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Original research article

A study of the winter congregation sites of the Gangetic River Dolphin in southern Assam, India, with reference to conservation



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ABSTRACT

The Gangetic River Dolphin (*Platanista gangetica gangetica*) is an exclusive river dolphin subspecies and inhabits the freshwater river systems of India, Nepal and Bangladesh. This cetacean is primarily piscivorous and strictly inhabits the freshwater ecosystems, chiefly rivers. They generally wander to different parts of the river in the monsoon, but congregate at meander bends in the river course where an eddy counter-current is prevalent and there are greater water depths during winter months. These meander bends are locally called 'Dhar' in the Barak river of southern Assam. The dolphin population in this river and its tributaries and distributaries has declined steeply in the recent past. Although certain factors have been identified, reports on these dolphins are extremely limited. The present study was carried out at the reported and possible winter aggregation sites in the Barak river, its tributaries and one of the distributaries, the Kushiya river, to find the present status of the dolphin and its habitats, along with prey fish abundance, threats and possible conservation strategies. We also conducted a survey on the responses of the local people, generally the fisher-folks, towards different dolphin conservation issues.

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1. Introduction

The Gangetic River Dolphin, locally called 'Phoo', 'Susu', 'Sishu' in southern Assam and first described by Roxburgh (1801), is distributed in the Ganga–Brahmaputra–Megna river systems of India, Bangladesh and Nepal (Choudhury, 1997; Moreno, 2003; Nowak, 1999, 2003; Kasuya and Haque, 1972; Shrestha, 1989; Reeves et al., 1993a,b). Choudhury (1997, 2013) and others (Biswas, 1995; Biswas and Boruah, 2000; Ahmed, 1992; Singha, 2000) mentioned the distribution of the Gangetic River Dolphin in both the Brahmaputra and Barak river systems of Assam. It is the top predator of the river ecosystem and consumes a variety of fishes like *Wallago attu*, *Eutropiichthys vacha*, *Mystus seenghala*, *Labeo rohita*, *Ompok pabo*, *Notopterus notopterus*, *Mystus aor*, *Cirrhinus reba*, *Mastacembellus armatus*, *Hilsa ilisha* and other catfishes, as well as crabs, etc. (Reeves and Brownell, 1989). They generally prefer deeper waters in the rivers and 50% of dolphin sightings in the Ganges were recorded at river confluences (Bashir, 2010).

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Unfortunately, this dolphin is on the verge of extinction in all its habitats due to poaching for oils and meat (Mohan and Kunhi, 1996; Choudhury, 2013), a decrease in prey fishes due to intense fishing (Bashir et al., 2010; Mohan et al., 1997; Biswas et al., 1997), a decrease in river depth due to deposition of sediments at the river beds owing to high embankments (Smith et al., 1998), habitat fragmentation due to construction of dams and barrages, accidental entanglements in fishing nets (Bashir, 2010), habitat destruction, extraction of water from rivers for human use (Reeves et al., 1991), sand mining, siltation and large scale hydrological changes (Dudgeon, 2000). Jones (1982) estimated the population to be around 4000–5000 individuals, which declined to 2000 individuals (Mohan, 1989), and the current global population is hardly 1200 individuals (Smith and Braulik, 2012). It is listed by the IUCN as endangered (Smith et al., 2012) and included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In India, it has been placed in Schedule-I of the Wildlife (Protection) Act, 1972 and it was declared the National Aquatic Animal in 2009.

The Barak river, the second largest river system of north-eastern India, has been among the most important habitats for the dolphin. Although the status (Singha et al., 2007, 2010, 2013) and distribution (Choudhury, 2013) of the dolphin in this river have been reported, it is among the least studied species. During the monsoons, the dolphins migrate (Moreno, 2003) to different tributaries of the Barak–Kushiyara river, while in winter they congregate at Dhars (meander bends), which usually have greater depths and eddy counter currents, as well as greater fish abundance (Biswas et al., 2007; Singha et al., 2007, 2010; Choudhury, 2013), where the fishes become disoriented and easy prey for the dolphins (Singha et al., 2010, 2013). In the 1970s–1980s, it was a common sighting in the Barak river, its tributaries and distributaries (Singha et al., 2007; Biswas et al., 2007). However, the population declined gradually and recent reports suggest that there are hardly a dozen animals that congregate in the winter season (Singha et al., 2007), while the dolphin is locally extinct from many of the tributaries, such as the Dhaleswari river (Choudhury, 2013).

