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Water Quality Analysis and The Possibility of Heavy Metal Contamination Hg, Pb And Cd On Water Zone in Village Pitusungguof Pangkep Regency Subariyanto, Patang, Fajar Wiramas Prabowo Lecturer of Makassar State University Makassar, Indonesia ABSTRACT--This study aims to determine the water quality and the possibility of heavy metal contamination of Hg, Pb and Cd in aquatic zones inPitusunggu village, Pangkep regency. Research is a quantitative research using descriptive method.

The parameters observed in this study are water quality parameters covering physical and chemical parameters ie temperature, degree of acidity (pH), salinity, dissolved oxygen (DO), BOD (Biocheminal Oxygen Demand) or biological oxygen requirement, COD (Cheminal Oxygen Demand) or chemical oxygen requirement and heavy metal mercury (Hg), plumbun or lead (Pb) and cadmium (Cd) as well as the potential analysis of the development of crab.

The results showed that related to water quality, then all parameters of water quality are still in the range that qualify for crab life, as well as heavy metals parameters such as mercury, Pb, Cd, all still under dangerous thresholds. Furthermore, the catching of crabs has increased along with the increase in crab demand. Keywords: water quality, contamination, heavy metal, waters zone I.

INTRODUCTION PangkepTegency consists of 13 District, 65 villages and 38 urban villages,in 2011 recorded the total population of 326.357 inhabitants. Distance capital of Pangkep regencyfrom the capital of South Sulawesi Province is ± 52 km.Pangkep regency is located on the west coast of South Sulawesi, has an archipelago of 117 islands, 80 islands are inhabited. The area of the islands is 351.5

km2 (The Central Bureau of Statistics Pangkep, 2015). Pangkep Regency has abundant biological resources both in coastal areas, sea and small islands. The big wealth is a big capital to build the region and to improve the welfare of fishing communities whose lives are highly dependent on fisheries resources. One of the fishery commodities that has a bright prospect in Pangkep Regency is a crabPortunuspelagicus.

Since the first is a fishery commodity that has high economic value. KKP (2008) states that crab export destination countries, especially the United States, account for 60% of total catches,in exports in fresh form of Singapore and Japan while in the form of processed (canned) exported to the Netherlands.

Some problems that occur due to the catching of crabsPortunuspelagicusexcessive of which is the decreasing of the catch of fishermen, the presence of smaller crab size symptom, the time of catching the longer, the trajectory fishing area tend to move away from the beach,and fishermen no longer choose the ideal catch (adult crab), but the crabs that lay eggs are also caught on the grounds that when it is released again into the sea,then other fishermen will catch it, even though the fishermen know that a crabPortunuspelagicusspawn should not be arrested.

This is an example of human behavior that if left over time will destroy the crab ecosystemin the future. Basically the household waste content affects the nature of the wastewhich can be classified as physical, chemical and biological (Suriawiria, 1986).Lead is one non- essential metal that is very dangerous and can cause poisoning (toxicity) on living things.

This poison is cumulative, meaning the nature of the poison will arise when accumulated large enough in the body of living things.Lead is present in the water due to contact between water and soil or polluted air of lead, water contaminated by industrial waste or due to lead- based pipe corrosion (Riani 2012).

Cadmium (Cd) is generally detected in terrestrial and aquatic environments, is a heavy metal released from both natural sources (eg, volcanism, erosion) and anthropogenic activities (eg, pigments, nickel ± cadmium batteries, melting and refining metals and various other sources).Cd is a powerful cell poison that causes various types of damage including cell death,and is a highly toxic environmental pollutant (Chiarelli et al. 2012).

PURPOSE The purpose of this study was to determine the water quality and the possibility of heavy metal contamination of Hg, Pb and Cd in the waters zone at Pitusunggu village, Pangkep regency. International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.82 II. METHOD Place and time

of research This research was conducted in the waters of Pitusunggu Village, Ma'rang Sub-district, Pangkep Regency from August to October 2017.

Types of research This research type is quantitative research by using descriptive method. Descriptive research method in this research is used to describe water quality and heavy metal contaminationas well as the catch of fishermen coming from the waters of Pitusunggu VillageMa'rang District of Pangkep Regency, based on field observations and laboratory checks.

This research is done by first doing observation to research area,Furthermorespecified parameters will be studied areanalysis of seawater quality analysis of heavy metal contamination (Hg, Pb and Cd) and fisherman catch. Water Sampling Direct measurements include the measurement temperature parameters directly using the Grab sampler method namely the method of sampling for a momentwhich shows the water characteristics only at that time (Effendi, 2003 inMahyudinet al, 2015).

