

Conservation status and distribution pattern of the Indus River Dolphin in River Beas, India

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Manuscript received: 25 March 2014. Revision accepted: 1 April 2014.

ABSTRACT

Khan MS, Pant A. 2014. Conservation status and distribution pattern of the Indus River Dolphin in River Beas, India. *Biodiversitas* 15: 75-79. Decline in the populations of Indus River Dolphins *Platanista gangetica minor* throughout its range of distribution and a perception that it is a 'keystone species' for riverine ecosystem stirred the idea of proposed study. Deficiency of baseline data on its distribution and ecology is a major constraint that this (only known sub-population in India) species' conservation is facing in the country. Thus to ascertain its conservation status and distribution pattern, the study was conducted between December 2010 to June 2012. During the study, three schools of dolphins have been identified, one each along Beas bridge-Gagdewal; Baguwal-Dhunda and Karmowala-Harike that comprised of adult, sub-adult and calves. The occurrence dolphins was found attributed to preferred habitat features such as deep pools, slow water current, abundant prey base and low disturbance.

Key words: Conservation, distribution, dolphin, River Beas

INTRODUCTION

The world's freshwaters are among the most bio-diversified ecosystems, inhabited by almost 6% of described species yet covering only 0.8% of the earth's surface. However, they are also hotspots of endangerment and are experiencing declines in biodiversity far greater than those in other ecosystems (Dudgeon et al. 2006; Strayer and Dudgeon 2010). Similar to their habitat, freshwater dolphins and porpoises are also among the world's most threatened mammals. Freshwater cetacean are distributed among nine river systems or brackish lagoons in Asia, and most of them are listed on the IUCN Red List as Endangered or Critically Endangered (IUCN 2010). After decades of concern about its status, the baiji *Lipotes vexillifer*, is believed to be functionally extinct (Turvey et al. 2007). Its extinction clearly demonstrates the paucity of appropriate approach for cetacean conservation and also questioned the future viability of remaining freshwater cetaceans.

The South Asian river dolphin *Platanista gangetica* occurs in a monotypic genus that includes the Indus River Dolphin *Platanista gangetica minor*, resident in the Indus River system in Pakistan and India, and the Ganges River Dolphin *Platanista gangetica gangetica* found in the Ganges-Brahmaputra and Karnaphuli-Sangu river systems in India, Bangladesh, and Nepal. Both subspecies are listed as Endangered in the IUCN Red List (Braulik 2004; Smith et al. 2004).

River dolphins occupy the top position in riverine ecosystem and hence act as the fulcrum for keeping the balance of its ecosystem. But being found in the world's

most densely populated human environments, river dolphins are among the world's most threatened mammals further their ecological requirements link them to food and water security issues in South Asia (Reeves et al. 2000; Khan 2013). Asian river dolphins have disappeared from much of the historic ranges and are believed to be declining rapidly in many areas where they still occur (Reeves et al. 2000). One such species is Indus River Dolphin locally called as *Bhulan* which is endemic to Indus river system and considered as second most threatened river dolphin after Baiji (Reeves et al. 2000; Khan 2013). Once the Indus River Dolphin was found in approximately 3400 Km of Indus river and its tributaries from the foothills of Himalayas to the limits of tidal zone in Pakistan (Anderson 1879; Braulik 2006).

The continuum of its distribution wrecked into small fragmented sub populations, one such population is reported from Punjab (India) in 2007 between Beas city (N 31°30'30.5" E 75°18'2.5") to Harike Barrage (N 31°9'6.8" E 75°57.8'6.5") and is believed to be the only surviving population of Indus River Dolphin in India (Behera et al. 2008; Khan 2013). According to an estimate the Indus River Dolphin now occupies only one fifth of its former range (Reeves et al. 1991). The species is facing a daunting array of challenges for its survival due to pollution, across river constructions (e.g. dams and barrages), water abstraction, destructive methods fishing and incidental caught into the gillnets of fishermen (Braulik 2006). Use of its meat as food is also reported from Sindh Pakistan, hence classified as endangered in IUCN (Braulik 2004).

