

UTILIZATION OF AC WATER AS AN ALTERNATIVE WATER RESOURCE FOR INCLUSIVE AND SUSTAINABLE GREEN ECONOMIC DEVELOPMENT

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Abstract

The Anugerah Insani Foundation oversees several schools, including kindergarten, elementary school, middle school, and high school, which require a lot of water resources every day. So far, water resources have only relied on groundwater for ablutions, toilets, watering plants, and cleaning. In the dry season, water availability at this school becomes a problem because the groundwater dries up. Finally, the limited water supply does not match the needs of the school. In September 2023, the toilets at the school ran dry so there was no water, so they had to connect pipes from other places while waiting for groundwater drilling to a depth of 30-40 meters. To meet the limited water resources, a collective of AC wastewater was built through pipes and collected into the tornado. The resulting conclusion is that AC wastewater can be used as an alternative for school water needs which can be used for watering plants and cleaning the school. The results of the FGD with the government regarding halalness and certainty of the required water quality standards. For uses related to physical members, both for ablution, washing hands, and toilets, the school cannot use them because there must be a halal test and hygiene test decided by the government. The next suggestion is to ensure that there are regulations for AC wastewater related to halal testing and hygiene testing by the government.

Keywords: AC Wastewater, Anugerah Insani Foundation, Bogor Regency, Green Economy, Sustainable, Water Resources

INTRODUCTION

Sustainable Development Goals (SDGs) are an international agenda that will be a continuation of the Millennium Development Goals (MDGs). These SDGs include 17 global environmental goals, one of which is goal no. 6 is also related to the sustainable development of clean water and proper sanitation (Clean Water and Sanitation). In 2014, the World Bank released data that there are still 780 million people who do not have access to clean water in the world and more than 2 billion people on earth do not have access to sanitation (<https://sdgs.un.org/goals>). Based on this, ensuring access to clean water and sanitation for all

is important to improve the quality of human life.

This very minimal availability of water should make people more efficient in its use and look for alternative water that can be used as wastewater. People often just throw away wastewater, for example from air conditioning. AC is a modification of the development of cooling machine technology which is used for various purposes, especially those who live in tropical regions. AC helps provide cool air and provides the body with the water vapor it needs. According to Lestari (2009), in the process, AC produces water which is the result of condensation or condensation of air from the surrounding environment so that it contains few minerals and has a low temperature. If we look at the process of wastewater, AC water is pure water that is almost unpolluted by precipitated elements and contains pure H₂O (Lestari, 2009).

The Anugerah Insani Foundation as the school manager is a service provider, in this case the school must provide good quality services to students (Nababan BO et al, 2023). The Anugerah Insani Foundation, which oversees several schools, including kindergarten, elementary school, middle school, and high school, requires a lot of water resources every day. So far, water resources have only relied on groundwater. During the dry season, water availability becomes a problem because groundwater dries up. Finally, the limited water supply does not match the needs of school-going students. For example, in September 2023, the toilets at schools were dry so there was no water, so they had to connect pipes from other places while waiting for groundwater drilling to a depth of 30-40 meters. Based on this, it is necessary to create alternative water resources to overcome the limited water supply.

Water resources are one of the service facilities provided by the Anugerah Insani Foundation, which is a foundation that oversees schools from kindergarten, elementary school, junior high school to high school, where each classroom has 2 AC units installed with PK sizes varying from 1 PK to 2 PK. Based on measurements carried out in this pre-survey, the amount of AC wastewater depends on the size of the AC PK and the temperature used each hour. AC 1 PK at a temperature of 240C to 200C in 1 hour produces 0.1 liters of water/hour to 1.4 liters per hour. AC 1.5 PK at a temperature of 240C to 200C in 1 hour produces 0.3 liters of water/hour to 1.8 liters per hour. AC 2 PK at a temperature of 240C to 200C in 1 hour produces 0.5 liters of water/hour to 2 liters per hour. There are 25 classrooms and 3 secretariats, most of which have 2 AC units with varying PK sizes, but the dominant one is 1 PK AC. If 1 room consists of 2 AC units measuring 1 PK then in 1 hour the AC operates producing 2.8 liters of AC wastewater per hour because usually the AC temperature is installed at 200C. If multiplied by 8 hours per day, the wastewater produced is 22.4 liters per day for 1 classroom. If there are 25 classrooms, the AC wastewater produced is 625 liters in 8 hours (per day). In 1 month, 18,750 liters of clean water are directly wasted per month or 187,500 liters per year (assuming 10 months are effective).

In terms of savings, groundwater that must be used for school toilet needs is 187,500 liters per year. The use of air conditioning in each classroom can produce quite a lot of wastewater and this wastewater becomes useless by being thrown into the water channel. This Beginner Community Service Activity has an idea regarding the use of AC wastewater as an alternative water resource which includes a green economy (sustainability of water resources that will always be available, but can also reduce the acquisition costs of obtaining these water resources). Therefore, this service has the following objectives: (1) disseminating related knowledge to partners, namely the Anugerah Insani Foundation, and introducing school

students to basic education about the importance of water resources, (2) trying to apply alternative AC wastewater resources for school needs. as a service facility for water availability (not group A and group B), and (3) trying to propose to the regional government of Bogor Regency regarding AC wastewater as an alternative water resource in offices, shopping centers and schools that have AC.

