

Environmental Impact of Community-Based Waste Management Study in Plosojenar Village, Ponorogo Regency

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Abstract

Community empowerment in waste management is a strategy for creating a clean and sustainable environment. Community-based waste management is expected to have an environmental impact, creating a sustainable environment. This research aims to describe and analyze the environmental impact of community-based waste management through community empowerment in Plosojenar Village, Ponorogo Regency. This research is a qualitative descriptive study. Data collection techniques include interviews, observation, documentation, and focus group discussions (FGD). Triangulation of sources and methods was used to test the validity of the data. Data analysis uses Creswell's qualitative analysis model. The research results show that community-based waste management has the opportunity to encourage environmental impact by empowering the community through the maesojenar Compost House. Various programs have been designed, such as the Coconut Fiber Waste Processing Program, Compost Fertilizer Processing Program, and Waste Savings Program. In the future, the sustainability of this program needs to be considered. Apart from that, the use of social media needs to be strengthened to voice issues surrounding waste management so that it can encourage the creation of good environmental impacts.

Keywords: waste management, environment, empowerment, impact, community

1. Introduction

Community empowerment is essential in dealing with environmental issues, including waste management. The community's helplessness in waste management can trigger the generation of increasingly accumulating waste. Globally, waste generation generated in various countries worldwide is 121 kilograms per person yearly (UN, 2022, p. 50). As of 2021, waste generation in Indonesia reached 29,446,146.21 tons/year. The amount of waste generated in Indonesia continues to increase to 35,803,483.85 tons/year in 2022 (SIPSN, 2023).

Ponorogo Regency, one of the districts in East Java Province, Indonesia, also has a large waste generation. In 2020, waste generation in Ponorogo Regency reached 127,432.45 tons per year. The amount of waste generated in Ponorogo Regency has increased to 141,540.58 tons per year in 2021 (SIPSN, 2023). This shows that waste management is a problem that needs to be taken more seriously by all stakeholders, as it can threaten environmental sustainability and public health. Therefore, community empowerment in waste management needs attention from stakeholders.

Several researchers have previously studied issues surrounding community empowerment in waste management (Fitriyanti & Yunita, 2021; Aerospace, 2020; and Bisung



& Dickin, 2019). In their research, Fitriyanti and Yunita (2021), examined the empowerment of Family Welfare members in Sumber Kidul Village through household waste-based crafts during COVID-19. His research showed that community members gained skills in processing plastic waste into handicrafts. Furthermore, through their research, Bisung & Dickin (2019), examines the involvement of stakeholders in community empowerment on environmental issues. The results of his research show the need for concept mapping in supporting the creation of individual and group contributions to environmental management.

On the other hand, Dirgantara (2020), through its research, examines community empowerment through carpet waste processing in Caikaobandung Village. The results of his research show that the community has independence in processing carpet waste into doormats. Ndjandji (2024), through his research, examines community empowerment based on the bamboo weaving industry in Ende Regency. The results of his research show that empowerment efforts have been carried out with awareness, capacity, and empowerment of the community. Some of the research conducted by previous researchers is very useful for the author in assessing community empowerment in waste management. However, researchers have yet to be seen assessing the environmental impact of community-based waste management through community empowerment. This research will examine the environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency.

Plosojenar Village, one of the villages in Ponorogo Regency, Indonesia, cannot be separated from efforts to overcome the problems surrounding this waste. Various efforts were made to provide community empowerment and the ability to manage waste in Plosojenar Village. Maesojenar Compost House was established in 2018 to encourage community empowerment in waste management. The Maesojenar Compost House was established with funding from the Special Allocation Fund (DAK) for Environment and Forestry in 2018, Ministry of Environment and Forestry of the Republic of Indonesia (KLHK RI). The establishment of the Maesojenar Compost House was designed by the Maesojenar Non-Community Group (KSM), which was previously formed on September 11, 2017.

The establishment of the Maesojenar Compost House is expected to drive community empowerment in waste management in Plosojenar Village. However, from 2021 to 2022, there was a decrease in the volume of waste entering the Maesojenar Compost House, from 5,300 kg/year to 4,900 kg/year. This shows a decrease in the volume of waste collected by the community to the Maesojenar Compost House. The following is data on waste managed at the Maesojenar Compost House in Plosojenar Village, Ponorogo Regency, from 2021 to 2022, can be seen in Table 1:

Table 1. Waste Managed at the Maesojenar Compost House in 2021 - 2022

Year	Volume of Waste accepted (kg/year)	Waste managed successfully (kg/yea	Waste Residue (%)
2021	5.300	5.250	0,95 %
2022	4.900	4.850	1,03 %

Source: Research results, 2023.



