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Study of Waste Reduction through Climate Village Program (Proklim) in Malang City

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Abstract: Waste is a critical problem that needs to be resolved immediately. Based on its source, the largest waste generation in Malang City comes from the domestic sector. So that there needs to be an effort to resolve this by involving the household sector. The purpose of this study was to calculate the level of waste reduction at the location of the climate village program (Proklim) in Community Association (RW) 07 Lesanpuro Village, Malang City. The research method used is the quantitative descriptive method. Data collection techniques through field measurements, observations, and interviews. Data analysis techniques using the calculation formula of waste *generation* waste composition, waste density, and waste reduction. Total waste reduction was calculated by mass balance analysis. The results showed that average amount of waste generation was 0.388 people/day (kg). The average density of waste is 152.38 kg/m3. The composition of waste is dominated by organic waste, which is 71.63%. The total reduction rate is 20.51% (organic waste is 16.03%, inorganic waste is 4.48%). This amount is not yet by the Jakstranas target of 30% by 2025, although the research location is included in the Proklim category so it is required to optimize waste management by the community.

Keywords: Composition; Jakstranas; Proklim; Reduction; Waste

Introduction

The waste problem is a strategic issue that must be resolved immediately because the impacts are very complex. The issue of waste is a very crucial problem at this time because with poor management, waste adds to environmental problems (Khairunnisa et al., 2023). Waste generation will continue to increase because the amount of waste generated is influenced by the increase in population. An increasing population will increase the volume of waste generated from daily activities. The population of Malang City in 2021 is 844,933 people and has increased 2022 to 846,126 people in 2022, this is in line with the population growth rate in 2021 of 0.13 and increased to 0.14 in 2022 (Badan Pusat Statistik, 2023). The increase in population growth rate affects the increase in the amount of waste generated. Waste generation in Malang City is one of the environmental problems that occur in this city. In 2023, the amount of waste generated was 284,095.41 tons, this figure increased when compared to the waste generation in 2022 which was 279,148.37 tons (Kementerian Lingkungan Hidup dan Kehutanan, 2024). The amount of waste that continues to increase every year in Malang City makes this city in the top 3 cities with the highest waste generation in East Java.

Malang City has been experiencing solid waste problems for several years (Kurniawan et al., 2023) which makes it necessary to handle this with a sustainable approach. Waste problems that occur are

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caused by several constraints including the implementation of legal rules, the level of community participation, and institutions and institutions that have not been maximized in waste management (Anisykurlillah et al., 2024). The government should be able to make the management of important waste management problems that must be prioritized (Manalu et al., 2022), by the direction of national and regional policies. Based on the Presidential Regulation of the Republic of Indonesia Number 97 of 2017 concerning National Policy and Strategy for the Management of Household Waste and Waste Similar to Household Waste, the Target for Reducing Household Waste and Waste Similar to Household Waste in 2025 is 30%.

The approach to waste reduction is time to switch to using a waste management hierarchy with an inverted pyramid approach from the initial use of the usual pyramid shape. The usual pyramid shape gives a large burden to the landfill, this is due to the lack of serious waste reduction efforts from the source of waste and the collection-transport-disposal pattern that will be implemented so far (Ruhmawati, 2017). Conversely, with the concept of an inverted pyramid in waste management, landfills will become an estuary for waste that can no longer be managed. The inverted pyramid system emphasizes that the main waste management is carried out on a scale of action with the largest composition including waste generation prevention, waste minimization, reuse, recycling, energy recovery, and finally landfill so that the amount of waste and composition of waste disposed of in landfills can be minimized.

