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## Full Length Research Paper

# Distribution of Indus River Dolphin (*Platanista gangetica minor*) in Dera Ismail Khan range Khyber Pakhtunkhwa, Pakistan

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To assess the status of the Indus River dolphin, *Platanista gangetica minor*, and to analyze the threats to their lives, a survey extending upto 103.5 km was conducted in the Khyber Pakhtunkhwa (KPK) of Pakistan in March 2012. It was conducted in the Indus River and its tributaries. The sum of best group size estimates produced an abundance estimate of 35 Dolphins. From Miran to Ramak in the Indus River approximately 48.57% of the dolphin population occurred in 27 km of river length, 0.33% of the dolphin population occurred in 46 km of river length from Dera Ismail Khan Bridge to Miran in the Indus River and 0.1% of the dolphin population occurred in 30.5 km of river length from Saggu to D.I. Khan Bridge. The density of dolphins was highest between Miran and Ramak in the Indus River. Increase in dolphin abundance was observed in a downstream direction. Threats to dolphins include too much vessel traffic, disturbance by the crane and duck hunters, high levels of anthropogenic threat and no effective measures for their conservation. River dolphins are particularly vulnerable to the activities of humans because of their restricted habitat. Threats vary geographically in their importance, but generally include accidental killing during fishing operations, habitat loss and population fragmentation from water development. Deliberate killing for dolphin products also threatens the animals. Recommendations are given for conservation.

**Keywords:** Distribution, Indus River dolphin, Khyber Pakhtunkhwa, Platanista, Threats

## INTRODUCTION

The Indus River Dolphin (*Platanista gangetica minor*) is a worldwide priority, endangered subspecies of freshwater cetacean, endemic to the Indus River System in Pakistan (Waqas et al., 2012). The Indus River Dolphin is the second most endangered obligate freshwater dolphin population, falling only after the 'functionally extinct' Yangtze River Dolphin (Smith and Braulik, 2008). It is

endemic to Pakistan and found only in the Indus River system which have five main tributaries; Beas, Chenab, Jhelum, Sutlej and Ravi Rivers (Braulik, 2006). Human habitation is sparse but increases with proximity to the delta. The only large towns located on the route of Indus River are Dera Ismail Khan in Khyber Pakhtunkhwa province and Sukkur and Hyderabad in Sindh Province. The river is not used for commercial traffic, and the few vessels present are oar-powered ferries and fishing boats (Braulik, 2006).

Presently, there are two subspecies of Dolphin, recognized in the genus *Platanista*; *Platanista gangetica minor* (the Indus River Dolphin) and *Platanista gangetica gangetica* (the Ganges River Dolphin) (Kasuya, 1972). Obligate river dolphins live only in freshwater; their physiological and ecological requirements apparently make it impossible for them to live in marine waters (Sinha and Sharma, 2003).

The distribution of the Indus River Dolphin falls entirely within three provinces; Sindh, Punjab, and Khyber Pakhtunkhwa. The Indus River forms the border between Punjab and Khyber Pakhtunkhwa from about 31° 20' N to 32° 30' N, and again from 33° N to the Himalayan foothills. Thus, only about 150-200 km of river in the extreme north of the species-range is in Khyber Pakhtunkhwa; jurisdiction there is shared with Punjab (Reeves et al., 1991). Its population was fragmented by the construction of Indus Basin Irrigation System (IBIS). The irrigation system of Pakistan, claimed to be the largest in the world, consists of 19 barrages, 12 inter-river link canals, and two million kilometers of tertiary watercourses (Hassan et al., 1999).

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 (Waqas et al., 2012).

The Indus River dolphin today is widely but sparsely distributed in the Indus (Pilleri and Zbinden, 1973-1974; Pilleri and Bhatti, 1978; Pilleri and Pilleri, 1980). The Indus system has been checked by two dams, six barrages and twelve headworks (ten in Pakistan) which have divided the original continuous population of the dolphin into several isolated populations. Low levels of water and illegal hunting have exterminated the dolphin in many parts of its former range (Khan and Niazi, 1989). The current study was designed with the main aim to determine the status, the current distribution and minimum abundance of the Indus River dolphin in Khyber Pakhtunkhwa (Dera Ismail Khan range) and to identify threats to the Indus River dolphin population and give some management solutions for its protection and conservation.

