

THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Analysis of cadmium (CD) and Lead (PB) Content in Losari Beach Waters and Its Relationship to Water Quality

Patang

Lecturer, Universitas Negeri Makassar, Indonesia

Harifuddin

Lecturer, Universitas Negeri Makassar, Indonesia

Andi Heryanti Rukka

Lecturer, Universitas Tadulako, Palu, Indonesia

Abstract:

The research aim was to analyze the content of Cadmium (Cd) and Lead (Pb) in Losari Beach Waters and their relationship to Water Quality starting from the Jeneberang upstream of Gowa Regency to Losari Beach, Makassar.

The observation station consists of 5 stations, namely Station 1 is Jeneberang upstream, Station 2 is Bili-Bili Dam, Station 3 is Sungguminasa of Jembatan Kembar, Station 4 is Jeneberang of estuary, and Station 5 around Tanjung Bayang, Losari Beach, Makassar.

The results showed that cadmium (Cd) content in fish samples was still high because it was in the range of 0.01 ppm, while sediment and water are still good. The content of lead (Pb) in water is still low except at station 4, which is around the river mouth Furthermore, water quality such as temperature, pH and oxygen are still optimal.

Keywords: Cadmium, lead, Losari beach, water quality

1. Introduction

The coastal area is very range with various problems especially environmental pollution. Environmental pollution cannot be separated from the food chain, and if the components at the beginning of the food chain contain heavy metals. Yunarti (2003) stated that the polluted aquatic environment will affect the nutrients contained in the waters which are substances needed in plant life.

The estuary region is very susceptible to natural or artificial damage and changes. Waste disposal, use of water as a means of transportation, and changes in the watershed system, are part of the causes of degradation of the economic quality of estuaries (Sudding et al. (2012).

The perceived environmental pressures include the decline in environmental water quality because the waste produced will all enter the coastal waters of Makassar City. Various wastes that can appear include organic trash, household discharge, industry and heavy metals. Of these types of waste, heavy metals are wastes that need important attention. This is caused by waste containing heavy metals is a material that is very dangerous, toxic to animals, plants and humans and are persistent in the environment (Darmono, 2001).

Increased concentration of heavy metals in seawater which continues continuously, will end with the onset of pollution (Putri et al. (2014). Among the various heavy metals, which are classified as dangerous are the Kadmiun (Cd) and Lead (Pb) types. Heavy metals Pb and Cd, if in large quantities can affect various aspects of the waters, including biological and ecological aspects. This pollutant if it is above the threshold in a water, there will be an imbalance in the aquatic environment which ultimately disrupts aquatic life.

Naturally, metal Pb can enter water areas through crystallizing Pb metal in the air with the help of rainwater. Besides that, Corrosizing process in mineral rocks as a result of waves and wind blows, also is one of the Pb metal source lines that will enter into the water area (Palar, 1994).

2. Research Purposes

The research aim was to analyze the content of Cadmium (Cd) and Lead (Pb) in Losari Beach Waters and their relationship to Water Quality starting from the Jeneberang upstream of Gowa Regency to Losari Beach, Makassar.

3. Method

This research has been done for three months, namely May to July 2018. The observation station consists of 5 stations, namely Station 1 is Jeneberang upstream, Station 2 is Bili-Bili Dam, Station 3 is Sungguminasa of Jembatan Kembar, Station 4 is Jeneberang of estuary, and Station 5 around Tanjung Bayang, Losari Beach, Makassar. The research activities carried out include equipment preparation, sampling, sample analysis in the laboratory and analysis of research data.

For analysis of heavy metal cadmium and lead associated with fish samples, water and sediment samples are carried out in the laboratory. Whereas for water quality will be carried out at the observation site. Data obtained and collected are then analyzed by descriptive analysis.

4. Results and Discussion

4.1. Cadmium

4.1.1. Content of Cadmium Fish Samples

Kadmiun content in sample fish is shown in Figure 1. n Figure 1 shows that the highest cadmium content in fish was obtained at station 1 at 0.01305 ppm, following Station 2 was 0.01175 ppm, Station 3 was 0.00885 ppm, Station 4 was 0.00395 ppm and station 5 was not found cadmium in fish. Therefore, the condition of metal cadmium at stations 1-4 is still relatively high according to the Decree of the State Minister of Environment Republic of Indonesia No. 51 in 2004 which requires cadmium content for sea water quality standards is a maximum of 0.01 ppm.

