



Marine Waste Management at the Samudra Mandiri Syariah Cooperative

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Abstract

Gampong Layeun and Pulot, Leupung District, Aceh Besar, Aceh Province, is famous as a producer of salted fish, fish jerky, and other processed fish products. The communities in the two villages took the initiative to establish the Koperasi Samudra Mandiri as a forum for processed seafood entrepreneurs, especially salted fish products, to gather and develop their businesses together. One of the problems faced by this koperasi is the handling of fish waste, which is classified as organic waste and includes fish innards, scales, etc. Apart from that, household waste management remains a problem. Generally, people throw rubbish into their backyard or burn it. The public does not yet know how to manage waste or how to sort organic and inorganic waste. Apart from that, the regional government responsible for waste management, namely Dinas Lingkungan Hidup, has also not reached the final disposal site to provide waste transportation services. To address the waste problem, the Syiah Kuala University (USK) service team provides waste management education to this community group, especially on sorting and processing organic waste. The Service Team and cooperative members also initiated the preparation of village regulations regarding waste management and coordinated with the village government to create a waste bank.

Keywords: Community participation, Management, Marine waste



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1. INTRODUCTION

(Undang Undang No 18, 2008) concerning Waste Management (hereinafter referred to as the Waste Management Law) states that waste is the residue of daily human activities and/or natural processes in solid form. Waste as a residue of human activities can come from industrial and household sources, including household industries such as the seafood processing industry. If left untreated, this waste material will cause environmental pollution and also affect people's lives. Community involvement in waste management is one solution to waste management, because the community, apart from being waste producers, is also the party most impacted by waste that is not handled correctly (Rahmah et al., 2021).

Community-based waste management is one approach to achieving sustainable waste management (Wibowo et al., 2023) (Ivakdalam et al., 2022) (Arifah et al., 2024) (Riska Ramadhani et al., 2025). Communities are invited to participate directly as key actors in waste reduction and management, particularly at the household level. Households, as part of society, are among the contributors to waste (Ismail, 2019). Furthermore, research shows that community involvement is strongly influenced by



"community understanding, willingness, and income," which fosters awareness of the need to improve environmental quality (Posmaningsih, 2016).

Waste management can be achieved through waste reduction and waste handling. Waste reduction encompasses waste limitation, reuse, and recycling, while waste handling encompasses sorting, collection, transportation, processing, and final processing (Waste Management Law). In the waste management process, the public can participate in sorting, collecting, and processing, particularly household waste. Meanwhile, the government is obligated to provide public waste transportation, particularly for residual waste.

Aceh Besar Regency has had (Qanun No 8 Tahun, 2014) concerning Waste Management (hereinafter referred to as the Waste Management Qanun) and Aceh Besar Regent Regulation (Peraturan Bupati Aceh Besar No 33, 2019) concerning the Policy and Strategy for Managing Household Waste and Similar Waste to Household Waste in Aceh Besar Regency. These two regulations are the legal basis for waste management in Aceh Besar Regency. Article 28 Paragraph (2) letters b and d of the Waste Management Qanun states that "The community can participate in waste management by actively participating in activities such as reducing, collecting, sorting, transporting, and processing waste; and can also play a role in providing a place to store organic and inorganic household waste in their respective homes."

Furthermore, the person responsible for waste management according to Article 16 is the Aceh Besar Regency Environmental Service (DLH). However, so far, the Aceh Besar DLH has not reached the Leupung area or its surroundings for waste collection, so organic/residue waste, as well as household waste, have not been appropriately managed. In addition, the village officials have not yet recognized waste as a problem to be solved, so there has been no effort to formulate policies for waste management in the two villages.

Gampong Layeun and Gampong Pulot are two of the six villages in Leupung District, Aceh Besar Regency, Aceh Province. Gampong is the term for villages in Aceh Province. Gampong Layeun covers 12.15 hectares and has a total population of 933, with a male-to-female ratio of 496 to 437. Of this number, 40 percent of residents work as fishermen, and around 20 percent work as processors and sellers of seafood, which is generally carried out by women (Wibisono et al., 2014). Meanwhile, Gampong Pulot covers 15.10 hectares and has a population of 614 people, including 310 males and 304 females. Similar to Gampong Layeun, the male population generally works as fishermen, while the female population works as processors and sellers of seafood (BPS Aceh Besar, 2020).



In 2021, the communities of the two villages established a cooperative called the Samudra Mandiri Syariah Producers Cooperative, which operates in the seafood processing business, specifically fish products, such as salted fish, fish jerky, and others. The cooperative was established to support the seafood processing community so that they can produce products with a broad market reach. The cooperative has 26 members, most of whom are women, and two representatives from the Lhok Leupung Sea Commander. The Sea Commander is the person who leads and regulates customs in the coastal and maritime sectors(Qanun No 10 Tentang Lembaga Adat, 2008).

