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Urban solid waste: the socio-environmental impacts of production and disposal in the monte castelo neighborhood in tefé/am

Abstract

The present work was developed with the objective of analyzing the socio-environmental problems arising from the consumption and disposal of waste by the residents of the Monte Castelo neighborhood, in the city of Tefé/AM. The empirical method was used, based on observation and interviews with residents for a quali-quantitative survey that allowed the understanding of the actions regarding the production and disposal of garbage in inappropriate places, the bibliographic review allowed a deepening of the categories of analysis. The accumulation of waste and the lack of sensitivity linked to the lack of infrastructural policies, brings residents closer to various pathologies, in addition to a space without quality of life. Therefore, a face-to-face conversation was necessary to sensitize them, in addition to an active participation with the Municipal Department of the Environment and the request to the Secretariat of Infrastructure for the installation of a culvert on Álvaro Maia street.

Keywords: solid waste, environmental education, socio-environmental impacts, mount castle

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Introduction

Urban solid waste management represents one of the most critical challenges for contemporary cities, especially in regions like the Amazon, where infrastructure and public policies for waste management are still precarious. The city of Tefé/AM, located in the heart of the Amazon, faces serious problems in relation to the collection, treatment and final disposal of solid waste, reflecting a reality that is common to many medium-sized cities in the region.

According to Leme,[1] the problem of urban solid waste involves environmental, social, economic and public health issues. The improper disposal of waste can lead to the pollution of soils and water bodies and compromise the quality of life of urban populations. In addition, the presence of waste in inappropriate places encourages the proliferation of disease vectors and directly affects the well-being of communities, as is the case in the Monte Castelo neighborhood, the subject of this study.

Against this backdrop, this research allowed us to analyze and understand the management practices of urban solid waste in the Monte Castelo neighborhood, located in Tefé/AM. This neighborhood was chosen because of its relevance to the urban dynamics of the municipality, as well as because of the representativeness of the problems faced in relation to inadequate waste management. The study sought not only to identify existing shortcomings and challenges, but also to propose alternatives and solutions that could contribute to the sustainable management of solid waste in the city.

Based on the experience in the Monte Castelo neighborhood, the aim was to understand the nuances of waste management in a context of limited resources and poor infrastructure, a reality that many cities in the Amazon face. The need to discuss and implement efficient solid waste management strategies is reinforced by Tefé's population and urban growth, which has increased the amount of waste produced and put even more pressure on the municipality's management capacity.

The authors Seiffert[2] and Cinquetti and Logarezi[3] point out that solid waste management must be an integrated process involving the planning, collection, transportation, treatment and final disposal of waste. These authors emphasize the importance of the participation of society, public authorities and the private sector in building effective and sustainable solutions to the issue of urban waste. For Machado,[4] it is essential that urban solid waste management is guided by an approach that integrates environmental education, public policies and the active participation of the local community.

In this context, the National Solid Waste Policy (Law No. 12.305/2010)[5] establishes important guidelines for waste management throughout the country, highlighting shared responsibility for the life cycle of products. However, the implementation of this policy encounters challenges, especially in cities that are more distant from major centers, such as Tefé/AM, where the lack of adequate infrastructure and the scarcity of resources make it difficult to operate an effective waste management system.[6]

For Braga Júnior and Albertin,[7] the absence of selective collection, the lack of environmental awareness on the part of the population and the improper disposal of waste are problems that have contributed to the accumulation of waste and environmental degradation in the Monte Castelo neighborhood. This scenario reinforces the need for studies such as this one, which aim to understand the dynamics of solid waste management and identify ways to promote more efficient and sustainable management.[8]

This article therefore sets out to carry out an in-depth analysis of solid waste management in the Monte Castelo neighborhood in Tefé/AM, using a methodology that combines bibliographic surveys, quantitative and qualitative data, and semi-structured interviews with local residents. From this perspective, it is hoped that the results of this research can contribute to the formulation of public policies and environmental education actions that promote community awareness and participation in solid waste management, as well as to the creation of innovative and sustainable solutions that respond to the challenges in the city of Tefé.

In the end, it is hoped that this study will reinforce the importance of integrating all the players involved - public authorities, the private sector, civil society and the community - in tackling the challenges associated with urban solid waste management and that it will contribute to promoting a healthier, cleaner and more sustainable urban environment.

Methodology

The methodology of this study was carefully structured to provide a detailed and accurate analysis of urban solid waste management in the Monte Castelo neighborhood in the city of Tefé/AM. To achieve this goal, a mixed research approach was adopted, integrating quantitative and qualitative methods, ensuring a broader and deeper understanding of the topic. This methodological combination made it possible to capture the nuances and complexities inherent in solid waste management, ensuring the richness and depth required for a study of this kind.[9] Figure 1 shows the location map of the city of Tefé, in the state of Amazonas, where the research was carried out.

