CURRENT STATUS OF THE GANGES RIVER DOLPHIN, *PLATANISTA GANGETICA* IN THE RIVERS KOSI AND SON, BIHAR, INDIA[1]

(*With one text-figure*)

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Surveys were conducted in February and March, 2001 to assess the current status of the Ganges river dolphin in the Rivers Son and the Kosi. No dolphin was sighted in the entire stretch of about 300 km of the Son, in Bihar. The local fishermen reported total elimination of dolphin population in *c.* 100 km stretch of the Son from the Uttar Pradesh - Bihar border to the Son Barrage at Indrapuri. During monsoon, the dolphins migrate for about 200 km from the mainstem of the Ganges into the Son up to the barrage. Dolphins were sighted in the entire stretch of about 300 km of Kosi between the Kosi Barrage at the Indo-Nepal border and its mouth at Kursela in Bihar. A total of 87 dolphins were sighted in the Kosi during the survey, however, many must have been missed due to the highly braided channel of the river. In both the rivers, no apparent source of pollution was found. Siltation and construction of the barrage were observed to be the main cause of habitat degradation in both the rivers.

INTRODUCTION

The Ganges river dolphin *Platanista gangetica*, commonly known as *susu*, is distributed in the Ganga-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of India, Nepal and Bangladesh, between the foothills of the Himalaya and the estuarine zone.

All the three Asian species of freshwater dolphins are classified as Endangered or Critically Endangered. Listed in order of most to least threatened, are *baiji* (*Lipotes vexillifer*) in River Yangtze of China (population: a few tens), *bhulan* (*Platanista minor*) in River Indus of Pakistan (population: a few hundreds), and *susu* (*Platanista gangetica*), population about 2,500. The fourth freshwater species, *boto* (*Inia geoffrensis*) is found in the Amazon River System in South America, population of which is estimated to be about 5,000. These four are the only freshwater dolphin species found in the world. Obligate river dolphins live only in fresh water, their physiological and ecological requirements apparently make it impossible for them to live in marine waters.

Other small cetaceans are normally associated with the marine environment, but they do range far upstream in large Asian rivers. These include, the finless porpoise (*Neophocaena phocaenoides*) in the Yangtze river of China, and Irrawaddy river dolphin *Orcaella brevirostris* in the Ayeyarwady (formerly Irrawaddy) river of Myanmar, Mahakam river of Indonesia, and Mekong River of Lao P.D.R., Cambodia, and Vietnam. *Sotalia fluviatilis* is another such species found in the Amazon-Orinoco river systems of South America.

The freshwater dolphins have a longer snout than marine species, which probably help them in collecting their food in the mud bottom of rivers. The two species of genus *Platanista* found in the Ganga and Indus system are practically blind, as they have eyes without crystalline lenses (Herald *et al.* 1969) and the

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transparency of their cornea is limited as it is vascularised (Dawson 1980). While visual acuity is reduced in these species, they may be able to form crude images using the narrow aperture of the pupil in a manner analogous to a pinhole camera. Amazon and Yangtze river dolphins have very limited vision.

Evolutionary adaptation to a fluviatile environment has resulted in a regression of the eye and the development of a sophisticated echolocation system, which allows Odontocetes, the suborder of toothed whales, to 'see' their environment through sound. Pulsed vocalization produced in specialized air sinuses in the nasal passages is focused by the 'melon' (forehead), which functions as an acoustic lens. The reflected pulsed sounds are received back through the jawbone, transmitted to the middle ear, and then analysed by the comparatively large brain.

Although the meta-population of the *susu* totals over two thousand, isolated subpopulations, especially in Nepal and in the Karnaphuli-Sangu River System of Bangladesh, have become extinct or critically reduced by the barrier effects of dams and barrages (Haque 1976, Smith *et al.* 1994). The distribution range of *susu* is shrinking, as evinced by their elimination from many of the smaller tributaries and upper reaches of the Ganga, where they were found earlier. Their population in the mainstem of the larger rivers is declining as they are being killed both incidentally as well as directly. Also, they compete unsuccessfully with humans for shrinking water and prey resources. The IUCN recently changed the status of the species from Vulnerable to Endangered (Baillie and Groombridge 1996).

