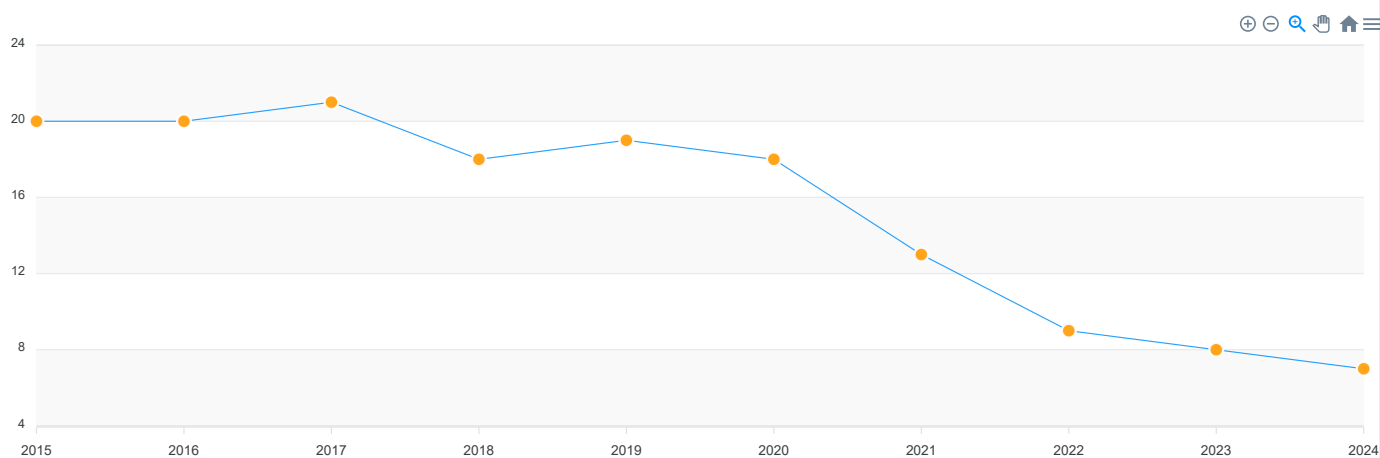




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Species Diversity of fish in Khlong Sak Nga, Sila Subdistrict, Lom Kao District,

Phetchabun Province

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Abstract

This survey aimed to assess the diversity of fish species living Khlong Sak Nga, which is one of the upper Pasak Basin. Fish samples were collected from November 2021 to August 2022 by using local fishing gears. Thirty-eight fish species belong to 36 genera and 19 families were identified. Cyprinidae was the most abundant species (15 species). The highest frequency of occurrence (100%) were *Devario laoensis*, *Mystacoleucus marginatus*, *Poropuntius bantamesis*, *Puntius brevis*, *Puntius rhombeus*, *Rasbora paviana*, *Systomus rubripinnis*, *Paralaubuca riveroi*, *Poecilia reticulata*, *Channa gachua*, *Channa striata*, *Trichopsis vittatus*, *Trichopodus trichopterus*, *Gyrinocheilus aymonieri*, *Schistura waltoni*, *Balitora* sp., *Xenentodon cancila* and *Dermogenys siamensis*. The highest E-value by number were *Mystacoleucus marginatus* (9.25%) and *Schistura waltoni* (7.68%). The lower E-value by number was *Ompok hypopthalmus* (0.21%), *Oxyeleotris marmorata* (0.21%). The average values of diversity

index and evenness index were 3.21 ± 0.10 and 2.71 ± 0.00 respectively. The Cyprinid fish showed the highest diversity both the number of species and the number of individuals, indicated that the aquatic environment qualities in the Khlong Sak Nga are in the optimal range of natural habitat for aquatic animals living. The dissolved oxygen ($4.11 - 8.24$ m/l), water temperature ($23.21 - 30.03$ °C), pH ($7.30 - 8.23$) ranged within the criteria suitable for the growth of aquatic animals.

