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# Identification of Fish Species in Kuning River, Sleman Regency, Yogyakarta Special Region

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**Abstract.** One of the ecosystems inhabited by many types of fish is a river. Kuning River is one of the rivers in Sleman Regency, D.I. Yogyakarta, which upstream is located at Mount Merapi. In 2010 there was a large cold lava flood in the Yellow River from Mount Merapi. So far, no identification of fish species in the river has been carried out. The purpose of the study was to determine the types of fish in the Yellow River (both local and introduced) and the state of the abiotic environment. The method used is purposive sampling with three research stations. Each station is divided into three sampling points. The fish samples obtained were identified in the Biology laboratory of Ahmad Dahlan University. Based on the identification, there are a total of 16 species of fish, with 13 local species, namely; *Barbodes binotatus* (cakul), *Hampala macrolepidota* (palung), *Mystacoleucus obtusirostris* (kepek), *Rasbora argyroteenia* (wader pari), *Labiobarbus leptocheilus* (lukas), *Barbonymus gonionotus* (tawes), *Osteochilus vittatus* (nilem), *Nemacheilus fasciatus* (kepala timah), *Channa gachua* (kotes), *Channa striata* (gabus), *Trichopodus trichopterus* (sepat), and *Dermogenys pusilla* (cucut tawar) and 3 introduced species, namely; *Poecilia reticulata* (gupi), *Xiphophorus helleri* (ekor pedang), and *Amphilopus labiatus* (red devil). Abiotic parameters in the Yellow River, Sleman Regency, DIY; average temperature, water pH, current strength, dissolved oxygen (DO) indicate normal conditions for fish survival.

**Keywords:** Identification, Fish Species, Kuning River

## 1. Introduction

Indonesia has a very high diversity of fish species, estimated at around 45% of the total number of species in the world. There are around 1,300 fish species in Indonesia, which makes it the second highest ranking in the world after Brazil [1] However, information about the richness of fish species in Indonesia is still relatively low. According to [2], the low knowledge of the richness of fish species becomes an obstacle in its utilization. Fish diversity is also determined by habitat characteristics. Kuning River, Sleman Regency is a river that was affected by the eruption of Mount Merapi in 2010, resulting in changes in habitat characteristics including river slope, the presence of forests or plants along the river flow which will be associated with the presence of animal populations in the watershed [3].

Freshwater fish species consist of 170 families and are divided into several orders, namely: Characiformes, Cypriniformes, Siluriformes, Gymnotiformes, Perciformes, and Cyprinodontiformes. Biogeographic distribution of the genera and species of freshwater fish, each consisting of 705 genera with 4,035 species in the Neotropics, 390 genera with 2,938 species in the Afrotropics, 440 genera with 2,345 species in the Oriental, 380 genera with 1,844 species in the Palearctic, 298 genera with 1,411 species in the Nearctic, and 94 genera with 261 species in Australia [4].

The order Siluriformes mostly lives in fresh water, but several families (Plotosidae and Ariidae) can be found in estuaries of rivers and the sea. Almost all fish of the order Siluriformes have barbels around their mouths. The order Siluriformes consists of 106 species grouped into 35 genera and 12 families, namely Bagridae, Siluridae, Schilbeidae, Pangasiidae, Akysidae, Parakysidae, Sisoridae, Clariidae, Ariidae, Plotosidae, and Loricariidae [1]. Several studies on the diversity of freshwater fish



and shrimp species in rivers flowing in DIY are [5] regarding fish biodiversity in the Opak River. The data on fish biota caught in the study in the waters of the Gendol River and upstream of the Opak River were 12 species dominated by cetol, uceng, and wader cakul as planktivore fish from the study, [6] regarding the diversity of fish species along the Boyong–Code River. In the Boyong–Code River from upstream to downstream, 24 species of fish were found, ten species of fish are native to consumption by the community and have the potential to be bred. [7] added data on fish species in the Opak River which is the estuary of the Yellow River to as many as 28 fish species.

