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# Non-Electrical Water Pump Technology for Fulfillment Water Supply in Gondanglegi Malang

Riana Nurmalasari[1]; Poppy Puspitasari[1]; Nonny Aji Sunaryo[1]; Viola Malta Ramadhani[1]; Tiara Estu Amanda[2]; Gladis Viona P. P. S[1]

[1] Universitas Negeri Malang, Indonesia

[2] Politeknik Negeri Malang, Indonesia

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## *Abstract*

Water is one of the indispensable human necessities. The majority of daily activities require water. Along with population growth and changes in people's lifestyles, the need for clean water grows daily. The people who live in Bulupitu village in Gondanglegi likewise recognize the importance of having access to clean water. Due to financial constraints, there are still a significant number of residents who lack access to local water company (PDAM). Therefore, the majority of people continue to rely on groundwater and river water. To maximize the use of water, therefore, a non-electrical gravity-based water pump technology is necessary. This pump operates without electricity, making it more cost-effective. This activity is implemented through surveys, discussions with partners, analysis of problems and needs, counseling regarding clean water, the development of water pump, evaluation, and monitoring. On the basis of an analysis of the needs and quantity of water required by the residents of Bulupitu, the acquisition of non-electric pumps can increase the total water supply by 7%. This is based on the estimation that each person requires 250 liters of water per day, given the total population of 3000. In order for the total water requirements of all residents to reach 750.000 liters. As a matter of fact, 24-hour pumps can produce between 47000- 52000 liters of water.

**Keywords:** *Water Pump; Non-Electrical; Water Supply*

## *Introduction*

Along with population growth and changes in people's lifestyles, the need for clean water grows daily. Water is one of the indispensable human necessities (Sutrisno, 2008). Almost all activities in daily life require water (Putra et al., 2020). The residents of Bulupitu Village, Gondanglegi, Malang are also in need of clean water.

Based on observations and interviews conducted in December 2021, it is known that many Bulupitu Village residents still lack access to local water company (PDAM) due to financial constraints. Therefore, the majority of people continue to rely on groundwater and river water. Bulupitu village

residents are frequently constrained in their use of groundwater and riverwater by economic factors, the distance from springs, and the lack of supporting infrastructure and facilities. There are still numerous residents who use the waterways with locals. Frequently, several families share one well. As a result, there are still a significant number of people who use low-quality water in their daily lives. If this condition persists, it will negatively impact the health of the villagers of Bulupitu.

The solution proposed by the Community Service Team of Malang State University to provide clean water to the villagers of Bulupitu is the development of gravity-based non-electric water pump technology. The pump is a device used to move liquids from one location to another via a piping system with a specific pressure, based on the requirements (Romadhoni & Jamaaluddin, 2018). Pumps come with readily accessible and simple-to-use accessories (Alshaari & Nor, 2021).

Non-electrical pumps that utilize Earth's gravity do not require electricity to operate, so it will be much more cost-effective for the residents of Bulupitu village. This pump is anticipated to assist the community in meeting its water requirements for daily activities. So that people do not have to travel too far to find water.

## *Method*

The implementation procedure for this service begins with a site survey. As a partner, a survey of Bulupitu Village was conducted to determine the obstacles to obtaining clean water. By knowing the conditions directly, problems that require resolution can be mapped and categorized to facilitate overall problem management (A'inun et al., 2015). Next, a discussion was held to determine the village's problems and requirements. The organization of this activity necessitates a discussion to identify a solution deemed simple. Several problems related to the provision of clean water for the community have not yet been resolved, according to the discussions between the activity's organizers and the village. After identifying the problems and requirements, the next step is to analyze the village's problems and requirements.

The subsequent activity is water quality counseling. The community is made aware of the significance of providing clean water for daily use through extension activities. Following the outreach efforts, a water pump was designed. The purpose of the development of water pump technology is to ensure that the residents of Bulupitu village have access to clean water, specifically by developing gravity-powered water pumps that do not require electricity. This pump does not require electricity to operate, making it considerably more cost-effective.

Evaluation and monitoring represent the final phase. Evaluation is required to provide partners with direction and opportunities for improvement, so that after service activities, clean water is available. While monitoring is used to ensure that the outputs obtained can be applied in accordance with their objectives, thereby providing substantial community benefits. After the development and implementation of the pump, an analysis is conducted to determine the extent to which the pump affects the provision of clean water (Nurmalasari et al., 2022).

