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Analysis the Quality of Clean Water and Laundry Water in Jakarta, Bogor, Bekasi City and Bekasi Regency

Muhammad Kholil

m.kholil2009 [at]gmail.com; muhammad.kholil [at]mercubuana.ac.id
Industrial Engineering Program, Engineering Faculty, Universitas Mercu Buana, 11650, Jakarta, Indonesia

Abstract: ***This research aims to determine the quality of water in urban cities in Indonesia, such as Jakarta, Bogor, and Bekasi. Sampling method in this research is using random sampling by collecting the sample at several places. The parameters tested are a physical analysis such as temperature and EC (Electrical Conductivity). The result shown that a) the clean water and laundry water has temperature in the range of 30°C – 32°C , b) EC value of clean water is in the range of 130 - 250 µS/cm and EC value of laundry water is in the range of 310 - 440 µS/cm. Clean water is still safe for use in daily activities and laundry water is still safe to be thrown into the environment.***

Keywords: Water quality; laundry water, Jakarta; Bogor, Bekasi

1. Introduction

Projections of climate change, urban and industrial development threaten water quality and the availability of water used. Population, consumption, and degradation of sources increase as if there is no limit to clean water supply [1-6].

Bogor is geographically surrounded by Mount Salak, Mount Gede, and Mount Pangrango. Because it is located in the mountains, Bogor has several clean springs. Nowadays Bogor city is already crowded with population, development everywhere, and industrial sector also began to enter Bogor. Increase domestic wastes and industrial wastes make water quality decrease, especially from young generation's life style [7].

Bekasi City is geographically located between industrial areas, densely populated settlements, and there is a final waste disposal [8]. The area divided into 3 (three) regions and each region has different soil structures that affect water quality. Section of South Bekasi have the best water quality because it is far from industrial areas and landfills, while the section of East Bekasi and West Bekasi West near with industrial areas and landfills that affect the quality of ground water [9-11]. Most of the areas in Bekasi Regency are industrial areas and dense settlements. This situation can also affect the quality of clean water [3, 12-14].

The development place in Jakarta makes the need for water increases. Higher population growth leads to increased demand for development. Residential development, malls, tall buildings, and other infrastructure make land-use changes that indirectly damage the water catchment areas.

From environmental problems that occur, such as reduced land, reduced ground water due to large amounts of groundwater retrieval periodically, extreme weather, it would have a negative impact on the quantity and quality of ground water and surrounding environments [15, 16]. The negative impact is the decrease of the quality of clean water.

This study aims to assess the quality of clean water and laundry water in Bogor, Jakarta, Bekasi City and Bekasi Regency, and compliance with water quality standards for their designated purpose [3, 17, 18].

2. Methodology

The variables of this study consisted of temperature and ec to determine the conductivity of electric water. The number of water samples taken as many as 15 samples from each area. The total numbers of samples collected were 240 water samples consisting of 128 samples of clean water and 112 samples of laundry water. Samples taken randomly and taken at the same time and same source in each week.

(a) Place and Time Measurement

This research is quantitative-descriptive [19-21]. The study did in September 2017 until November 2017. The research location consisted of 16 areas, East Bekasi, Bantar Gebang, Cileungsi, Jonggol, Gunung Puteri, Hankam, Mustika Jaya, East Jakarta, Palm Residen Bekasi, South Cikarang, Jati Sampurna, Cibarusah, Harapan Jaya, Kp. Pisangan, South Bekasi, and Limus. These 16 areas expected to represent water conditions in Bogor, Bekasi Regency, Bekasi city and Jakarta.

(b) Tools

1. Thermometer
2. To measure temperature of sample.
3. Conductometer
4. To measure conductivity of sample.
5. Water Container
6. This container as a place / container water that will be tested. It can use a glass.

