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Front cover: Bubalus depressicornis **(H. Smith, 1827)**
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Book:

Rai MK, Carpinella C. 2006. Naturally Occurring Bioactive Compounds. Elsevier, Amsterdam.

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Webb CO, Cannon CH, Davies SJ. 2008. Ecological organization, biogeography, and the phylogenetic structure of rainforest tree communities. In: Carson W, Schnitzer S (eds) Tropical Forest Community Ecology. Wiley-Blackwell, New York.

Abstract:

Assaeed AM. 2007. Seed production and dispersal of Rhazya stricta. 50th annual symposium of the International Association for Vegetation Science, Swansea, UK, 23-27 July 2007.

Proceeding:

Alikodra HS. 2000. Biodiversity for development of local autonomous government. In: Setyawan AD, Sutarno (eds.) Toward Mount Lawu National Park; Proceeding of National Seminary and Workshop on Biodiversity Conservation to Protect and Save Germplasm in Java Island. Universitas Sebelas Maret, Surakarta, 17-20 July 2000. [Indonesian]

Thesis, Dissertation:

Sugiyarto. 2004. Soil Macro-invertebrates Diversity and Inter-Cropping Plants Productivity in Agroforestry System based on Sengon. [Dissertation]. Universitas Brawijaya, Malang. [Indonesian]

Information from internet: Balagadde FK, Song H, Ozaki J, Collins CH, Barnet M, Arnold FH, Quake SR, You L. 2008. A synthetic Escherichia coli predator-prey ecosystem. Mol Syst Biol 4:187. www.molecularsystembiology.com

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A checklist of native freshwater fish from Brantas River, East Java, Indonesia

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Abstract. *Hasan V, Mamat NB, South J, Ottoni FP, Widodo MS, Arisandi P, Isroni W, Jerikho R, Samitra D, Faqih AR, Simanjuntak CPH, Mukti AT. 2022. A checklist of native freshwater fish from Brantas River, East Java, Indonesia. Biodiversitas 23: 6031-6039.* This study aims to provide information on the freshwater fish species composition of the Brantas River, the second-largest river in Java, Indonesia. All samples used in this study were the caught activities during Fish Resource Survey (form May 5, 2021 to August 20, 2022). Sampling was carried out in four stations of the Brantas River, representing upstream, the Karangkates Reservoir, midstream, and downstream. This work recorded 42 fish species divided into 35 genera and 21 families. Cyprinidae was the dominant family, comprising 12 genera and 15 species. According to the IUCN Red List, most fish species inhabiting the Brantas River have a conservation status of Least Concern (LC) or Data Deficient (DD), except for *Rasbora lateristriata* which is categorized as Vulnerable (VU). Genera *Tor* and *Neolissochilus* are rarely found in Javanese waters. We suggest that the conservation status of these species should be reviewed. Information on habitat use and ecological interactions of fish occurring in the Brantas River are needed urgently to make appropriate conservation decisions and plans. Therefore, we suggest that more collections need to be carried out in the studied river, as well as studies based on eDNA analysis and research incorporating both morphological and molecular data.

Keywords: Conservation, diversity, ecology, ecosystem, Teleostei, wetland

INTRODUCTION

Western Indonesia (Borneo, Sumatra, and Java islands) is one of the world's hotspots for freshwater fish (Kottelat et al. 1993; Kottelat 2013). In these three main islands, there are several rivers with varied topographies due to the paleogeology of the region. Tropical islands are subject to distinct speciation events as organisms adapt to specialized and isolated environments. Borneo (Kalimantan) is covered by tropical rainforests drained by large rivers. Whereas other localities have soft and acidic peat waters (black waters) which usually comprise a high fish species richness (Roberts 1989; Kottelat and Widjanarti 2005). Although Sumatra has rivers that are not as large as in Borneo, the fish species diversity is also very high, especially in rivers that flow to the east coast (Kottelat and Tan 2009; Tan and Kottelat 2009). Among these three main islands, Java is the smallest. It also possesses a high species richness, however, lower than Kalimantan and Sumatra. Given the heterogeneity and complexity of tropical island freshwater systems, it is essential to have a thorough understanding of species trends and occurrences in Java since many endemic and vulnerable species inhabit this island (Kottelat et al. 1993; Roberts 1993; Kottelat 2013).

The island of Java has high biodiversity, in not only freshwater fish but other groups of species. However, Java is the most populous island in the world, with ~141 million people inhabiting it. Therefore, the natural environment and resources are under substantial pressure from anthropogenic sources. The island of Java consists of limestone mountains that have many rivers that are used by the community as a water source and for inland fisheries. The fisheries are exploited by the communities along the entire river basin, from the headwaters to the lower reaches and estuarine zone. Some species are estuarine migrants, which have adapted to low salt levels and can be found in the lowest reaches of the rivers (Hasan et al. 2021b; Valen et al. 2022a). These fish have long been used by the communities that live near the river as a source of animal protein (Pratama et al. 2020; Valen et al. 2022b), while some are used for the aquarium trade (Gani et al. 2021; Ndobe et al. 2022; Nurjirana et al. 2022). Rivers also provide socio-economic value as they are widely used as water sources for domestic activities, tourism, agriculture, and other economic activities (Hertika et al. 2021; Nurhayati et al. 2021).

Western Indonesia, and especially Java, were the subject of intensive freshwater fish taxonomical surveys in the mid-19th century by European naturalists. Thus, there is a well-established taxonomy and type material of fish designated for the region (Kottelat 2013; Hasan et al. 2021c). Nonetheless, some groups have complex and cryptic diversity, and modern molecular methods will facilitate further comprehensive taxonomic revisions. Therefore, there is a high possibility of new fish species descriptions for this island (Hubert et al. 2019; Hasan et al. 2021d). Taxonomical shortfall and undescribed diversity pose an obstacle for conservation initiatives in stressed environments.

One of the main rivers from the island of Java is the Brantas River, located in East Java (Valen et al. 2020; Widodo et al. 2020). Brantas River flows from the Anjasmoro Mountains and then goes around the west of Mount Kulud and Mount Welirang, then continues to flow north towards the north coast of Java. The Brantas River originates in Batu City, and then flows through the Malang District, Blitar District, Tulungagung District, Kediri District, Jombang District, and Mojokerto District (Arsad et al. 2021; Rohman et al. 2022). The length of the Brantas River is about 320 km with a basin area of about 1194.93 ha. This river is the second longest in Java, after Bengawan Solo (600 km) (Hasan et al. 2022). The upstream condition of the Brantas river is dominated by mountains with springs flowing into the Karangkates Reservoir, then the flow merges into the main river to the estuary. The Brantas River is crucial for the community because it is the largest supplier of raw water for the main district in East Java.