Keywords: Fish biodiversity, Prevalence of fish communities, Khlong Sak Nga, upper Pasak Basin

Introduction

Klong Sak Nga is located in the area of Sila Sub-district, Lom Kao District, Phetchabun Province. It is a stream that serves as a tributary of the Pasak River Basin and connected to Klong Tad, receiving water from it and eventually merging with Klong Sak. This convergence creates a phenomenon known as "two-colored river" near Ban Sak Nga School, Sila Sub-district, Lom Kao District, Phetchabun Province. The water in Klong Sak Nga is less turbid compared to Klong Sak, which is the source of the Pasak River that flows from Dan Sai District, Loei Province, and into the Pasak River Basin. The Pasak River Basin is a long river basin divided into upper, middle, and lower sections. The upper Pasak River Basin, characterized by high mountainous terrain, originates from the Phetchabun Mountains. It covers parts of Dan Sai District in Loei Province, Nam Nao District, Lom Kao District, and Lom Sak District in Phetchabun Province. This basin is a vital water source, sustaining the lives of the population in Phetchabun Province, where the highest number of Pasak River Basin residents live, accounting for 55.53% of the total basin population. The upper Pasak River Basin is utilized for various purposes, including residential construction and agricultural activities such as rice and corn farming (Wannasri, 2011). Additionally, aquatic resources, including fish, are utilized. However, without proper management, fish populations may decline, impacting species diversity, which reflects the richness of the water source (Keawkhiew *et al.*, 2013).

Studying the fish species diversity in Klong Sak Nga, Sila Sub-district, provides current baseline data on the fish species in this water source. This information is crucial for the conservation and sustainable management of aquatic resources and can be used to promote ecotourism in the future for the Sila community. Local residents practice fishing with bare hands, and this data can also serve as a preliminary guide for understanding the distribution and abundance of fish species in Klong Sak Nga and the Pasak River Basin.

Methodology

1. Research Planning

Survey stations were established in Klong Sak Nga, in the area flowing through Sila Subdistrict, Lom Kao District, Phetchabun Province. The study area was divided into three survey stations as follows:

1. The confluence of Klong Sak Nga and Klong Sak,
2. Klong Sak and
3. The lower part of Klong Sak Nga near the end of the village.

Each survey point covered a distance of 100 meters. Data collection was conducted from November 2021 to August 2022, divided into three seasonal periods. Fishing tools such as nets, seines, gill nets, cast nets, and fishing rods. Collected fish samples were identified and categorized. Species that could not be identified on-site were preserved in 10% formalin solution and then identified later in the laboratory.

2. Laboratory Study

The collected fish samples were studied for taxonomic characteristics, primarily using external features for identification. References included Vidthayanon (2004), Kottelat (2000, 2001), and Suvamaraksha (2017). The conservation status of the identified fish species was checked against the database of threatened species in Thailand (Vidthayanon, 2005).

3. Data Analysis

The collected data on fish species identification, number, species composition, and frequency were analyzed as follows:

3.1 Frequency of Occurrence

$$F (\%) = \frac{\text{Number of times a species is found in samples}}{\text{Total number of sampling events}} \times 100$$

3.2 Percentage Species Composition (E-value) (Swingle, 1950)

$$E\text{-value} = \frac{\text{Number or weight of a particular fish species}}{\text{Total number or weight of all fish species}} \times 100$$

3.3 Species Diversity Index (Washington, 1984)

The Shannon-Weiner Diversity Index was calculated according to the method of Washington (1984):

$$H = - \sum (p_i \log_2 p_i)$$

Where:

H = Species Diversity Index

P_i = Proportion of the i-th species relative to the total number of individuals in the sample

3.4 Evenness Index

This index indicates the distribution of fish species at each survey station and season. A high value suggests that the station and season have a similar number and distribution of fish species. The Evenness Index was calculated using Pielou's Index (Clarke and Warwick, 1994):

$$E = H/\ln S \text{ or } H/H_{\max} (H_{\max} = \ln S)$$

Where:

E = Evenness Index

H = Species Diversity Index

S = Number of species found in the survey station or month

$H_{\max}$ = Maximum diversity index

Results

The study on the diversity of fish species in Klong Sak Nga identified a total of 19 families, 36 genera, and 38 species. The family Cyprinidae was the most diverse, with 15 species (Table 1). The species composition analysis across different survey stations revealed that survey station 1 had the highest fish species diversity, with 38 species. Survey station 2 followed with 37 species. In terms of monthly species composition, August 2022 showed the highest species diversity, with 38 species (Table 2).

