INFO TEKNIK
Volume 24 No. 1 Juli 2023 (1-18)

STUDY OF POTENTIAL SOURCES OF RAW WATER FOR PDAM KABUPATEN REGENCY

Priyoga A. Cahyono[1], Novitasari Novitasari[1*], and Nurfansyah Nurfansyah[2]

[1]*Civil Engineering Study Program, Faculty of Engineering, Lambung Mangkurat University*

[2]*Architecture Study Program, Faculty of Engineering, Lambung Mangkurat University*

*Corresponding author *Email : novitasari@ulm.ac.id*

ABSTRACT

Clean water is one of the most essential needs for humans because all human activities in various aspects of life require clean water. Kapuas Regency has 17 sub-districts and has a population of around 410,446 people based on BPS data in 2020. The purpose of this paper is to determine the amount of clean water needed in Kapuas Regency to serve the needs of the community in the future. The need for clean water for the residents of Kapuas Regency is supplied by PDAM Kapuas, with two intakes located in Selat Sub-District and Mostkau Village. However, the two intakes cannot meet the clean water needs of the population of Kapuas Regency, which is increasing every year. So it is planned to build a new intake so that the clean water needs of the residents of Kapuas Regency can be met.

The analytical method used to calculate population projections is the Geometric Method. The geometric method is used to obtain information on long-term development planning obtained from BPS (Central Bureau of Statistics) Kapuas Regency. The results of the geometric method will be known to predict the population in the next few years so that it can also be seen the amount of clean water needed to determine additional raw water sources in Kapuas Regency.

The water demand analysis research that has been carried out shows that Kapuas Regency, which has a population of 410,446 people who have a total non-domestic water need in 2020 is1.006.113 liters/day, and the total amount of household and urban water needs is 63,538,127 liters/day. The laboratory tests and direct observations in the field showed that the construction of the new intake selected was in the village of Palangkai. Palangkai Village has a more strategic location because it is included in the freshwater category, namely bypH 6-9 (PP No. 82 of 2001) with a result pH calculation is 6.1, which is closer to the standard than Sei Asam village, which has a pH of 5.1.

Keywords: clean water demand, water quality, geometric method, Kapuas

1. INTRODUCTION

Clean water is one of the most critical needs for humans. Because all human activities in various aspects of life require clean water. The water requirement for each individual is different for each place and for each level of need. The use of water is very wide, so efforts must be made in such a way as to remain available and meet certain physical, biological, and chemical requirements.

The provision of clean water in big cities and small towns, including rural areas,

requires a good clean water supply system that meets the needs of the people who live in the area. The clean water supply system for an area must meet the clean water quality requirements issued by the Ministry of Health of the Republic of Indonesia, and the quantity requirements must meet the needs at that time.

The existing production capacity is not balanced with the level of population needs while in the process of processing clean water until the distribution itself is still not optimal as expected by the community. So it is necessary to do comprehensive planning both regarding the production facilities and infrastructure as well as their distribution.

The need for clean water for the people of Indonesia is very important. It is well used for drinking, cooking, bathing, and washing. With the increase in population and the steady-state of the population's economy, the need for clean water for current and future residents is very important so that there is no shortage and excess of clean water production. Clean water is very important so it is only natural that the sector of clean water should be given top importance for handling because It touches many people's life.

Kapuas Regency has 17 sub-districts and a population of around 410,446 people based on BPS data in 2020. There are 2 intakes used by PDAM Kapuas to meet clean water needs, namely intake in Selat Subdistrict and intake in the village of Moskau. The increasing population growth and only two intakes are available, causing the need for clean water in Kapuas Regency to be unable to be fulfilled.

2. LITERATURE REVIEW

Water is part of the overall ecosystem. The existence of water in a different place makes water can be excessive and can be reduced so that it can cause various problems. For this reason, water must be managed wisely with a comprehensively integrated approach. Integrated means engagement with various aspects. For integrated water resources requires the involvement of various parties(Kodoatie, 2002).

