

Reducing the Impact of Plastic Waste in Kijang Makmur Village Through Ecobrick and Ecoprint Education

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Abstract. Ecobricks are a creative effort to manage plastic waste into useful objects, reducing pollution and toxins caused by plastic waste. The ecoprint technique was used to decorate the surface of a fabric with various shapes and colors (staining) produced from natural materials. The aim of this work program activity was to reduce the impact of plastic waste in Kijang Makmur Village through ecobrick and ecoprint education. Ecobricks specifically aim to manage inorganic waste that was difficult to decompose into useful products or goods and ecoprint specifically aims to reduce the use of plastics which can later become waste by using ecoprinted tote bags that can be used for a long period of time. The method used in this work program activity was the method of direct explanation and coercion. The result of making ecobricks was the production of a small table where plastic bottles of the same size were arranged, combined and wrapped around a clear cover which was used to attach one bottle to another. The result of making ecoprints was the production of totebags with natural decorations derived from leaf or flower extracts which can later be used to anticipate the use of plastic.

Keywords: Ecobrick, ecoprint, plastic.

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1. INTRODUCTION

Kijang Makmur Village is located within the Tapung Hilir District, Kampar Regency, Riau Province. Kijang Makmur Village is a village that has regional potential in the fields of plantations, livestock and industry. From the potential of the Kijang Makmur Village area in the field of plantations, there are oil palm plantations, chocolate plantations, banana plantations, coconut plantations and cassava plantations. Of the many plantations in Kijang Makmur Village, the most dominating is oil palm which covers 2653 hectares and most of the livelihoods of the people in Kijang Makmur Village are oil palm farmers. The potential of animal husbandry in Kijang Makmur Village includes chicken farming, goat farming, cattle farming and fish farming. The most dominating potential of this farm is goat farming, where approximately 45 ownership of goats are owned by the people of Kijang Makmur Village. The industrial potential found in Kijang Makmur Village is the existence of a palm oil mill,

namely PT Buana Wiralestari Mas Kijang Mill, which is one of the subsidiaries of PT Sinarmas Group. This mill is a palm oil producing mill located in Kijang Makmur Village. This is one of the reasons why Kijang Makmur Village has abundant palm oil plantations.

From the many potentials owned by Kijang Makmur Village, there are several problems in the Kijang Makmur Village environment that need attention, including the problem of environmental waste which until now still lacks attention from the local community. Waste management in accordance with Law Number 18 of 2008 concerning waste management requires a change in the way people view waste and how to treat or process waste. The community should not have the view that waste is only a useless waste product, but the community must have the view that waste is something that has use value and is useful. The ability of the community to process waste into useful items is important. Efforts have been made by Kijang Makmur Village, namely Waste Bank processing, but currently the programme is not running since the change of the new Village Head period, as well as MSMEs that no longer continue crafts from plastic waste. The processing of plastic waste that we do refers to the students of Kijang Makmur Village, especially at SDN 10 Kijang Makmur Village where we do ecobrick and ecoprint techniques are important innovations in an effort to protect the environment and reduce negative impacts on nature. Ecobricking refers to the act of collecting non-biodegradable plastic waste, such as plastic bags and bottles, and compressing them into large plastic bottles. This helps reduce plastic waste in the environment and provides an alternative solution for plastic waste management. On the other hand, ecoprint is an environmentally-friendly printing technique that uses water-based or organic inks that are more environmentally friendly than conventional chemical solvent-based inks. Ecoprint aims to reduce the negative impact of printing on the environment by reducing the use of harmful chemicals and printing waste. These two innovations are an important step in keeping our environment sustainable and minimising our carbon emissions.

