

EDUCATION FOR SUSTAINABLE DEVELOPMENT THROUGH STUDENT COMMUNITY SERVICE PROGRAM FOR ENVIRONMENTAL AND TECHNOLOGY IMPROVEMENT IN JEPARA WETAN, CILACAP

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ABSTRACT

Social empowerment applied the principles of Education for Sustainable Development (ESD). The process of solving real problems faced by target communities or development in the midst of community is combined with ESD-based learning. This will strengthen the function of wisdom also role and potential of human and natural resources contained in the community in every activities of problem solving and development. The real problems that occur in the village of Jepara Wetan include lack of street lights, the use of unhealthy sanitation, untreated yards, also non-optimal processing of organic waste. The purpose of this activity is to improve sanitation facilities, educate the importance of sanitation for health, utilize organic waste into compost, optimize yard maintenance, improve road infrastructure as a support for community activities, and technology literacy for the community to encourage changes both in individuals and all citizens. This community service activity is held from June to August 2017. Problem solving is done through community service activities including building healthy sanitation for residents; procurement of trash bins, training in composting, optimization of yard functions, installation of street lights, and basic computer training to village officials.

Keyword: community service, ESD, sanitation, optimalization, technology.

INTRODUCTION

Students are the ones who will succeed leading, managing, and develop knowledge for improving their nation. Every students are required to have theoretical and practical knowledge in their study, as a way to help them getting used to solving problems inside a society. Theoretical knowledge are conceptual knowledge learned from classes, while practical knowledge is acquired from fieldwork or practices in a lab. One of the approach to face the problems in society is to do a community service to delve into the heart of societal problems.

Community service program is part of the Tri Dharma, in which practice is also linked with the other 2 virtues and involve all academic members; lecturers, students, staffs, and even alumnus. Through community service program, Universitas Gadjah Mada (UGM) involve itself in Indonesian society. (UGM board of community services, 2017).

Social empowerment applied the principles of Education for Sustainable Development (ESD). The process of solving real problems faced by target communities or development in the midst of community is combined with ESD-based learning. This will strengthen the function of wisdom also role and potential of human and natural resources contained in the community in every activities of problem solving and development. Moreover, this process also stimulate community growth and self-sustainability in creating a good management of social, economy, and environment that could sustain the community until generations after.

Community service programs made by UGM board of community services targets communities living in high risk areas. Communities living in high risk areas need to be stimulated to become an independent and sustainable communities, as written in Strategic

Plan of UGM 2012-2017. Jepara Wetan Village, Binangun Sector, Cilacap Regency, Central Java became a location in this community service.

Our program, “Improvements in Environmental Management and Technological Literacy in Jepara Wetan Village” has several goals, such as: 1) Improving sanitation accessibility and sanitary education, 2) Optimizing backyard by organic waste as core ingredients for compost, 3) Improving roads as an infrastructure for supporting activities, and 4) Technological literacy as a mean to encourage individual and community change.

PROBLEMS

There are several aspects in Jepara Wetan village that are needed to be improved, such as infrastructure, economy, agriculture, education, environment, sanitation, and technology, which are:

1. Lack of illumination around the entrance, and inside Jepara Wetan Village. The lack of illumination hinders night activities and mobility. Moreover, it also provide chances for crimes, and dangers when threading the roads.
2. People are still using open cesspit, therefore, building a healthy alternative is needed.
3. Unutilized backyards
4. Lack of knowledge about optimizing organic wastes
5. Lack of technological literacy, hence needed to be improved as a way to gain knowledge.

METHODS

There are 4 activities that are enacted, provided in table 1.

Table 1. Activities in Jepara Wetan Village community service program

No	Activity	Goals	Activity Description
1	Utilizing compost for optimizing backyards	Utilizing organic waste as a core ingredients for optimizing backyards	Community service team made compost from organic waste to fertilize soil. Moreover, compost is also used to fertilize plants in backyards
2	Building sanitary toilets	Improving sanitation and providing sanitary education	Community service team built sanitary toilets with the help of community members.
3	Improving public road illumination	Improving road as a supporting infrastructure for community activities	Community service team installed lights around high risk points around Jepara Wetan Village.
4	Basic computer training	Improving technological literacy as a mean to gain knowledge	Community service team provided computer training, especially the usage of Microsoft Office towards Jepara Wetan Village governmental body.

