

Assessing current status of the Black-bellied Tern in Bangladesh

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Front Cover: Whiskered Tern
Inner Front Cover: River Tern

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Final report

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Summary

The global status of the Black-bellied Tern *Sterna acuticauda* has been moved to Endangered from Near Threatened due to its continuous decline of 20-29% over the last 27 years. The crisis of its global population decline has been recently described in Sykes 2010. Thorough surveys were suggested to verify its current status and distribution in Bangladesh and other Asian countries. Given the need, a survey was carried out between December 2011 and April 2012 covering c.199 km of Jamuna River and c.103 km of Padma River. Despite intensive search the team has failed to sight any Black-bellied Tern during the survey. It is perhaps impractical to conclude that Bangladesh is no longer a stronghold of the Black-bellied Tern given that some areas along Jamuna and Padma rivers were not surveyed. However, it is clearly apparent that a sharp decline took place since 1990s and if the Black-bellied Terns are still present in this area, the remaining population can be said to be very small. Other near threatened riverine species such as breeding River Lapwing, River Tern and Falcated Duck were recorded during the survey. In addition to degradation of the riverine ecosystems due to construction of dams, embankments, agricultural encroachment and other disturbances; hunting in winter by local or visiting sport-hunters and collection of eggs and chicks of sand-nesting birds in late-winter remain a frequent threat along Padma and Jamuna Rivers for the riverine species. To ascertain accurate status of the Black-bellied Tern, River Tern and River Lapwing in Bangladesh further surveys are required in the dry season ideally between February and May.

Introduction

The Black-bellied Tern *Sterna acuticauda* has been recently uplisted from Near Threatened to Endangered due to its very rapid and continuous decline over the last 27 years leading it to become almost extinct in a large part of its range. Loss of habitat through agricultural conversion, river flooding and unsustainable development along large rivers, egg collection, disturbance and reduction in food supplies as a result of overfishing are known threats to this species. The Black-bellied Tern is now very rare in southern China; fairly common in north Sind and Punjab in Pakistan; locally fairly common, but some evidence for localized declines in India; once locally fairly common but now a maximum population of 20 estimated in 2011 in Nepal; uncertain status in Myanmar with none recorded during recent surveys; very rare and probably extinct as breeding species in Thailand; large numbers along the Mekong channel bred in the past but very rarely recorded now in Laos ; fairly common along the Mekong in Cambodia in the past and is now considered probably extinct; and formerly recorded regularly but now probably extinct in Vietnam (BirdLife International 2012).

The Black-bellied Tern is now almost extinct in South-East Asia owing to its drastic decline. Although the species has a wide range, it is suspected that the global population is perhaps considerably fewer than 10,000 mature individuals (BirdLife International 2012). Apparently the only known stronghold of this species is National Chambal Sanctuary of India and recent counts from there are: 24 (2003), 34 (2004), 46 (2005), 64 (2006), 55 (2007), 59 (2008), 54 (2009) and 58 (2010) (Rahmani 2012). The crisis of its global population decline has been reinforced in Sykes 2010. Thorough surveys were suggested to determine its current status and distribution in Bangladesh, Myanmar, Nepal and South-East Asia.

A pair was sighted in breeding plumage in January 2011 on the banks of Jamuna River, this generated further hope that the species might be still breeding in these remote sandbanks of Jamuna and upper Padma. In order to assess this: (1) a thorough survey was conducted between December 2011 and April 2012 along Jamuna and upper Padma rivers on the Black-bellied Tern to determine its current status in Bangladesh, (2) to identify nesting sites in Bangladesh (if any), (3) to find out potential threats to the Black-bellied Tern and (4) to recommend future conservation measures. In addition, the survey aimed to determine current status of the least-surveyed riverine species in Bangladesh.

Methods

Study area

The survey was conducted on Jamuna and Padma Rivers, which are the two main large rivers of Bangladesh. The Jamuna River is the main channel of the Brahmaputra River when it flows out of India into Bangladesh moving south; ending at Goalundo Ghat and joins the Padma River. The total length of the Brahmaputra within Bangladesh territory is 205 km. The width of the river varies from 3 km to 18 km but the average width is about 10 km. The Padma River is the downstream of the Ganges, 120 km long and from 4 to 8 km wide (Banglapedia 2006). However, these rivers are now largely drying out, divided into multi-channels and studded with islands (chars) in dry season. The black-bellied Tern was regularly sighted in the 1990s along these two rivers, including 98 individuals in 1995 (P. Thompson *in litt.* 2011).

Riverine species survey technique

In the absence of a detailed habitat map of the rivers, potentially suitable and undisturbed sandbanks and chars away from the main channels were identified from satellite images freely available from Google Earth. In addition, more intensive searches targeting the Black-bellied Tern were carried out in recently and historically sighted locations. A total of c.302 km waterways were surveyed, comprising c.199 km along Jamuna and c.103 km along Padma Rivers. These two large rivers were surveyed using a slowly moving motor-powered boat. Additionally, undisturbed sandbars which had areas not entirely visible from the boat were investigated on foot between December 2011 and April 2012. Several sites such as Sirajganj, Sariakandi along Jamuna River and Kushtia along Padma River were revisited where *Sterna spp.* were seen recently and historically in December, March and April. A minimum of three observers undertook these surveys, while cruising through the rivers, two surveyors observed both banks of the river and one observed facing forward to minimize counting and identification errors.

In addition, semi-structured interviews were carried out targeting local fishermen and villagers on the occurrence of Black-bellied Tern and about threats to riverine birds such as hunting and collection of eggs.

Results

A total of 75 species of birds were recorded (Table 1) during the survey, comprising 67 on Jamuna and 51 on Padma rivers, of which 33 (44%) were residents and 42 (56%) were winter visitors. Majority of these birds fell into rare category for both rivers amongst five different abundance categories. In case of Jamuna River, 10.4% of the birds were categorized as common, 23.8% as uncommon, 26.8% as rare, 20.8% as very rare and 17.9% as present. Respectively, 3.9% were classified as common, 15.6% as uncommon, 35.2% as rare, 27.4% as very rare and 15.6% as present for Padma River.

Four species were recorded for the first time for Padma and Jamuna river systems: Common Shelduck *Tadorna tadorna*, Falcated Duck *Anas falcate*, Eastern Marsh Harrier *Circus spilonotus* and

Black-necked Grebe *Podiceps nigricollis*. All three were previously recorded from elsewhere in Bangladesh during winter.

Two globally vulnerable species: Indian Spotted Eagle *Aquila hastate* and Greater Spotted Eagle *Aquila clanga* and three near threatened species: Falcated Duck *Anas falcata*, River Lapwing *Vanellus duvaucelii* and River Tern *Sterna aurantia* were recorded during the survey.

