

Community Mitigation Climate Change at Household Waste Management

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ABSTRACT

Climate change is a concern in the world because of its threat to the environment. Household waste management can be done through mitigation to the community to reduce household waste, which causes methane gas emissions, climate change, and an increase in the volume of waste. This study aims to determine community mitigation in climate change in household waste management in Samarinda City and to determine community participation in implementing the climate village program in Samarinda City. This study is a descriptive study with a qualitative approach. The population in this study were all communities and ProKlim administrators in 5 research locations with purposive sampling and saturated sampling techniques with 35 informants. The sampling technique is interviews, observations, and documentation. The results of the study from 5 Proklims show that the community has carried out mitigation in their waste management to reduce carbon emissions and maintain their living environment. Forms of community mitigation include sorting and saving waste in waste banks in climate village groups. In addition, the community also reuses plastic waste that can be reused and makes compost from organic waste and recycles waste. Community participation in ProKlim is very supportive by participating in the activities, but some informants did not participate because ProKlim was not yet active.

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Introduction

Climate change is a crucial issue, especially in Indonesia. According to the Meteorology, Climatology and Geophysics Agency, Indonesia is ranked 13th as the hottest year in the world (BMKG, 2022). Climate change can occur due to an increase in the atmosphere's temperature on Earth or what is currently known as global warming (Ainurrohmah & Sudarti, 2022). Climate change is caused by an increase in the amount of greenhouse gases in the atmosphere, which causes heat energy that should be released out of the Earth's atmosphere to be reflected to the Earth's surface and will directly increase the temperature on Earth. The Indonesian government is addressing climate change, especially in Samarinda City, through various waste

management programs and community approaches such as the Climate Village Program (ProKlim). The Climate Village Program is a collaborative activity between climate change adaptation and mitigation efforts at the primary level by actively involving the role of the community and various supporting parties such as local governments, the business world, universities, and non-governmental organizations (Climate Village Program Implementation Guidelines, 2012). The community needs to understand the climate change actions that are occurring. So that they can reduce and inhibit the risks that arise. Increasing the role of the community is the primary key to mitigation, both individually and in groups.

In this case, the Samarinda City government has implemented a climate change village program to deal with household waste. Waste is from human activities in the form of solids, liquids, and gases (Faedlulloh et al., 2019). Human activities that can produce waste are from markets, factories, agriculture, livestock, and households. Household waste is the result of daily household activities or waste that can accumulate and cause harm to the community. Waste sources are divided into two, namely organic waste and inorganic waste.

Organic waste comes from the remains of living things containing carbon elements, such as feces, and food waste, such as spinach, cabbage, cooking oil, and other organic waste. In contrast, inorganic waste contains metals such as iron from used cars, glass, inorganic fertilizers, and materials that are difficult to decompose or rot (Dewi et al., 2021). The problem of organic waste in Indonesia occurs because people lack awareness and knowledge about the importance of protecting the environment and disposing of waste properly (Fatma Rabia et al., 2022). Municipal waste management in Indonesia is becoming an increasingly complex problem with the population growth rate, resulting in more and more waste or garbage being produced (Noventi, 2020). Samarinda City is one of the most densely populated cities in East Kalimantan. The more people there are, the more waste will be produced (Ma et al., 2019). This dense population is what causes piles of household waste or garbage to occur around the community. The increase in population is proportional to the increase in consumption, which has caused a significant increase in the volume of waste in Samarinda City (Nagong, 2021). The volume of waste based on East Kalimantan Province Waste Management Data produced by Samarinda City from the last five years starting from 2018 was 843,812.00 m³, in 2019 it was 857,404.00 m³, increased in 2020 to 873,582.84 m³, decreased in 2021 to 816,588.00 m³ and the latest data in 2022 increased again to 824,168.00 m³ (BPS, 2024).

The efforts made by the Samarinda City Environmental Service in socializing the program to reduce the impact of household waste in the Climate Village Program in various sub-districts are constructive in reducing the volume of waste that will be disposed of at the final disposal site (TPA). Household waste management aims to reduce the impact of waste on the environment and to overcome climate change where there is management of solid or inorganic waste that is recycled to reduce the amount of waste entering the final disposal site, which reduces CO₂ emissions from smoke from burning waste and composting which can reduce methane gas emissions produced from the decomposition of organic waste in landfills. However, based on observations of researchers in Samarinda City, some still have the habit of burning waste, so the smoke from the burning emits toxic gases that can harm health, worsen environmental quality, and increase climate change. Based on this problem, the focus of this study is to determine the ProKlim community's mitigation in managing the household waste sector to prevent climate change.

