

# Behaviour of Indo-Pacific humpback dolphin, *Sousa chinensis* (Osbeck) in the Ashtamudi estuary, southwest coast of India

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## Abstract

This paper documents the behaviour of Indo-Pacific humpback dolphin, *Sousa chinensis* (Osbeck) found in the Ashtamudi estuary situated along the southwest coast of India. The major foraging strategy of the dolphins observed was beach hunting. The feeding-related behaviours noted were sudden bout towards the prey with shuttling or speedy zigzagging backwards and forwards and fish-stunning by tossing them into the air. The surface feeding was primarily on mullets. The dolphins displayed a stereotyped surfacing–breathing pattern, with the rostrum rising steeply above the water before the forehead breaks the surface. While travelling, they move in the same direction and the group members dive and surface synchronously for a longer time. The resting activity was primarily floatation in water. As part of socializing behaviour, the humpback dolphins exhibited vertical leaps, side leaps, quasi leaps and somersaults. The principal threat to dolphins in the Ashtamudi estuary is the heavy traffic of trawlers and other motorised vessels.

**Keywords:** Humpback dolphin, group size, ethology, feeding, social life, resting behaviour.

## Introduction

The Indo-Pacific humpback dolphin, *Sousa chinensis* (Osbeck), is widely distributed in the shallow coastal and inshore waters of the Indian and western Pacific oceans (Jefferson and

Karczmarski, 2001). In the coastal waters of India, it is one of the commonly recorded species (Sathasivam, 2004; Sutaria and Jefferson, 2004; Afsal *et al.* 2008; Jayasankar and Anoop, 2010). Just as other cetaceans, they occupy the summit of the marine trophic webs with very low reproductive rate, and are thus particularly vulnerable to threats from human activities (Chen *et al.*, 2011). This species, typically with a near-shore distribution throughout its range, often enter estuaries and sometimes rivers (Ross, 2002), is listed as 'Near threatened' by the IUCN in the Red Data Book, besides being listed in Appendix I of the CITES and in the Appendix I of the CMS (Reeves *et al.*, 2008). The behaviour and ecology of *S. chinensis* has not been adequately studied throughout its range and therefore little is known about the ethology of this species inhabiting the coastal waters of India.

Reports on the behaviour of *S. chinensis* are available from the coasts of Australia (Corkeron, 1990; Ross, 2006), South Africa (Karczmarski *et al.*, 1997, 2000; Karczmarski and Cockcroft, 1999), Hong Kong (Parsons, 1998a; Jefferson, 2000) and China (Chen *et al.*, 2011). Lal Mohan (1983) documented the death of *S. chinensis* kept in captivity in India. Parson (1998b) observed the presence of *S. chinensis* in Goa, recorded a few behavioural patterns of the species and stressed the need for ethological studies in Indian waters. Knowledge on the

