JPPIPA 11(7) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

# The Potential of Fish in Lake Padong Pangeran Pati as a Biology Learning Resource

Putri Dwi Setya Ningsih[1], Eko Dewantoro[2*], Mahwar Qurbaniah[1]

[1] Biology Education Program, Faculty of Teacher Training and Education, University Muhammadiyah Pontianak, West Borneo, Indonesia.
[2] Aquaculture Study Program, Faculty of Fisheries and Marine Sciences, University Muhammadiyah Pontianak, West Borneo, Indonesia.

Received: May 03, 2025
Revised: June 03, 2025
Accepted: July 25, 2025
Published: July 31, 2025

Corresponding Author:
Eko Dewantoro
eko.dewantoro@unmuhpnk.ac.id

DOI: 10.29303/jppipa.v11i7.11569



**Abstract:** Several areas in Sanggau Regency have fish diversity that has the potential to be developed as a biology learning resource, one of which is Lake Padong Pangeran Pati. This study aims to identify the types of fish found in the lake and analyze their potential and suitability as a biology learning resource. The method used is descriptive qualitative with purposive sampling techniques. The analysis was carried out through direct observation and expert assessment of the relevance of the fish potential to biology subject matter at the junior and senior high school levels. The results showed that Lake Padong has fish diversity relevant to several biology topics such as classification of living things, ecology, biodiversity, as well as reproductive systems and animal tissue, with a feasibility percentage of 69.43%. This potential is considered feasible to be used as an alternative learning resource. The study recommends utilizing local potential in contextual learning to enhance students' understanding of biological concepts.

**Keywords:** Biodiversity; Endemic fish; Lake Padong; Learning resource

## Introduction

Biology education plays a vital role in introducing students to biodiversity and its interaction with the environment (Fitriati et al., 2023). However, in practice, biology learning in schools still heavily relies on textbooks and often fails to incorporate local potential as learning resources (Hayati et al., 2019). In fact, place-based learning approaches can make lessons more meaningful and contextual (Pratiwi et al., 2022).

Learning resources based on local potential offer several advantages (Prawati et al., 2024). They not only bring students closer to real and relevant learning objects, but also enhance teacher creativity and student engagement (Nurlina et al., 2016). Local potential is not only educationally valuable but also holds ecological and economic significance that supports sustainable education (Susilo, 2018). In the context of biology education, natural resources found around the school environment—such as local plants, animals, and ecosystems—hold great promise for integration into the curriculum (Yokhebed et al., 2016).

Unfortunately, many schools have yet to fully optimize this potential. Interviews with biology teachers at SMAN 2 Sekayam revealed that the teaching process remains dominated by textbook use. There has been little effort to develop local-potential-based learning resources, even though the Sekayam area in Sanggau Regency possesses rich biodiversity (Jayanti et al., 2017). One notable example is Lake Padong Pangeran Pati, a freshwater ecosystem known for its variety of local fish species. This ecological richness has not yet been utilized as a learning medium or teaching material (Nurdiana et al., 2024).

This research is important because it offers an innovative approach to biology education by utilizing local potential (Aulianti et al., 2024). It aligns with the Merdeka Curriculum, which emphasizes project-based and contextual learning (Ananda et al., 2024). This study also offers a new contribution by identifying the types of

**How to Cite:**
Ningsih, P. D. S., Dewantoro, E., & Qurbaniah, M. (2025). The Potential of Fish in Lake Padong Pangeran Pati as a Biology Learning Resource. *Jurnal Penelitian Pendidikan IPA*, *11*(7), 1082–1091. https://doi.org/10.29303/jppipa.v11i7.11569

fish found in Lake Padong Pangeran Pati and analyzing their potential as contextual and applicable biology learning resources. The findings are expected to serve as a model for developing environment-based teaching materials that can be implemented in junior and senior high schools across the Sekayam region (Febriyanda et al., 2022).

Through this approach, students will not only understand biological concepts theoretically but also gain firsthand learning experiences that foster environmental awareness (Aini et al., 2024). Additionally, this study is expected to encourage teachers to be more creative and innovative in designing instructional materials that reflect their local context (Lestari et al., 2024).

## Method

This study used a mixed methods approach, which is a combination of qualitative and quantitative approaches. This approach was chosen to obtain comprehensive data on the potential of fish in Lake Padong Pangeran Pati as a biology learning resource. Qualitative data were used to explore the views and experiences of the local community, while quantitative data were used to assess biology teachers' responses to the feasibility of fish potential as teaching materials, so that they are expected to provide relevant responses to research problems (Lenaini, 2021).

*Sampling techniques and Data Collection Tools.*

This study utilized both quantitative and qualitative data. Quantitative information was obtained through closed-ended questionnaires completed by biology teachers, generating scores and percentages that reflect their perceptions of the potential of fish as a learning resource. Meanwhile, qualitative data were collected through semi-structured interviews with fishermen, local community members, lake managers, and biology teachers to enrich the understanding of the research context and findings. The types of data included numerical responses from the questionnaires and narrative data from interviews. Primary data sources were selected using a purposive sampling technique, based on specific criteria relevant to the research objectives, such as involvement in fisheries activities, lake management, or experience in teaching biology (Lenaini, 2021).

The instruments used consisted of: A closed-ended questionnaire for teachers, designed to obtain numerical data on perceptions regarding the educational potential of fish. A semi-structured interview guide to explore in-depth insights from fishermen, community members, and lake managers; Documentation to support data validity. Primary data refer to information directly collected from research subjects using appropriate measuring tools (Abdullah et al., 2024). In this study, interviews and teacher questionnaire responses served as the main sources for identifying the potential and diversity of fish as biology learning materials. In contrast, secondary data were indirectly obtained through supporting documents such as records, archives, books, journals, and historical reports (Arifin, 2016).