Like most western Asian river systems, the length of the Brantas River is subject to high anthropogenic pressure, including inland fisheries for human consumption. There is no recent data on the fish species assemblage of the Brantas river. Fish inventories are essential baseline research for conservation management as diversity patterns are an indicator of ecosystem health and the data can be used to infer the impact of stressors (Pathak et al. 2014; Ismail et al. 2018). This information is crucial for conservation programs, such as domestication or the creation of fish sanctuary sites and the development of sustainable inland fisheries management policy to support socio-ecological systems. The purpose of this research is, therefore, to access the current status of the remaining native freshwater fish assemblage of Brantas River.

MATERIALS AND METHODS

Study area

This study was carried out in four segmentation areas of Brantas River, East Java, Indonesia, including upstream, Karangkates Reservoir, midstream, and downstream. A complete description of the sampling station is shown in Figure 1 and Tables 1 and 2. These three locations represent three different river ecosystems because they are located in different topography.

Water quality

The water quality parameters temperature (°C), pH, dissolved oxygen (ppm), and water flow (m/s) were measured at each location immediately after specimen collection. All water quality observations were carried out using the same standard procedure by observing the lowest point in the morning and the highest point in the afternoon to determine the range of values. For each location, at least two people are assisted in observing air quality. A summary of the characteristics of each collecting site Station is presented in tables 1 and 2.

Table 1. Coordinates, river segmentation, and description of the sampling sites

Station	Coordinates	River segmentation	Administrative area	Site description
1	7°46'40.3"S, 112°31'29.5"E	Upstream	Batu City	Narrow, fast water flow, with rocky and sandy substrate
2	8°10'21.1"S, 112°28'29.9"E	Karangkates Dam	Malang District	Very wide, stagnant water flow, with sandy mud substrate
3	7°39'24.5"S, 112°05'21.3"E	Midstream	Kediri District	Wide, slow water flow, with sandy mud substrate
4	7°22'03.9"S, 112°37'48.1"E	Downstream	Sidoarjo District	Wide, slow water flow, with sandy mud substrate

Table 2. Water parameters at each station

Parameters	Equipment	Station 1	Station 2	Station 3	Station 4	Reference (Boyd 2000)
Temperature (°C)	Thermometer	22-25	26-29	29-31	20-32	28-32
pH	pH meter	7.3-7.7	6.8-7.3	6.8-7.1	6.5-6.9	6.8-8.5
DO (ppm)	DO meter	6.4-8.2	5.1-5.5	6.0-6.9	5.2-5.8	> 4
water flow (m/s)	Current meter	1.5-2.0	0.1-0.2	0.5-1.0	0.5-1.0	0.2-0.5

Characterization of collection Stations

Station 1

Station 1 is an upstream area of the Brantas River, located at Batu City (coordinates 7°46'40.3"S, 112°31'29.5"E). The Brantas River in this station is narrow, possessing a fast water flow (ranging between 1.5-2.0 m/s) and rocky and sandy substrate. Station 1 is characterized by a slightly alkaline pH, high concentration of dissolved oxygen, in general, a moderate water temperature although lower than other Stations, and fast water flow (Tables 1 and 2).

Station 2

Station 2 is a Reservoir (Karangkates Reservoir) of the Brantas River, located in Malang District (coordinates 8°10'21.1"S, 112°28'29.9"E). This station is very wide, possessing a stagnant water flow (ranging between 0.1-0.2 m/s) with a sandy mud substrate. Station 2 had approximately neutral pH and is characterized by the lowest concentration of dissolved oxygen among the Stations, although it is similar to Station 4 in this respect. The water temperature was moderate, and the water flow was stagnant (Tables 1 and 2).

Station 3

Station 3 is a midstream area of the Brantas River, located in Kediri District (coordinates 7°39'24.5"S, 112°05'21.3"E). The Brantas River in this station is wide, possessing a slow water flow (ranging between 0.5-1.0 m/s) with a sandy mud substrate. Station 3 possesses an approximately neutral pH, a moderate concentration of dissolved oxygen, moderate water temperature, and a slow water flow (Tables 1 and 2).

Station 4

Station 4 is a downstream area of the Brantas River, located in Sidoarjo District (coordinates 7°22'03.9"S, 112°37'48.1"E). The Brantas River in this station is wide, possessing a slow water flow (ranging between 0.5-1.0 m/s) with a sandy mud substrate. Station 4 is slightly acidic in pH, with a low dissolved oxygen concentration - similar to Station 2. The water temperature is moderate with slow water flow (Tables 1 and 2).

Fish collection and species identification

The specimens were collected using cast nets (ca. 10 feet wide, mesh size 2.5 cm). Several specimens were also obtained from traditional fishermen living in the sampling location surroundings. All samples were identified based on identification keys provided by Kottelat et al. (1993) and Kottelat (2013). The validity, taxonomic status and current taxonomic classification of each species were checked by Fricke et al. (2022a,b). The specimens were preserved in 10% formalin. Selected specimens were deposited in the Environmental and Fisheries Resources Management Laboratory (EFRM), Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya, Indonesia. The specimens were collected from May 5, 2021 to August 20, 2022.