Based on data on the composition of waste in Malang City in 2023, it is known that the position of the top 3 waste sectors originating from households occupies the first position with a figure of 47.69%, the second position comes from regional waste sources of 24.01% and in commercial sources of 14.44% (Kementerian Lingkungan Hidup dan Kehutanan, 2023). Waste reduction efforts in Malang City must be carried out from the source of the waste itself, namely at the household scale. Waste originating from the household sector is the largest component of the cause of environmental pollution (Hutabarat et al., 2022), so community participation is very instrumental in reducing waste. In general, community participation in sustainably implementing existing waste management programs is still relatively low (Solihin et al., 2019). Programs and activities related to waste management must involve the community as a whole to improve the quality of waste management implemented (Irmawartini et al., 2023) and are very effective in realizing a zero-waste society (Ramadan et al., 2019).

When viewed from the characteristics of the Malang City community in particular, the forms of community participation are diverse, but the potential for community-based development can answer social problems in Indonesia (Faedlulloh, Irawan, et al., 2019). The form of community that allows to overcome waste problems in Malang City is through the Climate Village Program (Poklim). The Climate Village Program is a national program to support efforts to reduce emissions and climate resilience through community empowerment (Faedlulloh, Prasetyanti, et al., 2019). A proklim is an area with administrative boundaries at the lowest level of Rukun Warga (RW) and the highest level of the village that in its daily activities carries out adaptation and mitigation activities to climate change. Proklim aims to increase community involvement and other stakeholders to strengthen adaptive capacity to the impacts of climate change and reduce GHG emissions (Wiati et al., 2022). In addition to these aims, proklim is able to provide environmental sustainability benefits (Qomariah et al., 2021), but there are also benefits to improving economic and social quality (Muttaqin et al., 2019).

In line with the strategy to reduce the impact of climate change through Proklim, this climate issue is a goal of the Sustainable Development Program (SDGs) at point 13, namely handling climate change. Addressing climate change has the goal of taking immediate action to combat climate change and its impacts because climate change is a global challenge that affects everyone. The implementation of Proklim is a proactive step by the community independently which is a positive step to increase cooperation between the government and the community (public participation) in climate change adaptation-mitigation activities (Perdinan, 2020). Waste management is one of the efforts in climate change mitigation because almost all waste management processes will produce greenhouse gas emissions (Wang et al., 2015), mismanagement of waste can lead to climate change and public health problems (Herdiansyah, 2021). Greenhouse gas emissions generated from waste in landfills include the main greenhouse gases (GHG), namely methane (CH4) and carbon dioxide (CO2) (Sutthasil et al., 2023). Population size, poor waste reduction practices, and waste management affect the amount of GHG emissions produced.

Through Proklim, the community can carry out adaptation and mitigation activities for climate change, including waste management activities carried out in daily activities as a concrete action to combat climate change. All areas in Malang City that follow Proklim have tried to reduce the amount of waste generated through various types of activities carried out such as

Waste Bank activities, food waste management, composting, and Ecoenzymes. Waste Bank is a new approach strategy used for waste reduction, in this activity, the community actively exchanges waste that has a selling value to be exchanged into nominal money (Sekito et al., 2020).

There are several previous studies related to proklim community participation such as adapting and mitigating climate change in wetlands (Nasruddin et al., 2020), Emission gas studies at proklim locations (Sekaranom et al., 2022), proklim community-based approaches in facing climate change and COVID-19 (Ariyaningsih et al., 2023) and the use of drones in proklim mapping (Hernina et al., 2021). There are view research related to the level of waste reduction carried out by Proklim communities. Therefore, this research is very interesting to be carried out in Malang City to evaluate the level of waste reduction produced by pro-climate communities as an action of climate change adaptation and mitigation after the reduction efforts they carry out in their daily lives.

This paper aims to measure the amount of waste generated, and the level of reduction and describe community activities in waste reduction efforts. The selection of the Kampung Iklim location in Rukun Warga 07, Lesanpuro village, Kedungkandang sub-district from a total of 20 proklim locations in Malang city is due to several criteria, namely that it has been carrying out adaptation and mitigation activities consistently for more than 4 years, has registered its action in the National Registry System (SRN) and has actively carried out 3R activities. The results of this study are intended to identify and measure how the waste reduction program is implemented in the Proklim study area after implementing activities consistently for more than 4 years.