The percentage frequency of occurrence for each fish species, which indicates the overall qualitative distribution of each species by distance and time, it was found that 18 species had a 100% frequency of occurrence. These species are: *Devario laoensis*, *Mystacoleucus marginatus*, *Poropuntius bantamesis*, *Puntius brevis*, *Puntius rhombeus*, *Rasbora paviana*, *Systomus rubripinnis*, *Paralabuca riveroi*, *Poecilia reticulata*, *Channa gachua*, *Channa striata*, *Trichopsis vittatus*, *Trichopodus trichopterus*, *Gyrinocheilus aymonieri*, *Schistura waltoni*, *Balitora* sp., *Xenentodon cancila* and *Dermogenys siamensis*. Conversely, four species were found the lowest frequency of occurrence at 50.00% (*Clarias batrachus*, *Notopterus notopterus*, *Ompok siluroides* and *Oxyeleotris marmorata*). The habitat suitability and distribution patterns of each fish species across different distances and time periods are shown in Table 2.

The percentage of species composition (E-value) indicates the survival efficiency or viability of different fish species in the water body. The study found that the species with the highest E-value, indicating the most abundance, was *Mystacoleucus marginatus* (9.25%). This was followed by *Schistura waltoni* (7.68%) and *Systomus rubripinnis* (7.68%). The species with the lowest E-value were *Ompok siluroides* and *Oxyeleotris marmorata*, both with an E-value of 0.21% (Table 3).

The study of the fish community structure index in Klong Sak Nga revealed a diversity index and an evenness index of 3.21 ± 0.10 and 2.71 ± 0.00 , respectively. When examining the community structure index by survey stations, survey station 2 had the highest diversity index and evenness index values of 3.28 and 0.91, respectively. According to the monthly survey data, August 2022 showed the highest diversity index and evenness index, with values of 3.34 and 0.92, respectively (Table 4).

Table 1 Check list of fishes found in the Khlong Sak Nga during November 2021 to August 2022

Family/ Scientific name	English common name
1. Family Notopteridae	
<i>Notopterus notopterus</i> (Pallas, 1769)	Bronze featherback
2. Family Cyprinidae	
<i>Barbonymus gonionotus</i> (Bleeker, 1850)	Silver Barb
<i>Devario laoensis</i> (Pellegrin & Fang, 1940)	Laos Danio
<i>Esomus metallicus</i> (Ahl, 1924)	Flying Barb
<i>Garra cambodgiensis</i> (Tirant, 1884)	Stone Sucker
<i>Mystacoleucus marginatus</i> (Valenciennes, 1842)	Black margin spiny Barb
<i>Osteochilus vittatus</i> (Valenciennes, 1842)	Striped Hard Lipped Barb
<i>Poropuntius bantamesis</i> (Rendahl, 1920)	Stream Barb
<i>Puntioplites proctozyron</i> (Bleeker, 1865)	Smith's Barb
<i>Puntius brevis</i> (Bleeker, 1850)	Golden Little Barb
<i>Puntius rhombeus</i> (Kottelat, 2000)	Spotted Barb
<i>Rasbora paviana</i> (Tirant, 1885)	Black Striped Minnow
<i>Systomus rubripinnis</i> (Valenciennes, 1842)	Red Cheek Barb
<i>Labeo rohita</i> (Hamilton, 1822)	Rohu
<i>Cirrhinus cirrhosa</i> (Blotch, 1975)	Mrigla
<i>Paralaubuca riveroi</i> (Fowler, 1935)	Siames river abramine
3. Family Balitoridae	
<i>Balitora</i> sp.	
4. Family Nemacheilidae	
<i>Schistura waltoni</i> (Fowler, 1973)	Walton's Stream Loach

