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Training on Processing Household Waste into Organic Liquid Fertilizer for PKK Cadres in Baturetno Village

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ABSTRACT

Plant fertilizers can be made from household waste from living things such as leftover vegetables, fish bones, side dishes, or herbs that are no longer edible. These materials can be recycled into liquid organic fertilizer. The purpose of the community service held in Baturetno, Bantul, was to increase the understanding of Women's Empowerment Cadres about household waste management and qualify them to process household waste into organic liquid fertilizer. The problems in Baturetno Village were an excessive daily household waste, a lack of public awareness of the dangers of waste problems, and a lack of household waste processing activities. To overcome this problem, the efforts made include socializing the harm of waste problems for life, providing training on how to process household waste into organic liquid fertilizer, and distributing composter containers. This program has increased cadre awareness of the importance of processing household waste to maintain a clean environment, avoid disease spread due to rotten garbage, and increase the fertility of plants in the fields.

KEYWORDS
Training;
PKK;
Garbage;
Household;
Baturetno

1. Introduction (Heading 1) (bold, 11 pt)

The waste problem is still unresolved. The growing population and various activities raise the volume of waste. The waste problem has a severe impact on the community, particularly in terms of health and the environment. It also has something to do with finance because of waste management. So far, waste management has been ineffective. There is far too much waste to manage at the final TDS (temporary disposal site) or FDS (final disposal site). In 2020, Indonesia generated 67.8 million tons of waste. According to data from the Ministry of Environment and Forestry (KLHK), household activities generate 37.3% of waste in Indonesia, traditional markets generate 16.4%, areas generate 15.9%, commerce generates 7.29%, public facilities generate 5.25%, offices generate 3.22%, and other sources generate 14.6%. The two most common types of waste are food waste (39.8%) and plastic waste (17%). The waste problem must be addressed immediately to avoid long-term negative consequences. Household activities, which generate the most waste, require increased waste management awareness and training.

Several studies on waste management have become references for this service. Nicolini investigated MSW circularity in urban landscapes, an evaluation method for sustainable system implementation [1]. Rupani examined the current scenario of tehran municipal solid waste management rules in green technology [2]. Kazuva studied the DPSIR model for environmental risk assessment of municipal solid waste in Dar es Salaam, Tanzania [3]. Laitur studied the hydrological cycle in rapidly urbanizing watersheds [4]. Cheng reviewed Future household waste management for a sustainable environment in Malaysian cities [5]. Saldaa Durán identified sites with the potential for final disposal of municipal solid waste in the Nayarit suburbs [6]. Makamté Kakeu-Tardy studied urban solid-waste recovery in informal and formal sectors and urban space in Bafoussam (Cameroon) [7]. Richardson studied three cities in the northeastern United States and found no increased concentrations of trace metals or rare earth elements in urban forests near municipal solid waste incinerators [8].

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Lissah investigated domestic waste collectors' perceptions of occupational safety and self-reported health problems in Ghanaian urban cities [9]. Mondal proposed a multi-stage optimization approach for sustainable municipal solid waste collection systems in urban areas of newly industrialized Asian countries [10]. Feingold used city blueprint approach for urban water management and governance in us cities [11]. Hazarika used AHP for solid waste management and the suitability of a landfill site in the Guwahati metropolitan area, India [12]. Youngblood investigated the rapid characterization of macroplastic input and leakage in the Ganges Watershed [13]. J. A. Saucedo Martinez investigated solid waste collection in urban areas [14]. Tvedten examined urban waste management in Maputo, Mozambique [15]. Abdulredha reviewed the performance of the municipal solid waste management system during the Arba'een event in Kerbala, Iraq [16]. Sprague examined the Availability of trash cans in New York City [17]. D. Preininger investigated waste disposal site use as an all-you-can-eat buffet for carrion crows (Corvus corone) [18]. Based on stakeholder feedback, Yukalang researched Solid waste management solutions for rapid urbanization in Thailand [19]. Alkan looked into a study on a sustainable urban scale, using Anakkale as an example [20].

