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Population structure of Indian major carp, *Catla catla* (Hamilton, 1822) in Keliya Dam, Gujarat (India)

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Abstract

Fish population structure is very important in view of the fish exploitation pattern and it is directly related to sustainable fish production in the water body. The present study is aimed to determine the population structure of the Indian major carp (*Catla catla* Ham. 1822) at Keliya Dam (Gujarat). The total length and weight were measured from the randomly collected 597 fish specimens from commercial catches during November 2021 to March 2022 at Keliya Dam, Gujarat India. The length of the fish varied from 25.000-46.000 cm (934.405±0.158 cm) andthe weight was 206.000 -1525.000 gm (528.286±8.623 gm) in Keliya dam (Gujarat). The length-based group distribution shows the 5 length groups in which length group B was dominated (51.4 %) followed by length group C (28.5%), A (12.5%), D (6.9%) and E (0.7%) in the fish catches.The observations of population patterns show the 'urn shaped' pyramid and concluded that in harvested fish catch, the immature fish population was more compared to the mature fishes.These findings are useful for planning for sustainable fishery of studied fish catla in Keliya reservoir.

Keyword: *Catla catla*, Keliya reservoir, Keliya dam, Population structure,

Introduction

The *Catla catla*, (Hamilton 1822) is commonly known as the Indian major carp (IMC), Bhakur. It is a member of Cyprinidae family and a highly commercially important species for freshwater aquaculture in the Indian subcontinent as monoculture or polyculture (Harikrishnan & Balasundaram 2011, Mayank 2014). It is the second most important among Indian major carps due to high growth rate and acceptance of the consumers as food (Mitra 1942). This species inhabits in freshwater rivers, reservoirs, lakes, ponds and beels of south-east Asia and India (Jhingran 1959). It is commercially and economically exploited from the Ganga and Yamuna rivers (Tripathi *et al.* 2017). The population studies are a most important aspect of fishery biology and the growth rate of fish can be enumerated from the estimation of age and population structure, which can give important information on stock composition, age, maturity, life span, mortality, growth, production etc. Thus, the present study is highly significant for the management and conservation of fish population in natural water bodies (Haroon 1999, Ujjania *et al.* 2010, 2014). In a population, the ratio of different age classes at a given time represents the exploitation pattern of the population (Prashant *et al*. 2008).

The determination of age, growth and population pattern of fishes are useful to resolve the problems of basic life history and essential for formulating future policies and management of the fishery (Soni & Ujjania 2018). Similar findings on population structure of different fish species in different water bodies were reported i.e. Khan *et al*. (2017) for *Cirrhinus mrigala* in the Ghaghra river, Khan (2017) for common carp in the Ghaghra river, Dwivedi *et al.* (2017) for *C. mrigala* in the Ganga river, Soni & Ujjania (2018) for *C. mrigala* in Ukai dam, Khan (2019) for Gangetic Tengra in Ghaghra river and Ujjania & Soni (2020) for major carp (mrigal) in Ukai dam, Khan *et al.* (2007) and Imran *et al.* (2015) studied size composition and exploitation pattern of *C. mrigala* and other Indian major carp group fishes. This important biological aspect is considered, and population structure of the

Indian major carp (*Catla catla*) was investigated Keliya dam (Gujarat).

Materials and methods

Keliya dam is the earthen dam which was constructed across the river Kharera, a tributary of river Kaveri near village Keliya in district Navsari of Gujarat state (India). It was constructed for irrigation and flood control although used for fish culture. The dam contains maximum height (28.10 m), maximum length (814.00 m) and area at FTL (324 ha). The morphometric measurements, including length and weight of 597 were measured from randomly collected fish specimens during November 2021 to March 2022. The total length (snot tip to caudal fin end) was measured by measuring tap, where as the body weight (WT) of the fish was measured with the help of a single pan balance. The length data was distributed in different length groups (A, B, C, D and E) on the basis of the length difference of 5.0 cm (Ujjania *et al.* 2014). The graph and calculation of the data were prepared with the help of MS Excel 2010.

Result and Discussion

The observed length of the studied fish varied form 25.000 – 46.000 cm (934.405±0.158 cm) while the weight was 206.000 –1525.000 gm (528.286±8.623 gm) in Keliya dam (Gujarat) and from length-based group distribution 5 length groups were observed (Table 1). The result shows (Table 1) that length group B was dominated (51.4 %) followed by length group C (28.5%), A (12.5%), D (6.9%) and E (0.7%) in the fish catches (Fig. 1). From these findings it can be concluded that the middle sized (length group A & B) shared the maximum contribution in the exploitation compared to higher sized groups (C, D and E).

Table 1. Length group distribution of *Catla catla* in Keliya dam (Gujarat)

Length Groups	N	Percentage
A	75.00	12.56
B	307.00	51.42
C	170.00	28.48
D	41.00	6.87
E	4.00	0.67
Pooled	597.00	100.00

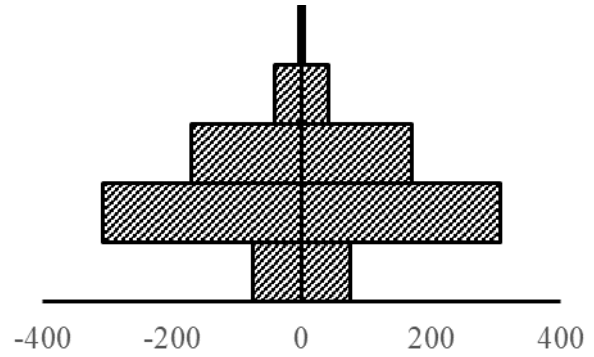

Fig. 1. Population structure of *Catla catla* in Keliya dam (Gujarat)

The observations of population patterns show the‘urn shaped’ pyramid and resulted that in harvested catch of fish immature fish population was more compared to the mature fishes. The present type of exploitation pattern of fish population was an indicator of over exploitation (Khan *et al.* 2017). Odum (1971) also reported that urn shaped figure of population structure is obtained when the birth rate is drastically reduced and the pre-reproductive group declines in proportion to the older age groups of the fish population. The findings of the present study are evidenced by the reports of the Jhingran (1959), Mayank & Tyagi (2013), Tripathi *et al*. (2015), Imran *et al*. (2015), Mayank & Dwivedi (2015), Dwivedi *et al.* (2016), Khan (2017), Soni & Ujjania (2018), Khan (2019), Ujjania and Soni (2020) and Gopesh *et al.* (2021).

Conclusion

On the basis of the findings of present study, it concluded that studied fish (catla) contains 5 length groups with normal growth and well survival. In the harvest of the fish catches, younger fishes (length group A & B) are dominated (63.98%) comparatively elder (length group C, D and E) fishes (36.02%) which is not a good sign for natural stocking of the aquatic environment. The findings of the present study are useful for planning for sustainable fishery of studied fish in Keliya reservoir and also help to design a suitable fishing policy. It is also suggested that better recruitment of catla by natural spawning and young mature fish in the water body.

Conflicts of interest: Authors declare no conflict of interest.

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