Smart Society : Community Service and Empowerment Journal
Volume 4, Issue 1, 17-26.
e_ISSN: 2807-5757
https://www.journal.foundae.com/index.php/smartsoc/index

Ecobricks: An Effort to Raise Awareness of Sustainable Environmental Practices in Tanjung Baru Village

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Article Info

Article history:

Received: February 8, 2024
Revised: April 30, 2024
Accepted: June 20, 2024

Keywords:

ecobrick;
environmental awareness;
sustainable.

Abstract

The aim of this research is to raise awareness of sustainable environmental practices among the community of Tanjung Baru Village, Merbau Mataram District, South Lampung Regency, through the use of ecobricks. This research employs a training approach involving several stages, including initial discussions and social mapping, problem identification, socialization, practice, and evaluation. A total of 40 residents from Tanjung Baru Village participated in this ecobrick socialization. Data were collected using pre-tests and post-tests, which were analyzed using the Likert scale. The pre-test results indicated that 38.7% of the community had an awareness of sustainable environmental practices. After participating in the socialization and hands-on practice, the post-test results showed a significant increase to 70.2%. This improvement indicates the effectiveness of the training in enhancing awareness of sustainable environmental practices. This study highlights the need for more training on renewable energy and environmental sustainability to increase community participation and the effectiveness of future socialization programs. Developing more structured and sustainable socialization programs and utilizing more sophisticated evaluation methods are necessary to measure the long-term impact of these interventions.

To cite this article: Widiarni, A., Nasution, S. P., & Syarlisjiswan, M. R. (2024). Ecobricks: An Effort to Raise Awareness of Sustainable Environmental Practices in Tanjung Baru Village. *Smart Society: Community Service and Empowerment Journal, 4*(1), XX-XX

INTRODUCTION

Indonesia is the largest and most populous country, with a population reaching 270.20 million people (Badan Pusat Statistik, 2021). Issues such as waste and pollution are among the critical problems faced by this country (Fikri et al., 2022). The problem of waste, including plastic waste, is also a focal point of the Sustainable Development Goals (SDGs) (Yusuf et al., 2020). According to data from the Ministry of Environment and Forestry (KLHK), the total national waste in 2021 reached 68.5 million tons, of which 17 percent, or approximately 11.6 million tons, was plastic waste, with 51% of it being plastic waste that can contaminate the soil (Agustin et al., 2022). Plastic waste has a significant negative impact on health, the environment, and the economy. Microplastic particles pollute water and soil, enter the food chain, and can cause diseases such as hormonal disorders and cancer (De-la-Torre, 2020). In the environment, plastic waste endangers marine life and damages ecosystems (Lebreton et al., 2018). Economically, plastic pollution harms the tourism and fisheries sectors and burdens the budget for waste management (MacLeod et al., 2021). Therefore, strategies to reduce plastic use, increase recycling, and educate the public are essential (Sari et al., 2023). The implementation of effective policies and public participation is key to addressing this issue in line with the SDGs' goal of sustainable consumption and production patterns, which include tackling plastic waste (UNEP, 2023).

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Ecobricks can be one of the alternative options for recycling plastic waste. Ecobricks utilize used bottles, plastic food wrappers, and other plastic waste, turning waste into useful and sustainable building materials (Aprilia, 2024). In the Philippines, ecobricks have been used to build playgrounds and community furniture (Missions, 2024), while in Indonesia, ecobrick projects in Bali have helped reduce plastic waste and educate the public about the importance of recycling (Risha et al., 2023). In South Africa, ecobricks have been used to build schools and community centers, demonstrating how this innovation can provide practical solutions and empower local communities (Romatex, 2022). Through these various projects, ecobricks not only help reduce plastic waste but also promote environmental awareness and community empowerment for sustainable waste management.

