THE FISH DIVERSITY IN CODE RIVER, BANTUL REGENCY, YOGYAKARTA SPECIAL REGION

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Abstract

Fish biodiversity is one that plays an important role in compiling the river ecosystem. Fish diversity will be disrupted by the invasive alien species (IAS) also domestic waste disposal activities, industrial activities, and agriculture into the River. The limitation of this research is Code River, Bantul Regency (downstream of the river). The purpose of this study was to determine the types of native and introduced fish and also to determine the quality of the water. The research method is purposive sampling with three sampling points and with three replications each point. Tools used to catch fish; nets, stocking nets, and small nets. Data analysis used descriptive analysis, fish samples that have been obtained are described and identified based on body morphology. The results of this study discovered 22 species of fish in the Code River, 17 are native species, namely; *Barbonymus balleroides, Hampala macrolepidota, Mystacoleucus obtusirostris, Barbodes binotatus, Rasbora argyrotaenia, Osteochilus vittatus, Puntius orphoides, Clarias batrathus, Channa striata, Channa gachua, Trichogaster sp., Nemacheilus testus fasciatus, Anabasilxterus, testus fasciatus, Atrichaplotus Hemibagrus mumurus and 5 (five) are introduced species, namely Poecilia reticulata, Pterygoplichthys pardalis, Oreochromis niloticus, Colossoma macropomum* and *Oreochromis mossambicus*. The measurement results of environmental parameters in the Code River are still support for fish life.

Keywords: Diversity, introduced fish, Code River

1. Introduction

One of the biodiversity that plays an important role in composing river ecosystems is fish[1]. There are 1,248 species of freshwater fish in Indonesian waters[2]. The Boyong-Code River is said to have 24 of fish species found from upstream to downstream, of the species found 10 species were declared native and consumed by the community also likely to be bred, and five species of which were found were introduced fish and one species species that can be used as ornamental fish[3]. Factors that can affect local fish life in rivers include: the entry of fish species from outside (introduced species), domestic waste disposal activities, industrial and agricultural activities. There are fish species from outside that have aggressive nature and can eat local species directly, also have good adaptability to the quality of the aquatic environment. In addition, the area around the Code River is dominated by residential areas, industrial and agricultural activities. This can cause domestic waste and industrial waste to enter river waters, causing polluted water and affecting fish life. Excessive use of pesticides will pollute the river and affect the life of aquatic organisms in it[4]. Based on this, this study was intended to determine the types of fish found in the Code River, Bantul Regency, D.I. Yogyakarta.

The aims of this study were to identify the types of fish, both local and introduced, which were harmful to the existence of local fish and to determine the water quality in the Code River, Bantul Regency, Yogyakarta Special Region in supporting fish life. The Code River is divided into 3 regions, namely the upstream, middle and downstream parts. The upstream is on the slopes of Mount Merapi (named the Boyong River), while the downstream part of the Code River merges with the Opak River in the Bantul Regency. Water pollution that occurs in the Code River occurs due to various factors, namely domestic waste, the textile industry, hospitals, hotel waste to printing waste. Activities from the disposal of liquid waste and industrial and domestic waste

carried out into the Code River will result in polluted water and will also have an impact on the life of the aquatic biota in it[5].

River water quality is a qualitative condition that is measured based on certain parameters using certain methods in accordance with applicable laws and regulations. River water quality can be expressed using parameters that describe the quality of the water. These parameters include chemical, physical, and biological parameters[6]. The quality of river water is influenced by the condition of the water supply from the river buffer zone and the condition of the river. The condition of the water supply in the buffer zone is generally influenced by the behavior and activities of the surrounding community. In general, the downstream has poorer water quality than the upstream. In the end, the downstream is where the accumulation of the liquid waste disposal process starts from the upstream[7]. Temperature can also affect body growth and fish metabolism. Changes in temperature greatly affect the biological, chemical and physical processes in a waters. Temperature affects the solubility of oxygen in water, when the temperature increases, the solubility of oxygen in water decreases. An increase in temperature will cause an increase in metabolic activity for aquatic organisms, so that fish organisms need a lot of oxygen. Aquatic organisms such as fish and shrimp can live well in a temperature range of 20-30°C. Temperatures reaching 30°C or 20°C will cause stress to fish which is generally followed by a decrease in digestibility[8].