Methodology

This study uses a descriptive qualitative research type. This study aims to obtain an overview of the household waste management system in Samarinda City by understanding climate change mitigation from a community perspective. The location of this study is in 5 sub-

districts that have been recorded in the Climate Change Village Program at the Samarinda City Environmental Service, namely Sindang Sari Village, Mugirejo Village, Sambutan Village, Makroman Village, and Karang Asam Ulu Village. In this study, the population is the community in the sub-districts included in the Samarinda City Climate Change Village. The sample in this study was the village staff, the head of the ProKlim management, and the community of the climate change village. The sampling technique used in this study was double sampling with a purposive sampling technique for selecting the location of the climate village sample and saturated sampling for interview samples of the community in the climate village area. The instruments used for data collection were observation, documents from the village and interviews with the village staff, the head of the ProKlim management and the community involved in the climate village. The results of observations, documents, and interviews were processed descriptively to determine the role of the community in carrying out climate mitigation in the household waste sector.

Result and Discussion

Location of Study and Respondent Characteristic

Samarinda City is one of the cities in East Kalimantan Province, Indonesia. Geographically, the area of Samarinda City is 718 km². Samarinda City has 10 sub-districts and 59 villages with a population of 766,015 people with an area of 783.00 km². Samarinda City is a fairly beautiful area; the presence of green open areas, such as city parks that surround it, adds to the beauty of this city. The community also pays close attention to environmental cleanliness by carrying out various routine activities such as mutual cooperation and community service, at least in the residential environment. However, in several locations where people live, there are several green areas that have not been utilized properly, and there is no household waste management, so efforts are needed to maximize the environmental potential.

Figure 1. Map of Study Location



The research location studied is an area far from the city centre, and of course, it is an advantage for the people of Samarinda City to be able to protect the environment and carry out mitigation in the Climate Village Program directed by the Samarinda City Environmental Service, which can reduce public and government concerns about the impact of prolonged climate change. The Climate Village Program, often called ProKlim, has been held in various regions in Indonesia, starting at the city and national levels, including Samarinda City. Through the Samarinda City Environmental Service, 14 sub-districts are proposed to researchers to study climate change mitigation. After the researchers discussed with the Samarinda City Environmental Service staff, the person in charge of Proklm be able to visit 5 sub-districts representing Proklm in Samarinda City, including Sindang Sari Village, Makroman Village, Sambutan Village, Mugirejo Village and Karang Asam Ulu Village. In implementing Proklm, Samarinda City has a vision and mission as a basic foundation for the community to be able to realize the hopes and goals of implementing Proklm. The vision and mission following the fifth mission of the City Government is to create a city with a friendly, comfortable, harmonious and sustainable environment.

The respondents in this study were the community and managers of the climate village program located in 5 research locations. There were 37 respondents, and their characteristics were age, gender, education, occupation, and length of stay. The respondents' characteristics are presented in Table 1.

Table 1. Respondents' Characteristics

No	Characteristics	Frequency	Percentage (%)
1	Age		
	25 - 30	1	2,7%
	31 – 36	12	32,8%
	37 – 42	14	37,8%
	43 – 48	5	13,5%
	49 – 50 and more	5	13,5%
2	Gender		
	Male	12	32,4%
	Female	25	67,5%
3	Education		
	Elementary School	4	10,8%
	Junior High School	10	27%
	High School	21	56,7%
	Diploma/ Bachelor's degree	2	5,4%
4	Occupation		
	Farmer	2	5,4%
	Housewife	25	67,5%
	Private Sector	5	13,5%
	Self-Employed	3	8,1%
	Nurse	1	2,7%
	Retiree	1	2,7%
5	Length of Stay		
	<5 year	1	2,7%
	5 – 15 year	28	75,6%
	>15 year	8	21,6%

Table 1 shows the characteristics of most respondents based on age, namely 37-42 years old, as many as 14 respondents (37.8%), the majority of female gender as many as 25 respondents (67.5%), the majority of education is high school as many as 21 respondents (56.7%), the majority of occupations are housewives as many as 25 respondents (67.5%) and the majority have lived in the village for 5-15 years as many as 28 respondents (75.6%).

Community Mitigation Climate Change in Household Waste Management in Samarinda City

From researchers' findings in mitigating climate change, especially in the household waste sector at Proklam Sindang Sari Village, the RT 09 community reduces household waste by sorting inorganic and organic waste at home. After being sorted, the waste will be transported to the waste bank. In utilizing inorganic waste, the RT 09 community recycles waste into flower pots or sells it directly to collectors so the waste is not directly disposed of at the landfill. This was expressed by the head of Proklam Sindang Sari Village RT 09, Mr. Ramian, where there is sorting in each resident's home, then after being sorted, the inorganic waste will be made into other crafts such as plant pots or sold to collectors. Proklam Makroman Village RT 20, in reducing household waste so that it is not disposed of in the landfill, utilizes waste to make eco-bricks as garden gates (Figure 2). Household waste management is an initial effort to reduce waste from the initial source of waste (Sutisno et al., 2021).