Important species account

BLACK-BELLIED TERN *Sterna acuticauda*

Endangered. Despite intensive search the team failed to sight any Black-bellied Tern. However, a group of fishermen claimed to see nesting terns including the Black-bellied Tern (photos were shown) near the Jamuna bridge in Sirajganj. None of the *Sterna spp.* was recorded even after several visits to those sites. It is perhaps impractical to conclude that Bangladesh no longer has a stronghold of the Black-bellied Tern given that large areas along Jamuna and Padma rivers still remain unsurveyed. However, it is apparent that a sharp decline took place since 1990s and if they do occur; the remaining population would be very small. Further surveys are still required to ascertain its accurate status in Bangladesh (see discussion).

FALCATED DUCK *Anas falcate*

Near Threatened. One Falcated Duck was seen within a mixed flock of wintering ducks near Dhunat on 30 December 2011 in Jamuna River, Rajshahi. It is considered as a rare winter visitor to Bangladesh and occurs mainly in the freshwater wetlands of Barisal, Chittagong, Dhaka and Sylhet Divisions (Siddiqui *et al.* 2008). This is the first record of this species for Jamuna River and for Rajshahi Division of Bangladesh.

INDIAN SPOT-BILLED DUCK *Anas poecilorhyncha*

At least 12 adult breeding pairs of Indian Spot-Billed Duck were seen in March and April, 2012 near Shariakandi and Gaibanda. This species was not recorded earlier in the survey during early to mid-winter assuming it was spread out in a wider distribution and later returned to the rivers to breed. Though it is considered as an uncommon resident of Bangladesh it's known to occur in all divisions (Siddiqui *et al.* 2008). However, recent observations from several freshwater wetland sites in northeast Bangladesh suggest that the resident population is undergoing a dawdling decline, primarily because of collection of eggs by human and lack of suitable habitat to breed.

Breeding records away from the Haors in the northeast are scarce, with almost no known recent records. One nest with seven eggs was found in February 2012 at Pashua Haor in northeast Bangladesh by the author, unfortunately they were later collected by local fishermen. A local fisherman at Shariakandi reported collection of several clutches from grassy Char lands (island) along Jamuna River. Hence it is important to note that these moderately undisturbed Char lands still support breeding populations of this declining species in Bangladesh.

RIVER LAPWING *Vanellus duvaucelii*

Near Threatened. Only a pair of River Lapwing was observed on a sandspit in Rajshahi (N24 20.354, E88 40.200) on 17 April 2012 at 10h00. The nest was recorded with three eggs on a c.450 m² sandy split in between c. 540 m and c.577 m channels. The scrape nest was primarily exposed, surrounded by scattered grass and was built on the edge of a small sand dune (Figure 3). The incubating River Lapwing (it was not possible to determine sex) left the nest as the observer approached within 40 m. Another individual of the pair was seen foraging, c.190 m away from the nest along the edge of the water. The oval shaped eggs were pale-brown and heavily dotted with dark-brown, brown and dark spots and bots (Figure 4). The River Lapwing is considered as a rare resident of Bangladesh and listed as nationally Endangered. Currently, it is known to occur mainly on the riverbed of Chittagong, Dhaka and Rajshahi divisions and thought to be extirpated from Sylhet Division (IUCN 2000, Siddiqui *et al.* 2008).

The River Lapwing was recently sighted in several locations outside the study area, these include: a flock of five birds on Gorai River near Kushita in June 2012, one bird on Piyain River at Jaflong area of Sylhet division in April 2012, nine individuals on the Sangu River in the south-east near Bandarban in December 2011 (S. Mahood *in litt.* 2012) and two birds on Mahananda River of Tetulia in September 2010. All these were sighted along rivers which are approximately 200-500 m wide, therefore the River Lapwing appears to prefer stable narrow rivers, tributaries and less dynamic channels adjacent to a wide river. Although this survey covered a huge area, only one pair was found. This presumably because the team only targeted large, fast flowing and wide rivers and the majority of its habitat especially in Rajshahi division remained unsurveyed. In Southeast Asia, especially in Cambodia and Laos River Lapwing prefers wide riverbeds, presumably Southeast Asian rivers are slow-moving as they are situated in upstream unlike wide rivers in Bangladesh which have higher water flow, velocity and hence more dynamic (Duckworth *et al.* 1998, BirdLife 2012).

SMALL PRATINCOLE *Glareola lacteal*

This species was commonly seen on both rivers in relatively good numbers, up to a flock of 156 individuals. A chick was found on a sandbank hiding in thin vegetation, 7 km downstream from Shariakandi on 22 April 2012 (Figure 5). At least 15 pairs were seen and several of those were possibly breeding on that sandbank but only one chick was found.

RIVER TERN *Sterna aurantia*

Near Threatened. Only one River Tern was sighted on 8 February 2012 on Padma River near Hardinge Bridge. The tern was observed for 20 minutes while it was actively foraging. There are only two recent records of this species from inland water, seven on Jamuna River near Nagarbarighat in December 2009 (P. Thompson *in litt.* 2010) and three on the river near Pashua Haor in Sunamganj in February 2011. There are regular records of upto 10 breeding pairs (several nests were found in January 2009) from Domar Char (22° 2'19.22"N, 91°4'5.11"E) adjacent to Hatia Island located in the south-central coast of Bangladesh and two pairs (probably breeding) were observed on Sandwip Island (22°24'1.06"N, 91°31'56.71"E) situated in the south-eastern coast. Both of these nest sites were located less than 500 m from open sea, this is probably the first record of nesting River Tern along the coastal sand dune.

INDIAN SPOTTED EAGLE *Aquila hastate*

Vulnerable. An adult Indian Spotted Eagle was seen near Nagarbarighat resting on the sandbank close to the water edge on 28 December 2011. It is considered as a rare resident of Bangladesh (Siddiqui *et al.* 2008). It is possible that the species is breeding in the area but no further evidence of breeding could be gathered.

GREATER SPOTTED EAGLE *Aquila clanga*

Vulnerable. An adult was observed soaring over Jamuna River in Belkuchia on 5 February 2012. Another two adults were seen soaring over Padma River near Hardinge Bridge 8 February 2012. This species is known as a rare winter visitor and occurs mainly in freshwater wetlands or Haors of Bangladesh (Siddiqui *et al.* 2008).

BLACK-NECKED GREBE *Podiceps nigricollis*

Four individuals were photographed near Aricha Ghat on 6 February 2012; this is the second record and first photographic evidence of this vagrant in Bangladesh. It was first observed among large concentration of waterfowl on Tanguar haor (north-east region) on 7 February 2002. Although reported from Bangladesh in Perennou *et al.* (1990), Thompson and Johnson (2003) did not consider that as confirmed, given that there were no details available supporting this record. This is possibly the maximum number recorded in the Indian Subcontinent; other vagrant records from adjacent areas were in Nepal, Assam, Meghalaya and Orissa (Grimmett *et al.* 2011).

