dubriar	Sylhet	24.43N, 91.53E	80	4
Baisha Beel	Dubriar	Sylhet	24.44N, 91.54E	80	4
Chalnia Beels	Damrir	Sylhet	24.45N, 91.56E	200	4
Deodar Beels	Damrir	Sylhet	24.47N, 91.56E	80	4
Juri River	-	Sylhet	24.42-24.43N 91.57-92.03E	(14 km)	1
Kair Gang & beel	Hakaluki	Sylhet	24.41N, 92.03E	100	4
Haor Khal	Hakaluki	Sylhet	24.41N, 92.04E	250	2
Puala Beel	Hakaluki	Sylhet	24.42N, 92.05E	100	4
Pingla Beel	Hakaluki	Moulvibazar	24.39N, 92.06E	100	4
Chatla Beel	Hakaluki	Moulvibazar	24.38N, 92.06E	300	2
Tural Beel	Hakaluki	Moulvibazar	24.38N, 92.05E	150	4
Dulla Beel	Hakaluki	Moulvibazar	24.38N, 92.04E	300	2
Chakia Beel	Hakaluki	Moulvibazar	24.37N, 92.03E	200	4
Gharkuri Beel	Hakaluki	Moulvibazar	24.37N, 92.04E	250	2
Khakra Kuri Beel	Balai	Sylhet	24.56N, 92.22E	50	5
Dubail Beel	Balai	Sylhet	24.56N, 92.21E	110	4
Jugni Beel	Balai	Sylhet	24.55N, 92.21E	60	5
Chunnia Beel	-	Sylhet	24.55N, 92.10E	80	4
Erali Beel	-	Sylhet	24.52N, 92.03E	320	4
Chapra, Singari etc.	Bara	Sylhet	24.53N, 91.57E	?	4
Mehdi Beel	-	Sylhet	24.51N, 91.54E	40	5
Deochapra Beel	Khai	Sunamganj	24.55N, 91.32E	40	5
Dabor Beel	Khai	Sunamganj	24.55N, 91.29E	30	4
Kuri Beel	Dekhar	Sunamganj	24.56N, 91.31E	73	4
Goraduba Beel	Dekhar	Sunamganj	24.58N, 91.26E	325	2

SITE NAME	HAOR SYSTEM	DISTRICT	COORDINATES	AREA (HA)	TYPE
Dapha, Ruwa, Guinga	Dekhar	Sunamganj	24.59N, 91.25E	200	4,5
Jaor Beel	Dekhar	Sunamganj	25.03N, 91.25E	150	4
Surma River	-	Sunamganj	25.04-24.53N 91.24-91.10E	(45 km)	1
Aila Beel	Panger	Sunamganj	24.53N, 91.13E	250	2
Pangna Beel	Panger	Sunamganj	24.54N, 91.12E	300	2
Karul Dhan Beel	Panger	Sunamganj	24.54N, 91.11E	20	5
Someswari River	-	Sunamganj	24.53-25.03N 91.10-91.06E	(20 km)	1
Patnai Gang	-	Sunamganj	25.10N, 91.08E	(12 km)	1
Pashua Beel	Gurmar	Sunamganj	25.02N, 91.05E	400	2,3
Kecharia Beel	Halir	Sunamganj	25.03N, 91.07E	50	5
Kanamaiya Haor	Kanamaiya	Sunamganj	25.04N, 91.06E	250	2
Pakertala Beel	Kanamaiya	Sunamganj	25.05N, 91.06E	250	2
Bara Beel	Matian	Sunamganj	25.07N, 91.08E	400	3
Banuar Beel	Matian	Sunamganj	25.08N, 91.07E	200	3
Palair Beel	Matian	Sunamganj	25.08N, 91.08E	400	3
Pana Beel	Tangua	Sunamganj	25.06N, 91.06E	100	4
Biaskhali Beel	Tangua	Sunamganj	25.07N, 91.07E	40	5
Rauar Beel	Tangua	Sunamganj	25.08N, 91.06E	500	2
Main Tangua Beel	Tangua	Sunamganj	25.08N, 91.05E	500	2
West Tangua Beel	Tangua	Sunamganj	25.08N, 91.04E	120	4
Two un-named beels	Tangua	Sunamganj	25.09N, 91.04E	50	5
Ainna Beel	Tangua	Sunamganj	25.10N, 91.03E	500	2
Ghaniakuri Beel	Tangua	Sunamganj	25.09N, 91.07E	80	5
Arabiakona Beel	Tangua	Sunamganj	25.10N, 91.06E	200	3
Un-named Beel	Tangua	Sunamganj	25.10N, 91.07E	50	5
Samsar Beel	Tangua	Sunamganj	25.11N, 91.07E	200	4
Uglar Beel	Ubdakhali	Netrakona	25.03N, 90.56E	50	5
Meda Beel	Ubdakhali	Netrakona	25.02N, 90.55E	122	4
Netrakona/Kaluma Kanda	Ubdakhali	Netrakona	24.54N, 90.50E	50	5,6
Kendua area	-	Netrakona	24.46N, 90.50E	10	6
Boraduba Beel	-	Mymensingh	24.55N, 90.12E	200	3

A.2 Itineraries of Wetland Appraisal and Main Ornithology Surveys

February/March 1992

Feb 18: Depart Dhaka by vehicle at 1015 hrs for Moulvibazar; survey of fish ponds south of Hail Haor (1645-1720 hrs); arrive Moulvibazar 1900 hrs. Overnight at NERP Guest House in Moulvibazar.

Feb 19: Survey of south and central portions of Hakaluki Haor (Gharkuri, Chatla, Pingla, Tural, Dulla and Chakia Beels) (0645-1900 hrs). Overnight in Moulvibazar.

Feb 20: Survey of Chalnia Beel (near Fenchuganj) and northwest Hakaluki Haor (Lamba, Niral and Puala Beels) (0655-1840 hrs). Overnight in Moulvibazar.

Feb 21: Survey of West Banugach Reserved Forest (0650-0945 hrs), southeastern portion of Hail Haor (0945-1450 hrs) and West Banugach Reserved Forest again in evening (1535-1845 hrs). Overnight in Moulvibazar.

Feb 22: Survey of east side of Kawadighi Haor (Ulauli Beel and Majherbanda Beel) in morning (0755-1410 hrs). Survey of west side of Kawadighi Haor (Petangi Beel) in afternoon (1520-1910 hrs). Overnight in Moulvibazar.

Feb 23: Brief visit to West Banugach Reserved Forest in early morning (0720-0900 hrs), then survey of west side of Hail Haor (0900-1330 hrs). Depart Moulvibazar at 1505 hrs for Sylhet and flight to Dhaka at 1805, arriving Dhaka 1850 hrs.

Feb 25: Aerial survey in Cessna 182 over central Haor Basin from Netrakona area south along Baulai River to confluence with Kalni River. (Take-off from Dhaka 1125; landing in Dhaka 1345).

Feb 26: Aerial survey in Cessna 182 over eastern Haor Basin from Bajitpur to Sylhet, returning via Erali Beel, Dubriar Haor, Hakaluki Haor, Kawadighi Haor and Hail Haor. (Take-off from Dhaka at 1110; landing in Dhaka at 1400).

Feb 28: Depart Dhaka by vehicle at 0845 hrs for Sunamganj, arriving at 1900 hrs. Overnight at Water Development Board Guest House in Sunamganj.

Feb 29: Survey of Dekhar Haor (Dapha, Ruwa, Guinga, Ghazaria, Panchakauri and Goraduba Beels), Dabor Beel, Kuri Beel and Deochapra Beel on Sunamganj - Sylhet road. Overnight in Sunamganj.

Mar 01: Depart by "engine boat" from Sunamganj at 1110 hrs for Tangua area, travelling down the Surma River to its confluence with the Someswari River then up the Someswari River to Sanbari Bazar, arriving 1830 hrs. Overnight on the boat at Sanbari Bazar.

Mar 02: Survey by boat upstream from Sanbari Bazar, visiting Kanamaiya Haor, Pakertala Beel, Pana Beel, Biaskhali Beel, Banuar Beel, Bara Beel, Rauar Beel and the Tangua beels (0645-1815 hrs). Overnight on the boat at Jaypur (near Rauar Beel).

Mar 03: Survey by boat along the Patnai Gang to Bhuragat, visiting Rauar Beel, Ghaniakuri Beel, Arabiakona Beel, Samsar Beel and an un-named beel south of Samsar on the way up, and Palair Beel and Bara Beel on the way back down (0615-1900 hrs). Overnight on the boat at Potabuka (near Pana Beel).

Mar 04: Survey by boat downstream from Potabuka and back up the Surma River to Sunamganj, visiting Pakertala Beel, Kanamaiya Haor, Kecharia Beel and Pashua Beel (0645-1645 hrs). Overnight at the Water Development Board Guest House in Sunamganj.

Mar 05: Drive to Sylhet (0850-1100 hrs) and survey of Deodar Beels, Chalnia Beels, Dubriar Haor (Dubriar Beel and Biasha Beel) and Mehdi Beel, on the Sylhet - Fenchuganj road (1100-1805 hrs). Overnight in Sylhet.

Mar 06: Survey of Erali Beel, Chunnia Beel (near Charkai) and Balai Haor (Khakra Kuri Beel, Jugni Beel and Dubail Beel) east of Sylhet (0730-1925 hrs). Overnight in Sylhet.

Mar 07: Survey of northwest Hakaluki Haor (Kair Gang, adjacent beel and Haor Khal) by boat from Fenchuganj (0745-1710 hrs). Overnight in Sylhet.

Mar 08: Survey of Maijeil Haor (Patachatal and Borachatal Beel) east of Balaganj, and Petangi Beel in western part of Kawadighi Haor (0800-1850 hrs). Overnight at NERP Guest House in Moulvibazar.

Mar 09: Survey of small beels along Khowai River, Ratna Beel and Sankardanga Beel west of Habiganj (0745-1755 hrs). Overnight in Moulvibazar.

Mar 10: Drive from Moulvibazar via Bhairab Bazar, Kishorganj and Kendua to Netrakona (0720-1805 hrs), with brief stops in Shatchari Reserved Forest (0900-1000 hrs) and at a small wetland northwest of Kendua. Overnight at Circuit House in Netrakona.

Mar 11: Survey of wetlands along Netrakona - Kaluma Kanda road and Ubdakhali Haor (Meda Beel and Uglar Beel) (0755-1725 hrs), driving to Mymensingh in evening. Overnight at Water Development Board Guest House in Mymensingh.

Mar 12: Survey of Boraduba Beel west of Phulpur in morning (0825-1300 hrs); return to Dhaka arriving at 1535 hrs.

April/May 1992

Apr 19: Depart Dhaka at 2200 hrs by train for Sylhet. Overnight on train.

Apr 20: Arrive Sylhet at 0555 hrs. Depart Sylhet by vehicle at 0700 hrs for Sunamganj, surveying Deochapra Beel, Kuri Beel, Dabor Beel and southwest portion of Dekhar Haor on way, and arriving in Sunamganj at 1315 hrs. Arranging boat and supplies in afternoon. Overnight at Water Development Board Guest House in Sunamganj.

Apr 21: Depart Sunamganj by boat at 0700 hrs for Ghazaria (on Surma River), arriving at 1105 hrs. Survey of Karul Dhan Beel, Pangna Beel and Aila Beel on plains east of Ghazaria (1110-1640

hrs). Travel up Someswari River in evening to Joysree, arriving 1835 hrs. Overnight on boat at Joysree.

Apr 22: Surveying wetlands in Gurmar Haor - Matian Haor - Tangua Haor complex (0530-1815 hrs), visiting Pashua Beel, Kecharia Beel, Kanamaiya Haor, Pakertala Beel, Pana Beel, Bara Beel, Biaskhali Beel, Banuar Beel, Rauar Beel, Tangua Beel and adjacent beels. Overnight on boat at Jaypur (near Rauar Beel).

Apr 23: Surveying wetlands along Patnai Gang (Rauar Beel, Ghaniakuri Beel, Palair Beel, Arabiakona Beel and Samsar Beel), and returning downstream to Pashua Beel in evening (0630-1910 hrs). Overnight on boat at Pashua Beel.

Apr 25: Final survey of Pashua Beel in morning (0530-1020 hrs); return by boat via Baulai River and Surma River to Sunamganj, arriving 1615 hrs. Travel by vehicle to Sylhet, arriving 1745 hrs. Overnight in Sylhet.

Apr 26: Survey of Dubriar Haor (Dubriar and Baisha Beels), Chalnia beels, Deodar beels and Mehdi Beel along Sylhet - Fenchuganj road in morning (0650-1325 hrs). Meeting with Ron Livingston in Sylhet in afternoon. Overnight in Sylhet.

Apr 27: Survey of Erali Beel, Chunnia Beel and Balai Haor (Khakra Kuri Beel, Jugni Beel and Dubail Beel) (0650-1810 hrs). Overnight in Sylhet.

Apr 28: Survey of Maijeil Haor (Patachatal and Borachatal Beels) in morning (0735-1030 hrs), continuing on to Moulvibazar, arriving 1345 hrs. Overnight at NERP Guest House in Moulvibazar.

Apr 29: Survey of eastern part of Kawadighi Haor (Ulauli Beel and Majherbanda Beel) in morning (0645-1200 hrs). Survey of fish ponds south of Hail Haor in afternoon (1540-1900 hrs). Overnight in Moulvibazar.

Apr 30: Survey of southeastern portion of Hakaluki Haor (Chatla Beel, Pingla Beel, Tural Beel and Gharkuri Beel) (0640-1710 hrs). Overnight in Moulvibazar.

May 01: Survey of West Banugach Reserved Forest near Srimangal (0635-1945 hrs). Overnight in Moulvibazar.

May 02: Survey of southeast portion of Hail Haor by boat (0645-1140 hrs), then west side by vehicle (1140-1820 hrs). Overnight in Moulvibazar.

May 03: Survey of Petangi Beel in western part of Kawadighi Haor in morning (0640-1135 hrs). Afternoon visit to Balisera Tea Estate east of Srimangal (1435-1915 hrs). Overnight in Moulvibazar.

May 04: Depart Moulvibazar at 0715 hrs by vehicle for Dhaka, stopping briefly at Shatchari Reserved Forest (0850-0955 hrs) and arriving in Dhaka at 1430 hrs.

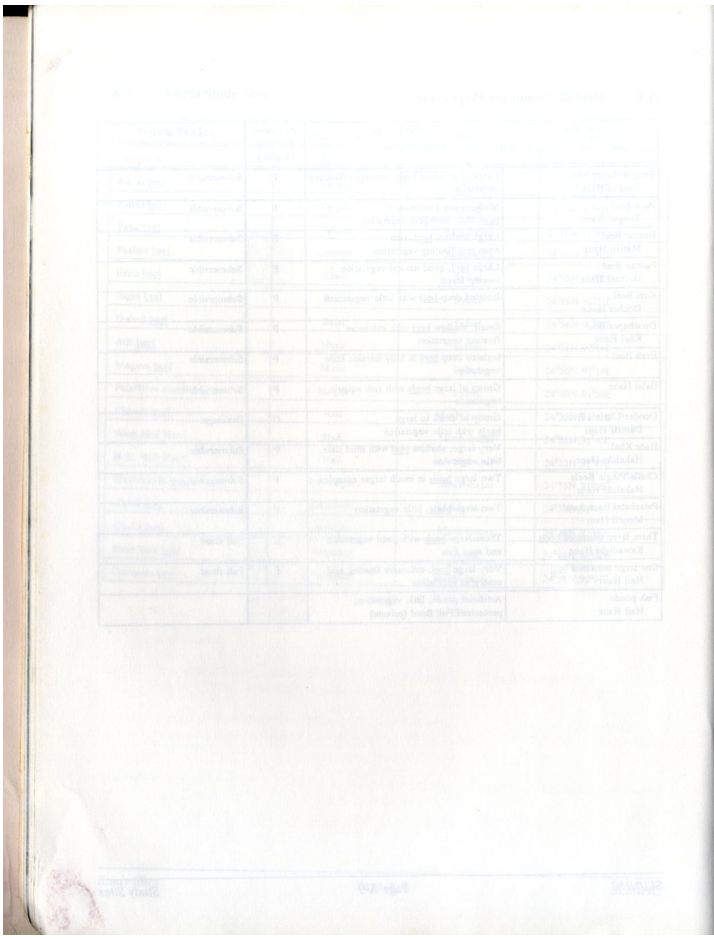
May 09: Aerial survey in Cessna 182 over central Haor Basin from Bajitpur via Ajmiriganj and Baniachong to Sylhet, then along the Surma River to Sunamganj and the Aila Beel complex, then down the Baulai River to Bhairab Bazar. (Take-off from Dhaka 0955; landing in Dhaka 1210).

A.3 Floral Study Sites

Site name	Haor system	District	Coordinates
Tangua beel	Tangua	Sunamganj	25°08N,91°05E
Rauar beel	Tangua	Sunamganj	25°08n,91°06E
Ainna beel	Tangua	Sunamganj	25°10n,91°03E
Pana beel	Tangua	Sunamganj	25°06n,91°06E
Pashua beel	Gurmar	Sunamganj	25°02N,91°05E
Erali beel	Erali	Sylhet	24°52N,92°03E
Jugni beel	Balai	Sylhet	24°55N,92°21E
Dubail beel	Balai	Sylhet	24°56N,92°21E
Atli beel	Murir	Sylhet	24°51N,92°14E
Magura beel	Murir	Sylhet	24°50N,92°14E
Pata/Bora chatal	Maijeil	Sylhet	24°40N,91°50E
Chanda beel	Hail	Moulvibazar	24°22N,91°41E
West Hail Haor	Hail	Moulvibazar	24°22N,91°40E
N.E. Hail Haor	Hail	Moulvibazar	24°23N,91°43E
Majerbanda beel	Kawadighi	Moulvibazar	24°35N,91°48E
Ulauli beel	Kawadighi	Moulvibazar	24°36N,91°48E
Chatla beel	Hakaluki	Moulvibazar	24°38N,92°06E
Haor khal beel	Hakaluki	Sylhet	24°41N,92°04E
Chinaura beel	Hakaluki	Moulvibazar	24°38N,92°07E

A.4 Monthly Monitoring Programme

Site name	Wetland Type	Proposed Existing Ongoing	FCDI project
Tangua/Rauar Beel Tangua Haor	Large, permanent beels, emergent/floating vegetation	P	Submersible
Pana Beel Tangua Haor	Medium-sized permanent beel, little emergent vegetation	P	Submersible
Banuar Beel Matian Haor	Large shallow beel, rich emergent/floating vegetation	E	Submersible
Pashua Beel Gurmar Haor	Large beel, good natural vegetation + swamp forest	E	Submersible
Kuri Beel Dekhar Haor	Isolated deep beel with little vegetation	P	Submersible
Deochapra Beel Khai Haor	Small, shallow beel with extensive floating vegetation	P	Submersible
Erali Beel	Isolated deep beel in hilly terrain; little vegetation	P	Submersible
Balai Haor	Group of large beels with rich aquatic vegetation	P	Submersible
Deodar/Chalnia Beels Damrir Haor	Group of small to large beels with little vegetation	O	Drainage
Haor Khal Hakaluki Haor	Very large, shallow beel with mud flats, little vegetation	P	Submersible
Chatla/Pingla Beels Hakaluki Haor	Two large beels in much larger complex	P	Submersible
Patachatal/Borachatal Meijeil Haor	Two large beels, little vegetation	P	Submersible
Three large unnamed beels Kawadighi Haor	Three large beels with good vegetation and mud flats	E	Full flood
One large unnamed beel Hail Haor	Very large beel, extensive floating and emergent vegetation	E	Full flood
Fish ponds Hail Haor	Artificial ponds, little vegetation, protectedEFull flood (private)		



ANNEX B

CENSUS FORMS

NORTHEAST REGIONAL PROJECT : MONTHLY WATERFOWL COUNT

NAME OF SITE:	REF
DATE OF COUNT:	OBSERVATION:
WEATHER:	ACCESS:

Waterfowl Counts

GREBES

_____ Little Grebe
_____ Great Crested Grebe
_____ Unidentified Grebe

CORMORANTS & DARTERS

_____ Great Cormorant
_____ Indian Shag
_____ Little Cormorant
_____ Unidentified Cormorant
_____ Oriental Darter

HERONS & EGRETS

_____ Great Bittern
_____ Yellow Bittern
_____ Cinnamon Bittern
_____ Black Bittern
_____ Night Heron
_____ Little Heron
_____ Indian Pond Heron
_____ Chinese Pond Heron
_____ Cattle Egret
_____ Little Egret
_____ Little Egret
_____ Intermediate Egret
_____ Great Egret
_____ Unidentified Egret
_____ Purple Heron
_____ Grey Heron

STORKS

_____ Asian Openbill
_____ Black Stork
_____ Wooly-necked Stork
_____ Black-necked Stork
_____ Lesser Adjutant Stork
_____ Greater Adjutant Stork
_____ Unidentified Stork

IBISES & SPOONBILLS

_____ Black-headed Ibis
_____ Black Ibis
_____ Glossy Ibis
_____ White Spoonbill

GEESE & DUCKS

_____ Fulvous Whistling Duck
_____ Lesser Whistling Duck
_____ Greyleg Goose
_____ Bar-headed Goose
_____ Unidentified Goose
_____ Ruddy Shelduck
_____ Common Shelduck
_____ Comb Duck
_____ Cotton Pygmy Goose
_____ Eurasian Wigeon
_____ Falcated Teal
_____ Gadwall
_____ Common Teal
_____ Mallard
_____ Spotbill Duck
_____ Northern Pintail
_____ Garganey
_____ Northern Shoveler
_____ Red-crested Pochard
_____ Common Pochard
_____ Baer's Pochard
_____ Ferruginous Duck
_____ Tufted Duck
_____ Greater Scaup
_____ Unidentified Duck

CRANES

_____ Sarus Crane
_____ Demoiselle Crane
_____ Unidentified Crane

RAILS, GALLINULES & COOTS

_____ Water Rails

_____ Slaty-breasted Rail
_____ Ruddy Crake
_____ Whitebreasted Waterhen
_____ Watercock
_____ Moorhen
_____ Purple Swamphen
_____ Common Coot
_____ Unidentified Rails/Crakes

JACANAS

_____ Pheasant-tailed Jacana
_____ Bronze-wined Jacana

SHOREBIRDS - WADERS

_____ Painted Snipe
_____ Black-winged Stilt
_____ Avocet
_____ Oriental Pratincole
_____ Small Pratincole
_____ River Lapwing
_____ Grey-headed Lapwing
_____ Red-wattled Lapwing
_____ Asiatic Golden Plover
_____ Grey Plover
_____ Long-billed Plover
_____ Little Ringed Plover
_____ Kentish Plover
_____ Mongolian Plover
_____ Greater Sand Plover
_____ Black-tailed Godwit
_____ Eurasian Curlew
_____ Spotted Redshank
_____ Redshank
_____ Marsh Sandpiper
_____ Greenshank
_____ Green Sandpiper
_____ Wood Sandpiper
_____ Terek Sandpiper
_____ Common Sandpiper
_____ Pintain Snipe
_____ Swinhoe's Snipe
_____ Common Snipe
_____ Asiatic Dowitcher
_____ Little Stint
_____ Temminck's Stint
_____ Long-toed Stint
_____ Dunlin
_____ Curlew Sandpiper
_____ Spoon-billed Sandpiper
_____ Broad-billed Sandpiper
_____ Ruff
_____ Unidentified Waders

GULLS, TERNS & SKIMMERS

_____ Brown-headed Gull
_____ Black-headed Gull
_____ Unidentified Gull
_____ Whiskered Tern
_____ White-winged Tern
_____ Gull-billed Tern
_____ Indian River Tern
_____ Common Tern
_____ Black-billed Tern
_____ Little Tern
_____ Unidentified Tern
_____ Indian Skimmer

RAPTORS

_____ Black-shouldered Kite
_____ Black Kite
_____ Brahminy Kite
_____ Pallas Fish Eagle
_____ Grey-headed Fish Eagle
_____ White-rumped Vulture
_____ Crested Serpent Eagle
_____ Western Marsh Harrier
_____ Eastern Marsh Harrier
_____ Pied Harrier
_____ Osprey
_____ Eurasian Kestrel
_____ Northern Hobby
_____ Unidentified Raptors

ADDITIONAL SPECIES

_____
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NORTHEAST REGIONAL PROJECT (FAP 6)

MONTHLY WATERFOWL COUNTS IN HAOR BASIN

1. SITE : 2. REF :
3. DATE : 4. COUNT NO. :
5. TIME :
6. ACCESS :
7. COVERAGE : A. upto 25 %; B. 25 - 50 %; C. 50 - 75 %; D 75 - 99 %; E. 100%
8. WEATHER / VISIBILITY :
9. COUNTERS :
10. WETLAND CONDITION :
    a. WATER LEVEL :
    b. VEGETATION :
    c. RICE CULTIVATION :
11. DISTURBANCE :
    a. FISHING :
    b. AGRICULTURAL ACTIVITY :
    c. OTHERS :
12. HUNTING ACTIVITY :
    a. GUNS :
    b. NETS :
    c. OTHERS :

13. SUMMARY OF WATERFOWL COUNTS :

GEEBES	_____	DUCKS	_____
CORMORANTS/DARTERS	_____	MOORHENS/COOTS	_____
HERONS/EGRETS	_____	JACANAS	_____
STORKS	_____	SHOREBIRDS	_____
IBISES	_____	GULLS	_____
WHISTLING DUCKS	_____	TERNS	_____
GEESE	_____		
		TOTAL :	

14. EVIDENCE OF BREEDING :

15. EVIDENCE OF MIGRATION :

16. OTHER FAUNA :

a. AMPHIBIANS :

b. REPTILES :

c. MAMMALS :

17. SUMMARY OF CHANGES SINCE PREVIOUS COUNT/COMMENTS :

FLORAL SURVEY : LIST OF WETLAND PLANT SPECIES

Wetland name : Sh. No.: Date:

SPECIES	FAMILY	HABIT	STATUS	HABITAT	USES	SOURCE

HABIT:
T-tree
S-shrub
SC-scrambler
E-epiphyte
Tr-treelet
C-climber
H-herb
A-aquatic

USES:
M-medicinal/narcotic/poison
C-ceremonial
FF-food: fruit & nuts
FS-food: starch/sugar/cereal
FV-food: vegetable
VO-vegetable oil
SF-spices/flavors
B-beverages
EO-essential oil
SM-smoking/chewing
FP-feed plants/forage
OR-ornamental/hedge
TS-timber/structure
DT- dyes/tannin
EX-exudates/resins
FU-fuel
FB-fiber/thatching/wickerwork
OT-other uses

HABITAT:
FS-freshwater swamp
FP-floodplain
RS-river system
M-open marshes

STATUS:
A-abundant
VC-very common
C-common
R-rare

VEGETATION QUESTIONNAIRE

Village Upazila Zila

Name:
Profession:
Number of family members: Area of homestead:
Male:
Female:

1. What do you use for fuel?

Material	Quantity	Source		
		Market	Homestead	Common field
Cowdung				
Jute stick				
Rice bucks				
Crop residue				
Grasses				
Branches				
Bamboo				
Commercial fuel				

2. What plant do you use for roofing?

Bamboo ____
Grasses ____
Rice stable ____
Tin ____

3. What plants do you use for frame?

4. Do you use any plant for medicine?

Name of plant _____ Name of disease _____

Source of supply wetland ____
Homestead ____
Local market ____
Forest ____

5. Do you use any plant for furniture?

Name _____ Quantity _____

Source of supply Wetland _____
Homestead _____
Local market _____
Forest _____

6. What plants did you find in the early days but do not find now in wetland, homestead or forest.

Name of the plants _____
_____
_____
_____

7. What is the reason for decline?

Over cutting ___
Changing climatic condition ___
Changing local environment (habitat) ___

WETLAND RESOURCES ASSESSMENT
NERP/NACOM

Date:

Bot. Name:

Local Name:

Locality:

Notes:

NORTHEAST REGIONAL PROJECT

WETLAND FAUNAL SURVEY FORM

Date: ..... Locality: .....

Time: ..... Weather: .....

Mode of survey: On foot/ On boat, etc. Habitat Type: .....

Participants: .....

Habitat Description:

Species	Locality	Status	Uses

WETLAND WORKSHEET

Project name: _____

Type	Identifying information		Current area		FWO area		FW area	
Cultivated Floodplain	F1+F2+F3 areas		ha		ha		ha	
Beels	**Beel name**	**Haor name**	**Current area**		**FWO area**		**FW area**	
			Beel	*Wetland*	*Beel*	*Wetland*	*Beel*	*Wetland*
In order of decreasing size; lump smallest beels together if desired			ha	ha	ha	ha	ha	ha
Indicate haor system for each, if applicable								
Show permanently flooded (beel proper) and seasonally-flooded (fallow) area for each								
Use correct spellings								
	TOTALS							
Rivers and Channels	**Length and width**		**Current area**		**FWO area**		**FW area**	
	FWO	**FW**						
Within the project area, Indicate ___ % perennial ___ % seasonal	km	km	ha		ha		ha	
	m	m						
Ponds and ditches If more detailed breakdown is used attach separate table and enter summary here	**Number and unit area**		**Current area**		**FWO area**		**FW area**	
	FWO	**FW**						
	# ponds # ditches	# ponds # ditches	ha		ha		ha	
	ponds @ ha ditches @ ha	ponds @ ha ditches @ ha						

Sign off:

_____
Water Resources Engineer

_____
Agronomist

_____
Wetland Resources Specialist

_____
Fisheries Specialist

Notes:

1. Change in cultivated floodplain area must match changes in agronomy analysis.
2. Total wetland area should match F4 area, less any F4 not associated with beels.
3. FWO means future without-project. FW means future with-project scenario

ANNEX C

RAMSAR INFORMATION SHEETS AND MAPS FOR KEY SITES

INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 24-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S. M. A. Rashid/ Istiak Sobhan
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

TANGUA HAOR

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

25°06′ - 25°11′ N, 91°01′ - 91°06′ E

8. General location: (e.g. administrative region and nearest large town)

10 km northwest of the headquarters of Tahirpur Thana and 30 km west-northwest of Sunamganj District town.

9. Area: (in hectares)

9727

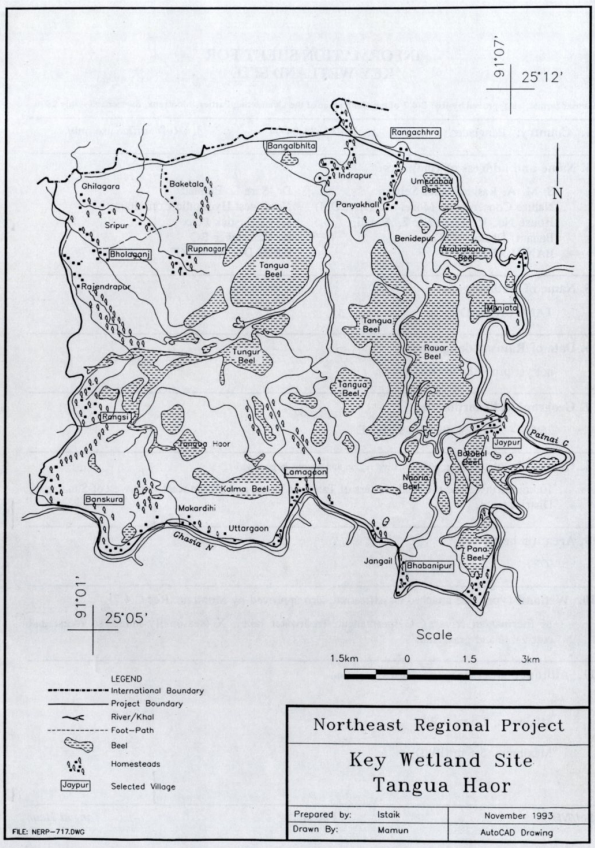
10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

M (permanent, rivers); O (permanent, freshwater lake); X (seasonally inundated forest and cultivable and grassland)

11. Altitude: (average and/or maximum & minimum)

Minimum: 2.5 m (PWD)

Maximum: 5.5 m (PWD)



12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

A complex of over 46 beels, the most important of which are Rauar beel, Tangua beel, Arabiakona beel, Bherberia beel, Rupaboi beel, Ainna beel, Pana beel and Kalma beel. The beels are interconnected with one another through narrow canals . During the rainy season, the entire wetland is inundated and the beels merge into a single, large body of water. The maximum depth of water in the beels varies from approximately 6 - 10 m during the rainy season and 2 - 8 m during the dry season.

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The wetland is bounded on the north by the Shillong Plateau, an elevated block of Pre-Cambrian Basement rock which has been draped over by late Mesozoic and Cenozoic sediments. The south face of the plateau has been dissected by steep, V-shaped canyon that follow structurally controlled valleys. The southern escarpment of the plateau is bordered by the east-west yrending Dauki Fault, which forms a dictinct lineament separating the lowlands in Bangladesh from the mountains in India. Most of the wetland area lies within the Sylhet Trough.

Most of the haor area is covered by the Young Piedmony Alluvial plain which comprises the alluvial fans of the Shillong plateau and also the adjoining basins and basin depressions. The fan soils are poorly to imperfectly drained, strongly mottled brown, loamy sands to clay loams, poorly structured to strongly to very strongly acid reaction. The very poorly drained basin deposits comprise strongly reduced heavy clay lacking any sign of profile development.

Tangua haor is one of the largest, natural haor systems in the northeast region. The haor system is mainly rendered with the backflow of river waters from Baulai, Patnai and Jadukata rivers. Due to this backflow the water is relatively clean, free from suspending materials and with less residual matter. As a result the water is transparent and sunlight can penetrate to quite a considerable depth. This increases the lotic area of the waterbody facilitating the photosynthesis and making it the most productive area (with high biomass) within the northeastern haor basin. It is because of these important physical features that this wetland is still capable of maintaining the ecosystem to its near-natural state resulting in high biomass production.

Apart from these features, the location of the haor is another factor for its high biomass production. The wetland is located right at the foothills of the Meghalaya Hills. Few hill streams flow into the haor system but the major water thrust comes from the south bacause of the back flow. The hill streams do bring in some sediment but considering the volume of water held in the haor and the area of the haor itself, it is insignificant. Because of the low quantity of silt plus its dissemination during flooding season this haor is still deep enough compared to the other haors where the rate of sedimentation is very high.

The haor system has a number of several beels which retain water throughout the year. In betwen the beels are higher grounds - leeves or kandas. These leeves support the major plant communities during drier months. At the onset of monsoon or floods all these leeves go under water transforming the whole wetland into a single sheet of water changing the whole scenario.

The depth of flooding during monsoon ranging from 2 to 10 meters.

The climatic features of the region are subtropical-monsoon in nature with three prominent seasons, viz. summer, monsoon and winter. Summer begins in April through to June. During this period the average mean temperature ranges from 30.9 to 33.4 ° C. The monsoon is the rainy season, extending from June to September with 80 % of the annual rainfall during this period. The average mean temperatures fluctuate between 25.8 to 29 ° C. Winter is the following season with the peak cold weather in December and January. Prior to these during October/November and at the later part during February/March the weather is intermittently cold. The temperatures during this period range between 8.5 to 16.6 ° C. The mean relative humidity varies between 83 % in the wet season and 64 % in the dry season.

14. Ecological features: (main habitats and vegetation types)

The ecological features of Tangua Haor vary distinctly because of the two different natural conditions namely dry season and monsoon (= rainy) season, of which the later is in extreme condition. As a result the plant communities have to be highly adaptive particularly in the monsoon season when much of the basin is under water. The plants have to modify themselves to survive this anaerobic condition.

The habitat and vegetation type are conditional to the environmental parameters (hydrology, soil, flood tolerence, and zonation) that regulate the development of vegetation. The vegetation consists of a large number of plant species which form aggregated assemblages into specific vegetation types based on physiognomy and environmental factors. They are infact part of a larger water related ecosystem that includes a diversity of plant, animals and man himself. Different plant communities occupy different habitat along the increasing gradient of flooding and moisture regime.

The identified plant communities are as follows:

A. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata, Potamogeton crispus, Najus Sp., Aponogeton appendiculatus* and *Ottelia alisoides*.

B. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes, Utricularia sp., Sylvannia natans* and *S. cucullata*.

C. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Trapa maximowiczii, Echinochloa colonum, Hygrorhyza aristata, Limnophila indica, Mersilea quadrifoliata, Nymphoides indicum*, and *Pseudoraphis* sp.

D. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Alternanthera philoxeroides, Clinogyne dichotoma, Eclipta alba, Enhydra fluctuans, Fimbristilis dichotoma, Ipomoea aquatica, I. fistulosa, Ludwizia sp., Polygonum sp., Scirpus juncoides, Vetiveria zizanioides*, and *Xanthium indicum*.

E. **Reeds:** The elevated areas with gentle slope are occupied by tall grasses or reeds. This includes *Asclepias sp., Asparagus racemosus, Ficus heterophylla, Lippia javanica, Phragmites karka, Rosa involucrata*, and *Saccharum spontaneum*.

F. **Freshwater Swamp Forest:** This type of vegetation consists of evergreen trees forming closed canopy. These trees are 8-12 m in top height. The common species are *Barringtonia acutangula, Pongamia pinnata*. Some other species are *Crataeva nurvala, Phyllanthus disticha, Trewia nudiflora*, and *Salix tetrasperma*.

G. **Crop Field Vegetation:** It is a synthetic plant community because it contains plant species which is also common in other types. This community comprises both wetland as well as open dry land smaller herbs. The composition, however, depends on the situation of water logging in the respective field. It includes *Alternanthera sessilis, Cotula hemispherica, Cynodon dactylon, Cyperus cephalotes, Eleocharis atropurpurea, Heliotropium indicum*, and *Leucas lavendulifolia*.

H. **Homestead Vegetation:** A synthetic vegetation community and very important for rich species diversity. Some of the common species within Tangua Haor are *Barringtonia acutangula, Bambusa sp., Calamus tenuis, Caryota urens, Cocos nucifera, Crataeva nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora*, and *Zizyphus mauritiana*. Among other species are *Albizzia procera, Alpinia sp., Anthocephalus chinensis, Areca catechu, Artocarpus heterophyllus, Bombax ceiba, Diospyros perigrina, Erythrina variegata, Mikania scandens*, and *Samanea saman*.

15. Land tenure/ownership of:

(a) site

The wetland is owned by the Government (khas land), and is under the control of a local government agency - Additional Deputy Commissioner (Revenue).

(b) surrounding area

The surrounding areas are privately owned.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

The wetland was earmarked by the Forest Department for the establishment of a Wildlife (Bird) Sanctuary. Recent information from the Forest Department does not indicate any tangibility of such plans. But recent work undertaken by NACOM/NERP has attracted many GOB officials including the Secretary, Ministry of Environment and Forest to take-up some conservation programmes. At present the wetland is leased out by the Ministry of Land through the local Government agency under a fishery development scheme.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It has been identified and proposed as a key wetland site during the NERP/NACOM survey. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Rupnagar	**Bangalbhita**	**Bholaganj**	**Joypur**	**Rangsi**	**Banskura**
Rangachhara	**Maindata**	**Panyakhali**	**Lamagaon**	**Bhabanipur**	

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

The wetland is leased out for fishing for nine year period time frame. Fishing was supposed to be carried out every three years but now fishing is done every two years. Apart from fishing, passanger transportation is another major activity during the monsoon period. Some duckery is also being raised in the wetland. Local people also collect reeds (*Phragmites, Vetiveria*) and grasses (*Hemarthria protensa*, chailla) either for thatching or using them to protect their homesteads from erosion during monsoon. These are also used as a substitute for fuel along with *Lippia, Ficus heterophylla, Rosa involucra* and some *Phyllanthus*. *Hygrorhyza*, parua grass are collected for fodder. *Trapa* fruits are also collected and serve as an important supplementary food.

(b) surroundings/catchment

The surrounding areas are mostly cultivated for HYV boro rice during the drier months.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Sedimentation due to the increase in erosion in adjacent areas and due to the greater volume of silt coming in from the hill streams. The ongoing channel shift from Jadukata River into the Maharram channel is delivering more sediment into the Tangua Haor than the past.

(b) surroundings/catchment

Deforestation in the Meghalaya Hills augmenting sediment inflow.

Intensive rice cultivation and wherever possible transforming the wetland for cultivation (< 5 %), deforestation of freshwater swamp forest in adjoining areas (eg. Rangchi).

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

No systematic study has done on ground water recharge in this wetland.

No quantitativa data are available on surface water inflows. The main inflow probably comes through the Patni river, a distributary of the Jadukata (2513 km^2), which flow south along the eastern side of Tangua. The Jadukata has a mean annual flow of 366 m^3/s; what proportion of these flows enter the Patni and reach the tangua Beel area is not known but might lie in the range of 20 - 40 %. A number of minor rivers enter Tangua Beel from the north but their catchments are small; the largest is the Maheshkhola which flows south along the western border of the beel before joining the Chasia; this flows eastwards along the southern border to join the Patni at the southeast outfall from the Beel into the Baulai river. Tangua Beel may be effected by back-water in the Baulai, but this remains to be confirmed. The embankments of Matian Haor to the east and of Gurmar Haor to the south may help to confine water in Tangua Beel.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The wetland is of great importance for fish production as well as for "mother fisheries". This is because many of the fish species migrate to this wetland for spawning and breeding. The floral richness and diversity and the water quality for high biomass production has already been discussed in different sections.

The adjoining area of Tangua support some freshwater swamp forest and reedlands. The forest provides protection to the adjacent villages from the onslaught of wave action and winds during monsoon. These forests provide some fire wood, building or thatching material, fish entranchments (branches of *Barringtonia*) and wood for making boats.

Some wetland plants are of special importance for the local people since they provide food substitutes (already mentioned in one of the sections).

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibians: *Bufo melanostictus, Rana tigrina, R. cyanophlyctis, R. limnocharis.*

Reptiles: *Varanus bengalensis, Cerberus rhynchops, Xenochrophis piscator, Enhydris enhydris, Python molurus* (rare), *Kachuga tecta, Hardella thurjii, Geoclemys hamiltonii (rare), Aspideretes hurum, Lissemys punctata.*

Aves: Great Crested Grebe, Great Cormorant, Herons, Egrets, Fulvous Whistling Duck, Falcated Teal, Mallard, Spotbill, Red-crested Pochard, Common Pochard, Bear's Pochard, Ferruginous, Tufted Duck, Watercock, Swamphen, Oriental Pratincole, River Lapwing, Blacktailed Godwit, Curlew, Spotted Red Shank, Ruff, Great Blackheaded Gull, Whiskered Tern, Common Tern, Greyheaded Fish Eagle, Pallas's Fish Eagle (endangered, RDB species), Shikra, Marsh Harriers, Pied Harrier.

Mammals: Musk Shrew, Fishing Cat, Large Indian Civet, Small Indian Mongoose, Jackal, and sometimes Leopard, Elephants, Wild Boar, Barking Deer, Gaur come in from the Meghalaya Hills, Flying Fox and Fruit Bats.

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Unique, Rare & Endangered: Bengal Rose (*Rosa involucrata*)

Biogeographically Important Community:

Freshwater Swamp Forest: *Barringtonia acutangula, Pongamia pinnata, Crataeva nurvala, Trewia nudiflora, Salix tetrasperma, Ficus* sp.

Reedland: *Phragmites karka, Vetiveria zizanioides, Saccharum spontaneum, Ficus heterophylla, Lippia javanica.*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

Under the umbrella of NERP (FAP-6) various scientific studies are going on since early 1992. These include studies on Agriculture, Hydrology, Sedimentation, Sociology, Fisheries, Environment (flora, fauna) which are directly related to the wetland, the people residing around it and the developmental activities to be undertaken.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

None existing but CIDA sponsored NERP/NACOM are planning to initiate an experimental Environment Management, Research and Education Centre.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

Eco-tourism has not yet set its pace in Bangladesh. It has to be appreciated and encouraged. Some visitors do visit the wetland from time to time but most of them come with a gun rather than a conservation message. Few scientists have recently started visiting the wetlands for scientific exploration. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

The wetland is managed by the Additional Deputy Commissioner (Revenue), Sunamganj District under the Ministry of Land.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Sunamganj; Tahirpur and Ministry of Land; Additional Deputy Commissioner (Revenue).

29. Bibliographical references: (scientific/technical only)

Scott, D.A. (1989). Directory of Asian Wetlands. IUCN.

Scott, D.A. & Rashid, S.M.A. 1992. Ornithological Main Surveys and Wetland Assessment. AWB/NACOM.

Karim, A. (1992). Wetlands plant diversity and conservation in Bangladesh. Paper presented at the Conference on Wetland Conservation in Bangladesh, held in Dhaka, November 1992. Jointly sponsored by IUCN, Ministry of Environment & Forest and CIDA.

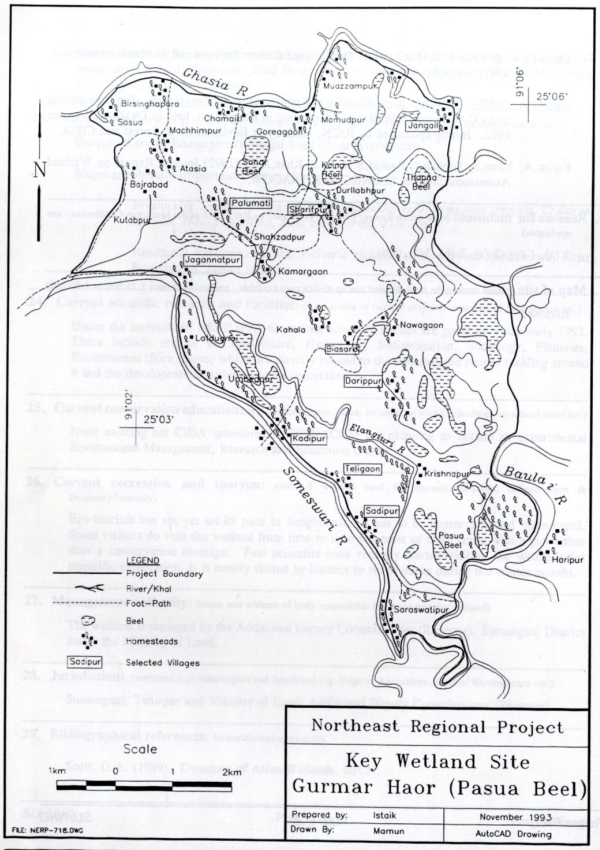
Karim,A; Khan,S; Sobhan,I; Rashid,S.M.A. & Khan,A.Z. (1992) Interim Report on Wetland Assessment Studies. SLI/NHC/NERP/NACOM.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

1 (a), 1 (c), 2 (a), 2 (b), 2(d), 3(b)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 17-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S. M. A. Rashid/ Istiak Sobhan
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

Pashua beel, Gurmar Haor

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

25°00′ N to 25°06′ N and 91°02′ E to 91°06′ E

8. General location: (e.g. administrative region and nearest large town)

± 8 km west-southwest of the headquarters of Tahirpur Upazilla and 25 km west-northwest of Sunamganj District Headquarters.

9. Area: (in hectares)

4140 (ca. 400 ha of swamp forest)

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

O (permanent freshwater lake), T (seasonal intermittent freshwater marshes) and X (swamp forest dominated wetland).

11. Altitude: (average and/or maximum & minimum)

Minimum: 3 m (PWD)

Maximum: 3.5 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

Pashua beel comprises a single large beel with two smaller beels nearby in the extreme southeast portion of Gurmar haor, adjacent to the Patnai Gang. The beels are surrounded by higher ground with dense grasses, scrub and mixed forest of *Pongamia, Barringtonia* with the former species dominating. Seasonally intermittant marshes with reeds (*Phragmites karka*) abundant within and in the peripheries of the beel. Gurmar Haor has recently (in 1991) been surrounded by a submersible embankment to protect against flash-flooding (Gurmar Haor Project No: 49, 1991)

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The area is bounded by Baulai River to the east, Mara Gang to the north and Someswari River to the south. The area has a general slope toward south-east. The area is deeply flooded during the monsoon season to 1.5-6.0 m. Flash floods occur during April and May when heavy rain falls in the area and in Meghalaya State.

The poorly drained basin soils are greey to dark grey,clay with prismatic or blocky structure and medium to strong acidic reaction. The very poorly drained basin clays, which remain saturated throughout the year, have a strongly reduced colour and near neutral reaction. Clay, bluish grey overlying anh organic layer within 40 inches of the surface.

The climatic features of the region are subtropical-monsoon in nature with three prominent seasons, viz. summer, monsoon and winter. Summer begins in April through to June. During this period the average mean temperature ranges from 30.9 to 33.4° C. The monsoon is the rainy season, extending from June to September with 80 % of the annual rainfall during this period. The average mean temperatures fluctuate between 25.8 to 29° C. Winter is the following season with the peak cold weather in December and January. Prior to these during October/November and at the later part during February/March the weather is intermittently cold. The temperatures during this period range between 8.5° to 16.6° C. The mean relative humidity varies between 83 % in the wet season and 64 % in the dry season.

The changes in the water level during the dry months and peak monsoon is quite contrasting. During peak monsoon (July/August) the water level is so high that 0.5 to 1 m of the tallest *Pongamia* trees are visible and the rest under water which brings the difference in water level to between 6 m and 8 m between the dry and monsoon months. The submersible embankment is also under ± 2 m water during peak monsoon.

14. Ecological features: (main habitats and vegetation types)

This wetland supports one of the last remaining natural stands of freshwater swamp forest and reedlands in the northeastern region of Bangladesh. Several distinct habitat types and plant communities, though subject to environmental parameters, can be identified during dry season:

i. **Open water:** This is the open water area consisting of submerged, rooted floating and free floating vegetation.

a. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata, Vallisneria spiralis, Najus sp., Aponogeton natans* and *Ottelia alismoides*.

b. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes, Sylvannia natans, S. cucullata* and rarely *Pistia sp*.

c. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Trapa maximowiczii, Hygrorhyza aristata*, and *Nymphoides indicum*.

ii. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Eleocharis dulcis, Polygonum barbatum, P. glabrum, Hemarthria protensa, Scirpus juncoides, Xanthium indicum, Alternanthera philoxeroides* and *Eclipta alba*.

iii. **Reeds:** Elevated areas, usually at the periphery and adjacent to the forest, with gentle slope are occupied by tall grasses or reeds. It includes *Asclepias sp., Asparagus racemosus, Ficus heterophylla, Lippia javanica, Hemarthria protensa, Saccharum spontaneum*, and *Phragmites karka*.

iv. **Freshwater Swamp Forest:** This type of vegetation consists of evergreen trees forming a dense closed canopy with very little cover underneath. These trees are 6 - 8 m in height. The species usually met with are *Pongamia pinnata, Barringtonia acutangula*, and *Crataeva nurvala*.

15. Land tenure/ownership of:

(a) site

The wetland is owned by the Government and is under the control of the local government agency - Additional Deputy Commissioner (Revenue), who leases it out for fisheries projects.

(b) surrounding area

The surrounding areas are privately owned excepting the rivers which are on the east, west and south of the wetland. On the opposite bank are little cultivable land owned privately.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No conservation plans exist excepting the fishing management practice which allows to fish every two or three years Recent studies undertaken by NERP (FAP-6)/NACOM designate it as a high priority area for conservation. IUCN Wetland Programme officials have recently visited this wetland and have recognized its importance and value both for fish production and as a waterfowl refuge. Of utmost importance is the natural stand of freshwater swamp forest and the existence diverse habitat types.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It has been identified and proposed as a key wetland site during the NERP/NACOM survey. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Janjail Sarifpur Bishara Darappur Kadirpur Palamati
Sadipur Telegaon Jagannathpur

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

Principal activities include fishing in the beel waters with some boro rice cultivation on the peripheries during drier period. The beel is usually leased out for three years but in most instances it is effective for nine years. Presently fishing is done every two years instead of three years. During monsoon, when the whole basin is under water some lumber poaching takes place. Branches of *Pongamia* and *Barringtonia* are also used fo fish entranchment and trunks are used in house building. During drier months extraction of grass, *Hemarthria protensa* is carried on either for fodder or to store it for future use as homestead binder - to protect the homestead from wave action during monsoon.

(b) surroundings/catchment

The surrounding cultivable areas are planted with rice. Some higher grounds grow potatoes. Some areas, adjacent to homesteads, are planted with some vegetables.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Gurmar Haor FCD Project. Project works consiss of 45 km of submersible embankments, more than 30 km of re-excavated drainage channels and five regulators.

During monsoon when the water level is even higher than the submersible embankments it is quite easier for the local people from the nearby villages to approach the swamp forest, who get involved in lumber poaching.

(b) surroundings/catchment

Tendency of the local people to bring more and more land under cultivation.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

Estimated available ground water recharge within the project area is 2 Mm^3.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The haor seems to support more than 100 species of freshwater fishes. But it has been ascertained that overall fish production of the area has been reduced by about 20% over the last 10 year period. Openwater fishery constitutes about 100% of the overall fish production. Fish production level is estimated to be more than 550 kg/ha in the beels and 44 kg/ha in the floodplain.

The main value of Pashua beel lies not so much in the beel itself, as in the fact that the surrounding area supports much the finest stands of natural floodplain vegetation. These include a dense stand of *Pongamia pinnata*, few *Barringtonia acutangula* and rarely *Crataeva nurvala*, large areas of dense tall grasses and patches of dense shrubbery. Although the main beel is intensively fished every two years and there are few small rice fields near the river embankment, there has obviously been little other exploitation in the area in recent years.

Pashua Beel was leased to the Pearl and Fishery Resources Development Program on a nine-year lease in 1983. The head of this program is reported to have been a Minister of the then Government of Bangladesh. Armed guards have been stationed at the beel to prevent illegal fishing, but it is apparent that these guards, and perhaps also a respect for the Minister, have been effective in preventing other forms of exploitation as well. The lease came up for renewal in 1992 and is apparently given out by open auction on a three year basis. Fortunately the next man is also a Member of Parliament, with lot of goodwill and power to offer almost the same level of protection which has been afforded to the habitats around the beel over the past nine years.

The importance of Pashua Beel in a regional context is quite outstanding. It contains what would appear to be the best remaining examples of the *Pongamia* forest and tall grassland ecosystems in the northeast region of Bangladesh. It provides a secure roosting site for huge numbers of cormorants, herons, and egrets (more than 10,000 in January 1993) and supports a number of species which are scarce or local elsewhere (eg. Purple Heron, Black-headed Ibis, Spotbilled Duck, and Purple Swamphen). A large flock of Asian Openbills frequented most part of the year excepting the peak monsoon months (June - September). They numbered + 700 in January 1993. Concentration of Pallas's Fish Eagle, nesting in adjoining areas, 19 in early-March, 28 in late-March, 3 active nests in adjoining areas are of great significance, as this is a globally threatened species. The area also supports a much higher diversity of waterfowl and other wetland birds than any other site studied in the northeast region. More than fifty species were recorded in the beel including Mandarin Duck, Comb Duck, Falcated Teal, Greater Scaup Duck, Red-crested Pochard and Baer's Pochard. The January, 1993 counts numbered 239,810 individuals.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibians: *Bufo melanostictus, Rana tigrina, R. cyanophlyctis.*

Reptiles: *Mabuya sp., Xenochrophis piscator, Enhydris enhydris, Kachuga tecta, Hardella thurjii, Geoclemys hamiltonii, Aspideretes hurum, Lissemys punctata.*

Aves: Great Crested Grebes, Great Cormorants, Oriental Darters, Night Heron, Grey Heron, Purple Heron, Openbill Storks, Blackheaded Ibis, Fulvous Whistling Teals, Spotbills, Comb Ducks, Mandarin Duck, Red Crested Pochard, Falcated Teal, and Mallard.

An endangered Red Data Book raptor species, Pallas's Fish Eagle (*Halieetus leucoryphus*) uses this beel as its feeding and roosting area. Several avian species are found here which are either rare or not seen in other places. During winter months the bird population reaches its peak. In January, 1993 the waterfowl count came to 239,810 individuals, the highest so far and has even surpassed the estimates for the whole northeast region by almost double. A vagrant Mandarin Duck, probably the first in Bangladesh, has been recorded from this beel. Apart from these a forest bird, Fire-throat (*Erithacus pectardens*) has also been recorded from the swamp forest which apparently seems to be the second record in the Indian sub-continent.

Mammals: Musk Shrew, Fishing Cat, Smooth Indian Otter, Long-tailed Tree Rat, Bandicot Rat, Flying Fox, Fruit Bats, False Vampires.

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Vallisneria spiralis, Najas sp., Aponogeton natans, Ottelia alismoides.*

Rooted Floating: *Hygrorhyza aristata, Trapa maximowiczii.*

Sedges and Meadows: *Eleocharis dulcis, Polygonum barbatum, P. glabrum, Hemarthria protensa.*

Reeds: *Phragmites karka, Saccharum spontaneum, Ficus heterophylla, Rosa involucrata, Lippia javanica.*

Swamp Forest: *Pongamia pinnata, Phyllanthus disticha, Asclepias sp., Barringtonia acutangula, Clorodendron sp., Crataeva nurvala, Salix tetrasperma, Trewia nudiflora.*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

A year long scientific study through NERP/NACOM Wetland Assessment Studies were recently undertaken monitoring the waterfowl population and seasonal changes in the flora at Pashua Beel. Other studies on fisheries, hydrology, sedimentology, sociology are being going on in adjoining areas/beels through NERP/FAP-6. A field station, located at Beheli is available for researchers/scientists with limited facilities. It is located about 5 km east of Pashua Beel.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

No environment and conservation education facilities exist but within the NERP (FAP-6) planning is an initiative to give an experimental start to environment and conservation education in the northeastern region of Bangladesh which will accomodate this beel.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

Eco-tourism has not yet set its pace in Bangladesh. It has to be appreciated and encouraged. Some visitors do visit the wetland from time to time but most of them come with a gun rather than a conservation message. Few scientists have recently started visiting the wetlands for scientific exploration. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

The wetland is managed by the Additional Deputy Commissioner (Revenue), Sunamganj District under the Ministry of Land.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Sunamganj District

Functional: Ministry of Land

29. Bibliographical references: (scientific/technical only)

Scott, D. A. & Rashid, S. M. A. (1992). Ornithological Main Surveys and Wetland Assessment. SLI/NHC/AWB/NACOM.

Karim, A. (1992). Wetlands plant diversity and conservation in Bangladesh. Paper presented at the Conference in Bangladesh, held in Dhaka, November 1992. Jointly sponsored by CIDA, Ministry of Environment and Forests and CIDA.

Karim,A.; Khan,S.; Sobhan,I.; Rashid,S.M.A. & Khan,A.Z. (1992). Interim Report on the Wetland Assessment Studies. SLI/NHC/NERP/NACOM.

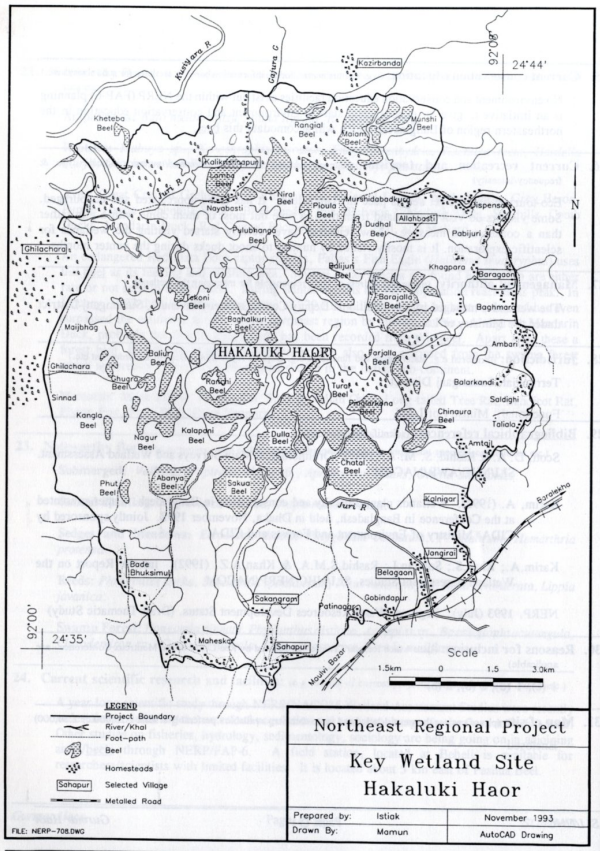
NERP. 1993 (July). Regional Water Resources Development Status. (Draft Thematic Study)

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

1 (c), 1 (d), 2 (b), 3 (b)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 24-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S. M. A. Rashid/ Istiak Sobhan
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

HAKALUKI HAOR

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

24°35′ - 24°44′ N and 92°01′ - 92°09′ E

8. General location: (e.g. administrative region and nearest large town)

30 km southeast of Sylhet District town and ± 40 km northeast of Maulvibazaar District town. Parts of the Haor lie within both Sylhet and Maulvibazaar districts. 5 km north of Juri township.

9. Area: (in hectares)

18,115, including 4,400 ha of beels.

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

O (Permanent,Freshwater Lakes), T (seasonal intermittent freshwater marshes), W (shrub dominated wetland).

11. Altitude: (average and/or maximum & minimum)

Minimum: 4.5 m (PWD)

Maximum: 9.0 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

A complex of more than 80 interconnecting freshwater beels in a shallow basin with the Patharia and Madhab Hills to the east and the Bathera Hills to the west. The most important beels are Chatla, Pinglarkona, Haorkhal, Footi, Tural, Paula, Juala, Kaiarkona, Balijuri, Kukurdubi, Katoa, Birai, Baia, and Chinaura. The beels are permanent, but as water level falls during the dry season, they become isolated from one another. Some of the land between the beels are cultivated while most of the land remain fallow and serve as pasture lands. Some of the beels are drained and fished in rotation.

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

Much of the area lies within the Sylhet Trough, one of the major tectonic structure of Bangladesh. The basement of the Trough slopes northwards at great depth and passes beneath the Shilong Plateau from which it is separated by the Dauki Fault. As a result the Plateau is rising and the Trough is subsiding.

Surface sediments in the haor consists of Paludal marsh clays and peats. It consists of bluish grey clay, herbaceous peat, and yellowish-grey silt. Alyternating beds of peat and peaty clay are common in these large structurally controlled depressions and in the beels; peat is thicher in the deeper parts. Soil associated with this unit are grey heavy silty clays of low permeability, with some peat.

Most of the inflow to the Hakaluki haor is contributed by the Kushiyara river, Sonai Baradal river and the Juri river. During monsoon heavy rainfall flooded the whole area at a depth of 2 to 5 meters. The Hakaluki Haor acts as a natural reservoir and the water level remains high till the end of monsoon. But after that the water level drops down very quickly with the downfall of Kushiyara.

The Meghna River Valley in the northeast part of Bangladesh, which includes the Hakauki Haor, has been formed by sediments deposited over the centuries by the many rivers entering the valley from the adjoining hills in India. The area is very flat with a gentle slope in a westerly direction for the upper half of the area and then in a southerly direction towards the Bay of Bengal. Considerable faulting has taken place in the floor of the valley and adjoining areas with definable movement activity. The upper part of the valley, comprising the Hakaluki Haor is probably the most active part of the seismic Meghna Valley area. The very noticeable depression area extends up the Meghna-Surma Rivers above Bhairab Bazar to the Jadukata river area and up the Kushiyara to the Hakaluki Haor.

The climatic features of the region are subtropical-monsoon in nature with three prominent seasons, viz. summer, monsoon and winter. Summer begins in April through to June. During this period the average mean temperature ranges from 30.9 to 33.4° C. The monsoon is the rainy season, extending from June to September with 80 % of the annual rain during this period. The average mean temperatures fluctuate between 25 to 29° C. Winter is the following season with the peak cold weather in December and January. Prior to this during October/November and at

the later part during February/march the weather is intermittently cold. The temperatures during this period range between 8.5° to 16.6° C. The mean relative humidity varies between 83 % in the wet season and 64 % in the dry season.

