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Physico-chemical Characteristics and Fighting Fish Species in Swamp Waters of Sawah Village, Kampar Utara District, Kampar Regency, Riau Province

Karakteristik Fisika-Kimia dan Jenis Ikan Laga di Perairan Rawa Desa Sawah Kecamatan Kampar Utara Kabupaten Kampar Provinsi Riau

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Abstract

Sawah Village Swamp is one of the swamp waters in Kampar Utara District, Kampar Regency, Riau Province, as a habitat for fighting fish. This study aimed to determine the existing conditions of water quality, type, and population of fighting fish. The research method used is the survey method. Determination of sampling points using a purposive sampling method. The data results measuring the existing conditions of the quality of swamp waters in Sawah Village can still support aquatic organisms, especially fighting fish. The types of fighting fish found during the study consisted of 4 types: Trichop*sis vittata, Betta akarensis, Betta waseri,* and *Betta imbellis*. The number decreases if fishing efforts continue to be increased.

Keywords: Swamp Waters, Water Conditions, Fighting Fish Species

Abstrak

Rawa Desa Sawah merupakan salah satu perairan rawa di Kecamatan Kampar Utara, Kabupaten Kampar, Provinsi Riau, yang menjadi habitat ikan aduan. Penelitian ini bertujuan untuk mengetahui kondisi eksisting kualitas air, jenis dan populasi ikan aduan. Metode penelitian yang digunakan adalah metode survei. Penentuan titik sampling menggunakan metode purposive sampling. Hasil data pengukuran kondisi eksisting kualitas perairan rawa di Desa Sawah masih dapat mendukung organisme perairan khususnya ikan aduan. Jenis ikan aduan yang ditemukan selama penelitian terdiri dari 4 jenis yaitu T*richopsis vittata, Betta akarensis, Betta waseri,* dan *Betta imbellis*. Jumlahnya menurun jika upaya penangkapan terus ditingkatkan.

Kata kunci: Perairan Rawa, Kondisi Perairan, Jenis Ikan Laga

1. Introduction

Kampar Regency is an area with relatively high aquatic resources and biodiversity, with rivers, reservoirs, and swamps. The area of Kampar Regency is ±1,128,928 Ha and the swamp area is 20,331 Ha (BPS Kabupaten Kampar, 2021). One of the areas in Kampar Regency that has swamp waters is Sawah Village, Kampar Utara District, Riau Province, the area of swamp waters in Sawah Village is ±6.8 Ha.

The swampy waters of Sawah Village are influenced by Kampar River runoff and rainwater. The swamp is utilized by the community as a capture fishery. The land around the swamp is converted into paddy fields, domestic waste disposal, rubber and palm oil plantations, and buffalo grazing. Marsh waters play an important role in regulating hydrological cycles and maintaining biodiversity.

Land use change around the swamp waters of Sawah Village is feared to reduce the sustainability of ecosystem diversity and conservation functions for flora and fauna. This is closely related to the reduced carrying capacity of the swamp ecosystem, one of which is fish (Fajri et al., 2020). Fighting fish is a type of freshwater fish that lives in the swampy waters of Sawah Village and is popular among ornamental fish lovers. Hobbyists are attracted to action fish because of their beautiful body color, unique fin shape, and fighting style (Siregar et al., 2018). The price range for male action fish is IDR 5,000-10,000 per fish, while for female action fish, it is IDR 2,000 - 5,000 per fish (Qotijah et al., 2021).

Interviews with fishermen revealed that action fish in the swamp waters are usually used as bait to catch consumer fish. Increasing land use change and the capture of fighting fish as bait around swamp waters is feared to cause fighting fish species to decrease. Research related to the physico-chemical characteristics and species of action fish in swamp waters is still limited. Given the importance of swamp waters as the original habitat of fighting fish, this study was conducted in the swamp waters of Sawah Village.

2. Material and Method

2.1. Time and Place

This research was conducted from April to June 2022 in the swamp waters of Sawah Village, North Kampar District, Kampar Regency, Riau Province. Sample measurements and analysis were carried out in the field, in the Aquatic Environmental Ecology and Management Laboratory, Marine Science Laboratory Universitas Riau, and PU laboratory.