Discussion

Black-bellied Tern

According to the BirdLife International (2012) species factsheet, the Black-bellied Tern was previously common and now a local breeder in Bangladesh. Apparently, there has been no substantiate record subsequent to 2000, the coastal records from Cox's Bazar cited in Sykes 2010 should be treated as unreliable (most likely late winter Whiskered Terns *Chlidonias hybridus* were misidentified as Black-bellied Terns) since recent year-round waterbird surveys in Cox's Bazar did not record any Black-bellied Tern (S. U. Chowdhury pers. observ. 2012). However, a pair was recently photographed in full breeding plumage from Sariakandi (c. N 24.891419, E 89.590759) of Bogra district on 25 January 2011 and on 11 February 2011, which confirmed the continuous presence of this species in Bangladesh, although this targeted and extensive survey had failed to find the tern (Chowdhury 2011).

The sharp decline of this riverine species is believed to be triggered by a combination of several factors throughout its range, a major one among these is the destruction of breeding habitat (islands and sandspits in larger rivers are increasingly cultivated), in Bangladesh however this appeared to be a modest threat as certain islands, sandbanks and sandplits are still undisturbed, although majority of the river banks are largely degraded and converted now. Other riverine species such as River Lapwing, Little Tern (although nest was not found but several pairs were sighted during the survey) and Small Pratincole are breeding along Jamuna and Padma rivers.

Moreover, human footprint or other anthropocentric activities were not observed on some of these islands and sandbanks, which could provide key breeding habitat for the Black-bellied Tern.

The collection of eggs for food might have been a reason when the Black-bellied Tern used to breed in large numbers in colony along Padma and Jamuna rivers. Several senior fishermen indicated that they formerly use to collect eggs of unidentified species of terns from sandbanks where they could find many nests in one place. To date, in the absence of the large tern colonies, many of the fishermen or other natural resource harvesters (grass cutter, farmers and random traveler) are collecting eggs of Indian Spot-billed Duck from bushy islands; Small Pratincole, Little Tern and River Lapwing from sandbanks. Damage of eggs by predators such as dogs and corvids are not major threats as no dog and only one flying Large-billed Crow *Corvus macrorhynchos* were observed on sandbanks of Jamuna and Padma during the survey. However, three Black Kites *Milvus migrans* were seen hovering over the sandbank where the Small Pratincole chick was found.

Black-bellied Tern primarily feeds on small fish (Rahmani 2012). Since 1960, hundreds of water resource development projects have been implemented in Bangladesh. Through these projects the entire country has been converted into a series of polders with earthen embankments, which resulted obstruction of natural migration and recruitment of fishes, and other aquatic animals between rivers and floodplains. Construction and operation of Farrakka Dam in India has changed the water flow regime and hydrology of entire Padma river basin. The negative impacts of the Farrakka and other barrages severely affected spawning, nurseries, feeding migrations, and also increased fishing pressure in the upstream river construction of embankments on both banks by the Ganges-Kobadak project. Moreover, flood control structures in the Northwest Regional destroyed fisheries and caused the destruction of many resident brood stocks of fish. River flows have been altered in both in depth and the duration of flooding, and with it changes in the pattern of siltation that caused detrimental effects on riverine fishes and prawns. It was estimated that the Northwest Region's contribution to national fish production fell from 14% in 1983–84 to 10% in 1988–89 and, in particular, riverine fish production decreased from 24,500 tonnes in 1983–84 to 3,940 tonnes in 1988–89. An estimated 2.0 million ha of floodplains will be lost to fisheries due to water development projects by 2005 with a loss of fish production of over 1.0 million tonnes per year (Ali 1997, Mazid 2002 and Hussian 2010). Therefore, this massive reduction of fisheries in Jamuna and Padma river systems in Bangladesh might have led to severe food scarcity for the Black-bellied Tern.

Other Species

Significant differences were observed for certain migratory and resident waterbird number and diversity in winter and late-winter. Resident species such as Little Tern *Sterna albifrons* and Indian Spot-billed Duck *Anas poecilorhyncha* were not sighted from December to February but seen in good numbers in March and April on both rivers. These resident species could be wintering in other places and moved to the rivers during breeding season. Migratory species like Ruddy Shelduck *Tadorna ferruginea* were commonly seen from December to February but was unrecorded in March and April, contrariwise the Whiskered Tern *Chlidonias hybridus* was recorded in relatively good numbers in March and April but was absent in winter, possibly occurring mainly as a passage migrant on these rivers.

Overall, the number and diversity of riverine birds were much higher on Jamuna than on Padma River, although two significant riverine species - the River Lapwing *Vanellus duvaucelii* and the River Tern *Sterna aurantia* were only recorded on Padma River. There are several species that were previously seen on these rivers but were not recorded during this survey, these are: Fulvous Whistling Duck *Dendrocygna bicolor*, Graylag Goose *Anser anser*, Greater White-fronted Goose *Anser albifrons*, Bar-headed Goose *Anas indica*, Mallard *Anas platyrhynchos*, Common Teal *Anas crecca*, Red-crested Pochard *Netta rufina*, Common Pochard *Anas ferina*, critically endangered Baer's Pochard *Aythya baeri*, Common Merganser *Mergus merganser*, Eastern Imperial Eagle *Aquila heliaca*, Grey-headed Lapwing *Vanellus cinereus*, Pacific Golden Plover *Pluvialis fulva*, Eurasian Curlew *Numenius arquata*, Common Redshank *Tringa totanus*, Green Sandpiper *Tringa ochropus*, Wood Sandpiper *Tringa glareola*, Pallas's Gull *Larus ichthyæetus*, Gull-billed Tern *Gelochelidon nilotica*, Common Tern *Sterna hirundo* and globally vulnerable Indian Skimmer *Rynchops albicollis*.

Threats

In addition to degradation of the riverine ecosystems due to construction of dams, embankments, agricultural encroachment on muddy shores (exposes as the water level recedes in dry season) and other disturbance; hunting in winter by local or visiting sport-hunters and collection of eggs and chicks of sand-nesting birds in late-winter are frequent along Padma and Jamuna rivers. Moreover, Sand and gravel extraction for development is common in these two rivers especially around large towns. This further stressed the overall riverine ecosystems and reduced roosting and nesting habitats of riverine bird species and other resident wildlife. Due to the loss of fisheries resources, competition between riverine birds and local fishermen is also expected.

