



Analysis of Clean Water Demand and Water Availability at PDAM Water Treatment Plant (Case Study: Nagari Aur Kuning, Pasaman District, West Pasaman District)

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Abstract: Water is an absolute need for living things, especially humans. The availability of clean water must be evenly distributed by making the most of clean water sources. This study aims to determine the estimated population and plan the amount of water demand up to 2030 or the next 15 years. Analysis of projected population growth data and predictions of clean water needs in 2030 or the next 15 years is by using the geometric method. The results of this study indicate that the predicted population in 2030 or the next 15 years is 22,044 people and the prediction of water demand until 2030 or the next 15 years is 78.93 l/s.

Keyword: Clean Water Needs, Water Availability, Water Treatment Plants .

INTRODUCTION

Water in human life has a very vital function. Human daily activities can never be separated from water. Starting from bathing, washing, cooking to the elements of the human body, one of which also consists of water. Therefore, clean water that does not contain chemical elements that are harmful and interfere with the functioning of the human body is very necessary.

Springs are one of the sources of water used to meet the needs of clean water. Springs have various advantages compared to groundwater as a source of clean water, because they come from the ground that appear on the surface of the ground due to pressure, so they have not been contaminated by contaminants.

At this time, Indonesia's population growth has reached quite large numbers. As the population increases, the number of necessities of life that must be met also increases. One of the main necessities of life is the need for clean water.

The problem of clean water supply is currently a special concern for both developed and developing countries. Indonesia as a developing country cannot be separated from the

problem of providing clean water for its people. One of the main problems faced is the lack of availability of clean water sources, the uneven distribution of clean water supply services, especially in rural areas and the existing clean water sources that have not been utilized optimally. In big cities, the source of clean water is used by PDAM. It has been polluted by industrial waste and domestic waste, so that the burden of managing clean water is increasing.

In order to meet the increasing demand for clean water, PDAM Kab. West Pasaman provides the needs of clean water for the area of Kec. Pasaman especially for the service area of the Water Treatment Plant PDAM in Kec. Pasaman Nagari Aur Kuning and its surroundings in 2030 or 15 years to come, so that the needs of the community in the service area of the Water Treatment Plant PDAM in Nagari Aur Kuning will be able to fulfill clean water.

In connection with that, the writer is interested in making it as material for thesis study in the Department of Civil Engineering, Faculty of Engineering, University of Ekasakti with the title " Analysis of Clean Water Needs and Water Availability in PDAM Water Treatment Plants " with a case study of PDAM Nagari Aur Kuning Kec. Pasaman Kab. West Passage.

LITERATURE REVIEWS

Water

Water can be solid (ice), liquid (water) and gas (water vapour). Water is the only substance that naturally occurs on the surface of the earth in all three of its forms. Water is a chemical substance with the chemical formula H_2O : one water molecule is composed of two hydrogen atoms covalently bonded to one oxygen atom. Water is colorless, tasteless and odorless under standard conditions.

This chemical is an important solvent, having the ability to dissolve many other chemicals, such as salts, sugars, acids, several types of gases and many types of organic molecules. Water is often referred to as the universal solvent because it dissolves many chemicals. Water is in dynamic equilibrium between the liquid and solid phases under standard pressure and temperature. In its ionic form, water can be described as a hydrogen ion (H^+) associated (bonded) with a hydroxide ion (OH^-).

Clean water

Clean water is water that is used for daily needs and will become drinking water after being boiled first. As a limitation, clean water is water that meets the requirements for a drinking water supply system, where the requirements in question are the requirements in terms of water quality which include physical, chemical, biological and radiological quality, so that when consumed does not cause side effects (General Provisions of Permenkes No. 416/Menkes/PER/IX/1990).

Drinking water

The definition of drinking water is water whose quality meets the health requirements that can be drunk. The health and technical reasons underlying the determination of drinking water quality standards are the effects of each parameter if it exceeds a predetermined dose. The definition of drinking water quality standards is the operational limit of water quality criteria by incorporating non-technical considerations, for example socio-economic conditions, production quality targets or levels, existing health levels and available technology. Based on Permenkes No. 416/Menkes/PER/IX/1990, which distinguishes the quality of clean water and drinking water is the maximum permissible quality standard for each physical, chemical, biological and radiological parameter.

