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Household Composting Innovation as a Participatory Solution for Waste Management: Strengthening Environmental Literacy through Household Composting

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ABSTRACT

This community service program aimed to improve environmental literacy and household waste management practices through participatory household composter innovation in Teluk Nilau Village, Tanjung Jabung Barat Regency, Jambi Province. The activity employed a Participatory Action Research (PAR) approach involving 35 participants consisting of housewives, youth groups, and community leaders. The program was conducted from August to September 2025 through problem identification, environmental education, composter training, mentoring, monitoring, and evaluation stages. Data were collected using observation sheets, interviews, pre-test and post-test instruments consisting of 15 indicators related to environmental literacy and waste management behavior. The results demonstrated significant improvement in participants' understanding and behavior. Knowledge regarding organic and inorganic waste classification increased from 30% to 70%, understanding 3R principles increased from 25% to 65%, household waste sorting behavior increased from 20% to 60%, and composting skills increased from 10% to 50%. The program also succeeded in establishing environmental cadres and initiating household compost production with economic value. This activity indicates that participatory-based waste management can strengthen environmental awareness, encourage behavioral transformation, and support sustainable community-based economic development in coastal areas.

Keywords: environmental literacy, household composter, participatory action research, waste management, 3R

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INTRODUCTION

Waste management is one of the major challenges to sustainable development in Indonesia. Rapid population growth, changes in community lifestyles, and increasing economic activities have contributed to a rise in the volume of both organic household waste and non-organic waste. According to data from the Ministry of Environment and Forestry (KLHK), Indonesia generates more than 17 million tons of waste annually, of which only around 12% is successfully recycled (Lingkungan et al., 2024). This condition indicates that waste management remains suboptimal and is still largely dominated by conventional practices, such as open burning and the disposal of waste into rivers or vacant land, which contribute to environmental pollution (Erika & Gusmira, 2024).

At the national level, the government has enacted Law No. 18 of 2008 concerning Waste Management as the legal foundation for waste reduction and management. However, its implementation at the local level, particularly in rural and coastal areas, continues to face significant challenges. In accordance with Government Regulation No. 81 of 2012, which requires every individual to sort waste at its source, household waste segregation has become an essential component of effective waste management. The waste management process consists of several stages, beginning with waste storage, collection, transportation, processing, and final disposal through environmentally sound management practices. Limitations in infrastructure, inadequate environmental literacy, and low levels of community participation remain the primary obstacles to establishing a sustainable waste management system.

Waste management is a series of planned, comprehensive, and sustainable activities aimed at reducing and handling waste. One approach that can be implemented in waste management is the 3R principle, namely Reduce, Reuse, and Recycle (Handayani et al., 2025). This approach is particularly important because rapid population growth and increasing consumption patterns contribute to the generation of larger volumes of waste. If waste is not managed properly, it can lead to environmental pollution, the spread of diseases, and hinder the achievement of sustainable development goals. When all types of waste are mixed without proper segregation, waste processing and recycling become more difficult to carry out effectively. Therefore, waste segregation is a crucial step in a sustainable waste management system. It also constitutes an important effort to create a clean and healthy environment (Hernando et al., 2024). Community-based waste management encourages individuals to recognize that waste is a shared responsibility within society.

Waste management has become a serious challenge in coastal areas, including Teluk Nilau Village, Tanjung Jabung Barat Regency. The increasing volume of household waste each year has not been matched by an adequate waste management system. According to data from the Environmental Agency of Tanjung Jabung Barat Regency, the volume of household waste generated in the coastal area of Pengabuan District has continued to increase annually, in line with the growth of domestic activities within the community. Teluk Nilau Village is among the areas that lack an integrated waste management system, resulting in most residents still relying on open burning or disposing of waste into nearby rivers. This condition contributes to coastal environmental pollution, reduces sanitation quality, and increases the risk of public health problems. In addition to the limited availability of waste management infrastructure, the low level of environmental literacy among community members is also a major factor hindering the sustainable implementation of 3R-based waste management practices.

