



Eco-enzym: Manifestasi Kesadaran Lingkungan Dan Strategi Alternatif Membangun Daya Tahan Ekonomi Masyarakat Desa Sukajaya Lembang

Alivia Ata Dinarzah^{1*}, Ikrima Bara Sophia², Rezky Firmansyah³, Yusuf Tri Herlambang⁴, Iim Siti Karimah⁵, Yadi Suryadi⁶, Rahman Wahid⁷, Yoga Prima Putra⁸, Citera Yusrina⁹, Agus Mulyana¹⁰, Farida Amalia¹¹, Budi Hendrawan¹²

¹Elementary School Teacher Education Program, Indonesian University Of Education, Bandung, Indonesia

²Elementary School Teacher Education Program, Indonesian University Of Education, Bandung, Indonesia

³Elementary School Teacher Education Program, Indonesian University Of Education, Bandung, Indonesia

⁴ French language study program, Indonesian University of Education, Bandung, Indonesia

⁵Elementary School Teacher Education Program, Indonesian University Of Education, Bandung, Indonesia

⁶Graduate school, educational administration study program, Indonesian University of Education, Bandung, Indonesia

⁷Elementary School Teacher Education Program, Darul Falah Institute, Bandung, Indonesia

⁸Graduate school, Indonesian language and literature study program, Indonesian University of Education, Bandung, Indonesia

⁹ Multiliteracy Education and Training Institution, Bandung, Indonesia

¹⁰Elementary School Teacher Education Program, Indonesian University Of Education, Bandung, Indonesia

¹¹ French language study program, Indonesian University Of Education, Bandung, Indonesia

¹² Elementary school teacher education study program, Muhammadiyah University of Tasikmalaya, Tasikmalaya, Indonesia

* Correspondence author: yusufth@upi.edu

Article Info:

Submitted: 04 April 2024

Revised: 01 Mei 2024

Accepted: 25 Juni 2024

ABSTRACT: *Low public awareness of waste issues is the primary factor driving the continued increase in environmental waste accumulation. Poorly managed waste accumulation has a negative impact on the environment. In addition to causing environmental pollution, this accumulation of waste can negatively affect soil and air quality due to methane produced by the decomposition of poorly managed waste. In this regard, education and solutions are needed to address these problems. Eco-enzymes are one solution that can be applied in the community to tackle the waste problem. Eco-enzymes are products that can benefit the environment because they are produced through fermentation of natural ingredients such as organic waste, sugar, and water, which can reduce the potential for environmental pollution caused by poorly managed waste. Eco-enzymes can be used as natural cleaners, natural fertilizers, and can even improve the condition of polluted river water and restore soil fertility. In the context of community service, eco-enzymes are not only beneficial to the environment, but can also have a positive impact on the community's economy through the sale of eco-enzyme products to farmers and the wider community.*

Keywords: *Eco-enzymes, Environmental Awareness, Economic Resilience.*

INTRODUCTION

This community service program is implemented based on the existing reality

that Indonesia is still experiencing serious problems related to waste management, one of which is caused by population growth



accompanied by community activities and a lack of public awareness of waste management (Idris, 2022; Fitriandeski, 2023; Rahman, 2021). The increasing population growth accompanied by increased community activities has led to a significant increase in the amount of waste. This certainly requires serious alternative solutions in both structural and operational dimensions, from the government to the community itself. The Directorate General of Waste, Waste Management and Hazardous Waste (Ditjen PSLB3) stated that the volume of waste in Indonesia in 2022 was recorded at 68.5 million tons, and in 2022 it increased to 70 million tons (Yuni, 2023). The Head of the West Java Provincial Environment Agency, Mayaningtias (in Shafa, 2022), explained that the people of West Java produce 23,000 tons of waste every day. Of this fantastic figure, 40% is caused by waste that has not been properly managed. The lack of knowledge and awareness among the community about waste management has resulted in environmental pollution, which has a negative impact on people's lives (Herlambang, 2018; Abidin, et al., 2022). This environmental pollution occurs because of the community's indifference to the environment, such as littering (Saputra, et al., 2022; Sujarta, 2021).

In relation to the above, in recent years, the impact of climate change and population growth has exacerbated environmental problems in Nagrak Village, Sukajaya Village. The presence of migrants and increased community activity in Sukajaya Village, as well as low public awareness of environmental issues, have been the main triggers (Yulistiar, 2023). In addition, the situation is exacerbated by increasing consumption patterns and suboptimal waste management, resulting in uncontrolled waste accumulation in Sukajaya Village. Poorly managed organic waste has become a major problem that threatens environmental health and reduces the quality

of life of the community. Therefore, there is a need for alternative solutions to tackle these problems effectively and efficiently, as well as provide benefits to the community, one of which is through the application of the eco-enzyme method in waste management, especially household waste.

