TRAINING AND SOCIALIZATION OF SIMPLE WATER FILTRATION AS AN EFFORT TO IMPROVE CLEAN WATER QUALITY IN KLEPU HALMET, GUNUNG KIDUL YOGYAKARTA

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Abstrak – *Lack of clean water is one of the problems in some areas in Indonesia. This condition occurs in several areas of Indonesia, such as in Gunung Kidul Regency, Yogyakarta. The lack of clean water suitable for use in Gunung Kidul is influenced by the composition of the region which is located above the karst mountains (limestone). One of them is Klepu Hamlet which is located in Giriasih Village, Purwosari District. The water used daily by Klepu Hamlet residents contains quite high lime content due to the environmental conditions which are predominantly lime-based. Based on this, this study uses a qualitative approach with participatory and collaborative methods, through socialization and training related to water filtration in the community in Klepu Hamlet. The tools we use can be easily found in aquarium shops and surrounding areas, such as used bottles, silica sand, zeolite stones, dacron foam, and activated carbon (charcoal). The results of the study showed that training and socialization related to water filtration were very effective in helping residents in Klepu Hamlet, although the lime content was not completely removed, but through this simple water filtration, it can help reduce the lime content of the water.*

Keywords: Gunung Kidul, Klepu Hamlet, Lime Water, Water Filtration, Workshop

1. INTRODUCTION

Water is one of the substances whose existence is really needed by living creatures in all parts of the world, both for plants, animals and especially humans. Therefore, water quality determines the development of living things. This is related to the opinion (Marliane, Khairiyati, Waskito, & Rahmat, 2021) that water plays a very important role in human life, for various daily needs, such as drinking, cooking, washing, bathing and so on. In an adult's body there is around 55-60% water contained in their body weight, while in a child it is around 65% and in a baby's body there is 80% water. Based on this, it can be said that access to clean and safe water is a basic right for every human being in this world, however according to (Sangadjisowohy et al., 2024) Indonesia only has around 6% of the world's water supply or around 21% of the water supply. Asia Pacific.

The lack of clean water is a problem in several regions in Indonesia. The Ministry of Public Works and Public Housing (PU-Pera) noted that in 2019, in (Syenrgi Solusi , 2020) access to clean water in Indonesia only reached 72%. This means that the distribution of clean water in Indonesia is not evenly distributed, and this has a big impact on the prosperity of village residents in obtaining and using clean water for their daily live. The factors causing the lack of availability of clean water in several parts of Indonesia are because the water sources are polluted, then the structure of the soil and terrain are different, making water less abundant and unable to be categorized as suitable for use. consumption. Scarcity and difficulty in getting clean and suitable water is a problem that often arises in many places and is pressing from year to year (Iskandar et al., 2022)

This condition occurs in several regions of Indonesia, such as in Gunung Kidul district, Yogyakarta. The lack of clean water suitable for use in Gunung Kidul is influenced by the composition of the area located above the karst (limestone) mountains. Therefore, the waters that flow and become a source in the villages of the Gunung Kidul region contain lime. One of them is Klepu hamlet in the Giriasih subdistrict, Purwosari sub-district. Water in Klepu Village only comes from two springs, namely the Kidul River and the Manggung River, which are used to meet the living needs of its residents. The distribution of water in Klepu Hamlet is often not smooth, thus hampering the delivery of water to residents' homes, therefore there are some residents who lack water and decide to buy it elsewhere.

The water used daily by the residents of Klepu Hamlet contains quite high lime content due to environmental conditions which are predominantly lime-based. As stated by Mr. Suryadi, the head of the hamlet in Klepu hamlet, "the condition of the water in Klepu hamlet is like this, the lime content is quite high, and there is no solution that can overcome this, so people have long been accustomed to consuming lime water." Then the youth leader of Klepu hamlet, Mr. Hartanto, also emphasized "The water problem in Klepu hamlet had actually been handled by several KKN groups in the previous year, but their method was ineffective and only lasted a few months, because they handled it directly at the water source. , so that if it fails at the source it will also fail in every house".

