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Innovation in Utilizing Plastic Waste into Ecobrick Pots at SD Negeri Keleyan 1 Socah Bangkalan

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ABSTRACT

Plastic waste is one of the major environmental problems that continues to increase, including within school environments. Its non-biodegradable nature makes plastic a type of waste that potentially pollutes soil, water, and air if not properly managed. This study aims to evaluate the effectiveness of an ecobrick pot-making program in reducing the amount of plastic waste at SD Negeri Keleyan 1 Socah Bangkalan, to raise students' and teachers' awareness of sustainable waste management, and to assess the use of ecobricks as planting media. This research employed a qualitative approach with an Action Research method carried out through the stages of planning, action, observation, and reflection. Data collection techniques included observation, interviews, and documentation. The results showed that the ecobrick program successfully reduced the amount of scattered plastic waste, prevented waste-burning practices, and transformed plastic into useful planting pots. In addition, the program enhanced the participation of students, teachers, and parents in maintaining school cleanliness and fostered collective awareness of environmentally friendly behavior. In conclusion, the ecobrick program at SD Negeri Keleyan 1 Socah Bangkalan proved effective in reducing plastic waste accumulation while simultaneously supporting school greening activities through the utilization of ecobricks as planting media.

A. INTRODUCTION

Waste is one of the main environmental problems faced by many countries, including Indonesia. Plastic waste has now polluted the soil, rivers, and oceans. Because plastic does not easily decompose naturally, plastic waste becomes very difficult to eliminate (Jumyetti, Rahmi Hidayati, Rina, Januar Putra, 2023) In addition, plastic waste is a common and dominant type of waste used today because its structure is durable, light, flexible, affordable, and easy to obtain. As a result, the amount of plastic waste continues to increase over time.

At SDN Keleyan 1, the issue of waste accumulation was clearly visible before the implementation of the program. Many areas within the school, including playgrounds, corridors, and surrounding drainage systems, showed piles of plastic and other non-biodegradable waste. This ongoing accumulation posed health risks to students and staff, disrupted school cleanliness, and highlighted the urgent need for an effective waste management program. Accumulation of waste has the potential to pollute the environment and increase the risk of various diseases (Ekawandani & Kusuma, 2018) Therefore, SDN Keleyan 1 was specifically chosen to address this environmental gap and serve as a model for proper waste handling practices in schools.

According to Sulistiyani (2022), based on data from the National Waste Management Information System (SIPSN), plastic waste ranks second after food waste, with a percentage of 18.1% of the total national waste generation in 2021. This figure shows a significant increase compared to 2005, which was only 11%, then rose to 15% in 2015, 16% in 2016, and finally reached 18.1% at the end of 2021. This indicates that the growth of plastic waste in Indonesia continues to increase from year to year, so more serious management efforts are needed to reduce its impact on the environment. This data also illustrates that plastic waste is the second largest contributor after organic waste in the total national waste production. According to data from the Ministry of Environment and Forestry (KLHK), 18.5% of the total 35.48 million tons of national waste is plastic waste, meaning that around 6.56 million tons of plastic waste is generated in a year (Nia Sasria, Vita Nur Afifah, Alma Alfiani, Muthia Putri Darsini Lubis, 2024)

Indonesia is the second-largest country in the world after China in terms of plastic waste entering the oceans, with around 187.2 million tons. This is supported by data from the Ministry of Environment and Forestry, which states that plastic waste produced from 100 stores or members of the Indonesian Retail Entrepreneurs Association (APRINDO) within one year can reach around 10.95 million pieces of plastic bags. This amount is equivalent to an area of 65.7 hectares of plastic bags (Purwaningrum, 2016)

Plastic is made from petrochemical substances that are very dangerous when they re-enter the environment. Research shows that these chemical substances are harmful to life, especially humans (Wisnu Pratama Nuruzzaman, Marianti, Agisniati Zain, Desi Rosmaya Putri, Mitha Amara & Sukerta, Vira Heryanto, Putri Jauhar Prihatini, Rr. Devi Delima Swiswidayati, 2021) The burning of plastic waste can trigger toxic gases such as carbon monoxide (CO) and hydrogen cyanide (HCN). Plastic that is burned, scattered, or thrown away will decompose into toxic chemical substances that then seep into the soil, water, and air. If these substances reach living environments, they can cause birth defects, hormonal disorders, and cancer. Even advanced landfill facilities are not an ideal solution because these chemicals will still seep into the biosphere or the living environment, which significantly affects human survival (Istirokhatun & Nugraha, 2020)