2.2. Methods

The research method is a survey method, namely making direct observations at the research site, namely in the swamp waters of Sawah Village. Primary data consists of the results of measurements of physical parameters including temperature, brightness, depth, and chemical parameters namely dissolved oxygen (DO), free carbon dioxide (CO_2), nitrate (NO_3^-), and fighting fish samples. While secondary data is data obtained from related agencies and various other supporting literature. The research sampling point consists of 4 sampling points with a purposive sampling method.

2.3. Data Analysis

The data obtained from both the types of fighting fish caught at the research site and environmental factors were tabulated into tables and graphs and then analyzed descriptively. Furthermore, it was discussed based on the literature

3. Result and Discussion

3.1. Physical Parameters

Water quality is the most important factor in aquatic ecosystems because it affects the ecological balance and abiotic-biotic interactions that occur in them (Sentosa et al., 2022). Water quality is important to support fish life. Existing condition parameters of water quality that affect the habitat of fighting fish in the swamp waters of Sawah Village consist of physics-chemical parameters that can be seen in the following Table 1.

The average temperature measurement during the study varied between 28,33 - 29,67 ^oC. The highest temperature was at sampling point 4 (29,67^oC) and the lowest temperature was at sampling point 3 (28,33^oC) can be seen in Table 1. The results of water temperature measurements at each sampling point show variations that are not much different. This is due to the state of the waters, the penetration of incoming sunlight, the weather conditions of water plants, and the time of temperature measurement that is not the same. According to Wahyudewantoro (2017), a good temperature for breeding and growth for fighting fish ranges from 26.5-31^0C.

The results of brightness measurements in the swamp waters of Sawah Village ranged from 38.33 to 112.83 cm. The highest brightness was observed at sampling point 1 (112.8 cm) and the lowest at sampling point 2 (38.33 cm) can be seen in Table 1. The high-low brightness value is due to the different water levels and aquatic

plants in the water, so it becomes a barrier to light entering the water. Low brightness indicates the number of particles that float and dissolve in water, thus blocking sunlight that penetrates the water (Harahap, 2000).

Table 1. Average measurement results of the existing condition of swamp waters quality of Sawah Village based on physical parameters

Parameters	Unit	Sampling Point				Quality Standard
		1	2	3	4	Class 3*
Temperature	^{0}C	29	28,67	28,33	29,67	Deviation 3
Brightness	cm	112,83	38,33	39,67	48	-
Depth	cm	145,67	51,67	53,33	61	-
Turbidity	NTU	6,1700	5,1800	4,9000	4,2867	-

* Quality standard value based on Government Regulation No. 22 Year 2021 Class III

The results of depth measurements in the swamp waters of Sawah Village ranged from 51.67 to 145.67 cm. The highest brightness was observed at sampling point 1 (145.67 cm) and the lowest at sampling point 2 (51.67 cm). Sampling point 1 is an area that has a fairly high depth range with wide open and wide waters compared to other sampling points and have diverse but not too many types of aquatic plants. Sampling point 2 is an area that has a fairly low depth and includes shallow water areas.

The results of turbidity measurements in the swamp waters of Sawah Village ranged from 4.2867 - 6.1700 NTU. The highest brightness was observed at sampling point 1 (6.1700 NTU) and the lowest at sampling point 2 (4.2867 NTU). The average value of turbidity measurements at the two sampling points has a difference. Sampling point 1 is a runoff area from plantations and rice fields and the substrate in this area is mud, causing the waters to become turbid and the decay of aquatic plants as a contributor to organic matter. According to Hanisa et al. (2017), states that turbidity in waters is caused by the presence of agriculture around the waters, the presence of organic matter from the decay of plants, and the erosion of the soil layer by rain (runoff).

3.2. Chemical Parameters

The results of the study of the average value of the degree of acidity of the swamp waters of Sawah Village at each sampling point have the same value of 5 can be seen in (Table 2). It can be concluded that the swamp waters are acidic. This is because in general, the area in Riau Province is a peatland area that has a low pH, so it can affect the pH of the waters, which is acidic. Dewantoro (2001), states that the pH value that supports the life of aquatic fighting fish ranges from 5-9.