Even though the people in Klepu Hamlet are used to living side by side with lime water, the community still hopes for the existence of clean water in their area so that their body health can be maintained well, because the continuous use of lime water will be one of the problems that can have a negative impact on the residents. society, because it can

cause disease, of course this is very worrying so an effort is needed to overcome this problem. In this case, the Collaborative KKN 93 group made a simple water filtering tool. According to (Ulasaswini et al., 2023) water filters can remove bacteria, color, turbidity and metal content such as iron. Water filtration uses silica sand, zeolite and activated charcoal media. In the filtration process, quite large particles will be filtered through the sand media, while the zeolite and activated charcoal media function to filter bacteria and metal content in the water. The space between grains functions as a place for sedimentation of impurities in water.

Several studies have shown that filtering can be a solution in overcoming waterrelated problems. Like research conducted by (Iskandar et al., 2022) entitled "Water Filtration Using Simple Tools to Produce Clean Water for Residents of Cikurutug Village, Cireunghas District" which was published in the journal PengabdianMu. This journal discusses the water problems experienced in Cikurutug Village, Cireunghas District, Sukabumi Regency, specifically in RW 1, related to the condition of the water which is murky because it comes from small rivers and not directly from mountains or springs but is the result of land seepage due to soil loosening. area around the river. In overcoming this problem, researchers in this journal used methods with simple tools, such as medium-sized buckets, glue gun, filter cotton, medium-sized stones, sand, charcoal, palm oil and gravel. The results show that if the water has been filtered, apart from being clearer in color, there is no visible dirt floating in it. This proves that this filtration is effective in purifying and improving water quality.

Then research (Ilyas et al., 2021) entitled "Water Purification with Filtration Methods to Improve Community Health in RT Pu'uzeze, Rukun Lima Village, East Nusa Tenggara" was published by Warta Pengabdian. This research discusses water problems experienced by residents in Flores, East Nusa Tenggara (NTT). The problem that occurs is due to the lack of clean water due to the environmental conditions of communities in coastal areas, so there is an increase in salt levels in wells so that the quality of the water is disrupted. Like an unpleasant smell. The method used by researchers to overcome this problem is by purifying well water using a filtration method with simple materials, namely gravel (zeolite), active carbon, and palm fiber belt which has proven to be able to function as a filter. The research results showed that the water was initially cloudy, but after being filtered it became clear and odorless. The filtration method of water purification has been proven to improve the quality of well water, so that the water is at the threshold that is suitable for consumption.

Furthermore, research conducted by (Kusmita et al., 2022) entitled "Clean Water Filtering for Households in RT 21 Simpang III Sipin Village, Kota Baru District, Jambi City". This research discusses the problems experienced by residents of RT 21 in Simpang III Sipin Village, Kota Baru District, Jambi City, related to well water which is yellowish, oily and smells of iron. The method used in this research is using water filtering with materials such as Malang sand, white coral, fine sand, coconut charcoal, palm fiber, ziloite and foam. The results show that the filtering was successful in cleaning the water well, with a pH of 6.5. So it can be concluded that filtering is effective as a solution to deal with this problem.

Based on this, it can be seen that water filtering can be used as a solution that is expected to solve problems related to lime water in Klepu village. To overcome these problems, this research aims to: determine public perceptions regarding water quality, then to analyze the steps for making simple tools for water filtering, and also to evaluate the effectiveness of training and socialization of water filtering. It is hoped that this research can contribute to the development of programs to improve water quality in rural areas, especially in Klepu hamlet. Apart from that, the results of this research can also be used as reference material for the government and related institutions in designing more effective policies in overcoming similar problems. For this reason, the Collaborative KKN 93 group plans to hold a workshop and socialize water filtering, on a household scale using simple equipment, so that later it can be used to improve the clean quality of water used in people's daily lives, especially in Klepu hamlet from house to house, not from house to house. the source.

