

# Conservation of Indus River Dolphin (*Platanista gangetica minor*) in the Indus River system, Pakistan: an overview

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## KEYWORDS

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## ABSTRACT

The Indus River dolphin (*Platanista gangetica minor*) is one of the world's most threatened cetaceans. It is endemic to the Indus River System in Pakistan. Its population is fragmented into five sub-populations due to six irrigation barrages on the Indus River. The largest sub-population of this subspecies is found between Guddu and Sukkur barrages, legally designated as the Indus Dolphin Reserve. The habitat of this subspecies is reduced to one fifth of its historic distribution range. The main threats to the Indus Dolphin are illegal fishing, water pollution and stranding in irrigation canals. There is also a potential risk of inbreeding due to the confined population in the Indus Dolphin Reserve. Escalating illegal fishing activities in Sindh Province are the consequences of revised fisheries legislation, which subsequently increased dolphin mortality in its high density areas. Illegal fishing practices include overnight netting across the river and use of poisonous pesticides to maximise fish catches, and both of these activities have increased dolphin bycatch in Sindh Province.

## Introduction

The Indus River Dolphin (*Platanista gangetica minor*) is a global priority, endangered subspecies of freshwater cetacean endemic to the Indus River System in Pakistan (Rice, 1998; Smith and Braulik, 2008). The Indus River Dolphin is the second most endangered obligate freshwater dolphin population, falling only after the 'functionally extinct' Yangtze River Dolphin. The demise of the Yangtze River Dolphin is a tragic reminder of the river dolphin's sensitivity to anthropogenic activities occurring in and around its habitat, and the need for its formal protection and conservation on a national level (Smith and Braulik, 2008). The South Asian River Dolphins, Family Platanista, were first described in 1801 by Lebeck. The Indus and Ganges River Dolphins were regarded as a single species until 1970. Further studies were conducted based on differences in skull structure, vertebrae and lipid composition and hence scientists declared the two populations as separate species in early 1970's (Pilleri *et al.*, 1982). In 1998, the validity of the earlier studies was questioned and the classification reverted to the pre-1970 consensus of a single species containing two subspecies until the taxonomy could be resolved using modern techniques such as molecular sequencing. Hence, presently, there are two subspecies recognised in the genus *Platanista*; *Platanista gangetica minor* (the Indus River Dolphin) and *Platanista gangetica gangetica* (the Ganges River Dolphin) (Kasuya, 1972)

The Indus River Dolphin is characterised by a long beak, rounded belly, stocky body, very small dorsal fin and large flippers. Although its eye has not developed a lens (this subspecies is also referred to as the "blind dolphin"), the dolphin still uses its eyes to differentiate between light and dark. It relies on echolocation to find fish, shrimp, and other prey in, or near, the bottom mud (Smith and Braulik, 2008). The Indus River Dolphin swims on its side, at times enabling it to move in water as shallow as 30 cm. As it swims on its side, it trails a flipper along the bottom of the river. After 30 to 60 seconds or more, it swims to the surface, rotates upright to take in air, and then rotates 90 degrees again as it swims back to the bottom. This unique side swimming behaviour is not consistently seen in any other dolphin, except the Ganges River Dolphin. Before the dolphin habitat became permanently fragmented, dolphins migrated upstream into the smaller tributaries during the monsoon rains and migrated downstream to the main channels in the dry season (Bhaagat, 1999). The Indus River Dolphin weighs

70-110kg (155-245lbs). The maximum size is approximately 2.5m (8.2ft), with males slightly smaller than females (Kasuya, 1972).

The current distribution range of the Indus River Dolphin comprises of 1500km from Jinnah Barrage to Kotri Barrage. The largest population consisting of about 1200 individuals exists only in about 200km of the Indus River in Sindh Province, making the existing population extremely vulnerable to risks such as disease outbreak, water pollution and inbreeding depression. The habitat of Indus River Dolphin is reduced to one fifth of its historical range (Reeves *et al.*, 1991) and this remaining habitat is degraded primarily due to shortage of water caused by its diversion to meet growing agricultural needs in a semi arid country. This also reduces the flow in the river, thus concentrating pollutants and increasing the chances that they will accumulate in the dolphins blubber. The population of the Indus River Dolphin is divided in sub-populations because of the six barrages constructed on the River Indus. Canal stranding, contamination due to industrial waste and agrochemicals, unsustainable fishing and net entanglements also contribute to the species endangerment. Dolphins are often caught in fishing nets accidentally. In the past these animals were targeted and harpooned by local fisherman for bait, medicine, and meat and oil for consumption (Anderson, 1879; Pilleri, 1972; Bhatti & Pilleri, 1982).

