

THE EFFECT OF TIDAL WATER ON WELL WATER QUALITY IN NORTHERN COAST ROAD

A Case Study In Ulujami Sub-District Pemalang Regency

Adwiyah Asyifa^{*, a,1} Pebri Ari Wibowo^{a,2}

^a University of Technology Yogyakarta, Indonesia

¹ pebryarie@yahoo.co.id*, ² adwiyah.asyifa@uty.ac.id

Abstract

Ulujami Sub-district is one of the sub-districts in Pemalang Regency, Central Java. Ulujami Sub-district is around 2305 ha, covering 18 urban villages. The 18 villages are: Ambowetan, Blendung, Botekan, Bumirejo, Kaliprau, Kertosari, Ketapang, Limbangan, Mojo, Padek, Pagergunung, Pamutih, Pesantren, Rowosari, Samong, Sukorejo, Tasikrejo, Wiyorowetan. It's a densely populated region. Some urban villages are located at the northern coastline of Java and along rivers, and are often hit by tidal floods. Therefore, a study on the effect of tidal water on the quality of well water at the coastline of Pemalang Regency, specifically Ulujami Sub-district, is necessary. The data required by the present study were administrative map and well water quality parameters from the Decision of the Minister of Health No.416/MenKes/Per/XI/2010. The instruments were GPS, stationary, and Water Quality Checker. The well water sampling used stratified random sampling technique. The analysis included quality test of well water in tidal flood areas. The research result showed that in general the well water quality in Ulujami Sub-district was unqualified for daily needs. However, some locations near the coast showed high salt content, so well water wasn't recommended for drinking, especially water from dug well. The well condition in Ulujami Sub-district is generally not fit for use. Of 36 tested well water in Ulujami Sub-district, 88.89% of the wells had odorless water, and 11.11% had slightly odored water, 11.1% had salty water, 3.89% had slightly salty water, and 75% had non-salty water, 44.44% had clear water, 33.33% had slightly cloudy water, and 22.22% had cloudy water.

Keywords: tide, well water quality, northern coast road coastline.

I. INTRODUCTION

Global warming has affected in atmospheric instability in the sub layers, especially those close to the earth's surface. Global warming is caused by the increase in gas which is dominantly generated by industries. The gases would give rise to this increased greenhouse effect causing reflection and absorption of long, hot waves.

Climate change results in significant disintegration of the region's hydrological cycle, namely altering evaporation, transpiration, run-off, groundwater, and precipitation. As impact, this would increase the intensity of rainwater, but in a certain period it able be result in a prolonged rainy season and also danger of flooding also increases. In addition, global warming has an impact on increasing temperatures and impacting in glaciers melts which affecting sea level rise.

Alteration in sea level elevation certainly disrupt existence because it would be affecting in inundation in coastal areas and lower urban landmasses, even capable of submerging small islands. Observations of global temperatures since the 19th century show a change in average temperature which is an indicator of climate change.

The sea level rises above the elevation, then water would inundate the entire land. This condition would worsen the quality of the environment and public around.

Pemalang District and its surroundings is one of the areas that has a coastal area in the north with a clear coastline that is greatly affected by the sea level rise.

Water contamination that occurs by the tidal water greatly affects clean water that is consumed for a long time, so it is not good for health in an environment that is prone to tidal flooding.

II. METHOD

The research was conducted in Ulujami District with an area of 2305 Ha covering 18 sub-districts, with the eastern boundary of Pekalongan district, west of ampilgading sub-district, north of Java, and north of Comal district. The research flow as follows.

A. Literature Study

Data collection begins with literature study to get a comprehensive picture of the tests to be carried out. Literature study is carried out using reference books, practicum manuals, journals and internet searches as well as previous research.

B. Primary and Secondary Data

Data collection begins with literature study to get a comprehensive picture of the tests to be carried out. Literature study is carried out using reference books, practicum manuals, journals and internet searches as well as previous research.

Primary data obtained by direct implementation of the field. The primary data is in the form of pH,

temperature, Turbidity or salinity, and DO (Dissolved Oxygen) data. Meanwhile, secondary data collection was carried out by cooperating with related agencies as follows.

1. Map of Ulujami District, Pemalang Regency
2. Disaster-prone map from the Pemalang District Disaster Management Agency.
3. Statistic data of Ulujami District.
4. Regulation Of The Minister Of Health No: 416/MENKES/PER/IX/2010 and Government Regulation No.82 Year 2001 (Inorganic Chemistry).

C. Benchmark Plotting

Selection and sampling of well water using stratified random sampling technique. Stratified Random Sampling: The population is divided into strata sub-populations), with the aim of forming sub-populations in which to form sampling units that have variable values that are relatively homogeneous. Furthermore, from each stratum the sample was selected through a simple random sampling process. For example there were 100 wells then 2% was taken then 2 wells were obtained to be used as samples representing 100 wells.