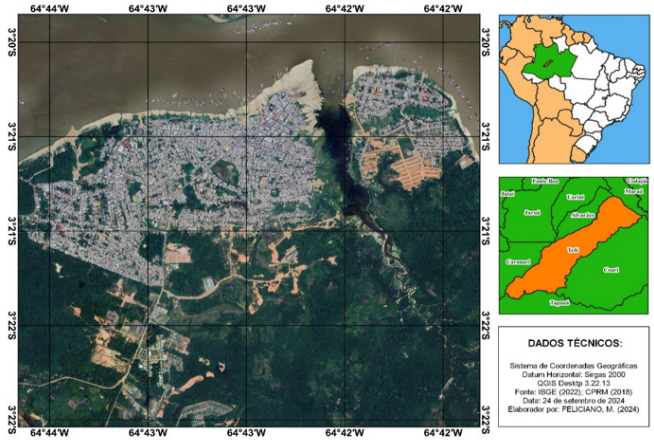

Figure 1 Location of the municipality of Tefé-AM.

Source: Prepared by Mateus Feliciano da Luz, (2024).

Initially, the research involved a comprehensive bibliographical survey on the subject, with the aim of providing a theoretical basis for the study, understanding recommended practices and the challenges faced in solid waste management in urban contexts similar to Tefé/AM. Renowned authors in the field were used as a basis, such as Seiffert[2] and Cinquetti and Logarezi,[3] who offer a comprehensive view of the importance of waste planning, collection, transportation, treatment and final disposal. In addition, these authors highlight the need for the active participation of society and public authorities in order to effectively manage solid waste.

After the literature review stage, data collection was conducted in the field and divided into two main stages: direct observation and semi-structured interviews. Direct observation made it possible to record solid waste disposal, collection and treatment practices in the Monte Castelo neighborhood, identifying the amount of waste accumulated, the predominant types and the collection and final disposal conditions. This process was fundamental in recognizing patterns of behavior and practices adopted by residents in relation to solid waste management. Semi-structured interviews were then conducted with 30 families living in the neighborhood, in an attempt to understand their perceptions, attitudes and practices in relation to solid waste management. The interviews were guided by a previously prepared script and covered topics such as disposal, selective collection, environmental awareness and knowledge of current legislation.

Statistical and content analysis techniques were used to analyze the data collected, enabling both quantitative and qualitative data to be treated appropriately. Data triangulation, as advocated by Silva,[10] was used to ensure the reliability and validity of the results, combining different methods and data sources. This technique made it possible to compare the information obtained at different stages of the research, resulting in a more in-depth and consistent understanding of solid waste management in the Monte Castelo neighborhood.

However, the research faced some limitations that are worth highlighting. The resistance of some residents to providing detailed information about their waste disposal practices posed a challenge, requiring additional effort to establish an environment of trust. In addition, the lack of up-to-date and accurate data from government sources on solid waste management in the municipality of Tefé limited the quantitative analysis. To overcome these limitations, primary data collection and triangulation were essential, ensuring the validity of the information obtained.

The choice of a mixed methodology is justified by the need to approach the problem of urban solid waste from multiple perspectives, enabling a more complete and detailed analysis of the reality of the Monte Castelo neighborhood. As argued by Minayo,[11] the integration of quantitative and qualitative methods contributes to a more in-depth understanding of social phenomena, especially in complex and multifaceted contexts such as urban solid waste management.

Therefore, the methodology adopted in this study was able to provide relevant information on the solid waste management situation in the Monte Castelo neighborhood, contributing to the identification of inadequate practices, challenges and opportunities for the implementation of a more effective and sustainable management system. This approach made it possible not only to map the current reality of the neighborhood, but also to provide input for the development of public policies and actions aimed at improving solid waste management in the region.

Theoretical framework

The urban space of Tefé, environmental issues related to solid waste

This problem has a lot to do with the city's history, since the migration of missionaries, explorers, travelers and indigenous people promoted urban territorialization. The Catholic Church was the first institution involved in Tefé's history with participatory activities that contributed to the growth of the municipality, and in particular, the city. The presence of the Spiritans contributed to the spatial formation of the town, which was previously known as Vila de Ega and was elevated to the category of city on June 15, 1855, with the name Tefé.[12]

According to Rodrigues,[12] this attraction has led to spatial expansion, promoting the emergence of new neighborhoods and the growth of existing ones. In this context, we are talking about

the neighborhood of Monte Castelo, a neighborhood that has grown in terms of demographics, providing occupation in the most different places, appropriate or not, for the construction of housing, emerging a tangle of streets and alleys without the minimum of urban infrastructure.