14. Ecological features: (main habitats and vegetation types)

The haor is regularly subjected to deep monsoon flooding from the Kushiyara, Juri and Phanai Rivers. But the water level drops quickly in the post-monsoon because of downfall of water level in Kushiyara. Because of the abrupt seasonal variation in the water level the biota inhabiting the area are specially adapted.

The haor shares most of the ecological features with the other haors in the region. The permanent waterbodies support a rich and diverse aquatic habitat comprising unique floral assemblence.

The identified plant communities are as follows:

A. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata*, *Potamogeton crispus*, *Najus Sp.*, *Aponogeton appendiculatus* and *Ottelia alisoides*.

B. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes*, *Utricularia sp.*, *Sylvannia natans* and *S. cucullata*.

C. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Trapa maximowiczii*, *Echinochloa colonum*, *Hygrorhyza aristata*, *Limnophila indica*, *Mersilea quadrifoliata*, *Nymphoides indicum*, and *Pseudoraphis* sp.

D. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Hemarthria protensa Alternanthera philoxeroides*, *Clinogyne dichotoma*, *Eclipta alba*, *Enhydra fluctuans*, *Fimbristilis dichotoma*, *Ipomoea aquatica*, *I. fistulosa*, *Ludwizia sp.*, *Polygonum sp.*, *Scirpus juncoides* and *Vetiveria zizanioides*.

E. **Reeds:** The elevated areas with gentle slope are occupied by tall grasses or reeds. This includes *Asclepias sp.*, *Asparagus racemosus*, *Ficus heterophylla*, *Lippia javanica*, *Phragmites karka*, and *Saccharum spontaneum*.

F. **Freshwater Swamp Forest:** This type of vegetation consists of evergreen trees forming closed canopy. These trees are 8-12 m in top height. The common species are *Barringtonia acutangula*, *Pongamia pinnata*. Some other species are *Crataeva nurvala*, *Phyllanthus disticha*, *Trewia nudiflora*, and *Salix tetrasperma*.

G. **Homestead Vegetation:** A synthetic vegetation community and very important for rich species diversity. Some of the common tree species within this area are *Barringtonia acutangula*, *Bambusa sp.*, *Calamus tenuis*, *Caryota urens*, *Cocos nucifera*, *Crataeva*

nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora, and *Zizyphus mauritiana.* Among other species are *Albizzia procera, Anthocephalus chinensis, Areca catechu, Artocarpus heterophyllus, Bombax ceiba, Diospyros perigrina, Erythrina variegata,* and *Samanea saman.*

15. Land tenure/ownership of:

(a) site

The beels and the leeves between the beels are government owned (khas land) as well as the low lying areas other than the beels which are seasonally flooded. These beels are leased out for fishing by the government through auction at the office of the Additional Deputy Commissioners at Maulvibazar and Sylhet.

(b) surrounding area

The surrounding areas are privately owned while some of them are government khas land leased out to either landless local people or other local villagers for cultivation.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made; management practices; whether an officially approved management plan exists and whether it has been implemented)

No legal status of protection has been extended to this wetland site nor the area has been categorised of any national importance. The importance of this area as a natural resorvoir and as a waterfowl refuge has long been known but no conservation measures have yet been taken. There is no management practices exist whether it is officiasllyt approved or not.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It is one of the key wetland areas identified during the NERP/NACOM survey and proposed as a protected area. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Dakhin Kalanigar	**Bagmara**	**Srierampur**	**Allah**	**Uzirpur**
Badebhuksimul	**Hamidpur**	**Khakhoir chak**	**Belgaon**	**Kalikrisnapur**
Badedeull				

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

Mostly fishing. During the winter season when the water level is lower, marginal land of the

beels are cultivated with paddy. Apart from it the leeves and the fallow land are used for cattle grazing.

(b) surroundings/catchment

Most of the surrounding area are used for rice cultivation with some vegetable growing. Other than this the waterways are used for local riverine transportation and for carrying bamboo rafts from the Juri river to the Kushiyara river. Motor pumps are also installed to pump water from the rivers to the paddy fields.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Manu River Improvement Project (NERP Proposed Project). The project involves construction of a 32 km diversion channel from Kotarkona (near Manu Railway bridge) to Hakaluki Haor. The diversion to Hakaluki cause water levels to rise from 11.30 m PWD to 11.50 m PWD. This would result in submerging about 1500 ha of additional land. The periodic influx of high flood flows could have a mojor impact on the physical characteristics of Hakaluki Haor, The sediment load that would be diverted from the Manu River average roughly 0.9 million tonnes/year.

Intensive fishing by draining water out of the wetlands; creating embankments restricting the water flow which causes low currents thus favouring sedimentation in the Juri river.

(b) surroundings/catchment

The Bangladesh Water Development Board has proposed to build full-flood embankments at some lengths of the Kushiyara river and also some submersible embankments to protect the crops from flash floods in the upper catchment of the Haor.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

Near surface sediments in the area are substantially thick and non-aquiferous. This lithologic condition is reflected in generally low permeability.

The Hakaluki Haor acts as a vast natural flood water reservoir for the whole basin.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The Hakaluki Haor is the largest haor in Bangladesh and has been identified as a "mother fishery" because of its favourable natural spawning ecology. Within the haor, relatively clear water (which allows sunlight to penetrate) flowing from the adjaceny hills mixes with the more turbid water of the Kushiyara River creating an excellent environment for fish breeding. This limnological characteristic is excellent for producing phytoplankton and zooplankton - excellent food for spawn, fish fry and fish. The brood fish overwinter in the duars of the Kyshiyara River

and then migrate into the beels of the Hakaluki Haor to spawn; mainly early in the monsoon season. Hakaluki Haor with a spawning habitat of 5000 ha is contributing an estimated 2500 tonnes of fish to the regional production. At present Hakaluki haor itself is producing about 2109 tonnes per year.

The swamp forest patches inside the Hakaluki Haor have almost disappeared except only a small patch in Chatla beel. On the other hand most of the naturally regenerating saplings are also being harvested as a source of fuel for the surrounding people.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibia: *Bufo melanostictus, Rana cyanophlyctis, Rana tigerina, Rana tytleri.*

Reptilia: *Varanus bengalensis, Hemidactylus brookii, Calotes versicolor, Hardella thurjii, Aspideretes hurum, Lissemys punctata.*

Aves: Great Crested Grebe, Great Bittern, Purple Heron, Openbill Stork, Adjudant Stork, Barheaded Geese, Bear's Pochard, Falcated Teal, Common Pochard, Spotted Redshank, Temminck's Stint, Broadbill Sandpiper, Nordmann's Greenshank, Great Blackheaded Gull, Whiskered Tern, Common Tern, Western & Eastern Marsh Harriers, Pied Harriers, Steppe Eagle, Pallas Fish Eagle, Osprey.

Mammalia: Grey Musk Shrew, Bandicot Rat, Fishing Cat, Jackal, Smooth Otter, Large Indian Civet, Flying Fox, Fruit Bats, False Vampire and Gangetic Dolphins in the adjacent Kushiyara river.

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Hydrilla verticillata, Ottelia alismoides, Sagittaria sagittifolia, Aponogeton natans.*

Free Floating: *Eichhornia crassipes, Utricularia stellaris.*

Rooted Floating: *Nymphea stellata, Nymphea nouchali, Eurayle ferox, Nymphoides cristatum, N. indicum, Panicum paludosum, Pseudoraphis spinescens, Trapa maximowiczii.*

Sedges & Meadows: *Monochoria hastata, Cyperus sp., Eleocharis dulcis, Ludwigia abscendens, Ipomoea fistulosa, I. aquatica, Alternanthera philoxeroides, Aeschynomene aspera, A. indica, Sesbania roxburghii, Eclipta alba, Clinogyne dichotoma.*

Reeds: *Phragmites karka, Ficus heterophylla, Lippia javanica.*

Swamp Forest: *Barringtonia acutangula, Crataeva nurvala, Phyllanthus disticha.*

Homestead: *Bombax ceiba, Caryota urens, Diospyros perigrina, Lagerstromia speciosa, Zizyphus mauritiana, Terminalia catappa, Tamarindus indica, Syzygium cumini, Syzygium fruticosa, Samanea saman, Alstonia scholaris*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

NERP/NACOM have recently completed a year-long study on the flora, fauna and ethno-biology of the Haor area. Studies on other disciplines like hydrology, sedimentology, water resources engineering, etc., are also being carried out with the reports coming out in September, 1993

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

No such conservation education centre or programmes are going on, however, through NERP/NACOM an experimental conservation education centre will be put under trial sometimes in the near future.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

Eco-tourism has not yet set its pace in Bangladesh. It has to be appreciated and encouraged. Some visitors do visit the wetland from time to time but most of them come with a gun rather than a conservation message. Few scientists have recently started visiting the wetlands for scientific exploration. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

The wetland is managed by the Additional Deputy Commissioner (Revenue), Sylhet and Moulavibazar District under the Ministry of Land.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

The vast haor area fall under the jurisdiction of various districts and thanas namely Fenchuganj, Juri, Borolekha, Kulaura. The functional jurisdiction lies with the Ministry of Land.

29. Bibliographical references: (scientific/technical only)

Berger Engineers. 1963. Feasibility Report: Hakaluki Haor Project. EPWAPDA. 166 p.

Scott,D.A. 1989. Asian Wetland Directory. IUCN/WWF.

Scott,D.A. & Rashid, S.M.A. 1992. Ornithological Main Surveys and Wetland Assessment Studies. SLI/NHC/NERP/NACOM.

Karim, A., Khan, S., Sobhan, I., Rashid, S.M.A. & Khan, A.Z. 1992. Interim Report on Wetland Assessment Studies. SLI/NHC/NERP/NACOM.

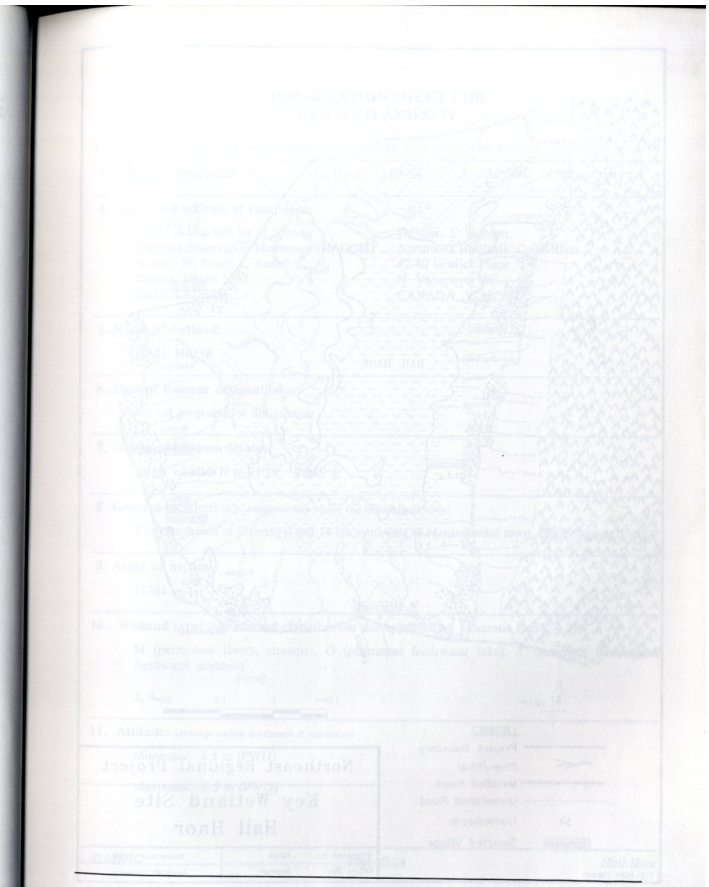
NERP. 1993 (December). Monu River Improvement Project.

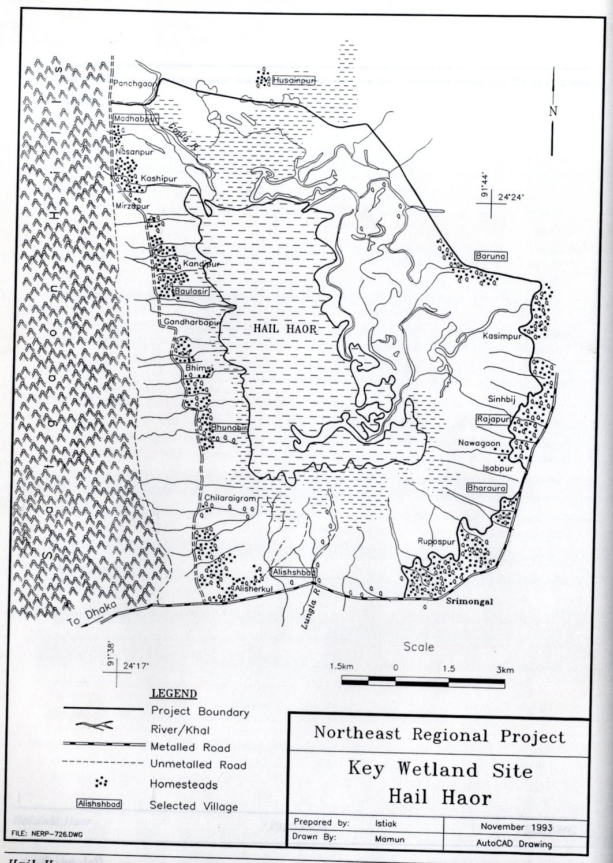
30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

1(c), 2(a), 2(b), 3(a), 3(b)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed





INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1.Country: Bangladesh **2. Date:** 13-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S. M. A. Rashid\ Istiak Sobhan
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BANGLADESH

Dr. Sara L. Bennett
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5. Name of wetland:

HAIL HAOR

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

24°18′ - 24°26′ N to 91°38′ - 91°45′ E

8. General location: (e.g. administrative region and nearest large town)

3 km northwest of Srimangal and 14 km southwest of Maulvibazaar town, Maulvibazaar district.

9. Area: (in hectares)

11261

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

M (permanent rivers, streams), O (permanent freshwater lake), T (seasonal, intermittent freshwater marshes)

3, 4

11. Altitude: (average and/or maximum & minimum)

Minimum: 3.5 m (PWD)

Maximum: 6.5 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

A large shallow lake in a saucer-shaped depression, bounded in the south, east and west by low hills and in the north by the plains of the Manu and Kushiyara rivers. The haor is almost encircled by a chain of tea gardens and natural forest blocks. The river Gopla flows through the wetland in a north-south direction. The lake floods during the rainy season, and almost dries up during the dry season. Land exposed as the water level recedes is converted to rice fields. Much of the lake's surface is overgrown with lotus and water hyacinth. The maximum depth of water during the rainy season is about 7.5 m.

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The haor forms part of the Meghna Basin, which is of pleistocene origin and includes a series of plunging anticlines, filled up by recent sediments. The Hail Haor is located in the anticline between the Satgaon and Dinajpur hills in the west and the Barshijura and Balishira hills in the east. Geologically the soils, which belong to the Recent Era overlay the pleistocene formations occurring at greater depths.

About 60 % of the area is covered by semi-recent Surma-Kushiyara flood plain alluvium, which is moderately to fine-textured. These soils are mostly seasonally flooded. Slightly more than 30 % of the area is covered by semi-recent piedmont colluvium and recent river outwash deposits, originating from sandy hill formations. These soils are commonly coarse to moderately (fine) textured and intermittently flooded after rains during the monsoon season.

Arable soils have been under cultivation for centuries. Because of the annual flooding these soils appear to be relatively fertile. The floodplain soils occupy flat to very gentle undulating (abandoned) leeves in the transition zone between piedmont aprons and river basins (Harinarayanpur Series), basin margins (Jainka Series) and proper basins which are almost flat to slightly undulating (gilgay) and are occupied by the fine textured Kirtantala Series.

The highest topographic position is occupied by the Mirzapur Series, followed second by the Lungla and Harinarayanpur Series. The lowest topographic positions are for the Kirtantala Series, followed second by the Jainka Series, which seem to appear the most responsive to field surface drainage.

The climate relates to the sub-tropical type with three distinct seasons. From November to early April which is relatively cool and dry (winter), from April to June/July which is hot with some rain (summer) and from July to October wet and warm (monsoon).

Some 94 % of the total annual rainfall is recorded in a period of seven consecutive months (from April till November) with the total minimum rainfall equalling to more than 4 inches. The evapotranspiration index (ET), exceeds rainfall from the month of November upto April, resulting in a P/ET - ratio of 50 % or less. In all the other months the ratio is well above 100 %, being highest in June (489 %). The annual P/ET - ratio equals 210 %. Lower temperatures are recorded during winter with the mean daily temperatures varying from 65 to 70° F while during

summer the mean daily temperature is 80° F. The highest values for relative humidity occur during the late monsoon because of high rainfall and limited sunshine duration and in the winter season due to low night temperatures causing heavy dew formation in the early morning hours.

The haor system is a small part of a much larger catchment of about 160,000 hectares. The Lungla river is the main collector that discharges into the haor. The Gopla river is the main discharge channel. The main source of flooding for the area is eivdently the Lungla; Kushiyara flood flow apparently does not reach the haor's northern boundary. The khals that originate in hills east and west (the Borshijura/Balishira Hills and Satgaon Hills respectively) are relatively small flood sources. The Gopla river is the only drainage outlet from the basin. Reportedly, the Gopla's drainage capacity downstream of the project has been reduced by siltation. The Gopla also drains Gangajuri Haor and other low areas to the north of Hail Haor. The Gopla downstream to its discharge into the Upper Meghna has not been studied.

The area under water varies from 2,800 hectares during the dry season to about 9,400 hectares during the monsoon period. Maximum flooded depth is 7.5 m and minimum dry season depth is 5.5 m. There are 352 small canals (locally called as charas) enter into the Hail Haor which are originated mainly from the Indian Hills.

14. Ecological features: (main habitats and vegetation types)

The ecological features of Hail Haor vary distinctly because of the two different natural conditions namely dry season and monsoon (= rainy) season. As a result the plant communities have to be highly adaptive for both the season. The plants have to modify themselves to survive the anaerobic condition in the monsoon and drought in the winter.

The habitat and vegetation type are conditional to the environmental parameters (hydrology, soil, flood tolerence, and zonation) that regulate the development of vegetation. The vegetation consists of a large number of plant species which form aggregated assemblages into specific vegetation types based on physiognomy and environmental factors. They are infact part of a larger water related ecosystem that includes a diversity of plant, animals and man himself. Different plant communities occupy different habitat along the increasing gradient of flooding and moisture regime.

The identified plant communities are as follows:

A. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata, Potamogeton crispus, Najus Sp., Aponogeton appendiculatus* and *Ottelia alisoides*.

B. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes, Utricularia sp., Sylvannia natans* and *S. cucullata*.

C. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Euryale ferox, Nelumbo nucifera, Trapa maximowiczii, Echinochloa colonum, Hygrorhyza aristata, Limnophila indica,*

Mersilea quadrifoliata, Nymphoides indicum, and *Pseudoraphis* sp.

D. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Alternanthera philoxeroides, Clinogyne dichotoma, Eclipta alba, Enhydra fluctuans, Fimbristilis dichotoma, Ipomoea aquatica, I. fistulosa, Ludwizia sp., Polygonum sp., Scirpus juncoides, Vetiveria zizanioides*, and *Xanthium indicum*.

E. **Crop Field Vegetation:** It is a synthetic plant community because it contains plant species which is also common in other types. This community comprises both wetland as well as open dry land smaller herbs. The composition, however, depends on the situation of water logging in the respective field. It includes *Alternanthera sessilis, Cotula hemispherica, Cynodon dactylon, Cyperus cephalotes, Eleocharis atropurpurea, Heliotropium indicum*, and *Leucas lavendulifolia*.

F. **Homestead Vegetation:** A synthetic vegetation community and very important for rich species diversity. Some of the common species within Hail Haor are *Barringtonia acutangula, Bambusa sp., Calamus tenuis, Caryota urens, Cocos nucifera, Crataeva nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora*, and *Zizyphus mauritiana*. Among other species are *Albizzia procera, Alpinia sp., Anthocephalus chinensis, Areca catechu, Artocarpus heterophyllus, Bombax ceiba, Diospyros perigrina, Erythrina variegata, Mikania scandens*, and *Samanea saman*.

15. Land tenure/ownership of:

(a) site

The waterbodies and lands inside the haor proper are owned by the government (khas land) and is leased out every year or every three years for fisheries.

(b) surrounding area

Almost all the surrounding lands are either privately owned or owned by the Tea gardens. Based on the agro-economic survey, DP(S), 1980, it is estimated that 45,500 acres of land is available for cultivation. The land tenure system is different from other areas of Bangladesh. 67 % of the farmers own their farm completely, 29 % own land and also cultivate some other plots under share-cropping arrangements and 4 % are farm labourers.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No national categorization or legal protection has been declared for the area. The area was ear-marked by the Forest Department to declared part of it as Bird Sanctuary, but no gazzette notification has been made to date and the tangibility of such a plan is in question. However, management practice for the fisheries resources exist and is practiced through the leasing system.

Asian Development Bank (ADB) is funding the Second Aquaculture Project which aims at increasing the fish production, mostly carps, which have been depleted during the recent years. They had been releasing fingerlings into

the haor basin during 1992 but in 1993 they plan to build up stock by buying fingerlings from the local markets and rearing it in the culture centres before releasing it in the haor.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It has been identified and proposed as a key wetland site during the NERP/NACOM survey. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Baruna Rajapur Bharaura Alishahbad Bhunabir Baulashir Madhabpur Husainpur

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

The waterbody is mostly used for fisheries management and extraction of wetland resources which includes thatching materials, animal fodder, wild plant fruits, food substitutes, fuel wood supplements and transportation.

(b) surroundings/catchment

The present use can be divided into several heads - homesteads (4.1 %), Orchards (3.9 %), Tanks/Ditches (2.8 %), Fallow (4.3 %), waterbodies (9.3 %) and arable land (75.6 %).

Principal human activity is agriculture. Various parts of the area are single, double and triple cropped. The lower parts of the basoin are single cropped, with broadcast aman and local boro. Higher land along the channels and on piedmont lands surrounding the haor is double cropped. B. aus-T.aman predominant. Triple cropping and the cultivation of vegetables are relatively limited, almost equal proportions of the total arable land are either single or double cropped with rice.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Hail Haor FCD/I Project, construction work began in 1985. Construction of bridges and culverts was carried out under the IDA-financed FCD-II Project. Earthwork is being carried out by BWDB under Food for Work (FFW).

Over exploitation and annual harvesting of fish by complete dewatering of the basins.

Heavy siltation of the waterbodies and reduction of dry season water hectare months. The Gopla river is gradually silted up and is suffering a loss in channel volume and discharge capacity. This results in regular occurence of high flooding.

Deforestation within the haor area.

Expansion of agricultural land and excessive use of insecticides in the paddy fields.

Growth of excessive aquatic weeds during the rainy season. This is due to impeded discharge rates at downstream end of the haor, which induces water logging and poor drainage.

Fish disease (Epizootic Ulcerative Syndrome).

(b) surroundings/catchment

Expansion of agricultural land.

Intentional siltation of the marginal lands to increase cultivable land area.

Excessive use of insecticides and pesticides in the paddy fields and use of herbicides in the gerdens.

Over exploitation of wetland resources.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

Estimated available ground water recharge within the project area is about 6 Mm^3. Hail haor is acting as a flood water reservoir of Lungla and numerous other hilly streams (chara) coming from Satgaon hills. In the monsoon water stored into the haor through all these channels and drains it slowly into the Kushiyara when its water level drops down. Hail haor also trapping the sadiments coming from the hills and the Tea gardens.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The area under water varies from 2800 ha during the dry season to 9400 ha during the monsoon. There is year-round fishing in Hail haor, but fishing is most active in the dry season from December to March. There are 22 fishermen villages around the haor area, comprising an estimated number of 11,500 fishermen. All of these fishermen are dependent on the wetland for their livelihood. Fish are landed at 10 centres both near and far from the haor.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibia: *Bufo melanostictus, Rana cyanophlyctis, R. tigrina, R. limnocharis, R. tytleri.*

Reptiles: *Varanus bengalensis, Calotes versicolor, Morenia petersi, Hardella thurjii,*

Kachuga tecta, Aspideretes hurum, Lissemys punctata, Xenochrophis piscator, Enhydris enhydris, Atritium schistosum, Python molurus.

Aves: Little Grebe, Yellow Bittern, Cinnamon Bittern, Chinese Pond Heron, Purple Heron, Grey Heron, Openbill Stork, Cotton Pygmy Goose, Watercock, Moorhen, Swamphen, Pheasant-tailed Jacana, Painted Snipe, Blackwinged Stilt, Oriental Pratincole, Marsh Sandpiper, Swinhoe's Snipe, Temminck's Stint, Whiskered Tern, Pallas's Fish Eagle, Greyheaded Fish Eagle, Steppe Eagle, Western Marsh Harrier, Eastern Marsh Harrier, Pied Harrier, Northern Hobby, Greater Spotted Eagle.

Mammalia: Grey Musk Shrew, Fishing Cat, Small Indian Mongoose, Jackal,

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Hydrilla verticillata, Najas sp., Ceratophyllum desmersum, Ottelia alismoides, Vallisnaria spirallis, Sagittaria guayanensis, Aponogeton appendiculatus, A. natans.*

Free Floating: *Salvania cucullata, S. natans, Utricularia aurea, U. exoleata, Eichhornia crassipes.*

Rooted Floating: *Nymphea nouchali, N. stellata, Nelumbo nucifera, Euryale ferox, Nymphoides cristatus, N. indicus, Trapa maximowiczii, Echinochloa colonum.*

Sedges & Meadows: *Monochoria hastata, Cyperus sp., Ipomoea fistulosa, Setaria glauca, Polygonum berbatum, Polygonum sp., Alternanthera philoxeroides, Fimbristylis sp., Limnophila sessiliflora.*

Crop Field: *Cyperus cephalotus, Cyperus sp., Lindernia crustacea, Alternanthera philoxeroides, Apponogeton appendiculatus.*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

NERP/NACOM have recently completed a year long study on the wetland resources mostly dealing with the flora and faula and their utilization. WWF-US through their Biodiversity Programme have funded a Dhaka University Project to study the wetland resources which commenced in 1992. Asian Development Bank (ADB) is also funding an Aquaculture Project to increase the fish production of the flood basin. Overseas Development Administration (ODA) through FAP-17 is also carrying out a study on the fisheries aspects of the haor.

ODA has a Rest House at Srimangal, where scientists can bave a brief stopover. NERP-FAP-6 has a Guest House at Maulvibazar where researchers can stay for a while. Apart from it there are some government rest houses both at Srimangal and Maulvibazaar which can be availed if booked earlier. Bangladesh Tea Research Institute (BTRI) also maintains Rest House at Srimangal available with prior permission from the Tea Board authorities.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

No conservation education programmes are currently running. However, through NERP/FAP-6 an Environment Management Research and Education Centre (EMREC) is planned which will include this haor in its programme.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

No recreation or tourism facilities are available. One can vist the wetland through own arrangements. Students from educational institutions and some members from conservation organisations do seldom visit the wetland. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

Additional Deputy Commissioner (Revenue), Maulvibazaar and Thana Nirbahi Officer, Srimangal.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Maulvibazaar District

Functional: Ministry of Land

29. Bibliographical references: (scientific/technical only)

Scott, D.A. 1989. Asian Wetland Directory. WWF/IUCN.

Scott, D.A. & Rashid, S.M.A. 1992. Wetland Assessment Studies and Ornithological Main Surveys. SLI/NHC/NACOM.

Karim, A., Khan, S., Sobhan, I., Rsahid, S.M.A., Khan, A.Z. 1992. Wetland Assessment Studies: Interim Report. SLI/NHC/NACOM.

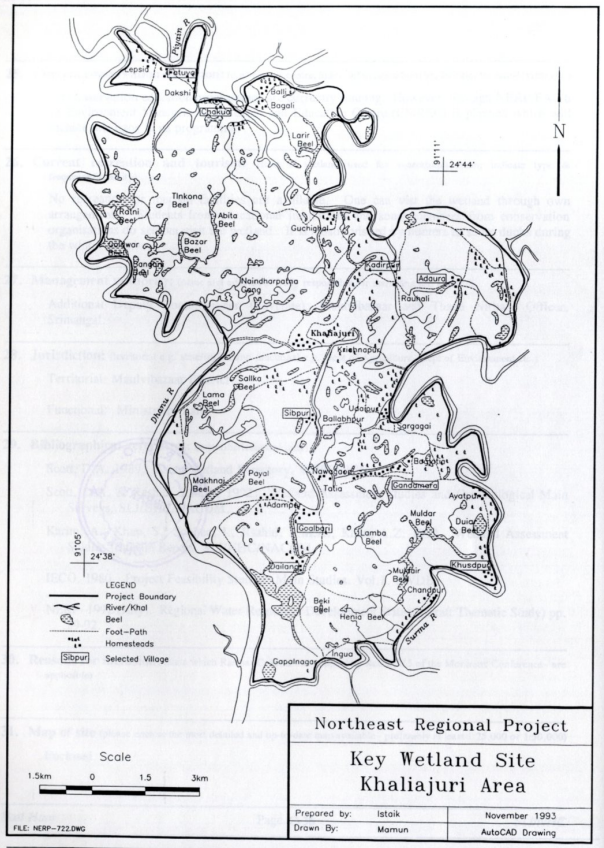
IECO. 1980. Project Feasibility Studies: Main Studies. Vol.1. BWDB.

NERP. 1992 (July). Regional Water Resources Development Status. (Draft Thematic Study) pp. 89-92.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 11-04-94 **3. Ref:** office use only

4. Name and address of compilers:

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BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

KHALIAJURI WETLAND AREA

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

24°38′ N to 24°45′ N and 91°04′ E to 91°12′ E

8. General location: (e.g. administrative region and nearest large town)

40 km northeast of Kishoreganj and 50 km southwest of Sunamganj district town.

9. Area: (in hectares)

12,197

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

M (permanent rivers, streams), O (permanent freshwater lake), T (seasonal, intermittent freshwater marshes)

3, 4

11. Altitude: (average and/or maximum & minimum)

Minimum: 2 m (PWD)

Maximum: 4 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

Deeply flooded region, deepest area of the Sylhet Central Basin. Unique feature is the vast expanse of grassland dominated by *Hemarthria protensa* (chailla) and small patches of freshwater swamp forest composed of mostly *Barringtonia acutangula* (hizal). The area in general slopes from northeast to southwest.

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The area is bounded by Dhanu or Baulai River to the west, Piyain River to the north and by the Mora Surma River to the east and south. The rivers in general have along their banks narrow natural levees composed of alluvial deposits, which are a few meters higher than the internal part of the basin. It is in the middle of a bowl-shaped depression with the Baulai River defining the western boundary. This depression is open to the south towards the Upper Meghna between the channels of the Baulai and Kalni Rivers. The area is laced with internal rivers and khals which are spill channels of the Surma and Kushiyara.

The hydrological regime of the area is governed mainly by the Surma, Kushiyara and Baulai Rivers. The lower Kushiyara (Kalni) and the Baulai are tidal and their water levels are affected by backwater from the Lower Meghna River. The internal runoff pattern is from north to south and from east to west. As the interior part of the basin is below the high levees along the peripheral river banks, these rivers dominate the flooding of the basin and also control its drainage.

Soils in this area comprise silty clay loams on relatively higher sites along rivers, silty clays on slightly lower sites and heavy clays in extensive basin areas. All the soils are seasonally flooded here. Most of them have a subsoil with mixed grey and yellowish brown colours, strong prismatic and blocky structure and a slight acid reaction. Soils in basin depressions are grey or dark grey in colour and remain wet for most or all of the dry season.

Three types of floods occur in the area: winter flood, pre-monsoon flash floods and monsoon season floods. The winter floods, which occur between December and February, are caused by winter storms in the outlying hills as well as by local rainfall. The pre-monsoon floods which occur between March and June are a normal feature of the region. The monsoon season floods are a combination of flood inflow from external rivers, seasonal rainfall, and in the lower part of the basin the lack of drainage due to backflow effect of the Lower Meghna. The monsoon season floods are large and normally last from July to October. The depth of average year monsoon flooding ranging from 4.0 to 4.5 meters.

Although the entire area is flooded deeply in the monsoon but numerous beels and depressions retain water throughout the year, which is about 5% of the total area. The major permanent water bodies are: Ratni beel, Larir beel, Muldar beel, Payal beel and Lama beel. All these beels are connected with rivers through different channels.

The area experiences the sub-tropical monsoon climate typical for Bangladesh. Rainfall is the

most significant and variable aspect of the climate, causing severe floods and flooding in summer. The average annual rainfall is 3000 mm. The most distinctive climatic events of the year are the onset and withdrawal of the monsoon. In the area onset occurs on average on June plus or minus about 4 days, and withdrawal occurs on average on 7 October plus or minus about 14 days. The average duration of the monsoon is 122 days, but it has varied from 112 days to 139 days.

Annual sunshine hours average 6.4 hours/day. The mean annual temperature is 24.9 C and average monthly temperature range from a minimum of 18.9 C in January to a maximum of 28.3 in August. The annual mean humidity is 79%, and monthly averages range from 65% in February to 88% in June through September. The annual mean wind speed is 7.3 km/hour from the east-southeast. Potential evapotranspiration averages 1550 mm/year, and ranges 103 mm in December to 162 mm in March.

The area drains into the Baulai River through the Mora Surma River channel. Local drainage is affected through a dense network of khals which are intercepted by the Mora Surma River. Most of the internal channels are interconnected, which makes the flow pattern quite complicated as it may change seasonally.

14. Ecological features: (main habitats and vegetation types)

The area is regularly subjected to deep monsoon flooding from the Surma, Mora Surma and Kushiyara Rivers. But the water level drops quickly in the post-monsoon period as the rain ceases. Because of the abrupt seasonal variation in the water level the biota inhabiting the area are specially adapted.

The area shares most of the ecological features with the other haors in the region, excepting the habitat composed of vast grassland, but different in composition than that of Bara Haor. Most of these grasses are annual but different perennial species are also present. The most important species of this grassland is *Hemarthria protensa* (chailla).

The permanent waterbodies support a rich and diverse aquatic habitat comprising unique floral assemblence.

The identified plant communities are as follows:

A. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata, Potamogeton crispus, Najus Sp., Aponogeton appendiculatus* and *Ottelia alisoides*.

B. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes, Utricularia sp., Sylvannia natans* and *S. cucullata*.

C. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Trapa maximowiczii, Echinochloa colonum, Hygrorhyza aristata, Limnophila indica, Mersilea quadrifoliata, Nymphoides*

indicum, and *Pseudoraphis* sp.

D. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Hemarthria protensa Alternanthera philoxeroides, Clinogyne dichotoma, Eclipta alba, Enhydra fluctuans, Fimbristilis dichotoma, Ipomoea aquatica, I. fistulosa, Ludwizia sp., Polygonum sp., Scirpus juncoides* and *Vetiveria zizanioides*.

E. **Reeds:** The elevated areas with gentle slope are occupied by tall grasses or reeds. This includes *Asclepias sp., Asparagus racemosus, Ficus heterophylla, Lippia javanica, Phragmites karka, Rosa involucrata,* and *Saccharum spontaneum*.

F. **Freshwater Swamp Forest:** This type of vegetation consists of evergreen trees forming closed canopy. These trees are 8-12 m in top height. The common species are *Barringtonia acutangula, Pongamia pinnata*. Some other species are *Crataeva nurvala, Phyllanthus disticha, Trewia nudiflora*, and *Salix tetrasperma*.

G. **Homestead Vegetation:** A synthetic vegetation community and very important for rich species diversity. Some of the common tree species within this area are *Barringtonia acutangula, Bambusa sp., Calamus tenuis, Caryota urens, Cocos nucifera, Crataeva nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora*, and *Zizyphus mauritiana*. Among other species are *Albizzia procera, Anthocephalus chinensis, Areca catechu, Artocarpus heterophyllus, Bombax ceiba, Diospyros perigrina, Erythrina variegata*, and *Samanea saman*.

15. Land tenure/ownership of:

(a) site

The permanent waterbodies are owned by the government and is leased out every year or every three years for fisheries. Kandas, river banks and some other areas are also owned by the government as khas land. Some portion of land has private ownership too.

(b) surrounding area

Land tenureship of most of the surrounding areas are very similar to that of the actual site.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No conservation measures have yet been taken.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It is one of the key wetland areas identified during the NERP/NACOM survey and proposed as a protected area. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Chakua	**Fatuya**	**Kadirpur**	**Adaura**	**Golabari**
Gandamara	**Shibpur**	**Khushalpur**	**Dhilong**	

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

The waterbodies are mostly used for fisheries management.

Agriculture is the second most important human activity.

Extraction of wetland resources which includes thatching materials, animal fodder, wild fruits, food substitutes, fuel wood supplements and transportation.

(b) surroundings/catchment

Settlements around the periphery of the area are not very sparse although the land elevation is very low and it is the deepest flooded region of the entire haor basin. Fishing is the main human activity here and all the waterbodies are mostly used for fisheries management.

Crop production practices in the basin are dictated by the hydrologic regime. Local as well as high yielding varieties of boro rice are grown.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Surma-Kushiyara-Baulai Basin Project (Proposed by NERP). The proposed project would construct submersible embankment on both Baulai and Kalni to protect the overbank spilling from these two rivers. Although the lower portion of the project would remain open.

Over exploitation and annual harvesting of fish by complete dewatering of the beels.

Heavy siltation of the waterbodies specially in beels and rivers. This results in regular occurrence of high flooding and reduction of dry season water hectare months.

Deforestation within the area.

Expansion of agricultural land.

(b) surroundings/catchment

Expansion of agricultural land.

Intentional siltation of the marginal lands to increase cultivable land area.

Over exploitation of wetland resources.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization etc.)

Estimated available ground water recharge within the project area is 16 Mm^3. An estimated usable recharge of about 12 Mm^3 is within the depth range accessible by force mode technology (deep tube wells). Deep-set shallow tube wells could be used to abstract up to 3 Mm^3. Suction mode (shallow tube well) technologies could be used to abstract 1 Mm^3.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The haor basin seems to support more than 100 species of freshwater fishes. But it has been ascertained that overall fish production of the area has been reduced by 20-30% over the last 10 year period. Openwater fishery constitutes about 100% of the overall fish production. Fish production level is estimated to be more than 550 kg/ha in the beels and 44 kg/ha in the floodplain.

There are at least fifteen to twenty patches of freshwater swamp forest existing within the area, each having an area ranging between 5 to 10 ha. The dominant species in these forests are *Barringtonia acutangula* (hizal). Other important species are *Pongamia pinnata* (koroch), *Trewia nudiflora* (gotogamar or panidumur) and *Cretaeva nurvala* (barun). The important undergrowing woody shrubs are *Ficus heterophylla* (bonolat or baludumur), *Asparagus racemosus* (satamuli or hilum) and *Phyllanthus disticha* (chitki).

Branches of hizal trees are used by the fish lease holders for fish entrancement. Apart from that, the scarcity of fuel wood around homesteads has resulted in people becoming increasingly dependent on the swamp forest as a source of fuel. Swamp forest trees other than hizal are in greatest demand, but all woody shrubs as well as grasses are used for this purpose. Saplings of swamp forest trees are also used, which is contributing to the poor regeneration rates of these species.

Some of the swamp forest patches are protected and maintained through local community management systems; the remainder are controlled through the revenue department of the local government.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibia: *Bufo melanostictus, Rana cyanophlyctis, R. tigrina, R. limnocharis.*

Reptiles: *Varanus bengalensis, Calotes versicolor, Hardella thurjii, Kachuga tecta, Aspideretes hurum, Lissemys punctata, Xenochrophis piscator, Enhydris enhydris, Atretium schistosum, Python molurus.*

Aves: Little Grebe, Large Cormorant, Darter, Lesser Adjutant, Purple Heron, Grey Heron, Openbill Stork, Blackheaded Ibis, Spoonbill, Barheaded Goose, Greylag Goose, Common Shelduck, Mallard, Falcated Teal, Redcrested Pochard, Baer's Pochard, Scaup Duck, Comb Duck, Pheasant-tailed Jacana, Painted Snipe, Temminck's Stint, Pallas's Fish Eagle, Greyheaded Fish Eagle, Steppe Eagle, Western Marsh Harrier, Eastern Marsh Harrier, Pied Harrier, Northern Hobby, Greater Spotted Eagle, Osprey.

Mammalia: Fishing Cat, Small Indian Mongoose, Jackal, Smooth-coated Otter *Lutra perspicillata*, Common Otter (*Lutra lutra*), Palm Civet (*Paradoxurus hermaphroditus*), False Vampire Bat, Fruit Bat, Flying Fox, Long-tailed Tree Rat, Gangetic Dolphin (*Platanista gangetica*).

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Hydrilla verticillata, Najas sp., Ceratophyllum desmersum, Ottelia alismoides, Vallisneria spirallis, Sagittaria guayanensis, Aponogeton appendiculatus, A. natans.*

Free Floating: *Salvania cucullata, S. natans, Utricularia aurea, U. exoleata, Eichhornia crassipes.*

Rooted Floating: *Nymphea nouchali, N. stellata, Nymphoides cristatus, N. indicus, Trapa maximowiczii, Echinochloa colonum.*

Sedges & Meadows: *Hemarthria protensa, Monochoria hastata, Cyperus sp., Ipomoea fistulosa, Setaria glauca, Alternanthera philoxeroides, Fimbristilis sp., Limnophila sessiliflora.*

Swamp Forest: *Pongamia pinnata, Phyllanthus disticha, Barringtonia acutangula, Clorodendron sp., Crataeva nurvala, Salix tetrasperma, Trewia nudiflora*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

NERP(FAP-6)/NACOM have recently completed a year long study on the wetland resources mostly dealing with the flora and fauna and their utilization. Project Prefeseability Studies have also been carried out through NERP/FAP-6.

Several initiatives aimed at enhancing fisheries are being carried out in and around the area. The

whole area has been designated as a " Mother Fishery " by the NERP/FAP-6 fisheries group.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc)

No conservation education programs are currently running. However, through NERP/FAP-6 an Environment Management Research and Education Centre (EMREC) is planned which will include this area in its program.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

No recreation or tourism facilities are available. One can visit the wetland through own arrangements. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

Additional Deputy Commissioner (Revenue), Netrokona.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Netrokona District

Functional: Ministry of Land

29. Bibliographical references: (scientific/technical only)

Karim, A., Khan, S., Sobhan, I., Rashid, S.M.A., Khan, A.Z. 1992. Wetland Assessment Studies: Interim Report. NERP/NACOM.

NERP. 1993 (December). Surma-Kushiyara-Baulai Basin Project.

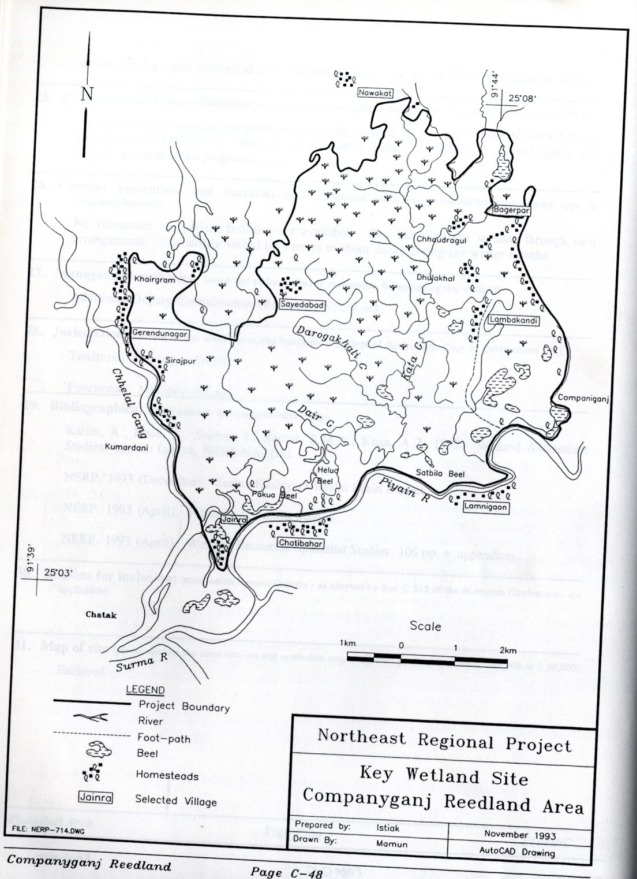
NERP. 1993 (April). Fisheries Specialist Studies.

NERP. 1993 (April). Wetland Resources Specialist Studies. 106 pp + appendices.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 11-04-94 **3. Ref:** office use only

4. Name and address of compilers:

Istiak Sobhan/ S.M.A. Rashid
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

COMPANYGANJ REEDLAND AREA

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

25°05′ N to 25°08′ N and 91°41′ E to 91°45′ E

8. General location: (e.g. administrative region and nearest large town)

25 km northwest of Sylhet, 3 km north of Chattak thana town and 2 km west of Companyganj thana town.

9. Area: (in hectares)

4015 (2500 ha Reedland with the status of Acquired Forest Class)

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

M (permanent rivers, streams), O (permanent freshwater lake), T (seasonal, intermittent freshwater marshes)

3, 4

11. Altitude: (average and/or maximum & minimum)

Minimum: 6 m (PWD)

Maximum: 12 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

Reedland, gently undulating area with extensive network of channels, which are extremely flashy in the monsoon and nearly dry in the summer. Unique feature is the vast expanse of reedland dominated by *Phragmites karka* (nol-khagra), associated with *Saccharum spontaneum* (khag).

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The area is bounded by Meghalaya Hills (Shillong Plateau) to the north and by the Surma River to the south. The area consists of a series of coalescing alluvial fans and piedmont stream deposits. The fans merge into the floodplain of the Surma river.

The hydrological regime of the area is governed by four principal water courses: Piyain, Dhalai, Umium (Chela), and Surma Rivers. Alluvial fans have formed on most of the rivers at the base of mountain canyons. The fans all appear to be moderately active, and the channels have all been subjected to periodic shifting and bank erosion. All the rivers are extremely flashy with flash peaks occurring several times during both the pre-monsoon and monsoon seasons. The recorded daily mean discharge of Surma at Chattak is 800 m^3/sec, Dhalai at Islampur is 119 m^3/sec and Umium at Chela-Sonapur is 99 m^3/sec. But at maximum peak they could reach up to 4814, 5310 and 1225 m^3/sec respectively.

Sub-recent piedmont and alluvial fan soils are poorly drained, and are intermittently flooded for a few days after heavy rains. The sandier soils have a grey massive, puddled topsoil with a ploughpan. The more silty and clayey soils have as stronger subsoil structure and a less hard ploughpan. They dry out generally by the middle of the dry season. The height parts of the subrecent piedmont have somewhat poorly to moderately well drained soils. They generally have a grayish-brown topsoil overlying a grayish-brown mottled subsoil with generally a weak or moderate blocky structure.

Sedimentation is a major physical feature of this area and most of the sediments deposited here consists of coarse-medium sand. Aggradation in the active channels leads to higher water levels, bar formations and a greater incidence of channel shifting and instability. In the past, this has led to periodic channel avulsions across the fan surface.

The area experiences two types of floods: the pre-monsoon flash floods from March to May, and seasonal monsoon floods from June to October. In some years flash floods also occur in the post-monsoon season from October to December. Monsoon peak water levels are about 2.2 to 3.0 meters higher than the pre-monsoon water levels for an average year. The average monsoon flood depth is from 0.5 to 4.0 meters in the area. The highest water levels occur at the southwestern corner near Chattak.

Although the area flooded deeply in the monsoon but a very little portion of it retain water throughout the year. The major permanent water bodies are: Helua beel, Pakua beel and Satbila beel. All these beels are connected with Piyain river through Dair Gang and Darogakhali Gang.

The climate of the area is monsoon tropical with hot wet summers and cool dry winters. The highest temperature in the area was recorded at 40.6 C in May and the lowest at 8.9 C in December and February. The lowest monthly temperature is in January, when the mean is 18.7 C and highest monthly temperature is in July, when the mean is 28.8 C.

The location of the area is in one of the highest rainy areas of the world. Rainfall distribution shows a general pattern of gradual increase from north to south. Mean monthly rainfall varies from 10 mm in January to 820 mm in June, and the mean annual rainfall is 7000 mm. Potential evapotranspiration is lowest in December at 102.6 mm per month and highest in March at 162.4 mm per month.

The whole area drains to the Surma River through Piyain and Umium Rivers. Water levels in the Surma River remain above that of the surrounding lands for most of the monsoon season and this hampers gravity drainage. In post-monsoon period sudden fall of water level in Surma River drain out the whole area very quickly.

14. Ecological features: (main habitats and vegetation types)

The area is subjected to both pre-monsoon flash flood and monsoon flooding from the Surma, Umium and Dhalai rivers. Because of the seasonal variation in the water level the biota inhabiting these areas are specially adapted.

The area is mostly dominated by reed swamps vegetation. This sort of habitat, in the past, were ideal to support the large mammals like hog deer, rhinos and wild buffaloes, birds like Bengal Floricans, Sarus Cranes, which have now become extinct from the region as well as the country in the recent past. Now the swamps can only support smaller mammals such as fishing cats, jackal and otters. There is a high concentration of both resident and migratory bird population as there is less human disturbance.

The permanent waterbodies also support a rich and diverse aquatic habitat comprising unique floral assemblence.

The identified plant communities are as follows:

A. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata, Potamogeton crispus, Najus Sp., Aponogeton appendiculatus* and *Ottelia alisoides*.

B. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes, Utricularia sp., Sylvannia natans* and *S. cucullata*.

C. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Trapa maximowiczii, Echinochloa colonum, Hygrorhyza aristata, Limnophila indica, Mersilea quadrifoliata, Nymphoides indicum*, and *Pseudoraphis* sp.

D. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Alternanthera philoxeroides, Clinogyne dichotoma, Eclipta alba, Enhydra fluctuans, Fimbristilis dichotoma, Ipomoea aquatica, I. fistulosa, Ludwizia sp., Polygonum sp., Scirpus juncoides, Vetiveria zizanioides*, and *Xanthium indicum*.

E. **Reeds:** The elevated areas with gentle slope are occupied by tall grasses or reeds. This includes *Phragmites karka, Saccharum spontaneum, Asclepias sp., Asparagus racemosus, Ficus heterophylla, Lippia javanica* and *Rosa involucrata*.

F. **Crop Field Vegetation:** It is a synthetic plant community because it contains plant species which is also common in other types. This community comprises both wetland as well as open dry land smaller herbs. The composition, however, depends on the situation of water logging in the respective field. It includes *Alternanthera sessilis, Cotula hemispherica, Cynodon dactylon, Cyperus cephalotes, Eleocharis atropurpurea, Heliotropium indicum*, and *Leucas lavendulifolia*.

G. **Homestead Vegetation:** A synthetic vegetation community and very important for rich species diversity. Some of the common tree species within the area are *Barringtonia acutangula, Bambusa sp., Calamus tenuis, Caryota urens, Crataeva nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora*, and *Zizyphus mauritiana*. Among other species are *Albizzia procera, Anthocephalus chinensis, Areca catechu, Artocarpus heterophyllus, Bombax ceiba, Diospyros perigrina, Erythrina variegata*, and *Samanea saman*.

15. Land tenure/ownership of:

(a) site

The waterbodies are owned by the government and is leased out every year or every three years for fisheries. Kandas and some other areas are also owned by the government as khas land.

Forest Department owned about 2500 ha of Reedland with Acquired Forest Class status. These lands are also leased out to Sylhet Pulp and Paper Mill (SPPM) in order to produce their raw materials. Some portion of land has private ownership too.

(b) surrounding area

Most of the surrounding area is under government jurisdiction, either as a khas land or having forest status. In the north the area is bounded by Meghalayan Hills.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Sylhet Pulp and Paper Mills (SPPM) started some rehabilitation work in the 80s, but due to inadequate manpower and lack of proper plantation technique output level never reached the satisfactory stage. Other than that no conservation measures have yet been taken.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It is one of the key wetland areas identified during the NERP/NACOM survey and proposed as a protected area. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Lambakandi	**Bagarpar**	**Lamnigar**	**Chatibahar**	**Purannawakat**
Saidabad	**Jazura**	**Kumardani**	**Birandranagar**	

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

The waterbodies are mostly used for fisheries management and extraction of wetland resources which includes thatching materials, animal fodder, wild plant fruits, food substitutes, fuel wood supplements and transportation.

Although agriculture is not very intensive in this area, but it is the fastest growing sector.

(b) surroundings/catchment

Settlements around the surrounding area is not very dense because of the fact that the land elevation is very low. Moreover the flashy nature of the nearby rivers discourage people to settle. The average population density in this area is about 300 persons per km^2.

Crop production practices in the area is dictated by the hydrologic regime. Local as well as high yielding varieties of aman and boro rice are grown. Flash floods in Dhalai and Umium rivers cause inundation of most of the cultivable areas. This water flows overland with sufficient velocity to cause damage to rice.

The most important human activity around this wetland is collection and carrying of sand and boulders from Bholaganj quarry.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Over and unplanned exploitation of reeds in the past.

Grazing in the reedland, which is totally destroying the possibility of regeneration.

Expansion of agricultural land and excessive use of insecticides in the paddy fields.

Annual harvesting of fish by complete dewatering of the area.

Heavy siltation of the waterbodies and reduction of dry season water hectare months. All the nearby rivers are gradually silted up and are suffering a loss in channel volume and discharge capacity. This results in regular occurrence of high flooding and erosion.

Fish disease (Epizootic Ulcerative Syndrome).

(b) surroundings/catchment

Expansion of agricultural land.

Deforestation in the catchment area.

Intentional siltation of the marginal lands to increase cultivable land area.

Over exploitation of wetland resources.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization etc.)

Estimated available ground water recharge within the project area is 2 Mm^3. Of this about 1 Mm^3 could be developed using DTW force mode technology. Suction mode STW technologies can not be developed in the area due to aquifer constraints.

Reeds are very useful sediment trapper, although by depositing such sands in their own community they themselves become threatened.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

The area seems to support more than 70 species of freshwater fishes. But it has been ascertained that overall fish production of the area has been reduced by 20-30% over the last 10 years period. Openwater fishery constitutes more than 90% of the overall fish production. Fish production level is estimated to be 550 kg/ha in the beels and 44 kg/ha in the floodplain.

There are no complete patches of freshwater swamp forest exist within and adjacent to the area, but individual trees like *Barringtonia acutangula* (hizal), *Pongamia pinnata* (koroch), *Trewia nudiflora* (gotagamar or panidumur) and *Cretaeva nurvala* (barun) are common in villages around.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibia: *Bufo melanostictus, Rana cyanophlyctis, R. tigrina, R. limnocharis.*

Reptiles: *Varanus bengalensis, Calotes versicolor, Hardella thurjii, Kachuga tecta, Aspideretes hurum, Lissemys punctata, Xenochrophis piscator, Enhydris enhydris, Atretium schistosum, Python molurus, Ptyas mucosus.*

Aves: Little Grebe, Yellow Bittern, Cinnamon Bittern, Purple Heron, Grey Heron, Openbill Stork, Cotton Pygmy Goose, Watercock, Moorhen, Swamphen, Pheasant-tailed Jacana, Painted Snipe, Blackwinged Stilt, Oriental Pratincole, Marsh Sandpiper, Temminck's Stint, Whiskered Tern, Pallas's Fish Eagle, Greyheaded Fish Eagle, Steppe Eagle, Western Marsh Harrier, Eastern Marsh Harrier, Pied Harrier, Northern Hobby, Greater Spotted Eagle.

Mammalia: Grey Musk Shrew, Fishing Cat, Small Indian Mongoose, Jackal, Smooth-coated Otter *Lutra perspicillata*, Common Otter (*Lutra lutra*), False Vampire Bat, Fruit Bat, Flying Fox.

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Hydrilla verticillata, Najas sp., Ceratophyllum desmersum, Ottelia alismoides, Vallisnaria spirallis, Sagittaria guayanensis, Aponogeton appendiculatus, A. natans.*

Free Floating: *Salvania cucullata, S. natans, Utricularia aurea, U. exoleata, Eichhornia crassipes.*

Rooted Floating : *Nymphea nouchali, N. stellata, Nymphoides cristatus, N. indicus, Trapa maximowiczii, Echinochloa colonum.*

Sedges & Meadows : *Monochoria hastata, Cyperus sp., Ipomoea fistulosa, Setaria glauca, Polugonum sp., Alternanthera philoxeroides, Fimbristilis sp., Limnophila sessiliflora.*

Reed swamps : *Phragmites karka, Saccharum spontaneum, Vetiveria zizanioides, Arundo donax, Sclerostachya fusca, Ficus heterophylla, Lippia javanica, Asparagus recemosus* and *Asclepias* sp.

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

NERP (FAP-6)/NACOM have recently completed a year long study on the wetland resources mostly dealing with the flora and fauna and their utilization. Project Prefeseability Studies have also been carried out through NERP.

Several initiatives aimed at enhancing fisheries are being carried out in and around the area. The whole area has been designated as a " Mother Fishery " by the NERP fisheries group.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

No conservation education programs are currently running. However, through NERP/FAP-6 an Environment Management Research and Education Centre (EMREC) is planned which will include this area in its program.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

No recreation or tourism facilities are available. One can visit the wetland through own arrangements. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

Additional Deputy Commissioner (Revenue), Sunamganj.

Divisional Forest Officer, Sylhet

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Sunamganj District

Functional: Ministry of Land/ Forest Department

29. Bibliographical references: (scientific/technical only)

Karim, A., Khan, S., Sobhan, I., Rashid, S.M.A., Khan, A.Z. 1992. Wetland Assessment Studies: Interim Report. NERP/NACOM.

NERP. 1993 (December). Sarigoyain-Piyain Basin project.

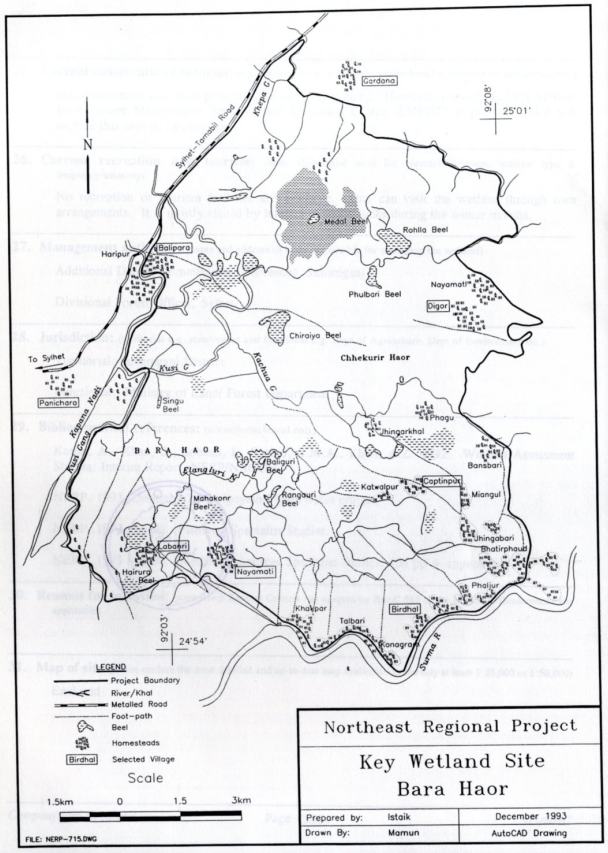
NERP. 1993 (April). Fisheries Specialist Studies.

NERP. 1993 (April). Wetland Resources Specialist Studies. 106 pp + appendices.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 18-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S. M. A. Rashid/ Istiak Sobhan
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

BARA HAOR

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

24°68′ N to 24°81′ N and 91°23′ E to 91°36′ E

8. General location: (e.g. administrative region and nearest large town)

18 km northeast of Sylhet and 2 km north of Haripur Gas Field, Sylhet district.

9. Area: (in hectares)

11.162 ha (217 ha under water during dry season and < 500 ha of grassland).

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

M (permanent rivers, streams), O (permanent freshwater lake), T (seasonal, intermittent freshwater marshes)

3, 4

11. Altitude: (average and/or maximum & minimum)

Minimum: 6 m (PWD)

Maximum: 15 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

Shallow, saucer-shaped depression in a gently undulating area, with the land sloping from north to south and east to west. Unique feature is the vast expanse of grassland dominated by *Vetiveria zizanioides* (binna) and small patches of freshwater swamp forest composed of mostly *Barringtonia acutangula* (hizal).

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The location of the haor is in one of the highest rainfall areas in Bangladesh. Bangladesh Metreorological Department has a climatological station at Sylhet. Information on the climate of the haor area is based on that station. Mean annual rainfall was 5000 mm for the period from 1891 through 1989. About 93% of the total annual rainfall falls during the April - October period. November through February is dry; March has slightly more rainfall with 150 mm (3% of total rainfall).

Maximum temperatures vary from about 28°C to over 40°C with highest temperatures experienced during April and May. Minimum temperatures range from 6°C to 25°C. Relative humidity is high throughout the year, with averages ranging from 65% to 89%. Humidity is highest in the monsoon season from June to September. Average wind speed varies from 3.0 to 4.0 km/sec, with the highest speeds occurring between March and June. Potential evapotranspiration rates vary seasonally. Highest rates (5.24 mm/day) occur during March-April pre-monsoon period and lowest rates (3.30 mm/day) occur during December in winter.

Bara Haor consists of nineteen perenial beels having an area of about 217 ha, and 250 ha of grasslands, dominated by *Vetiveria zizanioides*. The major beels are Salusari (40 ha), Ular (30 ha), and Kata (15 ha). The haor system is closely integrated with the Sarigoyain, Lubha and Surma rivers and their tributaries. Most of the beels are shallow (dry season depth ranging from 1.5 to 3 m).

The areas topography consists of low ridges (maximum elevation 60 m PWD) to the north and southwest, apparently associated with echelon faulting along the base of the Shillong Plateau escarpment. The rest of the area is gently undulating, with levels ranging from about 6 to 15 m (PWD), with the highest elevations located along the Surma River bank and along the Sarighat - Kanaighat road in the north. The land generally slopes from north to south and east to west into the saucer-shaped central depression (Bara Haor, Medhal Haor); this drains through the Sylhet - Jaintiapur road bridges to the west and through Kushi gang to the south, and then into the Surma river.

The area other than the hilly northern tip, is covered by subrecent alluvium of the Surma-Kushiyara floodplain. The main soils on the relatively high floodplain areas consist of grey, massive, puddled silt loam or silty clay loam topsoil, strongly to medium acid, overlaying a grey mottled yellowish brown silty clay loam to clay subsoil with coarse blocky structure. The main basin soils are similar but are generally clays throughout and have a very strongly acid topsoil. Stratified material, medium acid to neutral, occurs below 0.8 to 1.6 m in most of the floodplain.

Almost all soils are flooded during the rainy season and dry out strongly by the middle of the dry season. Most of them appear relatively slowly permeable in the subsoil and substratum. Organic matter contents are generally low. Natural fertility is moderate.

The principal water courses governing the area's hydrology are the Sarigoyain, Lubha and Surma rivers. These rivers mainly spill to the project area through the Lain Nadi, Pora Khal, Kushi Gang, Amri Khal, and Kapna Nadi. All the principal water courses are flashy and flash peaks can occur several times during pre-monsoon and monsoon seasons. In some years these peaks occur simultaneously. The recorded mean daily discharges for the Surma (at Kanaighat) 524 m^3/sec, the Sarigoyain (at Sarighat) 130 m^3/sec and for the Lubha river the minimum and maximum discharges are 1.84 m^3/sec and 800 m^3/sec.