Table 1 shows the decrease in incoming waste from 2021 to 2022. Ironically, the amount of waste managed in these community-based waste management facilities also decreased from 5,250 in 2021 to 4,850 in 2022. This condition impacts increasing waste residues from 0.95% in 2021 to 1.03% in 2022.

Based on this presentation, the community in Plosojenar Village still faces problems in optimizing environmental impacts on waste management through community empowerment. Environmental impact is significant in determining the success of this community-based waste management effort. Gutberlet (2021: 8) states that environmental impact is the primary goal of waste management. In line with this, Azevedo *et al.* (2019: 1384) also mentioned that waste management needs to pay attention to the environmental impact it causes. Moving on from here, this study aims to describe and analyze the environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency. The object of this research is related to the environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency, which is studied from the environmental impact theory as proposed by previous experts (Gutberlet, 2021; Azevedo *et al.*).

2. Method

Qualitative descriptive research was used in this study. Data collection techniques include interviews, observation, documentation, and *focus group discussion* (FGD). Primary and secondary data were used in this study. Primary data relates to data that directly provides information to researchers, while secondary data relates to data that does not directly provide information to researchers (Sugiyono, 2009, p. 137). Furthermore, the triangulation of sources and methods is used to test the validity of the data. This triangulation is used for data analysis from the sources and methods (Sutopo, 2002: 79).

This research adheres to a systematic qualitative analysis model developed by Creswell (2009: 185-190), which consists of 6 (six) stages. These stages include: data preparation and organization, thorough study and reading of the collected data, data analysis and coding, description of data in the form of narrative sentences, and interpretation of data. This structured approach ensures the reliability and robustness of our findings.

- a) Stage 1: Prepare the data and organize it. Researchers prepared environmental impact data on community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency. This data is obtained from primary data (from interviews, FGDs, and observations) and documentation.
- b) Stage 2, the data that has been collected is then studied and read one by one. Researchers read, analyze, and understand all incoming data.
- c) Stage 3, data analysis and coding. At this stage, researchers analyze the data and then provide specific codes.
- d) Stage 4, coding according to specific categorizations. Researchers categorize and code-determined data, which includes environmental impact data, community-based waste management data, and community empowerment data.



- e) Stage 5 describes the data/information in the form of narrative sentences. Researchers describe the data/information collected in descriptive sentences at this stage.
- f) In the final stage, we provide a comprehensive interpretation of the data. This involves comparing the data with existing theories, drawing conclusions about the environmental impacts, and relating them to community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency. This thorough interpretation ensures that our findings are well-informed and insightful.

3. Results and Discussion

Community empowerment in waste management in Plosojenar Village, Ponorogo Regency, is encouraged by the establishment of the Maesojenar Compost House. Maesojenar Compost House was established in 2018 and sourced from the Special Allocation Fund (DAK) for Environment and Forestry in 2018 by the Ministry of Environment and Forestry of the Republic of Indonesia (KLHK RI). The Maesojenar Compost House is expected to increase the capacity and ability of the community in Plosojenar Village to manage waste. This aligns with Raj *et al.* (2022: 380), who wrote that excellent local organizational capacity is needed for community empowerment. Furthermore, Wang *et al.* (2020: 1) also mentioned that community empowerment requires adequate local organizational capacity encouragement. In line with this, Barnes (2020: 12) also wrote that *empowerment by organization* is essential in determining the success of empowerment efforts.

Maesojenar Compost House has designed various programs to encourage the environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency. These various programs aim to achieve the environmental impact of these community-based waste management activities. This is in line with Rodic' & Wilson (2017: 1), which writes that environmental impacts in waste management need attention, primarily related to environmental sustainability. Various programs designed at the Maesojenar Compost House include Coconut Fiber Waste Treatment, Animal Waste Processing, and Saving Waste. The following is an overview and analysis of each of these programs:

Coconut Fiber Waste Treatment, The environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency can be studied from the extent of the implementation of the Coconut Fiber Waste Treatment Program at the Maesojenar Compost House. This Coconut Fiber Waste Treatment Program is one of the flagship programs at the Maesojenar Compost House in Plosojenar Village. The people of Plosojenar Village through the Maesojenar Compost House have succeeded in processing coconut fiber waste into *cocopeat* and *cocofiber*. *This cocopeatis* coconut fiber waste in the form of powder. Meanwhile, *cocofiber* is coconut fiber waste in the form of fiber. This innovation in coconut fiber waste processing comes from the anxiety of the community to see the accumulation of coconut fiber waste in Sumoroto Market, a traditional market located close to Plosojenar Village.

