



## From Organic Waste to Sustainable Resources: A Community-Based Approach to Environmental Improvement and Rural Sustainability

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**Abstract:** This community service article reports on a community-based organic waste management program implemented in Kurungkambing Village, Banten Province, Indonesia, aimed at improving environmental quality and supporting sustainable rural tourism. Despite the village's strong agricultural and tourism potential, unmanaged household and agricultural organic waste has contributed to environmental degradation and limited community awareness of sustainable waste practices. Using a participatory and empowerment-oriented approach, the program was conducted in three main stages: (1) community needs assessment and stakeholder consultation, (2) training and mentoring on organic waste composting and herbal plant cultivation, and (3) environmental arrangement through school garden development and compost utilization. The findings indicate increased community awareness of organic waste management, enhanced practical skills in compost production, and active participation in environmental greening initiatives involving local residents and school communities. In addition, the program strengthened collaboration between the university, local government, and community groups, contributing to cleaner public spaces and more sustainable village environments. This study demonstrates the value of integrated, community-driven interventions in promoting environmental sustainability and offers practical insights for similar community service initiatives in rural and developing contexts.

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## 1. INTRODUCTION

Environmental degradation caused by unmanaged organic waste remains a persistent challenge in many rural areas of Indonesia. Although organic waste such as household food residues, agricultural by-products, and garden waste is biodegradable, inadequate waste management practices often result in unpleasant odors, environmental pollution, and reduced environmental quality. In rural villages with agricultural and tourism potential, these conditions may further hinder local development and sustainability efforts.

Kurungkambing Village, located in Banten Province, Indonesia, represents a rural community with considerable potential in agriculture and emerging rural tourism. However, prior to this community service program, organic waste generated from households, farming activities, and public spaces was largely unmanaged and treated as residual waste rather than a reusable resource. Limited public awareness, lack of practical knowledge, and insufficient

access to simple waste management technologies contributed to low community participation in environmental preservation efforts.

Community-based waste management has been widely recognized as an effective approach to addressing environmental challenges in rural contexts. By actively involving local residents, schools, and community organizations, such initiatives can promote environmental awareness, strengthen local capacity, and foster a sense of collective responsibility for sustainability. Organic waste composting, in particular, offers a low-cost and environmentally friendly solution that aligns well with agricultural communities, as compost can be reused to improve soil quality and support local food and plant cultivation.

Universities play a strategic role in facilitating community empowerment through community service programs that integrate knowledge transfer, practical training, and participatory engagement. Through structured interventions, higher education institutions can act as catalysts for sustainable environmental practices while simultaneously strengthening university–community partnerships. In this context, community service activities should move beyond one-time training sessions and emphasize sustainable impact, community ownership, and long-term environmental benefits.

Against this backdrop, this article aims to report and analyze a community-based organic waste management program implemented in Kurungkambing Village. Specifically, the program sought to (1) increase community awareness of organic waste management, (2) enhance residents' practical skills in compost production and herbal plant cultivation, and (3) support environmental improvement through school garden development and compost utilization. By documenting the implementation process and outcomes, this study contributes practical insights into how participatory community service initiatives can support environmental sustainability and rural development in developing-country contexts.

## **2. METHOD**

### **Design and Approach**

This study employed a community-based participatory approach within the framework of a university-led community service program, emphasizing collaboration, empowerment, and sustainability. Community-based participatory approaches are widely recognized as effective for addressing complex social and environmental challenges, as they actively involve community members as co-creators of knowledge rather than passive recipients of intervention (Collins et al., 2018; Israel et al., 2005)

The program was designed as an applied intervention, aiming to facilitate knowledge transfer, practical skill development, and collective environmental action. Rather than testing causal relationships or hypotheses, this study focused on documenting the implementation process, community engagement, and observable outcomes, which is consistent with methodological approaches commonly adopted in community service and engagement-based research (Bringle et al., 2009; Franz et al., 2010)

A qualitative descriptive design was adopted to capture participants' experiences, learning processes, and contextual changes resulting from the intervention. Qualitative descriptive designs are particularly suitable for community-based studies that prioritize real-world impact, social interaction, and contextual understanding over experimental control (Creswell, 2013)

### **Setting and Participants**

The community service program was conducted in Kurungkambing Village, Banten Province, Indonesia, a rural area characterized by agricultural livelihoods and emerging rural tourism initiatives. Rural communities with agricultural bases often face challenges related to unmanaged organic waste, limited environmental awareness, and insufficient access to sustainable waste management practices (Kaza et al., 2018)