Method

This research uses a descriptive-analytical method conducted in the Proklim Community Association (Rukun Warga) 07 area of Lesanpuro Village, Malang City. There are two data used in this research, namely primary and secondary data. Primary data was obtained from field measurements, interviews, questionnaires, observations and documentation. Secondary data was obtained from related agencies, scientific articles and books.

Field measurement research through 8 days of sampling activities from October 29, 2023, to November 6, 2023 using the SNI 19-3964-1994 method regarding Methods of Taking and Measuring Examples of Urban Waste Generation and Composition (Badan Standarisasi Nasional, 1994).

Population and Sample Calculation

The population in this study are the actors of waste management activities in the Proklim RW 07 location, namely the community. The determination of the sample at the research location was carried out using the Slovin approach using the purposive sampling method, with the consideration that respondents residing in RW 07 are non-customers of the waste bank and are willing to become respondents. Determination of the number of samples used using the Slovin guideline formula. The calculation is as follows:

$$n=\frac{N}{1+Ne^2} \quad (1)$$

Description:
n = sample size
N = population
e = Margin of error, the percent allowance for inaccuracy due to tolerable or desirable sampling error is 10%.

The waste sampled amounted to 31 households. Waste will be collected at the same location for 24 hours a day for 8 days. The implementation stage of this research sample is based on SNI 19-3964-199. Marked plastic bags will be distributed to each sampling point the day before sampling, and waste will be collected from 05.00 am to 05.00 am the next day. Samples are collected at each sampling point and transported to the designated area. Each waste sample is measured by weight and volume to obtain data on waste generation units (Fauzi et al., 2023). The calculation for waste generation can be seen in the following equation.

$$\text{Waste Generation (kg/person/day)}=\frac{\text{waste weight }(\frac{\text{kg}}{\text{day}})}{\text{Total Population (Person)}} \quad (2)$$

$$\text{Total Waste Generation}\left(\frac{\text{kg}}{\text{day}}\right) = \text{Waste generation}\left(\frac{\text{Kg}}{\text{person.day}}\right) \text{x Total Population(person)} \quad (3)$$

After knowing the waste generated, calculations are made for the composition of the waste (Suharto et al., 2022) at proklim locations as in the following equation.

$$\%\text{Waste Composition}=\frac{\text{Waste weight per composition (kg)}}{\text{Total weight of waste (kg)}}\text{x}100\% \quad (4)$$

Data analysis using the % reduction equation. The amount of unmanaged waste from the difference between the amount of incoming waste and the amount of unmanaged waste will obtain the amount of reduced waste (Shofi et al., 2023). Residential waste reduction can be analyzed based on the results of a survey of community-based waste management in the Sukun Sub-

district, such as Waste Bank and the informal sector (collectors).

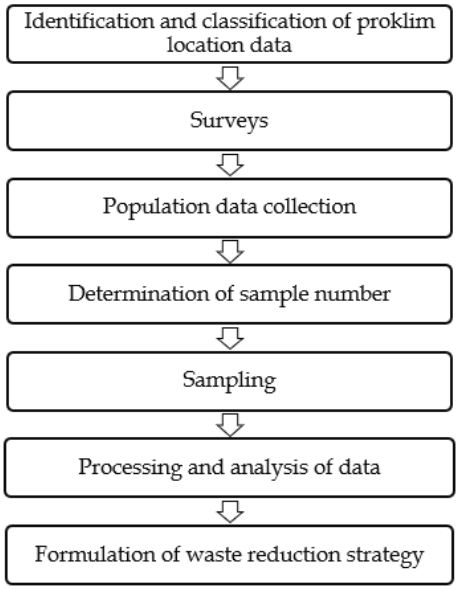

Figure 1. Research flow diagram

Waste reduction from the Waste Bank can be determined from the amount and composition of incoming waste in a certain period in kg/day and from the results of interviews and weighing activities carried out by the community in a certain period. Waste reduction is expressed in units of weight (kg/day). Waste reduction in settlements can be done from the source of waste, namely by calculating the results of sorting from each source.

