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# Monitoring of Heavy Metal Polution the Lead (Pb) with Bio Indicator Baung Fish (*Hemibagrus nemurus*) at the Musi River of South Sumatra

*Pemantauan Polusi Logam Berat Timbal* (*Pb*) *dengan Bioindikator Ikan Baung* (*Hemibagrus nemurus*) *di Sungai Musi Sumatera Selatan*

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## ABSTRAK

Tingginya aktivitas masyarakat di perairan sungai musi dapat mempengaruhi kualitas air sungai, bahkan dapat menyebabkan pencemaran air dan biota perairan termasuk ikan baung (*Hemibagrus nemurus*) oleh logam berat yang disebabkan oleh logam berat timbal (Pb). Penelitian ini bertujuan untuk menganalisa kandungan logam berat timbal (Pb) pada ikan baung hasil tangkapan nelayan di perairan sungai musi kota Palembang. Penelitian ini telah dilaksanakan pada bulan Mei-Juni 2019. Metode penelitian yang digunakan adalah dengan cara survei. Sampel penelitian ini didapatkan dengan cara observasi dari nelayan dan pasar ikan Gandus. Bagian yang diamati adalah bagian daging, kulit, hati, ginjal dan insang ikan baung (*H. nemurus*) yang diuji kandungan logam berat timbal (Pb) menggunakan alat AAS (*atomic absorption spectrophotometry*). Hasil penelitian ini menunjukkan konsentrasi logam berat timbal (Pb) pada ikan baung (*H. nemurus*) di perairan sungai musi rata-rata pada daging 0,046 mg/kg, pada kulit sebesar 0,058 mg/kg, pada hati 0,1516 mg/kg, pada ginjal 0,2513 mg/kg dan pada insang 0,2216 mg/kg. Pada sampel daging, kulit dan hati, kandungan Pb masih berada di bawah baku mutu yang telah ditetapkan sehingga masih layak dikonsumsi sedangkan pada sampel ginjal dan insang ikan berada di atas baku mutu yang telah di tetapkan berdasarkan peraturan Badan Pengawas Obat dan Makanan (BPOM) nomor 5 tahun 2018, yaitu 0,20 mg/kg.

Kata kunci: *atomic absorption spectrofotometry*, baku mutu, *Hemibagrus nemurus*, sungai musi, timbal (Pb)

## ABSTRACT

The high activity of the community in the musi river waters could affect the quality of river water, and can even caused water pollution and aquatic biota including fish baung (*Hemibagrus nemurus*) by lead heavy metals (Pb). This study aimed to determine the lead (Pb) heavy metal content of baung fish (*H. nemurus*) catches of fishermen in the musi river waters of palembang city. This research was conducted in May-June 2019. The method used is quantitative descriptive. The sample of this research is the meat, skin, liver, kidney and gill of baung fish (*H. nemurus*) which are tested for lead (Pb) heavy metal content using aas (*atomic absorption spectrophotometry*). The results of this study indicated that the concentration of heavy metal the lead (Pb) in fish baung (*H. nemurus*) in the waters of the musi river on the average meat of 0.046 mg/kg, on the skin of 0.058 mg/kg, in the liver of 0.1516 mg/kg, in the kidney at 0.2513 mg/kg, and in the gills at 0.2216 mg/kg. The Pb concentration on the meat, skin and liver samples were still below the established quality standards so that they were still suitable for consumption while the kidney and fish gill samples are above the quality standards that have been set based on the regulations of the Regulations Drug and Food Control Agency (DFCA) number 5 of 2018 which is equal to 0.20 mg/kg.