The potential of learning resources will be reviewed from the syllabus to determine the potential of learning resources. Researchers distributed questionnaires to 8 teachers from 4 different schools by giving 12 questions from 6 indicators that had been validated by expert validators. The 12 questions can be seen in Table 1.

**Table 1.** Questions Related to Learning Resource Indicators from Research

| Indicator | Question Description | (+) | (-) |
|---|---|---|---|
| Clarity of potential | The potential of fish in Padong Pangeran lake as a biology learning resource must be in accordance with the core competencies and basic competencies. | √ | |
| | Fish potential is difficult to relate to biology learning. | | √ |
| Clarity of purpose | Learning objectives can be achieved from the results of research on the potential of fish in Padong Pangeran Lake. | √ | |
| | Research on the potential of fish in Padong Pangeran Lake as a biology learning resource is not in accordance with the learning objectives. | | √ |
| Clarity of material objectives | Local potential-based learning resources can make biology lessons more interesting to learn. | √ | |
| | Research results on fish potential cannot help learners in learning. | | √ |
| Clarity of information disclosed | The potential of fish as a biology learning resource has information that is in line with the TP and CP. | √ | |
| | Research results on the potential of fish as a biology learning resource provide less clear information. | | √ |
| Clarity of exploration guidelines | The potential of fish as a biology learning resource can be used well by students and teachers. | √ | |
| | The results of research on fish potential have not been able to help students solve problems that exist in biology learning. | | √ |

| Indicator | Question Description | (+) | (-) |
|---|---|---|---|
| Clarity of expected gains | The results of research on the potential of fish as a source of biology learning are expected to help students understand the material. | √ | |
| | The results of research on fish potential have not been used as a biology learning resource. | | √ |

The use of a guttman scale is unidimensional and cumulative. The statements in this scale are arranged heirarchically, from the most acceptable to the most difficult. Furthermore, the percentage score of the plant questionnaire results was analyzed based on the potential rubric indicator criteria as in table 2.

**Tabel 2.** Rubric of Potential Fish Categories in Padong Lake Prince Pati as a Biology Learning Resource

| Presentation | Interpretation |
|---|---|
| 81% ≤ score ≤ 100% | Very feasible |
| 61% ≤ score ≤ 80% | Can be done |
| 41% ≤ score ≤ 60% | Feasible enough |
| 21% ≤ score ≤ 40% | Less feasible |
| 0% ≤ score ≤ 20% | Not worth it |

To calculate the percentage of teachers' questionnaires about the potential of fish in Padong Lake Prince Pati as a biology learning resource, the following equation was used:

$$P = \frac{f}{N} x\ 1 \quad (1)$$

Description:
P = Percentage number
F = Number of scores obtained
N = maximum score

## Result and Discussion

*Result*

Based on research conducted from January to March 2025, Lake Padong Pangeran Pati in Balai Karangan Village, Sanggau Regency, has 15 species of fish. This lake, spanning over 10 hectares, serves as a habitat for various fish species, making it a potential source for biological learning. The study employed techniques such as interviews, observations, and documentation, involving 31 informants from among fishermen, local residents, and lake managers.

**Tabel 3**. Types of Fish in Padong Lake Prince Pati

| Fish Species | Classification | Description |
|---|---|---|
|  Baung fish | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo : Siluriformes<br>Family : Bagridae<br>Genus : Hemibagrus<br>Spesies : *Hemibagrus nemurus* | Baung fish have a brown color on the body from head to body, while the sides and bottom are white. The body shape is elongated, has no scales, and feels slippery. This fish has three pairs of whiskers around the mouth and one pair near the breathing hole. The whiskers can grow to reach the anal fin. Its dorsal fin has hard, pointed fingers. The pectoral and dorsal fins are also equipped with spines (Firiola et al., 2022). |
|  Betok fish | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo : Anabantiformes<br>Family : Anabantidae<br>Genus : Anabas<br>Spesies : *Anabas testudineus* | Betok fish is a species of fish that can be found in wetlands and rice fields in Indonesia. Usually, betok fish are often seen towards the end of the dry season or during the rainy season. The wide, sturdy head, with a large, tip-top mouth, has a body that is flat at the back and large at the front (Marnn et al., 2025) |
|  Buing fish | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo: Cypriniformes<br>Family : Cyprinidae<br>Genus : Cosmochilus<br>Spesies : *Cosmochilus falcifer* | *Cosmochilus falcifer* is a river fish that has a high economic value. *Cosmochilus falcifer* has smooth-edged lips, except for the upper lip which is dentate. Mouth at the tip, sloping, wide and extending past the facial margin of the eye; 2 maxillary lashes. |

Cork fish

Kingdom : Animalia
Phylum : Chordata
Class : Actinopterygii
Ordo : Anabantiformes
Family : Channidae
Genus : Channa
Spesies : *Channa striata*

The morphology of cork fish (*Channa striata*) is characterized by a long and cylindrical body shape. This fish has a black back color from head to tail, while the belly is white. Its body is covered with scales, and it has a wide mouth that can be extended or ejected. The dorsal fin is longer than the anal fin, and the caudal fin is quite long and wide, resembling a fan. It is also equipped with pectoral and ventral fins (Pariyanto et al., 2021)

