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Jenis Ikan di Kawasan Konservasi (*Lubuk Larangan*) Sungai Bangko, Kabupaten Solok Selatan, Provinsi Sumatera Barat, Indonesia

Fish Species in Area Conservation (*Lubuk Larangan*) on the Bangko River, Solok Selatan District, West Sumatra Province, Indonesia

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ABSTRAK

Lubuk larangan adalah satu satu kawasan konservasi sumberdaya ikan. Namun belakangan ini jenis ikan yang hidup di area ini semakin terancam akibat perubahan lingkungan dan penangkapan yang tidak selektif. Oleh karena itu penting mengkaji keanekaragaman ikan air tawar di kawasan konservasi Lubuk Larangan yang terletak di sepanjang Sungai Bangko, Desa Luak Kapau, Kabupaten Solok Selatan, Provinsi Sumatera Barat, Indonesia. Data ini akan berguna dalam menentukan jenis ikan mana yang perlu diprioritaskan untuk didomestikasi sebagai calon ikan budidaya. Proses pengumpulan ikan dilakukan antara Juni sampai Juli 2020 dengan melibatkan pendampingan nelayan setempat yang menggunakan berbagai jenis alat tangkap, antara lain jaring insang, jaring tebar, bubu, dan pancing. Temuan dari penelitian ini mengungkapkan adanya 13 spesies ikan yang termasuk dalam tiga ordo, enam famili, dan tiga belas genus. Di antara spesies yang dikoleksi, famili Cyprinidae adalah yang paling dominan, dengan jumlah mencapai 61,53% dari total populasi ikan yang dikoleksi, diikuti oleh famili Cobitidae, Bangridae, Cichlidae, Mastacembelidae, dan Gobiidae, masing-masing terdiri dari 7,69% dari total keseluruhan. Spesies *Acanopsis octoactinotus* teridentifikasi sebagai rentan, sedangkan *Sicyopterus aeinsis* tergolong kawasan terancam. Tingkat keberfungsian kawasan konservasi terhadap kelestarian ikan adalah 84,35%, termasuk dalam kategori berfungsi sangat baik. Prioritas harus diberikan pada program pemuliaan dan inisiatif restorasi yang menargetkan populasi ikan air tawar yang terancam punah di masa depan.

Kata kunci: keanekaragaman hayati ikan, konservasi, lubuk larangan, spesies rentan

ABSTRACT

The conservation Area (*lubuk larangan*) is one of the fish resource conservation areas. However, recently, the types of fish that live in this area have become increasingly threatened due to environmental changes and non-selective fishing. Therefore, it is important to study the diversity of freshwater fish in the conservation area (Lubuk Larangan) located along the Bangko River, Luak Kapau Village, South Solok Regency,

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West Sumatra Province, Indonesia. This data will be valuable in determining which fish species should be prioritized for domestication as potential candidates for fish cultivation. The process of collecting fish is carried out between June and July 2020 by involving the assistance of local fishermen who use various types of fishing gear, including gill nets, spread nets, trap nets, and fishing rods. The findings from this study revealed the existence of 13 fish species belonging to three orders, six families, and thirteen genera. Among the species collected, the family Cyprinidae was the most dominant, accounting for 61.53% of the total fish population collected, followed by the families Cobitidae, Bangridae, Cichlidae, Mastacembelidae, and Gobiidae, each consisting of 7.69%. of the total. The species *Acanopsis octoactinotus* was identified as vulnerable, while *Sicyopterus aeinsis* was classified as near threatened. The level of functioning of the conservation area for fish preservation is 84.35%, which is included in the very well functioning category. Priority should be given to breeding programs and restoration initiatives targeting future populations of endangered freshwater fish.