Table 2. Average measurement results of existing conditions of swamp water quality in Sawah Village based on chemical parameters

Parameters	Unit	Sampling Point				Quality Standard
		1	2	3	4	Class 3*
pH	-	5	5	5	5	6 - 9
DO	mL/L	5,2	3,1	3,8	4,32	3 mg/L
CO_2	mL/L	14	17,33	15,67	14,33	-
COD	mL/L	43,7633	39,3167	37,5767	33,6100	40 mg/L
Nitrate (NO_3^-)	mL/L	0,0560	0,0704	0,0580	0,0481	20 mg/L
Phosphate (PO_4^{3-})	mL/L	0,0584	0,0594	0,0470	0,0535	1,0 mg/L

***** Quality standard value based on Government Regulation No. 22 Year 2021 Class III

The results of dissolved oxygen (DO) measurements in the swamp waters of Sawah Village ranged from 3.1 - 5.2 ml/L. The highest DO was observed at sampling point 1 (5.2 mL/L) and the lowest at sampling point 2 (3.1 ml/L). Yuliastuti (2011) states that the decrease or low concentration of dissolved oxygen indicates the occurrence of pollution by organic materials in the waters. The difference in dissolved oxygen concentration at each sampling point can be caused by the state of the water, the penetration of sunlight entering, weather conditions, and temperature measurement time that is not the same.

The measurement results of free carbon dioxide (CO_2) in the swamp waters of Sawah Village ranged from 14 - 17.33 mL/L. The highest CO_2 was observed at sampling point 1 (17.33 mL/L) and the lowest at sampling point 2 (14 mL/L). Ananda (2016), states that the content of free carbon dioxide is quite high in the waters allegedly due to the large number of aquatic plants around the waters and the large content of organic matter entering the waters. Action fish can live in narrow and limited land because they have a respiratory device, namely the labyrinth, to take oxygen from the air.

The results of COD measurements in the swamp waters of Sawah Village ranged from 33.6100 to 43.7633 ml/L. The highest COD was observed at sampling point 1 (43.7633 ml/L) and the lowest at sampling point 4 (33.6100 ml/L). The high concentration levels of COD values indicate a high level of environmental pollution in the waters. The high COD value at sampling point 1 is thought to be due to the influx of organic matter (domestic waste) produced by settlements around the swamp waters of Sawah Village. The lowest COD

concentration was found at sampling point 4, where there were not too many activities carried out by the local community.

The measurement results of nitrate (NO_3^-) in the swamp waters of Sawah Village ranged from 0.0481 to 0.0704 ml/L. The highest nitrate was observed at sampling point 2 (0.0481 mL/L) and the lowest at sampling point 4 (33.6100 ml/L). The swamp water area of Sawah village has settlements (domestic waste), fishing, rubber plantations, rice fields, and buffalo grazing as a contributor to nutrients in the form of nitrates in the waters. The results of nitrate measurements in the swamp waters of Sawah Village can be concluded that the swamp waters of Sawah Village are classified as oligotrophic waters. This is to the opinion of Wetzel (1983), nitrate waters are divided into three nitrate levels of 0-1 mg/L the waters are classified as oligotrophic.

The results of phosphate (PO_4^{3-}) measurements in the swamp waters of Sawah Village ranged from 0.0470 - 0.0594 mL/L. The highest nitrate was observed at sampling point 2 (0.0594 mL/L) and the lowest at sampling point 4 (0.0470 mL/L). The activities of rubber plantations, rice fields, residential areas, and oil palm plantations in the swamp waters of Sawah Village contribute organic and inorganic materials so that the concentration of phosphate levels in the swamp waters of Sawah Village has increased. Phosphate in waters comes from the weathering of phosphate minerals carried during erosion, domestic household waste (detergents), and industrial waste (Fajri & Kasry, 2013). Fighting fish that live in the swamp waters of Sawah Village, North Kampar Subdistrict, Kampar Regency, Riau Province, live well at phosphate concentrations of 0.0535-0.0584 ml/L.