Dolphins swim almost constantly on their side. Shortly after a dive, they spin 90° on their lateral axis and 180° on their longitudinal axis, to swim on their side in the direction opposite to their surfacing direction. The head sweeps up and down in a scanning motion and the deeper pectoral fin, or flipper, trails along or slightly above the bottom. The flippers are thought to have an important tactile function. Shortly before surfacing, the dolphins reverse the spin back to the direction in which the dive began.

In the Karnali river of Nepal, in their far upstream range as well as in the mainstem of the Ganga, *susu* are found most often in 'primary habitats' where convergent streams create an eddy counter-current system in the mainstream flow (Smith 1993). Less often, the dolphins are found in "marginal habitats" where the river meanders and creates similar eddy counter-current systems, which are also areas of high human use, making them particularly vulnerable to local environmental disturbances.

The river dolphin often takes advantage of the ecotone created by the transition between scour pools and running waters, visible as eddy turbulence. They prey on species migrating along the mainstem, while monitoring foraging opportunities from within the hydraulic refuge of counter-currents.

Current Status of the Ganges river dolphin

The total population of the *susu* was roughly estimated to be only 4,000-5,000 (Jones 1982). Dolphins are sighted throughout the Ganga from the Middle Ganga Barrage, Bijnor (129 km downstream of Haridwar) to its mouth at Sagar Island in the Bay of Bengal. About 35 *susus* have been isolated between the two barrages at Bijnor and Narora (166 km) in Uttar Pradesh (Sinha *et al.* 2000). The population between Narora and Allahabad (about 500 km) in low water season (January-March) is very sparse (a few tens) (Sinha 1999). In the lower reaches of the Ganga in West Bengal, only 152 *susus* were sighted in the Bhagirathi-Hooghly river system below Farakka Barrage (Sinha 1997). Maximum dolphins survive in the Ganga mainstem between Allahabad and Farakka. Less than 100 have been estimated in Chambal river, a tributary of the Yamuna. A total of about 2,000 dolphins have been estimated in

the Ganga-Brahmaputra river systems in the Indian territory (Sinha 1999). A few hundreds are present in Bangladesh. A comprehensive review of the *susu's* status in the entire Ganga system including tributaries has recently been documented (Sinha *et al.* 2000).

In the nineteenth century, dolphins were plentiful in the entire distribution range, though no actual data on populations is available. They were found in the Yamuna as far as Delhi, even in May when water was very low (Anderson 1879). In the last couple of decades, no dolphin has been sighted in the Yamuna at Delhi. Their current distribution in the Yamuna is mainly below the confluence of the Chambal and Yamuna near Etawah. In most of the small tributaries, dolphins have become locally extinct or are sighted only in the rainy season.

Platanista gangetica is legally protected, being included in Schedule I of the Indian Wildlife Protection Act (1972) and in Appendix I of Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits trade in dolphin products by signatory countries.

Past Distribution in Bihar

Anderson (1879) has mapped the distribution of dolphins in the entire stretch of the Ganga, all its tributaries both large and small, in the state of Bihar. No detailed study, especially in the Ganga and some of its tributaries was conducted until more than 100 years later (Sinha 1996). However, even this study was far from complete, as it was mainly conducted in the mainstem of the Ganga. When interviewed, the locals in North Bihar reported that about 40-50 years ago during monsoon, the *susu* were frequently sighted in all the rivers, including very small rivers, and connected water bodies. But, unfortunately, no baseline data on the status are available.