Keyword: *atomic absorption spectrofotometre, Hemibagrus nemurus*, musi river, lead (Pb) quality standards

## INTRODUCTION

Environmental pollution is a problem that is difficult to solve until now, and has a bad impact on life. Environmental pollution is caused by the entry of substances or pollutants such as plastic waste, motor vehicle fumes, pesticides, heavy metals, and industrial waste. Environmental pollution often occurs because of human activities which dispose of environmental pollutants which is environmental, causing environmental damage and affecting human life itself. Environmental pollution occurs when the material cycle in the environment changes so that the balance in terms of structure and function is disturbed (Putra, 2018). The imbalance in the structure and function of the material cycle occurs due to natural processes or also due to human actions. In this modern age, there are many human activities or actions to fulfill biological and technological needs, causing many environmental pollution (Jhon C. and Gram A.M, 2015). Heavy metal is an element which has a density greater than 5g/cm$^3$ include cd (cadmium), hg (mercury), Pb (lead), zn (zinc) and ni (nickel). Heavy metals such as lead (Pb) are referred to as non-essential metals and to some extent become toxic to living things (Ramlia, *et al.*, 2018). In low levels heavy metals are generally toxic to plants, animals and also humans. Heavy metals are metals that pose long-term environmental hazards, such as cadmium (cd), cobalt (co), chromium (cr), copper (cu), mercury (hg), nickel (ni), lead (Pb) and zinc (zn ) (Rahman, 2006). Heavy metals are usually found naturally in soil or rocks and their concentration is increasing due to human activities through gold mining companies, coal and other minerals, motor vehicle fumes and the presence of combustion products from the vehicle industry factory motor vehicles, clothing, electronic materials and the presence of forest fires (Windusari and Sari, 2016).

Lead (Pb) is a non-essential heavy metal which is very dangerous and can cause poisoning (toxicity) in living things (Clarkson and Magos, 2006). Lead toxicity (Pb) can influence growth rate, the longer the lead exposure (Pb) and the higher lead concentration (Pb) will decrease growth rate (Figueiredo-Fernandes *et. al.,* 2006). Lead metal (Pb) is toxic to the organism if the level exceeds the specified quality standard threshold (Yoko, 2004). Metal toxicity in the digestive tract occurs through water contaminated feed containing toxic doses of metal (Ay *et al.*, 2009). The process of accumulation of lead (Pb) in tissues occurs after absorption of metals from water or through lead contaminated feed (Pb) and will be carried by the circulatory system then distributed to network systems (Prianto and Husnah, 2017). Lead pollution (Pb) can cause health hazards to humans. Sources of lead pollutants (Pb) in the environment are industrial waste, ship paints, and lead-based fuels (Pb) (Rahayu, 2017). Lead (Pb) in the atmosphere enters ground water, and rivers or ponds through rain water, lead (Pb) can also come from piped drinking water pipes coated with lead (Pb) (Setiawan, 2015). In 2013 who estimated lead poisoning to result 143,000 cases of death and 600,000 cases of intellectual disability in children each year Mahalina *et al.* (2016). Lead poisoning can cause different symptoms according to toxicity, age, individual, and duration of exposure (Priatna *et al.,* 2016). Symptoms can occur after several weeks or months due to increased levels of lead (Pb) increasing in the body (Trisnain, *et al.*, 2018). Symptoms due to lead poisoning (Pb) include abdominal pain, convulsions, headaches, fatigue, insomnia, nausea, weight loss, hearing loss, visual impairment, body irritation, hypertension, loss of appetite, weak muscles, difficulty concentrating, anemia, kidney damage, brain damage, convulsions, paralysis, coma and death (Robert, 2018). Musi river is the largest river in south sumatra which divides the city of Palembang in two parts, namely the upstream and downstream regions (Hishen W, *et al.,* 2017). However, the condition of the musi river has changed due to dense settlements and industries such as oil refineries, fertilizer factories, processing of natural rubber, plywood and others (Fadhlan, 2016). The diversity of human activities along the Musi river has an impact on the physical condition of the river and the habitat of aquatic animals that inhabit the waters (Tanjung *et al.,* 2019). In addition, there is also a dense residential area in the city of Palembang with the Musi river flow through the settlement, where residents' activities in the river waters are still quite high. The level of activity in the waters of the Musi river can also have an influence on river water quality, and can even cause river water pollution. And biologically lead metal (Pb) will experience accumulation in the body of biota organisms such as fish (Ramlia, *et al.*, 2018). The problem that arises now is the community activities around the musi river which can pollute the waters of the Musi river, one of the pollutants in very dangerous waters is lead metal (Pb), lead metal (Pb) is derived from ship peeling paint and fuel oil from boats, from coal burning etc. At this time the community is less aware of protecting the environment even though the daily activities carried out by the community tend to damage and pollute the environment, which later this environmental problem will also impact on people's lives. With the increase in activities carried out by the community along the Musi river and the many sources of pollutants in the river water, it is feared that the Musi river's water quality has decreased and will affect the living biota in it. In addition to the water sources that the community uses for drinking water and bathing the Musi river as well as a source of livelihood for the people who work as fishermen who later catch fish from the musi river will be sold or consumed alone.

