

Pelagic Small Fishes in Peat Swamp of Jeruju River, South Sumatra, Indonesia

¹Arum Setiawan, ²Muhammad Iqbal, ³Rhamdhon Dorojatun Tanjung, ⁴Guntur Pragustiandi, Sarno, ⁴Pormansyah, ⁴Rio Firman Saputra and ¹Indra Yustian

¹ Department of Biology, Faculty of Science, Sriwijaya University, Jalan Raya Palembang-Prabumulih km 32, Indralaya, Sumatera Selatan 30662, Indonesia

² Biology Program, Faculty of Science, Sriwijaya University, Jalan Padang Selasa 524, Palembang, Sumatera Selatan 30139, Indonesia

³ Graduate Program of Tropical Biodiversity Conservation, Faculty of Forestry and Environment, IPB University, Jl. Lingkar Akademik Kampus IPB Dramaga, Bogor 16680, West Java, Indonesia

⁴ Conservation Biology Program, Faculty of Science, Sriwijaya University, Jalan Padang Selasa 524, Palembang, Sumatera Selatan 30139, Indonesia

(Received 1 June, 2021; accepted 30 June, 2021)

ABSTRACT

Jeruju River in Sumatra of Indonesia is one important remaining peat swamp area in South Sumatra Province. A study to looking at fish diversity and abundance of pelagic small fishes in Jeruju River was conducted on 28 to 30 August 2020. There are six species of pelagic small fishes recorded caught using hand lift net 1x1 m², including *Brevibora cheeya*, *Desmopuntius gemellus*, *Oxygaster anomalura*, *Pectenocypris micromysticetus*, *Rasbora einthovenii* and *Trigonopoma* sp. The species range from 19-45 mm in total length. *Pectenocypris micromysticetus* is most abundance fish species (up to 80%), following *Brevibora cheeya* (17%), *Desmopuntius gemellus* (0,32%), *Oxygaster anomalura* (0,63%), *Rasbora einthovenii* (0,40%) and *Trigonopoma* sp (0,24%).

Key words: Cyprinidae, Freshwater, Peat swamp, Sumatra, Indonesia

Introduction

Wetlands are transitional between aquatic and terrestrial ecosystems when the water level is regularly near the surface or the land is covered by shallow water (Kanaujia and Kumar, 2014). Wetlands in which considerable amounts of water are retained by an accumulation of partially decayed organic matter are peat swamps (Smith, 1996). Tropical peat swamps have been known to contribute ecosystem's significance as a global carbon store, but its biodiversity information remains poorly understood (Posa *et al.*, 2011).

The peat swamp in Indonesia and Southeast Asia

are often recognized as having unique biodiversity, while these nutrient-poor wetlands are indeed unique and include a distinct fauna (particularly fish) (Giesen *et al.*, 2018). The fish fauna and environmental information are needed for the assessment of fish biodiversity and population, because many local people depend on fishing for their livelihoods (Thornton *et al.*, 2018). This ecosystem supports many endemic freshwater fish species, but if current rates of conversion to a predominantly agricultural mosaic landscape continue through 2050, 16 fish species may become globally extinct (Giam *et al.*, 2012).

In Indonesia, more than half of peat swamps in

South Sumatra Province have been reduced to landscapes covered by shrubs, secondary growth and ferns, thereby, this province alone constitutes 65% of the whole extent of the lang coper types in Sumatra (Miettinen and Liew, 2010). Jeruju River in South Sumatra Province is one peat swamp where local communities depend on fishery resources and seasonal rice field production (Japan International Cooperation Agency, 2017). In this paper, we report fish diversity and abundance of pelagic small fishes in the peat swamp of the Jeruju River, to give evidence of how important peat swamps for certain freshwater fish species and populations.

