

THE EFFECT OF LAND AND WATER MANAGEMENT CONDITIONS ON CLEAN WATER AVAILABILITY IN FLOOD AND MINING IN BANJAR REGENCY

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ABSTRACT

Based on data from the Regional Disaster Management Agency (BPBD) of South Kalimantan Province (2018), the total disaster incidence in the South Kalimantan Region in 2017 was 381 disaster events. There were 54 flood disasters and in 2020 there were 6,670 houses affected and 11,269 people displaced and lack of clean water in Banjar Regency. Based on the 2018 Basic Health Research (Riskesdas) it was shown that in Banjar Regency the use of clean water per person per day was 2.41%. And the comparison of the use of clean water that is less due to the lack of clean water sources between urban 1.90% and rural 2.50% is approximately only 0.6% different. The purpose of this study is to analyze the influence of lithology or rock types contained therein, land conditions, the effect of water management on the availability of clean water in flood-prone areas and mining. Descriptive quantitative research to analyze land and water conditions. The results of this study are geoelectric measurements in Astambul District which state that in Kaliukan Village it is a water-passing aquifer (aquifer) which is good in quantity and groundwater looks cloudy (133.53 m). In the physical measurement of water in Keliukan Village, the values of pH, TDS, conductivity, turbidity, Do and temperature are in accordance with the standards.

Keywords: Land condition, water management, flood, mining

A. Introduction

Disaster is a phenomenon resulting from changes in ecosystems that occur suddenly in a relatively short time in the relationship between humans and their environment that occur in such a way, such as earthquakes, floods, volcanoes that require immediate countermeasures. Banjar Regency BNPB data shows that flood events occurred 38 times during 2018-2021 with an average flood height of 89.4 cm (BNPB, 2021). The impact of the floods felt during the floods in South Kalimantan in 2021, namely the closure of rice fields of around 36 hectares, 5 people lost their lives, 27,111 houses were flooded, and 112,709 people evacuated. (BNPB, 2021).

Based on the 2018 Basic Health Research (Riskesdas) it was shown that in Banjar Regency the use of clean water per person per day was 2.41%. And the comparison of the use of clean water that is less due to the lack of clean water sources between urban 1.90% and rural 2.50% is approximately only 0.6% different. The lack of clean water sources to meet sanitation needs in daily life and the lack of knowledge in how to use water properly in preventing the transmission of covid 19 have an impact on increasing diarrhea cases, namely

number 2 (two) as many as 3,317 with the highest prevalence number 1 being in toddlers as much as 280 and child deaths due to COVID-19 cases as many as 121 cases with a CFR of 8.4 in South Kalimantan in 2020 (Riskesdas, 2018, South Kalimantan epidemiological data, 2020).

Technological developments can help overcome various problems related to water as a basic need of life, one of which is by mapping and interpreting the existence of clean springs based on seasons through predictions of their existence associated with land conditions (soil conditions, land color, thickness of organic matter, land cover). Water Management (water sources, physical, chemical, bacteriological quality, water discharge, water quantity and potential). From this data, it is hoped that later it can provide a real picture to meet the needs of the community, especially in water-poor areas, flood-prone areas and mining. Based on this background, researchers are interested in conducting research on land conditions (soil conditions, land color, thickness of organic matter, land cover), water management (water sources, physical quality, chemical, bacteriological, water discharge, water quantity and potential) so that problems can be identified in efforts to manage clean water which will be applied in community empowerment activities later in flood and mining prone areas in Banjar Regency.

B. Method

This research is a descriptive quantitative research to analyze the condition of land and water system. The instruments that will be used in this research are fill sheets, water physical, chemical and bacteriological measuring instruments through laboratory tests, geoelectric tools, and current water tools to measure water discharge and land condition measuring instruments.

C. Results

1. Land Condition Results

Table 1. Soil Condition Measurement Results

No.	Sample Code	Coordinate		C	Organic Ingredients	Fe-dd	M N	Perm.
					---- % ----	ppm	mg/g	cm/hour
1	Kaliukan (0-20 cm)	-3.355927	114.896732		0.00	36.36	62.30	2.80
2	Kaliukan (150-170 cm)				0.00	28.27	25,20	1.27

Based on the results of the table above, it was found that in the soil sample in Kaliukan Village (0-20 cm) the Fe-dd yield was 36.36 ppm and the permeability was 2.80 cm/hour while at a depth of 150-170 cm the Fe-dd yield was 28.27 ppm and permeability of 1.27 cm/hour.

Table 2. Results of Measurement of Soil Color, Structure, Consistency and Plasticity

No.	Location	Depth (cm)	Color		Structure	Consistency	Plasticity
1	Kaliukan (120 cm Groundwater)	0 - 10	7.5 YR 5/1	Gray	Granular	Not sticky	Non plastic
2		10 to 20	7.5 YR 6/2	Pinkish Gray	Granular	Slightly sticky	Slightly plastic
3		20 - 150	7.5 YR 6/2	Pinkish Gray	Granular	Sticky	plastic

Based on the results of the table above, it was found that groundwater in Kaliukan Village with a depth of 0-10 cm obtained a color of 7.5 YR 5/1 Gray, a granular structure, non-sticky and non-plastic consistency. Groundwater with a depth of 10-20 cm is 7.5 YR 6/2 Pinkish Gray, granular structure, slightly sticky consistency, and slightly plastic. Groundwater with a depth of 20-150 cm is 7.5 YR 6/2 Pinkish Gray, granular structure, sticky consistency and slightly plastic.

2. Results of Geoelectrical Measurements in AstambulKecamatan District

A geoelectric investigation of the resistivity method has been carried out using the OYO McOHM 2119EL brand Resistivimeter made in Japan on September 26, 2021 with a Schlumberger configuration of 3 (six) measurement points. The coordinates of the measurement location are:

- GL-1 (Kaliukan Village) : - 03o 21' 39.34" and 114o 49' 45.62"

This activity is intended to investigate the distribution and arrangement of subsurface lithology based on the nature of the rock type resistance. The aim is to find out the possibility of a layer of soil/rock that functions as a water trap (aquifer) which can then be used as a basis for planning the development of underground water by drilling.

Table 3. Value relationship between rock type resistance

	10E-1	10E0	10E1	10E2	10E3	10E4	10E5	10E6
Igneous rocks								
Metamorphics rocks								
Limestones								
Porous limestones								
Sandstones								
Gravels								
Sand							Ohm.m	
Marls								
Clays								

Based on the results of the interpretation of the geoelectrical estimation with the help of a computer and it has been correlated with local geological and hydrogeological data, the resistivity log is obtained at each estimation point as shown in the following table below:

Table 4. Geoelectrical Results Table

Point guess	Layer	Interpretation results			Estimation lithology	Attitude of rocks to groundwater	Water quality
		Depth (m)	Thick (m)	Specific Resistance (Ω m)			
GL1	1	0.0 – 1.09			Cover ground	Wet aquiclude aquifer aquiclude aquifer	cloudy
	2	1.09 – 15.95	1.09	48.23	Clay		
	3	15.95 – 29.49	14.86	8.62	Sand		
	4	29.49 – 44.50	13.54	40.69	Clay		
	5	44.50 – 73.99	44.50	2.91	Sand		
		73.99 –		133.53			

The value of resistivity at the investigation site can be divided into several groups, namely:

- resistivity 0.33 – 1.21 Ω m at the top at a depth of 0.0 – 2.00 meters is interpreted as overburden and rock that is wet,
- Specific resistance < 10 Ω m, interpreted as clay that is impermeable to water (aqueous),
- The resistivity is 10 – 30 Ω m, interpreted as a sandy clay with poor aquifer characteristics,
- The resistivity of 30 – 150 Ω m is interpreted as sand with poor aquifer characteristics,
- Specific resistance of 150 – 300 Ω m, interpreted as good aquifer sand.