The ecoprint technique is used to decorate the surface of a fabric with various shapes and colours (dyeing) produced from natural materials. This ecoprint textile colouring, one of which is applied in the creation of products in the Kaine Art Fabric "Ecoprint Natural Dye" home industry located in the Gamping area, Sleman. A new thing in the formation of motifs and colouring on fabrics by utilising materials in the surrounding environment. The ecoprint process is a unique process of steaming to bring out the shape of leaves and colours from natural materials (plants). Ecoprint comes with its own characteristics, which are expressed in terms of motifs and colouring techniques. The motifs created from natural print materials show shapes and textures that are very similar to the original with colour results that match the content of the natural materials themselves. The relatively unique dyeing technique (needing heat assistance) which is easy to work with and environmentally friendly with its natural and soft colour properties, further adds to the appeal of ecoprint dyeing.(Saraswati et al., 2019).

Along with the times, fabric dyeing techniques with natural materials are developing with various new findings, one of which is ecodyeing and ecoprinting techniques. Ecoprinting and ecodyeing techniques are defined as the process of transferring colours and shapes to fabric through direct contact. Flint applies this technique by attaching colour-pigmented plants to natural fibre fabrics which are then boiled or steamed in a large cauldron. The plants used are those with a high sensitivity to heat, as this is an important factor in extracting colour pigments (Wirawan & Alvin, 2019).

One technique and product that is currently popular and inspired by nature is ecoprint. This technique has been developing for a long time, and was popularised in 2006 by Indiana Flint.

Originating from the eco dyeing technique, Flint developed it into the ecoprint technique. Some fashion designers who started to develop using the ecoprint technique include Renu Gupta, a fashion designer from India. One of the fashion designers from Indonesia who used the ecoprint technique is Novita Yunus, who held a fashion show in India, Amazon India Fashion Week Autumn/Winter 2017. Mentioned by Flint (2008), ecoprint technique is defined as the process of transferring colours and shapes onto fabric through direct contact between fabric and leaves. Flint applies this technique by attaching colour-pigmented plants to natural fibre fabrics which are then boiled or steamed in a large cauldron. (Saraswati et al., 2019).

Ecobricks are a creative way to manage plastic waste into useful objects, reducing the pollution and toxins caused by plastic waste. Ecobricks are a creative way to deal with plastic waste. Its function is not to destroy plastic waste, but to extend the life of those plastics and process them into something useful, which can be used for the benefit of humans in general. Ecobricking is still not very popular among the general public. Most people still treat plastic waste as household plastic waste, littering the environment, rivers and polluting daily life without any self-awareness. Plastic is a recycle material or material that can be recycled, that's why there are many ways or even thousands of years to decompose plastic by nature. Plastic is widely used in various kinds of human life needs. Starting from food wrapping materials to automotive materials. Plastic is the most popular and most widely used material as a material for making automotive components besides metal materials in the form of iron. The most important problem with plastic is that plastic waste cannot be biodegraded. It takes a very long time to clean up plastic waste from the face of the earth, especially since the use of plastic can hardly be controlled. Plastic also makes the air temperature hotter day by day, due to its non-porous polymer properties. (Suminto, 2017)

Most waste comes from residential areas, the composition of which is 75% organic waste and only 25% inorganic waste. Inorganic waste is very difficult to degrade and even cannot be degraded at all by nature, therefore a very large land area is needed to compensate for the production of this type of waste. Because of its considerable potential, it would be better to utilise this plastic waste into creative products and services in order to manage plastic waste properly, so that plastic truly supports our lives. As a creative product, plastic waste creations have a promising commercial value. These products have a marketability that can generate profits. In general, this business is divided into two types, namely products and services (Putra & Yuriandala, 2010).

PET (PolyEtylene Terephthalate). This material is clear, strong, chemical and heat resistant, and has good electrical properties which if used repeatedly, especially holding hot water, the polymer layer of the bottle melts releasing carcinogenic substances and can cause cancer. PET is used as a wrapper for carbonated drinks (soda), fruit juice bottles, bedding and textile fibres (Figure 1). PET is heat-resistant, hard, translucent (transparent), and has a melting point of 85°C. This material is produced from the condensation between ethylene glycol with terephthalic acid and is included in the thermoplastic type. PET can be formed into fibres such as dacron and films such as mylar. This PET material is the main plastic for making food packaging bags (Suminto, 2017).

