
WATER RESOURCES OF SUGAPA INTAN JAYA - PAPUA DISTRICT

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ABSTRACT

The existence and potential of water resources in the Sugapa District need to be known because the Sugapa District is the capital of Intan Jaya Regency. By conducting geological mapping and research as well as direct measurement of quantity and quality in the field, the results are obtained that springs are the main water resource used by residents in the study area. There are 7 (seven) springs in the Sugapa District which are in difficult morphology, in the form of steep valleys at high elevation (1,749 - 2,273 meters from sea level). Spring water discharge varies (<0.1 - 5.78 liters / second) with a quality that in general the parameters meet the drinking water quality requirements.

Keywords: water resources, springs, quantity, quality, drinking water

INTRODUCTION

Intan Jaya Regency is a regency in Papua Province, Indonesia. The administrative boundary of the Intan Jaya Regency is north of Waropen Regency, east of Puncak Regency, south of Paniai Regency, west of Paniai Regency and Nabire Regency. The geographical position of the Regency of Intan Jaya lies between the coordinates of the lines 2057 '19 " -3054'04" S and 136010'21 " -137021'34" E. Map of Intan Jaya Regency and Sugapa District can be seen in Figure 1.

Sugapa District is the capital of Intan Jaya Regency. As the district capital, water resources in the Sugapa District need to be known to meet the water needs in the region. Water resources can come from rainwater, surface water (including springs) and groundwater. In the research of water resources in the Sugapa District the focus is on researching springs in the area because springs are the main water resource used in the Sugapa District area.



Figure 1. Intan Jaya Regency and Sugapa District
(Source: BPPD Intan Jaya Regency, 2014)

METHODS

The method used in this research is literature study and direct research in the field. Direct research in the field was carried out to determine the geological conditions, water sources in the form of springs, and the quality of the water. Geological research is carried out by mapping surface geology. Springs research includes measurement of discharge and nature of water. Discharge measurement is done by volumetric method that is measuring the amount of volume of water flowing per unit time. Water quality measurements are carried out in the field using a measuring instrument to determine the parameters of TDS (Total Dissolve Solid), Salinity, pH, Turbidity, and EC (Electric Conductivity).



Photo 1. Research Team in the field and morphology of the study area.

RESULTS

The morphology of the study area is a mountainous slope with a height of about 2200 meters above sea level. Rain falls throughout the year with the intensity of rainy days more than on dry days. Rainfall 3,209 mm with 232 days of rain. Air temperature ranges from 15°C - 27°C with humidity between 75.85% - 79%. (Intan Jaya Regency RTRW, 2015-2035).

The constituent rocks in the dominant research area are the Malihan Derewo Rock, the Timepa Monzonite, and a small portion of the Kembalangani Group. The condition of the rock is mostly weathered. Existing geological structure in the form of an upward fault which is relatively east-west. There are 7 springs in the study area. The observation springs and geological conditions in the study area can be seen in Figure 2.