D. Tools

Tools used as follows:

- 1 Stationery
- 2 GPS (Global Positioning System).
- 3 Water Quality Checker.
- 4 Research form

E. Research Process

Steps to obtain results accordance with field conditions, namely: Determining research subjects, Determining the problems to be reviewed, making observations, taking samples, collecting data, processing data, analyzing the data obtained and conclusions.

III. RESULTS AND DISCUSSION

A. Water Test Result

This water test is manually using a water quality checker due to an unfavorable situation. Before analyzing the data, it is necessary to have the results of water quality testing in Ulujami District. The number of samples taken was 18 regional points (Table 1).

TABLE I. THE NUMBER OF WATER SAMPLES

| No | Research Area | Number of Samples | No | Research Area | Number of Samples |
|----|---------------|-------------------|----|---------------|-------------------|
| 1 | Ambowetan | 2 | 10 | Padek | 2 |
| 2 | Botekan | 2 | 11 | Pagergunung | 2 |
| 3 | Bumirejo | 2 | 12 | Pamutih | 2 |
| 4 | Botekan | 2 | 13 | Pesantren | 2 |
| 5 | Kaliprau | 2 | 14 | Samong | 2 |
| 6 | Kertosari | 2 | 15 | Rowosari | 2 |
| 7 | Ketapang | 2 | 16 | Sukorejo | 2 |
| 8 | Limbangan | 2 | 17 | Tasikrejo | 2 |
| 9 | Mojo | 2 | 18 | Wiyorowetan | 2 |

B. Well Water Quality Research Area

Most of the well water in Ulujami Subdistrict has a condition that is not suitable for consumption because of cloudy. In fact, many of the residents' water sources have an unpleasant odor. Well water quality is obtained from direct measurements in the field. Measurements were made using a Water Quality Checker tool. Measurement parameters include pH, temperature, turbidity or turbidity, salinity, and DO (Dissolved Oxygen) oxygen content.

C. pH

The pH level of the study area ranged from 8.32 - 8.5 (shown in Figure 1). Sampling that has the lowest pH is 8.32 in the Pamutih Village area. While the sample that has the highest pH, which is 8.5, is in the Ambowetan Village area (shown in Table 2). Most of the research areas have a pH level that tends to be alkaline. The pH level that is good for health and can be used for clean water based on the quality standards of the Minister of Health is in the range of 6.5-9.5.

TABLE II. THE PH VALUE OF THE RESEARCH SAMPLES

| No | Sub-district | pH | | Explanation |
|----|---------------|-----------|----------|-------------|
| | | Permitted | Research | |
| 1 | Ambowetan 1 | 6.5-9.5 | 8.5 | Good |
| 2 | Ambowetan 2 | 6.5-9.5 | 8.49 | Good |
| 3 | Blendung 1 | 6.5-9.5 | 8.47 | Good |
| 4 | Blendung 2 | 6.5-9.5 | 8.38 | Good |
| 5 | Botekan 1 | 6.5-9.5 | 8.39 | Good |
| 6 | Botekan 2 | 6.5-9.5 | 8.45 | Good |
| 7 | Bumirejo 1 | 6.5-9.5 | 8.46 | Good |
| 8 | Bumirejo 2 | 6.5-9.5 | 8.43 | Good |
| 9 | Kaliprau 1 | 6.5-9.5 | 8.44 | Good |
| 10 | Kaliprau 2 | 6.5-9.5 | 8.41 | Good |
| 11 | Kertosari 1 | 6.5-9.5 | 8.41 | Good |
| 12 | Kertosari 2 | 6.5-9.5 | 8.4 | Good |
| 13 | Ketapang 1 | 6.5-9.5 | 8.42 | Good |
| 14 | Ketapang 2 | 6.5-9.5 | 8.39 | Good |
| 15 | Limbangan 1 | 6.5-9.5 | 8.41 | Good |
| 16 | Limbangan 2 | 6.5-9.5 | 8.4 | Good |
| 17 | Mojo 1 | 6.5-9.5 | 8.38 | Good |
| 18 | Mojo 2 | 6.5-9.5 | 8.38 | Good |
| 19 | Padek 1 | 6.5-9.5 | 8.4 | Good |
| 20 | Padek 2 | 6.5-9.5 | 8.36 | Good |
| 21 | Pagergunung 1 | 6.5-9.5 | 8.38 | Good |
| 22 | Pagergunung 2 | 6.5-9.5 | 8.37 | Good |
| 23 | Pamutih 1 | 6.5-9.5 | 8.32 | Good |
| 24 | Pamutih 2 | 6.5-9.5 | 8.35 | Good |
| 25 | Pesantren 1 | 6.5-9.5 | 8.38 | Good |
| 26 | Pesantren 2 | 6.5-9.5 | 8.37 | Good |
| 27 | Rowosari 1 | 6.5-9.5 | 8.33 | Good |
| 28 | Rowosari 2 | 6.5-9.5 | 8.38 | Good |
| 29 | Samong 1 | 6.5-9.5 | 8.37 | Good |
| 30 | Samong 2 | 6.5-9.5 | 8.36 | Good |
| 31 | Sukorejo 1 | 6.5-9.5 | 8.37 | Good |
| 32 | Sukorejo 2 | 6.5-9.5 | 8.37 | Good |
| 33 | Tasikrejo 1 | 6.5-9.5 | 8.38 | Good |
| 34 | Tasikrejo 2 | 6.5-9.5 | 8.45 | Good |
| 35 | Wiyorowetan 1 | 6.5-9.5 | 8.48 | Good |
| 36 | Wiyorowetan 2 | 6.5-9.5 | 8.45 | Good |