Clean water is needed in fulfilling human needs to carry out all activities. Therefore, understanding how water is said to be clean in terms of quality and usable in sufficient amounts for daily human activities. There are numerous standards for quality that must be met, including physical quality consisting of odor, color and taste, chemical quality consisting of pH, hardness and biological quality, namely water free from

disease-causing microorganisms. In order for human survival to run smoothly, clean water must also be available in adequate quantities according to human activities at certain places and for a certain period of time.(Gabriel, 2001).

a. Clean Water Supply System

A water supply system capable of providing sufficient potable water is essential for a large modern city. The clean water supply system includes:

The raw water unit is a building to take raw water from a water source and flow it to the production unit through a transmission pipe. There are several stages of the water intake system, including:

a) Free Intake

Free intake serves to utilize river water into raw water.

b) Broncaptering

Broncaptering is one of the Simple Water Treatment Installation Systems (SiPAS) which is used in the drinking water supply system in the production unit. Broncaptering functions to protect and catch water from springs to be accommodated and distributed using a transmission pipe to the reservoir.

c) Weir

Weir is a construction building made of pairs of river stones or pairs of rock, gabions, or concrete, which is located across a river that serves to raise the water level for irrigation purposes.

d) Pump

The pump is a device that functions to drain water from the ground to all faucets in the house by sucking water from a low surface to a high surface.

Units of production are the efforts made to change the properties of a substance. This is important for drinking water because, with this treatment, we get drinking water that meets the drinking water standards that have been determined.The clean water distribution system consists of a distribution reservoir and a distribution pipe network.

a) A distribution Reservoir is a temporary water reservoir that holds water when usage is less than supply and is used to cover shortages when usage is greater than supply. Distribution reservoirs are usually in the form of a reservoir tower/tank or ground reservoir. Distribution reservoirs are generally box-shaped, and round or

conical shapes are usually made to add artistic value so that they are pleasing to the eye.

b) Pipe Networks, the use of pipelines in the field of civil engineering, is found in the drinking water distribution network system. This network system is the most expensive part of a water company. Therefore, careful planning must be made to get an efficient distribution system. The amount of discharge of water provided depends on the number of residents and the type of industry served.

b. Drinking-Water Quality Standard

Drinking water is the most important basic human need. Drinking water, according to the Regulation of the Minister of Health of the Republic of Indonesia No. 492/Menkes/Per/IV/2010 concerning requirements for drinking water quality, is water that goes through a processing process that meets health requirements and can be drunk directly. Drinking water is safe for health if it meets the physical, microbiological, chemical, and radioactive requirements contained in the mandatory parameters and additional parameters, based on Permenkes RI No. 492/Menkes/Per/IV/2010 concerning requirements for drinking water quality.

Table 1 Mandatory Parameters of Drinking Water Quality Requirements

No.	Parameter	Unit	Maximum rate allowed
1.	pH	-	6.5 –8.5
2.	TDS	mg/l	500
3.	Turbidity	NTU	5
4.	Salinity	mg/l	0
5.	Iron	mg/l	0.3
6.	Manganese	mg/l	0.4

In general, drinking water quality requirements consist of:

1. Physical requirements: water is free from pollution in terms of turbidity, color, taste, and smell.
2. Chemical requirements: drinking water must not contain toxic chemicals that can interfere with health, aesthetics, and economic disturbance.
3. Bacteriological requirements: water that is affected as water is free from germs, which include bacteria, protozoa, viruses, insects, and fungi.

4. Radioactive requirements: drinking water free from alpha and beta rays that can harm health.

c. Rivers and River Engineering

Rivers are open channels that form naturally above the earth's surface, not only storing water but also flowing it from the upstream to the downstream and to the estuary (Junaidi, 2014). According to Putra (2014), a river can be defined as an open flow with geometric sizes (appearing latitude, longitudinal profile, and valley slope) changing over time, depending on the discharge, bed and cliff materials, as well as the amount and type of sediment transported by the water.