WWF – Pakistan has been working with Punjab, KP and Sindh Wildlife Departments in collaboration with communities to conserve the species. WWF – Pakistan especially worked on Indus River Dolphin Conservation Project and the Pakistan Wetlands Programme to help conserve the endangered species in its entire range. This work focused on the root causes of biodiversity loss, specifically linking the protection of the Indus River Dolphin with measures in the agricultural and fisheries sectors. The purposes of these projects and programmes was to work in close coordination with key stakeholders and local communities particularly those living along the main river.

## Material and Methods

### Study Area

The Indus River is one of the world's largest rivers, extending from the Himalayas to the Arabian Sea. In its upper reaches, the river

runs a course through the Ladakh region of Jammu and Kashmir, Gilgit and Baltistan. After leaving behind the mountains, it flows in a southerly direction along the entire length of Pakistan to merge into the Arabian Sea near the port city of Karachi in Sindh. The total length of the river is 3,180 km (1,980 mi).

**Assessments**

Indus River Dolphin population assessment surveys were conducted in 2001 (Braulik, 2006), 2006 (Braulik *et al.*, 2012) and 2011 (WWF unpublished). General methods followed to assess dolphin population were those described by Smith and Reeves (2000), subsequently modified and improved to correct for missed animals (Braulik *et al.*, 2012). Standardised survey protocols were adopted including tandem direct count surveys and mark recapture analysis. The surveys included a direct count, an estimate of absolute abundance, a correction factor to account for missed animals and estimate of encounter rate dolphins/km.

Dolphin mortality data were collected using wildlife offence record, dolphin stranding record, direct observations and through community-based information.

**Results**

**Abundance of dolphins in 2001, 2006 and 2011**

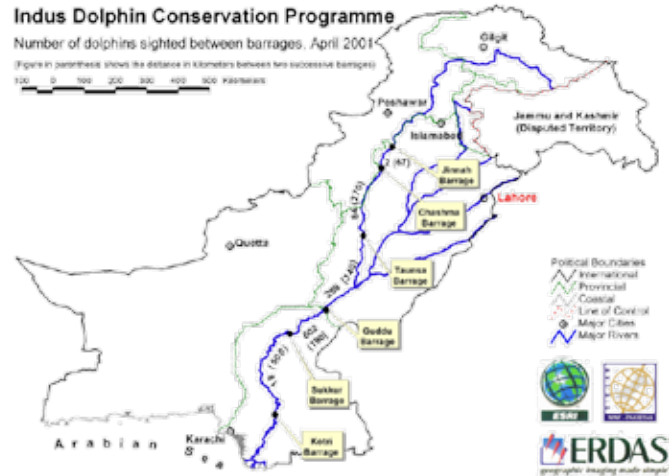
In 2001, dolphin direct counts obtained from five Indus Dolphin subpopulations were: Jinnah – Chashma (2); Chashma – Taunsa (84); Taunsa – Guddu (259); Guddu – Sukkur (725) and Sukkur – Kotri (18) (Braulik, 2006). The metapopulation was estimated to number approximately 1200.

In 2006, a more complex survey method was adopted which generated both direct counts and those corrected for missed individuals. Direct counts recorded in each Indus Dolphin subpopulation were as follows: Jinnah – Chashma (1); Chashma – Taunsa (82); Taunsa – Ghazi Ghat (44); Guddu – Sukkur (1,289) and Sehwan – Kotri (4). The corrected estimates for the three largest Indus River Dolphin subpopulations were estimated 101 (CV=44.1%) between Chashma and Taunsa barrages, 52 (CV=14.9%) between Taunsa barrage and Ghazi Ghat, and 1,289 (CV=33.4%) between Guddu and Sukkur barrages. The metapopulation was estimated as 1,550 – 1,750 individuals in 2006 (Braulik *et al.*, 2012). Figure 1 & 2 show results of population abundance in various sections of the Indus River.