With the increase in population, there was an increase in the production of solid waste by residents and the commerce that settled there, promoting socio-environmental impacts as a result of this action. In order to minimize the problems arising from the consumption and disposal of waste, it was necessary to take joint action in the search for quality of life, since, according to the city, it is the place where social, economic, political and cultural life is concentrated and effervescent, and the city of Tefé has experienced this effervescence.[5] The growth of the economy in the region began with the urbanization of the city, and modern globalization began slowly, but was visible in the development process of contemporary capitalism, which, among many other reasons, led to the emergence of various neighbourhoods. The radical transformations that took place gave rise to the Monte Castelo neighborhood in the city of Tefé/AM, as shown in Figure 2.

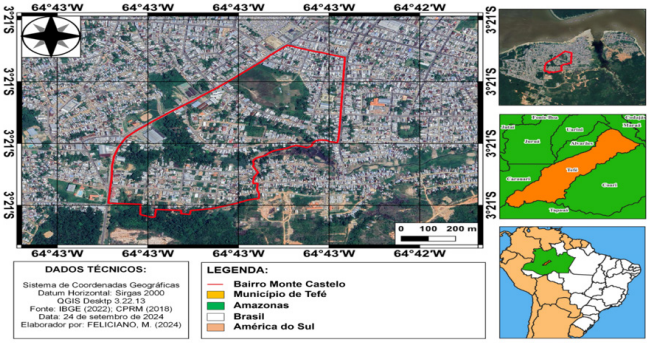

Figure 2 Spatialization of the Monte Castelo neighborhood in Tefé-Am.

Source: Prepared by Mateus Feliciano da Luz, 2024.

When talking about Tefé's urban space, historian Abreu tells us that the city began with three streets in the central part, and among the old neighborhoods is Monte Castelo, which was one of the first neighborhoods to emerge. However, it is known that the urban space is made up of a fragmented space, but at the same time spatially articulated and united. For Santos,[13] the elaboration of spatial reality is closely dependent on techniques, which become explanatory data for space, since they are realized in concrete relations that preside over them and integrate them into the mode of production and relations of production. Still in Santos' words:

The history of man on Earth is the history of a progressive rupture between man and his environment. This process accelerates when, at almost the same time, man discovers himself as an individual and begins to mechanize the planet, arming himself with new tools to try to dominate it. Artificialized nature marks a major change in the human history of nature. Today, with technoscience, we have reached the supreme stage of this evolution (Santos, 1994. p. 17).

Man's relationship with the geographic environment favors extraordinary changes. Man's relationship with the natural environment involves processes, both in the change of space and after he appropriates the space, redefining the place and consequently causing various problems:

The deepest force that drives man and makes him invent new forms of society is his ability to change his relationship with nature by transforming it. Furthermore, according to this anthropologist, no intentional action by man on nature can begin without the existence of representations, of ideas which, in some way, are only a reflection of the material conditions of production. (*apud* Godelier, 1984, 63).[14]

It is understood that, through all this appropriation of space, man defines it, identifies it and comes to dominate it, giving new characteristics to the environment.[15] This evolutionary process can cause positive and negative changes involving society, the environment, health and others. The positive processes involve the good comfort of the citizen, as long as they take care of the place, among others. The negative aspects, on the other hand, stem from the individual's accommodation in the environment, i.e. it is related to a lack of care when appropriating the space.

Solid waste management in the urban context

Urban solid waste management is an issue of great relevance to Geography, as it involves understanding the socio-spatial dynamics that influence the generation, collection and final disposal of this waste. According to Araújo,[16] urban solid waste management should be understood as a process that involves not only technical and operational aspects, but also the social, economic and environmental interactions present in urban areas. For Pereira,[17] the process of disorderly urbanization and population growth in Brazilian cities intensifies waste production, highlighting the challenges of implementing an effective collection, treatment and final disposal system.

Brazil, through the National Solid Waste Policy (PNRS), established by Law No. 12.305/2010,[5] seeks to promote the proper management of solid waste, focusing on waste reduction, reuse, recycling and treatment (BRASIL, 2010). However, Silva[10] notes that, in practice, the implementation of this policy faces challenges such as the lack of adequate infrastructure, limited financial resources and the need to raise public awareness, which hampers the effectiveness of actions aimed at waste management.