Rivers are places and containers as well as water drainage networks starting from springs to estuaries which are bordered on the right and left and along with their flow by border lines1. Rivers can also be interpreted as a part of the earth's surface that is lower than the surrounding land and is a place for freshwater to flow into the sea, lake, swamp, or other rivers. A river is a part of the earth's surface, which, by its nature, is a place where water flows. A river is a part of land where water flows from springs or rainfall. There are so many different characteristics that groupings are made, one of which is based on order.

d. Watershed Shape

Watershed or often abbreviated as DAS is an area bounded by natural boundaries, such as ridges or mountains, as well as rock boundaries, such as roads or embankments, where rainwater falls in the area contributing to the flow to the control point (outlet).(Suripin, 2002). (Kodoatie, 2002) defines a watershed as a unitary area/region / area of water management formed naturally where water is caught (derived from rainfall), and will flow from the area / region / area towards the rivers and rivers concerned.

(Asdak, 2010) defines a watershed (DAS) as a land area that is topographically limited by mountain ridges that accommodate and store rainwater to then channel it to the sea via the main river. The land area is called a water catchment area (DTA or catchment area) which is a regional ecosystem whose main elements consist of natural resources (soil, water, and vegetation).

According to (Sosrodarsono S., 1982), a Watershed is an area where precipitation concentrates into rivers. Watersheds, topography, vegetation and geology have an

influence on flood discharge, flood form, basic drainage discharge, and so on. The following are the characteristic forms of the Watershed:

a. Bird's-feather Watershed The area to the left and right of the main river where tributaries flow into the main river is called the Bird's Feather Watershed (Figure 2.1a). This form of the watershed has a small flood discharge because the time of arrival of the flood from the tributaries is different. On the other hand, the flood lasted for a long time.
b. Radial or spreading watershed The shape of this watershed is like a fan or circle and where the tributaries concentrate to a point radially. A watershed with this pattern has heavy flooding near the meeting point of the tributaries (Figure 2.1b).
c. Parallel watershed This form has a pattern in which two drainage areas are united in the stream that unites the downstream. The flood occurred downstream of the meeting point of the rivers.

e. Water Demand Projection

The need for clean water from year to year continues to increase, so the existing facilities/systems for providing clean water may not be able to serve water needs in the future. Meanwhile, planning and building the clean water supply facilities takes a long time.

Estimating how many years of clean water in the future is necessary so that we can prepare everything needed to produce clean water according to future needs.

The need for clean water in the future includes the need for energy and costs to manage the clean water supply system in the future.

1) Domestic Water Supply Standard

Domestic Water Supply Standards are determined by the number of domestic consumers who can be identified from existing population data. Standards for supplying domestic needs include drinking, bathing, cooking, and others. The trend of increasing basic water needs is determined by the lifestyle habits of the local community and is supported by socio-economic conditions.

With data, we can calculate/estimate the number of people in the future. So that we can know the water needs in the future. The more the number of people, the more they need water. Domestic water needs for cities are divided into several categories, namely:

a) Category I (Metropolitan) cities
b) Category II City (Big City)
c) Category III city (Medium City)
d) Category IV Cities (Small Towns)
e) Category V city (Village)

2) Non Domestic Water Supply Standard

Non-domestic water supply standards are determined by the number of non-domestic consumers, which include facilities such as offices, health, industrial, commercial, public, and others. Predicting the development of non-domestic water needs requires knowing the city development plan and its activities. If it is not known, then the prediction can be based on a population equivalent, where non-domestic consumers can be counted following the development of domestic water supply standards.

3) Amount of Water Requirement For Each Water User

The amount of water needed for each person, in general, will increase from year to year, this is due to, among other things:

1. Increased public awareness of the importance of clean water for health.
2. The increasing need for water for increasingly diverse uses, for example, for washing cars, air conditioning machines, and so on.