Baung fish (*Hemibagrus nemurus*) is one of the freshwater fish that inhabits major rivers in sumatra, one of which is the Musi river (Rahman. 2006). Baung fish (*H. nemurus*) have been quite difficult to obtain because of their rare presence in their natural habitat. Baung fish (*H. nemurus*) are often consumed and have high economic value. Baung fish (*H. nemurus*) is often processed into boiled dishes, salai fish (smoked fish) and other dishes. Baung fish (*H. nemurus*) live at the bottom of the river in the holes in the bottom of the river (Tanjung *et al.*, 2019). Baung fish (*H. nemurus*) is a common water fish that has a high economic value now and in the future (Muliari and Akmal, 2019). Baung fish has a savory meat taste and is not easily broken and easily digested. The protein content of baung fish is quite high and rich in omega-3, but the meat of baung fish is low in fat and cholesterol so that baung fish can be consumed by sufferers of cholesterol (Muhtadi *et al.,* 2017). In its natural habitat, baung fish live in rivers, lakes and swamps. In these public waters the baung fish likes to be at the edge of the waters where it lives (Palar, H, 2004). This study aimed to determine the lead heavy metal content (Pb) in baung fish (*H. nemurus*) catches of fishermen in the musi river waters of palembang city.

## MATERIALS AND METHODS

This research was conducted in May-June 2019 at the central laboratory of health (bblk) palembang city. The type of research in this research is quantitative descriptive with purposive sampling method. The population in this study is the fish baung (*H. nemurus*) the catch of fishermen in the waters of the city of palembang musi taken from the fish auction in the barren area. The samples in this study are the meat, skin, liver, kidneys and gills of the fish baung (*H. nemurus*) taken from the Fish Auction Place (FAP) in the gandus area. This research have done at Technical Centre of Environmental in Palembang. The Tools that used in this research are AAS (Atomic Absorption Spectrofotometry), 50 ml erlenmeyer, 25 ml and 50 ml measuring cups, homogenizer, polypropylene bottles, porcelain cup, desiccator, hot plate, 25 ml beaker glass, 100 ml and 250 ml, 100ml polypropylene flask, furnace (furnace), filter paper, 50 ml measuring flask, aluminum foil, analytical balance, scalpel, measuring pipette and drip pipette (Anggraini *et al.*, 2018). The material used in this research was a sample of baung fish (*hemibagrus nemurus*) the part taken is the meat, skin, liver, kidney, fish gills and the ingredients for destruction are hno3, aquades and lead standard solution (Pb).

Data Research was analised by procedure sample destruction (based on Standar Nasional Indonesia (SNI) 2354.5: 2011).

A. Separate the flesh, skin, liver, kidneys and gills of the fish (*H. nemurus*) from the other parts.
B. Samples of meat, skin, liver, kidneys and gills of baung fish (*H. nemurus*) were weighed using an analytical balance.
C. The sample is put into the furnace to be blasted for ± 3 hours. With a furnace initial temperature of 200oc then every 30 minutes the furnace temperature is raised to a temperature of 600oc and maintained for 2 hours.
D. Remove the sample from the furnace then chill at room temperature, then add 5 ml of concentrated hno3.
E. Reheat it on a hot plate at 100oc.
F. Transfer the sample to a 10 ml volumetric flask and add 5 ml of distilled water/until the volume becomes 10 ml while filtered using filter paper.
G. Transfer the sample to a closed test tube. Prepare a standard working solution Pb each of at least 5 concentration points. Standard working solutions and samples were read on a graphite furnace aas (atomic absorption spectrophotometer) instrument with a wavelength of 283.3 nm.

