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REVEAL BATU BUBUS AS MINI TEMPLE IN BIAS PUTIH BEACH BUGBUG KARANGASEM BALI BASED ON GEOELECTRIC DATA

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KEYWORDS:

batu bubus;
bias putih beach;
geoelectric data;
mini temple;

ABSTRACT

Batu Bubus is a place in Bias Putih Beach, Bugbug Village, Karangasem District, Bali, located at latitude 8,5010021 S and longitude 115,6107472 E. As visible, this place as seen as a pile of stones. Before the development of the tourist destination of Taman Harmoni Bali Bukit Asah, Batu Bubus has become a mini temple. But due to the development of tourist destinations, this place is often used as a place to take pictures. It's really exotic at all. But behind the exotic, do the visitors know that place is a sacred place according Hinduism? The following question is why is the place sacred? The answer of this question will be sought based on geoelectric data. The research has been conducted from April 2018 to August 2018 using geoelectric methods. By making several tracks around Batu Bubus. The results showed that in the research area found aquifer flow at 10-23 m depth. The upstream part of the aquifer is still fused, in the middle is branching. One of the smaller branches leads to the west, appearing as a small spring. This place is often used as a melukat. Another one, which is larger towards the bottom of the Batu Bubus, the springhead isn't visible, be expected be spring into the sea near the beachso it is a meeting between sea water and fresh water (campuhan). So Batu Bubus is sacred as mini temple because it is a meeting between sea water and fresh water (campuhan).

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1. INTRODUCTION

Batu Bubus is a place in Bias Putih Beach, Bugbug Village, Karangasem District, Bali, located at latitude 8,5010021 S and longitude 115,6107472 E. As visible, this place as seen as a pile of stones. Before the development of the tourist destination of Taman Harmoni Bali Bukit Asah, Batu Bubus has become a mini temple. But due to the development of tourist destinations, this place is often used as a place to take pictures. Look Figure 1. It's really exotic at all. But behind the exotic, do the visitors know that place is a sacred place according Hinduism? The following question is why is the place sacred? The answer of this question will be sought based on geoelectric data.

Figure 1. The People Climbing Batu Bubus for Take Picture

The geoelectric method is a method that is able to map the resistivity of rocks by injecting electric current into the earth and measuring the potential difference that results from it. Based on these two quantities, rock resistivity can be found in the study area [1-6]. This method has also often been used to find water sources (aquifers) below the soil surface or to map the flow of aquifers. The results are very satisfying [6, 7].

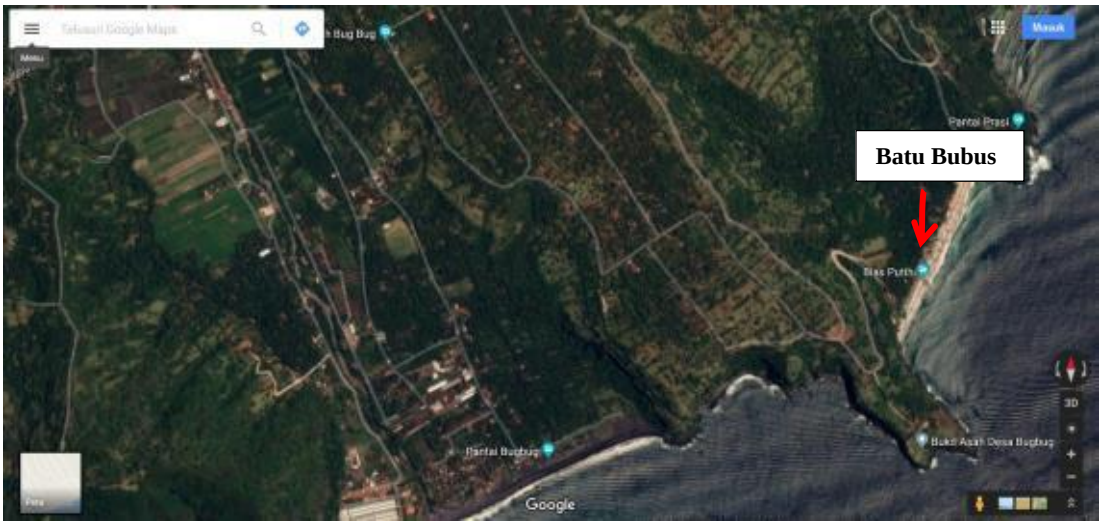
A place on the beach is sacred, one of the reasons is because the place is a meeting place between fresh water and sea water (*campuhan*) [8]. At the western Bias Putih Beach, there is a small spring. In this place many people do *pengalukatan* (self-purification). Based on this fact it is alleged that in Batu Bubus is a meeting place between fresh water and sea water (*campuhan*), so this place is used as a mini temple. This allegation will later be sought for answers based on geoelectric method data. So the purpose of this research is to reveal that Batu Bubus is used as a mini temple because it is a meeting place between fresh water and sea water (*campuhan*) based on geoelectric data.