## METHODS AND MATERIAS

The survey was conducted in March, 2012, and covered 103.5 km of the Indus River from Saggu to Ramak. This area was selected for survey as it included the location of all confirmed Indus River Dolphin sightings. Early spring is the optimum time to conduct an abundance survey as Indus discharge is at its annual minimum and Dolphins are concentrated into a narrower channel and are,

therefore, easier to count. This survey was conducted during a period of extended drought in Pakistan, and dry season river discharge was, therefore, lower than average.

Survey methods generally followed those described by Smith and Reeves (2000) for Asian river dolphins in wide-channel habitat. Observers were trained in dolphin survey techniques prior to the survey. Survey was conducted from oar-powered wooden boats traveling at 5–7 km/h in a downstream direction. Surveys were conducted using three forward observers, one rear observer, and a data recorder. The rear observer was responsible for detecting animals missed by the primary observation team and also assisted the primary team in group size estimation and group tracking.

For collection of data a survey data form was used, including all the information. Location of all the Dolphin sightings and to record the survey track, German 3 + GPS (Global Positioning System) units were used. The data was analyzed by using SPSS version 14.0 for windows. The results were obtained in percentage.

## RESULTS

This survey was conducted from Saggu to Ramak area in the Indus River in a distance of 103.5 km. This was completed in three steps; from Saggu to D.I.Khan Bridge (30.5 km), D.I.Khan Bridge to Miran (46 km) and from Miran to Ramak (27 km). During the survey, generally excellent sighting conditions were observed, with 90% of effort conducted in river surface state 0% or 1% and 100% with clear visibility. All potential dolphin habitats, including main and secondary channels were surveyed.

From the sum of best estimates of group size, an abundance estimate of 35 Indus River Dolphins was calculated. As the survey proceeded downstream to Ramak, encounter rates increased. Percentage of the total population of Dolphin observed in each area in the Indus River is presented in table 1. The sum of best group size estimates between Saggu and D.I. Khan Bridge was 03 Dolphins (0.1 Dolphins/km), between D.I. Khan Bridge to Miran, 15 (0.33 Dolphins/km) and between Miran and Ramak, 17 Dolphins (1.63 Dolphins/km) were recorded (Figure 1).

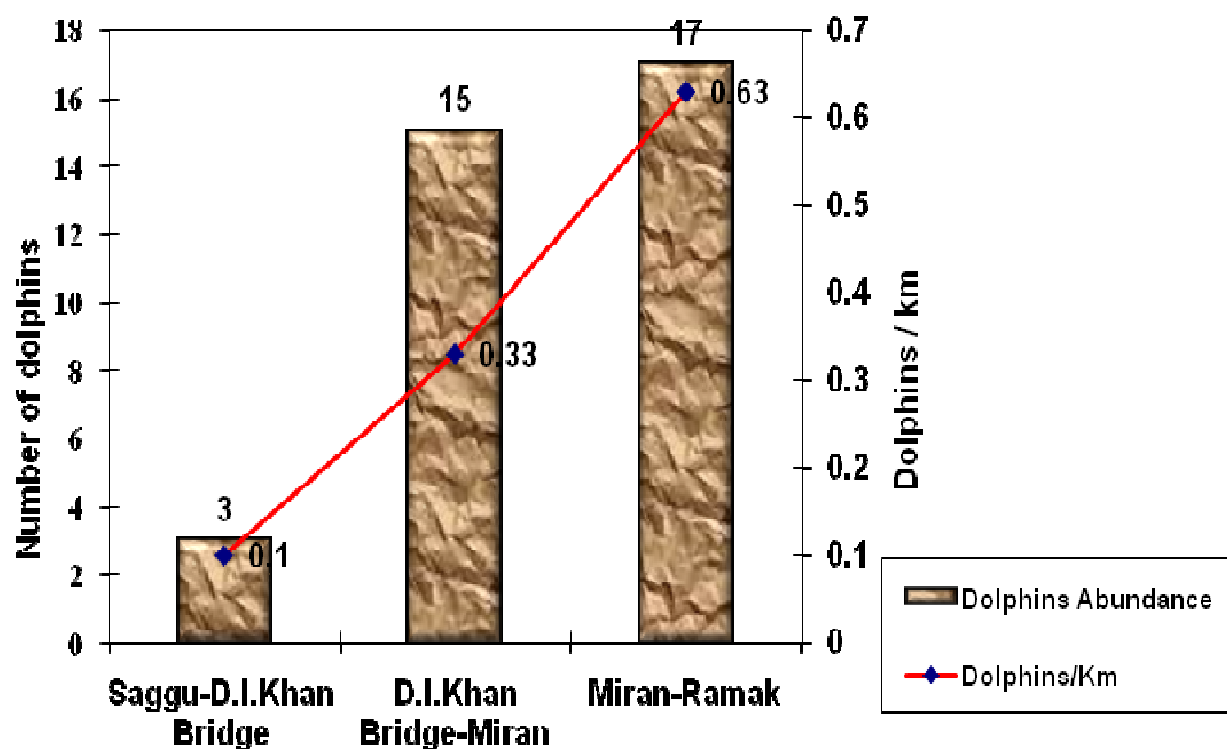
The group size ranged from 01 to 06 individuals with 2 and 4 animals the most frequently encountered (Figure. 2). As Dolphin encounter rate and population abundance increased, there was a corresponding increase in group size. Between D.I. Khan Bridge and Miran a Dolphin groups of 2 and 4 were recorded and the largest group of 6 was recorded between Miran and Ramak, in the Indus River. The largest Dolphin group, which comprised 06 animals, was located near the Ramak area very near to the Taunsa barrage.

