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Creativity and Innovation of the Community Based on Plastic Waste in Ubung Kaja Village, Bali

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Abstract
This community service activity aims to reduce the abundance of plastic waste, particularly plastic bottles, in the Ubung Kaja Village environment. After participating in this activity, participants will learn how to make chairs from used plastic bottles and process plastic waste, making the resulting products marketable. One of the efforts to tackle non-organic waste (such as plastic bottles and plastic bags) is to create chairs, tables, and beds with high market value. The aim and benefit of this community activity is to develop appropriate technology for managing plastic and bottle waste, thereby reducing the increasing volume of plastic waste. Ecobricks, commonly known as environmentally friendly bricks, are a method to minimize waste by filling plastic bottles with non-organic waste until they are completely solid and compact. This practice also educates children about non-organic waste, demonstrating how it can be repurposed into useful items like tables or chairs instead of waste.

Keywords:
Ecobrick, Plastic waste, Non-Organic, Creativity, Innovation.

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INTRODUCTION

Plastic waste poses a serious threat to the environment. Not only is its quantity continuously increasing, but plastic bags are also a type of waste that is difficult to decompose naturally (non-biodegradable) and are one of the xenobiotic pollutants (pollutants not recognized by biological systems in the environment, causing pollutant compounds to accumulate in nature) (Laksmi et al., 2023). The impacts of plastic waste include air pollution when burned openly, which can lead to cancer, and in higher doses, it can cause severe skin diseases like 'chloracne.' Plastic waste contaminates water channels, irrigation systems, rivers, lakes, beaches, and soil. Plastic waste can clog waterways and rivers significantly, leading to floods (Umam & Astuti, 2022; Veronica et al., 2020).

Plastic waste is a major environmental pollutant, affecting both land and sea. Its non-degradable nature, toxic processing by-products, and carcinogenic properties make it a long-term environmental threat, requiring hundreds of years to decompose naturally. Plastic waste is almost unavoidable, appearing everywhere in our surroundings (Saputra & Laksmi, 2024). Notably, various plastic products now come with specific codes indicating the type of plastic material which facilitates recycling (Bagheri et al., 2021; Saputra et al., 2021).

Plastic waste is difficult to break down, taking decades or even centuries to decompose. Therefore, alternative solutions are needed to manage plastic waste effectively. Due to its prolonged degradation period, 57% of the waste found on beaches consists of plastic. Around 46,000 plastic pieces float in every square mile of the ocean, with the depth of plastic waste in the Pacific Ocean reaching nearly 100 meters. Additionally, over 1 million birds and 100,000 marine animals are affected by plastic waste. According to domestic waste statistics, plastic waste ranks second in Indonesia, totalling 5.4 million tons yearly or 14% of the total waste. Consequently, plastic waste has overtaken paper waste, which previously held the second rank, now accounting for 3.6 million tons per year or 9% of total waste production (Rao, 2020; Žalėnienė & Pereira, 2021). Plastic waste can be recycled and reused into useful items. Unfortunately, education about plastic waste in Indonesia is not yet optimal. Many people are accustomed to disposing of plastic waste without separating it from other types of waste (Manurung et al., 2022). Mixed plastic waste becomes more challenging to recycle, and many

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people intentionally or unintentionally litter in natural recreational areas like beaches and mountains, causing plastic waste to end up at the bottom of the sea or in rivers (Saputra, 2020).

The impact of plastic waste on the environment is indeed hazardous. Additionally, its chemical components can break down into microplastics, adversely affecting human health. However, CNNIndonesia.com mentioned in an article that plastic waste also has economic value through recycling. For example, plastic bags can be sold for Rp500 – Rp1000 per kilogram. Collectors can also sell plastic bottles and their caps at even higher prices. If the use of plastic is banned, there is a potential loss of economic circulation that could harm the recycling industry. Based on this phenomenon, the student work program from Warmadewa University involves processing plastic bottles into useful items and training the community of Ubung Kaja Village to care for the environment by fostering creativity and innovation among the residents.

Plastic Waste Management. Plastic waste is a primary focus that needs to be addressed globally, and effective plastic waste management is essential to reduce the amount of waste in the world. A study from the journal Science states that 24-34 million metric tons of plastic waste enter the marine environment each year, which accounts for about 11% of the total plastic waste globally. Plastic waste presents various issues that need to be addressed beyond its large volume, such as the very long decomposition time (Christian & Alhazami, 2023). It takes at least 60 to 70 years for plastic to decompose completely. However, the impact continues, as there are still many shortcomings visible from an ecosystem perspective. Decomposed plastic also generates microplastics that affect surrounding animals, such as fish and shellfish. It is no surprise that the 3R method (Reduce, Reuse, Recycle) is promoted to ensure optimal utilization of plastic waste. Recycling plastic waste to provide economic value is commonly practised for various needs. In addition to companies generating plastic waste through the Reuse method to transform it into new plastic products, recycling can be performed by all layers of society, such as creating beneficial processing (Purnamawati et al., 2024).

