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New records of Carangids (Perciformes: Carangidae) from Chilika Lagoon, east coast of India

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Abstract

Four species of carangids, *Caranx papuensis*, *Carangoides ferdau*, *Trachinotus botla* and *Trachinotus baillonii* are presented here as new records from Chilika Lagoon, India. Five specimen of *C. ferdau* obtained are of juveniles, and hence represent possibility of breeding or spawning ground in the lagoon. The other carangid species collected were during late monsoon period from outer channel in brackish water conditions (13.07 ppt). Of the 60 known species of carangids in Indian waters, Chilika now support 23 (38%) species.

Keywords: First record, *Caranx papuensis*, *Carangoides ferdau*, *Trachinotus botla*, *Trachinotus baillonii*.
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Introduction

Carangids are widely distributed and among the most economically important pelagic fishes of the world. This large and diverse family includes the jacks, pompanos, scads, etc. that contribute around 7% of the annual marine fish landing in India (Nair 2000). High commercial and ornamental value makes this group very important in marine fisheries. They are represented by 147 species belonging to 30 genera (Laroche et al. 1984; Nelson et al. 2016) worldwide and in Indian subcontinent by 60 species (Abdussamad et al. 2013). Carangids, generally abundant in, shallow waters are known to enter coastal lagoons.

Chilika being a large coastal lagoon, have been reported to inhabit several species of carangids (Jones and Sujansingani 1954; Rama Rao 1995; Mohanty et al. 2006; Mohapatra et al. 2007; Mohapatra et al. 2015). The fish diversity of Chilika lagoon was first surveyed by Zoological Survey of India (ZSI), recording 112 fishes (Kemp 1915; Hora 1923), which was further added with 55 fish species during 1957-65 by Central Inland Fisheries Research Institute and 46 fish species by other workers (Chaudhuri 1916 a, b, c; Kaumans 1941; Jones and Sujansinghani 1954; Menon 1961; Misra 1969, 1976 a, b; Jhingran and Natrajan 1966, 1969; Rajan et al. 1968; Mohanty 1973; Talwar and Jhingran, 1991). Zoological Survey of India in 1987 survey (Rama Rao 1995) added four and Bhatta et al. (2001) recorded another eight species, bringing the total to number 225. Artificial opening of a mouth to the lagoon in the year 2000, helped the lagoon to recover its original brackish nature (Ghosh et al. 2006), which was lost due to closure of original mouth due to sedimentation, resulting fish diversity decline. The opening of new mouth led to significant enhancement of fish diversity (Mohanty et al. 2009); raising it to 317 species (Mohapatra et al. 2015) with 56 new records by Mohanty et al. (2006) and Mohapatra et al. (2007) and one species of ornamental fish by ZSI. These fishes recorded belonged to 87 families. Of the total fish diversity, nineteen species of carangids belonging to eleven genera have been recorded so far (Mohapatra et al. 2015) from the lagoon. The diversity of the lake is increasing continuously with reports of new records in the recent past (Roshith et al. 2016) and the present communication is also a part of the addition too. The present work adds four more species of three genera to the list of carangids from the lagoon.

Material and Methods

The Chilika, the Asia's largest coastal lagoon (19°28N', 85°06'E to 19°54'N, 85°35'E) in east coast of India, with 1165 km^2 area is known to harbor a huge floral and faunal diversity. A shallow (0.38-4.2 m) lagoon with unique characteristics of estuarine ecosystem, receives its freshwater character from discharge by riverine input and