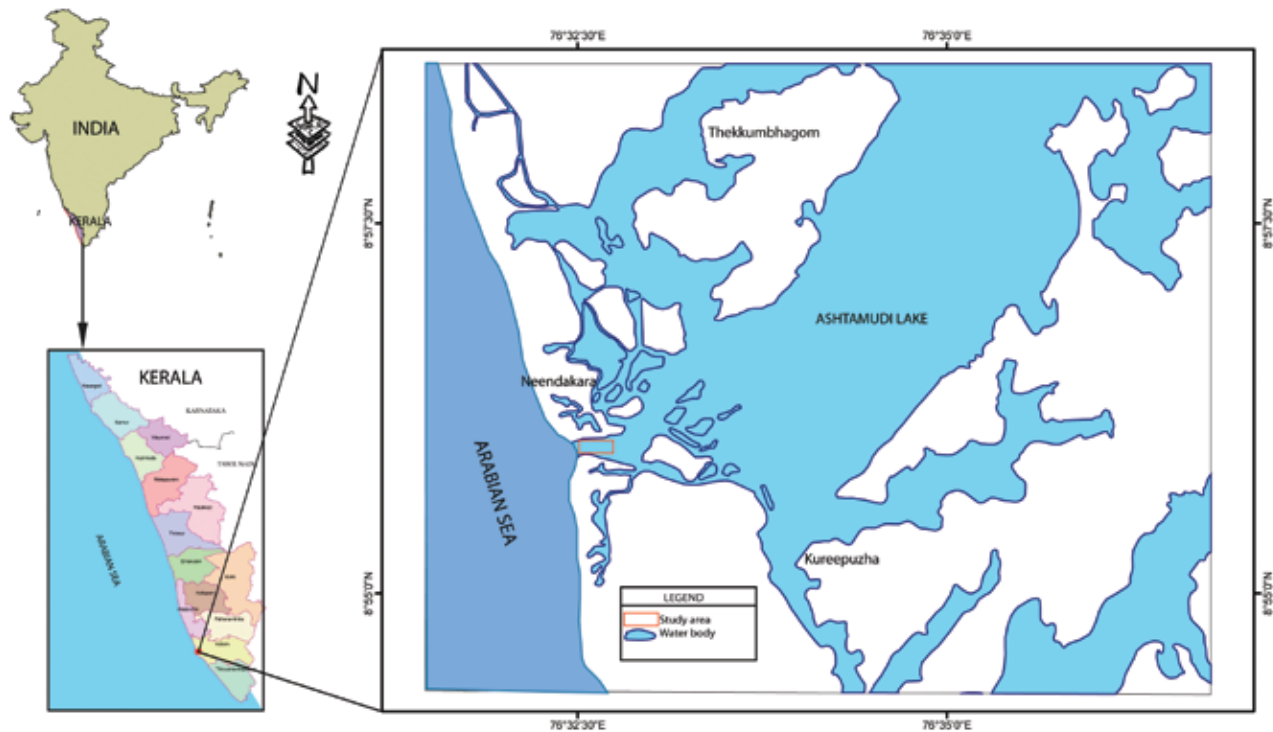


Fig.1 Map of Ashtamudi estuary, southwest coast of India

behaviour and ecology of coastal dolphins is essential to understand the functioning of communities, their relationship with the environment, effects of anthropogenic interventions and to frame conservation and management programmes. This paper presents the behaviour of *S. chinensis* in the Ashtamudi estuary of Kerala.

### Material and methods

The Ashtamudi estuary (8°45'- 9°28' N Lat. and 76°28'-77°17'E Long.), located in Kollam district of Kerala, is a palm-shaped backwater system on the southwest coast of India and the second largest and the deepest wetland ecosystem in the state (Fig. 1). The Ashtamudi with a total extent of about 32 sq. km waterspread area, is a Ramsar wetland. The Kallada river originating from the Western Ghats drains into the lake. The twin fishing harbours of Neendakara and Sakthikulangara located on either side of the estuary represent one of the leading marine fish landing centres in Kerala.

The behaviour of Indo-Pacific humpback dolphins in the Ashtamudi estuary were recorded during June 2010 - May 2011 through occasional observations (4-6 times) in every month. Dolphins were observed at a distance of 5 to 50 metres, with binoculars from the artificial sea wall of the Sakthikulangara fishing harbour, close to the mouth of the estuary and photographed with a digital camera (Nikon D90, Nikor Lens 300 mm). The observations were done during the

daylight hours. Sighted dolphins were identified following Jefferson *et al.* (1993). Definitions of feeding, travelling, resting and socialising behaviour of dolphins are those suggested by Karczmarski *et al.* (1997) and Karczmarski & Cockroft (1999).

### Results and discussion

The Indo-Pacific humpback dolphin can be distinguished by the presence of a long, well-defined beak and a prominent hump or ridge along the back of the animal (Fig. 2). They were found all the year round in the estuary and the majority of sightings were along the main channel. This species typically has a near-shore distribution throughout its range, primarily up



Fig.2 A group of *S. chinensis* represented by three individuals (with the hump at the base of the dorsal fin)

to depths of 25 m, and are frequently seen in the proximity of rivers, deltas and estuaries (Karczmarski *et al.*, 2000; Atkins *et al.*, 2004; Stensland *et al.*, 2006). Their entry into the estuary is greatly influenced by the tidal flow into the lake. While the maximum depth of the estuary is 14 m (Kurian *et al.*, 2001), majority of the sightings occurred in waters less than 10 m depth, primarily along the mouth of the estuary.

