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REVEALING THE APPEARANCE OF GROUND WATER BASED ON GEOELECTRIC DATA IN CANDIDASA KARANGASEM REGENCY, BALI PROPINCE

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Abstract: Candidasa is an area located in Bugbug Village, Karangasem Regency, Bali Propince, with a geographical position around 8.511030^0 S, 115.572357^0E. Geologically the rocks are alluvium and limestone. In Candidasa there is a pool with an area of 15,165.15 m^2 and there are islands in it with an area of 992.94 m^2. This poolhas many springs (appearance of ground water). Elsewhere, it is still in the Candidasa neighborhood, 229 m east of the large poool, at position 8.511281^0S, 115.574333^0E is a spring. This spring is able to release ground water throughout the yearboth in the rainy season and in the dry season, the water continues to flow. For this reason, it is necessary to reveal the condition of this spring, hopes that in the future this water source can be explored as new a source of drinking water, given the increasingly critical sources of fresh water available. Revealing of the appearance ground water in this research is based on geoelectric data. Geoelectric data retrieval activities were carried out in May 2017 - June 2017. The result is that the condition of springs in Candidasa due to the presence of rock fractures in the area. Whereas the source of water comes from upstream which flows to the source of the spring through the aquifer grooves. The flow of this aquifer is covered by rocks. Proof of the existence of aquifers covered by rocks can be seen based on the results of drilling at two upstream sites.
Keywords: ground water, candidasa, geoelectric data.

1. Introduction

Candidasa is an area located in Bugbug Village, Karangasem Regency, Bali Propince, with a geographical position around 8.511030^0 S, 115.572357^0E.
(https://www.google.com/maps/place/Candi+Dasa ,+Nyuh+Tebel, + Manggis, + Karangasem District, + Bali / @ - 8.5110798,115.5740019,578m / data =! 3m1! 1e3! 4m5! 3m4! 1s0x2dd20f2c802fb12d: 0x1eb0ffc994219401! 8m2! 3d-8.4993763! 4d115.5652961! 5m1! 1e1). Geologically, the rocks are alluvium and limeston rocks [1]. In Candidasa there is a pool with an area of 15,165.15 m^2 and there are islands in it with an area of 992.94 m^2. This poolhas many springs (appearance of ground water). Elsewhere, it is still in the Candidasa

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neighborhood, 229 m east of the large poool, at position 8.511281^0 S, 115.574333^0E is a spring. This spring is able to release ground water throughout the yearboth in the rainy season and in the dry season, the water continues to flow. For this reason, it is necessary to reveal the condition of this spring, hopes that in the future this water source can be explored as a new source of drinking water, given the increasingly critical sources of fresh water available.

Various methods have been carried out in groundwater survey. One of them is the geoelectric method as done as by [2-4] and the results are very satisfying. The geoelectric method is a geophysical method that works by injecting electric current into the ground. The measured physical quantities are the magnitude of the injected current and the potential difference caused [5]. The injection of strong currents and measurement of potential differences using electrodes that are plugged into the ground. Current electrode configuration and potential difference configuration can comply bySchulumberger configuration or Wenner configuration by observing the distance between electrodes. The relationship between the strength of the injected current, the potential difference caused and the distance of the electrode will get the rock resistivity magnitude at the measurement point.

The presence of water in rocks cause decreased rock resistivity [6, 7]. Thus the geoelectric method is expected to reveal the flow of aquifers and can also explain the emergence of water in springs, so the background of the problem in this case can be formulated as follows: How does the geological structure around the spring in CandidasaKarangasem Bali so ground watercan appear? Furthermore the purpose of this research is to reveal the geological structure around the spring based on geoelectric data, so that it can explain why ground water can appear in CandidasaKarangasem

2. RESEARCH METHODS

2.1 Place and time of research

Research has been conducted at CandidasaKarangasem Bali. See Figure 1. The research period is May - June 2017.