The community in this village still tends to burn waste or dispose of it into rivers, resulting in environmental pollution and increased health risks. The lack of adequate infrastructure and the low level of environmental literacy further exacerbate this situation. Therefore, a community service program based on active community participation is needed

to transform existing waste management practices while creating economic opportunities through the concept of a circular economy. Through this community engagement initiative, it is expected that the residents of Teluk Nilau Village will develop a collective awareness of the importance of proper waste management, reduce the generation of household waste, and create value-added products from waste materials. Furthermore, this program is expected to serve as a best practice model for sustainable, community-based economic development in Indonesia's coastal areas.

METHODS

The community service program was conducted from August to September 2025 in Teluk Nilau Village, Pengabuan District, Tanjung Jabung Barat Regency, Jambi Province. A total of 35 participants took part in the program, consisting of 20 housewives, 10 youths, and 5 community leaders. Participants were selected purposively, taking into account their active involvement in household activities and community environmental initiatives.

This community service program employed a Participatory Action Research (PAR) approach (Khasanah & Pd,. 2024). This approach was selected because it emphasizes the active involvement of community members throughout the stages of program planning, implementation, and evaluation.

The PAR approach was implemented through the following stages:

1. **Problem Identification**
   The community service team, together with local residents, conducted environmental observations and group discussions to identify household waste management practices and the challenges faced by the community.
2. **Program Planning**
   Community members were actively involved in determining the types of activities, the implementation schedule, the type of household composter to be used, and the distribution of roles among group members.
3. **Action Implementation**
   The activities included environmental literacy education, waste segregation training, hands-on practice in constructing household composters, and assistance in the processing of organic waste.
4. **Observation and Monitoring**
   The team monitored changes in community behavior through field visits, documentation, and the completion of monitoring forms.
5. **Reflection and Follow-up**
   The community and the service team jointly evaluated the outcomes of the program and developed follow-up actions, including the establishment of environmental volunteer cadres and community-based waste management groups.

The community was not merely positioned as the beneficiary of the program but also as a key partner, actively involved in identifying problems, formulating solutions, and implementing innovations in waste management.

1. *Location and Participants*
   The program was implemented in Teluk Nilau Village, Pengabuan District, Tanjung Jabung Barat Regency, Jambi Province. The participants included village officials, housewives, adolescents, and community leaders. These groups were selected because they play a strategic role in daily household waste management and have the potential to become agents of change within their communities.

2. *Program Implementation Stages*
   The program was carried out through several structured phases, as follows:
   a. Socialization and Awareness-Raising Phase
      Conducted during the first and second weeks, this phase aimed to enhance community awareness of the importance of proper waste management. Activities included community meetings, group discussions, and the distribution of educational materials in the form of posters.
   b. Training and Household Composter Implementation Phase
      Conducted during the third and fourth weeks, this phase provided participants with training on organic waste segregation and practical experience in producing compost using simple household composters. The training adopted a demonstrative and hands-on approach, enabling participants to directly apply the skills they acquired.
   c. Assistance and Implementation Phase
      Conducted from the fourth to the seventh week, the community service team and university students assisted households in the regular use of composters. Assistance was provided through field visits, discussions, and technical support whenever challenges arose during the waste processing activities.
   d. Monitoring and Evaluation Phase
      Monitoring was conducted periodically through observation, interviews, and activity documentation. Program evaluation was carried out by comparing participants' pre-test and post-test results related to environmental literacy, as well as by measuring the level of community participation in waste segregation practices. The evaluation instrument consisted of a closed-ended pre-test and post-test questionnaire containing 15 items based on the Guttman scale (true/false). The assessment indicators included understanding of waste classification, the 3R concept, waste segregation behavior, and compost processing skills. The instrument was validated through expert judgment by two university lecturers specializing in environmental studies and community empowerment.
   e. Institutional Strengthening and Sustainability Phase
      In the final stage, the community was facilitated in establishing environmental volunteer cadres and community-based waste management working groups. These groups are responsible for ensuring the sustainability of the program, managing waste banks, and developing value-added products derived from organic waste.
3. Evaluation Methods
   The success of the program was evaluated using the following indicators:
   a. Improvement in community knowledge regarding waste management (measured through pre-test and post-test results).
   b. Changes in community behavior related to household waste segregation and processing.
   c. The number of households consistently use composters.
   d. The production of economically valuable waste-derived products, such as compost fertilizer.
   e. The level of community participation in collective activities, such as community clean-up initiatives (gotong royong) and waste bank groups.
4. The Role of University Students and Collaboration
   University students were involved throughout all stages of the program as facilitators, field assistants, and developers of educational materials. In addition, the

