Freshwater fish diversity in Kerala part of the Nilgiri Biosphere Reserve

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A survey of freshwater fishes was conducted in two east-flowing and three west-flowing rivers in Kerala part of the Nilgiri Biosphere Reserve during 1993–95. Ninety-two species including 2 new species were recorded from the area. Seven species were new records to Kerala. Thirty-seven species are endemic to Western Ghats and 9 strictly endemic to Kerala. Estimation of abundance shows that 22.83% of the total were rare and 11.96% very rare. Major threats to the fauna are discussed.

BIODIVERSITY conservation necessitates knowledge on the diversity of animals and plants, their distribution and status. Western Ghats with a variety of vegetation types, climatic zones and remarkable endemism is considered to be one of the hot spot areas for biodiversity conservation. The Kerala part of Western Ghats is the source of 44 rivers of which 3 are east flowing. These rivers harbour a number of freshwater fishes which support the livelihood of both tribals and non-tribals to a great extent[1]. Damming the rivers for irrigation and hydroelectric projects, introduction of exotic fishes in reservoirs, pollution of major aquatic systems and recent outbreak of disease generated greater concern on the native fish fauna among the conservationists.

Study on freshwater fishes of Kerala starts with Day's monumental classic works[2,3]. After these, the Travancore region was comparatively well explored[4–6]. Malabar region, especially the region north of Palghat gap, remained underexplored. Hora[7] described fishes in Wayanad and the adjacent areas. Silas[8] listed the fishes of Anamalais and Nelliampathis. Mukerji[9] and Rajan[10] reported fishes of Bhavani and Rema Devi and Indra[11] described fishes of Silent Valley.

The Nilgiri Biosphere Reserve is located in the southwest portion of Western Ghats (north of Palghat gap between 10°45′ and 12°5′ N Lat. and between 76°10′ and 77°10′ E Long.), and is about 5500 km^2 in extent. The Kerala part of Niligiri Biosphere Reserve extends over an area of 1455 km^2 encompassing Silient Valley National Park, Wayanad, Mannarkkad, Nilambur North and South Forest Divisions. The major tributaries of Cauvery, the Kabani in Wayanad and Bhavani in Attappadi are the east-flowing river systems in the area. Chaliyar of Nilambur, Kunthi of Silent Valley and Vythiripuzha of Wayanad are the west-flowing river systems. The absence of dams in any part of the study area is worth mentioning. The riparian vegetation along the stream banks varied from moist deciduous and evergreen forests, and agricultural and wastelands. Conductivity was minimum in Kunthi river system and maximum in Kabani river. Dissolved oxygen was not a limiting factor in any of these areas. Chloride, alkalinity, total hardness and phosphate values were low in Kunthi river system and high in Kabani. The Kabani river system was comparatively more disturbed followed by Chaliyar.

We visited major rivers and streams in different seasons during the years 1993–1995. Collections of fishes were made from different places along the streams using scoop net, cast net and gill nets of varying mesh size. Conventional methods like bund making and sieving by clothes practised by tribals were also employed in suitable areas. Uniform effort was taken in all the areas for comparable abundance estimation. Maximum care was taken to collect only the minimum number of specimens required for identification. The works of Day[2,12], Jayaram[13], and Talwar and Jhingran[14] were referred for identification. The Homalopterids and loaches were dealt under family Homalopteridae and Cobitidae instead of Balitoridae[15,16]. A total of 56 locations were surveyed and 92 species belonging to 24 families and 46 genera were collected during the survey (Table 1). Among the 92 species recorded, 37 species (40.22%) were endemic to Western Ghats, of which nine species were strictly endemic to freshwaters of Kerala. *Batasio travancoria, Tetraodon travancoricus, Osteobrama bakeri, Puntius denisonii, Homaloptera pillai*, etc. were some of the endemics reported from Kerala (Table 1). *B. travancoria, T. travancoricus, O. bakeri, P. denisonii* were reported to be endemic to Travancore region of Kerala[12]. The present survey indicates their range of extension to north of Palghat gap.

Among the 92 species, 69 (75% of the total) were recorded from the east-flowing and 68 (73.91%) from the west-flowing rivers. Twenty-four (26.09%) species were observed exclusively in the east-flowing rivers and 23 (25%) in the west flowing. Nine species (09.78%) were strictly endemic to Kerala. The east-flowing rivers were more diverse compared to the west-flowing ones. But the west-flowing rivers had almost all species endemic

