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BUILDING SUSTAINABLE COMMUNITIES THROUGH ENVIRONMENTAL LITERACY AND COMMUNITY-BASED WASTE MANAGEMENT

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Abstract

The increasing volume of waste generated by households and communities has become an important environmental challenge that requires active participation from society. Inadequate waste management practices, including improper disposal, limited waste separation, and low awareness of waste reduction, may contribute to environmental pollution and reduce the quality of community living environments. This community service program aimed to strengthen environmental literacy and develop community-based waste management practices as a foundation for building sustainable communities. The program employed a participatory community-based environmental education and waste management approach consisting of initial observation, needs assessment, environmental literacy education, waste sorting training, practical waste management activities, community discussions, mentoring, and evaluation. Participants were introduced to the environmental impacts of waste, principles of waste reduction, reuse and recycling, household waste separation, organic and inorganic waste management, and community participation in maintaining environmental sustainability. Practical activities enabled participants to identify different types of waste, establish appropriate sorting practices, and explore simple methods for managing waste within their community. The program also encouraged participants to develop shared commitments toward maintaining cleanliness and sustaining community-based waste management practices. Evaluation was conducted through pre-test and post-test assessments, observation, practical activities, participant reflection, and feedback. The program demonstrated improvements in participants' understanding of environmental issues and their awareness of responsible waste management. Participants also demonstrated greater engagement in waste sorting and recognized the importance of collective participation in maintaining environmental quality. The findings indicate that environmental literacy combined with participatory waste management activities can strengthen community capacity to address local environmental challenges. Sustainable waste management requires not only infrastructure but also continuous education, behavioral change, community participation, and institutional support.

Keywords: *Environmental Literacy; Waste Management; Community Empowerment; Sustainable Community; Environmental Education*

INTRODUCTION

Environmental sustainability has become an increasingly important concern as communities experience growing pressure from population growth, consumption patterns, urbanization, and the increasing production of household and community waste. Waste that is not managed appropriately can contribute to environmental pollution, unpleasant living conditions, public health concerns, and the degradation of local ecosystems. The problem is not solely related to the quantity of waste generated but also to how waste is perceived, handled, separated, transported, and processed within communities (Windari et al., 2023).

Waste management has traditionally been approached primarily as a technical and infrastructural issue

(Agustian et al., 2023). However, the availability of waste collection systems and disposal facilities does not automatically guarantee effective waste management. Community behavior plays an important role in determining whether waste is properly separated, reduced, reused, recycled, or disposed of. When community members lack sufficient knowledge about the environmental consequences of waste and do not have established habits for managing it, even available waste management facilities may not be utilized effectively (Adhikari & Shrestha, 2023).

Environmental literacy is therefore an important foundation for developing sustainable waste management practices. Environmental literacy involves knowledge and understanding of environmental issues, awareness of the relationship between human activities and environmental conditions, attitudes toward environmental responsibility, and the ability to participate in actions that contribute to environmental sustainability. Individuals with stronger environmental literacy are more likely to understand the consequences of improper waste disposal and recognize their role in maintaining environmental quality (Arrifa'i, 2025).

The challenge of waste management is particularly relevant at the household level. Household waste often consists of organic materials, plastics, paper, packaging, and other materials that require different management approaches. When different types of waste are mixed together, opportunities for recycling and reuse may be reduced. Organic waste can also become a source of unpleasant odors and environmental problems when it is not managed appropriately. Simple practices such as separating waste at the source can therefore become an important starting point for improving community waste management (Chowdhury et al., 2024).

Community participation is essential because environmental problems are collective in nature. Waste generated by one household can affect surrounding households and the wider environment. Consequently, waste management cannot rely exclusively on individual actions or external service providers. Communities need shared awareness, agreed practices, and collective responsibility to maintain sustainable waste management systems.

Community-based waste management provides an opportunity to strengthen this collective capacity. Through participatory approaches, community members can identify local waste problems, discuss possible solutions, develop shared practices, and take responsibility for maintaining environmental programs. Such approaches are potentially more sustainable than programs that are introduced externally without sufficient community ownership (Halimah et al., 2024).