Water Needs

Water demand is the amount of water that is reasonably needed for basic human needs (domestic) and other activities that require water. The water requirement determines the size of the system and is determined based on water usage.

Water demand is the large amount of water needed for household, industrial, city flushing and others. Priority water needs include domestic water needs, industry, public services and water needs to replace leaks.

The need for clean water for the community is urgently needed. To anticipate water shortages in the coming years, long-term development policies and strategies are used in 2015. In accordance with the Millennium Development Goals (MDGs), Indonesia is expected to increase the coverage of clean water services to 80 % of the total population.

METHODS

At the data analysis method stage, it is done by calculating the existing data, to find the rate of change of each type of PDAM customer, secondary data is used. The data needed are population growth data and additional PDAM customers, then the data is analyzed using the population growth projection formula using the Geometric method (Noerbambang, 2005), to find clean water needs until 2030 or the next 15 years .

To clarify the research methodology, a writing root chart can be made as follows:

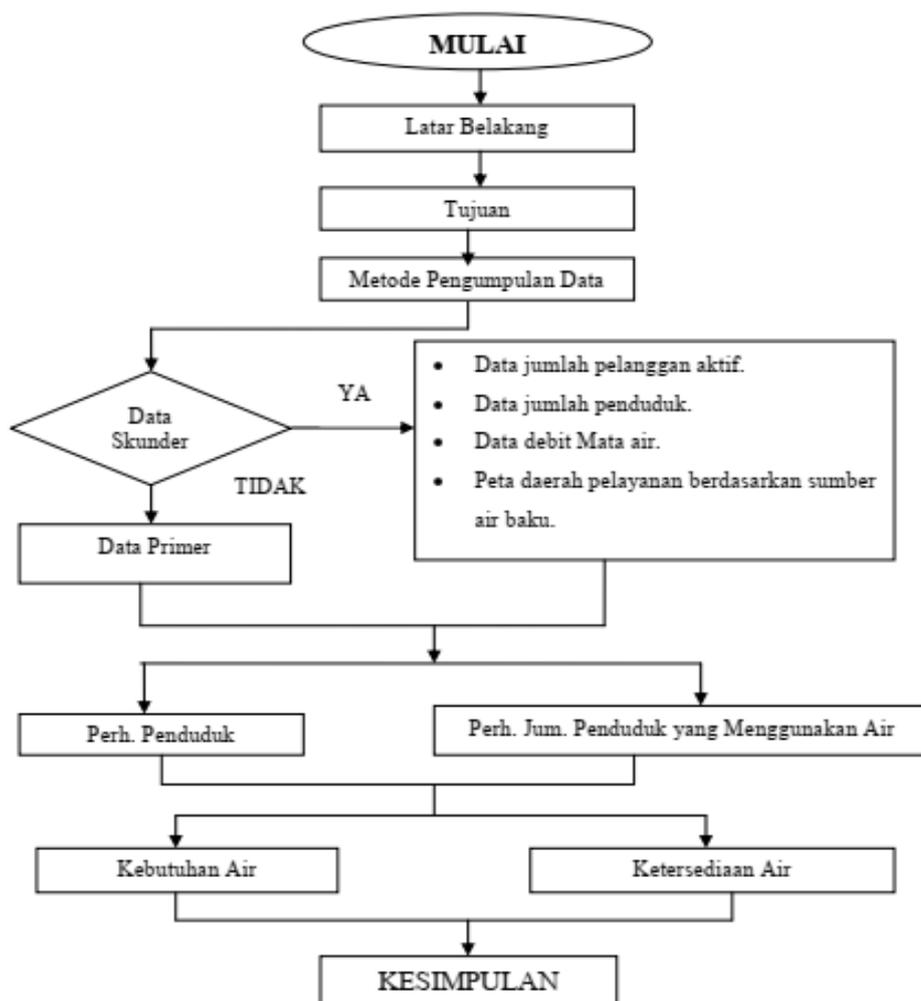


Figure 1. Writing Flowchart

RESULTS AND DISCUSSION

Research Result

1. Population Data

The results of data collection in the field found that the Water Treatment Plant (IPA) for PDAM springs for Nagari Aur Kuning Kec. Pasaman Kab. West Passage. Population data obtained for the last 6 years are as follows:

Table 1. Population Data for PDAM Service Areas for Nagari Aur Kuning district Pasaman Kab. West Passage

No	Year	Number (soul)
1	2010	20,719
2	2011	20,789
3	2012	20,906
4	2013	20,952
5	2014	20,995
6	2015	21,044

Source: PDAM West Pasaman, 2015

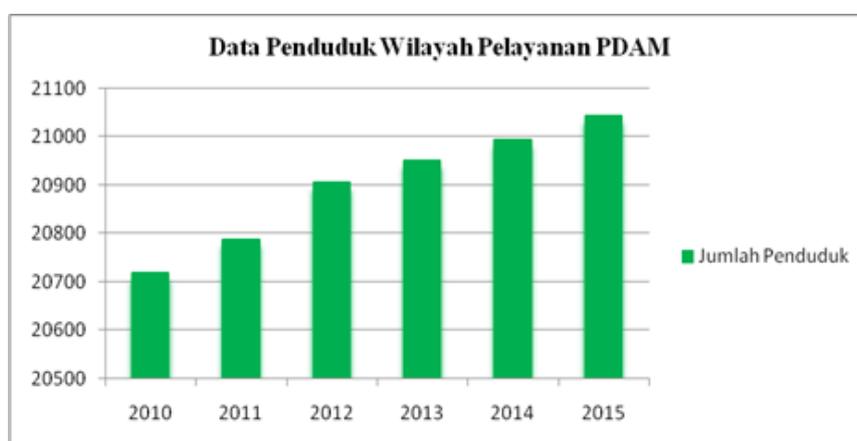


Figure 2. Population Data for the PDAM Service Area for Nagari Aur Kuning district Pasaman Kab. West Passage

2. Customer data

According to data obtained from PDAM Kab. West Pasaman, customer data in the PDAM Spring Water Treatment Installation Service Area for Nagari Aur Kuning Kec. Pasaman Kab. West Pasaman from 2010 - 2015 experienced an increase in the number of customers with a description as in table 4.2 as follows:

Table 2. PDAM Service Area Customer Data in 2015 for Nagari Aur Kuning, district Pasaman, Kab. West Passage

No	Customer Type	Total (SR)
1	General Social (S1)	33
2	Special Social (S2)	57
3	Household 1 (R1)	0
4	Household 2 (R2)	3,991
5	Household 3 (R3)	176
6	Household 4 (R4)	59
7	School (P1)	21
8	Governance (P2)	26
9	Commerce 1 (N1)	84
10	Commerce 2 (N2)	11
Amount		4,458

Source: Service Section of PDAM Kab. Pasaman Barat Nagari Aur Kuning, 2015

3. Debit Availability Data

Data on the availability of discharge at the PDAM Spring Water IPA for Nagari Aur Kuning Kec. Pasaman Kab. West Pasaman according to the data obtained can be seen in Table 4.3.

Table 3. Availability data for Spring Water Debit in PDAM for Nagari Aur Kuning district Pasaman Kab. West Passage

units	Q(m ³ /s)
Ampek intersection	0.965

Source: West Pasaman PDAM

Discussion

From the analysis above, there is data on the prediction of population growth in 2030 or the next 15 years, namely the service coverage method of 80% of the population in the PDAM Springs IPA Service Area for Nagari Aur Kuning Kec. Pasaman Kab. West Pasaman for:

No	Type	Amount l / s
1	Based on Total Population	27,72
2	Maximum Daily	31.88
3	Peak Hour Time Discharge	41.58

Source: Calculation Results

For the amount of clean water demand based on the prediction of each type of customer in the PDAM Spring Water IPA Service Area for Nagari Aur Kuning Kec. Pasaman Kab. Pasaman Barat is as big as.

