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Impact of fishing on size spectra of *Wallago attu* (Bloch and Schneider 1801) from the Rapti river, Uttar Pradesh, India

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Abstract

Fishing mortality of undersized fish (growth overfishing) is a serious issue for sustainable utilization of fish stock, which reduces the proportion of large individuals in river ecosystems with size spectra. For assessment of growth overfishing, fish samples of *Wallago attu* were collected from April 2023 to March 2024 from the Rapti River, Uttar Pradesh, India. A total of 165 fish specimens of *Wallago attu* were examined for the assessment of the impact of fishing on size spectra and exploitation structure. The size spectra of *W. attu* varied from 29.0 to 137.8 cm. The size group of 70.1 to 80.0 cm was the most common occurrence. The 120.1–130.0 cm and 130.1 to 140.0 cm shared very little proportion in the total catch. Overall, the middle-size group was the most fished compared to lower and higher-size spectra from the Rapti River. Additionally, the findings showed that because middle-sized spectra are so popular with consumers, fishermen targeted them.

Keywords: size spectra, *Wallago attu*, Rapti River, fishing pressure.

Introduction

Freshwater shark, *Wallago attu*, is distributed and established in India, Bangladesh, Pakistan, Sri Lanka, Nepal, Burma, Thailand, Vietnam, Kampuchea, the Malay Peninsula, Afghanistan, Sumatra, and Java (Talwar & Jhingran 1991, Giri *et al.* 2002, Mirza 2003). It is a large size catfish species, and they form important fisheries in rivers, lakes, wetlands, reservoirs, canals, and wild ponds (Talwar & Jhingran 1991, Rufus *et al.* 2015, Kumar *et al.* 2023). It has good market demand as a food fish. It is an economically important fish species from the Ganga River, Yamuna River, and its tributaries (Pathak *et al.*, 2011; Tripathi *et al.*, 2017; Mayank & Dwivedi, 2015; Nautiyal & Dwivedi, 2019). This fish highly damages fish production in wild ponds, lowland areas, and wetlands through piscivorous feeding habits (Dwivedi *et al.*, 2004; Islam *et al.*, 2006). This fish is known to significantly impact the biodiversity and ecosystem health of these water bodies. It can also reduce the population of native fish species.

Riverine fisheries provide nourishment and employment for millions of people worldwide (Dwivedi 2009, Dwivedi *et al.* 2014, Soni & Ujjania 2018). The size spectra of fish directly indicate the suitability of habitat, food supply, and fishing mortality (Dwivedi *et al*, 2011, 2017, Gopesh *et al.* 2021, Kumar *et al.* 2023).

The stock, size spectra, abundance, growth increment, and maximum life spawn of fish are reducing due to fishing pressure, habitat destruction, pollution, climate change, and consumer preferences (Dwivedi & Nautiyal 2012, Mayank & Dwivedi 2016, Tiwari *et al.* 2016, Ujjania & Soni 2020, Kumar *et al.* 2023, Tripathi *et al.* 2023). Size composition and exploitation pattern were studied by many researchers on *Labeo calbasu* (Imran *et al.* 2015), *Cirrhinus mrigala (*Dwivedi *et al.* 2017, Khan *et al.* 2017), *Clupisoma garua (*Gopesh *et al.* 2021). However, studies on *W. attu* from the Rapti River, Uttar Pradesh, India, have not been done before. The present study aims to emphasize the exploitation pattern and size composition of *W. attu* from the lower Rapti River at Gorakhpur, Uttar Pradesh. This study will help to develop fishery management policies and restoration strategies for *W. attu* in the riverine sector.

Material and method

A total of 165 specimens of *Wallago attu* were collected randomly from April 2023 to March 2024 from two different sites, namely Kauriram and Barahalganj fish markets (Gorakhpur) in the lower stretch of the Rapti River, Uttar Pradesh, India. These are landing centers for fish caught in the Rapti River.

Fish sizes were measured using a straight forward meter scale. The total length (TL) of the fish was measured from the tip of the snout to the largest fin rays of the caudal fin. The size spectra of fish varied from 29.0 to 137.8 cm. The collected data were classified at 10-cm intervals. The number of samples was arranged based on the classified size group and then converted into percentages.