3. Results and Discussion

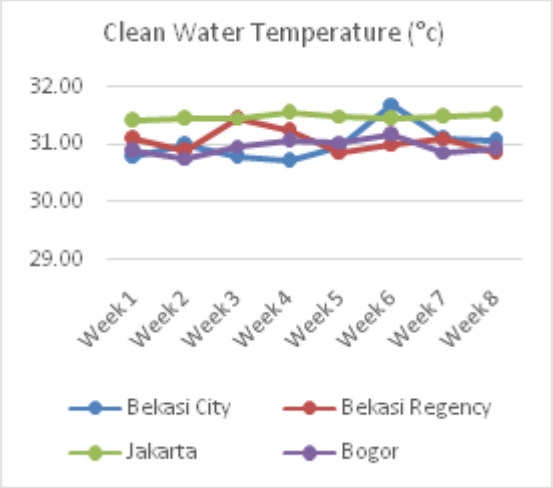

Figure 1: Graphic of clean water temperature

Based on a graph, it can be seen that the clean water temperature in the Jakarta area, Bogor, and Bekasi regency in every week is relatively constant. In Bogor the highest temperature is 31.17°C at week 6 and lowest is 30.76°C at week 2. In Jakarta the highest temperature is 31.54°C at week 4 and lowest is 31.42°C at week 1. In Bekasi regency the highest temperature is 30.87°C at week 5 and low 31.43°C at week 3. While in the area of Bekasi city at week 1 - week 5 water temperature relatively constant, but at week 6 water temperature rises to 31,71°C and at week 7 - 8 water temperature drops and returns constant.

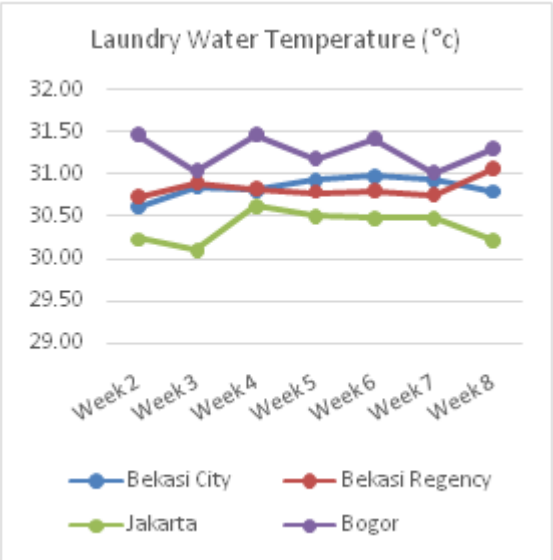

Figure 2: Graphic of laundry water temperature

Based on a graph, it can be seen that for the laundry water temperature in the Jakarta area, Bogor, Bekasi City and Bekasi regency in every week is relatively constant. In Bogor the highest temperature is 31.47°C at week 2 & 4 and lowest 31.02°C at week 7. In Jakarta the highest temperature is 30.63°C at week 4 and the lowest is 30.10°C at week 3. In Bekasi Regency the highest temperature is 31.06°C at week 8 and low 30.72°C at week 2. In Bekasi City the highest temperature is 30.97°C at week 6 and low 30.61°C at week 2.

Based on the water quality standard Class I (Regulation No. 82 of 2001), the average temperature of water in the range of the maximum allowable temperature (26-29°C).The result of clean water analysis area Bogor, Jakarta, Bekasi City and Bekasi Regency got temperature more than standard. Similarly, the results of the laundry water analysis area Bogor, Jakarta, Bekasi City and Bekasi Regency got temperature more than standard. Water temperature that exceeds the normal limit indicates that there are dissolve chemicals or these are in the process of decomposition of organic matter by microorganisms [22]. In addition, the ambient temperature may also affect the temperature measurement of water.

Figure 3: Condition of Cikeas River as a source of raw water in Bogor area

Figure 4: Condition of Kalimalang River as a source of raw water in Bekasi City and Bekasi Regency area

Figure 5: Condition of Ciliwung River as a source of raw water in Jakarta area

Based on a graph, it can be seen that value of EC clean water in Bogor, Jakarta, Bekasi City, and Bekasi Regency every week is relatively constant. In Bogor the highest EC is 180.2 µS/cm at week 5 and the lowest EC is 171.04 µS/cm at week 3. In Jakarta the highest EC is 150 µS/cm at week 4 and the lowest EC is 131 µS/cm at week 7. In Bekasi city the highest EC is 208.96 µS/cmat week 5 and lowest EC is 196.76 µS/cm at week 3. At Bekasi Regency highest EC is 244 µS/cm at week 5 and lowest EC is 228.50 µS/cm at week 7.