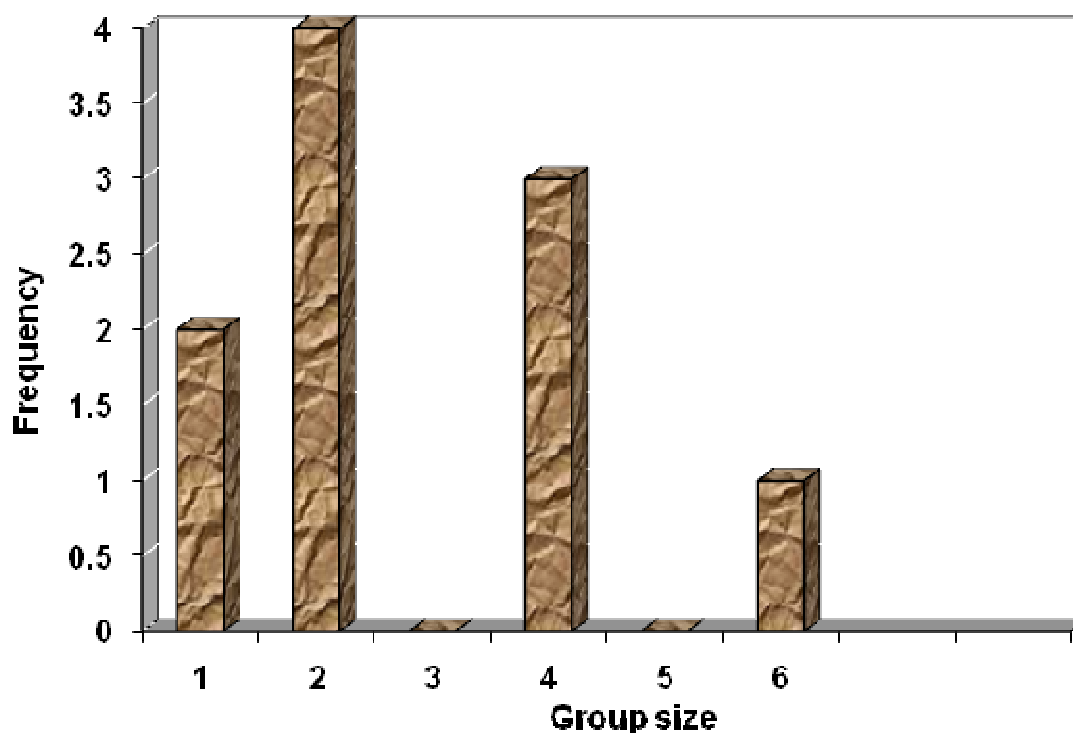
**Table 1.** Summary of Indus River Dolphin, *Platanista minor*, in Khyber Pakhtunkhwa, survey results March 2012

S. #	Section of the Indus River	Abundance	Distance surveyed (km)	Dolphin/km	(group size range)	% of total population
1	Saggu-D.I.Khan Bridge <sup>a</sup>	3	30.5	0.1	-	8.57
2	D.I.Khan Bridge-	15	46	0.33	(2-4)	42.86
3	Miran-Ramak <sup>a</sup>	17	27	0.63	(1-6)	48.57
4	Total for Indus River in *KPK	35	103.5	-	(1-6)	100

<sup>a</sup>Located areas near Indus River

\* Khyber Pakhtunkhwa

**Figure 1.** Encounter rate and abundance of Indus River Dolphins in each area



**Figure 2.** Size of Indus dolphin group encountered on the Indus River in Khyber Pakhtunkhwa March 2012

During this survey extensive disturbance was observed from the cranes and duck hunters in the whole range of Indus River from Saggi to Ramak, especially in the area of Miran spur where there was free movements and continuance traffic of the hunters. These hunters used motor boats for hunting purpose, which used a lot of disturbance and noise pollution. Nomads were also found to be busy in the catching of Dolphins for different purposes.