DISCUSSION

1.1. Building Sanitary Toilets

Health is an important factor in human life. United Nations Development Programs (UNDP) described 17 goals for sustainable development. One of those goals is to provide, and manage clean water and sustainable sanitation. According to United Nations Partnership for Development Framework (UNPDF), Indonesia is facing a crisis for clean water and sanitation. Only around 57,2% of population has a sustainable access towards sustainable water source. Around 55 million people (22% of population) still defecate in open spaces (UNPDF, 2016). This also contributes towards the lack of water source, and sanitation. In 2020, poor and most vulnerable communities will have a better and fairer access for social service, comprehensive social protection, and better access to clean water (UNPDF, 2016). One of basic infrastructure for sanitation is toilet.

Toilet is one of basic sanitation needs to support health that is important for communities. Availability of toilets need to be observed as a waste management and for sanitation. The imbalance between population growth and residential areas exacerbate the problem of managing human wastes. Management of human waste is a core problem that needs to be attended for community health (Notoatmodjo, 2003).



Picture 1. Unhealthy open cesspit condition

According to sanitation accessibility and ownership data in Cilacap Regency 2015, there are 317.924 people (17,6% of population) who are still using open cesspit as sanitation system. Meanwhile, according to census by Health Center of Binangun, there are 270 open cesspit, most of them are spread around Dusun Karangbawang, mostly in RT 28. Open cesspits in that area are as presented in Picture 1. According to research by Cilacap Regency Department of Health in 2016, usage of open cesspit are unhealthy and polluting the environment and cause air pollution around the area. Therefore, modern healthy toilets are needed in said locations.

4.1.1 Choice of Location

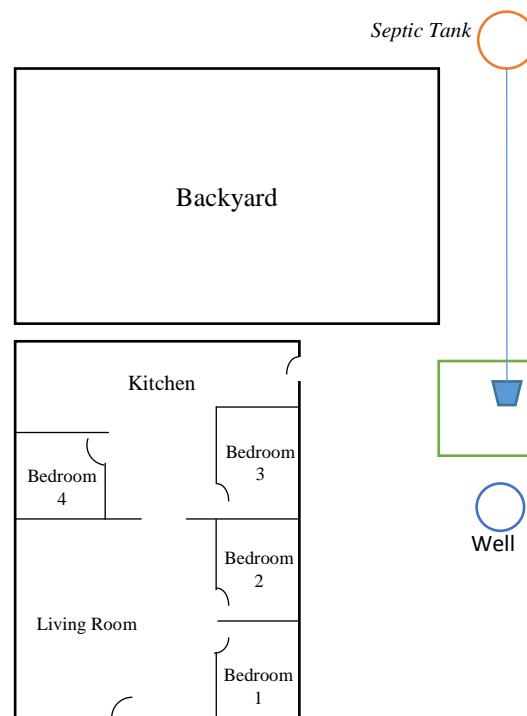
Location was made by doing a discussion and social survey in RT 28. Location was chosen according to its width ($>100\text{m}^2$), distance from housing ($>15\text{m}$), and accessible for several families at once. According to discussion and analysis as above, it was decided that the toilet would be build on Mr. Madarjo's backyard. Toilet location is as shown in Picture 2.



Picture 2. Location of toilet

4.1.2. Healthy toilet design

Building a healthy toilet means a closed bathroom and a toilet. As shown in Picture 3, the dimension of toilet is 2m x 2m x 2,25m, and septic tank located 10m from the toilet, with 2m depth. The septic tank would contain wastes from the toilet with a pipe. In the restroom, a well is also included to provide water for its patron.



Picture 3. Design for the healthy toilet

4.1.3. Building proceedings

The project for building healthy toilet was done from July 22 to 30, 2017. Construction work was done by community service team, with the help of nearby

residents, as shown in Picture 4. The result of this construction is a healthy toilet usable by nearby residents as shown in Picture 5.



Picture 4. Construction work by residents and community service team



Picture 5. Healthy toilet after construction

1.2.Backyard Optimisation

1.2.1. Waste Separation

Waste separation was done by using trash bin with 5 categories, which are, poisonous and dangerous waste (B3), Paper, Organic waste, Inorganic waste, and incombustibles. This program was done with collaboration with Cilacap Regency Environmental Department and held on SDN Jepara Wetan I and SDN Jepara Wetan III. From these 5 categories, only organic waste is used for the next process.

