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Full Length Research Paper

Fish fauna diversity of Karamana River, Kerala, India: A study

[1]Jancy Rani A.K and [2]Jobiraj

[1]Research scholar, Bharathiyar University, Coimbatore, Tamil Nadu.
[2]Assistant Professor, Govt. Collage, Kodanchery, Kozhikkode, Kerala.

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This study on Fish diversity of Karamana river was carried out from October 2015 and September 2016. The fish diversity is correlated with biological and various physio-chemical parameters that regulate the productivity and distribution of different species of fishes. The fish population is abundant and majority of the fishes are exploited for human consumption. For the purpose of the study, attempts were made to collect, classify and identify fish of river Karamana in three zones. The major fish abundance was noticed in the family Cyprinidae; several species of fish belonging to the different order were present. They were Anguliformes, Belonifoemes, Cypriniformes, Cryprinodontiformes, Peraciformes, Siluriformes, Synbranchiformes. The fish species diversity was found decreasing in March and was the highest in October in the year 2015-2016. Among the families of fishes collected Cyprinidae was the most dominant (41.55%), followed by Cichlidae (25.98%), Mugilidae (14.66%) Bagridae (3.33%), Channidae (3.13%), Siluridae (2.31%), Nandidae (1.79%), Godiidae (1.71%), Clariidae (1.41%), Ambassidae (0.91%), Aploecheilidae (0.80), Heteropneustidae (0.61%), Mastacembelidae (0.61%), Balitoridae (0.60%). The least were observed in Anguillidae (0.30%), Belonidae (0.20%) and Cobitidae (0.10%). The data shows the rivers are dominated by Cyprinidae with more ornamental fishes than cultivable and food fish. The Cichliddae family that dominates second has three species that are cultivable and food fish. The main reasons behind the decline of species are habitat destruction, introduction of exotic species, pollution and over fishing. Proper conservation methods and prevention of pollution can increase the number of food fish and cultivable fishes in the river. Information about the demography of the important threatened fishes points to the lack of conservation efforts. The result of the present study provides an insight on fish diversity of Karamana river, its proper management and the importance to conserve the fish diversity.

Keywords: Karamana river, fish diversity, exotic species, pollution, conservation, Western Ghats.

INTRODUCTION

Fishes are an important resource for humans, especially for food. Fishes in India have very important economic activity and is a flourishing sector with varied recourses and potentials. India is an important country that produces fish through aquaculture in the world. India is also the home to more than 10% of the global fish diversity. Due to the anthropogenic activities, the rivers and streams are facing a large number of environmental problems resulting in the decline of fresh water biodiversity.

Corresponding author. E-mail: akjancyrani@gmail.com

Fish have been regarded as an effective biological indicator of environmental quality and anthropogenic stem in aquatic ecosystem (Vijayasree and Radhakrishnan, 2014). Fish has been identified as suitable for biological assessment due to its easy identification and economic value. (Siligato and Bohned, 2001). The anthropogenic activities had caused a rapid decline in the aquatic fishes of rivers both in India and Kerala. The decline in the availability of fish will affect the livelihood of a large sector of the economically backward population of the country. The knowledge of correct exploitation, regulation and management of fishing is the first approach to the health of the riverine system.

Periodic assessment of fish diversity is also essential. (Kerala State Biodiversity Board). Fish diversity and distribution in various parts of Kerala, along the Western Ghats, has been studied extensively. According to them Kerala has about 44 rivers and as many as 200 fresh water fishes, of which 25 species are reported as endemic. (Vijaylakshmi C.et.al., 2010). There is practically not much literature available regarding the recent fish fauna of Karamana river. A study on the diversity of aquatic insects of Karamana river was carried out (Bismil and Pillai, 2015). Some related studies were carried out on Fish Diversity of Kuttanad River, Kerala State, India (Vijayasree and Radhakrishna, 2014); Study on Species Diversity and Assemblage of Fish Fauna of Jamner River: A Tributary of River Narmada (Vishwakarma and Vyas, 2014); Fresh water Fishes distribution and diversity Status on Mullameri River, a minor tributary of Bheema River of Gulbarga District, Karnataka; Exotic Fishes and freshwater fish diversity (Biju Kumar, 2000) and the fish fauna of Bharathapuzha River, Kerala (Biju Kumar & Sushama, 1999).