Historically river dolphins were found in the wide range of freshwater riverine habitat, their upstream distribution

was constrained by rocky and shallower river habitat while in the downstream they were found till the estuarine zone where the salinity forms a boundary (Reeves et al. 2000). Populations of river dolphins have declined dramatically in past two decades and the trend is still continue, much of their distribution range has already been lost (Reeves et al. 2000; Mohan 1989; Reeves et al. 1993; Smith 1996). The dwindling status of Indus River Dolphins population indicates the ever degrading riverine habitat. Indus river and its tributaries runs through the semi arid and irrigated agriculture landscape, practices like water diversion in canals for irrigation, riverbed extraction further added the stress on riverine ecosystem. Riverine corridors, throughout the range of distribution of Indus River Dolphins, need some sort of protection and the direct dependency of locals on water must be reduced or diverted (Khan 2013).

MATERIALS AND METHODS

Study area

Punjab instead of having semi arid bio-geographical condition supports an impressive range of natural endowments in terms of agro-ecology. The state of Punjab is a drainage basin of Indus river system derives its name *Punj + Aab* (which means the land of five rivers) from five

major tributaries of Indus river (i.e. Sutlej, Beas, Ravi, Jhelum and Chenab). However, after the state's partition in 1947, only Sutlej and Beas flow through it, while Ravi touches it at its north border. Total freshwater ecosystem contributes only 1.71 percent area of the state which includes rivers, lakes, ponds, water logged, and reservoirs etc. Among these, rivers is the most common type of freshwater ecosystem, sharing 69.38 percent of total freshwater area while man-made reservoirs is the second major type of freshwater ecosystem, accounting 13.74 percent of total freshwater area of state.

The *Beas River* originates in the Rohtang pass of the Himalayas in the central Himachal Pradesh in India at an altitude of 3977.64 m and flows for the length of 470 km before uniting with the Sutlej river at Harike Pattan south of Amritsar in Punjab. The surveyed stretch falls in three districts of Punjab namely Amritsar, Tarntaran and Kapurthala between 31°30' and 75°18' N Latitude and 31°10' and 74°58' E Longitude . The altitude of the area ranges between 217 m and 195 m above sea level (Figure 1). All through its course, a strip of shallow alluvial soil fringes its banks which are subject to inundation during the rainy season. The main channel of the river is broad, dotted with islands and wide pools. The depth of water varies from about 1.5 m during the dry seasons to about 4.5 m during the rainy seasons.