The individuals in the estuary were mostly solid lead grey in colour; mature specimens had light extremities of dorsal fin, melon, and rostrum. The group size varied from 1 to 5 individuals and was relatively small with a mean of 3. Groups of three individuals were most common (24% of total number of sightings) (Fig. 2). The maximum number of dolphins sighted in the estuary at a specific time was around 20. The Indo-Pacific humpback dolphins are either solitary or live in relatively small groups and this could be generally due to low population numbers, often reflecting the low carrying capacity of inshore waters (Peddemors and Thompson, 1994). According to the group size of *S. chinensis* varies between 10 and 25 Jefferson and Karczmarski (2001) Nevertheless, groups ranging from 30 to 100 individuals have been recorded in the Arabian Gulf and Arabian Sea (Baldwin *et al.*, 2004). Nithyanandan (2010) recorded a group size of 3 to 15 (mean = 7) for this species from the Arabian Gulf, off Kuwait. Sutaria and Jefferson (2004) observed a group size of 1 to 11 (mean = 3.9) in Gulf of Kachchh and a mean density of 3.4 along Goa coast of India. According to Afsal *et al.* (2008) the maximum group size of *S. chinensis* in Cochin backwaters and the Cochin bar-mouth area was 20 individuals (average = 3.6).

The smaller group size recorded in the present study could be due to the small size of domicile in the estuary. In general, Indo-Pacific humpback dolphins do not undergo large-scale seasonal migrations (Jefferson and Karczmarski, 2001), and the population present in the Ashtamudi estuary could be considered as resident.

More number of dolphins were observed in the forenoon hours and were found displaying feeding and foraging activities on most occasions (80% of observations). The diurnal behaviour of humpback dolphin exhibits variations associated with changes in sea-surface temperature (Parsons, 2004) and diurnal cycles of their prey (Karczmarski, 1999; Karczmarski and Cockcroft, 1999). In the present study there were no apparent differences in the number of dolphins in the estuary with months and seasons. Calves were seen year round, accompanied by one or more adults. Calves were recorded more during the summer months of April and May, which corroborates the observations of Baldwin *et al.* (1998),

who reported sightings of adults with calves during April-May in the Arabian Gulf.

While feeding, the individuals moved in various directions without any obvious pattern, diving frequently in an asynchronous manner. There was no obvious co-operation among individuals during feeding. The major foraging strategy of the dolphins observed in this work was herding, where one or more dolphins herded a school of fish from deep to shallow waters of the estuary either towards the sea wall (Fig. 3) or towards the beach and fed on them on those trying to jump out of water in confusion. The dolphins moved at great speed, swimming inverted down or on one side. Each chase usually lasted for about one to two minutes and the bout consisted of zig-zagging movement, followed by a short, fast leap. The solitary dolphins exhibited this behaviour several times a day and were observed in the same area for a long period of time. Though the movement of individuals was in all directions, the chase was perpendicular to the sea wall.



Fig.3 Herding behaviour of *S. chinensis*

Feeding-related behaviours of humpback dolphins such as feeding rush represented by sudden acceleration towards the prey, shuttling or speedy zigzagging backwards and forwards as a dolphin chases its prey and fish-stunning by tossing them into the air (Fig. 4) were recorded during the present study. These observations corroborate the reports of Parsons (2004) on the behaviour of humpback dolphins in Hong Kong waters.