MATERIALS AND METHODS

Study area

Over six hundred million depend on fishing and aquaculture for a living. The average human consumes 19 kg of fish every year. Karamana River is an important water resource to meet the fishing, irrigation and drinking needs of the population in Thiruvananthapuram city of Kerala. It originates from Chemmurji mothai – a peak in the Sahyadri hills of Western Ghats, at an altitude of 1717 mm amsl. The river flows 68 km westward and forms an estuary at Poonthura before debauching into the Arabian Sea. The Karamana river ranks 17th in terms of its channel length and occupies 20th position among all the rivers of Kerala state. The present study period was during October 2015 to September 2016. The stations selected for the study were Aruvikkara (Station 1- 8044', 76095'), the highland Vellaikadavu (Station 2-80 47', 760 98'), the midland and Thiruvallam (Station 3-80 57', 770 02') the lowland.

Fish Sample Collections

Fish samples were collected from different selected localities during the study period from September 2015 to October 2016 with the help of local fishermen using different types of nets namely gillnets, cast nets of standard size and dragnets with a mesh size of 2 mm. Immediately photographs were taken prior to preservation in 10% formalin solution. Fishes brought to the laboratory were fixed in this solution in separate jars according to the size of species. Smaller fishes were directly placed in the formalin solution while larger fishes were given an incision on the abdomen before they were fixed.

Fish Identification

The fishes were identified by using Day (1978); Talwar and Jhingran (1991) and Jayaram (2009, 1981).

RESULT AND DISCUSSION

During the study of fish biodiversity of Karamana river for a period of one year, a total of 40 species of fishes were recorded from 17 families, shown in table 1.

The Cryprinede family dominated with 14 species whereas Cichlidae Gobidae and Baguide followed with three species each and Channidae, Ambassidee and Nandidae with 2 species each, Aunguillidae, Aplocheildae, Balitoridae, Cobitidae, Belonidae, Claridae, Heteropneustidae, Mastacembelidae, and Siliuridae had one species each. A total of 9 species of cultivable fish, 16 species of food fish and 15 species of ornamental fish were observed in table 1. It is apparent that *Puntius vittatus* is the most dominant species in the midland and the lowland. However, it was absent in the highland. *Rasbora dandia* outnumbered others in all the three zones. *Barilius backer* is the species very next to the above species which is confined to the highland and the midland.

The distribution of fishes throughout the river showed a varied number of species of fishes from different families as shown in table 2. Among the them, cyprinidae was the most dominant with 411 (41.55%) species of individuals followed by Cichlidae 257 (25.98%), Mugilidae (14.66%), Bagridae (3.33%), Channidae

Table 1. List of fishes in Karamana River.

Order	Family	Genus & species	Fish type	Status
Anguliformes	Anguillidae	*Anguilla bengalensis*	CF	HL
Belonifoemes	Ambassidae	*Parambassis thomassi*	OF	ML, LL
		Parambassis ranga	FF	ML
	Cichlidae	*Etroplus maculatus*	FF	ML
		Etroplus suratensis	CF	ML, LL
		Oreochromis mossambicus	FF	ML, LL
	Nandidae	*Nandus nandus*	FF	ML, LL
		Pristolepis marginata	OF	ML
Cypriniformes	Balitoridae	*Mesonemacheilus triangularis*	OF	HL
	Cobitidae	*Lepidocephalus thermalis*	FF	ML
	Cyprinidae	*Devario malabaricus*	OF	HL, ML
		Rasbora dandia	FF	HL, ML, LL
		Barilius bakeri	CF	HL, ML
		Tor khudree	CF	ML
		Garra mullya	OF	HL, ML
		Hypselobarbus curmuca	CF	HL, ML
		Puntius dorsalis	OF	ML
		Puntius fasciatus	OF	HL
		Puntius filamentosus	OF	ML, LL
		Puntius mahecola	OF	ML
		Puntius parrah	OF	ML
		Puntius punctatus	OF	ML
		Puntius vittatus	OF	ML, LL
Cryprinidontiformes	Aploecheilidae	*Aplocheilus lineatus*	FF	MN
Mugiliformes	Mugilidae	*Liza tade*	FF	LL
		Liza macrolepis	FF	LL
Peraciformes	Belonidae	*Xementodon cancila*	OF	HL
	Channidae	*Channa marulius*	CF	ML, LL
		Channa striata	FF	ML
		Chanos chanos	FF	ML, LL
	Godiidae	*Sicyopterus griseus*	FF	HL
		Glossogobius giuris	FF	ML
Siluriformes	Bagridae	*Horabagrus brachysoma*	CF	LL
		Mystus malabaricus	FF	ML
		Mystus gulio	FF	HL
	Clariidae	*Clarias dussumieri*	CF	ML, LL
	Heteropneustidae	*Heteropneustes fossilis*	CF	ML, LL
	Siluridae	*Wallago attu*	OF	ML, LL
		Ompok bimaculatus	OF	ML
Synbran chiformes	Mastacembelidae	*Mastacembelus armatus*	FF	ML, LL

CF : Cultivable fish, FF : Food fish, OF : Ornamental fish
HL : Highland, ML : Midland, LL : Lowland.