Though a few papers on the Ganges river dolphin were published from Bihar earlier (Nath 1974, Gupta 1986, Ali 1992, Singh and Ahmed 1994, Kumar 1996) nothing specific is mentioned about its status and the reports carry only a general account of the species. Moreover, the papers record only casual observations on the animal in the River Ganga. Based on a systematic study, Sinha (1996, 1997 and 1999), Sinha *et al.* (2000) reported the current status and distribution of the *susu* in the Ganga and many of its tributaries. Though the overall estimate of *susu* abundance in the entire distribution range is not known, the largest sub-population occurs in the mainstem of the Ganga and its tributaries in Bihar. Most of the tributaries or parts thereof are yet to be surveyed thoroughly and these surveys were conducted in an effort to bridge this gap.

Study Area
(Fig. 1)

River Son: The River Son originates from Amarkantak Hills at Sonabhadra, in Madhya Pradesh, at an elevation of 600 m. It flows northwards through Madhya Pradesh, Uttar Pradesh and Bihar before it discharges into the Ganga at Haldi-Chhapra village near Maner, about 35 km upstream of Patna. In Uttar Pradesh, it receives the Rihand tributary across which the Rihand dam was constructed in 1963. Though the Son is a perennial river, the main source of water is rain. Its total length is 784 km of which about 300 km are in Bihar. It enters the state of Bihar near the village Domarkhoha in Rohtas district. After flowing for about 35 km in Bihar, it receives the River North Koel from Chhota Nagpur Plateau of South Bihar (now Jharkhand State). About 65 km downstream of the confluence, the Son Barrage was constructed in 1965 at Indrapuri, about 15 km upstream of Dehri, to divert the river water through three irrigation canals — Patna Canal on the right side and Western Canal, which is divided into Buxar and Ara Canals on the left side. A weir