Materials and Methods

This study was conducted at Jeruju River (03°33'12"S, 105°37'06"E). Jeruju River is administratively located at Jeruju Village, Cengal Subdistrict, Ogan Komering Ilir District, South Sumatra Province (Figure 1). The Jeruju village is located at the edge of the Jeruju River, and c. 15 km inland (Figure 2). The habitat is a peat swamp area, with 4 pH. We visit Jeruju Village on 28-30 August 2020, coincidentally during the dry season in Sumatra. This area can be accessed by car from Palembang (the capital city of South Sumatra Province) or Kayu Agung (the capital city of Ogan Komering Ilir). The Jeruju Village is one village facilitated by Peat Restoration Agency or Badan Restorasi Gambut, for a community development program to improve local people livelihoods (Badan Restorasi Gambut 2018). As a peat swamp area, vegetation in this area is dominated by *Meulaleuca* sp, *Hymenachine amplexicaulis*



Fig. 2. Jeruju River with vegetation and house of local people on 30 August 2020.

and *Pandanus* sp.

To looking at fish diversity and the abundance of pelagic small fishes in Jeruju River, We caught fish using a hand lift net 1x1 m², traditional fishing gear locally called "tangkul". The fishes were caught in ten times repetition on every one minute in a station. The fishes are identified with western Indonesia and South Sumatran freshwater fish guides (Kottelat *et al.*, 1993; Iqbal, 2011; Iqbal *et al.*, 2018; Iqbal *et al.*, 2020). The number of species, range of total length and number of individuals collected of each species are presented in Table 1.

Results

There are six species of small fishes range from 19 to

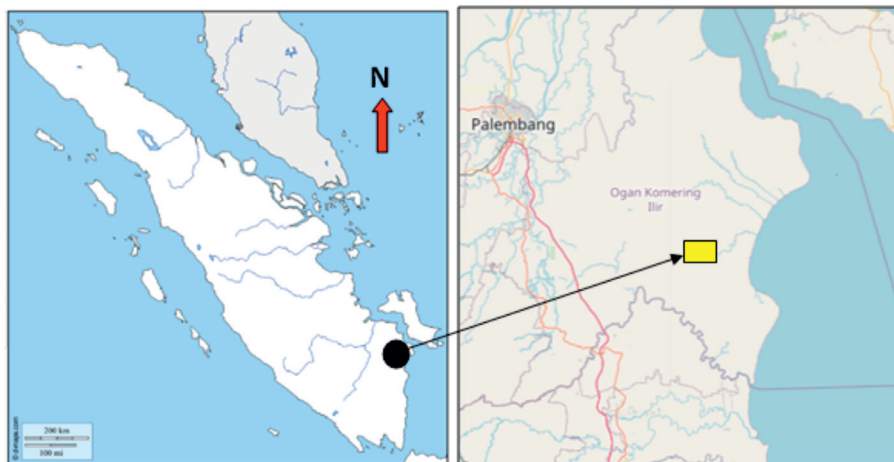


Fig. 1. The location of Jeruju River, South Sumatra, Indonesia. Yellow square show location where sample collected by researchers.

Table 1. Checklist and number of small pelagic fishes in Jeruju River caught by using handlift net (1x1 m²).

No.	Fish Species	Total Length (mm)	Caught Repeation Using Hand Lift Net										Total
			1	2	3	4	5	6	7	8	9	10	
1	<i>Brevibora cheeya</i>	23-33	36	30	40	50	132	33	23	59	16	33	452
2	<i>Desmopuntius gemellus</i>	37-45	0	2	2	1	0	0	1	1	1	0	8
3	<i>Oxygaster anomalura</i>	33-42	0	5	2	4	0	2	0	3	0	0	16
4	<i>Pectenocypris micromysticetus</i>	19-32	438	371	224	41	188	164	219	274	47	105	2071
5	<i>Rasbora einthovenii</i>	27-30	0	0	0	0	8	0	2	0	0	0	10
6	<i>Trigonopoma sp</i>	22-28	0	0	0	0	4	1	1	0	0	0	6
	Total		474	408	268	96	332	200	246	337	64	138	2563

45 mm caught using hand lift net, *Brevibora cheeya*, *Desmopuntius gemellus*, *Oxygaster anomalura*, *Pectenocypris micromysticetus*, *Rasbora einthovenii* and *Trigonopoma sp* (Figure 3). A total of 2.563 individuals of small fishes caught using hand lift net 1x1 m² in Jeruju River indicate small fishes in this area are very abundant. Based on the number of small fishes

caught, *Pectenocypris micromysticetus* is one most abundant fish species (up to 80%), following *Brevibora cheeya* (17%), *Desmopuntius gemellus* (0.32%), *Oxygaster anomalura* (0.63%), *Rasbora einthovenii* (0.40%) and *Trigonopoma sp* (0.24%).