The results obtained are:

- At the **GL-1** measurement location, it is recommended to drill a layer of sand with a depth of > **75 m**, the lithological layer that is targeted is a type of sand with a resistivity of **133.53 Ω m** which is an aquifer that is good in quantity and quality of groundwater seen **cloudy**.

3. Water Physical Measurement Results

Table 5. Physical Measurement of Water Before Treatment

No	village	Water sources	Measurement Type	Score	Information
1	Wandering	Well	TDS	258 mg/L	Standard
			Conductivity	1229	Standard

No	village	Water sources	Measurement Type	Score	Information
2			Turbidity	366 NTU	Non Standard
			DO	6.4 mg/L	Standard
			Temperature	31.4oC	Standard
		River	TDS	74 mg/L	Standard
			Conductivity	386	Standard
			Turbidity	22.43 NTU	Standard
			DO	6.4 mg/L	Standard
Temperature	28.1oC	Non Standard			

Description of Quality Standards:

- a. pH : 6.5 – 8.5
 - b. TDS : 1-500
 - c. Conductivity : 1-2000
 - d. Turbidity : 25
 - e. Do : > 4 Mg/L
 - f. Temperature : 30 - 36 C
- a. Measurement of Total Dissolved Solid (TDS) is a term to indicate the amount of dissolved solids or the concentration of the number of cations (positive charge) and anions (negative charge) in the water. TDS is described by the amount of solute in Parts Per Million (PPM) or equal to milligrams per Liter (mg/L). The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water in the village of Keliukan according to the standard with a value of 339 mg/L. So it can be concluded that all samples of dug well water from the TDS parameter according to the standards set by PerMenKes 907/Menkes/SK/VII/2002 are 500 mg/L
 - b. The results of the physical quality inspection, namely for measuring the conductivity of the dug well water in the Keliukan village, were 1620 μ . So it can be concluded that all samples of dug well water that are examined for the value of water conductivity can be stated to have not reached the threshold in mhos/cm or Siemens/cm units. Shallow groundwater generally has a value of 30-2000 μ mhos/cm.
 - c. Turbidity measurements indicate the presence of particles from the soil and the possibility of contamination of metals such as iron, manganese, and so on. The results of the physical quality inspection, namely the level of turbidity in dug well water, the results of testing well water samples at the Keliukan location, obtained turbidity according to the standard with a value of 6.08 NTU. So it can be concluded that all of the dug well water samples that were examined for the value of the turbidity level did not exceed the threshold set by Minister of Health Regulation 907/Menkes/SK/VII/2002 of 25 NTU.
 - d. Dissolved oxygen or DO (Dissolved oxygen) is the amount of dissolved oxygen in water that comes from photosynthesis and absorption of the atmosphere/air. Dissolved oxygen in water plays a very important role in the process of absorption of food by living things in the water. To know the quality of water in a waters, it can be done by observing several chemical parameters such as dissolved oxygen (DO). The more DO (Dissolved oxygen) amount, the better the water quality if the dissolved oxygen level is too low it will cause unpleasant odor due to anaerobic degradation that may occur. The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water in Keliukan Village, obtained Dissolve Oxygen (DO) according to the standard with a value of 5.3 mg/L. So it can be concluded that Kaliukan Village passed the threshold set by Government Regulation Number 82 of 2001 which is more than 4.
 - e. The air temperature in the three villages at the time of sampling was 33 C, so the standard temperature values ranged from 30–36 Celsius. The results of the physical quality inspection, namely the temperature level in dug well water, the results of testing well water samples at the Keliukan location, obtained the temperature according to the standard with a value of 35.9 celsius. So it can be concluded that all of the dug well water samples examined for the value of the turbidity level did not exceed the threshold set by Minister of Health Regulation 907/Menkes/SK/VII/2002, which is 30-36 Celsius.

Table 6. Physical Measurement of Well Water after Treatment (Rice Husk)

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Rice Husk					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 minutes	250 ml	6.7	274	921	6.8	31.8	57
1.2 grams	10 minutes	500 ml	6.6	261	1259	7.3	31.7	55
1.8 grams	20 minutes	750 ml	6.5	265	1261	9.9	31.7	54
2.4 grams	30 minutes	1000 ml	6.6	262	1255	8.3	31.3	45.6
3.0 grams	40 minutes	1000 ml	6.6	260	1252	8.6	31.0	26.7
3.6 grams	60 minutes	1000 ml	6.7	270	1296	8.8	31.0	41.8

- a. In **pH** measurement, the test results of well water samples after treatment at the Keliukan location with rice husk filtration materials of 0.6 grams, time 0 minutes, 250 ml of water according to the standard with a value of pH 6.7, rice husks of 1.2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of pH 6.6, rice husks of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of pH 6.5, rice husks of 2, 4 grams, 30 minutes, a lot of water 1000 ml according to the standard with a value of pH 6.6, rice husks of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of pH 6.6 and rice husks of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of pH 6.7.
- b. Measurement of **Total Dissolved Solid (TDS)** The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water after being treated with rice husks in the village of keliukan according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml according to the standard with a value of 274, rice husks of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 261, rice husks of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 265, rice husks of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 262, rice husks of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 260 and rice husks of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 270
- c. The results of the physical quality inspection are for measuring the **conductivity** of the dug well water in the village of Keliukan after treatment with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 921, rice husks of 1.2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of 1259, rice husks of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 1261, rice husks of 2.4 grams, time 30 minutes, lots of water 1000 ml according to the standard with a value of 1255, rice husks of 3.0 grams, time 40 minutes, lots of water 1000 ml according to the standard with a value of 1252 and rice husks of 3.6 grams, time 60 minutes, lots of water 1000 ml according to the standard with a value of 1296.
- d. Measurement of **turbidity**, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with rice husks, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml not according to the standard with a value of 57, rice husks of 1.2 grams, time 10 minutes, a lot of water 500 ml does not meet the standard with a value of 55, rice husks of 1.8 grams, time 20 minutes, a lot of water 750 ml does not meet the standard with a value of 54, rice husks of 2.4 grams, time 30 minutes, a lot of water 1000 ml does not meet the standard with a value of 45.6, rice husks of 3.0 grams, time 40 minutes, a lot of water 1000 ml does not meet the standard with a value of 26.7 and rice husks of 3.6 grams, time 60 minutes, 1000 ml of water does not meet the standard with a value of 41.8.

