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Real Work Lecture: Community Service in Making Simple Water Filters in Tulung Village, Gresik

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A B S T R A C T

Water is the source of life on earth. Clean water is a basic human need. The limited availability of water and the ever-increasing population has led to a drinking water crisis. The water emits an unpleasant odor and has a cloudy color, as experienced by the residents of Tulung village. This area is located in Kedamean District, Gresik Regency. This village is an area that does not yet have PDAM water supply. Most residents of Tulung Village still use the reservoir water for drinking, cooking, bathing and washing. To overcome these problems, one of the alternative solutions so that reservoir water can meet the physical, chemical and bacteriological requirements is to purify the water using the filtration method. Filtration method is the process of filtering water to remove suspended solids from water through a porous medium. Through the 2023 Real Work Program activities with the theme "Making Simple Water Filter in Tulung Village, Gresik" able to provide knowledge and understanding to the residents of Tulung Village as activity partners.

INTRODUCTION

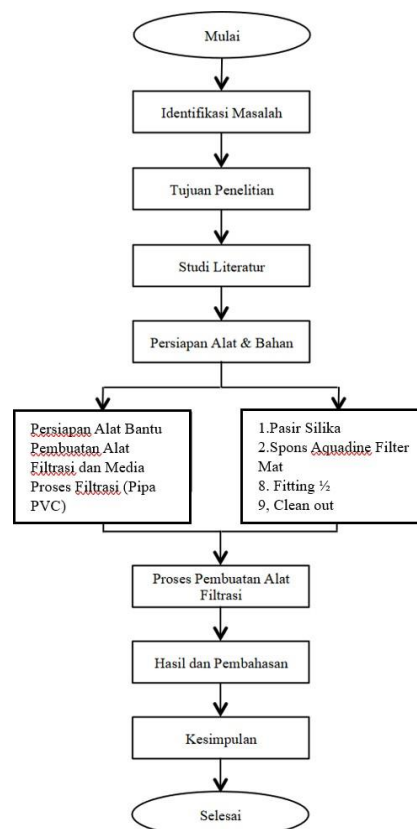
Gresik Regency is one of the areas closest to the capital city of East Java, Surabaya. In 2017 Gresik Regency had a population of 1,251,754 people consisting of 18 sub-districts, 26 sub-districts, and 330 villages. One of the sub-districts in Gresik Regency is Kedamean District which consists of 15 villages. One of the villages in Kedamean District is Tulung Village. Tulung Village itself has a total population of 2,535 people with 1,267 male residents and 1,268 female residents. Tulung Village consists of 2 hamlets, namely Tulung Hamlet and Panggang Hamlet.

From the results of observations, Tulung Village has a reservoir to accommodate rainwater that is distributed to residents' houses. The reservoir water has the characteristic of being green and smells bad. In Tulung Village, the reservoir water is used for daily purposes such as bathing, cooking, etc. Water is a need that must be met, ranging from living things to non-living things. The importance of water for daily needs, of course, needs to pay attention to water quality because it can have an impact on health and the environment (Marliani, 2015). Therefore, a way is needed to change the color of water to be clearer and free from bacteria (Budiman et al., 2017).

One of the ways of water treatment that can be used is to make a water purification device. Water purification equipment is a useful tool to carry out the process of purifying water from various particles such as sludge and other pollutants (Saravanan et al., 2021). This simple water filter is made from easy-to-find materials such as palm oil, charcoal, silica sand, sponge, and tissue arranged in layers. By using these easy-to-find materials, the filter has an affordable price (Brannen, 2017). With affordable prices and easy-to-find ingredients, it can be followed by all people of all ages from young to old. Therefore, with the existing problem, a purification filter is made. This simple water aims to purify the water used daily by residents in Tulung Village.

METHOD

This research is research in the form of testing water samples (lake water) in the Tulung Gresik hamlet area. From the results of a survey conducted by KKN students of Nadhalatul Ulama University Surabaya regarding the use of water for daily needs, it was obtained from lake water. The water of the lake in Tulung Village is yellowish to brownish and smelly, for this reason water purification is carried out using simple materials using charcoal as an alternative material. This research started from the process of preparing the materials that make up the filtration with a simple filter method consisting of aquadine sponge, tissue, silica sand, charcoal, and palm oil. The flow of this research can be seen in the figure below.