IMPLEMENTATION METHOD

The method used in community service activities (PPM) is to approach partners, namely the Yayasan Anugerah Ins, and formulate solutions to problems faced by partners. There are five main stages in this community service activity (PPM), as shown in Figure 1 (Agustriyana et al., 2022; Witono et al., 2021).



Figure 1. Stages of Community Service Implementation

1. Observation and Coordination

This observation and coordination was carried out by visiting partners of the Anugerah Insani Foundation located in the Acropolis Complex, Jl. Karadenan Regional Government, Bogor Regency. This observation aims to determine the conditions and facilities owned by partners regarding the availability of current water resources and AC wastewater. Meanwhile, coordination aims to discuss problems and shortcomings experienced by partners so far and formulate solutions to be offered to partners as well as record equipment needs and training/socialization/FGD required. Then coordination was also discussed to determine the time plan for implementing equipment handover and training activities.

2. Provisioning and Testing

At this stage, search and purchase the materials needed for AC wastewater collectivity online and offline. Providing practical AC wastewater collectivity is carried out based on data obtained during initial observations. The data collected includes the design of AC wastewater collectivity according to needs, including the type, size, and materials needed to accommodate AC water properly.

3. Handover of equipment

Handover of tools and materials for AC wastewater collection is carried out before the training is carried out on the day, time, and place agreed upon by the partners. The tools and materials for collecting AC wastewater were donated directly to the Anugerah Insani Foundation, and have been permanently installed by the community service implementation team. The handover of tools and materials for AC wastewater collectivity is accompanied by a manual book containing Standard Operating Procedures (SOP) starting from how to operate tools and

materials for AC wastewater collectivity to how to maintain them.

4. Support post-handover skills training

School teachers, students, education, and cleaning staff are provided with training programs. The training in question is how to gain knowledge regarding alternative water resources and the use of AC wastewater. Followed by a demonstration regarding the amount of AC wastewater that can be accommodated for the training participants. The next knowledge is that copy and paste can be done at home, or in places where there is air conditioning in the training participants' environment.

5. Evaluation, publication and report.

After the core activities for implementing PPM have been carried out, the next stage is evaluating the activities by summarizing the implementation process and recording obstacles and suggestions for the future. Then make a publication that is submitted to a national community service journal that has an ISSN and national accreditation. As well as making reports on the implementation of Community Service as a form of accountability to funders. The subject of this community service is the Anugerah Insani Foundation. This PPM activity will be carried out in schools under the management of the Anugerah Insani Foundation, Bogor Regency in October 2023.

RESULTS AND DISCUSSION

As a result of direct observations and discussions with partners regarding the problems faced, partner needs were formulated, namely AC wastewater collectivity that is hassle-free and easy to use, training related to knowledge, and copywriting for training participants so that it can be applied to the training participants' environment. Coordination with partners agreed to handover and training to be carried out in October 2023 at the home of the Anugerah Insani Foundation, Bogor Regency.



Figure 2. Air conditioning wastewater is wasted, causing moss and the roads to become slippery

Some of the things done by this beginner community service activity include:

1. Take water samples

AC wastewater samples were collected at the Anugrah Insani Junior High School (SMP) complex. This water sampling aims to determine the amount of wastewater produced every day and find out what content is contained in the wastewater. AC wastewater testing is carried out using a Water Quality Tester. Inactivity planning and testing of AC wastewater samples is carried out in the laboratory, however, seeing the large costs charged for testing water samples in the laboratory, the testing is carried out by conducting water quality tests which include physical and chemical water tests. To carry out microbiological tests, water samples must still be carried out in a laboratory that provides facilities to carry out these tests.

After several searches for information on laboratories that carry out water quality tests, it turns out that not all laboratories can carry out tests for outside parties other than the agency's activities. Currently, negotiations are still underway to carry out water quality tests with several laboratories around Bogor.



Figure 3. Water sampling

2. Conduct seminars and training for partners

Implementing community service, especially partners, by providing seminars and training to raise public awareness that there are water sources that have not been utilized, as well as providing knowledge about how to use AC wastewater as an alternative water source to meet daily water needs. The training material is also related to how to build an AC wastewater reservoir construction so that the water remains clean and not polluted by substances found around the water.



Figure 4. Training for partners

3. Carrying out construction of AC wastewater storage and pipes

The construction of this AC wastewater reservoir was carried out by first discussing it with partners. Determine the position of the reservoir, and determine the efficient pipe route does not interfere with the teaching and learning process activities and makes it easier to use the water.