program collaborated with the village government and the Office of Cooperatives and Micro, Small, and Medium Enterprises (MSMEs) of Tanjung Jabung Barat Regency as supporting partners, thereby fostering synergy among higher education institutions, government agencies, and the local community.

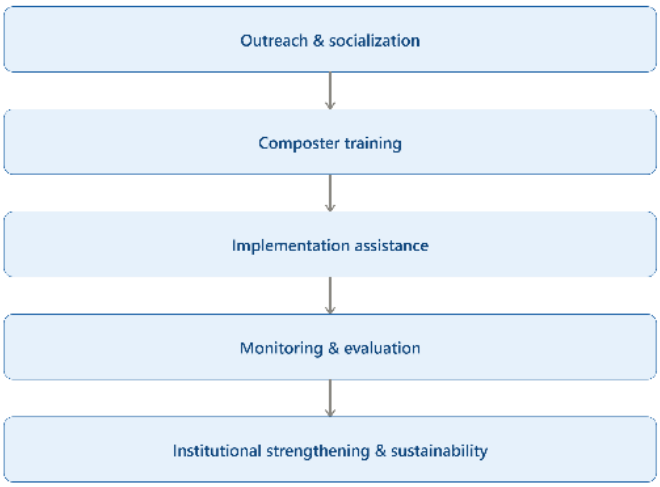

Figure 1. Flowchart of the community service program implementation method

With this methodological design (see Figure 1), the community service program not only focuses on knowledge transfer but also on strengthening the community's capacity to independently manage waste in a sustainable manner.

RESULT AND DISCUSSION

The implementation of the community service program in Teluk Nilau Village demonstrated significant outcomes in enhancing community awareness, skills, and participation in household waste management.

1. *Improvement in Environmental Literacy and Awareness*
   Before the program began, the majority of community members had limited understanding of household organic waste segregation. The pre-test results showed that fewer than 30% of respondents were able to correctly answer questions related to the Reduce, Reuse, and Recycle (3R) principles. Following the educational and awareness-raising activities (see Figure 2), a significant improvement was observed, with more than 60% of respondents able to correctly explain waste classification. These findings are consistent with the study by (Handayani, 2020), which reported that community-based interventions are effective in enhancing environmental literacy.
2. *Changes in Waste Segregation Behavior*
   The impact of the educational activities was reflected in household waste segregation practices. Prior to the program, most residents disposed of mixed waste in rivers or vacant land. After the training sessions, more than 10 households had adopted a simple waste segregation system by providing separate containers for different types of waste. This behavioral change indicates a shift in perspective, where waste is no longer viewed as a burden but as a resource that can be utilized.
3. *Improvement in Technical Skills*
   Through training on the use of household composters, community members acquired new skills in processing organic waste into compost fertilizer (see Figure 3). Several groups of housewives and youths successfully produced both solid compost and liquid organic fertilizer from household food waste. These products were not only used for

personal purposes but also marketed on a small scale within the local community. This finding supports the study by (Darmaraja et al., 2024), which emphasizes that hands-on training can significantly increase community motivation to participate in waste management activities.