- e. **Dissolved oxygen or DO (Dissolved oxygen)** The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water in Keliukan Village after treatment with morning husks obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 6.8, rice husks of 1.2 grams, time of 10 minutes, a lot of water 500 ml according to the standard with a value of 7.3, rice husks of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard a value of 9.9, rice husks of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 8.3, rice husks of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with value of 8.6 and rice husk of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 8.8.
- f. **Temperature** air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 31.8, rice husks of 1.2 grams, time 10 minutes, lots of water 500 ml according to the standard with a value of 31.7, rice husks of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 31.7, rice husks of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 31.3, rice husks of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 31.0 and rice husks of 3.6 grams, time 60 minutes, lots of water 1000 ml according to the standard with a value of 31.0

Table 7. Physical Measurement of Well Water after Treatment (Wood Charcoal)

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Wood Charcoal					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 minutes	250 ml	7.7	313	1452	6.2	30	38.9
1.2 grams	10 minutes	500 ml	7.5	305	1567	8.1	29.8	46.6
1.8 grams	20 minutes	750 ml	7.4	302	1506	8.0	29.2	31.5
2.4 grams	30 minutes	1000 ml	7.4	307	1587	7.1	29.7	31.3
3.0 grams	40 minutes	1000 ml	7.2	270	1040	4.8	27.8	3.89
3.6 grams	60 minutes	1000 ml	7.5	280	1255	5.1	27.4	3.15

- a. In **pH** measurement, the test results of well water samples after treatment at the Keliukan location with wood charcoal filtration material of 0.6 grams, time 0 minutes, 250 ml of water according to the standard with a value of pH 7.7, wood charcoal of 1.2 grams , 10 minutes, a lot of water 500 ml according to the standard with a value of pH 7.5, wood charcoal of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of pH 7.4, wood charcoal of 2, 4 grams, 30 minutes, a lot of water 1000 ml according to the standard with a value of pH 7.4, wood charcoal of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of pH 7.2 and wood charcoal of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of pH 7.5.
- b. Measurement of **Total Dissolved Solid (TDS)** The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water after being treated with wood charcoal in the village of keliukan according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml according to the standard with a value of 313, wood charcoal of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 305, wood charcoal of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 302, wood charcoal of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 307, wood charcoal of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 270 and wood charcoal of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 280

- c. The results of the physical quality inspection are for measuring the **conductivity** of the dug well water in the Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 1452, wood charcoal of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 1567, wood charcoal of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 1506, wood charcoal of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 1587, wood charcoal of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 1040 and wood charcoal of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 1255.
- d. Measurement of **turbidity**, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with wood charcoal, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of 250 ml of water not according to the standard with value of 38.9, wood charcoal of 1.2 grams, time 10 minutes, a lot of water 500 ml is not according to the standard with a value of 46.6, wood charcoal is 1.8 grams, time is 20 minutes, a lot of water 750 ml is not suitable standard with a value of 31.5, wood charcoal of 2.4 grams, time 30 minutes, a lot of water 1000 ml does not meet the standard with a value of 31.3, wood charcoal of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 3.89 and wood charcoal of 3.6 grams, a time of 60 minutes, 1000 ml of water according to the standard with a value of 3.15.
- e. **Dissolved oxygen or DO (Dissolved oxygen)** The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water in Keliukan Village after treatment with wood charcoal obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 6.2, wood charcoal of 1.2 grams, time of 10 minutes, a lot of water 500 ml according to the standard with a value of 8.1, wood charcoal of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with value of 8.0, wood charcoal of 2.4 grams, time of 30 minutes, a lot of water 1000 ml according to the standard with a value of 7.1, wood charcoal of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with value of 4.8 and wood charcoal of 3.6 grams, time of 60 minutes, a lot of water 1000 ml according to the standard with a value of 5.1.
- f. **Temperature** the air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 30, wood charcoal of 1.2 grams, time 10 minutes, a lot of water 500 ml not suitable standard with a value of 29.8, wood charcoal of 1.8 grams, time 20 minutes, a lot of water 750 ml does not meet the standard with a value of 29.2, wood charcoal of 2.4 grams, time 30 minutes, a lot of water 1000 ml not according to the standard with a value of 29.7, wood charcoal of 3.0 grams, time 40 minutes, a lot of water 1000 ml not according to the standard with a value of 27.8 and wood charcoal of 3.6 grams, time 60 minutes, a lot of water 1000 ml is not up to standard with a value of 27.4.

Table 8. Physical Measurement of Well Water after treatment (Coconut Shell)

Keliukan Village River								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Coconut shell					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 minutes	250 ml	7.0	92	463	5.2	31.9	15.59
1.2 grams	10 minutes	500 ml	6.9	106	584	6.3	31.5	27.17
1.8 grams	20 minutes	750 ml	7.1	109	638	6.8	32.1	29.33
2.4 grams	30 minutes	1000 ml	7.8	101	578	8.1	32.6	32.6
3.0 grams	40 minutes	1000 ml	6.7	105	588	6.7	31.2	20.6

Keliukan Village River								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Coconut shell					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
3.6 grams	60 minutes	1000 ml	7.2	98	576	7.7	31.9	17.07

- a. In **pH** measurement, the test results of well water samples after treatment at the Keliukan location with coconut shell filtration material of 0.6 grams, time 0 minutes, 250 ml of water according to the standard with a value of pH 7.0, coconut shells of 1.2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of pH 6.9, coconut shells of 1.8 grams, time of 20 minutes, a lot of water 750 ml according to the standard with a value of pH 7.1, coconut shells of 2, 4 grams, 30 minutes, a lot of water 1000 ml according to the standard with a value of pH 7.8, coconut shells of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of pH 6.7 and coconut shells of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of pH 7.2.
- b. Measurement of **Total Dissolved Solid (TDS)** The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water after being treated with coconut shells in the village of keliukan according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml according to the standard with a value of 92, coconut shell of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 106, coconut shell of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 109, coconut shell of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 101, coconut shell of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 105 and coconut shell of 3.6 grams, time of 60 minutes, a lot of water 1000 ml according to the standard with a value of 98.
- c. The results of the physical quality inspection are for measuring the **conductivity** of the dug well water in the village of Keliukan after treatment with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 463, coconut shells of 1.2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of 584, coconut shells of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 638, coconut shells of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 578, coconut shells of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 588 and coconut shells of 3.6 grams, time 60 minutes, lots of water 1000 ml according to the standard with a value of 576.
- d. Measurement of **turbidity**, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with coconut shells, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 15.59, coconut shell of 1.2 grams, time 10 minutes, a lot of water 500 ml is not up to standard with a value of 27.17, coconut shell is 1.8 grams, time is 20 minutes, a lot of water 750 ml is not up to standard with a value of 29.33, coconut shell of 2.4 grams, time 30 minutes, a lot of water 1000 ml is not according to the standard with a value of 32.6, coconut shell is 3.0 grams, time is 40 minutes, a lot of water 1000 ml is appropriate standard with a value of 20.6 and coconut shells of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 17.07.
- e. **Dissolved oxygen or DO (Dissolved oxygen)** The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water of Keliukan Village after treatment with coconut shells obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with value of 5.2, coconut shell of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 6.3, coconut shell of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with value of 6.8, coconut shell of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 8.1, coconut shell of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard value of 6.7 and coconut shell of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 7.7.
- f. **Temperature** the air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 31.9, coconut shells of 1.2

grams, time 10 minutes, lots of water 500 ml according to the standard with a value of 31.5, coconut shell of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 32.1, coconut shell of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 32.6, coconut shells of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 31.2 and coconut shells of 3.6 grams, time 60 minutes, lots of water 1000 ml according to the standard with a value of 31.9.