Source: Google map
https://www.google.com/maps/place/Candi+Dasa,+Nyuh+Tebel,+Manggis,+Kabupaten+Karangasem,+Bali/@-8.5110798,115.5740019,578m/data=!3m1!1e3!4m5!3m4!1s0x2dd20f2c802fb12d:0x1eb0ffc994219401!8m2!3d-8.4993763!4d115.5652961!5m1!1e1

Figure 1. Research Area

2.2 Data retrieval methods

Soil resistivity research using the geoelectric method. The geoelectric method is one of the geophysics that studies electricity in the earth by injecting an electric current (I) into the earth and measuring the potential difference (V) generated. The electric current injected is in the form of a direct current as well as low frequency [3]. The geoelectric method measurement scheme can be seen in the following picture [7, 8]:

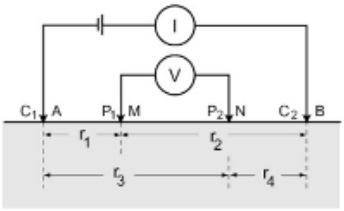

Figure 2. Geoelectric Method Measurement Scheme

The relationship between the measured current strength (I) and the potential difference generated (V) produces the rock resistivity (ρ) can be written [6, 9].

$$\rho = K\frac{V}{I} \quad \text{.....(1)}$$

K constants depend on the configuration used, I is the strength of the current being injected, V the potential difference generated and ρ is resistivity. The resistivity calculated here is a false resistivity. To get the real resistivity, the data ρ be analyzed with the Res2dinv program.

Before the data retrieval is done, the measurement lineis made. Based on surface geology, the measurement line is made in the North-South direction. The distance between electrodes is 4.75 m, by 48 electrodes, so the measurement line length becomes 47 x 4.75 = 223.25 m. Track position can be seen in Figure 1. Data retrieval using the SkillPro resistivity device. Measurement by Werner's configuration so that the placement of the electrodes and their joints is like Figure 3 [7], namely the distance A-M = M-N = N-B = a.

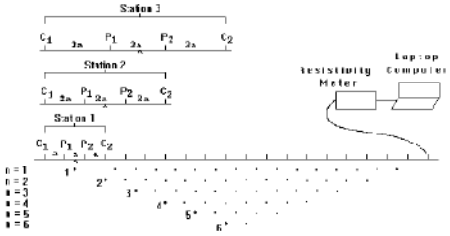

Figure 3. Retrieving DatabyWennerConfiguration

2.3 Data analysis methods

The measurement results in the form of current magnitude and potential difference and the relationship between the two quantities that produce apparent resistivity must to be analyzed with the Res2divn program [2, 7]. The analysis output is in the form of contour cross section resistivity, this contour is interpreted.

3.RESULTS AND DISCUSSION

The results of the research are line cross section resistivity contour as shown below

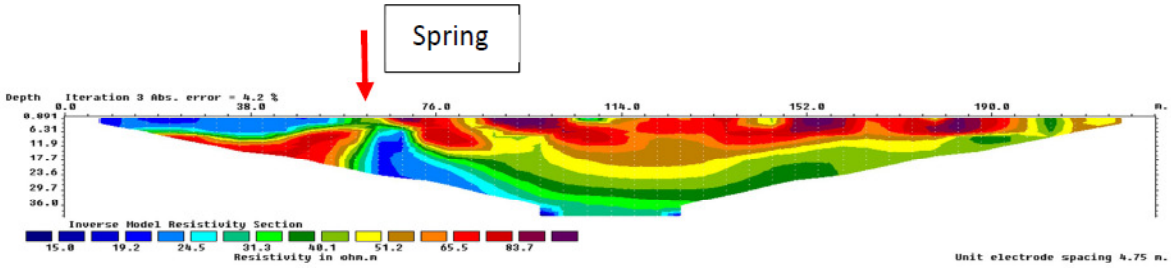

Figure 4. Cross-section Resistivity Contour

From Figure 4 it can be seen that at the position of 0-57 m on the surface it appears blue which is a small resistivity (around 19.2 ohms.m), this area is a muddy area resulting from overflow of springs. At the position of 57-61.75 m is where the spring comes out. Around the exit of the spring a rock is exposed. Areas that have large resistivity (between 65.5-83.7 ohm.m) are hard rock regions. Based on existing outcrops, these rocks are in the form of rocks. The rocks spread to the north. Based on the results of drilling at two locations 150 m from the spring, there are still rocks at a depth of 7 m. From the resistivity cross-sectional image can be interpreted that the emergence of springs in the study area

(CandidasaKarangasem Bali) due to the presence of aquifers under the rock and the water out through the rock outcrop. The presence of aquifers covered by a layer of rock in the future should be explored further as a new source of clean water. Exploration can be in the form of quality and quantity of water that can be taken.

4. CONCLUSION

The results of this research can be concluded that the appear of ground water as springs in CandidasaKarangasem Bali as a result of the disclosure of coral cover of aquifers. This spring can be explored as a new source of fresh water.

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