2. RESEARCH METHOD

This researchpurpose to reveal that Batu Bubus is used as a mini temple because it is a meeting place between fresh water and sea water (*campuhan*) based on geoelectric data, so that the main data needed is geoelectric data around Batu Bubus.

2.1 PLACE AND TIME OF RESEARCH

Based on observations around Batu Bubus, namely at Bias Putih Beach, exactly on the west area, there is a small spring. In this place many people do *pengalukatan* (self-purification), there are meeting between fresh water and sea water (*campuhan*). As surface geology can be interpreted that there is an aquifer flow in the upper part of the area. This is must be sought, so that research was conducted in Batu Bubus Bugbug Karangasem area (Figure 2). Research starts from July 2018 to September 2018.



Source: https://www.google.com/maps/@-8.5005748,115.6004593,1462m/data=!3m1!1e3!5 m 1!1e1

Figure 2. Research Area

2.2 RESEARCH INSTRUMENT

In this research, main data needed is geoelectric data, then drilling data is also needed to prove the existence of water sources, so the research instruments are as follows:

a. Geoelectric data retrieval, the instrument needed is a set of geoelectric devices *SkillPro*. The tool set consists of electrodes, connecting cables, crocodile clamped cables, batteries, hammers, meters, compasses, laptops.
b. Drilling to prove the existence of a water source, the instrument required is a set of drilling tools. The equipment includes drill bits, water and clay.

2.3 MEASUREMENT AND ANALYSIS GEOELECTRIC DATA METHODS

Geoelectric method is used to map aquifers flows. Measurements are did in the area where the aquifer flows is estimated. The measurement stages are as follows:

a. Make a measurement line.
b. Electrode installation
c. Connect resistivity to electrodes.
d. Take measurements.

Data retrieval begins by making five measurement lines. Measurement linnes can be seen in Figure 3.

Bsic Map:

https://earth.google.com/web/@-8.50069798,115.61014835,12.74004927a,511.6141234d,35y,-0h,0t,0r

$L_{1 \ldots 5}$ is measurement lines

Figure 3. Measurement Lines

On this measurement lines are measured by geoelectric sets. The geoelectric method is one of the geophysics that studies the nature of electricity in the earth by injecting electric current (I) into the earth and measuring the potential difference (V) generated. Electric current is injected in the form of direct electric current low frequency. Geoelectric method measurement scheme can be seen in the following figure [2].

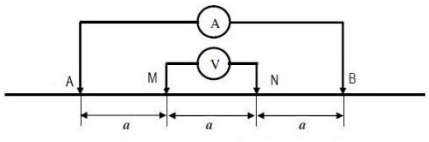


Figure 4. Geoelectric Method Measurement Scheme

Data measurement used*SkillPro* resistivity tool by the *Werner* configuration, so the placement of the electrode and its magnification is as shown in Figure 5[2].

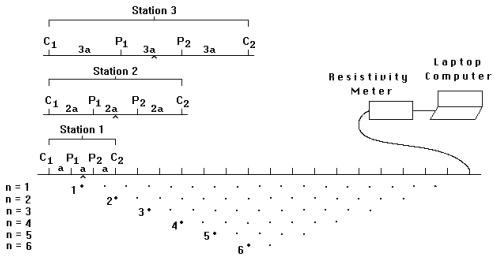


Figure 5. Data Measurementby*Wenner* Configuration

The relationship between measured current strength (I) with the potential difference generated (V) produces rock resistivity (ρ) can be written [1, 9]:

$$\rho = K\frac{V}{I}$$

K = (2πa) is *Werrner* constant; a is electroda spacing; I is the current strength injected and V the potential difference and ρ is resistivity. Resistivity results from the calculation in the above is false resistivity. To get real resistivity, the data ρ must to be analyzed by the *Res2divn* program. The result calculation is rock resistivity quantities per position and depth. This resistivity is contoured, resulting in a cross-section resistivity contour. This contour is interpreted. Furthermore, the drilling position is obtained. From several measurement lines, it is expected to be able to illustrate the aquifers flow in research area. Adn then, the drilling position is obtained.

2.4 METHOD OF PROVING AQUIFER FLOW

After the aquifer position in each measurement lines is obtained, continued with drilling to prove that there is water in the area. If water is found, it means that the location is indeed a flow of aquifers.