Now, this diversity is facing the threat of cold lava caused by Mount Merapi, which began to be active in 2020 until now. This research was conducted in order to obtain data on the diversity of fish species in the Kuning River if at any time cold lava hit this river. Abiotic environmental parameters were also measured at the sampling point to determine their suitability for fish life during the study. Data on fish species and their environmental conditions in the Yellow River, Sleman Regency, Yogyakarta Special Region will be useful as information on natural potential in the form of fish species richness and environmental conditions.

## 2. Materials and Methods

This research was conducted in Sungai Kuining which was divided into three stations, each with three sampling points. Determination of the sampling location using the purposive sampling method, which is based on certain criteria such as the location is easy to reach, depth, not steep, and is estimated to have many types of fish. The three stations selected were station I in the Pakembinangun area, station II on the Jangkang bridge, and station III in Purwomartani. The distance between stations is 1-2 km with a distance between sampling points of 50-100 meters. The tools used in this study: a guangming brand ruler with an accuracy of 0.5mm, a bubu net measuring 55cm, netting net, gill net, seser, bucket, clock bottle, plastic, ping pong ball, stationery, pH meter, thermometer, and CO2 kit and DO kits.

Fish and shrimp traps were installed in the afternoon at 16.00 WIB as many as 3 traps at each sampling point with fish pellets and rice snail meat as bait. Species that were trapped in the trap were taken in the morning at 6.00 WIB. Direct catching of fish using gill nets, stocking nets and seser. The fish species found were put in a bucket and an aerator was installed to keep the fish alive. Fish samples were brought to the laboratory for identification using the book Freshwater Fishes Of Western Indonesia and Sulawesi [1] Environmental parameters measured include water pH, water temperature, dissolved carbon dioxide (CO<sub>2</sub>), Dissolved Oxygen (DO), and current velocity.

## 3. Results And Discussion

### 3.1. Fish Species

Based on the results of observations and research in the Kuning River, Sleman Regency, it was found as many as 16 species of fish belonging to 7 families of fish in table 1 as follows.

**Table 1.** Types of fish identified from the Kuning River, Sleman Regency, Special Region of Yogyakarta.

No	Orer	Family	Species	Station		
				I	II	III
1.	Cypriniformes	Cyprinidae	<i>Barbodes binotatus</i>	-	√	-
			<i>Hampala macrolepidota</i>	√	-	√
			<i>Mystacoleucus obtusirostris</i>	-	√	√
			<i>Rasbora argyrotaenia</i>	-	√	-
			<i>Labiobarbus leptocheilus</i>	-	√	-

			<i>Barbonymus gonionotus</i>	-	√	√
			<i>Osteochilus vittatus</i>	-	-	√
		Nemacheilidae	<i>Nemacheilus fasciatus</i>	√	√	√
2.	Cyprinodontiformes	Poeciliidae	<i>Poecilia reticulata</i>	√	-	-
			<i>Xiphophorus helleri</i>	-	-	√
		Aplocheilidae	<i>Aplocheilus panchax</i>	-	√	√
3.	Perciformes	Chanidae	<i>Channa gachua</i>	√	-	-
			<i>Channa striata</i>	√	-	-
		Cichlidae	<i>Amphilopus labiatusus</i>	-	-	√
4.	Anabantiformes	Osphronomidae	<i>Trichopodus trichopterus</i>	-	√	-
5.	Beloniformes	Zenarchopteridae	<i>Dermogenys pusilla</i>	-	-	√

From the data in table 1 above, there are five orders and eight families with a total of 16 fish species. The family with the most is Cyprinidae, there are six species identified. The types of fish found that belong to several families are as follows:

#### 3.1.1. Family cyprinidae

According to [8], the large number of species from the cyprinidae family shows that members of this family have the ability to adapt and reproduce quickly. The characteristics of the cyprinidae family are having a flat body posture, tall and elongated, large scales, and a forked tail shape. According to Saanin (1984), the family cyprinidae has the characteristics of no more than four barbels in the mouth, the periphery of the eye socket is free or covered by skin, there is a single protrusion on the head or under the eye, the mouth is slightly downwards, the edge of the eye socket is slightly lower. eyes free or covered by skin. The dorsal fin is hard and lies at the same time as the pelvic fin. There is a jawbone connection that is not gnarled. The types of fish found in the Kuning River are members of the cyprinidae, namely:

##### 3.1.1.1. *Barbodes Binotatus* (local name is cakul).

The body of the cakul is slightly silvery white and the body shape is fusiform. Has two-spotted characteristics on the body. The cut specimen has a total length of 8.2 cm, the standard length is 5 cm. The length of this fish reaches 4.57 – 14.60 cm [13], and also can reaches to 15 cm [14]. The maximum length of *B. binotatus* can reach 20.0 cm [15]. The type of scales is cycloid, terminal mouth and forked tail shape. Meristic description D I,8; A I, 6-7; P 13; VII,7; C 22-24; Li 27. Has a small head and a pair of barbells. The anal and pelvic fins are slightly orange in color. This fish can be used as consumption fish and ornamental fish. Cakul is found only at station II.



Figure 1. *Barbodes binotatus*

##### 3.1.1.2. *Hampala macrolepidota* (local name is palung).

Palung fish have a special characteristic, namely a black line located between the dorsal and ventral fins, the line can be more faint when the fish are mature. Another feature, trough fish have yellowish red fins, except for the dark dorsal fin. The caudal fin is black. Ctenoid scale type, terminal mouth type, and forked tail shape [9] The identified trough fish specimen from the Kuning River had a total length of 10.7 cm and a standard length of 9 cm. The length of the male can reach 40.5 cm [16]. Scale formula /5/23/3/1/2, and Meristic Description

D II,8; A I,5; P II,26; V18; CIV,16. The trough fish in this study were found in stations I and II.



**Figure 2.** *Hampala macrolepidota*

**3.1.1.3. *Mystacoleucus obtusirostris* (local name is kepek)**

Kepek fish have the characteristics of a flat and long body shape with a high back. The total length of this fish is 9.1cm. This fish can reach until 18,5 cm in length [17]. The body is silvery, the dorsal and caudal fins are yellowish. The cycloid fish scales have a terminal mouth shape and a forked tail. The pectoral fins are yellow and the anal fins light yellow. The results of the study found that the meristic description of this fish was D IV 9; A 6:P IX 12; V 11; C 17. These fish spawn in October at the beginning of the rainy season [18].



**Figure 3.** *Mystacoleucus obtusirostris*

**3.1.1.4. *Rasbora argyrotaenia* (local name is wader pari)**

Wader pari fish are small fish. The identified specimen from the Kuning River has a total length of 4 cm with a standard length of 2 cm. the average length of this fish is 6.5 cm [19]. Has a flat body shape, scales formula / 2 / 26 / 2 / , has a pair of cleareyes, there is a black line in the middle of the body, D 5; A7; P30; V8; C 20; Li 26. Fish body color is yellowish brown. This fish has a high economic value [20]. Wader pari was found in station II.



**Figure 4.** *Rasbora argyrotaenia*

**3.1.1.5. *Labiobarbus leptocheilus* (local name is lukas)**

Lukas fish are fish that live in fresh water, including the Cyprinidae family. The luke fish has a body length of 4.7-5.2 times the head length, in adults it has a standard length of PS; 21-26.5 cm with forked rays on dorsal fin: faint dark band along the scales. Max length can reach up to 30 cm [21].



**Figure 5.** *Labiobarbus leptocheilus*

**3.1.1.6. *Barbonymus gonionotus* (local name is tawes)**

Tawes fish identified by the Kuning River has a total length of 8.5 cm, and a standard length of 5.1 cm with a meristic description: D I,8; A I, 6-7; P 13; V II,7; C 22-24; Li 27-30, scale formula: / 3/ 1/ 4/ . Tawes fish has the potential to be developed as aquaculture commodity [22] because it can grow large with a very large number of eggs. Tawes (*B. gonionotus*) has no sexual dimorphism and fish with length between 9,4 cm - 11,7 cm have an optimum condition factor [23].