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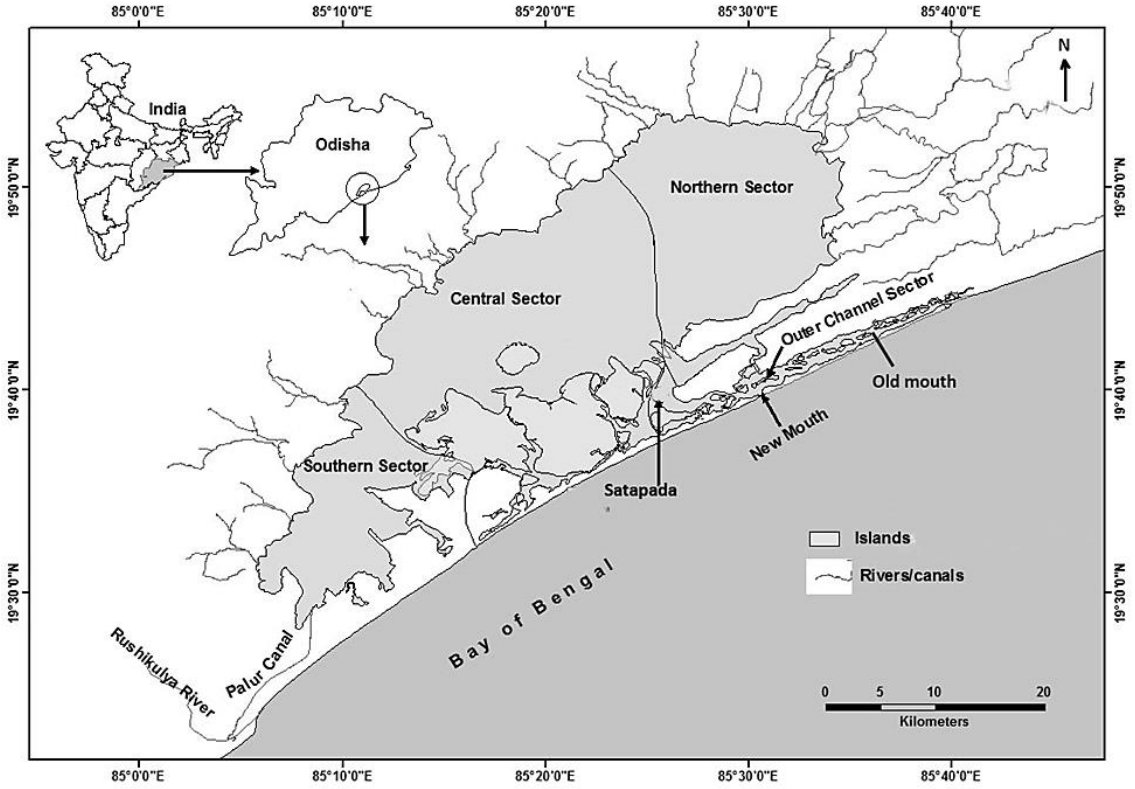

Figure 1. Chilika Lagoon with indications of collection sites.

brackish nature through tidal ingress of water from the Bay of Bengal. The lagoon thus has been classified into four broad ecological zones, the southern zone (saline), central zone (brackish), northern zone (freshwater) and the outer channel (saline) based on salinity gradient and depth (Ghosh and Pattanaik 2005) (Fig. 1). The salinity regime though tends to vary with season and thus the central and southern sectors tend to fresh water and outer channel to brackish during monsoons.

Samples of *Caranx papuensis* were recorded from gill net catch during 9th September 2015 and December 2015 and *Carangoides ferdau* during 28 May 2015; whereas *Trachinotus baillonii* and *T. botla* were collected from hook and line catch of the local fishermen from the Outer channel, during 9th September 2015. The samples were taken to the laboratory where they were identified using standard keys (Smith-Vaniz 1984; Abdussamad et al. 2013) and literature (Allen and Erdmann 2012). Species specific variations in morphology, meristic counts and colour pattern were studied to identify the fish specimen. They were measured with a caliper to the nearest 1.0 mm and the morphometric and meristic characters of the specimens recorded. The morphometric measurements were expressed in percentage of standard length (%SL). A short description of the species are provided.

Results

This paper reports presence of four carangid fish species, *C. papuensis*, *C. ferdau*, *T. botla* and *T. baillonii* from Chilika lagoon. One specimen each of *T. bolta* and *T. baillonii*, two specimens of *C. papuensis* and five specimens of *C. ferdau* were recorded during the surveys. The morphometric measurements of the species are given in Table 1.