Keywords: Bangko river, conservation, fish biodiversity, vulnerable species,

INTRODUCTION

Freshwater biodiversity is widely acknowledged to be in a state of crisis, as highlighted by Harrison et al. (2019). The loss of fish biodiversity in freshwater systems, such as rivers, can be attributed to two primary factors: sand mining and dams (Aryani et al., 2020). Conversely, overfishing in lake waters is the leading cause of fish biodiversity loss (Syandri et al., 2023). According to Darwall and Freyhof (2016), fish face the most significant challenges among all freshwater organisms.

Recently, human activities have classified freshwater habitats as moderately or severely threatened (Yang et al., 2022). Furthermore, the number of free-flowing rivers has significantly decreased, with only a few remaining (Grill et al., 2019). Threats to freshwater fish and their aquatic ecosystems vary, ranging from threats from the behavior of small fishermen (Aryani, 2015; El-Far et al., 2020) and those that have recently emerged, e.g., nanoparticles (Reid et al., 2019).

Every fish species in the River in Solok Selatan District, West Sumatra Province, Indonesia, holds economic significance for the rural communities residing in the area. Therefore, it is essential to identify the native species within the conservation area known as the conservation area (Lubuk Larangan) in the Batang Bangko River, Pinang Sinawa Village, Pauh Duo District, Solok Selatan Regency. This data will be valuable in determining which fish species should be prioritized for domestication as potential candidates for fish culture.

RESEARCH METHOD

Fish were collected from the conservation area called Lubuk Larangan in Bangko River (Fig 1) Luak Kapau Village, with coordinates S: 01 31' 12.1" - 01 31' 08.9" and E: 101 04' 16.8" - 101 04' 15.4". The collection process involved the assistance of local fishermen who used different types of fishing gear, including gill nets, scatter nets, trap nets, and fishing rods. Fish sampling was conducted from June to July 2020.It is worth noting that this area is situated at an elevation of 383 meters above sea level.

The collected fishes were transported to the laboratory and preserved in separate specimen jars using a 10% formalin solution, which was chosen based on the size of the species. Smaller fishes were directly placed in the 10% formalin solution, while larger fishes underwent an incision in their abdomen before being preserved. In the laboratory, the meristic and morphometric characters of the collected fishes were measured and identified up to

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the species level. This identification process was conducted using standard keys and reference books [Weber and de Beaufort, 1913, 1916, 1922; Kottelat et al., 1993].

Furthermore, a quantitative assessment of the suitability level of the conservation area in the Bangko River was conducted using a scoring system incorporating a weighting factor (refer to Table 1). The total weighting factor value for each parameter is 100. Fish conservation areas categorized as high suitability (S1) have a score of 3, those classified as moderate suitability (S2) have a score of 2, and those categorized as low suitability (S3) have a score of 1. The high suitability category (S1) corresponds to a range of 85%-100%, the moderate suitability category (S2) corresponds to a range of 70%-84%, and the low suitability category (S3) corresponds to a range of 55%-69% (Syandri, 2010).