Table 1 Continue

Family/ Scientific name	English common name
5. Family Gyrinocheilidae	
<i>Gyrinocheilus aymonieri</i> (Tirant, 1884)	Siamese Algae Eater
6. Family Bagridae	
<i>Hemibagrus filamentus</i> (Fang & Chaux, 1949)	Yellow mystus
<i>Pseudomystus siamensis</i> (Regen, 1913)	Asian Bubble-bee Catfish
<i>Mystus bocourti</i> (Bleeker, 1854)	Hi-fin Bagrid Catfish
7. Family Clariidae	
<i>Clarias batrachus</i> (Linnaeus, 1758)	Batrachian Walking Catfish
8. Family Siluridae	
<i>Ompok siluroides</i> (Lacepède, 1803)	Sheatfish
9. Family Hemirhamphidae	
<i>Dermogenys siamensis</i> (Fowler, 1934)	Halfbeak
10. Family Belontiidae	
<i>Xenentodon cancila</i> (Hamilton, 1822)	Freshwater Garfish
11. Family Poeciliidae	
<i>Poecilia reticulata</i> (Peter, 1859)	Guppy
12. Family Syngnathidae	
<i>Microphis boaja</i> (Bleeker, 1851)	Freshwater Pipefish
13. Family Mastacembelidae	
<i>Mastacembelus armatus</i> (Sykes, 1839)	Zig Zag Eel
<i>Macrognathus siamensis</i> (Hora, 1924)	Peacock Eel
14. Family Ambassidae	
<i>Parambassis siamensis</i> (Fowler, 1937)	Glassfish
15. Family Cichlidae	
<i>Oreochromis niloticus</i> (Linnaeus, 1758)	Nile
16. Family Eleotridae	
<i>Oxyeleotris marmorata</i> (Bleeker, 1852)	Marble Goby
17. Family Anabantidae	
<i>Anabas testudineus</i> (Bloch, 1792)	Climbing Perch

Table 1 Continue

Family/ Scientific name	English common name
18. Family Osphronemidae	
<i>Trichopsis vittatus</i> (Cuvier & Valenciennes, 1831)	Croaking Gourami
<i>Trichopodus trichopterus</i> (Pallas, 1770)	Tree Spotted Gourami
19. Family Channidae	
<i>Channa gachua</i>	Stream Snakehead Fish
<i>Channa striata</i> (Bloch, 1793)	Striped Snakehead Fish



Table 2 Appearance of fish in the Khlong Sak Nga during November 2021 to August 2022

Family	Scientific name	Station			Month			F%
		1	2	3	November 2021	April 2022	August 2022	
Notopteridae	<i>Notopterus nototerus</i> (Pallas, 1769)	+	+	-	-	-	+	50
Cyprinidae	<i>Barbonymus gonionotus</i> (Bleeker, 1850)	+	+	-	+	+	+	83.33
	<i>Devario laoensis</i> (Pellegrin & Fang, 1940)	+	+	+	+	+	+	100
	<i>Esomus metallicus</i> (Ahl, 1924)	+	+	-	+	+	+	83.33
	<i>Garra cambodgiensis</i> (Tirant, 1884)	+	+	-	+	+	+	83.33
	<i>Mystacoleucus marginatus</i> (Valenciennes, 1842)	+	+	+	+	+	+	100
	<i>Osteochilus vittatus</i> (Valenciennes, 1842)	+	+	-	+	+	+	83.33
	<i>Poropuntius bantamensis</i> (Rendahl, 1920)	+	+	+	+	+	+	100
	<i>Puntioplites proctozystron</i> (Bleeker, 1865)	+	+	-	+	+	+	83.33
	<i>Puntius brevis</i> (Bleeker, 1850)	+	+	+	+	+	+	100
	<i>Puntius rhombeus</i> (Kottelat, 2000)	+	+	+	+	+	+	100
	<i>Rasbora paviana</i> (Tirant, 1885)	+	+	+	+	+	+	100
	<i>Systemus rubripinnis</i> (Valenciennes, 1842)	+	+	+	+	+	+	100
	<i>Labeo rohita</i> (Hamilton, 1822)	+	+	-	+	+	+	83.33
	<i>Cirrhinus cirrhosa</i> (Blotch, 1975)	+	+	+	+	+	+	83.33
	<i>Paralabruca riveroi</i> (Fowler, 1935)	+	+	+	+	+	+	100
Balitoridae	<i>Balitora</i> sp.	+	+	+	+	+	+	100
Nemacheilidae	<i>Schistura waltoni</i> (Fowler, 1973)	+	+	+	+	+	+	100
Gyrinocheilidae	<i>Gyrinocheilus aymonieri</i> (Tirant, 1884)	+	+	+	+	+	+	100