D. Temperature

The average well water temperature from the results of all sampling in Ulujami District is 28.5 ° C. The well water temperature obtained ranged from 27 ° C to 33.3

° C (shown in Table 3). Based on the quality standards of the Minister of Health, a good temperature for clean water quality standards is 28-30 ° C (Figure 2).

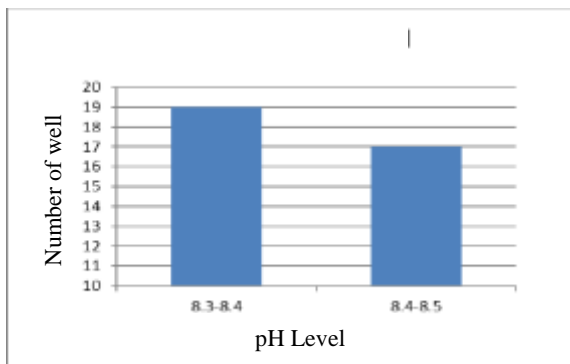


Figure 1. pH Level Diagram

have the highest turbidity value are in the Kalipraou Village and Padek Village. According to the Minister of Health, the maximum turbidity value is 5 NTU 'and does not exceed this figure.

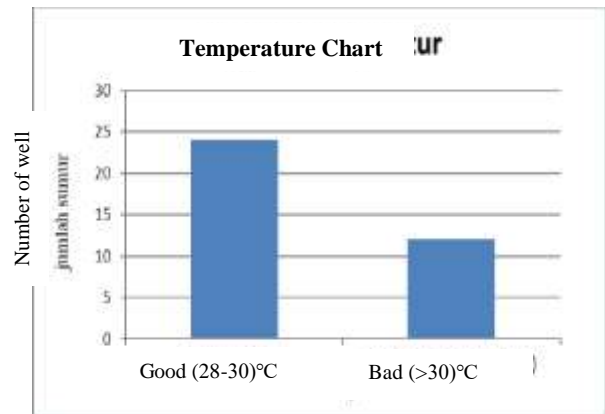


Figure 2. Temperature Chart

TABLE III. THE TEMPERATURE VALUE OF THE SAMPLE DIAGRAM

| No | Sub-district | Temperature | | Explanation |
|----|---------------|-------------|----------|-------------|
| | | Permitted | Research | |
| 1 | Ambowetan 1 | 28-30°C | 29,4 | Good |
| 2 | Ambowetan 2 | 28-30°C | 31,4 | Bad |
| 3 | Blendung 1 | 28-30°C | 33,3 | Bad |
| 4 | Blendung 2 | 28-30°C | 31,2 | Bad |
| 5 | Botekan 1 | 28-30°C | 30 | Good |
| 6 | Botekan 2 | 28-30°C | 29,9 | Good |
| 7 | Bumirejo 1 | 28-30°C | 29 | Good |
| 8 | Bumirejo 2 | 28-30°C | 29 | Good |
| 9 | Kalipraou 1 | 28-30°C | 31 | Bad |
| 10 | Kalipraou 2 | 28-30°C | 30,2 | Bad |
| 11 | Kertosari 1 | 28-30°C | 30,1 | Bad |
| 12 | Kertosari 2 | 28-30°C | 31 | Bad |
| 13 | Ketapang 1 | 28-30°C | 32,2 | Bad |
| 14 | Ketapang 2 | 28-30°C | 29,9 | Good |
| 15 | Limbangan 1 | 28-30°C | 29,9 | Good |
| 16 | Limbangan 2 | 28-30°C | 30,1 | Good |
| 17 | Mojo 1 | 28-30°C | 29,5 | Good |
| 18 | Mojo 2 | 28-30°C | 30,5 | Good |
| 19 | Padek 1 | 28-30°C | 29,7 | Good |
| 20 | Padek 2 | 28-30°C | 28,9 | Good |
| 21 | Pagergunung 1 | 28-30°C | 28 | Good |
| 22 | Pagergunung 2 | 28-30°C | 29,2 | Good |
| 23 | Pamutih 1 | 28-30°C | 28,6 | Good |
| 24 | Pamutih 2 | 28-30°C | 28,6 | Good |
| 25 | Pesantren 1 | 28-30°C | 32 | Good |
| 26 | Pesantren 2 | 28-30°C | 31,5 | Good |
| 27 | Rowosari 1 | 28-30°C | 27,5 | Good |
| 28 | Rowosari 2 | 28-30°C | 28,3 | Good |
| 29 | Samong 1 | 28-30°C | 29,5 | Good |
| 30 | Samong 2 | 28-30°C | 29,3 | Good |
| 31 | Sukorejo 1 | 28-30°C | 27,5 | Good |
| 32 | Sukorejo 2 | 28-30°C | 28,9 | Good |
| 33 | Tasikrejo 1 | 28-30°C | 29,2 | Good |
| 34 | Tasikrejo 2 | 28-30°C | 27,9 | Good |
| 35 | Wiyorowetan 1 | 28-30°C | 28 | Good |
| 36 | Wiyorowetan 2 | 28-30°C | 29,5 | Good |