Eco-enzymes are products that can protect the earth from damage caused by methane gas originating from the decomposition of organic waste (Abidin, et al., 2022). This product is the result of the fermentation of organic waste that most people consider unusable (Budiyanto, et al., 2022; Dewi, 2021). Eco-enzymes can be used as environmentally friendly fertilizers and organic cleaners, such as hand soap, detergent, shampoo, and floor cleaner (Pranata, et al., 2021; Junaidi, et al., 2021). In addition to reducing organic waste, eco-enzymes also utilize inorganic waste as fermentation containers, such as used plastic beverage bottles (Septiani, et al., 2021; Pribadi, et al., 2022). The implementation of organic waste management into eco-enzymes is expected to minimize the problems caused by waste to the environment and build community economic resilience (Saputra, et al., 2022). Although eco-enzymes have been proven to provide many benefits, not a few people lack awareness and understanding of eco-enzymes as a solution for organic waste management. In addition, eco-enzymes can be an alternative in building community economic resilience (Rambe, 2021). Based on this, the process of waste management through the production and use of eco-enzymes as a multipurpose natural liquid that can be used as a natural cleaner, improve soil fertility, and increase the economic resilience of the Sukajaya Village community as a partner is of high urgency.

METHOD

The approach used to support the implementation of this community service

program is participatory empowerment, which is divided into several systematic stages. These stages are visualized in the following figure:

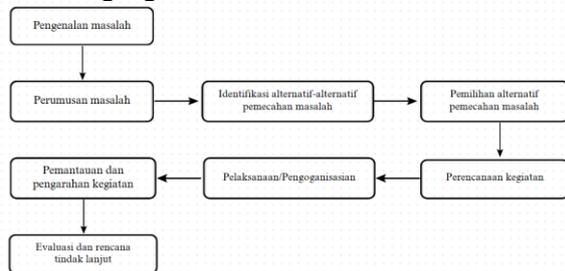


Figure 1. Program Implementation Flow Chart

The above activity flow chart can be explained as follows:

1. Problem Identification: At this stage, the team gathered information through reflective analysis and surveys of the partner location to review the conditions of the area and characteristics of the partner community, as well as to identify waste-related problems experienced by the community.
2. Problem Formulation: At the problem formulation stage, the team conducted interviews with the community, particularly residents and youth organizations in RW 008 Kampung Nagrak, Sukajaya Village, regarding problems in the processing and management of organic waste that occur in the community, accompanied by recording the necessary data.
3. Identification of Alternative Solutions: After determining the problem formulation, the team formulated various alternative solutions to address the problem formulation based on the conditions or realities occurring in the community, namely the lack of community awareness of environmental issues, particularly regarding waste processing and management.
4. Selection of Alternative Solutions: After identifying alternative solutions, the team initiated an eco-enzyme project as an alternative solution to build environmental awareness and economic resilience in the community to address the existing problems.

5. Program Planning: The program planning stage was a stage of consensus between the team and the RW 008 Kampung Nagrak, Sukajaya Village government in determining the orientation of activities, including: activity plans, implementation times, activity forms, and monitoring and evaluation of activities to be carried out, in coordination with the supervising lecturer.

6. Implementation/Organization: The implementation stage is the stage of implementing community service activities, which is carried out through a series of activities beginning with the socialization of activities. At this socialization stage, residents of RW 008 Kampung Nagrak were given material on waste processing and management through the application of eco-enzymes to maintain environmental health and build community economic resilience. After the community was provided with materials on eco-enzymes, they continued with the practice of making eco-enzymes together, which was demonstrated in advance and guided by the team.

7. Activity Monitoring and Guidance: The activity monitoring and guidance stage is the stage of controlling the program implementation process. This stage is carried out to monitor the program's impact on environmental awareness, production sustainability, eco-enzyme marketing, and closer commitments with various parties, especially those involved in the community, as well as to ensure that activities do not deviate from the predetermined objectives.

8. Evaluation and Follow-up Plan: In the evaluation and follow-up plan stage, the implementation team conducts a comprehensive evaluation to assess the program's success rate by reviewing the impact of the program that has been implemented in building environmental awareness and community economic resilience, as well as program sustainability.