Table 9. Physical Measurement of Well Water after Treatment (Kelor Leaves)

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Moringa Leaves					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 minutes	250 ml	7.1	150	757	1.5	31.9	40.02
1.2 grams	10 minutes	500 ml	6.6	133	624	2.5	30.9	37.15
1.8 grams	20 minutes	750 ml	6.5	134	701	1.6	30.9	40.51
2.4 grams	30 minutes	1000 ml	6.8	133	706	1.9	30.9	37.24
3.0 grams	40 minutes	1000 ml	6.4	135	662	1.2	30.7	39.46
3.6 grams	60 minutes	1000 ml	6.2	136	708	1.7	30.7	38.17

- In **pH** measurement, the test results of well water samples after treatment at the Keliukan location with Moringa leaf filtration material of 0.6 grams, time 0 minutes, 250 ml of water according to the standard with a value of pH 7.1, Moringa leaves 1.2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of pH 6.6, Moringa leaves 1.8 grams, time 20 minutes, lots of water 750 ml according to the standard with a value of pH 6.5, Moringa leaves 2, 4 grams, 30 minutes, 1000 ml of water according to the standard with a value of pH 6.8, Moringa leaves 3.0 grams, time 40 minutes, 1000 ml of water not according to standards with a value of pH 6.4 and Moringa leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml does not meet the standard with a value of pH 6.2.
- Measurement of **Total Dissolved Solid (TDS)** The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water after being treated with Moringa leaves in keliukan village according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml according to the standard with a value of 150, Moringa leaves 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 133, Moringa leaves 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 134, Moringa leaves 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 133, Moringa leaves at 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 135 and Moringa leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 135.
- The results of the physical quality inspection are for measuring the **conductivity** of the dug well water in the village of Keliukan after treatment with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 757, Moringa leaves 1.2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of 624, Moringa leaves 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 701, Moringa leaves 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 706, Moringa leaves 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 662 and Moringa leaves 3.6 grams, time 60 minutes, lots of water 1000 ml according to the standard with a value of 708.
- Measurement of **turbidity**, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with Moringa leaves, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of 250 ml of water not according to the standard with a value of 40.04, Moringa leaves 1.2 grams, time 10 minutes, a lot of water 500 ml is

not according to the standard with a value of 37.15, Moringa leaves are 1.8 grams, time is 20 minutes, a lot of water 750 ml is not suitable standard with a value of 40.51, Moringa leaves of 2.4 grams, time 30 minutes, a lot of water 1000 ml is not according to the standard with a value of 37.24, Moringa leaves of 3.0 grams, time 40 minutes, a lot of water 1000 ml not according to the standard with a value of 39.46 and Moringa leaves of 3.6 grams, time 60 minutes, 1000 ml of water does not meet the standard with a value of 38.17.

- e. **Dissolved oxygen or DO (Dissolved oxygen)** The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water in Keliukan Village after treatment with Moringa leaves obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes, 250 ml of water not according to standard with a value of 1.2, moringa leaves 1.2 grams, time 10 minutes, a lot of water 500 ml is not according to the standard with a value of 2.5, moringa leaves is 1.8 grams, time is 20 minutes, a lot of water 750 ml is not according to the standard with a value of 1.6, Moringa leaves of 2.4 grams, time 30 minutes, a lot of water 1000 ml is not according to the standard with a value of 1.9, Moringa leaves of 3.0 grams, time 40 minutes, a lot of water 1000 ml is not up to standard with a value of 1.2 and Moringa leaves of 3.6 grams, time 60 minutes, 1000 ml of water does not meet the standard with a value of 1.7.
- f. **Temperature** air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 31.9, Moringa leaves 1.2 grams, time 10 minutes, lots of water 500 ml according to the standard with a value of 30.9, Moringa leaves of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 30.9, Moringa leaves of 2.4 grams, time 30 minutes, lots of water 1000 ml according to the standard with a value of 30.7, Moringa leaves of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 30.7 and Moringa leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 30.7.

Table 10. Physical Measurement of Well Water after Treatment (Water Hyacinth Roots)

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Water Hyacinth Root					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 minutes	250 ml	6.6	135	749	1.7	30.4	41.38
1.2 grams	10 minutes	500 ml	6.5	137	746	2,0	29.4	44.18
1.8 grams	20 minutes	750 ml	6.5	134	691	1.7	29.5	37.23
2.4 grams	30 minutes	1000 ml	6.5	134	708	1.9	29.5	45.06
3.0 grams	40 minutes	1000 ml	6.5	132	698	1.8	29.8	41.99
3.6 grams	60 minutes	1000 ml	6.2	133	696	1.7	29.5	45.56

- a. In measuring **pH**, the test results of well water samples after treatment at the Keliukan location with water hyacinth root filtration material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of pH 6.6, water hyacinth roots of 1, 2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of pH 6.5, water hyacinth roots 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of pH 6.5, water hyacinth root hyacinth of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of pH 6.5, water hyacinth root of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of pH 6, 5 and water hyacinth root of 3.6 grams, time of 60 minutes, 1000 ml of water is not up to standard with a value of pH 6.2.
- b. Measurement of **Total Dissolved Solid (TDS)** The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water after being treated with water hyacinth roots in the village of keliukan according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes,

a lot 250 ml of water according to the standard with a value of 135, water hyacinth roots of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 137, water hyacinth roots of 1.8 grams, time 20 minutes, lots of water 750 ml according to the standard with a value of 134, water hyacinth roots of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 134, water hyacinth roots of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard standard with a value of 132 and water hyacinth root of 3.6 grams, time 60 minutes, 1000 ml of water according to the standard with a value of 133.