Water Quality Analysis ? Temperature was measured directly at the study site using a stem thermometer. Measurements are done in the morning at 06:00 WITA once a week for 1 month. ? Salinity measurement using salinometric method. ? Measurement Degree of acidity (pH) (SNI 6989.57: 2008). ? Dissolved Oxygen Measurement (SNI 06-6989.14-2004).

This method involves the test method of dissolved oxygen (DO) of the water sample. ? Biological oxygen demand or BOD (SNI 6989.72: 2009). The standard control material in the BOD test is used glutamic-glutamic acid solution. ? Chemical oxygen demand or COD (SNI 6989.2: 2009). In principle, the measurement of COD is in the test sample oxidized by Cr2O72 - in a closed reflux producing Cr3.

The amount of oxidant required is expressed in the ekuvalent (O2 ppm) measured in the visible spectroscopic spectrophotometry. Analysis of Heavy Metal Contamination ? Determination of total mercury (Hg) total weight in water by Spectrophotometric Atom Absorption (SSA) - cold- chillg 1Furherr atoar analyzed quantitatively by spectrophotometric absorption of cold atoms or Mercury Analizer at a wavelength of 253.7 nm.

? Determining the total weight of lead and water-soluble lead in atomic absorption spectrophotometry (SSA) in a range of Pb levels of 0.1 ppm is equal to 20 mg with a wavelength of 283.3 nm or 217.0 nm equipped with a background correction. ? The method used for the determination of total cadmium metal (Cd) and dissolved in water by Spectrofotometric Absorption ato (SSA) -sala at a range of Cd level 0.005 ppm to 2

ppm with wavelength of 228.8 nm. Data analysis The data that has been collected is then tabulated and analyzed by descriptive analysis. III.

RESULTS AND DISCUSSION Water quality Temperature Based on the value of research results on the water temperature of the village of Pitusunggu showed no change that occurred or stable for each measurement time of 29ºC.From the data obtained through direct measurement in the field, the water temperature conditions on the coast of Pitusunggu village did not show a significant or stable temperature difference ie the average temperature of the water at 29 ºC. Data of temperature values of Pitusunggu village waters can be seen in (Figure 1). Fig 1.Histogram Concentration Values Regional Sea Water Temperature Pitusunggu 29 29 29 29 0 10 20 30 40 Week 1 Week 2 Week 3 Week 4 Temperature (oC) International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.83 This indicates that in these waters the waters temperature is reasonable because in general in the tropics sea surface temperature ranges between 27-29 ° C and subtropical regions ranging from 15-20 ° C.This is consistent with Soegiarto and Birowo (1983) temperatures in the Indonesian waters ranging from 26-30 ° C, in the middle layer (thermocline) ranging from 9-26 ° C and in the inner layer (hipolimnion) ranging from 2- 8 ° C which is the lowest temperature layer.According to Nontji (1984), sea surface temperatures in Indonesian waters generally range from 28-31 ° C.

pH The pH is an important parameter in monitoring the quality of water that is often used as clues stating the merits of a body of water (Syamsuddin, 2014). The pH function itself becomes a limiting factor because each organism has maximum tolerance and a minimum value of pH (Al Husainy, 2014). Based on the pH value of the sea water shows relatively fluctuate in the first week of 8.08, the second week 8.345, the third week 8.225, then the fourth week 8.257.

However it remains at the required quality standard that is between 7-8.5 which is a pH based standard ofKep.MENLH No. 51 2004. Data of pH value of sea water in Pitusunggu village can be seen in (Figure 2). Fig2. Histogram Water pH Value of Pitusunggu Village The results showed that the relative pH value fluctuated in the first week of 8.080, the second week 8.345, the third week 8.225, then the fourth week 8.257 (Figure 2).

The pH value is quite good as is the range of established quality standards that are in the range of pH values between 7 to 8.5 is based on water quality standards for marine appropriateKep.MENLH No.51 2004. According toSimanjuntak (2012), the occurrence of a decrease in pH value in a waters indicates an increase of organic compounds in these waters.

This is similar to Cholik et al (2005) states that water pH fluctuates following dissolved CO2 and has an inverse relationship pattern, the higher the CO2 content of the water, the pH will decrease and vice versa. This fluctuation will decrease when water contains CaCO3 salt. Salinity The salinity of seawater fluctuates depending on the season, topography, tides, and the amount of fresh water.

Salinity is a description of the amount of salt in a waters (Dahuriet al, 1996).Based on the average value of laboratory test results on salinity of sea water which shows not too significant changes that occur. Data on the average salinity salinity value in Pitusunggu village.

