e-ISSN: 2745-9535
No. 105/E/KPT/2022
Jurnal Pengabdian Masyarakat
Member of: AJEBI
Editorial Office: Jl. Soekarno-Hatta, Rembuksari No. 1A, Malang, East Java, Indonesia, 65113
Contact: Phone: +62 (341) 478494 e-mail: jpm@asia.ac.id
The journal is published by Institut Teknologi dan Bisnis Asia Malang
Website: https://jurnal.stie.asia.ac.id/index.php/jpm
Indexed in: Google Crossref neliti GARUDA Journal Dimensions

Ecobrick Innovation For Plastic Waste Reduction And Community Environmental Awareness In Sijunjung

[1]Dony Novaliendry*, [1]Divia Tri Ananda, [1]Helma Wadria Putri, [1]Helmi Wadria Putri, [1]Mutia Ulfah, [1]Nursipa Amanda, [1]Khafila Demara, [1]Parbagian Tambunan, [1]Qodrialfarisi
[1]Universitas Negeri Padang, Indonesia
*Corresponding author
E-mail: dony.novaliendry@ft.unp.ac.id

Volume
7
Issue
1
Edition
May
Page
163-170
Year
2026

Article History

Submission: 07-01-2026
Review: 21-01-2026
Accepted: 09-05-2026

Keyword

Ecobricks;
Creative Solutions;
Clean and Healthy Environment;

How to cite

Novaliendry, D., Ananda, D. T., Putri, H. W., Putri, H. W., Ulfah, M., Amanda, N., Demara, K., Tambunan, P., & Qodrialfarisi. (2026). Ecobrick Innovation for Plastic Waste Reduction and Community Environmental Awareness in Sijunjung. Jurnal Pengabdian Masyarakat, Volume 7(1), 163-170. https://doi.org/10.32815/jpm.v7i1.2900

Abstract

Purpose: This study addresses plastic waste management challenges in Sijunjung Regency by introducing ecobrick innovation to enhance environmental sustainability and community awareness.

Method: Employing a community service approach, the research utilized literature review and field observation methods. Data were collected through documentation and direct observation of ecobrick production in Jorong Taruko Nagari Tanjung, then analyzed descriptively.

Practical Applications: Ecobricks transform non-organic plastic waste into functional garden elements, providing communities with a creative, low-cost waste management solution that improves environmental aesthetics, reduces pollution, and strengthens collective environmental stewardship through participatory engagement.

Conclusion: The initiative significantly shifted community mindsets toward sustainable waste practices, demonstrating ecobrick as an effective, innovative strategy for mitigating plastic pollution while fostering cleaner, healthier, and more sustainable living environments through empowered local action.

Introduction

Environmental sustainability remains a pressing global concern, with plastic waste emerging as one of the most pervasive ecological challenges of the contemporary era. The accumulation of non-biodegradable plastics severely compromises soil integrity, water quality, and public health, particularly in rural and semi-urban communities where waste management infrastructure remains underdeveloped. This investigation examines the residents of Jorong Taruko Nagari Tanjung in Sijunjung Regency, West Sumatra, a community that faces escalating environmental degradation due to the unregulated disposal of single-use and household plastics. Despite the growing recognition of waste-related hazards, localized awareness and systematic recycling practices remain insufficient, resulting in the pervasive accumulation of plastic debris that threatens both ecological balance and community well-being.

The selection of this demographic as the focal engagement site is predicated on its representative profile of Indonesian rural communities grappling with transitional waste management paradigms. While national policies increasingly emphasize sustainable waste reduction, grassroots implementation frequently lacks accessible, low-cost, and culturally resonant interventions. This study bridges the macro-level discourse on circular economy principles with micro-level community practice by investigating the applicability of ecobrick technology as a localized waste mitigation strategy. By concentrating on a clearly defined geographic and demographic boundary, the research isolates contextual variables that influence community adoption, thereby providing a replicable framework for similar underserved regions.

