



Analysis of Lead Concentration in Fish, Shellfish and Sediments in the Yotefa Bay, Jayapura City

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Abstract

The form of pollution due to industrial waste disposal mainly contains heavy metal groups. Unlike ordinary metals, heavy metals usually cause special effects on living things. This research is descriptive research with observational approach, that is a research conducted to describe a phenomenon that happened in society. The results show that Pb heavy metal pollution in the three sampling stations and on each sample type varies. For Pb collectors at each sampling station have not exceeded the NAV of $<0.01 \mu / l$, $0.07 \mu / l$ and $<0.01 \mu / l$, respectively. In the shell samples have not passed the NAB of $0.12 \mu / l$, $0.18 \mu / l$ and $0.11 \mu / l$, respectively. NAB for marine biota is $0.3 \mu / l$. Similarly, the Pb content of the first and second station sediment samples has not passed the NAV RNO of: $0.48 \mu / l$, $0.61 \mu / l$. while at the station furthest from pantaqi (station 3) the content of Pb in the sediment sample is only $0.27 \mu / l$, not yet passing the NAB. This study shows that the Pb content of each sample tends to be higher in sampling 2. This occurs because at station 2 there is one river mouth but actually this estuary comes from two rivers. In conclusion, another factor causing high levels of Pb in station 2 samples because the Yotefa Bay pollution factor comes from these two rivers is visible from the soil kountur and the level of population activity in the area. The effect of pollution is also evident from the farther the sampling station will have the Plumbum content on the sample. At station 3, the station farthest from the coast shows the lowest plumbum content of all samples.

Keywords: Pb; Pollution; Fish; Shellfish; Sediment.

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1. Introduction

Indonesia is the largest archipelagic country in the world with approximately 17,500 islands with coastlines of approximately 81,000 km and a sea of approximately 5.8 million km². Territory land and coastal ecosystem is very important in supporting human activities. The more human activity, the more impact it will have on the surrounding ecosystem [1-3]. In human activities produce waste that can pollute the environment, either in the form of solids, in the form of chemicals or liquids that can damage the environment. [4]. One example of pollution is the presence of waste water from human activities which is a factor that can affect the environment. Human activities in various fields produce also many waste that can play a role in water pollution. Waste water of human activities can be either solid or liquid waste. Wastewater may also harm humans because the ingredients consist of hazardous chemicals. This waste may come from agricultural activities, industrial activities, household activities, transport activities or other activities that may cause waste water [5].

The form of pollution due to industrial waste disposal mainly contains heavy metal groups. Unlike ordinary metals, heavy metals usually cause special effects on living things. It can be said that all heavy metals can be said toxins that will poison the body of the creature hidup. When this essential heavy metal enters the body in excessive amounts it will turn the function into a poison for the body [6]. Heavy metals are not widely known to the public, either danger or source. People do not realize that many of the materials used daily contain heavy metals. The heavy metal is dangerous even when it becomes waste and discharged into the environment still has risks for humans [7].

One of the things that needs to be done in monitoring and controlling the impact of environmental pollution is by analyzing the elements of Pb heavy metals in aquatic biota. The ability of aquatic biota accumulates essential and non-essential metals, biologically well-formed naturally. Jenkins, in Supriatno, 2009, reports that there is bioconcentration and bioaccumulation of some metals in plants and animals. According to Wright and Philips in Supriatno, 2009 the metallic concentration factor in animals is measured by $\mu\text{g} / \text{kg}$ units of surrounding water ($\mu\text{g} / \text{L}$). Yotefa Bay which has a slow current allows fish to live and can be caught easily by fishermen so that many fish and shellfish are sold in the market. In addition to fish there are several types of shells that come from the bay Yotefa and sold by the public.

From the authoring by Hasmi [6], it illustrates that Yotef Bay pollution comes from seven types of waste: from the population and solid waste, human fecal waste, KJA waste, residential waste (liquid), forest waste (due to new land clearing), waste cows and wastes from other animal waste. Based on the above description and direct observation in the field the author would like to give an idea of Pb contamination in Yotefa Bay of Jayapura. This is to anticipate the negative impacts caused to the people around Yotefa Bay about the dangers of heavy metal Plumbum [8]. This study wanted to give an idea how far the contamination of heavy metal plumbum to marine biota (fish and shellfish) and sediment.

Fish mullet

Fish as one source of food that is full of animal protein and contains unsaturated fatty acids are needed for

growth and lower cholesterol in the blood. But the existence of fish is very susceptible to environmental influences, one of them mullet fish (*Valamugil seheli* familia *mugilidae* family). Belanak is one of many types of fish consumption is quite well known in the waters of mangrove waters.

Scallops

Shellfish that is often consumed by people from the bay of Yotefa is a white shell, by local people called thin leather shells with *Anadara granosa* Latin name taken from the waters around the bay of Yotefa

Sediment

In the Indonesian dictionary the sediment is equated with the meaning of sediment, but in its meaning has somewhat different meaning. Sediments are solids deposited by water or ice. While the sediment is a loose material that lies and lies on the seabed, river, swamp. (KBBI online, 2016).