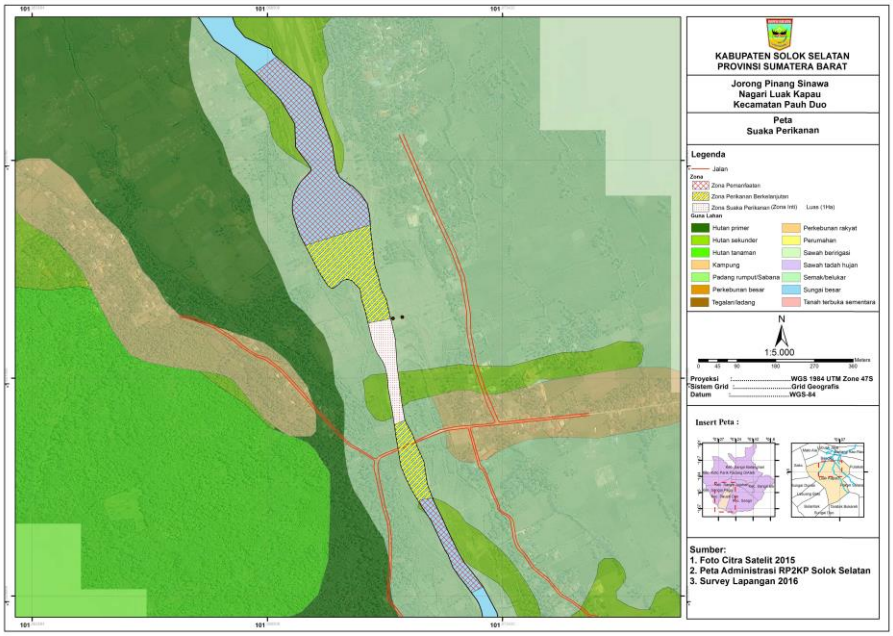

Figure 1. Location of sampling site in Bangko River, Pinang Sinawa, Solok Selatan Regency, West Sumatra Province, Indonesia

RESULTS AND DISCUSSION

The study findings indicated a notable presence of fish biodiversity in the investigated area (Table 1). For the study, a total of thirteen species from six families and three orders were collected. This demonstrates a diverse fish population within the area. Among these species, eight belong to the Cyprinidae family, accounting for 61.53%. Additionally, each of the families Cobitidae, Bangridae, Cichlidae, Mastacembelidae, and Gobiidae was represented by one species, comprising 7.69% each (Figure 2).

Out of the 13 fish species, according to the IUCN category for species Conservation Status in 2019, the classification is as follows: 30.76% (four species) were classified as NE (Not Evaluated), 38.46% (five species) were classified as LC (Least Concern), 7.69% (one species) were classified as DD (Data Deficient), 7.69% (one species) were classified as NT (Near Threatened), 7.69% (one species) were classified as VU (Vulnerable).

In addition, the function of the fish conservation area in the Bangko River, Luak Kapau Village, Solok Selatan Regency, is 84.35%, indicating a very high level of benefit for fish conservation and the local economy within the economic zone (Table 2).

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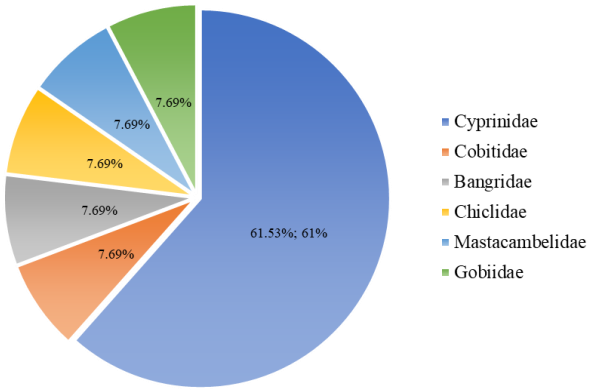

Figure 2. Families of fish composition in the conservation area in Luak Kapau, Bangko River

Currently, nearly one-third of all freshwater fish species are facing the risk of extinction, and the populations of specific migratory fish species like salmon (Salmonidae), sturgeon (Acipenseridae), and eel (Anguillidae) have declined by more than 75% in the last 50 years (Deinet et al., 2020). Indonesia is blessed with rich fish biodiversity, encompassing diverse ecosystems, species, and genetic variations. Approximately 3,000 fish species have been identified in various water bodies, with 1,300 species inhabiting inland waters, including migratory fish such as Anguilla bicolor and Anguilla bicolor pacifica that undertake upstream journeys (Ministry of Marine Affairs and Fisheries of the Republic of Indonesia, 2018).

The Bangko River in Solok Selatan regency is home to the dominant native species, which is the family Cyprinidae consisting of eight species. Other families found in the river include Cobitidae, Bangridae, Cichlidae, Mastacembelidae, and Gobiidae, each represented by one species. In the Kampar Kanan River, the dominant species is also Cyprinidae, but there are additional introduced fish species such as *Cyprinus carpio*, *Leptobarbus hoeveni*, *Oreochromis niloticus*, and *Osphronemus gourami* (Aryani, 2015). Similarly, in the Koto Panjang Reservoir, Cyprinidae is also the dominant family (Aryani et al., 2020).