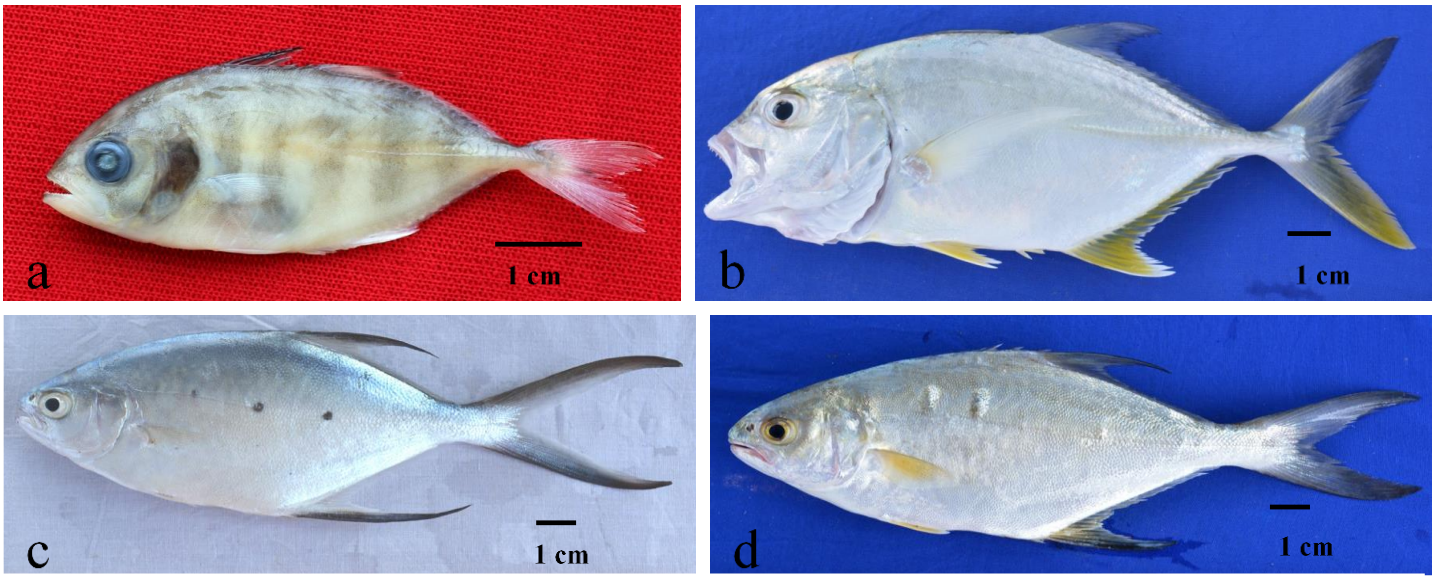

Figure 2. *Carangoides ferdau* (a), *Caranx papuensis* (b), *Trachinotus baillonii* (c) and *Trachinotus botla* (d).

Carangoides ferdau **(Forsskal, 1775)**

(Fig. 2a)

Diagnostic features: The fish has a compressed body with bluntly rounded snout. Its first dorsal fin is 0.25 times shorter than the second. The breast is naked ventrally and the juveniles are usually found to have 5 to 6 vertical dark bands on the body. The species was well-identified with the straight part of lateral line, which was little longer and had 29 scutes along with presence of 22 gill rakers on first gill arch. The specimens were collected from Satpada (Fig. 1) located at a distance of around 11 km from the sea mouth opening, during 28 May 2015 and measured 5.3, 6.21, 6.25 and 7.25 cm in total length (Table 1).

Caranx papuensis **Alleyne and Mac Leay, 1877**

(Fig. 2b)

Diagnostic features: The species breast is naked ventrally but scales present in the pre-pelvic region. It has a short upper jaw, ending before the middle of the eye. The species was well identified with the presence of distinct white narrow margin in pelvic, pectoral and anal fins. There was also a conspicuous white spot at the postero-dorsal margin of the opercle. The specimens was obtained from New mouth (Fig. 1) during 9 September 2015 and December 2015 and measured 19.9 cm and 27.1 in total length (Table 1).

Trachinotus baillonii **(Lacepède 1801)**

(Fig. 2c)

Diagnostic features: The species was distinctly identified with the three small black spots present on lateral line which were smaller than eye diameter. The middle spot was larger than the other two. Caudal fin was symmetrical. The specimen was obtained from Old mouth (Fig. 1) located around 16.67 km from sea opening, during 9 September 2015 and measured 22.4 cm in total length (Table 1).

Trachinotus botla **(Shaw, 1803)**

(Fig. 2d)

Diagnostic features: The fish species has four dull grey lateral line spots, located about 2/3rd above lateral line. The anterior one was larger and gradually decreasing towards the fourth. Second dorsal and anal fins are highly falcate and the soft anal rays count 19. The fish was caught from Old mouth (Fig. 1) during 9 September 2015 and the total length was 24.1 cm (Table 1).

Table 1. Morphometric measurements of the studied species collected from Chilika lagoon