Gourami fish

Kingdom : Animalia
Phylum : Chordata
Class : Actinopterygii
Ordo : Anabantiformes
Family : Osphronemidae
Genus : Osphronemus
Spesies : *Osphorenemus gouramy*

Gourami fish have a typical body shape with a flat body (compressed), a small mouth with the lower lip protruding compared to the upper lip, the tip of the mouth can be popped up so that it looks snouted (Kristina et al., 2015)

Guppy fish

Kingdom : Animalia
Phylum : Chordata
Class : Actinopterygii
Ordo : Cyprinodontiformes
Family : Peochiliidae
Genus : Poecilia
Spesies : *Poecilia reiculata*

These fish have the ability to adapt well, making guppy farming very easy. (Nurlina et al., 2016) Guppies lay their eggs inside the body of their female parent. Generally, the size of male guppies is smaller than female guppies, but the colors of male guppies are more attractive and varied. The guppy (*Poecilia reticulata*) is popular for its captivating variety of colors. The shape of the tail varies, such as fan-like, round, or wide (Nugroho et al., 2021)

Catfish

Kingdom :Animalia
Phylum : Chordata
Class : Actinopterygii
Ordo : Cypriniformes
Family : Siluriformes
Genus : Clarias
Spesies : *Clarias batrachus*

Catfish have a smooth, watery skin surface, without scales, and are equipped with arborescent organs, which allow catfish to survive in mud or water with low oxygen levels. Dark or gray catfish have a slender, flat downward body, with a flattened head and four pairs of long whiskers that serve as feelers (Manik et al., 2022)

Goldfish

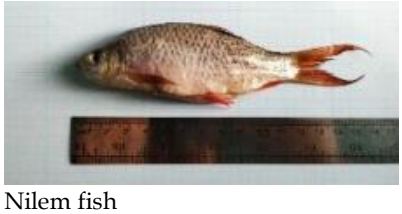
Kingdom : Animalia
Phylum : Chordata
Class: Actinopterygii
Ordo : Cypriniformes
Family : Cyprinidae
Genus : Cyprinus
Spesies : *Cyprinus carpio*

In general, the characteristics of this fish are: the body is slightly long and flat, there are six dark vertical stripes on the caudal fin, on the body there are ten vertical stripes, and on the tail there is a transverse stripe with a black tip (Arifin, 2016)

Tilapia

Kingdom : Animalia
Phylum : Chordata
Class : Actinopterygii
Ordo : Cichiliformes
Family : Cichilidae
Genus : *Oreochromis*
Spesies : *Oreochromis nilotus*

Tilapia (*Oreochromis niloticus*) is one type of freshwater fish that is widely cultivated due to its ability to adapt to less than ideal environmental conditions and is easy to spawn, so its distribution in nature is very wide, both in tropical and temperate regions. Tilapia are omnivorous and microphagous. In general, tilapia live in freshwater. It inhabits places with a pH between 6 and 8.5 and the best temperature is between 250-300°C. (Purnomo et al., 2022)



Nilem fish

Kingdom : Animalia
Phylum : Chordata
Class : Actinopterygii
Ordo : Cypriniformes
Family : Cyprinidae
Genus : Osteochilus
Spesies : *Osteochilus vitattus*

Nilem fish have characteristics that are almost similar to carp, which have two fine hairs at the corners of their mouths that function as a flavoring tool. The mouth is pointed with a folded snout (Ramadhan et al., 2024). Patchouli fish are included in the group of all-feeding fish because they can consume

| | | |
|---|---|---|
| | | phytoplankton, zooplankton, and natural food debris (Haris et al., 2018). |
|  Patin fish | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo : Siluriformes<br>Family : Pangasiidae<br>Genus : Pangasius<br>Spesies : *Pangasius hypophthalmus* | included in the category of fish that are high in protein and have moderate fat content (Hashim et al., 2015). The maximum body length can reach 120 cm, which is quite a large size for domestic freshwater fish. The head of catfish has a rather flat shape with the mouth located at the tip of the head, slightly below, which is characteristic of the catfish group. At the corners of its mouth there are two pairs of short whiskers that function as a sense of touch (Fadhilah et al., 2023) |
|  Seluang fish | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo : Cypriniformes<br>Family : Cyprinidae<br>Genus : Rasbora<br>Spesies : *Rasbora trilineata* | Seluang fish are known to eat plants belonging to the Spermatophyta group as well as algae that grow in rivers (Haris et al., 2018). In every 100 grams of seluang fish, there are nutritional contents that include 47.54 mg of protein, 12.36 mg of fat, 21.53 kilocalories, 2.9 ppm of iron, 0.38 ppm of copper, and 3.64 ppm of zinc (Fitriyani, 2018) |
|  Swamp sepat | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo : Anabantiformes<br>Family : Osphronemidae<br>Genus : *Trichogaster*<br>Spesies : *Trichogaster trichopterus* | The swamp trout (*Trichogaster trichopterus*) is known by the international name "three spot gourami" because it has two black dots on its body and one that looks a bit like an eye, making a total of three black dots. The swamp sepat is a type of fish that lives in freshwater and belongs to the Osphronemidae family (Syazali et al., 2022) |
|  Siamese bream | Kingdom : Animalia<br>phylum : Chordata<br>Class : Actinopterygii<br>Ordo : Anabantiformes<br>Family : Osphronemidae<br>Genus : Trichopodus<br>Spesies : *Trichopodus pastoralis* | Siamese bream has a long body, flattened from the sides (depressed), with its body height 2.2-3 times the standard length. The pectoral fins are longer than the head. The body is covered in scales and the mouth is located at the tip of the nose (terminal). The mouth is small and protractile (Akbar, 2016) |
|  Toman fish | Kingdom : Animalia<br>Phylum : Chordata<br>Class : Actinopterygii<br>Ordo: Anabantiformes<br>Family : Channidae<br>Genus : Channa<br>Spesies : *Channa micropeltes* | Toman fish (Chana Migropeltes) is a freshwater fish species found in the West Kalimantan region, which is thought to have quite high protein levels, especially albumin protein which is almost equivalent to cork fish. Protein levels in cork and toman fish reach 0.803 mg/ml (Pieter et al., 2024) |