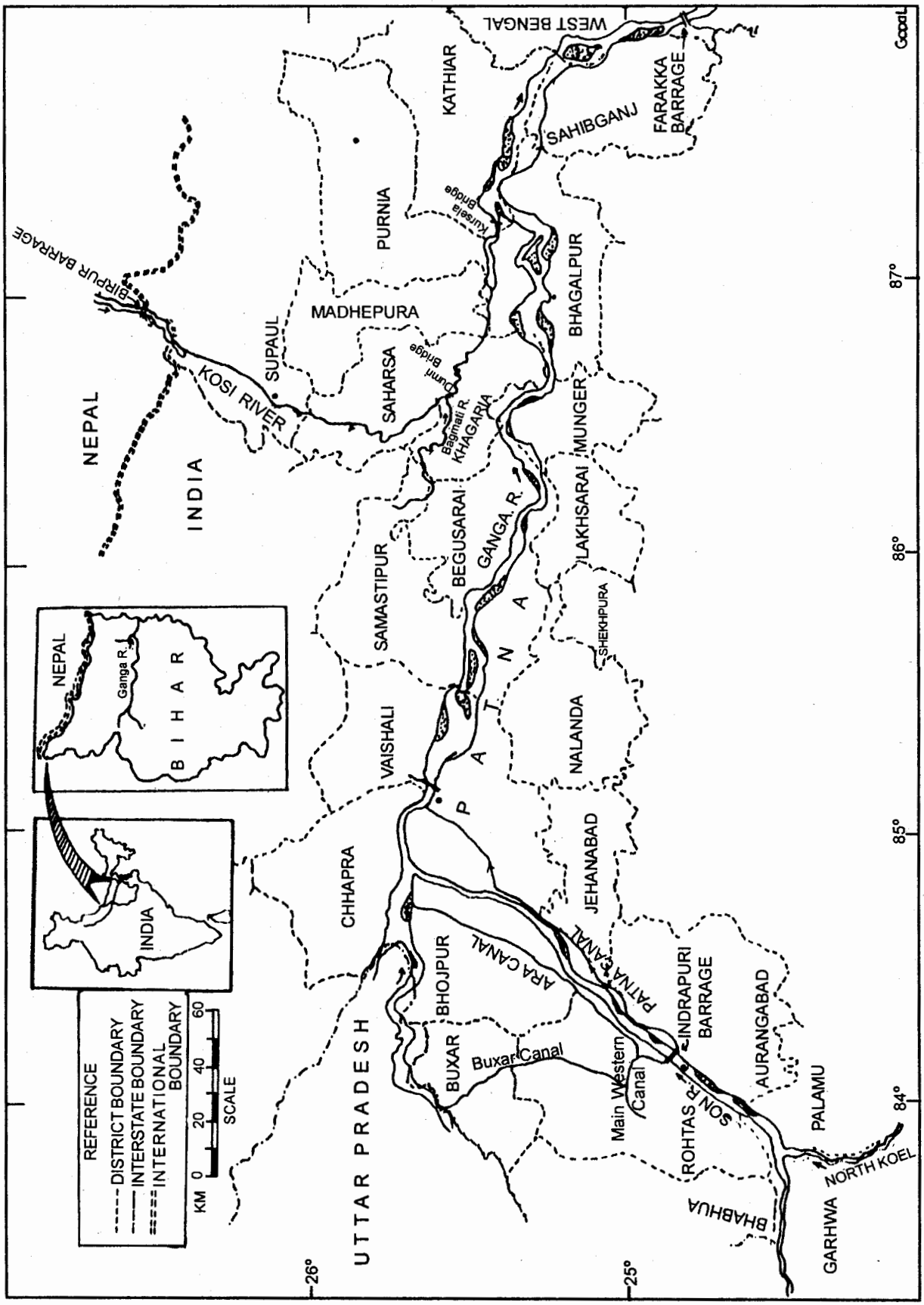


Fig. 1: Map showing course of the Rivers Kosi and Son in Bihar

constructed at Dehri in 1869-79 provided water for irrigation of 0.35 million ha of land. As the weir became old, the new barrage at Indrapuri was constructed which created a physical barrier for the migratory aquatic animals including dolphins of the river. The irrigation canals have converted the entire command area into a 'Grain Bowl' in Aurangabad, Jehanabad, Patna, Rohtas, Bhojpur, Kaimur and Buxar districts of Bihar. But this left almost no water downstream of the barrage to maintain its status as a river. The bed of the river consists mainly of coarse sand, which can retain little organic detritus. Extraction of sand as building material throughout this stretch of the river has added to the degradation and destruction of the river habitat.

River Kosi: The River Kosi (965 km) originates in Tibet at an altitude of 5,490 m and flows through Nepal; after running for *c.* 285 km in Bihar it joins the Ganga near Kursela in Katihar district. The Kosi is formed by the convergence of three rivers, the Sun Kosi, Arun Kosi and Tamur Kosi in Nepal. After the confluence, the river flows through a narrow gorge for 10 km and enters the plains at Chatra, traverses another 25 km and enters India near Hanuman Nagar. The total drainage area is 74,500 sq. km of which 11,000 sq. km lies within India.

The Kosi basin is the third largest in area in India. Its waters have the highest rate of siltation among the rivers of the state (average annual suspended load is 2,774 tonnes/sq. km) and it has a steep gradient. The Kosi is a torrential river of the mountains that has a catchment area too large for its relatively short course. Due to these topographical and meteorological features it is rated as one of the most problematic rivers of the world and is noted for its rapidity and unstable banks. Thus, in about 200 years, the river has moved 112 km laterally from Purnea to its present position.

Average discharge in normal years for the Kosi is estimated to be 1,75,000 cusecs. The average run off during monsoon (June-September) is about 83% and only 17% in the rest of the year. July-August is the period of peak flow, whereas January-February is the leanest period (Datta Munshi and Datta Munshi 2000). The Kosi Barrage at Hanuman Nagar was commissioned in 1965 from which two canals take off on either side to irrigate nearly one million hectares of land in Nepal and India. The barrage is intended to prevent the river from moving sideways. The important tributaries of the Kosi are rivers Bagmati and Kamala Balan.