Oxygen is a limiting factor for aquatic organisms, this is because oxygen levels in the waters are very limited when compared to oxygen levels in the air. Oxygen is needed in the catabolism process to produce the energy needed for life's needs. The main sources of dissolved oxygen are from photosynthesis and the atmosphere. Oxygen from the air is absorbed by direct diffusion across the water surface assisted by currents and water[9]. If there is very little oxygen in the waters, the waters are not suitable for fish and other organisms that live in the water, because it will affect the growth and speed of eating fish[10].

A large river slope can produce a faster flow or flow of water which generally occurs in rivers in mountainous areas. Fast river currents will of course also have an impact on the movement of fish and spawning. Spawning requires a calm current where a lot of overgrown aquatic plants. High river currents can affect the number of fish fertility. Categorizing rivers based on current speed, namely: very fast currents (>1 m/sec), fast currents (0.5-1 m/sec), moderate currents (0.25- 0.5 m/s), slow currents (0.1-0.25 m/s), and very slow currents (<0.1 m/s)[11].

2.Method

2.1. Time and Place

The research was conducted from September to March 2020. The research location is along the Code River, Bantul Regency, starting from Station I (Pandeyan), Station II (Wonokromo), to Station III (meeting with the Opak River). Sampling was carried out during the day for 3 repetitions. Fish identification was carried out at the Biology Laboratory of the Faculty of Applied Science and Technology, Ahmad Dahlan University, Yogyakarta. The flow map for the Code River station is presented in Figure 5.

2.2. Tools and materials

The tools used during the research were 3 buckets (5 liters), 2 portable aerators and electric aerators, 2 stocking nets (3.5 meters long), 2 bubu (87 cm diameter), 6 small nets, and large nets 4 pieces, and DO kit, thermometer 1 piece, pH indicator 1 pack, hand refractometer, bottle clock (250 ml) 10 pieces, bottle flakon (30 ml) 3 pieces, glass jar (16 cm diameter) 4 pieces, ruler (30 cm), 1 piece of paper scissors, camera, sewing meter (150 cm) 1 piece, 1 table tennis ball, 1 stereo microscope, 1 pair of boots, needle, hapa (1x1x0.6 m) 1 piece, 1 injection, 1 plastic box, identification book. The materials used during the research were golden snail, rapia rope, string thread, 1 pack of tissue, 70% alcohol, aquades, 10% formalin, 88 pellets, plastic.

2.3. Research variable

In this study there are two variables, namely the independent variable and the dependent variable. The independent variable in this study is the river that is used as a sampling location. The dependent variable in this study is the types of fish found.

2.4. Ways of working

Determination of the sampling location is done purposively, ie the sampling point has been determined based on the conditions of the sampling location, the ease of road access, and the presence or absence of fish. At Station I, Station II, and Station III Sungai Code, 3 sampling points were determined. Sampling was carried out during the day for 3 repetitions. The coordinates of the sampling point are marked using GPS (Global Positioning System).

Fish traps were installed using 2 traps at each sampling point. The traps were baited with snails and pellets and then tied a rope at the end of the trap to the bamboo tightly. Bubu installation is carried out in the afternoon at 16:00-17:30 WIB. In the morning, see the catch. Sampling of fish was carried out using stocking nets, fish seser, and hapa at each sampling point. The use of nets is done to take fish that are on the banks of the river, while the use of hapa is done by stretching the hapa to the bottom of the river then the fish to be caught are herded so that the fish are trapped in the hapa. The caught fish are placed in a bucket filled with river water and equipped with a portable aerator to meet oxygen needs. The caught fish are then transferred to a larger container and separated by fish species and size. The fish samples that have been obtained are then identified at the Biology Laboratory of the Faculty of Applied Science and Technology. Fish samples were identified for their morphometric and meristic characters. The measurement of morphometric characters includes total length and standard length, while the measurement of meristic characters includes identification of scales type, tail shape, mouth shape, scale counting, and fin counting. The explanation of each of the identification of morphometric and meristic characters carried out during the research is as follows.

