JHE 4 (2) (2019)

Journal of Health Education

http://journal.unnes.ac.id/sju/index.php/jhealthedu

ANALYSIS OF TEMPERATURE, TOTAL DISSOLVED SOLIDS (TDS) AND SALINITY OF DUG WELL WATER IN THE NORTH COAST REGION (CASE STUDY IN PACAR VILLAGE, REMBANG DISTRICT, REMBANG REGENCY)

Nely Zulfa[1]✉, Norma Era Lita[2]

[1]Industrial Engineering Study Program, Faculty of Industrial Engineering, Universitas Nahlatul Ulama Al Ghazali Cilacap
[2]Chemical Engineering Study Program, Faculty of Industrial Engineering, Universitas Nahlatul Ulama Al Ghazali Cilacap

Article Information

Article History:
Accepted July 2019
Approved August 2019
Published September 2019

Keywords:
Dug well water, physical quality of chemistry, coast.

Abstract

Background: *Residents of the Pacar Village, Rembang Subdistrict community generally have dug wells, these wells are used for daily needs such as washing, bathing, cooking and others. In addition, the disposal of domestic household waste is generally through sewers which lead directly to the sea. That is because the condition of the house is a few meters from the sea. Dug wells that are close to sea water, the routine habits of poor domestic waste disposal, have the potential to contaminate dug well water. If this happens then the water condition is not suitable for consumption. Therefore we need a study to find out the quality of ground water (dug wells) in the area.*
Methods: *This type of quantitative research uses random random sampling with research samples of 30 dug wells, data analysis is performed using Spearman's correlation test*
Results: *There is a correlation between the distance of dug wells to the shoreline against TDS (p< 0,000, r = + 0,717), salinity of dug well water (p<0,000, r = + 0,711) and there is no correlation between distance and temperature (P=0,475, r = -0,137)*
Conclusions: *There is an influence between the distance of dug wells on the value of Total Dissolved Solids (TDS), Salinity and there is no influence between the distance to the temperature. Dug well water in Pacar Village, Rembang District, Rembang Regency.*

✉ Correspondence address:
Universitas Nahlatul Ulama Al Ghazali Cilacap, Jl. Kemerdekaan Barat No.17, Gligir, Kesugihan Kidul, Kec. Kesugihan, Kabupaten Cilacap, Jawa Tengah,
E-mail: nely.zulfa89@gmail.com

ISSN 2527-9252

BACKGROUND

Water is one of the necessities of life, without water various life processes on this earth cannot take place. Therefore, water is a primary need for humans as a benchmark for human health and well-being (Raodhah et al., 2015). The need for clean water from year to year will increase because the population over the years has also increased. Therefore, according to Peraturan Menteri Pekerjaan Umum number 14/PRT/M/2010 regarding minimum service standards in the field of public works and spatial planning states that the average water requirement is 60 l / person/day for all purposes will also increase (Sasongko et al., 2014).

The coastal area is an area that directly borders the sea, therefore the water in the coastal area is affected by seawater intrusion which can contaminate groundwater turned into brackish or saltwater (Cruz & Andrade, 2017; Saila et al., 2017). The north coast which is directly adjacent to Pacar Village has an average temperature of 37.5 ° C, 30.75% salinity and TSS value of 178.21 mg / l (Zulfa et al., 2016). Anthropogenic sources and domestic waste can also affect coastal waters (Barut et al., 2016).Topographic map north of Pacar Village, Rembang District, Rembang Regency is bordered directly by the Java Sea. Rembang District has a population of 44,478 men and 44,838 women, the most dense population in Rembang District. The population density in Rembang Subdistrict is in the area directly adjacent to the coastal areas such as Tasik Agung, Pacar, Gegunung Kulon and Gegunung Wetan. Most of the population in Pacar Village use dug well water for daily household needs. Some of the domestic household waste generated by residents in the area is dumped directly into the sea, landfilled on the ground, and some are transported by garbage trucks. Therefore it greatly affects the condition of dug well water. Seawater intrusion results in contaminated dug well water which is influenced by the factor Distance of dug wells directly adjacent to the sea. Therefore, it is very important to know the effect of household domestic waste, to know the effect of the distance of dug well water to the coastline of the well in the area.

Considering that there is no data on water quality in the area, this study has the objective of analyzing the physical-chemical quality of dug wells on the north coast in Pacar Sub-district, Rembang District by measuring several samples taken from community wells.