Environmental cleanliness is a shared responsibility including children such as children who are still in elementary school. It is necessary to provide understanding from an early age so that they can become individuals who can maintain environmental cleanliness, starting from building the habit of throwing garbage in its place to being able to utilise or recycle existing waste into new quality products and creativity owned by students. Waste must be the centre of our attention. This waste management is known as the term "3R principle, namely Reduce, Reuse and Recycle". We conducted

this service activity and focused on the recycle principle through ecobricks and ecoprints at SDN 10 Kijang Makmur.

The results of surveys and discussions conducted by the Kukerta team in Kijang Makmur Village show that the problem of plastic waste in the school environment is an issue that must be given serious attention. To overcome this problem, several solutions can be implemented. First, schools can start a plastic reduction programme by reducing the use of single-use plastics, such as plastic straws, disposable food containers, or plastic bags. Secondly, it is important to provide separate bins for plastics and educate students on the importance of waste segregation. Thirdly, schools can collaborate with local recycling centres to collect and recycle plastic waste.

In addition, educational programmes on the adverse effects of plastic waste on the environment and the importance of reducing plastic use need to be organised to educate students. Environmental campaigns can also be an effective tool by involving students, teachers and school staff in the effort to reduce plastic waste. Encouraging the use of more environmentally friendly items, such as recycled stationery or stainless steel drinking bottles, can be encouraged in the school environment.

Cooperation with the local community is an important step in addressing the plastic waste issue holistically. Finally, it is important to conduct regular monitoring and evaluation of the plastic waste management programme to ensure the effectiveness of the measures taken. The involvement of the entire school community, including students, teachers, staff and parents, is crucial to achieving positive results in addressing plastic waste issues in schools.

2. THEORETICAL STUDIES

Reducing Plastic Waste Impact in Kijang Makmur Village Through Ecobrick and Ecoprint Education is an innovative program aimed at mitigating the negative effects of plastic waste in Kijang Makmur Village. This program is implemented through two main approaches, namely ecobrick and ecoprint education, with the goal of educating participants, especially students, about the importance of managing plastic waste sustainably and creatively.

Ecobrick education is an effort to change the community's, especially the students', understanding of plastic waste. Through ecobrick making, students are taught to collect, sort, and package plastic waste into functional bricks that can be used in construction. In this way, plastic waste, which was previously an environmental burden, can be transformed into a valuable resource.

On the other hand, the ecoprint approach teaches students how to create creative products using natural resources, such as leaves and flowers, on cloth tote bags. This process encourages students to develop their artistic skills while sustainably utilizing the plant resources around them. The result is ecologically friendly products with economic value.

The program aims to provide a deeper insight into environmental issues, raise awareness about the importance of plastic waste management, and stimulate the creativity of students in addressing this problem. With a focus on education, this program makes a positive contribution to reducing the impact of plastic waste in Kijang Makmur Village and nurturing a generation that cares about environmental sustainability.

3. METHOD

The method used in the activity "Reducing the Impact of Plastic Waste in Kijang Makmur Village through Ecobrick and Ecoprint Education" is the method of explanation and direct demonstration. The explanation starts with the definition of waste and how to manage the waste,

with a focus on processing waste into ecobricks that have benefits. In addition, the education also covered how to reduce the use of plastics that would otherwise become waste by encouraging the use of durable totebags.

The ecobricking process involves several steps, including the preparation of tools and materials such as used aqua bottles, dry inorganic plastic waste, and scissors. The used aqua bottle must have the packaging label removed, then the dry inorganic plastic waste is cut into small pieces and inserted into the bottle. Then, the contents are compacted using wood according to the size of the bottle, and if there are still empty parts, plastic waste is added again.

