

<https://doi.org/10.48047/AFJBS.6.13.2024.7738-7743>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

ANALYSIS OF CLEAN WATER RESOURCE NEEDS IN PANGKAJENE AND ISLAND (PANGKEP) REGENCY

¹Syairal Ilmiani Samadhi, ²Didi Rukmana, ²Saadah

¹Magister Program of Environmental Management Study Program, Graduate School, Hasanuddin University, Tamalanrea-Makassar, 90245, Indonesia

²Department of Agribusiness, Faculty of Agriculture, Hasanuddin University, Makassar, Indonesia

Volume 6, Issue 13, Aug 2024

Received: 15 June 2024

Accepted: 25 July 2024

Published: 15 Aug 2024

[doi: 10.48047/AFJBS.6.13.2024.7738-7743](https://doi.org/10.48047/AFJBS.6.13.2024.7738-7743)

1. Introduction

The water on earth consists of sea water or salt water amounting to 96.54% with an area of 1,338,000,000 Km³, and other water, namely fresh water and salt water other than sea water amounting to 3.46% with an area of 47,984,610 Km³ (UNESCO report 1978). Of the total volume of water in the world, which is 1,385,984,610 Km³, only 3% is fresh water.

According to the Ministry of Public Works and Public Housing (PUPR), of the total potential water resources, only around 20 percent has been utilized while around 80 percent has not been utilized. Of the water that can be utilized, around 20 percent is used to meet household, municipal and industrial raw water needs, the other 80 percent is used to meet irrigation needs.

Pangkajene and Islands Regency has an area of 12,362.29 km². The area covers: land covering an area of 898.29 km² and sea covering an area of 11,464 km². Pangkajene and Islands Regency has 13 sub-districts with 103 sub-districts/villages. The residents of Pangkajene and Islands Regency meet their drinking water needs from PDAM, ground water

Abstract

Pangkajene and Islands Regency (Pangkep) still has problems with the availability of clean water in its area. Regional Drinking Water Company (PDAM) service coverage that is not evenly distributed and the reduced flow of clean water sources in the dry season is a problem in the availability of clean water in this region. The aim of the research is to identify the availability and need for clean water in Pangkep Regency and project it for the next 10 years as well as formulate a clean water management strategy in Pangkep Regency. The results of this research show that the community's source of clean water comes from dug wells, rivers and springs processed by PDAM. PDAM Pangkep Regency serves 7 sub-districts out of 13 existing sub-districts. PDAM's clean water sources come from 7 springs and 1 river. Population projections are calculated using arithmetic, geometric and exponential methods. The population projection results using the arithmetic method in 2033 are 303,343 people with water needs of 30,344,260 liters/day. Based on the results of the SWOT analysis of clean water management strategies, it is hoped that PDAM will be able to improve and improve its services and encourage the government to find and process other sources of raw water.

Keywords: Availability of clean water, PDAM, management strategy

(well water), springs and surface water. Water use in Pangkep Regency is used for domestic, non-domestic, industrial and agricultural needs.

Currently, the fulfillment of clean water needs in Pangkep Regency is felt to be decreasing in several locations. During the long dry season, residents have difficulty getting clean water when the wells they dig dry up. This situation causes a reduction in the amount of clean water to meet people's daily needs. Well water used during the dry season is also not good for people's health. Poor availability of clean water can reduce community productivity. Apart from that, PDAM water discharge also decreases in the dry season so that several service areas in several sub-districts in Pangkep Regency experience difficulty in meeting their clean water needs.

Providing clean water is one of the determinants of improving the health, welfare and economic productivity of society. Increasing the availability of clean water in the future is important for human life. To increase water availability for the community and other users, it is necessary to further study clean water sources in Pangkep Regency and create a strategy for managing clean water in Pangkep Regency. This study allows local governments to expand PDAM services by paying attention to the quantity and quality of clean water sources so that clean water needs in Pangkep Regency can be met evenly.

2. Materials And Methods

Study Area

Administratively, the research location covers seven mainland sub-districts which are the Pangkep Regency PDAM service areas, namely: Pangkajene, Minasatene, Bungoro, Labakkang, Marang, Segeri and Mandalle sub-districts. The research was carried out for 3 (three) months, starting from September to September 2023.

Analysis Method

The research method used is quantitative and qualitative descriptive methods. The following analysis is used in this research: 1. Analysis of supply and demand; aims to see how much clean water is available to meet domestic clean water needs in 7 sub-districts. 2. Analysis of population projections; This analysis was carried out using several methods including linear, geometric and exponential (Klosterman, 1990). The population data used is a minimum of a 5 year time series. 3. Clean Water Management Strategy Analysis; Qualitative descriptive method analysis is used to create a SWOT strategy.