**Figure 6.** *Barbonymus gonionotus*

#### 3.1.1.7. *Osteochilus vittatus* (local name is nilem)

Nilem fish sampled from the Kuning River had a total length of 10.5 cm and a standard length of 6.5 cm. This fish is blackish brown with one or three hard tubules on the snout and a stripe of color from the operculum to the beginning of the caudal fin. Has cycloid scales type, subterminal mouth type and forked tail type and Meristic Description D VI,7 ; A II,5 ; P VIII, 20 ; VIV,14 ; C X,8 ; Lee 34. Nilem (*O. vittatus*) indicated as herbivorous plankton feeder because fed on phytoplankton [24]. In 2019, *O. vittatus* first recorded from Poreh River in Madura Island, thereby extending the distribution of the species approximately 170 km east from the mainland of Java [25].



**Figure 7.** *Osteochilus vittatus*

#### 3.1.2. *Nemacheilidae*

The Nemacheilidae family lives in rivers where the water flows rather fast, with a rock bottom as a shelter. The body size is small, this fish is thin, round, small, and has lines on its body, a maximum length of only 10 cm, and several tentacles at the end of its mouth. Besides being used for consumption, this fish is traded as ornamental fish. In the Kuning River, species belonging to the Balitoridae family were found as follows.

##### 3.1.2.1. *Nemacheilus fasciatus* (local name is uceng).

Large Uceng fish have an elongated body. The genus *Nemacheilus* has a short dorsal fin (7 or 8 branches), Meristic description D III,6; A I ,4; PIV,12; V IV,8; C IV, 26. Fish sampled in the Yellow River total length: 7.5 cm, standard length: 6.5 cm, with black eyeballs. The nostrils are close to each other, tubular but not as tentacles. Upper lip with a pair of barbells, circular mouth, slightly fleshy lips [1]. Uceng fish has a fairly high economic potential. However, the availability of this fish still relies on fishing in the wild [26].



**Figure 8.** *Nemacheilus fasciatus*

#### 3.1.3. *Poeciliidae*

The Poeciliidae family is characterized by small fish, with an oval body shape and cylindrical length. The head is small and enlarges in the middle of the body and then tapers to the tail. Having complete fins such as chest, dorsal fin, anal fin, tail fin, this family fish has a bright body color. The types of fish from the Poeciliidae family found in the Kuning River are:

##### 3.1.3.1. *Poecilia reticulata* (guppy/gupi)

The body of the guppy (guppy) is small with an elongated oval shape and has a fusiform body shape. Cycloid scale type and sub terminal mouth. The tail on this fish is tapered. Has a perfect lateral line from the gills to the base of the tail. The female fish is brownish yellow and the belly is white. Meristic description D 4-6; A 6- 7; P 14-15; C 9-11; Lee 22-24. These fish are often imported into the aquatic ecosystem as introduce species to control mosquito larvae. But this increases the risk of ecological instability and local fish that have a similar niche will be threatened with extinction [27].





**Figure 9.** *Poecilia reticulata*

The fish sampled in the Kuning River had a total length of 2.4 cm, and a standard length of 2 cm. Guppies are classified as introduced fish that are dangerous for small local fish. Guppies have high colonization power where one female parent can breed with a wide range of salinity and water temperatures. Male fish are smaller than female fish and have colorful tail fins. This type of fish can be found in a variety of habitats, ranging from ponds with cloudy water, ditches or waterways. Female guppies do not differentiate between native and foreign individuals in colonies. Therefore, these fish are likely to benefit from herd protection and as a result will increase their chances of survival [28]. This is one of the reasons they have successfully invaded the waters of various countries.

#### 3.1.3.2. *Xiphophorus helleri* (sword tail fish/ekor pedang)

Swordtail fish that has a sharp-tipped caudal fin at a slightly lower angle in males with varying tail color patterns. The total length of swordtail fish varies from 43.94 - 79.47 mm. Swordtail fish is not an endemic fish native to Indonesia. The characters of swordtail fish both male and female are D. 12-13; A. 8 - 9. This fish is native to Central America and has been reported to cause harm in some of the waters it inhabits [29].



**Figure 10.** *Xiphophorus helleri*

#### 3.1.4. *Aplocheilidae*

The Aplocheilidae family is a type of small fish that inhabits waters near rice fields. This fish is characterized by a white spot on its head that looks like a drop of lead. Small fish body shape is elongated, but rounded in the abdomen. The head is flat at the front, straight at the back, the top side is flat like the back.