Specific for salinity concentration shows low to high pattern ie first week 30,1 ppt, second week 31,2 ppt, third week 30,7 ppt, and fourth week 30,9 ppt. Data of salinity salinity value in Pitusunggu village can be seen in (Figure 3). 8.08 8.34 8.23 8.26 7.9 8 8.1 8.2 8.3 8.4 Week 1 Week 2 Week 3 Week 4 pH International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.84 Fig 3.

Histogram Mean Value of Saline Water Salinity Concentration of Pitusunggu Village Based on the results of the study showed that the pH value was relatively fluctuating in the first week 30.1 ppt, second week 31.2 ppt, third week 30,7 ppt, and the fourth week 30,9 ppt. According toNontji (1987) the distribution of salinity in the ocean is influenced by various factors such as patterns of water circulation, evaporation, rainfall and river flow.

Similarly with the sea, the amount of rainfall in a sea area then the salinity of the sea water will be low and otherwise the smaller the rainfall then the salinity in the sea area will be high.This is in accordance with the conditions in the field that in October is the transition season which where enter the rainy season, resulting in dilution resulting in low salinity in the sea area.

Dissolved Oxygen (DO) Based on the results of dissolved oxygen dissolved in the waters of the village of Pitusunggu is relatively unstable and shows the pattern of DO hunting with a margin of difference that is not too large.The data obtained shows the highest pattern of the highest is the first week 6.2816 ppm, the second week 6.2092 ppm, the third week 6.1742 ppm and the fourth week 6.0632 ppm, This condition is still above the minimum threshold of seawater quality standards for biota the sea is 5 ppm which is the standard DO based concentration of Kep. MENLH No. 51, 2004. Value acquisition dataDissolved Oxygen (DO) sea water in Pitusunggu Village can be seen in (Figure 4). Fig 4.Histogram Mean Value Concentration DO Water Pitusunggu Village The results of the measurement of dissolved oxygen (DO) in the waters of the Pitusunggu Village at

the first week taking 6,281 ppm, the second week 6,209 ppm, the third week 6,174 ppm, and the fourth week 6,063 ppm (Figure 4), is relatively unstable and shows a DO pattern of retard with a not too large difference in value. The dissolved oxygen concentration value of seawater is 6-6,5 ppm.

This value is far beyond the minimum threshold value of 30.1 31.2 30.7 30.9 29.5 30 30.5 31 31.5 Week 1 Week 2 Week 3 Week 4 Salinity (ppt) 6.28 6.21 6.17 6.06 5.95 6 6.05 6.1 6.15 6.2 6.25 6.3 Week 1 Week 2 Week 3 Week 4 Dissolved Oxygen (ppm) International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.85 the DO value concentration in the seawater quality standard for marine biota (Kep. MENLH NO.

51, 2004) ie 5 ppm, so the seawater with DO parameters ranges from 6 to 6.5 is still good for marine biota and marine ecosystems. Riani (2005) mentions that the decomposition of organic material and can reduce oxygen levels in the water until it reaches zero (anaerobic). Oxygen needs are strongly influenced by temperature and vary by type. The presence of waste into a waters will reduce oxygen levels in the water.When compared with the result of measurement of dissolved oxygen value in seawater in Pitusunggu village which has DO 6-6,5 is still good water and low pollution level.

Biological Oxygen Demand (BOD) The result of BOD water concentration analysis of Pitusunggu village in the initial week was 25,73 ppm and in the final weeks week with BOD value of 122,45 (Figure 5). Significant difference in values occurred in the initial and final weeks of 96.32 ppm which means very much between the initial and final weeks of the Pitusunggu village waters sample.

This value has exceeded the threshold of sea water quality standards for marine biota of 20 ppm (Kep. MENLH No. 51, 2004). Value acquisition dataBiological Oxygen Demand (BOD) sea water in Pitusunggu village can be seen in (Figure 5). Fig 5.Histogram Mean Value of BOD Concentration of Sea Water of Pitusunggu Village The low concentration of BOD values was in the initial week at 25.73 ppm and increased in the final week with BOD value of 122.457 ppm.

The result of BOD value measurement in seawater shows BOD value which is high enough when compared with maximum limit of BOD concentration value 20 ppm based on seawater quality standard for marine biota according to Kep. MENLH No. 51, 2004. The high levels of BOD in the last week is due to the large amount of oraganic waste that flows into the waters, this is because densely populated settlements do exist on the edge of the canal that is the route to the sea.