**Tabel 4.** Categories of Fish Potential in Padong Lake Prince Pati as Biology Learning Resources

| Aspects | Percentage | Interpretation |
|---|---|---|
| Clarity of Potential | 66.66% | Can be done |
| Clarity of Purpose | 66.66% | Can be done |
| Appropriateness of Purpose | 66.66% | Can be done |
| Clarity of Information Disclosed | 66.66% | Can be done |
| Clarity of Exploration Guidelines | 83.33% | Very feasible |
| Clarity of Expected Results | 66.66% | Can be done |
| Average | 69.43% | Can be done |

**Tabel 5.** Teaching Materials for Junior High School Science in Accordance with the Potential of Fish in Lake Padong Pangeran Pati

| Class | Material | Suitability | |
|---|---|---|---|
| | | Yes | No |
| X | Classification of Living Thing | √ | |
| | Ecology and Biodiversity of Indonesia | √ | |
| IX | Plant and Animal Breeding Systems | √ | |

**Tabel 6.** Teaching Material for High School Biology in Accordance with the Potential of Lake Padong Pangeran Pati

| Class | Material | Suitability | |
|---|---|---|---|
| | | Yes | No |
| X | Diversity of Living Things, Interactions, and Their role in Nature | √ | |
| XI | Animal Tissue Structure and Function | √ | |
| XII | Growth and evelopment of Living Things | √ | |

*Discussion*

*Types of Fish in Padong Lake Prince Pati*

Based on Table 3, there are 15 types of fish found in Lake Padong Pangeran Pati including, baung fish, betok fish, kod fish, gabus fish, gurami fish, guppy fish, catfish, carp, mujair fish, nilen fish, catfish, seluang fish, sepat rawa fish, sepat siam fish, and toman fish.

The baung fish has a white color. The head of the snapper is flat and wide. The body shape of the snapper is elongated and the front part is slightly flat. The mouth is located at the tip of the snout, facing forward (terminal). The tail of the snapper is bifurcated, with both fins pointed. The dorsal fin has hard rays and sharp spines, the pectoral fins have sharp spines that serve as a defense mechanism, the ventral fins do not have hard rays, the caudal fin is forked or bifurcated, the anal fin has hard rays, and the adipose fin is a small fleshy fin containing adipose tissue located on the back of the fish near the caudal fin. adipose fin is a small fleshy fin containing adipose tissue (fat) located on the back of the fish near the caudal fin (Ubabuddin, 2019).

The betok fish has a green body with a blackish back and white belly. The dorsal fin is dark brown. The head of the betok fish is blunt and slightly rounded at the front. The body of the betok fish is flat, elongated, and slightly widened at the sides. The mouth of the betok fish is elongated and can be protracted (protactile). The tail of the betok fish is rounded or curved. The dorsal fin extends from the back to the base of the tail fin, with the front part of the dorsal fin having hard, pointed rays. The rear portion of the dorsal fin has soft rays. The anal fin is shorter than the dorsal fin. The pectoral fins do not have hard rays. The ventral fins consist of 1 hard ray and 5 soft rays. The caudal fin is rounded or slightly rounded.

*Cosmochilus falcifer* the dorsal fin is blackish in color. It is flat (compact) and slightly widened. The mouth is smooth, except for the upper lip, which is curved. The mouth is pointed, oblique, wide, and extends beyond the edge of the face from the eye. This fish has a dorsal fin with 9 rays, an anal fin with 8 rays, a pectoral fin with 15 rays, and a forked caudal fin. The most distinctive feature of this fish is its dorsal fin, which measures 8.5 cm in length.

Cork fish is blackish on top and white on the belly. The head of the cork fish has scales that are large and flat. The body shape of the cork fish is elongated and rounded (streamline). The mouth is located at the tip of the head, facing forward, this position is called terminal. Cork fish have a rounded or rounded tail (rounded). Cork fish have various types of fins dorsal fin, caudal fin, anal fin, pectoral fin, and ventral fin. Among all these fins, the dorsal fin of cork fish is very prominent because of its long size, almost resembling the length of its body. Meanwhile, the caudal fin, known as the caudal fin, is located at the back of the body and plays an important role in its movement (Suryaningsih, 2021).

The gourami fish is brownish black in color, the head of the gourami is medium in size and slightly blunt in shape, the gourami fish has a rather long body shape, flattened to the side (compressed) and wide and scale type (ctenoid), the gourami mouth has a terminal shape, the gourami tail is round or slightly curved (rounded), and gourami have a dorsal fin (dorsal fin) has hard and soft fingers, has an elongated and whip-shaped ventral fin, pectoral fin (ventral fin) consists of hard and soft fingers, caudal fin (caudal fin) is rounded and anal fin (anal fin) whose length reaches the base of the tail (Muthoharoh, 2023).