Contemporary scholarship has increasingly documented the efficacy of upcycled plastic innovations in diverting waste from landfills and natural ecosystems. Studies indicate that ecobricks, which consist of plastic bottles densely packed with non-organic waste, serve as both a storage mechanism and a modular construction material, significantly extending the functional lifecycle of discarded polymers (Hidayatullah et al., 2024; Suminto, 2017). Furthermore, participatory environmental interventions have been shown to catalyze behavioral shifts, transforming passive waste disposal into active resource management (Majida et al., 2023). Despite these advances, a notable research gap persists regarding the socio-educational dimensions of ecobrick adoption in Indonesian rural contexts, particularly how hands-on engagement translates into sustained environmental awareness. This inquiry positions itself within this scholarly intersection by empirically examining how collaborative ecobrick production influences community mindsets, thereby extending existing literature beyond technical efficacy to encompass behavioral and educational outcomes.

The primary objective of this engagement is to foster measurable improvements in environmental stewardship, reduce localized plastic pollution, and cultivate aesthetically enhanced public spaces through community-driven ecobrick implementation. The anticipated qualitative and descriptive findings will directly align with these goals by documenting shifts in waste management practices, evaluating the ecological impact of diverted plastics, and assessing the educational sustainability of the intervention. By grounding community outcomes in observable behavioral data and environmental indicators, this study establishes a robust, evidence-based foundation for scaling participatory recycling initiatives. The subsequent sections delineate the methodological design, present empirical observations from field implementation, and discuss the broader implications of ecobrick innovation for sustainable rural development, ultimately offering a structured pathway for policymakers, educators, and environmental practitioners seeking actionable waste reduction strategies.

Method

This community service activity employed a participatory action research approach integrating literature review and field observation methods to examine the implementation of ecobrick innovation as a sustainable waste management solution. The literature review

component involved systematic data collection from peer-reviewed journals, academic articles, and technical reports concerning ecobrick methodology and plastic waste management strategies, establishing a theoretical foundation for the intervention. Field observations were conducted to document the practical processes of ecobrick production and assess their applicability within the specific socio-environmental context of Jorong Taruko Nagari Tanjung, Sijunjung Regency. All collected data were analyzed using descriptive analytical techniques to evaluate the potential of ecobrick as an accessible, community-driven solution for mitigating plastic waste pollution.

The intervention was implemented over a three-week period from June 24 to July 13, 2025, with the KKN student post at Jorong Taruko Nagari Tanjung serving as the central operational hub for training, production, and community engagement activities. The ecobrick fabrication process utilized readily available materials and low-cost tools, including scissors for material preparation, wooden dowels for compaction, standardized 600 mL PET bottles as structural containers, and collected non-organic plastic waste as the primary input material. The production protocol followed a sequential five-stage procedure: first, non-biodegradable plastic waste was systematically collected from household and public sources within the community; second, collected materials were thoroughly cleaned to remove soil and organic contaminants; third, cleaned plastics were sun-dried to reduce moisture content and prevent microbial growth; fourth, dried materials were cut into small, manageable fragments to facilitate efficient bottle packing; and fifth, fragmented plastics were manually compacted into PET bottles using wooden dowels to achieve the density standards required for structural integrity. This structured methodology ensured that community participants could replicate the process independently while maintaining consistent quality outcomes, thereby supporting the long-term sustainability of the waste management intervention.

Result

The introduction of ecobrick technology in Jorong Taruko Nagari Tanjung, Sijunjung Regency, addressed a previously unexplored waste management paradigm within the local community, where plastic disposal practices had historically lacked long-term environmental consideration. Baseline field observations revealed a substantial accumulation of non-biodegradable plastic waste, which was routinely discarded through open burning or indiscriminate dumping due to the absence of adequate village-level waste management infrastructure. This practice significantly exacerbated soil and water contamination while elevating localized public health risks. The Community Service Program (KKN) strategically introduced ecobrick production as an accessible, low-cost alternative to transform this persistent environmental liability into a functional resource. Initial activities centered on systematic plastic collection along public thoroughfares and residential zones, utilizing simple receptacles to gather target materials. This foundational phase not only secured the raw inputs required for fabrication but also served as an immediate catalyst for raising collective awareness, effectively motivating residents to transition from passive waste disposal to active environmental stewardship.