TABLE IV. THE RESULT OF THE TURBIDITY VALUE

| No | Sub-district | Turbidity | | Explanation |
|----|---------------|-----------|----------|-------------|
| | | Permitted | Research | |
| 1 | Ambowetan 1 | ≤ 5 | 0 | Good |
| 2 | Ambowetan 2 | ≤ 5 | 0 | Good |
| 3 | Blendung 1 | ≤ 5 | 24,3 | Bad |
| 4 | Blendung 2 | ≤ 5 | 15,5 | Bad |
| 5 | Botekan 1 | ≤ 5 | 0 | Good |
| 6 | Botekan 2 | ≤ 5 | 1,9 | Good |
| 7 | Bumirejo 1 | ≤ 5 | 1,5 | Good |
| 8 | Bumirejo 2 | ≤ 5 | 0 | Good |
| 9 | Kalipraou 1 | ≤ 5 | 10,5 | Bad |
| 10 | Kalipraou 2 | ≤ 5 | 10,8 | Bad |
| 11 | Kertosari 1 | ≤ 5 | 5,2 | Bad |
| 12 | Kertosari 2 | ≤ 5 | 3,5 | Good |
| 13 | Ketapang 1 | ≤ 5 | 15,5 | Bad |
| 14 | Ketapang 2 | ≤ 5 | 10,5 | Bad |
| 15 | Limbangan 1 | ≤ 5 | 20,5 | Bad |
| 16 | Limbangan 2 | ≤ 5 | 15,2 | Bad |
| 17 | Mojo 1 | ≤ 5 | 18,5 | Bad |
| 18 | Mojo 2 | ≤ 5 | 17,5 | Bad |
| 19 | Padek 1 | ≤ 5 | 1,1 | Good |
| 20 | Padek 2 | ≤ 5 | 5,2 | Bad |
| 21 | Pagergunung 1 | ≤ 5 | 0 | Good |
| 22 | Pagergunung 2 | ≤ 5 | 0 | Good |
| 23 | Pamutih 1 | ≤ 5 | 0,5 | Good |
| 24 | Pamutih 2 | ≤ 5 | 0,8 | Good |
| 25 | Pesantren 1 | ≤ 5 | 12,5 | Bad |
| 26 | Pesantren 2 | ≤ 5 | 11,5 | Bad |
| 27 | Rowosari 1 | ≤ 5 | 2,5 | Good |
| 28 | Rowosari 2 | ≤ 5 | 2,1 | Good |
| 29 | Samong 1 | ≤ 5 | 0 | Good |
| 30 | Samong 2 | ≤ 5 | 0 | Good |
| 31 | Sukorejo 1 | ≤ 5 | 0 | Good |
| 32 | Sukorejo 2 | ≤ 5 | 0 | Good |
| 33 | Tasikrejo 1 | ≤ 5 | 3,1 | Good |
| 34 | Tasikrejo 2 | ≤ 5 | 0 | Good |
| 35 | Wiyorowetan 1 | ≤ 5 | 0,6 | Good |
| 36 | Wiyorowetan 2 | ≤ 5 | 1,6 | Good |

E. Turbidity

Turbidity is used to express the degree of clarity in water caused by floating materials. The factors that affect turbidity are the color of water, the fine objects in the water. Turbidity has NTU units. The turbidity of well water from the results of sampling in Ulujami District is ranging from 0 to 33.1 NTU '. The areas that