Environmental education can play an important role in supporting this process. However, education should not be limited to the delivery of theoretical information. Community members need opportunities to observe environmental problems, identify different types of waste, practice sorting, and develop solutions that are appropriate to their local context. Practical learning can help transform environmental knowledge into concrete behavior (Aziz, 2025).

The integration of environmental literacy and community-based waste management is therefore particularly relevant for building sustainable

communities. Environmental literacy provides the knowledge and awareness required to understand environmental problems, while participatory waste management provides opportunities for communities to apply that knowledge in practical settings. The combination of these components can support changes in both individual behavior and collective practices (Nisa, 2021).

The present community service program focuses on strengthening environmental literacy and developing community-based waste management practices. The program emphasizes waste reduction, separation, reuse, recycling, and responsible disposal while encouraging community participation in maintaining environmental quality (Budiman et al., 2025). The approach positions community members not simply as recipients of environmental education but as active participants in identifying and addressing local environmental challenges (Cheung et al., 2024).

The novelty of this program lies in integrating environmental education with practical community-based waste management activities. Instead of focusing exclusively on awareness campaigns, the program connects environmental knowledge with direct practice, collective discussion, mentoring, and behavioral reflection. This approach seeks to create a stronger relationship between what community members understand about environmental sustainability and what they practice in their daily lives (Zaakiyyah, 2024).

The program aims to strengthen community members' environmental literacy, improve their ability to manage household and community waste, encourage sustainable waste-related behavior, and develop collective responsibility for maintaining environmental quality. Through these efforts, the program seeks to contribute to the development of cleaner, healthier, and more sustainable communities.

METHOD

The community service program employed a Participatory Community-Based Environmental Education and Waste Management approach (Creswell & Creswell, 2017). The method was selected because effective waste management requires active participation from community members and cannot depend solely on external intervention. The program combined environmental education, practical waste management training, community discussion, direct practice, mentoring, and evaluation.

The program began with an initial observation and needs assessment to identify existing waste management practices within the community. The assessment examined how waste was generated, collected, separated, and disposed of, as well as participants' existing knowledge of environmental issues and waste management. Discussions with community members were also conducted to identify common challenges and potential opportunities for developing more sustainable waste management practices.

The environmental literacy stage introduced participants to basic environmental concepts and the relationship between human activities, waste generation, and environmental sustainability. Participants discussed the consequences of unmanaged waste, the importance of waste reduction, and the principles of reuse and recycling. The learning materials were presented through practical examples related to

household activities and the participants' surrounding environment.

The next stage consisted of waste classification and sorting training. Participants were introduced to different categories of waste, particularly organic and inorganic waste, and practiced separating waste according to its characteristics and potential management methods. The practical activities were designed to make waste separation easier to understand and encourage participants to adopt sorting practices within their households.

Participants were subsequently introduced to simple community-based waste management practices. Organic waste was discussed in relation to possible utilization through appropriate processing methods, while recyclable inorganic materials were considered in terms of collection, reuse, or recycling. The specific practices were adjusted to the available resources and conditions of the community so that the activities would be realistic and sustainable.

Community discussions were conducted to identify ways of maintaining waste management practices beyond the training sessions. Participants were encouraged to discuss responsibilities, possible collection systems, community schedules, and strategies for maintaining cleanliness. This stage was intended to strengthen community ownership and encourage collective responsibility for environmental management.

Mentoring was conducted during the implementation stage to assist participants in applying the waste management practices introduced during training. Facilitators observed participant activities, provided feedback, and addressed practical difficulties. Participants were also encouraged to share their experiences and identify barriers that might prevent consistent implementation.

Program evaluation was conducted through pre-test and post-test assessments, observation, practical waste sorting activities, participant reflection, and feedback. The evaluation focused on changes in environmental knowledge, waste management awareness, practical skills, and participant engagement. The results were analyzed descriptively to identify changes and lessons that could inform the sustainability of future community-based environmental programs.