Table 2 Continue

Family	Scientific name	Station			Month			F%
		1	2	3	November 2021	April 2022	August 2022	
Bagridae	<i>Hemibagrus filamentus</i> (Fang&Chaux, 1949)	+	+	+	-	+	+	83.33
	<i>Pseudomystus siamensis</i> (Regen, 1913)	+	+	-	-	+	+	66.67
	<i>Mystus bocourti</i> (Bleeker, 1854)	+	+	-	-	+	+	66.67
Clariidae	<i>Clarias batrachus</i> (Linnaeus, 1758)	+	-	-	-	+	+	50
Siluridae	<i>Ompok siluroides</i> (Lacepède, 1803)	+	+	-	-	-	+	50
Hemirhamphidae	<i>Dermogenys siamensis</i> (Fowler, 1934)	+	+	+	+	+	+	100
Belonidae	<i>Xenentodon cancila</i> (Hamiton, 1822)	+	+	+	+	+	+	100
Poeciliidae	<i>Poecilia reticulata</i> (Peter, 1859)	+	+	+	+	+	+	100
Syngnathidae	<i>Microphis boaja</i> (bleeker, 1851)	+	+	-	-	+	+	66.67
Mastacembelidae	<i>Mastacembelus armatus</i> (Sykes, 1839)	+	+	-	-	+	+	66.67
	<i>Macrogathus siamensis</i> (Hora, 1924)	+	+	-	-	+	+	66.67
Ambassidae	<i>Parambassis siamensis</i> (Fowler, 1937)	+	+	+	-	+	+	83.33
Cichlidae	<i>Oreochromis niloticus</i> (linnaeus, 1758)	+	+	-	-	+	+	66.67
Eleotridae	<i>Oxyeleotris marmorata</i> (Bleeker, 1852)	+	+	-	-	-	+	50
Anabantidae	<i>Anabas testudineus</i> (bloch, 1792)	+	+	+	-	+	+	83.33

Table 2 Continue

Family	Scientific name	Station			Month			F%
		1	2	3	November 2021	April 2022	August 2022	
Osphronemidae	<i>Trichopsis vittatus</i> (Cuvier&Valenciennes, 1831)	+	+	+	+	+	+	100
	<i>Trichopodus trichopterus</i> (Pallas, 1770)	+	+	+	+	+	+	100
Channidae	<i>Channa gachua</i>	+	+	+	+	+	+	100
	<i>Channa striata</i> (Bloch, 1793)	+	+	+	+	+	+	100
Total families		19	18	10	9	16	19	
Total species		38	37	21	25	35	38	

Note - missing + found F% Frequency of occurrence

Table 3 Fish community by amount in the Khlong Sak Nga during November 2021 to August 2022