From a social science perspective, addressing the problem of plastic waste can be carried out through policy-based approaches (Astuti, 2016) One way to overcome plastic waste is by applying the principles of reduce, reuse, and recycle so that plastic waste, which is difficult to decompose, can be properly utilized and does not pollute the surrounding environment (Maria Carmelita Tali Wangge, Ngurah Mahendra Dinatha, Maria Yuliana Kua et al., 2023) Making ecobricks is one efficient way to manage large amounts of plastic waste. In addition, this unique, interesting, and applicable method can be carried out by the community because it does not require special skills. Waste management through ecobricks indirectly plays an important role in maintaining environmental ecosystem balance by minimizing the amount of plastic waste (M.Si, 2022)

Ecobricks are one method of processing plastic waste into environmentally friendly material. The term *ecobrick* comes from two English words: *eco*, meaning environmentally friendly, and *brick*, meaning brick (Pratiwi, 2025) Therefore, ecobricks can be used not only as artwork but also as alternative materials in building construction. The process is carried out by filling plastic bottles with soft plastic waste that has been cleaned until the bottles become dense and hard. This technique is not only aimed at reducing the volume of plastic waste but also at extending the useful life of plastic by turning it into a functional product. Ecobricks refer to plastic bottles that are tightly filled with plastic waste so that they have a solid structure (Ayyu Lailuki Azma, Oky Tania Savitri, Berlyana Andriani & Sinduwiatmo, 2024) This method is considered a practical solution in daily life to reduce plastic waste by transforming it into useful products. Ecobricks can be used for various purposes, such as materials for making furniture, decorative interior elements, and simple construction components (Pratiwi, 2025)

Ecobricks can be made anytime and anywhere, and they can be done individually or in groups to fill leisure time. Anyone who is part of a community can make ecobrick products, including children (Sakuntalawati & Ibad, 2021) Therefore, efforts were made to introduce and promote the use of ecobricks to the community, especially students at SD Negeri Keleyan 1 Socah Bangkalan. The purpose of this activity is to reduce the buildup of plastic waste and to equip the community, particularly elementary school students, with the skills to recycle plastic into something useful—in this case, ecobrick pots as planting media. In this way, plastic that was initially waste can be given new functional value while also supporting the school's greening movement.

B. METHODS

This study uses a qualitative approach with an Action Research method, carried out through several stages: planning, action, observation, and reflection.

1. Planning
   At this stage, problems related to plastic waste management in the environment of SD Negeri Keleyan 1 Socah Bangkalan were identified. Based on the results of this identification, an innovation program was designed in the form of utilizing plastic waste into ecobrick pots as planting media.
2. Action
   This stage involves implementing ecobrick pot–making activities at school, actively engaging students and teachers in collecting plastic waste, cutting it, compacting it into used plastic bottles, until the ecobricks are formed and ready to be used as plant pots.
3. Observation
   Observation was carried out throughout the activity to monitor student involvement, record any obstacles that arose, and document the process through field notes, photos, and videos.
4. Reflection
   The collected data were then analyzed descriptively to evaluate the effectiveness of the ecobrick pot–making program in reducing plastic waste at school. Reflection was also used to identify the impact of the activity on students' awareness of the importance of waste management, as well as to formulate recommendations for the sustainability of the program in the future.

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C. RESULTS AND DISCUSSION

1. PROGRAM IMPLEMENTATION

Training and assistance in making ecobricks at SD Negeri Keleyan 1 Socah Bangkalan were carried out through the community service (KKN) work program entitled "Training on Inorganic Waste Processing (Ecobricks)." The tools and materials used in making ecobricks were used 600 ml plastic bottles, household plastic waste, string, and wooden sticks to help compress the plastic so it becomes dense. The plastic bottles and household plastic waste were obtained from residents around the school as well as from students who brought plastic waste from home.

