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Fish Diversity and Threat Status in the Upstreams of Vamanapuram River, Kerala, India

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Abstract: ***The present study aimed to monitor the diversity and threat status of fishes in the selected upstream areas of Vamanapuram River from May 2016 to January 2018. 22 species of fishes belonging to 11 families and 8 orders were collected andidentified during the survey period. Among them the family Cyprinidae was found to be dominating with 7 species followed by Siluridae, Cichlidae, Bagridae,Channidae, Aploecheillidae, Anguillidae, Anabantidae, Heteropneustidae, Claridae, Mastacembelidae and Belonidae. Out of the 22 species identified, 10 were ornamental and 12 edible. While assessing the threat status of these fishes Anguilla bengalensis and Horabagrusbrachysoma were noted as endangered and Channamicropeltes was critically endangered. 5species were vulnerable, 3 species were at low risk nearly threatened and 2species were under least concern category. An exotic species, Oreochromismossambicus was also observed in the present investigation. The present study clearly indicates that there is high ichthyodiversity in the upstream areas of Vamanapuram River and are at high risk and special attention should be given to the conservation of these fauna.***

Keywords: Vamanapuram River, Cyprinidae,Threat status, Ichthyodiversity

1. Introduction

Kerala, God's Own countryis endowed with 44 rivers, of which 41 are west flowing and 3 are east flowing. These rivers are originating from different regions of Western Ghats and are repositories of rich fish diversity. Kerala is a land of rivers which harbours174 speciesof fresh water fishes belonging to 13 orders, 29 families and 65 genera. (Kurup*et al*, 2002).The rivers and streams of Kerala, with enriched germplasm and high degree of endemism is a highly threatened ecosystem due to anthropogenic activities such as pollution, overfishing, change in land use, sand mining, construction of dams, deforestation etc. Proper documentation of the distribution and diversity of species is crucial for the implementation of better biodiversity conservation strategies. Monitoring the occurrence of species and their population has been the basis for assessing the effect of environmental impacts (Spellerberg, 1993). To have an insight in to the various threats and the decline of species, documentation on the basic data of species distribution in an area is of great importance. Such information could be the basis of evaluation of the past, present and future changes in the species composition and abundance of the fish fauna. In this context, an attempt to identify the fish diversity and threat status in selected upstream areas of Vamanapuram River was carried out.

2. Materials and Methods

Study Area

Vamanapuram River is the longest river in Thiruvananthapuram District in south Kerala with a length of 88 km. It originates from the 'Chemmunjimotta hills'(alt.1860m) situated in the southern side of Western Ghats, and ends in Anchuthengu Lake near Attingal. Upper Chittar and Manjaprayar are the two tributaries of this river. The present study was conducted during May 2016 to January 2018 in the upstream areas of the river. The stations selected for collection of specimens were Ponnamchundunear Vithura (8.6818ºN 77.1022ºE), Palode(8.7033º N 77.0264º E) and Chellenchy(8.4255ºN76.599ºE).