Measurement of environmental factors in the Code River was carried out together with fish sampling. Parameters measured include; DO, pH, temperature, current velocity, and salinity are as follows: DO measurement of Code River water using DO kit. The bottle is washed with river water 3 times, the bottle is filled with river water until it is full without air bubbles in it, the water sample is added with 5 drops of manganese sulfate and alkaline acid each then shaken, added 10 drops of sulfuric acid then shaken and let stand for 2 minutes , 5 ml of water sample was put into a measuring bottle, added with 1 drop of starch indicator, then titrated with HI 3810-0 solution until the color changed to clear. If a scale of 0.5 is obtained, the result is multiplied by 10. The pH measurement of the Code River water is carried out using pH indicator paper. The pH indicator is dipped in river water and then waited for a while until the color changes. The color changes that occur are compared to the available color maps. The temperature of the river water is measured using a mercury thermometer. The thermometer is inserted into the river water at the observation point. After that it was left for a while until the mercury showed a constant number. The temperature can be seen on the scale and the result recorded. Current strength measurements were carried out at the edge and middle of the river using simple tools, namely a table tennis ball and a sewing meter. The sewing meter is stretched and the table tennis ball is drifted to a distance of 1.5 m, calculated by a stopwatch and stopped when the ball has drifted to a distance of 1.5 m.

2.5. Data analysis

Analysis of the data used in this study is descriptive analysis to describe the fish samples that have been obtained and determined based on body morphology[12].

3. Results and Discussion

3.1. Fish identification

From the results of research conducted in the Code River, Bantul Regency, 22 species were found in three stations. These fish are grouped into 5 orders and 13 families. Fish classified as introduced fish caught at the time of sampling in the Code River, among others: *Poecilia reticulata* (snakefish), *Pterygoplichthys pardalis* (broomfish), *Oreochromis niloticus* (tilapia), *Colossoma macropomum* (pomfret), and *Oreochromis mossambicus* (mujair fish). Introduced fish are fish that enter Indonesian waters either intentionally or unintentionally with certain aims and objectives. *Poecilia reticulata* (cuttlefish) was introduced from Venezuela which has the potential as an ornamental fish, *Oreochromis mossambicus* (tilapia fish) from Africa has the potential as a consumption fish. Meanwhile, according to Kotellat et al. (1993), stated that *Pterygoplichthys pardalis* (broomstick fish) introduced from South America originally had the potential as an ornamental fish to clean aquariums, but currently the broom fish is categorized as an invasive species because this species can become a

predator that will be harmful to other fish[3]. *Oreochromis niloticus* (tilapia) was introduced from the African continent initially as a consumption fish that can be cultivated in ponds, floating nets, or cages, but these fish are released or released into rivers. Tilapia is invasive because this fish is classified as omnivorous and also has good adaptability to changes in environmental conditions so that tilapia can compete with local fish in these waters. *Colossoma macropomum* (pomfret) comes from Brazil. Initially, this fish has the potential as an ornamental fish, but because the growth of this pomfret is very fast and the taste of the meat is delicious and savory, it is now becoming popular as a consumption fish. Similar to tilapia, pomfret is also an omnivorous fish and is a predator of other fish that live in these waters[13].

The species found at each station were grouped into 5 orders and 13 families, the orders found were: Cypriniformes, Perciformes, Siluriformes, Cyprinodontiformes, and Characiformes. Most of the species found belong to the order Cypriniformes of the families Cyprinidae and Balitoridae. The order Cypriniformes lives in flowing waters and is a close relative of the goldfish. Characteristics of fish belonging to the order Cypriniformes among others: do not have teeth, there are several species that have barbels and those without, do not have additional fins, the edges of the eye sockets are covered by skin, no more than four pairs of antennae, the location of the eye sockets, mouth slightly down, the mouth can be poked out[14]. The order Cypriniformes fish group in the Code River waters was found as many as eight species from two families, including: *Barbonymus balleroides, Hampala macrolepidota, Mystacoleucus obtusirostris, Barbodes binotatus, Rasbora argyrotaenia, Osteochilus vittatus, Puntius orphoides*, and *Nemacheilus fasciatus*.