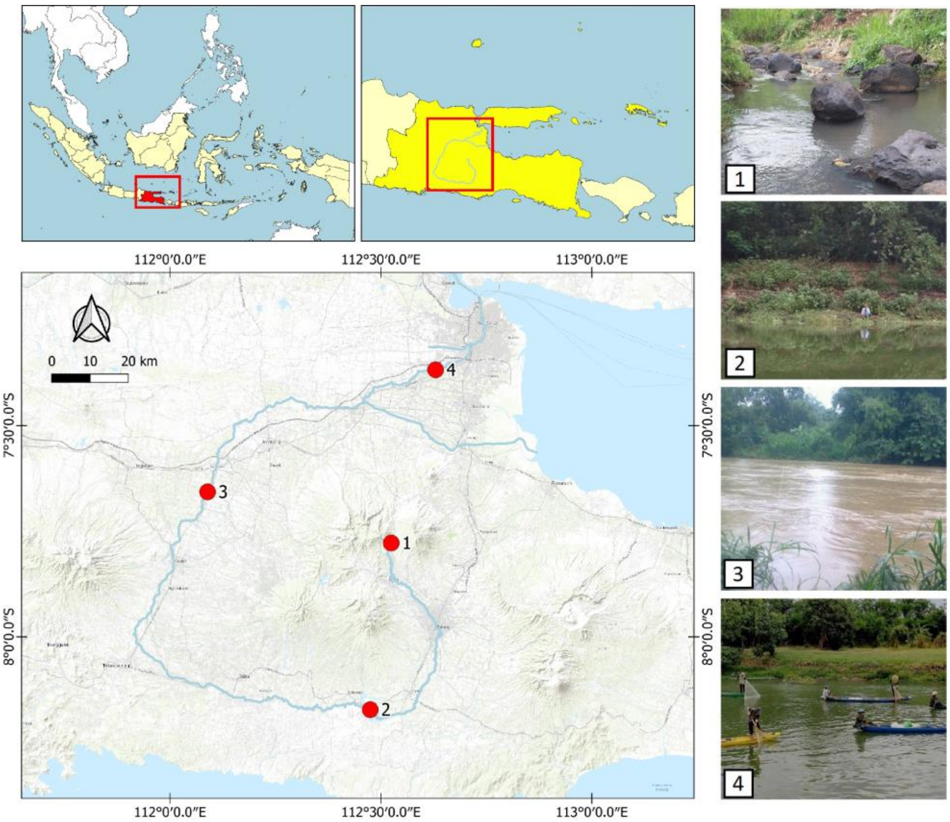

Figure 1. Collecting sites of Brantas River, East Java, Indonesia. 1. upstream; 2. Karangkates Reservoir; 3. midstream; 4. downstream

Data analysis

Sampling efficiency was assessed using a species accumulation curve in Primer 7 with observed species values (Sobs) compared to Michaelis Menton and bootstrapped estimator values (Clarke and Gorley 2015).

RESULTS AND DISCUSSION

Checklist

This work recorded 42 fish species divided into 35 genera and 21 families (Table 3). The sampling covered between 84-96% of expected species based on the curves from observed species values (Sobs) (Figure 2). Cyprinidae was the dominant family, comprising 12 genera and 15 species (Table 3). This family is widespread from upstream to downstream. This predominance of Cyprinidae is corroborated by other studies conducted in Southeast Asia (Rainboth 1996; Kottelat et al. 2013). Cyprinidae species are usually broadly tolerant to environmental changes and are opportunistic generalists. In addition, cyprinids are cyclic spawners with a high fecundity and reproduce throughout the year (Roesma et al. 2017; Efizon et al. 2021). These factors may favor the dominance of the family in freshwater environments.

Considering all the species recorded in this study, some of them were widespread across the basin and occurred in all four stations, such as *Mystacoleucus marginatus, Osteochilus vittatus, Systomus rubripinnis, Barbodes binotatus, Barbonymus gonionotus, Barbonymus balleroides, Anabas testudineus, Clarias batrachus,* and *Monopterus albus*. On the other hand, some species were rarer, being recorded only in one of the four stations, such as *Nemacheilus chrysolaimos, Glyptothorax platypogon,* and *Akysis variegatus* (Table 3). This suggests that there is some environmental filtering acting on the assemblage. For example, families associated with rheophilic conditions, Cobitidae, Sisoridae, and Akysidae, were only sampled upstream (station 1). These species are specialized for habitats with high concentrations of dissolved oxygen, fast-flowing water, and rocky habitats (Rainboth 1996; Kottelat et al. 2013). Thus, they are unable to inhabit the mid-lower reaches of the basin, where the habitat changes to the slower flow and is more prone to anthropogenic impacts. The upstream station (1) possessed the lowest species richness (22 species) compared to the highest species richness in the midstream (station 3; 37 species). Midstream station 3 was characterized by having slow flow, sandy mud bottom and large wide stretches. Station 4 had similar environmental characteristics as station 3, but only 26 species were collected there. This is probably a result of estuarine influences in the lower reaches of the river, where the salinity gradient may act as an environmental filter and limit the occurrence of some species that are less tolerant to salinity and other typical environmental characteristics of estuaries (Roberts 1989; Kottelat et al. 2013).

Several species considered endemic to Java, such as *Akysis variegatus, Clarias batrachus, Dermogenys pusilla, Glyptothorax platypogon, Hemibagrus nemurus,* and *Rasbora lateristriata* (Ng and Low 2019; Ng 2019a; Ng 2019b; Ng 2020; Lumbantobing 2021), were reported in this study. The ecology of these endemic fish should be prioritized, as they are at higher risk of extinction due to their restricted ranges. An example that demonstrates this urgency is the species *Chitala lopis* (Notopteridae) and *Lobocheilos lehat* (Cyprinidae) - both are considered to be extinct globally (Lumbantobing 2020; Ng 2020).

The occurrence of *Laides hexanema* (Ailiidae) (Figure 3) in the Brantas River is considered here as a new record. The closest record of this species was in the Citarum River, West Java. This species is similar to Pangasiidae but possesses a smaller and more compressed body, with larger eyes and a longer barble. This species was collected in stations 3 and 4. The bronze featherback *Notopterus notopterus* (Notopteridae) (Figure 4), a species fully protected species by the Indonesian Government, was found at stations 2, 3, and 4. The presence of this species in the three stations indicates that its population is still relatively stable. However, some species which were expected were not sampled in this study, such as *Cyclocheilos enoplos* (Cyprinidae), *Pangasius macronema* (Pangasiidae), *Homalopteroides wassinkii* (Balitoridae), *Lepidocephalichthys hasselti* (Cobitidae), and *Luciosoma setigerum* (Danionidae) (Bleeker 1862; Bleeker 1863). More extensive research is needed to confirm the existence of these species.

Data on habitat use, ecological interactions of fish occurring in the Brantas River, and fisheries pressure are needed urgently to make appropriate conservation decisions in line with sustainable resource management. This needs to occur at the basin level due to the connectivity and stress in the system. Therefore, we suggest that more collections need to be carried out in the Brantas river basin. Collection studies using eDNA analysis will improve sampling efficacy and research incorporating both morphological and molecular data will help to unravel taxonomical uncertainty in cryptic species.