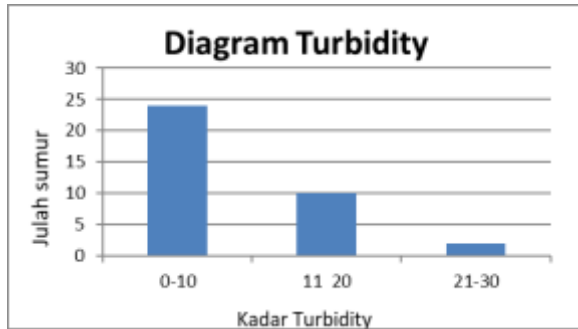


Figure 3. Turbidity Level Chart

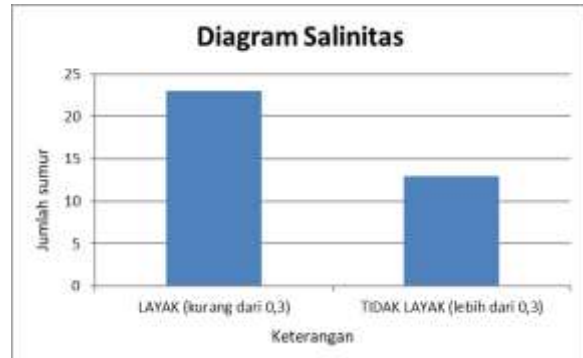


Figure 4. Salinity Diagram (Salt Content)

F. Salinity

Salinity dissolved is the level of salinity or salt dissolved in water. The factors that affect salinity are evaporation and rainfall. The allowable salinity value is 3‰ or 0.3 and does not exceed that number. The salt content obtained from the sampling results ranged from 0.1 to 2.5. The lowest salt content is in the Ambowetan, Bumirejo Padek, Samong and Wiyorowetan villages is 0.1. Meanwhile, the highest salt content was in Blendung Village is 2.5.

TABLE V. SALINITY VALUE OF SAMPLE

| No | Sub-district | Salinity | | Explanation |
|----|---------------|-----------|----------|--------------|
| | | Permitted | Research | |
| 1 | Ambowetan 1 | ≤ 0,3 | 0,1 | Feasible |
| 2 | Ambowetan 2 | ≤ 0,3 | 0,2 | Feasible |
| 3 | Blendung 1 | ≤ 0,3 | 0,5 | Not Feasible |
| 4 | Blendung 2 | ≤ 0,3 | 2,5 | Not Feasible |
| 5 | Botekan 1 | ≤ 0,3 | 0,2 | Feasible |
| 6 | Botekan 2 | ≤ 0,3 | 0,3 | Feasible |
| 7 | Bumirejo 1 | ≤ 0,3 | 0,1 | Feasible |
| 8 | Bumirejo 2 | ≤ 0,3 | 0,3 | Feasible |
| 9 | Kaliprau 1 | ≤ 0,3 | 0,5 | Not Feasible |
| 10 | Kaliprau 2 | ≤ 0,3 | 1,5 | Not Feasible |
| 11 | Kertosari 1 | ≤ 0,3 | 0,2 | Feasible |
| 12 | Kertosari 2 | ≤ 0,3 | 0,3 | Feasible |
| 13 | Ketapang 1 | ≤ 0,3 | 1,5 | Not Feasible |
| 14 | Ketapang 2 | ≤ 0,3 | 2 | Not Feasible |
| 15 | Limbangan 1 | ≤ 0,3 | 1,5 | Not Feasible |
| 16 | Limbangan 2 | ≤ 0,3 | 2 | Not Feasible |
| 17 | Mojo 1 | ≤ 0,3 | 1 | Not Feasible |
| 18 | Mojo 2 | ≤ 0,3 | 1,5 | Not Feasible |
| 19 | Padek 1 | ≤ 0,3 | 0,1 | Feasible |
| 20 | Padek 2 | ≤ 0,3 | 0,2 | Feasible |
| 21 | Pagergunung 1 | ≤ 0,3 | 0,1 | Feasible |
| 22 | Pagergunung 2 | ≤ 0,3 | 0,3 | Feasible |
| 23 | Pamutih 1 | ≤ 0,3 | 0,3 | Feasible |
| 24 | Pamutih 2 | ≤ 0,3 | 0,5 | Not Feasible |
| 25 | Pesantren 1 | ≤ 0,3 | 0,7 | Not Feasible |
| 26 | Pesantren 2 | ≤ 0,3 | 1,2 | Not Feasible |
| 27 | Rowosari 1 | ≤ 0,3 | 0,1 | Feasible |
| 28 | Rowosari 2 | ≤ 0,3 | 0,3 | Feasible |
| 29 | Samong 1 | ≤ 0,3 | 0,1 | Feasible |
| 30 | Samong 2 | ≤ 0,3 | 0,2 | Feasible |
| 31 | Sukorejo 1 | ≤ 0,3 | 0,2 | Feasible |
| 32 | Sukorejo 2 | ≤ 0,3 | 0,1 | Feasible |
| 33 | Tasikrejo 1 | ≤ 0,3 | 0,1 | Feasible |
| 34 | Tasikrejo 2 | ≤ 0,3 | 0,3 | Feasible |
| 35 | Wiyorowetan 1 | ≤ 0,3 | 0,1 | Feasible |
| 36 | Wiyorowetan 2 | ≤ 0,3 | 0,3 | Feasible |

G. Salinity

DO (Dissolved Oxygen) is the number of milligrams of oxygen gas dissolved in one liter of water. DO has units of mg / L. Based on the results of the analysis of dissolved oxygen levels in the water, the values ranged from 0.22 mg / L - 4.61 mg / L. The average DO value of all samples was 2.57 mg / L.