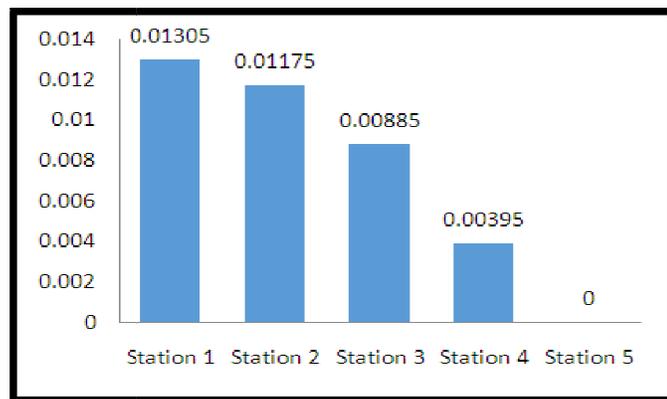


Figure 1: Kadmiun Content of Fish Samples for all Stations

4.1.2. Cadmium (CD) Soil and Water

Cadmium content in soil sediments for all stations shows numbers below 0.10 mg/kg. Whereas in the water sample, cadmium was not found. Therefore, Cadmium pollution in soil and water sediments at the study site is still relatively low.

4.2. Lead Content

4.2.1. Lead Water Samples

The content of lead in water at each observation station can be seen in Figure 2. Figure 2 shows that the highest lead content in sample water found at station 4 at the Jeneberang river estuary is 0.0509 ppm, following station 5 which is the Tanjung Bayang area of Losari beach that is 0.0221 ppm, and lowest station 1, station and station 3 with a value that is 0.002 ppm. Aryawan et al. (2017) which research the total Pb and Cu metal content in water, fish, and sediment in Serangan Beach area and bioavailability found 0.038933 lead metal in Serangan Beach area. Therefore, lead content in the water around Losari Beach is still better than Serangan Beach.

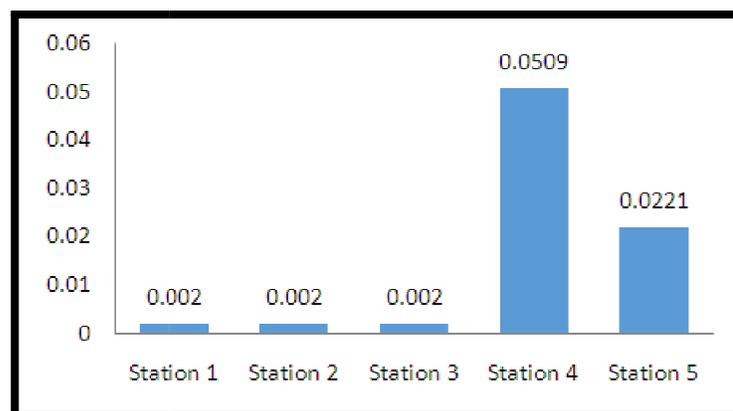


Figure 2: Lead Water Content of All Stations

4.2.2. Sediment of Lead

The presence of heavy metals greatly affects the level of pollution in sediments that is, heavy metals have easy binding properties and settle in the bottom of the water and unite with sediment, so that the level of heavy metals in sediment is higher than in water (Harahap, 1991).

The content of lead in soil sediment can be seen in Figure 3. In Figure 3 shows the value of lead in the highest soil sediment at station 3 which is the location of Sungguminasa of Jembatan Kembar is 32.3386 mg/kg, following station 4 is 30,0144 mg / kg, station 2 is 29,249 mg / kg, station 5 is 21,3669 mg / kg and the lowest at station 1 which is an area Jeneberang upstream of Gowa regency. The content of lead in sediments in this research is very high when compared with the findings of Putri et al. (2014) who did lead research on Manyar river estuary that is 2.7757-3.3726 mg/kg. While the lead content in fish shows values below <0.10 ppm.