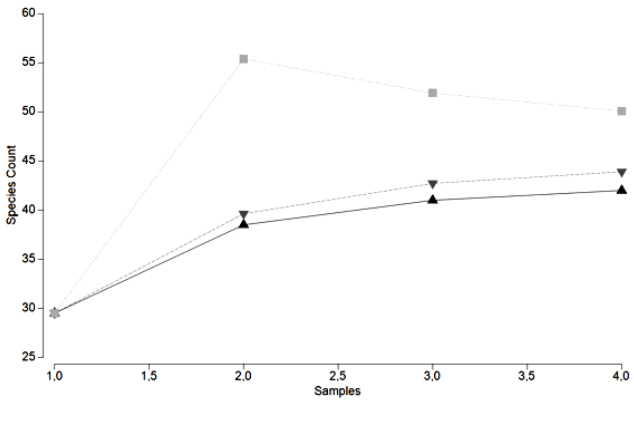

Figure 2. The curves from observed species values

Table 3. Fishes recorded by this work and their IUCN (International Union for Conservation of Nature) conservation status

Family	Genus	Species	IUCN Status (Last assessed)	Station 1	Station 2	Station 3	Station 4
Notopteridae	*Notopterus*	*Notopterus notopterus*	LC (2020)		X	X	X
Danionidae	*Rasbora*	*Rasbora argyrotaenia*	LC (2021)	X	X	X	
		Rasbora lateristriata	VU (2021)	X	X	X	
		Rasbora baliensis	LC (2021)	X	X		
Cyprinidae	*Barbichthys*	*Barbichthys laevis*	LC (2020)			X	X
	Labeo	*Labeo chrysophekadion*	LC (2020)		X	X	X
	Cyclocheilichthys	*Cyclocheilichthys apogon*	LC (2020)		X	X	
		Cyclocheilichthys armatus	LC (2019)		X	X	
	Labiobarbus	*Labiobarbus leptocheilus*	LC (2020)		X	X	
	Tor	*Tor tambra*	DD (2018)	X	X	X	
		Tor tambroides	DD (2018)	X	X	X	
	Neolissochilus	*Neolissochilus soro*	LC (2021)	X	X	X	
	Mystacoleucus	*Mystacoleucus obtusirostris*	LC (2012)	X	X	X	X
	Osteochilus	*Osteochilus vittatus*	LC (2020)	X	X	X	X
	Systomus	*Systomus rubripinnis*	DD (2019)	X	X	X	X
	Barbodes	*Barbodes binotatus*	LC (2019)	X	X	X	X
	Barbonymus	*Barbonymus gonionotus*	LC (2020)	X	X	X	X
		Barbonymus balleroides	LC (2020)	X	X	X	X
	Hampala	*Hampala macrolepidota*	LC (2020)	X	X	X	
Cobitididae	*Acantopsis*	*Acantopsis dialuzona*	LC (2020)	X			
Nemacheilidae	*Nemacheilus*	*Nemacheilus chrysolaimos*	LC (2019)	X			
Bagridae	*Mystus*	*Mystus singaringan*	LC (2019)		X	X	X
		Mystus nigriceps	LC (2019)			X	X
Clariidae	*Clarias*	*Clarias batrachus*	LC (2019)	X	X	X	X
Pangasiidae	*Pangasius*	*Pangasius djambal*	LC (2019)		X	X	X
	Pseudolais	*Pseudolais micronemus*	LC (2019)		X	X	X
Ailiidae	*Laides*	*Laides hexanema*	LC (2019)			X	X
Sisoridae	*Glyptothorax*	*Glyptothorax platypogon*	LC (2019)	X			
Akysidae	*Akysis*	*Akysis variegatus*	DD (2019)	X			
Siluridae	*Ompok*	*Ompok siluroides*	LC (2019)			X	X
Aplocheilidae	*Aplocheilus*	*Aplocheilus armatus*	LC (2018)		X	X	X
Zenarchopteridae	*Dermogenys*	*Dermogenys pusilla*	DD (2020)		X	X	X
Anabantidae	*Anabas*	*Anabas testudineus*	LC (2019)	X	X	X	X
Osphronemidae	*Trichopodus*	*Trichopodus trichopterus*	LC (2019)		X	X	X
	Osphronemus	*Osphronemus goramy*	LC (2019)		X	X	X
Channidae	*Channa*	*Channa striata*	LC (2019)		X	X	X
		Channa gachua	LC (2010)	X		X	
Eleotridae	*Oxyeleotris*	*Oxyeleotris marmorata*	LC (2019)		X	X	X
Gobiidae	*Glossogobius*	*Glossogobius aureus*	LC (2019)		X	X	X
Mastacembelidae	*Mastacembelus*	*Mastacembelus unicolor*	LC (2020)		X	X	X
	Macrognathus	*Macrognathus aculeatus*	LC (2019)	X	X	X	
Synbranchidae	*Monopterus*	*Monopterus albus*	LC (2020)	X	X	X	X

Figure 3. *Laides hexanema.* First record for Brantas River, East Java, Indonesia (Stations 3 and 4)

Figure 4. *Notopterus notopterus*. A protected species from Brantas River, East Java, Indonesia (Stations 2, 3, and 4)

Figure 5. Mahseers (*Neolissochilus* and *Tor*) schooling in the spring of Brantas River, East Java, Indonesia (station 1)

Conservation status

According to the IUCN Red List, most fish species inhabiting the Brantas River have a conservation status of Least Concern (LC) or Data Deficient (DD), except for *Rasbora lateristriata* (Danionidae), which is categorized as Vulnerable (VU) (Table 2). The bronze featherback *Notopterus notopterus* (Notopteridae) (Figure 2) is fully protected by the Indonesian Government (Ministry of Maritime Affairs and Fisheries 2021), even though this species is the main raw material for popular traditional foods in Indonesia. We suggest that an urgent inland fisheries assessment is used to determine the population sustainability of *N. notopterus* in Java.

Mahseer fish (genera *Tor* and *Neolissochilus*) are rarely found in Javanese waters. Therefore, we suggest that the conservation status of these species should be reviewed since they are categorized as Least Concern (LC) or Data Deficient (DD). These fish are very vulnerable to anthropogenic change as they require good water quality and integrity of environmental flow, while Java is an island with a high level of environmental damage (Muchlisin et al. 2015). *Tor* and *Neolissochilus* are protected by some communities as part of local wisdom due to the species consistently habituating springs (Figure 5).

Among other large islands of Indonesia, such as Sumatra, Borneo, Sulawesi, and Papua, due to the high population density, Javanese water bodies are the most affected by pollution. Further, changes in river function and connectivity resulting from the construction of dams without fishways, illegal mining, industrialization, and deforestation all negatively impact water quality and community assemblage (Garcia et al. 2019; Islamy and Hasan 2020; Pardemean et al. 2021; Setyaningrum et al. 2022). Freshwater fishes are some of the most vulnerable to biodiversity loss on a global scale, as freshwater aquatic environments have restricted dispersal potential (Comte and Olden 2017; Sayer et al. 2018; Albert et al. 2021).