METHODS

This research was conducted in June 2019 at thirty dug wells in Pacar Village, Rembang Subdistrict, Rembang District which was conducted randomly. And the location of the sample point is recorded, the coordinates of the dug well sample, the distance of the dug well from the shoreline.

The research material is water samples taken from thirty sampling point locations in Pacar Village, Rembang District, Rembang Regency. The tools needed in data collection are thermometer, pH meter, meter, water level meter or rope which has been equipped with ballast and measured in length, and GPS.

Figure 1. Map of sampling locations

Primary data collection was carried out directly by extracting dug well water and then examined physical parameters (temperature and TDS), water chemistry (salinity) in the laboratories of the Rembang Regency health office and Testing and Taming Center of DPU of Bina Marga and Cipta Karya in Central Java Province. The distance and dug wells to the beach are recorded directly. And make observations in the sampling environment that affects the results of research such as household domestic waste disposal. Secondary research data such as regional profiles etc.

Field datasheet for digging well water sampling and conducting interviews with the owner of the dug well water used as sampling. The data obtained are the coordinates of the sampling points, the distance data between the well and the edge of the sea.

Sampling was carried out on 30 dug wells in the Pacar Village, Rembang District in the morning, afternoon and evening. The water taken is brought to the laboratory for testing. Water sampling is carried out using a ballast bottle that has been tied with a rope marked every meter, but if the residents' wells are permanently closed then sampling is done using a water tap with the record that the water is allowed to flow for 1-2 minutes before the sample is taken.

RESULTS AND DISCUSSION

As for the coordinate data, the physical measurements of the chemical dug well water can be seen in table 1.

According to Syakti et al. (2012) along with the utilization of existing resources in the sea, the sea is also threatened by a lot of pressure from human activities, both directly and indirectly. This human activity can enter substances, materials, energy or organisms into the marine environment in the form, amount, and a certain time that causes a decrease in the quality of the marine environment in carrying out its functions and roles. The quality of the water body around the dug well will affect the water quality of the well (Ningrum, 2018). This is in accordance with the statement (Afrianita et al., 2017) impacting the land one of which is that when a tide occurs the sea will seep into freshwater.

Table 1. Coordinate data and physical-chemical parameters of dug well water Pacar Village

Sam-ple	Dis-tance (m)	Tempe-rature (°C)	TDS (mg/l	Salinity (%)
1	150	29	1350	0,19
2	117	29	2150	0,33
3	180	29	890	0,12
4	154	28,5	875	0,12
5	133	28,5	1550	0,23
6	90	28,5	3650	0,56
7	150	29,5	1100	0,15
8	177	29,5	1300	0,18
9	168	29,5	1350	0,18
10	157	29,5	1400	0,19
11	162	28,5	1050	0,14
12	179	28	875	0,12
13	212	27,5	895	0,12
14	154	27,5	970	0,12
15	190	28	850	0,1
16	144	28	1075	0,14
17	182	28	250	0,03
18	185	28	810	0,1
19	193	28	685	0,08
20	62	28	2150	0,29
21	69	28,5	1750	0,25
22	85	28	2150	0,28
23	116	27,5	2400	0,33
24	96	27,5	2500	0,34
25	98	28	1750	0,22
26	30	28	245	0,03
27	32	28	1750	0,22
28	28	28	2200	0,28
29	5	28	2100	0,27
30	6	28	2900	0,36

Saltwater has high mineral content and greater water pressure so that many wells are contaminated. If the water source is disturbed it will cause a water crisis that can induce damage to clean water sources in terms of quantity such as over-exploitation of aquifers, dry rivers and water quality affected by eutrophication, pollution of organic matter, the intrusion of seawater. Such damage can lead to health problems and has a negative influence on the ecosystem (Windraswara & Rizki, 2017).

The TDS value (3650 mg / l) exceeds the Permenkes RI number 32 of 2017 concerning environmental health quality standards and water health requirements for sanitation, swimming pools, solus per aqua and public baths which is 1000 mg / l and salinity (0, 56%) which is high in the sample 6 according to the statement Ningrum (2018) TDS contamination usually consists of organic substances, organic salts, and dissolved gases. The effect of TDS on health depends on the chemical species causing the problem. Solid objects in the water come from many sources, organics such as leaves, mud, plankton, as well as industrial waste and sewage. Other sources can come from household waste, pesticides, and many others. Beside sample 6, there are drainage household waste drains and household waste piles. High TDS values also affect the value of salinity (Effendi, 2003). If water containing TDS is drunk and the kidneys accumulate it will greatly affect the physiological function of the kidneys.