##### 3.1.4.1. *Aplocheilus panchax* (local name is kepala timah fish)

The kepala timah fish has an elongated cylindrical body, the head tends to be flat and there is a silver spot on the head. The head fish has cycloid type scales and has a subterminal mouth shape with a rounded tail shape. Cross body scales with the formula  $3 / 42 / 4 /$ , Meristik Description D IV,4; A 8; P30; V8; CIV,10; Li 42. The total length is 3.2 cm, and the standard length is 1.9 cm. Fish are found from Pakistan to Indonesia and can be used as dengue vector control, namely eating the larvae of the *Aedes aegypti* mosquito [30].



**Figure 11.** *Aplocheilus panchax*

#### 3.1.5. *Chanidae*

The Chanidae family has a long tail fin and a deep fork. The front rays of the dorsal fin members of

the Chanidae are elongated. The body is covered with stenoid scales with weak-fingered anal fins. The pectoral fins are located below the ventral side of the body. The snout is pointed, the terminal is located. The eyes are large, the lateral line is clearly visible in a straight direction, the body color is above the gray lateral line, the ventral side is white. The species found are as follows:

#### 3.1.5.1. *Channa gachua* (local name is kotes)

The kotes caught in the Kuning River have a total length of 10.2 cm and a standard length of 6.7 cm. In fact, the mean total length of adult kotes fish was recorded as  $12.85 \pm 0.40$  cm,  $12.63 \pm 0.55$  cm and  $12.31 \pm 0.69$  cm from GP, WHP and EH, respectively [31]. Another morphological feature is the sub-terminal mouth type and the mandible is a mixture of canines and scars. The tail is rounded and the body has a line at the top, the tips of the dorsal, caudal and anal fins are greenish. The ventral part of the body is white.



**Figure 12.** *Channa gachua*

#### 3.1.5.2. *Channa striata* (local name is gabus fish)

Snakehead fish or gabus fish are carnivorous animals that live at the bottom of the water, tend to live in swamps, rivers, and murky waters. This fish can reach a length of 30.4 cm (Muslimin et al., 2020), while those sampled in the Kuning River are still small, having a total body length of 6.7 cm, standard length: 5.9 cm. The back of the body is blackish brown and the belly is brownish white. Has a dorsal fin that extends to the base of the tail but not fused that is D 30; A26; P26; V12; C16; Li 45. The shape of the head is slightly flat like a snake's head with the body surface and head covered by thick scales, the type of scale is ctenoid, the scale formula is  $1/2/7/45/5/1/2$  and the surface is rough. The head is shaped like a snake's head, the mouth type is subterminal. The caudal fin is of the round type, which is rounded at the end [32].



**Figure 13.** *Channa striata*

#### 3.1.6. Cichlidae

There were three types of fish caught in the cichlidae family. The fish belongs to the cichlidae family type with the characteristics of a flat elongated body shape, slightly high back. The cichlidae family has a flat round body shape, the back is higher, on the body and caudal fin found a straight line (vertical). On the dorsal fin found a straight line lengthwise. This fish has five fins, namely dorsal fins (dorsal), anal fins (anal), tail fins (caudal), pectoral fins (pectoral), pelvic fins (ventral). Has a dorsal fin extending from the top of the gill cover to the top of the tail fin. There is also a pair of pectoral fins, one long anal fin and a small pelvic fin [33].

#### 3.1.6.1. *Amphilopus labiatus* (red devil).

Red devil fish have a flat body shape. Fish identified from the Kuning River had a total length of 5 cm, standard length 2.7 cm, scale formula  $5/1/7/Li 24$ . Description of meristik D XVII.10; A X.3; V II.12; P III.9; C III.12, bright orange color with black dorsal. On the fins are orange, have a cycloid type of scale and the terminal mouth, rounded tail shape. This fish is an introduced fish from Nicaragua



which is invasive and dangerous for the survival of endemic fish. Research in Lake Sentani Papua, this fish population is very large and threatens the existence of endemic species there [34].



**Figure 14.** *Amphilopus labiatus*

### 3.1.7. *Osphronomidae*

Osphronomidae are characterized by having elongated fins like in front of each pelvic fin. All show the behavior of caring as parents to their children. Some types build bubble nests.