$$\%\text{Reduction}=\frac{\text{Weight of reduced waste (kg)}}{\text{total weight of waste (kg)}}\text{x}100\% \quad (5)$$

Result and Discussion

Waste Generation

The initial stage in determining waste generation is determining the number of research samples. The number of samples of this study was 31 samples of households spread into 9 neighborhood associations (RT), the selection of samples was carried out in each RT to be able to represent the condition of waste generation in the Proklim RW 07 location in Lesanpuro Village. Stratified and purposive sampling techniques were applied in this study to distribute sample households. This research was conducted in an area where all houses are permanent buildings. Based on Khair et al. (2019), permanent houses are generally one-story or multi-story buildings and have good road connections. The number of floors is related to the economic level of the community so it is a consideration in the selection of waste samples. The samples were measured for waste generation, density, and composition.

Waste generation is calculated based on the weight of waste generated by the community. Waste generation is calculated for 8 eight days so that the waste generation value is obtained as in Table 1. This study collected and analyzed 49.29 kg of household waste. Waste generation data is supported by questionnaire data where on average each household consists of 3 family members.

Table 1. Waste Generation

Day-	Number of householder samples	Population (person)	Total weight (Kg)	Generation person/day (Kg)
1	31	127	44.49	0.350
2			57.90	0.456
3			48.14	0.379
4			49.89	0.393
5			48.67	0.383
6			49.78	0.392
7			48.31	0.380
8			47.14	0.371
			Average	0.388

The average result of waste generation is 0.388 Kg/day, this value is still in SNI 19-3983-1995 concerning Waste generation specifications for small cities and medium cities in Indonesia, the waste generation in the SNI component of the waste source is 0.35-0.4 Kg/day in the waste source component in permanent homes. Based on research (Muljaningsih et al., 2022), by sampling the Malang Waste Bank, waste generation in Malang City is 0.291 kg/person/day. Meanwhile in research (Khair et al., 2019), it was stated that the waste generation in Surabaya was 0.33 kg/person/day.

Waste Density

Waste density is the ratio of mass per volume of waste generated. The calculation of waste density was carried out to find out how appropriate efforts in waste management were carried out.

Table 2. Waste Density

Day-	Total Weight	Volume (m^3)	Density (kg/m^3)
1	44.49	0.286	155.56
2	57.90	0.298	194.01
3	48.14	0.289	166.34
4	49.89	0.350	142.38
5	48.67	0.319	152.67
6	49.78	0.344	144.88
7	48.31	0.410	117.71
8	47.14	0.324	145.50
Average		0.328	152.38

According to Syafrudin et al. (2023), the density value is related to the dominant composition of waste.

High density indicates that the most dominant composition of waste is organic waste which has high moisture and low heat. At the research location with a sample of permanent houses, the density of waste was 204.29 kg/m3 with an organic waste composition of 87.3%. The research results in RW 7 show that the density of waste is 152.38 kg/m3 and the dominant composition is organic waste as shown in the following table.

Table 3. Waste Composition

Waste Composition	Total number during the sampling period	Average	Percentage
Organic	341.58	42.70	71.63%
Paper	13.15	1.64	2.76%
Wood	2.21	0.28	0.46%
Textiles	5.50	0.69	1.15%
rubber-leather	1.05	0.13	0.22%
Plastic	29.26	3.66	6.14%
Metal	2.80	0.35	0.59%
Glass	5.91	0.74	1.24%
Others	72.60	9.08	15.25%
B3	2.74	0.34	0.57%
Total	476.90	59.61	100.00%

Based on the calculation results, the largest waste composition is organic waste with a percentage of 71.63%. This is by research Muktiningsih et al. (2023), which states that organic waste is the most dominant compared to other types. The composition of waste is influenced by several factors including the number and growth rate of the population, income levels and consumption patterns, the needs of the population, as well as climate and seasons. The composition of household waste is generally dominated by organic waste. This is influenced by people's consumption patterns and the behavior of disposing of organic waste without processing. In addition, the characteristics of organic waste have a high water content so it has a high weight (Suciutami et al., 2022).

