

## Conservation threats of the Gangetic Dolphin *Platanista gangetica gangetica* in River Kulsi, A Tributary of Brahmaputra, Assam, India

Shah Nawaz Jelil<sup>1,2\*</sup>

<sup>1</sup>Animal Ecology and Wildlife Biology Lab, Department of Zoology, Gauhati University, Guwahati-14, Assam, India.

<sup>2</sup>Kalpadroom Foundation, 32, Arunodoy Path, Christianbasti, Guwahati-5, Assam, India

### ABSTRACT

A site-specific threat assessment of the gangetic dolphin was carried out in river Kulsi. Threats were identified by extensive literature survey and direct observation in field. Twelve threats were identified after the study. The study was a fervent attempt to identify the threats and prepare a detailed list of these threats faced by the cetacean in Kulsi. The study reiterates that Kulsi is one of the last refuges of the gangetic dolphin and that the threats faced by the animal in this river are to yet to be acknowledged by the concerned authorities in order to conserve this species.

**Keywords:** Brahmaputra, Conservation threats, Gangetic Dolphin, Kulsi, Site-specific threats

### INTRODUCTION

Kulsi is considered as one of the last refuges of the gangetic dolphin in the state of Assam. River Kulsi, though burdened with sand mining and a fast changing environment, still acts as a potential habitat for the gangetic dolphin. Wakid (2005) reported a best estimate of 27 dolphins in Kulsi, in 2008 his team in the same river stretch, recorded a best estimate of 29 dolphins. Earlier studies in Kulsi on the gangetic dolphin have been limited to population assessment, abundance estimate, etc. Studies did aim to identify threats faced by the cetacean in this river, but results showed no detailed list of disturbances or threats. Considering its current state, river Kulsi was assessed to ascertain the threats

concerning the river dolphin conservation. Since, endangered species conservation requires many lines of inquiry to provide the evidence required for a holistic approach to conservation planning (Sutari, 2009), the findings of the site-specific threat assessment of the river dolphin in river Kulsi are reported here.

### MATERIALS AND METHODS

Conservation efforts should be globally planned; local databases and information are vital for effective conservation work plans. The study was an attempt to identify threats faced by the gangetic dolphin in river Kulsi so as to provide a basis to make an

\*Corresponding author's Email: shahnawazjelil@gmail.com

effective conservation work plan. The identification of threats combined two approaches, (a) Extensive literature survey: To gather information on ecology and threats of the river dolphin, an extensive literature search in Google Scholar and the Gauhati University library was conducted.

(b) Field surveys: The field team fragmented the whole river into six sample sites, namely Satpakehli, Kukurmara, Gumi, Samaria, Champupara and Nagarbera. All surveys were land based surveys. This included observation from high platforms on the banks of the river and walking along the river bank. Surveys were daylong and 12 surveys were carried out in total.

## RESULTS AND DISCUSSION

The study was year long and hence all the stresses that were identified were spread around the year. This means that some of the stresses were concerning only in certain seasons. For example, receding water levels. Two main types of stresses

were identified i.e., Natural and anthropogenic. Twelve site-specific threats to the Gangetic dolphin were identified during the year long study (Table 1). All these stresses were not observed in all the sample sites. Some sites faced more stresses than other sites (Table 2). Table 1 lists all the stresses and threats identified during the study (i.e. in literature survey and field observations). Some were not observed during the field survey but are obvious threats as indicated by literature (e.g. we did not encounter any dolphins entangled in fishing nets or poached by human). It is evident that all these threats are indeed present in Kulsī. A related disturbance observed during the study was the deteriorating condition of the adjoining wetlands. It is said that wetlands are more precious than trees to maintaining global warming. These are the heart of rivers. Kulsī is surrounded by a large number of wetlands. These serve as prey resource for the dolphin. The degradation of the adjoining wetlands is also reported by Goswami and Ali (2009).