Guppies are silver-brown in color with a head shape (Caput) that tends to taper forward. The body shape of the guppy is flattened to the side (compressed) and elongated. The mouth of the guppy is located at the tip of the head, facing forward (terminal). The tail of the guppy is round like a fan. Guppy fins have five fins, namely the dorsal fin located on top of the fish, the pectoral fin located on the side of the body, the ventral fin located under the body, in front of the anal fin, the anal fin located under the body behind the anus, and the caudal fin located at the rear end of the fish (Hasnawati, 2021).

Catfish are grayish black in color, the head of the catfish is flat and hard, the shape of the catfish body is elongated and slightly rounded in the middle, with a slightly flattened back to the side (depressed), the mouth of the catfish is located at the end of the head facing up (terminal), the shape of the catfish tail is rounded or rounded, and the catfish fins have several types of fins consisting of tungfal fins and paired fins. Single fin consists of dorsal fin, caudal fin, anal fin. While paired fins consist of pectoral fin, and ventral fin (Muthoharoh, 2023).

Goldfish have a black on the back and yellowish white on the belly, the carp's head is medium-sized, neither too large nor too small, and blends in with its body proportionally. The shape tends to be blunt at the front, with a rounded, non-tapered snout. Goldfish have a slightly elongated body shape and flatten upright, the mouth of the goldfish is small and can be reflected

(protactile) with the position of the mouth located at the tip of the head, facing forward this position is called terminal, the tail of the goldfish is forked, carp fins have dorsal fins (dorsal) elongated and located on the surface of the body, opposite the surface of the pelvic fins (ventral) the back of the dorsal fin has hard fingers while the end is serrated, the anal fin (anal) the back also has hard fingers, the caudal fin (Caudal) is forked (Kabani et al., 2023).

Tilapia is reddish yellow with black spots on its body, the head of tilapia is pointed. Tilapia have a flattened body shape (trenches) sideways and elongated, the fish mouth is located at the bottom of the head, slightly back from the leading edge of the snout (subterminal), the caudal fin is homocercal, the dorsal fin extends from the top of the gill lid to the top of the caudal fin, the caudal fin is homocercal, the anal fin is slightly elongated, the pectoral fin and ventral fin are small.

The nilem fish is silver in color, the pectoral fins and pelvic fins are reddish-orange with the head tending to taper towards the snout. The body shape of the nilem fish is slightly elongated and flattened. The mouth of the tilapia is located at the tip of the snout, facing forward (terminal). The hippopotamus has five fins, namely the caudal fin of the hippopotamus is forked, with two equal lobes, the dorsal fin is elongated and located on the dorsal surface, the pectoral fin is located on the side of the body, the ventral fin (ventral fin) is located behind the pectoral fin, the anal fin.

Patin fish are gray-black in color and white on the abdomen. The head of the catfish is flat and wide, similar to the head of a catfish. The body of the catfish is elongated and flat, the mouth of the catfish is located at the tip of the head, slightly downward (subterminal). Fins: catfish consists of several fins, including the dorsal fin which has one hard radius that becomes a serrated patil behind it and 7 soft fingers, the caudal fin is shaped like scissors or forked, pectoral fin is a small fleshy fin containing fatty tissue (adipose) located on the back of the fish close to the caudal fin, anal fin and ventral fin are formed by a stretch of weak and neatly arranged fingers (Suwarni, 2015).

Seluang fish the head tends to taper towards the snout, with the front of the head slightly rounded. The body shape is slender and elongated, and the mouth is generally located at the tip of the snout, facing forward. Some species may have a slightly upward-facing (subterminal) mouth position. The caudal fin is forked, the dorsal fin is located at the back of the fish, the anal fin is located at the bottom, close to the anus, the pectoral fins are located on the sides of the body, and the pelvic fins are located below (Latifah et al., 2023).

The swamp sepat has a light brown base color with gray body sides with a slight blue-green tint with black spots in the middle of the body and near the tail. The head is pointed, with a flattened (compressed) body shape and bilateral symmetry. The mouth of the swamp bream is located at the tip of the snout, facing forward (terminal). It has whip-like elongated pelvic fins, dorsal fins, pectoral fins located on the sides of the body, and anal fins that extend backwards, with a perpendicular caudal fin.

Siamese bream fish are brown in color with dark brown-black fins. The head of the Siamese sepat fish is pointed with a long and flat body shape (compress). The small mouth can be inflated in a terminal position. It has an elongated and whip-like ventral fin, a dorsal fin, a pectoral fin located on the side of the body, and an anal fin extending backwards, with an upright caudal fin.

The toman fish is blackish brown in color, the head of the toman fish is large, flat, and slightly oval. The body shape of the toman fish is elongated and round like a tube (streamline). The mouth of the toman fish is wide and located at the end of the snout which is called terminal. The dorsal and anal fins extend to the tail, the caudal fin has a rounded or rounded tail, the pectoral fins and pelvic fins are medium-sized.

*Analysis of the potential of fish as a learning resource*

The potential of fish in Lake Padong Pangeran Pati as a biology learning resource based on learning criteria, sources obtained based on the results of questionnaire filling by biology teachers. The selection of learning materials should be based on the objectives to be achieved in the learning process or the competencies that have been set. Quality learning resources should be able to provide significant learning experiences for students, so as to improve their thinking skills (Eurika et al., 2017).

Table 4 shows 6 requirements for learning resources, namely clarity of potential, clarity of purpose, clarity of objectives, clarity of information disclosed, clarity of exploration guidelines, clarity of expected results. There is great potential for objects and their symptoms to be used as learning resources for biology problems based on curriculum concepts. The research object—fish species found in Lake Padong Pangeran Pati—demonstrates strong potential as a contextual biology learning resource aligned with the curriculum. When integrated into relevant learning themes, this potential can support more engaging and contextualized learning activities for students (Purbosari et al., 2022).