The haor basin drains to the Surma and Sarigoyain rivers through the Kushi Gang in the pre-monsoon season and through the Kapna Nadi in the monsoon season. Pre-monsoon drainage is to both the Surma and Sarigoyain, though sometimes flow reverses through the Kushi Gang.

14. Ecological features: (main habitats and vegetation types)

The haor basin is subjected to both pre-monsoon flash flood and monsoon flooding from the Surma, Lubha and Sarigoyain rivers. Because of the seasonal variation in the water level the biota inhabiting the haor and adjacent areas are specially adapted.

The area shares most of the ecological features with the other haors in the region, excepting the habitat composed of vast perennial grassland. This grassland features the unique characteristic of this haor system which also extends (partly) to some of the other adjacent haor systems, like Medhal Haor (in the north) and Murir Haor (in the south). This sort of habitat, in the past, were ideal to support the large mammals like hog deers, rhinos and wild buffaloes, birds like Bengal Floricans, Sarus Cranes, which have now become extinct from the region as well as the country in the recent past.

Different plant communities occupy different habitat along the increasing gradient of flooding and moisture regime.

The identified plant communities are as follows:

A. **Submerged:** This type of vegetation remains fully under water for their whole life cycle. This includes *Hydrilla verticillata, Potamogeton crispus, Najus Sp., Aponogeton appendiculatus* and *Ottelia alisoides*.

B. **Free Floating:** This type of vegetation prefer to float freely in the water and collect their nutrient from it. This includes *Eichhornia crassipes, Utricularia sp., Sylvannia natans* and *S. cucullata*.

C. **Rooted Floating:** This type of plant although rooted deeply in the soil but their leaves and flower float on the surface of water. It includes *Trapa maximowiczii, Echinochloa colonum, Hygrorhyza aristata, Limnophila indica, Mersilea quadrifoliata, Nymphoides indicum*, and *Pseudoraphis* sp.

D. **Sedges & Meadows:** This is an ecotonal community consisting of mostly amphibious plants or geophytes of emergent plants. This includes *Alternanthera philoxeroides, Clinogyne dichotoma, Eclipta alba, Enhydra fluctuans, Fimbristilis dichotoma, Ipomoea aquatica, I. fistulosa, Ludwizia sp., Polygonum sp., Scirpus juncoides, Vetiveria zizanioides*, and *Xanthium indicum*.

E. **Floodplain Grassland :** This is a community very similar to that of reed swamp but differs with the composition and habitat preference. Primarily they favor higher land with flashing water, although they can easily withstand waterlogging for more than a few months. For these preferences the community is acclimated to plain lands in between haor basin and steep hills which is highly vulnerable to flash flood. This community consists of various medium to high grasses. The most dominant species is *Vetiveria zizanioides* (binna), which in extreme case practically form single species community. Other associated species are more or less same as reed swamp like *Phragmites karka* (khagra, nol), *Saccharum spontaneum* (khag), *Sclerostachya fusca* (khuri) and *Arundo donax* (baranol).

F. **Freshwater Swamp Forest:** This type of vegetation consists of evergreen trees forming closed canopy. These trees are 8-12 m in top height. The common species are *Barringtonia acutangula, Pongamia pinnata*. Some other species are *Crataeva nurvala, Phyllanthus disticha, Trewia nudiflora*, and *Salix tetrasperma*.

G. **Crop Field Vegetation:** It is a synthetic plant community because it contains plant species which is also common in other types. This community comprises both wetland as well as open dry land smaller herbs. The composition, however, depends on the situation of water logging in the respective field. It includes *Alternanthera sessilis, Cotula hemispherica, Cynodon dactylon, Cyperus cephalotes, Eleocharis atropurpurea, Heliotropium indicum*, and *Leucas lavendulifolia*.

H. **Homestead Vegetation:** A synthetic vegetation community and very important for rich species diversity. Some of the common species within Baro Haor are *Barringtonia acutangula, Bambusa sp., Calamus tenuis, Caryota urens, Cocos nucifera, Crataeva nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora*, and *Zizyphus mauritiana*. Among other species are *Albizzia procera, Alpinia sp., Anthocephalus chinensis, Areca catechu, Artocarpus heterophyllus, Bombax ceiba, Diospyros perigrina, Erythrina variegata, Mikania scandens*, and *Samanea saman*.

15. Land tenure/ownership of:

(a) site

The waterbody and the land is owned by the government (khas land) and is leased out every year or every three years for fisheries. Beel operators habitually construct bunds to increase the water retention during the dry season, so conjunctive use of beels for fish as well as irrigation is likely occurring. Most of the important fish-producing beels are interconnected by narrow channels. Uplands (kanda) occur between the beels. During the rainy season, the beels are inundated and

merge into a single, large sheet of water. At this time fish are widely dispersed throughout the area. During the dry season the individual beels act as an overwintering habitat for many fish species. Permanent and semi-permanent beels are mainly operated by the lease holders on a commercial basis, harvesting their catch during the dry season and guarding the beels throughout the monsoon. However, because of the extent of inundation, a large number of subsistence fishermen are able to fish during the wet season.

(b) surrounding area

There is an estimated 250 ha around Bara Haor that is reportedly government-owned (khas). It produces *Vetiveria zizanioides* (chhon), a wild grass used for roof thatching, and is also used for communal grazing by villagers living nearby. In certain areas, influential people are reportedly appropriating this land for rice cultivation, and conflicts over this are occurring.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No conservation measures have yet been taken.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It has been identified as a key wetland site for its unique flood plain grassland during the NERP/NACOM survey and proposed as protected area. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Lamajhingrabari Jhingarkhal Aagkopa Kapnakandi Balipara
Paschim kaptanpur Nayamati pahar Lohajuri pahar

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

The waterbody is mostly used for fisheries management and extraction of wetland resources which includes thatching materials, animal fodder, wild plant fruits, food substitutes, fuel wood supplements and transportation.

(b) surroundings/catchment

Settlements around the periphery of Bara Haor are extremely sparse because of the fact that the land elevation is very low. The average population density in this area is 353 persons per km^2. The average household size is estimated to be 6.25 persons.

Crop production practices in the basin are dictated by the hydrologic regime. Local as well as high yielding varieties of aus and aman rice are grown. Flash floods in the Lubha river back up and enter the project area through the Amri Khal. This water flows overland with sufficient velocity to cause damage to the aman rice and then accumulates in Bara Haor where it damages boro rice, cultivated in areas which are moderately inundated.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Surma Right Bank Project (NERP proposed project); the proposed project consists of flood protection for the project area from upper Surma and Lubha Rivers spills.

Over exploitation and annual harvesting of fish by complete dewatering of the basins.

Heavy siltation of the waterbodies and reduction of dry season water hectare months. The Gopla river is gradually silted up and is suffering a loss in channel volume and discharge capacity. This results in regular occurence of high flooding.

Deforestation within the haor area.

Expansion of agricultural land and excessive use of insecticides in the paddy fields.

Growth of excessive aquatic weeds during the rainy season. This is due to impeded discharge rates at downstream end of the haor, which induces water logging and poor drainage.

Fish disease (Epizootic Ulcerative Syndrome).

(b) surroundings/catchment

Expansion of agricultural land.

Intentional siltation of the marginal lands to increase cultivable land area.

Excessive use of insecticides and pesticides in the paddy fields.

Over exploitation of wetland resources.

Recently Water Development Board (WDB) has prepared the Bara Haor Project for protecting 20,000 hectares of land under Kanaighat-Jainta area from floods and provide adequate irrigation facilities. (Source: The Daily Star, ?? end-January/early-February '94)

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

Estimated useable ground water recharge within the project area is 51 Mm³. An estimated usable

recharge of about 28 Mm³ is within the depth range accessible by force mode technology (deep tube wells). Deep-set shallow tube wells could be used to abstract up to 4.0 Mm³. Standard suction mode (shallow tube well) technologies are not suitable at all because of aquifer constraints.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

There are at least ten patches of freshwater swamp forest existing within and adjacent to the haor, each having an area ranging between 5 to 15 ha. The dominant species in these forests are *Barringtonia acutangula* (hizal). Other important species are *Pongamia pinnata* (koroch), *Trewia nudiflora* (gotogamar or panidumur) and *Cretaeva nurvala* (barun). The important undergrowing woody shrubs are *Ficus heterophylla* (bonolat or baludumur), *Asparagus racemosus* (satamuli or hilum), *Phyllanthus disticha* (chitki) and *Asclepias* sp.

Branches of hizal trees are used by the fish lease holders for fish entranchment. Apart from that, the scarcity of fuel wood around homesteads has resulted in people becoming increasingly dependent on the swamp forest as a source of fuel. Swamp forest trees other than hizal are in greatest demand, but all woody shrubs as well as grasses are used for this purpose. Saplings of swamp forest trees are also used, which is contributing to the poor regeneration rates of these species.

Some of the swamp forest patches are protected and maintained through local community management systems; the remainder are controlled through the revenue department of the local government.

The haor basin seems to support more than 100 species of freshwater fishes. But it has been ascertained that overall fish production of the area has been reduced by 20-30% over the last 10 years period. Openwater fishery constitutes about 87% of the overall fish production (2868 mt/year). Fish production level is estimated to be more than 600 kg/ha.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibia: *Bufo melanostictus, Rana cyanophlyctis, R. tigrina, R. limnocharis, R. tytleri.*

Reptiles: *Varanus bengalensis, Calotes versicolor, Hardella thurjii, Kachuga tecta, Aspideretes hurum, Lissemys punctata, Xenochrophis piscator, Enhydris enhydris, Atretium schistosum, Python molurus.*

Aves: Little Grebe, Yellow Bittern, Cinnamon Bittern, Purple Heron, Grey Heron, Openbill Stork, Cotton Pygmy Goose, Watercock, Moorhen, Swamphen, Pheasant-tailed Jacana, Painted Snipe, Blackwinged Stilt, Oriental Pratincole, Marsh Sandpiper, Temminck's Stint, Whiskered Tern, Pallas's Fish Eagle, Greyheaded Fish Eagle, Steppe Eagle, Western Marsh Harrier, Eastern Marsh Harrier, Pied Harrier, Northern Hobby, Greater Spotted Eagle.

Mammalia: Grey Musk Shrew, Fishing Cat, Small Indian Mongoose, Jackal, Smooth-coated

Otter (*Lutra perspicillata*), Palm Civet (*Paradoxurus hermaphroditus*), False Vampire Bat, Fruit Bat, Flying Fox, Long-tailed Tree Rat.

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Hydrilla verticillata, Najas sp., Ceratophyllum desmersum, Ottelia alismoides, Vallisnaria spirallis, Sagittaria guayanensis, Aponogeton appendiculatus, A. natans.*

Free Floating: *Salvania cucullata, S. natans, Utricularia aurea, U. exoleata, Eichhornia crassipes.*

Rooted Floating: *Nymphea nouchali, N. stellata, Nymphoides cristatus, N. indicus, Trapa maximowiczii, Echinochloa colonum.*

Sedges & Meadows: *Monochoria hastata, Cyperus sp., Ipomoea fistulosa, Setaria glauca, Polygonum berbatum, Polygonum sp., Colocasia esculenta, Alternanthera philoxeroides, Fimbristilis sp., Limnophila sessiliflora.*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

NERP (FAP-6)/NACOM have recently completed a year long study on the wetland resources mostly dealing with the flora and fauna and their utilization. Project Prefeseability Studies have also been carried out through NERP/FAP-6.

Several initiatives aimed at enhancing fisheries are being carried out in and around the area. The Second Aquaculture Development Project (ADB financed) has excavated two road-side ponds (36 ha) with World Food Program assistance. The project is considering stocking of native and exotic fish species, carp culture extension within the haor area.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

No conservation education programmes are currently running. However, through NERP/FAP-6 an Environment Management Research and Education Centre (EMREC) is planned which will include this haor in its programme.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

No recreation or tourism facilities are available. One can vist the wetland through own arrangements. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

Additional Deputy Commissioner (Revenue), Sylhet.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Sylhet District

Functional: Ministry of Land

29. Bibliographical references: (scientific/technical only)

Karim, A., Khan, S., Sobhan, I., Rashid, S.M.A., Khan, A.Z. 1992. Wetland Assessment Studies: Interim Report. NERP/NACOM.

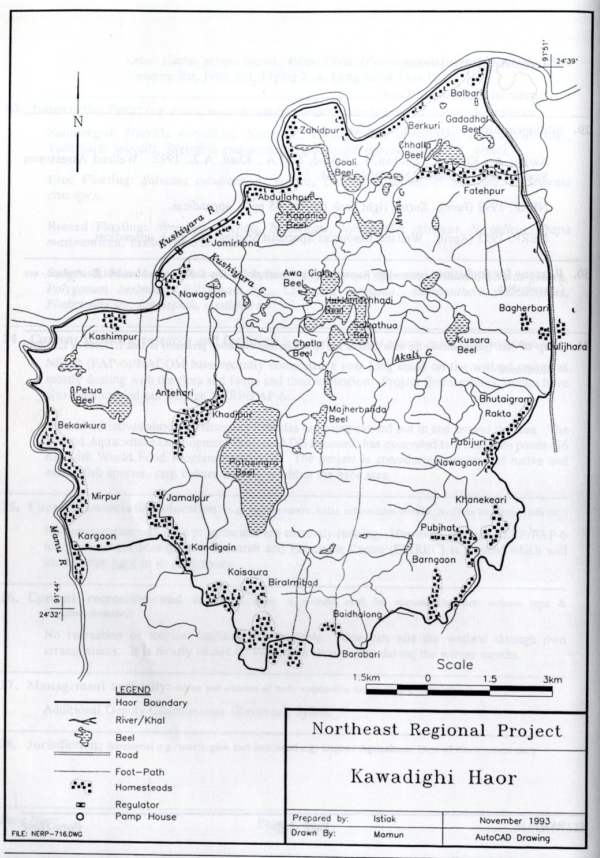
NERP. 1993 (June). Surma right bank project. 45 pp + appendices.

NERP. 1993 (April). Wetland Resources Specialist Studies. 106 pp + appendices.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 24-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S.M.A. Rashid/ Istiak Sobhan
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

KAWADIGHI HAOR

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

24°32′ N to 24°38′ N and 91°44′ E to 91°51′ E

8. General location: (e.g. administrative region and nearest large town)

15 km North-Northeast of Maulvibazaar District town.

9. Area: (in hectares)

11295

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

M (permanent river); O (permanent freshwater lakes); T (seasonal intermittent freshwater marshes)

11. Altitude: (average and/or maximum & minimum)

Minimum: 5.0 m (PWD)

Maximum: 8.5 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

A group of six to eight freshwater lakes (beels), important among them are Majherbandha, Patasingha, Halkatua, Rukka and Ulauli. The beels are isolated from one another during dry season, but unite to form a large shallow lake during the rainy season. The margins of the beels are converted into rice fields during dry season. Full-flood embankments have been constructed around the haor to improve the possibilities for fishing and agriculture. The maximum depth of water is 3-6 m during the rainy season and 1-2 m during dry season.

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The whole wetland lies within the Sylhet Trough, one of the major tectonic structures of Bangladesh. The basement of the Trough slopes northwards at great depth and passes beneath the Shilong Plateau from which it is separated by the Dauki Fault. As a result the Plateau is rising and the Trough is subsiding.

The project area is build up of recent and sub-recent alluvial sediments laid down by the rivers Kushiyara and Manu. The northeastern part is covered with outwash from the adjoining hills. The major area is occupied by a wide basin which is believed to be the result of tectonic subsidence of the earth surface. The general slope of the area is from east to northwest.

This haor is within the Monu River Irrigation Project (MRIP). The history goes back to early 1960's when the local people acting on their own initiative constructed a dwarf embankment along the right bank of the Monu river to protect their crop from early floods. Subsequently, a low embankment of about 37 km in length, and ranging from 0.6 m to 1.52 m in height was constructed by local authorities. This embankment was breached frequently resulting in damage to the crops. In 1961 the Monu river flood problem came under active consideration of East Pakistan Water and Power Development Authority (EPWAPDA) which assigned some international company to undertake a feasibility study. In 1963, the Executive Committee of the National Economic Council (ECNEC) sanctioned the project but administrative approval to proceed with the project was not given until 1968.

The project started in 1975-76 with Kuwaiti aid of Tk.130 million out of an estimated cost of Tk.686.6 million. The project was declared complete in 1982-83.

The project structures included flood control embankment; flood control embankment cross-drainage structures; barrage; irrigation headworks; irrigation canal system; irrigation canal cross-drainage structures; drainage sluices; and drainage pumping station.

The entire irrigation system is under Bangladesh Water Development Board (BWDB) control. Local participation seems to be totally absent. BWDB officials decide when to supply irrigation water and in what quantities. The supply is regulated by the canal headwork gates but when the pond level exceeds 11.58 m GTS the barrage gates are opened to release the excess water. There is no diversion after April when the monsoon season sets in. At that time any excess diversion does not need pumping out as it drains out through the two sluice gates adjacent to the pumping

station. The drainage through these sluice gates seem to be inadequate and may need pumping the water out.

The project area is roughly elliptical in shape, with a 22.8 km southwest to northeast axis and 14.8 km wide. The 6,000 h area of low hills (upto 43 m PWD) known as Bhatera Hills, form its upper catchment. The Bhatera Hills to the east, the Manu river to the west and south and Kushiyara river to the north form the boundaries of the project area.

The area comprises a concaved alluvial plain with the land sloping gently from the foothills in the east and river levees to the low north centre. Elevations range from 12.5 m PWD near the hills to below 4 m PWD at the low points. The area is occupied by grey, heavy silty clay loams on the ridges and clays in the basins. Noncalcareous Grey Floodplain soil is the only general type. Surface sediments in the haor consists of Paludal marsh clays and peats. It consists of bluish grey clay, herbaceous peat, and yellowish-grey silt. Alyternating beds of peat and peaty clay are common in these large structurally controlled depressions and in the beels; peat is thicher in the deeper parts. Soil associated with this unit are grey heavy silty clays of low permeability, with some peat. The organic matter content of the soil is moderate. Soil reaction ranges from strongly acidic to neutral. Levels of CEC and Zn are high while that of other essential nutrients are medium.

The area is bisected by numerous former distributaries and tributaries of the Manu and Kushiyara rivers and many smaller drainage khals. The Kawadighi Haor is the largest, permanent waterbody in the area. Most of the other smaller waterbodies (beels) located in the north and northwest dry up during he winter months. Before the implementation of this project, 25-30 % of the area was permanently and deeply inundated.

Maximum temperatures vary from about 28° C to 36° C with the highest temperatures experienced during the period March to June. There is a significant diurnal fluctuation with minimum temperatures ranging from about 6° C to 23° C.

The mean annual rainfall over the project area is about 2,865 mm. The rainfall exhibits a seasonal pattern with upto 65 % of the annual total experienced during the monsoon period - June to September. The period from December to march is significantly dry with less than 5.5 % of the annual total.

The relative humidity is high throughout the year, with average humidity ranging from 72 to 88 %. The humidity is highest during the monsoon period June to September. The average wind speed varies from about 3.5 to 5.4 m/s with the highest speeds occuring in between March and July. Potential evapotranspiration rates reflect seasonal patterns with the highest rates of upto 4.9 mm/day during the pre-monsoon month in May. The lowest rates, 2.6 mm/day occur during the winter months - December and January.

14. Ecological features: (main habitats and vegetation types)

A group of six main freshwater lakes (beels). The beels are isolated from one another during the dry season, but unite to form a large lake during the rainy season. The waterbody supports various hydrophytes which are broadly grouped as submerged, free floating, rooted floating,

sedges & meadows, cropland and homestead vegetation. During lean period, when the water level is low edges of the beels are used for cultivation rice. Some high lands within the beels remain fallow and are used as grazing grounds for the cattle.

Due to shallowness the flood water recedes quickly and water is restricted in a few big beels. As a result most of the area comes under rice cultivation while the higher grounds and kands remain fellow for grazing.

The wetland and the surrounding areas are devoid of any reed plants and freshwater swamp forest trees but the peripheries of the homesteads do sometimes show a few of them among their own rich diversity.

In this wetland various plant communities exist namely:

Submerged: This type of vegetation remain fully submerged for their whole life cycle. The only part they produce above the water surface is flower. These plants are highly susceptible to seasonal fluctuation of water level, because they need water for their survival and regeneration. They started growing at the very early monsoon with the rise of water level and persist whole season as long as the water retain. The species included *Hydrilla verticillata, Ottelia alismoides, Naja sp., Sagittaria guayanensis, Aponogeton natans, A. appendiculatus, Ceratophyllum desmersum.*

Free Floating: This type of vegetation generally prefer to float freely in the water and collect their nutrient from it. But most of them can also survive on the moist soil up to a certain period penetrating their roots into the soil for water and nutrient. These plants are also found to be affected by the fluctuation of water level although their floating habit protect them from eradication. They are found to grow luxuriant in the stagnant water within the individual beels before monsoon. The species found in this community are : *Elchhornia crassipes, Utricularia aurea, U. exoleata, Salvinia cucullata, Nymphea stellata, N. nouchali, Nymphoides cristatum.*

Rooted Floating: This type of plants although rooted deeply in the soil but their leaves and flower float on the surface of the water. So they generally have a very long stalk for both the leaf and flower whereas the stem remain under water and some time beneath the soil. But few plants have long stems for floating instead of long stalk. Like the other plant communities in wetland these plants are also susceptible to seasonal fluctuation of water level. In the permanent bils they can survive and regenerate for the whole year. But in the seasonally flooded portions of Haor the perennial buds remain berried under soil, they started sprouting from their rhizomes or seeds with the arrival of water. The common species are : *Hygrorhyza aristata, Nymphea stellata, N. nouchali, Trapa maximowiczii, Limnophila sessiliflora.*

Sedges & Meadows: This is an ecotonal community consists of mostly amphibian plants or geophytes of emergent plants. The root of these plants remain under water while leaves exposed to the air. Generally this vegetation type occupy the water margin during the dry season with the increase of water level during the wet season this vegetation type remain submerged under water. The shoot part of the plants dies out under submerged condition and slowly decomposed into the water and enrich the water with organic matter. But due to their habitat characteristics

these plants again buildup their community at the shallow water margin. The species included *Schoenoplectus articulatus, Ipomoea fistulosa, Alternanthera philoxeroides, Polygonum barbatum, Polygonum sp., Scirpus juncoides, Fimbristylis sp., Cyperus cephalotus.*

Crop Field: It is a disturbed plant community and it contains plant species which is also common in other types. This community comprises both wetland as well as open dry land smaller herbs. But their composition depend on the situation of waterlogging in the respective field. Due to their habitat condition they are regarded as weeds and destroyed by the farmers. But their regeneration system is well adapted to survive unfavourable periods and to multiply rapidly, so the death rate due to human interference can be compensate. The species included *Cyperus sp., Lindernia crustacea, Nymphoides sp., Limnophila sp.*

Homestead vegetation: It is a very important plant community, although it is a synthetic one. Because every homestead contains two different types of plant. One is cultivated for its various economic value and another is self growing. The plants of the first category can be found all over the country and its composition is also more or less similar. But the organization of second community is more important because it shows the resemblance with nearby natural plant types. Some of the common tree species in this haor : *Barringtonia acutangula, Bambusa sp., Calamus tenuis, Cocos nucifeça, Crataeva nurvala, Ficus bengalensis, Lagerstromia speciosa, Mangifera indica, Pongamia pinnata, Syzygium cumini, Trewia nudiflora,* and *Zizyphus mauritiana*

15. Land tenure/ownership of:

(a) site

The land is owned by the government and is leased out to the lease holder in exchange of some revenue for a year. Every year open public auction takes place for the lease.

(b) surrounding area

Contrasting variations are noticed in the land ownership. The average farm size of the households is 1.60 h. But in terms of farmer's category the difference in farm size varies significantly. The average farm size of the landless farmers is only 0.13 h, which is totally leased in land. Agricultural land ownership is mostly by the large farmers (47.8 %), followed by medium farmers (35.49 %) and small farmers own only 16.68 %. Per capita agricultural land of large, medium and small farmers are 1.09 h, 0.25 h, and 0.087 h respectively. Average per capita agricultural land is 0.226 h. Land tenurial pattern in the project area suggest that a number of arrangements are followed for land operation. 57 % of the farmers are owner operator while 12 % are owner-cum-barga leaser. Only share cropper is 3 % of the total farmers and owner-cum-share cropper is 12.5 %.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No national category exists for classification of wetlands and considering them as protected areas. The legal status of the wetlands is still not in favour of declaring them as protected areas. However, the government is keen in protecting some of the wetlands.

No conservation measures have been undertaken but the wetland is within the Manu River Irrigation Project. Because of this the whole project area is bounded by a full-flood embankment, with a barrage built upstream and irrigation canals within the project area. The project, so far has an adverse effect on the ecology of the wetland by destryoing the fish spawning ground, blocking the mirgatory route of fishes, stagnation of water thus encouraging aquatic weeds to flourish, etc., etc.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It has been identified and proposed as a key wetland site during the NERP/NACOM survey. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Antehari	**Abdullapur**	**Zahidpur**	**Berkuri**	**Fatepur**	**Dhulijura**
Rakta	**Kanikiari**	**Baragaon**	**Nawagaon**	**Jamalpur**	**Kandigaon**
Barabari	**Birahimabad**				

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

Open water fishery is the first priority. Other uses of the site include extraction of fodder plant species, thatching materials and edible parts (esp. fruits) of aquatic plants, extraction of molluscs for making duck feed and for pearls.

(b) surroundings/catchment

Major land use in the surroundings is for agricultural purposes. The major crop is rice (boro, aman and aus). No other crop with significant acreages are grown within the project area.

The cropping pattern is dependent on the flood depth, the deeply flooded areas being single cropped and the shallow flooded areas are either double or tripple cropped. About 24 % of the cultivable land of the project area is deeply flooded (with flood depth of more than 1.8 m) and is single cropped. Both local and HYV boro are grown in these areas. About 12 % of the cultivable land is in the medium flood depth region, with water depth varying between 0.9 - 1.8 m. The rest of the land is shallow flooded and can be triple cropped.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

1. Destruction of fish spawning ground;

2. Obstructing fish migrating route;
3. Influencing increase of aquatic weeds;
4. Increase in the rate of infestation of fish viral disease;

(b) surroundings/catchment

1. Siltation/sedimentation of the river bed;
2. Degradation of water quality;
3. Changes in the land fertility;
4. Use of more fertilizers and pesticides;
5. Drainage congestion.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization etc.)

The area is protected from flooding by flood embankments along the right bank of the Manu river from the southern Bhatera hills to Manumukh and along the left bank of Kushiyara from the northern Bhatera Hills to Manumukh. The Bhatera hills forming the eastern boundary is also the upper catchment of the area. Maulvibazaar town has been constructed on both banks of the Manu river and the major part on the right bank is frequently threatened by flooding.

The Manu, Kushiyara and Dhalai rivers are the principal water courses and are subject to flash floods. The Kushiyara river has a high catchment area, most of this area is in India but 520 km^2 is in Bangladesh. The Manu and Dhalai rivers originate in Lushai hill range in India; the Dhalai river flows into the Manu river about 4.6 km upstream of the Manu Barrage site. From its point of origin in India upto its confluence with the Kushiyara at Manumukh, the Manu is about 182 km in length. The Manu and Dhalai rivers have catchment areas of 2226 km^2 and 572 km^2 respectively in India and 59.5 km^2 and 292.5 km^2 respectively in Bangladesh upto their confluence point.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

This haor was known for its fishes prior to the inception of the MRIP. Existing project water level managemen indicates that areas under standing waterbodies has been decreased significantly. Consequently this has reduced the fish population and has adverse impact over the livelihood of fishermen. Every year these waterbodies are leased out for fishing. Open water capture fishery predomonates in the area yielding a total fish production of about 450 tonnes per year from eight beels and rivers/channels and 2310 h of floodplain (the low areas which dry up between November and February).

Information from the old villagers adjacent to the haor suggest that there was once freshwater swamp forest in the northwestern part of the wetland. Presently no such forest exist except some lonely *Barringtonia* to witness the changes in the haor system.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibia: *Bufo melanostictus, Rana tigerina, Rana limnocharis, Rana cyanophlyctis.*

Reptilia: *Varanus bengalensis, Xenochrophis piscator, Enhydris enhydris, Atretium schistosum, Aspideretes hurum, Lissemys punctata.*

Aves: Little Grebe, Grey Heron, Purple Heron, Cotton Pygmy Goose, Shoveler, Gadwall, Ferruginous Duck, Ruddy Crake, Watercock, Purple Swamphen, Coot, Pheasant-tailed Jacana, Bronze-winged Jacana, Oriental Pratincole, Redwattled Lapwing, Blackwinged Stilt, Spotted Redshank, Marsh Sandpiper, Little Stint, Blackheaded Gull, Whiskered Tern, Common Tern, Blackwinged Kite, Western Marsh Harrier, Eastern Marsh Harrier, Pied Harrier, Crested Serpent Eagle, Pallas's Fish Eagle, Steppe Eagle, Kestrel, Peregrine Falcon.

Mammalia: Small Indian Mongoose, Fishing Cat, Jackal, Large Indian Civet, Bandicot Rat, Gangetic Dolphin (in the Kushiyara & Monu rivers)

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Potamegeton mucronatus, P. crispus, Hydrilla verticillata, Ottelia alismoides, Vallisnaria spiralis, Najas sp., Blyxa sp., Ceratophyllum desmersum, Myriophyllum tetrandrum, M. tuberculatum, Sagittaria sagittifolia, S. guayanensis, aponogeton natans, A. undulatus, A. appendiculatus.*

Free Floating: *Eichhornia crassipes, Utricularia aurea, U. exoleata, U. stellaris, Pistia stratiotes, Spirodella polyrhiza, S. punctata, Wolffia microscopia, Lemna perpusilla, Salvinia natans, S. cucullata, Azolla pinnata.*

Rooted Floating: *Nymphea stellata, N. nouchali, Nymphoides cristatum, N. indicum, Hygrorhyza aristata, Panicum paludosum, Pseudoraphis spinescens, P. brunoninan, Trapa maximowiczii, Limnophila indica, L. sessiliflora, L. heterophylla.*

Sedges & Meadows: *Monochoria hastata, Cyperus sp., Eleocharis dulcis, Schoenoplectus articulatus, Ludwigia abscendens, Ipomoea fistulosa, I. aquatica, Alternanthera philoxeroides, Aeschynomene aspera, A. indica, Sesbania roxburghii, Enhydra fluctuans, Eclipta alba.*

Crop Field: *Cyperus cephalotes, Cyperus sp., Monochoria hastata, Aponogeton appendiculatus, Eichhornia crassipes, Sagittaria guayanensis, S. sagittifolia, Lindernia crustacea, Nymphoides sp., Limnophila sp., Alternanthera sessilis.*

Homestead: *Pongamia pinnata, Barringtonia acutangula, Crataeva nurvala, Lagerstromia speciosa, Trewia nudiflora, Mangifera indica, Ficus hispida, Ficus sp., Albizia procera, Artocarpus heterophyllus, Syzygium cumini, Bambusa sp., Salix tetrasperma, Pandanus sp., Zizyphus mauritiana, Musa paradisiaca.*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

Under the Flood Action Plan (FAP) various studies are being carried out which include fisheries, wildlife, flora, sociology, hydrology, sedimentology. Detailed studies on the fauna, flora have been done while some studies related to fisheries and social anthropology are still continuing within NERP (FAP-6) sponsored by CIDA. ODA funded FAP-17 are also conducting a study on fisheries in Kawadighi Haor. Temporary field stations (till June 1994) were established by FAP-6 and one of them is still in function. However, NERP (FAP-6) has a guest house in Maulvibazaar, 15 km south of the haor.

The haor area is within the Manu river irrigation project, so prior to the inception of the project several studies on the engineering, topography, hydrology, etc., were carried out. Unfortunately no detailed studies were undertaken on biological resources like fisheries.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

No such activities exist but through the NERP/NACOM initiative, planning is underway to start an environmental research and education centre on an experimental basis. Activities of this centre

will be extended to Kawadighi Haor too.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

No facilities are available for recreation or tourism. Eco-tourism is in infancy in Bangladesh and also not well understood. It will take time before any such recreational activities begin. The wetland is visited by duck hunters during the winter months when the migratory ducks are wintering here.

27. Management authority: (name and address of body responsible for managing the wetland)

Additional Deputy Commissioner (Revenue), Maulvibazar.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Maulvibazar and Rajnagar Upazilla under Maulvibazar District.

Functional: Additional Deputy Commissioner (Revenue), Maulvibazaar under the Ministry of Land.

29. Bibliographical references: (scientific/technical only)

Scott,D.A. 1989. Asian Wetland Directory. IUCN/WWF

Scott D.A. & Rashid, S.M.A. 1992. Wetland Assessment and Ornithological Main Surveys. SLI/NHC/AWB/NACOM.

Karim,A., Khan, M.S., Sobhan,I., Rashid, S.M.A. & Khan,A.Z. 1992. Wetland Assessment Surveys:Interim Report. SLI/NHC/NACOM.

Anonymous. 1990. Rapid Rural Appraisal:Manu River Project. 21 pp.

BWDB. 1992. Systems Rehabilitation Project : Manu River Irrigation Project. 26 pp.

BUET. 1990. Evaluation of the Manu River Irrigation Project. 65 pp.

NERP. 1993 (December). Manu River Improvement project.

NERP. 1993 (April). Fisheries Specialist Studies.

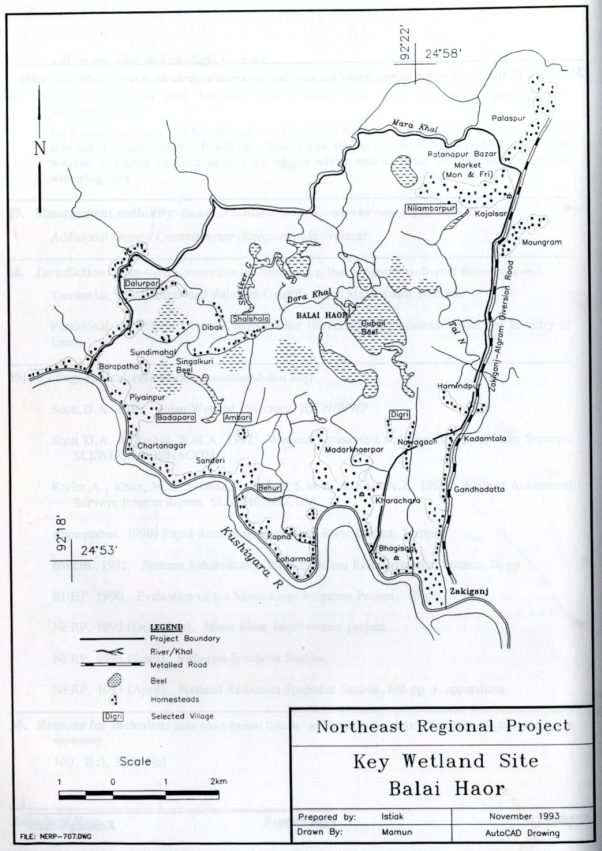
NERP. 1993 (April). Wetland Resources Specialist Studies. 106 pp + appendices.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

1(c), 2(c), 3(b), 3(c)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed



INFORMATION SHEET FOR KEY WETLAND SITE

Ramsar format, as approved by Rec.C.4.7 of the Conference of the Contracting Parties, Montreux, Switzerland - July 1990.

1. Country: Bangladesh **2. Date:** 27-04-94 **3. Ref:** office use only

4. Name and address of compilers:

S. M. A. Rashid/ Istiak Sobhan
Nature Conservation Movement (NACOM)
House No: 16, Road No: 2, Amtali,
Banani, Dhaka - 1212,
BANGLADESH

Dr. Sara L. Bennett
Northwest Hydraulic Consultants
#2-40 Gostick Place
N. Vancouver BC
CANADA V7M 3G2

5. Name of wetland:

BALAI HAOR

6. Date of Ramsar designation:

not yet proposed for designation

7. Geographical coordinates:

24°53′ N to 24°58′ N and 92°18′ E to 92o22′ E

8. General location: (e.g. administrative region and nearest large town)

It is situated about 75 km east-northeast of Sylhet District town and 2 km northwest of Jukiganj township. Its location is between the two rivers, Surma in the north and Kushiyara flowing in the south.

9. Area: (in hectares)

3981

10. Wetland type: (see attached classification, also approved by Montreux Rec.C.4.7)

N (Seasonal/intermittent streams, creeks, rivers); O (Permanent freshwater lake); T (Seasonal intermittent freshwater marshes); W (Shrub dominated wetland).

11. Altitude: (average and/or maximum & minimum)

Minimum: 10.5 m (PWD)

Maximum: 12.5 m (PWD)

12. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

Balai Haor is an isolated haor between the Surma and Kushiyara rivers in the extreme east of the northeastern region of Bangladesh. It is a complex of 59 beels, the principle ones being Dubail, Jugni, and Khagrakuri beels. These are surrounded by heavily grazed pastureland and rice fields. Most of the many low embankments and margins of the water courses have been invaded by dense stands of the introduced exotic plant *Ipomoea fistulosa* (Convolvulacae) and this is now spreading out into cultivable areas.

13. Physical features: (e.g. geology; geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuations in water level; tidal variations catchment area; downstream area; climate)

The location of the haor, in the extreme east of the northeastern region of Bangladesh.

The hydrology of the wetland depends on the Surma and Kushiyara Rivers, distributaries of the Borak River. The main waterway inside the wetland is Tal Nadi, which emerges from the Kushiyara below the bifurcation of the Barak river at Amalshid. It takes diferent names at different sections, flows through the wetland, branches off before joining the Kushiyara again. The Surma and Kushiyara Rivers, which flow on the high ridges, define the natural boundaries of the wetland. As the interior part of the basin is below the bank of the rivers, the rivers dominate the flooding and also control drainage from the area. Water level in the Surma and Kushiyara Rivers remain above the basin level for most of the monsoon season, which restricts gravity drainage.

Soils in the area were developed from alluvial sediments laid down by the Surma and Kushiyara Rivers. Heavy clay soils occur in the deeply flooded basins. Silty clay soils occur on low, smoothed-out ridges and basin edges. The finely textured soils (silty clays and clays) are poorly to very poorly drained, grey to dark grey in colour and have low available moisture holding capacity.

The wetland serves as a water storage area during flash floods. During flash floods and unpredecented rain when the volume of water discharge increases at both the rivers almost simultaneously, Balai Haor acts as a storage area minimising the loss.

The wetland is a bit different from the other haors because of its shallowness and broader expanse with most of the area, being shallow, are cultivated during non-flooding season. It is surrounded by villages on all sides - prone to exploitation and disturbance - and with a metalled road cutting the wetland area into half. The wetland is devoid of any trees excepting some lonely Hizals (*Barringtonia acutangula*) on the village edges. The higher grounds and edges of the water courses are over-grown by *Ipomoea fistulosa*, which provides fuel substitute to the local people and cover to the few remaining wildlife particularly birds. The homestead in the adjoining villages are very rich in tree cover and species diversification providing possibly the main shelter to the wildlife.

The climatic features of the region are subtropical-monsoon in nature with three prominent seasons, viz. summer, monsoon and winter. Summer begins in April through to June. During

this period the average mean temperature ranges from 30.9 to 33.4° C. The monsoon is the rainy season, extending from June to September with 80 % of the annual rainfall during this period. The average mean temperatures fluctuate between 25.8 to 29° C. Winter is the following season with the peak cold weather in December and January. Prior to these during October/November and at the later part during February/March the weather is intermittently cold. The temperatures during this period range between 8.5° to 16.6° C. Average annual rainfall is about 4000 mm. The mean relative humidity varies between 83 % in the wet season and 64 % in the dry season.

14. Ecological features: (main habitats and vegetation types)

Balai Haor is different ecologically from the other haors in the region because of its shallowness, its location between two rivers, and functioning as water reservoir during flash floods.

Due to shallowness the flood water recedes quickly and water is restricted mostly in the river and the three big beels. As a result most of the area comes under rice cultivation while the higher grounds and edges of water courses support dense growth of *Ipomoea fistulosa*.

The wetland and the surrounding areas are devoid of any reed plants and freshwater swamp forest trees but the peripheries of the homesteads do sometimes show a few of them among their own rich diversity.

In the beels various plant communities exist namely:

Submerged: This type of vegetation remain fully submerged for their whole life cycle. The only part they produce above the water surface is flower. These plants are highly susceptible to seasonal fluctuation of water level, because they need water for their survival and regeneration. They started growing at the very early monsoon with the rise of water level and persist whole season as long as the water retain. The species included *Hydrilla verticillata, Ottelia alismoides, Naja sp., Sagittaria guayanensis, Aponogeton natans, A. appendiculatus, Ceratophyllum desmersum*.

Free Floating: This type of vegetation generally prefer to float freely in the water and collect their nutrient from it. But most of them can also survive on the moist soil up to a certain period penetrating their roots into the soil for water and nutrient. These plants are also found to be affected by the fluctuation of water level although their floating habit protect them from eradication. They are found to grow luxuriant in the stagnant water within the individual beels before monsoon. The species found in this community are : *Eichhornia crassipes, Utricularia aurea, U. exoleata, Salvinia cucullata, Nymphea stellata, N. nouchali, Nymphoides cristatum*.

Rooted Floating: This type of plants although rooted deeply in the soil but their leaves and flower float on the surface of the water. So they generally have a very long stalk for both the leaf and flower whereas the stem remain under water and some time beneath the soil. But few plants have long stems for floating instead of long stalk. Like the other plant communities in wetland these plants are also susceptible to seasonal fluctuation of water level. In the permanent bils they can survive and regenerate for the whole year. But in the seasonally flooded portions of Haor the perennial buds remain berried under soil, they started sprouting from their rhizomes or seeds with the arrival of water. The common species are : *Hygrorhyza aristata, Nymphea stellata, N.*

nouchali, Trapa maximowiczii, Limnophila sessiliflora.

Sedges & Meadows: This is an ecotonal community consists of mostly amphibian plants or geophytes of emergent plants. The root of these plants remain under water while leaves exposed to the air. Generally this vegetation type occupy the water margin during the dry season with the increase of water level during the wet season this vegetation type remain submerged under water. The shoot part of the plants dies out under submerged condition and slowly decomposed into the water and enrich the water with organic matter. But due to their habitat characteristics these plants again buildup their community at the shallow water margin. The species included *Schoenoplectus articulatus, Ipomoea fistulosa, Alternanthera philoxeroides, Polygonum barbatum, Polygonum sp., Scirpus juncoides, Fimbristylis sp., Cyperus cephalotus.*

Crop Field: It is a disturbed plant community and it contains plant species which is also common in other types. This community comprises both wetland as well as open dry land smaller herbs. But their composition depend on the situation of waterlogging in the respective field. Due to their habitat condition they are regarded as weeds and destroyed by the farmers. But their regeneration system is well adapted to survive unfavourable periods and to multiply rapidly, so the death rate due to human interference can be compensate. The species included *Cyperus sp., Lindernia crustacea, Nymphoides sp., Limnophila sp.*

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15. Land tenure/ownership of:

(a) site

The wetlands are leased out to the lease holder for three years, under a Fisheries Development Scheme by the local authorities under the Ministry of Land.

(b) surrounding area

There are some government owned land (khas land) leased out to the people and the remaining lands are privetly owned.

16. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

No conservation measures have yet been taken and have no legal status as a protected area. No officially approved management plan exist. No national priority categorization exist but this Haor seems to be of National importance.

17. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

It has been identified and proposed as a key wetland site during the NERP/NACOM survey. A locally based management system is also proposed for all the key wetlands of the northeast region of Bangladesh in Northeast Environmental Management, Research, and Education Project (NEMREP). According to that plan the following villages would be the center of all managemental activities of this wetland (see attached map).

Ambari	**Dubrirpur**	**Shaitshowla**	**Hamindpur**	**Dakshin Bipak**
Badarpur	**Dalurpar**	**Degree**	**Nilambarpur**	

The cause for selecting these villages is for their close tie and high dependency on the wetland. Moreover accessibility and population density is also taken into account.

18. Current land use - principal human activities in:

(a) site

Mostly fishing. Other than this the wetland is utilized for pumping out water during dry season for irrigating the adjacent paddy fields. Cattle, mostly buffaloes are grazed in and around the wetland. Fruits of several aquatic plants (*Trapa, Ottelia, Nymphea*) are collected by the local people for either self consumption or selling them in the markets. Several other aquatic plants *Ipomoea aquatica, Alternanthera sp., Xanthium indicum* (young leaves), etc., are consumed as well as sold in the markets. Molluscs are collected, which after being crushed are used as duck feed. Among some of the molluscs - the freshwater mussel, *Unio sp.*, has a special demand among the jewellers for Pink Pearl. Areas near the water edge are used as nursery beds for rice. During monsoon floods, when most of the area is underwater the wetland areas become the principal areas for transportation by local country boats. All these activities provide some opportunities for local employment.

(b) surroundings/catchment

The surrounding areas are mostly cultivable land which during the rice growing period are under cultivation and at other times remains fallow and is used for grazing the cattle. The main water supply comes in from the Tal Nadi. It takes various names along its length. It originates from the Kushiyara below the bifurcation of the Barak river into Surma and Kushiyara at Amalshid, and flows into the Kushiyara after traversing through the wetlands ending up in numerous channels.

Most of the higher grounds within the haor and edges of the waterways have been dominated by an introduced exotic plant species, *Ipomoea fistulosa* (dhol kolmi). It is reported that these plants are even invading the cultivable lands. The local people have to put in a lot of effort to keep them away. The branches of this plant are cut, squashed on the roads to dry and later used as fuel wood. During drier months these are cut in the field and left there for several days before being collected for utilisation.

19. Disturbances/threats, including changes in land use and major development projects: (factors which may have a negative impact on the ecological character of the wetland)

(a) site

Upper Surma-Kushiyara Project (NERP Proposed Project), in which upgrading of existing embankment and reexcavation on drainage channels are proposed.

A metalled road is under construction through the wetland joining Jukiganj with the Sylhet Highway reducing the distance between Sylhet and Jukiganj by almost 20 km. With the construction of the road, which is near completion, the volume of transport and other mode of movement will increase. This will cause a general disturbance to the wetland environment and the inhabitants. With increased transportation facilities the rate of exploitation will also go up.

Dewaterization of beels for fishing and utilization of beel water for irrigation.

(b) surroundings/catchment

Balai Haor has been proposed under the flood action plan for water storage and increasing drainage during the flash floods and peak monsoon floods. Its location between the rivers Surma (in the north) and Kushiyara (in the south) has been a strategic one in terms of water drainage and flood control.

20. Hydrological and physical values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

The area is a part of the Upper Meghna Valley alluvium. Sediments carried by the Surma and Kushiyara Rivers have gradually built up the land. The deposits are predominantly fine textured silts and clays which have poor water bearing capacity. Therefore, there is a limited possibility of recharging ground water.

21. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

About 5-6 important permanent beels exist within Balai haor which serve as overwintering refuges for the species present in the area. Of the 133 species identified in the region, about 56 species inhabit this Surma-Kushiyara floodplain and beel. During monsoon season, water from the Surma and Kushiyara Rivers flows in through open khals, breached dykes, and by overtopping both the river banks. Most of the beels are interlinked with each other by narrow channels. Fish production in the haor has apparently declined by 30-40% over the last 5 years

This wetland is an important attraction for the local people living around the wetland. The wetland is the only source of water available to the locals. Rice cultivation during the dry season is totally dependent on irrigation for water pumped from the beel. Fishing is also an important activity. The beel as well as the Tal nadi are leased out for fishing. The fallow land around the wetland, which are seasonally inundated, are being heavily grazed serving as a pasture land for the cattleheads. The higher grounds are over-grown with an introduced exotic plant species, *Ipomoea fistulosa*, which provides the local people with fuelwood substitute. Fruits from aquatic

plants provide supplementary food and some hydrophytes are utilized as fodder.

22. Noteworthy fauna: (e.g. unique, rare endangered, abundant or biogeographically important species; include count data etc.)

Amphibians: *Bufo melanostictus* (Toad: kuno bang); *Rana tigrina* (Bull Frog: sona bang); *Rana cyanophlyctis* (Skipper Frog: kotkoti bang); *Rana temporalis* (Cricket Frog: gechu bang)

Reptiles: *Varanus bengalensis* (Monitor Lizard: kalo gui), *Hemidactylus brooki* (House Lizard: tiktiki), *Xenochrophis piscator* (Checkered Keelback: dora sap), *Enhydris enhydris* (Smooth Water Snake: maitta sap), *Cerberus rhynchops* (Dog-faced Water Snake: andha sap), *Ptyas mucosus* (Rat Snake: daraish sap), *Bungarus fasciatus* (Banded Krait: sankhini sap), *Naja n. kaouthia* (Monocellate Cobra: jati sap, gokra sap), *Hardella thurjii* (Brahminy Turtle: kali kaitta), *Kachuga tecta* (Common Roof Turtle: kori kaitta), *Lissemys punctata* (Spotted Flapshell: sundi kasim).

Aves: Purple Heron (beguni bok), Grey Heron (koira), Openbill Stork (shamuk khol), Adjudant Stork (madantak, hargila), White Ibis (kastey chura), Shoveller (maulvi hansh), Common Teal (bali hansh), Ruddy Shelduck (chokha chokhi), Pheasant-tail Jacana (jol pipi), Steppe Eagle, Western Marsh Harrier, Pied Harrier.

Mammals: Fishing Cat, Small Indian Mongoose, Smooth Indian Otter, Jackal, Flying Fox, Fruit Bat.

23. Noteworthy flora: (e.g. unique, rare endangered, or biogeographically important species/communities etc.)

Submerged: *Hydrilla verticillata, Ottelia alismoides, Najas sp., Sagittaria guayanensis, Aponogeton natans, A. appendiculatus, Ceratophyllum desmersum.*

Free Floating: *Eichhornia crassipes, Utricularia aurea, U. exoleata, Nymphea stellata, N. nouchali, Salvinia cucullata, Nymphoides cristatum.*

Rooted Floating: *Hygrorhyza aristata, Nymphea stellata, N. nouchali, Trapa maximowiczii, Limnophila sessiliflora.*

Sedges & Meadows: *Schoenoplectus articulatus, pomoea fistulosa, Alternanthera philoxeroides, Polygonum barbatum, Polygonum sp., Scirpus juncoides, Fimbristylis sp., Cyperus cephalotus.*

Crop Field: *Cyperus sp., Lindernia crustacea, Nymphoides sp., Limnophila sp.*

24. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

One year study on the flora, fauna and ethno-biology was carried out by NERP/NACOM studies from February 1992 through January 1993. Studies on the hydrology, sedimentology are currently being undertaken by NERP. No other facilities exist excepting the logistics support till August, 1993 through NERP.

25. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

Presently no such facility exists but through NERP/NACOM initiative an experimental conservation and education centre is planned to be launched in the near future.

26. Current recreation and tourism: (state if wetland used for recreation/tourism; indicate type & frequency/intensity)

Eco-tourism has not yet set its pace in Bangladesh. It has to be appreciated and encouraged. Some visitors do visit the wetland from time to time but most of them come with a gun rather than a conservation message. Few scientists have recently started visiting the wetlands for scientific exploration. It is mostly visited by hunters to shoot ducks during the winter months.

27. Management authority: (name and address of body responsible for managing the wetland)

The wetland is managed by the local thana administrative authority located at Jukiganj under the jurisdiction of the Additional Deputy Commissiner (Revenue), Sylhet District. The wetland is under the direct administration of the Ministry of land.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture. Dept of Environment etc.)

Territorial: Jukiganj Thana Parishad, Jukiganj; Sylhet District.

Functional: Ministry of Land.

29. Bibliographical references: (scientific/technical only)

Scott, D.A. & Rashid, S.M.A. 1992. Ornithological Main and Wetland Assessment Studies. SLI/NHC/NERP/NACOM.

Karim,A; Khan,S; Sobhan,I; Rashid,S.M.A. & Khan,A.Z. 1992. Interim Report on Wetland Assessment Studies. SLI/NHC/NERP/NACOM.

ISPAN. 1992. Environmental Impact Assessment: Case Study - Surma-Kushiyara Project. 226 pp

SLI/NHC. 1992. Regional Water Management Plan. Draft Report on Regional Consirderations. 110 pp.

NERP. 1993 (April). Upper Surma-Kushiyara Project.

30. Reasons for inclusion: (state which Ramsar Criteria - as adopted by Rec.C.515 of the Montreux Conference - are applicable)

1(d), 2(b), 3(b)

31. Map of site (please enclose the most detailed and up-to-date map available - preferably at least 1:25,000 or 1:50,000)

Enclosed

ANNEX D

SPECIES LISTS

Table D.1: Wetland plant species by community

Codes: Ex = Exotic; A = Annual; P = Perennial; H = Herb; S = Shrub; T = Tree; Tl = Treelet; C = Climber

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Submerged										
Aponogeton natans	Aponogetonaceae	ghechu			x	x				
Aponogeton undulatus	Aponogotonaceae	ghechu			x	x				
Aponogeton appendiculatus	Aponogetonaceae	ghechu			x	x				
Blyxa echinosperma	Hydrocharitaceae	shayala		x		x				
Ceratophyllum desmersum	Ceratophyllaceae	jhangi, katajhangi			x	x				
Ceratophyllum submersum	Ceratophyllaceae	jhangi			x	x				
Hydrilla verticillata	Hydrocharitaceae	kureli, jhangi			x	x				
Nachamendra alternifolia	Hydrocharitaceae	kaisa		x	x	x				
Myriophyllum tuberculatum	Haloraceae	--		x		x				
Myriophyllum tetrandrum	Haloraceae	--		x		x				
Najas sp.	Najadaceae	goisa		x		x				
Ottelia alismoides	Hydrocharitaceae	panikola, kaorali		x	x	x				
Potamogeton crispus	Potamogetonaceae	keorali		x	x	x				
Potamogeton pectinatus	Potamogetonaceae	keorali			x	x				
Potamogeton mucronatus	Potamogetonaceae	keorali			x	x				
Rotala rotundifolia	Lythraceae	--		x		x				
Rotala wallichii	Lythraceae	--		x		x				
Sagittaria guayanensis spp.*lappula*	Alismataceae	muamia, kaowathukri			x	x				
Sagittaria sagittifolia	Alismataceae	chhotokul			x	x				
Vallisnaria spiralis	Hydrocharitaceae	pataseola, bicha		x	x	x				
Free Floating										
Azolla pinnata	Salviniaceae	kutipana			x	x				
Eichhornia crassipes	Pontederiaceae	kochuripana			x	x				
Lemna perpusilla	Lemnaceae	khudipana			x	x				

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Pistia stratiotes	Araceae	topapana			x	x				
Salvinia cucullata	Salviniaceae	kuripana, indurkan			x	x				
Salvinia natans	Salviniaceae	tetulapana			x	x				
Spirodela punctata	Lemnaceae	khudipana			x	x				
Spirodela polyrhiza	Lemnaceae	khudipana			x	x				
Utricularia exoleata	Lentibulariaceae	chhotojhangi		x		x				
Utricularia aurea	Lentibulariaceae	chhotojhangi		x		x				
Utricularia stellaris	Lentibulariaceae	chhotojhangi			x	x				
Wolffia arrhiza	Lemnaceae	guripana			x	x				
Wolffia microscopica	Lemnaceae	guripana			x	x				
Rooted Floating										
Echinochloa colonum	Gramineae	parua		x	x	x				
Echinochloa sp.	Gramineae			x		x				
Eragrastis tenella	Gramineae	koni		x		x				
Euryale ferox	Nymphaeaceae	makhna		x	x	x				
Hygroryza aristata	Gramineae	phutki			x	x				
Leersia hexandra	Gramineae	--		x		x				
Limnophila indica	Scrophulariaceae	karpur		x		x				
Limnophila sessiliflora	Scrophulariaceae	bijatighash		x		x				
Limnophila heterophylla	Scrophulariaceae	karpur		x		x				
Mersilea quadrifoliata	Mersileaceae	sushnisak		x	x	x				
Nelumbo nucifera	Nymphaeaceae	padma			x	x				
Nymphaea stellata	Nymphaeaceae	nilshapla			x	x				
Nymphaea nouchali	Nymphaeaceae	sada, raktoshapla			x	x				
Nymphoides cristatum	Menyanthaceae	chandmala			x	x				
Nymphoides indicum	Menyanthaceae	panchuli			x	x				
Panicum paludosum	Gramineae	--		x		x				
Pseudoraphis spinescens	Gramineae	erali			x	x				

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Pseudoraphis brunoninan	Gramineae	--			x	x				
Trapa maximowiczii	Trapaceae	singra, paniphal			x	x				
Sedges & Meadows										
Aeschynomene aspera	Leguminosae	shola, banda		x			x			
Aeschynomene indica	Leguminosae	katshola, bhatshola		x			x			
Alternanthera philoxeroides	Amaranthaceae	helencha		x		x				
Arundo donax	Gramineae	baranal, gobanal		x		x				
Cleome hasslerana	Capparidaceae	nunirleta, hurhuri	x	x		x				
Clinogyne dichotoma	Marantaceae	sital-pati			x		x			
Colocasia esculenta	Araceae	kachu			x	x				
Cyperus sp.	Cyperaceae	mutha		x		x				
Eclipta alba	Compositae	kalokeshi, kalohuza		x	x	x				
Eleocharis dulcis	Cyperaceae	panichaise		x		x				
Enhydra fluctuans	Compositae	helencha, harhach			x	x				
Fimbristylis dichotoma	Cyperaceae	joina chaise			x	x				
Fimbristylis miliacea	Cyperaceae	joina, chatkighash		x		x				
Fimbristylis squarrosa	Cyperaceae	jumka chaich		x		x				
Hemarthria protensa	Gramineae	chailla		x		x				
Ipomoea aquatica	Convolvulaceae	kalmi shak			x	x				
Ipomoea fistulosa	Convolvulaceae	dhol kalmi	x		x		x			
Ludwigia abscendens	Onagraceae	kesardam, mulcha		x		x				
Ludwigia repens	Onagraceae	panidoga		x		x				
Monochoria hastata	Pontaderiaceae	baranukha, kechur			x	x				
Oryza rufipogon	Gramineae	jhara dhan		x		x				
Polygonum glabrum	Polygonaceae	bishkatali, kukra		x		x				
Polygonum stagninum	Polygonaceae	bishkatali, kukra		x		x				
Polygonum lanatum	Polygonaceae	kukra		x		x				
Polygonum pedunculare	Polygonaceae	kukra		x		x				

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Polygonum barbatum	Polygonaceae	bishkatali		x		x				
Rumex dentata	Polygonaceae	bonpalong		x		x				
Setaria glauca	Gramineae	kulkulle, kauni		x		x				
Seteria fusca	Gramineae	pinginatchi		x		x				
Schoenoplectus articulatus	Cyperaceae	--		x		x				
Scirpus juncoides	Cyperaceae	chisra			x	x				
Sclerostachya fusca	Gramineae	ekor,khuri		x		x				
Sesbania roxburghii	Leguminosae	huli, phuli		x			x			
Vetiveria zizanioides	Gramineae	binna, gandhabena			x	x				
Xanthium indicum	Compositae	ghagra, khagra		x		x				
Reeds										
Asclepias sp.	Asclepidiaceae				x					x
Asparagus racemosus	Liliaceae	satamuli, hilum			x		x			
Ficus heterophylla var. *heterophylla*	Moraceae	bonolat, baladumur			x		x			
Lippia javanica	Verbenaceae	bhuiokra			x		x			
Phragmites karka	Gramineae	khagra, nol			x		x			
Rosa involucrata	Rosaceae	gunja kata			x		x			
Saccharum spontaneum	Gramineae	khag, aisha			x		x			
Swamp Forest										
Barringtonia acutangula	Lecythidaceae	hijal			x			x		
Crataeva nurvala	Capparidaceae	barun			x			x		
Phyllanthus disticha	Euphorbiaceae	chitki			x		x			
Phyllanthus reticulatus	Euphorbiaceae	chitki			x		x			
Pongamia pinnata	Papilionoideae	karanch			x			x		
Salix tetrasperma	Salicaceae	bias, panihijal			x			x		
Trewia nudiflora	Euphorbiaceae	gotagamar, panidumur			x			x		

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Crop Field										
Ageratum conyzoides	Compositae	fulkuri		x		x				
Alternanthera sessilis	Amaranthaceae	haicha, sachishak		x		x				
Amaranthus spinosus	Amaranthaceae	kata note		x		x				
Ceratopteris thalictroides	Parkeriaceae	--		x		x				
Chenopodium ambrosoides	Chenopodiaceae	chapali ghash		x		x				
Coldenia procumbens	Boraginaceae	tripankhi		x		x				
Cotula hemispherica	Compositae	kancha ghash		x		x				
Croton bonplandianum	Euphorbiaceae	morchaagra, banjhal		x		x				
Cuscuta australis	Convolvulaceae	swarnalata		x						x
Cynodon dactylon	Gramineae	durba		x		x				
Cyperus cephalotes	Cyperaceae	niratraba		x	x	x				
Cyperus sp. (three species)	Cyperaceae	--		x		x				
Centipeda orbicularis	Compositae	machiti, hachuti		x		x				
Dentella repens	Rubiaceae	sadaphuli, sadajabri			x	x				
Digitaria longiflora	Gramineae	chota fulka		x	x	x				
Dipteracanthus prostratus	Acanthaceae	--		x		x				
Eleocharis atropurpurea	Cyperaceae	panichaise		x		x				
Eleusina indica	Gramineae	gaicha, chapre		x		x				
Ethulia conyzoides	Compositae	--		x		x				
Eupatorium odoratum	Compositae	assamlata	x		x	x				
Euphorbia sp.	Euphorbiaceae	--		x		x				
Glinus lotoides	Molluginaceae	alughas, kakdim		x		x				
Graphalium luteo-album	--	--								
Grangea maderaspatana	Compositae	nemuti, namuti		x		x				
Hedyotis sp.	Rubiaceae	--		x		x				
Heliotropium indicum	Boraginaceae	hatisur		x		x				
Herpestis monniera	Scrophulariaceae	brahmishak		x		x				

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Hydrocotyle bupleuroides	Umbelliferae	--		x		x				
Hygrophila deformis	Acanthaceae	--		x		x				
Hygrophila polysperma	Acanthaceae	--		x		x				
Hyptes capitata	Labiatae	--		x		x				
Justicia gendarusa	Acanthaceae	nilnishinda		x		x				
Justicia simplex	Acanthaceae	--		x		x				
Lapidagathis sp.	--	--		x		x				
Leucas lavendulifolia	Labiatae	dron		x		x				
Lindernia crustacea	Scrophulariaceae	bhui		x		x				
Ludwigia hyssopifolia	Onagraceae									
Mimosa pudica	Leguminosae	lajjabati	x		x	x				
Nicotiana plumbaginifolia	Solanaceae	bantamak		x		x				
Paspalum conjugatum	Gramineae	dadkuri			x	x				
Persicaria viscosa	Polygonaceae	lalkukra		x		x				
Polygonum plebejum	Polygonaceae	--		x		x				
Pogostemon stellatus	Labiatae	--		x		x				
Rottboellia protensa	Gramineae	barajati			x	x				
Rorippa indica	Cruciferae	bansarisha			x	x				
Rungia pectinata	Acanthaceae	pindi		x		x				
Sarcochlamys pulcherrima	--	brihati, karabi		x		x				
Scoparia dulcis	Scrophulariaceae	bandhundi	x	x		x				
Solanum khasianum	Solanaceae	phutibegun		x	x	x				
Solanum filicifolium	Solanaceae	titbegun			x		x			
Solanum nigrum	Solanaceae	kakmachi		x		x				
Solanum torvum	Solanaceae	gothdegun			x		x			
Solanum indicum	Solanaceae	phutibegun			x		x			
Spilanthes acmella	Compositae	marhatitiga		x		x				
Triumfetta rhomboides	Compositae	banokra		x		x				

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Homestead										
Achyranthes aspera	Amaranthaceae	apang		x		x				
Aegle marmelos	Rutaceae	bel			x			x		
Alstonia scholaris	Apocunaceae	chatim			x			x		
Albizia sp.	Leguminosae	koroi			x			x		
Albizia procera	Leguminosae	sadakorai, silkorai			x			x		
Alpinia sp.	Zingiberaceae	tara			x	x				
Anthocephalus chinensis	Rubiaceae	kadom			x			x		
Aponomyxis polystachya	Meliaceae	ryana			x			x		
Ardisia sp.	Myrtaceae	narkoli			x				x	
Areca catechu	Palmae	supari			x			x		
Areca triandra	Palmae	bangua			x			x		
Artocarpus heterophyllus	Moraceae	khatal			x			x		
Azadirachta indica	Meliaceae	nim			x			x		
Bombax ceiba	Bombacaceae	shimul			x			x		
Bambusa sp. (four species)	Gramineae	bans			x			x		
Borassus flabellifer	Palmae	tal			x			x		
Caesalpinia crista	Leguminosae	letkanta			x				x	
Calamus tenuis	Palmae	jalibet			x					x
Cassia occidentalis	Leguminosae	barahalkasunda			x		x			
Cassia siamea	Leguminosae	minjuri, eskikoroi			x			x		
Caryota urens	Palmae	bansupari, chaur			x			x		
Centella asitica	Umbelliferae	thankuni			x	x				
Chaetocarpus castanocarpus	Euphorbiaceae	bulkokra			x			x		
Citrus grandis	Rutaceae	jambura			x			x		
Cleorodendrum siphonanthus	Verbenaceae	bamanhati, banchat			x		x			
Cocos nucifera	Palmae	natrikal			x			x		
Crotalaria saltiana	Leguminosae	jhanjhani								

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Diospyros perigrina	Ebenaceae	gab, deshigab			x			x		
Datura suaveolens	Solanaceae	rajghanta	x		x		x			
Erythrina variegata	Leguminosae	mander, piltamander			x			x		
Erythrina ovalifolia	Leguminosae	talimander			x			x		
Ficus benghalensis	Moraceae	bot			x			x		
Ficus rumphii	Moraceae	hijulia			x			x		
Ficus religiosa	Moraceae	assawath			x			x		
Ficus hispida	Moraceae	dumur			x			x	x	
Ficus sp.	Moraceae	chini bot			x			x		
Jasminum sp.	Oleaceae	--			x		x			
Lagerstromia speciosa	Lythraceae	jarul			x			x		
Lantana camara var. *aculeata*	Verbenaceae	--	x		x		x			
Litsaea sp.	Lauraceae	--			x			x		
Mangifera indica	Anacardiaceae	am			x			x		
Melochia corchorifolia	Starculaceae	tikiokra			x			x		
Mikania scandens	Compositae	assamlata			x					x
Mikania cordata	Compositae	veratilata	x		x					x
Musa paradisiaca var. *sapientum*	Musaceae	kala			x				x	
Ocimum americanum	Labiatae	tulshi			x		x			
Pandanus sp.	Pandanaceae	keya			x		x			
Physalis minima	Solanaceae	bantepari		x		x				
Randia sp.	Rubiaceae	--			x				x	
Ricinus communi	Euphorbiaceae	reri, bheranda		x	x		x			
Samanea saman	Leguminosae	rendi, raintree	x		x			x		
Sapium indicum	Euphorbiaceae	harua,batul			x			x		
Syzygium fruticosa	Myrtaceae	khudijam			x				x	
Syzygium cumini	Myrtaceae	kalojam			x			x		
Terminalia catappa	Combretaceae	kathadam, deshibadam			x			x		

NAMES			Ex	Habit						
Scientific Name	Family	Local Name		A	P	H	S	T	Tl	C
Temarindus indica	Leguminosae	tentul			x			x		
Torinia sp.	--	--			x			x		
Trichosanthes bracteata	Cucarbitaceae	makal			x			x		
Urena lobata	Malvaceae	--			x		x			
Zizyphus mauritiana	Rhamnaceae	boroi, kul			x				x	

Notes: Floodplain grassland community is composed of a mixture of species from the sedge-meadow and reed swamp communities. Some field specimens (grasses) have not yet been identified.