3. Results and Discussion

Identify Clean Water

Conditions According to the results of interviews with stakeholders and the community. PDAM's clean water does not yet reach all areas of Pangkep district, especially in the seven mainland sub-districts. Some residents subscribe to PDAM and have dug wells in their homes. Several sources of clean water in the community can be seen in table 1.

Table 1. Number of clean water sources in 2023

No	District	Well Dig	Well Drilling	PAH	Piping	Pansimas
1.	Pangkajene	3258	2304	789	0	8
2.	Minasate'ne	2073	158	596	2354	2
3.	Bungoro	2785	88	1121	22	358
4.	Labakkang	1046	536	912	1	4
5.	Ma'rang	3371	1284	713	20	9
6.	Segeri	773	414	352	1	3

7.	Mandalle	309	183	344	2	6
----	----------	-----	-----	-----	---	---

Source: Pangkep District Health Service, 2023

PDAM Clean Water Conditions

PDAM Pangkep Regency manages 1 Central SPAM/BNA unit and 5 IKK SPA units. PDAM Pangkep Regency provides drinking water through the construction of drinking water supply infrastructure which is distributed through pumps and pipes. The details of drinking water pipelines managed by PDAM are as follows:

1. Central SPAM/BNA with water sources from MA Mattampa, MA Leang Kassi, MA Ciddokang. The service area includes Pangkajene, Minasate'ne and Bungoro districts
2. Kabba Unit with water source originating from MA Uluwere with service area covering Minasate'ne District
3. SPAM IKK Segeri, water source comes from MA Baring with service area covering Segeri and Bungoro Districts
4. SPAM IKK Bontoa, water source comes from MA Jatie I (not functioning) with service area covering Labakkang District.
5. SPAM IKK Ma'rang, water source comes from MA Jatie II with service area covering: Ma'rang District
6. SPAM IKK Mandalle, water source comes from MA Ulusalo with service area covering: Mandalle District
7. SPAM IKK Padanglampe, the water source comes from the Tombolo river and the service area includes: Ma'rang and Bungoro districts.

Clean Water Conditions Based on Watershed

After delineating the spring catchment area using the DEM map and PDAM spring coordinate points, it is known that the seven PDAM spring sources are still in the catchment area of the five watersheds that pass through Pangkep Regency. Figure 1. Map of spring point delineation of Pangkep Regency watershed boundaries.

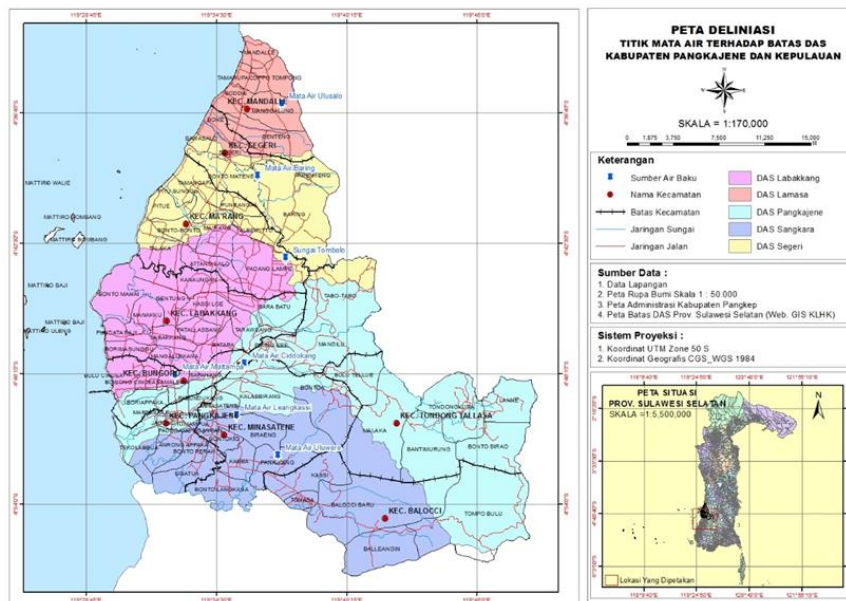


Figure 1. Map of spring point delineation of Pangkep Regency watershed boundaries

Clean water conditions based on karst

The karst area in Pangkep Regency is dominated by the Tonasa formation which is a water catchment area. By distributing the ordinates of the springs onto the Tonasa formation map, it is known that Baring Springs, Ciddokang Springs, Mattampa Springs, Leang Kassi Springs and Uluwere Springs are in the karst area. The map of the distribution of spring points in the Pangkep Karst area can be seen in Figure 2 below.