Calculating future water needs, it is also necessary to know the water needs for each water user in the future. These data, among others, can be made based on trends in water use in the past and present.

f. Population Projection

Population growth projection is to determine the estimated population of a city or region in the future according to the desired planning method.

Planning a drinking water distribution system requires several criteria as a basis for planning. The purpose of proposing several planning criteria is to obtain an appropriate and conditional planning result for a planning area.

The need for clean water is increasing as the population increases in the future. This requires population projections for the planning year. Although projections are predictive, where the truth is subjective, it does not mean that it is without considerations and methods.

Geometry Method

Projections with this method are assumed that population growth automatically doubles with population growth. This method does not pay attention to the fact that one day the development will decline because the population density is approaching the maximum. This method is widely used because it is easy and close to the truth.

The formula for the calculation:

$Pn = Po(1+r)n$

Where:

Pn = total population in the projected year (people)

Po = total population at the beginning of the base year (people)

A = average population growth (%)

n = difference between projection year and base year (year)

Calculation of Water Needs That Needs to be Produced

In general, the need for clean water will increase continuously. For this reason, it is necessary to estimate the need for clean water in the future. This is intended to prepare all the necessary facilities following the increasing demand for clean water in the future properly, efficiently, and economically.

Location Selection

The research location is one of the factors that determine the feasibility of the raw water-producing area due to the interaction between the construction building and its environment. In general, the construction and operation of a power plant will require the support of resources from the environment, especially infrastructure, utilities, and human resources. On the other hand, the existence of a building structure will also have a social, economic, and environmental impact on the surrounding community. (Solihin, 2020).

As we know that each intake building has different shapes according to the water source. For example, broncapterig is another word for intake for springs, bridge, or pontoon type intake for rivers, dams or reservoirs is another word for intake for dammed rivers, and many more. There are others, but all of them have the same function, namely to capture raw water with adequate capacity before it is sent to the Water Treatment Plant(Karel Sabono, 2016).

In selecting a location for a water reservoir, it has endeavored that the location

has potential such as dammed river areas or tapping structures, intakes, settling tanks, conveyance channels, and topographical conditions that support construction. The condition and stability of the soil must also be considered so that everything can function optimally according to the selected location(Solihin, 2020).

Central Kalimantan Province Medium Term Development Plan

In line with the dynamics of regional development planning, Government Regulation Number 8 of 2008 concerning Stages, Procedures for Preparation, Control and Evaluation of the Implementation of Regional Development Plans has been enacted as an elaboration of Article 154 of Law Number 32 of 2004 concerning Regional Government. Regional development planning, both at the provincial and district/city levels in accordance with their respective authorities, is carried out by the Regional Development Planning Agency (Bappeda).

The Provincial RPJM is used as a guideline for SKPD in preparing the Strategic Plan of the Regional Work Units (Rienstra SKPD) of Central Kalimantan Province for 2010-2015; materials for the preparation and evaluation of the district/municipal RPJM by taking into account the duties and authorities of the district/city in achieving the development targets of the Central Kalimantan Province as contained in the 2010-2015 Central Kalimantan Provincial RPJM, as well as guidelines in preparing the Regional Government Work Plan (RKPD). The Regional RPJM is translated into RKPD, which is the regional annual development plan(Central, 2011).