Calculation of lead metal concentration (Pb) furthermore, the results of the reading of the lead metal content from the aas (atomic absorption spectrophotometer) are calculated using the following formula:
Lead concentration

$$(Pb) \text{ or } \mu g/g = \frac{(d-e) \times fp}{w}$$

Note:
D = Sample Concentration µg/l from the AAS (*atomic absorption spectrophotometer*)
E = Concentration of Sample Blank µg/l from the reading of AAS (*atomic absorption spectrophotometer*)
Fp = Dilution Factor
W = Weight of Sample (g)

## RESULTS AND DISCUSSION

Measurement of lead metal (Pb) concentrations in the flesh, skin, liver, kidney and gills of baung (*H. nemurus*) fishermen's catches in the waters of the musi river were tested using the aas (atomic absorption spectrophotometry) data as follows:

Based on the absorbance data of a standard solution (Table 1), a standard curve is obtained with a linear line equation y = 0.00367 x -0.0004 with a coefficient value f (xy) = 0.9980. The standard curves below are used to determine the sample concentration based on absorbance. From the correlation coefficient f (xy) = 0.9980 is considered to be able to meet the minimum correlation coefficient ≥ 0.995 or must be close to 1. These results indicate that the tool used has a good response to the sample and the tool can provide a linear relationship between absorbance and the concentration of the solution be measured. Thus, it can be said that the tool is in good condition and the straight-line equation obtained can be used to calculate the concentration of the sample. Based on the standard metal concentration (Pb) curve in Standard Curve of Lead Metal Concentration ( Pb) (Figure 1), analysis of each sample of the organ of the baung fish was obtained and data obtained from the measurement of the lead metal concentration (Pb) of the baung fish (*H. nemurus*) are as follows:

Data of lead metal concentration (Pb) in baung fish (*H. nemurus*) was obtained by sampling fish from three vessels based on fishing areas, namely ship 1 with fishing areas in the Lais River area, ship 2 with fishing areas in 14 Ulu and ship 3 with fishing area in Musi II area. Based on measurement data of lead metal concentration (Pb) in baung fish (*H. nemurus*) in Table 2 above it can be seen that the sample of ship 2 gills, liver, kidney and 3 gills have lead concentration of metal (Pb) which is above the quality standard and unfit for consumption that is based on the regulation of the Food and Drug Supervisory Agency (BPOM) Indonesia number 5 of 2018 regarding the maximum limit of lead metal contamination (Pb) in fish and fishery products that is equal to 0.20 mg/kg.

Based on data on the concentration of lead metal (Pb) in the flesh, skin, liver, kidney and gills of baung fish (*H. nemurus*) contained in Table 2, it can be seen that the highest metal lead (Pb) concentration in the kidney organ is as shown in the graph below.

Baung fish samples (*H. nemurus*) contained in Figure 2 were taken from three vessels with fishing areas, namely fish 1 with fishing areas in the Lais River area, 2 ships with fishing areas in 14 Ulu area and 3 ships with fishing areas in Musi II area. Based on the three fishing areas, it can be seen that fish on ship 3 with fishing areas in Musi II area have the highest concentration of lead heavy metals (Pb) compared to fishes of ship 2 and ship 1, as contained in the graph below.

Table 1. Absorbance data of standard solutions

| Solution | Absorbance 1*** | Absorbance 2*** |
|---|---|---|
| Blanko* | -0.0001 | -0.0007 |
| Standar solution 1** | 0.0003 | 0.0000 |
| Standar solution 2** | 0.0011 | 0.0011 |
| Standar solution 3** | 0.0020 | 0.0017 |
| Standar solution 4** | 0.0025 | 0.0025 |
| Standar solution 5** | 0.0034 | 0.0033 |
| Larutan standar 6** | 0.0050 | 0.0049 |

Note: (* = a solution containing no analyte, ** is a solution whose concentration is known, *** = the absorption of light by certain chemicals based on wavelength)