Materials used:

1. 4-inch (1 meter) PVC pipe
2. 3-inch Pipe Cap (2 pieces)
3. PVC glue (1 piece)
4. 1/2-inch Pipe Connection (1 piece)
5. Silica Sand Size 4-30 mesh (2 kg)
6. Aquadine Filter Mat Sponge (2 Pieces)
7. Water faucet (1 piece)
8. SDI / Fitting 1/2 (1 piece) 9, Clean out (4 pieces)

Tools used:

1. Pipe Saw
2. Container
3. Pipe glue
4. Hammer
5. Cutter

The order of the arrangement of the pipe and the material of each pipe is as follows: The bottom material on the pipe is palm oil, then on top of the palm oil is attached to charcoal, on top of the charcoal there is silica sand and on the silica sand there is a sponge and tissue consisting of 3 layers.

LITERATURE REVIEW

A simple water purification filter is a widely used filtration system in both households and industries. Water purification filters consist of 2 media, namely filtration media and buffer media. The filtration media is silica sand and activated carbon. Meanwhile, the buffer media is generally in the form of gravel, coconut fiber, palm oil, charcoal, and sponge. This simple water purifier uses a filtration technique by slowing down the flow. Turbid water that enters the filter will be filtered out to produce clear water (Yusuf et al., 2019). This simple water purification filter can only be used for water purification and cannot remove the bacteria contained because the filter tool used is simple. The simple water purification filter media used is sponge, tissue, silica sand, charcoal, and palm oil. Each medium has its own function, namely silica sand functions as a medium that can remove mud, sediment, soil, and other small particles (Cescon & Jiang, 2020). Charcoal functions as activated carbon that can remove odors and colors. Sponges and tissues function to filter dirt in cloudy water (Ferdiansyah, 2023). The palm oil serves as a filter for dirt that escapes from the previous layer and evens out the flowing water.

RESULT AND DISCUSSION

In this water filtration, a Parallon or simple tube is used which consists of an array of aquarium filters (aquarium sponges), tissues, silica sand charcoal, and palm oil. In the order of the contents of the top tube there is an aquarium filter which aims to filter dirty water to be cleaner. Second, there is a tissue at the bottom of the aquarium filter which both aims to filter dirty or turbid water to be clearer (Palao et al., 2020). The aquarium and tissue filter consists of 3 stacks under which there is an aquarium filter then continued to the third arrangement, namely with silica sand. Silica sand aims to remove the content of small particles, mud, soil and sediment in water. Then in the fourth layer, there is charcoal (charcoal) which is intended as activated carbon in carrying out water filtration which aims to purify water, which is cloudy, smelly, to filter the metals contained in the water. Then the last in the fifth arrangement, namely palm oil, functions as filtering particles that have successfully passed through the previous layer and can flatten the flowing water.

From the results of the experiment using the tools and materials above, namely by using water samples that have a cloudy and smelly color. Then this turbid water is put into a water filter tube. After passing through filtration in the pipe, the water is clearer and the smell in the water has disappeared. The results of this study can be seen in the figure below.



Figure 1. Water Filtration Process Using Tulung Village Water Samples



Figure 2. Filtered water results

The results obtained from water that was originally cloudy and smelly became clearer and odorless. This happens because the materials used such as aquarium filters or aquarium sponges, tissues, silica sand, charcoal, and palm oil can purify cloudy, dirty, and smelly water.

CONCLUSION

After the water filter making and education activities were carried out, some of the things that have been achieved are that participants understand the standard standards for clean water quality requirements, understand the water purification process with filtration techniques using filtration media, the functions and benefits of simple water purifiers in daily life, understand the tools and materials that used in the manufacture of simple water purifiers, the steps in the process of making simple water purifiers, and can compare the results before and after water Cleared with a simple water purifier. The suggestion in this KKN activity is that it is hoped that similar activities can be held not only in the environment around the Rohman Mosque in Tulung Village, but it is also hoped that there will be activities. The next session was a discussion of laboratory tests regarding the feasibility of water purification results for drinking water needs.

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