This agrees with Mason (1980) which states one of the changes that occur due to disposal of waste marine bodies can lead to reduced dissolved oxygen levels. The amount of BOD concentration indicates that the waters have been contaminated (Mahyudin et al, 2015). As in the final week with a BOD value of 122.45 ppm is categorized as contaminated waters.According to Hariyadi (2004), BOD and COD measurements are still needed as parameters in wastewater quality standards or as water pollution parameters because of their role as an estimator of organic material contamination and its relation with decreasing dissolved oxygen content in waters.

If you look at the condition of BOD high water value but decrease the dissolved oxygen content value so that the waters in Pitusunggu area are classified based on sea water quality standard for marine biota according to Kep. MENLH No.51, 2004. Cemical Oxygen Demand (COD) The concentration of COD values in the first week was very high at 205.99 ppm and decreased in the final week with a COD value of 122.457 ppm. The results of the COD measurements in seawater showed a high enough BOD value.

This indicates that the condition of the sea in the first week was in poor condition good. Data of Cemical Oxygen Demand (COD) value of seawater in Pitusunggu area can be seen in (Figure 6). 25.73 122.46 0 20 40 60 80 100 120 140 early research end of the research Biological Oxygen Demand (ppm) International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.86 Fig 6.

Histogram Mean Value of COD Concentration of Sea Water of Pitusunggu Village The result of analysis of COD concentration of Pitusunggu village waters in the initial week was 205,99 ppm and at week of end of week with COD value 81,81 ppm (Figure 6). There was a significant difference in value in the initial and final weeks of 124.18ppm which means very much between the initial and final weeks of the Pitusunggu village waters sample.Hariyadi (2004) concluded that COD is parameter of estimating total amount of organic material present in water, both cheap and hard to decompose.

COD in the analysis, the oxygen consumed by microbes for oxidation is equivalent to the amount of dichromate required in the dissolved organic matter oxidation and suspended in the water of the sample because almost all organic matter can be oxidized to CO2 and H2O (Syamsuddin, 2014). Based on the results of BOD and COD analysis has a very real difference but the difference can not be concluded that the occurrence or not the occurrence of pollution because if other parameters have increased and exceeded the quality standard then there is an indication of pollution in the water.

This can happen because if there are toxic materials (toxic) in the water, heavy metals for

example (Mays, 1996; APHA, 1989), BOD values may be low or still meet the quality standards, in the case of water or waters contained toxic materials or water has been contaminated. Conversely, if the BOD and COD values that have been high enough and exceed the quality standard, then it can be suspected there are indications of contamination of organic materials. Heavy Metal contamination Mercury Based on the value of laboratory test results on Mercury of sea water which shows no change that occurred.

Data on the average value of mercury of sea water in Pitusunggu area can be seen in Table 1. Table 1.Residu Heavy Metals Mercury (Hg) at Water of Pitusunggu Village Sampling (Weeks) Heavy Metals Parameters Mercury The first week < 0.0003 Second week < 0.0003 The third week < 0.0003 The fourth week < 0.0003 Threshold Limit *) 0.003 *) Sea Quality Standard Based on Kep. MENLH No.

51 Years (2004) Source: Primary Data, (2017) The content of heavy metals of mercury (Hg) from four sampling times shows the number <0.0003 ppm is still below the threshold of water quality standard for marine biota is 0.003. This shows that the content of Hg in the waste does not significantly affect the breeding of crabs.

The results also showed mercury (Hg) levels in the first week u p to the fourth week of sampling were the same, each with a value below 0.0003 ppm.The value is the Limited Of Detection value of the AAS tool used in testing the water sample. So the mercury (Hg) content in seawater is very far below the detection 205.99 81.81 0 50 100 150 200 250 Early Research End of the Research Cemical Oxygen Demand (ppm) International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.87 limit of heavy metal readings of Atomic Absorption Spectrophotometers which indicate the value of heavy metal contamination of Hg and Pb in seawater is very small.

The results of mercury (Hg) concentration in seawater are still far below the maximum concentration of mercury heavy metals (Hg) based on sea water quality standards for marine biota (Kep. MENLH No. 51, 2004) ie maximum Hg level of 0.003 ppm (Table 1) So the sea water in the area of Pitusunggu is still quite safe to use or utilized as needed.

According to (Rolinsa, 2014), heavy metals have properties that easily bind organic materials and settle on the water and unite with sediment. Metal Lead Based on the value of laboratory test results against Lead of sea water which shows no change that occurred. Data on the average value of Lead of sea water in Pitusunggu area can be seen in Table 2. Table 2.