4. *Social and Cultural Impacts*
   The community service program also generated positive social outcomes. The tradition of gotong royong (mutual cooperation) became more prominent, as reflected in the active participation of residents in community clean-up activities and waste management group meetings. Social interactions among community members became more intensive, thereby strengthening local social capital. From a cultural perspective, the community began to cultivate new habits that were passed on to younger generations, particularly the practice of segregating waste from an early age. This is consistent with the findings of (Enjelina et al., 2023), which highlight the importance of cultural approaches in environmental management.
5. *Economic Impacts*
   One tangible outcome of the program was the production of compost fertilizer with economic value. Although still on a small scale, community members generated additional income by selling compost to neighbors and local farmer groups. Moreover, the use of organic fertilizer produced from household compost reduced dependence on relatively expensive chemical fertilizers. Consequently, the program contributed directly to enhancing household economic self-reliance.
6. *Capacity Building and Program Sustainability*
   The program successfully established environmental volunteer cadres consisting of youths, housewives, and community leaders (see Figure 4). These individuals serve as agents of change who continue the activities even after the intensive assistance provided by the community service team has ended. This capacity-building effort is essential for ensuring the sustainability of the program. According to Komarudin et al., (2023), the existence of local institutions is a key factor in guaranteeing the success of community-based waste management initiatives.
7. *Challenges and Solutions*
   The implementation of the program was not without obstacles. Some community members experienced difficulties in consistently segregating waste due to limited space in their homes. In addition, the coastal climate often hindered the compost drying process. To address these challenges, covered storage containers were provided, and a rotating workgroup system was introduced. These measures demonstrate that the success of the program depends not only on the availability of appropriate technology but also on its adaptation to local conditions.

Figure 2. Socialization and awareness-raising on environmental literacy and awareness

Figure 3. Training and assistance in organic compost production

Figure 4. Distribution of simple equipment and establishment of environmental volunteer cadres

Table 1. Results and interpretation of the program activities

Indicator	Pre-test	Post-test	Improvement
Knowledge of organic and inorganic waste	30%	70%	40%
Understanding of the 3R concept	25%	65%	40%
Waste segregation behavior	20%	60%	40%
Compost production skills	10%	50%	40%

Source: Processed Data (2025)

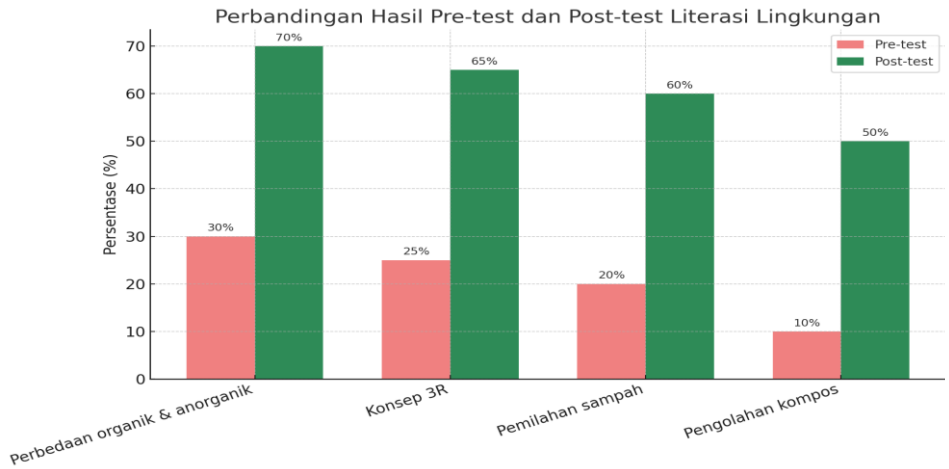

Figure 5. Pre-test and Post-test results of community participation in environmental literacy

Based on the pre-test and post-test results shown in Table 1 and presented in Figure 5, a significant improvement can be observed across all indicators of community environmental literacy following the implementation of the community service program. For the indicator measuring knowledge of the distinction between organic and inorganic waste, only about 30% of respondents were able to answer correctly before the program began. After the educational and awareness-raising activities were conducted, this figure increased to 70%.