Table 2. Data on the concentration of lead metal (Pb) in baung fish (*Hemibagrus nemurus*) in the Musi River of Palembang City

| Ship | Sampel | Abs. 1 | Abs. 2 | Concentration Pb µg/gr | Concentration Pb mg/kg |
|---|---|---|---|---|---|
| | Meat | 0.0012 | 0.0013 | <0.009 | <0.009 |
| | Skin | 0.0011 | 0.0010 | <0.009 | <0.009 |
| Ship 1 | Heart | 0.0010 | 0.0009 | <0.009 | <0.009 |
| | Kidney | 0.0014 | 0.0011 | 0.046 | 0.000046 |
| | Insang | 0.0017 | 0.0016 | 0.123 | 0.000123 |
| | Meat | 0.0017 | 0.0016 | 0.056 | 0.000056 |
| | Skin | 0.0020 | 0.0016 | 0.126 | 0.000126 |
| Ship 2 | Heart | 0.0016 | 0.0014 | 0.132 | 0.000132 |
| | Kidney | 0.0013 | 0.0012 | 0.036 | 0.000036 |
| | Insang | 0.0020 | 0.0019 | 0.237 | 0.000237 |
| | Meat | 0.0016 | 0.0020 | 0.084 | 0.000084 |
| | Skin | 0.0016 | 0.0013 | 0.048 | 0.000048 |
| Ship 3 | Heart | 0.0014 | 0.0015 | 0.323 | 0.000323 |
| | Kidney | 0.0019 | 0.0016 | 0.672 | 0.000672 |
| | Insang | 0.0023 | 0.0022 | 0.305 | 0.000305 |

Note: Concentrations above 0.20 mg/kg are above the quality standard based on the regulations drug and food control agency (DFCA) number 5 in 2018

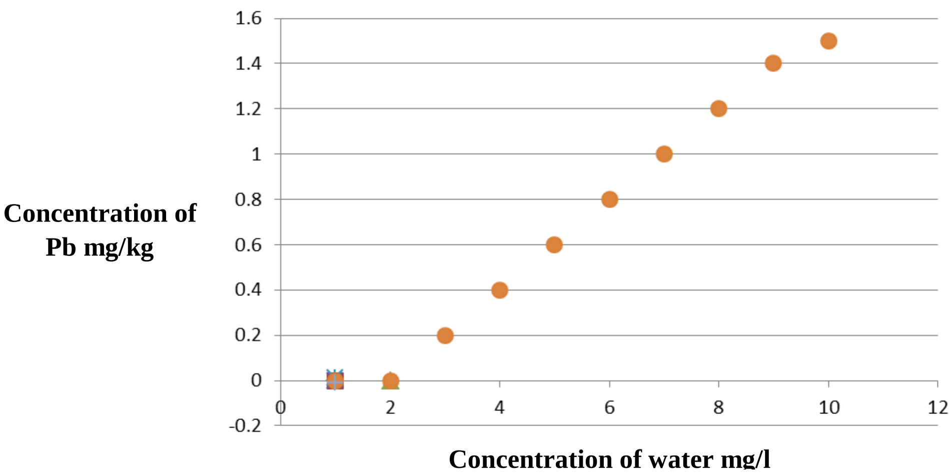


Figure 1. Standard curve of lead metal concentration (Pb)