The socialization of ecobrick use as a solution to plastic waste has been trending recently, with education and socialization of plastic waste management (Dasman et al., 2022; Ragil et al., 2024; Sari et al., 2023), ecobrick education in SD 6 (Islama et al., 2022), ecobricks as a smart solution to plastic waste (Ristanto et al., 2022; Yusuf et al., 2020), ecobricks as a solution for household non-organic waste management in Sayo Baru (Nuruzzaman, 2021), and waste management using ecobricks in Cikakak Village (Siti Septia Aprilia, 2024). However, no research has been conducted on ecobricks as an effort to increase sustainable environmental awareness in the community of Tanjung Baru Village. Therefore, this research needs to be explored for a sustainable future.

Tanjung Baru Village, located in Merbau Mataram District, South Lampung, has a population of 6,541 people (BPS Lampung Selatan, 2021). The dense population results in high waste volume, and the current waste management infrastructure is not yet capable of handling all the waste efficiently, which is one reason this village was chosen as the research site. This article aims to increase sustainable environmental awareness among the residents of Tanjung Baru Village using ecobricks. It is hoped that this research will provide practical solutions for reducing plastic waste and increasing public awareness of the importance of sustainable waste management.

METHOD

The method used in this research is training. The training method is typically employed to provide education to people, usually in the form of outreach or socialization(Fikri et al., 2022; Nuruzzaman, 2021). The following are the stages of this research:

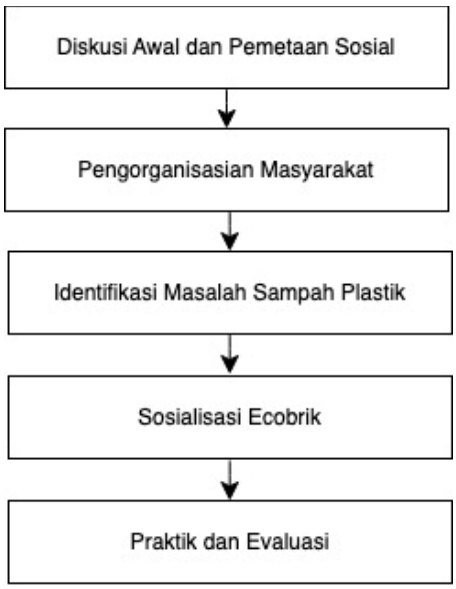

Figure 1. Tahapan-tahapan penelitian

Initial Discussion and Social Mapping

The first stage conducted by the researchers was holding an initial discussion with the village head and the community of Tanjung Baru Village. In this discussion, various issues faced by the community were identified. This discussion was crucial for gaining an initial understanding of the social conditions and existing problems in the village. Following this, social mapping was conducted to depict the community's conditions in more detail. This social mapping involved collecting data

through observations, interviews, and surveys. The purpose of social mapping was to identify the affected community groups, understand social dynamics, and recognize existing potentials and challenges.

Community Organization

After social mapping, the next stage was community organization. This process aimed to formulate specific problems based on the results of social mapping. In this context, the focus was on waste issues, particularly plastic waste. Community organization was carried out by holding regular meetings and group discussions to formulate the causes, background, and solutions to the waste problem. Active participation from the community was essential at this stage to ensure that the solutions formulated met the local needs and conditions. Additionally, community organization helped increase awareness and commitment to participating in the waste management program. Therefore, at this stage, the community was asked to complete a pre-test to assess their level of sustainable environmental awareness before participating in the socialization.

Identification of Plastic Waste Problems

The next stage was identifying the plastic waste problems in Tanjung Baru Village. Plastic waste is the most common type found and poses a significant challenge in waste management in the village. The identification was conducted through surveys and analyses of the types and quantities of plastic waste generated by households and other activities. Based on the identification results, an ecobrick socialization program was designed as a solution to tackle the plastic waste problem. This program involved all elements of the community and village government, aiming to provide understanding and skills in processing plastic waste into ecobricks.