Scientific name	number	E-value	Cumulative percentages
<i>Ompok siluroides</i> (Lacepède, 1803)	3	0.21	0.21
<i>Oxyeleotris marmorata</i> (Bleeker, 1852)	3	0.21	0.43
<i>Oreochromis niloticus</i> (Linnaeus, 1758)	5	0.36	0.78
<i>Microphis boaja</i> (Bleeker, 1851)	7	0.50	1.28
<i>Labeo rohita</i> (Hamilton, 1822)	8	0.57	1.85
<i>Clarias batrachus</i> (Linnaeus, 1758)	8	0.57	2.42
<i>Notopterus notopterus</i> (Pallas, 1769)	8	0.57	2.99
<i>Cirrhinus cirrhosa</i> (Blotch, 1975)	9	0.64	3.63
<i>Mastacembelus armatus</i> (Sykes, 1839)	10	0.71	4.34
<i>Paralauca riveroi</i> (Fowler, 1935)	11	0.78	5.12
<i>Mystus bocourti</i> (Bleeker, 1854)	14	1.00	6.12
<i>Parambassis siamensis</i> (Fowler, 1937)	15	1.07	7.18
<i>Channa striata</i> (Bloch, 1793)	16	1.14	8.32
<i>Macrognathus siamensis</i> (Hora, 1924)	16	1.14	9.46
<i>Hemibagrus filamentus</i> (Fang & Chaux, 1949)	17	1.21	10.67
<i>Xenentodon cancila</i> (Hamilton, 1822)	17	1.21	11.88
<i>Puntius proctozysron</i> (Bleeker, 1865)	19	1.35	13.23
<i>Trichopodus trichopterus</i> (Pallas, 1770)	20	1.42	14.65
<i>Anabas testudineus</i> (Bloch, 1792)	23	1.64	16.29
<i>Dermogenys siamensis</i> (Fowler, 1934)	23	1.64	17.92
<i>Trichopsis vittatus</i> (Cuvier & Valenciennes, 1831)	25	1.78	19.70
<i>Gyrinocheilus aymonieri</i> (Tirant, 1884)	28	1.99	21.69
<i>Pseudomystus siamensis</i> (Regen, 1913)	29	2.06	23.76
<i>Channa gachua</i>	30	2.13	25.89
<i>Garra cambodgiensis</i> (Tirant, 1884)	33	2.35	28.24
<i>Poropuntius bantamesis</i> (Rendahl, 1920)	45	3.20	31.44
<i>Balitora</i> sp.	47	3.34	34.78
<i>Osteochilus vittatus</i> (Valenciennes, 1842)	52	3.70	38.48
<i>Puntius rhombeus</i> (Kottelat, 2000)	60	4.27	42.75
<i>Barbonymus gonionotus</i> (Bleeker, 1850)	63	4.48	47.23
<i>Esomus metallicus</i> (Ahl, 1924)	63	4.48	51.71
<i>Puntius brevis</i> (Bleeker, 1850)	66	4.69	56.40

Table 3 Continue

Scientific name	amount (number)	E-value	Cumulative percentages
<i>Devario laoensis</i> (Pellegrin & Fang, 1940)	86	6.12	62.52
<i>Poecilia reticulata</i> (Peter, 1859)	86	6.12	68.63
<i>Rasbora paviana</i> (Tirant, 1885)	95	6.76	75.39
<i>Systomus rubripinnis</i> (Valenciennes, 1842)	108	7.68	83.07
<i>Schistura waltoni</i> (Fowler, 1973)	108	7.68	90.75
<i>Mystacoleucus marginatus</i> (Valenciennes, 1842)	130	9.25	100.00
Total	1406	100.00	

Table 4 Diversity index of fish in the Khlong Sak Nga during November 2021 to August 2022

Factor	No. species	diversity index	Evenness index
Station 1	38	3.27	0.90
Station 2	37	3.28	0.91
Station 3	30	3.07	0.90
November 2021	27	2.69	0.82
April 2022	35	3.15	0.89
August 2022	38	3.34	0.92
mean±SD (Station)	35.00±3.56	3.21±0.10	2.71±0.00