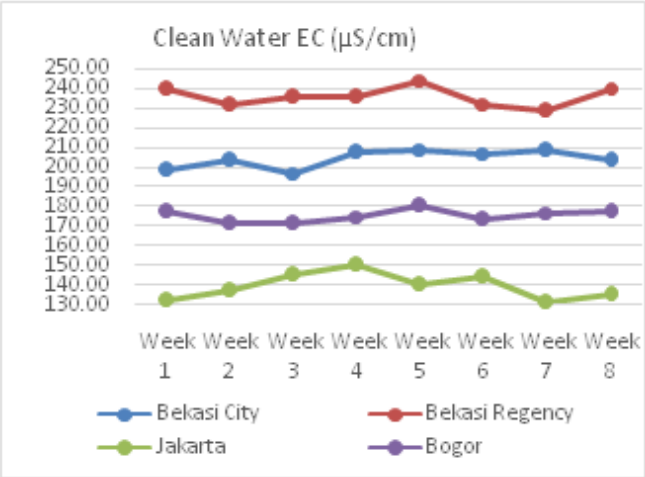

Figure 4: Graphic of clean water EC

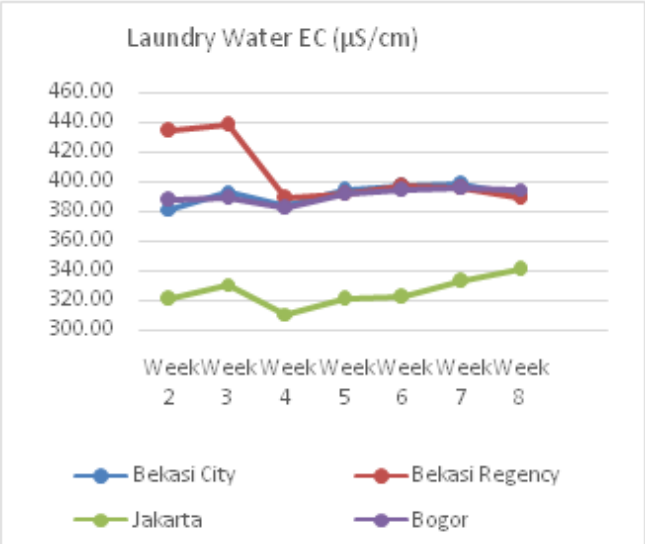

Figure 5: Graphic of laundry water EC

Based on a graph, it can be seen that the value of EC laundry waterin Bogor, Jakarta, and Bekasi City every week is relatively constant. While Bekasi Regency at week 2 and week 3 has a high EC, the value are 434.50 µS/cm and 438.00 µS/cm. At week 4 to week 8 the value is constant around 380-400 µS/cm with the lowest EC is 388.50 µS/cm at week 4. In Bogor the highest EC is 395.50 µS/cm at week 7 and the lowest EC is 382.50 µS/cm at week 4. In Jakarta the highest EC is 341 µS/cm at week 8 and the lowest is 311 µS/cm at week 4. In Bekasi city the highest EC is 398.11 µS/cm at week 7 and the lowest EC is 381.44 µS/cm at week 2.

Standard EC according to PPRI No.20 of 1990 about Water Pollution Control is 2250 µS / cm class D (water that can be used for agricultural purposes as well as urban, industrial, and power plant), while its natural content is 20-1500 µS/ cm (natural waters) [23].

The results of clean water analysis in the area Bogor, Jakarta, Bekasi City, and Bekasi Regency are all in accordance with standard PPRI No. 20 Year 1990. Similarly, the results of the analysis of laundry water in Bogor, Jakarta, Bekasi City, and Bekasi Regency are all in accordance with standard. The value of EC is influenced by the amount of dissolved salt. The more dissolved salts that can be ionized, the higher EC value. EC values are closely related to TDS values. The TDS value can be estimated by multiplying the EC value by the numbers 0,55 - 0,75 (Canadian Water Quality Guidelines, 1987 in Effendi, 2003). TDS value is usually smaller than the value of EC. So it can be said that the TDS Value of clean water and laundry water of all regions is theoretically in accordance with the standard [24].

The use of ec as a water quality parameter aims to measure the ability of ions in water to conduct electricity and predict mineral content in water. The measurements are based on the cation and anion ability to conduct the electric current flowing in the water samples can be used as indicators, whereby the greater electrical conductivity value indicated in conductometer, the greater abilities of cation and anion present in the water sample to conduct electrical current. This indicates that more minerals contained in water.

4. Conclusion

1. Clean water and laundry water has high temperature more than the normal limit.
2. EC value of clean water and laundry water still within range of normal limit.
3. Clean water is still safe for use in daily activities.
4. Laundry water is still safe to be thrown into the environment.

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