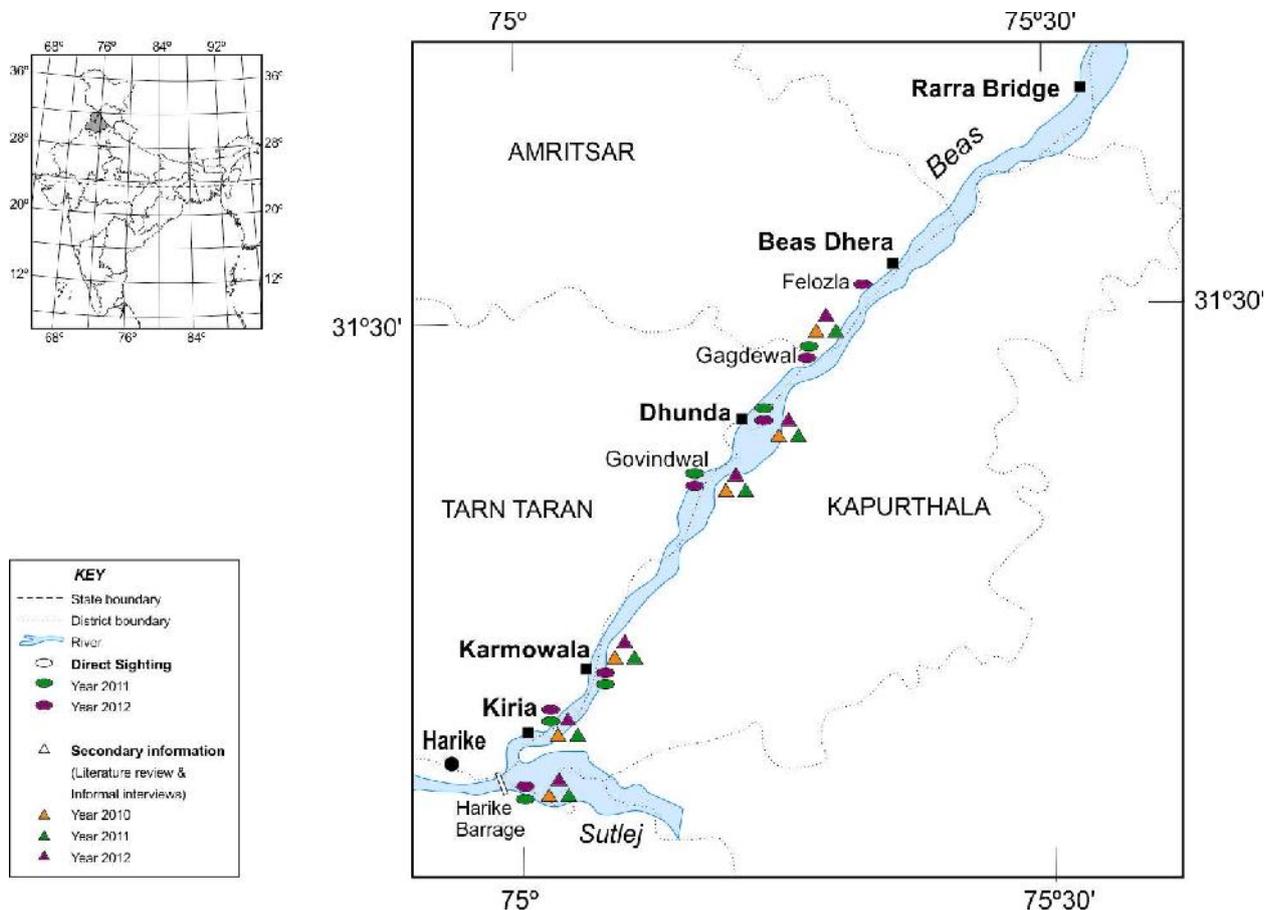


Figure 1. Sighting records of Indus River Dolphin in River Beas and Harike wetland, Punjab.



Figure 2. The habitat of Indus River Dolphin

As the river flows downwards the sandiness of the substrate gets reduced. The linear riparian habitats of the river stretch comprise of flowing water, islands and banks, hold a good variety of fauna. Large congregation of birds can be seen during winters. Among the mammalian community the area is known to support small populations of Bluebull *Boselaphus tragocamelus*, Wild Boar *Sus scrofa* and Golden Jackal *Canis aureus*. Reptilians like Indian Star Tortoise *Geochelone elegans* and Monitor Lizard *Calotes benghalensis* and several poisonous and non-poisonous species of snakes are also reported to occur in the drier parts such as grasslands and the agricultural fields adjoining the river stretch (Figure 2).

Primary data collection

The monthly intensive surveys for Indus River Dolphin population count were conducted since December 2010. River stretch was divided into 5km sampling segments. At each segment presence/absence of Indus River Dolphin was recorded, habitat parameters were quantified and disturbance was assessed. The field team consisted of three observer (including one researcher and two field assistants) and a boatman. Smith and Reeves (2000) survey methods for wide channel were followed. Boat speed was maintained at 8-10 km in a downstream direction following the deepest channel with a zigzag pattern from bank to bank. Although 3 observers were used at a time, 2 searched 90° off the right and left beam of the vessel and 1 rear observer, searching 180° behind the survey vessel. Positions of observers were rotated every 30 minutes to avoid fatigue. Vessel speed was reduced in preferred dolphin microhabitats, viz, confluences, meanderings, downstream of mid-channel islands and where there is large aggregation of fishermen or water birds (Wakid and Braulik 2009).

A dolphin group was defined if dolphins were not more than 1000 m apart, A 20 minute stoppage was made in areas of high dolphin abundance to make a more accurate group size estimate. All sightings were confirmed by a second observer.

Secondary data collection

As a part of the survey, informal interviews were conducted at every encounter with locals to seek information on dolphin occurrence in the stretch. Questionnaire was oral, informal and centered on colored plates of authentic field guides on Indian mammals. The questionnaire survey included following procedures: (i) Having people identify local aquatic mammals from pictures. (ii) Asking for physical description of Dolphins. (iii) If the respondents were found to be positive they were investigated further for supplementary.