Discussion

The survey of fish species composition in Khlong Sak Nga, using fishing tools such as nets, seines, gill nets, cast nets, fishing rods, and local fish market surveys from November 2021 to August 2022 divided into three seasonal periods, identified a total of 19 families, 36 genera, and 38 species. The family Cyprinidae had the highest species diversity with 15 species. Most of the found fish species are common in rivers. The species with the highest E-value by number were *Mystacoleucus marginatus* (9.25%), followed by *Schistura waltoni* (7.68%) and *Systomus rubripinnis* (7.68%). In comparison, the study of fish species diversity in the Wa River by Lothongkham and Duangjai (2010) found a distribution of 7 orders, 13 families, 32 genera, and 43 species, with Cypriniformes having the highest number of species (30 species), followed by Siluriformes (5 species), and Perciformes (3 species), representing 69%, 12%, and 7% respectively. The family Cyprinidae had the most species (22 species), followed by

Balitoridae (7 species) and Sisoridae (3 species), accounting for 51%, 16%, and 7% respectively. Notably, three species were reported that had not been previously recorded in the Chao Phraya River system: *Garra theunensis*, *Schistura latidens*, and *Glyptothorax macromaculatus*. Additionally, three non-native species were identified: *Cyprinus rubrofuscus*, *Clarias gariepinus*, and *Poecilia reticulata*. In the present study, two non-native species were found in Klong Sak Nga: *Poecilia reticulata* and *Oreochromis niloticus* due to the differences in the number and types of species depending on the survey methods and time periods. This study used similar fishing tools to those used by Valunpion and Suvarnaraksha (2013) in their study of fish species diversity in the Ing River, where 82 species, 57 genera, and 22 families were found. Additionally, Worapussu *et al.* (2021) investigated the fish species diversity in Klong Khek Noi using local fishing tools and local market surveys, identifying 27 species, 24 genera, and 13 families. The study by Keawkhiew *et al.* (2013) used various mesh-sized nets for sampling in Maesaw Creek, finding 17 species across 5 families. During the winter and summer seasons, the water is clear with low levels, making it possible to walk across the stream, while fish congregate in water pools. In the rainy season, the water level is high, and the flow is swift. Considering the fish community structure index by survey stations, survey station 2 had the highest diversity and evenness indices, 3.28 and 0.91 respectively. The highest monthly indices were observed in August 2022, with diversity and evenness indices of 3.34 and 0.92 respectively. An index value in the range of 1-3 indicates a suitable habitat for aquatic life (Tudorance *et al.*, 1975). Fish species in Klong Sak Nga prefer clean water, flowing habitats, and high oxygen levels but have low tolerance to pollution coherent with Lothongkham and Duangjai (2010) found that fish in the Wa River in Bo Kluea District, Nan Province, prefer fast-flowing, clear water with a gravel or stone bottom and algae, characteristics typical of highland streams or headwaters. The Cyprinidae family had the highest species count, indicating their upstream habitat preference. The high diversity of Cyprinidae species found in this study highlights the environmental quality of Klong Sak Nga as a natural habitat for aquatic life, with dissolved oxygen levels ranging from 4.11 to 8.24 mg/L, water temperatures between 23.21 to 30.03 degrees Celsius, and pH levels from 7.30 to 8.23. These parameters fall within the suitable range for aquatic growth. These findings provide a basis for planning the conservation and management of fish resources, promoting sustainable use, and encouraging aquaculture practices that align with the conservation of aquatic resources.

Conclusion

The fish diversity study in Klong Sak Nga identified a total of 19 families, 36 genera, and 38 species. The family Cyprinidae had the highest number of species with 15. The species composition by number showed that *Mystacoleucus marginatus* had the highest E-value at 9.25%, followed by *Schistura waltoni* and *Systomus rubripinnis*, both at 7.68%. survey station 2 had the highest species diversity index and evenness index, at 3.28 and 0.91, respectively. Considering the monthly survey data, August 2022 had the highest diversity and evenness indices, at 3.34 and 0.92, respectively. The dissolved oxygen levels, water temperatures and pH ranged from 4.11 to 8.24 mg/L, 23.21 to 30.03 °C, and 7.30 to 8.23 respectively. These conditions are suitable for aquatic life. These data highlight the current status of Klong Sak Nga, providing a foundation for planning the conservation and management of fish resources. It promotes sustainable use and supports aquaculture practices that align with the conservation of aquatic resources.

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