The present study has been conducted to elucidate the physicochemical water parameters, organic load, prey fish abundance, threats and conservation of the Gangetic River Dolphin in the Barak river system (the Barak river including its tributaries and one distributary—the Kushiyara river).

2. Methodology

2.1. Study area

The Barak river originates in the state of Manipur and flows through the plains of the Cachar, Hailakandi and Karimganj Districts of southern Assam. The major tributaries of the river include Jiri, Chiri, Badrinala, Jatinga, Madhura and Marang on the north bank, and Ghagra, Sonai (with Rukni), Katakhal and Dhaleswari on the south bank. The Barak river bifurcates at the India–Bangladesh border, near Rosulpur and Notunbasti of Karimganj district, producing two distributaries: the Surma and Kushiyara. The Surma flows directly into Bangladesh while the Kushiyara runs along the border through Karimganj before entering Bangladesh. The point of bifurcation is known as Tinganga (Fig. 1). Singla river and Longai river flow through Karimganj district and confluences with the Kushiyara river.

From the available literature as well as interactions with local people, 13 sites where dolphins are or were reported to congregate were selected for the study (Table 1; Fig. 1). Out of these sites, 1–10 are on the Barak river, 11 and 12 on the Kushiyara river, and 13 on the Longai river. Confluences were selected for study as they are among the major congregation points (Choudhury, 2013), while the Dhars were surveyed based on the earlier reports (Singha et al., 2010, 2013).

2.2. Duration and time of study

The study was conducted for a period of 3 months (January–March, 2014) when the animals are easily sighted (Wakid, 2009) as well as due to the objective of the study to elucidate the wintering grounds. Since dolphins are generally more active and easy to identify during the early morning and late afternoon hours, the surveys were conducted between 5:00 AM–11 AM and 3:00 PM–5:00 PM (Indian Standard Time).

2.3. Quantitative study of physicochemical parameters of water

Physicochemical parameters of water of any aquatic ecosystem are indications of the aquatic health and productivity which in turn determines the biodiversity of the system. The tested parameters include quantitative estimation of pH, Total Hardness and concentrations of Iron, Nitrate and Chloride. The tests were performed using commercially available kits (TRANSCHEM Agritech Ltd, Vadodara, India) following the protocols mentioned in the user manual. Turbidity interferes with penetration of light in water bodies and therefore determines productivity. It was measured using a Digital Turbidity meter (NAVYUG, India) which detects Brownian motion.

2.4. Qualitative bacteriological test to determine organic load

A bacteriological test was performed to estimate the presence of coliform bacterial species, which indirectly signifies the organic load. The test was performed using the kit 'Blue Bacta Vial' following manufacturer's protocol.