Kapuas Regency has relatively abundant raw water sources, namely surface water (rivers and lakes) and subsurface water (source/artesian water). The need for clean water for residents in Kapuas Regency uses more surface water sources (rivers) that are around the settlements directly because of the limitations of the distribution pipe network. In addition to using river water directly, the need for clean water in some areas also utilizes subsurface water (artesian) which is dug not far from the place of residence.(Kapuas, RPIJM Kapuas Regency, 2016)

Previous Research

Several previous studies have been carried out by several researchers on water needs. Previous research that was also conducted in Kapuas Regency found that PDAM Kapuas Regency had an intake of 387.5 L/sec, and it was found that the need for clean water for Kapuas Regency in 2016 exceeded the intake capacity or amounted to 731.511

L/sec. Clean water cannot be fulfilled. Therefore, PDAM Kapuas Regency needs to immediately plan to increase production/intake capacity so that the need for clean water is always met. Water quality data is taken by direct testing in the field. The criteria for water quality from this study are included in Group B (water that can be used as raw water for drinking water). The recommended temperature is ±3oC from the normal temperature. As is known, the normal temperature of the water is 25oC. From the test results obtained, the temperature value is in the specified value range. As for some temperature values that are outside the specified range, it can be caused by several factors such as the influence of outside temperature, which affects the water temperature, and so on. However, this value is still within the tolerance range for use as raw water for drinking water.

In addition to research on water quality and water availability in Kapuas Regency, research on water availability in several urban districts in Central Kalimantan Province was also carried out by several researchers. One of the studies conducted in Pulang Pisau Regency showed that Pulang Pisau Regency is a Regency with moderate population growth, where the demand for clean water will also grow and continue to grow. And there are still some residents who use river water directly for their daily needs because some areas have not been served clean water by PDAM. In this research, The calculation of the population projection uses statistical methods which take into account the rate of development of the past population to estimate the population in the future. There are several methods that can be used to analyze population growth in the future, namely Arithmetic, Geometric, Linear Regression, Exponential, and Logarithmic. For clean water quality, a field review was carried out with test parameters such as temperature (25 oC ±3), electrical conductivity, amount of dissolved solids (0.5), pH (6.5-8.5), turbidity (5 NTU), salinity, and dissolved oxygen measurements. In terms of water quality, the raw water source used by PDAM Pulang Pisau Regency has met the standards so that the use of the water is safe for the residents of Pulang Pisau Regency. There are several methods that can be used to analyze population growth in the future, namely Arithmetic, Geometric, Linear Regression, Exponential, and Logarithmic. For clean water quality, a field review was carried out with test parameters such as temperature (25 oC ±3), electrical conductivity, amount of dissolved solids (0.5), pH (6.5-8.5), turbidity (5 NTU), salinity, and dissolved oxygen measurements. In

terms of water quality, the raw water source used by PDAM Pulang Pisau Regency has met the standards so that the use of the water is safe for the residents of Pulang Pisau Regency. There are several methods that can be used to analyze population growth in the future, namely Arithmetic, Geometric, Linear Regression, Exponential, and Logarithmic. For clean water quality, a field review was carried out with test parameters such as temperature (25 oC ±3), electrical conductivity, amount of dissolved solids (0.5), pH (6.5-8.5), turbidity (5 NTU), salinity, and dissolved oxygen measurements. In terms of water quality, the raw water source used by PDAM Pulang Pisau Regency has met the standards so that the use of the water is safe for the residents of Pulang Pisau Regency. Total dissolved solids (0.5), pH (6.5-8.5), turbidity (5 NTU), salinity, and dissolved oxygen measurements. In terms of water quality, the raw water source used by PDAM of Pulang Pisau Regency has met the standards so that the use of the water is safe for the residents of Pulang Pisau Regency. Total dissolved solids (0.5), pH (6.5-8.5), turbidity (5 NTU), salinity, and dissolved oxygen measurements. In terms of water quality, the raw water source used by PDAM of Pulang Pisau Regency has met the standards so that the use of the water is safe for the residents of Pulang Pisau Regency.(Ulfa Fitriati SA, 2018).

