INTL J BONOROWO WETLANDS
Volume 14, Number 2, December 2024
Pages: 105-111

P-ISSN: 2775-8052
E-ISSN: 2775-8044
DOI: 10.13057/bonorowo/w140206

Freshwater fish diversity and habitat assessment with a focus on *Pethia reval* in Pusseli Oya, Kelani River Basin, Sri Lanka

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Manuscript received: 3 November 2024. Revision accepted: 31 December 2024.

Abstract. *Priyadarshana PHMGC, Vijethilaka ULNL, Fernando MT, Paranagama SD. 2024. Freshwater fish diversity and habitat assessment with a focus on* Pethia reval *in Pusseli Oya, Kelani River Basin, Sri Lanka. Intl J Bonorowo Wetlands 14: 105-111.* The Pusseli Oya, a tributary in the Kelani River Basin was investigated preliminary to assess the freshwater fish diversity with a particular focus on the endangered endemic species *Pethia reval*. This study highlights the urgent need for conservation actions to protect these unique ecosystems. Five distinct sites were selected for the study, and sampling was conducted from August to October 2024 using snorkeling, hand nets, and trawl nets complemented by measurements of physio-chemical parameters, including temperature, pH, and flow rate with anthropogenic activities. A total of 29 freshwater fish species were recorded, representing eight orders and 12 families, with Cyprinidae being the most dominant family. Among these, 10 species were endemic, highlighting the area's ecological importance. *P. reval* was recorded at most of the selected sampling sites but was absent in one sampling site, which displayed a lower pH and increased anthropogenic activities than other sites. These conditions and the presence of aquatic plants likely impacted the species' distribution, emphasizing its sensitivity to habitat disturbances. Findings reveal that sites with stable water quality and minimal anthropogenic influence are essential for sustaining diverse fish populations and conserving *P. reval* and other endemics. This research underscores the need for immediate area-based conservation actions to mitigate human impacts and maintain ecological balance within the Kelani River basin. Those area-based conservation activities will contribute to broader conservation throughout the country with a special focus on range-restricted and nationally important freshwater fish fauna on the island. Future studies should focus on longitudinal assessments to strengthen conservation strategies for Sri Lanka's endemic and native freshwater fish.

Keywords: Endemic, freshwater fish, Kelani River Basin, *Pethia reval*, preliminary study

INTRODUCTION

Sri Lanka has a diverse network of freshwater habitats across 103 river basins and man-made ecosystems. To date, Sri Lanka hosts a total of 127 species of freshwater fish, with 61 endemic and 30 introduced to the island (Goonatilake et al. 2020). Pethiyagoda and Sudasinghe (2021) noted that the wet zone contains 70 species of freshwater fish, followed by the intermediate zone (46) and dry zone (36), emphasizing the role of geographical and environmental diversity in shaping freshwater diversity in Sri Lanka. However, Sudasinghe et al. (2020) show that the nomenclature of Sri Lankan freshwater fish has been extensively revised during the past two decades, and many freshwater fish genera have been revised in order to evolutionary relationships.

Based on the distribution pattern of freshwater species (Senanayake and Moyle 1982) identified four major ichthyological provinces in Sri Lanka; the Southwestern, Mahaweli, Transition, and Dry Zone. The Mahaweli and southwestern ichthyological zones have the highest species diversity among the four zones. This is due to the high heterogeneity of the habitats, rainfall patterns, and topography of this region (Thilakarathne and Hirimuthugoda 2022). The Southwestern Province is demarcated in the south by the Nilwala River and the North by the Attanagalu Oya River. This region is recognized as a hotspot for endemic freshwater species. Yet, much of this biodiversity exists outside the current protected areas and faces significant risks of habitat degradation and other anthropogenic pressures (Thilakarathne and Hirimuthugoda 2022). Other than the well-known main drivers of biodiversity loss, including habitat degradation, habitat fragmentation, habitat conversion, climate change, and invasive alien species, sand mining has resulted in the extinction or reduction of the population of freshwater fish in Sri Lanka (Goonatilake et al. 2020).

The Kelani River is the second longest river in Sri Lanka, with 20 sub-basins that flow through seven districts of the country, starting from the Adam's Peak Mountain in southwestern Sri Lanka and ending in Colombo, the western part of the country (Goonatilake et al. 2016; Abeysinghe and Samarakoon 2017). The Kelani River is the most polluted river on the island, with severally degraded water due to domestic and industrial waste, agricultural runoff, soil erosion, saltwater intrusion, and flood inundation despite being the primary water source of drinking water for the residents of the river basin, host to many aquatic species and is utilized for many industries, agricultural activities, power generation, recreation, fisheries, tourism, and gem and sand mining (Abeysinghe and Samarakoon 2017; Mahagamage and Manage 2017). This river basin is spread within the Southwestern ichthyological Province, where more than half of Sri