Discussion

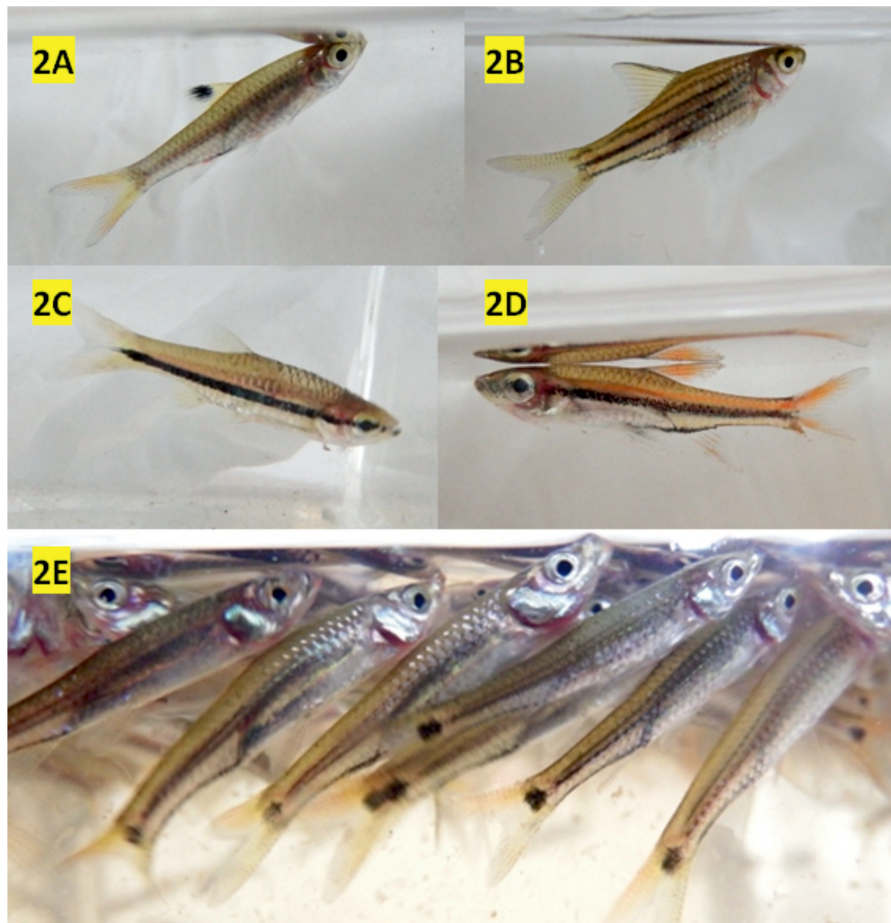


Fig. 3. Small fishes found during visit to Jeruju Village, Sumatra, Indonesia. (A) *Brevibora cheeya*; (B) *Desmopuntius gemellus*; (C) *Rasbora einthovenii*; (D) *Trigonopoma sp*; (E) *Pectenocypris micromysticetus* (All photos taken by Muhammad Iqbal).

Six species of small pelagic fishes were recorded at the peat swamp of Jeruju River. The number of fish diversity in a peat swamp in Indonesia and South-east Asia is around 41 to 73 species (Iqbal and Setijono, 2011; Ismail *et al.*, 2015; Muchlisin *et al.*, 2017; Thornton *et al.*, 2018). Although few studies of fish diversity in peat swamp areas have been reported, the study on small pelagic fishes in peat swamp is still little known. Pelagic fishes are fishes that associate exclusively with the open water on the upper section of the water (Cushing *et al.*, 2019). Pelagic fishes are most harvested fishes for human consumption encompass a diverse variety of animals, and they range from small, densely schooling, to large, top-level carnivores (Tyedmers, 2004). Small pelagic fishes offer large and underrecognized opportunities to boost food and nutrients security, generally processed, sold and eaten whole (Kolding *et al.*, 2019). In Indonesia, small pelagic fishes are sources of food, the most widely consumed by people, given the existence, of a fairly abundant species, and are found in almost entire territorial waters of this country (Anna, 2018).