This improvement indicates that the educational intervention successfully strengthened the community's fundamental understanding of waste classification as an initial step toward effective household waste management. Furthermore, understanding of the 3R concept (Reduce, Reuse, and Recycle) also showed a positive trend, increasing from 25% in the pre-test to 65% in the post-test. This finding demonstrates that the training program effectively fostered awareness of the importance of reducing waste generation and implementing recycling principles in daily life (Rizkiana, et al., 2025; Supriyanto, et al., 2025)

The indicator of household waste segregation behavior also experienced a significant change. Before the program, only 20% of respondents were accustomed to separating their waste; however, after receiving training and field assistance, this figure increased to 60%. This finding indicates that hands-on intervention combined with field mentoring is effective in driving real behavioral change within the community. Furthermore, the ability to process organic waste into compost also improved, despite starting from a relatively low baseline. Only 10% of respondents were aware of composting techniques prior to the program, whereas after training this figure increased to 50%. This improvement demonstrates that technical skills in organic waste processing can be effectively transferred through applied, practice-based learning methods (Rahmiantini, et al., 2025; Realita, at al., 2025)

The table and graph above show that all indicators experienced a 40% increase after the implementation of the program. These results demonstrate the effectiveness of the PAR approach in improving community literacy and waste management behavior, as well as in strengthening the sustainability of community-based programs. This program still has several limitations, including a relatively small number of participants and a mentoring period that has not been conducted over a long-term duration. In addition, the economic impact evaluation of compost production has not yet been comprehensively measured due to its still small-scale output. Therefore, further assistance and institutional support are needed to ensure the program’s sustainability can be optimally maintained.

CONCLUSION

Community service activities based on Participatory Action Research (PAR) in Teluk Nilau Village, Tanjung Jabung Barat Regency, successfully improved environmental literacy and community waste management behavior through the innovation of household composters. Evaluation results showed an increase in knowledge of waste classification from 30% to 70%, understanding of the 3R concept from 25% to 65%, waste segregation behavior from 20% to 60%, and composting skills from 10% to 50%. The program also succeeded in establishing environmental cadres and producing compost with economic value. These achievements indicate that a participatory approach is effective in raising environmental awareness and supporting sustainable community-based economic development in coastal areas. In the future, institutional strengthening, the development of waste banks, and entrepreneurship mentoring are needed to ensure the program’s sustainability.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

Darmaraja, A. P., Jalilah, D. N., & Aropah, S. S. (2024). Peningkatan Kesadaran dan Keterampilan Masyarakat dalam Pengelolaan Sampah Organik melalui Pelatihan Pembuatan Pupuk Kompos di Desa Sindanglaya. *Jurnal Pupuk*, *4*(1), 121–129.

Enjelina, W., Pratiwi putri, A., Simbolon, V. A., & Samosir, K. (2023). Pemberdayaan Masyarakat Dalam Meningkatkan Fasilitas Sanitasi Sebagai Upaya Pengendalian Penyakit Menular Wilayah Pesisir. *Segantang Lada : Jurnal Pengabdian Kesehatan*,

1(2), 131–140. https://doi.org/10.53579/segantang.v1i2.141

Erika Erika, & Eva Gusmira. (2024). Analisis Dampak Limbah Sampah Rumah Tangga Terhubung Pencemaran Lingkungan Hidup. *Profit: Jurnal Manajemen, Bisnis Dan Akuntansi*, *3*(3), 90–102. https://doi.org/10.58192/profit.v3i3.2245

Handayani, N. S., Kurniawati, A. R., Permata, D., Wulan, A. N., & Al-faqih, M. A. (2025). *Strategi Penguatan Literasi Lingkungan melalui Prinsip 3R untuk Perubahan Pola Pikir Masyarakat Abstrak Permasalahan krisis lingkungan akibat meningkatnya volume sampah telah menjadi isu global yang berdampak luas terhadap kesehatan , ekosistem , semakin* . *2*(1), 58–69.