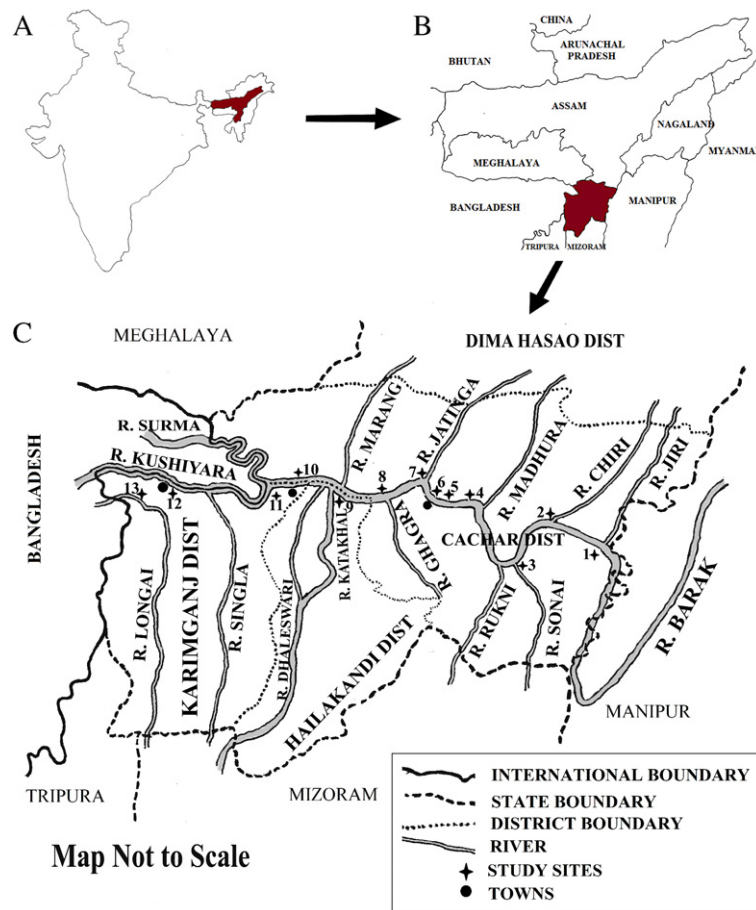


Fig. 1. Sketch map of: (A) India highlighting Assam, (B) Assam highlighting southern Assam (Barak valley), (C) southern Assam (the study area)—comprising Cachar, Hailakandi and Karimganj districts. Different rivers (R) of the study area as well as district, state and international boundaries are shown. The study sites are marked as 1–13 as solid star marks +, while the town areas are marked as solid circles (●).

2.5. Dolphin survey

The selected sites were surveyed three times each from the river banks on foot, for 1 h continuously at each visit. The distance covered at each site was 1 km upstream and 1 km downstream, except site 11, where due to the international boundary only the downstream part of the Kushiyara river could be surveyed. Thus, a total distance of 25 km on the river course was covered. However, sites 4 and 5, which were past dolphin strongholds (Singha et al., 2007, 2010), were surveyed 5 times. In addition to sighting with binoculars and the naked eye, videography of all the sites was done. These videos were carefully watched to re-examine different issues. We also interviewed local people and fishermen about sightings of the dolphins in the recent months and years.

2.6. Prey fish abundance survey

We selected ten different prey fish species (Table 2) to assess their abundance, for which we recorded the catch of three fishermen with three different types of fishing gears in their 10 efforts; thus a total of 30 efforts per site were recorded. The number of instances a particular prey fish was caught was used to determine its abundance. A fish not caught in any of the gears and also not reported in the last 3 months by the fishermen was regarded as 'absent'; a fish not caught but reported by fishermen to occur was considered 'rare'; those caught in 1%–25% of the efforts were considered 'less common'; those caught in 25%–50% of the efforts were considered 'common' and those caught in more than 50% of the efforts were considered 'abundant'.

2.7. Opinion survey on different conservation issues

To have an idea about the conservation issues, we interviewed 20 local fishermen and other people per site (totaling 260 people), generally the older folks. Different issues on which the opinions of the people were sought are given in Fig. 2.

Table 1

Results of different water parameters at the thirteen study sites as well as the number of dolphins sighted at these sites. Concentration of chloride (Cl^-), iron (Fe^{3+}) and nitrate (NO_3^-) are expressed in ppm, while total hardness is expressed in concentration of CaCO_3 (in ppm) and turbidity is expressed in nephelometric turbidity unit (NTU). The number of dolphins sighted at the sites is shown against each site. The number of dolphins sighted is the highest number that was sighted at different sites in a particular survey. However, a lesser number of animals were also sighted at site 12 in other two surveys, while in one survey, no animal could be sighted at site 11. Here, 'R' means 'river'.

Sl. No.	Different study sites (known/reported wintering sites)	Turbidity (in NTU)	Iron (in ppm)	Nitrate (in ppm)	pH	Chloride (in ppm)	Total hardness (in ppm)	Bacteriological test	No. of dolphins sighted
1	Jiri R-Barak R confluence (Jirimukh, Cachar)	15	<0.3	NIL	7.25	60	80	–	0
2	Chiri R-Barak R Confluence (Banskandi, Cachar)	18	<0.3	NIL	7	60	100	–	0
3	Sonai R-Barak R confluence (Sonai, Cachar)	16	<0.3	NIL	7	40	90	–	0
4	Niyairgram Dhar (Near Kashipur, Cachar)	10	<0.3	NIL	7.25	60	120	–	0
5	Lalmati Dhar (Near Kashipur, Cachar)	14	<0.3	NIL	7.25	60	120	–	0
6	Silchar Ghat Dhar (Near Silchar town, Cachar)	21	<0.3	NIL	7.25	60	120	–	0
7	Jatinga R-Barak R confluence (Jatingamukh, Cachar)	8	<0.3	NIL	8.75	60	120	–	0
8	Katakhal R-Barak R confluence (Katakhal, Hailakandi)	18	<0.3	NIL	8.25	60	90	–	0
9	Badarpur Ghat (Near Badarpur Town, Karimganj)	6	<0.3	NIL	8.25	60	75	+	0
10	Srigauri Dhar (Near Srigauri, Karimganj)	6	<0.3	NIL	8.25	40	120	–	0
11	Rosulpur Dhar (Near Tinganga, Karimganj)	9	0.3–0.5	5–10	7.5	40	90	+	1
12	Bash Ghat Dhar (Karimganj town, at Indo-Bangla Border)	8	<0.3	NIL	7.75	60	100	–	5
13	Amborkhana Dhar (on Longai R), Karimganj	25	0.3–0.5	NIL	7.25	40	75	–	0

