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Deviation in the catchability and prominent size-spectra stability of *Rita rita* (Hamilton 1822) from the Ganga river, Uttar Pradesh, India

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Abstract
Riverine fisheries are important as it provides nutritional food and employment for millions of people around the world. In general, environmental variability favours to catfishes in the riverine ecosystem. *Rita rita* is a sluggish, bottom dwelling catfish species. It is a medium-sized freshwater catfish with very high market value in the Indian sub-continent. Besides immense food value, the fish is also known as a sport fish. Study was carried out between the periods of August 2021 to October 2021 from the Ganga river at Prayagraj, Uttar Pradesh, India. In present study, 300 fishes were collected for the study of size spectra stability. The total length of *Rita rita* varied from 110 to 480 mm. The maximum exploitation was recorded in 141 to 180 mm size group fishes with 32.33%. Large size fishes shared small proportions. The current exploitation was indicated that the fishing pressure was recorded in small size group of fishes.

Keywords: Size composition, Exploitation pattern, *Rita rita*, Ganga river

Introduction

The Freshwater fishes are most important and valued property for income, human food, sport and ornament (Hering *et al.* 2015, Dwivedi *et al.* 2016a, Dwivedi & Mishra 2023). Fishes and few macroinvertebrates are most important indicators of environmental health of the water bodies (Nautiyal *et al.* 2004, Khan *et al.* 2017, Mayank *et al.* 2021, Mishra & Dwivedi 2022). Fishes are an integral component of stream and river systems and represent a visible measure of stream/river ecosystem structure and function (Tripathi *et al.* 2017, Mishra & Dwivedi 2020, 2021). Amplify about health consciousness and decrease in agricultural land, people have realized the importance of fish as a nutritious food (Tiwari & Dwivedi. 2014, Dwivedi & Mayank 2018, Mishra *et al.* 2021a).

Rita rita is a bagrid catfish species that is distributed across southern Asia. It is reported in India, Nepal, Myanmar, Pakistan, Afghanistan and Bangladesh (Chondar 1999, Laghari *et al.* 2009). *Rita rita* is also highly available in the Ganga river system with other catfishes (Devi *et al.* 1992, Dwivedi *et al.* 2011, Mushahida-Al-Noor *et al.* 2013, Mayank & Dwivedi 2015a, Nautiyal & Dwivedi 2019). It is universally established from foot hill of Haridwar region to all over the down stretch of the Ganga river (Mukhopadhyay *et al.* 1994, Nautiyal *et al.* 2013, Gupta 2015). *R. rita* shared 2.21% from the Ganga river at Prayagraj (Tripathi *et al.* 2017), 3.65% from the Ken, 2.91% from Paisuni, 6.21% from Tons rivers (Nautiyal & Dwived 2019) and 1,49% from the Yamuna river at Prayagraj (Mayank & Dwivedi 2015a), 4.38% by number from the middle stretches of the Ganga river (Kanpur to Varanasi section) (Dwivedi *et al.* 2016b) of the total catch.

Freshwater fishes are showing a remarkable seasonality in the catch/landing in respect of size and total production (Dwivedi *et al.* 2023). Fish size composition is an essential component of river and stream ecosystem and represents an evident of structure, function, depth and health of stream/river (Dwivedi *et al.* 2016b, Khan *et al.* 2017, Prakash *et al.* 2019). The fish exploitation is an economic activity governed by social needs, food security and pressures (Allan *et al.* 2005, Dwivedi 2009, Rizvi *et al* 2010, Lynch *et al.* 2016, McCafferty *et al.* 2012, Gopesh *et al.* 2021). It is well known fact that the knowledge on fish biology particularly on size composition, is of utmost importance not only to fill up the lacuna of our present day academic knowledge but also in the utility of the knowledge in increasing the

technological efficiencies of the fishery entrepreneurs for evolving judicious fishery management in the streams and rivers (Mayank & Dwivedi 2015b, Dwivedi *et al.* 2023).

The present study was thus undertaken to estimate size composition and exploitation pattern of *R. rita* from the Ganga river at Prayagraj, Uttar Pradesh, India. This study will help in formulation the fishery management policies of *R. rita* from the Ganga River, Uttar Pradesh, India.

Material and methods

The fish sample of *Rita rita* was collected from Daraganj fish market from the Ganga river at Prayagraj, Uttar Pradesh, India. The fish sample was collected during the months of August 2021 to October 2021. The fishes were collected using a variety of methods including drag netting (Mahajal, Chaundi, darwari), cast netting and hook and line. The most frequently encountered fishing gear was drag net (with large, medium or small meshes). The total length of each fish (from the tip of snout to the end of the largest caudal fin rays) was measured (mm) and recorded in fresh condition. The collected data was classified into a series of size groups of 40 mm intervals. The range and mode computed for each size group fish samples and expressed as percentage of total number of fishes in that size groups.

Result and discussion

In present study, 300 fishes were collected and used for the study of size spectra stability of the *Rita rita* from the Ganga river at Prayagraj, Uttar Pradesh. The exploitation pattern showed that the lower size group stock was more exploited than middle and higher size classes. The maximum exploitation was reported in 141 to 180 mm size group fishes with 32.33% (Table 1). Large size fishes shared small proportions. The size group 101-140, 181-220, 221-260, 261-300 and 301-340 mm were contributed 23.00%, 15.67%, 21.00%, 6.33% and 0.67%, respectively (Table 1). The current exploitation was indicated that the fishing pressure was recorded in small size group of *R. rita* fishes. The current exploitation was also indicated that the exploitation was not systematic especially in case of middle size group fishes (Table 1).

The Ganga river water quality is also supporting for satisfactory survival and recruitment of *R. rita*. In general, middle size group of fishes in riverine/natural stocks are more exploited than other size groups (Nikolskii 1980, Pathak *et al.* 2015, Mayank & Dwivedi 2015b, Tripathi *et al*. 2015). Dwivedi *et al.* (2023) reported lower size group of *Cyprinus carpio* was maximum exploited from the Tons river at Prayagraj, Uttar Pradesh. Kamal (1969) estimated lower and middle age groups of *Cirrhinus mrigala* were highly exploited from the river Yamuna at Allahabad. Middle size group of *Eutropiichthys vacha* was maximum exploited from the Ganga river at Allahabad (Tripathi *et al.* 2015). The maximum exploitation of *Rita rita* was recorded in 31.1-35.0 cm size group with 18.80% and minimum in 51.1-52.8 cm size group with 0.85% from the Yamuna river at Prayagraj (Prakash *et al.* 2019). Dwivedi *et al.* (2006) recorded lower size group of *Labeo calbasu*, maximum exploited in the Ghaghara river at Faizabad. Fishing pressure and water quality of the river changes the biodiversity, size composition, growth rate, age composition, sex ratio, income of fishers and maturation (Brown 2000, Arlinghaus *et al*. 2010, Dwivedi *et al*. 2017, Dwivedi & Nautiyal 2012, Imran *et al.* 2015, Nautiyal & Dwivedi 2020, Mayank & Dwivedi 2015a, 2016, Tiwari *et al*. 2016, Mishra *et al.* 2021b).

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Table 1 Size composition and exploitation structure of *Rita rita* from the Ganga river at Prayagraj, Uttar Pradesh, India

SN.	Size classes (mm)	Number of fishes	Percentage
1	101-140	69	23.00
2	141-180	97	32.33
3	181-220	47	15.67
4	221-260	63	21.00
5	261-300	19	6.33
6	301-340	2	0.67
7	341-380	1	0.33
8	381-420	0	000
9	421-460	1	0.33
10	461-500	1	0.33