The Proklim RW 07 community in Lesanpuro Village has implemented various models of organic and inorganic waste management through composting, recycling, and selling waste with economic value. Sinaga et al. (2023), referred to these efforts as a Waste Reduction Model based on Community Participation.

Organic Waste Reduction Rate

Organic waste is often a problem that is frequently encountered in urban and rural society (Fadlilla et al., 2023). The problem of organic waste are carried out using 3 alternatives reductions. The highest reduction in this effort is through composting activities with a reduction value of 1758.73 kg/month. Composting activities are a way of managing waste by utilizing microorganisms on organic waste that has a degradable nature so that it can reduce waste generation (Surjandari et al., 2009). Composting activities are prioritized as a solution for urban waste management (Cao et al., 2023), it is a more sustainable way of managing waste (Bhorkar et al., 2023). Composting is practical and can be a sustainable solution to the challenges associated with the fertilizer crisis, population growth, and the need for a circular economy (Pajura, 2024).

Table 4. Organic Waste Reduction

Existing reduction	Organic waste generation (kg/month)	Organic waste reduction (kg/ month)	Recovery factor (%)
Compost	12164.18	1758.73	22.4%
Eco enzyme		3.67	
Food waste Management		959.34	
Total	12164.18	2.721.74	22.4%

Another effort that can be used as an organic waste reduction effort is the utilization of food waste for animal feed with a waste reduction value of 959.34 kg/month. According to Gerda et al. (2023), the utilization of food waste as animal feed is one of the 7 indicators that affect waste generation from food waste. This effort is a form of application of the zero waste concept (Muliarta et al., 2023), which can reduce the amount of food waste entering the landfill.

Finally, organic reduction efforts are carried out by processing waste into something useful such as by making eco-enzyme (Permatananda et al., 2023). Eco-enzyme is the result of the fermentation of vegetable and fruit peels mixed with sugar and water which is normally extracted into a complex solution, eco-enzyme is not only able to reduce organic waste but also provides a substitute for synthetic chemicals that are harmful to humans health and the environment (Benny et al., 2023). Although the waste reduction rate using this method is only 3.67 Kg/month which is smaller than the other two methods, Eco-enzyme is an effective solution and accelerates the process of processing waste into more useful products, the advantage of this eco-enzyme is that it can be done on a household scale because it does not require large areas of land for the fermentation process and does not require composter tanks with certain specifications so that it can support the concept of reuse in saving the environment (Prarikeslan et al., 2023).

Inorganic Waste Reduction Rate

The community of RW 07 Lesanpuro Village has 5 (five) types of waste that can be reduced through the activities carried out. The community's efforts in reducing waste are based on the concept of the Circular

Economy. Efforts to reduce waste generation can solve environmental problems and reduce the need for expensive and limited landfills. Various reduction methods including limiting the use of single-use packaging, reuse, and recycling, can reduce the amount of waste generated. In addition, the application of waste processing technologies such as sorting, composting organic waste, and the use of other methods can eliminate negative impacts on the environment and potentially produce alternative energy (Budihardjo et al., 2023). In addition, waste management also provides economic benefits, especially for the community through the utilization of waste with economic value (Zhang et al., 2022).