3.3. Type and Classification of Fighting Fish

The types and classifications of fish caught during the study in the swamp waters of Sawah Village are presented in Table 3.

Table 3. Meristic calculation results of fighting fish

No	Type	Description
1	*Trichopsis vittata*	Standard length (SL) 50 mm and weight 1.65 g. Dorsal fin spines 2 pieces, dorsal fin soft fingers 8 pieces, anal fin spines 6 pieces, anal fin soft fingers 25 pieces.
2	*Betta akarensis*	Standard length (SL) 48 mm and weight 0.75 g. Dorsal fin spines 2 pieces, dorsal fin soft fingers 8 pieces, anal fin spines 4 pieces, anal fin soft fingers 27 pieces.
3	*Betta waseri*	Standard length (SL) 44 mm and weight 1.65 g. Dorsal fin spines 3 pieces, dorsal fin soft fingers 6 pieces, anal fin spines 2 pieces, anal fin soft fingers 29 pieces.
4	*Betta imbellis*	Standard length (SL) 50 mm and weight 1.65 g. Dorsal fin spines 1 piece, dorsal fin soft fingers 8 pieces, anal fin spines 2 pieces, anal fin soft fingers 22 pieces.

Trichopsis vittata, identification results obtained the characteristics and classification of action fish in the swamp waters of Sawah Village such as sharp and scaly head, terminal mouth position, the head has a yellow-brown color with two lines behind the eyes. The upper part of the body is blackish brown; the sides of the body are brown and greenish and have two dark color lines extending from the eyes to the middle of the body. The identification results follow the identification book guide by Kottelat et al. (1993) (Figure 1).

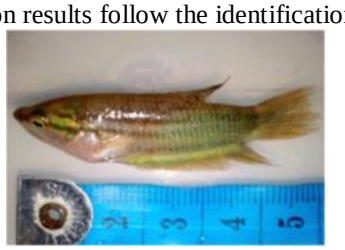

Figure 1. *Trichopsis vittata*

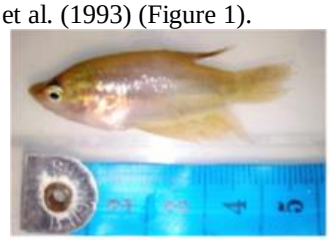

Figure 2. *Betta akarensis*

Figure 3. *Betta waseri*

Figure 4. *Betta imbellis*

Betta akarensis, identification results obtained characteristics and classification of action fish in the swamp waters of Sawah Village such as yellow eyes are large; the fingers of the caudal fin are only branched in fish that exceed 4 cm in length. The body color is yellow-brown. Two color lines on the head are not very clear; one line starts from the snout to the back through the eyes (Figure 2).

Betta waseri, identification results obtained characteristics and classification of action fish in the swamp waters of Sawah Village such as A single dark line on the head starting from the tip of the snout towards the back through the eyes; black markings on the lower lip. In the middle of the tail, there is a black line. The body is very dark black with black-brown fins that have black spots on each fin. Has a greenish eye color with black eyeballs (Figure 3).

Betta imbellis, identification results obtained the characteristics and classification of action fish in the swamp waters of Sawah Village such as medium size; no shiny white fringe on the dorsal fin; the fingers of the caudal fin and anal fin are red-brown, contrasting with the shiny membrane; the eyeball is speckled; the tip of the anal fin, the edge of the caudal fin and the pelvic fin have red spots and has black markings on the lower lip (Figure 4).

4. Conclusions

Existing condition parameters of water quality that affect fighting fish habitat in the swamp waters of Sawah Village are temperature, brightness, depth, dissolved oxygen (DO), free carbon dioxide (CO_2), and nitrate (NO_3) with environmental conditions overgrown with weeds. fighting fish species found in the swamp waters of Sawah Village consist of 4 species, namely *Trichopsis vittata, Betta akarensis, Betta waseri*, and *Betta imbellis*.

5. Suggestion

It is expected that for fish species in the swamp waters of Sawah Village to remain stable, it is necessary to maintain the condition of the water quality. The fishermen can utilize action fish as a business opportunity but the capture does not exceed the optimum exploitation, so that action fish is preserved.

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