Lanka's endemic freshwater fish are harbored. Surasinghe et al. (2020) documented a total of 60 freshwater fish species in the Kelani River basin, including 30 endemic species. Tributaries of the Kelani River cover the Colombo district, while semi-urban and rural areas of the Colombo district still provide habitat for the inland freshwater fish in Sri Lanka, with over 40 species having high endemism including range-restricted *Pethia reval* (Sudasinghe et al. 2014). Appropriate habitat assessments for those nationally important faunas should be evaluated, and a database on those habitat assessments is currently needed in Sri Lanka. The main threats to the native fish diversity in Colombo and its outskirts areas are water pollution, habitat loss, destruction of aquatic vegetation, exotic fish species, and other anthropogenic activities (Bandara et al. 2019).

Within the Kelani River basin, the Pusseli Oya tributary and other similar streams provide high ecological significance for aquatic life in the region (Goonatilake et al. 2016). Given the concerns, the Pusseli Oya tributary represents a critical study area for assessing both biodiversity and environmental health. Hence, this study was conducted in the Pusseli oya tributary to understand the freshwater distribution, including *P. reval*, and assess physio-chemical parameters and anthropogenic activities in the area. By focusing on Pusseli Oya, this research will contribute to assessing unique freshwater fish distribution, conservation efforts needed, and sustainable management practices for these small streams in the Kelani River basin in Sri Lanka.

MATERIALS AND METHODS

Study area

Pusseli Oya is a major tributary of the Kelani River basin starting from the hills in Pusselihena Hills and situated in the southwestern ichthyological province of Sri Lanka (Goonatilake et al. 2020). Five different sites along the stream were randomly identified as study sites, and each site was chosen not to overlap with another with focus on anthropogenic activities, i.e., Point A (6°51'17.30" N, 80°4'45.97" E), Point B (6°51'29.13" N, 80°4'43.46" E), Point C (6°51'34.45" N, 80°4'45.81" E), Point D (6°51'47.58" N, 80°4'47.11" E), Point E (6°52'1.64" N, 80°4'43.07" E) (Figure 1). Human settlements, rubber plantations, and shrub areas bordered the stream selected for the study.

Procedure and data analysis

The fishers were observed from August to October 2024, covering dry spells and second inter-monsoon climatic seasons by bank-side observation in shallow water areas by snorkeling, using hand nets and small trawl nets during the daytime (Sutherland 2006). Several factors were considered in the microhabitats of the selected sampling sites with 250 m intervals between each site, such as width, depth, flow rate, temperature, pH, bottom, and shade, including the presence of anthropogenic activities. Physio-chemical parameters of water were measured in each sampling session: temperature, pH using digital meters (Test range: 0.0-14.0PH, Resolution: 0.01PH Error: ±0.05PH, Operating temperature: 0 - 80°C), flow rate using a standard float, and depth and width using a standard measuring tape. Fish species were photographed using a Nikon D7200 DSLR camera, and collected individuals were released to their habitat after being photographed. The species were identified using field expert knowledge and following standard field guidebooks. Data was analyzed using the general Microsoft Office Professional Plus 2024 package functions.