The community often encounters the condition of careless disposal of coconut fiber waste by coconut traders in the market, which causes a buildup of coconut fiber waste.



Ironically, some of these coconut traders actually burn this coconut fiber waste, causing air pollution. This condition then triggers community members at the Maesojenar Compost House to process coconut fiber waste into products that are of selling value. This decision was taken by the community to reduce the negative impact caused by the accumulation of coconut fiber waste in the market, as well as optimize the added value of the waste. This is in line with Gutberlet (2021: 8) who wrote that waste management needs to consider environmental impacts.

This coconut fiber waste is obtained free of charge from coconut traders, then used by the manager of the Maeojenar Compost House to become *cocopeat* and *cocofiber*. The coconut fiber traders felt helped by the collection of coconut fiber waste by the manager of the Maesojenar Compost House, considering that they had been confused to dispose of the coconut fiber waste. This is in line with Jaligot, *et al.*, (2016: 86) which states that waste recycling activities need to pay attention to the selection of *material supply* or material supply. On the other hand, the manager of the Maesojenar Compost House obtains free supply materials from the coconut fiber waste for *cocopeat* and *cocofiber* processing. These various material supplies are sources of commodities in waste recycling activities (Cano, *et al.*, 2022: 2).

The processing of coconut fiber waste into *cocopeat* and *cocofiber* at the Maesojenar Compost House is supported by adequate coconut fiber shredding machine facilities. The manager of the Maesojenar Compost House applied for funding for the purchase of coconut fiber shredding machine facilities to the Ministry of Manpower of the Republic of Indonesia (Kemenaker), and was approved with the consideration that the Maesojenar Compost House was considered capable of absorbing labor from the surrounding environment. The results showed that the Maesojenar Compost House was able to absorb labor from the community in Plosojenar Village. The wages given to workers as services in the processing of coconut fiber waste are Rp 55,000.00 per day per person. The *cocopeat* is sold at a price of Rp 2,500.00 per kilogram, as well as *cocofiberis* also sold at a price of Rp 2,500.00 per kilogram.

This Coconut Fiber Waste Treatment Program is able to provide an environmental impact in the form of cleanliness in the Sumoroto Market environment. The coconut traders in the traditional market are no longer confused in disposing of the coconut fiber waste they produce, because the waste has been used by the manager of the Maesojenar Compost House into *cocopeat* and *cocofiber*. This is an illustration of the environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village. This condition is in line with Azevedo, *et al.*, (2019: 1384) who wrote the importance of environmental impacts in waste management. Furthermore, Aguilar, *et al.*, (2022: 60) also wrote the importance of local initiatives in encouraging the realization of a circular economy.

The Compost Processing Program, a unique initiative by the community at Maesojenar Compost House, stands as a testament to the environmental impact of community-based waste management. This program, a flagship at the Maesojenar Compost House in Plosojenar Village, is a prime example of community empowerment efforts in waste management.

This Compost Processing Program aligns with Ponorogo Regent Regulation Number 78 of 2018 concerning Policies and Strategies of Ponorogo Regency's Management of Household Waste and Similar Household Waste. This program requires community participation and



involvement in processing organic waste into compost worth selling. This aligns with Fernando (2020: 347), who wrote that community participation and involvement in composting activities are necessary for community-based waste management. In line with this, Mustafirin *et al.* (2021: 311) also wrote that community empowerment requires participation from the community. This is because empowerment efforts aim to provide power to the community (Ndjandji, 2024: 259).

The material used by members of the Maesojenar Compost House to make compost comes from animal manure and agricultural waste around Plosojenar Village. Members of the Maesojenar Compost House utilize goat manure obtained from farmers around Plosojenar Village. This goat manure was purchased for Rp 8,000.00 per sack, weighing 15 kilograms. This shows that the community has realized the use of waste as recycled material, especially in making compost. This condition is in line with Cano *et al.* (2022: 2), who wrote that it is necessary to pay attention to materials that can be recycled.