We observed that surface feeding of *S. chinensis* was primarily on mullets and this was photographed for the first time from India (Figs. 4, 5). The mullet species recorded from the Ashtamudi lake include *Mugil cephalus*, *Liza macrolepis*, *L. parsia*, and *Valamugil cunnensius* (Kurup and Thomas, 2001). The humpback dolphins choose to stay within the brackishwater system probably because of their feeding demand (Huang *et al.*, 1978). In Chinese waters, this species





Fig. 4 Capture of mullet tossed up in air



Fig.5 Movement of *S. chinensis* with mullet in mouth

feeds on several species of demersal and estuarine fishes, but with little evidence of predation on cephalopods or crustaceans (Jefferson and Hung, 2004). Stomach analysis of humpback dolphins caught from Mangalore, southwest coast of India, showed the presence of *Nemipterus sp.*, *Saurida sp.* and *Lactarius lactarius* (Anoop *et al.*, 2008). The preferred prey items of humpback dolphins include herrings, shad, sardines, mullet, croakers and grunts, which are typically estuarine, demersal or benthopelagic species, while cephalopods and crustaceans are found in small amounts in their stomach (Jefferson and Karczmarski, 2001; Ross 2002).

As observed by Karczmarski *et al.* (1997) in South Africa, humpback dolphins displayed a fairly stereotyped surfacing–breathing pattern, with the rostrum rising steeply above water before the forehead breaks the surface. When the blowhole is exposed to air, most of the body remains submerged with only a small part of the upper back and the anterior portion of the dorsal hump above the water (Fig. 2). While travelling, the group members dive and surface synchronously for a long time, moving in the same direction. The humpback dolphins also exhibited resting activities by floating in water, with slow anterior movements (Fig. 6).

As part of socializing behaviour, they exhibited leaps, high speed movement with frequent direction changes, and body contact with other individuals (Fig. 7). Porpoising, the high-speed surface piercing motion of dolphins in which long, ballistic jumps are alternated with sections of swimming



Fig.6 Floatation, a resting movement

close to the surface, was exhibited by the dolphins. The most common aerial behaviour was 'quasi-leaps', with the snout entering the water while the middle of the body was clearly above the water, but the tail not yet emerged (Fig. 2).

We also observed vertical leaps (Fig. 8), side leaps (Fig. 9) and somersaults (Fig. 10). These aerial behaviours, however, were not frequent and were recorded only occasionally during the periods of observation. Vertical leaps, side leaps and



Fig.7 Socialising movement with body contact

somersaults are typical of behaviour categorized as 'socializing and playing'. This was similar to the behaviour of humpback dolphins reported from other parts of the world (Saayman and Tayler, 1979; Karczmarski *et al.*, 1997; Jefferson, 2000; Chen *et al.*, 2011).



Fig. 8 Vertical leap



Fig.9 Side leap



Fig. 10 Somersault

Specific courtship behaviours were not noted during the present study. However, behaviour patterns similar to courtship, such as frequent exposure of almost half of the body above the water and prolonged body contact (Fig. 11), followed by aerial display of quasi-leaps, side leaps or vertical leaps were observed.



Fig.11 Prolonged body contact with vertical leap

Delphinids are known for their impressive capacity to both produce and perceive sounds (Popper, 1980). Whistles and screams were recorded from Indo-Pacific humpback dolphins inhabiting the Ashtamudi estuary.

Movement of the dolphins in Ashtamudi estuary is affected considerably by the heavy traffic of trawlers entering the fishing harbours of the Neendakara and Sakthikulangara, located on either side of the estuary. The dolphins were found to carefully avoid trawlers; when trapped in front of the moving vessel, they were seen to take a long leap and move away from the vessel, taking a direction right angle to the direction of the vessel. Similar behaviour of humpback dolphins to avoid boat traffic has been documented by many researchers (Roberts *et al.*, 1983; Karczmarski *et al.*, 1997; Ng and Leung, 2003; Afsal *et al.*, 2008).

The Ashtamudi estuary is relatively small and the entire estuarine area could be viewed from the sea wall constructed for the Neendakara and Sakthikulangara fishing harbours, this could be considered as an ideal site for studying the behaviour of Indo-Pacific humpback dolphins. Long-term observation on the ecology and behaviour of humpback dolphins is recommended to conserve and manage this threatened species.

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