Research Article

Occurrence of Malabar Snakehead, *Channa diplogramma* (Perciformes: Channidae) from River Valapattanam, Western Ghats of Kerala, India

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We report the occurrence of *Channa diplogramma* in the Valapattanam River in March 2013 and this study adds to the species record of *C. diplogramma* in terms of diversity and range distribution in the River Valapattanam and South India.

1. Introduction

Freshwater snakehead fishes of the family Channidae have widespread distribution in the tropics [1], represented by 38 species, of which 35 are of the Asian genus *Channa* [2] and three of the African genus *Parachanna* [1, 3, 4]. The Western Ghats biodiversity of India extends along the west coast and is crisscrossed with many streams, which form the major rivers draining water to the plains of Peninsular India [5]. The freshwater fish diversity in the Western Ghats hotspots is very high [6], with 320 species belonging to 212 endemic species 47% being under Threatened or Near Threatened categories and 23% being under Data Deficient or Not Evaluated categories [7]. The Valapattanam River is one of the west-flowing Rivers in the Western Ghats region of India and the main tributaries are Srikandapurampuzha, Bavalipuzha, Venipuzha, and Aralampuzha. In this paper, we report the occurrence and biometric characteristics of *C. diplogramma* (Day 1865) [8] from the river Valapattanam, Western Ghats of Kerala, India.

2. Materials and Methods

A specimen of *C. diplogramma* (Figure 1) was caught with an encircling net (length 50 meter; height 1.5 meter; mesh size 0.8 mm) from the River Valapattanam, northern Kerala

(11.93° N, 75.30° E) on 15 March 2013. The morphometric measurements of the formalin-preserved specimen were measured with a Vernier calliper to the nearest 0.1 millimetres and weighed to the nearest 0.01 gram using an electric balance (Sartorius-GD-603). The morphometric measurements and meristic counts were made by following Ng et al. [9]. Measurements of body parts are reported as percentage of standard length (%SL) and measurements of subunits of head are reported as percentage of head length (%HL). The specimen was preserved in 4% formaldehyde solution and deposited in the Museum of the Faculty of Fisheries, College of Fisheries, Kerala University of Fisheries and Ocean Studies, Panangad, Kerala, India (FRM-CH-DIP/2013-1).

3. Results and Discussion

Channa diplogramma was first described as *Ophiocephalus diplogramma* (Day 1865) based on one juvenile specimen (42 mm in length) collected near the mouth of the Cochin estuary in the port city of Cochin (Kerala, India). The close similarity of this juvenile specimen with *C. micropeltes*, originally described by Cuvier and Valenciennes [10] from Indonesia, may have misled author to synonymise *C. diplogramma* with *C. micropeltes* [11]. Recently researchers suggested that *C. diplogramma* is distinct from *C. micropeltes* and should be considered as a valid species [12, 13]. After 134

FIGURE 1: *Channa diplogramma* caught from the River Valapattanam (lateral view).

years of it being synonymised, *C. diplogramma* is known to be a valid endemic species of Peninsular India [11]. *Channa diplogramma* is endemic to southern Western Ghats region of India, where it has been reported from the River Meenachil, Manimala, Pampa, Achankovil, and Kallada in Kerala state, as well as the River Chittar and Tambraparni in Tamil Nadu state [11, 14, 15]. Benziger et al. [11] reported that they used comparative specimens of *C. diplogramma* from Canara and Mangalore region of south India, but there is no specific record from River Valapattanam [11]. This species has not been reported from the Valapattanam River in earlier works [16, 17]. Hence, this current record adds to the recorded ichthyodiversity of River Valapattanam in Kerala (Figure 2).

The morphometric and meristic characters of the collected *C. diplogramma* are presented in Tables 1 and 2. All the morphometric measurements and meristic counts of the current specimen were in the prescribed range for *C. diplogramma* as described by Benziger et al. [11]. Some researchers have used molecular analysis methods for the taxonomic identification of a species [2, 12, 18, 19]; however, we could not follow the molecular analysis in the current study. Benziger et al. [11] reported that *C. diplogramma*, collected from the riverine system of Kerala, had 103–105 lateral line scales, which was more than all other species in this genus. Similarly, the current specimen also had 104 lateral line scales and has a relatively long broad body with a laterally compressed head.

Snakeheads are very hardy animals due to the presence of several biological features that they share among their family [18]. In the present study *C. diplogramma* was collected from middle stream part of the river, pool type of habitat with riparian shade and bottom with rock, gravel, and sand. Banks of the site was supported with shrubs and trees giving strong shade into the water. In nature, snakeheads are carnivorous which feed only on live animals including small fishes, insects, crustaceans, frogs, and even baby turtles [20]. Mohsin and Ambak [21] and Roberts [22] noted that *C. micropeltes* kills more individual fish than it actually eats (i.e., not all prey is consumed); likewise, *C. diplogramma* may possibly be a biological threat to the small indigenous freshwater fishes in these rivers [18]. To understand its effects over indigenous freshwater fish diversity, more studies are to be conducted.