An empirical survey of the city of kigali was carried out by Squire on urban waste management in post-genocide Rwanda [21]. Hasan investigated the impact of land cover change on land use and the value of ecosystem services in Guangdong, Hong Kong, and Macau in southern China [22]. The spatiotemporal and environmental risk factors for visceral leishmaniasis were analyzed by Prestes-Carneiro in an urban setting in the Brazilian state of Sao Paulo [23]. Farzadkia investigated the impact of municipal solid waste recycling on energy savings and air pollution [24]. There is no environmental health without public health, as Sundar Navamany stated in his research on the relationship between sanitation and the health of water bodies in Bengaluru, India [25]. Quintana studied the multiscale environmental determinants of the Leishmania vector in an urban-rural context [26]. Prasad studied the visible waste stream in urban India [27]. Clayer investigated microplastic inputs of urban origin and silt in large Nordic lakes [28]. How do nature-based solutions help to ensure the long-term viability of urban landscapes? Tayefi Nasrabadi sought the answer in his research [29]. Meulemans studied urban pedogenesis [30]. Kurt Konakoglu investigated the evaluation of sustainable tourism development in selected cities in Turkey and Poland [31]. How can the circular economy be measured in urban systems? Muoz answered it in his study [32]. Studies of pollution levels in urban and beach environments were conducted by A. Yousefi Nasab, entitled "The Consequences of Throwing Away Cigarette Butts" [33]. Chen analyzed physical and virtual carbon metabolisms of global cities [34]. Mallory investigated agent-based modeling for the simulation-based design of sustainable sludge management systems [35]. Climate science, adaptation, and multi-level governance, according to Sethi, were related to the complexities of urban climate resilience in India [36].

The government's Climate Village Program has mandated the community to attempt climate change mitigation and adaptation, one of which is waste management. There is room for program implementation, specifically by developing and strengthening community capacity and institutions. In this case, one of the community institutions that attempts to improve and align the program with the actors who produce the most waste (households) is the Family Welfare Empowerment cadres. The community service team collaborates with the cadres in Baturetno Village, Bantul Regency. The village made up of eight hamlets: Gilang, Kalangan, Manggisan, Mantup, Ngipik, Pelem, Plakaran, and Wiyoro, is placed in the northern part of the Bantul Regency. It is located at 7° 49' 09" south latitude and 110° 24' 55" east longitude. Baturetno Village has a land area of 371.1730 ha. There are 114 neighborhoods in the eight hamlets. Baturetno Village has a population of 13,373 people, divided into 4,453 families. The male population is 6,663 people, while the female population is 6,710.

According to data from Kapanewon Banguntapan, general waste problems in Kapanewon include stalled disposal sites, littering habits, poor coordination of waste networks, and the community's inability to process generated waste, particularly household waste. Furthermore, the general issue in Bantul Regency is the growing waste volume. It reaches 400 tons daily, with each Bantul resident producing an average of 0.6 kg of waste per day. The Bantul Regency Government responded by launching the Bantul Clean Garbage 2025 (Bantul Bersama) program. Bantul Bersama aims to solve and reduce waste problems by focusing on waste processing at the village level, preventing waste from settling in Piyungan's final disposal site. Bantul Bersama is expected to foster a new culture of waste processing, particularly at the household level. The submitted description of the waste problem in the partner area is the basis for determining the contribution of activities in the community service program, specifically training on processing household waste into organic liquid fertilizer for the woman empowerment Cadres in the village. Household waste is the one from living things such as leftover vegetables, fish bones, side dishes, or herbs that are no longer edible. Those materials can be recycled into liquid organic fertilizer because simple to make, has real benefits for improving soil structure and texture for plant growth, or are sold as an alternative. It is hoped that the training will reduce household waste production while providing other benefits, such as the availability of organic liquid fertilizer with economic value, and contribute to the realization of Bantul Clean Garbage 2025.

2. Method

Observation to deepen partner problem mapping was the first stage of implementing the community service program for training in household waste processing into organic liquid fertilizer for women empowerment cadres in Baturetno Village. The Focus Group Discussion (FGD) method was used to map the problems with the cadres, community leaders, and local government. The obtained data and information were then analyzed to determine the outcomes of the activities to be carried out.

The next stage was a collaboration with stakeholders. When an activity is carried out collaboratively, it goes more smoothly. Table 1 presents a number of partners or stakeholders involved in this service program to ensure the program runs well. The table depicts each stakeholder's role, with the community service team members acting as a coordinator who directs the community programs and activities. The community service also performed as a facilitator to ensure the program ran smoothly from the preparation stage to the program evaluation stage. The village government served as a facilitator and resource provider for the program's smooth operation. The village governance also acted as a mediator between the community service team and the target group. The cadres would be involved in implementing service activities as partners and participants in the program. Students were also actively involved in developing program concepts up to the program evaluation stage, and the media was involved in covering and publishing the activities and outcomes of the programs.

Several activities carried out by the proposer, assisted by the stakeholders, were 1). socialization of the waste hazards problems for life, 2). Training on converting household waste into organic liquid fertilizers, 3). The distribution of composter containers. The last stage was the monitoring and evaluation follow-up plan. The programs that have been implemented within the time frame were monitored regularly. The monitoring purpose was to identify deviations in the program's course to run according to the original plan and to reduce the risk of program failure. The team members monitored the program twice in the first period. The program evaluation was carried out to assess the final achievements of the activities. In this process, a follow-up plan for the following years was determined.