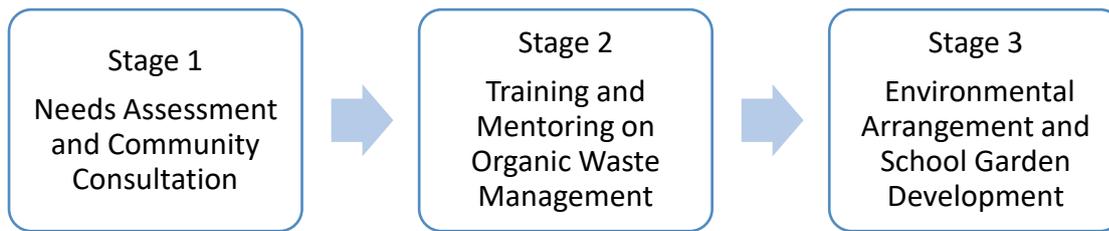
Participants included:

- a. Local residents representing household and farming communities
- b. Village leaders and community facilitators
- c. Teachers and students involved in school-based environmental activities

Participant selection was based on voluntary participation and community willingness, a principle commonly emphasized in participatory community development programs to ensure engagement and long-term ownership (Chambers, 2017; Pretty, 1995). Active involvement of local stakeholders throughout the program helped ensure cultural relevance and contextual appropriateness.

### **Program Design and Implementation Stages**

The intervention was implemented in three interrelated stages, integrating capacity building, experiential learning, and applied environmental action. Multi-stage program designs are recommended in community empowerment literature to support sustained learning and behavioral change (Kolb, 2015)



The first stage involved preliminary observations, informal interviews, and consultations with village leaders and community members to identify key environmental issues related to organic waste management. Needs assessment is a critical component of effective community interventions, as it aligns program objectives with local priorities and contextual realities (Hofman, 2015). Findings from this stage informed the design of training materials and intervention activities.

The second stage focused on capacity building through hands-on training and mentoring. Participants received practical instruction on organic waste sorting, compost production using locally available materials, and the application of compost for herbal plant cultivation. Experiential and practice-based learning approaches have been shown to enhance skill acquisition and knowledge retention, particularly in adult and community education contexts (Illeris, 2009; Kolb, 2015). Training sessions combined brief conceptual explanations with demonstrations and guided practice, consistent with recommendations for effective environmental education and skills training (Tilbury, 2011). Ongoing mentoring supported participants in applying newly acquired skills and addressing practical challenges.

The final stage emphasized the application of acquired knowledge through environmental arrangement activities, including school garden development and compost utilization. School-based environmental initiatives are widely recognized as effective sites for fostering environmental awareness, intergenerational learning, and community participation (Ardoin et al., 2020; Blair, 2009). This stage aimed to reinforce learning outcomes while promoting visible and sustainable environmental improvements.

### **Ethical Considerations**

Ethical principles were upheld by ensuring voluntary participation, informed consent, and respectful engagement with community members. Ethical reflexivity and transparency are essential in community-based research to protect participants and maintain trust (Banks, 2019). All data was used solely for academic and community development purposes, and no personally identifiable information was disclosed.

### 3. RESULT

#### **Increased Community Awareness as a Foundation for Sustainability**

One of the most significant outcomes of the community service program was the development of environmental awareness as a foundation for sustainable behavior change. Prior to the intervention, organic waste was largely regarded as a disposal problem. Following participatory training and mentoring activities, community members increasingly perceived organic waste as a renewable resource that could be reintegrated into local agricultural and environmental practices.



**Picture 1.** Community Awareness.

Environmental awareness is widely recognized as a prerequisite for sustainability-oriented action, particularly in community-based environmental (Ardoin et al., 2020; Tilbury, 2011) In this program, shifts in community perceptions indicated early-stage sustainability learning, where participants began to connect waste management practices with long-term environmental quality, resource efficiency, and community well-being. Such cognitive and attitudinal changes are essential for sustaining environmental initiatives beyond short-term project cycles (Monroe et al., 2019; Sterling, 2010)

#### **Sustainable Skill Development through Composting Practices**

The program contributed to the development of sustainable practical skills in organic waste composting among community members. Participants demonstrated the ability to independently apply composting techniques using locally available and low-cost materials, an important factor in ensuring the long-term feasibility of environmental practices in rural settings.



Picture 2. Mentoring On Organic Waste Composting and Herbal Plant Cultivation.

**STEVIA**  
Manfaat Stevia:

1. Mengganti gula pasir bagi penderita diabetes.
2. Membantu mengurangi lemak dalam darah.
3. Menurunkan kolesterol dalam darah.
4. Memperbaiki kadar kolesterol.
5. Menurunkan risiko terkena penyakit ginjal.

**Cara membuatnya:**  
10 gram stevia ditumbuk, dituangkan air, kemudian dituangkan 500 ml air. Air dituangkan hingga mendidih dituangkan mendidih 1-2 menit, kemudian dituang ke dalam gelas kemudian sebagai pengganti gula pasir.