Environmental and socio-spatial impacts of inadequate management

According to Reigota,[18] the improper disposal of solid waste has a significant impact on the environment and quality of life in cities, directly affecting public health and contributing to environmental degradation. Geography highlights the importance of analyzing how waste affects soils, waterways and urban ecosystems, since these impacts reflect the relationship between society and the environment. According to Silva, Tagliaferro and Oliveira,[19] soil and water contamination, visual and atmospheric pollution, as well as the proliferation of disease vectors, are some of the consequences of inadequate solid waste management.

In the context of the Amazon region, where the municipality of Tefé/AM is located, these impacts become even more worrying due to the vulnerability of ecosystems and the importance of environmental preservation. The lack of selective waste collection and adequate waste disposal systems contributes to the degradation of natural resources and puts biodiversity at risk, as well as the health of the populations living in these areas.[20]

Community participation and environmental education in waste management

The engagement of society and environmental education are essential components for effective solid waste management, as stated by Teobaldo Neto and Nishiyama.[21] According to Santaella et al.,[22]

environmental education makes it possible to raise awareness among the population about the importance of correct disposal and recycling, promoting changes in behavior that contribute to reducing the volume of waste generated and strengthening selective collection.

Community participation is a strategy that has been highlighted in studies on solid waste management, especially in areas with limited infrastructure, such as the Amazon. According to Sposito,[23,24] the implementation of selective collection and recycling projects can be enhanced when local communities are mobilized and engaged, as this contributes to the development of more sustainable practices and the promotion of collective environmental awareness.

Sustainable technologies and practices for waste management

The adoption of appropriate technologies for the treatment and final disposal of solid waste is one of the main challenges for implementing sustainable management. Braga Júnior and Albertin[7] point out that the use of technologies such as composting, biodigestion and incineration can help to reduce the volume of waste and transform organic waste into fertilizer or energy, in line with the principles of sustainability.

In the case of the municipality of Tefé/AM, the lack of adequate infrastructure and technologies makes it difficult to implement sustainable solid waste management practices, especially in outlying areas such as the Monte Castelo neighborhood. The study of Geography is fundamental to understanding how these technologies can be adapted to the local context, taking into account the available resources, the characteristics of the population and the socio-economic challenges of the region.[9]

Solid Waste Management and Sustainable Development in the Amazon

The concept of sustainable development is directly related to the efficient management of solid urban waste, especially in regions like the Amazon, where the pressure on natural resources is intense.[10] Geography offers an integrative perspective to understand how waste management can contribute to the sustainability of Amazonian cities, considering the environmental, social and economic dimensions.

Solid waste management, when carried out in an integrated and participatory manner, can be an important tool for promoting urban sustainability, preventing environmental degradation and encouraging the circular economy.[2] In this sense, the experience of Tefé/AM can serve as a relevant case study for understanding the challenges and opportunities in promoting solid waste management practices aligned with sustainable development in the Amazon region.

The literature reviewed shows that solid waste management is a multidimensional issue that requires different social actors, appropriate technologies and educational practices to promote more sustainable and healthy cities. According to Piaia, Cervi and Bertaso,[25] the geographical approach makes it possible to analyse how these practices are influenced by spatial, social and environmental factors, contributing to the construction of more effective and contextualized solid waste management strategies in urban areas in the Amazon.

Results and discussions

Through the research, it was possible to alert residents to the issue of improper waste disposal, especially for those who live in areas close to rivers and streams. Lavnitcki, Baum and Becegato[26] point out that the waste produced by man's actions, when it falls on the ground, can be taken to other places, causing serious damage to the environment and/or human health.

The city of Tefé and its rural communities have the support of government institutions that work to promote non-formal environmental education in various areas of social life, through a wide range of organizations and professionals. Known as the Municipal Secretariat for the Environment and Conservation (SEMMAC), it is responsible for projects within the city and communities, with the aim of reaching out to society and contributing to a better quality of life. It is through SEMMAC that transformative changes can be made to the environment, with the aim of solving the problems arising in the geographical space.

The Municipal Department of the Environment and Conservation (SEMMAC), in the municipality, pointed out that it has been working, showing its real interests to the municipality and neighboring regions, and more, they use work plans such as: plans aimed at Environmental Education, projects and activities, joint clean-up efforts, monthly meetings of the Municipal Environment Council (COMDEMA) giving a voice to the most worrying cases, i.e. those at risk, also, they work with schedules, highlight the materials needed for use, in this way, reaching and solving the problems arising, aiming at the improvement of all, within their standards and norms. The National Environmental Education Policy (PNEA), Federal Law 9.795 of April 27, 1999, and the National Solid Waste Policy (PNRS), in Law No. 12.305 of August 2, 2010, define solid waste as discarded material, substance, object or good resulting from human activities in society. In this context, the PNRS [...] defines municipal solid waste (MSW) as waste originating from domestic activities in urban homes and from sweeping, cleaning public places and roads and other urban cleaning services. (PROGRAMA LIXÃO ZERO, 2019, p. 15). Therefore, all the material found during the observation, along the streets and alleys, in the Monte Castelo neighborhood is defined as solid waste, considering what is established by the National Solid Waste Policy.