Recommendations

- ✓ Surveys the Black-bellied Tern are still needed later in the dry season ideally between February and May, especially in Sirajganj (around Jamuna Bridge), Sariakandi and Kurigram areas of Jamuna River and Pabna and Kushtia areas of Padma River.
- ✓ To identify breeding sites of riverine species further surveys are required. Once identified these sites can be declared as sanctuaries. The sandbanks and islands are not leased out and hence any change in management will not be resisted by leaseholders unlike other wetland sites in Bangladesh.
- ✓ There also needs to be a comprehensive conservation strategy for Padman and Jamuna rivers, with better management plans for fisheries and wildlife.
- ✓ An indicator bird species approach can be established to assess the overall health of the riverine ecosystem.
- ✓ Detailed study on the breeding biology of the little known River Lapwing is also recommended to aid future conservation action plan.
- ✓ Almost all the waterfowl species that occur in these areas are protected by the Bangladesh Wildlife Preservation Act. Therefore, enforcements are needed to tackle bird hunting and prevent illegal habitat encroachment.
- ✓ Awareness-raising activities in villages along these rivers should be carried out to educate local people especially fishermen and other natural resource harvesters about the importance of birds to maintain healthy riverine ecosystem.

- ✓ New guidelines for building Brickfields along Padma and Jamuna River are needed to reduce anthropocentric disturbance.

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Tables

Table 1: Number and Relative Abundance of birds recorded along Jamuna (J) and Padma (P) Rivers between Dec 2011 and Apr 2012.

Stretch #		J1	J1	J2	J3	J3	J4	J5	J6	J6	J7			P1	P2	P3	P4			
		41	41	45	29.5	29.5	44	29.5	20	20	17			27	35	32.5	8.5			
Stretch Length (km)																				
Date	Status	28/12/2011	05/02/2012	29/12/2011	30/12/2011	22/04/2012	0/01/2012	02/1/2012	04/1/2012	28/03/2012	06/02/2012			06/02/2012	07/02/2012	08/02/2012	16/04/2012			
From (Local Name)		Nagarbarighat	Nagarbarighat	Belkuchia	Dhunat	Dhunat	Sariakandi	Gabindaganj	Gatbanda	Gatbanda	Nagarbarighat			Aricha ghat	Pangsha	Kushia	Rajshahi			
To (Local Name)		Belkuchia	Belkuchia	Dhunat	Sariakandi	Sariakandi	Gabindaganj	Gaibanda	Bahadurabad	Bahadurabad	Aricha ghat			Pangsha	Kushia	Lalpur	Rajshahi			
From (Coordinates)		N23 56.913 E89 39.528	N23 56.913 E89 39.528	N24 16.910 E89 45.618	N24 39.742 E89 39.261	N24 39.742 E89 39.261	N24 54.527 E89 34.411	N25 09.581 E89 37.123	N25 23.385 E89 38.388	N25 23.385 E89 38.388	N23 56.913 E89 39.528			N23 47.346 E89 43.686	N23 50.465 E89 30.321	N23 55.660 E89 09.925	N24 20.822 E88 39.066			
To (Coordinates)		N24 16.910 E89 45.618	N24 16.910 E89 45.618	N24 39.742 E89 39.261	N24 54.527 E89 34.411	N24 54.527 E89 34.411	N25 09.581 E89 37.123	N25 23.385 E89 38.388	N25 34.113 E89 40.906	N25 34.113 E89 40.906	N23 48.335 E89 46.243			N23 50.465 E89 30.321	N23 55.660 E89 09.925	N24 09.574 E89 00.306	N24 19.505 E88 37.844			
Encounter rate of birds per visit on Jamuna River																				
Relative abundance of birds observed on Jamuna River																				
Encounter rate of birds per visit on Padma River																				
Relative abundance of birds observed on Padma River																				
1. Lesser Whistling-duck <i>Dendrocygna javanica</i>	R							1				1	VR							
2. Ruddy Shelduck <i>Tadorna ferruginea</i>	WV	27	17		79		24	25	29			16,5	C	6	1	1		5	UC	
3. Common Shelduck <i>Tadorna tadorna</i>	WV					2			4			2,1	R	2				1	VR	
4. Gadwall <i>Anas strepera</i>	WV			41	99	1	4		230		7	6,2	UC	77	3	130		2,1,2	R	
5. Falcated Duck <i>Anas falcata</i>	WV				1							1	R							
6. Eurasian Wigeon <i>Anas penelope</i>	WV					2						1	R							
7. Indian Spot-billed Duck <i>Anas poecilorhyncha</i>	R					22				7		5,1	UC							
8. Garganey <i>Anas querquedula</i>	WV					2						1	VR					15		

9. Northern Shoveler <i>Anas clypeata</i>	WV													2				1	VR
10. Northern Pintail <i>Anas acuta</i>	WV	120										1	VR	4	2			2	R
11. Tufted Duck <i>Aythya fuligula</i>	WV				1							1	VR						
12. Common Kingfisher <i>Alcedo atthis</i>	R			1			1	2		2	4,1	R		1					
13. White-throated Kingfisher <i>Halcyon smyrnensis</i>	R			1			1	1		1	3,1	R							
14. Pied Kingfisher <i>Ceryle rudis</i>	R		3	5	4		4		5	5	4	13,2,2	C	7	6	5	2	10,2,2	C
15. Common Greenshank <i>Tringa nebularia</i>	WV	2	5	2	2	10	3	10	15			11,6	C	14	3			5	UC
16. Common Sandpiper <i>Actitis hypoleucos</i>	WV	4	1	2								2,2	R	2				2	R
17. Temminck's Stint <i>Calidris temminckii</i>	WV						5					1	VR	17		2		2	R
18. Dunlin <i>Calidris alpina</i>	WV						12					1	VR		2			1	VR
19. Little Stint <i>Calidris minuta</i>	WV	2	5	7	8			1	11			5,1	UC	14			4	2	R
20. Curlew Sandpiper <i>Calidris ferruginea</i>	WV		3				2					1,1	VR		13	2		2	R
21. Little Ringed Plover <i>Charadrius dubius</i>	R	5	8	12	7		3	10	9	8		11,5,4	C	2	4		3	5	UC
22. Kentish Plover <i>Charadrius alexandrinus</i>	WV				3		2		1			3	R	112	3		3	2	R
23. Lesser Sand Plover <i>Charadrius mongolus</i>	WV	2					5					3	R	900	17		2	3	R
24. Greater Sand Plover <i>Charadrius leschenaultii</i>	WV													50				1	VR
25. River Lapwing <i>Vanellus duvaucelii</i>	R																2	1	VR
26. Red-wattled Lapwing <i>Vanellus indicus</i>	R	4	1		1					2	10	3,1	R						
27. Small Pratincole <i>Glareola lactea</i>	R	115		15		156	93		17	22	10	5,11	C	118	90	11	2	10,2	C
28. Brown-headed Gull <i>Larus brunnecephalus</i>	WV										8	2	R				32	1	VR
29. Black-headed Gull <i>Larus ridibundus</i>	WV	1										1	VR						
30. River Tern <i>Sterna aurantia</i>	R															1		1	VR
31. Little Tern <i>Sterna albifrons</i>	R					43				5		5	UC				4	2	R
32. Whiskered Tern <i>Chlidonias hybridus</i>	WV					39				11		6	UC				14	5	UC
33. Osprey <i>Pandion haliaetus</i>	WV													3	1	1		2,1,1,1	R
34. Black-winged Kite <i>Elanus caeruleus</i>	R	1	1		2			1		2		3,1	R						
35. Black Kite <i>Milvus migrans</i>	R	3		2	3	4	1		2		3	8	UC						
36. Western Marsh Harrier <i>Circus aruginosus</i>	WV			1	2			1			1	4	R						
37. Eastern Marsh Harrier <i>Circus spilonotus</i>	WV	1																	
38. Pied Harrier <i>Circus melanoleucos</i>	WV	1								1		1	VR						
39. Common Buzzard <i>Buteo buteo</i>	WV						1					1	VR				1	1	VR
40. Long-legged Buzzard <i>Buteo rufinus</i>	WV	1						2	3			3	R	8				8	UC
41. Indian Spotted Eagle <i>Aquila hastata</i>	R	1										1	VR						
42. Greater Spotted Eagle <i>Aquila clanga</i>	WV		1									1	VR			2		1	VR
43. Steppe Eagle <i>Aquila nipalensis</i>	WV	1		3								2	R	1		1	1	3	R