Survey Methodology

Downstream survey was conducted using country boats along the entire stretch of the rivers Son and Kosi. Following the recommendation of international experts (Perrin *et al.* 1989), direct count method was used to record the number of dolphins. Although searches were conducted continuously along the total length of the river under study, areas of confluence, meandering, downstream of sandbars etc. received greater attention. Search effort in these areas was maintained for at least thirty minutes to avoid missing extremely quiescent or long-diving animals. During survey, best, high and low estimates of the number of animals in the groups were recorded. The high and low estimate was used to reflect confidence in the accuracy of the best estimate. The low estimate was considered to be an absolute minimum count and the high estimate as maximum count. Identical best, high and low estimates were used to indicate a high level of confidence in our best estimate. Occasionally the dolphin appears to follow the boat, which adds uncertainty to whether the subsequent sighting is of a new or the same animal. In this case, a low estimate of zero was used to reflect the possibility of making double counts. The dolphin's long dive time, unpredictable movements and quiescent behaviour also make single counts unreliable.

During quiescent behaviour, the dolphin surfaces without an audible blow exposing only the uppermost dorsal surface of the melon. If subsequent surfacing, or confirmation by a second member of the team did not substantiate such a sighting it was given a best and low estimate of zero and high estimate of one. Estimates were arrived by concensus among the team of observers that initially sighted the dolphin.

When a sighting was made the size, sex and colour among other features were ascertained. Diagnostic characters for individual animals (visible scarring and deformities, ratio of rostrum length to the height of melon, etc.) were noted and sketched. Photographs were taken by a 35 mm SLR camera, equipped with a 300 mm telephoto lens and motor drive.

Data on the frequency of dolphin sightings per visit to habitat locations was recorded throughout the study and later processed.

Results and Discussion

River Son: A field survey was conducted in River Son between February 22 and 28, 2001. The survey started from a small tribal village Domarkhoha located at the Uttar Pradesh - Bihar border. Markings of large soft-shell turtles on the sand bar were seen, but no dolphin was sighted. Farther 5 km downstream at Belduria ghat / Newaria ghat, the locals informed that no aquatic wild animals except large soft-shell turtles were found in the area. However, a good number of dolphins and crocodiles had been reported in the river about 40-50 years ago. The Kaimur hill range is on the left bank (Rohtas district, Bihar) of the river between Domarkhoha and Newaria ghat. After this ghat, the river channel meanders towards the right bank (Garhwa district, Jharkhand) and a large island of about 100-150 sq. km has been formed which is used for farming. On the left bank, a 1-3 km wide plain is heavily cultivated for wheat, potato and vegetables. The river flows close to the left bank again at Teura ghat. No dolphin was sighted in this stretch. As reported by a fisherman, there used to be many deep pools of water in the river, but a high rate of siltation had filled up all these pools resulting in loss of habitats of dolphins and crocodiles. About 10 km downstream of Teura ghat is Uli ghat on the left bank. Opposite Uli, the River North Koel from Daltongunj and Garhwa districts discharges into the Son. However, the main channel of the Son flows close to the left bank. In spite of good habitats for dolphins near Uli ghat, no dolphin was sighted. It was learnt that about 10 years ago there used to be some dolphins in the area, but after the construction of the Rihand Dam in Uttar Pradesh the flow of the river had reduced which had affected the dolphin population. Another local fisherman informed about the killing of one dolphin about 15 years ago at village Jhitikia opposite Amjhore, about 30 km downstream of Uli. Earlier, the fishermen of village Deuri, located near Jhitikia, practised dolphin oil fishing. Frequent sightings of otters by the locals were reported near this ghat (river bank).

The river channel is highly braided and several small as well as large sand bars have been formed in the river downstream of Uli. The bed consists of coarse sand, mainly quartzite. The flow in the river increases after the North Koel joins the Son at village Tilothu, about 10 km upstream of Son barrage. It was reported that after construction of the barrage at Indrapuri in 1965, dolphin migration stopped and no more dolphins are sighted now. However, during the flood every year juvenile gharials occasionally drift into this area. Locals reported the killings of soft-shell turtles and presence of otters in the river in this area. About 200 fishermen fish in the river at Tilothu. The depth of river water was only about 50 cm to a metre at most places and many times it was difficult for a boat to float down in the highly braided river.