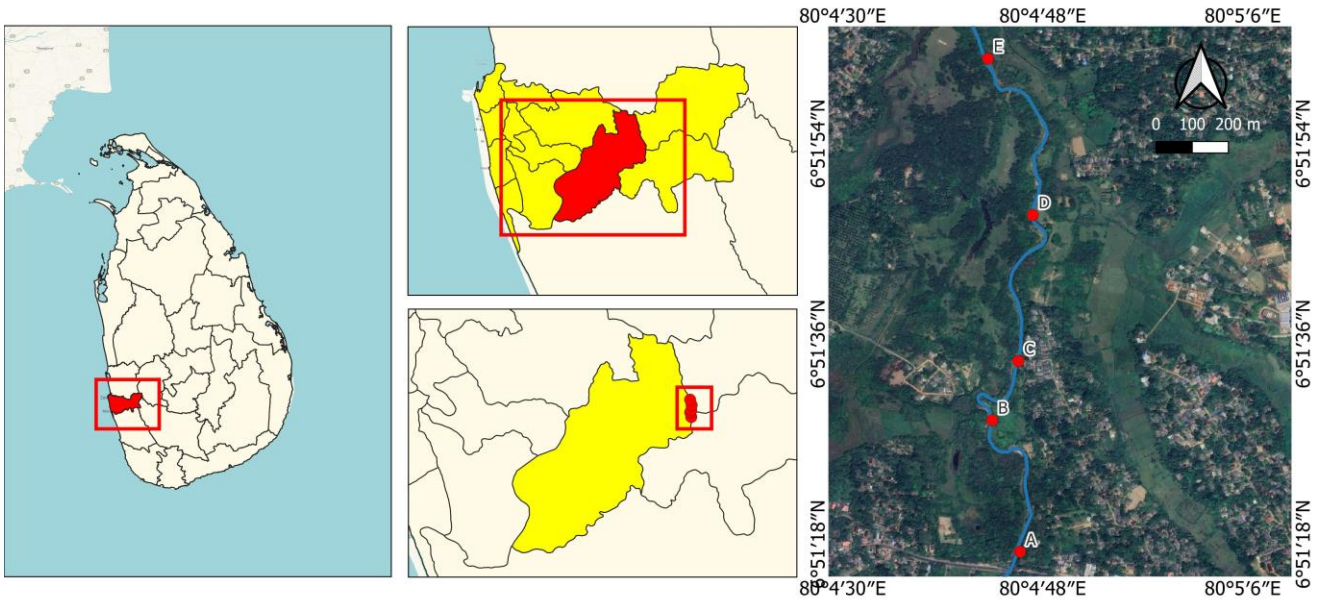

Figure 1. Sampling sites in Pusseli Oya, Kelani River Basin, Sri Lanka. Note: refer to text for point A-E

RESULTS AND DISCUSSION

The physio-chemical parameters of the selected sampling (Table 1) demonstrated significant variations, which are critical for assessing ecological health and biodiversity in an ecosystem. Site B recorded the largest width (14.56 m) with a depth of 1.04 m, indicating a more substantial water volume that may enhance habitat availability for aquatic flora and fauna. In contrast, Site A exhibited the smallest width (7.81 m) and shallowest depth of 0.5 m. Flow rates varied, with Site C recording the highest rate at 0.52 ms^{-1}, where Site B had the lowest flow rate (0.19 ms^{-1}), which could lead to stagnation and reduced oxygen levels. Temperature readings for sampling sites ranged from 28.8 (Site A) to 30.9°C (Site D), while pH values varied from 5.95 at Site C to 6.74 at Site A. The substrate composition differed among the sites as per the observation of the research team, with sandy substrate at Sites A and D and muddy conditions at Site B, while Site C contained a mix of both conditions. These variations could influence habitat structure and the assembling of freshwater fish fauna along the tributary. Additionally, shade conditions were present in Sites C and D with significant riparian canopy cover, which can positively affect the water temperature and light availability. Notably, anthropogenic activities (sand mining, pollution, day-to-day activities, etc.) were significantly higher at Site A compared to Site B, indicating a potential influence on water quality and habitat integrity. The aquatic plant distribution across the sampling sites (except Site D) supports habitat suitability for freshwater fish and ecosystem functioning in the water stream.

A total of 29 fish species belonging to eight orders and 12 families were recorded within the selected sampling points across the stream (Table 2). Among them, 10 species are endemic to Sri Lanka (Goonatilake et al. 2020). Family Cyprinidae was the most dominant fish family (13 species = 44.8%) in the study area (Figure 2), followed by families Aplocheilidae, Bagridae, Channidae, Gobidae and Cyprinidae (2 species = 6.9% each). Among the recorded species, 10 (34.5%) are endemic to Sri Lanka, including *Aplocheilus dayi*, *Mystus nanus*, *Mystus zeylanicus*, *Channa orientalis*, *Horadandia atukorali*, *Laubuka varuna*, *P. reval*, *Puntius thermalis*, *Paracanthocobitis urophthalma* and *Ompok argestes*. *A. dayi*, *P. reval*, and *P. urophthalma* are listed as locally Endangered. In comparison, *C. orientalis*, *H. atukorali*, *L. varuna*, and *O. argestes* are listed as Vulnerable fish species in Sri Lanka (Goonatilake et al. 2020). The highlighted factor is the global Red List™ provides evidence that all the endemic species recorded have declining population trends according to (The IUCN Red List of Threatened Species 2024).

Table 1. Physio-chemical parameters of water and human activities of sampling sites in Pusseli Oya, Kelani River Basin, Sri Lanka (measures in average)

Sampling site	Width (m)	Depth (m)	Flow rate (ms^{-1})	Temp (C°)	pH	Bottom	Shade	Human activities	Aquatic plants
A	7.81	0.5	0.35	28.8	6.74	Sandy	-	++	+
B	14.56	1.04	0.19	30.3	6.25	Muddy	+	-	+
C	9.70	1.32	0.52	29.4	5.95	Muddy and Sandy	-	++	+
D	9.41	0.62	0.27	30.9	6.32	Sandy	+	+	-
E	12.37	1.24	0.31	30.7	6.02	Muddy	+	-	+