Perciformes is the largest order in freshwater. Groups of fish order Perciformes are able to live in a variety of habitats and environmental conditions, so these fish are easy to find in the waters[12]. In the Code River, seven species from four families belonging to the order Perciformes were found, including *Channa striata, Channa gachua, Trichogaster* sp., *Trichopodus trichopterus, Oreochromis mossambicus, Oreochromis niloticus*, and *Anabas testudineus*. Species belonging to the Order Siluriformes have distinctive morphological characteristics, namely having barbels in their mouths. This group of mustachioed fish consists of 35 genera and 12 families, namely; Clariidae, Siluridae, Pangasiidae, Chacidae, Bagridae, Loricariidae, Schilbidae, Parakysidae, Plotosidae, Sisoridae, Ariidae, Akysidae[12]. Three species of fish of the Order Siluriformes were found in the Code River waters from three families, namely: *Clarias leiacanthus, Pterygoplichthys pardalis*, and *Hemibagrus mumurus*. The order that was discovered next was the Order Cyprinodontiformes. Cyprinodontiformes is a group of fish that can live in both fresh and brackish waters, characterized by small body size, lower jaw longer than upper jaw. Three species of fish of the order Cyprinodontiformes were found from three families, namely *Dermogenys pusilla, Aplocheilus panchax*, and *Poecilia reticulata*.

Order Characiformes is the largest group of fish Characins. Consists of 1,674 species from 270 genera[15]. The most widely known group of Characins fish is the red piranha fish (*Serrasalmus nattereri*). Live in fresh waters and some live in brackish waters, which are scattered in America, Mexico, and Africa. The hallmark of the Characins group of fish is that there is a fatty fin located far behind the dorsal fin. Fish order Characiformes found as many as one species from one family, namely *Colossoma macropomum*. Species from each order and family were then identified for their morphometric and meristic characteristics. Measurement of morphometric characters includes total length and standard length, while measurement of meristic characters includes identification of scales type, tail shape, mouth shape, scale counting, fin counting (tail fin, pectoral fin, pelvic fin, anal fin, and dorsal fin). The explanation of each family and species is as follows:

3.1.1. Family Cyprinidae

The Cyprinidae family is the largest freshwater fish family, the distribution is almost all over the world except New Zealand, Madagascar, Australia, and the United States[12] which consists of 220 genera and 2,420 species[16]. This large number indicates that the family Cyprinidae can reproduce quickly. In addition, they are able to adapt well so that they are spread in various worlds that can support the needs of human life[17]. The highest number of species found in the Code River came from the family Cyprinidae as many as 7 species. Fish belonging to the family Cyprinidae are freshwater inhabitants with large distribution and population for several rivers on the island of Java[12]. Several similar studies on fish species in freshwater also reported that fish species

belonging to the Cyprinidae family were the group that inhabited river waters the most. This is as reported along the Boyong Code River [3]; Sungai Enim[18], South Sumatra; in Batang Gadis River[19], North Sumatra; on the Luk Ulo River, Kebumen[1]. Several species were found belonging to the family Cyprinidae, namely *Barbonymus balleroides* (Valenciennes, 1842), *Hampala macrolepidota* (Khul & Van Hasselt, 1823), *Mystacoleucus obtusirostris* (Valenciennes, 1842), *Barbodes binotatus* (Valenciennes, 1842), Raaebora (Bleekerrot, 1849), *Osteochilus vittatus* (Valenciennes, 1842), and *Puntius orphoides* (Valenciennes, 1842).

The family Cyprinidae has the characteristics of a slightly downward mouth, there is a protrusion on the head or under the eyes, there are four barbels[14]. The distribution of these seven species is spread over the islands of Java, Sumatra, Kalimantan, Sulawesi, Bali, Myanmar, Vietnam, the Philippines, Laos and Cambodia[12]. Fish belonging to the Cyprinidae family found at each Code River station have medium to small body sizes, the Cyprinidae family likes flowing waters, therefore these fish are commonly found in rivers with moderate or calm currents with sandy and sandy bottoms. rocks. These seven species have morphological characters that are flat and elongated and the type of forked tail that distinguishes is the morphometric character and the meristic character of the species.

Hampala macrolepidota (palung) was only found at station I and station III on the Code River, this is likely at station II the water current was not so heavy and the water conditions at station II were cloudy. The number of *Hampala macrolepidota* (trough fish) is found in rivers with clear water and fast currents. In addition, if there are large numbers of trough fish in a waters, then these fish have the potential to become predators for other fish. The distribution of trough fish in Indonesian fresh waters is widely spread on the islands of Java, Sumatra and Kalimantan[12].

Mystacoleucus obtusirostris (wader kepek) was found at every station in the Code River in large numbers. At the time of observation, a lot of people were doing fishing/netting activities around the river and the fish that was caught a lot was the wader kepek. There are a lot of wader kepek fish when caught in stocking nets, probably because the start of the rainy season is the spawning season for these fish. In addition, the observation location has a sandy and rocky riverbed so it is very supportive as a place for spawning. The larvae of this fish are very easily carried away by the current so that it spreads to every river body, while at maturity the movement of these fish is against the current[20]. The distribution of wader kepek includes Vietnam, Myanmar, Java and Sumatra[21].