Table 1. Stakeholder Duties and Functions

Stakeholder	***Role***
The community service team	The community service team acts as a coordinator who directs the community programs and activities. It also performs as a facilitator and assists from the program preparation process to the program evaluation stage and service activities.
Village Government	The village government acts as a facilitator and provider of

Stakeholder	*Role*
	supporting resources for the smooth running of the program. They also serve as a mediator between the team and the target group.
Women empowerment cadres	Women empowerment cadres work as partners and participants in the program.
Student	Students Assist and be involved in the entire process of implementing service activities.
Mass media	Mass media work to broadcast and publish the activities and outputs of the programs to be known by other audiences.

3. Results and Discussion

The service carried out in Baturetno, Bantul, aimed to increase the understanding of Baturetno PKK Cadres on household waste management, train PKK Cadres in processing household waste into organic liquid fertilizer, and distribute containers to process household waste into organic liquid fertilizer. Three main activities, Socialization of the Hazards of Waste Problems for Life, Training on Processing Household Waste into Organic Liquid Fertilizer, and Providing Composter Containers, were to accomplish the program's goal. In detail, the implementation of the three activities is described below.

1. Socialization of the waste hazards problems for life

The socialization activity was carried out to increase the awareness of the cadres that household waste generated by the residents was large and was the potential to cause health and environmental issues. According to the participants, most cadres had no idea what household waste could be used for other than throwing it away or burning it.

The Baturetno village head stood to give a speech and plans for future activities related to waste management. He ensured that every hamlet representative attended the socialization and training activities so that the results of the training on household waste management would be evenly distributed in every hamlet and neighborhood in the Baturetno area.

2. Training on converting household waste into organic liquid fertilizer

Figure 1 depicts training in the processing of household waste into organic liquid fertilizer following the socialization of the dangers of waste problems for life. The training was led by Herry Setyawan, a lecturer at Ahmad Dahlan University and a member of the Muhammadiyah Environmental Central Leadership Council. During the training, participants learned how to process various types of household waste. However, the training's main focus was on processing vegetable waste.

Fig. 1. Training on converting household waste into organic liquid fertilizer

In contrast to granular fertilizers or solid fertilizers, liquid fertilizers can provide nutrients quickly to plants. Using liquid fertilizer can make it easier to give plants the boost they need in controlled doses.

The way to make liquid fertilizer is by collecting vegetable waste and cutting it into small pieces. It aims to speed up the fermentation process. The cut vegetables are then filled with rice-washing water, and three bottle caps of EM4 are added into the rice-washing water mixed with vegetable waste. EM4 is Effective Microorganisms 4 (EM4), which contains many beneficial bacteria. The solution was first discovered by Prof. Dr. Teruo Higa from Ryukyus University, Okinawa, Japan. EM4 can work effectively in fermenting organic matter [13]. The final step is to add sugar to the mixture and stir it well. The sugar in the mix is food for bacteria to speed the fermentation process. The fermentation process in covered containers lasts two weeks. The container containing all the ingredients must be stirred once every two days. After two weeks and the mixture smells sweet-sour, the process of converting vegetable waste into liquid organic fertilizer has been completed.

3. Distribution of composter containers

Household waste composter-container distribution was a significant step toward ensuring the program's long-term viability. However, it was undeniable that the actors, in this case, the women empowerment cadres, played a significant role in the program's sustainability. However, given the history of women's empowerment in Baturerno's activities and the local government's commitment to supporting all the activities, the program's sustainability had a great opportunity of being implemented. Furthermore, monitoring and evaluation were carried out during the implementation of the service program in Baturetno to ensure the progress of the program.

Fig. 2. Composting containers

4. Conclusion

The community service program involving the conversion of household waste into organic liquid fertilizer in Baturetno Village has been proven to be one of the resolutions that women empowerment cadres and the village government had hoped for. The three activities carried out received a positive response from the participants, as evidenced by the large number of attendees and active participation of participants in the training. This service program is consistent with Bantul Regency's goal of becoming a clean waste district. Suggestions for the Baturetno Village Government: The village government can allocate the regional government budget for household waste processing, such as routine training and providing waste processing tools and equipment. Waste management training can include youth and children, especially after the critical period of the COVID-19 pandemic. It aims to educate youth and children about the importance of environmental cleanliness and waste disposal.

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Author Contribution

The description of the waste problem in the partner area that has been submitted, becomes the basis for determining the contribution in activities in the community service program, namely training on processing household waste into organic liquid fertilizer for PKK Cadre in Baturetno Village, Kapanewon Banguntapan, Bantul Regency.

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Conflict of Interest

The authors declare no conflict of interest.

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