Note: ++: Plentiful, +: Not much, -: Nil

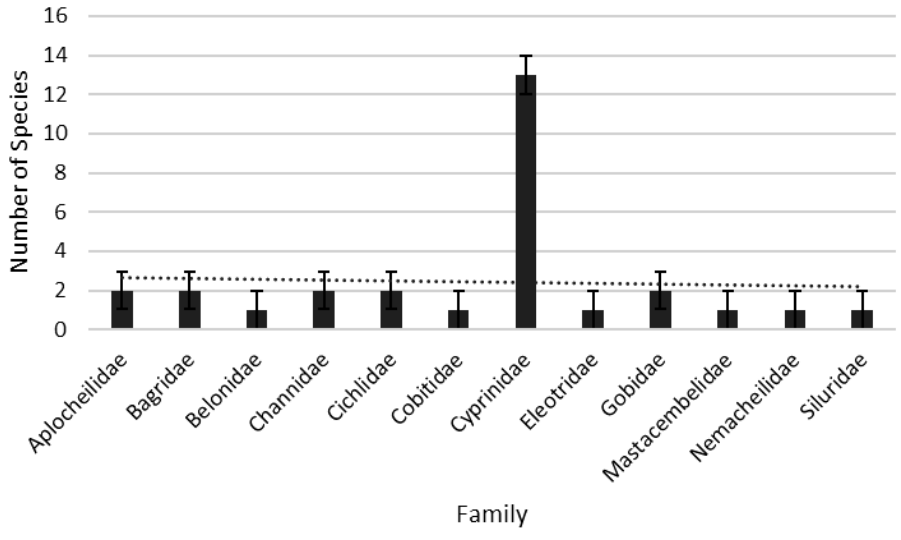

Figure 2. Number of species recorded by family during the study in Pusseli Oya, Kelani River Basin, Sri LankaLanka

Table 2. Recorded fish species on sampling sites in Pusseli Oya, Kelani River Basin, Sri Lanka

Family	Species name	Common name	Endemism in SL	NCS	Site				
					A	B	C	D	E
Aplocheilidae	*Aplocheilus dayi* Steindachner, 1892	Day's killifish	Endemic	EN	*	*		*	
Aplocheilidae	*Aplocheilus parvus* (Sundara Raj, 1916)	Dwarf panchax		LC	*	*		*	
Bagridae	*Mystus nanus* Sudasinghe, Pethiyagoda, Maduwage & Meegaskumbura, 2016	Striped dwarf catfish	Endemic	LC			*	*	*
Bagridae	*Mystus zeylanicus* Ng & Pethiyagoda, 2013	Sri Lanka mystus	Endemic	LC				*	
Belonidae	*Xenentodon cancila* (Hamilton, 1822)	Freshwater garfish		LC	*	*	*	*	*
Channidae	*Channa orientalis* Bloch & Schneider, 1801	Smooth breasted snakehead	Endemic	VU				*	
Channidae	*Channa striata* (Bloch, 1793)	Murrel		LC		*			
Cichlidae	*Etroplus suratensis* (Bloch, 1790)	Green chromide		LC		*			*
Cichlidae	*Pseudetroplus maculatus* (Bloch, 1795)	Orange chromide		LC	*			*	
Cobitidae	*Lepidocephalichthys thermalis* (Valenciennes, 1846)	Common spiny loach		LC	*			*	
Cyprinidae	*Dawkinsia filamentosa* (Valenciennes, 1844)	Filamented barb		LC	*	*	*	*	*
Cyprinidae	*Devario malabaricus* (Jerdon, 1849)	Giant danio		LC	*	*	*	*	*
Cyprinidae	*Puntius vittatus* (Day, 1865)	Silver barb		LC	*	*		*	
Cyprinidae	*Esomus thermoicos* (Valenciennes, 1842)	Flying barb		LC		*			
Cyprinidae	*Rasbora dandia* (Valenciennes, 1844)	Striped rasbora		LC	*	*	*		*
Cyprinidae	*Rasbora microcephalus* (Jerdon, 1849)	Common rasbora		LC	*	*	*	*	*
Cyprinidae	*Horadandia atukorali* Deraniyagala, 1943	Hora dandia	Endemic	VU	*	*			
Cyprinidae	*Laubuka varuna* Pethiyagoda, Kottelat, Silva, Maduwage & Meegaskumbura, 2008	Western laubuka	Endemic	VU				*	
Cyprinidae	*Pethia reval* (Meegaskumbura, Silva, Maduwage & Pethiyagoda, 2008)	Red-fin two-banded carplet	Endemic	EN	*	*		*	*
Cyprinidae	*Puntius dorsalis* (Jerdon, 1849)	Long-snouted barb		LC	*			*	*
Cyprinidae	*Puntius thermalis* (Valenciennes, 1844)	Swamp barb	Endemic	LC				*	*
Cyprinidae	*Systomus sarana* (Hamilton, 1822)	Olive barb		LC			*	*	*
Cyprinidae	*Tor khudree* (Sykes, 1839)	Mahseer		LC					*
Eleotridae	*Eleotris fusca* (Forster, 1801)	Brown gudgeon		LC				*	
Gobidae	*Awaous melanocephalus* (Bleeker, 1849)	Scribbled goby		LC	*	*		*	
Gobidae	*Glossogobius giuris* (Hamilton, 1822)	Bar-eyed goby		LC		*			
Mastacembelidae	*Mastacembelus armatus* (Lacepède, 1800)	Marbled spiny eel		LC	*			*	
Nemacheilidae	*Paracanthocobitis urophthalma* (Günther, 1868)	Tiger loach	Endemic	EN		*		*	
Siluridae	*Ompok argestes* (Sudasinghe & Meegaskumbura, 2016)	Wet zone butter catfish	Endemic	VU				*	