TABLE VI. DO VALUE OF THE RESEARCH SAMPLE

| No | Sub-district | DO (Dissolved Oxygen) | Explanation |
|----|---------------|-----------------------|-------------|
| | | Research | |
| 1 | Ambowetan 1 | 3,2 | Grade 3 |
| 2 | Ambowetan 2 | 2,58 | Grade 4 |
| 3 | Blendung 1 | 1,5 | Grade 4 |
| 4 | Blendung 2 | 0,25 | Grade 4 |
| 5 | Botekan 1 | 4,25 | Grade 2 |
| 6 | Botekan 2 | 4,19 | Grade 2 |
| 7 | Bumirejo 1 | 3,5 | Grade 3 |
| 8 | Bumirejo 2 | 3,51 | Grade 3 |
| 9 | Kaliprau 1 | 2,52 | Grade 4 |
| 10 | Kaliprau 2 | 2,12 | Grade 4 |
| 11 | Kertosari 1 | 1,52 | Grade 4 |
| 12 | Kertosari 2 | 1,56 | Grade 4 |
| 13 | Ketapang 1 | 0,3 | Grade 4 |
| 14 | Ketapang 2 | 0,29 | Grade 4 |
| 15 | Limbangan 1 | 0,27 | Grade 4 |
| 16 | Limbangan 2 | 0,27 | Grade 4 |
| 17 | Mojo 1 | 0,3 | Grade 4 |
| 18 | Mojo 2 | 0,35 | Grade 4 |
| 19 | Padek 1 | 2,4 | Grade 4 |
| 20 | Padek 2 | 2,85 | Grade 4 |
| 21 | Pagergunung 1 | 3,2 | Grade 3 |
| 22 | Pagergunung 2 | 3,5 | Grade 3 |
| 23 | Pamutih 1 | 2,55 | Grade 4 |
| 24 | Pamutih 2 | 2,75 | Grade 4 |
| 25 | Pesantren 1 | 1,55 | Grade 4 |
| 26 | Pesantren 2 | 2,2 | Grade 4 |
| 27 | Rowosari 1 | 3,45 | Grade 3 |
| 28 | Rowosari 2 | 3,85 | Grade 3 |
| 29 | Samong 1 | 3,5 | Grade 3 |
| 30 | Samong 2 | 3,2 | Grade 3 |
| 31 | Sukorejo 1 | 4,5 | Grade 2 |
| 32 | Sukorejo 2 | 4,5 | Grade 2 |
| 33 | Tasikrejo 1 | 4,61 | Grade 2 |
| 34 | Tasikrejo 2 | 4,5 | Grade 2 |
| 35 | Wiyorowetan 1 | 3,5 | Grade 3 |
| 36 | Wiyorowetan 2 | 3,4 | Grade 3 |

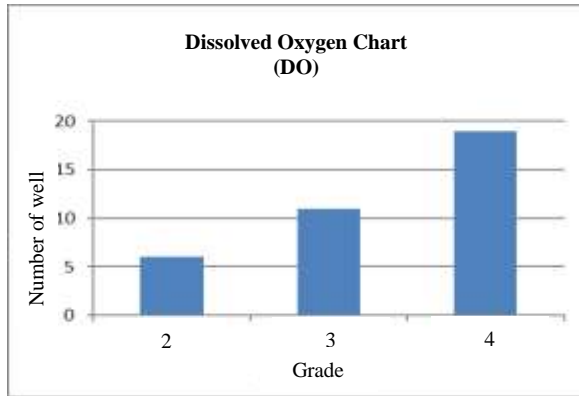


Figure 5. Dissolved Oxygen (DO) Grade

From the sampling in Ulujami District, we could estimate the quality of well water in the tidal area. Determination of well water points through well water sampling can be seen in Table 6.

Based on the results of the research, all Kelurahan in Ulujami District are still within the permitted pH according to the standards of Minister Decision of Health No.416 / MenKes / Per / XI / 2010, is 6.5 - 9.5. The average salinity value in Ulujami District is 0.1 to 2.5. The average value of Turbidity or turbidity in Ulujami District is 5.9 NTU. The average value of DO or bound oxygen was 2.57 mg / L.