Table 2

Abundance of the prey fishes at different study sites: A—Absent (not caught and also not reported by the fishermen in last three months); R—Rare (not caught but reported by the fishermen to occur); LC—Less Common (caught in 1%–25% of efforts) and C—Common (caught in 25%–50% of the efforts).

Name of the prey fish	Different study sites												
	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Hilsa ilisha</i>	A	A	A	A	A	A	A	A	A	A	A	A	A
<i>Eutropiichthys vacha</i>	LC	LC	LC	LC	LC	R	R	R	R	LC	C	C	LC
<i>Cirrhinus reba</i>	R	R	R	LC	R	R	R	R	R	LC	LC	LC	R
<i>Mystus aor</i>	LC	LC	LC	R	R	R	LC	LC	LC	C	C	C	LC
<i>Notopterus notopterus</i>	LC	LC	R	LC	LC	LC	LC	R	R	LC	LC	C	R
<i>Wallago attu</i>	R	R	R	R	R	LC	LC	LC	LC	LC	C	C	LC
<i>Mystus seenghala</i>	LC	LC	LC	LC	LC	LC	LC	LC	LC	LC	C	C	LC
<i>Labeo rohita</i>	R	R	R	LC	R	R	LC	LC	LC	LC	LC	LC	R
<i>Mastacembellus armatus</i>	LC	LC	A	LC	LC	A	R	R	R	R	LC	LC	LC
<i>Ompok pabo</i>	LC	LC	LC	C	LC	LC	R	R	R	LC	C	C	LC

3. Results

3.1. Occurrences of dolphins

Although reported from various parts of the Barak river starting from Jirimukh to Tinganga, that includes river confluences and Dhars (Choudhury, 2013; Singha et al., 2007, 2013; Biswas et al., 2007), no dolphin could be sighted in these sites upstream to Tinganga in our survey. This forced us to move downstream into the Kushiya river where, in contrast to the earlier reports (Biswas et al., 2007), dolphins were very frequently sighted at all the Dhars in and around Karimganj town, viz., Bash-Ghat Dhar, Chor-Bazar Dhar, Jokiganj Dhar and Deopur Dhar; and the dolphins have been observed to migrate between these Dhars on a daily basis. Five dolphins have been sighted here (site 12), while one has been sighted at site 11 (Table 1). The portion of the river from Tinganga and downstream also has resident dolphin populations at different locations.

3.2. Prey fish abundance

Abundance of prey fishes is one of the most important factors determining occurrences of the top predators, like the dolphins, in an ecosystem (Bashir et al., 2010). Out of the 10 species of prey surveyed, no species is abundant in any part of the Barak river system. However, fish abundance is relatively higher in the Kushiya river (Table 2).