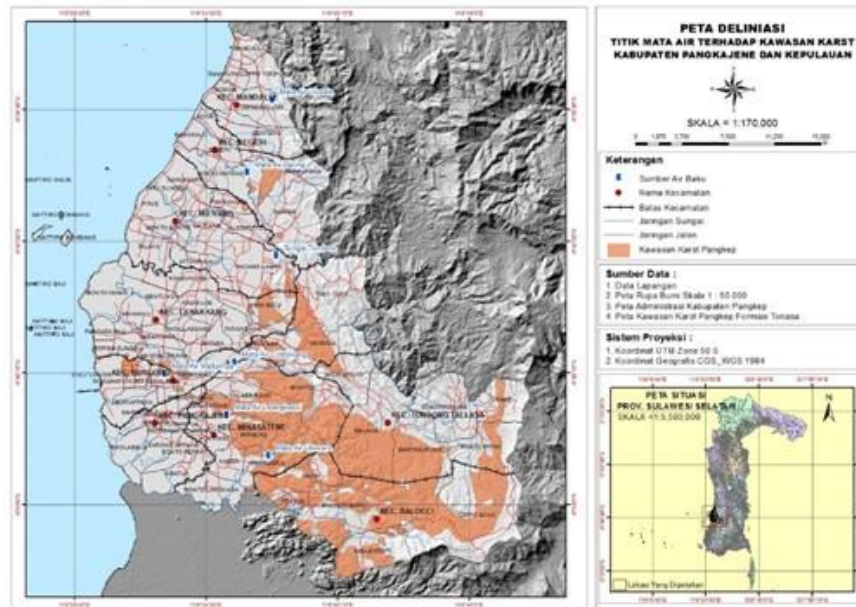


Figure 2. Delimitation map of spring points in karst areas

Analysis of Clean Water Needs

The need for clean water in Pangkep district is calculated by adding up the population of the 7 sub-districts multiplied by the clean water usage standards for the rural category. The formula used is as follows:

$$Q = P_n \times q$$

where Q = Water requirement (liters/day)

P_n = Population

q = standard water requirement

$$Q = 261,277 \times 100 \text{ ltr/org/day}$$

$$Q = 26,127,700 \text{ liters/day (26,127.7 m}^3\text{/day)}$$

Meanwhile, for the volume of clean water distributed by PDAM Pangkep district to seven sub-districts in 2023, data was obtained at 1,759,018 m³ or 4,819.23 m³/day.

Based on a comparison of supply and demand, it is known that clean water in the seven sub-districts has not been met. The water demand in these seven regions is greater, namely 26,127,700 ltr/day compared to the availability of clean water by PDAM which is only able to deliver clean water of 4,819,230 ltr/day.

Population Projection Analysis

The selection of population projection methods is based on statistical testing methods, namely based on the smallest standard deviation. The standard deviation values for the geometric, arithmetic and exponential methods are 8933.04; 8703.97 and 41767.5. From the three methods, the smallest standard deviation is obtained, namely the arithmetic method. So, from the results of the 10 year population projection calculation, it is known that the population in 2033 will increase by 303,343 people. To obtain projections of clean water needs in Pangkep

Regency, the same formula is used, namely $Q = P_n \times q$, where the standard water requirement per person is considered the same every year, namely 100 liters/day.

The results of the calculation of projected clean water needs in Pangkep Regency in 2033 were obtained at 30,334,260 liters/day. By comparing the volume of clean water production in 2023 and water demand in 2033 then: The need for clean water in 2033 = 30,334,260 liters/day and PDAM clean water volume in 2023 = 4,819,230 liters/day, Additional water discharge in 2033 = 25,515,030 liters/day.

Clean Water Management Strategy Analysis

To create a clean water management strategy in Pangkep Regency, a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) was chosen by researchers. The description of the identification and grouping of internal and external factors can be seen as follows

Tabel 2. Analysis Swot

Internal Factor	
Strangth	Weakness
1. There are government efforts to deal with the shortage of clean water	1. PDAM service coverage is not evenly distributed
2. There are legal regulations regarding clean water management	2. PDAM's clean water discharge is influenced by climatic conditions
3. There are several alternative sources of clean water available for use by the community	3. The regional budget for drinking water management is still minimal
4. Community involvement in non-piped clean water management	4. The physical quality of PDAM clean water is not good
External Factor	
Apportunities	Threats
1. Local government support to overcome the lack of clean water with the Pansimas, Arsinum etc. programs.	1. Reduced PDAM Spring Discharge
2. There is a potential source of raw water that can be used as a source of clean water.	2. Another use of PDAM spring water sources as irrigation for rice fields.
3. The community does not have economic problems, especially in providing clean water	3. There is a decline in water quality in coastal areas (well water becomes salty)
4. There is CSR assistance in providing clean water in several areas.	4. Water management by community groups is not well coordinated.