Barbodes binotatus (cakul) or known as the two-spotted wader is a fish belonging to the family Cyprinidae spread across Southeast Asia including Indonesia, Malaysia, Laos, Myanmar, Philippines, Vietnam, Thailand, Cambodia, and Brunei Darussalam[22]. Cakul wader fish has several synonymous names such as *Barbus maculatus, Puntius binotatus, Capoeta binotata, Systomus binotatus* [12,22]. Cakul wader fish were only found at stations I and II, it is possible that these fish were not caught at the time of sampling. However, the condition of the waters at station III supports the life of the cakul wader fish, namely living in fast-flowing rivers with rocky and sandy bottoms. Barbodes binotatus is commonly found in lakes and rivers with fast currents[22].

The genus Rasbora is a genus belonging to the family Cyprinidae. Distribution of Rasbora argyrotaenia in Indonesian waters can be found in Sumatra and Kalimantan[12]. *Rasbora argyrotaenia* (wader pari) in Indonesia is used as consumption fish, while in Asia it is used more as ornamental fish[23]. Wader pari were caught only at station I , this is because at station II the waters were cloudy but the current was not heavy, while at station III the river had a swift current so that stingrays were not found at that station. Wader pari fish generally live in rivers with weak and clear currents with rocky bottoms[24]. The downstream and estuaries, wadert pari are rarely found because these fish usually live in waters with a depth of less than 1 meter such as in the upstream and middle parts.

The body morphology of *Osteochilus vittatus* (nilem fish) has two pairs of small tentacles, the body is elongated and silvery, the back is black, the snout is blunt. Has a forked tail type, cycloid scales type, subterminal mouth shape. *Osteochilus vittatus* (nilem fish) was also found in all stations, probably because these fish can spawn all year round and are resistant to changing environmental conditions. Areas that become spawning grounds for these fish are usually on the banks of ponds and in rivers with calm currents which are overgrown

with plants and grass. In addition, the natural habitat of nilem fish is found in rivers and swamps because in this habitat, nilem fish get more natural food because nilem fish are omnivorous fish, their food includes detritus, mosses. plankton and aquatic plants that are important for fish. So that the availability of feed is very supportive for the life of the fish[25]. The distribution of nilem fish includes Thailand, Malaysia, Vietnam, and Cambodia[12].

Puntius orphoides is often called the derbang fish which is an acronym for wader abang (red wader) because this fish has an elongated body, red anal and ventral fins, caudal, dorsal and pectoral fins are slightly reddish in color with black edges for the dorsal and pectoral fins. Caudally, there is a reddish spot at the base of the operculum. It has a forked tail type, a cycloid scale type, and a terminal mouth shape. Derbang fish were found at all stations, this is probably September is the spawning season for derbang fish[26]. The peak of spawning of *Puntius orphoides* took place from September to October. The derbang fish release their eggs not simultaneously but gradually[27].

3.1.2. Family Channidae

The Channidae family is divided into two genera, namely the genera Channa and Parachanna. In the Asian region there are as many as 34 species belonging to the genus Channa, while Parachanna there are three species belonging to native fish in African countries[28]. The morphological characters of the genus Channa, among others: wide head and large scales, sharp angled mouth, dorsal and anal fins are almost the same length, in some species there is a dark band across the body[12]. In Channa gachua there is a dark band across the body but as the fish matures it will disappear. The distribution of the genus Channa is widely distributed in Asia, namely Malaysia, the Philippines, Taiwan, China, Myanmar, Indonesia, Singapore[12]. There are as many as five species scattered in Indonesia, Singapore, and Malaysia, including: *Channa micropeltes, Channa striata, Channa lucius, Channa melasoma,* and *Channa gachua*[29]. The species caught at the time of sampling belong to the Channidae family, namely: *Channa striata* and *Channa gachua*.