#### 3.1.7.1. *Trichopodus trichopterus*/blue gouramy (local name is sepat fish)

Sepat fish have the characteristics of an elongated flat body with a color pattern in the form of a dark oblique line on the lateral side of the body. In the middle of the sides of the body there are 1 or 2 black spots and at the base of the caudal fin. The edge is orange, the anal fin extends to the base of the tail and the tail fin has orange spots. The type of scale is cycloid. The dorsal fin lies further back, but ends some distance in front of the caudal fin. The caudal fin is yellowish. Pointed snout and small mouth with a terminal mouth type and a forked tail. Description of Meristik D VI,10; A XX,26; P 20; V2; C16; Li 42. The shoe identified from the Yellow River has a total length of 7.6 cm and a standard length of 3.9 cm. The blue gourami is endemic to south-east Asia, including Indonesia [35].

**Figure 15.** *Trichopodus trichopterus*



### 3.1.8. *Zenarchopteridae*

It is a family of freshwater and brackish julung fish with limited distribution in the Indo-West Pacific region [36]. Zenarchopteridae has a unique body morphology (beak-shaped), elongated flat body shape.

#### a. *Dermogenys pusilla* (local name is cucut tawar)

Cucut tawar fish have a flat body shape elongated like a cylindrical or pipe. The head is scaly, the lower jaw is longer than the upper jaw and the tip [1]. Description of Meristik D 9; A IV,9; P16; C 15; Li 16, Scales Formula: 1/2/3/16/3/1/2. The fish identified were 11.5 cm in total length and 6.8 cm in standard length. This fish is native to Indonesian waters.



**Figure 16.** *Dermogenys pusilla*

### 3.2. *Abiotic Condition in Kuning River*

Abiotic conditions (physical and chemical parameters) in the Kuning River, can be a factor that supports high or low fish and shrimp population density in the Yellow River. Water conditions that are not good or suitable will be able to maximize fish growth. The results of the measurement of physical and chemical parameters in the Yellow River are shown in the following table.

**Table 2.** Physical and Chemical Parameters in the Kuning River

No.	Parameter	Stasiun I	Stasiun II	Stasiun III
1.	Temperature	20°C	26°C	28°C
2.	pH	7	6	8
3.	DO	5,1 mg/l	5 mg/l	5,4 mg/l
4	Water Current	P : 0,16 m/s T : 0,12 m/s	P : 0,14 m/s T : 0,10 m/s	P : 0,10 m/s T : 0,17 m/s
5	River Width	2,4 m	5,7 m	6 m

The results of temperature measurements at the three research stations are still considered normal because they have an average water temperature of 20°C-28°C [10]. According to [11], that the water temperature that is suitable for fish life is 15°C-30°C. The research sites at three stations show that they are still within normal limits, so that fish populations living in the Yellow River can tolerate temperatures well.

The degree of acidity (pH) at the three research stations was between 6-8, indicating that the pH conditions in the Yellow River supported the natural growth of fish. According to [12], the pH of the waters that are good for fish life and natural food is between 6-8.7. The content of Dissolved Oxygen (DO) in the three research stations ranged from 5-5.4 mg/l. Based on this range, it shows that Dissolved Oxygen (DO) is in normal condition or feasible to support the growth of freshwater fish and shrimp. According to the opinion of [11], that the content of Dissolved Oxygen (DO) in water suitable for the growth of fish and shrimp is at least 5 mg/l.

Current water in the Kuning River at three stations shows a range of values between 0.10-0.17 m/s. The current is strong enough to support fish life in the Kuning River. The width of the river at the three stations on the Kuning River has a range of 2.4-6 m, each river width has advantages and disadvantages in using fishing techniques using stocking nets, so that you can get more fish.

#### 4. Conclusion

Types of fish identified in the Kuning River, Sleman Regency, DIY as many as 16 species. There are three types of introduced fish found in the Kuning River. Parameters of the abiotic environment; the average temperature, water pH, current strength, dissolved oxygen (DO) in the Kuning River, Sleman Regency, DIY are indicate normal conditions for the survival of fish

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