Table 5. Inorganic Waste Reduction

Waste composition	Total waste (kg/month)	Inorganic waste reduction (kg/month)	Recovery factor (RF) (%)
Paper	468.29	363.47	77.62%
Plastic	1041.90	307.49	29.51%
Metal	99.75	51.27	51.40%
Glass	210.46	22.72	10.79%
Leather	37.39	16.11	43.08%

The largest recovery factor at the Proklim RW 07 location in Lesanpuro Village is with the type of paper waste, which is 77%, in line with the research of Meidiana et al. (2020) the recovery factor in paper waste reaches 70% which is obtained from reducing waste in waste banks and the informal sector. Paper waste reduction has a fairly high rate because paper waste is very easy to find and collect in everyday life. Paper waste has a lot of interest from recycling activities because this type of waste can be recycled into paper again or made into various types of mixed materials such as Lightweight Concrete (Fachrizal et al., 2023), Gypsum Ceiling (Akbar et al., 2023) and various other types of benefits.

Plastic has a very important role in the economy and life (Vlasopoulos et al., 2023). The use of plastic is very common in everyday life, unfortunately, plastic is very difficult to decompose in the environment. Plastic waste must be managed properly and correctly, especially in developing countries such as Indonesia due to the impact on the ecosystem and endanger human health (Neo et al., 2021). Based on the research results, the recovery factor value in plastic waste is 29.51% which is still relatively low. The RF value in this component is still limited to the type of plastic that has a certain selling value, while other types of plastic such as plastic bags, straws, etc. have not been reduced.

The metal has a recovery factor value of 51.40%. Based on research by Rachmawati and Wilujeng (2023), the recovery factor value for metals can reach 61%. The results showed a smaller value compared to the RF value because people tend to utilize large metals that have high mass while metals with small sizes such as nails, bottle caps, etc. are directly thrown into the trash so that the recovery value of metal is not optimal.

The Recovery Factor value obtained on glass waste is 10.79%and rubber is 43.08%, both values are obtained in recovery efforts on certain types of glass and rubber waste that can still be utilized, while rubber with types that cannot be utilized tends to be thrown into the trash. Glass waste consists of perfume, vitamin, ketchup, and medicine bottles (Dhokhikah et al., 2015). Rubber waste management was traditionally done through disposal to landfill. In addition, the method of reducing this waste can be done by the 4R method (Reduce, Reuse, Recycle, Recover). Some effective rubber waste management methods are generally applied by industries because they require considerable costs for their management installations (Leong et al., 2023). In RW 7, rubber waste management is carried out using the reuse method for certain purposes. Inorganic waste management efforts are directly carried out in two ways, namely 3R efforts and management through the Waste Bank. Direct participation by the community related to the 3R principle is the main principle in household waste management (Saputra et al., 2022).

Table 6. Inorganic Waste Reduction

Existing reduction	Inorganic waste generation (kg/month)	Inorganic waste reduction (kg/month)	Recovery factor (%)
3 R (reduce, reuse, recycle)	1857.78	326.39	17.57%
Waste bank		434.66	23.40%
Total	1857.78	761.05	40.97%

The 3R efforts carried out by the community are carried out by utilizing unused items into functional value items such as plant pots, lampposts, signposts etc., through these activities they can reduce inorganic waste by 17.57% every month. The 3R activity is different from the Waste Bank because in this activity the community does not get economic value from the waste management carried out because in this type of activity the community gets social value. Another form of waste management effort is through the Waste Bank program. The Waste Bank program has a concept to exchange recyclable materials with income according to the type and weight of waste. The income is then deposited in a customer account that can be withdrawn in cash. In addition, waste segregation at the household level can reduce collection time and maintenance costs.