The Sea Commander is an association of indigenous peoples in Aceh, recognized by qanuns or regional regulations, to manage fisheries based on local knowledge and customary law (Sulaiman, 2010). In the Samudra Mandiri Cooperative, the presence of the Sea Commander as a member indicates recognition of marine product entrepreneurs, generally women, as part of the traditional sea community system. In addition to receiving support from the Panglima Laot (the Marine Commander), the cooperative also received assistance from two non-governmental organizations (NGOs), the Wildlife Conservation Society (WCS) and Natural Aceh. Both NGOs assisted in establishing the cooperative, providing financing, business management training, developing environmentally friendly packaging, and other support.

The Samudra Mandiri Cooperative has received assistance for its business activities. However, cooperative members still face unresolved problems, namely waste management issues, particularly fish waste such as innards, scales, and other byproducts. In addition, plastic waste management remains a significant obstacle for salted fish traders in the area, as most still use plastic packaging even though they have received assistance with environmentally friendly alternatives. So far, organic and inorganic waste (plastic) has been handled by burning it in the backyard or using it as food for animals, such as monitor lizards and wild boar. The community is aware of the dangers of burning waste, including the potential to cause respiratory problems and endanger the environment and the sustainability of their businesses, as fires can spread and burn their stalls. However, the community said they have no other choice but to burn the waste and lack knowledge of sustainable waste management.

Given this situation, it is crucial to realize collaboration between academics, NGOs, the community, and the government to support sustainable waste management as a form of community participation, as mandated by law. Based on this thinking, the community service activities aim to provide knowledge of sustainable waste management and to assist in developing village-level regulations on waste management in the Leupung area.



Figure 1. Condition of the Community Waste Disposal Site and Cooperative Members' Business Stalls

2. METHOD

This community service project uses qualitative methods, including in-depth interviews with several relevant parties, namely the NGO Natural and the Samudra Mandiri Syariah Producers Cooperative, which will serve as the community service partners. The interviews were conducted to obtain a complete initial picture of the partners' problems, namely, unmanaged waste. Natural is an NGO that helps empower cooperative members, especially mothers, in helping promote processed salted fish products. Furthermore, the community service team also conducted in-depth interviews with the USK Waste Bank Team (BSU) to discuss the best solution to the waste problem. This coordination was carried out by BSU, an institution experienced in educating the public about waste management, which also has a comprehensive waste-processing laboratory with a relatively complete set of equipment. In addition, BSU will serve as a resource person for the community service activity. Interviews were also conducted with the cooperative chairman and cooperative members. Furthermore, the community service team conducted direct observations in the Lepung area to understand field conditions and provide a general overview, especially of waste disposal locations at several village points.

The community service activities were conducted within the group. Layeun and Gp. Pulot, Leupung District, Aceh Besar Regency. The activities were carried out by the Community Service Team from Syiah Kuala University (USK), in partnership with the Samudra Mandiri Syariah Producer Cooperative, the USK Waste Bank, and the NGO Natural. All activities were carried out using participatory methods, meaning they actively involved cooperative members and administrators, as well as Gampong Layeun and Pulot officials, including in the design of the activities. To answer the objectives of community service, several stages of activity were carried out, as contained in the following table:



Table 1. Stages of Community Service Activities

NO	ACTIVITY	METHOD/FORM OF ACTIVITY
I	Preparation of Community Service Activity Plan	Discussion
II	Education about the environment, waste sorting and management, and training in making compost/biopores, eco-enzymes, and fish bone powder fertilizer	Participatory/Discussion
III	Visit to Waste Bank USK	Participatory/Workshop

3. RESULT AND DISCUSSION

The activity was carried out at the business premises of one of the cooperative administrators. During this activity, the Community Service Team and several cooperative administrators discussed the activity plan, the activities to be carried out, and the tentative implementation timeline. The activities agreed upon based on community needs included environmental education, waste sorting and management, and workshops on composting/biopores, ecoenzymes, and the production of fish-bone fertilizer. The next agreed-upon activity was a visit by cooperative members to the Syiah Kuala University Waste Bank (BSUSK). The purpose of this activity was for cooperative members to directly observe waste management activities, which was expected to increase their knowledge and interest in managing waste from business and household waste. At this meeting, the Community Service Team discussed the activity mechanism and received input from cooperative members and administrators to ensure the activity's success. Participation in community service activities is one way to involve the community, who are also the target of the service, so that they are expected to have ownership of the activity.

During the activity, the Community Service Team also conducted interviews with village officials. According to the village officials, the cooperative management has long complained about the fish waste problem due to its very strong odor, and they have not yet found a solution. Furthermore, the management has also tried to teach themselves how to process fish waste, but they have not found the proper method. Representatives from the NGO Natural were also asked for their opinion on the activity, and they stated that, so far, they have tried to help the cooperative by providing training in seafood management and environmentally friendly packaging. What they have not been able to do is help the cooperative manage waste from the marine industry. Natural attempted to provide a solution by connecting the cooperative with the USK Community Service team. In addition, the management of the USK Waste Bank (BSUSK) said that fish waste is

among the best compostable waste products and has a reasonably high market value.