Fish species	***C. papuensis* (n=2)**		***C. ferdau* (n=4)**		***T. botla* (n=1)**		***T. baillonii* (n=1)**	
Morphometric Characters	**min-max (cm)**	**(min-max) %SL**	**min-max (cm)**	**(min-max) %SL**	**cm**	**% SL**	**cm**	**% SL**
Total length	19.9-27.1	126.0-132.7	5.3-7.3	129.3-129.5	24.1	135.4	22.4	143.6
Standard length	15-21.5	100.0	4.1-5.6	100.0	17.8	100.0	15.6	100.0
Fork length	16.4-22.5	104.6-109.3			20.2	113.5	17.2	110.3
Head length	5.2-6.5	30.2-34.7	1.3-1.6	28.6-31.7	4.8	27.0	4.2	26.9
Pre-orbital length	1.6-1.9	8.8-10.7	0.3-0.4	6.6-7.3	1.4	7.9	1.0	6.4
Eye diameter	1.2-1.5	6.9-8.0	0.5-0.6	10.0-12.1	1.1	6.2	1.0	6.4
Post orbital length	2.2-2.4	11.2-14.7	0.7-0.9	15.7-17.1	2.2	12.4	2.0	12.8
Body depth	6.8-9.2	42.7-45.3			7.8	43.8	7.3	46.8
Lower jaw length	2.0-2.3	10.7-13.3	0.5-0.6	11.3-12.2	1.6	9.0	1.3	8.3
Upper jaw length	2.2-2.4	11.2-14.7	0.6-0.7	13.2-14.6	1.7	9.6	1.4	9.0
Pectoral fin length	6.1-8.1	37.7-40.7	1.5-1.8	26.4-43.9	3.5	19.7	2.9	18.6
Pelvic fin length	2.5-3.3	15.3-16.7	0.7-0.8	14.3-17.07	2.7	15.2	2.3	14.7
Dorsal I	2.4-2.7	12.6-16.0	1.1-1.2	19.6-29.2	1.2	6.5	0.7	4.5
Dorsal II	3.6-4.4	20.5-24.0	0.8-1	17.1-19.51	4.7	26.4	4.6	29.5
Inter dorsal length	0.7-1.2	4.7-5.58	0.1-0.1	1.8-2.4	0.1	0.6	0.0	0.0
Pectoral fin base length	1.9-2.0	9.3-12.7	0.3-0.4	6.4-7.3	1.0	5.6	0.8	5.1
Pelvic fin base length	0.5-0.6	2.8-3.3	0.3-0.5	7.3-9.1	0.4	2.2	0.2	1.3
Dorsal I	3.0-4.0	18.6-20.0	1.2-1.4	20.5-34.1	5.0	28.1	3.5	22.4
Dorsal II	6.1-6.9	32-40.7	2.3-2.7	40.7-65.85	6.6	37.1	5.9	37.8
Anal Fin length	3-3.8.0	17.7-20.0	1.2-1.5	21.2-36.6	5.0	28.1	6.2	39.7
Anal base length	6.1-7.2	33.5-40.7	2.3-2.4	41.6-58.5	6.3	35.4	5.8	37.2
Caudal peduncle length	1.2-1.9	8.0-8.8	0.1-0.1	2.0-2.4	1.7	9.6	1.9	12.2
Caudal peduncle depth	0.7-0.9	4.2-4.7	0.3-0.4	5.0-9.8	1.5	8.4	1.4	9.0

Discussion

The carangid diversity in the lagoon now represents 23 species (38%) out of the 60 species reported from Indian waters. Though *C. ferdau* was caught from the outer channel during high saline period (32.4 ppt), the rest three species were caught from the same sector when the water was brackish in nature (13.07 ppt). Thus the fish species recorded are expected to be migrants to the lagoon from the adjacent sea. The property of carangids to use lagoon as breeding and nursery ground has even aided their aquaculture in lagoons (Aquacop 1975). Four species of *Caranx* i.e. *C. ignobilis, C. melampygus*, *C. hippos* and *C. sexfasciatus* have been reported earlier from the lagoon. Jones and Sujansingani (1954) recorded *C. ignobilis* as *C. sansun* and *C. hippos* as *C. carangus*. Rama Rao (1995) added *C. melampygus* and *C. sexfasciatus* to the list of *Caranx.* The new addition to this genus, *C. paupensis* is a common tropical species, found from marine to brackish region (Bacchet et al. 2006) and inhabits lagoons.

Two species of *Carangoides* were recorded earlier from the lagoon. *Carangoides praeustus* was recorded by Jones and Sujansingani (1954) and its distribution was reported in outer channel (Menon 1961). Addition of *C. ferdau*, a tropical, marine to brackish dwelling species, makes the genera more prevalent in the lagoon. Unlike the reported total length of 30 cm (Masuda and Allen, 1993) for *C. ferdau*, the specimen recorded in this study ranged from 5.3 to 7.25 cm and hence considered as juveniles. This species is reported to spawn in reefs during spring and winter months (Johanness 1981). Occurrence of *C. ferdau* of such small length from the lagoon indicates it to be a potential breeding or nursery ground for this species.

The lagoon having such importance to these carangids, knowledge on their diversity in the lagoon gets more significance. Restoration of the lagoon, with a new mouth opening to the sea has privileged the access to many stenohaline marine fishes like carangids that generally inhabit coastal shallow waters. It is evident now that these carangids can easily enter such coastal lagoon also. Repeated occurrence of the mentioned species in

various seasons along with juveniles of few is an indication of the successful impact of eco-restoration of the lagoon. Not only the diversity, the shelter, nourishment and protection provided to these carangids, makes the lagoon more important for conservation. Enhancement in fish diversity of Chilika post restoration is thus precedent to many other dwindling lagoons around.

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