3.1.3. Family Belontiidae

The morphological characteristics of the Belontiidae family include: having a flat body, rounded, short and small mouth, elongated anal fin and no forked, sickle-shaped caudal fin, pelvic fin turning into long filaments, discontinuous lateral line[12]. or not visible, the surface of the operculum is not jagged. Species belonging to the Belontiidae family have an additional respiratory apparatus, namely a labyrinth as well as the Channidae, Clariidae, Loricariidae, Anabantidae families. The distribution of the Belontiidae family is quite wide, including in fresh waters in western Indonesia, India, and China[12]. The identified species belonging to the Belontiidae family, namely *Trichogaster* sp. and *Trichopodus trichopterus*.

3.1.4. Family Cichlidae

The Cichlidae family is a family of freshwater fish originating from various countries including Africa, Sri Lanka, Central and South America, India, and Asia. The Cichlidae family has characteristics, among others: there are nostrils located on each side of the head, the underside of the head is white, the Linea lateralis is divided into two front parts parallel to the base of the dorsal fin and the back is straight, the body is black in color. omnivore (eats everything). The species caught and belonging to the family Cichlidae were *Oreochromis mossambicus* (mujair fish) and *Oreochromis niloticus* (tilapia)[12].

Tilapia fish and tilapia are fish that were introduced from Africa in 1969, these fish are widely spread on the islands of Java, Sumatra, Sulawesi, and Borneo. These fish enter Indonesian waters with the aim of being consumption fish that can be cultivated in ponds, floating nets, or cages. These fish are deliberately released into reservoirs, rivers, and lakes in order to breed widely to meet food needs. Tilapia and tilapia usually swim in the middle of the water depth[3]. The habitat of tilapia and tilapia is generally found in rivers with moderate currents, lakes, reservoirs, swamps and ponds, these two species are euryhaline (can live in a wide salinity range) so that these fish can live in brackish water[30].

3.1.5. Family Clariidae

Family Clariidae is a family of catfish fish that are spread in the fresh waters of India, Africa, Southeast Asia, and Syria. Species belonging to the family Clariidae have an additional respiratory organ, namely a labyrinth to survive in oxygen-poor water conditions. The morphological characters of the Clariidae family include:

cylindrical body shape like an eel, there are four pairs of barbels, flat and hard head, long and spineless dorsal fin, anal fin, dorsal and caudal fins are not fused, do not have fat fins , there are no sharp spines on the pectoral fins[12]. One species caught during sampling was found belonging to the family Clariidae, namely *Clarias batrachus* (lele). Here is the explanation; *Clarias batrachus* is a freshwater fish that lives in rivers, swamps, and reservoirs. *Clarias batrachus* belongs to the family Clariidae. The morphology of Clarias batrachus has an elongated body shape, the body is not scaly with a slippery texture, there are sharp spines (patil) on the pectoral fins, the body color is grayish black. Dorsal fin extends to base of tail but not fused, anal fin long, head hard, tail rounded, mouth type inferior. In addition, catfish have four pairs of barbels on the maxillary barbel, nasal barbell, outer mandibular barbel, and inner mandibular barbel which function as a touch and smell food when the catfish is in a dark place and the water is cloudy.

3.1.6. Hemiramphidae family

The Hemiramphidae family is a family of freshwater and estuary fish whose distribution is in the IndoWest Pacific region[31]. The Hemiramphidae family consists of four genera, including Dermogenys, Numberhamphus, Hemirhamphodon, Zenarchopterus, Hyporhamphus[12]. The species caught belonging to the Hemiramphidae family were *Dermogenys pusilla* Khul & Van Hasselt, 1823. Morphology *Dermogenys pusilla* (freshwater cucut) caught had an upper jaw that was shorter than the lower jaw, an elongated flat body shape like a pipe, body color grayish white, big eyes. The lateral line is straight from behind the operculum to the base of the tail, there is a nostril on the upper jaw, the dorsal fin is farther back and shorter than the anal fin. The color of the dorsal and anal fins is striking red-yellow which comes from carotenoid pigments[32]. The morphological characters expressed on the genus Dermogenys, among others: the lower jaw is longer than the upper jaw, the lower jaw is in the shape of an elongated beak, the dorsal fin is shorter than the anal fin[12]. The distribution of shark is spread in Asian regions such as Thailand, Sumatra Island, Kalimantan, Java, Riau Islands, Malaysia[12].