44. Common Kestrel <i>Falco tinnunculus</i>	WV		2	1			2		3	1		5,1	UC		3		2	5	UC
45. Peregrine Falcon <i>Falco peregrinus</i>	WV	1										1	R						
46. Little Grebe <i>Tachybaptus ruficollis</i>	R								2			2	R	1				1	VR
47. Great Crested Grebe <i>Podiceps cristatus</i>	WV	1	1	1	2		2		2			6,1	UC	1	3			2	R
48. Black-necked Grebe <i>Podiceps nigricollis</i>	WV										4	1	VR						
49. Little Cormorant <i>Phalacrocorax niger</i>	R	23	2	3		13		3		2	40	11,6	C	2				2	R
50. Great Cormorant <i>Phalacrocorax carbo</i>	WV			1	2			1	1		11	7	UC	8				2	R
51. Great Egret <i>Casmerodius albus</i>	R	30			2			3				6	UC	7	2	5		5,1,3	UC
52. Intermediate Egret <i>Egretta garzetta</i>	R			1			1	3	1			5	UC		3			2	R
53. Little Egret <i>Egretta intermedia</i>	R	20		2	3			10				6	UC		3		6	2	R
54. Grey Heron <i>Ardea cinerea</i>	R	7	2	5	3			3	10			11,1	C	5	1	104	1	1,1,5	UC
55. Indian Pond Heron <i>Ardeola grayii</i>	R			2	4		1	5	4	3		5	UC		3			1	VR
56. Asian Openbill <i>Anastomus oscitans</i>	R											5	1	VR					
57. Woolly-necked Stork <i>Ciconia episcopus</i>	WV	1										1	VR						
58. Black Stork <i>Ciconia nigra</i>	WV								8	1		5	UC	1				1	VR
59. Brown Shrike <i>Lanius cristatus</i>	WV				1			2					P						
60. Long-tailed Shrike <i>Lanius schach</i>	R		1	1			1		1		1		P						
61. Large-billed Crow <i>Corvus macrorhynchos</i>	R	1							1				P						
62. Black Drongo <i>Dicrurus macrocercus</i>	R	2		1				3	1				P		2	3			P
63. Asian Pied Starling <i>Sturnus contra</i>	R	4	2		2		12	5					P				2		P
64. Bank Myna <i>Acridotheres ginginianus</i>	R				11			1	2	21			P	4				1	P
65. Sand Martin <i>Riparia ripari</i>	WV													4				1	R
66. Plain Martin <i>Riparia paludicola</i>	R						22		9	7		5	UC	5				1	R
67. Barn Swallow <i>Hirundo rustica</i>	WV	53					12						P	5					P
68. Zitting Cisticola <i>Cisticola juncidis</i>	R				1			1	1				P						P
69. Graceful Prina <i>Prinia gracilis</i>	R						1	2	1				P						
70. Bengal Bushlark <i>Mirafra assamica</i>	R				2								P						
71. Sand Lark <i>Calandrella raytal</i>	R	10	4		5		3	11	1	6			P	13	2		2	4	P
72. Oriental Skylark <i>Alauda gulgula</i>	R	2					1						P		1				P
73. White Wagtail <i>Motacilla alba</i>	WV	15	9	18			10		15			6,1	UC	6		2	1	5,1	UC
74. Citrine Wagtail <i>Motacilla citreola</i>	WV	3			2		1		1			4	R		1			1	VR
75. Yellow Wagtail <i>Motacilla flava</i>	WV			3	1			3	1			4	R		1			1	VR
Total		464	68	131	253	294	229	108	392	107	106			1396	171	270	83	84	

[Relative abundance was assessed based on number of times a species was encountered per visit and maximum rate of encounter between visits were taken during the assessment]

C= Common, encountered more than 10 times during a visit

UC = Uncommon, encountered between 5 and 10 times during a visit

R = Rare, encountered less than 5 but more than once times during a visit

VR= Very Rare, encountered only once in one or more visits

P = Present, opportunistic records of non-riverine species where abundance was not assessed