A large number of sandbars occupied by grasses and other thick vegetation have formed

behind the barrage. They provide good habitat for otters and many species of migratory birds. The local fishermen informed us of sightings of dolphins below the barrage during the high floods every year. They migrate up to the barrage from the Ganga river about 200 km downstream.

About 18 km downstream of the barrage is the 3.06 km long Dehri Road Bridge, commissioned in February 1965. The river channel is highly braided and the depth of the river flow is insufficient to float even a country boat. Farther 30 km downstream of Dehri — a ferry ghat, is Mahadeva ghat on the left bank and Daud Nagar on the right bank. The river bed is more than 3 km wide and is widely used for vegetable farming, both at Dehri and Mahadeva ghats. Most of the fishermen were busy in farming activities. A few of them were found doing subsistence fishing using small drag nets. A local fisherman informed us of the sighting of dolphins occasionally during flood season only. Otters are also sighted during the rainy season. The soft-shell turtles are found and killed during summer season. About 40 km downstream of Mahadeva ghat is Malhi Patti ghat on the right bank near Baiderabad. No dolphin could be sighted in this stretch; however, locals informed that during monsoon 3-7 dolphins were sighted every year. Heavy siltation in the river has destroyed the habitat of the *susu*. Otters are reportedly sighted occasionally near the Malhi Patti ghat. Turtles are found mainly during the monsoon. Farther 5 km downstream near Arwal is Ahiyapur ghat where a very good habitat for dolphin with eddy counter-current exists, but no dolphin was sighted. However, locals informed that during monsoon 10-15 dolphins are sighted here. Reportedly otters and turtles are also found. It is an important fish spawn collection centre in the monsoon. Sighting of five adult dolphins during the last monsoon of 2000 at Mohammadpur ghat, 20 km downstream of Arwal was reported by a local fisherman. During the survey, water flow in the River Son at this ghat was not enough to sustain a dolphin population in this season. Similarly, at Udaipur ghat near Pali, otters were found in the boulder pitched river bank, but no dolphin was sighted. It was reported that dolphins could be seen only during monsoon. The killing of a dolphin, three years ago, was reported by the locals. At Koilwar, the biggest site of sand mining in the River Son, 15-20 *susu* were reported during the monsoon. Earlier the dolphins used to be killed here by harpooning. The local fishermen consume both the meat and oil of the dolphin. The drift gillnets with large mesh size are dangerous for dolphins during monsoon as they get entangled in these net.

River Kosi: A survey in the River Kosi was conducted between March 2 and 10, 2001. Sighting records of dolphins are given in Table 1. The survey was started from the Kosi Barrage at Birpur. Water depth in the reservoir of the barrage was only about 5 m. The river water was being diverted to irrigation canals and almost no water was allowed to flow into the river downstream of the barrage. Hence, the river water below the barrage was very shallow, and not enough to sustain dolphin population below the barrage. When the gates of the barrage were opened in April, the dolphins from farther downstream moved to the barrage site. In April 1994, dolphins were sighted here (Sinha *et al.* 2000). One or two dolphins are reportedly killed here every year. The locals reported that the dolphins cross the barrage gates both ways in the monsoon season. This needs to be confirmed, but if true it is good for the survival of the dolphins not only in India but also in Nepal. Further 42 km downstream of the barrage at Bhaptiahi, two dolphins were sighted. Here the water depth was about 5 m. As water in the river in this stretch was quite low no dolphin was sighted between the barrage and Bhaptiahi. Poison-fishing in the floodplain wetlands was reported by the local fishermen, as also killing of soft-shell turtles. The river channel was highly