Due to the attractive colour pattern of juveniles of *C. diplogramma*, they have been overexploited from the wild for the international aquarium pet trade [23]. However, this profitable business sometimes poses a threat to the environment especially in places where snakehead is not a native fish since some of the fish find their way into dams, rivers, and other water bodies, either by accident or otherwise by being released by traders or by hobbyists

TABLE 1: Morphometric measurements of the *Channa diplogramma*.

Character	Measurement (mm)	% of Standard Length
Total length	534.1	
Standard length	437.1	
Head length	145.2	33.2
Head width	85.1	19.5
Head depth	73.6	16.8
Body depth	92.0	21.1
Body width	91.3	20.9
Predorsal length	154.2	35.3
Preanal length	221.1	50.6
Prepectoral length	149.1	34.1
Prepelvic length	155.3	35.5
Dorsal fin base length	282.1	64.5
Anal fin base length	169.1	38.7
Caudal peduncle length	61.1	14.0
Caudal peduncle depth	58.5	13.4
Caudal fin length	97.1	22.2
Orbital diameter	16.1	3.6
Preorbital length	33.2	7.6
Postorbital length	108.9	24.9
Inter orbital width	48.9	11.2
Jaw length	61.2	14.0
Jaw width	54.1	12.4
Gape width	21.1	4.8
Dorsal fin length	36.1	8.2
Pectoral fin length	65.6	15.0
Pectoral fin base length	24.1	5.5
Pelvic fin length	55.1	12.6
Anal fin length	32.1	7.3
Character	Measurement	% of Head length
Head width	85.1	58.6
Head depth	73.6	50.7
Orbital diameter	16.1	11.1
Preorbital length	33.2	22.9
Postorbital length	108.9	75.0
Inter orbital width	48.9	33.7
Jaw length	61.2	42.1
Jaw width	54.1	37.3
Gape width	21.1	14.5

when they mature into less attractive colours [18]. *Channa diplogramma* shows a similar pattern of body colouration as in *C. micropeltes* [11]; the current specimen showed to be dark blue with white spots along the whole of its profile down to its white underside. According to Benziger et al. [11], *C. diplogramma* shows multiple colour stages during its life history, which makes local fishermen believe that they are different species. Because of this colour differentiation, *C. diplogramma* is locally known by different vernacular names

TABLE 2: Meristic data of the *Channa diplogramma*.

Character	Number
Dorsal fin rays	42
Anal fin rays	27
Pectoral fin rays	15
Pelvic fin rays	6
Lateral line scales	104
Scales above Lateral line	7
Scales below Lateral Line	16

FIGURE 2: Distribution of *Channa diplogramma* in the rivers of Kerala.

such as *Puli vaka*, *Kari vaka*, *Manal vaka*, *Charal vaka*, and *Vaka varal*. The current female specimen measured 534.1 mm in total length and 1720 g in body weight. The spent stage of ovarian maturity was observed in the current specimen of *C. diplogramma* caught in March, which may be helpful for future biological and conservation studies in *C. diplogramma*.

The population of *C. diplogramma* is declining due to the overexploitation for consumption and aquarium trading [1, 11]. A recent study revealed that *C. diplogramma* contributed 0.79 tonnes in the exploited fishery from River Pampa [24]. Kurup and Ranjeeth [25] reported that the population of *C. diplogramma* has declined significantly over the last two

decades in the rivers of Kerala (>90%). Kurup [26] noticed that this species was subjected to alarming decline in its population due to destructive type of fishing activities including dynamiting and poisoning, EUS, habitat alteration, and pollution. Consulting the local fishermen and fish collectors in the River Valapattanam, it is known that *C. diplogramma* is caught occasionally by artisanal fishing, namely, seine netting, gill netting, or long lining. Our personal observations and discussions with local fishermen reveal that most of the extensive fishing of *C. diplogramma* was carried out during the monsoon season. Habitat destruction and sand mining in the river basin of Valapattanam have posed serious problems to the freshwater fish population by affecting their breeding and spawning grounds. Due to its restricted distribution, small population size, illegal fishing, and anthropogenic pressure to its natural habitats, the species is classified under Vulnerable by the IUCN [27]. However, the present record is nevertheless significant in extending recorded distribution of *C. diplogramma* in the Western Ghats of India.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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