Furthermore, the community also uses milled and burnt husks as material for processing compost. Milled husks are agricultural waste that is leftover from rice milling activities. This milled husk is purchased for Rp 800.00 per kilogram. Meanwhile, burnt husks are agricultural waste left over from rice milling activities and burned incompletely; these burnt husks are obtained free of charge from farmers around Plosojenar Village. The following are some of the materials used by the community in making compost at the Maesojejenar Compost House can be seen in Table 1:

Free of charge		
No.	Materials	Purchase price
1.	Goat droppings	IDR 8,000.00 /15 kg
2.	Ground husks	IDR 800,00/kg
3.	Burnt husk	Free

Source: Research results, 2023.

Table 1 presents the unique materials used in the compost processing at the Maesojenar Compost House. These materials, sourced from livestock and agricultural waste in Plosojenar Village, include goat manure, milled husks, and burnt husks obtained free of charge from local farmers. This innovative approach aligns with Zubaedi's (2013: 22-23) emphasis on optimizing existing resources for community empowerment.

The location of the Maesojenar Compost House office adjacent to the agricultural and rice field areas is an advantage for the manager in obtaining burnt husks from farmers. In addition, the Maesojenar Compost House office is also close to the rice milling factory, which is only approximately 300 meters away. The accessibility of this affordable Compost House location is an advantage in obtaining various materials for the compost processing supply. In addition, this condition can encourage the creation of environmental impacts caused by community-based waste management through community empowerment efforts in Plosojenar Village. This is relevant to Hoesein (2020: 129), who wrote that waste management needs to consider the environmental impact caused.

The material in the form of goat manure, burnt husks, and milled husks is processed by



members of the Maesojenar Compost House into compost. Previously, several times, the manager of the Compost House had conducted experiments to make the correct formulation to produce compost with good quality and affordable materials. In the end, mixing the three materials was deemed appropriate and has been used until now to produce compost at the Maesojenar Compost House. The compost product is sold for Rp 30,000.00, with a size of 30 kilograms. The compost products produced by the community through the Maesojenar Compost House are labeled "Maesojenar."

The manager of the Maesojenar Compost House entrusts the compost products he produces to several agricultural shops and ornamental plant shops in urban areas. The manager also sells this compost product to farmers and communities around Plosojenar Village. Usually, people come directly to the Maesojenar Compost House office to buy the compost. This Compost Processing Program can encourage environmental impacts in community-based waste management through community empowerment efforts in Plosojenar Village. This is relevant to Jomehpour and Behzad (2020: 1), who wrote about the importance of environmental impacts in waste management.

Saving Trash, Maesojenar Compost House also has a Waste Saving Program. The environmental impact of community-based waste management through community empowerment efforts in Plosojenar Village, Ponorogo Regency, can be studied from the extent of implementing the Waste Saving Program at Maesojenar Compost House. This Waste Saving Program is one of the flagship programs at the Maesojenar Compost House in Plosojenar Village.

People in Plosojenar Village, through the Maesojenar Compost House, are encouraged to sort non-organic waste produced in their respective households—these non-organic wastes, such as drink bottles, plastic wrap, cardboard, and so on. Community participation and involvement are critical elements in the implementation of the program. This aligns with Narayan (2002: 18), who writes that participation/inclusion is critical to community empowerment. Furthermore, Benito *et al.* (2021: 807) also mentioned that waste management requires community involvement in all aspects. Community participation is indispensable in environmental governance (Wang *et al.*, 2020, p. 1).

The Maesojenar Compost House manager will periodically pick up disaggregated waste in each member's house. The garbage collection is carried out only a few times a week, but according to the request of its members. Members will contact the manager of the Maesojenar Compost House if the disaggregated waste they have collected is felt to have been enough. The Maesojenar Compost House Manager facilitates groups through the *WhatsApp (WA)* application, where all members are included so they can inform requests for garbage collection at any time. This is in line with Sewak *et al.* (2021: 8), who wrote about the importance of online media in connecting the community with public service providers.

Furthermore, this WhatsApp Group(WA) is also designed to strengthen kinship between members and exchange information on waste management issues in Plosojenar Village. Providing adequate information accessibility is expected to encourage community capacity in managing waste (Matsumoto, 2020: 4). This is important, considering that *access to information* is one of the essential elements in community empowerment (Narayan, 2002: 18).