TABLE VII. THE RESULTS OF RESEARCH IN THE ULUJAMI DISTR

| No | Village | pH | salt | temp | TUR | DO |
|----|---------------|------|------|------|------|------|
| 1 | Ambowetan 1 | 8.5 | 0.1 | 29.4 | 0 | 3.2 |
| 2 | Ambowetan 2 | 8.49 | 0.2 | 31.4 | 0 | 2.58 |
| 3 | Blendung 1 | 8.47 | 0.5 | 33.3 | 24.3 | 1.5 |
| 4 | Blendung 2 | 8.38 | 2.5 | 31.2 | 15.5 | 0.25 |
| 5 | Botekan 1 | 8.39 | 0.2 | 30 | 0 | 4.25 |
| 6 | Botekan 2 | 8.45 | 0.3 | 29.9 | 1.9 | 4.19 |
| 7 | Bumirejo 1 | 8.46 | 0.1 | 29 | 1.5 | 3.5 |
| 8 | Bumirejo 2 | 8.43 | 0.3 | 29 | 0 | 3.51 |
| 9 | Kaliprau 1 | 8.44 | 0.5 | 31 | 10.5 | 2.52 |
| 10 | Kaliprau 2 | 8.41 | 1.5 | 30.2 | 10.8 | 2.12 |
| 11 | Kertosari 1 | 8.41 | 0.2 | 30.1 | 5.2 | 1.52 |
| 12 | Kertosari 2 | 8.4 | 0.3 | 31 | 3.5 | 1.56 |
| 13 | Ketapang 1 | 8.42 | 1.5 | 32.2 | 15.5 | 0.3 |
| 14 | Ketapang 2 | 8.39 | 2 | 29.9 | 10.5 | 0.29 |
| 15 | Limbangan 1 | 8.41 | 1.5 | 29.9 | 20.5 | 0.27 |
| 16 | Limbangan 2 | 8.4 | 2 | 30.1 | 15.2 | 0.27 |
| 17 | Mojo 1 | 8.38 | 1 | 29.5 | 18.5 | 0.3 |
| 18 | Mojo 2 | 8.38 | 1.5 | 30.5 | 17.5 | 0.35 |
| 19 | Padek 1 | 8.4 | 0.1 | 29.7 | 1.1 | 2.4 |
| 20 | Padek 2 | 8.36 | 0.2 | 28.9 | 5.2 | 2.85 |
| 21 | Pagergunung 1 | 8.38 | 0.1 | 28 | 0 | 3.2 |
| 22 | Pagergunung 2 | 8.37 | 0.3 | 29.2 | 0 | 3.5 |
| 23 | Pamutih 1 | 8.32 | 0.3 | 28.6 | 0.5 | 2.55 |
| 24 | Pamutih 2 | 8.35 | 0.5 | 28.6 | 0.8 | 2.75 |
| 25 | Pesantren 1 | 8.38 | 0.7 | 32 | 12.5 | 1.55 |
| 26 | Pesantren 2 | 8.37 | 1.2 | 31.5 | 11.5 | 2.2 |
| 27 | Rowosari 1 | 8.33 | 0.1 | 27.5 | 2.5 | 3.45 |
| 28 | Rowosari 2 | 8.38 | 0.3 | 28.3 | 2.1 | 3.85 |
| 29 | Samong 1 | 8.37 | 0.1 | 29.5 | 0 | 3.5 |
| 30 | Samong 2 | 8.36 | 0.2 | 29.3 | 0 | 3.2 |
| 31 | Sukorejo 1 | 8.37 | 0.2 | 27.5 | 0 | 4.5 |
| 32 | Sukorejo 2 | 8.37 | 0.1 | 28.9 | 0 | 4.5 |
| 33 | Tasikrejo 1 | 8.38 | 0.1 | 29.2 | 3.1 | 4.61 |
| 34 | Tasikrejo 2 | 8.45 | 0.3 | 27.9 | 0 | 4.5 |
| 35 | Wiyorowetan 1 | 8.48 | 0.1 | 28 | 0.6 | 3.5 |
| 36 | Wiyorowetan 2 | 8.45 | 0.3 | 29.5 | 1.6 | 3.4 |

It is included in class 3 (three), that is water intended for use for water recreation facilities / infrastructure, freshwater fish farming, animal husbandry, planting, and other uses with the same quality requirements.

The average well water temperature from the results of all sampling in Ulujami District is 28.5 ° C. The well

water temperature obtained ranged from 27 ° C to 33.3 ° C. The area that has the largest turbidity value is in the Kaliprau Village area and Kelurahan Padek. The salt content obtained from the sampling results ranged from 0.1 to 2.5.