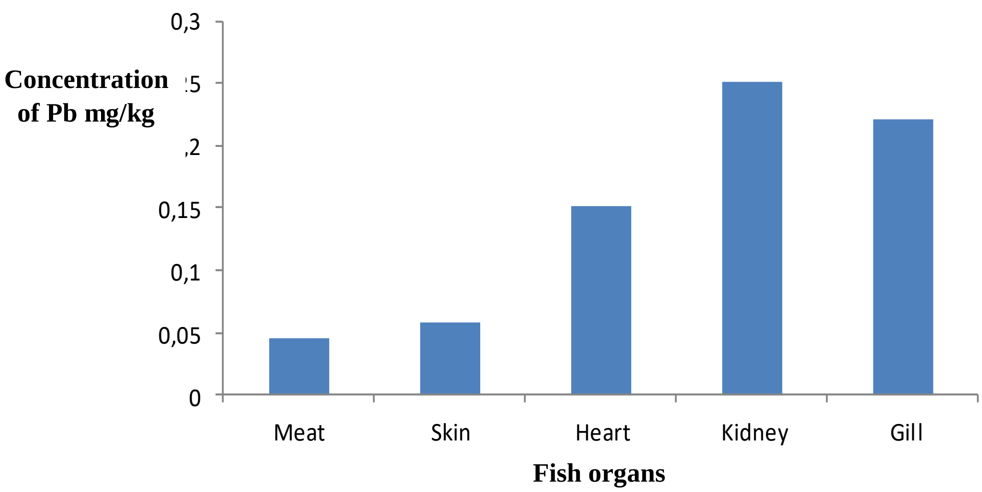


Figure 2. The average value of lead metal concentrations in baung fish organs

## Discussion

### Lead Metal Concentration (Pb) Based on Sampling Location

Data of lead metal concentration (Pb) in baung fish (*H. nemurus*) contained in Figure 3 was obtained by sampling fish from three vessels based on fishing areas, namely ship 1 with fishing areas in the Lais River area, ship 2 with fishing areas in 14 Ulu and ship 3 with fishing areas in the Musi II area, then fish obtained from each ship were tested for lead (Pb) metal content in the flesh, skin, liver, kidney and gills using AAS (Atomic Absorption Spectrophotometry) (Ullrich, *et al.*, 2001). These three sampling areas are located in the Musi River Basin which is the center of community activity in the City of Palembang. Various activities in the Musi River, including industries such as fertilizer factories, rubber factories, mines, plantations, agriculture, households, as well as daily activities carried out by people who are in the Musi River Basin can adversely affect the aquatic biota in Musi River and the public health that is there. These activities cause heavy metals such as lead (Pb) to enter the river body (Setiawan dan Eddy, 2011). The relationship between the amount of metal absorption and the metal content in water is usually proportional, where the increase in the metal content in the tissue matches the increase in the metal content in water.

In essential metals, their contents in tissues are usually subject to regulation, but in non-essential metals in tissues they continue to increase in accordance with the increase in the concentration of metals in their environmental water (Clarkson and Magos. 2006). In the body of aquatic biota the amount of metal that accumulates will continue to increase. In addition, the level of biota in the food chain system also determines the amount of lead that accumulates (Amanah and Nur, 2019).

Baung fish (*H. nemurus*) is one of the freshwater fish that inhabits large rivers in Sumatra, one of which is the Musi River. Baung fish (*H. nemurus*) have been quite difficult to obtain because of their rare presence in their natural habitat. Baung fish (*H. nemurus*) are often consumed and have high economic value. Baung fish (*H. nemurus*) is often processed into boiled dishes, salai fish (smoked fish) and other dishes. Baung fish (*H. nemurus*) live on the riverbed, in the holes in the riverbed (Tang *et al.*, 2018). Based on the data obtained, it can be seen that fish on ship 3 from the catch in Musi II area of Palembang City is the highest concentration of lead metal in all parts of the fish tested.

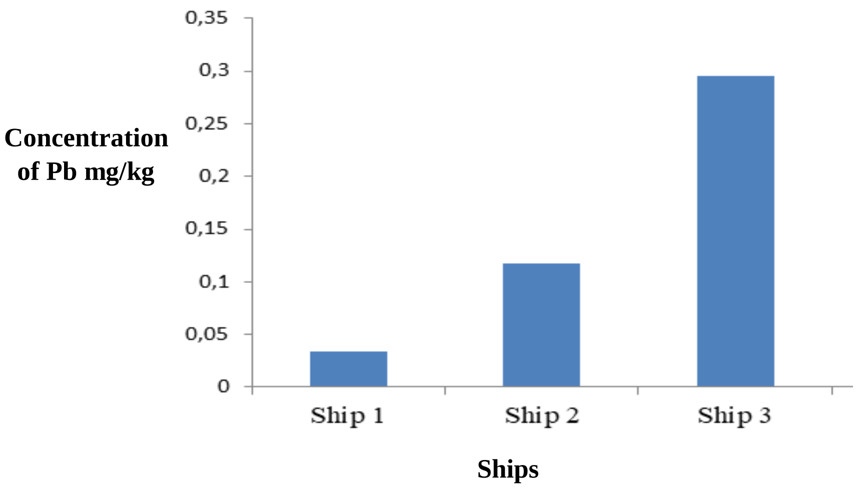


Figure 3. Data on lead metal concentration (Pb) for the ship

Fish from ship 2 are also quite high in lead metal concentration compared to fish in ship 1. Musi II area is located in Gandus District, Palembang City, high lead content (Pb) in baung fish (*H. nemurus*) captured in this area it is estimated because in this area many rubber factories are suspected of dumping their waste into the waters of the Musi River and also there are still many large and small ships passing through this area.

