Heavy Metals Pb In Water, Sediment And Shrimp Ghost Shrimp In The Coastal Subdistrict Labang, Bangkalan Madura

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Abstract

This study aims to determine the level of pollution in Madura Strait waters based on water quality parameters (pH, temperature, Dissloved Oxygen, and salinity), heavy metal Pb content in water, sediment and Ghost Shrimp as information on the importance of protecting the coastal environment from pollution. The method used is analysis of water quality (insitu) and sampling of water, sediment, Ghost Shrimp shrimp. As a bioindicator, the content of heavy metal Pb will be analyzed using AAS. The results of the water quality analysis found that the level of pollution in the Madura Strait, especially Labang Subdistrict, was included in the high category and was dangerous for the life of the organisms of the coastal ecosystem. This is because the western Madura strait is a waste disposal area from various major cities, such as Surabaya, Gresik, and Labang itself. Waste in the form of fuel spills for fishing boats, boat maintenance activities that use paint material. Household wastes and factories which are carried by current and suspended in the waters. Therefore, information on the dangers of consuming organisms that live and develop in the area of pollution becomes important for the health of coastal residents who depend on Madura strait marine resources.

Keywords : Madura Strait, Heavy metal Pb, Ghost shrimp, Pollution

I. Introduction

Madura Strait Coastal Waters is the second largest sea transportation route in Indonesia (Setiawan, 2011). The sea is considered as a final disposal place for human life, but it is ignored by humans because the sea has a large volume of water and has the ability to dilute all kinds of substances which are considered to have no impact at all (Ningsih, 2018).

To meet the needs of human life requires a number of activities that actually play a role in the damage to the surrounding environment (Environment, 2016). Fisheries processing, fishing activities, household waste and boat maintenance activities are a source of pollution in the Madura Strait, especially in Labang. Pollution that is often found in the form of heavy metals is Lead (Pb). Naturally lead is present in small amounts in rocks, evaporation of lava, soil and plants. While commercial lead is produced through mining waste, smelting, extracting and secondary reprocessing (Joko, 1995).

Badan Lingkungan Hidup (2012) states that the metal content of lead in the Madura Strait in 2012 amounted to 0.0036 mg / L with 0,005 quality standards. But in 2014 a preliminary study of lead in the Madura Strait increased by 0.26 mg / L. Thus, the high value of the lead in the Madura Strait will affect the biota and humans who consume these organisms.

Input of pollutants on the coast suspended in the mud which has a direct impact on aquatic ecosystems, especially biota that live in mud like ghost shrimp, “petatos” shrimp spend most of its life in the mud. This shrimp is widely used by

local people for consumption. This shrimp that enter the genus Neotrypaea are found along the coastal areas of the Madura Strait waters. This type of shrimp lives by digging burrows at the bottom of the mud as a place to find food and shelter. This type of shrimp is the omnivor who eats detritus in the mud (Dana, 1854).

Information on the content of heavy metals in water, sediment and shrimp is expected to change the mindset of the citizens of the dangers of heavy metal contaminated biota and preserve the coastal environment for sustainable fisheries.

II. Materials and Methods

Studies determining the water quality include temperature, DO (dissolved oxygen), pH, and salinity. Furthermore, measuring the content of heavy metals lead (Pb) in water, sediment, and shrimp in a place with four replications. Each stage is as follows:

Water sample

Water samples are taken from the bottom and surface. This is meant because the level of accumulation of water at the base and on the surface will be different. Water samples were taken and then preserved with HNO3. Then 500 ml of water sample will be taken and then mixed with concentrated nitric acid (HNO3) of 1 ml or 65% into 500 ml of sample water so that the pH reaches 1.5. After it was added to a cool box.

Sediment Samples

For sediment samples, the sludge is taken from each location at the same time as at the time of the shrimp sampling. Then the sediment is put into a jar which is closed tightly and taken to the Laboratory for analysis of the heavy metal content.

Shrimp Samples

The shrimp used are "petatos" shrimp (Ghost shrimp). Shrimp samples were then analyzed by laboratory to determine Pb content. The size of the shrimp used is 12 cm - 14 cm from the total body length, weighing 90 grams - 105 grams.

Further samples of water, sediment, and shrimp will be analyzed with methods of analysis for the determination of metallic elements and their number by using Atomic Absorption Spectrophotometer (AAS).

III. Result and Discussion

Result

Environmental factors affect the life of an organism. Some environmental factors can even affect metabolic processes directly. Rochyatun and Abdul (2007) said that aquatic environmental factors such as pH, hardness, temperature and salinity affect the height or low of toxins in these waters.