Toxicology

According to [4], toxicology comes from a toxic word meaning poison and logos which means scientific. Simply toxicology can be interpreted as a science that discusses the poison. Another stated notion of toxicology is that all substances used, manufactured or resulted from a formulation and by-product of an industry entering the environment and having the ability to cause negative effects on humans (The National Institutes for Occupational Safety and Health - NIOSH).

Plumbum

Pb is the chemical formula of Plumbum that we often refer to as much lead contained in premium. Pb is a black metal. Formerly Pb is used as a constituent in paint, battery and widely used in gasoline. Organic pb (TEL = tetra ethyl lead) is intentionally added in the gasoline to increase the octane rating. Pb is a systemic poison.

Characteristics of Yotefa Bay

One of the specific things of the Yotefa bay is that the waters off the high seas are very difficult to enter into the bay because of the narrow strait. The longer the strait is getting narrower due to the existing development in the city of Jayapura. The difficulty of water in Yotefa bay to mix with the waters of the bay of Yos Sudarso can make pollutants enter into difficult to decompose. Pollutants will last longer in the waters of Yotefa bay. This is one of the things that can illustrate that ecosystems are easily exposed to pollutants [10]. Its location which encircles the eastern side of Jayapura and is surrounded by mangroves making the Yotefa Bay as a place to develop water biota such as shrimp, crab and shrimp and provide stunning panorama in the waters of Jayapura. On the other hand, the mangrove forest in Yotefa Bay becomes a buffer abrasion area rivers and abrasion of the sea that threatens the inhabitants of Kampung Tobati and Kampung Enggros and Nafri which is the native village of the local people who live along this bay.

2. Materials and Methods

2.1 Types and research design

This research is descriptive research with observational approach, that is a research done to describe a phenomenon that happened in society [11].

2.2 Location and time of study

The research was conducted at Yotefa Bay of Jayapura City, while for sample inspection was done at Balai Laboratorium Kesehatan Daerah Provinsi South Sulawesi. Time Research The study was conducted for one (2) months, ie in October - November 2016.

2.3 Population and sample

Population is all the object of research. Population in this research that is all type of fish, shell and sediment in Yotefa Bay Jayapura. While the sample is part of the population of the marine ecosystem of Yotefa Bay is the type of fish, shellfish and sediment. For samples of fish and shell each taken one type that is the most commonly consumed by society, while sediment sample is taken padatitik same with both sample above.

2.4 Tools and materials

The tools used in the research are fishing rods, Cool Boxes, Buckets, Plastic containers, Paper labels, Laboratory chemical analysis equipment, Cameras, and Atomic Absorption Spectrofotometry (AAS) atomic spectrophotometers for heavy metal analysis in fish. The materials used in this study are water biota in the form of fish, shellfish, seaweed, sea water and sediment.

3. Result and Discussion

3.1 Description of Research Location

The Bay of Yotefa Jayapura is one of the bays located in the Jayapura City area. The Yotefa grove at this time has degraded the ecosystems of concern. From direct interviews to residents it is illustrated that since the development of the city took place in the Abepura region, the state of Yotefa Bay has been increasingly alarming. Initially, the flowing water (Kali Acai) to Yotefa Bay can be used for daily use. People who live in the village of Enggros and Tobati used to take water at the mouth of Kali Acai.

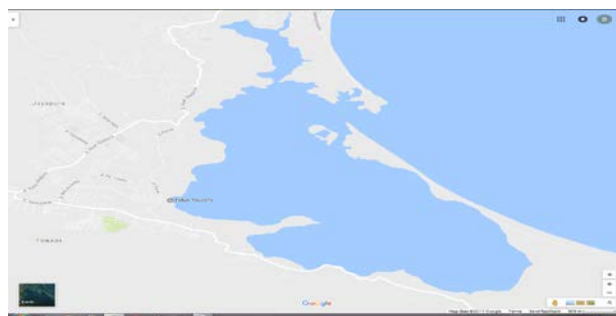


Figure 1: Teluk Yotefa

3.2 Findings

Illustration the samples taken during the research time. has a connection that is: if the fish samples taken at one station, then the shellfish and sediment samples taken also at the station. This is what makes this research take a long time.

Table 1: Types of sample by weight and size From Yotefa Bay of Jayapura

No	Sample station	Weight (gr)	size(cm)	
			Long	Wide
<u>Fish sample</u>				
1	Stasiun I	76	16.8	3.8
2	Stasiun II	97	33	7
3	Stasiun III	83	19	4
<u>Shellfish</u>				
1	Stasiun I	19	5	5.8
2	Stasiun II	22	5.7	6.5
3	Stasiun III	21	5.6	6.2
<u>Sedimetr</u>				
1	Stasiun I	250	Sediment	
2	Stasiun II	250	Sampel filled in	
3	Stasiun III	250	the glass	

Examination of Plumbum chemical parameters (Pb) from samples of fish, shellfish and sediment that have been sent, then the results can be presented as follows:

3.3 Fish

From the results of the examination at the Central Health Laboratory of South Sulawesi Province in Makassar, then for the parameter of Pb in fish, can be seen in the following table.