3. RESULTS AND DISCUSSION

Overview of Research Area

Kapuas Regency is one of the regencies in the province of Central Kalimantan. The district capital is located in Kuala Kapuas. In general, the administrative area of the Kapuas Regency Government is 14,999 km2 or 9.77% of the total area of Central Kalimantan Province. Kapuas Regency includes 17 sub-districts, 17 sub-districts, and 231 villages. The length of the beach is ± 189.85 km, which crosses 5 (five) villages in Kapuas Kuala District. Geographically, it is located at 00 8' 48" -30 27' 00" South Latitude and 1130 2' 36" -1140 44' 00" East Longitude.

Population Projection

In general, projections are predictions or estimates of future conditions. This can be in the form of forecasting changes in demand, technological developments, or developments in the business world that can affect the planning of production.

The Central Bureau of Statistics of Kapuas Regency recorded data in 2018-2020 the population of Kapuas Regency reached 410,446 people. In calculating the projected

population, population data in Kapuas Regency is used from 2013 to 2020.

Table 2 Total Population in Kapuas Regency

No.	Year	Total population
1	2013	341,600
2	2014	344,955
3	2015	348,049
4	2016	351.043
5	2017	353.844
6	2018	356,382
7	2019	358,820
8	2020	410.446

(Source: BPS Kapuas Regency)

Long-term development planning by taking into account the population for the next 5-25 years using the Geometric Method can be seen in Table 4.3.

Example of Population Projection Calculation:

Kapuas Regency (5 Years)

Population Growth Rate = $1/t - 1\left(\frac{Pt}{P0}\right) = 1/5 - 1\left(\frac{410.446}{358.820}\right) =$ 469,844 souls

Table 3 Population Projection of Kapuas Regency

Year	Population	5 years	10 years	15 years	20 years	25 years
2013	341,600	391.035	447,624	512,403	586.555	671,440
2014	344,955	469,844	452.020	517,435	592,316	678,034
2015	348,049	398,417	456,075	522.076	597,629	684,115
2016	351.043	401.845	459,998	526.567	602,770	690,000
2017	353.844	405.051	463,668	530,769	607.579	695.506
2018	356,382	407,956	466,994	534,576	611,937	700,495
2019	358,820	410.747	470.189	538,233	616,124	705,287
2020	410.446	469,844	537,838	615,672	704.770	806.761

Water Demand Analysis

The standard amount of domestic water demand based on population and type of city is taken in the range of 100-150. This is because Kapuas Regency is included in the Big City with a population of 410,446 people

Table 4 Amount of Urban Water Needs by Population

Density Criteria (Soul/Ha)	Total Urban Water Demand
> 100	25-35
50 – 100	20-30
< 50	15-30

Table 5 Standard Household Water Needs by Type of City and Number of Population

Total population	City Type	Total Water Needs (liters/person/day)
> 2,000,000	Metropolitan	> 210
1,000,000 - 2,000,000	Metropolitan	150 – 210
500,000 - 1,000,000	Big	120 – 150
100,000 - 500,000	Big	100 – 150
20,000 - 100,000	Currently	90 – 100
3,000 – 20,000	Small	60 – 100

Table 6 Amount of Non-Domestic Water Needs by Population

Criteria (Number of Population)	Total Domestic Water Needs
> 500,000	40
100,000 - 500,000	35
< 100,000	25

Table 7 Amount of Domestic Water Needs by Population

DOMESTIC WATER NEEDS STANDARDS		
Total population	City Type	Total Water Needs
> 2,000,000	Metropolitan	> 210
1,000,000 - 2,000,000	Metropolitan	150 – 210
500,000 - 1,000,000	Big	120 – 150
100,000 - 500.00	Big	100 – 150
20,000 - 100,000	Currently	90 – 100
3,000 - 20,000	Small	60 - 100

Projection of Water Demand after the Construction of Intake

This projection is carried out to calculate the appropriate amount of water demand because every year, there is always an increase in population growth, so that the water demand in that location also increases.

Water Quality Analysis

Water quality testing was carried out by taking two water samples located in Sei Asam village and Palangkai village. This test was conducted to determine the parameters contained in the water sample. The test is carried out using a pH meter and a TDS-3 meter by dipping it into a water sample from which water quality data will be taken.