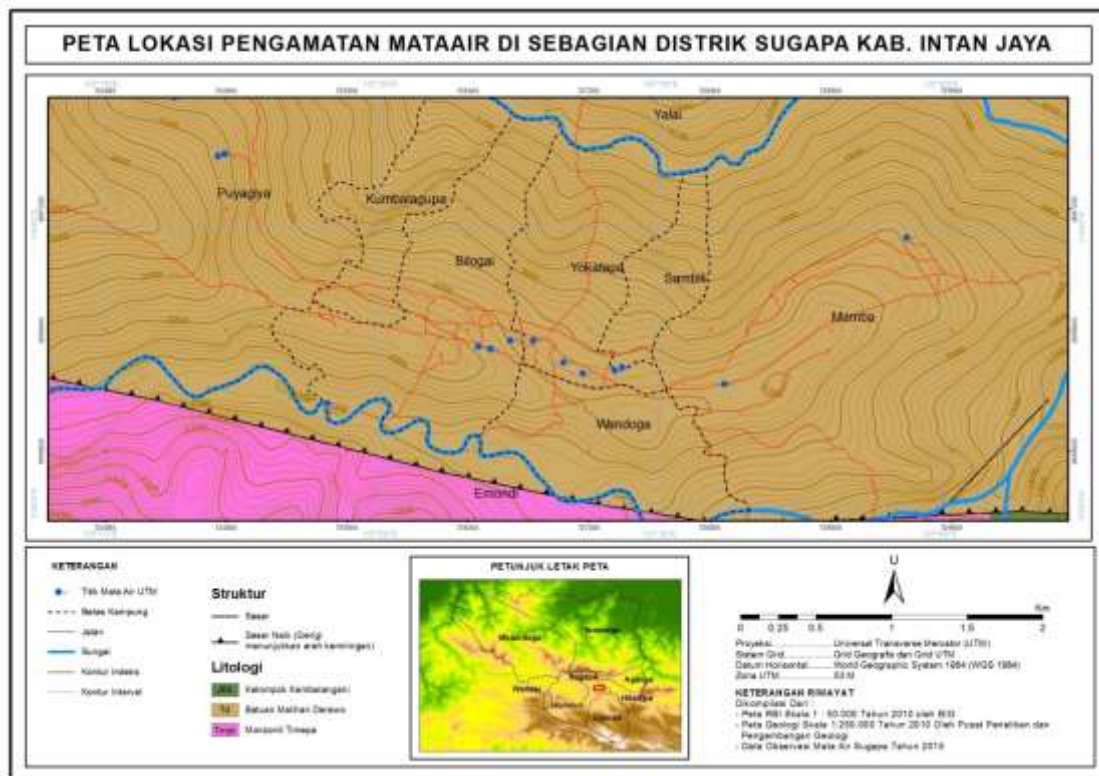


Figure 2. Observation Location of the Sugapa District Springs.

There are 7 (seven) observation points for the springs in Sugapa District:

1. Spring in the village of Puyagia,
2. Spring in Ndugusiga Village,
3. Spring in Salimbi Village,
4. Spring in the Sugapa Police Station,
5. Spring in the East of the Regent's House,
6. Spring south of the Sugapa Koramil,
7. Spring in Sugapa Middle School.

The illustration of the springs are as follows:

- 1) The spring of Puyagiya Village (Photo 2) is located at an elevation of 2,273 meters above sea level. This spring has a spring water that is clear, odorless, tasteless. This spring never dries. The community uses this spring as a water source for their daily needs. To manage this spring, the local government has actually built a reservoir, but it has not yet function optimally because there are several points of the pipeline network that are damaged or damaged by residents.



Photo 2. Spring of Puyagiya Village

- 2) The spring of Ndugusiga Village (Photo 3) is located at an elevation of 1,749 meters above sea level. This spring has a spring water that is clear, odorless, and tasteless. This spring never dries. This spring is a source of water used by local people to meet their daily needs. To utilize this spring is very difficult because of the position of the spring far above the hill.



Photo 3. Spring of Ndugusiga Village

- 3) Sambili Village spring (Photo 4) is located at an elevation of 2,113 meters above sea level. This spring has a spring water that is clear, odorless, and tasteless. This spring never dries. This spring is a source of water for local residents. Because

the location of springs is far and not strategic, it makes access to the springs very difficult.



Photo 4. Location of Sambili Village Spring

- 4) Springs in the Sugapa Police Station (Photo 5) are located at an elevation of 2,124 meters above sea level. This spring has a spring water that is clear, odorless, and tasteless. This spring never dries. This spring is a source of water consumed by the surrounding community.



Photo 5. Sugapa Police Station Spring

- 5) The spring in the East of the Regent's House (Photo 6) is located at an elevation of 2,189 meters above sea level. This spring has a spring water that is clear, odorless, and tasteless. This spring is never dry in the dry season. This spring is usually consumed by people who live around the regent's house.



Photo 6. Eastern Springs of the Regent's house

- 6) Spring in the South Sugapa Koramil (Photo 7) is located at an elevation of 2,119 meters above sea level. This spring has a spring water that is clear, odorless, and tasteless. This spring is protected by the abundance of wild plants that exist so as to keep the water clean and no wild animals enter to pollute the spring. This spring is consumed by the community.



Photo 7. Koramil Selatan Spring

- 7) The spring in Sugapa Middle School (Photo 8) is at an elevation of 2,117 meters above sea level. Location of springs that are in the school environment. This spring has a spring water that is clear, odorless, and tasteless. This spring is also consumed by the community. This spring is also protected by many wild plants and fences made of wood to keep it from getting dirty and to be protected from wild animals so that it is safe to use to meet people's consumption needs.



Photo 8. Spring in Sugapa Middle School

The results of measurements of discharge and water quality consisting of TDS (Total Dissolved Solid) parameters, Salinity, pH, Turbidity, and EC (Electrical Conductivity) of springs in the Sugapa District can be seen in Table 1 and Table 2.