Results and discussions

The size spectra of the *Wallago attu* varied from 29.0 cm to 137.8 cm in the lower stretch of the Rapti River at Gorakhpur, Uttar Pradesh. The fish were mostly fished by dragnet, harpoon, hook and line. The size range of 70.1 to 80.0 cm was the maximum abundance in the catch, which accounted for 18.78% of the total catch. Due to favourable market prices and consumer preferences, fishermen heavily targeted this size group. The size range of 120.1–130.0 cm and 130.1–140.0 cm, with 0.6% of the total catch in each range, was the minimum target size for fishermen (Fig. 1). The range of lower size groups of 20.1-30.0 cm, 30.1-40.0 cm, 40.1-50.0 cm, and 50.1-60.0 cm contributed 1.21%, 12.72%, 8.48%, and 9.69% of the total catch, respectively (Fig. 1). The range of middle size groups 60.1–70.0 cm, 70.1–80.0 cm, 80.1–90.0 cm, and 90.1–100.0 cm shared 17.57%, 18.78%, 14.54%, and 7.87% of the total catch, respectively. The range of higher size groups 100.1–110.0 cm and 110.1-120.0 cm contributed 6.66% and 1.21% of the total catch, respectively (Fig.1). More than 100 cm size groups were sold in other markets, namely Gorakhpur, Azamgrah, Varanasi, and Kolkata, in preserved condition. These markets demand relatively larger groups of fish. However, the majority of the total catch was sold at local markets.

Based on the data, it was recorded that the middle-sized group was most exploited (58.79%) compared to the small-size group (32.12 %) and higher-size group (9.09%) from the Rapti River (Fig. 2). The results indicate that the exploitation was not sustainable in the lower-sized group and the higher-sized group. Due to the market price, lower-size groups of fish were not facing fishing pressure, while due to the unavailability of the market, higher-size groups of fish were safe.

Size spectra of fish varied from place to place and habitat to habitat (Nikolskii 1980, Achakzai *et al.* 2013, Hoque *et al.* 2020). Thella *et al.* (2018) stated that high fishing mortality was observed in the Manimala and Pampa rivers. The size distribution of fish provides information about the availability of food and compatibility of the surrounding habitat (Tripathi *et al.* 2015, Vilizzi *et al.* 2015). Imran *et al.* (2015) stated that the middle-size group of *Labeo calbasu* at Allahabad is being exploited more than other size groups. It has been generally observed that the middle-sized groups are most exploited in riverine or natural water bodies (Tripathi *et al.* 2015, Pathak *et al.* 2015, Mayank & Dwivedi 2015, Dwivedi *et al.* 2023).

It may be concluded that the size spectra and exploitation pattern of *W. attu* from the lower stretch of the Rapti River are slightly disturbed by fishing pressure, especially in lower-size group. Due to this type of fishing pressure, shortly its stock gradually and smoothly declined. Overall size spectra indicated that the water quality of the river and habitat was suitable for *W. attu.*

Conclusion

The decline in the stock of *W. attu* in the lower stretch of the Rapti River due to fishing pressure highlights the need for sustainable fishing practices to maintain healthy fish populations. Despite the disturbance caused by fishing pressure, the overall size spectra of *W. attu* indicate that the water quality and habitat in the river remain suitable for this species. Continued monitoring and conservation efforts are essential to ensure the long-term health and sustainability of the *W. attu* population in the Rapti River.

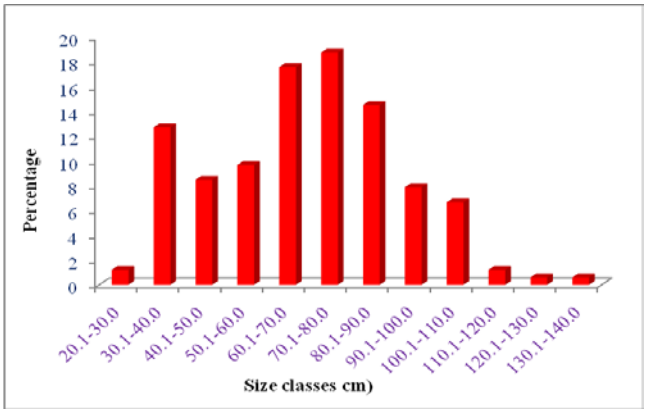

Fig. 1 Exploitation pattern of *W. attu* according to size classes from the Rapti River

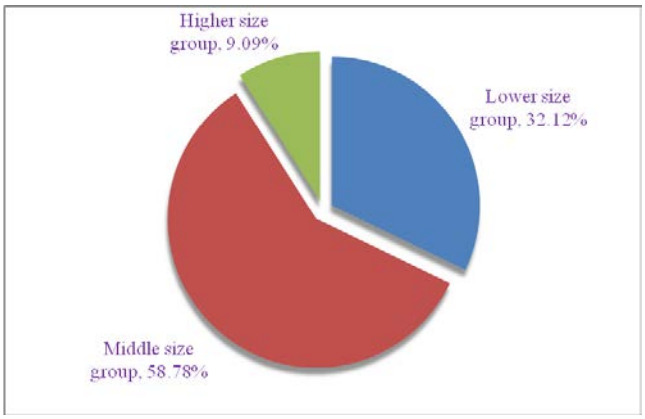

Fig. 2 Exploitation pattern of *Wallago attu* according to major group wise from the Rapti River

References

Achakzai, W. M., W. A. Baloch, S. Saddozai & N. Memon 2013. Length-weight relationships (LWRs) of *Wallago attu* (Bloch and Schneider) from Manchar Lake Jamshoro, Sindh, Pakistan. *J. Appl. Ichthyol.,* **(2013):** 1, doi: 10.1111/jai.12149.