The activity began with socialization and counseling for teachers and students about the importance of managing plastic waste into new products that have functional value. Ecobricks were chosen as an alternative solution to process plastic bottles and household plastic waste that had previously only been burned or thrown away. With ecobricks, environmental pollution caused by plastic can be reduced because the waste is reused as filler material for the bottles (Farahdiansari et al., 2025) The purpose of ecobricks is not to destroy plastic, but to recycle it so that it has utility and economic value (Candra et al., 2023)

Making ecobricks does not require special skills or large costs because the main materials come from household or school plastic waste. This activity can also be carried out at any time, either individually or in groups (Samad et al., 2021) The ecobrick products made at SD Negeri Keleyan 1 Socah Bangkalan were focused on making plant pots as growing media to support the greening of the school environment. The steps in making ecobricks include: sorting the plastic bottles to be used, filling the bottles with plastic waste until they are dense, tightly closing the bottles after they are full, and then arranging the ecobricks as needed (RD Hera Merdeka Khazinatul Khaeriah, Siti Wulandari, Nurul Lailatul Qodriyati & Lestari, Tiktik Dewi Sartika, Amanda, 2024) In this activity, the ecobricks were arranged and shaped into creative plant pots, which were then used to plant various types of ornamental plants and vegetables in the school environment. Through this activity, students not only learned about waste management but were also trained to care for the environment through hands-on practice in utilizing plastic waste as useful planting media.

The steps for making ecobricks at SD Negeri Keleyan 1 Socah Bangkalan are as follows:

1. Collection of Plastic Waste

   Students were encouraged to collect plastic waste, gallon waste, and used 600 ml bottles. The collected waste had to be clean and dry. The sources of waste came from the school canteen, students' homes, and the surrounding environment.

Figure 1.1 Gallon Waste Collection

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2. Processing Plastic Waste

The collected plastic waste is washed thoroughly to remove any food residue or dirt, then dried completely. After that, the students and facilitators work together in assembling the ecobrick pots by tying the ecobrick bottles with string so that they are neatly and firmly arranged. This stage trains students to work as a team and to understand the principles of reuse and recycle in plastic waste management.

Figure 1.2 Students Arranging Ecobrick Bottles into Pot Shapes

3. Making Ecobricks

The next process is filling the ecobrick pots with soil. The students take turns helping to put the growing media, in the form of soil and fertilizer, into the pots that have been formed while planting ornamental plants.

Figure 1.3 Assistance for Students in Making Ecobricks

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Figure 1.4 The Process of Tying Plastic Bottles to Form an Ecobrick Pot

Figure 1.5 Students Working Together in the Ecobrick-Making Activity

Figure 1.6 Group Photo with the Completed Ecobrick Pots as the Final Result of the Activity

B. THE PROGRAM'S IMPACT ON REDUCING PLASTIC WASTE

The ecobrick program implemented at SD Negeri Keleyan 1 Socah Bangkalan has had a direct impact on plastic waste management in the school environment. Plastic waste that is scattered, burned, or discarded can produce toxic chemicals. Plastic must be removed or processed as well as possible to prevent harmful effects on life (Andriastuti, 2019) The function of ecobricks is not only to deal with plastic waste but also to extend the life of plastic materials by turning them into something very useful for human needs. The impact of this program can be seen from three main aspects:

1. Reduction in the Amount of Scattered Waste

   Before the ecobrick program was implemented, plastic waste was often found in areas of the school such as the yard, garden, and canteen. After the program was introduced, the amount of scattered waste decreased significantly because students had a means to manage it. This is in line with the theory of planned behavior, which explains that individuals are more likely to perform positive actions when provided with a clear mechanism to address a problem, in this case, waste management (Wardani et al., 2025)
2. More Effective Utilization of Waste

   Plastic waste that was previously considered useless is now processed into the main material for making ecobricks. The principle of the circular economy is highly relevant, as waste that is usually discarded can be reused in the form of durable products, such as ecobrick pots used as planting media at school (Geissdoerfer et al., 2017) The 3R concept (reduce, reuse, recycle) and sustainable waste management theory are also reflected in this practice, reducing dependence on waste burning and minimizing negative environmental impacts (Rahmi et al., 2024)
3. Program Sustainability in Maintaining School Cleanliness