(3.13%), Siluridae (2.31%), Nandidae (1.79%), Godiidae (1.71%), Clariidae (1.41%), Ambassidae (0.91%), Aploecheilidae (0.80), Heteropneustidae (0.61%), Mastacembelidae (0.61%), Balitoridae (0.60%), Anguillidae (0.30%), Belonidae (0.20%) and Cobitidae (0.10%) respectively. The distribution of family wise species composition is represented on a pie diagram as shown in figure 1.

India has vast inland and marine fishery resources of which inland fishing is more common among economically backward population. Inland fishing resources include lakes, rivers, streams, channels, ponds, tanks and estuaries. Riverine fishes are highly dispersed and unorganized, making collection of data on fishing and fish yield difficult. Study on fish diversity of Bharatapuzha showed abundance of Tilapia population replaced by native fishes (Biju Kumar and Sushama, 1999). In a similar study conducted in Kuttanad River Kerala State, India, 12 species of cultivable fish, 22 species of food fish and 28 species of

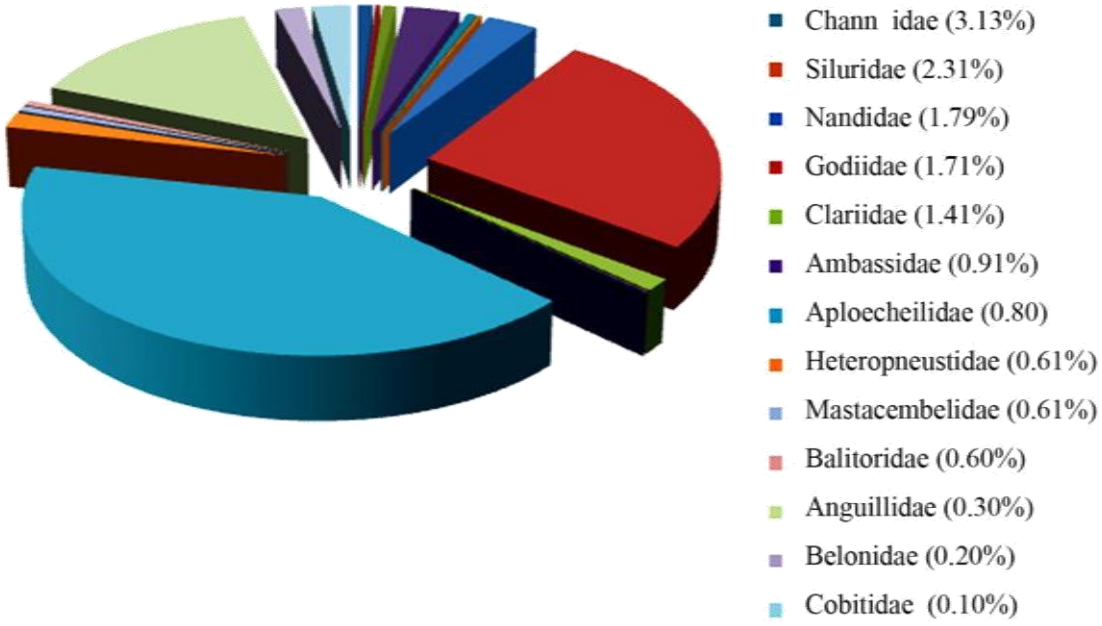
Table 2. Family wise fish individuals and percentage of Karamana River.

Sl.No.	Fish Family	No. of Individual	Percentage
1	Ambassidae	9	0.91
2	Anguillidae	3	0.30
3	Aploecheilidae	8	0.80
4	Bagridae	33	3.33
5	Balitoridae	6	0.60
6	Belonidae	2	0.20
7	Channidae	31	3.13
8	Cichlidae	257	25.98
9	Clariidae	14	1.41
10	Cobitidae	1	0.10
11	Cyprinidae	411	41.55
12	Godiidae	17	1.71
13	Heteropneustidae	6	0.61
14	Mastacembelidae	6	0.61
15	Mugilidae	145	14.66
16	Nandidae	17	1.79
17	Siluridae	23	2.31
	Total	**989**	**100%**

ornamental fishes were recorded (Vijayasree and Radhakrishnan, 2014). Study conducted in the Narmada River in the western zone recorded 28 species from Cyprinidae family, 3 species from Siluridae family and 1 species from Gobiidae. (Rakawale and Kanhere, 2013).