2. METHOD

This research uses a qualitative approach with participatory and collaborative methods to explore the impact and effectiveness of the lime water filtering workshop carried out by the Collaborative KKN Group 93 from UIN Sunan Kalijaga Yogyakarta with UIN Cyber Syekh Nurjati Cirebon in Klepu Hamlet, Giriasih Village, Purwosari District, Gunungkidul Regency. This approach was chosen because it allows researchers to understand in depth the community's experiences, views and responses to the workshop, as well as analyze how this program contributes to improving the quality of clean water in the area (Zunaidi , 2024). A participatory approach was implemented by involving the Klepu Hamlet community in every stage of the research, from planning to evaluating activities (Erna Zuni et al., 2024)

The community is actively involved in the process of making lime water filtering equipment, with the aim that they not only become beneficiaries, but also have an active role in learning and sharing knowledge (Dirkareshza et al., 2023). This approach allows for more effective knowledge transfer and empowers communities to apply lime water filtering techniques independently in the future. Through active participation, the community is also encouraged to apply lime water filtering techniques independently and sustainably after the workshop is completed (Priyanto, 2024). Furthermore, the collaborative approach emphasizes cooperation between members of the Collaborative KKN Group 93 and the local community. This collaboration involves dividing roles in designing and implementing the workshop, where students act as facilitators and assistants, while the community makes contributions based on their local knowledge about limestone water conditions in the area. This collaborative approach aims to build mutually beneficial relationships, where academic knowledge and local knowledge can combine to create more effective solutions to clean water access problems (Saputra et al., 2023).

The observation method was used to directly observe the implementation of the workshop, interactions between participants and facilitators, as well as the process of making and using lime water filtering equipment (Ardani et al., 2024).These observations provide empirical data about group dynamics, participants' responses to the material

presented, and challenges that arise during the implementation of the workshop. With this method, researchers can gain more detailed insight into the effectiveness of training in increasing community understanding and skills regarding lime water filtering (Setiawan et al., 2024). After the workshop, in-depth interviews were conducted with workshop participants to dig deeper into their understanding of the importance of lime water filtering, as well as the impacts felt after attending the workshop. This interview also aims to obtain feedback regarding the implementation of the workshop and suggestions for future improvements (Romauli et al., 2024).

Focus Group Discussion (FKD) is a focus group discussion conducted involving community representatives and KKN team members to evaluate the success of the workshop and plan follow-up actions. This FGD allows dialogue between various communities to equalize perceptions (Tania et al., 2024). Data obtained from observations, interviews and focus group discussions were analyzed thematically (Sayla et al., 2024). Researchers identified the main things that emerged, such as people's perceptions of clean water, the impact of workshops on daily behavior, and factors that influence the adoption of filtering technology. This analysis aims to understand in depth how the workshop influenced community awareness and action regarding lime water filtering, as well as how participatory and collaborative approaches can increase the effectiveness of the program.

The qualitative research method with a participatory and collaborative approach used in this research has provided a comprehensive picture of the impact of the lime water filtering workshop on the awareness and ability of the Klepu Hamlet community to access clean water. This approach not only assesses the success of the program from a technical perspective, but also from social aspects and community empowerment, thereby supporting the achievement of sustainable development goals. The following are additional steps regarding the lime water filtering training workshop using a participatory and collaborative approach. First, identify needs and initial planning before training begins, for example observing the Klepu Hamlet community to identify the main needs and challenges related to clean water and determining relevant solutions such as designing a lime water filtering device that suits the conditions of the local community. Second, collect the materials and equipment that will be used to make a lime water filter by considering the right types of materials and how to get them at an affordable cost.

Third, training or workshop which begins with a training session and demonstration on making lime water filtering equipment. KKN students act as facilitators who guide the community in every step of production, from preparing tool components to effective lime water filtration techniques. During this session, the public is encouraged to ask questions and provide input, so that there is two-way interaction that supports joint learning. Fourth, independent practice where people are given the opportunity to practice making filtering tools independently or in small groups. This approach allows the community to directly apply the knowledge they have acquired, with support from KKN students as companions. This independent practice is also an important moment to evaluate the community's understanding and skills in using lime water filtering equipment. Fifth, discussion and reflection where the community is given time to share

their experiences and difficulties they faced during the process of making the filtering tool.