**Table 1.** Showing the identified threats/disturbances in river Kulsī

Nature of disturbances	Types of disturbances	Code
Natural	River bank erosion	E
	Receding water level	R
Anthropogenic	Fishery by-catch	F
	Sand mining	S
	Overfishing	F <sub>o</sub>
	Motor boats	B <sub>m</sub>
	Vessel strikes	V
	Siltation	S <sub>i</sub>
	Dams, barrages, embankments	D
	Introduction of invasive species	I
	Poaching	P
	Pesticide Use in Riparian Areas	P <sub>c</sub>

**Table 2.** Showing the observed threats in the sample sites respectively

Sample Sites	Observed threats (Code)
Satpakheli	E, R, F, S, F <sub>o</sub> , P <sub>e</sub>
Kukurmara	E, R, F, S, F <sub>o</sub>
Gumi	R
Samaria	E, R, F, F <sub>o</sub>
Champurpara	E, F
Nagarbera	E, B <sub>m</sub>

Code Source : Table 1.

Out of all the sites surveyed, Satpakheli was burdened with the most of number of disturbances viz., river bank erosion, receding water level, over fishing, sand mining, wooden canoes operating the sand mining and use of pesticides in the riparian areas. The study reiterates that the stretch from Ghoramara to Kukurmara is crucial from the conservation point of view. This stretch needs immediate attention.

Concerning natural phenomenon observed in Kulsi are river bank erosion and receding water levels during the pre-monsoon period. Field surveys show that the river in the pre-monsoon season becomes so shallow that the team literally crossed the river on foot in certain areas. These sample sites were Samaria and Satpakheli. Most of the tributaries namely, Boko river, Botha river, Singra river dry up completely in this season risking the very survival of the dolphin in these areas. However in the monsoon season, handsome number of dolphins were observed in these sites.

The threats are discussed below in detail:

**Receding water levels:** All freshwater cetaceans require adequate water flow and water quality within their range; these are the basic elements of a suitable habitat and are needed by the animals to support their physical health, mobility and ability to forage efficiently. It is important to determine which habitats are preferentially used by dolphins during the low-water season so that

conservation efforts can be focused in these locations. In the dry season, channel constrictions, confluences and channels with high cross-sectional areas are all high-use dolphin habitats that could benefit from management as discrete dolphin conservation zones (Sinha & Kannan, 2014).

**River bank erosion:** River bank erosion is also concerning in all the sample sites except Gumi. The erosion causes siltation. Felling of trees on the river is not only a disturbance for the dolphins but also concerns the whole of the aquatic ecosystem. It stops the normal flow of the river, in some cases it might even change the direction of the flow.

**Sand mining:** Mohan *et al.* (1998) reported sand mining as the greatest threat to dolphins in Kulsi river. He reported that the population was declining from 1992 to 1995 at a rate of 14–29%. Another disturbing fact is that the major livelihood of the villagers in this area is sand mining, not fisheries as is the case in all other dolphin habitats of Assam. Although the high rate of sand mining is one of the major disturbing factors to the dolphins of Kulsi, Wakid and Braulik (2009) in their report are of the opinion that it has had the effect of maintaining or possibly increasing the depth of the river which may have a positive effect on the dolphins. Whether sand mining is a threat or a hidden bliss for the river is still under question.

**Dams, barrages and embankments:** Dams, barrages and embankments are also evident threats to the river dolphins. Kulsī multipurpose project is proposed to have a 42 m high dam with installed capacity of 29 MW by Brahmaputra board, Ministry of Water Resource. The Kulsī Multipurpose Project envisages construction of an earthen dam across the river Kulsī at about 1.5 km downstream of Umkiām village in Assam. This dam construction will destroy all the resources including dolphin and fish of the river (Goswami & Ali, 2012). Construction of at least 50 dams and barrages within the known or suspected historical range of the Ganges dolphin (Smith et al. 2000) has dramatically affected its habitat, abundance, and population structure during the last 45-50 years. Dams and barrages restrict the movement of dolphins, rendering them isolated into separate sub-populations. Embankments cause sediment deposits in the riverbed instead of in floodplains, thereby eliminating or reducing the extent of the eddy-counter currents, where dolphins are generally found (Smith et al. 1998). The embankments also restrict access of riverine fishes to the floodplain habitat critical to their reproduction and growth (Boyce, 1990). The cumulative effects of these projects/activities compromise the ecological integrity of the riverine ecosystems, especially the small tributaries where the suitable habitat is limited and disproportionately vulnerable to local disturbance. Declining flows in the rivers have received little attention for a long time. The newly established National Ganga River Basin Authority by the Indian government in 2009, an apex body under the chairmanship of the Prime Minister of India, has the mandate of “*Aviral Dhara Nir-mal Dhara*” (uninterrupted quality flow). Such efforts may help restore the riverine environment (Sinha & Kannan, 2014).