This water quality parameter has a correlation with the projected need for clean water because water quality is a factor in the number and percentage of services to the community. The better the water quality, the higher the possibility of improving the service. The test results at the PDAM Kapuas Laboratory were obtained from two test points, namely in Palangkai Village and Sei Asam Village, as shown in Table 11 below.

Water quality testing consists of physical, chemical, and biological tests. Based on the tools available at the PDAM Kapuas Laboratory, the only tests that can be done are physical and chemical tests. In the physical test, the results obtained from the pH meter and TDS-3 meter obtained the turbidity parameter, while for the chemical test, the results obtained were Ph and Total Dissolved Solids (TDS).

Based on the results of color observations in Palangkai Village and Sei Asam Village, they have the same color, namely cloudy white, and both have no smell. However, the taste parameter in Palangkai Village, the test results are tasteless, while in Sei Asam Village, based on the test results, it is hanta.

Table 8 Results of Water Quality Data Collection

No	TESTED PARAMETERS	UNIT	STANDARD Permenkes No. 492/Menkes/Per / IV/2010	TEST RESULT		DESCRIPTION
				PALANGKAI VILLAGE	ASAM SEI VILLAGE	
1	Color	TCU	15	cloudy white	cloudy white	Organoleptic
2	Flavor	-	Tasteless	Tasteless	Hanta	Organoleptic
3	Smell	-	Odorless	Odorless	Odorless	Organoleptic
4	pH	-	6.5 - 8.5	6.2	5.1	
5	Turbidity	NTU	Max. 5	22.63	19.44	
6	Dissolved Substance (TDS)	Mg/l	Max. 500	21	19	
7	hardness	Mg/l	Max. 500	-	-	
8	Residual Chlorine	Mg/l	0.2 - 0.5	-	-	
9	Iron (Fe)	Mg/l	Max. 0.3	-	-	
10	Manganese (Mn)	Mg/l	Max. 0.4	-	-	
11	Nitrate (NO3)	Mg/l	Max. 50	-	-	
12	E. Coli	MPN/100 ml	0	-	-	
13	coliform	MPN/100 ml	0	-	-	
14	Salinity	Mg/l	Max. 141.68	-	-	

Discussion

The construction of this new intake is expected to meet the clean water needs of the residents of Kapuas Regency. So that in order to achieve good conditions, it is necessary to conduct a direct survey of the field to determine the location and quality of the new intake plan water. Based on the results of direct observations to the intake location in Palangkai village, it is still included in the category of freshwater, in contrast to Sei Asam village, where when there is a dry season, the water turns salty, this happens due to seawater intrusion. From the results of testing water samples at the PDAM Kapuas Laboratory, as shown in Table 4.11, it is known that the water sample testing in Sei Asam village has a pH value of 5.1, and in Palangkai village, it has a pH value of 6.1.

In addition, for other parameters such as color, taste, and smell, the intake location in Palangkai village has met the standard. The value of turbidity (NTU) in Palangkai village is 22.63, and in Sei Asam village is 19.44. So that these two locations do not meet the turbidity test parameters and it is necessary to add chemicals in the clean water treatment process by PDAM. The parameters of dissolved substances in the first location and the second location have met the standard because they are below the maximum standard of 500 Mg/l.

The location of the intake selected based on the results of laboratory testing and direct field observations that have been carried out illustrates that the construction of a new intake is more appropriate if it is carried out in the village of Palangkai. This is due to its strategic location because it is included in the category of freshwater with a pH of 6-9 (PP No. 82 of 2001). And in laboratory tests such as dissolved substances parameters and pH calculations in Palangkai village, which has a pH value of 6.1 is better than in Sei Asam village, which has a pH value of 5.1.