All of the small pelagic fishes caught in the Jeruju River are members of the family Cyprinidae. Cyprinidae is the largest group of freshwater fishes worldwide (Winfield and Nelson, 1991), and also in the peat swamp areas of Indonesia, eg. Rawa Tripa and Merang Kepayang (Iqbal, 2011; Muchlisin *et al.*, 2017). The finding of Cyprinidae as a single dominated group of small pelagic fishes suggests the importance of Cyprinidae as aquatic fauna in the peat swamp of Jeruju River. Visit Jeruju River is a coincidence during the dry season in Sumatra. In the flood plain of Ogan Komering wetlands of South Sumatra Province, where the water level recedes, the fish become concentrated and attract many fish-eating animals, particularly birds (Verheugt *et al.*, 1993).

Record of total of 2.563 individuals of small pelagic fishes within ten minutes suggests how the abundance of small pelagic fishes in Jeruju River. The most abundant species is *Pectenocypris micromysticetus* with a total number of 2.071 individuals or 80% of the total proportion. This species is Sumatran endemic freshwater fish that a relatively described as new species for science (Tan and Kottelat, 2009). The second most abundant is *Brevibora cheeya* with a total number of 452 individuals (17%). Similar to *Pectenocypris micromysticetus*, *Brevibora cheeya* is also a new species described for science in 2011 (Liao and Tan, 2011). In zooge-

graphic freshwater fish concern, the significant number of *Pectenocypris micromysticetus* and *Brevibora cheeya* suggest the importance of Jeruju River as a habitat of Sumatran endemic and restricted freshwater species.

This study has successfully documented to looking at species diversity and abundance of pelagic small fishes of peat swamp in Jeruju River of South Sumatra Province, Indonesia. Further study and monitoring of pelagic small fishes in peat swamp of Jeruju River and other parts of Indonesia are urgently needed, particularly the fishes become important sources food of local people and continuous of loss of peat swamps elsewhere in Indonesia.

Acknowledgements

The research /publication of this article was funded by DIPA of Public Service Agenc of Universitas Sriwijaya 2021. SP DIP-023.17.2.677515/2021, on November 23, 2020. In accordance with the Rector's Decree Number: 0010/UN9/SK.LP2M.PT/2021, on April 28, 2021. We thank Ecology, Environment and Conservation editorial team, and anonymous reviewer/s for giving earlier comments to make this paper improve. Finally, We are very grateful to the head of Jeruju Village, Mr. Edi Karso, who facilitate us during fieldwork.

References

- Anna, Z. 2018. Indonesia small pelagic resources accounting. In: *KnE Life Sciences/2nd International Conference on Sustainable Agriculture and Food Security: A comprehensive Approach (ICSAFS)*. Muhaemin, M., Hidayat, Y. & Lengkey, H. A. W. (eds): 29-42.
- Cushing, D. H., Shipley, O. N. and Siskey, M. R. 2019. Pelagic Fishes. In: *Encyclopedia of Ocean Sciences (Third Edition)*. Cochran, J. K., Bokuniewicz, H. J. & Yager, P. L. (eds): 290-296.
- Badan Restorasi Gambut. 2018. *Profil Desa Peduli Gambut, Desa Kuala Sungai Jeruju, Kecamatan Cengal, Kabupaten Ogan Komering Ilir, Sumatera Selatan*. Badan Restorasi Gambut, Jakarta. 64 p. [in Indonesian]
- Giam, X., Koh, L. P., Tan, H. H., Miettinen, J., Tan, H. T. W. and Ng, P. K. L. 2012. Global extinctions of freshwater fishes follow peatland conversion in Sundaland. *Frontiers in Ecology and the Environment*. 10: 465-470.
- Giesen, W., Wijedasa, L. S. and Page, S. E. 2018. Unique Southeast Asian peat swamp forest habitats have relatively few distinctive plant species. *Mires and*