3.1.7. Family Loricariidae

The Loricariidae family is a freshwater family native to South America. Species in this family are characterized by their bodies covered by hard skin and disc-shaped mouths[12]. Species belonging to the family Loricariidae found one species, namely *Pterygoplichthys pardalis* (broom fish). Broomfish were introduced from Central America and spread across the Asian continent, including: Indonesia, Malaysia, India, Japan, Bangladesh, Philippines, Thailand. These fish live in fresh waters such as rivers and lakes. This fish is categorized as an *invasive species* because either directly or indirectly this species can become a predator or competitor for local fish in these waters[33]. If the local fish population in a waters decreases, it may be due to the presence of broom fish in these waters, this is because there are no predators that eat broom fish. Therefore, broomfish can be found in large numbers in a waters[34]. Broom fish lay their eggs by making holes on the river bank. Some broom fish also have the potential as ornamental fish to clean the aquarium[35]. The body morphology of the captured *Pterygoplichthys pardalis* has the characteristics of its body being covered with hard skin with a rough and sharp surface, wide dorsal fin, disc-shaped mouth, wide fish head and body, black body with white stripes pattern, all fins on broom fish broom begins with hard fingers. *Pterygoplichthys pardalis* was found at all observation stations, this was because the broomstick fish was able to survive in various environmental conditions, one of which was a polluted environment.

3.1.8. Family Bagridae

The Bagridae family belongs to the order Siluriformes which is characterized by the presence of tentacles in the mouth. The Bagridae family is a species of freshwater fish spread across Africa, East Asia and Southeast Asia. The difference between the Bagridae family and the Clariidae family is that the Clariidae family does not have fat fins and there are no sharp spines (patil) on the pectoral fins, while the Bagridae family has fatty fins that are the same length as the anal fins and there are sharp spines on the pectoral and dorsal fins. The species belonging to the Bagridae family were *Hemibagrus mumurus* (baung fish). The distribution of baung fish in Indonesia is spread in Java, Kalimantan, West Sumatra, Riau, Jambi, South Sumatra. The morphological characters of *Hemibagrus mumurus* are as follows: the body is not scaled, has fat fins, curved mouth, long jaw barbels, spines on the pectoral fins are sharp and serrated, the barbels are longer than the head, the eyes are not covered with

skin. This fish is found in the Code River which has a weak current[12]. The distribution of baung fish is spread across Java, Sumatra, Mekong watersheds, Chao Phraya[21].

3.1.9. Family Balitoridae

The Balitoridae family is a family of freshwater fish that live and spread in the rivers of Europe, Asia and Ethiopia. Previously this family was known as homalopteridae and later revised to Balitoridae. The species caught and belonging to the Balitoridae family were *Nemacheilus fasciatus* (Uceng). *Nemacheilus fasciatus* Valenciennes, 1846 is used as consumption and ornamental fish. The distribution of uceng fish includes Thailand, Malaysia, Borneo, Sulawesi, Sumatra, Belitung. The original habitat of uceng fish is found in rivers with calm currents with sandy to rocky water substrates. *Nemacheilus fasciatus* was only found at station I. The small elongated body of the uceng fish and its habitat in shallow freshwater with rocky and sandy riverbeds make it very difficult to catch uceng fish[12].

3.1.10. Family Poeciliidae

Poeciliidae is a family of freshwater and brackish fish whose natural distribution is in Southern Argentina and South America. The species caught and belonging to the family Poeciliidae, namely *Poecilia reticulata* (guppies/cetol). The morphological characters of the Poeciliidae family , that *Poecilia reticulata* has a light brown body color, some species have a coloring pattern, there are black spots on the anal fin, guppies are viviparous (give birth). The distribution of cetol fish in Indonesia includes: Sulawesi, Java, Sumatra, Kalimantan[12]. *Poecilia reticulata* Peters, 1859 belongs to the family Poeciliidae which is a fish introduced from Venezuela, this fish has the potential as an aquarium ornamental fish. Many cetol fish are found in shallow water, and swim on the banks of rivers[3]. The entry of Poecilia reticulata fish into Indonesia has resulted in a reduced population of *Aplocheilus panchax* (tin head) fish. *Aplocheilus panchax* (tin head) is a fish that lives in fresh waters which is naturally distributed in Indonesia. *Aplocheilus panchax* fish and *Poecilia reticulata* fish compete fiercely because these two species have similar feed preferences and living habitats. *Poecilia reticulata* was found at all stations. This is because *Poecilia reticulata* is able to adapt well in new environments and can live in polluted or dirty water and its small body can facilitate the movement of stork fish to move from place to place[12].