Ecobrick Socialization

Ecobrick socialization was conducted as the primary method of addressing the plastic waste problem in Tanjung Baru Village. This socialization was carried out through outreach to the village community and village government on how to make and use ecobricks. An ecobrick is a plastic waste processing technique where plastic waste is packed tightly into plastic bottles, which can then be used as environmentally friendly building materials. The outreach was designed to provide an understanding of the importance of plastic waste management and the benefits of ecobricks for the environment and the community's economy. This activity also included a hands-on demonstration of how to make ecobricks**.**

Practice and Evaluation

The practice of making ecobricks was conducted directly by socialization participants at the Tanjung Baru Village Hall on August 15, 2023, with 40 participants from the community and village government. This activity aimed to provide practical experience in making ecobricks and to measure the effectiveness of the socialization. Evaluation was conducted to assess the success of the socialization program and the ecobrick-making practice. This evaluation included assessing participants' understanding of ecobricks, the number of ecobricks successfully made, and their potential use in the village. The expected output is the reduction of plastic waste problems through the production of ecobricks with high commercial value.

After participating in the ecobrick socialization and practice, participants will take a post-test to determine whether there has been an increase in sustainable environmental awareness following the socialization and practice sessions. Data analysis in this research was conducted descriptively using both qualitative and quantitative methods. The collected data were analyzed using the Likert scale (Hartanto, 2017).

Table 1. Score Interpretation

No	Category	Score
1	Strongly Agree	5
2	Agree	4
3	Neutral	3
4	Disagree	2
5	Strongly Disagree	1

The percentage feasibility calculation uses the following equation:

$$P = \frac{\sum x}{SM} \; X \; 100\%$$

Explanation:
P = Percentage
∑x = Total Score
SM = Maximum Score

Next, the overall percentage is calculated using the following equation:

$$P = \frac{F}{N}$$

Explanation:
F = Total percentage
N = Number of subjects
P = Percentage

After that, the percentage score results are categorized based on the assessment criteria shown in Table 2.

Table 2. Score Scale Interpretation

Interval	Criteria
$0 < x \leq 20\%$	Very Low
$20\% < x \leq 40\%$	Low
$40\% < x \leq 60\%$	Fairly High
$60\% < x \leq 80\%$	High
$80\% < x \leq 100\%$	Very High

RESULTS AND DISCUSSION

Initial Discussion and Social Mapping

The first stage of this research involved an initial discussion with the village head and the community of Tanjung Baru Village. This discussion identified various issues faced by the community, including waste management. The high percentage of the population in Tanjung Baru Village contributes to the waste problem, as the high levels of consumption and production lead to waste, particularly plastic waste, which has not yet been adequately addressed. Social mapping, conducted through observations, interviews, and surveys, provided a clear picture of the community's conditions, the affected groups, and the existing potentials and challenges.

Community Organization

Community organization was carried out by holding regular meetings and group discussions. These routine discussions aimed to identify the causes, background, and ways to address the waste problem. One of the main factors contributing to the plastic waste problem is the lack of public awareness about the negative impacts of plastic waste on the environment. Many people are unaware of how plastic waste can contaminate soil, water, and even the human food chain. Additionally, the limited waste management facilities pose a significant challenge. Although Tanjung Baru Village has a Village-Owned Enterprise (BUMDes) with a waste management program, the BUMDes has not yet been actively managing it. The BUMDes only collects household waste and is still in the waste sorting stage, without progressing to waste management.

During this stage, a pre-test was also conducted to determine whether the residents of Tanjung Baru Village already have an awareness of sustainable environmental practices.