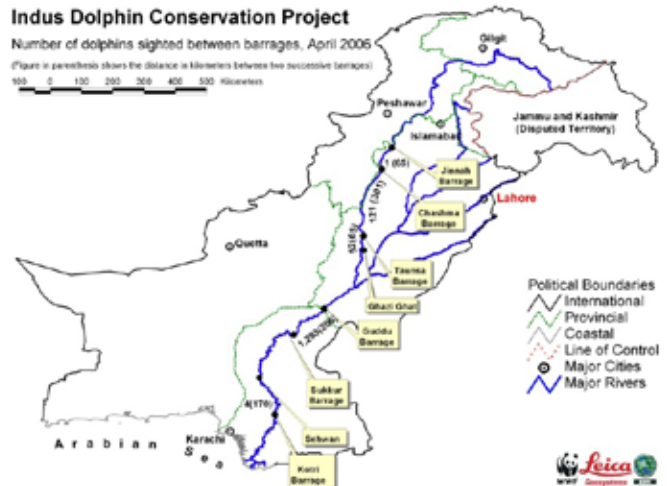
The complete statistical analysis is yet to be conducted on the 2011 survey data but direct counts of Indus River Dolphins between Guddu to Sukkur were lower than in 2006 and 2001. While a non standardised direct count survey method adopted for the section between Taunsa to Guddu counted more dolphins than the previous survey in 2001.

**Canal stranding and rescues of Indus River Dolphins**

Dolphin movement is not restricted to the main stretch of the Indus River only. It frequently moves back and forth in irrigation canals and other tributaries of the Indus River. Stranding occurs when canal gates are closed and due to sudden decrease in water level, dolphin gets stuck in small water pools. The level of water during rescue operation significantly affects its success. The lower the water level, higher the chances of successful rescues. Timely reporting of the stranded dolphin is highly important for its successful rescue. Dolphin can suddenly die due to stress and shock during rescue operations. Dolphin rescue operations were started in 1992 in collaboration with the Sindh Wildlife Department. A total of 137 stranding cases were reported from 1992 to 2012. Out of 137 stranded dolphins, 103 dolphins were rescued successfully, while, 34 dolphins died during the rescue. Figure 3 shows percentage of successful rescue operations from 1992 to 2012.

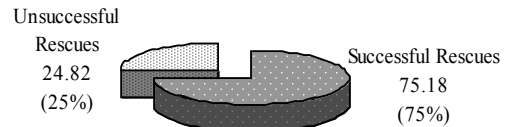


**Figure 1:** Estimate of dolphin population in various sections of the Indus River, 2001



**Figure 2:** Estimate of dolphin population in various sections of the Indus River, 2006

**Success Rate (percentage) of Dolphin Rescue Operations (1992 - 2012)**



**Figure 3:** Success rate (percentage) of dolphin rescue operation from 1992 to 2012

**Increased mortality of Indus River Dolphins**

The Indus River Dolphin mortality has increased dramatically after the devastating flood in 2010. Most of the dead dolphins were found in the mainstream of the Indus River, either along the banks or trapped against the Sukkur Barrage. The local fishermen and fish contractors (who are mostly among the influential lords living along the river) have intensified the fishing practices using illegal means violating laws of fisheries and wildlife. There are also some unconfirmed reports of more deaths along the river stretch particularly between Guddu and Sukkur barrage. Figure 4 shows

the total number of dolphins died from 1993 to 2011. The highest mortality is recorded in 2011 with a total number of 45 dead dolphins. A total of 15 dolphins are recorded dead till May 2012.