Evaluation and follow-up, at this stage a Focus Group Discussion (FGD) was carried out involving community representatives and KKN students to evaluate the success of the lime water filtering tool training. The evaluation results are used to improve and develop similar programs in the future, as well as ensuring that lime water filtering training not only produces effective tools, but also empowers communities with the knowledge and skills needed to independently maintain clean water quality and the sustainability of the application of water filtering techniques chalk in Klepu Hamlet.

3. RESULTS AND DISCUSSION

Community Perceptions Regarding Water Quality

The Klepu community has a deep dependence on local water sources, which come from caves in the Klepu area and have a high lime content. This water source has become an integral part of their daily lives, used for drinking, cooking and other domestic activities. Despite increasing awareness regarding the health risks of consuming water with excessive lime content, the Klepu community remains dependent on this source. According to (Santoso et al., 2020) water with a high level of hardness is very detrimental because it can cause rust on iron tools, increase soap consumption because the soap does not foam enough, and cause scale in processing places. Calcium content in drinking water lower than 75 mg/l can cause brittle bone disease, while content of more than 200 mg/l can cause corrosiveness in water pipes (Widiyastuti et al., 2022). Several factors that encourage this dependency include limited access to safer and more affordable sources of clean water, as well as the high cost of obtaining clean water from outside the region. In addition, habits and culture that have been deeply ingrained over many years make changing behavior in water use a challenge that is not easy.

Figure 1. Simple Water Filtering Training and Socialization Documentation KKN 93 COLLABORATION

People also believe in the efficacy of traditional medicine that uses lime water, which adds complexity to efforts to reduce consumption of this water. On the other hand, the lack of accurate and comprehensive information regarding the health risks that may arise from consuming lime water is an additional obstacle to educational efforts. In this context, overcoming the problem of dependence on lime water requires a comprehensive and

sustainable approach. The government and related parties need to increase community access to adequate and affordable clean water sources, as well as provide intensive health education so that people understand the long-term impacts of consuming lime water. The development and application of technology that is appropriate to local conditions is also an important step, both in providing clean water and in efforts to treat water to make it safer for consumption. Only with an integrated and collaborative approach can the Klepu community's dependence on limestone water sources be reduced, and their health and well-being can be guaranteed.

Steps to Make a Simple Tool for Water Filtering

Making a simple water filtering tool is done using a trial and error process in the process of making a simple water filtering tool. The first trial was carried out using a composition of sand, river gravel, and activated carbon (charcoal), as well as dishwashing foam, but the results found from the composition of these materials were not able to remove lime. The next trial we used a composition of silica sand, zeolite stone, activated carbon (charcoal), and foam to filter water from a fairly high lime content. The composition of the materials used in this trial succeeded in showing better results than the previous trial. The tools we use can be easily found in aquarium shops and local places, such as used bottles, silica sand, zeolite stones, Dacron foam, and activated carbon (charcoal).

In the manufacturing process, first the used bottles that have been prepared are perforated with small and large holes at the bottom of the bottle, while the top or cap of the bottle is perforated the size of the tap that each resident usually uses at home. The function of the bottle hole at the bottom is for water flow. comes out while the hole in the bottle cap functions as an inlet for water which is installed in the tap. Firstly, the bottom of the bottle is filled with dacron foam which functions as the final filter to absorb the remaining dirt from the other components above, after the dacron foam the next layer is zeolite stone, silica sand, and the final top layer is charcoal or activated carbon.

Figure 2. Simple Water Filtering Training and Socialization Documentation KKN 93 COLLABORATION

In (Tugiyono, 2017) activated carbon functions to remove micro pollutants such as organic substances, detergents, odors, phenol compounds and to absorb heavy metals and others. If the entire surface of the activated charcoal is saturated, or is no longer able to absorb it, the absorption process will stop. Zeolite is one of the natural ion exchangers

that is widely available. The working system of this natural zeolite is by ion adsorption. The Na+ ions contained in natural zeolite will be released and the natural zeolite will absorb Ca2+ ions in the water. The ability of zeolites as ion exchangers has long been known and used to remove chemical pollutants. In water, zeolite is also able to bind E Coli bacteria. As for silica sand or river sand. Quartz sand is a mineral that consists of silica crystals (SiO2) and contains impurity compounds carried away during the deposition process. To test the level of lime that has been filtered through a simple filtering tool that we designed, we use an indicator by checking the lime in the process of removing scale from boiled water and showing clear results.