3. RESULTS AND ANALYSIS

3.1 The geological state in research area

The research location is located in Bugbug Village, Karangasem District, Karangasem Regency, Bali Province, altitude about 21 m above mean sea level, coordinates around 8,500474 S, 115,60951 E. Rock formations around research area is consist of alluvium rock formations [10].

3.2 Geoelectric data analysis and results

Measurement lines are made in the research area (see Figure 3). This lines is the lines where geoelectric measurements are did. Photos of measurement activities can be seen in the following figure.

Figure 6. Geoelectric Data Measurement

The geoelectric equipment used is *SkillPro*by*Wenner* configuration. Geoelectric data is initially in the form of injected current strength (I) quantities and potential difference magnitude (ΔV) due to current injection. But in the *SkillPro*geoelectric tool set can be directly obtained the amount of apparent resistivity at the measurement points. The apparent resistivity value is analyzed by the *Res2divn* program to obtain the real resistivity value of each measurement point. The resistivity contours of each cross section can be seen in Figure 7-11.

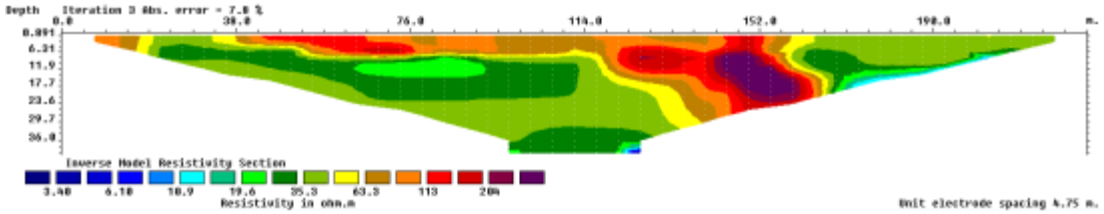


Figure 7. Resistivity Contour of Line 2 Cross Section

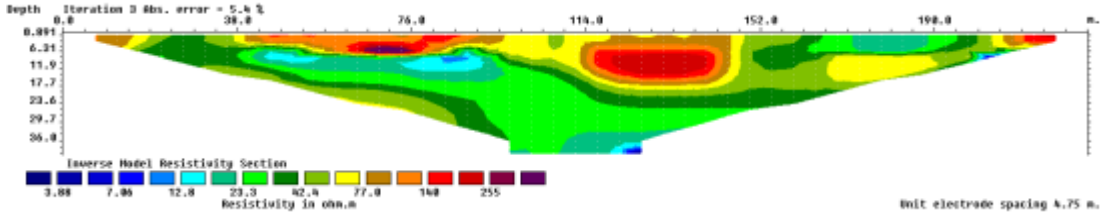


Figure 8. Resistivity Contour of Line 3 Cross Section

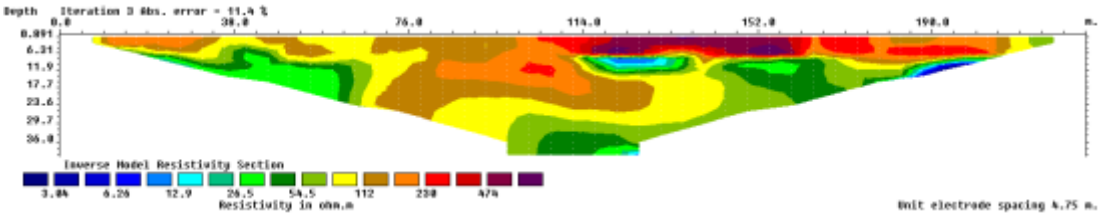


Figure 9. Resistivity Contour of Line 1 Cross Section

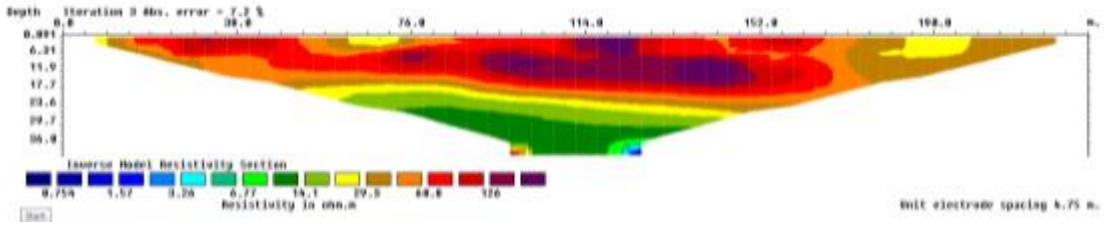


Figure 10. Resistivity Contour of Line 4 Cross Section

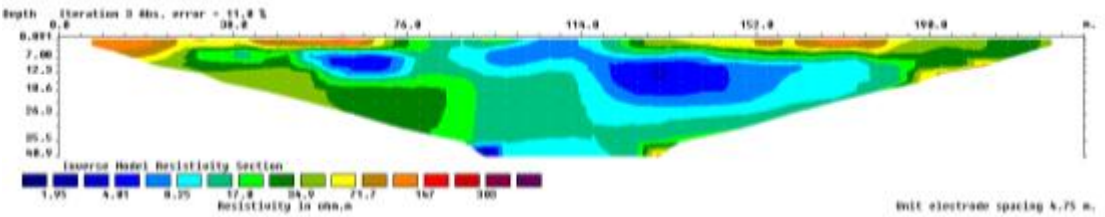


Figure 11. Resistivity Contour of Line 5 Cross Section

3.3 INTERPRETATION OF GEOELECTRIC DATA

When observed the contours of each cross section, it can be said that in each section there are areas that have very small resistivity with a resistivity value between 5-50 Ω.m which is suspected as an aquifer. If the aquifers are connected, the aquifer flow are obtained (Figure 12). Aquifers form like blood vessels in the human body not in a flat form. Among the five measurement lines, line 3 is most likely to be drilling at 99.75 m.

3.4 PROOF OF THE EXISTENCE OF A WATER SOURCE