Collected organic waste will then be utilized to make compost. According to National Standardization (2004) body, there are several factors that affect compost processing, abiotic and biotic, such as:

- a. Material separation: Waste is separated into metal, rock and plastic waste. Materials that hinders microbe growth will be separated from compost material, such as pesticide residue.
- b. Material shape: Smaller and similar shape would hasten and improve the quality of composting process. With smaller and similar shaped materials, microbe has a wider surface as base for activities. Moreover, material shape affects needed oxygen diffusion and extraction of produced CO₂.
- c. Nutrients: Microbes need carbohydrates for their activities in composting. 20% to 40% of used carbohydrates will be assimilated into cell components, and CO₂. Composting process, a balance of Nitrogen and Carbohydrate is needed. The optimum division between Carbohydrate and Nitrogen for composting is 25:1, with the maximum of 10:1.
- d. Water content: Water content varies between material shape and type. The optimal water content for composting is between 50% to 70%. There are several exceptions of this rule, for material such as hay, the optimal water content is 85%.

In composting, collected waste are separated into green waste, and brown waste. Carbon rich materials become energy source for microbes. These materials tend to have the characteristics of being dry, rough, and brown coloured. Nitrogen is needed for microbe growth, and breeding. Nitrogen materials tend to be green coloured, and contains water. Separated waste will then be mixed with the ratio of 1 part brown waste to 4 part green waste. Mixed waste will then be put inside a container which has soil as its base, with holes for extracting excessive water. A layer of soil will then be added on top of it. Gunny is used as container lid to maximize composting process. Composting process will take 1 month. Materials need to be stirred once a week. Compost is ready to use in the fifth week after processing starts.

1.2.2. Backyard Managing With Compost.

Compost can be used to fertilize plants in backyards. Backyards are managed in such way that it could be utilized optimally. Backyards before management is shown in picture 8. Backyard was managed by cleaning them from dead plants and wild grass. Areas that are planned for seeding is then tilled. Soil is tilled for helping roots to enter the ground and absorb nutrients. Seeding is then done on tilled soil.



Picture 3. Backyard management

Compost fertilizers will be used to fertilize these plants. Fertilizing plants will optimize plant growth. Compost usage also has other advantages, such as improving soil fertility, repairing soil structure and characteristics, improving water absorption capacity, stimulating microbes activity, increasing crop yield, providing hormones and vitamins for plants, deterring plant diseases, and increasing nutrients in soil. (Sudiana, 2005).

1.3. Public Road Illumination Improvement

According to data from Statistics Indonesia (BPS), there are 106,2 thousand traffic accident in Indonesia in 2016. According to data from Cilacap Departmental Police of the Republic of Indonesia, there are 770 cases of traffic accident in Cilacap regency in 2016. Accidents in remote village are not included in this data.

There are several factors that could lead to traffic accidents, such as road conditions, vehicle increase, and violation of traffic laws (Faraby, 2012). In Jepara Wetan Village, human error and road condition become the main reason of traffic accidents. The lack of supporting infrastructure such as illumination, also contributes to the reason of traffic accidents in this area. Therefore, illumination is an important infrastructure for roads. The main goals of illumination is to increase speed, accuracy, visibility at night for drivers and pedestrian (Santoso, 2009). The lack of illumination is one of the issues that need immediate attention from community and government. Road illumination in Jepara Wetan

village is only centred in regency main roads. Based on research by community service team found 10 high risk spots for accident and crime in road without illumination.

Road illumination program is made of 3 phase, Planning, Permit, and installation. Planning phase is based on the result of surveys in high risk spots, and installation budgeting. Permit phase is done by asking residents who live near the area to provide electricity. Installation phase is installing street lights based on the plan that has been made.

Planning phase was done to balance between budget and the community need, in which the amount and quality of illumination can be optimized. The result of that optimization is to install 10 lights in 10 dark areas in Jepara, Dewagang, Karangbawang, and Cengkoreh. The installation process is shown in picture 9.