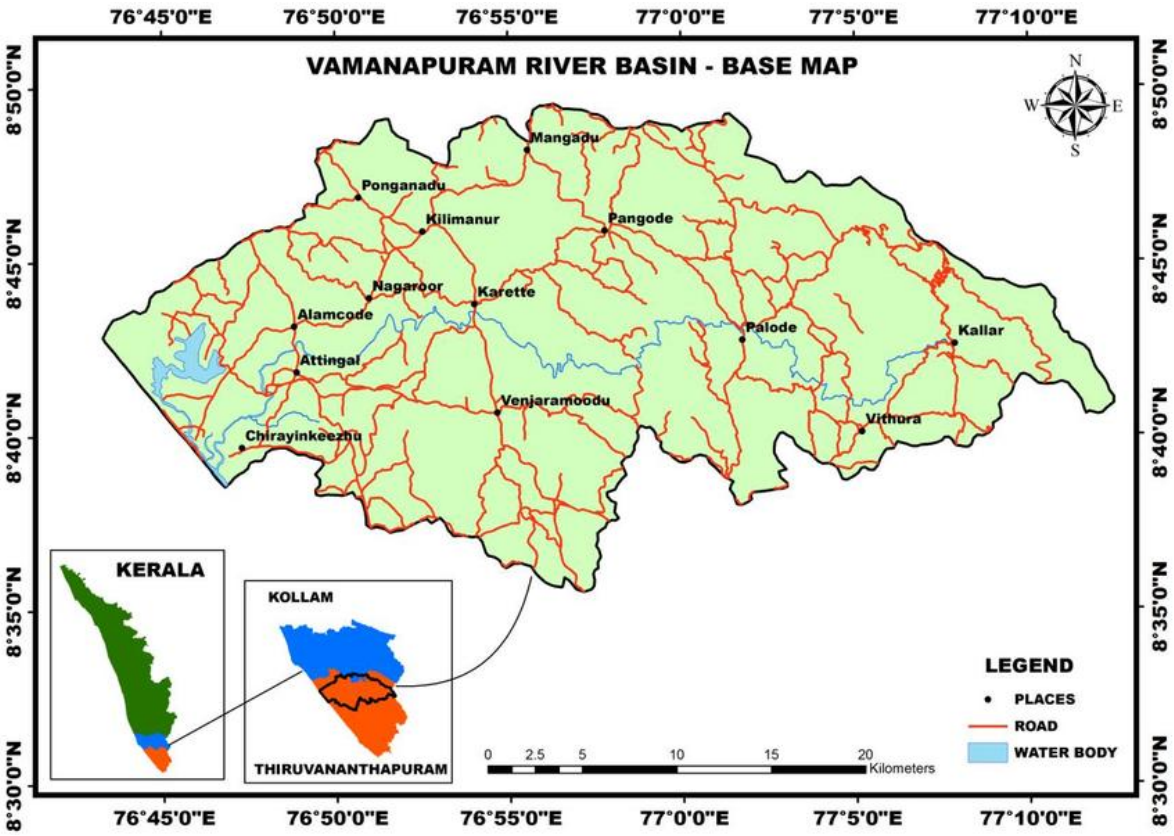

Figure 1: Vamanapuram River Basin – Base Map

Sample Collection and Identification.

The fishes were collected from the selected sites with the participation of local people by using caste nets,hand – drawn towels and hooks and line.The photographs were taken before preserving them in 10% formalin. The fishes were identified with the help of the text books (Ranjith Daniels, 2002; Jayaram, 2009 &1981), and a hand book published by the KSBB (Kerala State Biodiversity Board). The threat statuses of the identified fishes were listed by following Radhakrishnan&Kurup, (2010) and by IUCN Red List of Threatened species, Version 2011 (Ali *et al*., 2011).

3. Results

In the present study, a total number of 22 species of fresh water fishes belonging to 12families and 8 orders were identified (Table 1) from the upstream areas of Vamanapuram River.Among the fishes identified, the Cyprinidae family was dominated by 7 (31.82%)species, whereas Siluridae, Cichlidae, Bagridae and Channidae with 2 species each (9.09% each) and Aploecheillidae, Anguillidae, Anabantidae, Heteropneustidae, Claridae, Mastacembelidae and Belonidae had one species each (4.54% each) (Fig.2).

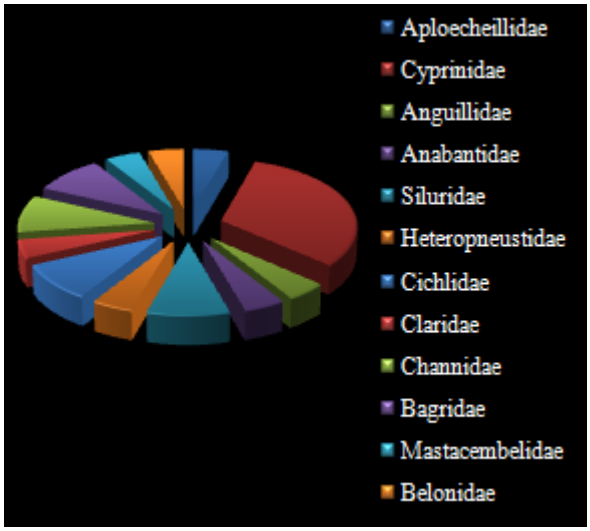

Figure 2: Family wise species assemblage of fish fauna.

Fishes belonging to the order Cypriniformes were dominated by 7 species followed by Siluriformes (6 species) and Perciformes(4species) and Symbranchiformes (2 species). The orders,Cyprinidontiformes, Anguilliformes and Beloniformes were represented by 1 species each. Out of these fishes, 10 were ornamental fishes which are used as aquarium fishes and the rest were widely used as food.