Based on the results of drilling on line measurement 3 at point 99.75 m, aquifers have been obtained at a depth of 12 m, but according to geoelectric data, good water is estimated at a depth of 22 m, so drilling continues to a depth of 31 m. To avoid contamination of water that is not good, the cassing screen is made from a depth of 23 m. The casing uses a paralon pipe type WA 5".

*Basic Map:*https://earth.google.com/web/@-8.50069798,115.61014835,12.74004927a,511.6141234d,35y,-0h,0t,0r

Remark: aquifer flow

Figure 12. Aquifer Flows at Batu Bubus Around

Figure 13. Drilling on Line Measurement 3 Point 99.75 m

After completion of the drilling, a pilot pump installation was also carried out to ensure that the well had water. It turns out the water, that means there is water and can be taken (Figure 14).

Figure 14. Pump Installation in Drilling Well

3.5 DISCUSSION

The presence of water in the well indicates that the aquifer flows as in Figure 12 are true. A small flow in the direction of the West forms a small spring, where people are *melukat*. One more larger aquifer channel passes through Batu Bubus. Means that under Batu Bubus there is a meeting between fresh water and salt water. Thus the presumption that states that under Batus Bubus is a meeting place between fresh water and sea water (*campuhan*), so that this place is used as mini temple, proven by its existence. Figure 15 shows Small Spring and Batu Bubus as Mini Temple

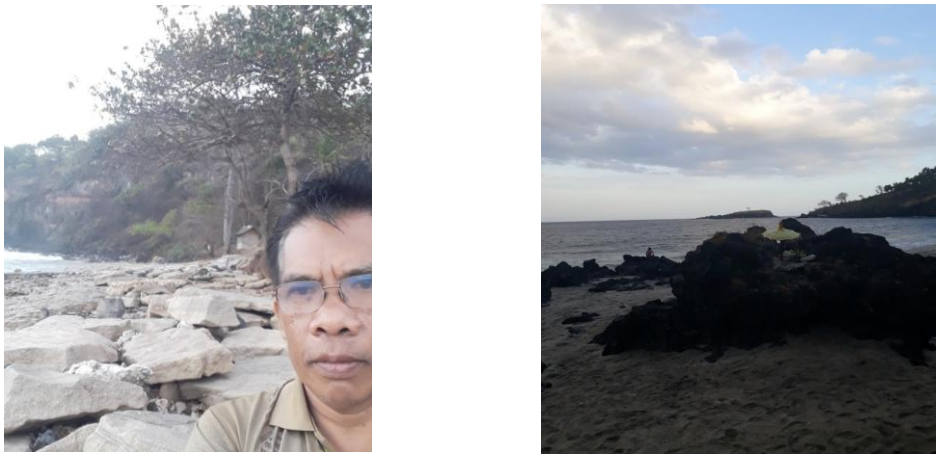


Figure 15. Small Spring and Batu Bubus as Mini Temple

4. CONCLUSION

Geoelectrical data around Batu Bubus shows that there are aquifer flows under Batu Bubus, one empties into the west to serve as a *melukat*, one empties below the Batu Bubus. So under Batu Bubus is a meeting place between fresh water and sea water (*campuhan*). Allegations stating that Bubus Batus is a meeting place between fresh water and sea water (*campuhan*), so that this place is used as mini temple, proven by its existence.

Conflict of interest statement and funding sources

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Statement of authorship

The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

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