Note: NTS: National Threaten Status (Goonatilake et al. 2020), LC: Least Concerned, NT: Near Threatened, VU: Vulnerable, EN: Endangered, *: presence in the sites

The variations in human activities and physio-chemical parameters among sample locations have a significant impact on aquatic ecosystems and species distribution. Our research has revealed significant differences in water quality between sampling locations, a result of both natural and man-made influences. For instance, Sites A and B, despite their moderate differences in water depth and flow rate, do not support aquatic plants and have minimal human activity in Site B and high human activity in Site A, respectively. This finding underscores the crucial role of aquatic plants, even in sites with different substrate types like muddy or sandy bottoms, which is important for providing habitat and food resources for various freshwater fish species (Maitland and Lyle 1991). On the other hand, Site C, with its more acidic pH (5.95), is notable for a small amount of aquatic plants and experiencing considerable anthropogenic activities, which reduces species richness compared to other areas. Allan et al. (2020) show that human activities and water quality changes, particularly in pH can disrupt aquatic habitats and impact stream fish populations. The distribution of aquatic plants provides suitable habitats and food items to other aquatic organisms, especially fish (Ismail et al. 2018). The distribution of aquatic plants is linked to aquatic species richness, as the presence of aquatic vegetation correlates with higher biodiversity in freshwater ecosystems (Law et al. 2019). The increase in habitat volume may support a diverse range of flora and fauna by offering more space for species to thrive (Kowarik 2018). These findings have significant implications for the management and conservation of aquatic ecosystems, highlighting the need for further research and action in this area.

Flow rate variability is important because flow rates determine oxygen availability and sediment transport, hence directly influencing habitat structure and the distribution of species (Allan et al. 2020). The lower flow rate at Site B may stagnate and reduce oxygen levels, which may stress aquatic species. This is important to note for those species with higher oxygen demand, like the family Cyprinidae, which dominated study sites (Goonatilake et al. 2020). Besides, the lower flow rates can promote the settlement of pollutants and degrade water quality, thereby lowering the stream's general ecological health (Koushali et al. 2021). The temperatures were also varying among the sites, with a minimum of 28.8±℃ at Site A and a maximum of 30.9±℃ at Site D. Temperature

has been considered one of the most important parameters affecting metabolic rates, breeding patterns, and species distribution in freshwater ecosystems (Christensen et al. 2021). Furthermore, the substrate type is one of the critical elements for habitat formation, while it strongly influences water filtration, oxygenation, and the availability of shelters for fish species. Sites with sandy substrates would probably be better for burrowing and nesting species, while muddy substrates are capable of trapping pollutants and reducing habitat quality (Christensen et al. 2021). In Sites B, D, and E, shade was available due to riparian vegetation, thus moderating the water temperature and improving water quality because of the reduction in direct sunlight. Generally, shade cover would have a positive impact on aquatic habitat and increase of fish population because of its controlling effect on algal growth and maintenance of habitat integrity (Misteli et al. 2022). Significantly, high human activities have been attributed to a decrease in both water quality and species richness (Feisal et al. 2023). For instance, the suspected anthropogenic activities around Site C are the disposal of waste and a high volume of water extraction that could explain the absence of more sensitive species like *P. reval*.

The high dominance of the species belonging to the family Cyprinidae across sites further enforces the ecological importance of this family in Sri Lankan freshwaters. Most of these species have a greater chance to survive in the environment changes and, hence, are common in disturbed habitats. However, the incidence of endemic species, which are mostly threatened, could indicate the need to focus on conservation practices to save the habitats of such species (Muluneh 2021). This unique freshwater ecosystem supports a few other endangered native fish species each having specific ecological requirements and habitat sensitivities. As an example, *P. reval* is represented in Deduru oya to Kelaniya Basin in slow and stagnant water flows (Pethiyagoda and Sudasinghe 2021).