Residu Heavy Metal Lead on Sea Water Pitusunggu Village Sampling (Weeks) Heavy

Metals Parameters Metal Lead The first week < 0.002 Second week < 0.002 The third week < 0.002 The fourth week < 0.002 Threshold Limit *) 0.008 *) Sea Quality Standard Based on Kep. MENLH No. 51 Years (2004) Source: Primary Data, (2017) The results showed that the residual weight of heavy metal residue in household waste that potentially damaged water quality along the coast of Pitusunggu village showed a number <0.002 ppm in samples taken both the first, second, third and fourth weeks, this condition still below the water quality standard threshold for marine biota is 0.05 ppm which is the standard concentration of DO based on Kep. MENLH No. 51, 2004.

The results showed that cadartimbal in the first week up to the fourth week of sampling were the same, each with a value below 0.002 ppm. The value is the Limited Of Detection value of the AAS tool used in testing the water sample. So the cadartimbal contained in seawater is far below the detection limit of heavy metal readings of Atomic Absorption Spectrophotometers.

The result of cadartimbal research on seawater is still far below the maximum concentration of heavy metal timbale based on seawater quality standard for marine biota (Kep. MENLH No. 51 2004) ie maximum Pb level of 0.008 ppm (Table 2). So, the sea water in the area of Pitusunggu is still quite safe to use or utilized as needed.

According to Palar (2012) Metal Lead that enter into the waters comes from human life activities such as industrial waste water disposal such as tin ore mining, remaining industrial batteries, motor vehicle emissions and coal combustion.Badan waters that have been contaminated with compounds or metal lead ions that exceeding the above normal concentration may result in death for the biota in the waters.

Cadmium (Cd) Based on the value of laboratory test results on cadmium (Cd) sea water which showed not too significant changes that happened.Data acquisition value of average cadmium (Cd) sea water in the village of Pitusunggu can be seen in Table 3. Table 3.Residu Heavy Metal Cadmium (Cd) on Sea Water in Pitusunggu Village Sampling (Weeks) Heavy Metals Parameters Cadmium (Cd) The first week < 0.0005 Second week < 0.0005 The third week < 0.0005 The fourth week < 0.0005 Threshold Limit * 0.001 *) Sea Quality Standard Based on Kep. MENLH No.

51 Years (2004) Source: Primary Data, (2017) International Conference Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018 I4.88 The content of heavy metal residue of Cadmium (Cd) on the coast of Pitusunggu Village shows the result that the first week to four is at <0.0005. The water quality standard limit is 0.001 or still in the category according to below the quality standard of water quality for marine biota sebasar 0.01 which is the standard concentration of DO based on Kep.

MENLH No. 51, 2004.

The results showed that the level of cadmium (Cd) in the first week up to the fourth week of sampling was the same ie each with a value below 0.0005 ppm. The results of cadmium content (Cd) in seawater is still far below the maximum concentration of heavy metal cadmium (Cd) based on sea water quality standards for marine biota (Kep. MENLH No. 51, 2004) namely maximum Cd level of 0.001 ppm (Table 3) So the sea water in the area of Pitusunggu is still quite safe to use or utilized as needed.

Analysis of Fishermen Catch crabs The potential of crab (P.pelagicus) is in fact not evenly distributed throughout the waters. This is partly due to differences in water environment conditions. In general, crabs (P.pelagicus) spread in the waters of the coastal sub-districts and the nearby archipelago sub-districts from the coast.

Nowadays, the crab is excellent, because it is an export commodity and the price is quite expensive. This condition gives consequences to the crab (P.pelagicus) become the most sought after by all fishermen in Pangkep regency, both day and night. Furthermore, the increasing demand of crabs in the international market also encouraged the development of home industry is one of the triggers of the increase of crab catching. In addition, there are several fishing gear for crabs that cause mass death for crabs especially in the phase zoea, megalopa and young crab.

Table 4. Production and CPUE of Each Unit of Fishing Gear Crab Years CPUE Standard Production (kg) Effort (trip) CPUE (kg) 2008 368.532 92.985 3.59 2009 288.088 83.314 1.63 2010 420.335 98.99 4.37 2011 367.836 122.243 1.89 2012 586.405 181.038 2.78 *) Processed based on the results of fishermen recording in 2008-2012 Source: Ihsan (2015) Jafar (2011) states that there is a fluctuation of crab production between 2008-2012 in Pangkep regency, with problems of changing the size of crab populations due to fishing effort and technological progress of fishing gear, and if the arrest takes place continuously without regulation and control then the capacity of population growth will someday decrease so that will be harmful to the preservation of the crab populations. IV.

CONCLUSION Based on the results of the study it can be concluded that the related water quality of all parameters indicates that water quality is still in the range that qualifies for crab life,as well as heavy metal parameters, all still below the dangerous threshold.Furthermore, the catching of crabs has increased along with the increase in crab demand.

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