Status = Status in Bangladesh: R - resident and WV - winter visitor

Figures

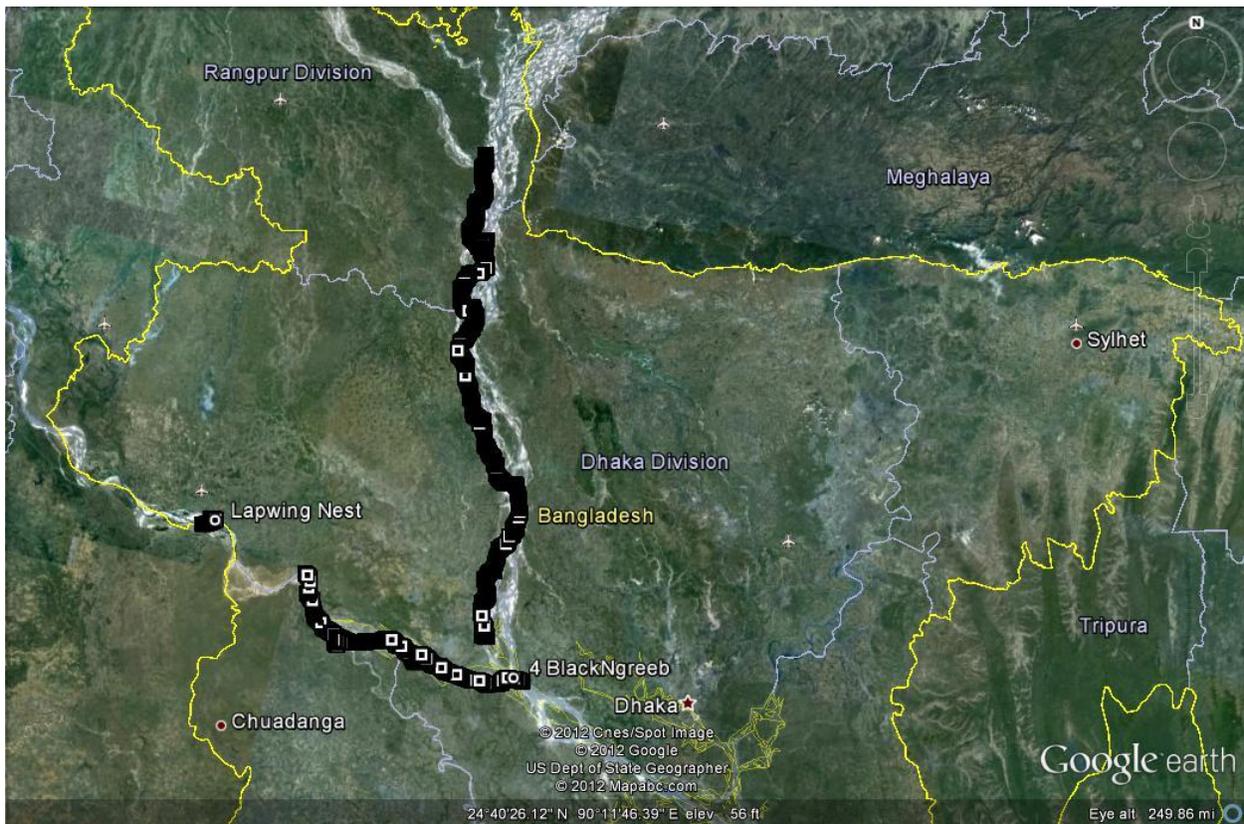


Figure 1. Survey route (GPS Track) of Padma and Jamuna Rivers



Figure 2. Incubating River Lapwing, Padma River Char (April 2012)



Figure 3. River Lapwing nest, Padma River Char (April 2012)



Figure 4. River Lapwing eggs, Padma River Char (April 2012)



Figure 5. Small Pratincole chick, Jamuna River Char (March 2012)



Figure 6. Black-necked Grebe, Aricha, Jamuna River (February 2012)



Figure 7. Human disturbance along Jamuna River (Dec 2011)



Figure 8. Hunters on Jamuna River (December 2011)



Figure 9. A hunter with gun on the bank of Jamuna River (Dec 2011)



Figure 10. Sand mining along Jamuna River (December 2011)



Figure 11. Sand mining in an island on Jamuna River (March 2012)



Figure 12. Sand mining on Padma River (February 2012)



Figure 13. Human disturbance along Padma River (February 2012)

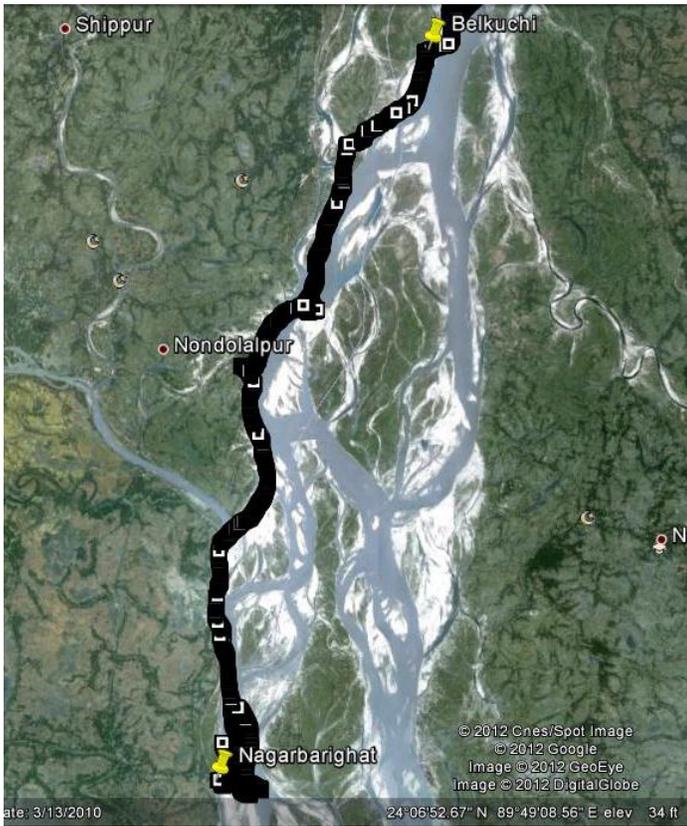


Figure 14. Map of survey route, Jamuna: Nagarbarighat to Belkuchi (J1)

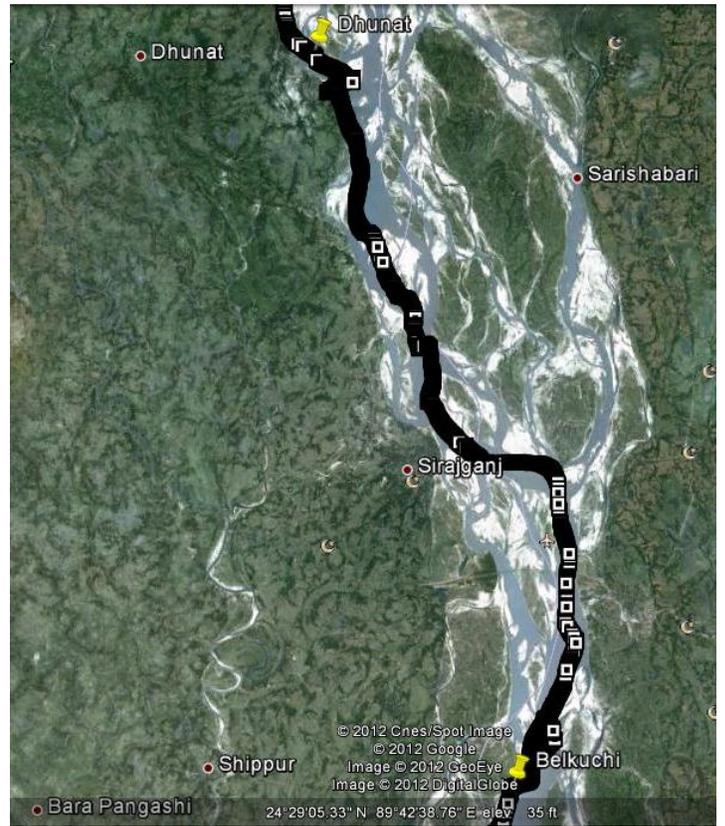


Figure 15. Map of survey route, Jamuna: Belkuchi to Dhunat (J2)