- c. The results of the physical quality inspection are for measuring the **conductivity** of the dug well water in the village of Keliukan after treatment with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 749, water hyacinth roots of 1.2 grams, 10 minutes, 500 ml of water according to the standard with a value of 746, water hyacinth roots of 1.8 grams, 20 minutes of time, 750 ml of water according to the standard with a value of 691, water hyacinth roots of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 708, water hyacinth roots of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 698 and water hyacinth roots of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 696.
- d. Measurement of **turbidity**, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with water hyacinth roots, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml not according to standard with a value of 41.48, water hyacinth root of 1.2 grams, time 10 minutes, a lot of water 500 ml not according to the standard with a value of 44.18, water hyacinth root of 1.8 grams, time 20 minutes, a lot of water 750 ml is not up to standard with a value of 37.23, water hyacinth root is 2.4 grams, time is 30 minutes, a lot of water 1000 ml is not up to standard with a value of 45.06, water hyacinth root is 3.0 grams, time is 40 minutes, 1000 ml of water does not meet the standard with a value of 41.99 and water hyacinth roots of 3.6 grams, time of 60 minutes, 1000 ml of water does not meet the standard with a value of 45.56.
- e. **Dissolved oxygen or DO (Dissolved oxygen)** The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water in Keliukan Village after treatment with water hyacinth roots obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes, 250 ml of water is not suitable standard with a value of 1.7, water hyacinth root of 1.2 grams, time 10 minutes, a lot of water 500 ml does not meet the standard with a value of 2.0, water hyacinth root of 1.8 grams, time 20 minutes, lots of water 750 ml is not up to standard with a value of 1.7, water hyacinth root is 2.4 grams, time is 30 minutes, a lot of water 1000 ml is not up to standard with a value of 1.9, water hyacinth root is 3.0 grams, time is 40 minutes, 1000 ml of water is not up to standard with a value of 1.8 and water hyacinth roots of 3.6 grams, time of 60 minutes, 1000 ml of water does not meet the standard with a value of 1.7.
- f. **Temperature** air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 30.4, water hyacinth roots of 1.2 grams, time 10 minutes, lots of water 500 ml is not up to standard with a value of 29.4, water hyacinth root is 1.8 grams, time is 20 minutes, a lot of water 750 ml is not standard with a value of 29.5, water hyacinth root is 2.4 grams, time is 30 minutes, 1000 ml of water is not up to standard with a value of 29.5, water hyacinth root is 3.0 grams, time is 40 minutes, 1000 ml of water is not up to standard with a value of 29.8 and water hyacinth roots are 3.6 grams, time 60 minutes, 1000 ml of water is not up to standard with a value of 29.5.

Table 11. Physical Measurement of Well Water after Treatment (Water Hyacinth Trunk)

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Water Hyacinth Stem					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 minutes	250 ml	6.7	136	705	1.7	29.1	43.23
1.2 grams	10 minutes	500 ml	6.7	137	704	2.0	29.2	40.99
			6.4	142	720	1.9	29.7	37.02

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Water Hyacinth Stem					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
1.8 grams	20 minutes	750 ml	6.6	145	757	3.0	29.8	37.34
			6.7	146	736	2.5	29.4	36.09
2.4 grams	30 minutes	1000 ml	6.6	141	732	1.9	29.2	35.39
3.0 grams	40 minutes	1000 ml	6.4	142	749	1.3	29.1	37.64
3.6 grams	60 minutes	1000 ml	6.2	133	696	1.7	29.5	45.56

- In **pH** measurement, the test results of well water samples after treatment at the Keliukan location with water hyacinth stem filtration material of 0.6 grams, time 0 minutes, 250 ml of water according to the standard with a value of pH 6.7, water hyacinth stems of 1, 2 grams, 10 minutes, a lot of water 500 ml according to the standard with a value of pH 6.7 and 6.4, water hyacinth stems of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of pH 6, 6 and 6.7, water hyacinth stems are 2.4 grams, time is 30 minutes, a lot of water is 1000 ml according to the standard with a value of pH 6.6, water hyacinth stems are 3.0 grams, time is 40 minutes, lots of water is 1000 ml not according to standard with a value of pH 6.4 and water hyacinth stems of 3.6 grams, time 60 minutes, a lot of water 1000 ml is not up to standard with a value of pH 6.2.
- Measurement of **Total Dissolved Solid (TDS)** The results of the physical quality examination, namely the amount of dissolved substance (TDS) in dug well water after being treated with water hyacinth stems in the village of keliukan according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of 250 ml of water according to the standard with a value of 136, water hyacinth stems of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 137 and 142, water hyacinth stems of 1.8 grams, time 20 minutes, a lot 750 ml of water according to the standard with a value of 145 and 146, water hyacinth stems of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 141, water hyacinth stems of 3.0 grams, time 40 minutes, a lot 1000 ml of water according to the standard with a value of 142 and water hyacinth stems of 3.6 grams, time 60 minutes, 1000 ml of water according to the standard with a value of 133.
- The results of the physical quality inspection are for measuring the **conductivity** of the dug well water in the village of Keliukan after treatment with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 705, water hyacinth stems of 1.2 grams , 10 minutes, a lot of water 500 ml according to the standard with values of 704 and 720, water hyacinth stems of 1.8 grams, time 20 minutes, lots of water 750 ml according to standards with values of 757 and 736, water hyacinth stems of 2, 4 grams, 30 minutes, a lot of water 1000 ml according to the standard with a value of 732, water hyacinth stems of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 749 and water hyacinth stems of 3.6 grams , time 60 minutes, a lot of water 1000 ml according to the standard with a value of 696.
- Measurement of **turbidity**, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with water hyacinth stems, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml not according to standard with a value of 43.23, water hyacinth stems of 1.2 grams, time 10 minutes, a lot of water 500 ml does not meet the standard with values of 29.2 and 29.7, water hyacinth stems of 1.8 grams, time 20 minutes , a lot of water 750 ml is not up to standard with a value of 29.8 and 29.4, water hyacinth stems are 2.4 grams, time is 30 minutes, a lot of water 1000 ml is not up to standard with a value of 29.2, water hyacinth stems are 3.0 grams, time 40 minutes, a lot of water 1000 ml does not meet the standard with a value of 29,1 and water hyacinth stems of 3.6 grams, time 60 minutes, a lot of water 1000 ml is not up to standard with a value of 29.5.
- Dissolved oxygen or DO (Dissolved oxygen)**The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in the dug well water in Keliukan Village after treatment with water hyacinth stems obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes,

250 ml of water is not suitable standard with a value of 1.7, water hyacinth stems of 1.2 grams, time 10 minutes, a lot of water 500 ml does not meet the standard with values of 2.0 and 1.9, water hyacinth stems of 1.8 grams, time 20 minutes, 750 ml of water is not up to standard with values of 3.0 and 2.5, water hyacinth stems are 2.4 grams, time is 30 minutes, 1000 ml of water is not up to standard with values of 1.9, water hyacinth stems of 3.0 grams, time 40 minutes, a lot of water 1000 ml is not according to the standard with a value of 1.3 and water hyacinth stems of 3.6 grams, time of 60 minutes, 1000 ml of water does not meet the standard with a value of 1.7.

- f. **Temperature** the air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml not according to the standard with a value of 29.1, water hyacinth stems of 1.2 grams, time 10 minutes, lots of water 500 ml is not up to standard with values of 29.2 and 29.7, water hyacinth stems are 1.8 grams, time is 20 minutes, a lot of water 750 ml is not up to standard with values of 29.8 and 29.4, water hyacinth stems 2.4 grams, time 30 minutes, 1000 ml of water is not up to standard with a value of 29.2, water hyacinth stems are 3.0 grams, time is 40 minutes, 1000 ml of water is not up to standard with a value of 29.1 and water hyacinth stems of 3.6 grams, time 60 minutes, a lot of water 1000 ml is not up to standard with a value of 29.5.