Consequently, many of the recorded endemic species are specifically adapted to the physio-chemical conditions of freshwater habitats that were studied during the study and are sensitive to changes in water quality, and habitat structure. Moreover, human-induced activities reported in the area, like sand mining, agricultural runoff, and clear-cutting of riparian vegetation, reduce habitat complexity and increase turbidity, which directly threatens the spawning and feeding habitats of species. Hence, the restricted distribution and sensitivity to human activities call for specific conservation measures that should be taken to protect unique freshwater biodiversity (Cantonati et al. 2020). The survival of such species will not only maintain the ecological balance but also preserve the genetic diversity that makes Sri Lanka's freshwater habitats globally significant and irreplaceable.

The correlation between aquatic plant distribution and fish biodiversity observed in this study is a significant finding that reinforces the idea the role of aquatic vegetation supporting fish assemblages is multifaceted and may act as sources of food, shelter, and breeding sites (Lal et al. 2024). However, the absence of aquatic plants at Site D recorded the highest number of species during the study. According to the site observation, the site has a sandy substrate, with moderate water flow and considerable riparian vegetation with debris along the river bank with not much human disturbance, which could lead to a high density of fish species.

The genus *Pethia* represents five species from Sri Lanka, all of which are endemic to the island. Among them, *Pethia nigrofasciata* distributed from Attanagal Oya to the Walawe River Basin. *Pethia cumingii* and *P. reval* are a paratactic species pair. *Pethia cumingii* ranges from Kalu to the Walawe basin. In contrast, *P. reval* ranges from the Kelani River to the Deduru River basin, with a translocated population in the Mahaweli River Basin. Furthermore, the other *Pethia* sp. is *Pethia bandula*, a point endemic species recorded in a narrow range of the "Galapitamda" area, "Minimaru Kolaniya," a stream connected to the Kelani River basin (Pethiyagoda and Sudasinghe 2021).

Endemic *P. reval* already listed as endangered under criteria B1ab(iii,v)+2ab(iii,v) (IUCN Red List 2019) (Figure 3) was notably recorded in large numbers at most sites except Sampling Site C, illustrating the influence of environmental factors like pH and habitat structure on species presence. Its absence at sampling Site C suggests that specific physio-chemical factors and human activities may influence its distribution. The lower pH (5.95) at site C likely plays a significant role as *P. reval* may be sensitive to more acidic environments, unlike other species present at this site, despite similar conditions.

Aquatic vegetation, which is present in Sites A, B, C, and E, is a crucial factor in the survival of the species *P. reval*, providing protection, breeding sites, and feeding potential; thus, it is a factor that helps to perpetuate the populations of the species. The absence of aquatic vegetation at Site C, along with a mix of muddy and sandy substrate, could cause a less favorable habitat, as aquatic plants provide shelter, breeding sites, and food resources, demonstrating their adaptability. However, it was found in locations with different substrates but consistently had aquatic plants (except Site D), highlighting the significance of vegetation in sustaining this species. Consequently, those habitats made up of a variety of aquatic plant life, which *P. reval* is accustomed to, generally consist of complicated, vegetated structures that support a balanced ecosystem.

Figure 3. *Pethia reval* observed in Pusseli Oya, Kelani River Basin, Sri Lanka. Photo: Chathura Priyadarshana

Another key factor that seems important regarding the distribution of *P. reval* is the flow rate. The species were found to be relatively more abundant in sites characterized by moderate flow rates. These sites maintain higher oxygen levels, a crucial factor in reducing the accumulation of pollutants and ensuring a healthy ecosystem. While a high rate of flow may interfere with habitat stability, as can be seen in Site C, a low flow rate may lead to stagnation of water, as in Site B, affecting the availability of oxygen. On the other hand, the absence of *P. reval* from Site C, with high recorded flow rates, may suggest that this species prefers sites with a moderate current, which suits their physiological requirements, matching feeding behavior. In contrast, low oxygen levels due to stagnation may also be stressful to the generally less hypoxia-tolerant *P. reval* than species with greater tolerance.

Human activities also appear to impact the occurrence of *P. reval*, which was observed in Site A, where there was also evidence of human activities as sand mining; however, the type and severity of disturbances, including sand mining and waste disposal at and around Site C could be more damaging to its ecology including habitat preference of *P. reval*. Jayaneththi and Pradeep Suranga (2014) found that *P. reval* is not found in mud-bottom substrates in the Aththanagalu Oya River Basin. Still, the current study reveals that *P. reval* can thrive in sites with sandy or muddy substrates, its presence in areas with aquatic plants, and moderate human disturbance combined with more neutral pH areas.