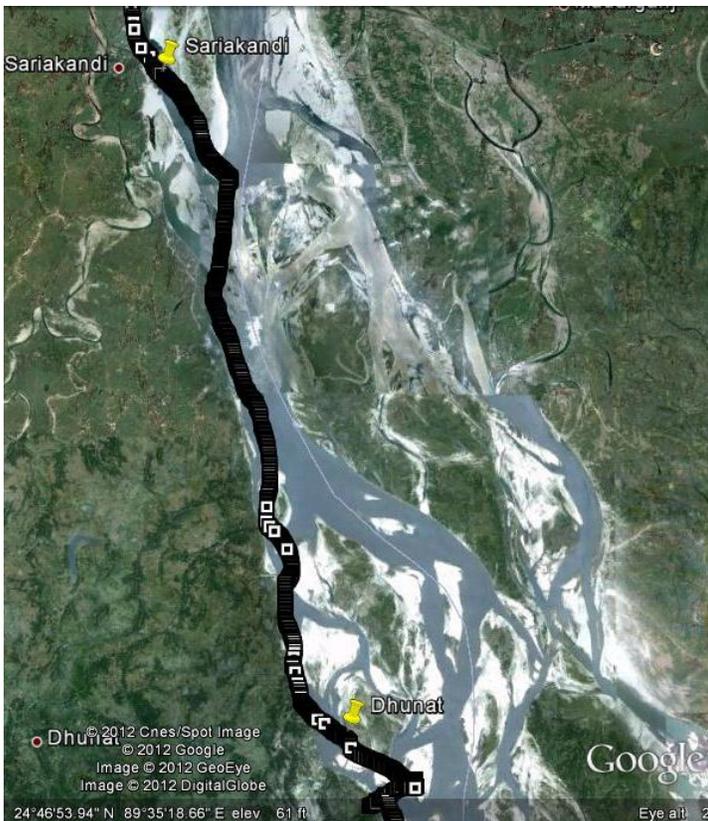


Figure 16. Map of survey route, Jamuna: Dhunat to Sariakandi (J3)

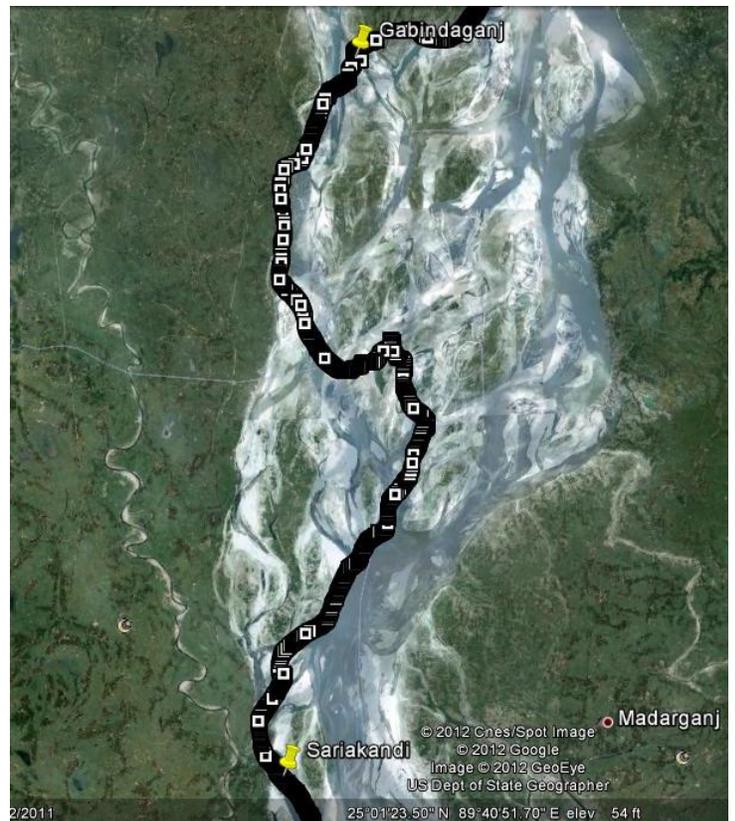


Figure 17. Map of survey route, Jamuna: Sariakandi to Gabindaganj (J4)



Figure 18. Map of survey route, Jamuna: Gabindaganj to Gaibanda (J5)

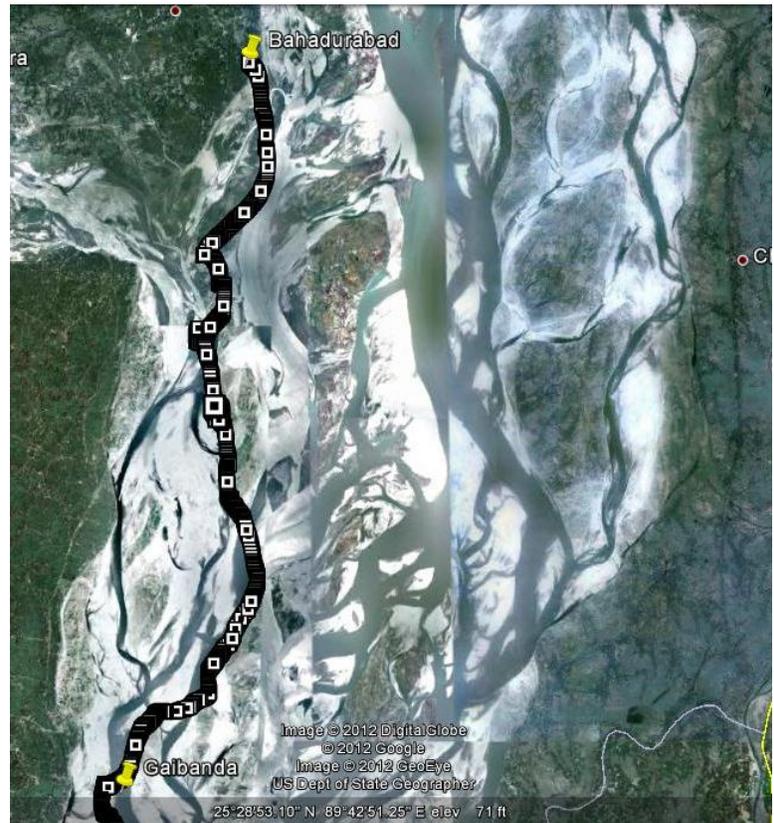


Figure 19. Map of survey route, Jamuna: Gaibanda to Bahadurabad (J6)



Figure 20. Map of survey route, Jamuna: Nagarbarighat to Aricha (J7). [Manually created approximate route as GPS was not in use]



Figure 21. Unsurveyed area map, Jamuna. C. 20 km area near the Indian border were not surveyed.