Dwivedi, A.C, P. Mayank & A. Tiwari 2017. Size selectivity of active fishing gear: changes in size, age and growth of *Cirrhinus mrigala* from the Ganga River, India. *Fisheries and Aquaculture Journal*, **8(2):** DOI: 10.4172/2150-3508.1000205.

Dwivedi, A.C. & P. Nautiyal 2012. Stock assessment of fish species, *Labeo rohita*, *Tor tor* and *Labeo calbasu* in the rivers of Vindhyan region, India. *J. Environ. Biol.*, **33(2):** 261-264.

Dwivedi, A.C. 2009. Ecological assessment of fishes and population dynamics of *Labeo rohita* (Hamilton), *Tor tor* (Hamilton) and *Labeo calbasu* (Hamilton) in the Paisuni river. *Aquacult*, **10(2):** 249-259.

Dwivedi, A.C. N. Mishra & P. Mayank 2023. Variations in the catchability and remarkable size-spectra stability of *Cyprinus carpio* (Linnaeus, 1758) with reference of ecology from the Tons river, Central India. *Ecology and Conservation Science*, 2(3): 555590. **DOI:** 10.19080/ECOA.2023.02.555590.

Dwivedi, A.C. N. P. Tewari & K. R. Singh 2004. Present structure of capture and culture fishery of the Faizabad District (U.P.). *Bioved*, **15(1, 2):** 95-98.

Dwivedi, A.C., D. N. Jha & P. Mayank 2014. Food security, livelihood and non-native fish species: status, trends and future perspectives. *Journal of the Kalash Science*, **2(3) (Special Volume):** 41-46.

Dwivedi, A.C., P. Mayank & S. Tripathi 2011. Size composition, exploitation structure and sex ratio of catfish, *Rita rita* (Hamilton) in the lower stretch of the Yamuna river at Allahabad. *Flora and Fauna*, **17(2):** 295-300.

Giri, S.S., S.K. Sahoo, B.B. Sahu, S.N. Mohanty, P.K. Mukhopadhyay & S. Ayyappan (2002). Larval survival and growth in *Wallago attu* (Bloch & Schneider); effects of light, photoperiod and feeding regimes. *Aquaculture*, **213:** 151-161.

Gopesh, A., S. Tripathi, K. D. Joshi & A. C. Dwivedi 2021. Size composition, exploitation structure and sex ratio of *Clupisoma garua* (Hamilton) from middle stretch of the Ganga River at Allahabad, India. *National Academy Science Letter*, **44(4):** 309-311, **DOI**: 10.1007/s40009-020-01011-0.

Hoque, M.M., M.A. Rahman, A. Basu, M.I. Haider M.M. Hasan M.M.H. Pramanik, F.K.K. Hasan, M.K. Rahman & Y. Mahmud 2020. Length-weight relationship of *Wallago attu* from the river of Dakatia (tributary of Meghna), Chandpur, Bangladesh. *Bangladesh J. Fish. Res.*, **19(1-2):** 59-66.

Imran, S., S. Thakur, D. N. Jha & A.C. Dwivedi 2015. Size composition and exploitation pattern of *Labeo calbasu* (Hamilton 1822) from the lower stretch of the Yamuna river. *Asian Journal of Bio Science*, **10(2):** 162-164. DOI: 10.15740/HAS/AJBS/10.2/171-173.

Islam, Md. S., M.M. Rahman, G.C. Halder & M. Tanaka. 2006. Fish assemblage of a traditional fishery and the seasonal variations in diet of its most abundant species *Wallago attu* (Siluriformes: Siluridae) from a tropical floodplain. *Aquatic*

Ecology, **40:** 263–272.

Khan, S., A. C. Dwivedi & P. Mayank 2017. Size composition and exploitation pattern of *Cirrhinus mrigala* (Hamilton, 1822) from the Ghaghara River, India. *Journal of Scientific Achievements*, **2(9):** 20-22.

Kumar, A., A. C. Dwivedi & Venkatesh R. Thakur 2023. The record of the largest Fresh water Shark, *Wallago attu* (Bloch & Schneider, 1801) from the Sarayu river, Uttar Pradesh, India. *Journal of the Kalash Science*, **11(2):** 21-23.

Kumar, D., A. C. Dwivedi & J. Kumar 2023. Maximum size of Helicopter catfish, Wallago attu (Bloch & Schneider, 1801) from the Rapti river, Uttar Pradesh, India. *Journal of Nehru Gram Bharati University*, **12(2):** 48-51.