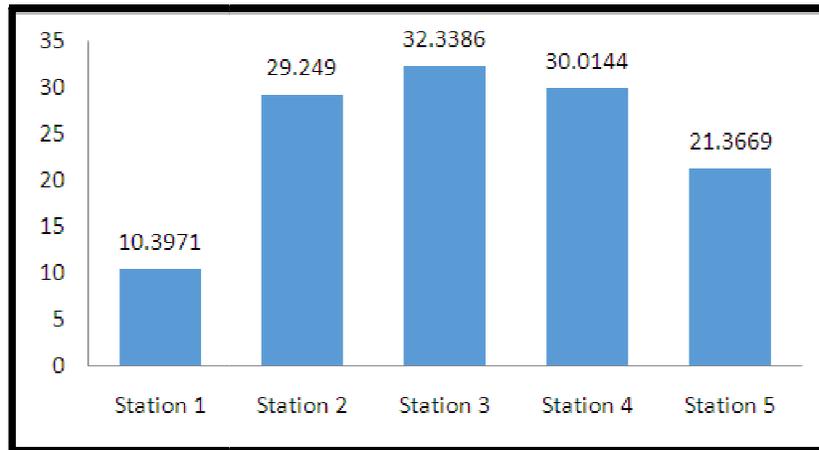


Figure 3: The Content of Sediment Lead to All Stations Water Quality

4.2.3. Temperature (°C)

Temperature is one of the water physics factors that is very important for the life of organisms or aquatic biota. Water temperature will affect the solubility process of heavy metals entering the waters. The higher the temperature of an aquatic, the higher the solubility of heavy metals such as Pb. The higher the temperature of an aquatic, the higher the solubility of heavy metals such as Pb will also be higher, and vice versa (Rosmaria, 2009).

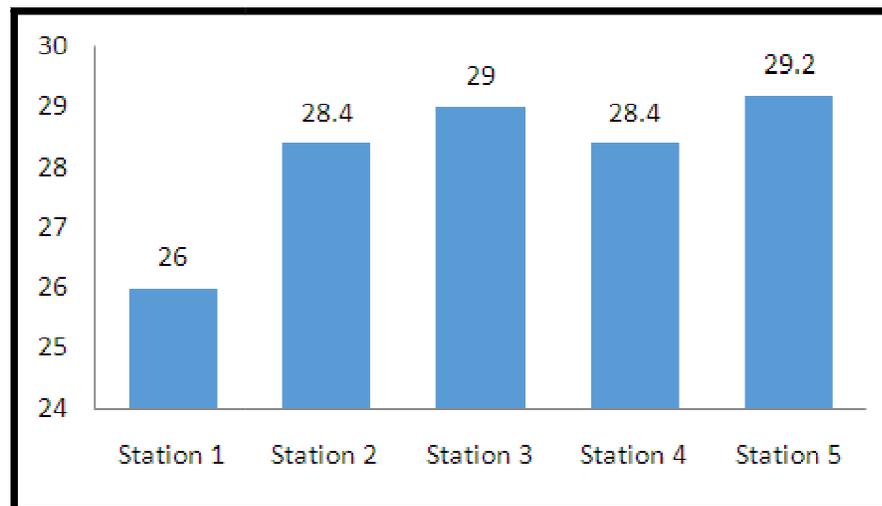


Figure 4: Average Water Temperature of all Stations

Water temperatures at each observation station can be seen in Figure 4. In Figure 4, the average temperature parameter values for all stations show a good value with a range of 26-29.2°C, with the highest average temperature obtained at station 5 is 29.2°C, following station 3 is 29°C, stations 2 and 4, respectively averaging 28.4°C and the lowest at station 1 is 26°C. The low temperature at station 1 is thought to be caused by every observation always starts from station 1 and starts in the morning.

4.2.4. pH of Water

The pH value of water at each station can be seen in Figure 5. In Figure 5 shows that the pH value for each station is not much different with the highest water pH value obtained at station 2 is 7.6, following station 5 is 7.58, station 4 is 7.4, station 1 is 6.96 and lowest station 3 is 6.32.