Table D.2: Lowland mammal, reptile, and amphibian species

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
CLASS MAMMALIA															
Order Primates															
Family Cercopithecidae															
Macaca mulatta	Rhesus Macaque	banor													R
Order Pholidota															
Family Manidae															
Manis crassicaudata	Indian Pangolin	bon rui								x		x		3	
Order Lagomorpha															
Family Leporidae															
Caprolagus hispidus	Hispid Hare	khorgosh		x					x			x		2	
Lepus nigricolles	Rufoustailed Hare	sashak										x		2	
Order Rodentia															
Family Sciuridae															
Cllosciurus pygerythrus	Irrawaddy Squirrel	badami kathbirali												1	
Family Hystricidae															
Hystrix indica	Indian Porcupine	sajaru												1	
Family Muridae															
Bandicota bengalensis	Mole Rat	indur												1	
Bandicota indica	Bandicot Rat	dhari indur												1	
Mus booduga	Field Mouse	metho indur												1	
Mus musculus	House Mouse	nengti indur												1	
Rattus rattus	Common House Rat	indur												1	
Family Soricidae															
Suncus murinus	Grey Musk Shrew	chika										x		1	

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
Family Pteropodidae															
Cynopterus sphinx	Short-nosed Bat	bucha kola badur													P
Pteropus giganteus	Flying Fox	badur												1	
Family Megadermatidae															
Megaderma lyra	False Vampire	dhani badur												1	
Family Vespertillionidae															
Hesperetenus tickellii	Tickell's Bat	chamchicka													P
Pipistrellus coromandra	Indian Pipistrelle	khudi chamchika												1	
Order Cetacea															
Family Platanistidae															
Platanista gangetica	Freshwater Dolphin	shu shuk		x					x			x		1	
Order Carnivora															
Family Canidae															
Canis aureus	Jackal	pati shial												1	
Vulpes bengalensis	Bengal Fox	khek shial					x					x		2	
Family Herpestidae															
Herpestes autopunctatus	Small Indian Mongoose	beji, nakul										x		1	
Herpestes edwardsi	Common Mongoose	bara beji										x		1	
Family Mustelidae															
Lutra lutra monticola	Eurasian Otter	ud biral							x			x		2	
Lutra perspicillata perspicillata	Smooth Indian Otter	shosh dharia, jaat dharia					x		x			x		1	
Family Viverridae															
Viverra zibetha	Large Indian Civet	bagdash												1	
Viverricula indica	Small Indian Civet	khatash							x			x		1	

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
Family Felidae															
Felis chaus	Jungle Cat	bon biral								x		x		2	
Felis viverrina	Fishing Cat	mecho biral								x		x		2	
Panthera pardus	Leopard	chita bagh		x					x			x			
Panthera tigris	Tiger	bagh		x					x			x			
Order Proboscidea															
Family Elephantidae															
Elephas maximus	Indian Elephant	hati		x					x			x		2	
Order Perissodactyla															
Family Rhinocerotidae															
Didermocoeros sumatrensis	Sumatran Rhinoceros	dui shinga gondar		x					x						
Rhinoceros sondiacus	Javan Rhinoceros	ek shinga gondar		x					x			x			
Rhinoceros unicornis	Great Indian Rhinoceros	ek shinga gondar		x					x						
Order Artiodactyla															
Family Suidae															
Sus salvinius	Pygmy Hog	khoday shukor		x					x						
Sus scrofa	Wild Boar	bonna shukor										x			
Family Bovidae															
Bos gaurus	Gaur	bon goru			x				x			x			
Bubalus bubalis	Wild Buffalo	bonna mahis		x								x			
Family Cervidae															
Axis porcinus	Hog Deer	natrini										x		3	

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
Cervus duvauceli	Swamp Deer	barosinga		x					x			x			
Cervus unicolor	Sambar	shambar										x		3	
CLASS REPTILIA															
Order Testudines															
Family Emydidae															
Cuora ambionensis	Malayan Box Turtle	diba kasim													L
Geoclemys hamiltoni	Spotted Pond Turtle	kalo kasim					x		x			x		1	
Hardella thurjii	Brahminy Turtle	kali kaitta												1	
Kachuga dhongoka	Three Striped Roof Turtle	tinsira kachap													L
Kachuga smithii	Brown Roof Turtle	boro kari kaitta													L
Kachuga sylhetensis	Sylhet Roof Turtle	sylhet katua					x								L
Kachuga tecta tecta	Common Roof Turtle	kori kaitta							x				x	1	
Morenia petersi	Bengal Eyed Turtle	holday kaitta										x		1	
Family Trionychidae															
Aspideretes gangeticus	Ganges Soft Shell	khalua kasim							x			x		3	
Aspideretes hurum	Peacock Soft Shell	dhum kasim							x			x		1	
Chitra indica	Narrow-headed Soft Shell	sim kasim													R,L
Lissemys punctata punctata	Flapshelled Spotted Turtle	sundi kachap							x				x	1	
Order Sauria															
Family Gekkonidae															
Gekko gecko	Wall Lizard	tokkhak										x		1	
Hemidactylus brooki	House Lizard	tiktiki												1	
Hemidactylus frenatus	Common Lizard	tiktiki												1	
Family Agamidae															
Calotes versicolor	Garden Lizard	raktochusha												1	

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
Mabuya carinata	Common Skink	anjan												1	
Family Varanidae															
Varanus bengalensis	Bengal Grey Lizard	gui shap							x			x		1	
Varanus flavescens	Yellow Common Lizard	shona gui					x		x			x		1	
Order Serpentes															
Family Pythonidae															
Python molurus molurus	Rock Python	ajogar, moyal		x					x			x			L
Family Dipradidae															
Lycodon jara	Yellow Wolf Snake	ghorginni													L
Pareas monticola	Assam Snail-eater	samukkhor													R
Family Natricidae															
Amphiesma stolata	Striped Keelback	dora shap													R
Atretium schistosum	Olive Keelback	mete shap												1	
Xenochrophis cerasogaster	Dark-bellied Marsh Snake	kalo mete dora													R
Xenochrophis piscator	Checkered Keelback	dhora shap												1	
Family Colubridae															
Ahaetulla nasutus	Common Vine Snake	laodoga												2	
Ptyas mucosus	Rat Snake	daraj												2	
Family Homalopsidae															
Cerberus rhynchops[1]	Dog-faced Water Snake	jalbora												1	
Enhydris enhydris	Smooth Water Snake	pyna shap												1	
Enhydris sieboldi	Siebold's Water Snake	pyna shap													L
Family Elaphidae															
Bungarus caeruleus	Common Krait	kal keotey												3	

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
Bungarus fasciatus	Banded Krait	shakini												2	
Naja naja kaouthia	Monocellate Cobra	gokhra												3	
Naja naja naja	Binocellate Cobra	khoia gokhra												2	
Order Crocodylia															
Family Crocodylidae															
Crocodylus palustris	Marsh Crocodile	kumir			x				x			x			
CLASS AMPHIBIA															
Order Anura															
Family Bufonidae															
Bufo melanostictus	Common Toad	kuno bang												1	
Family Microhylidae															
Kaloula pulchra	Kaloula Frog	bhenpu bang												1	
Microhyla ornata	Ornate Frog	china bang												1	
Microhyla rubra	Red Microhylid	lal china bang												1	
Uperodon globolosum	Balloon Frog	phatka bang													L
Family Ranidae															
Rana cyanophlyctis	Skipper Frog	kotkote bang												1	
Rana limnocharis	Cricket Frog	jhi jhi bang											x	1	
Rana temporalis	Tree Frog	gecho bang												2	
Rana tigrina	Bull Frog	sona bang								x			x	1	
Rana tytleri	Tytler's Frog	pana bang												1	
Family Racophoridae															
Rhacophorus leucomystax	Tree Frog	gecho bang												1	
Rhacophorus maculatus	Maculated Tree Frog	gecho bang												1	

Name			IUCN						CITES			Wildlife Act		Current regional observations	
Scientific	English	Bangla	Ex	E	V	R	I	K	I	II	III	P	G	NERP	Other
OVERALL TOTALS			0	10	4	0	5	1	21	6	0	31	5		
Families: 37															
Species: 89															
CURRENT TOTALS			0	1	2	0	5	1	10	6	0	22	4		
Families: 32															
Species: 77															

[1]Known to be anadromous in breeding habits, usually inhabits coastal brackish and saline waters.

Notes

Name
Scientific, English, and Bangla names of all species known or thought to have occurred in the lowlands (homestead and below) of the Northeast Region, rare visitors excepted.

IUCN
Global status as indicated in IUCN (1990). Coding:
- Ex Extinct
- E Endangered
- V Vulnerable
- R Rare
- I Indeterminate (known to be either Endangered, Vulnerable, or Rare)
- K Insufficiently known (suspected to be in one of the above categories)

CITES
Appendices I, II, and III to the Convention on International Trade in Endangered Species of Wild Flora and Fauna classify species as:
- I Species for which trading permits are never given

II Species for which international trade is controlled
III Species for which trade is controlled within (a) country, and the cooperation of other parties to the Convention is sought

Wildlife Act

Bangladesh Wildlife (Preservation) (Amendment) Act, 1974 lists 'game' (Schedule I, Part 1) and 'protected' animals (Schedule III):

P protected
G game

Current regional observations

Species observed (i) during NERP 1992-3 field surveys or (ii) other observers. Coding:

1 Direct encounter (seen), positive species identification
2 Contemporary species-specific physical evidence (nest, scat, etc.)
3 Recently captured live specimens
R Reported to NERP team by local observers
L Literature reports; recent NACOM sighting prior to NERP
P Presumed present

Table D.3: Bird species of the Northeast Region

Notes: The nomenclature and sequence follows King and Dickinson (1975). The 370 species listed here are all those observed during NERP 1992-3 field work, plus 36 waterfowl species known or thought to inhabit the region now or previously. + indicates upland forest birds, * indicates waterfowl; unmarked species can be found in both habitats.

* ***Great Crested Grebe*** *Podiceps cristatus*
* ***Little Grebe*** *Tachybaptus ruficollis*
* ***Great Cormorant*** *Phalacrocorax carbo*
* ***Little Cormorant*** *Phalacrocorax niger*
* ***Oriental Darter*** *Anhinga melanogaster*
* ***Grey Heron*** *Ardea cinerea*
* ***Purple Heron*** *Ardea purpurea*
* ***Large Egret*** *Ardea alba*
* ***Pond Heron*** *Ardeola grayii*
* ***Chinese Pond Heron*** *Ardeola bacchus*
Little Heron *Butorides straitus*
Cattle Egret *Bubulcus ibis*
* ***Intermediate Egret*** *Egretta intermedia*
* ***Little Egret*** *Egretta garzetta*
Night Heron *Nycticorax nycticorax*
\+ ***Tiger Bittern*** *Gorsachius melanocephalus*
\+ ***Little Bittern*** *Ixobrychus minutus*
Cinnamon Bittern *Ixobrychus cinnamomeus*
* ***Yellow Bittern*** *Ixobrychus sinensis*
\+ ***Black Bittern*** *Dupetor flavicollis*
Great Bittern *Botaurus stellaris*
Asian Openbill *Anastomus oscitans*
Lesser Adjutant Stork *Leptoptilos javanicus*
* ***Black-headed Ibis*** *Threskiornis aethiopica*
* ***White Spoonbill*** *Platalea leucorodia*
* ***Bar-headed Goose*** *Anser indicus*
* ***Lesser Whistling Duck*** *Dendrocygna javanica*
* ***Fulvous Whistling Duck*** *Dendrocygna bicolor*
* ***Ruddy Shelduck*** *Tadorna ferruginea*
* ***Common Shelduck*** *Tadorna tadorna*
* ***Pintail*** *Anas acuta*
* ***Common Teal*** *Anas crecca*
* ***Spotbill Duck*** *Anas poecilorhynchus*
* ***Mallard*** *Anas platyrhynchos*
* ***Gadwall*** *Anas strepera*
* ***Falcated Teal*** *Anas falcata*
* ***Eurasian Wigeon*** *Anas penelope*
* ***Garganey*** *Anas querquedula*
* ***Shoveller*** *Anas clypeata*
* ***Red-crested Pochard*** *Netta rufina*
* ***Ferrugunous Duck*** *Aythya nyroca*
* ***Baer's Pochard*** *Aythya baeri*
* ***Tufted Duck*** *Aythya fuligula*
* ***Greater Scaup*** *Aythya marila*
* ***Cotton Pygmy Goose*** *Nettapus coromendelianus*
* ***Comb Duck*** *Sarkidiornis melanotos*
Black-winged Kite *Elanus caeruleus*
\+ ***Black-crested Baza*** *Aviceda leuphotes*
\+ ***Honey Buzzard*** *Pernis ptilorhynchos*
Black Kite *Milvus migrans*
Brahminy Kite *Haliastur indus*
\+ ***Goshawk*** *Accipiter gentilis*
\+ ***Shikra*** *Accipiter badius*
\+ ***Crested Goshawk*** *Accipiter trivirgatus*
\+ ***White-eyed Buzzard Eagle*** *Butastur teesa*
\+ ***Changable Hawk-Eagle*** *Spizaetus cirrhatus*
Tawny Eagle *Aquila rapax*
\+ ***Greater Spotted Eagle*** *Aquila clanga*
\+ ***Lesser Spotted Eagle*** *Aquila pomarina*
\+ ***Steppe Eagle*** *Aquila nipalensis*
\+ ***Malayan Eagle*** *Ictinaetus malayensis*
* ***Pallas's Fish Eagle*** *Haliaeetus leucoryphus*
* ***Grey-headed Fish Eagle*** *Ichyophaga ichthyaetus*
Griffon Vulture *Gyps fulvus*
Long-billed Vulture *Gyps indicus*
White-rumped Vulture *Gyps bengalensis*
Hen Harrier *Circus cyaneus*
Pied Harrier *Circus melanoleucos*
* ***Western Marsh Harrier*** *Circus aeroginosus*
* ***Eastern Marsh Harrier*** *Circus spilonotus*
\+ ***Crested Serpent Eagle*** *Spilornis cheela*
* ***Osprey*** *Pandion haliaetus*
Peregrine Falcon *Falco peregrinus*
\+ ***Northern Hobby*** *Falco subbuteo*
\+ ***Oriental Hobby*** *Falco severus*
\+ ***Red-headed Merlin*** *Falco chiquera*
Eurasian Kestrel *Falco tinnunculus*
* ***Swamp Partridge*** *Francolinus gularis*
Rain Quail *Coturnix coromendelica*
Blue-breasted Quail *Coturnix chinensis*
\+ ***Manipur Bush Quail*** *Perdicula manipuriensis*
\+ ***Rufous-throated Hill Partridge*** *Arborophila rufogularis*
\+ ***Kalij Pheasant*** *Lophura leucomelana*
\+ ***Red Jungle Fowl*** *Gallus gallus*
\+ ***Peacock Pheasant*** *Polyplectron bicalcaratum*
\+ ***Bustard Quail*** *Turnix suscitator*
\+ ***Slaty-breasted Rail*** *Gallirallus straitus*
\+ ***Water Rail*** *Rallus aquaticus*
\+ ***Ruddy Crake*** *Porzana fusca*
White-breasted Waterhen *Amaurornis phoenicurus*
* ***Watercock*** *Gallicrex cinerea*
* ***Purple Swamphen*** *Porphyrio porphyrio*

* **Common Moorhen** *Gallinula chloropus*
* **Coot** *Fulica atra*
* **Pheasant-tail Jacana** *Hydrophasianus chirurgus*
* **Bronze-winged Jacana** *Metopidius indicus*
* **Painted Snipe** *Rostratula benghalensis*
* **Black-winged Stilt** *Himantopus himantopus*
* **Pied Avocet** *Recurvirostra avosetta*
* **Oriental Pratincole** *Glareola maldivarum*
* **Small Pratincole** *Glareola lactea*
* **Grey-headed Lapwing** *Vanellus cinereus*
Red-wattled Lapwing *Vanellus indicus*
* **River Lapwing** *Vanellus spinosus*
Yellow-wattled Lapwing *Vanellus malabaricus*
* **Pacific Golden Plover** *Pluvialis fulva*
* **Grey Plover** *Pluvialis squatarola*
* **Large Sand Plover** *Charadrius leschenaultii*
* **Little Ringed Plover** *Charadrius dubius*
* **Kentish Plover** *Charadrius alexandrinus*
* **Longbilled Plover** *Charadrius placidus*
* **Mongolian Plover** *Charadrius mongolus*
* **Whimbrel** *Numenius phaeopus*
* **Curlew** *Numenius arquata*
* **Blacktailed Godwit** *Limosa limosa*
* **Bartailed Godwit** *Limosa japonica*
* **Spotted Redshank** *Tringa erythropus*
* **Common Redshank** *Tringa totanus*
* **Marsh Sandpiper** *Tringa stagnatilis*
* **Greenshank** *Tringa nebularia*
* **Wood Sandpiper** *Tringa glareola*
* **Spotted Greenshank** *Tringa guttifer*
* **Terek Sandpiper** *Tringa terek*
* **Common Sandpiper** *Actitis hypoleucos*
Pintail Snipe *Gallinago stenura*
Fantail Snipe *Gallinago gallinago*
* **Swinhoe's Spine** *Gallinago megala*
* **Sanderling** *Calidris alba*
* **Little Stint** *Calidris minuta*
* **Temminck's Stint** *Calidris temminckii*
* **Longtoed Stint** *Calidris subminuta*
* **Dunlin** *Calidris alpina*
* **Curlew Sandpiper** *Calidris testacea*
* **Broadbilled Sandpiper** *Limicola falcinellus*
* **Ruff & Reeve** *Philomachus pygnax*
* **Herring Gull** *Larus argentatus*
* **Great Blackheaded Gull** *Larus ichthyaetus*
* **Brownheaded Gull** *Larus brunnicephalus*
* **Blackheaded Gull** *Larus rudibundus*
* **Whiskered Tern** *Chlidonias hybrida*
* **White-winged Tern** *Childonias leucopterus*
* **Gull-billed Tern** *Gelochelidon nilotica*
* **Caspian Tern** *Hydroprogne caspia*
* **Indian River Tern** *Sterna aurantia*
* **Common Tern** *Sterna hirundo*
* **Little Tern** *Sterna albifrons*
\+ **Pin-tailed Pigeon** *Treron apicauda*
\+ **Wedge-tailed Pigeon** *Treron sphenura*
\+ **Yellow-footed Pigeon** *Treron phoenicoptera*
\+ **Grey-fronted Pigeon** *Treron pompadora*
\+ **Orange-breasted Pigeon** *Treron bicincta*
\+ **Green Pigeon** *Ducula aenea*
\+ **Imperial Pigeon** *Ducula badia*
Blue Rock Pigeon *Columba livia*
\+ **Rufous Turtle Dove** *Streptopelia orientalis*
\+ **Ring Dove** *Streptopelia decaocto*
\+ **Red Turtle Dove** *Streptopelia tranquebarica*
\+ **Spotted Dove** *Streptopelia chinensis*
\+ **Emerald Dove** *Chalcophaps indica*
\+ **Large Indian Parakeet** *Psittacula eupatria*
\+ **Rose-ringed Parakeet** *Psittacula krameri*
\+ **Red-breasted Parakeet** *Psittacula alexandari*
\+ **Vernal Hanging Parrot** *Loriculus vernalis*
\+ **Pied Crested Cuckoo** *Clamator jacobinus*
\+ **Common Hawk Cockoo** *Cuculus varius*
\+ **Indian Cuckoo** *Cuculus micropterus*
\+ **Himalayan Cuckoo** *Cuculus saturatus*
\+ **Common Cuckoo** *Cuculus canorus*
\+ **Grey-bellied Cuckoo** *Cacomantis passerinus*
\+ **Plaintive Cuckoo** *Cacomantis merulinus*
\+ **Emarald Cuckoo** *Chalcites maculatus*
\+ **Drongo Cuckoo** *Surniculus lugubris*
\+ **Common Koel** *Eudynamus scolopacea*
\+ **Large Green-billed Malkoha** *Rhopodytes tristis*
\+ **Sirkeer Cuckoo** *Taccocua leschenaultii*
\+ **Greater Coucal** *Centropus sinensis*
\+ **Lesser Coucal** *Centropus bengalensis*
Barn Owl *Tyto alba*
\+ **Spotted Scops Owl** *Otus spilocephalus*
\+ **Scops Owl** *Otus scops*
\+ **Collared Scops Owl** *Otus bakkamoena*
\+ **Eagle Owl** *Bubo bubo*
\+ **Forest Eagle Owl** *Bubo nipalensis*
\+ **Dusky Horned Owl** *Bubo coromandus*
\+ **Brown Fish Owl** *Ketupa zeylonensis*
\+ **Tawny Fish owl** *Bubo flavipes*
\+ **Barred Owlet** *Glaucidium cuculoides*
\+ **Brown Hawk Owl** *Ninox scutulata*
\+ **Spotted Owlet** *Athene brama*
\+ **Jungle Nightjar** *Caprimulgus indicus*
\+ **Longtailed Nightjar** *Caprimulgus macrurus*
\+ **Franklin's Nightjar** *Caprimulgus affinis*
\+ **Alpine Swift** *Apus melba*
House Swift *Apus affinis*
Palm Swift *Cypsiurus balasiensis*
\+ **Red-headed Trogon** *Harpactes erythrocephalus*
* **Pied Kingfisher** *Ceryle rudis*
\+ **Black-backed Kingfisher** *Ceyx erithacus*
* **Common Kingfisher** *Alcedo atthis*
\+ **Stork-billed Kingfisher** *Pelargopsis capensis*
* **White-throated Kingfisher** *Halcyon smyrnensis*

\+ **Chestnut-headed Bee-eater** *Merops leschenaulti*
\+ **Blue-tailed Bee-eater** *Merops philipinus*
Green Bee-eater *Merops orientalis*
\+ **Blue-bearded Bee-eater** *Nyctyornis athertoni*
\+ **Indian Roller** *Coracias benghalensis*
\+ **Broad-billed Roller** *Eurystomus orientalis*
\+ **Hoopoe** *Upupa epops*
\+ **Indian Pied Hornbill** *Anthracoceros malabaricus*
\+ **Lineated Barbet** *Megalaima lineata*
\+ **Blue-throated Barbet** *Megalaima asiatica*
\+ **Blue-eared Barbet** *Megalaima australis*
\+ **Coppersmith Barbet** *Magalaima haemacephala*
\+ **Wryneck** *Junx torquilla*
\+ **Speckeled Piculet** *Picumnus innominatus*
\+ **Rufous Piculet** *Sasia ochracea*
\+ **Rufous Woodpecker** *Micropternus brachyurus*
\+ **Little Green Woodpecker** *Picus myrmecophoneus*
\+ **Grey-headed Woodpecker** *Picus canus*
\+ **Greater Yellownape** *Picus flavinucha*
\+ **Black-rumped Flameback** *Dinopium bengalense*
\+ **Fulvous-breasted Woodpecker** *Picoides macei*
\+ **Yellow-fronted Woodpecker** *Picoides mahrattensis*
\+ **Hodgson's Broadbill** *Serilophus lunatus*
\+ **Indian Pitta** *Pitta brachyura*
\+ **Hooded Pitta** *Pitta sordida*
Bush Lark *Mirafra assamica*
Red-winged Bush Lark *Mirafra erythroptera*
Short-toed Lark *Calandrella sp.*
Oriental Skylark *Alauda gulgula*
\+ **Finch Lark** *Eremopterix grisea*
* **Plain Martin** *Riparia paludicola*
* **Collared Sand Martin** *Riparia riparia*
Barn Swallow *Hirundo rustica*
Red-rumped Swallow *Hirundo daurica*
\+ **Grey Shrike** *Lanius excubator*
\+ **Black-headed Shrike** *Lanius schach*
\+ **Brown Shrike** *Lanius cristatus*
\+ **Black-naped Oriole** *Oriolus chinensis*
\+ **Black-headed Oriole** *Oriolus xanthornus*
Black Drongo *Dicrurus adsimilis*
\+ **Ashy Drongo** *Dicrurus leucophaeus*
\+ **Crow-billed Drongo** *Dicrurus annectans*
\+ **Bronzed Drongo** *Dicrurus aeneus*
\+ **Lesser Racket-tail Drongo** *Dicrurus remifer*
\+ **Greater Racket-tail Drongo** *Dicrurus paradiseus*
Swallow Shrike *Artamus fuscus*
\+ **Glossy Stare** *Aplonis panayensis*
Grey-headed Myna *Sturnus malabaricus*
Pied Myna *Sturnus contra*
Common Myna *Acridotheres tristis*
Jungle Myna *Acridotheres fuscus*
\+ **Hill Myna** *Gracula religiosa*
\+ **Green Magpie** *Cissa chinensis*
\+ **Blue Magpie** *Cissa flavirostris*
\+ **Treepie** *Dendrocitta vagabunda*
\+ **Himalayan Treepie** *Dendrocitta formosae*
House Crow *Corvus splendens*
Jungle Crow *Corvus macrorhynchus*
\+ **Flycatcher-Shrike** *Hemipus picatus*
\+ **Common Wood Shrike** *Tephrodornis pondicerianus*
\+ **Large Wood Shrike** *Tephrodornis virgatus*
\+ **Black-faced Cuckoo-Shrike** *Coracina novaehollandiae*
\+ **Black-winged Cuckoo-Shrike** *Coracina melaschistos*
\+ **Scarlet Minivet** *Pericrocotus flammeus*
\+ **Small Minivet** *Pericrocotus cinnamomneus*
\+ **Common Iora** *Aegithina tiphia*
\+ **Gold-fronted Leafbird** *Chloropsis aurifrons*
\+ **Gold-mantled Leafbird** *Chlorosis cochinchinensis*
\+ **Fairy Bird** *Irena puella*
\+ **Black-headed Bulbul** *Pycnonotus articeps*
\+ **Black-crested Bulbul** *Pycnonotus melanicterus*
\+ **Red-whiskered Bulbul** *Pycnonotus jocosus*
Red-vented Bulbul *Pycnonotus cafer*
\+ **White-throated Bulbul** *Criniger flaveolus*
\+ **Olive Bulbul** *Hypsipetes viridescens*
\+ **Ashy Bulbul** *Hypsipetes flavala*
\+ **Black Bulbul** *Hypsipetes madagascariensis*
\+ **Spotted Babbler** *Pellorneum ruficeps*
\+ **Buff-breasted Babbler** *Trichastoma tickelii*
\+ **Abbot's Babbler** *Trichastoma abbotti*
\+ **Scimitar Babbler** *Pomatorhinus hypoleucos*
\+ **Long-billed Wren Babbler** *Rimator malacoptilos*
\+ **Lesser Wren Babbler** *Pnoepyga pusilla*
\+ **Spotted Wren Babbler** *Spelaeornis formosus*
\+ **Red-fronted Babbler** *Stachyris rufifrons*
\+ **Yellow-eyed Babbler** *Chrysomma sinense*
\+ **Common Babbler** *Turtoides caudatus*
\+ **Straited Babbler** *Turtoides earlei*
\+ **Jungle Babbler** *Turtoides striatus*
\+ **Necklaced Laughing Thrush** *Garrulax moniligerus*
\+ **Black-gorgeted Laughing Thrush** *Garrulax pectoralis*
\+ **White-crested Laughing Thrush** *Garrulax leucolophus*
\+ **Red-headed Laughing Thrush** *Garrulax erythrocephalus*
\+ **Silver-eared Mesia** *Leiothrix argentauris*
\+ **Shrike Babbler** *Pteruthius melanotis*
\+ **Chestnut-headed Yuhina** *Yuhina castaniceps*
\+ **Black-chinned Yuhina** *Yuhina nigrimenta*

+ ***White-bellied Yuhina*** *Yuhina xantholeuca*
+ ***Quaker Babbler*** *Alcippe poioicephala*
+ ***Nepal Babbler*** *Alcippe nepalensis*
+ ***Long-tailed Sibia*** *Heterophasia picaoides*
+ ***Sooty Flycatcher*** *Muscicapa sibirica*
+ ***Brown Flycatcher*** *Muscicapa latirostris*
+ ***Red-breasted Flycatcher*** *Muscicapa parva*
+ ***Blue-throated Flycatcher*** *Muscicapa rubeculoides*
+ ***Tickell's Blue Flycatcher*** *Muscicapa tickelliae*
+ ***Verditer Flycatcher*** *Muscicapa thalassina*
+ ***Grey-headed Flycatcher*** *Culicicapa ceylonensis*
+ ***White-browed Fantail*** *Rhipidura aureola*
+ ***White-throated Fantail*** *Rhipidura albicollis*
+ ***Paradise Flycatcher*** *Terpsiphone paradisi*
+ ***Black-naped Flycatcher*** *Hypothymis azurea*
+ ***Spotted Bush Warbler*** *Bradypterus thoracicus*
+ ***Brown Bush Warbler*** *Bradypterus luteoventris*
+ ***Fantail Warbler*** *Cisticola exilis*
+ ***Ashy Wren Warbler*** *Prinia socialis*
+ ***Tailor Bird*** *Orthotomus sutorius*
+ ***Goldenheaded Tailor Bird*** *Orthotomus cuculatus*
+ ***Pallas's Warbler*** *Locustella certhiola*
+ ***Grasshopper Warbler*** *Locustella naevia*
+ ***Straited Marsh Warbler*** *Megaurus palustris*
+ ***Thickbilled Warbler*** *Acrocephalus aedon*
* ***Great Reed Warbler*** *Acrocephalus stentorius*
* ***Blyth's Reed Warbler*** *Acrocephalus dumetorum*
* ***Paddyfield Warbler*** *Acrocephalus agricola*
+ ***Chiffchaff*** *Phylloscopus collybita*
+ ***Tickell's Leaf Warbler*** *Phylloscopus affinis*
+ ***Dusky Leaf Warbler*** *Phylloscopus fuscatus*
+ ***Yelloweyed Flycatcher Warbler*** *Seicercus burkii*
+ ***Rubythroat*** *Erithacus callipoe*
+ ***Bluethroat*** *Erithacus svecicus*
+ ***Himalayan Rubythroat*** *Erithacus pectoralis*
+ ***Magpie Robin*** *Copsychus saularis*
+ ***Shayma*** *Chopsychus malabaricus*
+ ***Black Redstart*** *Phoenicurus ochruros*
+ ***Plumbeous Redstart*** *Rhyacornis fulliginosus*
+ ***Black-backed Forktail*** *Enicurus immaculatus*
+ ***Spotted Forktail*** *Enicurus maculatus*
+ ***Collared Bush Chat*** *Saxicola torquata*
+ ***Pied Bush Chat*** *Saxicola caprata*
+ ***Jerdon's Bush Chat*** *Saxicola jerdoni*
+ ***Blue Rock Thrush*** *Monticola solitarius*
+ ***Blue Whistling Thrush*** *Myiophonus caeruleus*
+ ***Orangeheaded Ground Thrush*** *Zoothera citrina*
+ ***Black-breasted Thrush*** *Turdus dissimilis*
+ ***Grey Tit*** *Parus major*
+ ***Velvet-fronted Nuthatch*** *Sitta frontalis*
+ ***Olive Tree Pipit*** *Anthus hodgsoni*
+ ***Paddyfield Pipit*** *Anthus novaeseelandiae*
+ ***Red-throated Pipit*** *Anthus cervinus*
+ ***Rosy Pipit*** *Anthus roseatus*
+ ***Forest Wagtail*** *Dendronanthus indicus*
* ***Yellow Wagtail*** *Motacilla flava*
* ***Yellow-headed Wagtail*** *Motacilla citreola*
* ***Grey Wagtail*** *Motacilla cinerea*
* ***White Wagtail*** *Motacilla alba*
Pied Wagtail *Motacilla maderaspatensis*
+ ***Thick-billed Flowerpecker*** *Dicaeum agile*
+ ***Tickell's Flowerpecker*** *Dicaeum erythrorhynchos*
+ ***Scarlet-backed Flowerpecker*** *Dicaeum cruentatum*
+ ***Rubycheek*** *Anthreptes singalensis*
+ ***Purple-rumped Sunbird*** *Nectarina zeylonica*
+ ***Van Hasselt's Sunbird*** *Nectarina sperata*
+ ***Purple Sunbird*** *Nectarina asiatica*
+ ***Mrs. Gould Sunbird*** *Aethopyga gouldie*
+ ***Yellow-backed Sunbird*** *Aethopyga siparaja*
+ ***Little Spiderhunter*** *Arachnothera longiristris*
+ ***Streaked Spiderhunter*** *Arachnothera magna*
+ ***White-eye*** *Zosterops palpebrosa*
House Sparrow *Passer domesticus*
Baya *Ploceus philippinus*
Black-throated Weaver Bird *Ploceus benghalensis*
Red Munia *estrilda amandava*
+ ***Common Silverbill*** *Lonchura malabarica*
+ ***Nutmeg*** *Lonchura atriata*
+ ***Spotted Munia*** *Lonchura punctulata*
+ ***Black-headed Munia*** *Lonchura malacca*
+ ***Black-faced Bunting*** *Emberiza spodocephala*
+ ***Chestnut-eared Bunting*** *Emberiza fucata*
+ ***Yellow-breasted Bunting*** *Emberiza aureola*
+ ***Crested Bunting*** *Melophus lathami*

D.4 Waterfowl species of the Northeast Region of Bangladesh

This annotated checklist of the waterfowl of the Northeast Region on Bangladesh includes all species of waterfowl known or thought to have occurred in the region. The sequence and nomenclature follow Harvey, W.G. (1990) *Birds in Bangladesh*, University Press, Dhaka. Each species account begins with a short statement of the current status of the species in the Northeast Region, as determined on the basis of the present surveys, recent literature and some unpublished material available to the authors. The status of each species as summarized by Harvey (1990) is given in parenthesis at the end of the species accounts.

Details of the main survey observations (dates 18 Feb to 12 Mar 92, 20 Apr to 4 May) have been included.

Little Grebe *Tachybaptus ruficollis*

Common resident and winter visitor.

353 were recorded during the Feb/Mar survey, with birds present at 20 sites. The largest concentrations were 51 at Arabiakona Beel, 51 at an un-named *beel* south of Samsar Beel, and 40 at Dekhar Haor. The great majority of birds were in parties of 5-15 individuals, and were still in non-breeding plumage, although there were a few solitary birds in breeding plumage.

534 were recorded during the Apr/May survey, with birds present at 17 sites. Approximately 350 of these were in a large flock of obvious non-breeders at Arabiakona Beel, but most of the others were paired and in breeding plumage. Much calling was heard, and it appeared that the birds were settling down to breed. The species favours shallow *beels* with large areas of floating vegetation, and was often found on very small *beels*, e.g. in Dekhar Haor, at Mehdi Beel and at Karul Dhan Beel.

(Locally common breeding resident).

Great Crested Grebe *Podiceps cristatus*

Fairly common winter visitor, frequenting the larger, deeper *beels*.

135 were recorded during the Feb/Mar survey, with birds present at 11 sites. The highest counts were 55 at Chatla Beel and 30 at Pana Beel. Most birds were in breeding plumage, but no courtship behaviour was observed. All had apparently left the area by the time of the second survey. These records suggest that the species is not as rare in northeastern Bangladesh as was formerly supposed.

(Uncommon winter visitor).

Great Cormorant *Phalacrocorax Carbo*

Winter visitor in small numbers to the deeper *beels* in the north.

54 were recorded during the Feb/Mar survey, with birds present at 11 sites. Apart from a flock of 11 at Kuri Beel on 29 Feb, all were in the Tangua, Matian and Pasua complex in the north, the highest count being 19 at Pana Beel. Only one individual was recorded during the Apr/May survey: a slightly injured bird in flight over the Someswari River on 21 Apr. The only other reports of this species in Bangladesh in recent years are of small numbers wintering in the coastal zone.

Many of the birds observed in February and March were in full breeding plumage, and it is possible that given suitable nesting sites (tall trees) and freedom from disturbance, the Great Cormorant would become re-established as a breeding species in the region. There would certainly appear to be no shortage of suitable feeding habitat.

(Former? resident).

Indian Shag *Phalacrocorax fuscicollis*

Status uncertain.

Not recorded during the present surveys. Apparently this species has never been recorded in the Northeast, although it is widespread throughout the Indian Subcontinent, and occurs in wetlands elsewhere in Bangladesh. Its absence is therefore surprising.

(Scarce? resident. Not recorded for the Northeast).

Little Cormorant *P. niger*

Common resident, particularly in the north.

5,277 were recorded during the Feb/Mar survey, with birds present at 37 sites. Over 4,560 (86%) were in the Tangua, Matian and Pasua complex in the north, with the largest concentrations being along the Someswari River (500), at Kanamaiya Haor (750), at Pasua Beel (450) and at Bara Beel (425). The only large numbers away from this area were 160 at Chatla Beel (Hakaluki Haor).

6,090 were recorded during the Apr/May survey, with birds present at 38 sites. As in Feb/Mar, much the largest numbers were in the Tangua, Matian and Pasua complex, with at least 2,500 roosting in the trees at Pasua Beel on 23 Apr. However, the species was rather more widespread throughout the region as a whole, with small numbers present in most of the major wetland areas. Most birds were in non-breeding plumage or immatures, and there was no evidence of breeding activity. According to Harvey (1990), the species has been found breeding in Bangladesh between June and February.

(Locally common breeding resident).

Oriental Darter *Anhinga melanogaster*

Local resident, almost confined to the Tangua/Pasua complex.

21 were recorded during the Feb/Mar survey, with birds present at six sites. All but one were in the Tangua, Matian and Pasua complex in the north, the highest counts being six along the Someswari River and 10 at Pasua Beel. One bird at Uglar Beel (Meda Haor) was the only other record.

21 were again recorded during the Apr/May survey. Sixteen of these were at Pasua Beel and the others at Pana Beel (3) and Tangua Beel (2). No evidence was found of breeding. According to Harvey (1990), the species breeds in Bangladesh between September and February.

(Local breeding resident).

Spot-billed Pelican *Pelecanus philippensis*

Extinct as a breeding species in Bangladesh, and now only a rare vagrant.

Not recorded during the present surveys. This species was once a common species almost throughout the Indian Subcontinent and in neighbouring Southeast Asia. However, populations have declined dramatically this century, and the species survives in substantial numbers only in southern India and Sri Lanka. It is now listed in the IUCN Red Data Book as a threatened species.

(Former? resident. Now rare vagrant).

Dalmatian Pelican *Pelecanus crispus*

Extinct in Bangladesh.

Formerly a winter visitor to Bangladesh from breeding areas in China, this species has not been recorded for many years. Once widespread in much of central and southern Asia, the species has disappeared from much of its former range, and is now listed in the IUCN Red Data Book as a threatened species.

(Former visitor).

Great Bittern *Botaurus stellaris*

Status uncertain; probably a scarce winter visitor.

One at Khakra Kuri Beel (Balai Haor) on 6 Mar.

(Rare passage migrant).

Yellow Bittern *Ixobrychus sinensis*

Probably a fairly common breeding summer visitor, but very secretive and easily overlooked.

None was recorded in the Feb/Mar survey. However, one was seen at Balai Haor on 27 Apr, and at least two were flushed from reed-beds at Hail Haor on 2 May.

(Local breeding resident).

Cinnamon Bittern *Ixobrychus cinnamomeus*

Probably a common breeding summer visitor.

None was recorded during the Feb/Mar survey. However, the species was fairly common in Apr/May, especially around small ponds in homestead forests. The species generally avoids open wetlands, and only eight were recorded at the study sites: five at Pasua Beel, two at Hail Haor and one at Balai Haor. At each of these sites, there is plenty of dense vegetation to provide suitable cover.

(Common breeding resident).

Black Bittern *Dupetor flavicollis*

Status uncertain.

Only one was recorded: a bird in flight over rice fields and homestead forest to the east of Hail Haor on 4 May. This is a secretive species, generally keeping to dense cover, and is easily overlooked.

(Local breeding resident).

Malayan Night-Heron *Gorsachius melanolophus*

Status uncertain.

Not recorded during the present surveys. This is a very secretive heron of damp forest and forest streams, avoiding open wetlands. There has been at least one recent record from West Banugach Reserved Forest (July 1988).

(Local visitor).

Black-crowned Night-Heron *Nycticorax nycticorax*

Fairly common winter visitor, and possibly also a passage migrant.

149 were recorded during the Feb/Mar survey, most observations being of birds at day roosts in homestead forests. These included five in a roost near the Khowai River west of Habiganj, at least 90 at a roost near Ruwa Beel (Dekhar Haor), and 39 flushed from a roost by the Surma River west of Sunamganj.

The only birds observed during the Apr/May survey were a flock of 33 flying out at dusk from the forest patch at Pasua Beel on 23 Apr.

(Local breeding resident).

Little Heron *Butorides striatus*

Scarce resident.

The only records of this secretive and largely crepuscular heron were: two along the Juri River on 20 Feb and two again on 25 Apr; five along the Someswari River on 1-2 Mar, and one there on 21 Apr; and three at Pasua Beel on 21-23 Apr.

(Local breeding resident).

Indian Pond Heron *Ardeola grayii*

Common and widespread resident.

977 were recorded during the Feb/Mar survey, with birds present at 44 sites. Much the largest concentration was 320 at Petangi Beel (Kawadighi Haor) on 22 Feb. This was the most widespread waterbird in the region, occurring in all types of wetland habitat with some cover, including wet rice fields, roadside ditches and small pools in homestead forest.

280 were recorded at the main wetlands during the Apr/May survey, with birds present at 30 sites. Much the largest counts were 68 at Hail Haor and 50 along the Someswari River. The species was even more widely distributed than in Feb/Mar, and many birds (which do not figure in the counts) were found scattered in rice fields, borrow pits and the small wetlands associated with homestead forests. Although no breeding colonies were located, many of the birds were in full breeding plumage, and it seemed likely that they were breeding somewhere, perhaps in small groups in homestead forests.

(Abundant breeding resident).

Chinese Pond Heron *Ardeola bacchus*

Possibly a regular winter visitor in small numbers, but status uncertain because of difficulties in identification when in non-breeding plumage.

None was recorded during the Feb/Mar survey, but the species could easily have been overlooked, as at this time of the year it closely resembles *A. greyii*. Two adults in breeding plumage were observed during the Apr/May survey: one at Pasua Beel on 22 Apr and one in rice fields west of Hail Haor on 3 May.

(Rare visitor).

Cattle Egret *Bubulcus ibis*

Common resident.

324 were recorded during the Feb/Mar survey, with birds present at 22 sites. No large flocks were observed in these areas. However, flocks of 255 and 70 were observed in rice fields between Bhairab Bazar and Srimangal on 18 Feb, bringing the total recorded during the survey to 649.

1,675 were recorded during the Apr/May survey, with birds present at 17 sites. Major concentrations included at least 300 at the egret roost at Pasua Beel, 150 at Balai Haor, 255 at Kawadighi Haor, and a flock of 500 in rice fields near Bhairab Bazar. No evidence was found of breeding, although most birds were in full summer plumage.

(Local breeding resident).

Little Egret *Egretta garzetta*

Common resident.

1,121 were recorded during the Feb/Mar survey, with birds present at 36 sites. The largest concentrations were 350 at Petangi Beel (Kawadighi Haor) and 125 at Pasua Beel.

970 were recorded during the Apr/May survey, with birds present at 24 sites. Much the largest concentrations were 500 at the egret roost at Pasua Beel and 225 at Petangi Beel (Kawadighi Haor). Many of the birds were in breeding plumage, but no evidence was found of nesting.

(Locally common breeding resident).

Intermediate Egret *E. intermedia*

Common resident.

498 were recorded during the Feb/Mar survey, with birds present at 34 sites. The largest concentrations were 160 at Petangi Beel, 50 at Hail Haor and 45 at Dekhar Haor.

866 were recorded during the Apr/May survey, with birds present at 32 sites. The largest concentrations were 300 at the egret roost at Pasua Beel, 140 at Hail Haor and 125 at Kawadighi Haor. No evidence was found of breeding, although some birds were in breeding plumage.

(Locally common breeding resident).

Great Egret *E. alba*

Abundant winter visitor, with many non-breeders remaining throughout the summer; possibly also a breeding species.

2,539 were recorded during the Feb/Mar survey, with birds present at 41 sites. The largest concentrations were 600 at Pasua Haor, 500 at Petangi Beel, 300 at Majherbanda Beel and 300 at Bara Beel.

1,855 were recorded during the Apr/May survey, with birds present at 37 sites. The largest concentrations were 900 at the egret roost at Pasua Beel, 355 at Kawadighi Haor, 154 at Hail Haor and 110 in the Rauar/Tangua Beel complex. Very few birds were in breeding plumage, and it seems likely that the majority were either late migrants or over-summering non-breeders (mostly immatures). There do not appear to have been any confirmed breeding records in Bangladesh in recent years.

(Locally common resident).

Grey Heron *Ardea cinerea*

Common winter visitor, with some non-breeders remaining throughout the summer.

606 were recorded during the Feb/Mar survey, with birds present at 31 sites. The largest concentrations were 135 at Hail Haor, 125 at Petangi Beel and 125 at Pasua Beel. Numbers had fallen considerably by Apr/May, and most of the remaining birds were immatures. Only 128 were recorded, with birds present at 20 sites. The largest concentrations were 45 at Pasua Beel and 34 at Petangi Beel (Kawadighi Haor). No evidence of breeding was observed, although Harvey (1990) gives the breeding period in Bangladesh as November to May.

(Local breeding resident).

Purple Heron *A. purpurea*

Perhaps mainly a rather scarce summer visitor and passage migrant, with a few birds over-wintering.

Only five were recorded during the Feb/Mar survey: four at Hail Haor on 21 Feb and one at Khakra Kuri Beel (Balai Haor) on 6 Mar. 35 were recorded during the Apr/May survey, with birds present at six sites. Much the highest count was 27 at the heron and egret roost at Pasua Beel on 23 Apr. This is a rather secretive heron of dense reed-beds, and is only likely to nest at sites such as Hail Haor, Pasua Beel, Tangua Haor and Matian Haor with tall stands of emergent marsh vegetation.

(Local breeding resident).

White-bellied Heron *A. imperialis*

Possibly a very rare straggler from forested areas in neighbouring India.

None was recorded during the present surveys. This very large heron is an extremely rare species of forested swamps and streams, formerly occurring from the Himalayan foothills in Nepal to southwest China and Burma. There have been few reliable records in recent years, and the species is now listed in the IUCN Red Data Book. There is, however, one recent record from the Northeast Region: two

appeared at a small lake in a tea estate near Srimangal on 25 March 1988 (John Woolner, pers. comm.). It seems unlikely, however, that there is a sufficient area of suitable habitat remaining in Bangladesh to support a viable population.

(Rare visitor).

Painted Stork *Mycteria leucocephala*

Extinct in the region.

Formerly a widespread breeding species in Bangladesh (and still so over much of the Indian Subcontinent), the Painted Stork has almost completely disappeared from the country, and now occurs only as a rare straggler. There are no recent records in the Northeast.

(Rare visitor. Formerly resident).

Asian Openbill *Anastomus oscitans*

Locally common winter visitor and passage migrant.

A large flock was apparently resident at Pasua Beel from early March until at least the end of April. 128 were present on 4 Mar, about 400 on 23 Mar and at least 300 on 22-24 April. The birds were roosting in the *Pongamia* trees near the *beel*, and flying out to feed on nearby *haors*. The only other Openbills recorded during the surveys were one at Balai Haor on 6 Mar, six in flight over cultivated plains between Netrakona and Kaluma Kanda on 11 Mar, one at Kecharia Beel on 22 Apr, 13 at Balai Haor on 27 Apr, and singles in flight over tea estates near Maulvibazar and Srimangal on 30 Apr and 2 May, respectively.

The Openbill is much the commonest stork in Bangladesh, but has not been known to breed in recent years. The large flocks which apparently appear with some regularity in the Northeast may belong to the large migratory population which breeds in south Thailand.

(Local wandering resident).

Woolly-necked Stork *Ciconia episcopus*

Probably now extinct in the Northeast Region.

Formerly a widespread resident in Bangladesh, this species is now very rare, and may only occur as a straggler from neighbouring countries. There do not appear to have been any records in the Northeast in recent years.

(Rare winter visitor).

White Stork *Ciconia ciconia*

Rare winter visitor.

None was recorded during the present surveys. There have, however, been at least two recent records of small groups in the Srimangal area; in November 1988 and April 1989 (John Woolner, pers. comm.).

(Rare winter visitor).

Oriental Stork *Ciconia boyciana*

Probably now extinct in Bangladesh.

Formerly a rare winter visitor to Bangladesh, this species, which breeds in northeast Asia, has not been recorded for many years. The species has shown a dramatic decline throughout its range this century, and is now listed in the IUCN Red Data Book.

(Formerly rare winter visitor).

Black-necked Stork *Ephippiorhynchus asiaticus*

Extinct in the Northeast Region.

Formerly a widespread resident in Bangladesh, this species has become extinct as a breeding species and now occurs only as a rare straggler from neighbouring countries. The species has shown a dramatic decline throughout its wide range in mainland Asia during the past few decades, and is now a rare bird almost everywhere except in New Guinea and northern Australia.

(Rare visitor. Former resident).

Lesser Adjutant *Leptoptilos javanicus*

Perhaps only a rare straggler from neighbouring India.

A pair was observed at Khakra Kuri Beel (Balai Haor) on 6 Mar. This species is now listed in the IUCN Bird Red Data Book in the category "Vulnerable". A small population survives in the Sundarbans, but elsewhere in Bangladesh, the species is now only a rare straggler.

(Locally breeding resident).

Greater Adjutant *L. dubius*

Extinct in the Northeast Region.

Formerly a widespread and fairly common breeding bird in much of the Indian Subcontinent and Southeast Asia, the Greater Adjutant has suffered a catastrophic decline throughout its range in recent decades, and is now one of the most seriously threatened waterbirds in Asia. The reasons for its decline are uncertain, but probably include large-scale destruction of forested wetlands suitable for breeding colonies, especially in central Burma where there were enormous colonies in the 19th century. One or two pairs may continue to survive in southeastern Bangladesh, but there have been no records in the Northeast Region in recent years.

(Rare resident or winter visitor. Formerly more common).

Glossy Ibis *Plegadis falcinellus*

Rare straggler in winter.

Formerly a regular winter visitor to Bangladesh and perhaps even a breeding species, the Glossy Ibis now occurs only as a rare winter visitor. None was recorded during the present surveys, but two were observed near Srimangal in December 1990 (John Woolner, pers. comm.).

(Former? winter visitor).

Red-naped Ibis *Pseudibis papillosa*

Extinct in the Northeast Region.

Perhaps formerly a widespread resident in Bangladesh, the Red-naped Ibis now occurs only as a rare straggler from neighbouring countries. There do not appear to have been any records from the Northeast Region in recent years.

(Rare visitor).

Black-headed Ibis *Threskiornis melanocephala*

Scarce winter visitor.

A flock of 11 was observed at Pasua Beel on 4 Mar, and three were present there on 23 Apr. Formerly a widespread resident in Bangladesh, this species has disappeared as a breeding species. Mid-winter waterfowl counts in the coastal zone in recent years have revealed that it remains a regular winter visitor in small numbers, but elsewhere in Bangladesh the species is now only a rare visitor.

(Rare visitor).

White Spoonbill *Platalea leucorodia*

Rare passage migrant.

One immature at Pasua Beel on 22 Apr.

(Rare winter visitor).

Fulvous Whistling Duck *Dendrocygna bicolor*

Abundant winter visitor, principally in the Tangua Haor area.

9,815 were recorded during the Feb/Mar survey, with birds present at 12 sites. Almost 9,000 (93%) were in the Tangua, Matian and Pasua complex in the north, with major concentrations at Pakertala Beel (3,850), Pana Beel (3,800), Arabiakona Beel (850) and Rauar Beel (650). Elsewhere, there were flocks of 500 at Chatla Beel (Hakaluki Haor), 60 at Chalnia Beel and 60 at Dekhar Haor.

1,263 were recorded during the Apr/May survey, with birds present at seven sites. The largest concentrations were 650 at Aila Beel and 550 at Chatla Beel. All of the birds were still in flocks, and there were no signs of breeding behaviour. Only 36 were present at Balai Haor on 27 Apr, although there had been 5,000 there on 27 Mar (during the Monthly Waterfowl Census).

These high counts of *D. bicolor* are unprecedented in the Subcontinent in recent years; indeed, the highest total for the whole of the Subcontinent in the first five years of the Asian Waterfowl Census (1986/87 to 1990/91) was 4,910 in 1989/90, with the highest count in Bangladesh being 275 in the same year. The wetlands of the Haor Basin, and especially the Tangua Haor complex, are clearly of outstanding importance as wintering habitat for this uncommon species.

(Local winter visitor).

Lesser Whistling Duck *D. javanica*

Abundant winter visitor and common resident.

9,016 were recorded during the Feb/Mar survey, with birds present at 15 sites. Much the largest concentration was a flock of 6,000 at Chatla Beel (Hakaluki Haor). Other high counts included 780 at Uglar Beel (Meda Haor) and 455 at Chalnia Beel. There were only 440 in the Tangua, Matian and Pasua complex, where the species was greatly outnumbered by *D. bicolor*.

1,791 were recorded during the Apr/May survey, with birds present at 14 sites. The largest concentrations were 550 at Chatla Beel (Hakaluki Haor), 400 at Tangua Beel, 200 at Aila Beel and 150 at Balai Haor. At the latter site, about 15,000 *D. javanica* were present on 27 Mar following recent flooding, but by the end of April, water levels had receded almost to their late February levels, and the large flocks had moved on. At several sites (e.g. Hail Haor and Tangua Haor), many birds were paired and showing some courtship behaviour, suggesting that they were preparing to breed.

(Common winter visitor and local breeding resident).

Greylag Goose *Anser anser*

Possibly still a rare winter visitor or passage migrant.

Formerly a common winter visitor to wetlands throughout Bangladesh, the Greylag Goose is now regular only at remote wetlands in the coastal zone. Harvey (1990) indicates that there have been some recent records in the Northeast Region, but none was recorded during the present surveys.

(Local winter visitor).

Bar-headed Goose *A. indicus*

Rare winter visitor or passage migrant.

The only record was of a party of four on a small island in Kuri Beel on 29 Feb. As with *A. anser*, *A. indicus* was formerly a common and widespread winter visitor to the wetlands of Bangladesh, but is now regular only in the coastal zone. It is doubtful if there are any areas in the Haor Basin sufficiently free from human disturbance to support significant numbers of geese on a regular basis.

(Local winter visitor).

Ruddy Shelduck *Tadorna ferruginea*

Fairly common winter visitor, principally in the north.

337 were recorded during the Feb/Mar survey, with birds present at seven sites. Apart from four at Petangi Beel (Kawadighi Haor), all were in the Tangua, Matian and Pasua complex in the north, with

flocks of 170 at Pakertala Beel and 132 at Pana Beel. Only 40 were recorded during the Apr/May survey: flocks of 19 at Pangna Beel and Pasua Beel, and singles at Kawadighi Haor and Balai Haor.

(Local winter visitor).

Common Shelduck *Tadorna tadorna*

Rare winter visitor or passage migrant.

One with a flock of Ruddy Shelducks at Pangna Beel on 21 Apr was the only record. This is primarily a species of coastal wetlands and brackish to saline lakes.

(Local winter visitor).

White-winged Wood-Duck *Cairina scutulata*

Extinct in the Northeast Region.

Formerly a resident of forested wetlands in much of Bangladesh, this globally endangered species has been reported in recent decades only from the Chittagong Hill Tracts, where a tiny population was still known to be surviving as recently as 1981.
A small population survives in neighbouring Assam, but it seems that no suitable habitat is now left for the species in the Northeast.

(Very rare breeding resident).

Comb Duck *Sarkidiornis melanotos*

Perhaps still a very rare resident or occasional visitor.

Formerly a widespread and fairly common resident of wetlands throughout Bangladesh, this species has become very rare. There have apparently been some records in the Northeast Region in recent years (Harvey, 1990), but no birds were seen during the present surveys. Direct persecution and the loss of suitable nesting sites (holes in large trees) have doubtless been responsible for the species' decline.

(Rare breeding resident).

Cotton Pygmy Goose *Nettapus coromandelianus*

Fairly common resident, especially in the Tangua Haor and Matian Haor area.

111 were recorded during the Feb/Mar survey, with birds present at eight sites. Most were in the Tangua, Matian and Pasua complex, with 50 at Palair Beel, 30 at Banuar Beel and 11 at an un-named *beel* south of Tangua Beel. Elsewhere, there were eight at Petangi Beel, three at Dubail Beel (Balai Haor), one at Deochapra Beel and three at Uglar Beel (Meda Haor).

206 were recorded during the Apr/May survey, with birds present at 11 sites. Again, most were in the Tangua, Matian and Pasua complex, with concentrations of 65 at Biaskhali Beel, 52 at Banuar Beel, 24 at Palair Beel and 12 at Rauar Beel. However, smaller numbers were also recorded at Hail

Haor (14), Hakaluki Haor (3), Balai Haor (20) and Mehdi Beel (4). Birds were paired and a great deal of courtship behaviour was observed, suggesting that breeding was about to take place.

(Local breeding resident).

Eurasian Wigeon *Anas penelope*

Scarce winter visitor.

101 were recorded during the Feb/Mar survey, with birds present at 9 sites. The highest counts were 60 at Pana Beel, 17 at Tangua Beel and 10 at Little Tangua Beel. In Apr/May, there were 91 at a total of six sites, the highest counts being 40 at Pasua Beel and 30 by the Someswari River.

(Scarce winter visitor).

Falcated Teal *A. falcata*

Rare winter visitor.

A male at Pana Beel on 2 Mar. This is a rare winter visitor to Bangladesh, occurring here near the extreme western edge of its range. Harvey (1990) mentions only one recent record.

(Rare winter visitor).

Gadwall *A. strepera*

Fairly common winter visitor.

507 were recorded during the Feb/Mar survey, with birds present at 10 sites. Much the largest concentration was 400 at Pana Beel. Two other sites held double figures: Chalnia Beel with 41, and Chatla Beel with 30.

Only 51 were recorded during the Apr/May survey, with birds present at six sites. The highest counts were 32 in the Aila/Pangna *beel* area and 15 at Pasua Beel.

(Scarce winter visitor).

Common Teal *A. crecca*

Scarce winter visitor.

73 were recorded during the Feb/Mar survey, with birds present at 10 sites. Much the largest concentration was 45 at Kuri Beel. While it is likely that many more *A. crecca* were overlooked in the large flocks of Garganey with which they were usually associated, it is clear that the species is a rather scarce winter visitor to northeastern Bangladesh. Most had departed by late April, and only four were observed during the Apr/May survey (last on 22 Apr).

(Locally common winter visitor).

Mallard *A. platyrhynchos*

Very scarce winter visitor.

Only 16 were recorded during the Feb/Mar survey, and all were in the Tangua and Matian complex as follows: one at Pana Beel, six at Biaskhali Beel and nine at Palair Beel. None was observed during the Apr/May survey.

(Rare winter visitor).