Table 1. Spring Water Discharge in Sugapa District.

Nu.	Spring Location	Elevation (m-asl)	Discharge (liters/second)
1	Spring in Puyagiya Village	2273	5,78
2	Spring in Ndugusiga Village	1749	< 0,1
3	Spring in Salimbi Village	2113	2,96
4	Spring in the Sugapa Police Station	2124	0,15
5	Spring in the East of the Regent's House	2189	0,33
6	Spring in the south of the Sugapa Koramil	2119	0,104
7	Spring in Sugapa Middle School	2117	0,2

Table 2. Water Quality of Springs in Sugapa District

No.	Spring Location	Parameters				
		TDS (mg/L)	Salinity (ppm)	pH	Turbidity (NTU)	EC (μ S/cm)
1	Spring in Puyagiya Village	6.5	0.0	5.37	2.47	14.59
2	Spring in Ndugusiga Village	97.7	0.0	6,72	1.72	204
3	Spring in Salimbi Village	10.9	0.0	6.34	0.24	23.9
4	Spring in the Sugapa Police Station	10.3	0.0	5.13	0.06	22.7
5	Spring in the East of the Regent's House	8.1	0.0	5.79	3.87	17.95
6	Spring in the south of the Sugapa Koramil	13.6	0.0	5.77	6.18	29.5
7	Spring in Sugapa Middle School	25.5	0.0	6.81	1.19	54.3

DISCUSSION

The springs in the Sugapa District are at various elevation heights (1,749 - 2,273 meters from sea level). Existing springs, generally, are found in areas with high morphology and are in steep valleys.

Spring water discharge ranges from <0.1 - 5.78 liters / second. Based on the classification of springs according to Meinzer in Todd (1980), the class of springs in the Sugapa District varies from Class V to Class VII. Classes of springs based on their discharge according to Meinzer can be seen in Table 3.

The Minister of Health Regulation No. 492 / Menkes / Per / IV / 2010, regarding drinking water quality requirements states that parameters that meet drinking water quality for: TDS value is <500 mg / l; for pH values ranging from 6.5 - 8.5; for a maximum turbidity value of 5 NTU. Water is stated as fresh water if the Salinity value is 0-500 ppm and EC is 0-1000 μ S/cm. In the book Groundwater Hydrology (Todd, 1980) stated that water is declared fresh if the price of TDS ranges from 0 - 1000 mg / l. For drinking water, the maximum TDS price is 500 mg / l.

Based on megaskopis observations and measurement results of several parameters of water quality in springs in Sugapa District, referring to the regulation of the minister of health and existing literature, in general water quality from existing springs is meeting the requirements for drinking water except the pH value in 5 locations (i.e. at: Spring in Puyagiya Village, Spring in Salimbi Village, Spring in the Sugapa Police Station, Spring in the Sugapa Police Station, Spring in the East of the Regent's House, Spring in the south of the Sugapa Koramil). At the 5 locations of the springs the pH value does not meet the requirements as drinking water. Based

on TDS, salinity and electrical conductivity, water from springs in the Sugapa District can be classified as fresh water.

In general, the springs that flow throughout the year, so included in the type of spring water perennial. Perennial spring whose the water flowing throughout the year is not affected by rainfall (Purnama, 2010).

Table 3. Spring Classes (Meinzer in Todd, 1980)

Nu.	Class	Discharge (liters/second)
1	I	≥ 10.000
2	II	$1.000 \leq x < 10.000$
3	III	$100 \leq x < 1000$
4	IV	$10 \leq x < 100$
5	V	$1 \leq x < 10$
6	VI	$0,1 \leq x < 1$
7	VII	$0,01 \leq x < 0,1$
8	VIII	$< 0,01$

CONCLUSIONS

- 1) There are 7 (seven) springs in Sugapa District, which are a source of water to meet the needs of residents in the vicinity. The spring is in a difficult morphology in the form of steep valleys at high elevation (1,749 - 2,273 meters above sea level).
- 2) The spring in Sugapa district is a perennial spring whose water flows throughout the year.
- 3) Springs discharge varies (<0.1 - 5.78 liters / second), according to Meinzer, the class of springs in Sugapa District varies from Class V to Class VII.
- 4) Water quality parameters of springs in general meet drinking water requirements except for the low pH found in the 5 springs found.

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