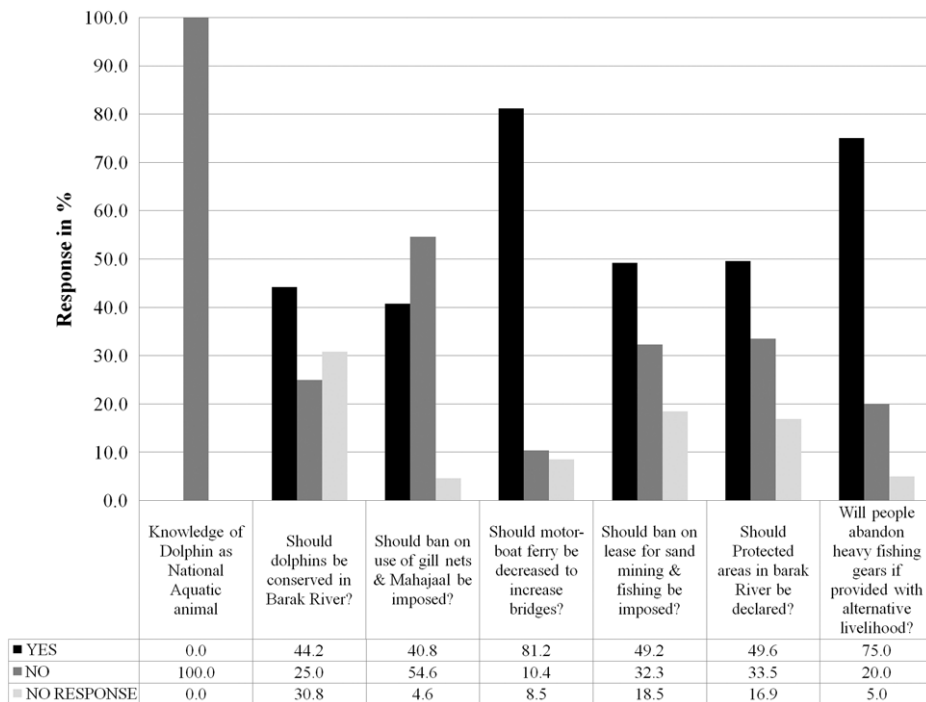


Fig. 2. Response of the local people towards different dolphin conservation issues. The responses are expressed in percentage.

3.3. Physicochemical parameters and bacteriological test

Results of the study on physicochemical parameters of water and the bacteriological test are given in Table 1. In most parts of the Barak river, the level of chlorides was between 40 and 60 ppm. Although the pH in the upper parts (upstream to Silchar town) was between 7 and 7.5, it was in the range of 8–8.5 in the downstream. The confluence of the Jatinga and Barak river had the maximum pH of 8.5–9. From Jatingamukh and downstream, pH was above 8. The highest recorded hardness (ppm CaCO₃) was 120 at sites 4, 5, 6, 7 and 10. The highest recorded turbidity was at Site 13 (25 NTU). Although Site 9 has a comparatively high organic load, as evident from the positive bacteriological test, due to the effluent discharge from the Hindustan Paper Corporation Ltd. (HPCL), Panchgram, Hailakandi, and the cement industry, BVCL, at Badarpurghat, the turbidity is not high (Table 1). The Rosulpur Dhar (Site 11) with the highest nitrate (5–10 ppm) and iron concentration (0.3–0.5 ppm) also showed a positive bacteriological test. Turbidity was high at all the sites studied, with the highest at Amborkhana Dhar. In addition to interference with penetrance of light thereby hampering productivity, turbidity leads to siltation as well.

3.4. Response of local people and fishermen to different conservation issues

Out of the eight different conservation aspects (Fig. 2), apart from the ban on the use of *Mahajaal*, gill-nets, etc., most people were in favor of conservation of the dolphins and their habitat. However, most people are unaware of the status of the dolphins here and are ignorant of the animal.

4. Discussion

Tropical southern Asian regions are not only the habitat for a diverse wild flora and fauna, but also the most populated regions of the world. In addition, most tropical regions of Asia are developing or underdeveloped areas with a large proportion of people dependent directly on the environment for their livelihoods, and southern Assam is no exception. The Gangetic River Dolphin used to be very abundant in the Barak river system of southern Assam a few decades back (Choudhury, 1997, 2013). However, in the recent years, the population has decreased significantly, mainly in the winter seasons, and the last threatened wintering grounds in the Barak river, the Lalmati Dhar and Niyairgram Dhar (Singha et al., 2010), are no longer used as congregation spots, as shown by the present study.

Due to the construction of a sluice gate at the confluence of the Dhaleswari river, the visits of dolphins to this tributary ceased (Choudhury, 2013). In the Katakhal river also, the visits of dolphins have declined since the HPCL was established in 1970. Discharge of effluents from the paper mill – which has an unbearably pungent smell – into the south bank of the Barak river forces the dolphins to prefer the north bank while migrating upstream, thereby missing out the confluence.