Spot-billed Duck *A. poecilorhyncha*

Fairly common resident, almost exclusively in the north.

243 were recorded during the Feb/Mar survey, with birds present at 16 sites. Except for 3 at Dekhar Haor, all were in the Tangua, Matian and Pasua complex, with much the highest count being 120 at Pasua Beel. 122 were recorded during the Apr/May survey, with birds present at 15 sites. Again, except for 10 in the Aila/Pangna Beel area, all were in the Tangua, Matian and Pasua complex, with the largest concentrations being 40 at Pasua Beel, 20 at Pana Beel and 12 at Rauar Beel. By Apr/May, most of the birds were paired; some pairs appeared to be prospecting for nests sites, and the presence of single males in suitable breeding habitat suggested that a few females might already be incubating. Clearly, this is a commoner species in northeastern Bangladesh than Harvey (1990) suggests, and there are indications that the region supports a small breeding population.

(Rare winter visitor).

Northern Pintail *A. acuta*

Abundant winter visitor.

20,283 were recorded during the Feb/Mar survey, with birds present at 28 sites. The major concentrations were at Hakaluki Haor (15,310) and Kawadighi Haor (2,825), and there were only about 850 in the Tangua, Matian and Pasua Beel complex. Only 72 were recorded during the Apr/May survey, these including 20 at Chatla Beel, 15 at Aila Beel and 15 at Pasua Beel.

(Common winter visitor).

Garganey *A. querquedula*

Abundant winter visitor and probably also passage migrant.

15,487 were recorded during the Feb/Mar survey, with birds present at 30 sites. The largest concentration was in the Tangua, Matian and Pasua complex (10,207), with the highest counts at West Tangua Beel (2,000) and Bara Beel (1,600). Other concentrations included 1,495 at Hakaluki Haor, 1,430 at Kawadighi Haor, 1,150 at Maijeil Haor and 690 at Hail Haor.

8,658 were recorded during the Apr/May survey, with birds present at 15 sites. Much the largest concentration was a flock of 7,000 at Aila Beel on 21 Apr. Other high counts included 450 at Chatla Beel, 325 at Pasua Beel, 150 at Patachatal Beel and 120 at Haor Khal. This is typically the last of the wintering ducks to depart in spring and the first to return in autumn.

(Common winter visitor).

Northern Shoveler *A. clypeata*

Very common winter visitor.

12,913 were recorded during the Feb/Mar survey, with birds present at 20 sites. There were 9,379 at Hakaluki Haor, 2,850 at Maijeil Haor, 857 in the Tangua, Matian and Pasua complex and 750 at Kawadighi Haor, with the largest single concentration being 5,000 at Chatla Beel (Hakaluki Haor). Only 214 were recorded during the Apr/May survey, with birds present at 11 sites. The highest counts were 75 at Aila Beel, 50 at Chatla Beel and 35 at Pasua Beel. Clearly, this is a much commoner winter visitor than Harvey (1990) suggests.

(Scarce winter visitor).

Marbled Teal *Marmaronetta angustirostris*

Possibly a very rare vagrant.

Although there are some old specimen records of the Marbled Teal in the eastern half of the Indian Subcontinent, recent reports from Assam are open to some doubt. The species is known to breed no further east than Pakistan and extreme western China (Sinkiang), and is primarily a species of the Middle East and Mediterranean. Many populations have shown marked declines in recent decades, and the species is now listed in the IUCN Red Data Book. It is highly unlikely that it would occur in Bangladesh as anything other than a very rare vagrant.

(Winter vagrant).

Pink-headed Duck *Rhodonessa caryophyllacea*

Extinct.

The Pink-headed Duck was a bird of grassy swamps on the floodplains of the Ganges, Brahmaputra and Irrawaddy in eastern India, Bangladesh and northern Burma. Massive conversion of this habitat type to rice cultivation had already reduced populations to very low levels by the end of last century, and there have been no reliable records of the species since 1935. However, rumours of its continued existence in Assam and northern Burma persist, and there is a slight possibility that the species could survive in some of the extensive marshes in the upper Irrawaddy drainage in Burma. Its chances of survival in Bangladesh would, however, appear to be negligible.

(Almost certainly globally extinct since 1935 when last recorded in Bihar, India).

Red-crested Pochard *Netta rufina*

Scarce winter visitor to the north of the region.

This species, previously thought to be a rare visitor to Bangladesh, was recorded at four sites in the Tangua Haor complex during the Feb/Mar survey: 12 at Pana Beel, 22 at Rauar Beel, 13 at West Tangua Beel and 40 at a small un-named *beel* west of Tangua Beel, all on 2 Mar. A single male was observed by the Someswari River on 22 Apr, and two pairs were present at Pasua Beel on 24 Apr. There have been two other records of this species in Bangladesh since 1990.

(Winter vagrant. No recent records).

Common Pochard *Aythya ferina*

Scarce winter visitor.

Only 119 were recorded during the Feb/Mar survey: 80 at Chatla Beel, 30 at Chalnia Beel, five at Gharkuri Beel and four at Pana Beel. None was recorded during the Apr/May survey.

(Scarce winter visitor).

Baer's Pochard *A. baeri*

Fairly common winter visitor, especially in the north.

No less than 697 were recorded during the Feb/Mar survey, with birds present at seven sites. Apart from five at Chatla Beel and five at Gharkuri Beel in Hakaluki Haor, all were in the Tangua, Matian and Pasua complex. Much the largest concentration was a single flock of 660 at Pana Beel (on 2 Mar), but there were also 20 at Palair Beel, four at Banuar Beel, two at Pasua Beel and one at West Tangua Beel. All had departed by the time of the Apr/May survey. This species is currently listed in the IUCN Bird Red Data Book in the category "Vulnerable". Although the species winters widely from south China through Vietnam, Thailand and Burma to northeastern India and occasionally even Nepal, it is everywhere rather scarce, and this concentration of almost 700 in the Haor Basin is thus of considerable international significance.

(Rare winter visitor).

Ferruginous Duck *A. nyroca*

Common winter visitor.

1,973 were recorded during the Feb/Mar survey, with birds present at 16 sites. The great majority (1,952) were recorded at 13 sites in the Tangua and Matian Haor complex, where the largest concentrations were 500 at Palair Beel, 420 at Rauar Beel and 275 at West Tangua Beel. Elsewhere, there were 15 at Chalnia Beel, four at Dubail Beel (Balai Haor) and two at Chatla Beel. Only one was recorded during the Apr/May survey: at Rauar Beel on 23 Apr.

(Locally common winter visitor).

Tufted Duck *A. fuligula*

Common winter visitor.

2,351 were recorded during the Feb/Mar survey, with birds present at nine sites. The largest concentrations were 1,200 at Chalnia Beel, 500 at Hakaluki Haor, 360 at Maijeil Haor and 280 at Pana Beel. Only 54 were recorded during the Apr/May survey: 20 at Aila Beel, 14 at Pana Beel, 14 at Chatla Beel and six at Haor Khal.

(Locally common winter visitor, sometimes oversummering).

Greater Scaup *A. marila*

Rare winter visitor.

A party of three males and two females with a flock of *A. fuligula* at Pana Beel on 2 Mar. This constitutes the first record of *A. marila* in Bangladesh for many years. The species is a very scarce winter visitor to the Subcontinent, but may be commoner than the records suggest as it is easily overlooked in large flocks of *A. fuligula*. (One male was observed at Aila Beel on 22 Mar, during the Monthly Waterfowl Census).

(Rare winter visitor. No recent records.)

Common Merganser *Mergus merganser*

Possibly still a rare winter visitor.

Not recorded during the present surveys. Although the species is known to have occurred in the Northeast Region, it is primarily a bird of clear, fast-flowing rivers in hilly areas, and is thus unlikely to occur with any regularity.

(Former winter visitor).

Slaty-breasted Rail *Gallirallus striatus*

Scarce resident.

One feeding in a small rice field in a tea estate east of Srimangal on 1 May. This is a very secretive species, easily overlooked.

(Local resident).

Water Rail *Rallus aquaticus*

Possibly a scarce winter visitor and/or passage migrant.

Not recorded during the present surveys, but easily overlooked.

(Rare passage migrant).

Ruddy-breasted Crake *Porzana fusca*

Possibly a fairly common resident.

Not recorded during the present surveys, but extremely secretive and easily overlooked. The species has recently been found nesting in the Srimangal area (John Woolner, pers.comm.).

(Scarce winter visitor).

Brown Crake *Amaurornis akool*

Status uncertain.

Not recorded during the present surveys, but extremely secretive and easily overlooked.

(?Former resident. No recent records).

White-breasted Waterhen *A. phoenicurus*

Status uncertain; possibly an occasional visitor or scarce resident.

Not recorded during the present surveys. This was surprising, as the species is generally common throughout the Indian Subcontinent and Southeast Asia, and frequently lives around small ponds and tanks in close proximity to humans. It has a very loud and distinctive call, and is not easily overlooked. Harvey (1990) gives its distribution in Bangladesh as "throughout in wetlands including mangroves". The species has recently been recorded as an occasional visitor in tea estates near Srimangal (John Woolner, pers. comm.).

(Local breeding resident).

Common Moorhen *Gallinula chloropus*

Common breeding bird; perhaps mainly a summer visitor.

Only ten were recorded during the Feb/Mar survey: seven at Hail Haor on 23 Feb and three at the nearby fish ponds on 18 Feb. However, 120 were recorded during the Apr/May survey, with birds present at 10 sites. Much the largest concentration was 62 in the Rauar/Tangua Beel complex, but there were also at least 12 at Balai Haor, 11 at Pasua Beel, 10 at Hail Haor and smaller numbers at five other sites. The scarcity of records in Feb/Mar would suggest that the species is primarily a summer visitor to the Northeast Region.

(Local breeding resident).

Purple Swamphen *Porphyrio porphyrio*

Locally common resident.

Purple Swamphen were recorded at only four sites, but at all of these, the species appeared to be common. At Pasua Beel, there were 102 on 4 Mar and 420 on 22-24 Apr; at Rauar Beel, there were 31 on 2 Mar and 170 on 22-23 Apr; at Tangua Beel there were 75 on 22 Apr; and at Hail Haor there was one on 23 Feb and at least five on 2 May. The species would appear to be quite common wherever sufficient emergent marsh vegetation survives to provide the dense cover which it requires.

(Scarce breeding resident).

Watercock *Gallicrex cinerea*

Probably a fairly common summer visitor.

The only record during the Feb/Mar survey was two in *Ipomoea* scrub at Balai Haor on 6 Mar. Eleven were recorded during the Apr/May survey: six at Hail Haor, four at Mehdi Beel and one at Pasua Beel.

(Local breeding resident).

Eurasian Coot *Fulica atra*

Common winter visitor, mainly in the north.

5,320 were recorded during the Feb/Mar survey, with birds present at 11 sites. The great majority (5,100) were in the Tangua, Matian and Pasua complex, with concentrations of 3,040 at Rauar Beel, 1,120 at Tangua Beel and 500 at Pana Beel. The only large numbers elsewhere were 200 at Chatla Beel. Only 65 were recorded during the Apr/May survey, at a total of six sites. Again, the highest counts were at Rauar Beel (38) and Tangua Beel (16).

(Scarce breeding resident).

Common Crane *Grus grus*

Probably extinct in Bangladesh.

This species was formerly a winter visitor to the wetlands of Bangladesh, but there have been no confirmed records this century.

(Former winter resident).

Sarus Crane *G. antigone*

Extinct as a breeding bird in the Northeast.

The Sarus Crane probably once occurred as a resident throughout the larger wetland areas of Bangladesh, but disappeared from most of its range many years ago, and has been regular in recent years only in the extreme northwest. A specimen in the National Museum was reportedly shot in the Northeast Region in 1990, but this seems to have been the only record in recent years. The species has shown a dramatic decline almost throughout its range in the Indian Subcontinent and Southeast Asia in recent decades.

(?Former resident, now maybe all but extinct).

Demoiselle Crane *Anthropoides virgo*

Possibly a rare winter visitor.

Formerly a regular winter visitor to Bangladesh, the Demoiselle Crane is now apparently very rare. Although there have been two or three records from the Northeast in recent years, none was recorded during the present surveys.

(Rare winter visitor).

Pheasant-tailed Jacana *Hydrophasianus chirurgus*

Common breeding resident.

1,022 were recorded during the Feb/Mar survey, with birds present at 17 sites. Over 680 were observed in the Tangua and Matian complex, where the highest counts were 180 at West Tangua Beel, 140 at Tangua Beel, 120 at Rauar Beel and 120 at a small *beel* west of Tangua Beel. Elsewhere, there were 300 at Petangi Beel, 13 at Boraduba Beel, 10 at Deochapra Beel and smaller numbers at Hail Haor, Chalnia Beel, Balai Haor and Uglar Beel.

393 were recorded during the Apr/May survey, with birds present at 16 sites. The highest counts were 102 at Majherbanda Beel (Kawadighi Haor), 90 at Bara Beel, 53 at Hail Haor, 33 at Rauar Beel and 25 at Palair Beel. Many birds were in full breeding plumage and paired; a considerable amount of calling was heard, and it appeared that the birds were settling down to breed at many of the sites.

(Scarce breeding resident).

Bronze-winged Jacana *Metopidius indicus*

Fairly common breeding resident.

37 were recorded during the Feb/Mar survey. 25 were present at Deochapra Beel and much smaller numbers at Hail Haor, Ulauli Beel (Kawadighi Haor), Chalnia Beel, Meda Beel and Boraduba Beel.

35 were recorded during the Apr/May survey, with birds present at 13 sites. The highest counts were 11 at hail Haor, 10 at Deocahpra Beel and eight at Mehdi Beel. Birds were paired and displaying, and it appeared that they were settling down to breed.

(Local breeding resident).

Greater Paintedsnipe *Rostratula benghalensis*

Possibly a fairly common breeding resident.

One at Banuar Beel (Matian Haor) on 22 Apr, and a pair at Hail Haor on 2 May. This is a secretive species, easily overlooked and possibly much commoner than these records suggest.

(Local breeding resident).

Black-winged Stilt *Himantopus himantopus*

Common winter visitor and possibly a local breeding bird.

1,267 were recorded during the Feb/Mar survey, with birds present at 16 sites. The largest concentrations were 380 at Kanamaiya Haor, 315 at Bara Beel, 280 at Majherbanda Beel and 120 at Pakertala Beel. 376 were still present in Apr/May, with birds at a total of 13 sites. Much the largest concentrations were at Kawadighi Haor, where there were 165 at Majherbanda Beel on 29 Apr and 90 at Petangi Beel on 3 May. At both of these *beels*, small parties of stilts were indulging in aerial displays, and at Petangi Beel, several pairs were observed nest-building. Obviously this species is much commoner than Harvey (1990) suggests, and may nest in the region.

(Scarce winter visitor).

Pied Avocet *Recurvirostra avosetta*

Scarce winter visitor or passage migrant.

A party of four at Haor Khal (Hakaluki Haor) on 7 Mar. This is primarily a species of coastal wetlands and brackish to saline lakes.

(Scarce winter visitor).

Oriental Pratincole *Glareola maldivarum*

Status uncertain.

The species was observed only once: a single over the Surma River near Sunamganj on 1 Mar.

(Local breeding resident).

Small Pratincole *G. lactea*

Status uncertain. Possibly a resident in the west of the region.

Two were observed on the mudflats at Haor Khal (Hakaluki Haor) on 7 Mar. This is very much a bird of sand banks in large rivers, and might only be expected to be regular in the far west of the region.

(Local breeding resident. Not listed for northeast).

Little Ringed Plover *Charadrius dubius*

Common winter visitor.

357 were recorded during the Feb/Mar survey, with birds present at 25 sites. The largest concentrations were 175 at Haor Khal and 40 at Mehdi Beel. All had departed by late April.

(Common winter visitor and local breeder).

Long-billed Plover *C. placidus*

Status uncertain; probably a rare winter visitor.

Not recorded during the present surveys. There are only two recent records of this East Asian species in Bangladesh.

(Scarce winter visitor. ? Formerly more regular).

Kentish Plover *C. alexandrinus*

Locally common winter visitor.

752 were recorded during the Feb/Mar survey, with birds present at eight sites. Much the highest count was 650 at Haor Khal (Hakaluki Haor) on 7 Mar, where the extensive mudflats provided ideal feeding conditions. Other concentrations included 40 at Majherbanda Beel (Kawadighi Haor) and 34 on mud banks in the Someswari River. All had departed by late April.

Mongolian Plover *C. mongolus*

Scarce winter visitor.

Five at Majherbanda Beel (Kawadighi Haor) on 22 Feb, and seven at Haor Khal (Hakaluki Haor) on 7 Mar. This is primarily a bird of coastal mudflats and sandy beaches.

(Abundant winter visitor, non-breeders oversummering. Not listed for the Northeast).

Asiatic Golden Plover *Pluvialis fulva*

Common winter visitor and passage migrant.

821 were recorded during the Feb/Mar survey, with birds present at 21 sites. The largest concentrations were at Hakaluki Haor (433), Balai Haor (150), Pakertala Beel (82) and Hail Haor (60).

Large numbers were still present in late April/early May, and probably far more than the total count (585 at 14 sites) would suggest, as the birds were making much more use of rice stubble, and were therefore far more scattered than in Feb/Mar. A number of flocks were seen passing overhead in a northeasterly direction. Much the largest concentration was 300 in the Balai Haor area on 27 Apr.

(Common winter visitor).

Grey Plover *P. squatarola*

Scarce winter visitor.

Two at Pakertala Beel on 2 Mar and three at Haor Khal (Hakaluki Haor) on 7 Mar. This is primarily a species of coastal mudflats and sandy beaches.

(Locally common winter visitor, nonbreeders oversummering. Not listed for northeast).

River Lapwing *Vanellus duvaucelii*

Scarce resident along wide rivers with extensive sand banks.

Not recorded during the present surveys. This is a species of extensive sand banks in large rivers - a habitat type not visited during the surveys. It is known to occur along the Old Brahmaputra in the west of the region, but is apparently scarce.

(Rare? resident).

Grey-headed Lapwing *V. cinereus*

Common winter visitor.

685 were recorded during the Feb/Mar survey, with birds present at 24 sites. The largest concentrations were 210 at Majherbanda and Ulauli Beels, 82 at Ratna Beel, 61 at Hail Haor and 60 at Kair Gang (Hakaluki Haor). Most had left by late April, but there were still 15 at Kawadighi Haor, eight at Hail Haor and one at Haor Khal. Bangladesh appears to be one of the most important

wintering areas for this rather scarce lapwing which breeds in Northeast Asia and winters in wetlands from northern India east to South China.

(Local winter visitor).

Red-Wattled Lapwing *V. indicus*

Scarce resident.

Only three individuals were recorded during the Feb/Mar survey: singles at Dubriar Haor, Pana Beel and Palair Beel; and only one was recorded during the Apr/May survey: at Bara Beel. The scarcity of this species in the Haor Basin is surprising, as it is a common resident over much of its range from the Middle East to Thailand and often occurs on agricultural land and waste ground around human habitation.

(Local breeding resident).

White-tailed Lapwing *V. leucurus*

Rare winter visitor.

Not recorded during the present surveys, but one was reported at Hail Haor by Anisuzzaman Khan and Mark Barter in early February, just before the first survey.

(Former winter visitor. No recent records).

Northern Lapwing *V. vanellus*

Vagrant in winter.

Not recorded during the present surveys. This is probably only a rare vagrant in winter, as Bangladesh lies to the south of the species' normal winter distribution.

(Former winter visitor. No recent records).

Little Stint *Calidris minuta*

Common winter visitor.

741 were recorded during the Feb/Mar survey, with birds present at 6 sites. The largest concentrations were 550 at Haor Khal, 100 at Majherbanda Beel and 60 in rice fields between Netrokona and Kaluma Kanada. Only four were recorded during the Apr/May survey, at Petangi Beel on 3 May. All birds examined closely appeared to be of this species rather than the very similar Rufous-necked Stint *C. ruficollis*, which is believed to be the commoner of the two in the coastal zone.

(Local winter visitor. Not listed for northeast).

Temminck's Stint *C. temminckii*

Common winter visitor.

132 were recorded during the Feb/Mar survey, with birds present at 22 sites. The largest concentrations were 20 at Hail Haor, 20 in rice fields between Netrokona and Kaluma Kanda, 15 at

Mehdi Beel and 15 at Hail Haor. Only six were recorded during the Apr/May survey: three at Kuri Beel on 20 Apr and three at Pingla Beel on 30 Apr. The species typically occurs in ones and twos around small muddy pools, in shallow marshes and in rice fields, and is thus easily overlooked and very difficult to census. It is clear that the total population wintering in the Haor Basin could be very much larger than the counts might suggest.

(Scarce winter visitor).

Long-toed Stint *C. subminuta*

Scarce passage migrant.

Two were observed at Haor Khal on 25 Apr.

(Scarce winter visitor).

Dunlin *C. alpina*

Scarce winter visitor.

One at Majherbanda Beel on 22 Feb, and two at Haor Khal (Hakaluki Haor) on 7 Mar. This is primarily a shorebird of coastal mudflats, near the southern limit of its winter distribution in Bangladesh.

(Rare winter visitor. Not listed for the Northeast).

Curlew Sandpiper *C. ferruginea*

Scarce winter visitor and passage migrant.

Two at Majherbanda Beel on 22 Feb, and 20 at Haor Khal (Hakaluki Haor) on 7 Mar. One at Haor Khal on 25 Apr, and three at Petangi Beel on 3 May. Like the Dunlin, this is primarily a shorebird of coastal mudflats .

(Common winter visitor, nonbreeders oversummering).

Broad-billed Sandpiper *Limicola falcinellus*

Scarce winter visitor.

One at Haor Khal (Hakaluki Haor) on 7 Mar. Primarily a bird of coastal mudflats.

(Local winter visitor. Not listed for northeast).

Ruff *Philomachus pugnax*

Common winter visitor and/or passage migrant.

912 were recorded during the Feb/Mar survey, with birds present at 16 sites. The largest concentrations were 300 at Tangua Beel, 150 at Petandi Beel, 130 at Banuar Beel and 100 at Bara Beel. *P. pugnax* is one of the earliest spring migrants, and it is possible that many of these birds were already on their return spring migration from wintering areas further south in the Subcontinent.

Only 51 were recorded during the Apr/May survey: a flock of 50 at Haor Khal on 25 Apr, and one at Balai Haor on 27 Apr.

(Passage migrant and rare winter visitor).

Jack Snipe *Gallinago minima*

Probably a winter visitor in small numbers.

Not recorded during the present surveys, but a very secretive species, easily overlooked. The species has been observed on a number of occasions in the Srimangal area in recent years (John Woolner, pers. comm.).

(?Former winter visitor).

Common Snipe *Gallinago gallinago*

Abundant winter visitor.

Snipe were recorded in a wide variety of wet habitats in Feb/Mar, and were frequently flushed from rice fields where they were probably the commonest shorebird. The species is notoriously difficult to census, and thus the total count of 553 (at 30 sites) gives little more than an indication of its general abundance. Unusually large concentrations included 150 at Haor Khal, 90 at Boraduba Beel and 80 at Dekhar Haor. Only 31 were observed during the Apr/May survey, at a total of six sites. The Haor basin is clearly a very important wintering area for this species.

(Abundant winter visitor).

Pintail Snipe *G. stenura*

Common winter visitor.

G. stenura is perhaps even more difficult to census than *G. gallinago* as it occurs not only in wetlands but also in drier habitats such as stubble fields and grassy areas with some herbaceous cover. The total count of 41 in Feb/Mar (at 13 sites) merely supports Harvey's statement that the species is common (Harvey, 1990). Only six were recorded in Apr/May, and five of these were at Balai Haor on 27 Apr.

(Common winter visitor).

Swinhoe's Snipe *G. megala*

Probably a scarce winter visitor.

Two with *G. gallingo* and *G. stenura* in rice fields on the west side of Hail Haor on 23 Feb. The birds were identified from *stenura* on a combination of their larger size, heavier flight, longer bills, more conspicuous white in the outer tail features and slightly different call. This apparently constitutes the first record of *G. megala* in Bangladesh, although Rashid (1967) assumed that it must occur as it winters widely in the subcontinent south to Kerala and Sri Lanka, and has been recorded in neighbouring Assam, Manipur and West Bengal (Ali and Ripley, 1969). The species is, however, very difficult to separate from the much commoner *G. stenura* in the field, and is thus easily overlooked.

(Not listed).

Solitary Snipe *G. solitaria*

Possibly a rare winter visitor.

Not recorded during the present surveys. This is primarily a species of bogs and streams in hilly areas, and is thus unlikely to occur with any regularity in the Haor Basin.

(Rare winter visitor. No recent records).

Eurasian Woodcock *Scolopax rusticola*

Possibly a scarce winter visitor.

Not recorded during the present surveys. This is a nocturnal feeder, spending the day in thick cover, usually in damp forest. It is thus easily overlooked.

(Former winter visitor. No records this century).

Black-tailed Godwit *Limosa limosa*

Fairly common winter visitor.

420 were recorded during the Feb/Mar survey, with birds present at nine sites. The largest flocks were 165 at Majherbanda Beel, 140 at Pana Beel and 65 at Puala Beel (Kawadighi Haor). 93 were recorded during the Apr/May survey, with birds present at five sites. The highest counts were at Petangi Beel (31), Biaskhali Beel (25) and Pasua Beel (23). The species would appear to be commoner than Harvey (1990) suggests.

(Scarce winter visitor).

Eurasian Curlew *Numenius arquata*

Scarce passage migrant.

A flock was heard passing overhead at night at Rauar Beel on 22 Apr. At least three birds were calling. This is primarily a shorebird of coastal mudflats.

(Locally common winter visitor. Not listed for the Northeast).

Spotted Redshank *Tringa erythropus*

Fairly common winter visitor.

No less than 135 were recorded during the Feb/Mar survey, at a total of ten sites. The highest counts were 55 at Pasua Beel, 30 at Haor Khal and 30 at Majherbanda Beel. Smaller numbers (less than 10) were present at Kair Gang (Hakaluki Haor), Khakra Kuri Beel and Dubail Beel (Balai Haor), Kuri Beel, Someswari River, Kanamaiya Haor and Pakertala Beel. 18 were recorded during the Apr/May survey, at four sites, the largest flock being 13 at Pingla Beel on 30 Apr. Although listed by Rashid (1967) as a winter visitor to much of Bangladesh, the species was not listed by Harvey (1990). However, there have been several records in recent years (John Woolner, pers. com.), and it is now thought to be a scarce winter visitor. The present series of records would suggest that it is a fairly common winter visitor to the wetlands of the Haor Basin.

(Not listed).

Common Redshank *T. totanus*

Scarce winter visitor, but probably a fairly common passage migrant.

Only three were recorded during the Feb/Mar survey: one at Majherbanda Beel on 22 Feb, and two at Jugni Beel (Balai Haor) on 6 Mar. 20 were observed in Apr/May at a total of six sites, the highest count being five at Haor Khal on 25 Apr. This is primarily a bird of coastal mudflats in Bangladesh.

(Common winter visitor, nonbreeders oversummering).

Marsh Sandpiper *T. stagnatilis*

Common winter visitor.

434 were recorded during the Feb/Mar survey, with birds present at 16 sites. The largest concentrations were 145 at Haor Khal, 100 at Majherbanda Beel and 100 at Puala Beel. Only six were recorded during the Apr/May survey: at Petangi Beel on 3 May. This was one of the commonest shorebirds at *beels* with exposed mudflats in Feb/Mar, and would appear to be much commoner than Harvey (1990) suggests.

(Scarce winter visitor).

Common Greenshank *T. nebularia*

Fairly common winter visitor.

119 were recorded during the Feb/Mar survey, with birds present at 18 sites. The largest concentrations were 21 at Kuri Beel and 20 at Majherbanda Beel. Only seven were recorded in Apr/May, at five sites.

(Common winter visitor).

Green Sandpiper *T. ochropus*

Rather scarce winter visitor.

Singles were recorded at eight sites in Feb/Mar, and at four sites in Apr/May (last on 22 Apr). As this is a species of small pools, roadside ditches and muddy creeks, generally avoiding large open wetlands, it is often overlooked during waterfowl censuses. Nevertheless, a total count of only 12 suggests that the species is relatively uncommon.

(Common winter visitor, nonbreeders oversummering).

Wood Sandpiper *T. glareola*

Abundant winter visitor and passage migrant.

848 were recorded during the Feb/Mar survey, with birds present at 41 sites. The largest concentrations were 250 at Mehdi Beel, 90 at Haor Khal, 65 at small *beels* between Netrakona and Kaluma Kanda, and 60 in paddies by the Khowai River west of Habiganj. This was one of the commonest and most widespread shorebirds in the Haor Basin, frequenting a variety of wetland

habitats and occurring commonly in wet rice fields. As only a tiny fraction of the suitable habitat was covered, the total count of about 850 must represent only a tiny fraction of the birds present.

Most had departed by late April, and only 133 were recorded during the Apr/May survey (at a total of 13 sites). The highest counts were 50 at Balai Haor and 24 at Haor Khal. On several occasions, small flocks were seen passing overhead in a northeasterly direction.

(Common winter visitor, and abundant passage migrant).

Common Sandpiper *Actitis hypoleucos*

Fairly common winter visitor.

26 were recorded during the Feb/Mar survey, with birds present at 16 sites. Most were recorded singly along river banks, and the only site to hold more than two was Kuri Beel with three. Only 12 were recorded in Apr/May, with one or two individuals present at eight sites.

(Common winter visitor).

Common Black-headed Gull *Larus ridibundus*

Scarce winter visitor.

Fourteen were recorded during the Feb/Mar survey: eight at Puala Beel (Hakaluki Haor) on 20 Feb, one over the Baulai River on 25 Feb, one at Pakertala Beel on 2 Mar and four at Baisha Beel (Dubriar Haor) on 5 Mar. Only one was observed in Apr/May: a slightly injured bird at Haor Khal on 25 Apr. This species is primarily a bird of the coastal zone in Bangladesh.

(Locally common winter visitor).

Brown-headed Gull *L. brunnicephalus*

Fairly common winter visitor and passage migrant.

185 were recorded during the Feb/Mar survey, with birds present at 19 sites. The largest concentration was 60 at Haor Khal (Hakaluki Haor) on 7 Mar. Numbers had increased considerably by late April, presumably because of an influx of migrants from the south. 408 were recorded during the second survey, with birds present at 18 sites. The largest concentration was 150 at the Tangua/Rauar *beels* on 22 Apr, but there were also 80 at Pasua Beel, 45 at Haor Khal, 35 at Aila Beel and 35 at Pakertala Beel. Many of the birds were in full breeding plumage, and probably on the point of departing for their breeding areas on the Tibetan Plateau.

(Common winter visitor).

Gull-billed Tern *Gelochelidon nilotica*

Probably a scarce passage migrant.

None was recorded during the two main surveys, but a party of seven was observed at Pasua Beel on 23 Mar during the Monthly Waterfowl Census. This appears to be primarily a coastal species in Bangladesh.

(Common winter visitor, non-breeders oversummering).

River Tern *Sterna aurantia*

Status uncertain; possibly a fairly common resident on large rivers in the west, but only an occasional visitor to the Haor Basin.

A party of five on the Kalni River on 26 Feb and five along the Someswari River on 1 Mar and 4 Mar were the only records during the two surveys, although three were observed at Pasua Beel on 23 Mar during the Monthly Waterfowl Census. This is very much a species of large rivers with extensive sand banks.

(Local breeding resident).

Common Tern *S. hirundo*

Passage migrant in small numbers.

Eight were recorded during the Mar/Apr survey: four over the Someswari River on 22 Apr, two at Majherbanda Beel on 29 Apr, and singles at Tural Beel on 30 Apr and Petangi Beel on 3 May.

(Scarce winter visitor, non-breeders oversummering. Not listed for the Northeast).

Black-bellied Tern *S. acuticauda*

Possibly a scarce resident on large rivers in the extreme west.

Not recorded during the present surveys. This is a species of sand banks in wide rivers (a habitat type not investigated during the present surveys), and may occur in small numbers along the Old Brahmaputra in the extreme west of the region.

(Very local breeding resident. Not listed for the Northeast).

Little Tern *S. albifrons*

Status uncertain; probably a scarce resident.

A single immature at Patachatal Beel (Maijeil Haor) on 8 Mar, and a pair at the same locality on 28 Apr were the only records.

(Scarce breeding resident. Not listed for northeast).

Whiskered Tern *Childonias hybrida*

Abundant winter visitor and possibly a breeding bird.

2,139 were recorded during the Feb/Mar survey, with birds present at 32 sites. The largest concentrations were 455 at Kawadighi Haor on 22 Feb, 435 along the Baulai River on 25 Feb and 350 at Pasua Beel on 4 Mar. Some individuals were beginning to show signs of their breeding plumage by early March.

1,597 were recorded during the Apr/May survey, with birds present at 37 sites. The highest counts were 440 along the Someswari River, 203 at Hail Haor, 150 at Haor Khal and 142 at Pingla Beel. The species was even more widespread than in Feb/Mar, and many birds were in full breeding plumage,

but the only indication that breeding might be about to occur was at Petangi Beel, where a pair was observed showing courtship behaviour at a potential nest site on 3 May.

(Common winter visitor, nonbreeders oversummering).

White-winged Tern *C. leucopterus*

Rare passage migrant.

One was observed with a large flock of Whiskered Terns at Pingla Beel (Hakaluki Haor) on 30 Apr.

(Rare passage migrant. Not listed for the Northeast).

Indian Skimmer *Rhynchops albicollis*

Possibly a scarce passage migrant or winter visitor on large rivers in the west.

Not recorded during the present surveys. This is a species of sand banks in wide rivers (a habitat type not investigated during the present surveys), and may occur on passage and/or in winter along the Old Brahmaputra in the extreme west of the region.

(Local winter visitor. Listed for the East-central Region, but not for the Northeast).

D.5 Wetland birds of the Northeast Region of Bangladesh (other than waterfowl)

This annotated checklist contains all those species of birds (other than the true waterfowl listed in Section D.4) which are ecologically dependent on wetlands and floodplain grasslands, and are known or thought to have occurred in the Northeast Region of Bangladesh. Sequence and nomenclature follow Harvey, W.G. (1990) *Birds in Bangladesh*, University Press, Dhaka. Each species account begins with a short statement of the current status of the species in the Northeast Region, as determined on the basis of the present surveys, recent literature and some unpublished material available to the authors. The status of each species as summarized by Harvey (1990) is given in parenthesis at the end of the species accounts.

The dates of the two surveys were:

18 Feb to 12 Mar 92
20 Apr to 9 May 92

Pallas's Fish-Eagle *Halieetus leucoryphus*

Fairly common resident.

Thirty adults and 26 immatures were recorded during the Feb/Mar survey, and 17 adults and eight immatures during the Apr/May survey. These birds would appear to belong to a resident population. Most of the adults were paired and much display was noted during late February and early March. Three occupied nests were found; one on an electricity pylon at Dubriar Haor and two in tall trees on the edges of villages in the Tangua Haor area. The species was recorded at 27 sites, with major concentrations at Pasua Beel (two adults and 17 immatures) and Tangua Haor (eight adults and five immatures) in early March. Birds were less conspicuous in April/May, presumably because breeding pairs were already incubating. No aerial displays were observed, less calling was heard, and many of the adults were observed singly.

Single adults or pairs of adults were observed at the following localities: Sankardanga Beel, Ratna Beel, Chalnia Beel/Dubriar Haor, Juri River, Hakaluki Haor, Balai Haor, Mehdi Beel, Kuri Beel/Deochapra Beel, Dekhar Haor, Surma River (west of Sunamganj), Aila Beel, Someswari River (two pairs), Pasua Beel, Matian Haor, Tangua Haor (four pairs) and between Netrakona and Kaluma Kanda. These observations could represent as many as 20 pairs.

Pallas's Fish-Eagle is currently listed in the IUCN Red Data Book in the category "Rare". It occurs from Kazakhstan and Pakistan east to China and Burma, but populations appear to be declining almost everywhere. In the mid 1980s, it was feared that the species had become endangered in Bangladesh, with perhaps only a few breeding pairs remaining (Husain and Sarker, 1984). It is clear, however, that a substantial population still survives in the Haor Basin, and this may now be one of the largest single populations in the world.

(Rare breeding resident. Formerly more common).

Grey-headed Fish-Eagle *Ichthyophaga ichthyaetus*

Fairly common resident.

Nineteen individuals were recorded during the two surveys, including a pair of adults at Boraduba Beel (west of Phulpur) and single adults by the Khowai River west of Habiganj, at three *beels* between Kaluma Kanda and Netrakona, at two *beels* near Bhairab Bazar, and at Mehdi Beel, Chalnia Beel, Dekhar Haor, Deochapra Beel, Balai Haor, Pasua Beel, Pana Beel and Meda Beel. This could

represent as many as 15 pairs. Single immatures were observed at Hail Haor and between Sylhet and Maulvibazar. This species is less prone to soaring than most other large raptors, and may therefore be even commoner than these records suggest.

(Local breeding resident).

Western Marsh Harrier *Circus aeruginosus*

Fairly common winter visitor.

Fairly common in wetlands with emergent marsh vegetation. Thirty-three individuals were recorded during the Feb/Mar survey, at a total of 23 sites. The highest counts were five at Hail Haor and four at Tangua Beel. Only eight were recorded in Apr/May, and six of these were in the Tangua Haor, Matian Haor and Gurmar Haor area. The latest was a bird at Kawadighi Haor on 29 Apr.

(Common winter visitor).

Eastern Marsh Harrier *Circus spilonotus*

Fairly common winter visitor.

Fairly common in Feb/Mar, but outnumbered more than two to one by *C. aeruginosus*. Fifteen individuals were recorded during the Feb/Mar survey, at 13 sites. Only three were seen in Apr/May: singles by the Surma River on 21 Apr, by the Someswari River on 22 Apr and at Hakaluki Haor on 30 Apr. The species was much less confined to wetlands than *aeruginosus*, and was often seen hunting over agricultural land and dry ground with herbaceous vegetation.

(Scarce winter visitor).

Pied Harrier *C. melanoleucos*

Fairly common winter visitor and probably also a passage migrant.

A fairly common and widespread raptor, occurring primarily over rice fields, wheat fields and dry ground with herbaceous vegetation. At least 18 individuals were recorded during the Feb/Mar survey and 15 during the Apr/May survey.

(Scarce winter visitor).

Greater Spotted Eagle *A. clanga*

Rare winter visitor.

Only one individual was recorded: an adult at Hail Haor on 21 Feb.

(Scarce winter visitor).

Osprey *Pandion haliaetus*

Rather scarce winter visitor.

Seven were recorded during the Feb/Mar survey as follows: two at Dubriar Haor on 5 Mar, and singles over the Kusiyara River at Fenchuganj on 20 Feb, at Rauar Beel on 3 Mar, near Sunamganj

and at Chalnia Beel on 5 Mar, and at Balaganj Haor on 8 Mar. Five were recorded in Apr/May: singles at Pasua Beel, Pana Beel and Banuar Haor on 22 Apr, and along the Patnai Gang and at Pakertala Beel on 23 Apr.

(Scarce winter visitor).

Swamp Francolin *Francolinus gularis*

Probably extinct in the Northeast Region.

The Swamp Francolin is one of a number of species of birds which are more or less confined to reed-beds, stands of elephant-grass and scrub jungle in low-lying swampy areas subject to seasonal flooding in the basins of the Ganges and Brahmaputra rivers. With the massive loss of these habitats as a result of conversion to rice cultivation, overgrazing by domestic livestock and clearance for human settlement, many of these species have become rare and local throughout their ranges, and several are now listed in the IUCN Red Data Book of Threatened Animals. Most of these species would once have occurred widely in the floodplain grasslands and swampy scrub jungle of the Haor Basin in northeast Bangladesh, but all are now either extinct in the region or very rare. There have been no records of the Swamp Francolin anywhere in Bangladesh in recent years, and it is almost certainly extinct in the Northeast Region as there do not appear to be any sufficiently large tracts of suitable habitat remaining. This species is currently listed in the IUCN Red Data Book in the category "Vulnerable".

(?Former resident. No recent records).

Blue-breasted Quail *Coturnix chinensis*

Possibly a local resident.

A pair in marshy grassland by Chatla Beel (Hakaluki Haor) on 30 Apr. Apparently there has been only one other record of this species in Bangladesh in recent years (near Dhaka, in February 1986; personal observation).

(? Former resident. No recent records).

Bengal Florican *Eupodotis bengalensis*

Almost certainly extinct in the Northeast Region.

This large bustard of floodplain grasslands with scattered bushes is now seriously at risk throughout its range from the Nepal terai to northern Vietnam, and has not been recorded in Bangladesh for many years. It is currently listed in the IUCN Red Data Book in the category "Endangered". (See comments under Swamp Francolin).

(?Former resident. No recent records).

Australasian Grass Owl *Tyto longimembris*

Probably extinct in the Northeast Region.

The Grass Owl is a terrestrial owl of tall grass jungle and open grassland on floodplains. There have been few records of the species in Bangladesh and none in recent years, but it can be assumed that the

species formerly occurred throughout much of the country. It is doubtful if any suitable habitat now remains in the Northeast Region. (See comments under Swamp Francolin).

(? Former resident. No recent records).

Brown Fish-Owl *Ketupa zeylonensis*

Probably a scarce resident.

One was observed on a roadside telegraph pole between Kulaura and Maulvibazar at dusk on 19 Feb.

(Local breeding resident. Not listed for the Northeast).

White-throated Kingfisher *Halcyon smyrnensis*

Common resident.

Common and widespread, primarily around small wetlands in homestead forests and tea estates, but also occasionally along rivers and at large wetlands. Fifty-five were recorded during the Feb/Mar survey, with a number of birds occurring in wetlands far from the nearest wooded areas. However, only 10 were recorded in Apr/May, and all were in homestead forest or tea estates.

(Common breeding resident).

Black-capped Kingfisher *Halcyon pileata*

Possibly a scarce winter visitor.

None was observed during the present surveys. The species remains quite common elsewhere in Bangladesh (e.g. in the Sundarbans), and has been recorded near Srimangal in recent years (John Woolner, pers. com.)

(Locally common winter visitor).

Stork-billed Kingfisher *Halcyon capensis*

Possibly a scarce resident.

None was observed during the present surveys, but the species has been recorded in tea estates near Srimangal in recent years (John Woolner, pers. com.)

(Locally common breeding resident).

Common Kingfisher *Alcedo atthis*

Very common resident.

Common at all types of wetlands including small ponds within homestead forests. Widely distributed throughout the wetlands during Feb/Mar, but much more confined to the vicinity of homestead forests and small rivers and khals in Apr/May, presumably because of the greater availability of nests sites in these areas. Approximately 160 were recorded in Feb/Mar and 50 in Mar/Apr.

(Abundant breeding resident).

Blyth's Kingfisher *Alcedo hercules*

Possibly only a rare visitor to the Northeast Region.

None was recorded during the present surveys, but there has been one recent record in the Northeast Region: a single at Hail Haor in the month of February. This is primarily a species of forest streams, and may never have been regular in the open wetlands of the Haor Basin. It is currently listed in the IUCN Red Data Book in the category "Indeterminate".

(Rare visitor?).

Pied Kingfisher *Ceryle rudis*

Fairly common resident, especially along the major rivers and at large beels.

Fairly common and widespread, favouring rivers and the larger, deeper beels with suitable perches (e.g. fish stakes). Thirty-four were recorded in Feb/Mar and 26 in Apr/May.

(Locally common breeding resident).

Plain Martin *Riparia paludicola*

Status uncertain. Possibly a locally common breeding bird and/or passage migrant.

None was observed during the Feb/Mar survey. Singles were observed over the Surma River, Patnai Gang and Manu River in Apr/May. This is primarily a species of large rivers with extensive sand banks, and is therefore more likely to be commoner in the extreme west of the region

(Local breeding resident).

Sand Martin *R. riparia*

Locally common winter visitor and abundant passage migrant.

Very patchily distributed, but locally abundant in Feb/Mar; much commoner and more widespread in Apr/May, when several large migrating flocks were observed. The only records in Feb/Mar were at least 70 at Hail Haor on 21 and 23 Feb, several thousands in the Tangua Haor area on 1-4 Mar, and 95 at Petangi Beel (Kawadighi Haor) on 8 Mar. In Apr/May, concentrations of several hundred to a thousand individuals were observed in the Tangua Haor area and at Pasua Beel, Kawadighi Haor, Hakaluki Haor, Hail Haor and Srimangal.

(Local winter visitor and common passage migrant).

Red-throated Pipit *A. cervinus*

Probably a regular winter visitor in small numbers.

At least eight individuals were recorded during the Feb/Mar survey as follows: one in wet grassland south of Hakaluki Haor and one by Gharkuri Beel (Hakaluki Haor) on 19 Feb; four in wet rice fields near Puala Beel (Hakaluki Haor) on 20 Feb; one in rice fields east of Kawadighi Haor on 22 Feb, and two in the same area on 8 Mar. These apparently constitute the first confirmed records of this species in Bangladesh, although Rashid (1967) assumed that it must occur as a passage migrant. *A. cervinus* breeds in the tundra zone from northern Scandinavia to the Bering Straits, and winters south to north

Africa, the Middle East, Burma, Indochina and the Philippines. Although regular in winter in Pakistan and on passage in Nepal, there are rather few records from elsewhere in the Indian Subcontinent. The species has been recorded in Manipur, and is listed as a winter visitor to the Andaman and Nicobar Islands (Ali and Ripley, 1973). *A. cervinus* is generally a shy and secretive pipit, crouching when alarmed and flying a considerable distance when flushed. It is best identified on call, which resembles that of the much commoner *A. hodgsoni*, and is thus easily overlooked. On its winter quarters, it typically frequents marshy grassland and wet rice fields.

None was recorded during the Apr/May survey, by which time the wintering birds had presumably departed for their breeding grounds.

(Not listed).

Rosy Pipit *A. roseatus*

Common winter visitor.

Common and widespread around wetlands, frequenting muddy shores of beels, river banks, damp grassland and occasionally also wet rice fields. About 240 were recorded during the Feb/Mar survey, but many had left by Apr/May, when only 70 were seen (the last being one at Hail Haor on 2 May).

(Local winter visitor).

Yellow Wagtail *Motacilla flava*

Common winter visitor.

Common and widespread on damp grassland, on arable land and around wetlands, occasionally occurring in large flocks. *M. flava* generally showed a preference for somewhat drier habitats than *M. citreola*. About 430 were recorded in Feb/Mar. Most had left by late April, and only 35 were recorded during the second survey (the latest being four at Balai Haor on 27 Apr).

(Common winter visitor).

Yellow-hooded Wagtail *M. citreola*

Very common winter visitor.

Common and widespread on damp grassland - the commonest wagtail - favouring wet marshes and rice fields, but also occurring on muddy shores of *beels* and on river banks. Over 470 were recorded during the Feb/Mar survey, and 150 during the Apr/May survey. There were still at least 17 at Hail Haor on 2 May.

(Locally common winter visitor).

Grey Wagtail *M. cinerea*

Scarce winter visitor.

The only records were three around ponds in homestead forest south of Hakaluki Haor on 19 Feb, and one in Sunamganj on 1 Mar.

(Scarce winter visitor).

White Wagtail *M. alba*

Fairly common winter visitor.

About 80 individuals were recorded during the Feb/Mar survey in a wide variety of habitats, but most commonly along the banks of large rivers. Only one was recorded during Apr/May: at Pasua Beel on 24 Apr.

(Abundant winter visitor).

White-browed Wagtail *M. maderaspatensis*

Probably a scarce breeding resident.

None was recorded during the present surveys, but the species has been recorded in the Hail Haor area in recent years (John Woolner, pers. com.).

(Scarce breeding resident).

Bluethroat *Erithacus svecicus*

Fairly common winter visitor.

Fairly common and widespread around wetlands wherever there was sufficient cover; usually flushed from herbaceous vegetation on embankments. *E. svecicus* is a secretive species, generally keeping to dense cover. At least 42 individuals were recorded during the Feb/Mar survey, suggesting that the species is a common winter visitor to the area, rather than a passage migrant as listed by Harvey (1990). Only three were recorded during the Apr/May survey: two at Tangua Haor on 23 Apr and one at Pasua Beel on 24 Apr.

(Locally common passage migrant).

White-tailed Bushchat *Saxicola leucura*

Possibly now only a rare visitor to the Northeast Region.

This is another species typical of tall grass, reeds and bushes on damp or inundated ground, especially in the vicinity of large rivers. Little of this habitat remains in the Northeast Region, and no *S. leucura* were observed during the present surveys, but there has been one recent record (April) in the Northeast (John Woolner, pers. com.). (See comments under Swamp Francolin).

(? Former resident. No recent records).

Jerdon's Bushchat *S. jerdoni*

Possibly only a rare winter visitor to the Northeast Region.

This species, even more than *S. leucura*, is a bird of large stands of elephant-grass and reeds. None was recorded during the present surveys, but there have been two recent records from the Srimangal area; in February 1986 and February 1988 (John Woolner, pers. com.). (See comments under Swamp Francolin).

(Rare visitor. Only one recent record).

Zitting Cisticola *Cisticola juncidis*

Abundant resident. One of the commonest birds of the rice fields.

Very common and widespread around wetlands, frequenting emergent marsh vegetation and wet rice fields. Many birds were heard in song during both surveys, and were presumably nesting.

(Local breeding resident).

Yellow-bellied Prinia *Prinia flaviventris*

Rare resident.

None was recorded during the present surveys, but the species has been recorded at least once in the Srimangal area in recent years. In Southeast Asia, this is a very common bird of rank vegetation around wetlands.

(Rare resident).

Swamp (Long-tailed) Prinia *P. (burnesii) cinerascens*

Possibly extinct in the Northeast Region.

There have been no records of this threatened species in Bangladesh in recent years, although it remains locally common in parts of northeastern India. It is typically a bird of swamps and vast expanses of elephant-grass in the vicinity of large rivers. The form *cinerascens*, confined to the basin of the Brahmaputra, is usually treated as a subspecies of the Long-tailed Prinia (*Prinia burnesii*), which is now listed in the IUCN Red Data Book in the category "Rare". (See comments under Swamp Francolin).

(? Former resident. No recent records).

Large Grass-Warbler *Graminicola bengalensis*

Possibly extinct in the Northeast Region.

This is another species of tall grass and reeds which must once have occurred widely in Bangladesh, but has not been recorded in recent years. (See comments under Swamp Francolin).

(? Former resident. No recent records).

Pallas's Warbler *Locustella certhiola*

Possibly a fairly common passage migrant, but easily overlooked.

At least five were located in dense herbaceous vegetation along embankments near Arabiakona Beel (Tangua Haor) on 23 Apr, and two were found in dense, damp thickets at Pasua Beel on 24 Apr.

(Rare passage migrant).

Lanceolated Warbler *L. lanceolata*

Possibly a fairly common winter visitor and/or passage migrant, but easily overlooked.

One was flushed from herbaceous vegetation on an embankment at Pasua Beel on 4 Mar. This is apparently the first record of this extremely secretive warbler in Bangladesh in recent years. The species winters from northern India east to Indochina and south to the Andaman and Nicobar Islands, Sumatra and Borneo.

(Rare passage migrant or winter visitor. No recent records).

Grasshopper Warbler *L. naevia*

Status uncertain. Perhaps a rare winter visitor or passage migrant.

None was observed during the present surveys. The species favours rank vegetation in and around wetlands and is extremely secretive and easily overlooked. Bangladesh lies close to the eastern extremity of the species' wintering range, and it may be that the bird is uncommon here.

(? Rare passage migrant or winter visitor).

Bristled Grass-Warbler *Chaetornis striatus*

Possibly extinct in the Northeast Region.

This is yet another species of tall grasses in swampy areas which once occurred widely in Bangladesh, but has not been recorded in recent years. (See comments under Swamp Francolin).

(? Former resident. No recent records).

Striated Warbler *Megalurus palustris*

Very common resident, especially in the north.

Very common and widespread around wetlands wherever there is sufficient herbaceous cover, but absent from pure stands of rice. Particularly common in the Tangua Haor area where several hundred individuals were recorded in early March and again in late April. Many birds were in song and presumably about to breed.

(Locally common breeding resident).

Thick-billed Warbler *Acrocepahlus aedon*

Winter visitor and/or passage migrant.

Four in secondary scrub near Maulvibazar on 30 Apr and one in a tea estate near Srimangal on 3 May were the only records. This species commonly occurs in secondary scrub and forest edge situations, and is less dependent on wetland vegetation than others of the genus *Acrocephalus*.

(Local winter visitor).

Blunt-winged/Paddyfield Warbler *A. concinens/agricola*

Status uncertain because of difficulties in field identification. *A. concinens* is probably a scarce winter visitor and very common passage migrant.

Recorded at three localities in Feb/Mar: at least eight in herbaceous vegetation on the edge of Rauar Beel (Tangua Haor) on 3 Mar; one in herbaceous vegetation by Arabiakona Beel (Tangua Haor) also on 3 Mar; and at least five in *Ipomoea* scrub on embankments in Balai Haor on 6 Mar. Very common in late April and early May, with hundreds in the Tangua Haor, Matian Haor and Gurmar Haor area on 22-24 Apr, 20 at Hakaluki on 30 Apr and two at Hail Haor on 2 May. Many birds were in song, especially in the tall reed-beds at Pasua Beel. All birds examined closely were thought to be *A. concinens*. However, *A. concinens stevensi*, which breeds in Assam and has been recorded in winter in Bangladesh, and *A. agricola*, which breeds in central Asia and winters throughout the Indian Subcontinent, are generally regarded as being indistinguishable in the field.

(Rare winter visitor (*concinens*), ? scarce passage migrant *(agricola)*.

Blyth's Reed Warbler *A. dumetorum*

Fairly common winter visitor and probably also passage migrant.

Fairly common in homestead forests throughout the region in Feb/Mar and again in Apr/May.

(Abundant winter visitor).

Black-browed Reed Warbler *A. bistrigiceps*

Scarce winter visitor and probably also passage migrant.

One was observed in herbaceous vegetation by Rauar Beel (Tangua Haor) on 3 Mar. The bird was in the same area as about eight *A. concinens/agricola* and was readily distinguishable by its bold head markings and different call. At least four were singing (two seen well) in extensive stands of rushes at Hail Haor on 2 May. These apparently constitute the first records of *A. bistrigiceps* in Bangladesh, although Rashid (1967) indicated that it might occur as a winter visitor to the northeast and southeast. The species breeds from northeast Mongolia and southeast Siberia east to Sakhalin and Japan and south to the lower Yangtze Valley in China, and winters mainly in southeast China and Southeast Asia west to Burma. It has been recorded in winter in West Bengal (where it is regular in small numbers), eastern Assam and Manipur (Ali and Ripley, 1973), and is therefore not unexpected in Bangladesh.

(Not listed).

Clamorous Reed Warbler *A. stentoreus*

Scarce winter visitor and fairly common passage migrant.

Recorded only once during the Feb/Mar survey: three in *Ipomoea* scrub at Balai Haor on 6 Mar. Fairly common and widespread in Apr/May, with about 35 birds recorded at Dekhar Haor, Pasua Beel, Tangua Haor, Dubriar Haor, Balai Haor and Hail Haor. Most individuals were found in stands of *Barringtonia*, *Pongamia* or *Ipomoea*, and several were giving short bursts of song.

(Common winter visitor, sometimes oversummering).

Dusky Warbler *P. fuscatus*

Very common winter visitor and probably also passage migrant.

Fairly common during Feb/Mar, and very common in Apr/May. About 15 were recorded during the first survey, at Erali Beel, Balai Haor, Kaluma Kanda and Meda Beel, and 50 during the second survey, at Pasua Beel, Tangua Haor, Balai Haor, Hakaluki Haor and Hail Haor. Most were in low shrubbery or rank vegetation (including *Ipomoea* scrub) near water.

(Abundant winter visitor).

Marsh Babbler *Pellorneum palustre*

Possibly still a very local resident in the Northeast.

None was recorded during the present surveys, despite a special search in potentially suitable habitat. The species has, however, been recorded on one occasion in the Northeast Region in recent years: a bird in damp forest scrub in February 1989 (Harvey, 1990). This is a bird of extensive reed-beds, coarse high grass alongside swamps and rivers, elephant-grass and also bushes and low tree-jungle on marshy ground. It has now become very rare over much of its range in Arunachal Pradesh, Assam and Bangladesh, and is listed in the IUCN Red Data Book in the category "Insufficiently Known". (See comments under Swamp Francolin).

(? Rare local resident or winter visitor).

Chestnut-capped Babbler *Timalia pileata*

Probably a scarce and local resident.

None was recorded during the present surveys, but there have been a number of records of this species in tea estates near Srimangal in recent years (John Woolner, pers. com.). This is a bird of low-lying swampy areas, affecting tall grass, reed-beds, brushwood and scrub jungle, often along streams. (See comments under Swamp Francolin).

(Local breeding resident).

Jerdon's Moupinia *Chrysomma altirostre*

Possibly extinct in the Northeast.

This species is confined to large stands of elephant-grass, reed-beds and other dense marsh vegetation. It occurs in three separate populations: on the plains on the Indus in Pakistan, in the basin of the

Ganges and Brahmaputra in northeast India and Bangladesh, and on the plains of the Irrawaddy in south-central Burma. All three populations are at risk, and the latter may be extinct. The species is currently listed in the IUCN Red Data Book in the category "Vulnerable". (See comments under Swamp Francolin).

(? Former resident. No recent records).

Black-breasted Parrotbill *Paradoxornis flavirostris*

Possibly extinct in the Northeast.

This is a species of reeds and wet grassland, occurring from Nepal and Bhutan east to northeast India, Bangladesh, west Burma and southwest China. There are very few recent records from anywhere in its range, and the species is now listed in the IUCN Red Data Book in the category "Indeterminate". (See comments under Swamp Francolin).

(? Former resident. No recent records).

Striated Babbler *Turdoides earlei*

Local resident, presumably now much reduced in numbers.

Recorded on only two occasions: one in a wheat field near Boraduba Beel on 12 Mar, and at least four in secondary scrub near Maulvibazar on 30 Apr. Elsewhere in the Indian Subcontinent, this is primarily a species of tall grass, elephant-grass, rushes and reed-beds in swampy areas. It seems likely that the babbler would have been much commoner and more widespread in the Northeast Region when these were the dominant habitats of the floodplains. (See comments under Swamp Francolin).

(Locally common breeding resident).

Slender-billed Babbler *T. longirostris*

Possibly extinct in the Northeast Region.

Another bird of long grass, usually near water, which has not been recorded in Bangladesh in recent years. (See comments under Swamp Francolin).

(Rare? resident. No recent records).

Black-breasted Weaver *Ploceus benghalensis*

Locally common resident.

None was recorded during the Feb/Mar survey, but in winter the species resembles the Baya Weaver (*Ploceus philippinus*), and is easily overlooked in large flocks of that species. Several small breeding colonies (with about 100 birds) were located in the extensive rush beds at Hail Haor on 2 May.

(Locally common breeding resident).

Streaked Weaver *P. manyar*

Possibly a rare resident.

Only one individual was recorded: a female amongst Black-breasted Weavers at Hail Haor on 2 May.

(Rare breeding resident).

Chestnut Munia *L. malacca*

Common resident.

Fairly common in pairs and small parties in reed-beds, herbaceous vegetation around wetlands, and occasionally also in rice and wheat fields. At least 100 were present amongst the vast flocks of Baya Weavers (*Ploceus philippinus*) and Scaly-breasted Munias (*Lonchura punctulata*) in rice fields south of Hail Haor on 29 Apr.

(Local resident).

Black-faced Bunting *Emberiza spodocephala*

Common winter visitor.

Recorded on a number of occasions during both surveys as follows:
a male at Arabiakona Beel (Tangua Haor) on 3 Mar; two at Pasua Beel on 4 Mar; at least three at Dubriar Haor on 5 Mar; at least 20 at Balai Haor on 6 Mar; one at Maijeil Haor on 8 Mar; one by the Surma River on 21 Apr; three by the Someswari River and 10 at Pasua Beel on 22 Apr; four at Arabiakona Beel and at least 30 at Pasua Beel on 23 Apr; and 10 at Pasua Beel on 24 Apr. The great majority were observed in rank herbaceous vegetation, *Ipomoea* scrub or shrubbery along embankments adjacent to wetlands. This series of records suggests that this rather secretive bunting is a common winter visitor to northeastern Bangladesh.

(Rare winter visitor).

Chestnut-eared Bunting *E. fucata*

Fairly common winter visitor.

This inconspicuous bunting was observed on several occasions during both surveys as follows: at least 20 in herbaceous vegetation in a large sandy area between Dubriar Beel and Baisha Beel (Dubriar Haor) on 5 Mar; one in a wheat field near Meda Beel on 11 Mar; one in herbaceous vegetation at Dekhar Haor on 20 Apr; one in herbaceous vegetation at Arabiakona Beel on 23 April; three at Dubriar Haor on 26 Apr (in the same area as on 5 Mar); three in herbaceous vegetation at Maijeil Haor on 28 Apr; one in rushes at Chatla Beel (Hakaluki Haor) on 30 Apr; and one in rice stubble at Hail Haor on 2 May. These are apparently the first records of this rather secretive and easily overlooked bunting in Bangladesh in recent years, although it is listed as a winter visitor to most of Bangladesh by Ali and Ripley (1974).

(? Former winter visitor. No recent records).

Yellow-breasted Bunting *E. aureola*

Common winter visitor.

Flocks and small parties were recorded on a number of occasions during both surveys as follows: four near Kulaura on 19 Feb; one near Kawadighi Haor on 22 Feb; a flock of 60 at Hail Haor on 23 Feb; 12 near Sunamganj on 1 Mar; seven at Samsar Beel (Tangua Haor) on 3 Mar; a flock of 30 by the Surma River on 21 Apr; six at Pasua Beel and 10 at Rauar Beel on 22 Apr; one at Arabiakona Beel and at least 100 roosting in shrubbery at Pasua Beel on 23 Apr; two at Pasua Beel on 24 Apr; and one at Hail Haor on 2 May. Birds were commonly seen feeding in rice stubble.

(Locally common winter visitor).