The results of research on the total mercury content in various types of Cat Fish in the Musi River Waters of Palembang City, on the measurement of heavy metal mercury (Hg) in baung, juaro, lais and catfish, the highest concentration of mercury (Hg) in baung fish. The mercury (Hg) content in the downstream region is relatively greater. The high content of mercury (Hg) in the downstream region is due to water from the upstream area flowing downstream, so that the pollutants accumulate in the downstream region (Putri and Purwiyanto, 2016).

Lead Metal Concentration (Pb) in Baung (*H. nemurus*) Organs Based on Figure 2, it can be seen that the highest concentration of lead metal (Pb) is found in the kidney organs of the fish, followed by the gills, liver, skin and the lowest in fish meat. Heavy metals enter the fish's body tissue through a number of ways namely the respiratory tract (gills), digestive tract, excretory channels (kidneys), through the food chain process and into the body's tissues and through the skin which directly come into contact with the pollutant environment. Fish kidneys function as filtration tools and excretory organs. The kidneys secrete materials that are not normally needed by the body, including toxic materials such as heavy metals. Kidney is the main excretory organ in the body, this causes the kidneys to often experience damage and is the main target where accumulation of heavy metals or other pollutants (Suharto *et al.,* 2019). Lead metal (Pb) is a metal that is toxic, lead metal enters the body through food, drinks, air, water and dust contaminated with lead (Pb) that enters the digestive tract, breathing and through skin contact. The second highest concentration of lead metal (Pb) is in the gills. Gills are organs of respiration in fish that are directly related to water, so that if the water is contaminated with harmful substances it can cause damage to the gills. The process of breathing through the gills begins with opening the mouth of the fish and then closing the operculum. The effect of toxic substances on fish causes the morphology of the gills to change. Healthy fish gill epithelial cells consist of only one or two layers of flat epithelium cells located in the basement membrane. Among the epithelium cells are goblet cells which produce mucous cells and chloride cells which are important in the osmoregulation process. Gill tissue damage that is seen is necrosis (cell death), edema (cell swelling), hyperplasia (excessive tissue formation), atrophy (shrinkage of cell size) (Clarkson and Magos. 2006).

In this study the liver of the baung fish (*H. nemurus*) had the third highest concentration of lead metal (Pb) after the kidney organ and the gill of the baung fish (*H. nemurus*). According to Setiawan dan Eddy, (2011), the liver is an important organ that secretes ingredients for the digestive process. This organ is brownish red, most of the toxins that enter the body after being absorbed by the intestinal epithelial cells will be carried by the liver by the portal vein of the liver. High heavy metals or other toxicity that enters the liver can reduce the ability of the liver to eliminate toxic substances. That's why the liver is very susceptible to the influence of chemicals and is an organ that often experiences damage and abnormalities in the histological structure of the liver. Another side that baung fish wasnot death because in the body consist of glutation enzyme

In the test of lead metal content (Pb) in baung fish (*H. nemurus*) the skin is known to have the second lowest concentration of lead (Pb) after meat. parts of the fish skin of baung (*H. nemurus*) are exposed to lead (Pb) due to direct contact with river water that has been contaminated by heavy metals such as lead (Pb). According to Palar, H. (2004), the concentration of lead metal (Pb) in the skin occurs because the lead metal (Pb) in the skin comes in through direct contact with water (Simanjuntak, 2018). From the results of the analysis on each fish organ such as the kidneys, liver, gills and skin of the fish, meat is known to have the lowest metal lead (Pb) concentration compared to the four organs. According to Windusari and Sari (2016), the value of lead metal (Pb) in meat is smaller than that of the gills and kidneys, this is presumably because meat has a greater mass. The low content of lead heavy metals (Pb) in fish meat is related to the physiological and metabolic role of fish, besides fish meat is not an active network in accumulating heavy metals. Meat is part of the body of fish consumed by humans. The nature of heavy metals that are difficult to be excreted by the body can accumulate in body tissues, consume fish meat that has been exposed to lead even in low concentrations and below quality standards and is still suitable for consumption still not too recommended because it will later accumulate in the body and adversely affect for human health (Caroline and Moa, 2015).