According to reference (Laxmappa et al., 2015), the family Cyprinidae represents the largest freshwater fish species worldwide, except in Australia, Madagascar, New Zealand, and South America. In the Koilsagar reservoir located in Mahbubnagar District, Telangana, India, 13 species of the order Cypriniformes account for 43.33% of the total (Laxmappa., 2015). In the Betwa River in Madhya Pradesh, India, Cypriniformes comprise 29 species, making up 56.86% of the total (Vyas et al., 2012). In the River Narmada, Western Zone, there are 28 species of the order Cypriniformes, representing 54.90% (Bakawale and Kanhere., 2013).

Furthermore, species classified as vulnerable, especially Acanopsis octoactinotus, were found in the study. On the other hand, bilih fish (*Mystacoleucus padangensis* Blkr) in Lake Singkarak, West Sumatra, Indonesia, is also considered vulnerable by the IUCN (Syandri et al., 2023). However, this conservation area has functioned well. However, it is essential to establish legal protection measures for endangered fish species, perhaps through environmental protection laws or regulations. This will involve implementing fishing quotas, minimum catch sizes, and appropriate fishing seasons. In addition, it is very important to prohibit or minimize destructive fishing practices, such as using explosives or hazardous chemicals.

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Table 1. The native species of fish in the conservation area in Bangko River, Luak Kapau Village, Solok Selatan Regency.

No	Order	Families	Species	Local name	English name	IUCN Categories for Species Conservation Status, 2019	The IUCN Red List Status in 2019 for various species
1	2	3	4	5	6	7	8
1	Cypriniformes	Cyprinidae	*Tor douronensis*	Garing	Semah mahseer	NE	
2	Cypriniformes	Cyprinidae	*Hampala macrolepidota*	Mansai	Silver rasbora	NE	Threatened
3	Cypriniformes	Cyprnidae	*Osteochilus haselti*	Paweh	Bonylip barb	NE	Threatened
4	Cypriniformes	Cyprnidae	*Labiobarbus festivus*	Mali	Signal barb	DD	Threatened
5	Cypriniformes	Gobitidae	*Chromobotia macrachantus*	Sijubang	Clown loach	LC	Threatened
6	Cypriniformes	Cyprinidae	*Crossocheilus oblongus*	Silimang batu	Siamese flying fox	LC	Threatened
7	Cypriniformes	Cyprinidae	*Macrochirichthys macrochirus*	Simancung	Minnows or carps	LC	Threatened
8	Cypriniformes	Cyprinidae	*Cyclocheillichthys apogon*	Keperas	Beardless barb	LC	Threatened
9	Cypriniformes	Cobitidae	*Acantopsis octoactinotus*	Tali-Tali	-	VU	Threatened
10	Cypriniodontiformes	Bangridae	*Hemibagrus nemurus*	Baung	Asian redtail catfish	LC	Threatened
11	Cypriniodontiformes	Chiclidae	*Oreochromis niloticus*	Nila	Nile tilapia	NE	Threatened
12	Perciformes	Mastacambelidae	*Mastacambelus unicolor*	Tilan	-	LC	Threatened
13	Perciformes	Gobiidae	*Sicyopterus aeinsis*	Mungkus	Creek Ai's goby	NT	Threatened

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Table 2. Weights for assessing the level of functioning of the fish conservation area in the Bangko River, Luak Kapau Village, Solok Selatan Regency