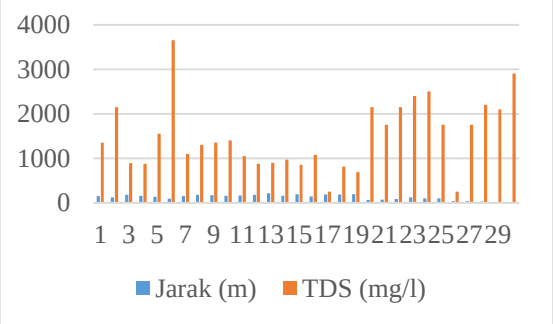

Figure 2. Distance and TDS correlation

Table 2. Distance and TDS correlation

		Distance	TDS
Distance	Correlation Coefficient	1,000	-717**
	Sig. (2-tailed)		,000
	N	30	30
TDS	Correlation Coefficient	-717**	1,000
	Sig.(2-tailed)	,000	
	N	30	30

The results of the measurement of the TDS values in Figure 2 are not in accordance with the statement Saila et al. (2017) the further away from the shoreline theoretically the TDS concentration will be smaller. This can be affected due to environmental conditions around the well such as the example of household waste disposal near dug wells that affect dug wells and the construction of dug wells. Well 6 uses red brick construction without cemented while well 29 even though the well is 5 meters away from the shoreline but uses permanent base construction. This is in line with the statement Sasongko et al. (2014) the quality of dug well water can be influenced by seepage of household wastewater, chemical waste, laundry, nearby polluted water seepage, and others.

Based on the output of table 2 it is known that N or the amount of research data is 30, then the value of sig. (2-tailed) is 0,000 as the basis for decision making above, it can be concluded that there is a significant relationship between distance and TDS. Furthermore, the output data above is known to the correlation coefficient of 0.717> r table 0.361 then this value indicates a high relationship between distance and TDS.

This salinity will change if there is an influence from changes in temperature, evaporation, water input from the ocean and also the freezing or melting that occurs at the poles. Salinity and increased water temperature will reduce the level of saturated oxygen in the water. According to Pujiastuti et al. (2013) water

temperature has a real influence on the exchange or metabolism of living things. So that temperature is one of the important factors in regulating the life processes and distribution of organisms. The factors that influence the temperature of the long exposure, the angle of sunlight, relief of the earth's surface, more or less clouds, differences in the location of latitude. This study shows that there is a correlation between distance and salinity according to the output data (table 3). The correlation coefficient is 0.711> r table 0.361.

Table 3. Distance and salinity correlation

		Distance	Salinity
Distance	Correlation Coefficient	1,000	-711**
	Sig. (2-tailed)		,000
	N	30	30
Salinity	Correlation Coefficient	-711**	1,000
	Sig.(2-tailed)	,000	
	N	30	30

Table 4. Distance and temperature correlation

		Distance	Tempe-rature
Distance	Correlation Coefficient	1,000	-135
	Sig. (2-tailed)		,475
	N	30	30
Tempe-rature	Correlation Coefficient	,135	1,000
	Sig.(2-tailed)	,475	
	N	30	30

The temperature of dug well water still meets the quality standards of the Permenkes RI number 32 of 2017 concerning environmental health quality standards and water health requirements for sanitation, swimming pools, solus per aqua and public bathing standards as a comparison of ± 30°C. Clean water sources are used by residents for daily needs such as bathing, washing. Wells water that is included in the category of medium / brackish and rather salty / brackish cannot be used as drinking water but can be used for other needs. This study shows that there is no correlation between distance and temperature because the correlation coefficient is 0.135 <r table 0.361 (table 4).

CONCLUSION

There is an influence between the distance of dug wells on the value of TDS, Salinity and there is no influence between the distance to the temperature of dug well water in Pacar Village, Rembang District, Rembang Regency. The quality of the physical parameters of the chemical dug well water showed several TDS values exceed the quality standard affect the water salinity level. The community is advised to pay attention to distance, construction before making dug wells and good waste disposal behavior. For the campus, it is recommended to convey the results of research to the public. Further research is needed to determine the factors of well depth, time of taking wells and increasing the physical parameters of water chemistry. who can find out the quality of dug well water.

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