- Peat*. 22 : 1-13.
- Iqbal, M. 2011. *Ikan-ikan di Hutan Rawan Gambut Merang-Kepayang dan Sekitarnya*. Merang REDD Pilot Project, Palembang [in Indonesian].
- Iqbal, M., Setiawan, A., Yustian, I., Pormansyah., Indriati, W., Saputra, R. F. and Salaki, L. D. 2020. *Ikan-ikan Air Tawar Sembilang Dangku*. Zoological Society of London Indonesia, Bogor, 56 p. [in Indonesian].
- Iqbal, M., Yustian, I., Setiawan, D. and Setiawan, A. 2018. *Ikan-ikan di Sungai Musi and pesisir timur Sumatera Selatan (Fishes of Musi river and east coast of South Sumatra)*. Kelompok Pengamat Burung Spirit of South Sumatra bekerjasama dengan Jurusan Biologi FMIPA Universitas Sriwijaya dan Zoological Society for the Conservation of Species and Populations, Palembang. [in Indonesian].
- Ismail, A., Amal, M. N. A., Talib, A., Sepet, J., Aziz, A. and Hussein, A. S. 2015. Fish Diversity of North Selangor Peat Swamp Forest, Selangor, Malaysia. In: *Seminar Ekologi Malaysia*. Anonim (eds): 115-118.
- Japan International Cooperation Agency. 2017. *Data collection survey on forest and peatland fire control and peatland restoration in Indonesia (phase 2), final report*. Japan International Cooperation Agency, Jakarta, Indonesia.
- Kanaujia, A. and Kumar, A. 2014. Wetlands: significance, threats and conservation. *Green*. 7: 1-21.
- Kolding, J., van Zwieten, P., Martin, F., Funge-Smith, S. and Poulain, F. 2019. *Freshwater small pelagic fish and their fisheries in the major African lakes and reservoirs in relation to food security and nutrition*. FAO Fisheries and Aquaculture Technical Paper T642, Rome, Italy.
- Kottelat, M., Whitten, A. J., Kartikasari, S. N. and Wirjoatmodjo, S. 1993. *Freshwater Fishes of Western Indonesia and Sulawesi*. Periplus, Hong Kong.
- Liao, T. Y. and Tan, H. H. 2011. *Brevibora cheeya*, a new species of cyprinid fish from Malay Peninsula and Sumatra. *The Raffles Bulletin of Zoology*. 59 : 77-82.
- Miettinen, J. and Liew, S. C. 2010. Status of peatland degradation and development in Sumatra and Kalimantan. *Ambio*. 39 : 394-401.
- Posa, M. R. C., Wijedasa, L. S. and Corlett, R. T. 2011. Biodiversity and Conservation of Tropical Peat Swamp Forests. *BioScience*. 61 : 49-57.
- Smith, R. L. 1996. *Ecology and Field Biology, Fifth Edition*. Addison-Wesley Educational Publishers, California, USA.
- Tan, H. H. and Kottelat, M. 2009. The fishes of Batang Hari drainage, Sumatra, with description of six new species. *Ichthyological Exploration of Freshwaters*. 20: 13-69.
- Thornton, S. A., Dudin, S. E., Upton, P. C. and Harrison, M. E. 2018. Peatland fish of Sebangau, Borneo: diversity, monitoring and conservation. *Mires and Peat*. 22: 1-25.
- Tyedmers, P. 2004. Fisheries and energy use. In: *Encyclopedia of Energy*. Cleveland, C. J. (Ed): 683-693.
- Winfield, I. J. and Nelson, S. 1991. *Cyprinid Fishes: Systematics, Biology and Exploitation*. Chapman and Hall, New York, USA.
- Verheugt, W. J. M., Skov, H., Danielsen, F., Suwarman, U., Kadarisman, R. and Purwoko, A. 1993. Notes on the birds of the tidal lowlands and floodplains of South Sumatra province, Indonesia. *Kukila*. 6 : 53-84.