RESULTS AND DISCUSSION

A. Result

The implementation of a program related to organic waste management through eco-enzymes in Sukajaya Village, Lembang District, has had a significant impact on increasing environmental awareness and the economic resilience of the local community. The initial phase of the program involved determining target areas and objects based on research findings from several stages of analysis and mapping. These steps enabled accurate identification of areas requiring organic waste management intervention. This was followed by surveys and field observations in the designated areas to identify concrete problems faced by the village community in organic waste management, as well as potential opportunities that could be utilized to improve the program's effectiveness.

increasing with waste efficiently and population growth environmentally friendly. and economic activity.

4. Financial constraints, children dropping out of school, unemployment, and helping parents with work. Eco-enzymes have the potential to increase community resilience by selling the resulting eco-enzymes to farmers and the wider community.

After understanding the problems and potential that can truly be utilized in Sukajaya Village, the next step is to obtain permits and coordinate with various parties related to the implementation of the program, especially the Village Head, RW Head, and Head of the Karang Taruna of Nagrak Village, Sukajaya Village.



Figure 2. Coordination with Community Partners

The positive response from partners to this program indicates a strong level of support and indicates that the program has the potential to be widely accepted by the community in RW 008, Nagrak Village, Sukajaya Village. Next, the research team developed a program implementation schedule and designed outreach materials focused on organic waste utilization. The goal of this activity was to raise environmental awareness and sustainability, as well as improve the community's economic resilience. The program implementation schedule was structured and systematic, taking into account the routine activities of the community in RW 008, Nagrak Village, Sukajaya Village. This was intended to ensure the program was well integrated into daily life.

No	Permasalahan	Potensi
1.	Increase in organic waste from fruit and vegetable farming in the Lembang area, especially Sukajaya village	The increasing production of organic waste from fruit and vegetable farming can be a potential opportunity for the development of eco-enzymes. The use of eco-enzymes in organic waste processing can reduce the negative impacts caused by organic waste on the environment..
2.	The impact of the use of pesticides and chemical fertilizers on the environment which has the potential to damage the environmental ecosystem	The development of eco-enzymes as an environmentally friendly alternative can reduce dependence on pesticides and chemical fertilizers.
3.	Challenges in household waste management are	The production of eco-enzymes can be a solution for managing household



Figure 3. Socialization of the Organic Waste Management Program Using Eco-enzymes
The first socialization was held at the Al-Furqon Grand Mosque, RW 008, Nagrak Hamlet, Sukajaya Village. The response from participants, especially mothers, to the initial introduction of the program was very positive and they fully supported its implementation. This response demonstrates the program's potential for growth. The face-to-face approach allows for direct interaction between organizers and participants, allowing for the exchange of information, questions, and clarifications that strengthen understanding and commitment to the program. The community's active participation in the program introduction underscores their important role in supporting and promoting the program at the household and local community levels.



Figure 4. Eco-enzyme Production Training with Community Partners

B. Discussion

This scientific article discusses the background to the organic waste management problem in Nagrak Village, which triggered the initiation of the eco-enzyme program. The program's objectives include reducing environmental pollution, more effective organic waste management, and increasing environmental and economic awareness in the community. The program's implementation results show significant positive impacts, including increased environmental awareness, expanded use of eco-enzymes, community economic

empowerment, and the creation of a cleaner environment. The program's implementation method was systematic, from problem identification to evaluation and follow-up planning. The program also includes sustainability strategies, such as ongoing training, partnerships, monitoring, and regular evaluation. Therefore, it can be concluded that the Community Service Program (PKM-PM) "Eco-enzyme: An Alternative Solution in Building Environmental Awareness and Community Economic Resilience" program is a significant step in addressing the organic waste problem and improving the well-being of the community in Nagrak Village.

CONCLUSION

Based on research results and program implementation, it can be concluded that the application of organic waste management methods through eco-enzymes has successfully increased environmental awareness and built economic resilience in the Sukajaya Village community, Lembang District. Eco-enzymes have proven effective in reducing environmental pollution, increasing the efficiency of organic waste management, and providing economic benefits through product sales. This program has also succeeded in educating the community about the importance of waste management and empowering them to create a cleaner and healthier environment.

ACKNOWLEDGEMENT

The author would like to thank the Directorate General of Higher Education, Research, and Technology (Ditjen Dikti Ristek) through the Directorate of Learning and Student Affairs (Belmawa) for providing funding assistance for the activity. The author would also like to thank Dr. Tita Mulyati, M.Pd., as the head of the PGSD study program at UPI Campus in Cibiru and Dr. Yusuf Tri Herlambang, M.Pd., MCE., as the

supervisor of the community service activity that has been carried out.

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