Conclusion

From the results of the research that has been carried out, the conclusions obtained to answer the research targets are as follows:

1. The condition of the community's clean water sources in Pangkep Regency comes from PDAM water, dug wells, drilled wells, Pansimas, and rainwater.
2. The availability (supply) of clean water provided by PDAM in 2023 is 4,819,230 liters/day and the need (demand) for water in 2023 is 26,127,700 liters/day.

3. The projected population in 2033 shows an increase to 303,343 people. The projected results for water needs in 2033 are 30,334,260 liters/day. From a comparison of water availability in 2023 with projected water needs in 2033, water availability is needed 5 times the current PDAM clean water discharge of around 25,515,030 liters/day.
4. The strategy for solving the problem of meeting clean water needs by implementing a SWOT analysis strategy is an opportunity strategy in minimizing the weaknesses of the W-O (Weaknesses- Opportunities) strategy, with the main priority of maximizing community empowerment strategies with a bottom-up approach, namely: Implementation of drinking water and sanitation-based programs community (PAMSIMAS), increasing community knowledge and ability to innovate in managing water sources as an alternative clean water supply system, utilizing the economy of communities that do not experience difficulties in implementing the PAMSIMAS program.

References

- [1] Kodoatie R J. (2003). *Manajemen dan Rekayasa Infrastruktur*. Yogyakarta: Pustaka Pelajar.
- [2] Brahmanja B. (2014). *Prediksi Jumlah Kebutuhan Air Bersih BPAP Unit Dalu-Salu 5 Tahun Mendatang (2018) Kecamatan Tambusai Kabupaten Rakun Hulu (Skripsi)*. Riau: Universitas Pasir Pengaraian.
- [3] Chaiddir M, Eveline M. (2015). Perencanaan Sistem Penyediaan Air Bersih Di Desa Taratara Kecamatan Tomohon Barat. *Jurnal TEKNO Vol. 13 (64): 39-40*
- [4] SNI 19-6728.1-2002 Penyusunan Neraca Sumber Daya – Bagian 1: Sumber Daya Air Spasial. Badan Standarisasi Nasional.
- [5] SNI 6728.1:2015, Penyusunan Neraca Spasial Sumber Daya Alam - Bagian 1: Sumber Daya Air. Badan Standarisasi Nasional.
- [6] Susanti, Nelya Eka, and Akhmad Faruq Hamdani. "Kebutuhan dan Ketersediaan Air Domestik Penduduk Desa Girimoyo, Kecamatan Karangploso, Kabupaten Malang." *Prosiding Seminar Hasil Penelitian. Universitas Kanjuruhan Malang, Agustus*. 2016.
- [7] Damayanti, Adlima, Gusti Zulkifli Mulki, and Riska A. Ayuningtyas. "Analisis Kebutuhan Air Bersih Domestik Di Desa Kedamin Darat Dan Desa Kedamin Hilir." *JeLAST: Jurnal PWK, Laut, Sipil, Tambang* 5.2 (2017).
- [8] Afriyanda, Ridha, Gusti Zulkifli Mulki, and Meta Indah Fitriani. "Analisis Kebutuhan Air Bersih Domestik Di Desa Penjajap Kecamatan Pemangkat Kabupaten Sambas." *JeLAST: Jurnal PWK, Laut, Sipil, Tambang* 6.2 (2018).
- [9] Kusumawardani, Yustika Kusumawardani Yustika, and Widi Astuti. "Evaluasi pengelolaan sistem penyediaan air bersih di PDAM Kota Madiun." *Neo Teknika* 4.1 (2018).
- [10] Najib, Nardy Noerman. *Kontribusi dan strategi Pengelolaan Jasa Lingkungan Air Tanah di Kota Makasar. Jurnal Pengelolaan*, 2018.
- [11] Nussy, Santhy Metlyn, A. Sakliressy, and Charles J. Tiwery. "Analisa Kebutuhan Air Bersih Desa Leahari Kecamatan Leitimur Selatan Kota Ambon." *Manumata: Jurnal Ilmu Teknik* 5.2 (2019): 65-75.
- [12] Marta, Adi, Ana Susanti Yusman, and Rumilla Harahap. "Kebutuhan Air Minum Nagari Malampah Kecamatan Tigo Nagari Kabupaten Pasaman." *Akselerasi: Jurnal Ilmiah Teknik Sipil* 2.2 (2021).
- [13] Kabupaten Pangkajene dan Kepulauan Dalam Angka 2022. Badan Pusat Statistik Kabupaten Pangkep.