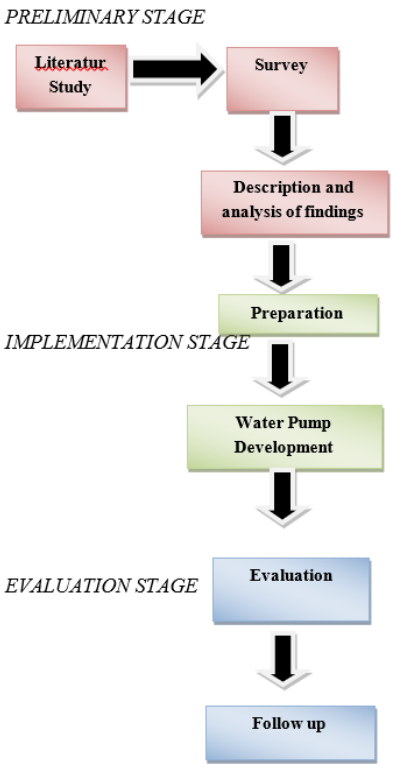


Figure 1. Flow of Water Pump Development

## *Results and Discussion*

Water is one of the indispensable human necessities (Sutrisno, 2008). Almost all activities in daily life require water (Putra et al., 2020). Along with population growth and changes in people's lifestyles, the need for clean water grows daily. The residents of Bulupitu Village, Gondanglegi, Malang are also in need of clean water. Due to financial constraints, there are still a significant number of residents who lack access to local water company (PDAM). Therefore, the majority of people continue to rely on groundwater and river water.

The use of groundwater and riverwater by Bulupitu villagers is frequently constrained by the cost of digging wells, the distance from springs, and the lack of supporting infrastructure and facilities. There are still numerous residents who use the waterways with locals together. Frequently, several families share one well. As a result, there are still a significant number of people who use low-quality water in their daily lives. If this condition persists, it will negatively impact the health of the villagers of Bulupitu.

A sufficient supply of clean water is essential for maintaining the health and comfort of a community's daily activities (Ubaedilah, 2016). Therefore, efforts are required so that the community's need for clean water can be met without incurring excessive costs. Utilizing the earth's gravity to develop non-electrical water pump technology is one solution. This pump does not require electricity to operate, so it will be significantly more cost-effective for the villagers of Bulupitu. There are numerous pump mechanisms that can be adapted to the terrain and requirements of the pump location (Sularso & Haruo, 2000).

The UM Team has installed a non-electric water pump for the residents of Bulupitu based on the results of their service activities. The installed pump has a 50 meter long, 2-inch diameter input pipe from the spring. The pump output flows through a pipe measuring ½ inch in diameter and measuring between

300 and 400 meters in length. A 1000-liter container is used to store the water produced by the pump. The pressure generated in the output pipe is influenced in part by the velocity and elevation of the water source. According to Nugroho et al. (2020), one of the elements affecting pump pressure is the input speed. In addition to these variables, according to da Gama Rego et al. (2017) hydro energy has an impact on pump performance.

This non-electrical pump installation provides residents with access to clean water for immediate consumption. The water flow from the pump is also used for community activities such as ablution facilities, agricultural field irrigation, village library water supply, etc. According to Dupont & Peri (2011), agricultural land is one of the major consumers of water, accounting for 70% of all human water use. Clearly, the purchase of this pump is sufficient to assist the residents of Bulupitu in meeting their daily water needs.

If the pump's faucet is left open 24 hours a day, this non-electric pump arrangement can provide a constant water supply. So that the demand for water, particularly on agricultural land that requires significant volumes of water continuously, may be supplied. The acquisition of non-electric pumps can enhance the water supply by 7%, based on an examination of the needs and quantity of water required by the residents of Bulupitu. This is based on the estimation that each inhabitant of Bulupitu need 250 liters of water per day, based on the population estimate of 3000 people. In order to meet the overall water needs of all residents, which amount 750.000 liters. The output of 24-hour pumps is between 47.000 and 52.000 liters.

Figure 2. Non Electrical Water Pump

Figure 3. Implementation of Water Pump

Figure 4. Water Reservoir and Faucet

## *Conclusion*

Based on the results of the development and use of non-electrical water pumps in Bulupitu Village, it is known that the pump is capable of constantly dispensing water for 24 hours if the pump's faucet is always open. So that water needs, particularly those of agricultural land requiring enormous quantities of water continuously, can be addressed. The purchase of non-electric pumps can enhance the water supply by 7%, based on an examination of the needs and quantity of water required by the residents of Bulupitu. This is based on the estimation that each inhabitant of Bulupitu requires 250 liters of water per day, based on the population estimate of 3000. So as to meet the total water requirements of all residents, which amount 750.000 liters. Meanwhile, a 24-hour pumping operation can produce between 47.000 and 52.000 liters of water.

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