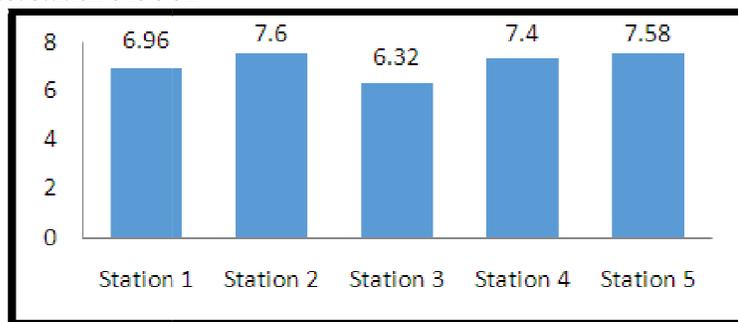


Figure 5: Average Water Ph of All Stations

4.2.5. Dissolved Oxygen (PPM)

Dissolved oxygen values for all observation stations can be seen in Figure 6. In Figure 6 shows the dissolved oxygen value is still at the optimum value for the survival of the organism, namely the highest dissolved oxygen was obtained at station 2 is 7.42 ppm, following station 5 is 7.34 ppm, station 4 is 7.16 ppm, station 3 is 6.92 ppm and lowest station 1 is 6.02 ppm.

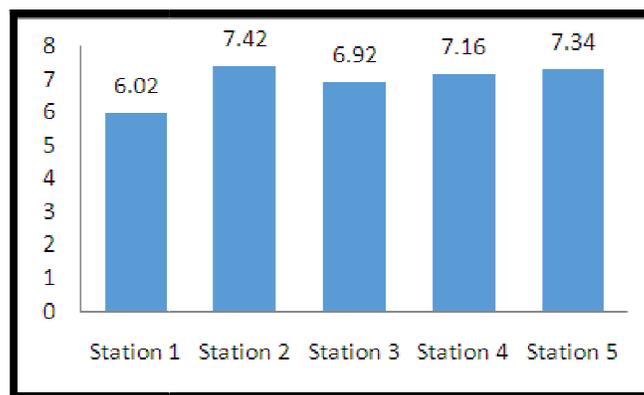


Figure 6: Average Dissolved Oxygen (PPM) Waters of All Stations

5. Conclusion

The results showed the cadmium content in the sample fish was still high because it is in the range of 0.01 ppm, the content of lead in water is still low except at station 4, which is around the estuary. Furthermore, water quality such as temperature, pH and oxygen are still good for the needs of organisms in these waters.

6. References

- i. Aryawan, I. G. N. R., E. Sahara, and I. E. Suprihatin. 2017. Total Pb and Cu Metals in Water, Fish and Sediment in Serangan Beach Area and its bioavailability. *Jurnal Kimia*11(1), Januari 2017:56-63
- ii. Darmono. 2001. Environment and pollution Relationship with Metal Compound Toxicology. Universitas, Indonesia, Jakarta
- iii. Harahap, S. 1991. Level of Water Pollution in Cakung River Judging from the Physical-Chemical Properties, Especially Heavy Metals and diversity of animal species. *Benthos Makro*, IPB, Hal 167
- iv. Palar, H. 1994. Heavy Metal Pollution and Toxicology. Rineka Cipta, Jakarta
- v. Putri, Z. L., S. Y. Wulandari, and L. Maslukah. 2014. Study the distribution of heavy metal content of lead (Pb) in water and basic sediment at River estuary waters Manyar, Gresik Regency, East Java. *Journal Oseanografi*. Vol. 3 No. 4: 589-595.
- vi. Rosmaria, O. 2009. Heavy Metal Copper (Cu) and Lead (Pb) Study on Sediments in the Tallo River Waters of Makassar City. Hasanuddin University. Makassar
- vii. Sudding, S. Side., and A. M. Dewi. 2012. Analysis of Lead (Pb) in Api-Api Putih Roots (A.albaB.) on Jongaya Drainage Metro Street Tanjung Bunga Makassar. *Journal Chemica* Vo/.13 Nomor 2 Desember 2012, 26-32
- viii. Yuniarti, E. 2003. Distribution Pattern of Heavy Metal Lead (Pb) in the waters of Balikpapan Bay. Thesis. Hasanuddin University Postgraduate Program. Makassar