**KUNYIT**  
Manfaat Kunyit:

1. Menurunkan asam lemak.
2. Menurunkan tekanan darah.
3. Menurunkan kolesterol total.
4. Mengurangi pengerasan pembuluh darah.
5. Menurunkan gula darah.
6. Menurunkan berat badan.

**Cara membuatnya:**  
1. Rebus kunyit 1 liter air, dituangkan, dituangkan ke dalam 2 gelas air, dituangkan mendidih 1-2 menit, dituang.  
2. Tambahkan madu dan jeruk nipis untuk memperkaya rasa.  
3. Minum 3 kali sehari, masing-masing 1/2 gelas.

**TEMULAWAK**  
Manfaat Temulawak:

1. Meningkatkan fungsi pencernaan.
2. Meningkatkan penyerapan lemak.
3. Anti kanker.
4. Meningkatkan fungsi ginjal.
5. Mengurangi risiko dari infeksi.
6. Membantu proses pertumbuhan tulang.
7. Mengurangi rasa sakit.
8. Memperbaiki tekanan darah.
9. Meningkatkan kadar kolesterol.
10. Meningkatkan risiko terkena diabetes.
11. Menurunkan tekanan darah.
12. Menurunkan risiko terkena penyakit ginjal.

**Cara membuatnya:**  
1. Sediakan bahan-bahan 1 liter air, dituangkan, dituangkan ke dalam 2 gelas air, dituangkan mendidih 1-2 menit, dituang.  
2. Tambahkan madu dan jeruk nipis untuk memperkaya rasa.  
3. Minum 3 kali sehari, masing-masing 1/2 gelas.

**JAHE**  
Manfaat Jahe:

1. Mengurangi asam lemak.
2. Mengurangi tekanan darah.
3. Menurunkan kolesterol total.
4. Menurunkan risiko terkena penyakit ginjal.
5. Menurunkan gula darah.
6. Menurunkan berat badan.
7. Menurunkan risiko terkena penyakit ginjal.
8. Menurunkan tekanan darah.
9. Menurunkan risiko terkena penyakit ginjal.
10. Menurunkan risiko terkena penyakit ginjal.

**Cara membuatnya:**  
1. Sediakan bahan-bahan 1 liter air, dituangkan, dituangkan ke dalam 2 gelas air, dituangkan mendidih 1-2 menit, dituang.  
2. Tambahkan madu dan jeruk nipis untuk memperkaya rasa.  
3. Minum 3 kali sehari, masing-masing 1/2 gelas.

**PKM NASIONAL  
DI DESA KURUNG KAMBING  
KABUPATEN PANDEGLANG  
PROVINSI BANTEN**

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Picture 3. Herbal Plant Donation from UT.

Sustainability-oriented skill development emphasizes not only technical competence but also adaptability and resource efficiency (Wiek et al., 2011). The hands-on and experiential learning design adopted in this program supported participants in internalizing composting practices as part of their routine household and agricultural activities. This outcome aligns with

sustainability education literature, which highlights the importance of practice-based learning in fostering durable behavioral change and environmental responsibility (Illeris, 2009; Kolb, 2015)

### **Community Participation as a Driver of Social Sustainability**

Active participation from residents, local leaders, teachers, and students emerged as a key indicator of social sustainability within the program. Engagement extended beyond training attendance to collective decision-making, environmental arrangement activities, and school garden maintenance. Social sustainability in community development is closely linked to participation, inclusivity, and shared ownership of initiatives (Chambers, 2017; Pretty, 1995). In this program, collaborative engagement strengthened social networks and reinforced a collective commitment to environmental stewardship. Such participatory dynamics are essential for sustaining community-based interventions, as they reduce dependency on external facilitators and enhance local capacity for self-managed development (Collins et al., 2018; Franz et al., 2010)

### **School Gardens as Sustainable Learning and Environmental Sites**

The development of school gardens functioned as a sustainability-oriented outcome that integrated environmental improvement with educational continuity. These gardens served as living laboratories where compost produced from organic waste was applied, monitored, and reused, reinforcing cyclical resource use principles. School gardens are widely recognized as effective tools for promoting environmental literacy, intergenerational learning, and long-term sustainability awareness (Ardoin et al., 2020; Blair, 2009). In this study, the school garden supported the institutionalization of sustainability practices within the local education context, increasing the likelihood that environmental values and skills will be transmitted to future generations.