Handayani, R. (2020). Pemberdayaan masyarakat melalui pengelolaan sampah rumah tangga. *Jurnal Sosio Ekonomi Lingkungan*, *7*(3), 150–166. https://doi.org/10.24815/jsel.v7i3.150-166

Hernando, R., Widiastuti, F., & Hastuti, D. (2024). Pelatihan Pengelolaan Sampah Berbasis Inovasi dan Modernisasi pada Masyarakat Desa Sumur Gedang. *Jurnal Pengabdian*, *7*(1), 44–52.

Khasanah, U., & Pd, M. I. (2024). *Metodologi Pengabdian Kepada Masyarakat : Teori Dan Implementasi*.

Komarudin, A., Rosmajudi, A., & Hilman. (2023). Implementasi Kebijakan Dalam Pengelolaan Sampah Rumah Tangga Dan Sampah Sejenis Sampah Rumah Tangga Di Kecamatan Indihiang Kota Tasikmalaya. *Indonesian Journal Of Education And Humanity*, *3*(4), 41–49.

Lingkungan, K., Deputi Bidang Pengelolaan Sampah, L. dan B., & Sampah, D. P. (2024). *Capaian Kinerja Pengelolaan Sampah adalah Capaian Pengurangan dan Penanganan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga.* https://sipsn.kemenlh.go.id/sipsn/

Supriyanto, A., et al. (2025). Pemberdayaan Masyarakat Lokal Melalui Komposter Sebagai Alternatif Pengolahan Limbah Sampah Rumah Tangga. *Jurnal Akademik Pengabdian Masyarakat*, 4(3), 55–67. https://doi.org/10.61722/japm.v4i3.9755

Puspita, H., Agustianti, R., Rizqi, V., & Alti, R. M. (2025). Transformasi Sampah Organik Rumah Tangga menjadi Kompos untuk Mendukung Ekonomi Sirkular. *Jurnal Pembelajaran Pemberdayaan Masyarakat*, 6(4), 310–321. https://doi.org/10.33474/jp2m.v6i4.24177

Rizkiana, C., et al. (2025). Pengelolaan Sampah Organik Rumah Tangga Berbasis Kompos Takakura di Kelurahan Kertosari. *Jurnal Pengabdian Masyarakat dan Riset Pendidikan*, 4(2), 88–97. https://doi.org/10.31004/jerkin.v4i2.2724

Rahmiantini, N., Antriyandarti, E., Ulfa, A. N., & Dani, F. Z. D. P. (2025). Analisis Faktor Sosial Ekonomi Masyarakat yang Memengaruhi Pengelolaan Sampah Rumah Tangga sebagai Upaya Menunjang Ketahanan Ekonomi Keluarga di Kota Surakarta. *Jurnal Ilmu Lingkungan*, 23(3), 856–866. https://doi.org/10.14710/jil.23.3.856-866

Realita, A., et al. (2025). Inovasi Komposter Dua Fungsi Sebagai Solusi Pengelolaan Limbah Rumah Tangga di Kabupaten Trenggalek. *Journal of Dedication in Community*, 3(2), 1–11. https://doi.org/10.26740/jodic.v3n2.p1-11

Republik Indonesia (2008). Undang-Undang Republik Indonesia Nomor 18 Tahun 2008 tentang Pengelolaan Sampah. Lembaran Negara Republik Indonesia Tahun 2008 Nomor 69.