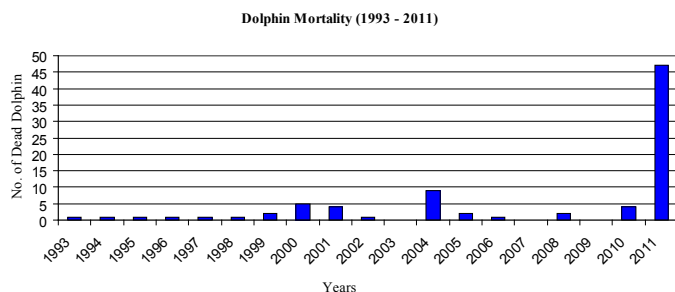


Figure 4: The total number of dead dolphins each year from 1993 to 2011

## Discussion

The recent flood in 2010 in Pakistan has severely affected the socio-economic condition of indigenous communities consequently escalating their dependence on natural resources for their likely survival. Many native and local people of the Indus Dolphin Reserve are dependent on fishing for their subsistence. Fishing is legally banned in the Indus Dolphin Reserve. Currently, temporary lakes, water channels along the Indus River and permanent irrigation canals are declared as open water areas for fishing by the Sindh Fisheries Department. Temporary lakes and water channels become active during high water level and when the water level recedes, these become perfect places for fishing. These lakes and channels are found connected to the main river in most cases. It is assumed that dolphins are attracted to such areas due to the availability of fish, and they become vulnerable to different illegal means of fishing.

Change in the fishing system from contract to license, only for Sindh province, has resulted in over harvesting of fish resources, and an increase in illegal fishing practices, such as overnight netting, pesticide poisoning, and fishing without a legal permit. Fishing licenses are issued at district level at a very low cost, for a period of one year. Moreover, the traditional contract fishing systems still prevails in this protected area, where some water areas are auctioned for fishing by the fisheries authorities. The contractors either hire local people for fishing or their fishing teams consist of fishermen from other cities.

In the low water season, in addition to fishermen, turtle hunters also join the harvest, resulting in increased pressure on the natural resources of the Indus Dolphin Reserve. An illegal trade in river turtle body parts is at its peak in the entire country. Turtle capturing groups use overnight hook-lines and pesticide poisoning to catch turtles. These illegal activities adversely affect the Indus dolphin. Pollution loads in the river and irrigation canals also add up to threats to the aquatic animals during low water season.

WWF – Pakistan has taken up the issue of dolphin mortality on a high priority level and contacted relevant government authorities and line departments to take serious actions in order to control dolphin mortality. Establishing liaison with distant communities of this area is a key to developing improved community based mortality monitoring and reporting system for stranded or dead dolphins. WWF – Pakistan is contacting the influential local people in the project area as an effective means of controlling accidental mortality of dolphins. A community outreach programme has also been launched to create environmental awareness among native communities with the help of influential local people. An improved Sindh fisheries legislation is imperative for likely benefits of fishermen and for the sustainable conservation of all natural resources of the area. Inter-departmental coordination and effective implementation and enforcement of provincial wildlife and fisheries legislation are essential for successful management

of the Indus Dolphin Reserve, and protecting endemic biodiversity of the Indus River.

The Fisheries Department needs to take strict actions to stop the illegal modes of fishing that have deteriorated the situation for Indus Dolphin. There is an urgent need for patrolling and monitoring to keep check on these fishing nets and practices. There is also need of dialogues with those fish contractors and card holders and strong message may be conveyed to stop the destructive fishing practices that are posing direct threats to Indus dolphin.

## Conclusion

The Indus River Dolphin is one of the most threatened obligate freshwater species found only in the Indus River system of Pakistan. According to the population surveys of 2001 and 2006 the population trend was increasing but the recent 2011 population survey, revealed less dolphins numbers compared to 2001 and 2006. The Indus River Dolphin mortality has significantly increased after the devastating flood in 2010, which is the highest mortality rate in a year. The flood has severely affected the socio-economic conditions of indigenous communities consequently escalating their dependence on natural resources for their likely survival. Change in the fishing system from contract to license for this province and ever increased illegal fishing practices such as overnight netting, pesticide poisoning, and fishing without legal permit has resulted in over harvest of fish resources. Beside the mortalities, WWF - Pakistan and Sindh Wildlife Department have rescued 75 % of the stranded dolphins from 1992 to 2012.

## Acknowledgements

The conservation efforts along the entire habitat of Indus River Dolphin have been carried out with the help of local community based organisations particularly fishing communities and with the key stakeholders including the provincial fisheries, wildlife and forest departments of Khyber Pakhtunkhwa, Punjab and Sind.

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