On the other hand, the manager of the Maesojenar Compost House also actively asks its members whether the waste they collect is ready to be taken. The manager also has a network with cadres of TP PKK (Family et al. Team) at the Plosojenar Village and RT (Rukun Neighbor) levels, where the community can collect the waste they sort into the designated cadres. In addition, the management of the Maesojenar Compost House also collaborates with cadres of Posyandu Balita (Integrated et al. Under Five Years) and Posyandu Lansia (Integrated et al. for the Elderly) to make it easier for the community to collect disaggregated waste through these cadres. Some members of the Maesojenar Compost House chose to directly deposit the waste they sorted into the Maesojenar Compost House office.

The manager of the Maesojenar Compost House will immediately record the incoming waste from each member. Each member is given a Waste Logbook to make it easier to monitor how much waste he deposited and how much nominal money he received. Some members choose to exchange their disaggregated waste for cash directly. In contrast, most other Maesojenar Compost House members choose to save the nominal money in a passbook at the Maesojenar Compost House. Periodically, the nominal savings of money from the sale of waste at the Maesojenar Compost House can be taken by members.

In 2021, the Waste Saving Program was collaborated by the manager of the Maeojenar Compost House with PT Pegadaian (Persero). Moving on from the initiation of this collaboration, the Waste Saving Program then developed into the Waste Saving Program into Gold. Member savings from saving waste at the Maesojenar Compost House are periodically deposited into gold savings at PT Pegadaian (Persero). This shows good collaboration between the community and the business sector. This condition is relevant to Sewak *et al.* (2021: 9), who wrote that the business sector needs to be involved in overcoming problems around waste management. In line with this, Aguilar *et al.* (2022: 60) said collaboration between stakeholders is needed for better waste management.

The agent appointed by PT Pegadaian (Persero) is one of the village officials in Plosojenar Village who is also active in the Maesojenar Compost House, making it easier to coordinate between the manager of the Maesojenar Compost House, the village, the community, and PT Pegadaian (Persero). The appointment of an agent from PT Pegadaian (Persero) is strengthened by Certificate Number 000601/06/2021. The following certificate of appointment of agent from PT Pegadaian (Persero) can be seen in Figure 1:



Figure 1. Certificate of Agent of PT Pegadaian (Persero)
(Source: researcher documentation, 2023)



Figure 1 shows the Agent Certificate of PT Pegadaian (Persero), with Agent Code Number 1402921001, on behalf of Prasetia Muniarini, from Kelompos Non-Community (KSM) Maesojenar. As for through this agent appointment certificate, the person concerned has the right to market all products and services from PT Pegadaian (Persero). These products and services include the Saving Waste into Gold Program, a collaboration between the management of the Maesojenar Compost House and PT Pegadaian (Persero).

This program can encourage people to collect and sort waste at their respective household levels. Changes in community behavior began to be seen since the program's implementation, where people competed to collect and sort waste to be deposited into the Maesojenar Compost House. The environment in Plosojenar Village is becoming cleaner and minimizing litter. This aligns with Bonato *et al.* (2022: 2), who wrote about paying attention to environmental impacts in the waste management value chain. In line with this, Hapsari (2019: 229) also wrote that environmental cleanliness and declining waste generation are expected environmental impacts from community-based waste management.

Furthermore, various waste management programs designed at the Compost House received appreciation from the government. In 2021, Plosojenar Village received the Serial Village award in the Primary category from the Environment Office (DLH) of East Java Province. This award shows that community-based waste management through community empowerment in Plosojenar Village, Ponorogo Regency, received appreciation from the government. Furthermore, this shows that, in general, community-based waste management through community empowerment in Plosojenar Village, Ponorogo Regency, has achieved the expected environmental impact.

4. Conclusion

Moving on from the results and analysis of the research, the community in Plosojenar Village, Ponorogo Regency, has the opportunity to encourage the creation of environmental impacts in community-based waste management through community empowerment efforts. Maesojenar Compost House is designed with various programs to encourage the creation of this environmental impact, such as the Coconut Fiber Waste Treatment Program, Compost Treatment Program, and Waste Saving Program. These programs can encourage communities to create a clean environmental impact and minimize littering. The impact generated in community-based waste management through this community empowerment effort is to create a clean environment in Plosojenar Village, Ponorogo Regency. This can be seen from a more beautiful environment and minimal garbage thrown carelessly in rivers and other public areas.

Future recommendations suggest that these programs need to be sustained. In addition, the community needs to be encouraged to use online media more to voice environmental issues, especially in waste management. In closing, the researcher expressed his gratitude to the parties who have supported the running of this research, where this research was funded by the Education Fund Management Institute (LPDP), Higher Education Financing Center (BPPT), Education Financing Service Center (PUSLAPDIK), Indonesian Education Scholarship (BPI).



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