Table 12. Physical Measurement of Well Water after Treatment (Hyacinth Leaves)

Keliukan Village Well								
Amount of Filter Material (g)	Time	Lots of Water (ml)	Water Hyacinth Leaves					
			pH	TDS	Conductivity	DO	Temperature	Turbidity
0.6 gram	0 menit	250 ml	6,7	136	709	1,7	29,1	43,23
1.2 grams	10 minutes	500 ml	6.5	134	689	1.3	29.8	40.42
1.8 grams	20 minutes	750 ml	6.5	132	726	1.9	29.4	38.81
2.4 grams	30 minutes	1000 ml	6.5	135	710	1.9	29.6	39,20
3.0 grams	40 minutes	1000 ml	6.3	136	752	2.5	29.4	39.00
3.6 grams	60 minutes	1000 ml	6.5	178	721	1.9	29.5	37.71

- a. In measuring pH, the test results of well water samples after treatment at the Keliukan location with water hyacinth leaf filtration material are 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of pH 6.7, 1.2 grams of water hyacinth leaves, 10 minutes of time, 500 ml of water according to the standard with a value of pH 6.5, water hyacinth leaves of 1.8 grams, 20 minutes of time, 750 ml of water according to the standard with a value of pH 6.5, water hyacinth leaves are 2.4 grams, time is 30 minutes, a lot of water 1000 ml according to the standard with a value of pH 6.5, water hyacinth leaves are 3.0 grams, time is 40 minutes, a lot of water 1000 ml is not according to the standard with a value of pH 6.3 and water hyacinth leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml is not up to standard with a value of pH 6.5.
- b. Measurement of Total Dissolved Solid (TDS) The results of the physical quality examination, namely the amount of dissolved substances (TDS) in dug well water after being treated with water hyacinth leaves in the village of keliukan according to standards, with a lot of filtering material of 0.6 grams, time 0 minutes, a lot water 250 ml according to standard with a value of 136, water hyacinth leaves of 1.2 grams, time 10 minutes, a lot of water 500 ml according to the standard with a value of 134, water hyacinth leaves of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 132, leaves 2.4 grams of water hyacinth, 30 minutes of time, 1000 ml of water according to the standard with a value of 135, water hyacinth leaves of 3.0 grams, 40 minutes of time, 1000 ml of water according to the standard with a value of 136 and water hyacinth leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 178.
- c. The results of the physical quality examination are for measuring the conductivity of the dug well water in the village of Keliukan after treatment with a lot of filtering material of 0.6 grams, time 0 minutes, a lot of water 250 ml according to the standard with a value of 709, water hyacinth leaves of 1.2 grams, 10 minutes,

a lot of water 500 ml according to the standard with a value of 689, water hyacinth leaves of 1.8 grams, time 20 minutes, a lot of water 750 ml according to the standard with a value of 726, leaves water hyacinth of 2.4 grams, time 30 minutes, a lot of water 1000 ml according to the standard with a value of 710, water hyacinth leaves of 3.0 grams, time 40 minutes, a lot of water 1000 ml according to the standard with a value of 752 and water hyacinth leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml according to the standard with a value of 721.

- d. Measurement of turbidity, the results of physical quality checks, namely the level of turbidity in dug well water after treatment with water hyacinth leaves, the results of testing well water samples at the Keliukan location with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml not in accordance with the standard with a value of 43.23, 1.2 grams of water hyacinth leaves, 10 minutes of time, a lot of water 500 ml is not up to the standard with a value of 40.42, water hyacinth leaves are 1.8 grams, time is 20 minutes, a lot of water 750 ml is not up to standard with the value of 38.81, water hyacinth leaves of 2.4 grams, time 30 minutes, a lot of water 1000 ml is not according to the standard with a value of 39.20, water hyacinth leaves are 3.0 grams, time is 40 minutes, a lot of water 1000 ml is not according to the standard with a value of 39.00 and water hyacinth leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml does not meet the standard with a value of 37.71.
- e. **Dissolved oxygen or DO (Dissolved oxygen)** The results of the physical quality examination, namely the level of Dissolve Oxygen (DO) in dug well water in Keliukan Village after treatment with water hyacinth leaves obtained Dissolve Oxygen (DO) with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml not in accordance with the standard with a value of 1.7, water hyacinth leaves of 1.2 grams, time 10 minutes, a lot of water 500 ml is not up to standard with a value of 1.3, water hyacinth leaves are 1.8 grams, time is 20 minutes, a lot of water 750 ml is not up to standard with the value of 1.9, water hyacinth leaves of 2.4 grams, time 30 minutes, 1000 ml of water is not according to the standard with a value of 1.9, water hyacinth leaves of 3.0 grams, time 40 minutes, 1000 ml of water is not according to the standard with a value of 2.5 and water hyacinth leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml does not meet the standard with a value of 1.9.
- f. **Temperature** air in Keliukan village after being treated with a lot of filtering material of 0.6 grams, time 0 minutes, lots of water 250 ml not in accordance with the standard with a value of 29.1, 1.2 grams of water hyacinth leaves, 10 minutes of time, 500 ml of water is not up to standard with a value of 29.8, water hyacinth leaves are 1.8 grams, 20 minutes of time, 750 ml of water is not up to standard with the value of 29.4, water hyacinth leaves of 2.4 grams, time 30 minutes, a lot of water 1000 ml is not according to the standard with a value of 29.6, water hyacinth leaves are 3.0 grams, time is 40 minutes, a lot of water 1000 ml is not according to the standard with a value of 29.4 and water hyacinth leaves of 3.6 grams, time 60 minutes, a lot of water 1000 ml does not meet the standard with a value of 29.5.

4. Water Chemistry Measurement Results

No	village	Water sources	Measurement Type	Score	Information
1	Wandering	Well	pH	6.0	Non Standard
2		River	pH	7.2	Standard

pH normal range : 6.5 – 8.5

- a. When measuring **pH**, it expresses the intensity of the acidity or alkalinity of a dilute liquid, and represents the hydrogen ion concentration. pH is an important parameter in water quality analysis because of its influence on biological and chemical processes in it. The results of the physical quality examination, namely the acidity (pH) of water which is smaller than 6.5 or acidic pH increases the corrosiveness of metal objects, causes an unpleasant taste and can cause some chemicals to become toxic that interfere with health. The test results of well water samples before treatment at the Keliukan location were pH 6.0 and river water samples before treatment were pH 7.2. So it can be concluded that the dug well water samples from chemical parameters did not meet the standards set by government regulation No. 82 of 2001 on water quality management and water pollution control, but the river water samples were in accordance with regulatory standards.

Table 9. Table of Chemical Measurement Results of Kaliukan Village Wells

No	PARAMETER	UNIT	SAMPLE CODE	Information
			Wandering	
WATER CHEMISTRY				
1	Iron	mg/L	0.087	Standard
2	Manganese	mg/L	12.60	Non Standard

Based on Permenkes 416/Menkes/Per/IX/1990, the standard quality of iron in clean water is 1 mg/liter. The results of the measurement of iron in well water in Kaliukan Village are 0.087 mg/L, meaning that the well water meets the standard. According to Permenkes 416/Menkes/Per/IX/1990, the quality standard for Manganese in clean water is 0.5 mg/L. The results of manganese measurements in well water in Kaliukan Village are 12.60 mg/L, meaning that the well water is not up to standard.