D.6 Lists of nationally threatened waterbirds in Bangladesh

From *Draft National Conservation Strategy for Bangladesh*, Wildlife and Protected Areas (version credited to K.Z. Husain):

Little Grebe *Tachybaptus ruficollis*
Oriental Darter *Anhinga melanogaster*
Grey Heron *Ardea cinerea*
Purple Heron *Ardea purpurea*
Asian Openbill *Anastomus oscitans*
White-necked Stork *Ciconia episcopus*
Glossy Ibis *Plegadis falcinellus*
White Spoonbill *Platalea leucorodia*
Fulvous Whistling-Duck *Dendrocygna bicolor*
Comb Duck *Sarkidiornis melanotos*
Pheasant-tailed Jacana *Hydrophasianus chirurgus*
Greater Paintedsnipe *Rostratula benghalensis*

From *Draft National Conservation Strategy for Bangladesh*, Wildlife and Protected Areas (version credited to Syed Abdur Rahman and Abdul Wahab Akonda):

White Stork *Ciconia ciconia*
White Spoonbill *Platalea leucorodia*
Comb Duck *Sarkidiornis melanotos*
Demoiselle Crane *Anthropoides virgo*

From Nature Conservation Movement (NACOM) (Dec 91):

Goliath Heron *Ardea goliath*
Black-crowned Night Heron *Nycticorax nycticorax*
Yellow Bittern *Ixobrychus sinensis*
Asian Openbill *Anastomus oscitans*
White Spoonbill *Platalea leucorodia*
Grey Lag Goose *Anser anser*
Bar-headed Goose *Anser indicus*
Comb Duck *Sarkidiornis melanotos*
Northern Shoveler *Anas clypeata*
Sarus Crane *Grus antigone*
Long-toed Stint *Calidris subminuta*
Spoon-billed Sandpiper *Eurynorhynchus pygmeus*
Asian Dowitcher *Limnodromus semipalmatus*
Nordmann's Greenshank *Tringa guttifer*
Indian Skimmer *Rhynchops albicollis*

Table D.7: Woody flora of Northeast Region upland forests

Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Acanthaceae	*Adhatoda zeylanica*	Vasak		X				X				X
	Eranthemum suffruticosum	–	X									X
	Phlogacanthus curviflorus	–			X		X					X
	P. thyrsiflorus	Ramvasak	X				X					X
	P. tubiflorus	–		X			X					X
	Strobilanthes anisophyllus	–	X	X			X					X
	S. fimbriatus	–		X			X					X
	S. flaccidifolius	–		X					X		X	X
	S. glomeratus	–	X	X				X				X
	S. panichanga	–	X	X				X				X
	S. scaber	–	X					X				X
	Thunbergia grandiflora	Nillata, Nallata		X		X	X					X
Actinidiaceae	*Saurauja roxburghii*	Dalup	X						X			X
Alangiaceae	*Alangium barbata*	Salbiholom	X					X				X
	A. begoniaefolia	Marli	X			X		X				X
Anacardiaceae	*Drimycarpus racemosus*	Telsur	X					X				X
	Holigarna caustica	Jhawa		X			X					X
	Lannea coromandelica	Jiyal, Kai–engla				X		X				X
	Mangifera indica	Am		X	X				X		X	
	M. sylvatica	Bon–am, Lakshmi–am		X			X					X
	Pegia nitida	–			X	X		X				X
	Rhus succedanea	Kakrashringi		X				X				X
	Semicarpus anacardium	Bhela				X			X			X
	S. prainii	–	X					X				X
	Spondias pinnata	Amra			X		X					X
Ancistrocladaceae	*Ancistrocladus wallichii*	–	X						X			X
Annonaceae	*Alphonsea lutea*	–		X				X				X
	A. ventricosa	–			X				X			X
	Annona reticulata	Nona			X				X		X	X
	A. squamosa	Ata				X			X			X
	Artabotyris suaveolens	–		X					X			X
	Cyathostemma argenteum	–			X			X				X
	Desmos chinensis	–		X				X				X
	D. dumosus	–		X					X			X
	D. longiflorus	–	X					X				X

MEG:Moist evergreen; EG:Evergreen; MIEG:Mixed evergreen; DE:Deciduous; VC:Very common; C:Common; UC:Uncommon; R:Rare; PI:Planted; Na:Natural

Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Annonaceae	*Goniothalamus sesquipedalis*	–	X							X		X
	Melodorum bicolor	–	X						X			X
	M. polyanthum	–	X					X				X
	M. rubiginosum	–		X					X			X
	M. verrucosum	–		X					X			X
	M. wallichii	–		X					X			X
	Miliusa roxburghiana	Bonponial			X	X						X
	M. velutina	–								X		X
	Oxymitra fornicata	–		X				X				X
	Polyalthia argentea	–			X				X			X
	P. jenkinsii	–			X				X			X
	P. simiarum	Chami, Arjan			X				X			X
	Uvaria cordata	Dunal		X				X				X
	U. hamiltonii	–		X					X			X
Apocynaceae	*Aganosma cymosum*	–			X			X				X
	A. marginata	Malati			X				X			X
	Alastonia scholaris	Chhatim, Satni			X		X				X	X
	Alyxia gracilis	–			X			X				X
	Anodendron manubriatum	–			X			X				X
	Beaumontia grandiflora	–		X					X			X
	Eevatamia divaricata	Togor		X			X					X
	Holarrhena pubescens	Kurchi, Dudhari			X			X			X	X
	Ichnocarpus frutescens	Shamalata, Kalilata		X	X		X					X
	I. ovatifolius	–		X	X			X				X
	Kopsia fruticosa	–			X					X		X
	Melodinus khasianus	–	X						X			X
	M. monogynus	–	X						X			X
	Parabarium micranthum	–	X						X			X
	Parsonsia helicandra	–		X				X				X
	Pottsia laxiflora	–		X				X				X
	Rauvolfia serpentina	Sarpaghanda		X	X	X		X			X	X
	Rhynchodia verrucosa	–	X						X			X
	Strophanthus wallichii	–			X			X				X
	Willoughbeia edulis	Gedraphol		X				X				X
	Wrightia coccinea	Pallam, Palan		X				X				X
	W. tomentosa	Dudhkoriya		X				X				X
Aquifoliaceae	*Illex godajam*	Ludh		X					X			X
	I. griffithii	–		X				X				X
	I. sulcata	–				X		X				X
Araliaceae	*Heteropanax fragrans*	Keseru		X				X				X
	Macropanax oreophilum	–		X						X		X

MEG:Moist evergreen; EG:Evergreen; MIEG:Mixed evergreen; DE:Deciduous; VC:Very common; C:Common; UC:Uncommon; R:Rare; PI:Planted; Na:Natural

Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Araliaceae	*M. undulatum*	–		X					X			X
	Schefflera bengalensis	–		X				X				X
	Trevesia palmata	Argoza		X				X				X
Aristolochiaceae	*Aristolochia saccata*	Iswararmul	X						X			X
Asclepiadaceae	*Calotropis gigantea*	Akon			X	X		X				X
	Ceropegia lucida	–		X	X			X				X
	Cosmostigma racemosum	–	X						X			X
	Cynanchum corymbosum	–		X					X			X
	Genianthus crassifolius	–		X					X			X
	Gymnema acuminatum	–		X					X			X
	G. latifolium	–	X	X				X				X
	Marsdenia eriocarpa	–			X	X		X				X
	M. tenacissina	Jitti, Chiti			X		X					X
	M. tinctoria	Reyong			X			X				X
	Raphistemma pulchellum	–		X				X				X
	Toxocarpus acuminatus	–			X			X				X
	Tylophora exilis	Anantamul			X	X		X				X
Bignoniaceae	*Haplophragma adenophyllum*	Kawatuti			X			X				X
	Oroxylum indicum	Nasona, Sona		X	X		X					X
	Pajanelia longifolia	Hona, Kawarnosa			X			X				X
	Stereospermum personatum	Paroi, Parniawal			X	X			X			X
Bombacaceae	*Bombax ceiba*	Simul			X	X			X		X	X
	B. insigne	Pahariasimul				X		X				X
Boraginaceae	*Cordia dichotoma*	Aslia, Kalauja			X	X			X			X
	C. dichotoma var. brunnea	–			X				X			X
	C. fragrantissima	Kaladuti, Kawatuti			X			X				X
	Tournefortia candollii	–		X					X			X
	T. viridiflora	–		X				X				X
Buddlejaceae	*Buddleja asiatica*	Budbhota			X			X				X
Burseraceae	*Commiphora roxburghii*	–		X					X			X
	Canarium bengalense	Dhuna–rata		X				X				X
	C. resiniferum	Beri–rata		X				X				X
	Garuga pinnata	Engla, Hengla			X	X		X				X
	Protium sarratum	Neru, Heru		X					X			X
Capparidaceae	*Crataeva magna*	Barun	X						X			X
	Stixis suaveolens	Madabmaloti	X	X			X					X
Caprifoliaceae	*Viburnum colebrookianum*	–		X				X				X
Celastraceae	*Bhesa robusta*	Salkachra		X				X				X
	Celastrus monosperma	–		X				X				X
	C. paniculata	Malkagni		X					X			X
	C. venulosa	–		X	X				X			X

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Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Celastraceae	*Euonymus attenuatus*	–		X					X			X
	E. bulletus	–		X				X				X
	Gymnosporia neglecta	–		X					X			X
	Hippocratea indica	Kathapaharia			X			X				X
	H. obtusifolia	–			X				X			X
	Lophopetalum wightianum	Sutrong		X					X			X
	Microtropis discolor	–		X				X				X
	Salacia floribunda	–		X	X				X			X
	S. prinoides	Modhuphol			X			X				X
	S. roxburghii	–		X			X					X
Combretaceae	*Anogeissus sericea*	–		X					X			X
	Calycopteris floribunda	Goache lata, Goichia lata			X				X			X
	Combretum decandrum	Kaligaichi			X			X				X
	C. extensum	Baulata, Dulia		X	X			X				X
	C. flagocarpum	–			X			X				X
	C. pilosum	Jhuni vargur			X			X				X
	Terminalia bellirica	Bohera				X		X				X
	T. catappa	Kathbadam				X			X		X	X
	T. chebula	Haritaki			X	X		X			X	X
	T. citrina	Hora			X				X			X
	T. myriocarpa	Hasna, Jhalna		X				X				X
	T. tomentosa	Hasna		X					X			X
	Quisqualis indica	Madhabilata, Madhumalati			X				X		X	X
Compositae	*Blumea chinensis*	–			X				X			X
	B. myriocephala	–			X				X			X
	Vernonia arborea	Panikossom		X	X			X				X
	V. divergens	–		X				X				X
	V. scandens	–		X					X			X
Connaraceae	*Connarus paniculata*	Malcheri		X	X			X				X
	Rourea commutata	Bol, Hialia, Dulibol		X	X			X				X
Convolvulaceae	*Aniseia martinicensis*	–	X						X			X
	Argyreia argentea	Bararupatola			X			X				X
	A. capitiformis	–			X				X			X
	A. nervosa	Guguli, Bijtarak			X			X				X
	A. roxburghii	–			X			X				X
	Bonamia semidigyna	–			X				X			X
	Erycibe albiflora	–		X					X			X
	E. glaucescens	–		X					X			X
	Ipomea fistulosa	Dholkalmi	X	X				X			X	X
	I. rubens	–		X				X				X
	I. yomae	–		X					X			X

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Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
	Lepistemon binectariferum	–	X	X				X				X
	Merrimia umbllllata sub sp. orientalis	Sadakalmi			X				X			X
	Porana paniculata	–		X				X			X	X
Crypteroniaceae	*Crypteronia panculata*	Nishama		X					X			X
Datiscaceae	*Tetrameles nudiflora*	Tirol, Tula			X				X			X
Dichapetalaceae	*Dichapetalum gelonioides*	Moakura			X			X				X
Dilleniaceae	*Delima sarmentosa*	Chalia lot			X				X			X
	Dillenia indica	Chalta			X			X			X	X
	D. pentagyna	Hargoza, Chaliabanak		X	X		X					X
	D. scabrella	Hill ekush			X				X			X
Dipterocarpaceae	*Dipterocarpus turbinatus*	Garjan, Koroil		X				X			X	X
	Hopea odorata	Telsur		X	X				X			X
	Shorea robusta	Sal			X	X		X			X	X
	Vatica lanceaefolia	Lechua garjan, Sutagula		X					X			X
Ebenaceae	*Diospyros lanceaefolia*	–		X				X				X
	D. nigricans	–		X					X			X
	D. pilosula	–		X					X			X
	D. racemosa	Kalakhura, Gulal		X				X				X
	D. stricta	–		X					X			X
Ehretiaceae	*Ehretia serrata*	Kalahuja		X	X				X		X	
Elaeagnaceae	*Elaeagnus latifolia*	Loh–baroi		X	X			X				X
Elaeocarpaceae	*Elaeocarpus acuminatus*	–		X				X				X
	E. cuneatus	–		X					X			X
	E. floribundus	Belphoi, Selfoi		X				X			X	X
	E. lanceaefolius	–		X					X			X
	E. petiolatus	Cheng–bichal	X						X			X
	E. prunifolius	–		X				X				X
	E. robustus	Huara, Jalpai, Chekio			X			X				X
	E.rugosus	Durbichi	X						X			X
	E. sphaericus	Ludrai, Rudraksha		X	X				X			X
	E. varunna	–		X				X				X
	Sloanea assamicus	Sita, Sinta			X	X		X				X
Euphorbiaceae	*Actephila excelsa*	–			X			X				X
	Alchornea tiliaefolia	–			X				X			X
	Antidesma acuminatum	Shialbuka		X				X				X
	A. bunius	Koranda		X				X				X
	A. diandrum	Bon–koranchа		X	X		X					X
	A. ghaesembilla	Heloch, Tendera		X	X		X					X
	A. khasianum	–		X				X				X
	A. nigricans	–		X	X				X			X
	A. roxburghii	–				X		X				X

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Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Euphorbiaceae	*Aporusa dioica*	Patakharolla		X				X				X
	A. wallichii	Kokra		X				X				X
	Baccaurea ramiflora	Bhubi	X	X			X				X	X
	Bischofia javanica	Kanjeri, Jhonkijam		X	X			X				X
	Breynia patens	Kakro, Chhitki			X		X					X
	Bridelia assamica	–			X			X				X
	B. squamosa	Kata–kushui		X				X				X
	B. stipularis	Pat khowi		X					X			X
	B. tomentosa	Khoi, Serai				X		X				X
	Chaetocarpus castanocarpus	Dhala kakra			X		X					X
	Claoxylon khasianum	–		X					X			X
	Cleistanthus chartaceous	–		X					X			X
	Cnesmone javanica	Paharibichuti			X			X				X
	Croton caudatus	Nanbhantui, Sabarjala				X		X				X
	C. chlorocalyx	–			X	X		X				X
	C. joufra	Gangamaricha, Joufra			X			X				X
	C. oblongifolia	Chuka, Baragachi			X	X			X			X
	Endospermum chinense	–			X				X			X
	Excoecaria acerifolia	Tamal			X				X			X
	E. oppositifolia	–		X	X			X				X
	Glochidion arborescens	–			X			X				X
	G. hirsutum	–			X				X			X
	G. lanceolarium	Anguti, Kakra, Bhauri		X					X			X
	G. multiloculare	Keura, Keotomi			X			X				X
	G. sphaerogynum	Kaiyengla		X	X			X				X
	G. thomsonii	–			X				X			X
	G. zeylanicum	–		X				X				X
	Homonoia riparia	Jamynerei, Khasia	X						X			X
	Jatropha gossypifolia	Lal–bherendra		X				X				X
	Macaranga denticulata	Jakura, Jagra			X		X					X
	M. indica	–			X			X				X
	Mallotus albus	Muralia		X				X				X
	M. philippensis	Kamela		X	X			X				X
	M. repandus	–		X	X			X				X
	M. roxburghianus	Gulli			X		X					X
	Margaritaria indica	–			X				X			X
	Ostodes paniculata	–		X					X			X
	Phyllanthus baeobotryoides	–			X				X			X
	P. emblica	Amloki, Aila			X	X		X				X
	P. reticulatus	Poir			X				X			X
	P. roxburghii	–			X			X				X

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Euphorbiaceae	*Putranjiva roxburghii*	Putranjiva			X				X			X
	Ricinus communis	Rari, Veranda				X			X			X
	Sapium baccatum	Bella, Bolass		X				X				X
	S. eugeniaefolium	–		X					X			X
	Sauropus androgynus	–		X					X			X
	S. trinervius	–			X				X			X
	Securengea virosa	Khaukra			X	X		X				X
	Suregada multiflora	–		X					X			X
	Trewia nudiflora	Mera, Pitali, Bhuri	X					X				X
	Trigonostemon semperflorens	–				X			X			X
Fagaceae	*Castanopsis hystrix*	Kata singra		X					X			X
	C. indica	Hinguri, Gol–shingra		X					X			X
	C. tribuloides	Singra, Gurjabatna		X				X				X
	Quercus fenestrata	–		X					X			X
	Q. lanceaefolia	Shafma		X					X			X
	Q. lappacea	–		X				X				X
	Q. semiserrata	Ramrata		X					X			X
	Q. spicata	Batna, Ramkota		X					X			X
	Q. spicata var. brevipetiolata	–		X					X			X
	Q. thomsoni	Basuabatna		X					X			X
Flacourtiaceae	*Casearia vareca*	–		X				X				X
	Flacourtia jangomas	Luk–luki, Tokroi			X		X					X
	Gynocardia odorata	Chalmugra		X				X				X
	Homalium bhamoense	–		X					X			X
	H. schlichii	–		X					X			X
	Hydnocarpus kurzii	Chalmugra, Dalmugri		X					X			X
Gramineae	*Bambusa arundinaceae*	Kentua, Kenta bans			X			X			X	X
	B. balcooa	Silbarua, Hilbarua			X			X			X	X
	B. glaucescens	–			X			X			X	X
	B. natans	Peechle		X	X		X					X
	B. pallida	–			X				X		X	X
	B. polymorpha	Pharua		X	X		X					X
	B. tulda	Miringa		X	X		X				X	X
	B. vulgaris	Jai			X			X			X	X
	Bambusa sp.	Tentua, Konkoi			X			X			X	X
	Dendrocalamus hamiltonii	Pencha bans		X					X			X
	D. longispathus	Rupai, Khang		X				X				X
	Melocalamus compactiflorus	Daral, Lotabans		X				X				X
	Melocanna baccifera	Muli		X	X		X				X	X
	Neohouzeaua dullooa	Dollo		X	X		X					X
	Oxytenanthera nigrociliata	Kalia, Kaliseri		X	X		X					X

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Gesneriaceae	*Rhynchotechum ellipticum*	–			X			X				X
Guttiferae	*Calophyllum polyanththum*	Chandua, Toilo		X	X				X			X
	Garcinia affinis	–		X					X			X
	G. cowa	Kau			X			X				X
	G. lanceaefolia	–		X					X			X
	G. morella	Tamal, Swarnakhiri		X	X				X			X
	G. paniculata	Bubi–kewa			X				X			X
	G. pedunculata	–			X					X		X
	G. xanthochymus	Dephal			X			X				X
	Keyea floribunda	Banspatti, Korol		X	X				X			X
	Mesua ferrea	Nageswar, Muralia			X	X			X			X
Icacinaceae	*Gomphandra axillaris*	–		X					X			X
	Natsiatum herpeticum	–	X	X				X				X
Juglandaceae	*Engelhardtia spicata*	Dhala rata				X			X			X
Labiate	*Anisomeles ovata*	–			X				X			X
	Gomphostemma parviflorum	Jateribormala			X			X				X
Lauraceae	*Actinodaphne angustifolia*	–		X	X				X			X
	A. obovata	Kolapata		X					X			X
	Beilschmiedia assamica	Naga sutrong		X					X			X
	B. fagifolia	–		X				X				X
	B. gammieana	–		X					X			X
	B. roxburghiana	–		X	X			X				X
	Cinnamomum cecidodaphne	Gonori		X					X			X
	C. obtusifolium	Tezia		X	X				X			X
	C. pauciflorum	–			X					X		X
	C. tamala	Tezpata		X	X					X	X	X
	Cryptocaria amygdalina	Sutrong			X				X			X
	Endiandra firma	–	X	X					X			X
	Lindera reticulata	–		X				X				X
	Litsaea angustifolia	Garia, Chhotoshiyalbuka		X	X				X			X
	L. cubeba	–		X				X				X
	L. glutinosa	Kakurchita, Rattan	X	X	X			X				X
	L. laeta	–		X					X			X
	L. lancifolia	–		X				X				X
	L. monopetala	Huoria, Kukurcita		X	X			X				X
	L. nitida	–		X					X			X
	L. panamonja	–		X						X		X
	L. salicifolia var. attenuata	Bara shiyalbuka		X					X			X
	L. salicifolia var. ellipsoidea	Paniamula		X					X			X
	L. salicifolia var. laurifolia	–		X					X			X
	L. thomsonii	–		X					X			X

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Lauraceae	*Neolitsea cassia*	–		X				X				X
	Persea bombycina	Nalaomshi	X	X	X			X				X
	P. owdenii	Maricha sundi, Tilsundi		X				X				X
	P. villosa	–		X					X			X
	Phoebe attenuata	Bonsum	X	X				X				X
	P. lanceolata	Dulia, Changri		X	X				X			X
	P. pallida	–		X					X			X
Lecythidaceae	*Barringtonia acutangula*	Hizal	X						X			X
	Careya arborea	Kumb			X	X			X		X	X
Leeaceae	*Leea acuminata*	Phupharia		X				X				X
	L. crispa	Ban–chalta		X				X				X
	L. hirta	Banchalita, Mach		X			X					X
	L. sambucina	Kakurjhiwa, Kakura		X					X			X
	L. umbraculifera	Hupar–ura		X				X				X
Leguminosae (Caesalpinoideae)	*Acrocarpus fraxinifolius*	Mayanin			X				X			X
	Bauhinia macrostachya	–			X			X				X
	B. malabarica	Phutki, Kanchan			X	X		X				X
	B. nervosa	–		X					X			X
	B. piperifolia	–		X					X			X
	B. purpurea	Kanyar			X			X			X	X
	B. rufa	–		X					X			X
	B. variegata	Tulla, Kanchan		X					X			X
	Caesalpinia crista	Nata		X	X			X				X
	C. microphylla	–		X					X			X
	C. pulcherrima	Radhachura			X				X		X	X
	Cassia alata	Dadmardan, Dadmari			X			X			X	X
	C. fistula	Sonalu, Bandarlathi			X			X			X	X
	C. nodosa	Lolhonal, Bansonalu		X				X				X
	C. siamea	Minjiri			X		X				X	X
	Cynometra polyandra	–		X				X				X
	Mezonevron cucullatum	Kuchai–lot		X	X				X			X
	M. enneaphyllum	Kuchai		X					X			X
	Saraca asoca	Asok			X			X				X
	Tamarindus indica	Tentul			X				X			X
(Mimosoideae)	*Acacia auriculiformis*	–		X				X			X	
	A. mangium	Mangium		X			X				X	
	A. oxyphylla	–		X				X				X
	A. pinnata	Boloa lot, Kuchilot		X	X			X				X
	A. rugata	Banritha, Latbabul		X				X				
	Adenanthere pavonina	Kuachandan, Ranjan		X				X			X	
	Albizia chinensis	Harish		X			X				X	X

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(Mimosoideae)	*A. lebbeck*	Siris		X			X				X	X
	A. lucida	Motorkorai, Sundi		X				X			X	X
	A. odoratissima	Moroi, Hiharu		X				X			X	X
	A. procera	Jatkoroi, Koroi		X			X				X	X
	Calliandra umbrosa	Chotto betmara		X				X			X	X
	Entada paseoloides	Gila lot		X	X				X			X
	Paraserianthes falcataria	Malakana koroi						X			X	
	Parkai roxburghii	Lonchak		X					X			X
	Pithecellobium angulatum	Morogmara, Jigra	X	X					X			X
	Xylia dolabiformis	Lohakat			X				X		X	
(Papilionoideae)	*Abrus precatorius*	Kunch		X					X			X
	Butea monosperma	Palas			X			X			X	X
	B. minor	–			X				X			X
	Crotalaria anagyroides	–				X			X		X	X
	C. occulta	–				X		X				X
	C. pallida	Jhumjhumi			X			X				X
	C. striata	Chhtojhanjhuna		X					X			X
	Dalbergia assamica	–		X				X				X
	D. confertiflora	–		X					X			X
	D. stipulacea	Dadbari			X	X		X				X
	D. rimosa	Kawagurum			X				X			X
	D. reniformis	Kures			X				X			X
	D. tamarindifolia	Keti		X					X			X
	D. velutina	–		X					X			X
	D. volubilis	Ankilata		X						X		X
	Dalhousiea bracteata	–			X				X			X
	Derris cuneifolia	–		X						X		X
	D. elliptica	Tubamul		X					X			X
	D. ferruginea	–		X						X		X
	D. marginata	Makrigill		X					X			X
	D. robusta	Miringa		X						X		X
	Desmodium alatum	–			X				X			X
	D. concinnum	–			X			X				X
	D. pseudotriquetrum	–			X			X				X
	D. retroflexum	–		X					X			X
	D. triquetrum	–		X	X			X				X
	D. virgatum	–		X					X			X
	Dioclea javanica	–			X				X			X
	Erythrina fusca	Mander	X					X			X	X
	E. orientalis	Mander	X					X			X	X
	E. stricta	Mander	X		X				X		X	X

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(Papilionoideae)	*Flemingia congesta*	Barasaipan, Dalia		X				X				X
	F. lineata	–			X			X				X
	F. stricta	Charchara			X				X			X
	F. strobilifera	–		X				X				X
	Indigofera viscosa	–			X				X			X
	Millettia caudata	–		X				X				X
	M. cinerea	–		X					X			X
	M. piscidia	–		X	X		X					X
	M. pulchra	–		X					X			X
	Mucuna imbricata	Kasi		X				X				X
	M. macrocarpa	–		X						X		X
	M. monosperma	Nata alkushi			X				X			X
	M. prurita	Khamach, Alkushi			X				X			X
	Ormosia robusta	–		X						X		X
	Pongamia pinnata	Karanch	X						X			X
	Priotropis cytisoides	–		X					X			X
	Pureria phaseoloides	–		X			X					X
	P. thomsoni	–		X					X			X
	P. wallichii	–		X				X				X
	Spatholobus crassifolius	–		X				X				X
	S. roxburghii	Maula, Goalialata		X					X			X
	Tephrosia candida	–			X			X				X
	Uraria crinita	–			X	X		X				X
	Vigna dolichoides	–			X			X				X
Linaceae	*Ixonanthes khasiana*	–		X						X		X
Loganiaceae	*Strychnos laurina*	Bogalota		X				X				X
	S. wallichiana	Kuchilota		X					X			X
Loranthaceae	*Dendrophthe falcata*	Bandha, Pharulla		X					X			X
	D. pentandra	–		X				X				X
	Helixanthera parasitica	–		X				X				X
	Macrosolen cochinchinensis	Rema, Chotobhanda		X				X				X
	Scurrula gracilifolia	–		X					X			X
	S. parasitica	–		X					X			X
	Taxillus umbellifer	–		X				X				X
	Tolypanthus involucratus	–		X					X			X
	Viscum articulatum	–		X					X			X
	V. monoicum	Samulata		X					X			X
Lythraceae	*Lagerstroemia parviflora var. bengalensis*	Tillajarul, Neemjarul	X	X				X				X
	L. speciosa	Jarul	X	X			X				X	X
Magnoliaceae	*Kadsura roxburghiana*	–	X					X				X
	Michelia champaca	Champa, Sundi			X				X			X

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Magnoliaceae	*M. manii*	–		X					X			X
	M. montana	Sundi–champa		X					X			X
	M. oblonga	Sopa		X					X			X
	Talauma hodsoni	–		X						X		X
Malpighiaceae	*Aspidopterys glabriuscula*	–		X					X			X
	Hiptage bengalensis	Madabilota, Bashanti		X				X				X
Malvaceae	*Abelmoschus moschatus*	Mushakdana, Kalokasturi		X				X			X	X
	Hibiscus fragrans	–			X		X					X
	H. macrophylla	Chamia		X				X				X
	Urena lobata	Banokra, Atlera, Nageji			X				X			X
Melastomaceae	*Melastoma malabathricum*	Phutili, Lutki			X	X		X				X
	Memecylon umbellatum	Anjan, Bombayanjan			X		X					X
	M. plebejum var. silhetense	–		X					X			X
	Osbekia nepalensis	–		X					X			X
	O. rostrata	Baragaich			X	X		X				X
	Oxyspora vagans	–			X				X			X
Melliaceae	*Aglaia edulis*	–	X							X		X
	A. wallichii	–		X					X			X
	Amoora wallichii	Rongirata, Phutrata		X					X			X
	Aphanamixis polystachya	Beri–rata		X				X				X
	Azadirachta indica	Neem		X				X			X	X
	Chisocheton paniculatus	Rata			X		X				X	X
	Chukrasia tabularis	Hatia, Chikrasi		X					X			X
	Dysoxylum binecteriferum	Hota–rata, Bara–rata		X				X				X
	D. grande	–		X					X			X
	D. hamiltonii	Chotarara, Raunipoma		X					X			X
	D. procerum	Dingori		X				X				X
	Melia sempervirens	Kawa neem, Goraneem		X					X			X
	Munronia wallichii	–			X			X			X	X
	Toona ciliata	Poma, Kuma	X	X				X				X
	Walsura robusta	Uphing, Banlichi	X	X	X		X				X	X
Menispermaceae	*Cissampelos pareire*	Aknadi, Ekleja		X					X			X
	Cyclea peltata	–			X			X				X
	Limacia cuspidata	–			X				X			X
	Pycnarrhena pleniflora	–			X					X		X
	Stephania japonica	Nimukha, Chhotogouma		X					X			X
	S. glandulifera	–		X	X				X			X
	Tinospora cordifolia	Gulancha		X						X		X
	T. crispa	–		X	X			X				X
Moraceae	*Artocarpus chaplasha*	Cham, Sam		X	X				X			X
	A. heterophyllus	Kathal		X	X		X				X	X

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Moraceae	*A. lacucha*	Dewa–cham		X				X			X	X
	Cudrania javanensis	–		X					X			X
	Ficus auriculata	–		X	X				X			X
	F. benghalensis	Bot		X	X			X			X	X
	F. benjamina	Pakur		X					X			X
	F. benjamina var. nuda	–		X					X			X
	F. fistulosa	–	X	X	X			X				X
	F. geniculata	–			X				X			X
	F. gibbosa	–		X					X			X
	F. hederacea	Parkath		X				X				X
	F. heterophylla var. heterophylla	Bolowa, Bonolot	X	X			X					X
	F. hirta	Dangra, Khandadumur		X			X					X
	F. hirta var.roxburghii	–		X					X			X
	F. hispida	Dengura	X	X				X				X
	F, ischnopoda	–		X					X			X
	F. lepidosa	Dumur		X				X				X
	F. nervosa	Panidumur		X				X				X
	F. obtusifolia	Swet–bot		X		X			X			X
	F. prostrata	–		X	X			X				X
	F. racemosa	Domur		X				X				X
	F. ramentacea	–		X						X		X
	F. religiosa	Aswath			X		X				X	X
	F. rumphii	Bot			X			X			X	X
	F. sarmentosa	–		X						X		X
	F. semicordata	Jagadumur		X					X			X
	F. silhetensis	–		X						X		X
	F. sinuata	–		X						X		X
	F. variegata var. chlorocarpa	–		X					X			X
	Morus laevigata	Bhola		X				X				X
	Streblus asper	Sheora			X				X			X
Moringaceae	*Moringa olifera*	Sajna			X			X			X	
Myricaceae	*Myrica esculenta*	–		X					X			X
Myristicaceae	*Myristica angustifolia*	–		X	X			X				X
	M. glabra	–		X					X			X
	M. kingii	–		X					X			X
	M. linifolia	Amboala		X						X		X
Myrsinaceae	*Amblyanthopsis membranacea*	–		X				X				X
	Amblyanthus glandulosus	–		X				X				X
	Antistrophe oxyantha	–		X					X			X
	Ardisia colorata	–		X						X		X
	A. floribunda	–		X					X			X

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Myrsinaceae	*A. solanaceae*	Banjam		X						X		X
	A. paniculata	–		X						X		X
	Embelia nutans	–		X					X			X
	E. ribes	Biranga, Bhaibiranga		X					X			X
	E. robusta	–		X					X			X
	Hymendra wallichii	–		X				X				X
	Maesa chisia	–		X				X				X
	M. indica	Ramjoni			X				X			X
	M. ramentaceae	Noamricha, Maricha			X				X			X
	M. paniculata	–		X				X				X
Myrtaceae	*Eugenia bifaria*	–	X						X			X
	E. cuneata	Lari	X					X				X
	E. diospyrifolia	–	X					X				X
	E. khasiana	–		X					X			X
	E. lanceolaria	Parajam		X					X			X
	E. macrocarpa	Chaltajam		X					X			X
	E. mangifolia	–		X				X				X
	E. ramosissima	–			X				X			X
	E. saligna	–		X						X		X
	E. wallichii	Kharkharajam		X				X				X
	Syzygium aqueum	Jambo		X						X		X
	S. bracteatum	Hijli menadi		X	X			X				X
	S. claviflorum	Nalijam, Lamba nalijam		X				X				X
	S. cumini	Jam	X	X	X		X				X	X
	S. cumini var. caryophyllifolia	–		X				X				X
	S. fruticosum	Banjam, Khudijam		X				X				X
	S. grande	Dhakijam		X	X		X					X
	S. inophyllum	–		X				X				X
	S. jambos	Golapjam			X			X			X	
	S. oblatum	–		X	X			X				X
	S. operculatum	Botijam, Patiajam		X					X			X
	S. polypetalum	–	X					X				X
	S. roxburghianum	–		X					X			X
	S. tetragonum	–		X				X				X
	S. syzygioides	Kharijam, Jonkijam		X	X		X					X
	S. zeylanicum	–		X				X				X
	Psidium guajava	Piara, Sabri						X			X	
Nyssaceae	*Nyssa javanica*	Malatilata, Malati		X					X			X
Ochnaceae	*Ochna integerrima*	–			X			X				X
	O. squarrosa	Ramdhan champa			X	X			X			X
Olacaceae	*Erythropalum scandens*	–	X	X	X			X				X

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Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Olacaceae	*Olax acuminata*	–			X			X				X
	Schoepfia acuminata	–		X	X			X				X
Oleaceae	*Jasminum anastomosans*	–			X		X					X
	J. attenuatum	–			X			X				X
	J. sambac	–			X				X			X
	J. scandens	Banmallika, Malshi			X			X				X
	J. subtriplinerve	Bel–phuler–lot		X	X			X				X
	Ligustrum robustum	–		X					X			X
	Linociera macrophylla	Silphoi		X				X				X
	Myxopyrum smilacifolium	–		X				X				X
	Olea dentata var. salicifolia	–			X				X			X
Oxalidaceae	*Averrhoa carambola*	Kamranga			X			X			X	X
Palmae	*Calamus erectus*	Sungutta			X				X			X
	C. flagellum	Hudum, Bhudum			X				X			X
	C. floribundus	–			X				X			X
	C. guruba	Sundibet			X			X				X
	C.latifolia	Horna		X				X				X
	C. tenuis	Jalibet	X	X			X					X
	Daemonorops jenkinsian	Golla bet	X	X				X			X	X
Piperaceae	*Piper attenuatum*	–	X					X				X
	P. hamiltonii	–	X					X				X
	P. nigrum	Golmarich	X	X					X		X	
	P. peepuloides	Pipul	X					X				X
	P. rhytidocarpum	–	X						X			X
	P. sylvestre	Pahari pipul	X	X					X			X
Polygonaceae	*Securidaca tavoyana*	–		X					X			X
	Xanthophyllum flavescens	Gandi, Hanshak		X				X				X
Proteaceae	*Helcia erratica*	–		X					X			X
	H. excelsa	–		X					X			X
Ranunculaceae	*Clemetis cadmia*	–	X					X				X
	Naravelia zeylanica	Chagalbati, Murcha	X						X			X
Rhamnaceae	*Gouania tiliaefolia*	Ichalot		X				X				X
	Hovenia dulcia	–			X	X		X				X
	Ventilago calyculata	–			X	X			X			X
	V. madraspatana	Raktapitha		X	X				X			X
	Ziziphus funiculosa	–		X				X				X
	Z. mauritiana	Boroi			X	X		X			X	X
	Z. oenoplia	Anor, Jonglikol		X	X		X					X
	Z. rugosa	Bon–boroi			X	X		X				X
Rhizophoraceae	*Carllia brachiata*	Matan, Latkao		X				X			X	X
Rosaceae	*Prunus ceylanica*	–		X						X		X

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Rosaceae	*Rubus hexagynus*	Hirachhara, Hirachura	X	X					X			X
Rubiaceae	*Adina cordifolia*	Haldu			X	X			X			X
	A. polycephala	Kumiari		X				X				X
	Anthocephalus chinensis	Kadam		X				X			X	X
	Canthium angustifolium	Bishnein, Kantanali			X				X			X
	C. dicoccum	–		X	X				X			X
	C. glabrum	–		X				X				X
	Cephalanthus naucleoides	–		X					X			X
	Coffea bengalensis	Bannay kafi		X					X			X
	C. fragrans	–		X					X			X
	Gardenia campanulata	Biolem				X		X				X
	G. Coronaria	Bela				X		X				X
	G. turgida	–			X	X			X			X
	Hedyotis scandens	Guji, Latamel, Bishlata		X				X				X
	Hymenodictyon orixensis	Putikadam		X		X		X				X
	Hyptianthera stricta	–		X					X			X
	Ixora acuminata	–		X					X			X
	I. arborea	Swetrangan		X				X				X
	I. cuneifolia	Beophul		X				X				X
	I. undulata	Palkajui		X					X			X
	I. villosa	–		X				X				X
	Lasianthus cyanocarpus	–		X					X			X
	L. inconspicuous	–		X	X			X				X
	L. tentaculatus	–		X				X				X
	L. wallichii	–		X				X				X
	Mitragyna parvifolia	Bhutiawal		X				X				X
	Morinda angustifolia	Holdiruk, Baroful	X	X	X		X					X
	Mussaenda corymbosa	Silchaonri, Silchauri	X	X	X			X				X
	Myrioneuron nutans	–		X					X			X
	Nauclea sessilifolia	–			X	X			X			X
	Pavetta assamica	–		X				X				X
	P. naucleifolia	–		X				X				X
	Petunga racemosa	Jhizir, Narikili		X				X				X
	Prismatomeris albidiflora	–		X					X			X
	Psychotria adenophylla	–		X			X					X
	P. calocarpa	–		X				X				X
	P. montana	–		X					X			X
	P. monticola var. fulva	–		X					X			X
	P. silhetensis	–		X					X			X
	P. sphaerocarpa	–		X					X			X
	P. symplocifolia	–		X						X		X

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Rubiaceae	*Randia densiflora*	–		X		X		X				X
	R. dumentorum	Mon		X			X					X
	R. fasciculata	–			X	X		X				X
	R. longiflora	–			X			X				X
	R. tetrasperma	–			X				X			X
	R. wallichii	–			X			X				X
	R. uliginosa	Belong, Piralu	X	X	X				X			X
	Silvianthus bracteatus	–		X				X				X
	Tricalysia singularis	Pakhir har		X					X			X
	Uncaria macrophylla	–		X				X				X
	U. sessilifructus	–		X					X			X
	Webra dispersa	–		X				X				X
	W. odorata	–		X				X				X
	Wendlandia grandis	–		X				X				X
	W. exserta	–		X					X			X
	W. scabra	–		X				X				X
	W. tinctoria	–		X					X			X
Rutaceae	*Acronychia laurifolia*	Tulalodh		X	X			X				X
	Aegle marmelos	–		X				X				X
	Atalantia monophylla	Bel			X			X			X	X
	Citrus aurantium	–		X					X			X
	C. grandis	Komola			X				X		X	
	C. hystrix	Jambura			X			X			X	
	C. medica	Satkora			X					X	X	
	Clausena excavata	Shashri–jamir			X			X			X	
	C. heptaphylla	–		X						X		X
	Euodia meliaefolia	Karanphul, Pomkafur		X				X				X
	Glycosmis aarborea	Machalipoma		X					X			X
	Luvunga scandens	Assera, Malkhila			X	X	X					X
	Micromelum minutum	Lavangalota		X					X			X
	Murraya koenigii	Koroiphula		X				X				X
	Paramignya citrifolia	–		X	X			X				X
	Toddalia aculeata	Bannebu, Karipa		X				X				X
	Zanthoxyllum budrunga	Dahin, Kadtodali			X			X				X
	Z. hamiltoniana	Bajrang			X				X			X
	Z. ovalifolium	–			X				X			X
	Z. rhetsa	–			X				X			X
Sabiaceae	*Meliosma pinnata*	Tambul, Bajna			X	X		X				X
	M. simplicifolia	Adsliya, Attaliya		X					X			X
	Sabia lanceolata	Dibaru, Dibru	X	X	X			X				X
	S. limoniacea	–		X					X			X

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Family	Scientific Name	Vernacular Name	MEG	EG	MIEG	DE	VC	C	UC	R	PI	Na
Salicaceae	*Salix tetrasperma*	Biash	X							X		X
Sapindaceae	*Aesculus punduana*	–		X				X				X
	Allophylus cobbe	Chita, Rakhalchita		X				X				X
	Aphania danura	Danura, Ambruj		X			X					X
	A. rubra	Lalkoipura		X			X					X
	Cupania pentapetala	Koipura		X				X				X
	C. sumatrana	–		X					X			X
	Erioglossum rubiginosum	Baraharina		X				X			X	X
	Lepisanthes andamanica	Banderful, Banlichu	X	X	X			X				X
	Mischocarpus pentapetalus	–		X					X			X
	Sapindus mukrossi	Ritha		X				X			X	X
	Xerospermum noronhianum	Bura		X					X			X
Sapotaceae	*Donella roxburghii*	–		X				X			X	X
	Mimusops elengi	Bakul		X	X			X			X	X
	Palaquium polyanthum	Kurta		X					X			X
	Sarcosperma arboreum	–		X					X			X
	Sideroxylon grandifolium	–		X						X		X
Simarubaceae	*Brucea mollis*	–		X					X			X
	Picrasma javanica	–		X				X				X
Solanaceae	*Solanum indicum*	Phutkibegun	X	X	X		X					X
	S. khasianum	–			X			X				X
	S. torvum	Bekhori			X		X					X
Sonneratiaceae	*Duabanga grandiflora*	Ramdalu, Larpati		X				X				X
Staphyleaceae	*Trupinia pomifera*	–		X					X			X
Sterculiaceae	*Abroma augusta*	Ulattkambal			X				X		X	X
	Buettneria aspera	–	X	X	X			X				X
	B. pilosa	Harjora	X	X	X				X			X
	Firmiana colorata	Udal				X		X				X
	Heritiera papilio	–		X						X		X
	Pterospermum acerifolium	Mushkand, Modubura		X	X			X				X
	P. lanceaefolium	Narcha			X	X		X				X
	Pterygota alata	Buddahnarikel		X					X			X
	Sterculia coccinea	–		X						X		X
	S. guttata	–		X	X					X		X
	S. parviflora	–		X					X			X
	S. villosa	Udal, Fashiyaudal				X			X			X
Styraceae	*Styrax serrulatum*	Fulkat, Kanchani		X				X				X
	Symplocos grandiflora	–		X					X			X
	S. macrophylla	–		X					X			X
	S. racemosa	Lodh, Lodhra		X					X			X
Ternstroemiaceae	*Camellia caudara*	Phulkat		X					X			X

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Ternstroemiaceae	*C. sinensis*	Cha, The tea plant					X				X	
	Eurya acuminata	Sagoler bori		X				X				X
	Schima wallichii	Banak	X	X	X			X				X
Thymelaceae	*Aquilaria agallocha*	Agar								X	X	
	Linostoma decandrum	Hirenda		X					X			X
Tiliaceae	*Grewia denticulata*	–			X					X		X
	G. glabra	Baman, Kathbimla		X	X			X				X
	G. microcos	Assar, Patka		X	X			X				X
	G. sclerophylla	–			X				X			X
	G. serrulata	Purakoroi			X			X				X
	Triumfetta rhomboidea	Banokra			X			X				X
Ulmaceae	*Aphananthe cuspidata*	–		X					X			X
	Celtis cinnamomea	–		X	X				X			X
	C. tetrandra	–			X	X			X			X
	Trema orientalis	Gunali, Dhala guaya		X	X			X				X
	T. tomentosa	–			X				X			X
Urticaceae	*Boehmeria malabarica*	–	X	X	X			X				X
	B. scabrella	–			X	X			X			X
	Laportea crenulata	Bangaldandi, Sutra	X	X				X				X
	Oreocnida integrifolia	Horhuta	X	X				X				X
	Sarcochlamys pulcherrima	Brihati, Murichia	X	X				X				X
Verbenaceae	*Callicarpa arborea*	Dhalahuza			X	X		X				X
	C. longifolia var. lancealaria	–		X	X					X		X
	C. macrophylla	Fulujha, Barmala			X	X		X				X
	Clerodendrum colebrookianum	Bon–bhati		X	X		X					X
	C. hastatum	–			X			X				X
	C. indicum	Chokphutra			X		X					X
	C. kaempferi	Bhandariphul		X	X			X				X
	C. serratum	Barangi, Bamanhati			X				X			X
	C. viscosum	Bhaint		X	X		X					X
	C. wallichi	–			X				X			X
	Gmelina arborea	Gamar			X	X			X			X
	Holmskioldia sanguinea	Phulhuri		X					X			X
	Lantana aculeata	Lantana, Urusia		X	X		X					X
	L. trifolia			X				X				X
	Lippia alba	Pichach–lakri	X	X			X					X
	Premna bengalensis	Pakiora, Pongta	X	X				X				X
	P. coriacea	–	X	X					X			X
	P. corymbosa	Gunal			X			X				X
	P. esculenta	Lalana, Lalong			X					X		X
	P. latifolia	Masuma		X	X				X			X

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Verbenaceae	*P. micrantha*	–		X	X					X		X
	P. scandens	–		X	X				X			X
	Sphenodesma pentandra var. wallichiana	–			X				X			X
	Tectona grandis	Segun			X			X			X	
	Vitex atissima	Anhui, Monawal		X				X				X
	V. canescens	Bhatkur		X	X			X				X
	V. glabrata	Goda, Guaria			X	X			X			X
	V. negundo	Nishinda			X			X			X	X
	V. peduncularis	Awal		X	X			X				X
	V. pinnata	Awal, Badruk		X				X				X
	V. quinata	Bhathur		X				X				X
Violaceae	*Alsodeia bengalensis*	–		X	X				X			X
	A. roxburghii	–		X					X			X
Vitaceae	*Ampelocissus barbata*	–		X					X			X
	A. latifolia	Govola		X				X				X
	Cayratia elongata	–		X						X		X
	C. japonica	–		X					X			X
	C. pedata	–		X				X				X
	C. trifolia	Amal–lata		X	X			X				X
	Cissus adnata	Bhatia–lot		X	X				X			X
	C. discolor	–		X				X				X
	C. quadrangularis	Harenga, Harjora		X				X				X
	C. repanda	–		X				X				X
	C. repens	Marmarialata		X					X			X
	Tetrastigma bracteolatum	Golgotilata		X					X			X
	T. campylocarpa	–	X	X					X			X
	T. lanceolarium	–		X						X		X
	T. thomsonianum	–		X					X			X
	Vitis planicaulis	–		X	X					X		X
	V. rubifolia	–		X					X			X

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Table D.8: Upland animal species – mammals and birds

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
CLASS MAMMALIA									
Order Insectivora									
Family Tupaiidae									
Tupaia glis	Malayan Tree Shrew			x			x		
Family Soricidae									
Suncus murinus	Grey Musk Shrew			x		x			
Suncus etrucus	Pygmy Shrew				x		x		
Family Talpidae									
Talpa micrura	Eastern Mole				x		x		
Order Chiroptera									
Family Pteropidae									
Pteropus giganteus	Flying Fox	x				x			
Rousettus leschenaultii	Fulvous Fruit Bat			x		x			
Cynopterus spinx	Shortnosed Fruit Bat		x			x			
Family Rhinopomatidae									
Rhinopoma kinneari	Rat-tailed Bat			x			x		
Family Emballonuridae									
Taphozous melanopogon	Bearded Bat			x			x		
Taphozous kachhensis	Sheathtailed Bat			x			x		
Taphozous saccolaimus	Pouchbearing Bat		x				x		
Family Megadermatidae									
Megaderma lyra	False Vampire		x			x			

Scientific	English (Bangla)	Abundance VC	C	UC	Rare	Evidence Sighting	Literature	Widely distributed	Remarks
Family Rhinolophidae									
Rhinolophus subbadius	Horseshoe Bat			x			x		
Order Primates									
Family Lorisidae									
Nycticebus coucang	Slow Loris (lajjabati)				x		x		CITES II
Family Cercopithecidae									
Subfamily Cercopithecinae									
Macaca nemestrina	Pigtailed Macaque (ultolejhi banar)				x	x			
Macaca arctoides	Stumptailed Macaque (khatolej bana)				x		x		CITES II K
Macaca mulatta	Rhesus macaque (bandar)			x		x			CITES II
Macaca assamensis	Assamese Macaque				x		x		CITES II
Subfamily Colobinae									
Presbytis phayrei	Phayre's Leaf Monkey (chasmapora)		x			x			CITES II
Presbytis pileatus	Capped Langur (mukpura hunuman)		x			x			CITES II
Presbytis obscurus	Dusky Leaf Monkey		?				x		?
Family Hylobatidae									
Hylobates hoolock	Hoolock Gibbon (ulluk)		x			x			CITES I E
Order Pholidota									
Family Manidae									
Manis crassicaudata	Indian Pangolin (banrui)				x		x		CITES II
Manis javanica	Malayan Pangolin				x		x		CITES II
Order Carnivora									
Family Canidae									
Canis aureus	Jackal (shial)	x							Population declining
Vulpes bengalensis	Bengal Fox (khek shial)		x					x	
Cuon alpinus	Wild Dog (ram kutta)				x		x		CITES II E

Scientific	English (Bangla)	Abundance VC	C	UC	Rare	Evidence Sighting	Literature	Widely distributed	Remarks
Family Ursidae									
Melursus ursinus	Sloth Bear (bhaluk)				x		x		CITES I E
Selenarctos thibetanus	Himalayan Bear (kalo bhaluk)				x		x		CITES I E
Family Mustelidae									
Lutra lutra	Common Otter (ud biral)			x					CITES I, population declining
Lutra perspicillata	Smooth Indian Otter			x					CITES II, population declining
Aonyx cinerea	Clawless Otter			x					CITES II, population declining
Family Viverridae									
Viverra zibetha	Large Indian Civet (bagdash)			x					Population declining
Viverricula indica	Small Indian Civet (khatash)				x				Population declining
Paradoxurus indica	Palm Civet (gondha gokul)			x					Population declining
Arctictis binturong	Binturong (gechu bhaluk)				x		x		CITES I (E)
Family Herpestidae									
Herpestes auropunctatus	Small Indian Mongoose (benji)	x						x	
Herpestes edwardsi	Common Mongoose (bara benji)		x				x		
Herpestes urva	Crab-eating Mongoose (kakrabhuk)			x			x		
Family Felidae									
Panthera tigris	Royal Bengal Tiger (bagh)				x		x		CITES I (E)
Panthera pardus	Leopard (chita bagh)				x	Pug marks			CITES I (E)
Neofelis nebulosa	Clouded Leopard (gecho bagh)				x		x		CITES I (E)
Felis temmincki	Golden Cat (sonali biral)				x		x		CITES I
Felis bengalensis	Leopard Cat (chita biral)			x			x		CITES I

Scientific	English (Bangla)	Abundance VC	C	UC	Rare	Evidence Sighting	Literature	Widely distributed	Remarks
Felis viverrina	Fishing Cat (mecho biral)		x			x			CITES II
Felis chaus	Jungle Cat (ban biral)		x			x			CITES II
Order Proboscidea									
Family Elephantidae									
Elephas maximus	Asian Elephant (hati)			x					CITES I (E), non-resident
Order Artiodactyla									
Family Bovidae									
Subfamily Bovinae									
Bos gaurus	Gaur (ban garu)				x				CITES I, non-resident
Subfamily Caprinae									
Capricornis sumatraensis	Serow (ban chagal)				x		x		CITES I
Cervus unicolor	Sambar				x		x		non-resident
Muntiacus muntjac	Barking Deer (maya harin)			x		Prints			Footprints along streams
Family Suidae									
Sus scrofa	Wild Boar (buno shukor)		x				x		
Order Lagomorpha									
Family Leporidae									
Lepus nigricollis	Rufous-tailed Hare (sashak)			x			x		
Caprolagus hispidus	Hispid Hare (khargosh)				x		x		CITES I (E)
Order Rodentia									
Family Sciuridae									
Pataurista pataurista	Flying Squirrel (uranta kathbirali)				x		x		
Ratufa bicolor	Malayan Giant Squirrel		x			x			
Callosciurus pygerythrus	Hoarybellied Squirrel		x			x			

Scientific	English (Bangla)	Abundance VC	C	UC	Rare	Evidence Sighting	Literature	Widely distributed	Remarks
Callosciurus erythraeus	Pallas's Squirrel				x		x		
Dremomys lokriah	Himalayan Squirrel				x		x		
Family Muridae									
Bandicota bengalensis	Lesser Bandicot (indur)		x					x	
Bandicota indica	Bandicot Rat (dhari indur)		x					x	
Millardia meltada	Softfurred Rat		x					x	
Mus booduga	Field Mouse (metho indur)	x						x	
Mus musculus	House Mouse (nengti indur)	x						x	
Rattus rattus	House Rat (indur)	x						x	
Vandeleuria oleracea	Longtailed Tree Mouse				x		x		
Family Rhizomyidae									
Cannomys badius	Bay Bamboo Rat				x	x			
Family Hystricidae									
Hystrix indica	Indian Porcupine (sajaru)			x			x		
CLASS AVES									
Family Podicipadidae									
Podiceps ruficollis	Little Grebe (duburi)			x				x	
Family Phalacrocoracidae									
Phalacrocorax niger	Little Cormorant (pankowri)		x					x	
Family Ardeidae									
Ardeola grayii	Pond Heron (kani bok)		x					x	
Ardeola straitus	Green Heron (sabuj bok)		x					x	
Bubulcus ibis	Cattle Egret (go-bok)		x					x	
Egretta garzetta	Little Egret (choto bok)			x				x	
Nycticorax nycticorax	Night Heron (nishi bok)			x				x	

Scientific	English (Bangla)	Abundance: VC	C	UC	Rare	Evidence: Sighting	Literature	Widely distributed	Remarks
Gorsachius melanolophus	Tiger Bittern (bagha bok)				x	x			
Ixobrychus cinnamomeus	Chestnut Bittern (nolgongha)			x				x	
Family Ciconiidae									
Anastomus oscitans	Openbill Stork (shamuk khol)			x				x	
Leptoptilos javanicus	Lesser Adjutant (modantak)			x				x	
Family Anatidae									
Dendrocygna javanica	Fulvous Tree Duck (sarali)			x				x	
Nettapus coromendelianus	Pygmy Goose (bali hans)		x					x	
Family Accipitridae									
Elanus caeruleus	Blackwinged Kite (sada baj)		x					x	
Aviceda jerdoni	Blyth's Baza (baro baj)				x		x		
Aviceda leuphotes	Blackcrested Baza (kalo baj)			x				x	
Pernis ptilorhynchus	Honey Buzzard			x			x		
Milvus migrans	Pariah Kite (bhuban chil)		x					x	
Haliastur indus	Brahminy Kite (shankha chil)			x				x	
Accipiter gentilis	Goshawk (boro baj)				x		x		
Accipiter badius	Shikra (turki baj)		x					x	
Accipiter virgatus	Sparrow-Hawk				x		x		
Buteo buteo	Buzzard				x		x		
Batastur teesa	White-eye Buzzard			x			x		
Spizaetus cirrhatus	Crested Hawk-Eagle			x			x		
Aquila pomarina	Lesser Spotted Eagle			x		x			
Haliaeetus leucorhyphus	Pallas's Fish Eagle			x		x			
Icthyophaga ichthyaetus	Greyheaded Fish Eagle			x		x			
Gyps fulvus	Griffon Vulture				x	x			
Gyps indicus	Longbilled Vulture			x		x			

Scientific	English (Bangla)	Abundance: VC	C	UC	Rare	Evidence: Sighting	Literature	Widely distributed	Remarks
Gyps bengalensis	Whiterumped Vulture			x		x			
Circus melanoleucos	Pied Harrier (rakhal bhulani)			x		x			
Circus aeruginosus	Marsh Harrier			x		x			
Circaetus gallicus	Short-toed Eagle				x		x		
Spilornis cheela	Crested Serpent Eagle		x			x			
Falco peregrinus	Peregrine Falcon (baj)				x	x			
Falco subbuteo	Hobby				x		x		
Falco severus	Oriental Hobby				x	x			
Falco tinnunculus	Kestrel		x			x			
Family Phasianidae									
Coturnix coturnix	Common Quail (baro batera)				x		x		
Coturnix coromandelica	Rain Quail (china batera)				x		x		
Coturnix chinensis	Bluebreasted Quail			x		x			
Perdicula manipuriensis	Manipur Bush Quail				x		x		
Arborophila rufogularis	Rufousthroated Partridge				x	x			
Bambusicola fytchii	Bamboo Partridge				x		x		
Lophura leucomelana	Kalij Pheasant (mathura)			x		x			
Gallus gallus	Red Jungle Fowl (banmurag)			x		x			
Polyplectron bicalcaratum	Peacock-Pheasant				x		x		CITES II
Family Rallidae									
Rallus aquaticus	Water Rail (jalchari)			x		x			
Porzana fusca	Ruddy Crake (ranga jalchari)			x		x			
Amaurornis phoenicurus	Waterhen (dahuk)			x		x			

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Family Charadriidae									
Subfamily Charadriinae									
Vanellus indicus	Lapwing (hot-ti-ti)		x			x			
Subfamily Scolopacinae									
Actitis hypoleucos	Common Sandpiper			x		x			
Family Columbidae									
Treron apicauda	Pintailed Pigeon (horial)				x	x			
Treron sphenura	Wedgetailed Pigeon (horial)				x	x			
Treron pompadora	Greyfronted Pigeon		x			x			
Treron bicincta	Orangebreasted Pigeon			x		x			
Treron phoenicoptera	Green Pigeon (botkol)		x			x			
Ducula aenea	Imperial Pigeon (dhumkol)			x			x		
Columba livia	Blue Rock Pigeon (kobutor)		x			x			
Streptopelia orientalis	Rufous Turtle Dove (ghugu)		x			x			
Streptopelia decaocto	Ring Dove (raj ghugu)		x			x			
Streptopelia tranquebarica	Red Turtle Dove (lal ghugu)		x			x			
Streptopelia chinensis	Spotted Dove (tila ghugu)		x			x			
Chalcophaps indica	Emerald Dove (sabuj ghugu)			x		x			
Family Psittacidae									
Psittacula krameri	Roseringed Parakeet (tia)	x				x			
Psittacula alexandari	Redbreasted Parakeet (tuta)	x				x			
Loriculus vernalis	Lorikeet (latkan)			x		x			
Family Cuculidae									
Clamator coromandus	Redwinged Crested Cuckoo				x		x		
Clamator jabonicus	Pied Crested Cuckoo		x			x			Monsoon visitor
Cuculus varius	Hawk-Cuckoo (chokh-gelo)	x						x	

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Cuculus micropterus	Indian Cuckoo		x					x	
Cuculus saturatus	Himalayan Cuckoo				x		x		
Cacomantis merulinus	Plaintive Cuckoo (shatak)		x					x	
Chalcites maculatus	Emerald Cuckoo				x		x		
Surniculus lugubris	Drongo-Cuckoo			x		x			
Eudynamus scolopacea	Koel (kokil)		x					x	
Rhopodytes tristis	Malkoha (sabuj kokil)		x			x			
Taccocua leschenaulti	Sirkeer Cuckoo				x		x		
Centropus sinensis	Crow-Pheasant (kana-kuka)		x					x	
Centropus toulou	Lesser Coucal (kukka)		x			x			
Family Strigidae									
Subfamily Tytoninae									
Tyto alba	Barn Owl (laxmi pencha)		x					x	
Subfamily Striginae									
Otus spilocephalus	Spotted Scops Owl				x		x		
Otus scops	Scops Owl			x			x		
Otus bakkamoena	Collared Scops Owl		x					x	
Bubo bubo	Eagle Owl (hutum pencha)			x				x	
Bubo nipalensis	Forest Eagle Owl				x		x		
Bubo coromandus	Dusky Horned Owl				x		x		
Bubo zeylonensis	Brown Fish Owl (bhutum)		x					x	
Glaucidium cuculoides	Barred Owlet		x					x	
Ninox scutulata	Brown-Hawk Owl (kupock)		x					x	
Athene brama	Spotted Owlet (khuruley)	x						x	
Strix leptogrammica	Brown Wood Owl				x		x		

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Family Caprimulgidae									
Caprimulgus indicus	Jungle Nightjar (dinkana)		x					x	
Caprimulgus macrurus	Longtailed Nightjar (ratchara C)							x	
Caprimulgus asiaticus	Common Indian Nightjar			x			x		
Caprimulgus affinis	Franklin's Nightjar			x			x		
Family Apodidae									
Apus melba	Alpine Swift (pahari ababil)			x					Forests
Apus affinis	House Swift (ababil)	x						x	
Cypsiurus parvus	Palm Swift (nakkati)	x						x	
Family Trogonidae									
Harpactes erythrocephalus	Redheaded Trogon		x						Forests
Family Alcedinidae									
Ceryle rudis	Pied Kingfisher (pakra)		x					x	
Alcedo atthis	Common Kingfisher (machranga)	x						x	
Ceyx erithacus	Threetoed Kingfisher				x				Forests
Pelargopsis capensis	Storkbilled Kingfisher		x					x	
Halcyon smyrnensis	Whitebreasted Kingfisher	x						x	
Family Meropidae									
Merops leschenaulti	Chestnutheaded Bee-eater		x						Hills (forests)
Merops orientalis	Green Bee-eater (suichura)	x						x	
Merops philippinus	Bluetailed Bee-eater			x					Charas/river banks
Nyctyornis athertoni	Bluebearded Bee-eater				x				Forests
Family Coraciidae									
Coracias benghalensis	Indian Roller (nilkantha)		x					x	
Eurystomus orientalis	Broadbilled Roller				x		x		Forests

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Family Upupidae									
Upupa epops	Hoopoe (hudhud)		x					x	
Family Bucerotidae									
Anthracoceros malabaricus	Indian Pied Hornbill (danesh)			x					Forests
Family Capitonidae									
Megalaima lineata	Lineated Barbet (beghbou)		x					x	
Megalaima asiatica	Bluethroated Barbet		x					x	
Megalaima australis	Blueeared Barbet				x				Forests
Megalaima haemacephala	Coppersmith (basanta bauri)	x						x	
Family Picidae									
Junx torquilla	Wryneck			x				x	M
Picumnus innominatus	Speckled Piculet				x		x		Forests, R
Sasia ochracea	Rufous Piculet				x		x		Forests, R
Micropternus brachyurus	Rufous Woodpecker			x				x	R
Picus myrmecophoneus	Scalybellied Woodpecker			x				x	R
Picus canus	Blacknaped Woodpecker			x					Forests, R
Picus flavinucha	Large Yellownape			x					Forests, R
Picus chlorolophus	Small Yellownape			x					Forests, R
Dinopium benghalense	Flameback	x						x	R
Dinopium shorii	Himalayan Threetoed				x		x		Forests, R
Dinopium javanense	Indian Threetoed				x		x		Forests, R
Picoides mahrattensis	Pied Woodpecker		x					x	R
Picoides canicapillus	Greycrowned Woodpecker			x				x	R
Picoides nanus	Pygmy Woodpecker				x			x	R
Blythipicus pyrrhotis	Bay Woodpecker				x		x		Forests, R
Chrysocolaptes lucidus	Large Flameback			x			x		Forests, R

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Family Eurylaimidae									
Serilophus lunatus	Hodgson's Broadbill				x		x		Forests, R
Family Pittidae									
Pitta molluccensis	Bluewinged Pitta			x				x	R
Pitta sordida	Hooded Pitta (nil pakhi)		x				x		Forests, R
Pitta cyanea	Blue Pitta				x		x		Forests, R
Family Alaudidae									
Mirafra assamica	Bush Lark (bharat pakhi)	x						x	R
Alauda gulgula	Eastern Skylark			x				x	R
Family Hirundinidae									
Riparia riparia	Collared Sand Martin			x				x	R
Hirundo rustica	Common Swallow (ababil)	x						x	R
Hirundo daurica	Redrumped Swallow		x					x	M
Family Laniidae									
Lanius excubator	Grey Shrike (koshai)				x				Forests, M
Lanius tephronotus	Tibetan Shrike				x		x		Forests, M
Lanius schach	Blackheaded Shrike	x						x	R
Lanius cristatus	Brown Shrike	x						x	M
Family Oriolidae									
Oriolus chinensis	Blacknaped Oriole				x		x	x	M
Oriolus xanthornus	Blackheaded Oriole	x						x	R
Family Dicruridae									
Dicrurus adsimilis	Black Drongo	x						x	R
Dicrurus leucophaeus	Ashy Drongo		x					x	R
Dicrurus annectans	Crowbilled Drongo			x			x		Forests, R
Dicrurus aeneus	Bronzed Drongo	x							Forests, R