No	Type	Amount l / s
1	Based on Customer Type	52,62
2	Maximum Daily	60,52
3	discharge Time Peak hours	78,93

Source: Calculation Results

When reviewing the availability of discharge at the IPA PDAM Springs for Nagari Aur Kuning Kec. Pasaman Kab. West Pasaman in 2030 or 15 years to come Amount:

$$\begin{aligned}
 \text{Water discharge} &= \text{Available Debt} - \text{Total Total Water Needs} \\
 &= 965 \text{ lt / s} - 78.93 \text{ lt / s} \\
 &= 886.07 \text{ lt / s}
 \end{aligned}$$

It can be seen that there are still plenty of springs for Nagari Aur Kuning with a total water discharge of 886.07 l/s.

No	Type	Amount l / s
1	Based on Total Population	27,72
2	Maximum Daily	31.88
3	discharge Time Peak hours	41.58
4	Based on Customer Type	52,62
5	Maximum Daily	60,52
6	discharge Time Peak hours	78,93

Source: Calculation Results

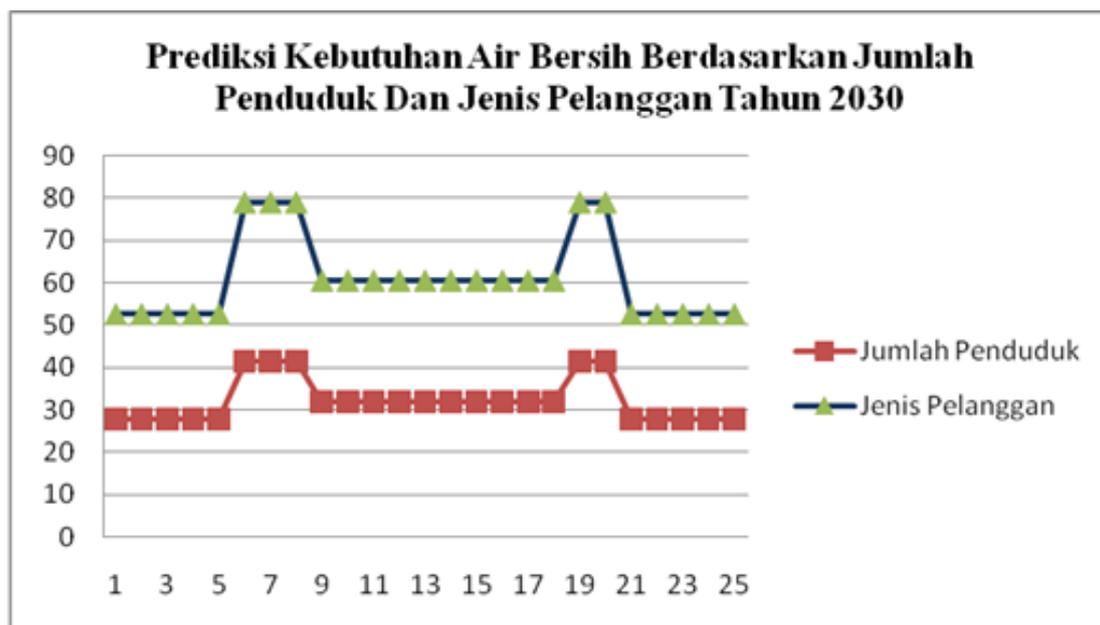


Figure 3. Prediction of Clean Water Needs Based on Population And Types of Customers in 2030

CONCLUSION

Based on the analysis and discussion that has been described above, the following conclusions can be drawn :

1. The population in 2030 or 15 years to come will be 22,044 people.
2. The total water demand until 2030 or the next 15 years is 78.93 l /sec. This means the availability of water debit at PDAM For Nagari Aur Kuning Kec. Pasaman Kab. West Pasaman until 2030 or 15 years to come is still sufficient.

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