Pethia reval is sensitive to human disturbance, evidenced by either complete absence or very low incidence in sites with high levels of anthropogenic disturbance. For instance, sand mining reduces substrate stability and makes it difficult for territories to be established or any reproduction by species. Waste disposal, on the other hand, reduces water quality and increases the levels of contaminants, hence further stressing species with narrow ecological tolerances (Bhattacharya et al. 2019). The limited distribution of *P. reval* in disturbed sites calls upon the vulnerability of the species, as habitat conservation along with pollution control enables the protection of sensitive endemic species. Conserving these nationally important and endangered freshwater faunal species based on their home range following in-situ conservation practices could prime the increase of health of the river basin eventually. Hence, the country needs interconnected broader ecosystem management to conserve this faunal taxon, balancing co-existence with humans in the future.

Since most of the threatened and endemic freshwater fish are distributed outside the current protected area, there is a high need to protect them according to an area-based conservation strategy. Any anthropogenic activity that causes harm to these habitats and critical species needs to be clearly assessed with a community-based conservation perspective, especially focusing on knowledge sharing and capacity building on conservation and sustainable practices. When critical species are located outside of the protected areas, the local communities must be made aware of this and be involved in conservation programs. Ex-situ breeding programs, translocation, and reintroduction should be established with the aim of increasing the wild population.

In conclusion, the presence of endemic and endangered species in the sites observed with optimum water quality, pH, and minimum anthropogenic activities correspond with a greater diversity of fish species, including key endemics like *P. reval*. Conservation measures should prioritize maintaining optimal water qualities and balancing human impact and aquatic ecosystems to support the long-term survival of *P. reval* across its range. Protecting these environments is essential for maintaining the ecological balance and ensuring the sustainability of both aquatic life and communities that depend on these resources. Future resources should focus on long-term monitoring of these parameters and their relationship with fish ecology in the areas for effective management strategies with a community participation perspective on conservation and ecosystem management. Hence, the previous literature and distribution of these endemic and native species confirm our observation, and it reveals that not only *P. reval* species but also other endemic and native species in this small stream need to be conserved. Future research on identifying life cycles, species-based habitat preferences, and potential area-based conservation measures are needed.

ACKNOWLEDGEMENTS

The research team would like to express their sincere and deepest gratitude to Shantha Jayaweera, the Honorable Senior Instructor of the Aquatic Life Group of the Young Zoologists' Association of Sri Lanka, for his kind supplementing of the funds necessary for the research field visits. Also, the team is equally grateful to the Homagama Divisional Secretariat for allowing and enabling the execution of this study in their area. Additionally, we would like to acknowledge the invaluable assistance provided by all others who contributed their time and efforts, which greatly facilitated the successful completion of this study.

REFERENCES

Abeysinghe NMDEA, Samarakoon MB. 2017. Analysis of variation of water quality in Kelani River, Sri Lanka. Intl J Environ Agric Biotechnol 2: 2770-2775. DOI: 10.22161/ijeab/2.6.1.

Allan JD, Castillo MM. 2020. Stream Ecology: Structure and function of running waters. Springer, Dordrecht. DOI: 10.1007/978-3-030-61286-3.

Bandara AGGC, Priyadarshana PHMGC, Wickramasinghe WAADL. 2019. Species composition and checklist of freshwater ichthyofauna of Colombo urban wetlands. First Res Symp Ocean Univ Sri Lanka 2019: 37.

Bhattacharya RK, Das Chatterjee N, Dolui G. 2019. Consequences of sand mining on water quality and instream biota in alluvial stream: A case-specific study in South Bengal River, India. Sustain Water Resour Manag 5 (4): 1815-1832. DOI: 10.1007/S40899-019-00345-Y.

Cantonati M, Poikane S, Pringle CM, Stevens LE, Turak E, Heino J, Richardson JS, Bolpagni R, Borrini A, Cid N, Čtvrtlíková M. 2020. Characteristics, main impacts, and stewardship of natural and artificial freshwater environments: Consequences for biodiversity conservation. Water 12 (1): 260. DOI: 10.3390/w12010260.

Christensen EAF, Norin T, Tabak I, Van Deurs M, Behrens JW. 2021. Effects of temperature on physiological performance and behavioral thermoregulation in an invasive fish, the round goby. J Exp Biol 224 (1): jeb237669. DOI: 10.1242/JEB.237669.

Feisal NAS, Kamaludin NH, Abdullah Sani MF, Awang Ahmad DK, Ahmad MA, Abdul Razak NF, Tengku Ibrahim TN. 2023. Anthropogenic disturbance of aquatic biodiversity and water quality of an urban river in Penang, Malaysia. Water Sci Eng 16 (3): 234-242. DOI: 10.1016/J.WSE.2023.01.003.