## DISCUSSION

*Platanista minor* is the most important species of the world. Due to the combination of human-created barriers such as dams and barrages, hunting, and a limited natural range have resulted in a dangerously-low total population of only several hundred individuals. Since 1970's, these dolphins are classified as endangered. Their extremely low population size may also restrict their gene pool, thus they might soon have many problems associated with low genetic variation within a population. (Moreno, 2004; Reeves and Chaudhry, 1998).

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 (Waqas et al., 2012).

History shows that the Indus River dolphin was found in abundance in the river Indus and its tributaries, mainly from Himalayan foothill (KPK) to Delta region (Sindh). About a century ago the range of river Indus measured by Anderson (1879) was approximately 3400 km from upstream Attock to downstream Delta region and Sutlej, Ravi, Chenab and Jhelum Rivers. At present the potentially available habitat has shrunk to 1000 km. mainly in between Jinnah barrage and Sukkur barrages. The natural biodiversity of the Indus basin has been altered by the construction of barrages. Similarly, construction of Dams and Barrages on river Indus have changed the distribution and movements of Indus Dolphin and have divided the current population of Indus Dolphin in to four or five sub-populations in isolated pockets in between these barrages and dams (Gachal and Slater, 2004). The Indus River dolphin now occupies approximately one fifth of its former range (Reeves *et al.*, 1991) and was listed as 'Endangered' in the 2004 IUCN Red List. In Pakistan, most of the direct responsibility for wildlife conservation and environmental protection is provincial. The distribution of the Indus River dolphin falls entirely within three provinces: Sindh, the Punjab, and KPK. The Indus River forms the border between Punjab and KPK from about 31° 20' N to 32° 30' N, and again

from 33° N to the Himalayan foothills. Thus, only about 150-200 km of river in the extreme north of the species-range is in KPK; jurisdiction there is shared with Punjab (Reeves *et al.*, 1991).

During this survey, a decline in the Dolphin population was found as compared to the previous surveys, locally conducted by the Wildlife department of D.I. Khan. This means that Dolphin population continuously decreases. It is because of the extensive interference of human activities and natural disasters, including flood in 2010 which was responsible for a lot of mortality of the Indus River Dolphin.

While comparing the counts from place to place, a school of 11 dolphins near D.I. Khan Bridge (Chaudhry and Khalid, 1989) was missing. Similarly, near the Miran Spur in the Indus River, no dolphin was observed but according to the wildlife department of D.I. Khan and the crane hunters, there were schools of dolphin. Rest of the individuals was located in the vicinity of previous locations, though not exactly at the same locations.

The population of dolphins continuously increases from Chashma downstream (Chaudhry and Khalid, 1989). From Chashma to Taunsa only 15 dolphins were recorded, which is very less but increase from Chashma downstream was clearly observed in the present survey because from Saggu downstream population, is continuously increasing towards the Ramak, near the Punjab boundary. This could be due to increasing rapidity of the Indus River or due to warmer temperature, more productivity, better food availability and better suited ecological features.

There is an apprehension that some dolphins might have not been observed. Some might have shifted to small side streams where the boat could not have run or some might have shifted obscurely due to the disturbance made by the too much vessels traffic of the crane and duck hunters. This could be understandable as the dolphin, with highly developed echo-location system could have sensed the noise from far off distances and made the obscure from the view. Hunting or poaching of dolphins within the Khyber Pakhtunkhwa is not known. Hardly any reports have been made of its killing. Investigations from the nomads near the catchment area of Indus River shows that their fore fathers caught the dolphins, extracted oil and used it for the cooking of sweets and pakoras. Some nomads eat the dolphin meat even now. These come to be some of the other reasons (threats) of dolphin declining. As for the community of fisherman, such an Act is unknown. If at all a dolphin is caught in the fishing net, it is released back in the river.

River dolphins are particularly vulnerable to the activities of humans because of the restricted confines of their habitat. Ever-increasing human populations, often living in impoverished conditions, make increasing demands on water and riparian resources. People rely on rivers to provide them with food, drinking water, and the

means to wash and take care of their livestock. In addition, water is required to irrigate crops and to supply industry. Domestic and industrial wastes are discharged into rivers. Rivers are modified for generating hydro-electric power, controlling floods, increasing navigation access, and for irrigation, domestic, and industrial use, and for the locations of major water developments affecting river dolphins. All of these activities result in the degradation and loss of aquatic habitat.