Figure 5. Discussion with the Anugerah Insani Foundation

Next, design the construction of the shelter, and appropriate supporting materials, determine the size of the storage container, determine the size of the pipe, and determine the arrangements for channeling the water.

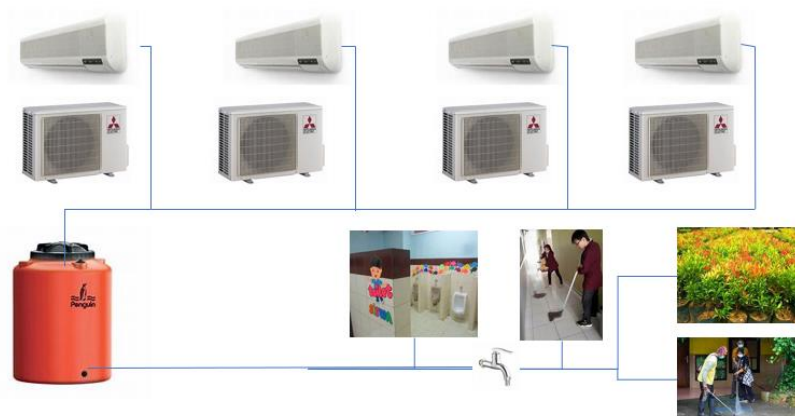


Figure 6. AC wastewater collectivity design

After the design drawings have been prepared, the materials and materials needed for the storage container are purchased.



Figure 7. Materials used

Next, construction was carried out and assisted by partners. The partners provide craftsmen to build the construction of AC wastewater reservoirs. Craftsman fees are charged for this service activity.



Figure 8. Torn collecting AC wastewater

4. Make a video related to water resources in the school, including wastewater from installed AC

The aim of making the video is to provide documentation of all community service activities related to the use of AC wastewater at Anugrah Insani Middle School. This video was made starting by determining the location for building the shelter, the construction process, the socialization process, the seminar process, and the training carried out. It is hoped that this video, can expand the reach of people who know about the benefits of AC wastewater and also provide learning about how reservoirs can be made at a cost that is not too expensive but provides great benefits to people's lives. The video that has been made can be seen on the YouTube link: https://youtu.be/i8h9fSebM10?si=hNRS_mZL6EmGrZVF.

5. Outreach to students regarding the use of clean water

Socialization about the use of clean water was also conveyed to Anugrah Insani Middle School students. During the socialization, Anugrah Insani Middle School students were very enthusiastic in listening, taking notes on the material presented, and actively participating in the games provided by the organizers of community service activities. To attract the attention of

the students, in between explanations about water sources, the benefits of water for daily life, and the benefits of AC wastewater that have been implemented by some communities, the students were asked several questions. Students who managed to answer correctly were given consolation prizes so that the students were even more enthusiastic about taking part in the socialization.



Figure 9. Training for the students partners

6. Propose to the Bogor Regency government to prepare regulations for the use of AC wastewater

Notes provided from the results of the FGD with the Bogor Regency government include:

- 1) This idea and innovation is very good, because it is related to sustainable water resources.
- 2) It is necessary to study the halalness of AC wastewater.
- 3) Need to study water quality.
- 4) It is necessary to study the collective costs of AC wastewater.



Figure 10. FGD related to AC wastewater regulations

7. Write and compile a community service journal related to the use of AC wastewater

Community service journal writing has been carried out by referring to the relevant journal template. Journal writing has reached 100% of the total writing target. The journal manuscript for the use of AC wastewater has been published in the ABDI DOSEN journal at Ibnu Khaldun

University, Bogor, to implement the tri dharma of higher education. This manuscript was published in the ABDI DOSEN journal volume 7 number 4 in December 2023.

8. Submit an article to Radar Bogor as an effort to socialize alternative water resources

An online publication to disseminate information about the benefits of AC wastewater as an alternative water resource was chosen using Radar Bogor. Radar Bogor was chosen, because this platform is the largest news platform in Bogor, so it is hoped that information about the benefits of AC wastewater as an alternative water resource and installations for making wastewater reservoirs can be spread widely among the public. It is hoped that there will be feedback from Radar Bogor readers regarding AC wastewater. The news that has been created can be seen at the link: <https://www.radarbogor.id/2023/10/31/wujudkan-green-economy-institut-stie-dewantara-uji-pemanfaatan-air-buangan-ac/>.

CONCLUSION

Conclusions that can be given include:

1. This idea and innovation are very good because it is related to sustainable water resources. After all, AC is always used in rooms, offices, schools, and shopping buildings. Apart from that, it also reduces the cost of obtaining water because the water is available by itself by utilizing gravity.
2. There needs to be a study of the halalness of AC wastewater by the relevant official institutions, not just a community service study.
3. A water quality study is needed which is not possible in the short term, but must be carried out comprehensively by competent institutions if it is to be carried out en masse, especially if regulations are to be made.
4. It is necessary to study the collective costs of AC wastewater if it is to be implemented by other agencies because each organization also considers the advantages and disadvantages of using it.

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