No.	Parameter	Value
1.	Temperature (°C)	29
2.	DO (ppm)	8
3.	Salinity (ppm)	29
4.	Ph	7

Table 1. Madura Strait water quality

Temperature

Temperatures in the Madura Strait waters are around 29 ° C. Effendi (2013) states that the temperature will be influenced by the time at the time of sampling. At the time of sampling temperature and other water quality parameters taken in the afternoon between the hours of 14:30 to 15:00 pm. MENLH Decree No. 51 (2004), states that standard standards for temperature, salinity and DO in waters are still natural. This is due to the

different geographical locations of different regions. And depending on when the sampling took.

The size of the temperature is also affected by the light entering the waters. Dahuri (2001) states that the range of sea surface temperatures in Indonesia ranges from 28-38 ° C. Each organism in the waters has a different tolerance to changes in temperature. Some are able to survive even though it will inhibit its growth, but there are also those who cannot survive if there is a fluctuating temperature that rises drastically.

Nybakken (1988) also explained that temperature is a very important factor in regulating the life process or metabolism of the body and the spread of these organisms.

DO (Dissolved Oxygen)

Oxygen As oxidizing and reducing toxic chemicals into other compounds that are simpler and non-toxic. In addition, oxygen is also needed by microorganisms for respiration. Certain organisms, such as microorganisms, was instrumental in outlining the potentially toxic chemical compounds rnenjadi Another simple Iebih andnot toxic (Fauziah, I. 2010). DO (Dissolved Oxygen) in the research location obtained 8 ppm. Dissolved oxygen levels in marine waters ranged between 11 mg / l at 0 ° C and 7 mg / l at 25 ° C (McNeely et al 1979 in Effendi, 2003). The lower the dissolved oxygen level, the higher the toxicity of Zn and Lead (Pb). The waters used for fisheries should not DO levels <5 mg / l. This dissolved oxygen level is also influenced by mining. Where mining is making dynamic waters conditions, thus affecting oxygen solubility in the area.

Salinity

Salinity at location is 29 ‰. The salinity value in the location is influenced by the input of liquid material from the land in the form of household waste. The distribution of salinity in the sea is influenced by various factors such as the pattern of water circulation, evaporation, rainfall and river flow (Nontji 1987). Ross (1970) states that sea surface salinity depends on differences in evaporation and precipitation. Surface salinity in the open sea, varies between 33-37 ‰ with an average value of 35 ‰. In shallow waters, the homogeneous layer is to the bottom with homogeneous salinity and temperature (Nontji 1987). The value of sea water salinity will be even greater with increasing depth. The biggest changes in salinity occur at depths between 100-1000 m, areas where there is a very rapid change in salinity called the halocline layer. Salinity is one of the environmental factors needed by the shrimp for its physiological sell activities, where with an increase in salinity, the energy expenditure for the osmoregulation process will increase.

pH

The degree of acidity of a waters, both plants and animals so that it is often used as a clue to express the good or bad of a waters (Odum, 1971). The pH value is also one of the factors that affect the productivity of the waters (Pescod, 1973). Usually the pH value in an waters can be used as an indicator of the balance of chemical elements and can affect the availability of chemical elements and nutrients which are very useful. for the life of aquatic vegetation. PH value in the Madura Strait waters was obtained 7. Henny (2011) stated that the pH of the waters that were fed into tin mining waste had a low pH. A pH value of 6.0 to 6.5 has a general effect where the diversity of

plankton and benthos decreases (Effendi, 2003). Novonty and Olem (1994) in Effendi (2003) say that a low pH value will affect increasing metal toxicity. It is also reported by Henny and Triyanto (2011) that the increase in water temperature will increase the pH of the waters. Therefore temperature, pH, and DO are related to one another.

Heavy Metal Pb On Sea Water

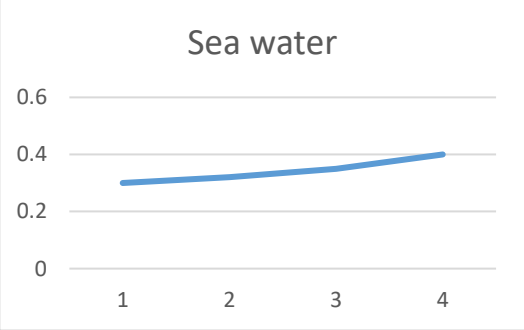

Figure 1. Pb content in sea water

The content of heavy metals in water indicates the range between 0.3-0.4 ppm, Based on the results of measurements of Pb metal content in the water indicates the value has exceeded the threshold that has been set BLH 2012 is 0.005 ppm.