Table 3. Pre-test Results of Sustainable Environmental Awareness

Indicator	Question	Percentage Result
Awareness of Waste Management	1. I always sort the types of waste in my home	25%
	2. I often use recyclable products.	20%
	3. I understand the importance of reducing single-use plastic.	42%
	4. I actively participate in waste management socialization activities.	50%
	5. I participate in activities to clean the surrounding environment.	80%
Knowledge of Sustainable Environmental Issues	1. I understand the impact of global warming on the environment	30%
	2. I am aware of various types of pollution and their impact on human health.	10%
	3. I understand the importance of preserving biodiversity for ecosystem sustainability.	40%
	4. I know that plastic takes hundreds of years to decompose in nature.	60%
	5. I understand the concept of renewable energy and its benefits for the environment.	30%
Average		**38,7%**

The pre-test results indicate that the community does not yet have sufficient awareness of sustainable environmental practices, with an average score of 38.7%. Therefore, several strategic steps can be taken to address this issue. Education and outreach to the community are crucial for increasing awareness of sustainable environmental practices, plastic waste, and the importance of proper waste management. This program is named "Ecobrick Socialization as a Solution for Plastic Waste Management.

Identification of Plastic Waste Issues

At this stage, the author conducted a survey at the waste disposal site in Tanjung Baru Village, revealing that plastic waste is the most generated type of waste. The data collected shows that the average household produces about 0.5 kg of plastic waste per day. This identification serves as the foundation for designing the ecobrick socialization program.

Ecobrick Socialization

The ecobrick socialization was attended by 40 people from the community and village government. This outreach provided an understanding of the importance of plastic waste management (organic vs. inorganic waste), the impact of plastic waste on the ecosystem, and the process of making ecobricks. The hands-on demonstration helped participants practically understand the ecobrick-making process. The following are the steps to make an ecobrick:

a. Collect used bottles, such as those from mineral water or other plastic packaging. Clean the bottles with water and dry them.
b. Collect all types of plastic or non-organic waste such as paper, detergent wrappers, instant noodle wrappers, snack wrappers, and so on. Ensure the plastic waste is free from food residues and dry.
c. Cut the plastic waste into small pieces.
d. Insert the plastic waste into the plastic bottles. Ensure that the materials used do not contain glass, metal, or other sharp objects.
e. The plastic waste inside the bottle must be compacted until there is no air trapped in the bottle or any empty space left.
f. Use a tool like a stick made of wood or bamboo to compact the plastic waste inside the bottle, ensuring there are no empty spaces.

g. Then, glue the bottles together and shape them according to the initial plan, such as creating a desired form. In this socialization, a flower vase was made.
h. To create more creative products from ecobricks, you can paint them and shape them accordingly.

Setelah mengikuti sosialisasi dan pelatihan ecobrick, peserta melaksanakan post test dengan hasil post test sebagai berikut :

Table 4. Post-test Results of Sustainable Environmental Awareness

Indicator	Question	Percentage Result
Awareness of Waste Management	1. I always sort the types of waste in my home	80%
	2. I often use recyclable products.	73%
	3. I understand the importance of reducing single-use plastic.	82%
	4. I actively participate in waste management socialization activities.	72%
	5. I participate in activities to clean the surrounding environment.	80%
Knowledge of Sustainable Environmental Issues	6. I understand the impact of global warming on the environment	77%
	7. I am aware of various types of pollution and their impact on human health.	82%
	8. I understand the importance of preserving biodiversity for ecosystem sustainability.	70%
	9. I know that plastic takes hundreds of years to decompose in nature.	86%
	10. I understand the concept of renewable energy and its benefits for the environment.	60%
Average		**70,2%**

The post-test results indicate a high level of awareness, showing that the majority of participants have understood and are applying waste sorting practices at home. This signifies success in educating the importance of waste sorting for better management. The very high level of awareness about the long-term impact of plastic was also well understood by the participants.

Practice and Evaluation

The practice of making ecobricks was conducted directly by the socialization participants. As a result, in one session, participants successfully created around two ecobricks. The evaluation showed that participants felt more confident and ready to apply this technique in their homes. Additionally, participants expressed interest in sharing this knowledge with other community members. \

The enthusiasm and spirit of the village community were reflected in the active participation of village residents (especially the women of the PKK) during the socialization and practice sessions. The community listened attentively to the socialization about organic vs. non-organic waste. Organic waste is biodegradable, while non-organic waste is non-biodegradable (Patricia, 2021). The creation of ecobricks has become one of the solutions to address the plastic waste problem. Ecobricks provide an efficient way to recycle waste (Yusuf et al., 2020), as plastic waste takes 1,000 years to decompose

in the soil. Maintaining safety, comfort, and environmental sustainability can be achieved through the creation of ecobricks, which can also contribute to the local economy.