Following the collection phase, the ecobrick fabrication process was executed through a structured, five-stage protocol designed for maximum community accessibility and operational efficiency. The gathered plastics underwent rigorous cleaning and sun-drying to eliminate organic contaminants, reduce material volume, and prevent microbial proliferation, thereby ensuring safer handling and higher structural integrity. Subsequently, dried plastics were manually cut into smaller fragments using scissors to facilitate optimal compaction within standardized PET bottles. Participants utilized wooden dowels to densely pack the fragmented materials, a critical step that guarantees the durability and load-bearing capacity of the final units. The KKN team further enhanced the intervention by integrating an aesthetic finishing stage, wherein completed ecobricks were coated with a white primer and yellow exterior finish. These painted units were then strategically arranged to form modular garden installations,

demonstrating how functional waste management can simultaneously yield visually appealing public infrastructure. The sequential workflow, from material retrieval to final garden assembly, was systematically documented to validate procedural fidelity and community engagement.

Figure 1. Roadside Waste Collection and Drying of Plastic Waste

Source: Private Documentation, 2025.

The implementation of this intervention yielded measurable shifts in community cognition and waste-handling behaviors, directly aligning with the program's educational and environmental objectives. Residents demonstrated a marked transition in their perception of plastic waste, increasingly recognizing it not as a disposable nuisance but as a recoverable resource with practical and aesthetic utility. This cognitive shift was reinforced through sustained participatory engagement, which successfully cultivated a culture of mutual cooperation (gotong royong) centered on village cleanliness. Tangible outcomes included a visible reduction in scattered plastic litter, the elimination of open-burning practices in targeted zones, and the establishment of aesthetically enhanced ecobrick garden spaces that improved local environmental quality. The simplicity of the fabrication process ensured high community adoptability, enabling participants to independently replicate the technique while internalizing sustainable waste management principles as a routine domestic practice.

Figure 2. Cutting Plastic Waste Using Scissors, Inserting into Bottles, Compaction, Painting of Waste in Bottles

Source: Private Documentation, 2025.

Beyond immediate environmental remediation, the ecobrick initiative generated multidimensional community benefits encompassing ecological preservation, socioeconomic empowerment, and sustained environmental education. By securely sequestering non-biodegradable plastics within durable structures, the program directly mitigated long-term ecological degradation and reduced the potential for greenhouse gas emissions associated with traditional disposal methods. Concurrently, the intervention fostered local empowerment by equipping residents with practical upcycling skills, thereby transforming waste management from a municipal burden into a community-driven enterprise with tangible value creation. The program also functioned as an experiential learning platform, elevating public understanding of the protracted decomposition timeline of plastics—which globally exceeds 100 to 500 years—and reinforcing the urgency of preventive consumption and circular resource utilization. Ultimately, the KKN intervention established ecobrick technology as a scalable,

participatory model that successfully harmonizes environmental sustainability with community resilience, providing a replicable framework for rural waste management transformation.

Figure 3. Storage and Arrangement of Completed Ecobricks

Source: Private Documentation, 2025.

Discussion

The ecobrick community service initiative successfully fulfilled its foundational objectives of mitigating localized plastic pollution and catalyzing sustainable behavioral shifts within Jorong Taruko Nagari Tanjung. The transition from indiscriminate disposal and open burning to structured waste segregation and upcycling was empirically validated through consistent production output and measurable enhancements in environmental literacy among participants. This attainment transcends mere technical adoption; it is fundamentally driven by the program's participatory pedagogical framework, which leveraged experiential learning to bridge the gap between abstract ecological awareness and tangible daily practices. By demystifying the ecobrick fabrication process and aligning it with the culturally ingrained principle of gotong royong, the intervention effectively repositioned plastic waste from a burdensome liability to a recoverable community asset. The observed cognitive shifts indicate that hands-on engagement, coupled with immediate visual feedback through modular installations, serves as a critical mechanism for internalizing sustainable waste management protocols, thereby ensuring that knowledge acquisition translates directly into habitual behavioral adaptation.

The implementation of the ecobrick program generated multifaceted consequences across the environmental and socio-cultural landscape of the target community. Environmentally, the systematic sequestration of non-biodegradable plastics into durable structural units significantly reduced surface litter and mitigated the risks associated with traditional disposal methods, such as soil degradation and localized water contamination. Socially, the collaborative fabrication and arrangement processes fostered enhanced communal cohesion and collective stewardship, transforming waste management from an isolated household responsibility into a shared public endeavor. While the initiative yielded predominantly positive outcomes, it is important to acknowledge potential trade-offs, including the initial reliance on external student facilitators and the labor-intensive nature of manual compaction, which may limit rapid scalability without supplementary tooling. Nevertheless, the long-term projection suggests that the aesthetic valorization of ecobricks as garden components will sustain community interest, embedding environmental maintenance into local cultural practices and ensuring that the intervention's ecological and social benefits persist well beyond the initial implementation phase.