This system is data-poor in recent information on species assemblages, ecological function, and socio-economic relevance, however, there is a high potential that any change may result in the loss of keystone species and bioindicator species. Maintaining relevant wet collections of these species is essential to understanding the historical and contemporary ecological role of fish assemblages in the Brantas River. Thus, it is recommended that further investigation and taxonomical collections are made before rapid environmental change drives more extinction events.

East Java is also the center of aquaculture and aquarium trade in Indonesia, there is a high likelihood of the introduction of non-native species through this pathway (Fadjar et al. 2019; Hasan et al. 2020a, 2020b). Non-native species introductions as a result of the aquarium trade have occurred exponentially in the last five decades, causing disruption to the native species communities across the trophic network (Ohee et al. 2018; Hasan et al. 2020c; Insani et al. 2020). Non-native species cause a negative ecological impact on native species directly through predation and indirectly through competition for resources and niches (Hasan and Tamam 2019; Hasan et al. 2019a; Hasan et al. 2019b; Olden et al. 2022). The Brantas River basin has multiple obstructions in the form of several large dams without fishways which prevent migratory species from carrying out seasonal and reproductive migrations (Anna et al. 2017; Anna et al. 2018). A similar case of dam construction also occurred in the Mekong River, which crosses Indochina, causing the loss of endangered species, such as the giant Mekong catfish *Pangasianodon gigas* (Pangasiidae) and the giant freshwater whipray *Urogymnus polylepis* (Dasyatidae) (Hogan 2011; Grant et al. 2021). Therefore, the existence of a fish sanctuary as part of in-situ conservation is very important in maintaining the existence of the native fish of the Brantas River. In addition, ex-situ conservation through domestication programs is also important to increase fish population stocks through careful restocking processes (Ohee 2016; Gumiri et al. 2018; Hasan et al. 2019c; Hasan et al 2019c; Hasan et al. 2021). Finally, developing an inland fisheries assessment process for food fisheries as well as the aquarium trade to monitor the status and exploitation rates of ecologically and socio-economically important species across Indonesia is recommended to support the sustainable development goals of Life Under Water and No Hunger (Hasan and Widodo 2020; Lynch et al. 2020; Saptadjaja et al. 2020; Hasan and Islam 2021; Hasan et al. 2021c; Hasan et al. 2021d).

Water parameters

The water parameters varied between the stations (Table 2). In general, the water parameters in all Brantas River stations are in the range of fish habitat quality standards (Boyd 2000). Therefore, these stations possess reasonable water quality suitable for fish. However, given the high rates of specialization in freshwater fishes, any environmental change will likely exert some environmental filtering on the assemblage, which may have varied implications for the ecological functioning of the system. Further research is needed on water quality using more specific parameters such as total dissolved solids and chemical and heavy metal pollution.

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REFERENCES

Abdulmalik-Labe OP, Quilang JP. 2019. Genetic diversity among the endemic barb *Barbodes tumba* (Teleostei: Cyprinidae) populations from Mindanao, Philippines. J Threat Taxa 11 (7): 13822-13832. DOI: 10.11609/jott.4851.11.7.13822-13832.

Albert JS, Destouni G, Duke-Sylvester SM, Magurran AE, Oberdorff T, Reis RE, Winemiller KO, Ripple WJ. 2021. Scientists' warning to humanity on the freshwater biodiversity crisis. Ambio 50: 85-94. DOI: 10.1007/s13280-020-01318-8.

Anna Z, Handaka AA, Maulina I, Rizal A, Hindayani P. 2017. Biological parameters of fish stock estimation in Cirata Reservoir (West Java, Indonesia): A comparative analysis of bio-economic models. Biodiversitas 18: 1468-1474. DOI: 10.13057/biodiv/d180423.

Anna Z. 2018. An analysis of capture fisheries resource depletion in Cirata Reservoir, West Java, Indonesia. Biodiversitas 19: 927-935. DOI: 10.13057/biodiv/d190323.

Arsad S, Putra KT, Latifah N, Kadim MK, Musa M. 2021. Epiphytic microalgae community as aquatic bioindicator in Brantas River, East Java, Indonesia. Biodiversitas 22: 2961-2971. DOI: 10.13057/biodiv/d220749.

Bandjolu KP, Madiyono E, Herjayanto M, Gani A, Nur M, Laheng S, Gundo MT. 2021. Checklist of endemic (Adrianichthyidae, Gobiidae, Zenarchopteridae) and introduced fish in Lake Poso, Sulawesi, Indonesia. IOP Conf Ser: Earth Environ Sci 869: 012060. DOI: 10.1088/1755-1315/869/1/012060.

Bleeker P. 1862. Atlas Ichthyologique des Indes Orientales Neerlandaises. Tome II. Siluroides, Chacoides et Heterobranchoides. Frederic Muller, Amsterdam.

Bleeker P. 1863. Atlas Ichthyologique des Indes Orientales Neerlandaises. Tome III. Cyprins. Frederic Muller, Amsterdam.

Clarke K, Gorley R. 2015. PRIMER v7: User Manual/Tutorial. Primere Ltd, United Kingdom.

Comte L, Olden J. 2017. Climatic vulnerability of the world's freshwater and marine fishes. Nat Clim Change 7: 718-722. DOI: 10.1038/nclimate3382.

Efizon D, Batubara AS, Muchlisin ZA, Elvyra R, Rizal S, Siti-azizah MM. 2021. Reproductive aspects of naleh fish (*Barbonymus* sp.): A native species from Nagan River, Aceh Province, Indonesia. Biodiversitas 22: 2682-2690. DOI: 10.13057/biodiv/d220528.

Fadjar M, Islamy RA, Herawati EY. 2019. Short communication: First record of *Arapaima gigas* (Schinz, 1822) (Teleostei: Osteoglossomorpha), in the Brantas River, Sidoarjo, East Java, Indonesia. Biodiversitas 20: 3527-3531. DOI: 10.13057/biodiv/d201209.

Freyhof J, Kottelat M. 2008. *Coregonus hiemalis*. The IUCN Red List of Threatened Species 2008: e.T135671A4175929. DOI: 10.2305/IUCN.UK.2008.RLTS.T135671A4175929.en.

Fricke R, Eschmeyer WN, Fong JD. 2022a. Eschmeyer's Catalog of Fishes: Genera/Species By Family/Subfamily. http://researcharchive.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp.

Fricke R, Eschmeyer WN, Van der Laan R. 2022b. ESCHMEYER'S Catalog of Fishes: Genera, Species, References. http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp.