   The ecobrick program serves as a long-term solution in creating a sustainable waste management system. By involving students, teachers, and parents, this program not only contributes to the cleanliness of the school environment but also fosters collective awareness of the importance of pro-environmental behavior. According to sustainable development theory, environmental solutions must consider long-term benefits. Ecobricks meet this principle because, in addition to reducing current waste, they also shape new habits in future waste management (Budiman et al., 2024)

   Thus, the ecobrick program has proven effective in reducing the amount of plastic waste at school through three main aspects: reduced scattered waste, increased utilization of waste, and the creation of a sustainable waste management system. In addition, the program enhances the awareness of students and teachers regarding the importance of protecting the environment, thereby shaping environmentally friendly behavior that can be applied in daily life.

C. THE PROGRAM'S IMPACT ON TEACHER AND STUDENT AWARENESS

The impact of the ecobrick program on student and teacher awareness is an important aspect in assessing the success of its implementation at school. This program does not only function as an effort in waste management, but also influences changes in environmental attitudes and behavior among school members (Sumaya et al., 2024) The ecobrick program has a real influence on improving students' environmental awareness. They begin to realize the importance of managing plastic waste by bringing waste from home to be processed into ecobricks. This is in line with environmental behavior change theory, which states that environmental behavior can change when individuals understand the negative impact of their actions on the environment and know practical ways to make positive contributions (Lestari et al., 2025)

This awareness grows because students understand that the waste they produce can be transformed into something useful, such as ecobricks. In accordance with experiential learning cycle theory, direct experience in collecting, cutting, and compacting plastic waste becomes a trigger for awareness, as students go through a process of reflection and real-life practice (Chin et al., 2025) To increasing awareness, the ecobrick program also encourages changes in student behavior. They become more disciplined in disposing of waste in the proper place and participate actively in reducing plastic waste at school. This can be explained through the Theory of Planned Behavior, which states that behavior is influenced by individual intention, positive attitudes, social norms, and perceived behavioral control (Wardani et al., 2025) In this context, students have positive attitudes because they see the benefits of ecobricks, are supported by social norms from teachers and peers, and feel capable of contributing by bringing waste from home and making ecobricks.

D. CONCLUSION

The activity of utilizing plastic waste through the making of ecobrick pots at SD Negeri Keleyan 1 Socah Bangkalan has shown positive results and has had a real impact on the cleanliness and beauty of the school environment. Through this activity, the amount of plastic waste has been successfully reduced, the habit of burning waste has been minimized, and plastic waste that previously had no value has been transformed into useful plant pots. In addition, this activity has increased the knowledge and awareness of students and teachers about the importance of sustainable waste management by applying the 3R principles (reduce, reuse, recycle), while also fostering a sense of responsibility for environmental cleanliness and sustainability.

As a recommendation, similar activities in the future need to be carried out sustainably and integrated into school programs so that their benefits can be felt more widely. This program can serve as an educational model for other schools in efforts to foster environmental awareness from an early age. Further research is recommended to explore new innovations in the utilization of plastic waste or to assess the long-term impact of ecobrick activities on students' behavior in maintaining environmental cleanliness.

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F. AUTHOR CONTRIBUTIONS

Activity implementation: Hendra Herlambang Nugroho (HHN), Achmad Amrosi (AA), Annisa Putri Azalia Maulidina (APAM), M. Fadlillah (MF). Article preparation: Hendra Herlambang Nugroho (HHN), Annisa Putri Azalia Maulidina (APAM), M. Fadlillah (MF). Impact analysis: Hendra Herlambang Nugroho (HHN), Achmad Amrosi (AA), M. Fadlillah (MF). Presentation of results: Hendra Herlambang Nugroho (HHN), Annisa Putri Azalia Maulidina (APAM). Article revision: M. Fadlillah (MF), Hendra Herlambang Nugroho

(HHN). Other contributions (coordination with the school, activity documentation, and final report preparation): Hendra Herlambang Nugroho (HHN), Achmad Amrosi (AA), Annisa Putri Azalia Maulidina (APAM).

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