5. Water Bacteriological Measurement Results

Table 10. Water Bacteriological Measurement Results

No.	Sample	MPN Coliform Index In 100 ml sample
1	Wandering	1,600

The results obtained in water samples in Keliukan Village are the MPN Coliform index in 100 ml samples exceeding the threshold, namely 1.600/100ml

D. Discussion

1. Geoelectric Measurement

The role of groundwater as a resource that complements surface water for water supply which tends to increase can be understood because of several advantages, namely water quality is generally good, investment costs are relatively low, and its utilization can be carried out where it is needed (in situ). However, excessive groundwater extraction can have negative impacts on the resources themselves and the surrounding environment, such as seawater intrusion, aquifer pollution, and land subsidence. In order for the use and availability of water to be sustainable, efforts need to be made to utilize and conserve surface water and groundwater in an integrated manner. For this reason, it is necessary to have guidelines for the use and conservation of surface water and groundwater in an integrated manner as a support for other related agencies and institutions (Wahyono and Wianto, 2008).

Based on the Regulation of the Minister of Health No. 528 of 1982 concerning the quality of ground water related to health that ground water has a role in maintaining, protecting and enhancing the health status of the people; prevent contamination of ground water and protect the public from the use of ground water that does not meet. In this Ministerial Regulation what is meant by groundwater is all water contained in the water-containing layer below the ground surface, either as free groundwater or as artesian water. Artesian groundwater is groundwater contained in a water-containing layer flanked by an impermeable layer. The water-containing layer is a layer or rock formation that contains sufficient pass/nest material to release significant amounts of water as a water source (Wahyono and Totok, 2008).

2. Physical Measurement of Water

Total Dissolved Solid (TDS) or dissolved solids are solids that have a smaller size than suspended solids. Dissolved materials in natural waters are not toxic, but if they are excessive they can increase the turbidity value which will further inhibit the penetration of sunlight into the water and ultimately affect the photosynthesis process in the waters. High levels of TDS if not managed and processed can pollute water bodies. In addition, it can kill aquatic life, and has adverse side effects on human health because it contains high concentrations of chemicals, including phosphate, surfactant, ammonia, and nitrogen as well as high levels of suspended and dissolved solids, turbidity, BOD5, and COD. (Kustiyansih E and Irawanto R, 2020). The content of TDS in water can also give a taste to water, namely water becomes like salt, so that if water containing TDS is drunk, there will be an accumulation of salt in the human kidneys, so that over time it will affect the physiological function of the kidneys (Afrianita, et al, 2017).

The high TDS content in water can be overcome by the reverse osmosis method, which is a method in which the water will be distilled to separate the water from the substances contained in it. Brackish water treatment with reverse osmosis system consists of two parts, namely the initial treatment unit (Pretreatment) and the

advanced treatment unit (Treatment), namely the reverse osmosis unit. The preliminary treatment unit consists of several main equipment, namely a raw water pump, a dosing pump equipped with a chemical tank, a reactor tank (contactor), a sand filter, a zeolite manganese filter, and a filter for color removal/activated carbon filters, and filters. cartridge size 0.5 m. While the advanced processing unit consists of a high pressure pump, reverse osmosis membrane, a dosing pump for anti-scalding (antiscalant) and anti-fungal (anti-biofouling) materials equipped with a chemical tank and an ultra violet (UV) sterilizer (Sulaeman O, 2020).

A slight change in pH from the natural pH will give an indication of a disturbed buffer system. This can cause changes and imbalances in CO₂ levels that can endanger the life of biota in the water. High and low pH is influenced by fluctuations in the content of O₂ and CO₂. Not all creatures can withstand changes in pH values, for that nature has provided a unique mechanism so that changes do not occur or occur but slowly. A pH level less than 4.8 and greater than 9.2 can be considered polluted (Rukminasari N, et al, 2014).

The pH value can affect the toxicity of a chemical compound, the higher the pH value, the higher the alkalinity value and the lower the carbon dioxide level. If the pH is low, then the water is acidic and corrosive, metal toxicity will increase, and the nitrification process will be hampered. The high level of pH in the water causes the water to become acidic which results in disruption of the life of organisms in the water, including organisms that undergo a calcification process in their life cycle, such as *Halimeda* sp. *Halimeda* sp is a type of macroalgae that contains calcium levels, where in its life cycle there is a calcification process that is able to drown CO₂ in waters (Rukminasari N, et al, 2014).

If the pH value in the water is not normal, several ways can be done to be able to normalize the pH value again. For pH below 6.5 or acidic, it can be overcome in a natural way, namely by providing a filter consisting of coral fragments and shell fragments mixed with pieces of limestone in the pond aeration channel. If the pool water is in alkaline conditions or the pH value is high, then you can use ketapang leaves to lower it. The trick is to soak the ketapang leaves in the bottom of the water for a few days. Before soaking the ketapang leaves, first boil the ketapang leaves to remove the tannins contained, because the tannins can cause a yellow color in the water (Ariyani S, et al).

Measurement of Conductivity (Electrical Conductivity/DHL) is a numerical description of the ability of water to carry electricity. Therefore, the more dissolved salts that can be ionized, the higher the DHL value. Measurement of electrical conductivity aims to measure the ability of ions in water to conduct electricity and predict mineral content in water. The higher the conductivity content in the water, the more dangerous it is because it can precipitate and damage kidney stones. According to WHO, the threshold value for the conductivity / electrical conductivity of drinking water sources is 1500 µS / cm (Nurhidayati et al, 2021).

The high and low conductivity values in coastal well water can be influenced by the large mass of seawater that pollutes groundwater. The electrolyte content includes salts dissolved in water, related to the ability of water to conduct electric current. The more dissolved salts the better the electrical conductivity of the water. High conductivity values cause water to easily conduct electricity and indicate the presence of a high salt content. The high salt content in peat water will cause the water to have a salty taste so it is not suitable for consumption. In addition, the impact of high water conductivity values will lead to low diversity of aquatic animals (Said et al, 2019).

Research on sodium ions that can be exchanged for hydrogen ions derived from cation exchange resins with a batch system has been carried out by Aulia (2002). In Partuti's research, an ion exchange process was carried out using a cation exchange resin to reduce the concentration of TDS in the waste water produced by a column system, so that the output water from the cation exchange process was safely discharged into the environment in accordance with the established quality standards. Research on reducing the concentration of TDS and conductivity in the reactor primary cooling water using ion exchange resin has also been carried out by Lestari, et al (2006). The replacement of ion exchange resin after saturation will greatly affect the quality of the primary cooling water for the better, where the conductivity of the water becomes smaller, The pH of the water is close to pure water and the TDS concentration is lower than the maximum limit specified. Maulana and Widodo studied the variation of the ratio of cation and anion resins to the decrease in TDS concentration and conductivity, where the ratio of 4:6 cation and anion resins resulted in low product water conductivity (Partuti T, 2014).

Turbid water conditions are caused by changes in the ecosystem in natural water sources and poor local water conditions so that the water quality decreases and is not suitable for domestic use, especially for drinking water.

The presence of organism activity in the form of bacteria in the well is one of the factors that the well smells. In addition, turbidity in water is caused by the presence of suspended solids such as clay, organic matter, plankton and other fine substances. Cloudy and dirty water is the cause of infectious diseases such as: Typhus abdominalis, Cholera, Diarrhea, and Bicillary dysentery. Although disease-causing bacteria can be killed by boiling water, there are also harmful substances, especially metals that can cause poisoning (Adeko et al, 2019).