Apart from that, another indicator that we use is by comparing the Ph of water that has been filtered through a simple water filtering device that we designed with water directly from residents' taps which still contains lime. The Ph level shows that the water that has gone through the filtering device is at Ph 7, which means normal and safe to use, while water directly from residents' taps that has not gone through a filtering process is at Ph 10, with this number indicating that the water tends to have more alkaline properties. The characteristics of lime water are when used for washing, the foam produced is less, the water tastes stale and bitter, when the water is boiled it will cause crust on the walls of the pan, and when the pH is measured, the lime water has a basic nature, namely a pH of more than 8.

Therefore, we also conducted tests again to measure and compare the lime content in water that had gone through a simple water filtration process that we designed with pure water from residents' taps that are commonly used every day, by dissolving soap in it, and the results found that water that had gone through the water filtration process had more foam compared to pure water from residents' taps which had less foam and even tended to disappear. This shows that pure water from residents' taps is hard water and contains lime so that the foam produced is small and disappears quickly, while water that has gone through the filtration process shows a normal Ph level so that the soap dissolved in it has a lot of normal foam.

Evaluation of the Effectiveness of Water Filtering Training and Socialization

The purpose of this simple water filtration training and socialization is to help and educate the people of Padukuhan Klepu in reducing the lime water content that is commonly used by the community for daily needs. In practice, we prepare simple water filtration materials, which will later be used by residents. Then we held a kind of training and socialization on Thursday afternoon, August 1, 2024 at the Balai Padukuhan Klepu. The evaluation of this simple water filtration training and socialization is that the majority of the people of Padukuhan Klepu are farmers and wood craftsmen, who are active during the day. So that the people who participated in this Simple Water Filtration training and socialization were only a group of housewives. This causes the distribution of this Simple Water Filtration material to be uneven and ineffective. The solution is that we visit every community association of Padukuhan Klepu and provide materials and procedures for making the Simple Water Filtration. Not only the Simple Water Filtration program, but also the work program as a whole.


Figure 3. Simple Water Filtering Training and Socialization Documentation KKN 93 COLLABORATION

After the water filtration was carried out through socialization and training, it was proven to be very effective in helping residents' problems to reduce the levels of lime contained in their area. Several residents of Klepu Hamlet expressed their gratitude to KKN Collaboration 93 for creating a work program that could help residents "Thank you, sis, sir, for making a simple tool to reduce the lime content, yesterday I tried using the tool and when I boiled water, the water did not overflow, meaning the lime content has decreased, not like before". Regarding this, it can be concluded that training and socialization related to water filtration are very effective in helping residents in Klepu Hamlet, although the lime content is not completely gone, but through this simple water filtration, it can help reduce the lime content of the water.

4. CONCLUSION

Problems related to the lack of clean water quality in the Klepu Giriasih hamlet, Cirebon district, need to be overcome in a simple way. Making a simple water filtration device is done by trial and error in the process of making a simple water filtration device. The first trial was carried out using a composition of sand, river gravel, and activated carbon (charcoal), as well as dishwashing foam, but the results found from the composition of the materials could not remove lime. In the next trial we used a composition of silica sand, zeolite stone, activated carbon (charcoal), and foam to filter water from a fairly high lime content. The composition of the materials used in this trial managed to show better results than the previous trial. Evaluation of the training and socialization of this simple water filtration is that the majority of the Klepu Hamlet community are farmers and wood craftsmen, who are active during the day. So that the people who took part in the training and socialization of this Simple Water Filtration were only a group of housewives. This causes the distribution of this simple Water Filtration material to be less even and effective. The solution is that we visit every communiassociation in Klepu Hamlet and provide materials and procedures for making

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