4. CONCLUSIONS AND SUGGESTIONS

Based on the analysis and research that has been done, the following conclusions can be drawn:

1. The results of the analysis of water needs, Kapuas district, is included in the category of large cities with a population of 410,446 people. It can be concluded that the total non-domestic water demand in 2020 is1.006.113 Liter/day, and the total amount of household and urban water needs is 63,538,127 liters/day. Long-term development planning by taking into account the population for the next 5-25 years is calculated using the Geometric Method in 5 years, namely469,844 people, at 10 years it was 537,838 people, at 15 years it was 615,672 people, at 20 years it was 704,770 people, at 25 years there were 806,761 people.
2. Based on the results of laboratory tests and direct observations in the field, the construction of the new intake chosen was in the village of Palangkai. Its strategic location because is included in the freshwater category, namely bypH 6-9 (PP No. 82 of 2001) with a result pH calculation is 6.1, which is closer to the standard than Sei Asam village, which has a pH of 5.1.

From the results of calculations and studies that have been carried out, there are several suggestions, namely:

1. In calculating water demand, researchers have shortcomings because there are several limitations of incomplete data recorded every year, such as sector data needed for calculating domestic water standards so that some of these data are still assumed.
2. In future research, it is recommended that further research be conducted on the analysis of water quality that affects the quality of drinking water because this study only examines the description of water quality through the water class table without analyzing the things that affect the processing process.

5. BIBLIOGRAPHY

Asdak, C. (1995). Hydrology of Watershed Treatment. Yogyakarta: Gadjah Mada University.

Asdak, C. (2010). Hydrology and Watershed Management: Fifth Revised Edition. Yogyakarta: Gadjah Mada University.

Chandrawidjaja, R. (2011). River and Coastal Engineering. Banjarmasin: Lambung Mangkurat University.

Dini Pangestu, JM (2020). Site Selection and Planning of Raw Water Intake System in Sungai Jawi, Sungai Kakap District, Kubu Raya Regency. Tanjung Pura University, 1-9.

Gabriel, F. (2001). Environmental Physics. Jakarta: Hippocrates.

Indarto. (2011). Basic Theory and Examples of Hydrological Models. Jakarta: Earth Literacy.

Kapuas, PK (2016). RPIJM Kapuas Regency. Kuala Kapuas: Kapuas Regency Government.

Kapuas, PK (2019). Kapuas Regency Medium Term Development Plan. Kuala Kapuas: Kapuas Regency Government.

Karel Sabono, SS (2016). Preparation of Master Plan for Drinking Water Service System. Tanimbar Islands: West Southeast Maluku.

Ministry of Health. (2002). Regulation No. 1405. Jakarta: Ministry of Health.

Ministry of Health. (2002). Health Requirements for Office and Industrial Work Environments. Jakarta: Ministry of Health.

Kodoatie, RJ (2002). Management of Water Resources in Regional Autonomy. Yogyakarta: Andi.

Rahayu, d. (2009). Floods and their Management Efforts. Bandung: Center for Disaster Mitigation (PMB-ITB).

Solihin, R. (2020). Study on the Potential of Salaman River Water Resources for Raw Water Sources in the Jorong Industrial Estate, Jorong District, Tanah Laut Regency, South Kalimantan Province. Lambung Mangkurat University, 1-190.

Sosrodarsono S., T. (1982). Hydrology For Irrigation. Bandung: PT Pradnya Paramita.

Suripin. (2002). Conservation of Soil and Water Resources. Yogyakarta: Andi.

Tengah, PP (2011). Central Kalimantan Regional Medium Term Development Plan. Palangka Raya: Central Kalimantan Provincial Government.

Triatmodjo. (2008). Applied Hydrology. Yogyakarta: Beta Offset.

Ulfa Fitriati, II (2019). Study of the Need for Clean Water in Kapuas Regency. Lambung Mangkurat University, 291-295.

Ulfa Fitriati, SA (2018). Study of Clean Water Needs in Pulang Pisau Regency. Lambung Mangkurat University, 34-41.