Community Creativity. The beneficial processing of plastic waste that can be used in daily life includes various applications, such as creating large plant pots from unused gallon containers. Many plants can also be used as growing media (Cucchiella et al., 2014). Not only can valuable items be produced, but toys can also be made from plastic waste. Toys made from plastic can vary widely in shape or design. Unused plastic waste can also be repurposed to create woven bags for shopping. It is no surprise that the durability of plastic waste allows it to have a long lifespan, as this material is also difficult to decompose. Children's piggy banks can be created from plastic waste by using unused plastic bottles. Opening the piggy bank is made easy with a removable bottle cap. Accessories can also be stored in unused plastic containers. This utility is especially beneficial for keeping small accessories organized, as they are prone to getting lost if placed in non-specialized storage. Various types of accessories, such as bracelets, necklaces, rings, earrings, and more, can be housed in specially created containers made from recycled plastic bottles.

METHODS

The community service activity took place at the Ubung Kaja Village Hall, with the participants consisting of elementary school students and other community members, totalling 40 participants. The activity involved the Socialization and Training on Plastic Waste Management for crafts. The implementation was divided into several phases:

1. Preparation Phase
2. Execution Phase
3. Reporting Phase

The socialization was conducted through a lecture method, interspersed with ice-breaking activities for the students to keep the atmosphere engaging. The student team also gave the participants light snacks and bottled tea drinks. Two speakers from Warmadewa University students then presented the material, focusing on the definition of plastic waste and the 4R-based waste

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management approach (Reduce, Reuse, Recycle, Replace). After the presentation, there was a Q&A session between the speakers and the participants to assess their understanding of the plastic waste management material.

Following the socialization, the practical plastic waste management training was conducted by student instructors. For the hands-on part, participants were divided into five groups and tasked with practising waste recycling. The materials used were primarily the plastic bottles from the snacks consumed during the event. The training was supervised by the student team, who not only assisted the participants if they encountered difficulties but also provided the necessary tools to help them turn the waste into valuable items, empowering them with the skills to make a difference in their community.

RESULT AND DISCUSSION

Ways to Reduce Plastic Waste. The use of single-use items is gradually being reduced. A small yet consistent step in this direction is using more easily degradable organic materials. In addition to reducing plastic waste, people have started carrying stainless steel or wooden utensils, especially during the pandemic. These small habits help reduce the potential waste from single-use plastic utensils. Here are a few other actions that can be taken to reduce plastic waste:

Cooking at Home: In the digital era, it has become easier to order ready-to-eat food. However, every time you purchase food packaged in plastic, you contribute to plastic waste. By cooking at home, you can reduce this waste.

Buying Raw Materials in Larger Quantities: If you often buy small packages of spices or cleaning products, try purchasing them in larger sizes. This way, you can reduce plastic waste. For example, you can store snacks like chips in large jars or containers to keep them fresh for longer.

Bringing a Shopping Bag When Going Out: This habit is common when planning to shop at supermarkets or minimarkets. Ensure you always carry a shopping bag when going out, as some places no longer provide plastic bags. Even if you do not plan to shop, it is good to be prepared.

Using Reusable Utensils: Many restaurants have stopped using single-use utensils. Although some may still use plastic straws, it is more convenient to use your straws and utensils. Reusable stainless steel utensils are not only cleaner but also more practical for cutting tougher foods.

Replacing Wet Wipes with a Cloth: Many people use wet wipes to clean surfaces at home, but wet wipes often contain plastic resins that are difficult to dissolve in water. It is wiser to replace wet wipes with a damp cloth.

Plastic Bottle Chairs. Plastic waste is a significant environmental challenge. Burning plastic waste can damage the ozone layer, and burying it will not allow it to decompose naturally. The best way to handle plastic waste is to recycle it. This is what students from Warmadewa University did in collaboration with the Ubung Kaja Village community. They turned discarded items, such as plastic mineral water bottles found in the village, into chairs and tables. According to one student, it only took two days to create two chairs and a table from plastic bottles. The goal of this creative project was to produce useful items with aesthetic and economic value by utilizing readily available materials.

The plastic bottle chairs are sturdy and visually appealing. They are made by filling used mineral water bottles with compacted plastic waste and sealing the tops. The colourful plastic waste inside the bottles gives the chairs an aesthetic appearance. Once assembled, the tops of the bottles are covered with a layer of foam to create a comfortable seat. This project reduces plastic waste while turning it into functional furniture. Recycling plastic waste is an effective way to keep the environment clean.

The creation of chairs from plastic bottles is a form of creative waste management. Plastic bottle waste is a type of non-biodegradable waste with a high volume, particularly in Indonesia, where the consumption of beverages in plastic bottles is still prevalent. Reusing plastic bottle waste is, therefore, a highly beneficial practice.

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CONCLUSION

Plastic bottle waste, which is harmful to the environment, can be repurposed into useful items by transforming it into a multifunctional chair that is easy to make and comfortable to use. In addition to being a household item, this multifunctional chair can also be decorated and has the potential to be a source of income.

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