Gani A, Nurjirana, Bakri AA, Adriany DT, Wuniarto E, Khartiono LD, Satria DH, Hasan V, Herjayanto M, Burhanuddin AI, Moore AM, Kobayashi H. 2021. First record of *Stiphodon annieae* Keith & Hadiaty, 2014 (Teleostei, Oxudercidae) from Sulawesi Island, Indonesia. Check List 17 (1) 261-267. DOI: 10.15560/17.1.261.

Garcia DAZ, Vidotto-Magnoni AP, Costa ADA, Casimiro ACR, Jarduli LR, Ferraz JD, De Almeida FS, Orsi ML. 2019. Importance of the Congonhas River for the conservation of the fish fauna of the Upper Paraná basin, Brazil. Biodiversitas 20: 474-481 DOI: 10.13057/biodiv/d200225.

Grant I, Rigby CL, Bin Ali A, Fahmi, Haque AB, Hasan V, Sayer C. 2021. *Urogymnus polylepis*. The IUCN Red List of Threatened Species 2021: e.T195320A104294071. DOI: 10.2305/IUCN.UK.2021-2.RLTS.T195320A104294071.en.

Gumiri S, Ardianor, Syahrinudin, Anshari GZ, Komai Y, Taki K, Tachibana H. 2018. Seasonal yield and composition of an inland artisanal fishery in a humic floodplain ecosystem of Central Kalimantan, Indonesia. Biodiversitas 19: 1181-1185. DOI: 10.13057/biodiv/d190401.

Hasan V, Faqih AR, Maftuch M. 2020b. The range expansion of *Parachromis managuensis* (Günther, 1867) (Perciformes, Cichlidae) in Java, Indonesia. Biotropia 29: 90-94. DOI: 10.11598/btb.2022.29.1.1278.

Hasan V, Gausmann P, Ottoni FP. 2021b. First scientific observation of the threatened speartooth shark *Glyphis glyphis* (Müller & Henle, 1839) (Carcharhiniformes: Carcharhinidae) in Indonesia. Cybium 45 (4): 321-324. DOI: 10.26028/cybium/2021-454-010.

Hasan V, Samitra D, Widodo MS, Islam I, Ottoni FP. 2021d. An update checklist of vulnerable freshwater fish *Rasbora Baliensis* (Hubbs & Brittan 1954) (Cypriniformes: Cyprinidae) in Indonesia. Malays J Sci 40 (3): 107-113. DOI: 10.22452/mjs.vol40no3.8.

Hasan V, Soemarno S, Widodo MS, Wiadnya DGR. 2021a. Beardless *Barb Cyclocheilichthys apogon* (Valenciennes, 1842) (Cypriniformes: Cyprinidae) in Madura Island, Indonesia. Biotropia 28 (3): 274-277. DOI: 10.11598/btb.2021.28.3.1276.

Hasan V, South J, Katz AM, Ottoni FP. 2022. First record of the Small-eyed loter *Prionobutis microps* (Weber, 1907) (Teleostei: Eleotridae: Butinae) in Java, Indonesia. Cybium 46 (1): 49-51. DOI: 10.26028/cybium/2022-461-008.

Hasan V, Vieira L, de O, Ottoni FP, Masithah ED. 2021b. Two new localities for *Lobocheilos falcifer* (Valenciennes, 1842) (Teleostei: Cyprinidae), a rare and vulnerable freshwater fish species of Java, Indonesia. Intl J Aquat Biol 9 (4): 244-247. DOI: 10.22034/ijabv9i4.1285.

Hasan V, Tamam MB. 2019. First record of the invasive Nile Tilapia, *Oreochromis niloticus* (Linnaeus, 1758) (Perciformes, Cichlidae), on Bawean Island, Indonesia. Check List 15 (1): 225-227. DOI: 10.15560/15.1.225.

Hasan V, Valen FS, Islamy RA, Widodo MS, Saptadjaja AM, Islam I. 2021. Short communication: Presence of the vulnerable freshwater goby *Sicyopus auxilimentus* (Gobiidae, Sicydiinae) on Sangihe Island, Indonesia. Biodiversitas 22: 571-579. DOI: 10.13057/biodiv/d220208.

Hasan V, Pratama F, Malonga WAM, Cahyanurani AB. 2019a. First record of the Mozambique Tilapia *Oreochromis mossambicus* Peters, 1852 (Perciformes: Cichlidae) on Kangean Island, Indonesia. Neotrop Biol Conserv 14 (2): 207-211. DOI: 10.3897/neotropical14.e35601.

Hasan V, Mukti AT, Putranto TWC. 2019b. Range expansion of the invasive nile tilapia *Oreochromis niloticus* (Perciformes: Cichlidae) in Java Sea and first record for Kangean Island, Madura, East Java, Indonesia. Ecol Environ Conserv 25: S187-S189.

Hasan V, Widodo MS. 2020. Short communication: The presence of bull shark *Carcharhinus leucas* (Elasmobranchii: Carcharhinidae) in the fresh waters of Sumatra, Indonesia. Biodiversitas 21 (9): 4433-4439. DOI: 10.13057/biodiv/d210962.

Hasan V, Islam I. 2020. First inland record of bull shark *Carcharhinus leucas* (Müller & Henle, 1839) (Carcharhiniformes: Carcharhinidae) in Celebes, Indonesia. Ecologica Montenegrina 38: 12-17. DOI: 10.37828/em.2020.38.3.

Hasan V, Widodo MS, Faqih AR, Mahasri G, Arief M, Valen FS, Tamam MB, Yonarta D, Pratama FS, Fitriadi R. 2020c. Presence of striped flying barb *Esomus metallicus* (Teleostei, Cyprinidae) from West Sumatra, Indonesia. Ecol Environ Conserv 26: S73-S75.

Hasan V, Widodo MS, Islamy RA, Pebriani DAA. 2020a. New records of alligator gar, *Atractosteus spatula* (Actinopterygii: Lepisosteiformes: Lepisosteidae) from Bali and Java, Indonesia. Acta Ichthyologica et Piscatoria 50: 233-236. DOI: 10.3750/AIEP/02954.

Hasan V, Samitra D, Widodo MS, Gausmann P. 2021c. A new inland record of the Bull Shark *Carcharhinus leucas* (Müller & Henle 1839) from Peninsular Malaysia. Sains Malays 50 (10): 3153-3158. DOI: 10.17576/jsm-2021-5010-26.