RESULT AND DISCUSSION

The implementation of the community service program demonstrated that participants possessed varying levels of environmental awareness and waste management knowledge before the intervention. Most participants recognized that waste could create environmental problems, but their understanding of specific waste categories, appropriate sorting practices, and the relationship between household behavior and broader environmental sustainability was less consistent. Initial observation also indicated that waste management practices were influenced by convenience, existing habits, and the availability of appropriate facilities (Chuanchen & Zaini, 2023). These conditions demonstrated that environmental awareness alone does not necessarily result in consistent environmental behavior.

The environmental literacy activities broadened participants' understanding of the relationship between daily consumption patterns and waste generation. Participants were encouraged to recognize that waste problems begin not only when waste is discarded but also when products are

purchased, used, and disposed of (Al Ayyubi et al., 2024). Discussions regarding reducing unnecessary consumption, reusing materials, and selecting products with lower environmental impact helped participants view waste management as part of a broader environmental responsibility. This perspective encouraged participants to consider preventive approaches rather than focusing exclusively on disposal.

The waste classification activities provided participants with practical knowledge that could be directly applied within households. Participants practiced distinguishing between organic and inorganic waste and identifying materials that could potentially be reused or recycled (Villegas, 2018). The direct experience helped participants understand that waste is not a homogeneous category. Different materials require different management approaches, and separating waste at the source can make subsequent processing more effective. The activity also demonstrated the importance of simple and consistent household practices as a foundation for community-wide waste management (Habibulloh et al., 2024).

The practical sorting sessions increased participants' awareness of the consequences of mixing different types of waste. When organic and recyclable materials are mixed, the quality and usability of recyclable materials can be reduced, while organic waste may create additional environmental problems. Participants began to recognize that sorting waste at the point of disposal is a relatively simple action that can support subsequent waste processing (Caniago, 2024). This understanding is important because sustainable waste management does not always require complex technology at the household level; consistent basic practices can provide an important starting point.

The program also introduced participants to the principles of waste reduction, reuse, and recycling. Participants were encouraged to consider whether certain materials could be used repeatedly before being discarded and whether potentially recyclable materials could be separated and collected appropriately (Bakker et al., 2023). These activities helped participants shift from a disposal-oriented perspective toward a more resource-oriented understanding of waste. Materials previously considered useless were increasingly viewed as resources that might still possess economic or practical value when managed appropriately.

The discussion of organic waste provided additional opportunities for participants to consider simple methods of utilization. Participants learned that organic materials can potentially be managed through appropriate processing rather than being mixed with other waste and immediately discarded. The activities encouraged participants to identify organic waste generated within their households and consider environmentally appropriate management strategies. Such practices can contribute to reducing the amount of waste sent to disposal sites while potentially generating useful products for community activities (Tambun & Irawanto, 2023).

An important outcome of the program was the development of greater awareness that waste management is a collective responsibility. Participants recognized that individual efforts may have limited impact when surrounding households do not adopt similar practices. This realization encouraged discussion about shared community

practices and the importance of establishing consistent expectations regarding waste separation and disposal. The program therefore shifted the focus from individual cleanliness toward collective environmental responsibility.

The participatory approach contributed to stronger engagement because participants were able to discuss environmental problems that they encountered directly in their surroundings. Rather than receiving environmental information only through lectures, participants examined their own waste practices and discussed possible solutions. This approach allowed facilitators to address specific misconceptions and practical barriers. It also created opportunities for participants to exchange experiences and develop solutions that were more compatible with their local conditions.

The results further indicate that environmental literacy is closely connected with behavioral change. Knowledge about environmental problems is important, but knowledge alone may not be sufficient to change established habits. Participants need practical opportunities, appropriate facilities, social encouragement, and consistent community norms. The program therefore combined education with direct practice and community discussion to strengthen the likelihood that participants would apply the knowledge in their daily activities.

The program also demonstrated the importance of simplicity in community waste management. Waste management practices that require complex equipment or substantial financial resources may be difficult to maintain at the community level. Participants were therefore encouraged to begin with manageable activities such as separating waste, reducing unnecessary waste generation, reusing materials, and maintaining clean collection areas. Starting with practical actions can help communities develop confidence before implementing more complex waste management systems.