RESULTS AND DISCUSSION

Field assessments examined the possible existence and conservation viability of the only reported breeding population of the Endangered Indus River Dolphin. Observations showed that dolphins occur in River Beas and the Harike wetland (Figure 1). A total of 16 sighting frequencies were possible during the study period. These sightings were largely concentrated in zones Karmowala-Harike [$f = 5$]; Baguwal-Dhunda [$f = 5$]; Gagdewal-Baguwal [$f = 3$] and Beas bridge-Gagdewal [$f = 3$] (Figure 1). 3 groups were identified, one each along Beas bridge-Gagdewal; Baguwal-Dhunda and Karmowala-Harike that comprised of adult, sub-adult and calves (Figure 1). On 6 occasions adult Dolphins were recorded solitary. During the course of the study opportunistic sightings of adult

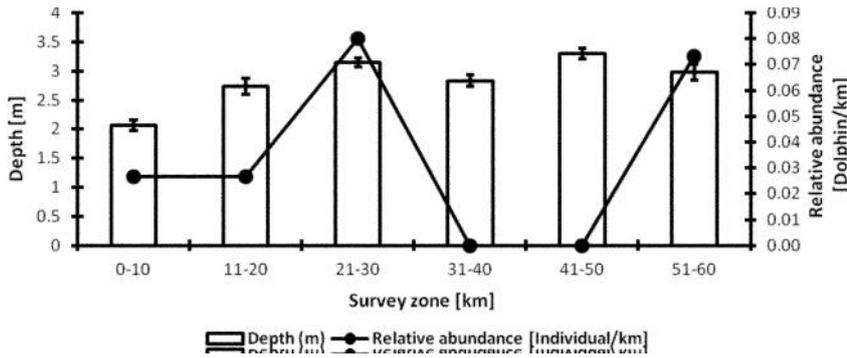


Figure 3.A. Dolphin occurrence was found strongly associated with deep pools

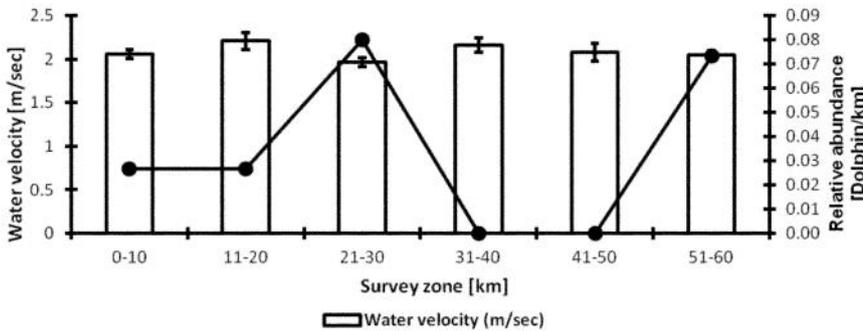


Figure 3.B. Dolphin occurrence was found strongly associated with slow water current

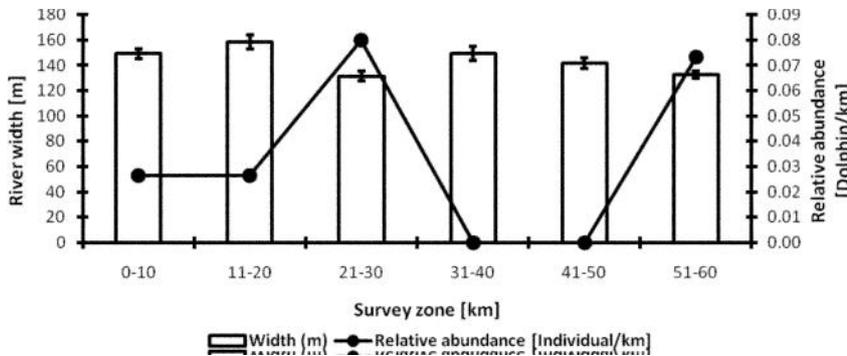


Figure 3.C. Dolphin occurrence was found strongly associated with moderate to wide river width

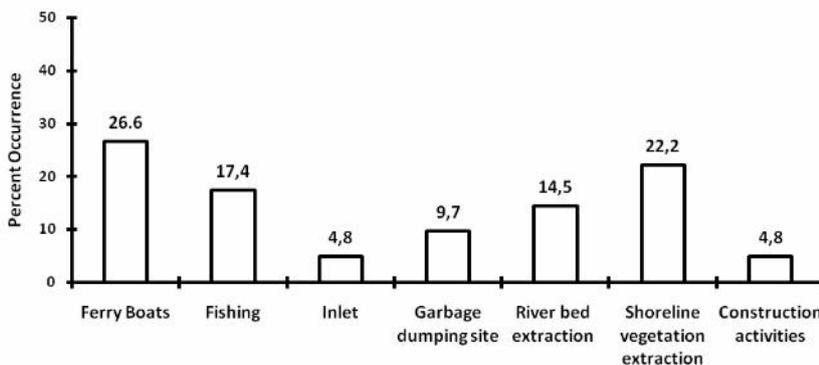


Figure 4. Percent occurrence of recorded disturbances

Dolphins were also recorded, 4 at Harike Wildlife Sanctuary while 2 at Karmowala. These opportunistic sighting records have been excluded from the analyses.