The confluences of the tributaries, Chiri, Jiri, Ghagra, Sonai, Badrinala and Jatinga, were previously reported to have small populations of the dolphins, sometimes throughout the year (Choudhury, 2013); however, they no longer congregate at these sites in winter, mainly due to depletion of prey fish species, heavy siltation and excessive sand mining. Moreover, owing to their hill origin, these rivers carry high suspended particle loads which get deposited at the confluences. This not only increases turbidity but also reduces light penetration, raises river beds, and invites sand mining.

Sadarghat Dhar, Niyairgram Dhar, Lalmati Dhar and Narayan Dhar are among the reported wintering grounds of the dolphins, with all the necessary physical features (Singha et al., 2010). However, from 2012 onwards, no dolphin has been sighted by local people or fishermen in the winter months, apparently because of the depletion of the prey fish base. Lalmati Dhar and Narayan Dhar are among the most disturbed places in terms of fishing practices, while Niyairgram Dhar and Sadarghat Dhar are comparatively less disturbed although prey species are still limited. Thus, the Barak river has fewer prey fishes overall to support a resident dolphin population in the winter months.

The bifurcation point of the Barak river at Tinganga (Fig. 1) is among the least disturbed habitats, owing to recent boundary conflicts between India and Bangladesh. The water current, sufficient depth and width, and lesser fishing activity with comparatively higher prey fish abundance make it one of the most important wintering grounds for the dolphins, and they were sighted very often. Also, the levels of nitrates (5–10 ppm) and iron (0.3–0.5 ppm) were high at this site. Most of Kushiara river falls at the India–Bangladesh border in the Karimganj district and is comparatively less disturbed. Although previously reported to have no sightings (Biswas et al., 2007), our survey team has recorded the dolphins from all the Dhars in and around Karimganj town, which is in accordance with Choudhury (2013) and Wakid (2009). The place has high prey fish abundance (Table 2) in addition to river depths and width for dolphin survival, so the dolphins find it suitable to congregate during winter. The dolphins were found to migrate between different Dhars. From the survey on the 10 selected prey species, we found that site 12 had the highest prey fish abundance followed by sites 11 and 10. No species was common in the Barak river, except *M. aor* at site 10. That abundance of prey fishes has a positive correlation to the abundance of dolphins was reported by Bashir et al. (2010) in the river Ganga in relation to the prey fishes *M. armatus* and *C. reba*.

Dolphins were found not to aggregate at any part of the Longai river (Karimganj) in winter, since the river depth and width are less, siltation is high and the fishing intensity is also too high which has led to depletion of prey fishes (Table 2). As per local reports, Amborkhana Dhar is the most preferred site (Site 13), but unfortunately, fishing practices are very rigorous and fishermen generally use gill nets from one bank to another, as the river has lesser width. Thus, this is no longer a good dolphin wintering site.

Out of the 260 local people and fishermen interviewed, nobody knew that the Gangetic River Dolphin is the National Aquatic Animal of India and neither did they know about the present Endangered status of the dolphins. However, they have noticed that the population is decreasing in recent decades. While 25% of people did not want the dolphin to be conserved, thinking that it competes for fishes with them, which is a fact due to lesser prey abundance, 33.5% people think that their livelihood will be devastated if the areas are declared protected and fishing is banned. Since most people are fishermen and use of gill-nets is an easy method of fishing, while use of *Mahajaal* provides more catches per unit effort, especially during winter months, 54.6% people are against banning use of these nets. However, 40.8% people think that *Mahajaal* and gill-nets have led to the present reduction in fish abundance and thus should be banned (Fig. 2). The overall picture is that, although most people want the dolphins to be conserved, protected areas to be created, and sand mining leases to be forbidden, they are reluctant to abandon extensive fishing unless provided with alternative means of livelihood.

From the present study, we find that the major factor that has contributed to the present decline in dolphin prevalence in the Barak river system is depletion of prey fishes, as has been reported from other regions also (Wakid, 2005, 2009; Reeves et al., 1993a,b; Shrestha, 1989; Garg et al., 2013). A large section of people living in and around the rivers are fishermen who generally use gears like *Mahajaal*, gill-nets, *Dheki Jaal*, *Hazari-Hooks*, etc., for catching fish. According to the IUCN Red List, most prey species of the Dolphin viz., *Hilsa ilisha*, *Wallago attu*, (Ng, 2010a), *Mastacembellus armatus* (Rayamajhi et al., 2010), *Eutropiichthys vacha* (Ng, 2010b), *Glossogobius giuris* (Larson and Britz, 2012), are declining. Local reports suggest that the fish catch in the Barak river as well as its tributaries has drastically fallen in the recent years, which is consistent with our findings as well. However, physicochemical parameters reveal that all the sites have conducive habitats for dolphin survival. Other negative factors includes raising of embankments in the river, which leads to settling of silt and sediments at the river beds instead of on the surrounding plains, resulting in a decrease in river depths. In addition, occasional entanglements of the dolphins (generally calves) in fishing nets, deliberate killing for blubber to extract oil, etc., are also prevalent, albeit rare. Lack of awareness and limitation of sufficient data have also contributed to the decline in population.