Figure 2. Eco-bricks as Arch Decoration



ProKlim Kelurahan Sambutan RT 08, in addition to selling inorganic waste, also uses it to decorate its waste bank. In contrast, ProKlim Kelurahan Mugirejo RT 26 uses it to sell to collectors to increase community income or RT cash (Figure 3). For ProKlim Kelurahan Karang Asam Ulu RT 32 recycles inorganic waste into crafts, eco-bricks, and candles and sells them to collectors. This was conveyed by Mrs Nana, one of the residents who was sorting waste at the research location to be ready to be sold to collectors. The collection, sorting and sale of waste is a straightforward effort in waste management (Rohma et al., 2023).

Figure 3 Transportation of Waste Sold to Collectors



There are also results of organic waste management in the manufacture of solid organic fertilizer and liquid organic fertilizer that are used by the community personally as plant fertilizer around the house and sold. ProKlim, which utilizes household waste to be made into compost, is ProKlim of Makroman, Mugirejo and Karang Asam Ulu Villages, where the community makes compost both at home and at the Waste Bank. The use of organic fertilizer is a form of community effort to utilize recycled organic waste for independent or commercial needs (Qodriyatun, 2014).

In addition, there is also a prohibition against burning garbage in the home environment so that the smoke from burning does not produce emissions that impact the release of carbon into the atmosphere. This is under observation at the Sindang Sari Village Proklm, which has a warning sign that says not to burn garbage. Regulations in waste management are the basis for forcing the community to be willing to manage waste (Martitah et al., 2024). From the results of interviews with the community, household waste management involves actions aimed at reducing the impact of waste on the environment and specifically addressing climate change. This is where solid or inorganic waste that is recycled is managed to reduce the amount of waste that goes to the final disposal site. It also reduces CO₂ emissions from smoke from burning garbage and composting, which can reduce methane gas emissions produced from the decomposition of organic waste in landfills. In addition, educating the community about the importance of sustainable waste management can produce more responsible consumer behaviour and be aware of its impact on climate change. In this case, the community in the 5 research locations has understood well to be able to manage waste or waste and not burn waste, especially in open areas, if they burn waste, there are applicable sanctions from Proklm and the relevant Agency.

Community participation in the implementation of the climate village program in Samarinda City

Participation is a form of community involvement and willingness to manage waste from their homes (Tarigan et al., 2020). Based on the research results, community participation in Sindang Sari Village RT 09 is marked by waste management at the waste bank. Based on interviews with the community, all respondents stated that they participated in the activities carried out in ProKlim. In Makroman Village, RT 26, community participation is marked by the presence of a park in the middle of the village decorated with eco-cookies originating from household waste management. For household waste management activities, some people do not manage their waste because there is no place to manage it, either in a composting container or because of the residents' busyness. Community participation in Sambutan Village RT 08 shows that only some people manage their waste properly. This condition can be seen from the sale of plastic waste at the waste bank. Still, in RT 26, mitigation activities did not run because there was no longer a waste bank, and the community lacked awareness of household waste management. Meanwhile, community participation in Mugirejo Village can be seen in the making of compost from leaves, the sale of inorganic waste to the waste bank and the making of compost, which is then sold to organic fertilizer collectors. Likewise, community participation in Karang Asam Ulu Village has managed waste in a waste bank (Figure 4), made crafts as part of waste recycling, and utilized the results of compost fertilizer to cultivate medicinal gardens. Community participation in reducing waste from the household sector makes a significant contribution to reducing emissions from households (Dhokhikah et al., 2015).

Figure 4. Household waste sorting



On the way from ProKlim, there is still a lack of assistance from the village, such as in Sambutan Village RT 26, where only one resident manages household waste due to the absence of a waste bank. Likewise, the community's awareness or willingness to implement the climate village program is still lacking. Then, there needs to be consistency among community groups in activities such as in Makroman Village, where some of the residents still wait for the head of the village to instruct, and then the residents follow.

Conclusion

Based on the results of the research and discussion, it can be concluded that the forms of community mitigation in household waste management in Samarinda City are carried out through several activities, namely sorting organic and inorganic waste, recycling, making compost, making eco-enzymes, making eco-bricks and selling at waste banks to collectors. In addition, community participation in the implementation of ProKlim activities in Samarinda City greatly supports ProKlim activities. This is evidenced by the management of waste banks, the creation of parks (with pots from recycled waste) or green areas around the village and the prevention of land fires with waste by making regulations related to the prohibition of burning waste.

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