Figure 2. Discussion with Cooperative Management and Members

3.1 Education about the Environment and Waste Management

This activity involved the Community Service Team, the USK BS Team, and cooperative members. The education provided included information on the environment, types of waste, and the concept of waste management known as the 3Rs: reduce, reuse, and recycle. This activity aims to foster a deeper understanding of the importance of protecting the environment around homes and businesses, the dangers of littering and burning, the need to sort waste at home, and the dangers of plastic waste to the environment.

Next, they practiced sorting organic, inorganic, and residual waste and processing organic waste into biopore compost. On this occasion, the Team also provided knowledge on processing fish bone waste into organic fertilizer. Fish bone is one of the best raw materials for compost and has high economic value. However, because processing takes time, this session only introduced the fertilizer production method but did not practice it. Processing fish bone waste takes about a week, either by drying naturally in the sun or in an oven. After drying, the bones are ground into a powder. The community service team and BSU also taught about the production of eco-enzymes, which are helpful as liquid organic fertilizers and have other functions.

This activity also implements the zero-waste principle. All activities strive to eliminate the use of single-use materials. Drinks and food are packaged without plastic, using cups and plates from the cooperative's inventory instead. Administrators and members stated that these utensils had not been used for a long time, as they had been using bottled water, which they considered more practical. They greatly appreciated the idea and stated that they would continue to implement the zero-waste principle in future cooperative activities.



Figure 3. Waste Management Education Activities and Preparation of Follow-up Action Plans



Figure 4. Biopore compost-making activity

3.3 Visit to the Syiah Kuala University Waste Bank

During the visit to Waste Bank of USK, the Team was attended by the management and members of the Samudra Mandiri Syariah Cooperative, as well as village officials, namely the Keuchik (village head) of Gampong Pulot and the Secretary of Gampong Layeun. The visit aimed to introduce the waste management process carried out by the Waste Bank of USK, starting with sorting and processing organic waste, and processing cardboard, plastic, and other types of waste for sale to collectors. Participants were also introduced to the waste bank method, which is turning waste into additional income for families. Participants also visited the Waste Bank of USK II, a facility that processes organic waste to produce compost.

Participants were very enthusiastic about the activities and also learned to use waste as a potential source of additional family income and to solve waste problems in their area. This meeting is expected to foster motivation and enthusiasm among village members and communities to start managing waste and applying the 3R principles of reuse, reduce, and recycle to the best of their ability.



Figure 5. Visit of Participants and Community Service Team to BSI USK

3.4 Establishment of Waste Banks & Village Regulations on Waste

Based on field visits, village officials decided to continue waste management in both villages. To this end, a plan was developed to establish waste banks in both villages and to establish village regulations on waste management. Establishing waste banks is one way to demonstrate community participation in independent waste management (Putra & Ismaniar, 2020)

The Team believes that one way to ensure the sustainability of the waste management program is to establish legal regulations that serve as the basis for policies and guidelines for systematic, structured management efforts. The Team proposed involving the Samudra Mandiri Syariah Producer Cooperative as part of the Management Team. Based on these considerations, the Community Service Team submitted an initial draft to the Management Team for consideration as a Village Regulation.

The formation of the village qanun by the Keuchik is in accordance with one of the authorities of the Keuchik, as regulated in the Aceh Besar Regency Qanun Number 2 of 2020 concerning Village Government(Qanun No 2, 2020). Article 5, paragraph (2) letter d stipulates that the Keuchik, in carrying out his duties, has the authority to determine the village qanun. The definition of the village qanun is stated in Article 1, letter 23, namely the statutory regulations stipulated by the Keuchik after being discussed and agreed upon with the Tuha Pheut. Tuha Pheut is an institution that carries out government functions, with members representing the village population through regional representation and elected democratically.



The existence of qanun/reusam, namely regulations at the gampong (village) level, is one of Aceh Province's special features in the field of customs. Gampong-level waste management also reflects active community involvement in waste reduction, collection, sorting, transportation, and processing. Based on this, the Qanun will define the scope of waste management, including waste reduction, collection, sorting, transportation, and processing activities, for both household waste and marine industry waste. The existence of qanun/reusam can also realize sustainable community-based waste management (Safrina et al., 2023).

4. CONCLUSION

Community involvement in waste management is one way to achieve sustainable waste management. Community service activities by the Usk Community Service Team have provided an understanding of waste management and waste processing practices. In addition, the Team has also drafted an initial draft of the Village Qanun or Keuchik Regulation on Waste Management and a mechanism for establishing a Waste Bank. The existence of the Village Qanun or Keuchik Regulation as the legal basis for waste management is expected to be the first step towards the sustainability of community/cooperative businesses and the protection of the surrounding and village environments. Furthermore, it is hoped that the existence of community waste management will support village and community activities in general and can provide welfare to the community.

Sustainable waste management requires organization and management. Therefore, the management and members of the Samudra Mandiri Syariah Producers Cooperative are advised to continue waste management and identify business opportunities in this area to generate added value for cooperative members. Village officials can support and implement waste management mechanisms and establish waste banks to ensure sustainable management.

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