**Pesticide dumping:** Rivers are generally in

close proximity to human activities and, therefore, are ultimate sinks for the discharge of sewage and industrial wastewater that emanates from human activities. In Kulsī most riparian zones are agricultural fields where use of pesticide was common. These pesticides make their way to the river ultimately. It was found that gangetic dolphins have a low capacity to metabolize some toxic pollutants. The proximity to intense pollution sources and low capacity to metabolize pollutants make the gangetic dolphins vulnerable to the effects of chemical pollution. Several studies have shown that some freshwater aquatic mammals, such as mink and river otter, are very sensitive to the effects of chemical pollution (Kannan et al. 2000). Thus, studies are needed to assess the impact of pollutants on the health of river dolphins. In addition to the contaminants that arise from sewage pollution and diseases in river dolphins should be examined in future studies.

**Fishery by-catch and poaching:** These are disturbing activities in Kulsī, as well. Fishery by-catch is incidental whereas poaching is deliberate. Mortality from fishing gears, especially monofilament nylon gillnets, is a severe problem for the gangetic dolphins throughout their range (Sinha, 2002). Dolphins are particularly vulnerable, because their preferred habitat is often in the same location as the fishing grounds. A specific problem is that, because dolphin oil is highly valued as a fish attractant, fishermen have a strong incentive to kill any dolphin found alive in their nets and even to set their nets strategically in the hope of capturing dolphins, which is termed “assisted incidental capture” (Sinha, 2002). Meaningful quantitative data on the magnitude of catches, either deliberate or incidental, are unavailable and unlikely to become available in the absence of organized fishing in the river system. Most of the riverine villagers

in remote areas believe that dolphin oil has medicinal value and they use it to treat different rheumatic diseases (Wakid, 2005).

**Motor boats:** The operation of motor boats was observed in Nagarbera, close to the confluence of river Kulsī and Brahmaputra. The effects of motor boats on river dolphins are not yet well understood, but they do cause a lot of noise pollution. gangetic dolphins in some parts of Ganga show longer surfacing time-intervals than normal in presence of motor boats, i.e. they remain under water for longer (Kelkar, N. pers. comm. September 2014). Jelil (2013) reported that sites with noises of motor boats or other machines such as motor water pipes showed a decreased number of or no dolphins in river Brahmaputra.

**Exotic species:** Presence of potentially harmful exotic co-predators of the dolphins are reported by Goswami and Ali (2012) in Kulsī. Abundant number of the Thai Catfish or locally called *Thailand magur* (*Clarius garripinius*) are present in Kulsī. Other exotic fishes reported by Goswami and Ali (2012) are common carp (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idella*), Silver carp (*Hypophthalmichthys molitrix*), Big head carp (*Hypophthalmichthys nobilis*) and Japāni kawai (*Oreochromis mossambica*). The presence of exotic co-predator species such as the Thai Catfish proves the presence of inter-specific competition, which could become rigorous in scarcity of various resources that they equally depend upon. Thai Catfishes are reported to injure turtles in Hajo Pond, Assam, biting off flesh from the hindlimbs and forelimbs. (Malakar, P. pers. comm. June 2012). This exotic species may harm the dolphins as well, which are much more fleshier and vulnerable than the turtles. So they not only compete for the same resources as the dolphin but can also potentially injure/harm them physically.

## CONCLUSION

The study identified a total of 12 threats faced by the dolphins in river Kulsī. Six sites were surveyed in this study. Studies carried out in different sites than the sample sites of this study may reveal new and more threats faced by the dolphins. Regular monitoring may also increase the list of threats. Concerned authorities must take note of all these threats. The need of the hour now is to come up with a conservation plan to stop or at least decrease the magnitude of the effects of these threats.