**Picture 4.** School Garden Development.

### **Institutional Sustainability through University and Community Partnerships**

Beyond immediate environmental outcomes, the program strengthened institutional sustainability by reinforcing partnerships between the university and the local community. Community members increasingly viewed the university not merely as an external project implementer but as a long-term partner in sustainable development. Sustainable university–community engagement requires continuity, mutual benefit, and alignment with local development goals (Bringle et al., 2009). The findings suggest that structured community service programs can function as sustainable platforms for ongoing collaboration, enabling knowledge exchange, capacity building, and environmentally responsible practices that persist beyond the formal duration of the program.

## **4. DISCUSSION**

This community service demonstrates that community-based organic waste management initiatives can function as sustainable, multi-dimensional interventions that address environmental, social, and educational challenges in rural contexts. The findings

extend existing community service literature by illustrating how participatory waste management programs contribute not only to immediate environmental improvement but also to longer-term sustainability outcomes aligned with the United Nations Sustainable Development Goals (SDGs).

### **Alignment with SDG 12: Responsible Consumption and Production**

The program's core intervention aligns with SDG 12 (Responsible Consumption and Production) by promoting sustainable resource use and circular waste practices at the community level. By reframing organic waste as a reusable resource rather than residual waste, the program supported a shift toward more responsible consumption patterns and environmentally sound production practices. Previous studies emphasize that community-level waste management initiatives are critical for advancing SDG 12, particularly in developing-country contexts where centralized waste infrastructure is limited (Kaza et al., 2018). The present situation reinforces this perspective by demonstrating that low-cost, locally adaptable composting practices can foster sustainable behavior change when supported by participatory education and mentoring.

### **Contribution to SDG 11: Sustainable Cities and Communities**

Beyond waste management, the program contributed to SDG 11 (Sustainable Cities and Communities) through environmental arrangement activities and the improvement of public and educational spaces. The development of school gardens and cleaner village environments enhanced the livability and ecological quality of the community, supporting the broader goal of sustainable rural development. Consistent with community development literature, the results indicate that environmental sustainability initiatives are more likely to be sustained when local stakeholders actively participate in planning, implementation, and maintenance processes (Ardoin et al., 2020; Chambers, 2017; Pretty, 1995).

### **Quality Education through Sustainability-Oriented Learning**

The integration of school gardens as part of the intervention highlights the program's contribution to SDG 4 (Quality Education), particularly in promoting sustainability-oriented learning. School gardens served as experiential learning spaces where students and teachers engaged directly with environmental concepts, reinforcing ecological literacy and practical problem-solving skills. Sustainability education scholars argue that experiential and place-based learning approaches are essential for developing environmental awareness and responsible citizenship (Sterling, 2010; Tilbury, 2011). The findings suggest that embedding sustainability practices within educational settings can strengthen the continuity of community service outcomes and support intergenerational transmission of environmental values.

## **Social and Institutional Sustainability through Community–University Partnerships**

From a broader sustainability perspective, the program contributed to social and institutional sustainability by strengthening partnerships between the university, local government, and community members. Such partnerships are increasingly recognized as central to the role of higher education institutions in advancing the SDGs through community engagement and knowledge exchange (Bringle et al., 2009; Franz et al., 2010).

By positioning the university as a long-term facilitator rather than a short-term project implementer, the program enhanced trust, collaboration, and local capacity. This aligns with calls for sustainable university–community engagement models that support continuous learning, shared responsibility, and scalable impact in rural and developing contexts.

## **Implications for Sustainable Community Service Programs**

The findings underscore the importance of designing community service programs that integrate environmental sustainability, social participation, and educational continuity. Rather than treating sustainability as an add-on outcome, the program demonstrates how sustainability principles can be embedded throughout program design, implementation, and evaluation.

By explicitly aligning community service initiatives with SDG 12 as the primary goal, supported by SDG 11 and SDG 4, this study provides a structured framework for universities seeking to enhance the sustainability and policy relevance of their community engagement activities. Such alignment strengthens the contribution of community service programs to global development agendas while remaining responsive to local needs and contexts.

## **5. CONCLUSION**

This study demonstrates that community-based organic waste management programs can serve as effective and sustainable interventions for improving environmental quality, strengthening community capacity, and supporting rural development in developing-country contexts. Through a participatory approach involving residents, schools, and local stakeholders, the program successfully increased environmental awareness, enhanced practical composting skills, and fostered active community participation. The integration of school garden development further reinforced sustainability-oriented learning and intergenerational knowledge transfer.

From a sustainability perspective, the findings indicate that community service initiatives grounded in local participation, low-cost technologies, and experiential learning are more likely to generate long-term impact. By positioning organic waste as a reusable resource, the program contributed directly to SDG 12 (Responsible Consumption and Production), while

also supporting SDG 11 (Sustainable Cities and Communities) and SDG 4 (Quality Education). These outcomes highlight the potential of university-led community engagement to align local environmental action with global development agendas.

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