## **Recommendations for monitoring and management**

### **Regular surveys**

Regular surveys, whatever their methodological shortcomings, are important. They provide opportunities for Wildlife Department staff to detect major changes in the dolphin population's composition, distribution and abundance and in the status of its habitat. Better co-ordination and co-operation should be sought among the Khyber Pakhtunkhwa, Sindh and Punjab Wildlife Departments so that conservation strategies can be pursued at the metapopulation level rather than on the present piecemeal basis.

Count reporting should always include a detailed description of methods, effort and survey conditions. Individual sightings should be reported, with number of animals and position given. The procedure developed by Smith *et al.* (1994) of recording best, high and low counts at each river dolphin sighting should be adopted among Khyber Pakhtunkhwa, Sindh and Punjab; though it provides an initial, albeit crude means of accounting for uncertainty.

### **Patrolling and law enforcement**

Of all the threats to the species, the most clear and certain is deliberate killing. Major progress towards preventing dolphin killing should be made among Khyber Pakhtunkhwa, Sindh and Punjab. The fact remains, however, that patrolling and enforcement are at best sporadic and at worst non-existent in many of the areas used by river dolphins. Wildlife protection agencies in Pakistan are chronically under equipped and underfunded. Morale very low, particularly, at the Sindh Wildlife Department office in Sukkur where the staff is idle much of the time. No powered vessel is available, and game officers must rely on their own initiative to travel along the river. Documentation of dolphin catches, whether accidental or deliberate, is essentially opportunistic. In addition to improved enforcement, there is a need for culturally appropriate public education efforts. Even though most people in Pakistan respect the Islamic injunction against consuming dolphin meat, however,

they have no religious or economic motivation for protecting the animals.

### Research and monitoring

Information on the abundance, distribution, and habitat of Indus River dolphin is essential for designing effective conservation programmes. This information is lacking for most of the range for all river cetacean species. Methods for surveying populations and habitat need to be standardized so as to be replicated for long-term monitoring. Results from investigations should be published promptly in peer reviewed journals that are available to researchers worldwide.

### Substitutes for dolphin products

Appropriate substitutes for the use of dolphin oil as a tonic, liniment and fish attractant should be found and made available to local people. This may be effectively accomplished as a "for-profit" venture conducted by local entrepreneurs.

### Protected areas

Protected areas can be a mechanism for more focused efforts to conserve river cetaceans. The extent and configuration of protected areas should be based on information on stock structure, movement patterns, suitability of available habitat, and potential for reducing threats. Implementation requires the support of local people and a site-specific management plan. A potential danger of establishing protected areas is that the public may be misled into believing that conservation measures are being taken while the reserve exists on paper only. A "managed resource" approach that ensures "long-term protection and maintenance of biological diversity, while providing a sustainable flow of natural products and services to meet community needs" (IUCN, 1994) may be appropriate, if adequate protection for river cetaceans can be assured.

### Managing fisheries to reduce accidental catch and ensure sustainable prey

Local people are more likely to support measures for protecting river dolphins, if they are linked to sustainable fisheries. Fish and crustacean spawning areas on floodplains and in tributaries should be protected. The establishment of fishing reserves in deep counter-current pools, which are the breeding grounds for many economically important fishes, as well as the primary

habitat of river dolphins, should be considered. Traditional fishing methods (e.g., single hook and lines, throw-nets, seine nets, etc.), which do not harm dolphins and are selective in their catch, should be encouraged.

### Preventing vessel disturbance

Consideration should be given to restricting vessel speed and routes in areas where Indus River dolphins are frequently found. The use of traditional non-motorized canoes and sail-powered boats should be encouraged in pristine segments of river. Propeller guards should be considered for motorized boats used in protected areas. It is suggested that the population be studied throughout the year at least where they are in fair numbers. Similarly, the people of the area should be made aware that poaching or killing of dolphins is an offence, punishable by law. Threats should be regularly studied and some management solutions be made.

### CONCLUSION

The Indus River Dolphin mortality rate increase day by day due to human interference and natural disasters. It is a threatened fresh water obligate species and is going to be near to extinction if proper management and conservation acts were not taken. Due to the flood of 2010 in Pakistan, Dolphin population was tremendously decreased. The large range decline, population fragmentation, small size of several populations and continuing habitat degradation, as well as our poor understanding of some potential threats, make the future very uncertain for the Indus River dolphin.

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