



Role and Invasive Potential of Non-native Fish Species from the Gomti River, India

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Abstract

The fish samples were collected from the Gomti river at Lucknow, India. Two non-native fish species, *Cyprinus carpio* and *Oreochromis niloticus* were selected for the present study. The size of fishes varied from 126-379 mm and 143-684 mm of *O. niloticus* and *C. carpio*, respectively. The size data indicated that the both species powerfully invaded from the Gomti river, India. The maximum fishes of *O. niloticus* was exploited in 211-240 mm size classes with 23.46% while in case of *C. carpio* 391-440 mm size classes fishes with 16.07%. The largest size of fishes constituted small proportion in the exploitation in both fishes. The stock of *O. niloticus* and *C. carpio* was dense by middle size classes from the Gomti river at Lucknow, India.

Keywords: Invasive potential, Non-native fish species, Size composition, Exploitation pattern, Gomti river

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1. INTRODUCTION

Fisheries of tropical rivers are very essential for the livelihoods and food security of millions of people around the world [1, 2, 3]. Introduction of non-native fish is a global phenomenon that has occurred for well over a century [4, 5]. *C. carpio* and *O. niloticus* have been intentionally spread around the world despite recognition of their potentially detrimental effects on native flora and fauna (open and close water bodies) [6, 7]. *C. carpio* and *O. niloticus* are invasive fish species for India which was introduced intentionally in Indian water [8-12]. Intentional introductions are, and have been, motivated by economic, environmental and social considerations [13-16]. Invasive species generally disrupt recipient ecosystems leading to a loss of native biodiversity and fish stock [17-19]. *O. niloticus* and *C. carpio* have no water quality parameter [20-22]. Riverine fisheries are important as it provides nutritional food and employment for millions of people around the world [23-25]. Most wild stocks in Indian rivers have been overexploited or have their maximum sustainable yield due to over fishing, habitat degradation and pollution. The native fish stock management and non-native fish impact evaluation in respect of ecosystem function and biodiversity, currently disputing both scientific communities and environmental executives (e.g. policy maker/government) especially in developing countries. The present study was aimed to update the information on role and invasive potential of non-native fish species from the Gomti river, India.

2. MATERIALS AND METHODS

The related information and data were collected from the Gomti river at Lucknow site. The climate of this region is marked by mild cold during winters and intensive heat during summers. The monsoon season is July to September. Sometimes winter rainfall is also recorded. Freshwater ecosystems might be the most endangered ecosystems in the globe and highly vulnerable. Drag nets (mahajal, Chauneli, Darwari), cast nets and gill nets were used to catch the present fish species in the river. Both species are of great economic importance for the region and river. 485 and 613 fish specimens (male and female) were analyzed to *Oreochromis niloticus* and *Cyprinus carpio*, respectively. The total length (mm) from the tip of snout to the end of largest caudal fin rays was measured by scale. The role and invasive potential was determined with help of exploitation pattern. The exploitation pattern was determined the number of total samples in each size groups, which converted in the percentage.

3. RESULTS AND DISCUSSIONS

Both species are of the most desirable species for food and commercial purposes by majority consumers. The size of fishes varied from 126-379 mm and 143-684 mm of *O. niloticus* and *C. carpio*, respectively. These size classes indicated that the both species have very high potential for invasion in the river. Data also indicated that the both species powerfully invaded from the Gomti river. The maximum fishes of *O. niloticus* was exploited in 211-240 mm size classes with 23.46% (Fig. 1) while in case of *C. carpio* 391-440 mm size classes fishes with 16.07% (Fig. 2). The largest size of fishes constituted small proportion in the exploitation in both fishes. The stock of *O. niloticus* and *C. carpio* was dense by middle size classes from the Gomti river at Lucknow, Uttar Pradesh. *O. niloticus* and *C. carpio* were contributed dominant proportion in the catch of total landing of fishes. After these fishes, small size fishes of other species contributed good percentage. The invasion of both species from the Gomti river, native stock of other fishes frequently minimizes.

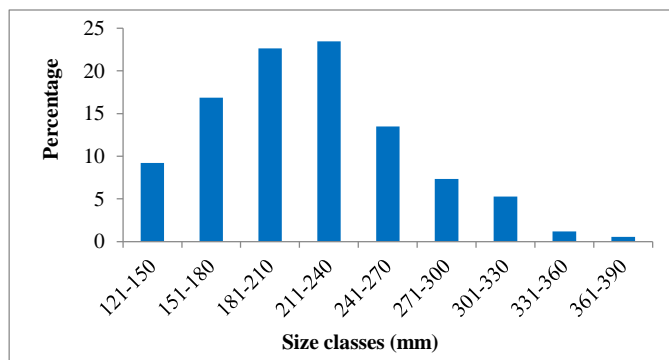


Fig. 1. Size composition and exploitation pattern of *O. niloticus*

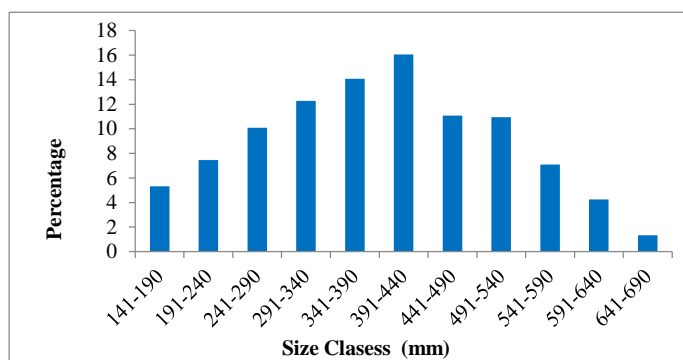


Fig. 2. Size composition and exploitation pattern of *C. carpio*

The exploitation of fishes is total dependent on the economic value of fishes in the river. Exploitation is an economic activity governed by social needs and pressures. Over exploitation and non-targeted fishing is the biggest problem of riverine fishery [2, 3,]. In general, middle size classes of fishes are higher exploited compared to lower and higher size classes [26-30]. *O. niloticus* and *C. carpio* are powerfully invaded from the Ganga and Yamuna river (Dwivedi and Jha 2013). Both species are producing grate opportunity for livelihood for fishermen community and food security in the Ganga basin [31-33]. Both species are creating pressure into *Cirrhinus mrigala* for food and space [34, 35]. The aquatic ecosystems before intrusion of non-native species are providing services completely in the form of interlinking of ecological fundamentals.

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