There are various simple ways that we can use to get clean water, and the easiest and most commonly used way is to make a water filter, and for us perhaps the most appropriate is to make a water purifier or a simple water filter. It should be noted that the clean water produced from this simple water filtration process cannot completely remove the dissolved salts in the water. Use simple distillation to produce salt-free water. Slow Sand Filter (SPL) aka Slow Sand Filter (SSF) has long been known in Europe since the early 1800s. To meet the need for clean water, the Slow Sand Filter can be used to filter cloudy water or dirty water. The Slow Sand Filter is very suitable to meet the need for clean water in small-scale communities or household scales. This is none other than because the clean water discharge produced by SPL is relatively small. The filtering process on the Slow Sand Sieve is carried out physically and biologically. Physically, the particles in a cloudy or dirty water source will be retained by a layer of sand in the filter. Biologically, the filter will form a layer of bacteria. Bacteria from the genera *Pseudomonas* and *Trichoderma* will grow and reproduce to form a special layer. During the filtration process with slow water flow (100-200 liters/hour/m² filter surface area), the pathogens retained by the filter will be destroyed by these bacteria (Wibowo S, 2013).

Dissolved oxygen (OT) indicates the distribution of oxygen in water bodies which is used as a basis for assessing water quality conditions. The DO value fluctuates depending on organic pollutants (BOD) and the natural purification of the river. Concentration of pollutants discharged into rivers can reduce DO content due to consumption by microbes to degrade organic matter (deoxygenation). On the other hand, the condition of the hydraulic profile of the river that forms a certain relief causes oxygen supply from the atmosphere due to turbulence in the water flow so that the DO content in river waters increases (reoxygenation). The rate of reduction of dissolved oxygen is expressed in the rate of deoxygenation (rD) and the rate of addition of dissolved oxygen in the waters is expressed by the rate of reoxygenation (rR) (Novita et al, 2021).

The more plants found in the river will increase the dissolved oxygen level in the river, so that if the river is given plants, the dissolved oxygen level is still higher than a river that has no plants at all, because plants release oxygen through the process of photosynthesis. In addition to photosynthesis, aeration in rivers has also been shown to increase dissolved oxygen levels in rivers (Priyantini HR et al, 2001).

The measurement of the temperature of clean water should not be hot, because the hot temperature can help dissolve the chemicals present in the water channels/pipes and water containers (Sudiby, 1999). According to the Regulation of the Minister of Health of the Republic of Indonesia No. 416/MENKES/PER/IX/1990, the standard temperature for clean water is: air temperature \pm 3 Celsius. The solubility of oxygen in high-temperature water is relatively small so that it can harm the life of microbes or living things in the water (Dahruji et al, 2017).

3. Water Bacteriological Measurement

Based on the Decree of the Minister of Health of the Republic of Indonesia No. 416 of 1990 concerning requirements and supervision of clean water quality states that the content of Total Coliform bacteria in clean water is 50/100 ml piped water and 10/100 ml for non-piped water. Based on Government Regulation No. 82 of 2001, the criteria for class I water is a total of 1,000 colonies of coliform/100 ml of sample (Patmawati&Sukmawati, 2020).

E. Conclusions and Suggestions

1. Conclusion

The conclusions obtained from this research are

- a. The results of geoelectrical measurements in Astambul District stated that in the Kaliukan Village it is a good aquifer, and the groundwater looks cloudy (133.53 m).
- a. In physical and chemical measurements of water before treatment in Keliukan Village, it has a pH value of 6.0 and turbidity 366 NTU is not up to standard. Whereas TDS 258 mg/L, conductivity 1229, DO 6.4 mg/L and temperature 31.4 oC according to the standard.

- b. The treatment using rice husk had the appropriate standard pH, TDS, Conductivity, DO values. Meanwhile, the turbidity of the results obtained is not up to the standard.
- c. Treatment using wood charcoal has a standard value of pH, TDS, Conductivity, DO. The value of turbidity on a material weight of 3.0 grams with a time of 40 minutes for a 1000 ml water sample and 3.6 grams with a time of 60 minutes on a 1000 ml water sample has a value according to the standard.
- d. Treatment using coconut shells has a standard value of pH, TDS, Conductivity, DO. The value of turbidity on a material weight of 0.6 grams with a time of 0 minutes for a 250 ml water sample, a material weight of 3.0 grams with a time of 40 minutes on a 1000 ml water sample and a material weight of 3.6 grams with a time of 60 minutes on a 1000 ml water sample has standard value.
- e. Treatment using Moringa leaves has TDS, Conductivity, and Temperature values according to standards. The pH value of the material weight is 0.6 grams with a time of 0 minutes for a 250 ml water sample, a material weight of 1.2 grams with a time of 10 minutes on a 500 ml water sample and a material weight of 1.8 grams with a time of 20 minutes on a 750 water sample ml and the weight of the material is 2.4 grams with a time of 30 minutes on a 1000 ml water sample has a value according to the standard.
- f. Treatment using water hyacinth root has a standard TDS value and conductivity. The pH value of the material weight is 0.6 grams with a time of 0 minutes for a 250 ml water sample, a material weight of 1.2 grams with a time of 10 minutes on a 500 ml water sample and a material weight of 1.8 grams with a time of 20 minutes on a 750 water sample ml, the weight of the material is 2.4 grams with a time of 30 minutes on a 1000 ml water sample and a material weight of 3.0 grams with a time of 40 minutes on a 1000 ml water sample and the temperature value for a material weight of 0.6 grams with a time of 0 minutes for a water sample of 250 ml has a standard value
- g. Treatment using water hyacinth stems had TDS and conductivity values according to standards. The pH value of the material weight is 0.6 grams with a time of 0 minutes for a 250 ml water sample, a material weight of 1.2 grams with a time of 10 minutes on a 500 ml water sample and a material weight of 1.8 grams with a time of 20 minutes on a 750 water sample ml and the weight of the material is 2.4 grams with a time of 30 minutes on a 1000 ml water sample has a value according to the standard.
- h. Treatment using water hyacinth leaves has a standard TDS and conductivity value. The pH value of the material weight is 0.6 grams with a time of 0 minutes for a 250 ml water sample, a material weight of 1.2 grams with a time of 10 minutes on a 500 ml water sample and a material weight of 1.8 grams with a time of 20 minutes on a 750 water sample ml, the weight of the material is 2.4 grams with a time of 30 minutes on a 1000 ml water sample and a material weight of 3.6 grams with a time of 60 minutes on a 1000 ml water sample has a value that matches the standard has a value that matches the standard.
- i. After being given treatment, the values of pH, TDS, Conductivity, DO, turbidity and temperature changed.
- j. It was found that the values of pH, TDS, Conductivity, DO, Turbidity and Temperature in coconut shell filtration materials were lower than rice husk and wood charcoal filtration materials and the average values obtained were in accordance with the standard.

2. Suggestion

- a. It is necessary to add filtration material and increase the amount of water in order to know the maximum results
- b. There needs to be cooperation with all parties, especially the Banjar Regency Environmental Service regarding the influence of land conditions with water management in the form of water quality for the availability of clean water in flood-prone areas and mining.

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