Table 1: Status of the Ganges dolphin in the River Kosi during March, 2001

Place	GPS Reading	Distance from Kosi Barrage (in km)	No. of Dolphins H	B	L	No. of Groups of Dolphins
Kosi Barrage	26° 31.24' N 86° 56.03' E	0	-	-	-	-*
Bhaptiahi	26° 18.31' N 86° 44.06' E	42	-	-	-	-*
Sujanpur	26° 13.18' N 86° 37.48' E	60	8	7	6	3
Situhar Ghat	26° 05.39' N 86° 30.40' E	72	6	5	5	1
E 2 Ghat	26° 00.98' N 86° 28.10' E	78.3	9	8	8	2
Baluaha Ghat	25° 52.49' N 86° 27.05 'E	92	2	2	0	1
Dengrahi Ghat	25° 43.49' N 86° 30.07' E	102	9	8	8	2
Badla Ghat	25° 34.17' N 86° 35.34' E	135	10	9	9	2
Chautham Ghat	25° 33.01' N 86° 39.32' E	156	4	4	4	1
Dumri Bridge	25° 32.46' N 86° 42.89' E	167	3	3	3	1
Vijay Ghat	25° 25.17' N 87° 05.13' E	220	20	17	16	3
Kursela	25° 25.39' N 87° 13.57' E	270	16	14	14	3

H - Highest, B - Best, and L - Lowest; Total No. of the dolphins: H-87, B-78, L-73; * - Reported by locals

braided and shallow in this stretch. Farther downstream, four adults, two sub adults and one calf dolphin were sighted at Sujanpur, a village on the left bank near Thirbitia. The locals were expecting the number of dolphin to increase up to 20-25 after the gates of the barrage would be opened in April. At this site, two channels of the Kosi join resulting in increase in water flow. The water depth near the village was 6 to 8 m. Locals here do not kill dolphins, though turtles and avifauna were poached. Otters were reported in the area. About 9 km downstream, a very good dolphin habitat was found near the spur, but no dolphins were sighted. However, just 3 km further downstream at Situharghat three adults, two sub-adults and one calf dolphin were sighted (Highest 6 - Best 5 - Lowest 5) in one group. The locals reported killing of a dolphin at this site. Farther downstream, a highest of 9 and 8 each of best and lowest count of dolphins

(4 adults, 3 sub-adults and one calf) were sighted at E2 Ghat (93.2 km from the barrage). About 20-25 hard-shell turtles were also sighted. Erosion of the left embankment was noticed here. The locals reported degradation of dolphin habitat due to the erosion. Incidental killings of dolphin by gillnets were reported, however, no intentional killing was reported. Soft-shell turtles of 20-40 kg were reported at this site. Poison-fishing in floodplain wetlands was reported by the locals. The fishing activity was found to be very low. Fourteen kilometres further downstream is Baluaha ghat, another Ferry ghat. The river flows close to the left bank in this stretch. One dolphin was sighted here, however, the locals reported sighting of a good number of dolphins around the year. A large number of small turtles were also sighted. Ten kilometres further downstream is Dengrahi ghat where a highest of 9 and 8 each of best and lowest counts of dolphins were sighted in two groups including 6 adults and 3 sub adults. It was a very good habitat for the dolphins and the river was flowing mainly along the left bank. Gharials were reportedly sighted here. Soft-shell turtles up to 50 kg are killed regularly, however, dolphins are not killed here according to the locals. About 23 km further downstream is Koparia, 125 km downstream of the barrage. The east embankment of the Kosi terminates here. The river channel was highly braided and it was impossible for a boat to float downstream from Koparia.