TABLE VIII. TYPES OF WELLS AND THEIR DESCRIPTION

| No | Village | Types of wells | Explanation |
|----|---------------|----------------|---|
| 1 | Ambowetan 1 | SB | Not smell, Not salty, Clear |
| 2 | Ambowetan 2 | SG | Not smell, Not salty, A bit Turbid |
| 3 | Blendung 1 | SB | A bit smelly, Salty, Turbid |
| 4 | Blendung 2 | SG | A bit smelly, Salty, Turbid |
| 5 | Botekan 1 | SB | Not smell, Not salty, Clear |
| 6 | Botekan 2 | SB | Not smell, Not salty, Clear |
| 7 | Bumirejo 1 | SB | Not smell, Not salty, Clear |
| 8 | Bumirejo 2 | SB | Not smell, Not salty, Clear |
| 9 | Kaliprau 1 | SB | Not smell, Not salty, Clear |
| 10 | Kaliprau 2 | SB | Not smell, Not salty, A bit Turbid |
| 11 | Kertosari 1 | SB | Not smell, Not salty, A bit Turbid |
| 12 | Kertosari 2 | SB | Not smell, Not salty, A bit Turbid |
| 13 | Ketapang 1 | SG | Not smell, Not salty, Mixed rob, Turbid |
| 14 | Ketapang 2 | SG | A bit smelly, Salty, Turbid |
| 15 | Limbangan 1 | SG | Not smell, A bit salty, Mixed rob, Turbid |
| 16 | Limbangan 2 | SG | Not smell, A bit salty, Mixed rob, Turbid |
| 17 | Mojo 1 | SG | Not smell, A bit salty, Mixed rob, Turbid |
| 18 | Mojo 2 | SG | A bit smelly, Salty, Turbid |
| 19 | Padek 1 | SB | Not smell, Not salty, A bit Turbid |
| 20 | Padek 2 | SB | Not smell, Not salty, A bit Turbid |
| 21 | Pagergunung 1 | SG | Not smell, Not salty, A bit Turbid |
| 22 | Pagergunung 2 | SB | Not smell, Not salty, A bit Turbid |
| 23 | Pamutih 1 | SB | Not smell, Not salty, A bit Turbid |
| 24 | Pamutih 2 | SB | Not smell, Not salty, A bit Turbid |
| 25 | Pesantren 1 | SG | Not smell, A bit salty, Mixed rob, A bit Turbid |
| 26 | Pesantren 2 | SB | Not smell, Not salty, A bit Turbid |
| 27 | Rowosari 1 | SB | Not smell, Not salty, Clear |
| 28 | Rowosari 2 | SB | Not smell, Not salty, Clear |
| 29 | Samong 1 | SG | Not smell, Not salty, Clear |
| 30 | Samong 2 | SG | Not smell, Not salty, Clear |
| 31 | Sukorejo 1 | SB | Not smell, Not salty, Clear |
| 32 | Sukorejo 2 | SB | Not smell, Not salty, Clear |
| 33 | Tasikrejo 1 | SB | Not smell, Not salty, Clear |
| 34 | Tasikrejo 2 | SB | Not smell, Not salty, Clear |
| 35 | Wiyorowetan 1 | SB | Not smell, Not salty, Clear |
| 36 | Wiyorowetan 2 | SB | Not smell, Not salty, Clear |

SB: Sumur Bor ; SG : Sumur Gali

The salt content obtained from the sampling results ranged from 0.1 to 2.5. The lowest levels of salt are scattered in the Ambowetan, Bumirejo, Padek, Samong and Wiyorowetan urban villages, is 0.1. Meanwhile, the highest salt content was in Blendung Village, is 2.5. Based on the types of wells and the physical tests that have been obtained are presented in Table 8.

Based on the results of well testing in Ulujami District, the following results were obtained:

1. Well water with no odor was 88.89%, and the one with a mildly odor was 11.11% from 36 well water tests in Ulujami District
2. Wells with salty tasting water were 11.1%, 3.89% mildly salty, and 75% of the 36 well water tests in Ulujami District.
3. The wells with clear water were 44.44%, 33.33% mildly cloudy, and 22.22% of the well water tests in Ulujami District.

IV. CONCLUSION

The research was conducted in Ulujami Subdistrict, conduct by taking well water samples including dug well water and borehole water. The number of samples taken was 36 regional points. Most of the well water in

Ulujami Subdistrict is not suitable for consumption because it visibly cloudy, especially dug wells.

Well water quality is obtained from direct field testing. Tests were conducted using the Water Quality Checker tools. Measurement parameters include pH, temperature, Turbidity or turbidity, salinity, and DO (Demand Oxygen) dissolved oxygen content in water. From the research results, the following results were obtained:

1. The condition of clean water in Kecamatan Ulujami is innadequate, because based on testing from 36 wells, 24 artesian wells, and 12 dug wells in Ulujami Subdistrict, Pemalang Regency, most of them are not feasible, especially in dug wells showing class 2 water as much as 16.67 %, class 3 amounted to 30.56%, and class 4 amounted to 52.78%.
2. Rob water is highly influential on the wells in Ulujami District, because the wells in the area would gradually develop a salty sense

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