No	Parameters	Value parameters	Value weighting factor	Value scoring	Value scoring with a weighting factor
1	Area of conservation (Ha)	>500		3	
		200-500	12	2	
		<200		**1**	**12**
2	Water depth (m)	<16-25		**3**	**16**
		>3-15	8	2	
		<2		1	
3	Water quality	Lightly polluted	10	**3**	**30**
		Moderately polluted		2	
		Heavily polluted		1	
4	Availability of fish houses	Highly available	12	**3**	**36**
		Enough available		2	
		Not available		1	
5	Fish nursery area (%× area)	11-25	12	**3**	**36**
		5-10		2	
		< 2		1	
6	Diversity of fish species (number species)	>15	15	3	
		10-15		**2**	**30**
		<10		1	
7	Society community participation	High community participation	10	**3**	**30**
		Moderate community participation		2	
		Low community participation		1	
8	Conservation area security	Secure conservation area	6	**3**	**18**
		Sufficiently secure conservation area		2	
		Unsafe conservation area		1	
9	Conservation education programs.	Significant benefits	7	3	
		Moderate benefits		**2**	**14**
		Low benefits		1	
10	Multiplier effect	Significant effect	8	1	
		Moderate effect		2	**16**
		Low effect		3	
			Total value		256
			The highest value		294
		Functional value of fish reserve = 248/294×100 = 84.34%			

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CONCLUSION

Our research results provide preliminary data for documenting fish species within a conservation area located in the Bangko River, South Solok Regency. This area has been successful in preserving thirteen fish species that hold economic significance and face potential risks. Our findings contribute to future studies on fisheries conservation and management, specifically addressing the Bangko River in the Solok Selatan District, for the Indonesian government. The objective of these efforts is to support the conservation of these species by implementing tailored legal protection measures aimed at safeguarding endangered fish species. These actions are expected to generate sustainable economic benefits for local communities

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REFERENCES

Aryani N., Suharman I., Azrita A., Syandri, H., & Mardiah, A. (2020). Diversity and distribution of fish fauna of upstream and downstream areas at Koto Panjang Reservoir, Riau Province, Indonesia. F1000Research, 8:1435 https://doi.org/10.12688/f1000research.19679.2

Aryani N. (2015). Native species in Kampar Kanan River, Riau Province, Indonesia. International Journal of Fisheries and Aquatic Studies, 2(5): 213-217. https://www.fisheriesjournal.com/vol2issue5/Pdf/2-5-63.1.pdf

Bakawale S., & Kanhere RR., (2013). Study on the fish species diversity of the River Narmada in Western Zone. Research Journal of Animal, Veterinary and Fishery Sciences, 1(6):18-20. http://www.isca.in/AVFS/Archive/v1/i6/5.ISCA-RJAVFS-2013-037.pdf

Darwall W.R.T., & Freyhof J. (2016) Lostfishes, who is counting?The extent of the threat to freshwaterfish biodiversity. InConservation of Freshwater Fishes, Closs GP, Krkosek M,Olden JD (eds). Cambridge University Press: Cambridge, 1–36. https://assets.cambridge.org/97811070/40113/excerpt/9781107040113_excerpt.pdf

Deinet, S., Scott-Gatty, K., Rotton, H., Twardek, W. M., Marconi, V., McRae, L., Baumgartner, L. J., Brink, K., Claussen, J. E., Cooke, S. J., Darwall, W., Eriksson, B. K., Garcia de Leaniz, C., Hogan, Z., Royte, J., Silva, L. G. M., Thieme, M. L., Tickner, D., Waldman, J., Wanningen, H., Weyl, O. L. F., & Berkhuysen, A. (2020) The Living Planet Index (LPI) for migratory freshwater fish - Technical Report. World Fish Migration Foundation, The Netherlands. https://worldfishmigrationfoundation.com/wp-content/uploads/2020/07/LPI_report_2020.pdf

El-Far A., Aly W., El-Haweet., El-Din A., Nasr-Allah A., & Karisa H. (2020). Fisheries management based on gear selectivity of a tropical reservoir, Lake Nasser, Egypt. The Egyptian Journal of Aquatic Research, 46(1), 71–77. https://doi.org/10.1016/j.ejar.2020.02.004