Hasan V, Soemarno, Widodo MS, Wiadnya DGR, Mukti AT,Irawan B. 2019c. Distribution extension and first record of *Lobocheilos falcifer* (Cypriniformes, Cyprinidae) in Central Java Province, Indonesia. Ecol Environ Conserv 25: S158-S161.
Hasan V, Soemarno, Widodo MS, Wiadnya DGR. 2019d. *Lobocheilos falcifer* (Valenciennes, 1842) (Cypriniformes, Cyprinidae): distribution extension in Java and first record from Tuntang river, Semarang Regency, Indonesia. Ecol Environ Conserv 25 (4): 1713-1715.
Hasan V, Gausmann P, Nafisyah AL, Isroni W, Widodo MS, Islam I, Chaidir RRA. 2021. First record of Longnose marbled whipray *Fluvitrygon oxyrhyncha* (Sauvage, 1878) (Myliobatiformes: Dasyatidae) in Malaysian waters. Ecologica Montenegrina 40: 75-79 DOI: 10.37828/em.2021.40.6.
Hertika AMS, Supriatna, Darmawan A, Nugroho BA, Handoko AD, Qurniawatri AY, Prasetyawati RA. 2021. The hematological profile of Badher fish (*Barbonymus altus*) to evaluatewater quality in the Badher Bank Conservation Area, Tawangrejo Village, Blitar District, East Java, Indonesia. Biodiversitas 22: 2532-2541. DOI: 10.13057/biodiv/d220510.
Hogan Z. 2011. *Pangasianodon gigas*. The IUCN Red List of Threatened Species 2011: e.T15944A5324699. DOI: 10.2305/IUCN.UK.2011-1.RLTS.T15944A5324699.en.
Hubert N, Lumbantobing DN, Sholihah A, Dahruddin H, Delrieu-Trottin E, Busson F, Sauri S, Hadiaty RK, Keith P. 2019. Revisiting species boundaries and distribution ranges of *Nemacheilus* spp. (Cypriniformes: Nemacheilidae) and *Rasbora* spp. (Cypriniformes: Cyprinidae) in Java, Bali and Lombok through DNA barcodes: implications for conservation ina biodiversity hotspot. Conserv Genet 20: 517-529. DOI: 10.1007/s10592-019-01152-w.
Indonesian Ministry of Maritime Affairs and Fisheries. 2021. Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 1 of 2021 Concerning Protected Types of Fish. Ministry of Maritime Affairs and Fisheries, Jakarta.
Insani L, Hasan V, Valen FS, Pratama FS, Widodo MS, Faqih AR, Islamy RA, Mukti AT, Isroni W. 2020. Presence of the invasive nile tilapia *Oreochromis niloticus* Linnaeus, 1758 (Perciformes, Cichlidae) in the Yamdena Island, Indonesia. Ecol Environ Conserv 26 (3): 1115-1118.
Ismail SN, Hamid MA, Mansor M. 2018. Ecological correlation between aquatic vegetation and freshwater fish populations in Perak River, Malaysia. Biodiversitas 19: 279-284. DOI: 10.13057/biodiv/d190138.
Islamy RA, Hasan V. 2020. Checklist of mangrove snails (Mollusca: Gastropoda) in South coast of Pamekasan, MaduraIsland, East Java, Indonesia. Biodiversitas 21 (7): 3127-3134. DOI: 10.13057/biodiv/d210733.
Kottelat M, Tan HH. 2008. A synopsis of the genus *Lobocheilos* in Java, Sumatra and Borneo, with descriptions of six new species (Teleostei: Cyprinidae). Ichthyol Explor Freshw 19: 27-58.
Kottelat M, Whitten AJ, Kartikasari SN, Wirjoatmodjo S. 1993. Freshwater Fishes of Western Indonesia and Sulawesi. Periplus Editions, Hong Kong.
Kottelat M. 2013. The fishes of the inland waters of Southeast Asia: A catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. Raffles Bull Zool Suppl (27): 1-663.
Lumbantobing D. 2021. *Rasbora lateristriata*. The IUCN Red List of Threatened Species 2021: e.T91073440A162164796. DOI: 10.2305/IUCN.UK.2021-2.RLTS.T91073440A162164796.en.
Lynch AJ, Elliott V, Phang SC, Claussen JE, Harrison I, Murchie KJ, Steel AE, Stokes GL. 2020. Inland fish and fisheries integral to achieving the sustainable development goals. Nat Sustain 3: 579-587. DOI: 10.1038/s41893-020-0517-6.
Muchlisin ZA, Batubara AS, Siti-Azizah MN, Adlim M, Hendri A, Fadli N, Muhammadar AA, Sugianto S. 2015. Feeding habit and length weight relationship of keureling fish, *Tor tambra* Valenciennes, 1842 (Cyprinidae) from the western region of Aceh Province, Indonesia. Biodiversitas 16: 89-94. DOI: 10.13057/biodiv/d160112.
Ndobe S, Gani A, Bakri AA, Andriyani DT, Wuniarto E, Khartiono LD, Herjayanto M, Hasan V, Moore AM. 2022. First and recurrent records of *Stiphodon surrufus* Watson & Kottelat, 1995 (Gobiiformes, Gobiidae, Sicydiinae), a naturally rare amphidromous goby, in Sulawesi, Indonesia. Check List 18 (2): 253-260. DOI: 10.15560/18.2.253.
Ng HH, Low BW. 2019. *Clarias batrachus*. The IUCN Red List of Threatened Species 2019: e.T166613A1138872. DOI: 10.2305/IUCN.UK.2019-2.RLTS.T166613A1138872.en.
Ng HH. 2019a. *Glyptothorax platypogon*. The IUCN Red List of Threatened Species 2019: e.T91214589A91214643. DOI: 10.2305/IUCN.UK.2019-3.RLTS.T91214589A91214643.en.
Ng HH. 2019b. *Akysis variegatus*. The IUCN Red List of Threatened Species 2019: e.T91215838A91215844. DOI: 10.2305/IUCN.UK.2019-3.RLTS.T91215838A91215844.en.
Ng HH. 2020. *Chitala lopis*. The IUCN Red List of Threatened Species 2020: e.T157719927A89815479. DOI: 10.2305/IUCN.UK.2020-1.RLTS.T157719927A89815479.en. Accessed on 18 September 2022.
Ng HH. 2020. *Hemibagrus nemurus*. The IUCN Red List of Threatened Species 2020: e.T180954A91179822. DOI: 10.2305/IUCN.UK.2020-1.RLTS.T180954A91179822.en.
Nurhayati PA, Affandi M, Nurinsiyah AS. 2021. Diversity and abundance of terrestrial Gastropods on the slopes of Mount Arjuna-Welirang, East Java, Indonesia. Biodiversitas 22: 4193-4202. DOI: 10.13057/biodiv/d221009.
Nurjirana, Burhanuddin AI, Keith P, Moore AM, Afrisal M, Gani A, Hasan V, Wuniarto E, Bakri AA, Adriany DT. 2022. Additional records of *Sicyopus discordipinnis* (Watson, 1995) (Oxudercidae: Sicydiinae) in Central Sulawesi, Indonesia. Cybium 46b (1): 41-43. DOI: 10.26028/cybium/2022-461-006.
Ohee HL, Sujarta P, Br Surbakti S, Barclay H. 2018. Rapid expansion and biodiversity impacts of the red devil cichlid (*Amphilophus labiatus*, Günther 1864) in Lake Sentani, Papua, Indonesia. Biodiversitas 19: 2096-2103. DOI: 10.13057/biodiv/d190615.
Ohee HL. 2016. Freshwater fish diversity in an oil palm concession area in Mimika, Papua. Biodiversitas 17: 665-672. DOI: 10.13057/biodiv/d170240.
Olden J, Chen K, García-Berthou E, King AJ, South J, Vitule JRS. 2022. Invasive species in streams and rivers. In: Tockner K, Mehner T (eds). Reference Module in Earth Systems and Environmental Sciences. Elsevier, Netherlands.
Pardamean MA, Islamy RA, Hasan V, Herawati EY, Mutmainnah N. 2021. Identification and physiological characteristics of potential indigenous bacteria as bioremediation agent in the wastewater of sugar factory. Sains Malays 50 (2): 279-286. DOI: 10.17576/jsm-2021-5002-0.
Pathak AK, Sarkar UK, Singh SP. 2014. Spatial gradients in freshwater fish diversity, abundance and current pattern in the Himalayan region of Upper Ganges Basin, India. Biodiversitas 15: 186-194. DOI: 10.13057/biodiv/d150210.
Pratama WW, Nursyam H, Hariati AM, Islamy RA, Hasan V. 2020. Short communication: Proximate analysis, amino acid profile and albumin concentration of various weights of Giant Snakehead (*Channa micropeltes*) from Kapuas Hulu, West Kalimantan, Indonesia. Biodiversitas 21: 1196-1200. DOI: 10.13057/biodiv/d210346.
Rainboth WJ. 1996. FAO Species Identification Field guide for Fishery Purposes. Fishes of the Cambodian Mekong. MRC, Bangkok and FAO, Rome.
Roberts TR. 1993. The freshwater fishes of Java, as observed by Kuhl and van Hasselt in 1820-23. Zoologische Verhandelingen 285: 1-94.
Roesma DI, Tjong DH, Munir W, Agesi AV, Chornelia A. 2017. Genetic diversity of *Tor douronensis* (Pisces: Cyprinidae) in West Sumatra, Indonesia. Biodiversitas 18: 1018-1025. DOI: 10.13057/biodiv/d180320.
Rohman F, Priambodo B, Akhsani F, Rahayu SE, Wangkulangkul S, Kundariati M. 2022. Revealing herpetofauna diversity Brantas River, East Java, Indonesia: Evidence of decreasing populations. Biodiversitas 23: 1475-1481. DOI: 10.13057/biodiv/d230335.
Roth BM, Mandrak NE, Hrabik TR, Sass GG, Peters J. 2012. Fishes and decapod crustaceans of the Great Lakes basin In: Taylor WW, Ferreri CP (eds). Great Lakes Policy and Management, 2nd Edition. Michigan State University Press, United States.
Saptadjaja AM, Hasan V, Arief M, Isroni W, Rozi. 2020. First record of threatened Asian Catfish, *Clarias batrachus* (Linnaeus, 1758) (Siluriformes, Clariidae) from Kangean Island, Indonesia. Ecol Environ Conserv 26 (3): 1055-1058.
Sayer CA, Máiz-Tomé L, Darwall WRT. 2018. Freshwater biodiversity in the Lake Victoria Basin: Guidance for species conservation, site protection, climate resilience and sustainable livelihoods. IUCN, Cambridge, UK and Gland, Switzerland.
Setyaningrum N, Lestari W, Krismono, Nuryanto A. 2022. Exploitation of striped snake head (*Channa striata*) in Sempor Reservoir, Central Java, Indonesia: A proposed conservation strategy. Biodiversitas 23: 3584-3592. DOI: 10.13057/biodiv/d230735.