The presence of lead metal (Pb) in all parts of the fish baung (*H. nemurus*) the catch of fishermen in the waters of the Musi River is caused by several factors such as the number of ships leaning on the pier with the condition of peeling paint so that it settles to the bottom of the waters, other than that Other factors that lead to the presence of lead metal (Pb) in the waters of the Musi River are fuel discharges from cargo ships and fishing boats that go back and forth through the Musi River every day, where lead metal (Pb) is a mixture of fuel and paint. Water pollution by heavy metals such as lead (Pb) can be reduced by phytoremediation, namely the use of plants to absorb pollutants such as heavy metals or other inorganic compounds. This research on phytoremediation was conducted by Heri S (2015), under the title phytoremediation of lead metal (Pb) using water jasmine plants (Echinodorus palaefolius) in copper and brass smelting industry wastes, the results of their research showed that water jasmine plants were able to absorb lead metal (Pb) from waste reactors as much as 4.87 mg / kg with a percentage of 81.72% allowance (Ahmad F, 2016).

**Lead Metal Quality Standards (Pb) in Fish**

Based on the regulation of the Food and Drug Supervisory Agency (FDSA) number 5 of 2018 regarding the maximum limit of heavy metal contamination in food, the threshold or quality standard of lead metal contamination (Pb) in fish and fishery products is 0.20 mg / kg. From the results of the research that has been done, it can be seen that all samples that have been tested, namely the meat, skin, liver, kidney, and gill of baung fish (*H. nemurus*) are all still below the threshold or quality standards that have been set so that the meat, skin and fish liver is still suitable for consumption. But even though it is still suitable for consumption it is not recommended to always consume fish that have been contaminated by heavy metal lead (Pb) because the properties of heavy metals such as lead (Pb) are difficult to digest by the body and over a long period of time will accumulate in the body and will cause harmful effects for those who consume it both long term and short term (Rahman, 2006). Heavy metals are bad for human health and therefore heavy metal pollution in the food chain needs special attention. Heavy metals cause oxidative stress by the formation of free radicals. Oxidative stress refers to an increase in the generation of reactive oxygen species that can interfere with antioxidant defenses in cells and can cause cell damage or death. Besides heavy metals can replace important metals in pigments or enzymes that interfere with its function (Setiawan dan Eddy, 2011). Consuming food that has been contaminated with heavy lead (Pb) can cause long-term and short-term harmful effects.

Short-term danger caused by lead (Pb) is to cause abdominal pain, rising blood pressure, anemia, headache, hearing loss, weight loss, insomnia, irritation, loss of appetite, weak muscles. While the long-term danger caused by lead is that it can cause brain and kidney damage in adults and miscarriage in pregnant women, reduce fertility in men, paralysis, cancer, coma and even death (Zulfahmi *et al.*, 2018).

### Research Contribution

In research on the test of lead content of heavy metals (Pb) in fish baung (*H. nemurus*) the catch of fishermen in the waters of the Musi River in the city of Palembang in addition to the resulting value of the concentration of lead metal (Pb) in the fish organ (*H. nemurus*) also resulted in research contributions the field of education is a module on environmental change material in which environmental issues including the influence of heavy metals such as lead (Pb) caused by environmental pollution and will affect aquatic organisms such as baung fish (*H. nemurus*) and will have an impact on human health consume these fish.

## CONCLUSION

Based on research that has been done, it can be concluded that the concentration of lead heavy metals (Pb) in baung fish (*H. nemurus*) in the waters of the Musi River on the meat is 0.046 mg/kg, on the skin 0.058 mg/kg, the liver is 0.151 mg/kg, in the kidney at 0.251 mg/kg and the gills at 0.221 mg/kg. From the results of this study it can be seen that the meat, skin and liver samples of fish are still below the quality standard that has been set and in the kidney and gills of fish are above the quality standards that have been determined based on the regulation of the Food and Drug Supervisory Agency (FDSA) Number 5 In 2018 that is equal to 0.20 mg / kg so that the meat, skin and liver of the fish are still suitable for consumption by the community and the kidneys and gills are not suitable for public consumption.

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