The Indonesian Ministry of Environment (2012) states that there are six benefits of waste banks, which

are reducing the amount of waste disposed to landfills, increasing the economic value of waste, changing people's behavior in managing waste, creating a clean and healthy environment, creating jobs and empowering the community's economy (Sekito et al., 2019). The RW 07 community can reduce inorganic waste by 23.40% every month. Transactions of waste reduction activities through waste banks are carried out every month by collecting, weighing and recording the amount of waste generated at the waste bank location. The payment system for waste generated is done once a year so that the amount of money generated for members can be collected rather than using a monthly periodic system. In addition, people choose the annual option so that it can be used as a motivation for savings. The role of the waste bank in this location is still less than optimal because the community considers that the selling value of the waste obtained is considered very small and the waste sorting efforts that must be carried out before selling the waste to the waste bank are considered inefficient. According Syarifuddin et al. (2019), waste bank activities can effectively increase waste reduction at the household level and simultaneously increase community income.

After knowing the amount of waste processed and what percentage of RF each component has, then draw a mass balance diagram. Mass balance diagram can describe the amount of waste that is processed or sold, as well as those that will be disposed of to landfill. (Cahya et al., 2017).

Mass Balance Diagram

Material flow analysis is one of the methods that can be used in waste flow analysis as a database for waste management development and a reference in decision-making. With the waste material flow, it can be analyzed the amount of waste that has been managed and its development potential (Widyarsana et al., 2020). In this study, the waste material flow diagram is used to calculate the amount of waste that is reduced and that goes to the TPS facility. The waste reduction rate in the Proklim RW 07 area of Lesanpuro Village was calculated using the amount of reduced organic and inorganic waste according to Figure 1 below.

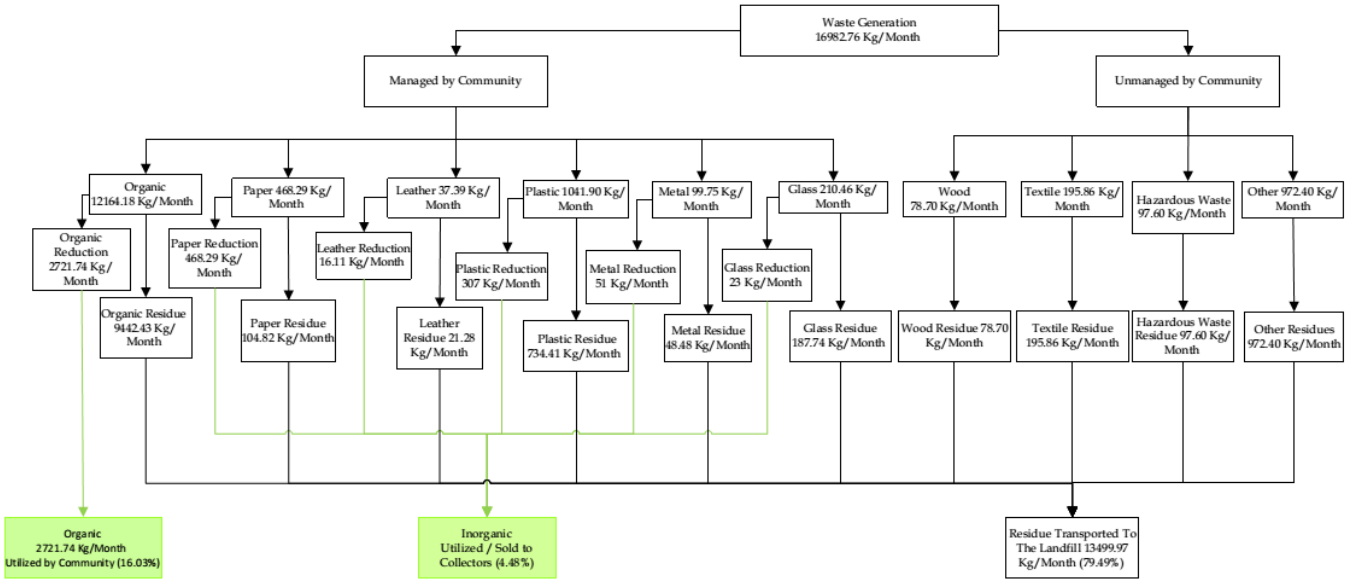

Figure 2. Material balance analysis of waste management

Based on the Mass Balance analysis, it can be seen that waste is separated into 10 types. The waste is managed and utilized by the community with organic and inorganic management schemes. Inorganic waste is managed based on the types of paper, rubber, metal plastic, and glass. Waste management is able to reduce organic and inorganic waste disposed of in landfills.