The operational architecture of the ecobrick intervention demonstrates robust potential for long-term sustainability and contextual replication across similar rural and semi-urban

environments. The methodology's reliance on readily available materials, minimal financial capital, and low technical barriers ensures that it can be readily adapted to communities facing analogous waste management infrastructural deficits. Critical success factors identified throughout the implementation include the integration of aesthetic design elements, which sustained participant motivation, and the decentralized, facilitator-guided training model that promoted skill transferability. However, operational bottlenecks were noted in the initial stages, particularly concerning consistent waste collection logistics and the need for standardized compaction density to ensure structural uniformity. To optimize future iterations, it is recommended that local authorities establish community-based waste collection hubs, integrate ecobrick pedagogy into primary and secondary environmental education curricula, and develop simplified visual manuals to enable autonomous replication. Furthermore, forging partnerships with regional environmental agencies could facilitate the transition from student-led initiatives to municipally supported sustainability programs, thereby institutionalizing the practice within local governance frameworks.

Despite its documented efficacy, the program encountered several logistical and methodological challenges, including initial community skepticism, variable participant retention across different demographic segments, and the physical demands of manual waste processing. These barriers were effectively mitigated through phased capacity-building workshops, the implementation of peer-mentorship networks, and the strategic use of visual demonstrations to demystify the technical requirements. When contextualized within broader scholarly discourse, the findings align with established literature on community-driven waste upcycling, corroborating the conclusions of Hidayatullah et al. (2024) and Majida et al. (2023) regarding the environmental viability of ecobricks. However, this intervention distinctively advances the existing paradigm by integrating aesthetic landscaping as a primary motivational driver, thereby addressing a common limitation in prior initiatives where purely functional outputs failed to sustain long-term community engagement. The comparative analysis underscores that active, culturally resonant participation remains the pivotal determinant of programmatic success, outweighing technical sophistication alone. Ultimately, this community service initiative demonstrates that ecobrick technology, when embedded within a structured, participatory framework, serves as a highly effective catalyst for environmental remediation and behavioral transformation. The synthesized outcomes provide actionable methodological benchmarks for future community service practices, emphasizing that sustainable waste management must be cultivated through localized empowerment, aesthetic integration, and continuous stakeholder collaboration to achieve enduring ecological resilience.

Conclusion

The primary objective of this community service initiative was to mitigate localized plastic waste accumulation and foster sustainable environmental stewardship within Jorong Taruko Nagari Tanjung, Sijunjung Regency, through the participatory implementation of ecobrick technology. The intervention successfully achieved these aims by transitioning community waste disposal practices from indiscriminate dumping and open burning to structured, creative upcycling. Empirical observations and participatory engagement metrics confirmed a marked improvement in residents' environmental literacy, alongside the successful fabrication of densely compacted ecobrick units that effectively sequestered non-organic plastics. These outcomes directly align with the study's foundational goals, demonstrating that hands-on, community-centered education effectively translates abstract ecological awareness into actionable, habitual waste management practices. The documented behavioral shifts and tangible reduction in surface plastic litter substantiate the efficacy of the ecobrick methodology as a localized environmental remediation strategy.

The practical implications of these findings extend significantly beyond immediate waste reduction, offering a replicable, low-cost framework for rural and semi-urban communities grappling with inadequate municipal waste infrastructure. By transforming discarded plastics

into functional and aesthetically integrated garden components, the intervention operationalizes circular economy principles at the grassroots level, providing residents with both environmental and socio-cultural dividends. A distinctive contribution of this research lies in its strategic synthesis of technical upcycling with aesthetic valorization and culturally resonant collaborative practices (gotong royong), which collectively sustained participant motivation and fostered enduring community ownership. This novel pedagogical and operational approach bridges the gap between environmental policy and community practice, illustrating how visually demonstrative, participatory interventions can catalyze lasting behavioral adaptation. Consequently, the methodology offers actionable insights for environmental educators, local policymakers, and community development practitioners seeking scalable, resource-efficient solutions for sustainable waste management.