The assessment of the six aspects shows that five aspects, namely clarity of potential, clarity of targets, alignment with objectives, clarity of information, and clarity of expected results, each received a score of 66.66%, which is categorized as "acceptable." Meanwhile, the exploration guidance aspect received the highest score of 83.33%, which is interpreted as "highly acceptable." Clarity of potential refers to the

availability of suitable objects in the field, particularly the diversity of fish in Lake Padong Pangeran. This biodiversity allows students to conduct direct exploration, enhancing experience-based learning.

The clarity of the exploration guidelines received a score of 83.33%, categorized as highly feasible. Two teachers responded to the teacher response questionnaire with differing answers. This indicates that the study has the potential to enhance students' learning motivation and uncover the value of local wisdom. The research findings were obtained through a structured procedure, including the determination of research objects, use of tools and materials, development of working methods, selection of data analysis techniques, and drawing of conclusions. The research involved identifying subjects such as fishers, local communities, and lake managers, and utilized instruments such as books, pens, cameras, and interview guides.

Thus, the suitability of the material with the potential of fish in Lake Padong Pangeran Pati as a learning resource is assessed based on the biology syllabus for junior high school grades VII, VIII, and IX, and the high school syllabus for grades X, XI, and XII. The amount of teaching material that is suitable for the potential of these fish can be seen in Table 5.

## Conclusion

This study identified a diversity of fish species in Lake Padong Pangeran Pati, consisting of both wild and cultivated types. The analysis results indicate that the fish in the lake have feasible potential to be utilized as biology learning resources, with an eligibility score of 69.43%. This potential is relevant for supporting the teaching of various biology concepts, such as classification, ecology, biodiversity, and reproductive systems. These findings suggest that local environments can serve as contextual learning resources that enrich students' learning experiences and promote the integration of local wisdom into biology education.

**Acknowledgments**
We would like to express our gratitude to the people of Balai Karangan village for their hospitality and willingness to share information about fish species, as well as to the teachers of SMPN 1 Sekayam, SMPN 2 Sekayam, SMAN 1 Sekayam, and SMAN 2 Sekayam.

**Author Contributions**
Conceptualization, PDSN and ED; methodology, PDSN and MQ; validation, ED and MQ; formal analysis, PDSN; investigation, PDSN and MQ; resources, ED; data curation, MQ; writing—original draft preparation, PDSN and MQ; writing—review and editing, ED; visualization, PDSN and ED. All authors have read and agreed to the published version of the manuscript.

**Funding**
This study was independently funded by the authors.

**Conflict of Interest**
The authors declare no conflict of interest.

## References

Abdullah, N., Badruli, M., & Nanda, F. M. (2024). Analisis Keterampilan Kolaborasi Siswa Sekolah Dasar Dengan Menggunakan Media Pembelajaran Berbasis Games Educaplay Pada Pembelajaran IPAS. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *9*(3), 2548–6950. https://doi.org/10.23969/jp.v9i3.16995

Aini, S., Setiadi, A. E., & Sunandar, A. (2024). Development of encyclopedia based on local vegetables North Kayong Regency as biology learning media. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *10*(1), 38–46. https://doi.org/10.22219/jpbi.v10i1.31557

Akbar, J. (2016). *Pengantar Ilmu Perikanan dan Kelautan (Budi Daya Perairan)*. Lambung Mangkurat University Press.

Ananda, D. P., Qurbaniah, M., & Rahayu, H. M. (2024). Implementation of the Environmental Exploration Learning Model (JAS) Assisted by Google Lens on the Scientific Literacy of Taman Mulia High School Students. *Jurnal Penelitian Pendidikan IPA*, *10*(8), 4480–4485. https://doi.org/10.29303/jppipa.v10i8.8156

Arifin, M. Y. (2016). Pertumbuhan Dan Survival Rate Ikan Nila (Oreochromis. Sp) Strain Merah Dan Strain Hitam Yang Dipelihara Pada Media Bersalinitas. *Jurnal Ilmiah*, *16*(1), 159–166. Retrieved from https://media.neliti.com.

Aulianti, D., Ari, S., & Rahayu, H. M. (2024). Development of Encyclopedia Based on Ethnogastronomy of Sambas Malay Porridge. *Jurnal Penelitian Pendidikan IPA*, *10*(10), 7993–8001. https://doi.org/10.29303/jppipa.v10i10.8375

Eurika, N., & Hapsari, A. I. (2017). Analisis potensi tembakau na oogst sebagai sumber belajar biologi. *Jurnal Biologi Dan Pembelajaran Biologi*, *2*(2), 11–22. Retrieved from http://jurnal.unmuhjember.ac.id/index.php/BIOMA/article/view/824

Fadhilah, M. N., Sayuti, M., & Salampessy, R. B. S. (2023). Karakteristik Fillet Patin (Pangasius sp.) Beku. *Jurnal Perikanan Unram*, *13*(1), 180–191. https://doi.org/10.29303/jp.v13i1.460

Febriyanda, Y., Sunandar, A., & Setiadi, A. E. (2022).