## ACKNOWLEDGMENT

I thank Pranjal, Shakeel and Mr. Jahangir Hussain for their invaluable help in the field.

## REFERENCES

- Bashir, T., Khan, A., Behera, S. K., and Gautam. P. 2010a. Socio-economic factors threatening the survival of Ganges River Dolphin *Platansita gangetica gangetica* in the Upper Ganges River, India. *J. Threat. Taxa*. 2: 1087–1091.
- Boyce, J. K. 1990. Birth of a megaproject: political economy of flood control in Bangladesh. *Environmental Management* 14: 158–165.
- Goswami, C and Ali, S. 2012. Ichthyofaunal Diversity of Kulsī River: Prime Habitat of Dolphin. *Biological Forum*. 4(2):38–44.
- Jelil, S. N. 2013. Population Survey of Ganges River Dolphins in River Brahmaputra from Palashbari to Kuruā. M. Sc. 1<sup>st</sup> semester dissertation report. Gauhati University. 43 pp.
- Kannan, K., Blankenship, A. L., Jones, P. D., and Giesy, J. P. 2000. Toxicity

- reference values for the toxic effects of polychlorinated biphenyls in aquatic mammals. *Human and Ecological Risk Assessment* 6:181–201.
- Mohan, R. S. L., Dey, S. C., Bairagi, S. P., and Roy, S. 1997. On a survey of the Ganges River Dolphin *Platanista gangetica* of Brahmaputra River, Assam. *The Journal of the Bombay Natural History Society* 94: 483–495.
- Mohan, R. S. L., Dey, S., and Bairagi, S. P. 1998. On a resident population of the Ganges River dolphin, *Platanista gangetica* in the Kulsī River (Assam), a tributary of Brahmaputra. *The Journal of the Bombay Natural History Society* 95: 1–7.
- Roy, S. 2000. Studies on the ecology of the Gangetic River Dolphin *Platanista gangetica* (Roxburgh, 1801) in the Kulsī river of Assam. Ph.D. Thesis. Gauhati University.
- Sinha, R. K. 2002. An alternative to dolphin oil as a fish attractant in the Ganges River system: Conservation of the Ganges River dolphin. *Biological Conservation* 107: 253–257.
- Sinha, R. K., and Kannan, K. 2014. Ganges River Dolphin: An Overview of Biology, Ecology, and Conservation Status in India. *Ambio*. ISSN 0044-7447. DOI 10.1007/s13280-014-0534-7.
- Smith, B. D., Diyan, M. A. A., Mansur, R. M., Mansur, E. F., and Ahmed, B. 2010. Identification and channel characteristics of cetacean hotspots in waterways of the eastern Sundarbans mangrove forest, Bangladesh. *Fauna and Flora International*. *Oryx* 1–7. DOI 10.1017/S003060530990159.
- Sutari, D. 2009. Species Conservation in a Complex Socio-Ecological System: Irrawaddy Dolphins, *Orcaella brevirostris* in Chilika Lagoon, India. PhD thesis, School of Earth and Environmental Sciences, James Cook University, Townsville, Australia. Pg. 10.
- Turvey, S., Pitman, R. L., Taylor, B., Barlow, J., Akamatsu, T., Barrett, L. A., Zhao, X., Reeves, R. R., Stewart, B. S., Wang, K., Wei, Z., Zhang, X., Pusser, L. T., Richlen, M., Brandon, J. R., Wang, D. 2007. First human-caused extinction of a cetacean species? *Biology Letters* 3: 537-540.
- Wakid, A. 2005. Status and distribution of newly documented residential Gangetic Dolphin (*Platanista gangetica gangetica*) population in eastern Assam. *The Journal of the Bombay Natural History Society* 102: 158–161.
- Wakid, A. and Braulik, G. 2009. Protection of endangered Ganges river dolphin in Brahmaputra River. Final Technical Report submitted to IUCN-Sir Peter Scott Fund, 44 pp.