Community participation also emerged as an important factor in sustaining environmental initiatives. When community members are involved in identifying problems and developing solutions, they are more likely to develop a sense of ownership. The program encouraged participants to discuss how waste management activities could be maintained collectively rather than depending entirely on facilitators. Such ownership is important because external support may eventually decrease, while environmental challenges continue to require ongoing community action.

The training also highlighted the relationship between environmental sustainability and economic opportunities. Certain recyclable materials may possess economic value when properly separated and collected. Community-based waste management can therefore potentially support both environmental and economic objectives when appropriate systems are established. However, the economic value of waste should not become the only motivation for environmental action. Participants were encouraged to understand that waste reduction and responsible management are fundamentally part of environmental responsibility and community well-being.

The findings further suggest that environmental education should be continuous rather than conducted as a one-time activity. Habits related to waste generation and disposal are often formed through repeated daily practices. Consequently, maintaining new waste

management behaviors requires reinforcement, monitoring, and social support. Community meetings, environmental campaigns, household reminders, and periodic evaluation can help maintain awareness and encourage consistent behavior.

The program also identified the importance of community infrastructure. Environmental literacy can encourage people to separate waste, but the availability of appropriate collection and processing systems can determine whether those practices can be maintained. If separated waste is subsequently mixed during collection, participants may lose motivation to continue sorting. Sustainable community waste management therefore requires coordination between community awareness, household practices, collection mechanisms, and downstream waste processing.

Another important aspect is the role of community leadership and local organizations. Environmental initiatives are more likely to continue when there are individuals or groups responsible for coordinating activities, communicating expectations, and monitoring progress. Community leaders can help establish schedules, organize collection activities, and encourage participation. The program therefore encouraged participants to consider institutional arrangements that could support waste management after the completion of the community service activities.

The results demonstrate that community-based environmental education can contribute to strengthening environmental responsibility when it is connected with practical action. Participants were not only introduced to environmental concepts but were also given opportunities to practice waste sorting and discuss solutions to local problems. This combination of knowledge and action helped make environmental sustainability more tangible and relevant to participants' everyday experiences.

The program further suggests that sustainable communities require a shift in how waste is perceived. Waste should not simply be viewed as something that needs to be removed from households. Instead, communities need to consider how waste can be reduced at the source, separated according to its characteristics, reused where possible, and processed responsibly. This shift requires changes in knowledge, attitudes, habits, and community systems.

The sustainability of the program remains an important consideration. Continued mentoring and monitoring are necessary to determine whether participants maintain the practices introduced during the program. Future community service initiatives could strengthen the program by establishing community waste banks, developing household waste monitoring systems, organizing regular environmental campaigns, and creating partnerships with local waste management institutions or recycling organizations. Such initiatives could provide stronger institutional support for maintaining the behavioral changes developed during the training.

Overall, the program demonstrates that environmental literacy and community-based waste management can complement one another in strengthening community capacity for sustainability. Environmental literacy provides the knowledge and awareness necessary to understand environmental challenges, while participatory waste management provides opportunities to transform that

understanding into practical action. The integration of these approaches can help communities develop more responsible waste management practices and strengthen collective capacity to maintain environmental quality.

CONCLUSION

The community service program demonstrates that participatory environmental education combined with practical waste management activities can strengthen community environmental literacy and encourage more responsible waste management practices. Participants developed a broader understanding of the environmental consequences of waste and gained practical experience in identifying, separating, reducing, reusing, and managing different types of waste. The program also strengthened awareness that environmental sustainability is not solely an individual responsibility but requires collective participation, shared practices, and community commitment.

The main contribution of the program lies in connecting environmental knowledge with direct community action. Sustainable waste management requires more than awareness because long-term environmental improvement depends on consistent behavior, appropriate infrastructure, community participation, and continued support. The participatory approach provided opportunities for community members to identify local environmental challenges, practice waste management, and discuss strategies for maintaining the program. Although the activities provided an important foundation for behavioral change, continued mentoring, community monitoring, and institutional support are necessary to ensure sustainability. Future community service programs should strengthen long-term waste management mechanisms, develop community-based recycling initiatives, and establish collaboration with relevant local institutions so that environmental literacy can develop into sustained community practices that support cleaner, healthier, and more sustainable living environments.

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