Waste reduction efforts cannot be carried out on 4 types of waste with the types of wood, textiles/fabrics, B3, and residues so these types of waste are directly disposed of without management. Management of wood and fabric waste is very difficult to do because the economic and social value of this type of waste has not been able to be optimized. B3 waste does require special management in accordance with Government Regulation Number 22 of 2021 concerning Environmental Protection and Management.

Based on Figure 2, it is known that the waste reduction efforts made by the RW 7 community of Lesanpuro Village, amounted to 20.51% of the total waste generated. This result is smaller when compared to the overall reduction rate in Malang City, which is 25.56% (Rachmawati et al., 2023). Meanwhile, residual or unmanaged waste still has a very large percentage,

which is 74.49%. This is not in accordance with the target in Presidential Regulation Number 97 of 2017 concerning National Policy and Strategy for Household Waste Management and Waste Similar to Household Waste (Jakstranas) which states that by 2023 the level of waste reduction from the source is 27% and by 2025 it reaches 30% (Mustafa et al., 2022).

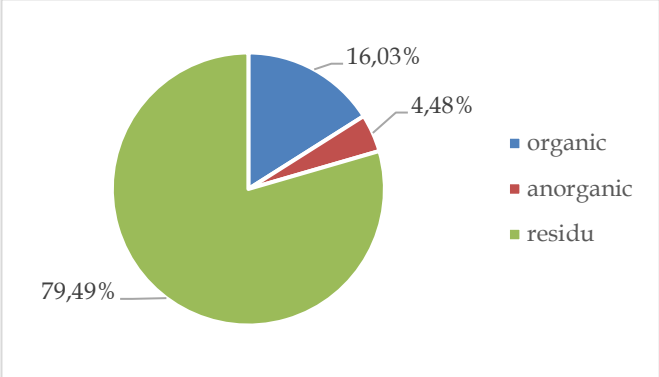

Figure 3. Existing waste reduction percentage

Not achieving the waste reduction target according to the Jakstranas needs attention. This is because RW 07 Lesanpuro Village is one of the climate village programs that is expected to be a role model for other villages in Malang, especially in terms of independent waste management. Through this research, it is known that RW 07 Lesanpuro Village succeeded in reducing both organic and organic waste by 20.51%. This number is smaller when compared to the overall reduction rate in Malang City, so the community of RW 07 Lesanpuro Village needs to increase their participation in efforts to manage household waste reduction. Increasing community participation rates must be supported by relevant stakeholders through education and training in waste management. It is expected that the community's knowledge will increase to increase environmental awareness.

Conclusion

The results of the research show that at the climate village program location (Proklim) Rukun Warga (RW) 07, Lesanpuro Village, Malang City, the average amount of waste generated is 0.388 people/day (kg). The average waste density is 152.38 kg/m3. The composition of waste is dominated by organic waste, namely 71.63%. The total reduction was 20.51% (organic waste 16.03%, inorganic waste 4.48%). This number does not meet the Jakstranas target of 30% by 2025, even though the research location is included in the Proklim category, so it is necessary to optimize waste management by the community.

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Author Contributions
Conceptualization, L.Y.R, A.E, S.T.W, D.A.; validation, L.Y.R and A.E.; formal analysis, S.T.W.; investigation, L.YR., S.T.W and D.A.; resources, P. M. Z. and T. R.; data curation, R. A. E.: writing—original draft preparation, L.Y.R, S.T.W and D.A.; writing—review and editing, A.E., and D.A,: visualization, and L.Y.R, S.T.W.and A.E. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

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