Table 1. List of freshwater fishes in the Nilgiri Biosphere Reserve

Species		EF	WF	Status	Species		EF	WF	Status
Anguilla bengalensis		–	+	R	*H. montana*	EK	–	+	VR
Anguilla bicolar bicolar		–	+	R	*Noemacheilus denisoni*		+	+	A
Notopterus notopterus		+	–	A	*N. monilis*	EWG	+	–	A
Cyprinus carpio communis		+	+	A	*N. petrubanarescui*	EWG	+	+	A
Puntius amphibius		+	+	A	*N. triangularis*	EWG	–	+	A
P. arulius	EWG	+	–	A	*N. nilgiriensis*	EWG	+	–	A
P. carnaticus	EWG	+	+	A	*N. semiarmatus*	EWG	+	–	A
P. chola		+	+	A	*N. sinuatus*	EWG	+	–	VR
P. curmuca		–	+	A	*N. guentheri*	EWG	+	+	A
P. conchonius		+	–	A	*Pangio bashai*	EK	–	+	R
P. denisonii	EK	–	+	VR	*Lepidocephalus thermalis*		+	+	A
P. dorsalis		+	–	R	*Batasio travancoria*	EK	–	+	VR
P. filamentosus	EWG	–	+	A	*Mystus occulatus*		–	+	VR
P. melanampyx	EWG	+	+	A	*Mystus armatus*	EWG	+	–	R
P. melanostigma	EWG	+	–	VR	*M. punctatus*		+	–	R
P. micropogon		+	+	R	*M. montanus*	EWG	+	+	A
P. sarana subnasutus	EWG	+	+	A	*M. malabaricus*	EWG	+	+	A
P. ticto ticto		+	+	A	*M. cavasius*		+	–	A
P. ticto punctatus	EWG	+	+	A	*Ompok bimaculatus*		+	+	A
P. wynaadensis	EK	+	–	VR	*Wallago attu*		+	+	A
Osteobrama bakeri	EK	–	+	VR	*Glyptothorax anamalaiensis*	EWG	–	+	R
Osteochilus brevidorsalis	EWG	+	–	A	*G. madraspatanum*	EWG	+	+	A
O. nashii	EWG	+	+	A	*G. annadalei*	EWG	–	+	A
Tor khudree		+	+	VR	*Heteropneustes fossilis*		+	+	A
Labeo ariza		+	–	R	*Clarias dussumieri*		+	+	A
L. potail		+	–	R	*Hyporhamphus limbatus*		–	+	R
L. rohita		+	+	A	*Xenentodon cancila*		–	+	R
Esomus danricus		+	+	A	*Aplocheilus lineatus*		+	+	A
Barilus gatensis		+	+	A	*Poecilia reticulata*		+	–	A
Barilius bakeri	EWG	+	+	A	*Doryicthys cunalus*		–	+	R
Danio aequipinatus		+	+	A	*Chanda thomassi*		–	+	A
Danio malabaricus		+	–	A	*C. ranga*		+	–	A
Danio rerio		+	–	A	*Pristolepis marginata*	EWG	+	+	A
Rasbora daniconius		+	+	A	*Tilapia mossambica*		+	+	A
Amblypharyngodon melettinus		+	+	A	*Etroplus suratensis*		–	+	R
Chela laubuca		+	–	A	*E. maculatus*		–	+	A
Salmostoma acinaces		+	+	A	*Glossogobius giuris giuris*		+	+	A
S. boopis		+	+	A	*Schismatogobius deranyagalai*		–	+	R
Crossocheilus latius		+	–	A	*Macropodus cupanus*		–	+	A
Garra mullya		+	+	A	*Channa marulius*		+	+	R
G. mcClellandi	EWG	+	+	R	*C. orientalis*		+	+	A
G. gotyla stenorhynchus		+	–	A	*C. striatus*		+	+	R
G. menoni	EWG	+	+	A	*Mastacembelus armatus armatus*		+	+	A
Bhavania australis	EWG	+	+	A	*Euryglossa orientalis*		–	+	R
Balitora mysorensis	EWG	+	–	VR	*Tetraodon travancoricus*	EK	–	+	VR
Homaloptera pillai	EK	+	+	A					
H. menoni	EK	+	–	R					

EWG, Endemic to Western Ghats; EK, Endemic to Kerala; EF, East flowing; WF, West flowing; A, Abundant; R, Rare, VR, Very rare.

to Kerala. East-flowing rivers harboured a number of Western Ghat endemics (27 out of 37 in the present survey) than the west-flowing which had only 24. Of these, 10 species were found only in the east-flowing and 9 exclusively in the west-flowing rivers. *Labeo potail, Danio (Brachydanio) rerio, Noemacheilus petrubanarescui, N. nilgiriensis, Osteochilus brevidorsalis* and *Schismatogobius deraniyagalai* are new additions to the

fresh waters of Kerala (08.70% of the total). *Cyprinus carpio communis, Poecilia reticulata, Tilapia mossambica* are exotic species introduced to Kerala and were thriving better than the native ones. *Labeo rohita*, the native of North Indian rivers and introduced to South India, also thrived well and supported the fisheries of Wayanad.

Among the river systems studied, Kabani was more diverse with 59 species followed by Chaliyar with 50 species. Kunthi river harboured only 11 species. However, since the survey was confined to Kunthi up to Sirendhri of Silent Valley National Park, it is possible that more species might occur downstream.

Silurus wynaadensis, Oryzias melanostigma, Clarias dussumieri dayii, Noemacheilus striatus were earlier reported from Wayanad[12]. However, these could not be located during the present survey. Since the type locality of these could not be traced, it was possible that these were confined to a small part of the river or were very few in number. *Euryglossa orientalis, Doryichthys cuncalus* and *Schismatogobius deraniyagalai* are primarily estuarine. But their occurrence in the upper reaches of Chaliyar river system proves that the hill streams are also a good habitat for these fishes. The genus *Schismatogobius*, recently reported from Sri Lanka[17], is a new genus to India. *Pangio bashai* Easa and Shaji[18] and *Homaloptera menoni* Shaji and Easa[19], are new descriptions from the study area. Menon[20] listed the endangered fishes from Kerala. However, the present survey, based on the estimation of the abundance of fishes, indicates that 60 species were abundant (65.22%), 21 (22.83%) rare and 11 (11.96%) very rare in the river systems (Table 1). The very rare species could be considered as endangered and the rare ones as vulnerable.

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