3.1.11. Family Aplocheilidae

The Aplocheilidae family is a small family that has many genera in Africa, in Asia there is only one genus spread from India to Indonesia. Based on table 3, one species belonging to the family Aplocheilidae was found, namely *Aplocheilus panchax* Hamilton, 1822, or better known as the tin head fish is a fish that lives in freshwater which is distributed naturally in Indonesia. The distribution of tin head fish is spread in India, Sumatra Island, Sulawesi and Indochina. This fish eats mosquito larvae, small shrimp, small aquatic animals. Leadhead fish usually swim from the surface to the bottom of the water[12]. Tin head fish are only found at station III, this is due to the entry of *Poecilia reticulata* fish (cetol fish) into Indonesian waters so that the presence of tin head fish is eliminated and its population decreases in nature.

3.1.12. Family Anabantidae

Anabantidae is a small family of which several species are distributed in Africa and there are two species in Asia. Species found in Indonesia belonging to the Anabantidae family are *Anabas testudineus* which has a habitat in freshwater and has additional respiratory organs. Characters from the Anabantidae family have a slightly elongated flat body shape, brown to black body color, small mouth, long anal fin, different number of dorsal and anal fin rays, have additional respiratory organs, namely maze[12,14]. At the time of sampling, one species belonging to the Anabantidae family was found, namely Anabas testudineus Bloch, 1792 or betok fish at first glance similar to tilapia fish, this fish is a freshwater fish commodity that lives wild in rivers, lakes, or swamps. Betok fish belong to the Anabantidae family. The distribution of betok fish spread in Sulawesi, Indochina, India, Sri Lanka, Philippines, Taiwan. A. testudineus has a flat, elongated body, there are faint black vertical stripes along its body. Has a brownish-black body color, dorsal fin extends from behind the operculum to the base of the tail, dorsal and anal fins are not fused with the caudal fin, anal fin long, the back side of the operculum sharp, squarish tail type, terminal mouth position, stenoid scales type. Betok fish are able to live in waters with low oxygen levels,

polluted waters, and muddy[12]. These fish have additional breathing apparatus, namely the labyrinth located at the top of the gill cavity, it is useful for taking oxygen directly in the air when the fish are in muddy waters[36].

3.1. 13. Family Serrasalmidae

The family Serrasalmidae is a family of fish that has a total of 90 species. This family is also called the "salmon family" which has a medium to large body size. Table 3 shows one species belonging to the family Serrasalmidae, namely *Colossoma macropomum* Cuvier, 1816. C. macropomum (pomfret) is an introduced fish, this fish comes from the country of Samba, Brazil. Initially this fish was introduced to Indonesia in 1986 by PT. Cipta Mina Sentosa Jakarta with the aim of being traded as ornamental fish. Pomfret was caught at stations I and III, probably due to the fast currents of the waters at those stations. Pomfret fish live in groups in waters that have fast currents[12].

3.2. Environmental Parameters

Measurement of environmental parameters aims to determine the condition of the Code River waters for fish life in it. Measurement of physical and chemical parameters includes; temperature, current velocity, salinity, pH, and DO.

Table 1. Environmental Parameters Measurement

No	Parameter	Station		
		I	II	III
1	Temperature (^{o}C)	26	27	27
2	Current velocity (m/s)	0,02-0,20	0,02-0,25	0,04-0,23
3	Salinity (ppt)	0	0	0
4	pH	7	7	7
5	DO (ppm)	3.55	3.19	3.6

The results of the measurement of environmental parameters in the Code River are still within the range that supports fish life, so that various types of fish are still found in this river.

4.Conclusion

Based on the results of research on the types of fish in the Code River, Bantul Regency, Yogyakarta Special Region, it can be concluded as follows: The types of fish found along the Code River, Bantul Regency were 22 species grouped into 5 orders and 13 families. The highest number of species was in the order Cypriniformes and the family Cyprinidae, which found seven species. Some of these species are classified as local fish and introduced fish. There are five species of introduced fish that can affect local fish life in rivers, namely: *Poecilia reticulata, Pterygoplichthys pardalis, Oreochromis niloticus, Colossoma macropomum* and *Oreochromis mossambicus*. The results of the measurement of physico-chemical parameters in the Code River are still within a reasonable range for fish life, but the dissolved CO2 level is quite high but not lethal to fish.

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