Unlike many marine dolphins, Indus River Dolphins do not form easily defined, interactive groups. Instead, they are frequently observed in loose aggregations with little apparent interaction between individuals (Braulik 2006). Their occurrence has been attributed to preferred habitat features such as deep pools, slow water current, abundant prey base and low disturbance. During the study period, dolphins were generally sighted in loose groups of 2-3 individuals at three different sites in river Beas and they preferred habitats with deep pools [$t = -2.82$; $p < 0.01$], slow water current [$t = 4.49$; $p < 0.001$] and moderate to wide river width [$t = -2.30$; $p < 0.01$] (Figure 3.A; 3.B, and 3.C). The available habitat recorded suitable for Indus River Dolphin *Platanista gangetica minor* and other associated fauna is limited and disturbed. Peripheral areas of the sanctuary are more vulnerable from disturbances; hence on urgent basis such habitats must be conserved.

Destructive anthropological activities further intensify the pressure on their fragmented small populations. In current scenario river dolphins and their habitat are facing a series of serious problems which need to be estimated and mitigated. The problems includes (i) extensive of fish throughout their range of distribution which consequently reduces the availability of their prey. (ii) Degradation of their habitat through increased sedimentation, which is usually caused due to the deforestation of river basin. (iii) Industrial and human waste. (iv) Agricultural runoff with high concentration of chemical fertilizers and poisonous pesticides. (v) Accidental entanglement in fishing nets causes the death of dolphins. (vi) Construction of large, cross river water development structures, for example dams and barrages causes the isolation of small fragmented sub-populations and perhaps, is the

most deadly threat to river dolphins (Khan 2013; Reeves et al. 2000).

Data were collected on 7 variables perceived as disturbance toward the existing population of Dolphins in the study area. Disturbance factors like Ferry boats (26.6%), shoreline vegetation extraction (22.2%), commercial fishing (17.4%) and riverbed substrate extraction (14.5%) were founded extensively during the field visits while garbage dumping sites (9.7%), inlets (4.8%) and backsides construction (4.8%) were recorded in small magnitudes (Figure 4).

Water systems particularly rivers are witnessing the landslide changes in the land use and land cover of their basins. Urbanization, industrialization, modern agricultural practices, hydro developmental projects and other developmental activities ensures the better human access to water but unfortunately, it often accompanied by impairment to ecosystem and its biodiversity with potentially serious cost which are usually unquantifiable (Abell et al. 2008). Proposing interventions to halt this degradation to the rivers includes scientific assessment of their biodiversity, strict implementation of conservation laws of the land together with ensuring the sustainable to fulfil the needs of the society (Vorosmarty et al. 2010).

CONCLUSION

The finding of this study emphasizes on the relationship of riparian communities and natural resources and indicates activities which detrimentally affect the habitat and should be discouraged. The detailed approach adopted in the present work is clearly necessary to begin to understand the precise relationships between species distribution, ecology and habitat attributes-information that is essential for conservation measures and the implementation of management practices. Riparian communities with a stake in the long term future of the freshwater species and habitats across the region must be fully engaged in the development and conservation planning processes in order to assure the future sustainability of associated livelihoods and the ecosystem services provided by fully functioning freshwater ecosystems.

ACKNOWLEDGEMENTS

We take this opportunity to express my gratitude to the Nokia Corporation for funding this study. We also acknowledge the Department of Forests and Wildlife Preservation, Government of Punjab for granting permission to conduct this study in area of its jurisdiction and for field support. Authors are grateful to Ravi Singh (SG & CEO, WWF India), Dr. Sejal Worah (Programme Director, WWF India) and Dr. Asghar Nawab (Senior Coordinator, River Basin Division, WWF India) and colleagues for their helpful suggestions on the study.

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