The process of making ecoprints involves preparing tools and materials such as fresh leaves or flowers, a mortar or stone, plastic ice cubes, and a totebag measuring 15 cm x 30 cm. The leaves or flowers are arranged on the totebag, covered with plastic ice cubes, and then pounded with a mortar or stone to extract the colours and patterns from the leaves or flowers onto the totebag. This process is repeated for the other totebags. Once the whole process is complete, the totebags are dried in the sun so that the extracts from the leaves or flowers stick well.

The results of ecobricking and ecoprinting were assessed qualitatively. Besides producing useful products, this approach also helps to reduce the use of single-use plastics, such as food wrappers from the school canteen, and engages students in efforts to keep the school environment clean. Students also participated in reducing the use of inorganic plastics that are difficult to decompose by using ecoprinted totebags, which can be used for a longer period of time.

4. RESULTS AND DISCUSSION

Kukerta students from Riau University conducted ecoprint and ecobrick socialisation activities simultaneously on the same day and time by dividing into two teams. The first team consisted of three Kukerta students who were tasked with conducting ecoprint socialisation activities with grade 5B students while the second team consisted of two people who were tasked with conducting ecobrick socialisation activities with grade 6C students. This ecoprinting training activity was attended by 22 students from class 5B at SDN 10 Kijang Makmur, Tapung Hilir District, Kampar Regency. This activity was carried out as a form of community service involving elementary school students with the aim of training creativity, a form of concern for the environment, and a form of increasing confidence in the work created.

The socialisation aims to add insight to students about the use of excess from the surrounding environment in the form of plants into a product that has economic value in the form of an ecoprint totebag. In addition, it also introduces environmentally friendly products to students because the colouring does not use textile or chemical dyes. This was done with the aim of fostering an attitude of environmental love to students in an effort to preserve the natural environment.

The training activities for making ecoprints were carried out on Saturday, 29 July 2023. In this training, tools and materials such as leaves or flowers, mortar or stone, as well as plastic for the base, totebag were provided by Mahasiwa Kukera. We used totebag with canvas material which is easy to absorb measuring 15 cm x 30 cm. In this training, students were guided to learn how to make the ecoprint motifs that would be produced.

The activity began with arranging the leaves and flowers to be used on the totebag. Next, the leaves and flowers that have been arranged, covered by plastic which is used as a base when pounding, then, the students are asked to pound the leaves and flowers using a mortar or stone evenly until all the colours come out of the leaves, concentration and accuracy are needed in the stage so that

the resulting motif is nice and neat. When it is enough, the remaining leaves and flowers that have been pounded are cleaned. Next, the totebag is dried in the sun until it is dry. Some of the ecoprint training activities can be described in the form of documentation as follows.



Figure 1 Ecoprint socialization activity for 5th-grade students at SDN 10 Kijang Makmur Village

Figure 1 is a socialisation activity carried out before conducting training. Mahasiwa Kukerta gave a brief and concise explanation about ecoprint that was easily understood by elementary school students. There we explained about ecoprint which is a form of love for the environment because it can reduce environmental pollution because it uses natural tools and materials, namely leaves and flowers from surrounding plants. We explained about ecoprint making briefly so that the students have an idea of what they will do in the next ecoprint training.



Figure 2 The process of making ecoprint by 5th-grade students at SDN 010 Kijang Makmur Village



Figure 3 The process of making ecoprint by 5th-grade students at SDN 10 Kijang Makmur Village

Figures 2 and 3 are the ecoprint training activities that were directly guided by us to the students of Class 5B SDN 10 Kijang Makmur. They created the shapes of leaves and flowers according to their imagination and creativity.



Figure 4 Group photo with 5th-grade students at SDN 010 Kijang Makmur Village.

Figure 4. is a group photo between Kukerta students and students of class 5B SDN 10 Kijang Makmur while showing their ecoprint totebag works. The motifs produced are very diverse with natural colours from leaves and flowers that are very beautiful. They felt very happy with this ecoprint training. Here they can express their creativity and imagination in an environmentally friendly work that can later be developed and utilised to reduce environmental pollution. The results of the ecoprint totebag can later be used by students as a substitute for plastic bags as an effort to reduce plastic waste.