Heavy Metal Pb in Sediment

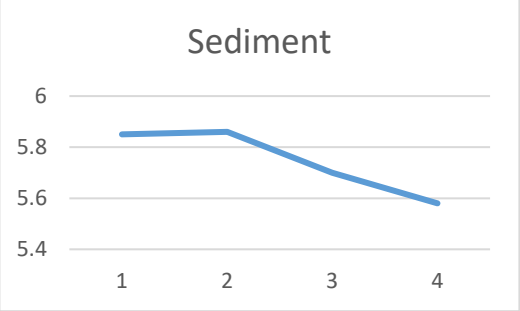

Figure 2. Pb content in sediment

Heavy metal content in sediments in the location ranges from 5.7-5.86 ppm. Madura Bangkalan coastal area is a TSS (Total Suspended Solid) deposition area from various locations, besides being a ship lane, factory waste disposal and Lapindo Porong mud. As long as the kenjeran area constitutes 60% of the population in Surabaya, then the input of waste in the form of sediment that eventually settles and is carried away by the current. The current movement in the research station is in the form of a small bay so as to give small particles the chance to settle. This factor influences the high Pb value in sediment rather than water and shrimp.

Heavy Metal Pb in Ghost Shrimp

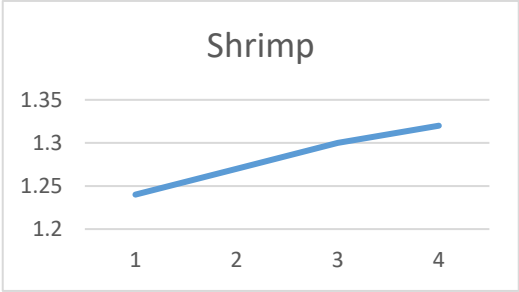

Figure 3. Heavy Metal Pb in Ghost Shrimp

Pb heavy metal content in Ghost Shirmp shrimp ranged from 1.24 to 1.32 ppm. The value of Pb in shrimp has exceeded the threshold of proper or safe, consumption is determined KMNLH (2004) 0.008 ppm. Shrimp Ghost Shrimp is a type of shrimp that almost all of its life in the mud, this type of shrimp usually makes two or more water circulation holes in the sediment (Rachman, 2006). This type of shrimp is a filter feeder by filtering water. Organisms whose life is sedentary cannot avoid contaminants and have a high tolerance to certain heavy metals, so that they can accumulate more metals than other animals (Darmono, 1995).

Ghost shrimp Shrimp much consumed by people around because it is believed to cure allergies, hives, and bedwetting in young children. The impact caused by consuming organisms that accumulate heavy metals is a long-term

impact. According to (Hutagalung et al, 1997) metals in the water column will experience sedimentation in the sediment, then will accumulate in the body of the existing biota, the ability of the biota to accumulate metal (Bioaccumulation) through the food chain so that biologically hazardous material metabolism occurs and will affect the organisms in these waters. The accumulation of each biota differs depending on its biological properties (type, age, and physiology), differences in physical and chemical properties, and activities in each location.

Discussion

Aquatic ecology in the Madura Strait, namely the presence of mangrove ecosystems, coral reefs, seaweed. Aside from being a national salt center, the potential of natural resources in the Madura Strait waters also has the potential as a provider of oil and gas and fish. However, the use of mangrove forests is excessive and exceeds their use therefore abrasion now often occurs on the coast of the Madura Strait and heavy metals or other pollutants are increasing due to the absence of a magrove that serves as an absorbent of polluted material (Rochem, 2011).

The amount of activity and density of population in the coastal areas of the Madura Strait caused the rubbish piled up along the coast of Madura Strait. Fahri Rozi (2013) conducted a field survey and stated that garbage on the coast of the Madura Strait accumulated. The waste comes from household waste. That is one of the factors that make the waters of the Madura Strait polluted while after the next survey is carried out by looking at the level of the heavy oil content in the waters.

In addition, direct contamination can be seen from the movement of fish began to move toward the east and the sea water turns into brown (Rochem, 2011). In addition, the activities of washing the ship's machinery, dumping waste into the sea, and the density of settlements also caused the coastal areas of the Madura Strait to be polluted.

Madura Strait waters vulnerable to marine disasters such as large waves and their abrasion due to the use of mangrove that does not comply with its function, but it is also the coastal areas of Madura will undergo sedimentation due to the Lapindo mud carried by the Porong River which empties into the Madura Strait.

Awareness of coastal communities on the importance of protecting the environment is a problem that must be resolved immediately, socialization from related agencies is the solution to this problem. Labang Bangkalan people mostly work as fishermen who depend on marine resources. if this is left unchecked, the fishing community will switch professions or look for other locations for fishing activities that will trigger regional conflicts with other fishermen.

Conclusion

Pollution in the Madura region is at an alarming stage, by looking at the Pb threshold values on 3 parameters, namely water, sediment and shrimp. the high Pb value is due to the high input of pollutants from land, factory and household waste, fishing activities (fishing and boat / boat maintenance), processed fish waste and plastic waste. There needs to be information for the public about the dangers of consuming aquatic biota exposed to heavy metals for the health of the Madura Strait coastal communities.

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