The survey was resumed from Badla ghat in River Bagmati, an important tributary of Kosi. In this area, the highly braided channel of River Kosi flows parallel to Bagmati being separated only by 7 km. A channel of Kosi discharges into Bagmati upstream of Badla ghat. Near the Badla ghat railway bridge, a highest of 10 and 9 each of best and lowest counts of dolphins, including 6 adults, 3 sub-adults and one neonate were sighted in two groups. The river water was quite deep and meandering, and with erosion, eddy counter-currents were creating a good habitat for the dolphins. The water current in the river was very slow but the deeper zone sustained a good population of the dolphins. At Chautham ghat, 21 km farther downstream, 4 adult dolphins were sighted. Ten kilometres downstream of the Chautham ghat, the Bagmati joins the Kosi near Dumri Road Bridge. The Bagmati is deeper than Kosi near the confluence. Absence of dolphins, at the confluence of Bagmati and Kosi, was disappointing. The local fishermen reported non-availability of fish in the area as a reason for the absence of the dolphins.

Three adult dolphins were sighted about 2 km downstream the Dumri bridge. Dolphins are reportedly neither killed nor eaten by the locals in this area. The dolphin oil is used only as folk medicine. Otters are occasionally sighted farther 35 km downstream at Vijay ghat, Naugachhia where a highest of 20, best of 17 and lowest of 16 dolphins in three groups were sighted. The villagers here killed dolphins and reportedly over 30 containers of dolphin oil were available on that day in the village. Here the river channel was very wide (about 3-4 km) and water near the right bank was about 15 m deep. Downstream from Vijay ghat and about 1 km upstream of Kursela Bridge a dry channel of Kosi, Chhoti Kosi joins the main channel — the Bari Kosi. At the confluence of the two, a highest of 16 and 14 each of best and lowest counts of dolphins including 8 adults, 4 sub adults, one calf and neonate each were sighted. Four dolphins were sighted in the dead channel. Subsistence fishing with lift-net and cast-net was observed here. A local businessman accompanying our team up to this point informed us that a large (201.5 kg) dolphin was caught at Kursela in 1995 and he had transported it to Siliguri fish market himself. Otters were reported to be abundant here. The Kosi discharges into the Ganges 3 km downstream of Kursela Bridge.

Thus, in the Kosi a highest of 87 and best of 78 dolphins were sighted distributed almost along the entire stretch of the river. As the river

channel is highly braided many more must have been missed.

Threats to the Survival of Dolphins

The main threats to dolphin survival are the construction of barrages, heavy siltation, farming in the river bed using chemical fertilisers and organochlorine pesticides, use of detrimental fishing gill nets, shortage of fish in the rivers, and incidental as well as intentional killings of the dolphin for oil and meat. The barrages have created a physical barrier for all the migratory species of the rivers, including dolphins. As there is no industry and urban settlement on the banks of the two rivers, the possibility of organic pollution is remote. However, non-point sources of pollution, namely chemical fertilisers, organochlorine pesticides and heavy metals cannot be ruled out.

Conservation Measures

The heavy siltation in the rivers has degraded the dolphin habitat. There is a serious need for mass scale plantation in the catchment area of the rivers to reduce the silt load entering the river system. For this, international efforts are required as the Kosi flows through Nepal and the greater part of the silt load originates there. A minimal flow of water in the rivers must be allowed even during the lean season, so that the dolphin population can survive and migrate. Another serious need is fishery regulation in the rivers. No effective regulation exists. The detrimental gill-nets must be banned and only dolphin friendly nets should be allowed. The efficacy of legal measures to protect dolphins is non-existant. Hence, there is a need to motivate wildlife and other administrative officials to implement the Wildlife (Protection) Act efficiently. An alternative fish attractant, other than dolphin oil that is used throughout the state, should be identified.

Recently, fish scrap oil has been field-tested for three years and found to be a good alternative to dolphin oil as fish attractant (Sinha 2002). However, there is again a serious need of a long term extension programme for educating the fishermen to use the alternative fish attractant.

Education and awareness programmes to educate the target group, i.e. fishermen, officials, school and college children, and the common man will be helpful in conserving the dolphin.

Periodical monitoring of the dolphin population will help in evaluating the effects of Dolphin Conservation Programmes, if any.

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