Mayank, P. & A. C. Dwivedi 2015. Biology of *Cirrhinus mrigala* and *Oreochromis niloticus*. LAP LAMBERT Academic Publishing GmbH & Co. KG, Dudweiler Landstr. 99, 66123 Saarbrucken, **Germany,** Pp. 188.

Mayank, P. & A. C. Dwivedi 2016. Stock assessment and population structure of alien fish species, *Oreochromis niloticus* (Linnaeus) from the lower stretch of the Yamuna river, India. *Journal of the Experimental Zoology, India*, **19(1):** 163-167.

Mirza, M.R. 2003. Checklist of freshwater fishes of Pakistan. *Pakistan Journal of Zoology*, **3:** 1–30.

Nautiyal P. & A. C. Dwivedi 2019. Fishery in the tributaries of Yamuna river (Ken river, Paisuni rivers) and Ganga river (Tons river). *Journal of Mountain Research*, **14(2):** 19-36.

Nikolskii, G.V. 1980. *Theory of Fish Population Dynamics as the Biological Background for Rational Exploitation and Management of Fishery Resources.* Bishen Singh Mahendra Pal Singh Dehra Dun (India) and Otto Koeltz Science Publishers Kooenigstein, W. Germany, pp 1-323.

Pathak, R. K., A. Gopesh & A. C. Dwivedi 2011. Alien fish species, *Cyprinus carpio* var. *communis* (common carp) as a powerful invader in the Yamuna river at Allahabad, India. *National Academy of Science Letter*, **34(9 & 10):** 367-373.

Pathak, R. K., A. Gopesh & A. C. Dwivedi 2015. Invasion potential and biology of *Cyprinus carpio* (Common carp). LAP LAMBERT Academic Publishing GmbH & Co. KG, Dudweiler Landstr. 99, 66123 Saarbrucken, Germany.

Rufus, T., P.S. Eldho, A. Ali, N. Dahanukar & R. Raghavan 2015. Length-weight relationship and condition factor of a large predatory catfish, *Wallago attu* (Schneider, 1801) from the rivers of central Kerala, India. *Journal of Aquatic Biology & Fisheries*, **3:** 105-110.

Soni, N. & N. C. Ujjania 2018. Age, Growth and Population structure of *Cirrhinus mrigala* (Ham. 1822) in large reservoir (Vallabhsagar), Gujarat. *International Journal of Advance and Innovative Research*, **4 (IV):** 14-17.

Talwar, P.K. & A.G. Jhingran 1991. Inland fishes of the India and adjacent countries. AA Balkema. 541 pp.

Thella, R., N. Dahanukar, P.S. Eldho, A. Ali & R. Raghavan 2018. Population Dynamics of Wallago attu (Bloch and Schneider 1801) (Osteichthyes, Siluridae) in Three Small Rivers of Southern India. Asian Fisheries Science **31:** 172–178.

Tiwari, A., A. C. Dwivedi & P. Mayank 2016. Time scale changes in the water quality of the Ganga River, India and estimation of suitability for exotic and hardy fishes. *Hydrology Current Research*, **7(3):** 254. doi:10.4172/2157-7587.1000254.

Tripathi, S., A. Gopesh & A. C. Dwivedi 2017. Framework and sustainable audit for the assessing of the Ganga river ecosystem health at Allahabad, India. *Asian Journal of Environmental Science*, **12(1):** 37-42. DOI: 10.15740/HAS/AJES/12.1/37-42.

Tripathi, S., A. Gopesh & A. C. Dwivedi 2023. Food and feeding habit of commercially important catfish, *Clupisoma garua* (Hamilton, 1822) from the middle stretch of subtropical the Ganga river, India. *Journal of Nehru Gram Bharati University*, **12(2):** 13-23.

Tripathi, S., A. Gopesh, K.D. Joshi & A. C. Dwivedi 2015. Size composition, exploitation pattern, sex ratio and sex structure of *Eutropiichthys vacha* (Hamilton, 1822) from the middle stretch of the river Ganga at Allahabad, India. In: Advances in biosciences and Technology edited by K.B. Pandeya, A.S. Mishra R.P. Ojha and A.K. Singh published by NGBU, Allahabad, Pp 116-120.

Ujjania, N.C. & N. Soni 2020. Age structure, growth rate and exploitation pattern of *Cirrhinus mrigala* (Ham. 1822) in Vallabhsagar reservoir, Gujarat, India. *Indian Journal of Experimental Biology*, **58:** 498-501.

Vilizzi, L., A. S. Tarkan & G. H. Copp 2015. Experimental evidence from causal criteria analysis for the effects of common carp *Cyprinus carpio* on freshwater ecosystems: a global perspective. *Rev. Fish. Sci. Aquaculture*, **23(3):** 253-290.