Table 1: Fish Diversity and Threat Status in the upstream areas of VamanapuramRiver

Sl No.	Common name	Scientific name	Family	Order	IUCN Status
1	Malabar killie	*Aplocheiluslineatus*	Aploecheillidae	Cyprinidontiformes	LRlc
2	Blacklinerasbora	*Rasboradaniconius*	Cyprinidae	Cypriniformes	LRNt
3	Garra	*Garramullaya*	Cyprinidae	Cypriniformes	LRlc
4	Malabar danio	*Daniomalabaricus*	Cyprinidae	Cypriniformes	LRIc
5	Olive barb	*Puntiussarana*	Cyprinidae	Cypriniformes	VU

6	Filament barb	*Puntiusfilamentosus*	Cyprinidae	Cypriniformes	LRIc
7	Melan barb	*Puntiusfasciatus*	Cyprinidae	Cypriniformes	LRNt
8	Attentive carplet	*Amblypharyngodonmelettinus*	Cyprinidae	Cypriniformes	LC
9	Indian long-fin eel	*Anguilla bengalensis*	Anguillidae	Anguilliformes	EN
10	Climbing perch	*Anabas testudeneus*	Anabantidae	Synbranchiformes	VU
11	Butter catfish	*Ompokbimaculatus*	Siluridae	Siluriformes	VU
12	Sheatfishes	*Wallagoattu*	Siluridae	Siluriformes	LRNt
13	Stinging catfish	*Heteropneustesfossilis*	Heteropneustidae	Siluriformes	VU
14	Mozambique tilapia	*Orechromismossambicus*	Cichlidae	Perciformes	Intr
15	Orange chromide	*Etroplusmaculatus*	Cichlidae	Beloniformes	LRIc
16	Walking catfish	*Clariasbatrachus*	Claridae	Siluriformes	LC
17	Banded snake head	*Channastriatus*	Channidae	Perciformes	LRlc
18	Malabar snake head	*Channamicropeltes*	Channidae	Perciformes	CR
19	Yellow catfish	*Horabagrusbrachysoma*	Bagridae	Siluriformes	EN
20	Longwhiskers catfish	*Mystusgulio*	Bagridae	Siluriformes	LRlc
21	Marbled spiny eel	*Mastacembelusarmatus*	Mastacembelidae	Synbranchiformes	LRIc
22	Kola	*Xenentodoncancila*	Belonidae	Perciformes	LC

EN-Endangered, LR- Low Risk, LRlc- Low Risk least concern, LRNt- Low Risk nearly threatened, Intr- Introduced, LC-Least Concern, and CR-Critically endangered, VU-Vulnerable.

The threat status of the identifiedfishes were also assessed as per the IUCN red list and represented in Table 1 and Fig.3.Out of 22 species identified, *Anguilla bengalensis* and *Horabagrusbrachysoma* were noticed as endangered and *Channamicropeltes* as critically endangered. Among the 22 fishes reported, 5 species were vulnerable (VU), 3 were under low risk nearly threatened (LRNt), 8 were under low risk least concern (LRlc), 2 were under least concern (LC) and onespecies was recorded as introduced (Intr). The exotic species reported in the present study was *Orechromismossambicus*.