Figure 22. Map of survey route, Padma: Aricha Ghat to Pangsha (P1).



Figure 23. Map of survey route, Padma: Pangsha to Kushita (P2).



Figure 24. Map of survey route, Padma: Kushita to Lalpur (P3).

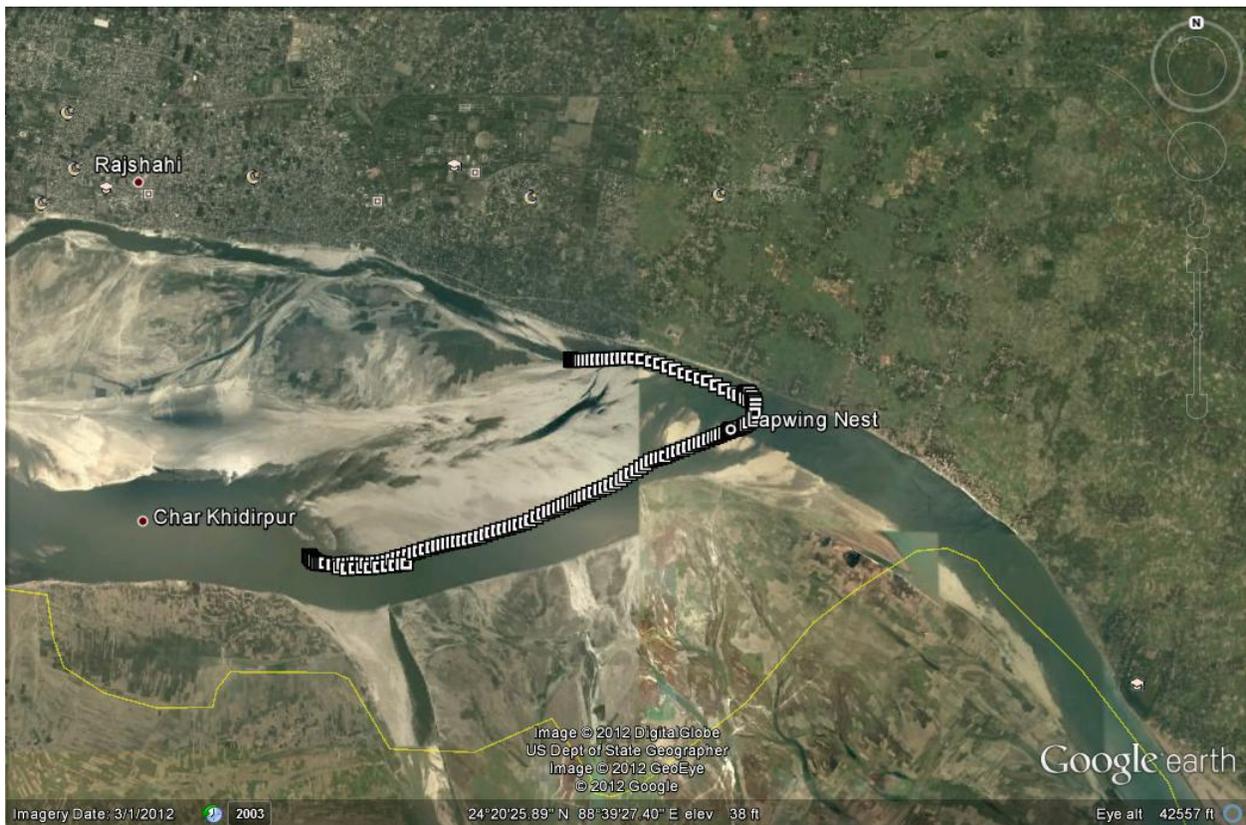


Figure 25. Map of survey route, Padma: Rajshahi (P4)



Unsurveyed area map of Padma. C. 20 km area near the Indian border were not surveyed.



Figure 14. Padma River survey, February 2012



Figure 15. Padma River, near Hardinge Bridge, December 2012



Figure 16. Night halt along Jamua River, January 2012



Figure 17. Surveying undisturbed sandbank of Jamuna River

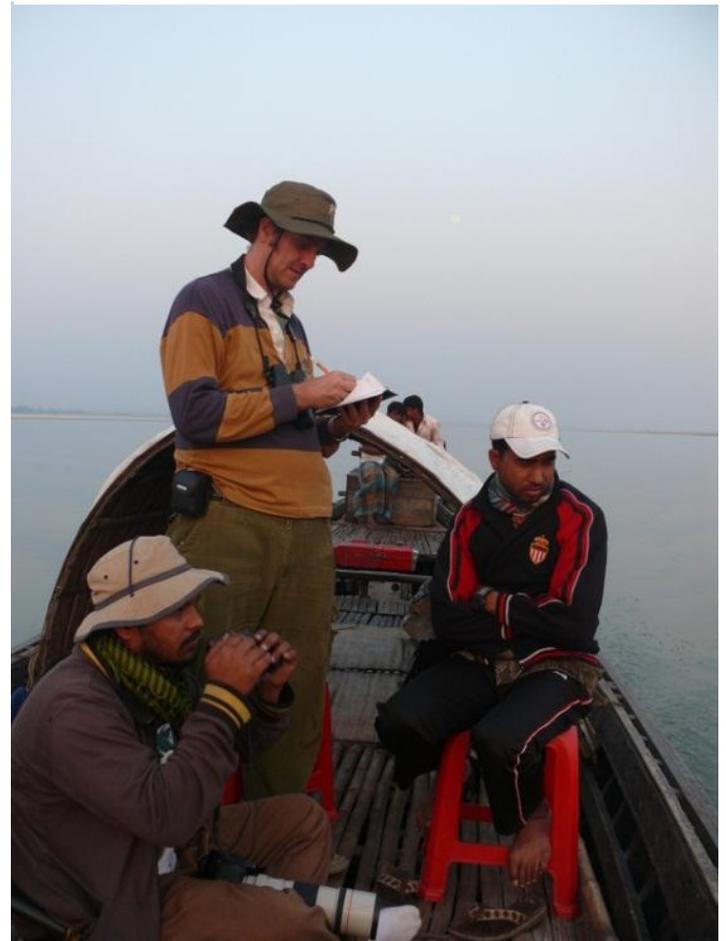


Figure 18. Survey team, Padma River (from left-Sayam, James & Foysal)