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Dicrurus ramifer	Lesser Racket-tailed				x				Forests, R
Dicrurus hottentotus	Hairycrested		x						Forests, R
Dicrurus paradiseus	Greater Racket-tailed		x						Forests, R
Family Artamidae									
Artamus fuscus	Ashy Swallow-shrike		x					x	R
Family Sturnidae									
Aplonis panayensis	Glossy Starling			x					Forests/hills, R
Sturnus malabaricus	Greyheaded Myna			x				x	R
Sturnus contra	Pied Myna (goborey shalik)	x						x	R
Acridotheres tristis	Common Myna	x						x	R
Acridotheres fuscus	Jungle Myna	x						x	R
Gracula religiosa	Hill Myna/Grackle		x						Forests/hills, R
Family Corvidae									
Cissa chinensis	Green Magpie			x					Forests/hills, R
Cissa flavirostris	Blue Magpie				x		x		Forests/hills, R
Dendrocitta vagabunda	Treepie (harichacha)	x						x	R
Dendrocitta formosae	Himalayan Treepie			x			x		Forests, R
Corvus splendens	House Crow (pati kak)	x						x	R
Corvus macrorhynchus	Jungle Crow (dar kak)	x						x	R
Family Campephagidae									
Hemipus picatus	Pied Flycatcher-Shrike			x					Forests, R
Tephrodornis pondicerianus	Common Wood Shrike	x						x	R
Coracina novaehollandiae	Large Cuckoo Shrike		x					x	R
Coracina melaschistos	Grey Cuckoo-Shrike			x				x	M
Coracina melanoptera	Blackheaded Cuckoo-Shrike			x				x	M

Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	Remarks
Pericrocotus flammeus	Scarlet Minivet		x						Forests, R
Pericrocotus cinnamommeus	Small Minivet		x						Forests/open woods, R
Family Irenidae									
Aegithina tiphia	Common Iora (towfik)	x						x	R
Chloropsis aurifrons	Goldfronted Leafbird		x					x	R
Chloropsis cochinchinensis	Goldmantled Leafbird			x					Forests/woodland, R
Irena puella	Fairy Bluebird (nilpori)			x					Forests, R
Family Pycnonotidae									
Pycnonotus articeps	Blackheaded Bulbul			x					Forests, R
Pycnonotus melanicterus	Blackheaded Yellow Bulbul		x						Forests, R
Pycnonotus jocosus	Redwhiskered Bulbul			x				x	R
Pycnonotus cafer	Redvented Bulbul (bulbuli)	x						x	R
Criniger flaveolus	Whitethroated Bulbul		x						Forests, R
Family Muscicapidae									
Subfamily Timaliinae									
Pellorneum ruficeps	Spotted Babbler			x					Forests, R
Trichastoma tickelli	Buffbreasted Babbler				x		x		Forests, R
Trichastoma abbotti	Abbot's Babbler		x					x	R
Pomatorhinus horsfieldii	Scimitar Babbler			x			x		Forests, R
Pomatorhinus hypoleucos	Large Scimitar Babbler				x		x		Forests, R
Rimator malacoptilus	Longbilled Wren-Babbler				x		x		Forests, R
Pnoepyga pusilla	Scalybellied Wren-Babbler				x		x		Forests, R
Spelaeornis formosus	Spotted Wren-Babbler				x		x		Forests, R
Stachyris rufifrons	Redfronted Babbler				x		x		Forests, R
Timalia pileata	Redcapped Babbler			x					Forests, R
Turdoides caudatus	Common Babbler			x				x	R

Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	Remarks
Turdoides earlei	Straited Babbler		x						Forests/woods, R
Turdoides striatus	Jungle Babbler (satbhai)	x						x	R
Garrulax moniligerus	Necklaced Laughing Thrush			x					Forests, R
Garrulax pectoralis	Blackgorgeted L. Thrush		x						Forests, R
Garrulax virgatus	Manipur Streaked L. Thrush				x		x		Forests, R
Garrulax erythrocephalus	Redheaded Laughing Thrush			x					Forests/woods, R
Leiothrix argentauris	Silvereared Mesia				x		x		Forests, R
Pteruthius melanotis	Shrike-Babbler				x		x		Forests, R
Yuhina castaniceps	Chesnutheaded Yuhina				x		x		Forests, R
Yuhina nigrimenta	Blackchinned Yuhina				x		x		Forests, R
Yuhina xantholeuca	Whitebellied Yuhina				x		x		Forests, R
Alcippe rufogularis	Redthroated Tit-Babbler				x		x		Forests, R
Alcippe poioicephala	Quaker Babbler			x				x	R
Alcippe nepalensis	Nepal Babbler			x			x		Forests, R
Heterophasia picaoides	Longtailed Sibia				x				Forests/woods, M
Subfamily Muscicapinae									
Muscicapa sibirica	Sooty Flycatcher				x		x		Forests, M
Muscicapa latirostris	Brown Flycatcher			x			x		Forests, M
Muscicapa parva	Redbreasted Flycatcher	x						x	M
Muscicapa rubeculoides	Bluethroated Flycatcher			x				x	M
Muscicapa tickelliae	Tickell's Blue Flycatcher			x			x		Forests, M
Muscicapa thalassina	Verditer Flycatcher			x					Forests, M
Culicicapa ceylonensis	Greyheaded Flycatcher		x					x	M
Subfamily Rhipidurinae									
Rhipidura aureola	Whitebrowed Fantail			x				x	R
Rhipidura albicollis	Whitethroated Fantail		x					x	R

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Subfamily Monarchinae									
Terpsiphone paradisi	Paradise Flycatcher				x			x	R
Hypothymis azurea	Blacknaped Flycatcher		x					x	R
Subfamily Sylviinae									
Bradypterus thoracicus	Spotted Bush Warbler				x		x		Forests, M
Cisticola exilis	Fantail Warbler			x				x	R
Cisticola juncidis	Streaked Fantail Warbler			x				x	R
Prinia rufescens	Beaven's Wren-Warbler				x		x		Forests, R
Prinia hodgsonii	Franklin's Wren-Warbler		x					x	R
Orthotomus sutirius	Tailor Bird (tuntuni)	x						x	R
Orthotomus cuculatus	Goldenheaded Tailor Bird			x			x		Forests, R
Acrocephalus stentorius	Great Reed Warbler	x						x	R
Acrocephalus dumentorum	Blyth's Reed Warbler	x						x	R
Phylloscopus collybita	Chiffchaff			x				x	M
Phylloscopus affinis	Tickell's Leaf Warbler	x						x	M
Phylloscopus fuscatus	Dusky Leaf Warbler		x					x	M
Seicercus burkii	Flycatcher-Warbler				x		x		Forests/woods, M
Subfamily Turdinae									
Erithacus callipoe	Rubythroat			x					Forests/woodlands, M
Erithacus pectoralis	Himalayan Rubythroat			x					Forests/woodlands, M
Copsychus saularis	Magpie-Robin (doyel)	x						x	R
Copsychus malabaricus	Shama (shayma)			x					Forests/woods, R
Phoenicurus ochruros	Black Redstart (lalgirdhi)			x				x	M
Cinclidium lecurum	Whitetailed Robin				x		x		Forests, R
Enicurus immaculatus	Blackbacked Forktail			x					Forests, R
Enicurus maculatus	Spotted Forktail		x						Forests, R

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Saxicola torquata	Collared Bush Chat			x				x	M
Monticola solitarius	Blue Rock Thrush			x				x	M
Myiophonus caeruleus	Blue Whistling Thrush			x					Forests, R
Zoothera citrina	Orangeheaded Ground-Thrush			x				x	R
Family Paridae									
Parus major	Grey Tit	x						x	R
Family Sittidae									
Sitta formosae	Beautiful Nuthatch				x		x		Forests, M
Sitta frontalis	Velvetfronted Nuthatch			x					Forests/woods,R
Family Motacillidae									
Anthus hodgsoni	Tree Pipit	x						x	M
Anthus novaezeelandiae	Paddyfield Pipit	x						x	M
Motacilla indica	Forest Wagtail			x			x		Forests, M
Motacilla flava	Yellow Wagtail (khonjan)		x					x	M
Motacilla citreola	Yellowheaded Wagtail		x					x	M
Motacilla cinerea	Grey Wagtail		x					x	M
Motacilla alba	White Wagtail	x						x	M
Family Dicaeidae									
Dicaeum erythrorhynchos	Tickell's Flowerpecker	x						x	R
Dicaeum cruentatum	Scarletbacked Flowerpecker	x							Forests, R
Family Nectariniidae									
Anthreptes singalensis	Rubycheek			x			x		Forests, R
Nectarinia zeylonica	Purplerumped Sunbird (moutushi)	x						x	R
Nectarinia sperata	Van Hasselt's Sunbird		x						Forests, R
Nectarinia asiatica	Purple Sunbird (niltuni)	x						x	R
Aethopyga gouldiae	Mrs. Gould's Sunbird				x				Forests, R

Name		Abundance				Evidence			Remarks
Scientific	English (Bangla)	VC	C	UC	Rare	Sighting	Literature	Widely distributed	
Aethopyga siparaja	Yellowbacked Sunbird		x						
Arachnothera longirostris	Little Spiderhunter			x					Forests, R
Family Zosteropidae									
Zosterops palpebrosa	White-eye (sheiakkhi)		x						Forests/woods, R
Family Ploceidae									
Passer domesticus	House Sparrow (charui)	x						x	R
Passer montanus	Mountain Sparrow			x			x		R
Ploceus philippinus	Weaver Bird (babui)		x					x	Forests, M
Ploceus manyar	Streaked Weaver Bird			x					R
Family Estrildinae									Forests/woods, R
Estrilda amandava	Red Munia			x				x	R
Lonchura malabarica	Common Silverbill				x				R
Lonchura striata	Nutmeg		x					x	R
Lonchura punctulata	Spotted Munia	x							R
Lonchura malacca	Blackheaded Munia		x					x	R
Family Fringillidae									Forests/hills, R
Melophus lathami	Crested Bunting			x					Forests/foothills, M

Abundance codes
VC very common
C common
UC uncommon
R rare

Remark codes
M Migratory
R Resident

ANNEX E

UPLAND BIODIVERSITY

ANNEX E: UPLAND BIODIVERSITY

E.1 STUDY OVERVIEW

E.1.1 Rationale

A few small but highly biodiverse fragments of tropical forest survive in the Northeast Region. These fragments are the remnants of much larger forest ecosystems that were destroyed to create space for agriculture, economic forestry, and human settlement. These fragments have significant value, deriving from a variety of functions and products:

- As surviving representatives of indigenous ecosystems
- As key habitats for threatened animal and plant species, including some locally (upland-lowland) migrating animals
- As repositories of biodiversity which has potential commercial, medical, scientific, and other value
- As sources of forest products and services for local people, including indigenous forest peoples, and for the nation.

National forestry sector studies, understandably focused on the numerous pressing problems of the sector, have tended to gloss over these small but important biodiversity assets. This is unfortunate, for these small areas are under intense human pressure; with each additional year of inaction, their valuable biodiversity assets remain at risk of irreversible loss.

NERP's investigation of the region's upland biodiversity was undertaken in attempt to learn something about these areas, rounding out our understanding of regional biodiversity, and to draw attention to them within the national conservation and forestry community.

As the uplands studies account for but a small fraction of the total wetland/upland study effort, the upland results are presented as an annex. Detailed studies of the diverse biological wealth of the uplands of the Northeast Region are still urgently needed.

E.1.2 Objective of Field Studies

The objective of the upland forest desk and field studies were to gain an impression of: upland land use; conditions in the remaining natural forest areas, particularly the least disturbed areas; remaining forest biodiversity; and human activities in natural forest areas in terms of past and potential biodiversity impacts, opportunities for ecotourism, and so on.

E.1.3 Methodology

With the help of the Bangladesh National Herbarium and the Forest Department, existing literature and statistics were reviewed. Two field trips were undertaken. The first was for ten days to the eastern side of the region, to visit Rema-Kalenga Reserve Forest, Juri Forest, Madabchara Forest, Lawachara Forest, Shaltila Forest, Latitila Forest, and Surma Block bash mahal (bamboo forest). The second was for two days to the northern side of the region, to visit the Gazni sal forest.

E.2 GEOMORPHOLOGY AND GEOLOGY OF THE UPLANDS

The Northeast Region is bounded to the north, the east and a portion of south by hills (tilas). These uplands occupy about 8% of the region (1,580 km^2). They consist of Dihing and Dupi Tila Formation rock of Pleistocene and Pliocene age, composed of weathered, poorly consolidated sandstone, siltstone, and conglomerate.

In the north and east, the uplands are in the form of hill ranges that gradually increase in height toward the Shillong Plateau. In the east and south, the uplands are in the form of a series of projections from the Tripura system; these area called the Patharia Hills, Hararganj Hills, Rajkandi Hills, Bhatera Hills, Tarap Hills, and Raghunandan Hills.

E.3 BOTANICAL PROVINCE AND FOREST TYPES

Hooker (1904) divided British India into three botanical areas (Himalayan, Eastern, and Western), subdivided into nine provinces. The whole of Bangladesh, including Sylhet and Mymensingh, falls into the Eastern Moist province.

Forests in the Northeast Region comprise the following types :

- Evergreen forest
- Mixed evergreen forest
- Deciduous forest (sal)
- Bamboo forest
- Grass land (savannah)

Prior to human incursion, virgin stands of climax forests types would have predominated, with grass land appearing in patches affected by fire or disease.

E.3.1 Evergreen forest

Pure evergreen stands are very limited and rare in the region, appearing only in areas where moisture conditions are most favourable. Evergreen forest generally presents a three-storied appearance with a top storey constituted of various *Artocarpus* sp., *Elaeocarpus robustus*, *Holigarna caustica* and *Dusoxylum* sp; a middle storey formed of a large number of mixed species such as *Mesua ferra*, *Amoora wallichii*, *Sapium baccatum*, *Duabanga grandiflora*, and a variety of bamboo and rattan species; and a third storey of shrubs, mainly members of Rubiaceae, Acanthaceae, *Mallotus* sp., and *Macaranga* sp., plus many woody climbers and other herbaceous taxa.

E.3.2 Mixed evergreen forest

Mixed evergreen forest covers the larger part of the wooded area in Sylhet division. Ecologically this forest is a transitional type, having mixed characters of Burmese forest and Eastern Himalayan forest. It consists of a mixture of many tropical evergreen and tropical deciduous trees, occurring in association with bamboo jungles. The majority of the understorey trees are evergreen, while the bulk of the large and emergent trees are deciduous. The forest has an evergreen appearance because some of the deciduous trees shed leaves in the winter and others just before the monsoon. There are more than a hundred tree species; *Dipterocarpus* sp., *Swintonia floribunda* and *Vitex* sp. are prominent in the top storey, but no single tree type is uniform or clearly defined over a large tract. In the middle storey *Dillenia pentagyna*, *Artocarpus* sp., *Bombax* sp., *Albizia* sp., *Mangifera* sp. and *Ficus* sp. are

very frequent. The commonest tree species in the lower storey are *Syzygium* sp., *Lagerstromia speciosa*, *Michella* sp., *Gmelina arborea* and various *Cassia* sp.

E.3.3 Deciduous forest

This forest consists of sal (*Shorea robusta*), occasionally with other tree species. The sal forests existing today are the vestiges of extensive forests of earlier times. In the Northeast Region, sal forest survives only in the Rangtia range of Mymensingh division. Most of the remaining sal forest is severely depleted and consists of sporadic intact sal forest mostly of coppice origin. In densely populated areas, extreme human interference has occurred with people have cutting back the sal coppice repeatedly, causing the stumps to lose coppicing power and leading to sal scrub forests or blanks. This process has been going on for many decades (Champion *et al.*, "Forest Types of Pakistan, 1955).

E.3.4 Bamboo forest

Bamboo occurs in pure densely stocked patches without trees, or as undergrowth of other forest types. It occurs in abundance in many parts of Sylhet division. Muli (*Melocanna baccifera*) predominates everywhere. Other species occur in varying proportion in different localities; these species include mitinga (*Bambusa tulda*), parua (*B. polymorpha*), dalua (*Neohouzeaua dullooa*), kali (*Oxytenanthera nigrociliata*) and pencha (*Dendrocalamus hamiltonii*).

E.3.5 Grass land (savannah)

Savannah-type scrubby jungle appears as a sub-climax community in areas affected by repeated excessive felling followed by fire. This forest type consists of scattered trees of *Dillenia pentagyna*, *Terminalia bellirica*, *Syzygium fruticosum* and *Albizzia lebbeck*. The whole of the ground is covered by thatch grass (*Imperata cylindrica*). This type is seen today in Raghunandan unclassed state forest and acquired forest areas.

E.4 HISTORY OF HUMAN ACTIVITIES IN UPLAND AREAS

Human interaction dates to the first appearance of indigenous people millenia ago, who initially would have been entirely dependent on hunting forest animals and gathering forest plants. At some point, primitive forms of agriculture would have appeared.

With the establishment of tea estates in the 1850s, systematic massive deforestation began. Moreover many roads and railways were constructed, crisscrossing the forest and fragmenting virtually the entire tract. Sugarcane cultivation was introduced and jhum (shifting) cultivation expanded, reflecting increasing pressure for short-term economic returns. In 1914, the British colonial government introduced the concept of reserved forest, and as forests came under this system, cultivating and cutting virtually ceased, forest vegetation began regenerating, and forest growth improved, a process which is continuing today in some forest areas.

E.5 CURRENT UPLAND LAND USE AND TENURE

Current upland land use is classified into four broad categories: agriculture, natural forest (both good condition and degraded), economic forest, and homestead/other. Each of these is further divided into subcategories. The relative areas occupied by the main land use categories are shown in Figure E.1. The area and tenurial regime corresponding to each category and subcategory are shown in Table E.1.

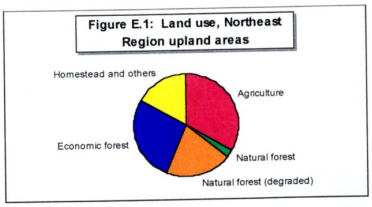


Table E.1: Land use and tenure, Northeast Region uplands

Land use category	Land use subcategory	Tenure	Area (ha)	%	
Agriculture	Tea	Lease	44,360	84	
	Fruit	Lease/private	5,000	9	
	Jhum & encroachment	Forest Dept.	3,284	6	
	SUBTOTAL		52,644		33
Natural forest	Parks and sanctuary	Forest Dept.	1,095	3	
	Natural forest (good density)	Forest Dept.	2,749	8	
	Natural forest (poor density)	Forest Dept.	1,788	5	
	Mainly bamboo	Forest Dept.	13,826	38	
	Scattered trees & denuded	Forest Dept.	9,413	26	
	Unclassed state forest	Forest Dept.	2,215	6	
	Unproductive including blanks	Forest Dept.	5,115	14	
	SUBTOTAL		36,201		23
Economic forest	Plantation including rubber plantation	Forest Dept.	41,215	96	
	Social afforestation & agroforestry	Forest Dept.	1,670	4	
	SUBTOTAL		42,885		27
Homesteads & others		Private	26,270		17
TOTAL			158,000		

Source : Forestry Master Plan (1992) and MPO (1986).

Some general remarks on each type of land use appear below. Natural and economic forest areas are owned by the Forest Department. The administrative units of the Forest Department in the Northeast Region are shown in Figure E.2.

E.5.1 Agriculture, economic forest, and homestead/other land use types

Agriculture

Most (80%) of the upland area classified as agriculture is planted to tea, with the remainder producing fruit and jhum cultivated betel leaf.

Tea. Of the 152 tea estates in the country, 130 are in Sylhet, Moulavibazar, and Habiganj districts, the three tea producing districts in the region. Of the national tea cropped area and tea production, the region accounts for 93 and 96 percent respectively. Lands used in tea plantation are leased out on a long-term basis by the Government to national and international tea growing companies. Many of the tea garden labourers are Oriya (originating from the Indian State of Orissa), brought in by the British during the colonial period.

Fruit. The region produces one-third of the country's pineapples, one-fifth of its limes and lemons, and one-half of its oranges. Most of these areas are privately owned. Some of the fruit growing area is on leased land inside the tea estates.

Jhum and encroachment. Jhum cultivation is not as extensive in the Northeast Region as it is in the Chittagong Hill Tracts. The encroachment comes in different forms. Most is attributable to forest villagers and their relatives, who have easy accessibility to the forest. Encroachment by Tipra tribal people inside the natural forest is typically for betel leaf cultivation. They destroy only undergrowth initially, but ultimately this leads to total destruction of forest cover. The actual area of this cultivation is very difficult to estimate.

Economic forest

Plantation including rubber plantation. Figure E.3 shows the area planted by decade. The first plantations in Sylhet Division were created in the 1920s. Most of the earlier plantations were monoculture teak (*Tectona grandis*) or sal (*Shorea robusta*). These older plantations are now well established and in many places they look more natural than the so-called remnant natural forest. They support considerable wild life including birds, as we observed. In the mid-'60s to early '70s, the Forest Department in association with Bangladesh Forest Industries Development Corporation (BFIDC) established rubber plantations in selected beats, such as Sahazibazar, Bhathera, and Asandhakura. The most recent plantations are generally of mixed type, except for some monoculture *Eucalyptus* planted for production of pulp wood.

Social afforestation and agroforestry programmes. Under the relatively new social afforestation programmes, local people and the Forest Department enter into a profit-sharing partnership, in which trees are planted and cared for by local people on denuded Forest Department lands. Mymensingh Division is the only area where this has been implemented so far. Under the agroforestry programme, high-valued fuel and timber producing species are raised by the Forest Department in association with the local people.

Homestead/other

About one-fifth of the upland area is privately owned and used for dwellings and related purposes.

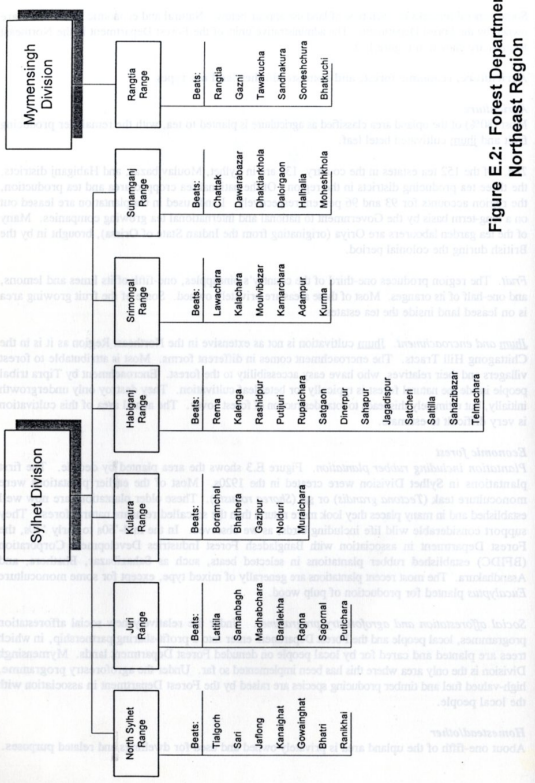
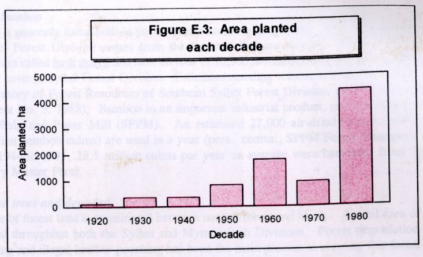


Figure E.2: Forest Department, Northeast Region



E.5.2 Natural Forest

The current extent and condition of natural forest is difficult to characterize for the region as a whole. Encroachment for agriculture and human settlement affects many areas of nominal designated forest land. In addition, official statistics for designated forest land area are not consistent from year to year nor among official sources. Figures given here are from Forestry Master Plan (1992) unless otherwise noted.

Within the Northeast Region, under Sylhet and Mymensingh Forest Divisions, the Forest Department has jurisdiction over more than 810 km^2, including natural forest, economic plantations, encroached areas, and degraded areas. Sylhet Forest Division lands (747 km^2) are scattered throughout the districts of Sylhet (207 km^2), Moulvibazar (294 km^2), Habiganj (140 km^2), and Sunamganj (106 km^2), plus there is about 20 km^2 of unclassed state forest in various locations. Mymensingh Forest Division has only one Forest Range within the Northeast Region, with an area of 47 km^2.

Parks and sanctuary

Rema-Kalenga Wildlife Sanctuary is the only designated protected area in the Northeast Region. Its area is about 1095 ha, comprising some of the compartments of Rema and Kalenga Forest Beats. Lawachara Beat of Srimangal Range has been proposed as a National Park by the Forest Department, but it is not yet designated.

Natural forest (good density)

Only 2,750 ha is counted as good density natural forest. Most of this is under Juri Forest Range, within the Latitila, Samanbagh, and Madhabchara Beats. With Rema-Kalenga Sanctuary, this is the only virgin forest left in the region; even so, few large mature trees are present.

Natural forest (poor density)

Most of this poor density natural forest land is sal forest located in Rangtia Forest Range, Mymensingh Division. The total area of this type of forest is about 1,800 ha. These areas contain mainly secondary regrowth or coppice still in the process of redevelopment.

Mainly bamboo

Bamboo is generally found both as pure clusters and as undergrowth. Most of the bamboo produced in Sylhet Forest Division comes from the Juri and Kulaura Ranges. Areas mainly occupied by bamboo are called bash mahal and have an area of 13,900 ha. In fact they account for the greater part of forest cover in Sylhet Forest Division. Estimated standing volume is 0.222 million m^3 (Drigo, *et. al*. Inventory of Forest Resources of Southern Sylhet Forest Division, FAO/UNDP Project. Field Document No. 3. 1988). Bamboo in an important industrial product, used as input material to the Sylhet Pulp and Paper Mill (SPPM). An estimated 27,000 air-dried tonnes (ADT) of bamboo (17 million bamboo culms) are used in a year (pers. comm., SPPM Forest Manager). During the years 1944 to 1991, 28.5 million culms per year on average were harvested from Sylhet forests (Forestry Master Plan).

Scattered trees and denuded

This type of forest land is transitional between natural forest and blank. A total area of 9,400 ha is scattered throughout both the Sylhet and Mymensingh Divisions. Forest degradation from over-harvesting and illegal lumber poaching has been the main process in creating this forest land type.

Unclassed state forest

Unclassed state forest (2,210 ha) consists of areas which have not been assigned a classification status. They are dominated primarily by bamboos and grasses. Most of these lands are found in the Kulaura and Habiganj Ranges, with additional fragments in the North Sylhet Range.

Unproductive including blanks

This is the ultimate state of a forest destroyed by over-harvesting. Natural regeneration is suppressed because the soil has become so depleted. Sometimes not even shrubby vegetation is present. The total area occupied by this type of land of the region is about 5,100 ha.

E.6 FOREST PRODUCTS AND SERVICES

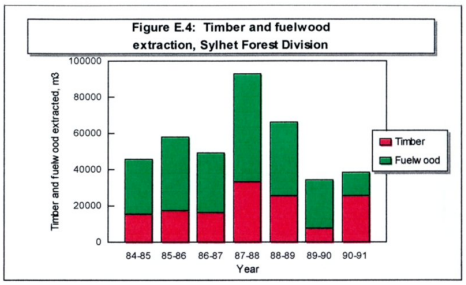
The upland forests provide a number of products and services, including input to the pulp and paper mill (described above in Section E.5.2), timber, timber products (e.g. for plywood and chipboard), fuel, food, drinks, building materials, thatching materials, medicine, natural dye, and fodder.

Of these, only timber and fuel have been quantified in national statistics; these are shown in Figure E.4.

E.7 BIODIVERSITY

E.7.1 Plant species

A list of about 800 species of woody plants found in Northeast Region is provided in Table D.7, Annex D. This list was derived from field observations, searches of literature and plant collections at the Bangladesh National Herbarium. With the addition of herbaceous species and lower order plants, the total macrophyte species count could easily double.



E.7.2 Animal species

A list of some of the mammals and birds observed or thought to be present in the Northeast Region is provided in Table D.8, Annex D. This list was derived from field observations, literature searches, and inferences from species' presumed distributions.

E.7.3 Areas of highest biodiversity

Among the areas of highest biodiversity are the Rema-Kalenga Reserve Forest/Sanctuary and the Juri Forest Range. Notes from our visits to these sites are presented below.

E.7.4 Threatened forest type

The Modhupur Tract and the northern margin of Mymensingh Division were once vast tracts of moist deciduous sal forest. Now, sal forest has dwindled to a few remnants in Gazni Forest Beat, Rangtia Range, Mymensingh Division, located north of Jhinaigathi in Sherpur District. Notes from our visit to this forest are presented below.

E.8 REMA-KALENGA RESERVE FOREST/SANCTUARY

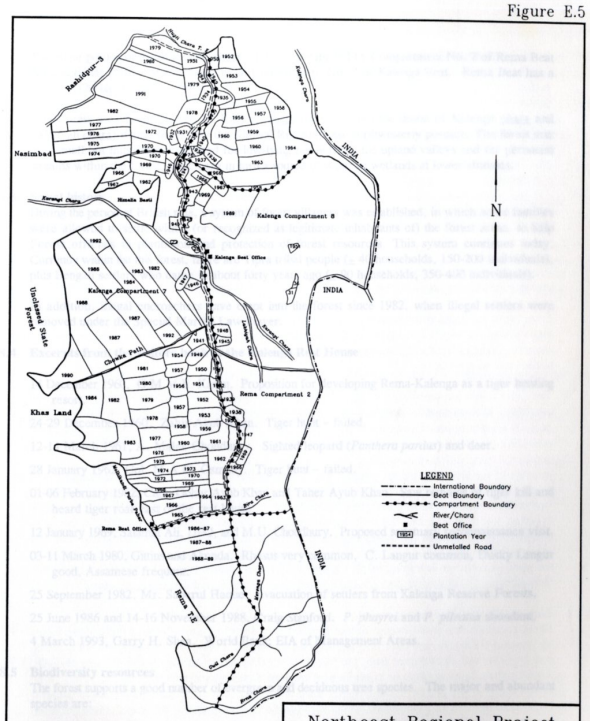
E.8.1 IUCN directory listing

As Rema-Kalenga has official sanctuary status, it is included in the IUCN directory of parks and sanctuaries. Some of the information given below derives from this source. IUCN categorizes Rema-Kalenga in Management Category IV (Managed Nature Reserve), Biogeographical Province 4.09.04 (Burma Monsoon Forest). A map of Kalenga and Rema Forest Beats is shown in Figure E.5.

E.8.2 Topography

The Rema-Kalenga Reserve Forests are within the Tarap Hill Reserve. The total reserve forest under Kalenga Beat is about 2700 ha bounded in the east by India, with the Kalenga chara (hill stream) forming the border line. The sanctuary area is 1104 ha (FAO Field Document No. 3, Dridges and Choudhury, 1988).

Figure E.5



Northeast Regional Project	
KALENGA FOREST BEAT/ REMA FOREST BEAT	
Prepared by: Istiak	April 1994
Drawn By: Mamun	AutoCAD Drawing

FILE: NERP-B2B3.DWG

The major portion of the sanctuary, about 770 ha, is comprised by Compartment No. 2 of Rema Beat An additional 330 ha of sanctuary lie in Compartment No. 8 of Kalenga Beat. Rema Beat has a further 2120 ha of reserve forest.

The forest area is intersected by Karangi chara (formed from the union of Kalenga chara and Lakhiyah chara) which flows into the Khowai River in west-northwesterly position. The forest acts as a small but important watershed for low-lying pot-holes in the upland valleys and for perennial streams within the forest, which are in turn a source of water to wetlands at lower altitudes.

E.8.3 Social history

During the period of British rule, a system of forest villagers was established, in which some families were allowed to settle within (or recognized as legitimate inhabitants of) the forest areas, to help Forest officials in plantation and protection of forest resources. This system continues today. Currently within the this forest, there are Tipra tribal people (± 40 households, 150-200 individuals), plus Bengali settlers who came in about forty years ago (± 90 households, 350-400 individuals).

In addition, illegal encroachers have crept into the forest since 1982, when illegal settlers were removed under the Special Martial Law Power.

E.8.4 Excerpts from the visitors book at the Kalenga Rest House

14 December 1960, G.M.M.E. Karim. Proposition for developing Rema-Kalenga as a tiger hunting resort.

24-29 December 1960, Zahir Ayub Khan. Tiger hunt – failed.

12-14 March 1961, A. Malek Choudhury. Sighted leopard (*Panthera pardus*) and deer.

28 January 1962, Col. M.A.G. Osmany. Tiger hunt – failed.

01-06 February 1962, Capt. Gohur Ayub Khan and Taher Ayub Khan. Saw remains of tiger kill and heard tiger roar east of the rest house.

12 January 1969, Salamat Ali, DFO, and M.U. Choudhury. Proposed sanctuary reconnaissance visit.

03-11 March 1980, Gittins and Akonda. Rhesus very common, C. Langur common, Dusky Langur good, Assamese frequent.

25 September 1982, Mr. Saberul Haque. Evacuation of settlers from Kalenga Reserve Forests.

25 June 1986 and 14-16 November 1988, Craig Stanford. *P. phayrei* and *P. pileatus* abundant.

4 March 1993, Garry H. Shea. World Bank; EIA of Management Areas.

E.8.5 Biodiversity resources

The forest supports a good number of evergreen and deciduous tree species. The major and abundant species are:

cham (*Artocarpus chaplasha*)
wild mango (*Mangifera longipes*)
hargaza (*Dillenia* sp.)
barenga awal (*Vitex* sp.)
looth, koroi (*Albizzia* sp.)
dicham (*Artocarpus lakoocha*)
amloki (*Emblica officinalis*)
anna agar (*Aquilaria agallocha*)
bonak (*Schima wallichi*)
kali bansh (*Oxytenenthera nigrocilinta*)
paura bansh (*Bambusa teres*)
muli bansh (*Melocanna bambusoides*)

boro jam (*Syzygium* sp.)
menda, mandar (*Erythrina stricta*, *E. indica*)
kodom (*Anthocephalus indicus*)
gamari (*Gmelina arborea*)
thonna (*Tetrameles nudiflora*)
dollu bansh (*Teinostachyum dulloa*)
garjan (*Dipterocarpus turbinatus*)
sal (*Shorea robusta*)
mitenga bansh (*Bambusa tulda*)
gila lata (*Entada purseatha*)
belfoi (*Elaeocarpus floribundus*)
german lata (*Michenia scandens*)
kalokesh (*Lantana camara*)
sita (*Cassia fistula*)
amora (*Spondias mangifera*)
aswatha (*Ficus religiosa*)
bahera (*Terminalia belerica*)
shimul (*Salmalia insignis*)
bot (*Ficus bengalensis*)
haritaki (*Terminalia chebula*)
jarul (*Lagerstroemia* sp.)
nageswar (*Mesua ferrea*)
rata (*Amoora wallichi*)

The forest floor is quite rich in plant species. A thorough investigation of floral diversity and plant resources utilization needs to be carried out.

Some rattan and murta plantations were also observed. It was decided to plant murta because of the high demand and insufficient supply of this resource in the handicraft industry, which provides good income. Murta plantations situated in lower well-watered areas were flourishing, while those on higher ground were not.

The forest within the sanctuary exhibits very diverse tree species represented by individuals in good condition. Low-lying areas within the forest, called jheels, well-shaded and adjacent to steep hills, support unique upland forests tracts having an upper canopy as high as 25 - 30 m. The forest provides cover for a wide array of wildlife species.

In some of the low-lying jheels, phumdi was found, similar to that of the Assam - Manipur forest areas. Phumdi is a water-saturated area covered by a soft mat of decomposing organic material of variable thickness, with some grass cover and herbs, and water underneath. Phumdi serves as a good breeding and feeding habitat for a variety of amphibian species; temperatures are not so low as to compel the amphibians to hibernate. We heard three to four different species croak and at least one species (Balloon Frog, *Uperodon globosum*) was breeding. Egg masses and larvae were observed at the small pools in the low lying jheels. It appears that this species favours winter months with low temperatures, low humidity, and adequate water and food supply for breeding purposes.

E.8.6 Forest utilization and management

Forest resources are an important income source for the forest villagers, Tipra tribal people, Oriya tea plantation labourers, and other people living near the forests. Fuelwood, raw material, food items, and medicine are all extracted from the forests. Illegal lumber poaching is a significant problem. Trade in these items tends to be controlled by local influential people and urban elites.

The Tipras and Oriyas are involved in making mats, baskets, containers, fish traps, and other items from bamboo strips extracted from the forests free of cost. There is a system of issuing permits for limited extraction by the Forest Department, but this rule is not always followed. Usually muli, mitenga, and paura bamboos are used for the mats. Mats made from epidermis strips cost Tk 20 to 25 each; those made from the endodermis are cheaper at Tk 8 to 12 each. On average, 30 to 35 bamboo culms make one epidermal mat and four endodermal mats, bringing the value to Tk 2 to 2.5 per bamboo piece. It takes 3 to 4 person-hours to make a 3' x 4' mat. Sometimes dadon system is

followed, in which local traders make an advance payment to the Tipras, who then supply the mats at a stipulated time. Rattan cane is scarce; limited extraction was noticed. Some local initiatives for planting rattan cane were observed in Oriya homestead areas.

In the Tipra household system, each family owns a handloom for making cloth for their own use. They buy the threads from outside to make the cloth; selling cloth is not practised. (We failed to persuade a lady to sell one to us !).

Tribal people use leaves of various plants, mixed with rice, to make laanghi, a cheese-like material used to make local liquor. Forests areas are left fallow after cultivation and used for cattle grazing. The villagers do not allow their cattle to enter the natural forests, an encouraging sign.

E.8.7 Forest Department development plans

The Forest Department is planning to renovate the existing Rest House and construct additional accommodation so that wildlife staff can be deployed here. Excavation of artificial waterholes for wildlife is planned for the low-lying jheel/phumdi areas. While the intention is good, this will likely compromise these microecoystems' biodiversity.

E.8.8 Options to improve management and protect biodiversity

Various options exist for improving resource management and protecting biodiversity:

- Institute a system of permits/fees for extraction of forest products in limited quantities, to control exploitation and raise money for improved management
- Tax finished products from forest raw materials, to raise money for improved management
- Develop tourism facilities
- Involve forest villagers in conservation activities, awareness building, and conservation education
- Institute formal recognition (awards, prizes, etc.) for villagers in recognition of their efforts for conservation activities
- InvolveTipras in income generating activities utilizing other than forest raw materials
- Create artificial reservoirs for holding water in the forest areas
- Study and document indigenous knowledge, e.g. medicinal practices of tribal people

E.9 JURI FOREST RANGE

E.9.1 Location, extent, and administration

Juri Forest Range in the Sylhet Forest Division is in the central eastern portion of the Northeast Region on the border with India. The forest area in the Range is about 10,450 ha, of which 9890 ha are in the Patharia Hill and Haraganj Reserve Forests. The remaining 560 ha are in Kechrigul Notified Forest. Some of the Notified Forest Area, near Latu north of the Juri Range, is also claimed by India. A map of Juri Forest Range is provided in Figure E.6.

For administrative purposes, the Range is divided into seven Beats. The Beat offices are Ragna, Sagarnal, Putichara, Latitila, Samanbagh, Madhabchara, and Barolekha. Maps of Latitila and Madhabchara Forest Beats are provided in Figures E.7 and E.8.

Figure E.6

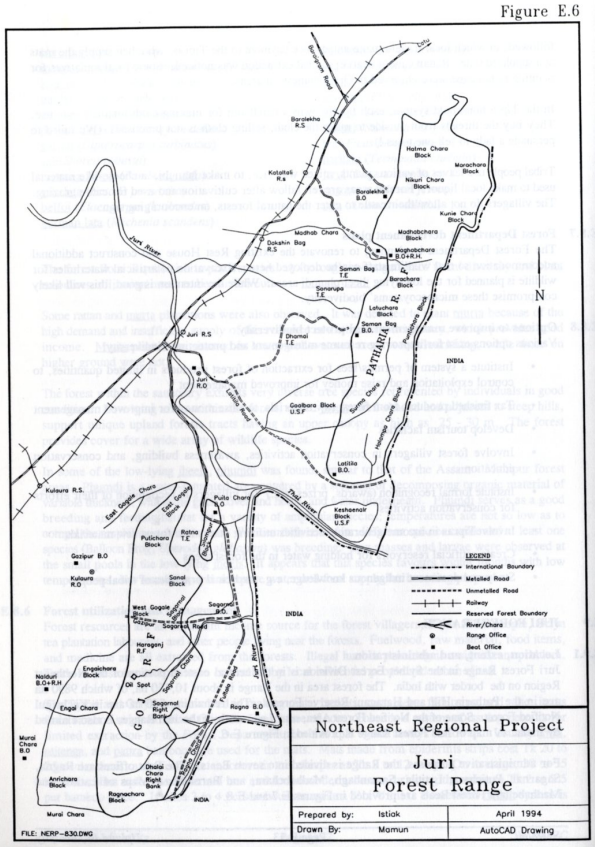


Figure E.7

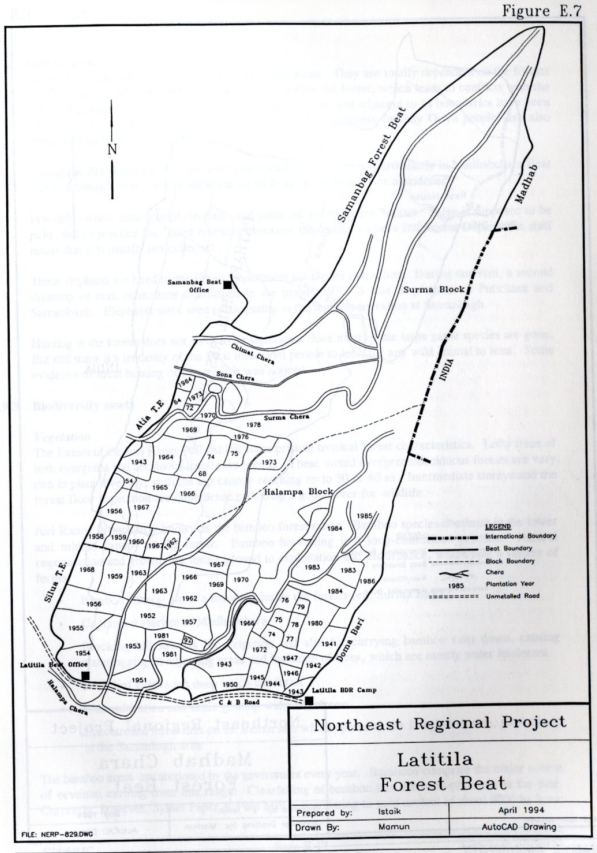
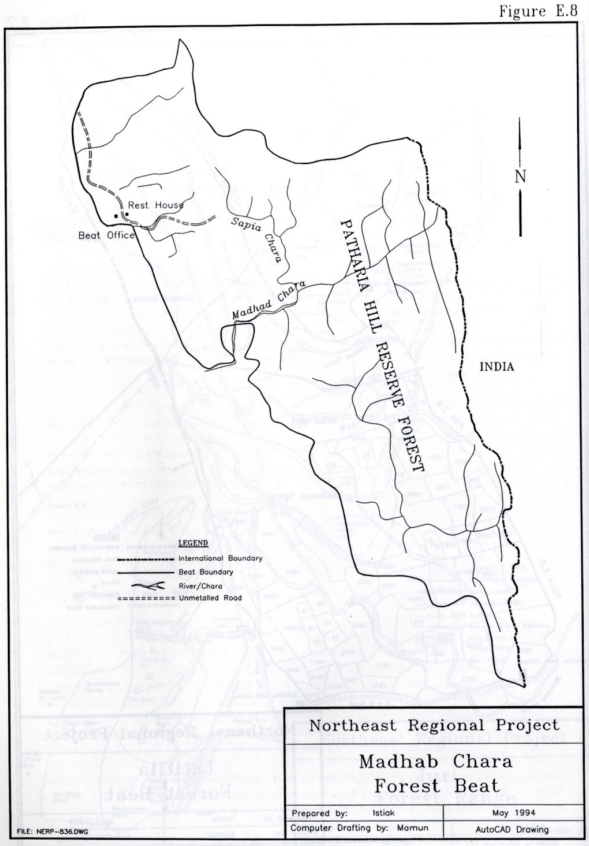


Figure E.8



E.9.2 Social history

Tipras and Khasia tribal people reside in the forest areas. They are totally dependent on the forests for their livelihood. They also plant betel leaves within the forest, which leads to conflicts with the Forest Department. Some areas within the Reserve Forest and adjacent to its boundaries have been leased out for tea plantation. Some of the tea garden labourers (mainly Oriya people) are also dependent on forest resources.

During the British period, oil rigs were established in some areas, particularly in Madhabchara Beat and Samanbagh Beat. At present these oil wells are all sealed off or abandoned.

Privately-owned, tame/trained elephants and cattle are grazed in the forests. A fee is supposed to be paid, but in practice the "good relations" between the animal owners and Forest Department staff mean that it is usually not collected.

These elephants are hired by the Forest Department for timber extraction. During our visit, a second thinning of teak plantations established in the period 1973-78 was in progress at Putichara and Samanbagh. Elephants were seen participating in the logging operation at Samanbagh.

Hunting in the forests does not seem to be significant since most of the large game species are gone. But still there is a tendency of the local influential people to look for any wild animal to hunt. Some evidence of local hunting of forest birds was noticed.

E.9.3 Biodiversity assets

Vegetation

The forests of the Juri Range still exhibit some pristine tropical forest characteristics. Lofty trees of both evergreen and deciduous species are present. These mixed evergreen/deciduous forests are very rich in plant diversity, with the top canopy reaching up to 30 or 40 m. Intermediate storeys and the forest floor vegetation are quite dense providing a good cover for wildlife.

Juri Range is popularly known as the bamboo forest range. Bamboo species dominate in the lower and middle canopy of the forest. Bamboo harvesting is a long-established practice. Natural regeneration and growth are losing ground to exploitation and disturbance, which take a variety of forms:

- Bamboo cutters- about a thousand inside the forests (eg. Surma Block).
- Unplanned tourism at Madhabchara
- Blocking hill streams for irrigation and also for carrying bamboo rafts down, causing waterlogging in adjoining areas and the death of trees, which are mostly water intolerant
- Betel leaf cultivation deep inside the forest
- Rice cultivation and cattle grazing within the forest
- Uncontrolled forest fires on the Indian side which spread to the Bangladesh side, particularly in the Samanbagh area

The bamboo areas are auctioned by the government every year. Bamboos comprise the major source of revenue earning from this range. Clearfelling of bamboo has not been practised in the past. Currently, however, Sylhet Paper & Pulp Mill is negotiating to gain control of about 8000 ha here,

in exchange for SPPM's 20,000 ha of reedland in Companyganj, which was transferred from the Forest Department to SPPM in the 1970's.

Wildlife

A list of some of the mammals and birds observed or thought to be present in the Northeast Region is provided in Table D.8, Annex D.

The populations of some mammals such as wild boar, barking deer, and rhesus macaques seems to have increased because of the lack of large predator mammals. All over the forest floor foot prints could be seen. Along the charas, many foot prints of fishing cat, leopard (rare; Samanbagh), otters, and monitor lizards were seen. Primates of four species were observed; it is expected that at least nine or ten species occur here.

Amphibians observed included some common species like *Bufo melanostictus, Rana cyanophlyctis, R. limnocharis* and *R. tigrina*; tree frog (*Hyla* sp.) was heard croaking. Among reptiles, Common Skink (*Mabuya carinata*), Garden Lizard (*Calotes versicolor*), and Wall Lizard (*Gekko gecko*) were found to be quite common. Some information on the possible occurrence of two species of python, Rock Python (*Python molurus*) and Recticulated Python (*Python reticulatus*) was noted during the literature review. Both these species are endangered, however, and the occurrence of Reticulated Python would be noteworthy, as its occurrence in Bangladesh is doubtful. There are reports of Yellow Land Tortoise (*Indotestudo elongata*) and Black Hill Turtle (*Melanochelys* sp.), but lacking specimens these cannot be confirmed. There is however a possibility that these two species and others such as *Cyclemys dentata*, *Kachuga* sp., *Cuora ambionensis*, *Indotestudo emys*, and *Lissemys punctata* are present in these forests and adjacent areas.

Of the forests of the Northeast Region, this range happens to support the highest number of non-human primate species. Worth mentioning are Hoolock Gibbon (*Hylobates hoolock*) , Pharye's Leaf Monkey (*Presbytis phayrei)*, Pigtailed Macaque (*Macaca nemestrina*), Assamese Macaque (*Macaca assamensis*) and Slow Loris (*Nycticebus coucang*). The population of Phayre's Leaf Monkey seems to be quite high compared to the forests in the Chittagong division. Possibly this is because of the lesser magnitude of disturbance in Sylhet Division as compared to Chittagong Division. Another possibility is that the tea gardens at the periphery of the forest act as a buffer zone.

Wild elephants also visit this region from India. Seven to eight elephants are reported to visit this forested area regularly during the winter months. This poses the question of establishing safe corridors between the two countries so that these animals do not either drift away from their usual route during migration or create problems through human-elephant interaction.

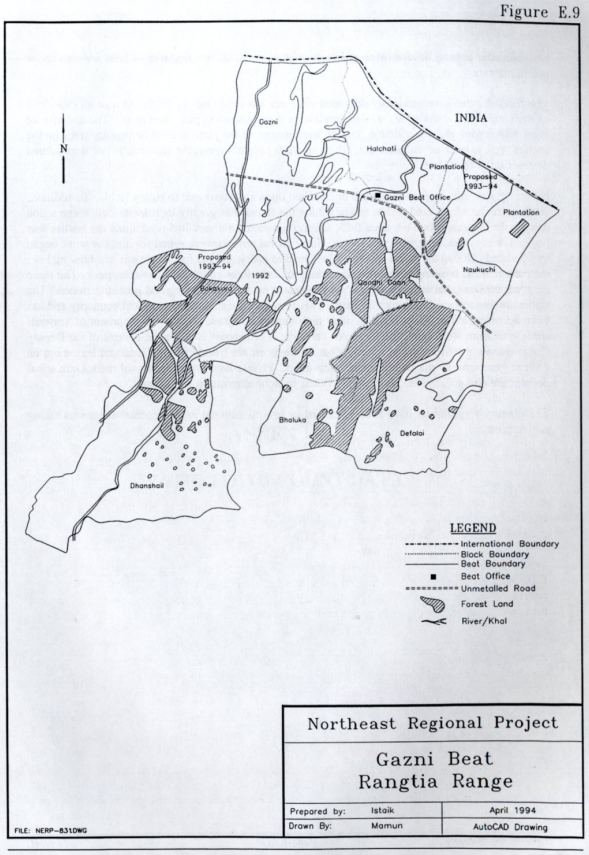
E.9.4 Forest products

A number of products are derived from the forest here. Among these are timber, fuel wood, thatching material, fodder, medicinal plants, liquor base stock, natural dye, bamboo, foods (gach alu, fig, jam, amra), and building materials.

E.10 GAZNI SAL FOREST

Gazni forest (see map, Figure E.9) is dominated by sal (*Shorea robusta*). Apart from this species are found jarul (*Lagerstromia* sp.), hargaza (*Dellinia* sp.), amloki, bot (*Ficus* sp.), gamari (*Gmelina arborea*), and other species. In recent years, several exotic species, mostly *Acacia* sp., have been

Figure E.9



Northeast Regional Project

Gazni Beat
Rangtia Range

Prepared by:	Istaik	April 1994
Drawn By:	Mamun	AutoCAD Drawing

FILE: NERP-831.DWG

planted under various development assistance programmes. A few hectares of land are also under murta plantation.

The forest has been tremendously degraded since our last field visit in 1985. Almost all (90-95%) of the natural forest has gone, with the remaining areas under coppice plantation. The last official clear felling took place in 1965/66, but the truth is none of the planted trees or coppice trees on the ground seem to be over ten years old, which suggests recent large-scale uncontrolled or unregulated destruction of the forest.

In some places, forest areas have been encroached upon and converted to paddy fields. In addition, stone extraction from land within and adjoining the forests has greatly increased. Stone extraction dates to the Pakistan period but since 1985, when construction of a metalled road along the border was planned, it has gradually gained momentum. International tenders were asked for and the work began as scheduled. During the winter months, when the land is dry and the forest streams are flowing low, the collection and breaking of stones, and trucking of them through the forest is at its peak. The stone quarry is not large, but even so, over 1500 people are involved in digging and breaking stones. The stones are sold to local contractors for cash. This activity has transformed the local economy and has been accompanied by an increase in other high-impact activities, such as development of seasonal roads to facilitate stone extraction by motor vehicles. The process is under the control of the Deputy Commissioner's office. Streams coming out of the forest are treated as khas land and leased out on a three-year term by the DC for stone excavation. Private landowners, many of them Garo tribal people, are also selling land, even paddy fields, to stone excavation contractors.

The country's sal forests have been identified in several national environmental studies as facing severe pressure.

ANNEX F

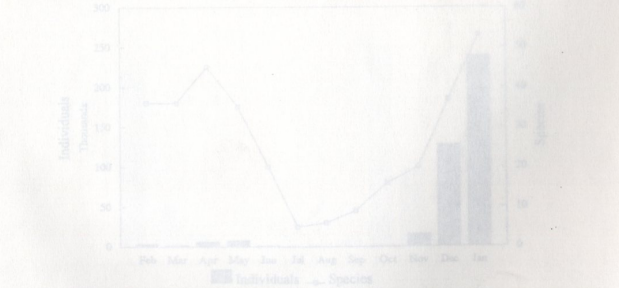
WATERFOWL COUNT DATA

NORTHEAST REGIONAL PROJECT BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
TOTAL COUNT

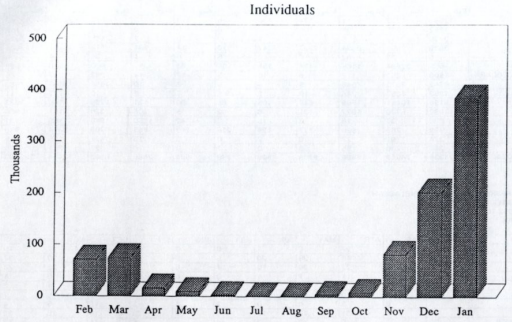
SITE NAME	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
TANGUAR	12883	4712	2111	124	130	5	113	312	619	30332	32299	41742
BANUAR	1252	1935	298	105	1	0	0	0	456	158	748	2054
PANA BEEL	9220	7142	515	67	1	0	0	2	145	2548	2078	1521
PASHUA	3696	2056	6334	7727	1347	10	14	261	613	16332	127906	238910
ERALI BEEL	6	33	62	0	0	5	0	1	30	4	6	32
BALAI HAOR	559	32694	1165	124	155	35	63	397	620	528	529	2109
CHALNIA & DEODAR	1903	353	117	8	16	5	17	14	283	217	65	654
HAORKHAL	8242	7673	545	5	4	0	3	10	1394	16147	27963	63789
PATACHATAL	4253	1057	248	10	3	9	7	2	10	722	11	65
KAWADIGHI	9196	10441	1599	619	105	88	80	131	1796	6146	3933	12916
CHATLA	17892	5770	1872	131	6	2	5	206	326	5181	5966	15423
FISH POND	886	37	18	3	15	3	40	1360	940	169	431	550
HAIL HAOR	729	289	920	177	124	216	245	969	703	3374	918	4561
KURI BEEL	374	91	27	8	2	0	9	16	424	165	15	56
DEOCHAPRA	247	230	55	0	0	2	0	6	23	391	35	97
MONTHLY TOTAL	71338	74513	15886	9108	1909	380	596	3686	8382	82414	202903	384479

NORTHEAST REGIONAL PROJECT - BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
TOTAL SPECIES

SITE\MONTH	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	JAN
PANA	31	23	17	6	1	0	0	1	5	11	15	12
PASHUA	36	36	45	35	20	5	6	9	16	20	37	53
TANGUA	41	30	27	20	10	4	8	19	15	23	23	38
BANUAR	16	11	11	7	1	0	0	0	5	6	11	10
KURI	19	20	9	4	3	1	4	10	19	4	6	13
DEOCHAPRA	16	11	10	0	1	2	0	3	9	8	7	9
ERALI	6	8	3	0	0	3	1	3	12	5	4	6
BALAI	33	28	31	11	16	8	7	23	18	25	22	29
CHALNI/DEODER	23	20	8	3	3	4	2	6	14	13	13	15
HAORKHAL	36	21	26	4	3	1	2	2	23	31	26	40
CHATLA/PINGLA	34	24	24	11	1	2	2	3	11	28	28	38
PATA/BOROCHATAL	24	19	14	4	5	3	3	1	4	17	5	6
KAWADIGHI	43	24	28	17	11	9	8	10	22	28	20	37
HAIL	30	17	28	12	14	11	10	15	17	30	21	29
FISH POND	14	8	7	2	7	1	8	11	21	19	14	21

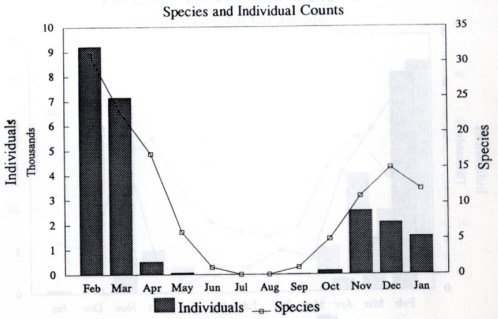


Waterfowl Count Summary



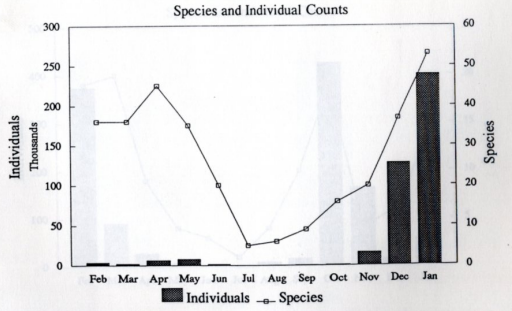
Pana Beel

Species and Individual Counts



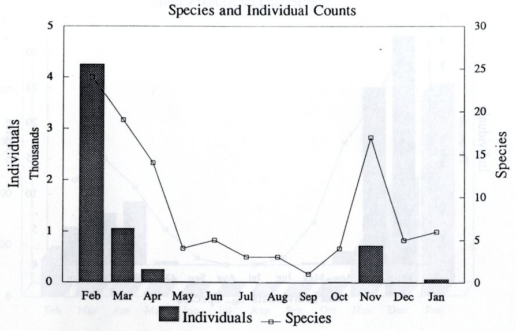
Pashua Beel

Species and Individual Counts



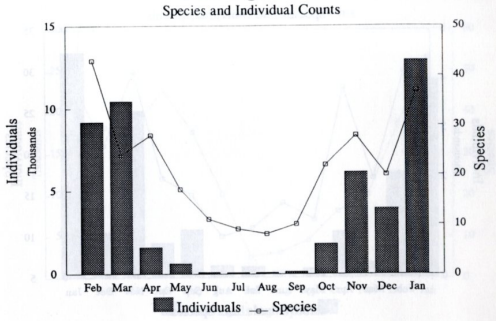
Patachatal Beel

Species and Individual Counts



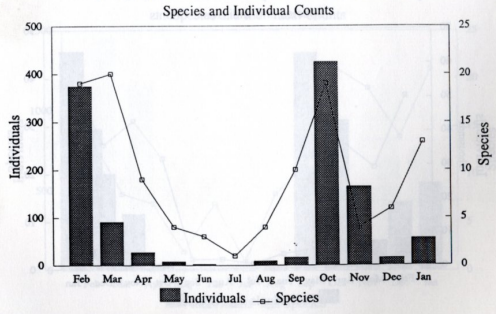
Kawadighi Haor

Species and Individual Counts



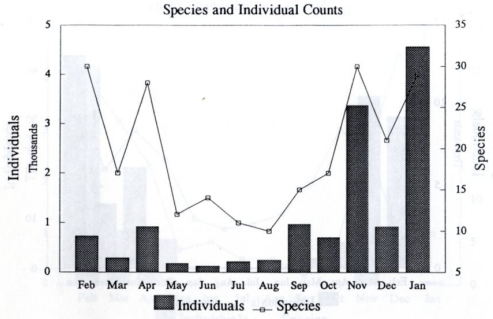
Kuri Beel

Species and Individual Counts



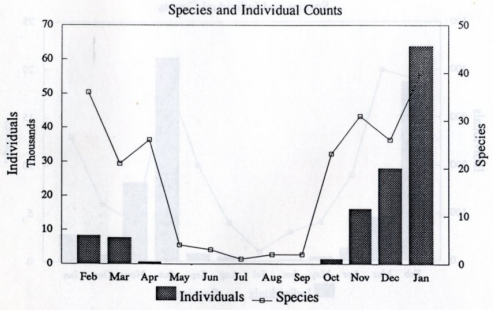
Hail Haor

Species and Individual Counts



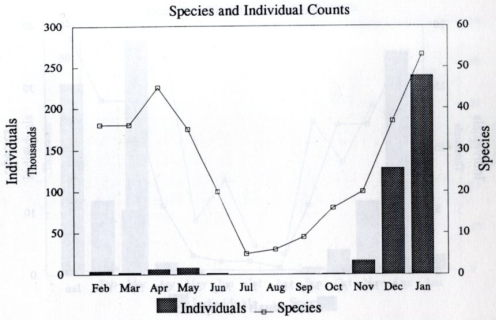
Haorkhal Beel

Species and Individual Counts



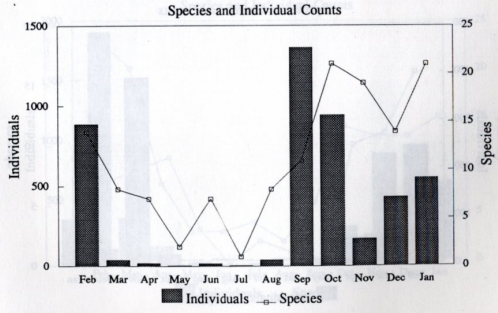
Erali Beel

Species and Individual Counts



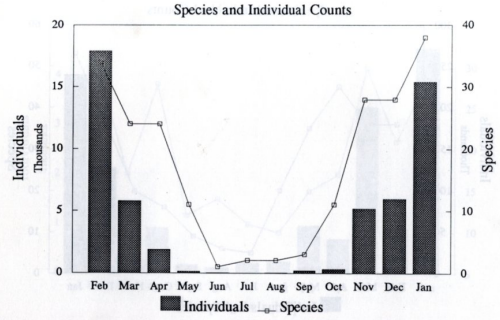
Fish Pond (Hail Haor)

