



## Growth, mortality and stock status of three commercially important catfishes from the River Ganga, India

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### ABSTRACT

A study was undertaken to determine population parameters and stock status of three commercially important catfishes viz. *Eleotrisichthys waicha* (Hamilton, 1822), *Chaptasia garua* (Hamilton, 1822) and *Ailia coilia* (Hamilton, 1822) from middle and lower stretch of the River Ganga. Monthly length and weight data of three species from Patna, Buxar and Bhagalpur was collected for determining population parameters and stock status using standard procedures. The von Bertalanffy growth parameters (VBGF) including the total mortality ( $Z$ ), natural mortality ( $M$ ) and fishing mortality ( $F$ ) rates for all three catfishes were analysed and compared with past studies. The calculated  $E$  value of the three catfishes was above the level of optimum exploitation (0.5) but was below 0.7 indicating that caution need to be exercised in order to avoid overexploitation of the fish stocks. Management measures such as reduction of fishing pressure either by limiting number of boats or fishing hours, imposing mesh size regulation to avoid growth overfishing, minimum legal size, declaring closed season or closed area throughout the breeding season of the catfish can be suggested for revival of the fish stocks. Further, studies on the reproductive biology, identification of spawning season and spawning grounds is suggested which will play a pivotal role in the management of stocks of these fishes in the River Ganga.

Keywords: Exploitation rate, FISAT II, Length frequency, Population dynamics

### Introduction

Rivers are considered to be one of the most threatened ecosystems of the world (Sondheimer and Schmittz, 2018) due to multiple anthropogenic and natural stressors triggering higher degree of extinction of freshwater fishes in comparison to other vertebrates (Bruton, 1995; Sarkar *et al.*, 2008). River Ganga is the largest river system of India that sustains rich wealth of aquatic fauna including fish. The first known survey of fish fauna in the river Ganga and its tributaries was conducted by Hamilton (1822) who described 269 fish species of which about 34 fish species of Gangetic carps, murrels, featherbacks and large catfishes are known to have high commercial importance (Islam *et al.*, 2006; Singh *et al.*, 2013).

Catfish constitutes about one third of the total fish fauna globally (Jayaram, 2009). In River Ganga catfish under the family Bagridae, Siluridae, Sisoridae and Schilbiidae exhibit significant commercial importance (Misra, 1959; Mason, 1974; Bhingran, 1975) and forms the second most dominant group in terms of total fish landings (Bansal, 1994; Das *et al.*, 2013), contributing about 21-24% (Da, 1999; Sarkar *et al.*, 2012). The three catfish species *Eleotrisichthys waicha* (Hamilton, 1822), *Chaptasia garua* (Hamilton, 1822) and *Ailia coilia* (Hamilton, 1822) under the family Ailiidae contribute significantly to the commercial fish landings in the middle and lower stretch

of the River Ganga. *E. waicha*, commonly known as 'Bachma waicha', is a riverine freshwater catfish known for its rich taste, nutritional aspect and high market value (Hanan *et al.*, 2002). The species is listed as 'Endangered' in India (Mohar and Walker, 1998). *C. garua* is a bottom and margin dwelling species with high fat content and moderate protein (Jaffri *et al.*, 1964; Gupta and Banerjee, 2016) making it commercially valuable. *A. coilia* widely known as 'Gangetic Ailia' is a freshwater inhabitant of the River Ganga. It forms an important fishery for the artisanal fishers and was recently listed under 'Near Threatened' category by the IUCN (Ng and Dehaanok, 2011). Though, studies on biology and population parameters of these catfishes are available from other river systems in India (Máyan *et al.*, 2016; Nazir and Khan, 2017; Biswas *et al.*, 2019; Khan and Nazir, 2019), information regarding the growth, mortality and exploitation status of *E. waicha*, *C. garua* and *A. coilia* stocks in the River Ganga is lacking.

In this background, the present study was conducted to estimate the growth, mortality and stock status of *E. waicha*, *C. garua* and *A. coilia* from the middle and lower stretch of the River Ganga.

### Material and methods

The study was carried out in Buxar (25°33'50"N, 83°56'28"E), Patna (25°37'06"N, 83°11'50"E) and