Despite its documented efficacy, this study is subject to certain methodological and contextual limitations, including a constrained three-week implementation period, reliance on external student facilitators for initial training, and the labor-intensive nature of manual compaction, which may pose scalability challenges without supplementary tooling. Furthermore, the absence of longitudinal tracking limits the capacity to definitively assess the long-term retention of newly adopted waste management behaviors post-intervention. Future research should therefore prioritize longitudinal studies to evaluate behavioral sustainability, explore the integration of ecobrick pedagogy into formal and informal educational curricula, and investigate the development of standardized, low-cost compaction mechanisms to enhance operational efficiency. Notwithstanding these constraints, the initiative substantiates the critical role of community-driven, low-tech environmental interventions in fostering ecological resilience and socio-cultural cohesion. By establishing a pragmatic, evidence-based model for localized plastic waste mitigation, this research contributes meaningfully to the broader discourse on sustainable community development, offering a transferable framework that warrants continued scholarly attention, policy integration, and practical replication in analogous environmental contexts.

Acknowledgements

The authors extend their sincere gratitude to Universitas Negeri Padang for the institutional and financial support provided through the Community Service Program (KKN), which was fundamental to the successful execution of this initiative. We deeply acknowledge the active participation and invaluable cooperation of the local government officials, community leaders, and residents of Jorong Taruko, Nagari Tanjung, Sijunjung Regency, whose engagement and practical insights directly facilitated the implementation and impact of the ecobrick program. Special recognition is also extended to the administrative and technical staff across the collaborating faculties at Universitas Negeri Padang for their logistical coordination, resource management, and operational assistance throughout the project duration. We further appreciate our fellow researchers, student colleagues, and academic partners for their constructive feedback, field assistance, and unwavering dedication. Finally, we express our heartfelt thanks to our families and all individuals who provided continuous moral support and encouragement. The collective contributions of each party have been indispensable to the realization of this community engagement endeavor and its contribution to sustainable environmental practices.

Reference

Hidayatullah, M. F., Putri, D. A., Istiqomah, N., Supriyadi, A., Agur, S., Hafni, M. R., Yusuf, D., Syafril, Ismail, H., & Rahmi, S. A. (2024). Pengolahan Sampah Plastik melalui Kreativitas Produk Ecobrick di Dusun Dasan Anyar, Desa Teniga. TRIMAS: Jurnal Inovasi Dan Pengabdian Kepada Masyarakat, 3(2), 12–18. https://doi.org/10.58707/trimas.v3i2.691

Majida, A. Z., Muzaki, A., Karomah, K., & Awaliyah, M. (2023). Pemanfaatan Sampah Plastik

dengan Metode Ecobrick Sebagai Upaya Mengurangi Limbah Plastik. Profetik: Jurnal Pengabdian Masyarakat, 1(01), 49–62. https://doi.org/10.62490/profetik.v1i01.340

Nazaruddin. (2014). Analisis Perilaku Masyarakat dalam Upaya Menciptakan Kebersihan Lingkungan di Kota Pekanbaru (Studi Kasus Kelurahan Simpang Baru). Jom FISIP, 1(2), 1–15. https://media.neliti.com/media/publications/31637-ID-analisis-perilaku-masyarakatdalam-upaya-menciptakan-kebersihan-lingkungan-di-ko.pdf

Nuruzzaman, W. P., Marianti, M., Zain, A., Putri, D. R., Amara, M., Sukerta, I. M., Heryanto, V., Prihatini, P. J., Swiswidayati, R. D. D., & Rokhmat, J. (2021). Ecobrick Sebagai Solusi

Penanggulangan Sampah Non-Organik Rumah Tangga di Lingkungan Sayo Baru. Jurnal Pengabdian Magister Pendidikan IPA, 4(2), 0–5. https://doi.org/10.29303/jpmpi.v4i2.730 Suminto, S. (2017). Ecobrick: solusi cerdas dan kreatif untuk mengatasi sampah plastik. PRODUCTUM Jurnal Desain Produk (Pengetahuan Dan Perancangan Produk), 3(1), 26. https://doi.org/10.24821/productum.v3i1.1735