Furthermore, the socialisation of waste management into ecobricks was carried out to provide education to students of class 6C SDN 10 Kijang Makmur, regarding the sorting of organic and inorganic waste and the use or reuse of inorganic waste. Plastic waste is one of the most common types of inorganic waste, especially in the school environment.

The ecobricks produced from this activity are tables made from inorganic waste by utilising used plastic bottles and used plastic packaging in Kijang Makmur Village. Basically, ecobricking activities are not limited to just making chairs, but can be formed into other items or objects such as tables and others based on needs and creativity. Some of the ecobrick training activities can be described in the form of documentation as follows.



Figure 5 Students' enthusiasm for making ecobricks.

Figure 5 is the activity of the students who were very enthusiastic in doing hands-on practice in ecobricking. The practice of ecobricking begins with the collection of clean and dry plastic waste from snacks, which is then cut and put into a plastic bottle that has been prepared.



Figure 6 Group photo with 6th-grade students from SDN 10 Kijang Makmur Village.

Figure 6. is a group photo between Kukerta Students and Class 6C Students of SDN 10 Kijang Makmur while showing the results of bottles containing plastic waste that have been cut out. The activity in the form of socialisation and training in ecobricking is one way of campaigning to students about a clean and healthy environment. This activity also aims to reduce plastic waste that has not been utilised optimally.



Figure 7 Completed ecobrick results.

Figure 7. is a photo of the results of ecobricking that has been completed into a table. Plastic bottles of the same size are arranged and combined as neatly as possible and wrapped around clear tape used to glue one bottle to another. The combined used plastic bottles that have been tied together can be made into a table as shown in Figure 3.

The socialization activities regarding ecoprint and ecobrick education are expected to have a positive impact on the environment. During the course of these activities, several positive aspects have been observed, such as: a) Students have shown a high level of attention to the material presented, b) Students have displayed a keen interest in directly participating in the creation of

ecobricks and ecoprint, c) Students have exhibited enthusiasm in performing the ecoprint technique by creatively incorporating flowers and leaves onto tote bags, d) Students have been able to complete the construction of one ecobrick within 15-20 minutes, and e) Students have been able to create ecoprint and ecobrick items according to the guidance provided by the team.

The aim of socializing the ecoprint and ecobrick creation activities is for students not only to comprehend the purpose and goals of these activities but also to apply them in the form of crafting skills. The ecoprint activity provides an opportunity for students to express their creativity and utilize environmental resources, such as plants, to create economically valuable products. In the long run, ecobricks made from plastic-filled bottles can be used as environmentally friendly building materials.

When evaluating this activity, there are strengths and weaknesses that need to be considered, particularly in the context of the students' conditions at the activity location. The strengths include the high enthusiasm of the students in participating in the service activity, their interest in exploring new and beneficial things, the support provided by teachers and educational staff for the service activity, as well as the easy accessibility of the required materials.

5. CONCLUSION

Children's creativity is important to develop from an early age. Efforts are needed to develop it, one of which is with ecoprinting training. Ecoprint training can provide benefits and new insights for students, especially Class 5B students of SDN 010 Kijang Makmur. The students were very enthusiastic in this training activity. Ecoprint training can express the creativity and imagination of students in an environmentally friendly work that can later be developed and utilised to reduce environmental pollution.

Ecoprint training activities are expected that all students can continue to develop creativity in utilising leaves and flowers in order to reduce environmental pollution, hone skills that will be useful at the next level of education, concentration and accuracy are needed so that the resulting motifs are good.

The socialisation of waste management into ecobricks at SDN 010 Kijang Makmur in practice has run well in accordance with the processes and methods that have been applied so that students are very enthusiastic in conducting socialisation activities regarding waste management into ecobricks. The socialisation of the use of plastic waste into ecobricks had a very good impact on the students which was reflected in the increased knowledge of sustainable waste management. This socialisation uses waste generated daily with the aim that students understand that the waste generated every day can be of economic value when the waste has been processed and made into ecobricks.

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