Tan HH, Kottelat M. 2009. The fishes of the Batang Hari drainage, Sumatra, with description of six new species. Ichthyol Explor Freshw 20 (1): 13-69.

Triyanto, Haryani GS, Lukman, Wibowo H, Ali F, Hidayat. 2021. Perspective plan for sustainable eel management in Lake Poso, Central Sulawesi. E3S Web Conf 322: 05014. DOI: 10.1051/e3sconf/202132205014.

Valen FS, Hasan V, Ottoni FP, Nafisyah AL, Erwinda M, Annisa AN, Adis MA. 2022a. First country record of the bearded gudgeon *Pogoneleotris heterolepis* (Günther, 1869) (Teleostei: Eleotridae) from Indonesia. IOP Conf Ser: Earth Environ Sci 1036 (1): 012074. DOI: 10.1088/1755-1315/1036/1/012074.

Valen FS, Hasan V, Ottoni FP, Nafisyah AL, Erwinda M, Annisa AN. 2020c. Description of silver barb *Barbonymus gonionotus* (Bleeker, 1849) (Cypriniformes: Cyprinidae) from Madura Island, Indonesia. IOP Conf Ser: Earth Environ Sci 1036 (1): 012066. DOI: 10.1088/1755-1315/1036/1/012066.

Valen FS, Soemarno, Widodo MS, Wiadnya DGR. 2020. Contemporary distribution records of yellow finned Barb *Mystacoleucus marginatus* (Valenciennes, 1842) in Brantas Basin, Indonesia. Ecol Environ Conserv 26: S40-S43.

Valen FS, Widodo MS, Islamy RA, Wicaksono KP, Insani L, Hasan V. 2022b. Molecular phylogenetic of Silver Barb *Barbonymus gonionotus* (bleeker, 1849) (Cypriniformes: Cyprinidae) in Java, Indonesia. IOP Conf Ser: Earth Environ Sci 1036 (1): 012011. DOI: 10.1088/1755-1315/1036/1/012011.

Widodo MS, Hasan V, Mukti AT, Kusuma B. 2020. Distribution of dwarf snakehead *Channa gachua* Hamilton, 1822 (Teleostei, Channidae) on Brantas River Basin, Indonesia. Ecol Environ Conserv 26 (2): 618-621.