Habitat Utilization by Long-Tailed Monkeys (Macaca fascicularis) in Gunung Palung National Park as a Biology Learning Resource. *Jurnal Penelitian Pendidikan IPA*, *8*(5), 2392–2398. https://doi.org/10.29303/jppipa.v8i5.1869

Firiola, S., & Elvyra, R. (2022). Morphometric Characteristics of Baung Fish (Hemibagrus hoevenii, Bleeker 1846) in Langgam and Tambak Village, Kampar River, Riau Province. *Biospecies*, ***15***(2), 61–72. Retrieved from https://www.online-journal.unja.ac.id/biospecies/article/view/12887

Fitriati, R., Yuniastuti, A., & Dewi, N. K. (2023). Development of an Interactive E-booklet on Fish Diversity at TPI Tambaklorok to Improve Science Process Skills of High School Students. *Jurnal Penelitian Pendidikan IPA*, *9*(6), 4326–4330. https://doi.org/10.29303/jppipa.v9i6.3614

Fitriyani, E. (2018). The Effect of Temperature and Time of Extraction Toman Fish (Channa micropeltes) become to Albumin Powder. *Jurnal Galung Tropika*, *7*(2), 102–114. Retrieved from https://www.jurnalpertanianumpar.com/index.php/jgt/article/view/318/pdf_31

Haris, H., Mutiara, D., & Arsyad, N. (2018). Kebiasaan Makan Ikan Seluang (Rasbora argyrotaenia) di Perairan Sungai Musi. *Sainmatika: Jurnal Ilmiah Matematika Dan Ilmu Pengetahuan Alam*, *15*(2), 123. https://doi.org/10.31851/sainmatika.v15i2.2244

Hashim, R. B., Jamil, E. F., Zulkipli, F. H., & Daud, J. M. (2015). Fatty acid compositions of silver catfish, Pangasius sp. farmed in several rivers of Pahang, Malaysia. *Journal of Oleo Science*, *64*(2), 205–209. https://doi.org/10.5650/jos.ess14191

Hasnawati, H. (2021). Pengelolaan Sumber Belajar dalam Pembelajaran Anak Pada TK Handriani. *Cokroaminoto Journal of Primary Education*, *4*(2), 93–101. https://doi.org/10.30605/cjpe.422021.612

Hayati, I. A., Rosana, D., & Sukardiyono, S. (2019). Pengembangan modul potensi lokal berbasis SETS. *Jurnal Inovasi Pendidikan IPA*, *5*(2), 248–257. https://doi.org/10.21831/jipi.v5i2.27519

Jayanti, U. N. A. D., Susilo, H., & Suarsini, E. (2017). Analisis Kebutuhan Bentuk Sumber Belajar dan Media Pembelajaran Biologi Berbasis Potensi Lokal untuk Kelas X SMA di Provinsi Lampung. *Prosiding Seminar Pendidikan IPA Pascasarjana UM*, *2*, 591–599. Retrieved from http://pasca.um.ac.id/conferences/index.php/ipa2017/article/view/1122

Kabani, R., Setiadi, A. E., & Sunandar, A. (2023). Kearifan Lokal Masyarakat Desa Batu Berian dalam Strategi Konservasi Sumber Daya Laut Sebagai Sumber Belajar Biologi. *Diklabio: Jurnal Pendidikan Dan Pembelajaran Biologi*, *7*(2), 212–219. https://doi.org/10.33369/diklabio.7.2.212-219

Kristina, M., & Sulantiwi. (2015). Sistem Pendukung Keputusan Menentukan Kualitas Bibit Ikan Gurame Di Pekon Sukosari Menggunakan Aplikasi Visual Basic 6.0. *Jurnal Technology Acceptance Model*, *4*, 26–33. Retrieved from www.stmikpringsewu.ac.id

Latifah, L., Zainuddin, M., & Surayanah, S. (2023). Analisis Kebutuhan Bahan Ajar Matematika Siswa Kelas V Sdn Kepanjenlor 1. *Wahana Sekolah Dasar*, *31*(2), 115. https://doi.org/10.17977/um035v31i22023p115-121

Lenaini, I. (2021). Teknik Pengambilan Sampel Purposive Dan Snowball Sampling. *HISTORIS: Jurnal Kajian, Penelitian & Pengembangan Pendidikan Sejarah*, *6*(1), 33–39. Retrieved from http://journal.ummat.ac.id/index.php/historis

Lestari, L., Qurbaniah, M., & Setiadi, A. E. (2024). Development of an Encyclopedia of Traditional Foods Preserved by the Malay Tribe of Kayong Utara Regency as a Biology Learning Resource. *Jurnal Penelitian Pendidikan IPA*, *10*(11), 8612–8623. https://doi.org/10.29303/jppipa.v10i11.8048

Manik, R. R. D. S., Handoco, E., Tambunan, L. O., Tambunan, J., & Sitompul, S. (2022). Socialization of Catfish (Clarias sp.) Using Semi-Artificial Spawning in Aras Village, Batu Bara Regency. *Mattawang: Jurnal Pengabdian Masyarakat*, *3*(1), 47–51. https://doi.org/10.35877/454RI.mattawang822

Marnn, P., Ali, H., Jiang, H., Liu, Y., Li, Z., Ahmed, S., Yang, T., Li, Z., & He, C. (2025). Modeling the Impact of Ecological Restoration on Waterbird Diversity and Habitat Quality in Myanmar's Moe Yun Gyi Wetland. *Biology*, *14*(5), 519. https://doi.org/10.3390/biology14050519

Muthoharoh, A. (2023). Keanekaragaman Bivalvia Laut di Pesisir Pasuruan sebagai Potensi Sumber Belajar Biologi Kelas X SMA. *Jurnal Pendidikan Biologi Undiksha*, *10*(2), 26–38. Retrieved from https://ejournal.undiksha.ac.id/index.php/JJPB/index