3.4 Shellfish

The shellfish samples taken tend to have the same size. From the results of the examination at the Central Health Laboratory of South Sulawesi Province in Makassar, then for parameters Pb on the shell is as follows.

Table 2: Plumbum content (Pb) in fish taken in Yotefa Bay Jayapura

N	Sample	Units	Test
o	Stasiun		results
1	Stasiun I	ug/g	< 0.01
2	Stasiun II	ug/g	0.07
3	Stasiun III	ug/g	< 0.01

Table 3: Plumbum Level (Pb) on Shellfish taken at Yotefa Bay Jayapura

N	Sample	Units	Test
o	Stasiun		results
1	Stasiun I	ug/g	0.12
2	Stasiun II	ug/g	0.18
3	Stasiun III	ug/g	0.11

3.5 Sediment

From the results of the examination at the Central Health Laboratory of South Sulawesi Province in Makassar, then for parameter Pb is as follows:

Table 4: Plumbum Level (Pb) on Sediments taken at Yotefa Bay of Jayapura

N	Sample	Units	Test
o	Stasiun		results
1	Stasiun I	ug/g	0.48
2	Stasiun II	ug/g	0.61
3	Stasiun III	ug/g	0.27

3.6 Assessment of Pollution Level

The results of research published by the Regional Health Laboratory of South Sulawesi Province in Makassar, all analysis base on the procedure and quality assurance [12.13]. The distribution of heavy metal pollution Plumbum and the level of pollution differences in sampling stations and we can analyze through the graph below:

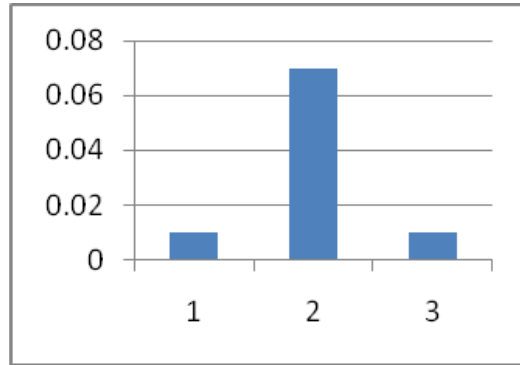


Figure 1: Graph of Plumbum content in mullets fish

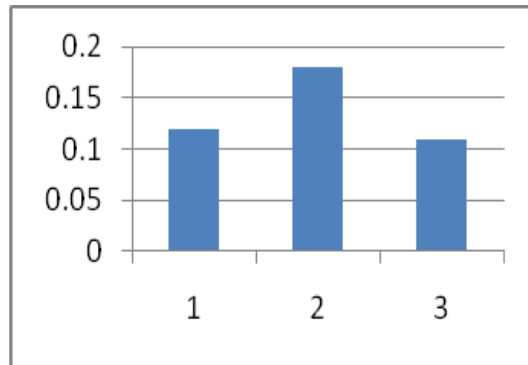


Figure 2: Graph of Plumbum content on shellfish

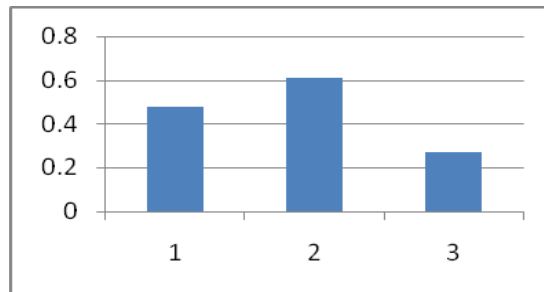


Figure 3: Graph of Plumbum content on Sediment

From the above three graphs we can observe that there is consistency of heavy metal pollution of Plumbum especially at station 2. The second station tends to be higher in heavy metal content in fish, shell or on sediment. The station is located on the estuary of two rivers, the river coming from the South Jayapura District Office and the river coming from the back of CV. Tomas [14,15].

4. Conclusion

4.1 Pb levels in mullets taken from all three points are still below the NAVs of <0.01, 0.07 and <0.01, respectively. The NAV stipulating SNI 7387: 2009 is <0.3 mg / kg.

- 4.2 The concentration of Pb on the shells taken from the three titks has not exceeded the NAV of 0.12, 0.18 and 0.11, respectively. The NAV stipulating SNI 7387: 2009 is <0.3 mg / kg.
- 4.3 The level of Pb in the sediment taken from the three titles has passed through the NAB RNO except in titk 3, respectively 0.48, 0.61 and 0.27. NAB RNO is 0.01 ppm (0.01 mg / kg) dry weight.
- 4.4 Comparison of Pb levels as shown in table Chapter IV shows that sediment samples have the highest Pb levels, followed by Pb levels in shellfish and lastly in Belanak Fish.
- 4.5 At each point of sampling shows that the second point has the highest Pb content in all samples where the first and third points tend to be the same.

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