This research aligns with (Fikri et al., 2022) which shows that training methods combined with initial discussions, social mapping, and community organization are effective in increasing awareness and participation in plastic waste management. A participatory approach that actively involves the community is crucial for the success of environmental programs. Ecobricks provide a valuable breakthrough in transforming several changes in waste management in this village. For instance, plastic that was previously used and discarded was only collected by scrap dealers. However, after this socialization, the community became interested in managing plastic waste, particularly plastic waste like plastic bottles, detergent packaging, plastic bags, etc., which are used in daily life. The ecobricks produced during this socialization took the form of flower vases.

Figure 2. Presentation of the Socialization

Figure 3. Hands-on Ecobrick Making Practice

Figure 4. Ecobrick Production Results

Based on the results of the pre-test and post-test, which also support these findings, the post-test results show a significant increase from an average of 38.7% to 70.2%, indicating that the

community's understanding of sustainable environmental awareness in Tanjung Baru Village improved after the training and socialization were conducted. The ecobrick socialization as a solution to the plastic waste problem successfully provided the community with both understanding and practical skills. This aligns with the findings of Suhardi et al. (2024), who stated that outreach and direct demonstrations can enhance practical skills in waste management. With direct demonstrations, participants were able to see firsthand how plastic waste can be processed into useful ecobricks. The practice of making ecobricks not only provided practical experience to the participants but also showed that this method can be easily implemented and has the potential to be further developed. This research is consistent with the study by Rery et al. (2023), which was conducted with the active participation of children at SDN 002 Rambah. The evaluation of this practice showed that participants felt more confident and prepared to apply this technique in their homes. Moreover, the success in creating two ecobricks in a single session demonstrates that this technique can be a practical and effective solution for reducing plastic waste.

The importance of community organization was also clearly evident in this research. Through regular meetings and group discussions, the community was able to better understand the issues they faced and work together to find solutions. Active participation from the community is essential to ensure that the solutions formulated meet local needs and conditions. This also helps increase community awareness and commitment to participating in waste management programs. The participatory and community-based approach in this study offers a solution for addressing environmental issues that can be effectively and sustainably implemented. This is in line with the research by Selintung & Lando (2021), which emphasizes that collective efforts and the involvement of all stakeholders are crucial for tackling climate change challenges and achieving environmental sustainability.

This research provides recommendations for future studies, such as developing more innovative methods and incorporating the latest technology in waste management. Additionally, it is important to expand the scale of the research by involving more community members and measuring the long-term impact of these socialization and training programs on the environment and community welfare. The key point in this socialization is not just about managing plastic waste, which has become ingrained in its use, or merely creating and shaping a product with ecobricks. Instead, it is about educating the community to reduce plastic waste consumption and increasing awareness to make ecobricking a cultural norm..

CONCLUSION

This study successfully demonstrates that the ecobrick training and socialization method is effective in increasing sustainable environmental awareness among the residents of Tanjung Baru Village. Through the stages of initial discussion, social mapping, problem identification, socialization, practice, and evaluation, this research identified the main issues faced by the community related to plastic waste and provided practical solutions to address them. The pre-test results showed that only 38.7% of the community had sustainable environmental awareness before participating in the socialization. However, after the socialization and hands-on practice of making ecobricks, there was a significant increase in sustainable environmental awareness, with post-test results reaching 70.2%. This improvement indicates that the community not only understands the importance of plastic waste management but has also begun to adopt environmentally friendly practices in their daily lives. With these steps, it is hoped that the residents of Tanjung Baru Village can serve as a good example in plastic waste management and the implementation of sustainable environmental practices, supporting global sustainability goals.

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