Nugroho, A. A., Muzaki, A., Anggraini, A. I., & Haryanti, D. (2021). Studi Perilaku Interaksi Ikan Guppy Jantan Dan Betina (Poecilia reticulata) Pada Masa Reproduksi. *Teknosains: Media Informasi Sains Dan Teknologi*, *15*(3), 287. https://doi.org/10.24252/teknosains.v15i3.20582

Nurdiana, N., Rahayu, H. M., & Qurbaniah, M. (2024). Ethnobotany Study Tradition Buang Abu Melayu Sambas as a Biology Learning Resource. *Jurnal Penelitian Pendidikan IPA*, *10*(10), 7894–7903. https://doi.org/10.29303/jppipa.v10i10.8096

Nurlina, & Zulfikar. (2016). Immersion time effect of guppy brood fish (Poecilia reticulate) in honey of

onto male sex ratio (sex reversal) guppy fish. *Acta Aquatica*, *2*(2009), 75–80. https://doi.org/10.29103/aa.v3i2.327

Pariyanto, P., Hidayat, T., & Sulaiman, E. (2021). Studi Populasi Ikan Gabus (Channa striata) Di Sungai Air Manna Desa Lembak Kemang Kabupaten Bengkulu Selatana. *DIKSAINS: Jurnal Ilmiah Pendidikan Sains*, *1*(2), 53–60. https://doi.org/10.33369/diksains.1.2.53-60

Pieter, J., & Risamasu, P. V. M. (2024). Integrating Ethnoscience in Physics Teaching Materials and its Impact on Student's Science Process Skills and Mastery Concept. *Jurnal Penelitian Pendidikan IPA*, *10*(6), 2948–2955. https://doi.org/10.29303/jppipa.v10i6.7210

Pratiwi, M., Nurusman, A. A., Marifah, D. R., Nugroho, D., & Febrianti, N. (2022). Penyusunan E-Booklet Burung Kicau Yang Dilindungi Di Pasty Sebagai Sumber Belajar Biologi. *Bioilmi: Jurnal Pendidikan*, *8*(1), 40–47. https://doi.org/10.19109/bioilmi.v8i1.12920

Prawati, L., Sunandar, A., & Setiadi, A. E. (2024). Development of an Ethnobotanical Encyclopedia on the Antar Ajong Ceremony. *Jurnal Penelitian Pendidikan IPA*, *10*(7), 3957–3967. https://doi.org/10.29303/jppipa.v10i7.8350

Purbosari, P. P., & Putri, M. N. H. (2022). Penyusunan Leaflet Variasi Morfologi Durian sebagai Sumber Belajar Biologi SMA berdasarkan Hasil Studi Variasi Karakter Morfologi Buah Durian (Durio zibethinus Murr.) di Dusun Dirun Kabupaten Banjarnegara. *Briliant: Jurnal Riset Dan Konseptual*, *7*(3), 737. https://doi.org/10.28926/briliant.v7i3.1081

Purnomo, E., & Chika, S. (2022). Potensi Keragaman Ikan Di Waduk Kedung Ombo Sebagai Penyedia Kebutuhan Pangan Berkelanjutan. *Jurnal Biogenerasi*, *7*(1), 99–107. https://doi.org/10.30605/biogenerasi.v7i1.1679

Ramadhan, S. D., Widodo, M. S., Ariyani, D. F., Pratama, R. N., & Dailami, M. (2024). Pendugaan Fekunditas Induk Betina Ikan Nilem (Osteochilus vittatus) berdasarkan Karakter Morfometrik. *ACROPORA: Jurnal Ilmu Kelautan Dan Perikanan Papua*, *7*(2), 106–112. https://doi.org/10.31957/acr.v7i2.4389

Suryaningsih, Y. (2021). Ekowisata Sebagai Sumber Belajar Biologi Dan Strategi Untuk Meningkatkan Kepedulian Siswa Terhadap Lingkungan. *Nippon Jibiinkoka Gakkai Kaiho*, *124*(4), 539–539. https://doi.org/10.3950/jibiinkoka.124.539

Susilo, M. J. (2018). Analisis potensi lingkungan sekitar sebagai sumber belajar biologi yang berdayaguna. *Proceeding Biology Education Conference*, *15*(1), 541–546. Retrieved from https://jurnal.uns.ac.id/prosbi/article/view/326 06

Suwarni, E. (2015). Pengembangan Buku Ajar Berbasis Lokal Materi Keanekaragaman Laba-Laba Di Kota Metro Sebagai Sumber Belajar Alternatif Biologi Untuk Siswa Sma Kelas X. *BIOEDUKASI (Jurnal Pendidikan Biologi)*, *6*(2), 86–92. https://doi.org/10.24127/bioedukasi.v6i2.336

Syazali, M., & Ilhamdi, M. L. (2022). Keterampilan Proses Sains Mahasiswa Pada Topik Keanekaragaman Hayati Melalui Implementasi Laboratorium Alam Dan Spada Unram. *LENSA (Lentera Sains): Jurnal Pendidikan IPA*, *12*(1), 19–26. https://doi.org/10.24929/lensa.v12i1.174

Ubabuddin. (2019). Hakikat Belajar dan Pembelajaran Di Sekolah Dasar. *IAIS Sambas*, *1*(1), 18–27. https://doi.org/10.37567/jie.v5i1.53

Yokhebed, Titin, & Wahyuni, E. S. (2016). Peningkatan Life Skill melalui Pembelajaran berbasis Keunggulan Lokal Life Skill Improvement through Learning Local Benefits. *Proceeding Biology Education Conference*, *13*(1), 455–460. Retrieved from https://jurnal.uns.ac.id/prosbi/article/view/5794