Species and Individual Counts



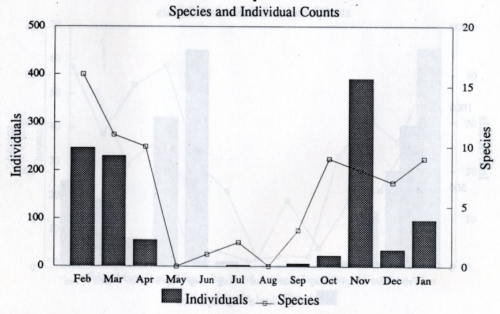
Chatla Beel

Species and Individual Counts



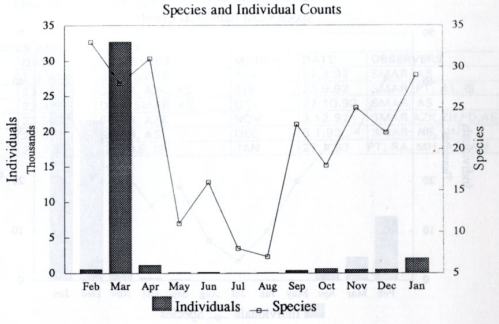
Deochapra Beel

Species and Individual Counts



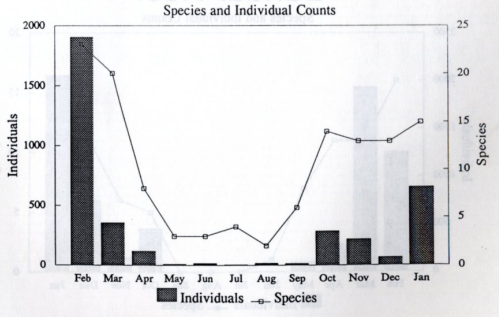
Balai Haor

Species and Individual Counts



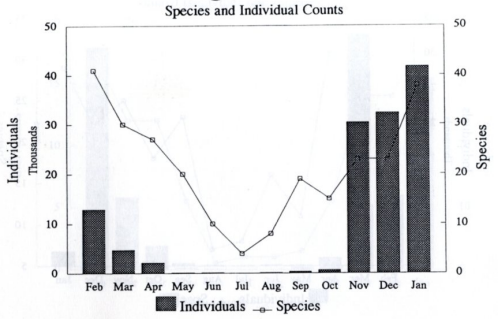
Chalnia & Deodar Beel

Species and Individual Counts



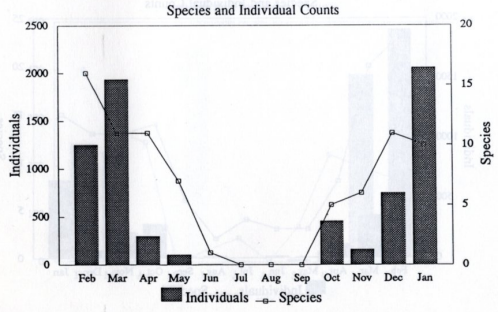
Tanguar Haor

Species and Individual Counts



Banuar Haor

Species and Individual Counts



NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
PANA BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	2.3.92	DAS, SMAR	AUG	27.8.92	SMAR, AS
MAR	23.3.92	SMAR, AZK, AS	SEP	22.9.92	SMAR, PT, AS, IS
APR	22.4.92	DAS, SMAR, AS	OCT	27.10.92	SMAR, AS
MAY	23.5.92	SMAR, AZK	NOV	3.12.92	SMAR,AZK,ZH,PD,AS
JUN	22.6.92	SMAR, AS	DEC	3.1.93	SMAR, AS, QMH
JUL	21.7.92	AZK, AS, IS	JAN	27.1.93	PT, RA, MH, AS, AM

Waterfowl Counts, Feb92 to Jan 93, PANA BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe				2								
Great Creasted Grebe	30	7								1	17	31
Unidentified Grebe												
Great Cormorant	19									2	41	45
Indian Shag											7	
Little Cormorant	450	350	400	4					2	132	530	1874	1250
Unidentified Cormorant												
Oriental Darter	1	3	3	2						1			3
Great Bittern												
Yellow Bittern												
Cinnamon Bittern												
Black Bittern												
Night Heron												
Little heron												
Indian Pond Heron		3				1					4	
Chinese pond Heron												
Cattle Egret			29							8		
Little Egret			3							2	2	
Intermediate Egret			4	35								
Great Egret	3	4	5							4	16	5
Unidentified Egret												
Purple Heron												
Grey Heron	3	8								1	1	
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck	3800	2500										
Lesser Whistling Duck	200	1500										
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck	132											
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose												
Eurasian Wigeon	60	100										
Falcated Teal	1											
Gadwall	400	3										
Common Teal	3	1										
Mallard	1	1										
Spotbill Duck	10	20	20	18						8		2	2
Northern Pintail	400	3									200	100	56
Garganey	600	1500	15								500		5
Northern Shoveler	500	1000											
Red-crested Pochard	12										300		
Commom Pochard	4	3											
Baer's pochard	660	6											
Ferruginous Duck	200	400		2									14
Tufted Duck	280		14								1000		109
Greater Scaup	5												
Mandarin Duck													
Unidentified Ducks	800												
Water Rail													
Slaty-breasted Rail													
Ruddy Crake													
White-breasted Waterhen													
Watercock													
Moorhen													
Purple Swamphen													
Commom Coot	500	200	2										
Unidentified Rails/Crakes													
Pheasant-tailed Jacana													
Bronze-winged Jacana													
Painted Snipe													
Black-winged Stilt	4											5	
Avocet													
Oriental Pratincole													
Small Pratincole													
River Lapwing													
Grey-headed Lapwing													
Red-wattled Lapwing	1											1	
Asiatic Golden Plover													
Grey Plover													
Long-billed Plover													
Little Ringed Plover													
Kentish Plover													
Mongolian Plover													
Greatr Sand Plover													
Black-tailed Godwit	140												
Eurasian Curlew													

Waterfowl Counts, Feb92 to Jan 93, PANA BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank												
Marsh Sandpipper												
Greenshank												
Normann's Greenshank												
Green Sandpipper												
Wood sandpipper				1								
Terek Sandpipper				1								
Common Sandpipper												
Pintail Snipe												
Swinhoe's Snipe												
Commom Snipe												
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper												
Spoon-billed Sandpipper												
Broad-billed Sandpipper												
Ruff	1											
Unidentified Waders												
Brown-headed Gull			8							4		1
Black-headed Gull												
Unidentified Gull												
Whiskered Tern		28	10								8	
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite											1	
Brahminy Kite												
Pallas Fish Eagle		1								1		
Grey-headed Fish Eagle			1									
Steppe Eagle												
White-rumped Vulture												
Crested Serpent Eagle												
Western Marsh Harrier		1										
Eastern Marsh Harrier												
Pied Harrier	1		1								1	
Osprey			1								1	1
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Unidentified Raptors												
TOTAL WATERFOWL	9221	7642	518	63	1	0	0	2	146	2548	2081	1522

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
PASUA HAOR

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	4.3.92	DAS, SMAR	AUG	27.8.92	SMAR, AS
MAR	23.3.92	SMAR, AZK, AS	SEP	22.9.92	SMAR, PT, AS, IS
APR	22-24.4.92	DAS, SMAR, AS	OCT	27.10.92	SMAR, AS
MAY	22-23.5.92	SMAR, AZK, AS	NOV	3.12.92	SMAR,AZK,ZH,PD,AS
JUN	21.6.92	SMAR, AS	DEC	2.1.93	SMAR, AS, QMH
JUL	20.7.92	AZK, AS, IS	JAN	27.1.93	SMAR, AZK

Waterfowl Counts, Feb92 to Jan 93, PASHUA HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe			6	7								6
Great Creasted Grebe	10									25	210	75
Unidentified Grebe												
Great Cormorant	5								11	130	25	
Indian Shag												
Little Cormorant	400	14	2500	1753	1015			216	434	575	7500	5000
Unidentified Cormorant												
Oriental Darter	10	1	16	8	6			6	17	2	23	56
Great Bittern												
Yellow Bittern				5	5							
Cinnamon Bittern			5	2	5	4						1
Black Bittern												
Night Heron			33	11							6	17
Little heron			3	20	10		6	6	4		1	6
Indian Pond Heron	1	7	30	35	12	3	5	7	3	20	300	200
Chinese pond Heron			1									
Cattle Egret	5	8	300	180							1200	1500
Little Egret	125	80	500	235	36			1	2		1000	600
Intermediate Egret	15	45	300	2243	27						100	500
Great Egret	600	59	900	1556	53			10	15	105	6000	3000
Unidentified Egret				703	63						200	
Purple Heron			27	33	11							16
Grey Heron	125	118	45	45	15	1		6	49	148	1140	346
Asian Openbill	128	400	300	147							658	700
Lesser Adjudant												
Black-headed Ibis	11		3									3
White Spoonbill			1									
Fulvous Whistling Duck										865	21500	60000
Lesser Whistling Duck		22	200	5						4200	41000	30000
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck	4		19									
Common Shelduck												
Comb Duck												3
Cotton Pygmy Goose				2								
Eurasian Wigeon		4	40									8
Falcated Teal												
Gadwall			15	2	3						800	5000
Common Teal			1								500	4000
Mallard												2
Spotbill Duck	120	4	40	187	13			9	26			109
Northern Pintail		45	15	14	8					1500	20050	80000
Garganey	400	370	325	19					6	811	6000	12000
Northern Shovaler	200	150	35	7						200	8000	8000
Red-created Pochard			4							4002		6
Commom Pochard											50	2000
Baer's pochard	2											600
Ferruginous Duck	1			2			1			219	400	2500
Tufted Duck	5									2054	4020	3000
Greater Scaup												1
Mandarin Duck											4000	1
Unidentified Ducks	600			12					22			15000
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock			1	7	3		1		3			6
Moorhen			11	54	81	2			4		50	14
Purple Swamphen	102	137	420	781						75	100	200
Commom Coot	61								14	1400	3000	2000
Unidentified Rails/Crakes												1
Pheasant-tailed Jacana				4								
Bronze-winged Jacana												
Painted Snipe												
Black-winged Stilt	55	85	6								31	120
Avocet												
Oriental Pratincole												16
Small Pratincole												
River Lapwing												
Grey-headed Lapwing	5	7									11	6
Red-wattled Lapwing												
Asiatic Golden Plover			14				1					
Grey Plover												
Long-billed Plover												
Little Ringed Plover		5										
Kentish Plover	2	14										
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit	12	3	23									17
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, PASHUA HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank	55	2	2									
Redshank			4									
Marsh Sandpiper		23										
Greenshank	11	17	2							1		
Normann's Greenshank												
Green Sandpiper		1										
Wood sandpiper	1											
Terek Sandpiper												
Common Sandpiper		2	2									
Pintail Snipe												
Swinhoe's Snipe												
Commom Snipe												
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper												
Spoon-billed Sandpiper												
Broad-billed Sandpiper												
Ruff	65	36										90
Unidentified Waders	200											
Brown-headed Gull	10	94	80								2	500
Black-headed Gull												2500
Unidentified Gull												
Whiskered Tern	350	198	100	1					3		31	78
White-winged Tern												
Gull-billed Tern		7										
Indian river Tern		3										
Commom Tern						1						
Black-billed Tern												
Little Tern												
Unidentified Tern												6
Black-shouldered Kite		1	2	1	1							
Black Kite												3
Brahminy Kite						2	2	2	2	4		5
Pallas Fish Eagle	19	28	4								2	4
Grey-headed Fish Eagle	1											
Steppe Eagle		1										
White-rumped Vulture		2	1									
Crested Serpent Eagle												1
Western Marsh Harrier	2	4	2	1						1	2	4
Eastern Marsh Harrier												
Pied Harrier			2								22	
Osprey			1	1						1	1	
Eurasian Kestrel												
Northern Hobby				1								
Peregrine Falcon												
Shikra				1								
Unidentified raptors											1	
TOTAL WATERFOWL	3718	1998	6341	8085	1370	12	16	263	617	16334	127934	239827

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
TANGUA & RAUAR BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	2-3.3.92	DAS, SMAR	AUG	27-28.8.9	SMAR, AS
MAR	24-25.3.92	SMAR, AZK, AS	SEP	22.9.92	SMAR, PT, AS, IS
APR	22-23.4.92	DAS, SMAR, AS	OCT	27.10.92	SMAR, AS
MAY	23-24.5.92	DAS, SMAR, AS	NOV	3.12.92	SMAR,AZK,ZH,PD,AS
JUN	22.6.92	SMAR, AS	DEC	3.1.93	SMAR, AS, QMH
JUL	21.7.92	AZK, AS, IS	JAN	27.1.93	RT, RA, MH

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	50	27		7							3	1
Great Crested Grebe											36	29
Unidentified Grebe												
Great Cormorant	2	2		1						1		6
Indian Shag												
Little Cormorant	1155	642	650	51	41	2	4	39	299	63	158	1031
Unidentified Cormorant												
Oriental Darter	2	1	2	9								4
Great Bittern												
Yellow Bittern												
Cinnamon Bittern				1	1							
Black Bittern												
Night Heron								16				
Little heron		1		3	2		1			1		
Indian Pond Heron	14	18	10		14	2	9	30	9		25	3
Chinese pond Heron												
Cattle Egret			100		61		91	35	50	4		2
Little Egret	70	277	25									5
Intermediate Egret	18	16	50	34				3	5			9
Great Egret	80	337	110	1					25	1	7	452
Unidentified Egret	50	100		8					15			
Purple Heron			2	1	1					1		1
Grey Heron	21	38	3	3						1	64	74
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck	650		22									
Lesser Whistling Duck	43		430							2400		
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck		11										6
Common Shelduck												
Comb Duck												
Cotten Pygmy Goose	11	33	12	2								
Eurasian Wigeon	33											800
Falcated Teal										3	6	39
Gadwall	9									200	800	1700
Common Teal	6											1150
Mallard									1			31
Spotbill Duck	24	4	14	35			6	82	137	77	14	96
Northern Pintail	130			1						8370	30	13800
Garganey	3930	1190	60					1	1	4110	800	2445
Northern Shoveler	4	30	4							200		10
Red-crested Pochard	75									68	68	875
Common Pochard										500	32	375
Baer's pochard	1											112
Ferruginous Duck	895		1							38	3500	2764
Tufted Duck	2									7000		212
Greater Scaup												1
Mandarin Duck												
Unidentified Ducks		358							53	1050	25088	3000
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock				10								
Moorhen			62		10						60	8
Purple Swamphen	31	14	245	17						15	43	174
Commom Coot	4530	1134	54							6000	1500	12060
Unidentified Rails/Crakes												
Phaesant-tailed Jacana	560	290	33	2				1			56	70
Bronze-winged Jacana		1										
Painted Snipe												
Black-winged Stilt	6	12									6	6
Avocet												
Oriental Pratincola								80				
Small Pratincola												
River Lapwing				8								
Grey-headed Lapwing	13											
Red-wattled Lapwing												
Asiatic Golden Plover	4						2		1			
Grey Plover												
Long-billed Plover												
Little Ringed Plover		7										
Kentish Plover		1										
Mongolian Plover								10				
Greatr Sand Plover												
Black-tailed Godwit		2										
Eurasian Curlew			3									

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank			1									
Marsh Sandpiper												
Greenshank												
Normann's Greenshank												
Green Sandpiper			1									
Wood sandpiper	13	29										
Terek Sandpiper									1			
Common Sandpiper	1								2			
Pintail Snipe	3	15										
Swinhoe's Snipe												
Commom Snipe	11											1
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper												
Spoon-billed Sandpipper												
Broad-billed Sandpipper												
Ruff	321											
Unidentified Waders												
Brown-headed Gull	10	23	150	1							8	390
Black-headed Gull												
Great Blackheaded Gull									11			
Whiskered Tern	115	73	70			1					15	230
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												3
Black-shouldered Kite					1							
Black Kite									30			
Brahminy Kite					3	1	4				2	2
Pallas Fish Eagle	4	13	4						5	7	2	4	4
Grey-headed Fish Eagle					1					1		
Steppe Eagle												
White-rumped Vulture									4			
Crested Serpent Eagle												
Western Marsh Harrier	5											2	4
Eastern Marsh Harrier	1											
Pied Harrier			2						2			
Osprey									1			
Eurasian Kestrel	1							4				
Northern Hobby												
Peregrine Falcon												
Shikra				2								
Longbilled Vulture									1			
TOTAL WATERFOWL	**12904**	**4699**	**2120**	**198**	**135**	**6**	**121**	**355**	**627**	**30336**	**32305**	**41752**

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
BANUAR HAOR

COUNT DATES AND OBSERVERS

MONTH	DATE	DAS, SMAR	MONTH	DATE	OBSERVERS
FEB	2.3.92	SMAR, AZK, AS	AUG	27.8.92	SMAR, AS
MAR	23.3.92	DAS, SMAR, AS	SEP	22.9.92	SMAR, PT, AS, IS
APR	22.4.92	SMAR, AZK	OCT	27.10.92	SMAR, AS
MAY	25.5.92	SMR,AZK,AS,AK,SK,I	NOV	3.12.92	SMAR,AZK,ZH,PD,AS
JUN	23.6.92	SMAR, AS	DEC	3.1.93	SMAR, AS, QMH
JUL	22.7.92	AZK,AS, IS	JAN	27.1.93	PT, RA, MH, AM, AS

Waterfowl Counts, Feb92 to Jan 93, BANUAR HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe			40								1	
Great Crested Grebe											1	
Unidentified Grebe												
Great Cormorant	5										6	
Indian Shag												
Little Cormorant	80	31	110	56					226	24	565	6
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern				4								
Black Bittern												
Night Heron												
Little heron												
Indian Pond Heron		4		4	1				2			
Chinese pond Heron												
Cattle Egret										2		7
Little Egret		5	10									
Intermediate Egret	7	8	5						3			6
Great Egret		130	40	2					4	2	66	17
Unidentified Egret				30								
Purple Heron												
Grey Heron	3		5								1	30
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck												
Lesser Whistling Duck												
Greylag Goose												
Bar-headed Goose												
Unidentified Goose				3								
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose	30	50	52									
Eurasian Wigeon												
Falcated Teal												
Gadwall											27	1600
Common Teal												
Mallard											2	5
Spotbill Duck	4	10							221		51	
Northern Pintail	1											130
Garganey	880	500										
Northern Shoveler		185										
Red-crested Pochard												
Commom Pochard												
Baer's pochard	4											
Ferruginous Duck	65										26	93
Tufted Duck											2	160
Greater Scaup												
Mandarin Duck												
Unidentified Ducks		1000										
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												
Purple Swamphen												
Commom Coot	4											
Unidentified Rails/Crakes												
Pheasant-tailed Jacana	30		20									
Bronze-winged Jacana												
Painted Snipe			1									
Black-winged Stilt	9											
Avocet												
Oriental Pratincole												
Small Pratincole												
River Lapwing												
Grey-headed Lapwing												
Red-wattled Lapwing												
Asiatic Golden Plover												
Grey Plover												
Long-billed Plover												
Little Ringed Plover												
Kentish Plover												
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, BANJAR HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank												
Marsh Sandpipper												
Greenshank												
Normann's Greenshank												
Green Sandpipper												
Wood sandpipper												
Terek Sandpipper												
Common Sandpipper												
Pintail Snipe												
Swinhoe's Snipe												
Commom Snipe												
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper												
Spoon-billed Sandpipper												
Broad-billed Sandpipper												
Ruff	130	12										
Unidentified Waders										100		
Brown-headed Gull												
Black-headed Gull												
Unidentified Gull												
Whiskered Tern				15						30		
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite												
Brahminy Kite											1	
Pallas Fish Eagle	3											
Grey-headed Fish Eagle												
Steppe Eagle	1											
White-rumped Vulture												
Crested Serpent Eagle												
Western Marsh Harrier												
Eastern Marsh Harrier												
Pied Harrier												
Osprey				1		1						
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Unidentified Raptors												
TOTAL WATERFOWL	1256	1935	299	100	1	0	0	0	456	159	748	2054

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
KURI BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	29.2.92	DAS, SMAR	AUG	29.8.92	SMAR, AS
MAR	26.3.92	SMAR, AZK, AS	SEP	25.9.92	SMAR, PT, AS, IS
APR	20.4.92	DAS, SMAR, AS	OCT	30.10.92	SMAR, AS
MAY	26.5.92	SMAR, AZK, AS	NOV	4.12.92	SMAR,AZK,ZH,PD,AS
JUN	20.6.92	SMAR, AS	DEC	6.1.93	AS
JUL	19.7.92	AZK, AS, IS	JAN	25.1.93	AS

Waterfowl Counts, Feb92 to Jan 93, KURI BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe			1									6
Great Crested Grebe												
Unidentified Grebe											1	2
Great Cormorant	11		2									
Indian Shag			7	2					1		5	22
Little Cormorant												
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern												
Black Bittern												
Night Heron									12			
Little heron									2			2
Indian Pond Heron	10	7	7	4	2		5	5				
Chinese pond Heron									5	105	4	
Cattle Egret	22										1	
Little Egret	3	5	4	3			1	5				
Intermediate Egret	21								20		1	5
Great Egret	5	7	1	1								
Unidentified Egret												
Purple Heron												1
Grey Heron	3	1	1					2	2			
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck												
Lesser Whistling Duck												
Greylag Goose												
Bar-headed Goose	4											
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotten Pygmy Goose												
Eurasian Wigeon												
Falcated Teal												
Gadwall	9											
Common Teal	45											
Mallard												
Spotbill Duck									33			
Northern Pintail	3											
Garganey	185	3										
Northern Shoveler												
Red-crested Pochard												
Commom Pochard												
Baer's pochard												
Ferruginous Duck												
Tufted Duck												
Greater Scaup												
Mandarin Duck												
Unidentified Ducks			2									
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												
Purple Swamphen												
Commom Coot												
Unidentified Rails/Crakes												
Pheasant-tailed Jacana												
Bronze-winged Jacana												
Painted Snipe									25	50		
Black-winged Stilt												
Avocet									200			
Oriental Pratincole												
Small Pratincole												
River Lapwing									21			8
Grey-headed Lapwing	10	6										
Red-wattled Lapwing								3	56	10		2
Asiatic Golden Plover				6								
Grey Plover												
Long-billed Plover											3	6
Little Ringed Plover												
Kentish Plover												
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit			1						5			
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, KURI BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank	2											
Redshank												
Marsh Sandpipper												
Greenshank	21								5			
Normann's Greenshank												
Green Sandpipper												
Wood sandpiper	15		5					3		30			2
Terek Sandpipper												
Common Sandpiper	3		3	2					1	2		
Pintail Snipe			2									
Swinhoe's Snipe												
Commom Snipe										4		
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper			3							1		
Spoon-billed Sandpipper												
Broad-billed Sandpippper												
Ruff												
Unidentified Waders												
Brown-headed Gull												
Black-headed Gull												
Unidentified Gull												
Whiskered Tern	2		11	1								
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite									2			1
Brahminy Kite					1	2	1	4	2	1		6
Pallas Fish Eagle	1		1					1				
Grey-headed Fish Eagle				1	1			1				
Steppe Eagle												
White-rumped Vulture			18	8				2				
Crested Serpent Eagle			1									
Western Marsh Harrier												
Eastern Marsh Harrier												
Pied Harrier												2
Osprey			1							1		
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Unidentified Raptors												
TOTAL WATERFOWL	375	87	32	9	4	2	10	26	427	166	15	65

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
DEOCHAPRA BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	29.2.92	DAS, SMAR	AUG	29.8.92	SMAR, AS
MAR	26.3.92	SMAR, AZK, AS	SEP	25.9.92	SMAR, PT, AS, IS
APR	20.4.92	DAS, SMAR, AS	OCT	30.10.92	SMAR, AS
MAY	26.5.92	SMAR, AZK, AS	NOV	4.12.92	SMAR,AZK,ZH,PD,AS
JUN	20.6.92	SMAR, AS	DEC	6.1.93	AS
JUL	19.7.92	AZK, AS, IS	JAN	25.1.93	AS

Waterfowl Counts, Feb92 to Jan 93, DEOCHAPRA BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe												
Great Crested Grebe												
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant	30	18	5							2		2
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern												
Black Bittern												
Night Heron		16										12
Little heron												
Indian Pond Heron	10	15	5			2		3			3	
Chinese pond Heron												
Cattle Egret	1	2							5	16	4	31
Little Egret	2	1							1		1	2
Intermediate Egret	5											
Great Egret	4	1	1						8	8	2	
Unidentified Egret												
Purple Heron												
Grey Heron												
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck	1											
Lesser Whistling Duck	140	150								300	20	30
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotten Pygmy Goose	1											
Eurasian Wigeon												
Falcated Teal												
Gadwall												
Common Teal												
Mallard												
Spotbill Duck												
Northern Pintail												
Gargeney												
Northern Shoveler												
Red-crested Pochard												
Common Pochard												
Baer's pochard												
Ferruginous Duck												
Tufted Duck												
Greater Scaup												
Mandarin Duck												
Unidentified Ducks												
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen				1								
Purple Swamphen												
Commom Coot												
Unidentified Rails/Crakes												
Phaasant-tailed Jacana	10	17	9							1	40	6
Bronze-winged Jacana	25	5	10								14	3 2
Painted Snipe												
Black-winged Stilt												
Avocet												
Oriental Pratincole												
Small Pratincole												
River Lapwing												
Grey-headed Lapwing												
Red-wattled Lapwing												
Asiatic Golden Plover				4						1		
Grey Plover												
Long-billed Plover												
Little Ringed Plover												
Kentish Plover												
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, DEOCHAPRA BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank												
Marsh Sandpipper												
Greenshank												
Normann's Greenshank												
Green Sandpipper												
Wood sandpipper	2		2	16					3	5	10	12
Terek Sandpipper												
Common Sandpipper												
Pintail Snipe												
Swinhoe's Snipe												
Commom Snipe	15										3	2
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper												
Spoon-billed Sandpipper												
Broad-billed Sandpippper												
Ruff												
Unidentified Waders												
Brown-headed Gull												
Black-headed Gull												
Unidentified Gull												
Whiskered Tern	1			4								
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite										1		
Black Kite						2	2		1	1	2	6
Brahminy Kite				1								
Pallas Fish Eagle												
Grey-headed Fish Eagle	1											
Steppe Eagle												
White-rumped Vulture												
Crested Serpent Eagle												
Western Marsh Harrier	1											
Eastern Marsh Harrier												
Pied Harrier			1									
Osprey												
Eurasian Kestral												
Northern Hobby												
Peregrine Falcon												
Unidentified Raptors												
TOTAL WATERFOWL	249	228	56	0	2	4	0	7	25	393	35	103

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
ERALI BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	6.3.92	DAS, SMAR	AUG	29.8.92	SMAR, AS
MAR	27.3.92	SMAR, AZK, AS	SEP	28.9.92	SMAR, AS IS
APR	27.4.92	DAS, SMAR, AS	OCT	31.10.92	SMAR, AS
MAY	27.5.92	SMAR, AZK, AS	NOV	25.11.92	SMAR, AS
JUN	27.6.92	SMAR, AS	DEC	31.12.92	SMAR, AS
JUL	25.7.92	AZK, AS, IS	JAN	29.1.93	SMAR

Waterfowl Counts, Feb92 to Jan 93, ERALI BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe												
Great Crested Grebe												
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant		1		1								
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern							1					
Black Bittern												
Night Heron			1									
Little heron												
Indian Pond Heron		2	5				4		1	1		4
Chinese pond Heron												
Cattle Egret			4									
Little Egret												
Intermediate Egret										1		
Great Egret										3		
Unidentified Egret												
Purple Heron												
Grey Heron												
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck												
Lesser Whistling Duck			7	60								
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose												
Eurasian Wigeon												
Falcated Teal												
Gadwall												
Common Teal												
Mallard												
Spotbill Duck												
Northern Pintail												29
Garganey									11			
Northern Shoveler												
Red-crested Pochard												
Commom Pochard												
Baer's pochard												
Ferruginous Duck												
Tufted Duck												
Greater Scaup												
Mandarin Duck												
Unidentified Ducks												
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												
Purple Swamphen												
Commom Coot												
Unidentified Rails/Crakes												
Pheasant-tailed Jacana												
Bronze-winged Jacana												
Painted Snipe												
Black-winged Stilt												
Avocet												
Oriental Pratincole												
Small Pratincole												
River Lapwing												
Grey-headed Lapwing												
Red-wattled Lapwing												
Asiatic Golden Plover												
Grey Plover												
Long-billed Plover												
Little Ringed Plover												
Kentish Plover												
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, ERALI BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank												
Marsh Sandpiper												
Greenshank									1			
Normann's Greenshank												
Green Sandpipper									1	1	1	2
Wood sandpipper			1						4	2		
Terek Sandpipper												
Common Sandpipper	1			1					2	1	1	1
Pintail Snipe	2		1									
Swinhoe's Snipe												
Commom Snipe												
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper												
Spoon-billed Sandpiper												
Broad-billed Sandpiper												
Ruff												
Unidentified Waders												
Brown-headed Gull									6			
Black-headed Gull												
Unidentified Gull												
Whiskered Tern												
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite								1	1			
Brahminy Kite						2	1	1	2	2	1	2
Palles Fish Eagle												
Grey-headed Fish Eagle												
Steppe Eagle												
White-rumped Vulture		1										
Crested Serpent Eagle	2											
Western Marsh Harrier												
Eastern Marsh Harrier										1		
Pied Harrier	1	2										1
Osprey												
Hen Harrier												1
Northern Hobby												
Peregrine Falcon												
Unidentified Raptors									1			
TOTAL WATERFOWL	**9**	**22**	**62**	**0**	**0**	**7**	**1**	**3**	**34**	**7**	**7**	**36**

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
BALAI HAOR

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	6.3.92	DAS, SMAR	AUG	29.8.92	SMAR, AS
MAR	27.3.92	SMAR, AZK, AS	SEP	26.9.92	SMAR, AS, IS
APR	27.4.92	DAS, SMAR, AS	OCT	31.10.92	SMAR, AS
MAY	27.3.92	SMAR, AZK, AS	NOV	25.11.92	SMAR, AS
JUN	27.6.92	SMAR, AS	DEC	31.12.92	SMAR, AS
JUL	25.7.92	AZK, AS, IS	JAN	29.1.93	SMAR

Waterfowl Counts, Feb92 to Jan 93, BALAI HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	6	1	8					1				
Great Creasted Grebe												
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant	39	3	78	16	10	11	9	27	33	22	155	238
Unidentified Cormorant												
Oriental Darter												1
Great Bittern	1											
Yellow Bittern			1		1		2					
Cinnamon Bittern			1									
Black Bittern												
Night Heron												
Little heron				1								
Indian Pond Heron	66	23	7	3	4	2	9	13	13	16	16	54
Chinese pond Heron		1										
Cattle Egret	8		154	6	4		15	25	230	53	40	21
Little Egret	20	3	20	16	10	6		8	3		22	14
Intermediate Egret	3		118	10				2				5
Great Egret	3	2	35	12	40			92	78	4	17	3
Unidentified Egret				44				13	200			
Purple Heron	1		1							1	1	
Grey Heron	5		5		9					8	46	21
Asian Openbill	1		13	12	30							67
Lesser Adjudant	2											
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck		5000	36						9	20		2
Lesser Whistling Duck		15000	152	2	42	8	22	69	27	200		200
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck		1	1									
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose	3	6	20	10		4	4	18		8		
Eurasian Wigeon			3									
Falcated Teal												
Gadwall		7								8		
Common Teal	2										2	230
Mallard												
Spotbill Duck												
Northern Pintail	48	7000								31		706
Garganey		5000	50		1					1	100	400
Northern Shoveler	23	3	20									21
Red-crested Pochard												
Common Pochard												
Baer's pochard												
Ferruginous Duck	4									11		
Tufted Duck												
Greater Scaup												
Mandarin Duck												
Unidentified Ducks		200						3		80		
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen				1								
Watercock	2							1	5	2		
Moorhen			12					6				
Purple Swamphen										1		
Commom Coot												
Unidentified Rails/Crakes												
Pheasant-tailed Jacana	3		11		1			6	3	4	7	9
Bronze-winged Jacana			1		2	4	2	4	9	8	5	5
Painted Snipe												
Black-winged Stilt		9	2									
Avocet												
Oriental Pratincole								47	2		11	
Small Pratincole												
River Lapwing												
Grey-headed Lapwing	49								3	34	4	19
Red-wattled Lapwing												
Asiatic Golden Plover	180	59	345								52	57
Grey Plover		2										
Long-billed Plover												
Little Ringed Plover	6										7	1
Kentish Plover												
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, BALAI HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank	2											
Redshank	2											
Marsh Sandpipper	1											
Greenshank	17										13	
Normann's Greenshank												
Green Sandpipper		5							1			2
Wood sandpipper	24	103	50						8	5	12	26	25
Terek Sandpipper												
Common Sandpipper		2										
Pintail Snipe			5									
Swinhoe's Snipe												
Commom Snipe	28		15						3		4	5	3
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Dunlin												
Curlew Sandpipper		3										
Spoon-billed Sandpipper												
Broad-billed Sandpippar												
Ruff	2	250	1									
Unidentified Waders									50			
Brown-headed Gull												
Black-headed Gull												
Unidentified Gull												
Whiskered Tern												
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite									2	4	2	7	2
Brahminy Kite						2	1		2	8	1	5	3
Pallas Fish Eagle	1												
Grey-headed Fish Eagle		1	1			1	1		1				
Steppe Eagle													
White-rumped Vulture										4			4
Crested Serpent Eagle		1	2			1						1	
Western Marsh Harrier	2	1									2		7
Eastern Marsh Harrier	1	1											
Pied Harrier	2	3	2								2	2	2
Osprey													1
Eurasian Kestrel													
Northern Hobby													
Peregrine Falcon													
Unidentified Raptors										3			
TOTAL WATERFOWL	557	32690	1170	132	159	37	63	402	639	535	544	2133

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
CHALNIA & DEODAR BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	20.2/5.3.92	DAS, SMAR, AZK	AUG	24.8.92	SMAR
MAR	26.3.92	SMAR, AZK, AS	SEP	27.9.92	SMAR, AS, IS
APR	26.4.92	DAS, SMAR, AS	OCT	30.10.92	SMAR, AS
MAY	28.5.92	SMAR, AZK, AS	NOV	26.11.92	SMAR
JUN	28.6.92	SMAR, AS	DEC	6.1.93	AS
JUL	24.7.92	AZK, AS, IS	JAN	30.1.93	SMAR, AS

Waterfowl Counts, Feb92 to Jan 93, CHALNIA & DEODAR BEELS

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	17											3
Great Crested Grebe	5											
Unidentified Grebe												
Great Cormorant			1									
Indian Shag												
Little Cormorant						14				19	12	27
Unidentified Cormorant	5	55	96									
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern							1					
Black Bittern												
Night Heron												
Little heron							1					
Indian Pond Heron	3	48	1			2	3		2	8		2
Chinese pond Heron												
Cattle Egret		3								8	46	8
Little Egret										4	10	6
Intermediate Egret	3	1										12
Great Egret	10	1	1							36	3	4
Unidentified Egret		15		1								150
Purple Heron												
Grey Heron		5										
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck	60	85										
Lesser Whistling Duck	455	25										
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck		2										
Common Shelduck												
Comb Duck												
Cotten Pygmy Goose		25										40
Eurasian Wigeon			6									
Falcated Teal												
Gadwall	41											
Common Teal										8		
Mallard												
Spotbill Duck												
Northern Pintail	30									45		
Garganey	4	25										
Northern Shoveler	11											
Red-crested Pochard												
Common Pochard	30											
Baer's pochard												
Ferruginous Duck	15											
Tufted Duck	1200	9										
Greater Scaup												
Mandarin Duck												
Unidentified Ducks									116			210
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												
Purple Swamphen												
Commom Coot	2											
Unidentified Rails/Crakes												
Pheasant-tailed Jacana	5	34										11
Bronze-winged Jacana	1											
Painted Snipe												
Black-winged Stilt												
Avocet												
Oriental Pratincole								5	50			
Small Pratincole												
River Lapwing												
Grey-headed Lapwing									3			
Red-wattled Lapwing												
Asiatic Golden Plover		1	11				17			1	6	
Grey Plover												
Long-billed Plover												
Little Ringed Plover	2									20	6	57
Kentish Plover												
Mongolian Plover									1		8	
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, CHALNIA & DEODAR BEELS

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank		1										
Marsh Sandpipper												
Greenshank												
Normann's Greenshank												
Green Sandpipper												
Wood sandpipper	4	7						3	21	50		85
Terek Sandpipper												
Common Sandpipper										1	2	
Pintail Snipe												
Swinhoe's Snipe												
Commom Snipe									1		3	
Asiatic Dowitcher												
Little Stint												
Temminck's Stint												24
Dunlin												
Curlew Sandpipper											1	
Spoon-billed Sandpiper												
Broad-billed Sandpiper												
Ruff											4	
Unidentified Waders										14		
Brown-headed Gull			2						8			
Black-headed Gull												
Unidentified Gull												
Whiskered Tern				7				2	27		3	1
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern								2				
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite								8	4	3		4
Brahminy Kite					5	1	5		5	1		2
Pallas Fish Eagle	2		1									
Grey-headed Fish Eagle			1	1								
Steppe Eagle												
White-rumped Vulture												
Crested Serpent Eagle												
Western Marsh Harrier		1										
Eastern Marsh Harrier												
Pied Harrier	1	1										1
Osprey	1											
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Unidentified Raptors												
TOTAL WATERFOWL	**1907**	**345**	**119**	**9**	**21**	**6**	**22**	**22**	**292**	**221**	**65**	**661**

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
HAOR KHAL & KAIR GANG

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	7.3.92	DAS, SMAR, AS	AUG	25.8.92	SMAR
MAR	28.3.92	SMAR, AZK, AS	SEP	27.9.92	SMAR, AS, IS
APR	25.4.92	DAS, SMAR, AS	OCT	1.11.92	SMAR, AS, MR, SR
MAY	28.5.92	SMAR, AZK, AS	NOV	26.11.92	SMAR, AS
JUN	28.6.92	SMAR, AS	DEC	29.12.92	SMAR, AS, QMH
JUL	24.7.92	AZK, AS, IS	JAN	30.1.93	SMAR, AS

Waterfowl Counts, Feb92 to Jan 93, HAOR KHAL AND KHAIRGANG

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe												
Great Creasted Grebe										65	30	28
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant												7
Unidentified Cormorant												
Oriental Darter												
Great Bittern												1
Yellow Bittern												
Cinnamon Bittern												
Black Bittern												
Night Heron									7			
Little Heron			1								4	2
Indian Pond Heron			2		1	4			7	1	2	12
Chinese pond Heron												
Cattle Egret										1	4	66
Little Egret	3		12						4	9		
Intermediate Egret	3		12							2		
Great Egret		8	1	1					24	16	12	18
Unidentified Egret												
Purple Heron										1		
Grey Heron	51	14	2							3		5
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck		2000	12							500	4000	1000
Lesser Whistling Duck	300	5000							40	5000	10000	12000
Greylag Goose												
Bar-headed Goose										5		
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose												
Eurasian Wigeon	2											50
Falcated Teal												
Gadwall			2							300	800	6000
Common Teal	7										200	200
Mallard												
Spotbill Duck												
Northern Pintail	5050		14						32	3212	2500	36500
Garganey	75	277	120							3300	2000	1000
Northern Shoveler	425	50	6						150	2100	6000	3000
Red-crested Pochard											300	
Common Pochard									5			100
Baer's pochard									2			300
Ferruginous Duck									50	300		1000
Tufted Duck			6						200	2		800
Greater Scaup												
Mandarin Duck												
Unidentified Ducks									600			220
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												
Purple Swamphen												
Commom Coot										200	1575	
Unidentified Rails/Crakes												
Pheasant-tailed Jacana												
Bronze-winged Jacana												
Painted Snipe												
Black-winged Stilt	10	7	16						33	537		
Avocet	4											
Oriental Pratincole												
Small Pratincole	2											
River Lapwing												
Grey-headed Lapwing	60	15	1						4	45	276	83
Red-wattled Lapwing												
Asiatic Golden Plover	230		7						38	38	69	385
Grey Plover	3											
Long-billed Plover												
Little Ringed Plover	175									3	28	525
Kentish Plover	650										18	
Mongolian Plover	7											28
Greatr Sand Plover												
Black-tailed Godwit	1		13									
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, HAOR KHAL AND KHAIRGANG

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank	31		1									
Redshank			5						2			
Marsh Sandpipper	145											
Greenshank	12		2							1		55
Normann's Greenshank												
Green Sandpipper										10		
Wood sandpipper	120	103	24							25	36	116
Terek Sandpipper												
Common Sandpipper	1	1	1					3	1	3	7	8
Pintail Snipe	2	5										
Swinhoe's Snipe												
Commom Snipe	155		9							1	6	15
Sanderling												1
Little Stint	550											9
Long-toed Stint	2											79
Temminck's Stint	25											
Curlew Sandpipper	20		1									3
Spoon-billed Sandpipper												
Broad-billed Sandpippe	1											4
Ruff	30		50									1
Unidentified Waders									11	450		112
Brown-headed Gull	60	57	45						122	15	86	59
Black-headed Gull		5	1									
Great Blackheaded Gull									2			
Whiskered Tern	30	80	190	3			3	7	60		5	
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite									7		5	6
Brahminy Kite						4	1	2	9		3	3
Pallas Fish Eagle		1										
Grey-headed Fish Eagle												
Steppe Eagle	1	1										
White-rumped Vulture		4	5	35	4							
Crested Serpent Eagle												
Western Marsh Harrier	1									1		
Eastern Marsh Harrier												
Pied Harrier		1								3	2	2
Osprey												
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Long-billed Vulture		1										
TOTAL WATERFOWL	8244	7633	558	40	12	1	5	10	1410	16149	27968	63803

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
CHATLA & PINGLA BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	19.2.92	DAS,AZK	AUG	25.8.92	SMAR
MAR	30.3.92	SMAR, AZK, AS	SEP	27.9.92	SMAR, AS, IS
APR	30.4.92	DAS, SMAR, AS	OCT	1.11.92	SMAR, AS, MR, SR
MAY	31.5.92	SMAR, AZK, AS	NOV	2.12.92	SMAR, AS
JUN	28.6.92	SMAR, AS	DEC	1.1.93	SMAR, AS
JUL	27.7.92	AZK, AS, IS	JAN	1.2.93	SMAR, AS

Waterfowl Counts, Feb92 to Jan 93, CHATLA & PINGLA BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	13										85	98
Great Crested Grebe	55	1							2	55	67	47
Unidentified Grebe												
Great Cormorant									7	6		
Indian Shag												
Little Cormorant	160	31	4	8		2			112	225	85	126
Unidentified Cormorant												
Oriental Darter									1			
Great Bittern												
Yellow Bittern												
Cinnamon Bittern												
Black Bittern												
Night Heron												
Little heron												
Indian Pond Heron			3	1	3					30		14
Chinese pond Heron												
Cattle Egret				23								50
Little Egret		10		13								
Intermediate Egret	23			5								
Great Egret	15	38	10	4					4			320
Unidentified Egret												
Purple Heron			1								1	3
Grey Heron		12	2						2	1	2	
Asian Openbill				60								84
Lesser Adjutant				1								
Black-headed Ibis												
White Spoonbill											3	
Fulvous Whistling Duck	500	2512	550									
Lesser Whistling Duck	6000	1000	550							250		
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck			7	3								
Comb Duck												
Cotton Pygmy Goose												4
Eurasian Wigeon	1											10
Falcated Teal												3
Gadwall	30									1500	800	2196
Common Teal	4										50	200
Mallard												
Spotbill Duck												
Northern Pintail	5000	15	20							1145	1100	6825
Garganey	500	800	450								4	1050
Northern Shoveler	5004	1000	50								130	300
Red-created Pochard											1	
Commom Pochard	80										70	230
Baer's pochard	5											700
Ferruginous Duck	2											
Tufted Duck	250	200	14							100	200	
Greater Scaup										1000	2179	1522
Mandarin Duck												1
Unidentified Ducks												
Water Rail											100	
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												1
Purple Swamphen												
Commom Coot	200	54	1							130	890	851
Unidentified Rails/Crakes												
Pheasant-tailed Jacana	3	8	4									33
Bronze-winged Jacana		1	1									
Painted Snipe												
Black-winged Stilt	1		14							351	18	15
Avocet												
Oriental Pratincole												
Small Pratincole												
River Lapwing												
Grey-headed Lapwing	10									40	7	8
Red-wattled Lapwing											1	
Asiatic Golden Plover	5											
Grey Plover												
Long-billed Plover												
Little Ringed Plover	1	10									4	
Kentish Plover										1		
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, CHATLA & PINGLA BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank			13									
Redshank												
Marsh Sandpipper	1									21		
Greenshank										1	5	20
Spotted Greenshank										25		
Green Sandpipper										3		
Wood sandpiper	20	9							4	15	22	210
Terek Sandpiper												
Common Sandpiper		1										
Pintail Snipe	2											
Swinhoe's Snipe												
Commom Snipe	2									3	2	64
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Temminck's Stint	3		3									
Curlew Sandpiper										20		
Spoon-billed Sandpiper												
Broad-billed Sandpiper												
Ruff										20		66
Unidentified Waders		10								200	50	350
Brown-headed Gull	1		8						139	39	90	22
Black-headed Gull												
Unidentified Gull												
Whiskered Tern		8	172	73	6		5	205	55	25		
White-winged Tern			1									
Gull-billed Tern												
Indian river Tern												
Commom Tern								1				
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite									2	99		4
Brahminy Kite							50	3	1	3	9	2
Pallas Fish Eagle	1	1	1								4	2
Grey-headed Fish Eagle												
Steppe Eagle												
White-rumped Vulture			22	59								28
Crested Serpent Eagle												
Western Marsh Harrier	2	1										2
Eastern Marsh Harrier	2		1								1	1
Pied Harrier	1	1									1	8
Osprey												
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Lesser Spotted Eagle	2											
Long-billed Vulture				2								
TOTAL WATERFOWL	**17899**	**5733**	**1896**	**251**	**6**	**52**	**8**	**207**	**331**	**5315**	**5971**	**15470**

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
PATACHATAL & BORACHATAL BEEL

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	8.3.92	DAS, SMAR, AS	AUG	30.8.92	SMAR, AS
MAR	29.3/1.4.92	SMAR, AZK, AS	SEP	28.9.92	SMAR, AS, IS
APR	28.4.92	DAS, SMAR, AS	OCT	25.10.92	SMAR, AS
MAY	29.5.92	SMAR, AZK, AS	NOV	5.12.92	AS
JUN	29.6.92	SMAR, AS	DEC	30.12.92	SMAR, AS, QMH
JUL	26.7.92	AZK, AS, IS	JAN	24.1.93	AS

Waterfowl Counts, Feb92 to Jan 93, PATACHATAL & BORACHATAL BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	8											
Great Creasted Grebe										2		16
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant			2	6		1						
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern												
Black Bittern												
Night Heron			7									
Little heron					1		1					
Indian Pond Heron	3			4	3	1	8	2		5	24	2
Chinese pond Heron												
Cattle Egret			1								78	
Little Egret						1					34	
Intermediate Egret				1								
Great Egret			8							2	13	
Unidentified Egret					4					2		
Purple Heron												
Grey Heron			4	1							5	
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck	10	35										
Lesser Whistling Duck	240	906			2						220	
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose												
Eurasian Wigeon	1		6									
Falcated Teal												
Gadwall												
Common Teal												
Mallard												
Spotbill Duck												
Northern Pintail	570		5									
Garganey	1150	200	150									
Northern Shoveler	1850		1									11
Red-created Pochard												
Commom Pochard												
Baer's pochard												
Ferruginous Duck												
Tufted Duck	360	90										
Greater Scaup												
Mandarin Duck												
Unidentified Ducks		100										
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock												
Moorhen												
Purple Swamphen												
Commom Coot												
Unidentified Rails/Crakes												
Pheasant-tailed Jacana			13									
Bronze-winged Jacana												
Painted Snipe												
Black-winged Stilt										90		
Avocet												
Oriental Pratincole												
Small Pratincole												
River Lapwing												
Grey-headed Lapwing												
Red-wattled Lapwing												
Asiatic Golden Plover	16	2	47							37		5
Grey Plover												
Long-billed Plover												
Little Ringed Plover	19										1	
Kentish Plover												
Mongolian Plover												
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, PATACHATAL & BORACHATAL BEEL

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank										19		
Marsh Sandpipper										46		
Greenshank			1									
Normann's Greenshank												
Green Sandpipper												
Wood sandpipper	2	3	1					1		61	3	2
Terek Sandpipper												
Common Sandpiper	2											
Pintail Snipe												
Swinhoe's Snipe	1											
Commom Snipe	2									26	1	
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Temminck's Stint	1		2									
Curlew Sandpiper										6		
Spoon-billed Sandpipper												
Broad-billed Sandpipper												
Ruff										61		
Unidentified Waders		25					5					
Brown-headed Gull	3										6	29
Black-headed Gull												
Unidentified Gull												
Whiskered Tern	14	5	11					2				
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern												
Black-billed Tern												
Little Tern	1		2									
Unidentified Tern												
Black-shouldered Kite												
Black Kite										3	30	
Brahminy Kite					6	2	1		1	6		
Pallas Fish Eagle												
Grey-headed Fish Eagle												
Steppe Eagle	1											
White-rumped Vulture		200			33							
Crested Serpent Eagle	1											
Western Marsh Harrier	1	1										
Eastern Marsh Harrier												
Pied Harrier	1		1									
Osprey	1	1										
Eurasian Kestrel												
Northern Hobby												
Peregrine Falcon												
Longbilled Vulture					6							
TOTAL WATERFOWL	4258	1593	249	10	48	11	9	2	10	731	41	65

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
KAWADIGHI HAOR

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	22.2/8.3.92	DAS, SMAR, AZK	AUG	22.8.92	SMAR, AS
MAR	29.3.92	SMAR, AZK, AS	SEP	30.9.92	SMAR, AS, IS
APR	29.4/3.5.92	DAS, SMAR, AS	OCT	21.10.92	SMAR, SLB, AS
MAY	30.5.92	SMAR, AZK, AS	NOV	30.11.92	SMAR, AS
JUN	30.6.92	SMAR, AS	DEC	5.1.93	SMAR, AS
JUL	28.7.92	AZK, AS, IS	JAN	31.1.93	SMAR, AS

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	14		5									412
Great Crested Grebe												
Unidentified Grebe												
Great Cormorant											1	
Indian Shag												
Little Cormorant			40						4			17
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern					1							
Cinnamon Bittern				4	2							
Black Bittern												
Night Heron												
Little Heron					1							
Indian Pond Heron	340	21	22	7	20	14	13	25	37	33	245	221
Chinese pond Heron												
Cattle Egret		50	256	4			3			126		419
Little Egret	430		229	47						4		7
Intermediate Egret	175		125	162					20	4		1
Great Egret	800	128	355	269					28	15	165	87
Unidentified Egret									600		1045	1000
Purple Heron												
Grey Heron	145	42	36	3				1		1		
Asian Openbill												
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck	9	2000							89	667		2
Lesser Whistling Duck	50	300		2		1		91	182	1692		9
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck	4		1									
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose	8	23		13	3	5	2			15		11
Eurasian Wigeon		15										
Falcated Teal												
Gadwall										2		
Common Teal												39
Mallard												
Spotbill Duck												
Northern Pintail	2825		3						61	457		388
Garganey	1430	5000	14						396	1250		16
Northern Shoveler	750	2000	12							3		
Red-crested Pochard												
Common Pochard												
Baer's pochard												
Ferruginous Duck		12								7		11
Tufted Duck		8										1
Greater Scaup												
Mandarin Duck												
Unidentified Ducks									279	1700	12	7066
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock				6	4	4	2		2	2		
Moorhen										1		
Purple Swamphen										14		
Common Coot	17											
Unidentified Rails/Crakes					2							
Pheasant-tailed Jacana	300	114	102	70	18	6	8	7	35	97	220	816
Bronze-winged Jacana	1			5								
Painted Snipe												
Black-winged Stilt	280	169	255							7		200
Avocet												
Oriental Pratincole												
Small Pratincole												
River Lapwing												
Grey-headed Lapwing	215	81	15						2	15	249	48
Red-wattled Lapwing										9		8
Asiatic Golden Plover	12	7	10				5		4			309
Grey Plover												
Long-billed Plover												
Little Ringed Plover	17	2									1	18
Kentish Plover	40	1										
Mongolian Plover	5											
Great Sand Plover												
Black-tailed Godwit	165		31								18	
Eurasian Curlew												

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank	30											
Redshank	1		4									
Marsh Sandpiper	100		6									
Greenshank	20		2									
Normann's Greenshank												
Green Sandpiper												
Wood sandpiper	55	59	20						7	12	353	228
Terek Sandpiper												
Common Sandpiper	1	1					4				1	1
Pintail Snipe		3										
Swinhoe's Snipe												
Commom Snipe	12										8	19	250
Asiatic Dowitcher												
Little Stint	100		4									1
Dunlin	1											
Temminck's Stint	15											
Curlew Sandpiper	2		3								55	1
Spoon-billed Sandpipper												
Broad-billed Sandpiper												3
Ruff	150	8									440	
Unidentified Waders	200										5	300	500
Brown-headed Gull	12		8									403
Black-headed Gull										2		
Unidentified Gull										36		
Whiskered Tern	465	159	38	35	56	53	47	1	20		809	523
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern			3	1				3	2			
Black-billed Tern												
Little Tern												
Unidentified Tern								3				
Black-shouldered Kite												
Black Kite									3	2	13	133
Brahminy Kite					2	3	2	6	8		1	7
Pallas Fish Eagle	1	2										1
Grey-headed Fish Eagle												
Steppe Eagle	1											
White-rumped Vulture	3		80	10			33					20
Crested Serpent Eagle									1			1
Western Marsh Harrier	1		1								3	2	
Eastern Marsh Harrier	1											
Pied Harrier									1	1	4	2	
Osprey												
Eurasian Kestrel												
Northern Hobby				1								
Peregrine Falcon												
Unidentified Raptors				1	1							
TOTAL WATERFOWL	9203	10205	1680	640	110	123	82	139	1818	6155	3951	13178

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
HAIL HAOR

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	21.2/23.2.9	DAS, AZK	AUG	23.8.92	SMAR, AS
MAR	31.3.92	SMAR, AZK,AS	SEP	29.9.92	SMAR, AS, IS
APR	2.5.92	DAS, SMAR,AS	OCT	22.10.92	SMAR, SLB, AS
MAY	1.6.92	SMAR, AZK, IS	NOV	1.12.92	SMAR, AS
JUN	1.7.92	SMAR, AS	DEC	4.1.93	SMAR, AS
JUL	29.7.92	AZK, AS, IS	JAN	2.2.93	SMAR, AS

Waterfowl Counts, Feb92 to Jan 93, HAIL HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	2		7		2		1				1	1
Great Crested Grebe												
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant					1					3	1	
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern			2	4	1	1						
Cinnamon Bittern			2	2	1	2	1					
Black Bittern												
Night Heron												
Little heron												
Indian Pond Heron	55	95	68	18	6	8	24	153	28	79	229	315
Chinese pond Heron			1									
Cattle Egret	5	3	10	13	87	191	204	3	14	119	255	695
Little Egret	7	25	61	2				4	2	8	24	14
Intermediate Egret	50		140	8						1		79
Great Egret	15	2	154	4					13	11	173	395
Unidentified Egret				91				600	300		78	
Purple Heron	4	3	3									1
Grey Heron	135		10									86
Asian Openbill		4								201		162
Lesser Adjudant												
Black-headed Ibis												
White Spoonbill												
Fulvous Whistling Duck												
Lesser Whistling Duck			51		3			8	50	2200		
Greylag Goose												
Bar-headed Goose												
Unidentified Goose												
Ruddy Shelduck												
Common Shelduck												
Comb Duck												
Cotton Pygmy Goose			14	6	2	6	2			14		
Eurasian Wigeon												
Falcated Teal												
Gadwall												
Common Teal												
Mallard												
Spotbill Duck												
Northern Pintail										90		
Garganey	140									60		
Northern Shoveler												
Red-crested Pochard												
Common Pochard												
Baer's pochard												
Ferruginous Duck												
Tufted Duck												
Greater Scaup												
Mandarin Duck												
Unidentified Ducks										70		
Water Rail												
Slaty-breasted Rail												
Ruddy Crake												
White-breasted Waterhen												
Watercock		2	6	5	1	2				2		
Moorhen	7		10		1							
Purple Swamphen	1		5	7								
Common Coot												
Unidentified Rails/Crakes												
Pheasant-tailed Jacana	4		53	16	10	5	5			105	26	9
Bronze-winged Jacana	3	1	11		3							
Painted Snipe			2									
Black-winged Stilt	1	10								18	2	64
Avocet												
Oriental Pratincole									80			97
Small Pratincole												
River Lapwing												
Grey-headed Lapwing	61	14	8						18	53	34	63
Red-wattled Lapwing				1	6							
Asiatic Golden Plover	40	7	88					64	16	5	3	40
Grey Plover												
Long-billed Plover												
Little Ringed Plover	6										11	23
Kentish Plover												
Mongolian Plover								5				
Greatr Sand Plover												
Black-tailed Godwit												
Eurasian Curlew												

Waterfowl Counts, Feb92 to Jan 93, HAIL HAOR

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank												
Redshank			2								3	
Marsh Sandpipper										15	2	6
Greenshank											1	
Normann's Greenshank												
Green Sandpipper		1										
Wood sandpiper	45	38	1					8	103	78	77	66	962
Terek Sandpiper												
Common Sandpiper							1			1		
Pintail Snipe	14	12							1			
Swinhoe's Snipe	2											
Commom Snipe	55								26	4	18	9	245
Asiatic Dowitcher												
Little Stint												
Long-toed Stint												
Temminck's Stint	15											
Curlew Sandpipper											3		3
Spoon-billed Sandpipper												
Broad-billed Sandpipper												
Ruff	62										117		1286
Unidentified Waders											35		1
Brown-headed Gull				8								
Black-headed Gull												
Unidentified Gull												
Whiskered Tern				203					1	100	69		15
White-winged Tern												
Gull-billed Tern												
Indian river Tern												
Commom Tern									1			
Black-billed Tern												
Little Tern												
Unidentified Tern												
Black-shouldered Kite												
Black Kite									12	4	1	12	156
Brahminy Kite						3	3	2	4	15	4	2	8
Pallas Fish Eagle			2										1
Grey-headed Fish Eagle	1						1						
Steppe Eagle	1	1									2		2
White-rumped Vulture	29		10				4	4					
Crested Serpent Eagle										1		1	1
Western Marsh Harrier	5									1	5		6
Eastern Marsh Harrier	1												
Pied Harrier	3	2	1						7	2	4	4	1
Osprey													
Eurasian Kestrel													
Northern Hobby			1										
Shikra								1					
Greater Spotted Eagle	1												
TOTAL WATERFOWL	770	222	932	177	127	224	252	992	726	3390	937	4736

NORTHEAST REGIONAL PROJECT-BANGLADESH
MONTHLY WATERFOWL COUNTS
FEBRUARY 1992 TO JANUARY 1993
HAIL HAOR FISH POND

COUNT DATES AND OBSERVERS

MONTH	DATE	OBSERVERS	MONTH	DATE	OBSERVERS
FEB	18.2.92	DAS, AZK	AUG	22.8.92	SMAR, AS
MAR	31.3.92	SMAR, AZK, AS	SEP	30.9.92	SMAR, AS
APR	29.4.92	DAS, SMAR, AS	OCT	24.10.92	SMAR, AS
MAY	30.5.92	SMAR, AKZ, AS	NOV	1.12.92	SMAR, AS
JUN	29.6.92	SMAR, AS	DEC	4.1.93	SMAR, AS
JUL	26.7.92	AZK, AS, IS	JAN	2.2.93	SMAR, AS

Waterfowl Counts, Feb92 to Jan 93, HAIL HAOR FISH POND

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Little Grebe	1		2	3		2						2
Great Crested Grebe												
Unidentified Grebe												
Great Cormorant												
Indian Shag												
Little Cormorant									1			
Unidentified Cormorant												
Oriental Darter												
Great Bittern												
Yellow Bittern												
Cinnamon Bittern				2				4	1			
Black Bittern												
Night Heron									1			
Little heron												
Indian Pond Heron	50		11	6		1	3	7	47	16	22	78	32
Chinese pond Heron													
Cattle Egret	1					2		24	1188	30		114	
Little Egret	10			4					4	15	4	7	13
Intermediate Egret										16	4		
Great Egret	40								60	12	1	32	1
Unidentified Egret										500			
Purple Heron													
Grey Heron										1			
Asian Openbill										1		32	12
Lesser Adjudant													
Black-headed Ibis													
White Spoonbill													
Fulvous Whistling Duck													
Lesser Whistling Duck	200		178	2		2		2	26	25			261
Greylag Goose													
Bar-headed Goose													
Unidentified Goose													
Ruddy Shelduck													
Common Shelduck													
Comb Duck													
Cotton Pygmy Goose						2							
Eurasian Wigeon													
Falcated Teal													
Gadwall	3												
Common Teal	3												
Mallard													
Spotbill Duck													
Northern Pintail													
Garganey	550		16										60
Northern Shoveler													
Red-crested Pochard													
Common Pochard													
Baer's pochard										2			
Ferruginous Duck													
Tufted Duck													
Greater Scaup													
Mandarin Duck													
Unidentified Ducks													
Water Rail													
Slaty-breasted Rail													
Ruddy Crake													
White-breasted Waterhen													
Watercock				1									
Moorhen	3												4
Purple Swamphen													
Commom Coot													
Unidentified Rails/Crakes													1
Pheasant-tailed Jacana													
Bronze-winged Jacana												2	3
Painted Snipe													
Black-winged Stilt										13	11	18	
Avocet													
Oriental Pratincole										5			
Small Pratincole													
River Lapwing													
Grey-headed Lapwing											11	16	41
Red-wattled Lapwing					6							4	2
Asiatic Golden Plover	20			1									
Grey Plover								2					
Long-billed Plover													
Little Ringed Plover										4			
Kentish Plover													
Mongolian Plover											1		
Great Sand Plover													
Black-tailed Godwit													
Bar-Tailed Godwit													2

Waterfowl Counts, Feb92 to Jan 93, HAIL HAOR FISH POND

SPECIES	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Spotted Redshank										4		
Redshank										2		
Marsh Sandpipper										2	2	
Greenshank											1	
Normann's Greenshank												
Green Sandpipper	1	1							1	1		
Wood sandpiper	2	35						1	32	206	68	114	90
Terek Sandpipper													
Common Sandpiper			2						1	2	2		2
Pintail Snipe		1											
Swinhoe's Snipe													
Commom Snipe	2									90	13	6	26
Asiatic Dowitcher													
Little Stint											1		
Long-toed Stint													
Dunlin													
Curlew Sandpiper											2		
Spoon-billed Sandpiper													
Broad-billed Sandpiper													
Ruff											20		
Unidentified Waders												5	
Brown-headed Gull													
Black-headed Gull													
Unidentified Gull													
Whiskered Tern													
White-winged Tern													
Gull-billed Tern													
Indian river Tern													
Commom Tern													
Black-billed Tern													
Little Tern													
Unidentified Tern													
Black-shouldered Kite					2	2		1	1				2
Black Kite									3				38
Brahminy Kite								2	2	2			3
Pallas Fish Eagle													
Grey-headed Fish Eagle													
Steppe Eagle													1
White-rumped Vulture													
Crested Serpent Eagle													
Western Marsh Harrier											2		2
Eastern Marsh Harrier													
Pied Harrier										1	1		
Osprey													
Eurasian Kestrel		2											
Northern Hobby													
Peregrine Falcon													
Unidentified Raptors													
TOTAL WATERFOWL	**886**	**246**	**20**	**3**	**17**	**3**	**43**	**1363**	**946**	**172**	**431**	**598**