Grill G., Lehner B., Thieme M., Geenen B., Tickner D., Antonelli F., Babu S., Borrelli P., Cheng L., Crochetiere H., Ehalt Macedo H., Filgueiras R., Goichot M., Higgins J., Hogan X., Lip B., McClain M. E., et al…. & C. Zarfl. (2019). Mapping the world's free-flowing rivers. Nature, 569(7755), 215–221. https://doi.org/10.1038/s41586-019-1111-9

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Harrison I., Abell R., Darwall W., Thieme M. L., Tickner D., & Timboe I. (2018). The freshwater biodiversity crisis. Science, 2018; 362(6421), 1369.1–1369. https://doi.org/10.1126/science.aav9242

Laxmappa B., Jithender K.N.S., & Vamshi S. (2015). Ichthyofaunal diversity of Koilsagar reservoir in Mahbubnagar district, Telangana, India. International Journal of Fisheries and Aquatic Studies, 2(3):23-30. https://www.fisheriesjournal.com/archives/2015/vol2issue3/PartA/2-2-55.pdf

Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia. (2012). Rare fish in Indonesia. Directorate General of Marine, Coastal and Small Islands. Ministry of Maritime Affairs and fisheries RI, 350.

Reid, A.J., Carlson, A.K., Creed, I.F., Eliason, E.J.,Gell, P.A., 5, Johnson, P.T.J., Kidd, K.A., MacCormack, T.J., Olden, J.D., Ormerod, S.J., Smol, J.P., 11, Taylor, W.W., Tockner, K., Vermaire, J.C., Dudgeon, D., & Cooke, S.J. (2019). Emerging threats and persistent conservation challenges for freshwater biodiversity. Biological Reviews, 94, 849–873. https://doi.org/10.1111/brv.12480

Weber, M., & de Beaufort LF. (1913) The fishes of the Indo-Australian Archipelago. II. Malacoptergii, Myctophoidea, Ostariophysi: I. Siluroidea. Brill Ltd. Leiden, 404.

Weber, M., & de Beaufort LF. (1916). The fishes of the Indo-Australian Archipelago. III. Ostariophysi: II. Cyprinoidea, Apodes, Synbranchii. Brill Ltd. Leiden, 455

Weber M., & de Beaufort LF. (1922). The fishes of the Indo-Australian Archipelago IV. Heteromi, Solenichthyes, Synentognathi, Percesoces, Labirynthici, Microcyprini. Brill, Leiden, 410.

Kottelat M., Whitten AJ., & Kartikasari, Wirjoatmodjo SNS. (1993). Freshwater Fishes of Western Indonesia and Sulawesi. Periplus Editions Limited. Jakarta, 229. https://opac.perpusnas.go.id/DetailOpac.aspx?id=357320

Syandri H., (2010). Pengelolaan Sumber Daya Perairan Umum Daratan. Bung Hatta University Press.

Syandri, H., Azrita, A., Thamrin, R., Zen, D., Roza, H.D., Orah, J.C.E., Abdurahman, M., Yuza, A., Irvan, I., & Afriwan, A. (2023). Broodstock development, induced spawning and larval rearing of the bilih, Mystacoleucus padangensis (Bleeker, 1852), a vulnerable species, and its potential as a new aquaculture candidate. F1000Research, 12:420 https://doi.org/10.12688/f1000research.132013.1

Vyas V., Dinesh D., & Vivek P. (2012). Fish biodiversity of Betwa River in Madhya Pradesh, India with special reference to a sacred ghat. International Journal of Biodiversity and Conservation, 4(2):71-77. https://www.cabdirect.org/cabdirect/abstract/20123108165

Yang. Y., Yichao Tian, Y., Zhang, Q., Tao, J., Huang, Y., Gao, C., Lin, J., & Wang, D. (2022). Impact of current and future land use change on biodiversity in Nanliu River Basin, Beibu Gulf of South China, Ecological Indicators, 141,109093 https://doi.org/10.1016/j.ecolind.2022.109093

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