Goonatilake SDA, Fernando M, Kotagama O, Perera N, Vidanage S, Weerakoon D, Daniels AG, Maíz-Tomé L. 2020. The National Red List of Sri Lanka: Assessment of the Threat Status of the Freshwater Fishes of Sri Lanka 2020 Colombo: IUCN. International Union for Conservation of Nature, Sri Lanka and the Biodiversity Secretariat, Ministry of Environment and Wildlife Resources, xv-106 pp.

Goonatilake SDA, Perera N, Silva GD, Weerakoon D, Mallawatantri A. 2016. Medium to long-term multi-stakeholder strategy and action plan for management and conservation of the Kelani River Basin (2016-2020): Natural resource profile of the Kelani River Basin, Colombo.

Ismail SN, Abd Hamid M, Mansor M. 2018. Ecological correlation between aquatic vegetation and freshwater fish populations in Perak river, Malaysia. Biodiversitas 19 (1): 279-284. DOI: 10.13057/biodiv/d190138.

IUCN Red List. 2019. Redfin Two-banded carplet. IUCN Red List of Threatened Species. DOI: 10.2305/IUCN.UK.2019-3.RLTS.T196103A174841471.EN.

IUCN Red List of Threatened Species. 2024. https://www.iucnredlist.org/.

Jayaneththi HB, Suranga WDP. 2014. Preliminary study on *Pethia reval*, Meegaskumbura & Pethiyagoda 2008, and other related ichthyofauna of Attanagalu river Basin, Sri Lanka. Sri Lanka Nat 7 (3-4): 11-14.

Koushali HP, Mastouri R, Khaledian MR. 2021. Impact of precipitation and flow rate changes on the water quality of a coastal river. Shock Vib 2021: 6557689. DOI: 10.1155/2021/6557689.

Kowarik I. 2018. Urban wilderness: Supply, demand, and access. Urban For Urban Green 29: 336-347. DOI: 10.1016/j.ufug.2017.05.017.

Lal J, Vaishnav A, Patel A, Kumar S, Verma DK, Rathod SKK, Kumari K, Kumari K, Kanaujiya K, Kumar A. 2024. Aquatic Greenery: Managing Aquatic Vegetation and Harnessing their Potential. J Sci Res Rep 30 (7): 830-842. DOI: 10.9734/jsrr/2024/v30i72193.

Law A, Baker A, Sayer C, Foster G, Gunn IDM, Taylor P, Pattison Z, Blaikie J, Willby NJ. 2019. The effectiveness of aquatic plants as surrogates for wider biodiversity in standing fresh waters. Freshw Biol 64 (9): 1664-1675. DOI: 10.1111/FWB.13369.

Mahagamage Y, Manage P. 2018. Socio-economic background of Kelani River Basin regions, Sri Lanka. Asian J Microbiol Biotechol Environ Sci 20 (3): 744-756.

Maitland PS, Lyle AA. 1991. Conservation of freshwater fish in the British Isles: The current status and biology of threatened species. Aquat Conserv: Mar Freshw Ecosyst 1 (1): 25-54. DOI: 10.1002/AQC.3270010104.

Misteli B, Pannard A, Labat F, Fosso LK, Baso NC, Harpenslager SF, Motitsoe SN, Thiebaut G, Piscart C. 2022. How invasive macrophytes affect macroinvertebrate assemblages and sampling efficiency: Results from a multinational survey. Limnologica 96: 125998. DOI: 10.1016/J.LIMNO.2022.125998.

Muluneh MG. 2021. Impact of climate change on biodiversity and food security: a global perspective—a review article. Agric Food Secur 10 (1): 36. DOI: 10.1186/s40066-021-00318-5.

Pethiyagoda R, Sudasinghe H. 2021. The Ecology and Biogeography of Sri Lanka: A context for freshwater fishes. WHT Publications (Private) Limited, Colombo.

Senanayake FR, Moyle PB. 1982. Conservation of freshwater fishes of Sri Lanka. Biol Conserv 22: 181-195. DOI: 10.1016/0006-3207(82)90068-4.

Sudasinghe BSATH, Nilupul PWDT, Bandara SPJ. 2014. Freshwater ichthyofauna in Mullegama-Habarakada area. J Threat Taxa 6: 5731-5737. DOI: 10.11609/jott.o3583.5731-7.

Surasinghe T, Kariyawasam R, Sudasinghe H, Karunarathna S. 2020. Biodiversity conservation challenges in Sri Lanka's tropical river basin. Water 12 (1): 26. DOI: 10.3390/w12010026

Sutherland WJ. 2006. Ecological Census Techniques: A Handbook (Second Edition). Cambridge University Press, Cambridge.

Thilakarathne D, Hirimuthugoda G. 2022. Can the Sri Lankan endemic-endangered fish *Labeo fisheri* (Teleostei: Cyprinidae) adapt to a new habitat? J Threat Taxa 14: 21579-21587. DOI: 10.11609/jott.7621.14.8.21579-21587.