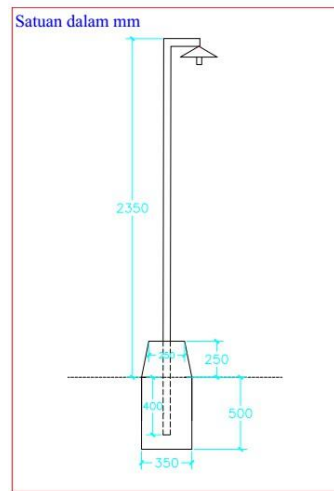
Picture 9. Street lights installation

The light bulb used in this project is 9 watt LED light bulbs, installed in a 2,35m galvanic pole, using NYM 2x1,5mm² cables, with 20m length from resident house, and each poles are based with concrete for durability. Street light design is shown in picture 11. The building process is described in this list:

1. Excavating 0,5m deep hole to plant galvanic pole.
2. Fill the hole with galvanic pole inside it, and wait 1-2 days for it to harden.
3. Installing bamboo pole for cables.
4. Installing cable to light fitting and switch.
5. Installing light housing on the pole by using steel wire and duct tape.
6. Installing T-Fitting on house porches, as a switch for street lights.
7. Tidying up cables.



Picture 4. Street light installation location



Picture 5. Street lights design

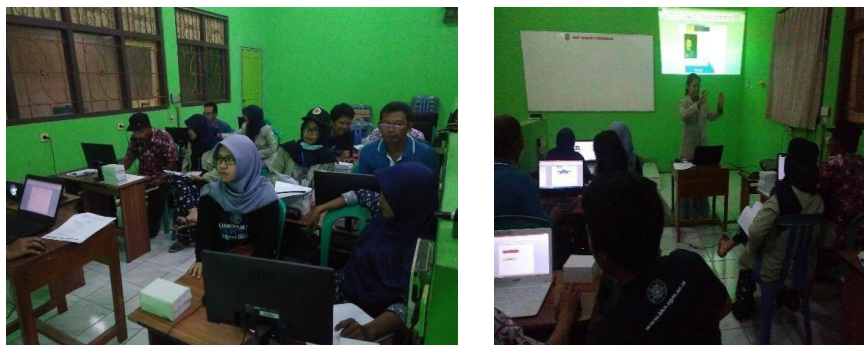
1.4. Basic Computer Training

Basic computer training is needed for Jepara Wetan Village public service staff. With sufficient knowledge about Information Technology, staffs can utilize technology to improve their efficiency, and integrate staffs, partners, and residents. Fragmented implementation of e-government also exacerbate the problem of fulfilling public needs and achieving results. Government institution should have had their own information system (Mayowan, 2010).

Internet based government or e-Government implementation was done to ease information sharing related to public service to people, businesses, and other agencies by using information technology. e-Government made it possible for people to interact and receive service from local, regency, and central government in any time (Praditya, 2014).

E-government system was made to improve public services. According to survey done to 5 of 10 Jepara Wetan Village public service staff, they aren't capable of utilizing computer even for basic task such as writing a letter or making a financial report. These task, and a lot of other village public service tasks need the use of computer.

The training program consists of 3 phases on 3 days in SMPN 2 Binangun. The first phase is survey, followed by composing module, and direct training of village public service staff as the final phase. The first step was done by interviewing the village public service staffs. The result of this training can be used to compose letters, financial letters, processing village statistics, village assets inventory, and other related village public service activities. The inability of using Microsoft office will hinder work, and public service speed.



Picture 6. Basic computer training in SMPN 2 Binangun computer lab

Documentation of community service in Jepara Wetan Village can be seen through this URL ugm.id/ugmidJPkM17. This link holds documentation of activities and programs explained in this chapter. Other than that, there are video files about other activities done in Jepara Wetan Village in the duration of community service.

CONCLUSION

Community service in Jepara Wetan Village, Binangun, Cilacap regency has been completed successfully. Written here are the conclusion of the community service, and suggestions for the next community service program.

1. Building sanitary toilets
Sanitary toilets were built in areas that has limited accessibility to proper sanitation. This toilet is used by nearby residents for sanitary activities. Education about the importance of sanitation and sanitation facility maintenance is needed.
2. Backyard optimization
Backyard optimization consists of several activities such as waste separation, composting, and backyard management. These activities are linked and related to each other. These activities can be sustained by using the potential that backyard has. This optimization might be able to increase crop yield from backyards.
3. Improvement of public road illumination
Installation of street lights to improve road illumination was done in dark areas. This activity has improved the safety of resident's night mobility and activity. Maintenance of these infrastructure need to be enforced.
4. Basic computer training
This program goal is to improve knowledge about the world outside the village through technology. This training is hoped to has a lasting effect towards the younger generation so that they can bring more technology into Cilacap regency.

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