5. Conclusions and recommendations

Depth and width of the river, along with prey fish abundance and the presence of eddy counter-currents, are the most important criteria for choosing a site for wintering by the dolphins. The present survey recorded no dolphins in the Barak river; while owing to its geographic location on the India–Bangladesh border, the Kushiara river is less disturbed and has comparatively higher fish abundance; and the river – from the point of its bifurcation up to Karimganj town – serves as wintering grounds as well as last refuges and reserves. As the population of the dolphin is in a steep decline, there is an urgent need to conserve the animal and its natural habitats. For the effective conservation of the endangered Gangetic River Dolphins in the Barak river system, the following recommendations are made:

- (i) Restriction in the use of gill-nets, *Mahajaal*, etc., in the present (Tinganga to Karimganj town section) and past (Niyairgram to Lalmati section) dolphin congregation sites should be imposed, especially in the winter months. This is to ensure high prey abundance and minimum accidental deaths of the dolphins.
- (ii) The section between Tinganga and Badarpur (5 km length of river course) should be notified as a protected area and declared as the Barak Dolphin Sanctuary. Biswas et al. (2007) proposed that the Lalmati Dhar–Niyairgram Dhar section should be protected. Since these earlier proposed sites no longer maintain viable dolphin populations and since the sites proposed here have higher prey fish abundance, along with higher depth and width in the river, they are strongly recommended for a dolphin sanctuary. Moreover, the people of this region are comparatively less dependent on fishing than those of other regions, and other anthropogenic activities are less here. Creation of a dolphin sanctuary will therefore not harm a large section of the people.
- (iii) There are many ox-bow lakes that are forbidden parts of the Barak river course, like the *Banskandi Anua*, *Ramnagar Anua*, etc., that can be used for *ex situ* conservation and breeding, as well as tourism development.
- (iv) Full migratory routes of the dolphins in the Barak river system throughout the year should be traced. In addition, abundance of prey populations, hydrological changes, river widths and depths, siltation of the river bed and socio-economic status of the people living in and around dolphin aggregation and migration routes should be studied. Frequent monitoring of the physical and chemical water parameters of the dolphin aggregation sites should be made.
- (v) The proposal for the construction of a dam at Tipaimukh (near the entry of Barak river into the plains of Cachar) will badly hamper the dolphin population, as suggested for other places by Reeves and Leatherwood (1994) and Ahmed (1992). Thus, it should be protested against. Any such dam in the Barak river system will devastate the dolphins more as compared to the others, because the Barak is a totally rain-fed river and the depth in winter decreases so that in certain places it does not exceed 1.5–2 feet. In such a situation, if the dam uses up the water in winter, nothing will be left for dolphins in the mainstream.
- (vi) Pollution and hydrological changes of the Barak river should be minimized and the discharges of the HPCL and BVCL should be checked.
- (vii) The Department of Forest (Govt. of Assam) should not provide leases for fishing and sand mining at the possible wintering grounds of the dolphins.
- (viii) Mass awareness camps should be organized immediately and frequently, and local people should be involved in conservation. Some of them can be trained to conserve the dolphins.

The present study that revealed a grim future for the Endangered Gangetic River Dolphin in the Barak river system of southern Assam and unless proper steps, as recommended, are taken by concerned authorities; it will become locally extinct in the foreseeable future. Moreover, if these or other additional steps are not taken by the competent authorities, then the motto behind declaring the dolphin as the National Aquatic Animal will not be served to the extent desired.

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Author Contribution

MKM and FB contributed to the overall design of the study, field surveys, as well as conception of the idea. BB and US contributed to the field survey, while BB performed testing of the water parameters. MKM contributed to drafting while MKM and FB finally approved the manuscript.

Conflict of Interest

None declared.

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