A study conducted on Species diversity and assemblage fish fauna of Jamner River recorded 17 species of Cyprinidae family and 1 species each from Ambassidae, Bagridae, Gobiidae and Siluridae. (Vishwakarma & Vyas, 2014). Fresh water fish distribution and the diversity status of Mullameri River, a tributary of River Bheema in Gulbarga District of Karnataka recorded 8 species from the Cyprinidae family, 2 species from Siluridae and Channidae and 1 species each from Mastacembelidae and Notopteridae (Vijaylaxmi, Rajshekhar and Vijayakumar, 2010). The study largely focuses on fish species richness and diversity of Mullameri River. According to them, the multiple use of fishery resources, habitat loss and environmental degradations has effected the fish fauna seriously. Fish diversity and abundance in water quality of Anjanapura reservoir, Karnataka, India had 14 species from family cyprinidae while Siluridae recorded 3 species and one species from Bagridae, Claridae, Ambassidae, Gobidae, Channidae, Mastacembelidae, Notopteridae (Basavaraja et al., 2014). The water quality of any river is determined by the species richness and its diversity. The study conducted on ichthyofaunal diversity of Krishna River recorded a total of 109 species of primary freshwater fishes belonging to 19 families and 46 genera were recorded from the study

Fig. 1 : Family wise species composition



sites. Out of total fish species observed under study, 59 common, 31 scanty and 19 were found rare in the area. It is noticed that indiscriminate harvesting of fish species from their natural habitat is regularly done by the rural people, which may lead to serious decline of fishes especially carps (Laxmappa B. et. al., 2015). Study of Fish Diversity in Nira River had 10 species from Cyprinidae, 2 species from Siluridae and one species each from Bagridae, Gobiidae Notopteridae , Claridae, Clupeidae and Cichlidae (Shendge, 2007). Biodiversity status of fishes from Vattakayal, a part of Asthamudi Lake, Kollam district, Kerala, South India had a total of 22 species of fishes and 2 species from Aplocheildae and Channidae (Seethal Lal, Jaya and Williams, 2013). The aim of the review is to assess the variety and abundance of the important fish fauna inhibiting freshwaters of Indian rivers and lakes. Even though the riverine fishes are dispersed and unorganized, the present study gives a clear fish fauna diversity of cultivable and food fish. The fish fauna of Karamana river when compared to other Indian rivers showed a remarkable species richness and diversity, whereas when compared with fresh water ecosystems of Kerala like Kuttanad river and Vattakayal the species diversity and food fish fauna was found less. This is due to over fishing, killing of fry and fingerlings etc., along with high amount of household waste and industrial pollutants poured into the river diminished health of the riverine ecosystem. Lack of conservation had also caused a decline in the fish diversity of Karaman river. Therefore, the present study will help to save the fish fauna diversity of the river from further decline. Conservatory steps and productivity potential of the river should be well maintained to keep the ecosystem balanced. Otherwise native fishes that have high economic value will be replaced by other non-native fishes.

CONCLUSION AND RECOMMENDATION

This ichthyofaunal study is a very important aspect to understand the diverse fish fauna in the water body. Changes in the fish community directly or indirectly affect the physical chemical and biological characteristics of the riverine system. Different types of habitat of fish fauna diversity should be monitored all over the world. Industrial effluent, over exploitation, poll-

ution and anthropogenic activities had contributed towards the disturbance in the balance of the aquatic system. In order to maintain fish diversity certain conservative measures are recommended : (i) fingerling/fry should not be harvested (ii) prevent the introduction of new species (iii) no harvesting in breading seasons (iv) prevent anthropogenic activities like pollution, contamination etc. (v) educate the people about the importance of biodiversity in maintaining ecological balance. The fish of Karamana river are subjected to pollution leading to the killing of spawn and decrease in fish population. Owing to increasing demand of fish as food the aquatic ecosystems are under constant pressure. In future, this work will provide strategies for monitoring, controlling, conserving and developing the diverse fish fauna of fresh water ecosystem throughout the country.

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