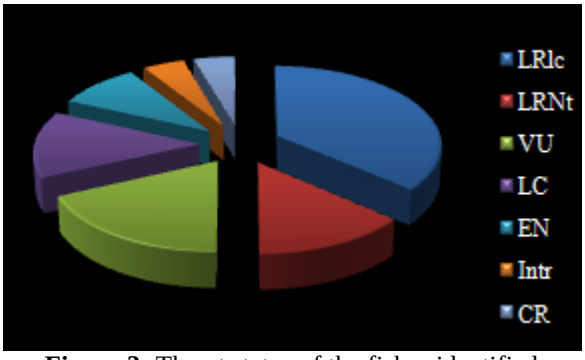

Figure 3: Threat status of the fishes identified

4. Discussion

The status and distribution of fishes in an aquatic ecosystem have been regarded as an effective biological indicator for the assessment of environmental quality and anthropogenic interventions. The fresh water fishes represent the most threatened vertebrates all over the world (Leveque, 1997). The fresh water ichthyofaunal diversity in the rivers of Kerala is also alarmingly decreasing due to various reasons such as over exploitation, loss of riparian vegetation, pollution due to urbanization, introduction of exotic species of fishes , climate change etc. Since fishes are the integral part of the food chain, the decline in the fish diversity, will cause an imbalance in the ecosystem and may ultimately leads to the extinction of certain species of organisms. The best way for planning suitable conservation strategies to save the entire aquatic ecosystem is the timely monitoring of its biodiversity. In the present study, we took an effort to monitor the diversity of the ichthyofauna in upstream areas of VamanapuramRiver. The diversity and distribution of fishes in the rivers of Kerala along with Western Ghats has been studied extensively and reported by many authors. Notable studies on the fresh water fish fauna of Kerala are those of Kurup (1994), Esa and Shaji (1997), Bijukumar & Sushama, (1999), Biju*et al*, 1999,Biju Kumar (2000), Raghavan *et al*, (2008), Vijayasree and Radhakrishna, (2014) and Jancy Rani and Jobiraj, 2017).

Out of the 22 species of freshwater fishes identified, 10 were ornamental and others were used as food. Among the 11 families reported, Cyprinidae family was found to be dominating. Various authors reported the dominance of Cyprinidae family in rivers of Kerala such as in KuttanaduRiver (Vijayasree and Radhakrishna, 2014) andKaramanaRiver (Jancy Rani and Jobiraj, 2017). These authors also reported the presence of other families such as Siluridae, Cichlidae, Bagridae, Anguillidae, Claridae, Anabantidae, Aploecheillidae, Heteropneustidae, Mastacembelidae, Belonidae and Claridae as obtained in the present study. Several studies from different states in India also reported the dominance of Cyprinidae family in the riverine system (Bakawale and Kanhere, 2013, Vishwakarmaand Vyas, 2014. Vijayalexmi et al, 2010, Basavaraja et al, 2014).This clearly indicates the abundance of important fish fauna in the rivers of Kerala and India.

While assessing the threat status of the fishes according to the IUCN red list, *Anguilla bengalensis* and *Horabagrusbrachysoma* were found to be endangered.Out of the 22 fishes, one is critically endangered and four were under vulnerable category. Studies on the threat status of fishes in Kerala were also reported from Chalakkudy river (Raghavan *et al*,2008), Periyar Tiger reserve (Radhakrishnan and Kurup, 2010) and Bharathappuzha River (Bijukumar*et al*, 2013).Unsustainable exploitation of the resources with the help of fish poisons, dynamiting, other prohibited fishing methods, destruction of natural spawning and breeding grounds of fishes through sand mining ,the depletion of riparian vegetation and the introduction of exotic species of fishes in the water bodies are the major reasons for the decline and endangerment of the ichthyo fauna. Various biodiversity threatsand conservation strategies of fresh water

fish fauna in Kerala were discussed by many authors (Zacharias *et al* 1996; Kurup, 2001;Biju Kumar,2000; and Bijukumar *et al*, 2013). According to the local people, thenumbers of fishes are decreasing year after year and anthropogenic interventions are the major cause for this decline in thestudy area. So long term management strategies for biodiversity conservation should be adopted at the earliest to conserve the species assemblage of this riparian system.

5. Conclusion and Recommendations

Fishes, the keystone species, determine the abundance and distribution of other fauna in a riverine system and are good indicators of the water quality and health of the system they represent.In the present study, fish diversity and their threat status in the upstream areas of Vamanapuram River were investigated. The fresh water fish diversity in Kerala is facing serious threats due to various factors especially anthropogenic interventions.During the present study, it was noticed that various destructive fishing methods such as dynamiting and poisoningwere in practice in the study area. The exotic species such as *Tilapia* was also found in the Vamanapuram River, which is reported as a threat to the indigenous fishes. In order to maintain the species richness in Vamanapuram River basin, some conservation strategies are recommended: (i) create awareness among the local people about the importance of conservation of biodiversity, (ii) the introduction of exotic species should be discouraged, (iii) documentation of the fish diversityin the river should be implemented through Biodiversity Management Committees (BMC) at the local Panchayath, (iv) destructive fishing activities should be banned. By periodical monitoring of diversity and threat status of fishesin this area and by following suitable long term conservation strategies, the species richnesscan be augmented and conserved.The present work was restricted to certain locations of Vamanapuram River and elaborate studies in this area are warranted in future as a conservation strategy.

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