The analysis of the results and discussion of solid waste management in the Monte Castelo neighborhood in Tefé/AM reveals a complex intersection between local practices, socio-economic issues and the effectiveness of public policies aimed at environmental management. This analysis was enriched by various data collection and interpretation tools, including photographic records, georeferencing, and interviews with residents, allowing for an in-depth understanding of the challenges faced in waste management. Figure 3 shows the topographical distinction between the high (A) and low areas of the Monte Castelo neighborhood:

Figure 3 Mosaic of high (A) and low (B) areas of a stretch of the Monte Castelo neighborhood.

Source: Authors' own elaboration (2023).

The survey revealed that the neighborhood has low and high areas (Figure 3). The upper parts (Figure 3 "A") are less affected by the open sewage, while the lower parts (Figure 3 "B") are affected by the

houses, and those that are close to the lake suffer from the flooding, as the land is located in areas that suffer from flooding at the time of the flood, even affecting the houses located between Rua Raimundo Pires and Ruí Barbosa. According to one resident, this part of the neighborhood is known as the buriti village. He couldn't explain why, hypothetically, because the buriti palm grows in a flooded area.

The phenomenon occurs every year and can be distinguished as a normal flood, a large flood and an exceptional flood. The exceptional flood is known for exceeding all the limits of the others that have already occurred. It causes a great deal of damage to the residents of the floodplains and to those who live on the banks of the rivers and streams drained by Lake Tefé. Lake Tefé is of great importance to the city and the region, as it supplies primary products from the countryside and industrialized products from the major urban centers, while on the other hand it causes damage to the residents who live on the banks of the river, both on land and on the banks.

Variation in topography, as shown in Figure 3, is a crucial factor influencing solid waste distribution. Geographical literature points out that the physical configuration of a neighborhood can impact waste management, as areas with poor infrastructure and accessibility are often more prone to garbage accumulation, especially during periods of heavy rainfall (Santos, 2018). This is because the accumulation of waste can lead to clogged drainage systems, exacerbating flooding and creating a cycle of environmental degradation that affects public health (Kumar & Kumar, 2020).

Figure 4 shows the mosaic representing the trail georeferenced by the GeoTracker application (C) and the improper disposal of waste in the neighborhood's streets (D) and next to a "no littering" sign (E). The presence of garbage in prohibited places reflects a significant gap between environmental legislation and the daily practice of residents. According to Pires and Martinho (2019), the lack of environmental awareness and the absence of effective enforcement contribute to disregard for disposal rules. In addition, the perception of ineffectiveness in public policies can lead to apathy among the population in relation to the problem, highlighting the need for education and engagement strategies that promote awareness of the importance of correct waste disposal. See Figure 4:

Figure 4 Trail mosaic (C), garbage on the side of the road (D) and garbage next to a "no littering" sign (E).

Source: Authors' own elaboration (2024).

The sign in Figure 4 "C", according to Municipal Law No. 044/2008, is placed in places where the presence of garbage is greatest, precisely to raise awareness and demonstrate to the population that there are laws that seek to prevent the environment, the sign was placed at the request of a resident, when he realized that the place is in this situation, in a serious state.

In the neighborhood, they deliver information on the days that the collector passes through, which are: Monday, Wednesday and Friday, after the information stated, they realize that they do their work according to the standards, they seek collaboration from the residents regarding the waste discarded in the sewer and other parts of the neighborhood, so that together they can achieve future objectives, related to a clean environment**.**

The mosaic in figure 05 shows the methods used to educate residents about waste collection and awareness of proper waste disposal. The effectiveness of educational campaigns is often debated in the literature, where it is noted that awareness-raising actions must be continuous and adapted to the cultural and socio-economic specificities of communities (Burgos and Mertens, 2016). Despite the efforts made by organizations and public authorities, effective community participation in waste management initiatives is still limited. Combining environmental education with practical actions, such as clean-up efforts and recycling workshops, can increase the population's engagement and create a sense of belonging and shared responsibility towards the environment (Barreto and Tavares, 2016). Take a look at Figure 5, which deals with the methods used to guide neighborhood residents in relation to solid waste in the neighborhood surveyed.

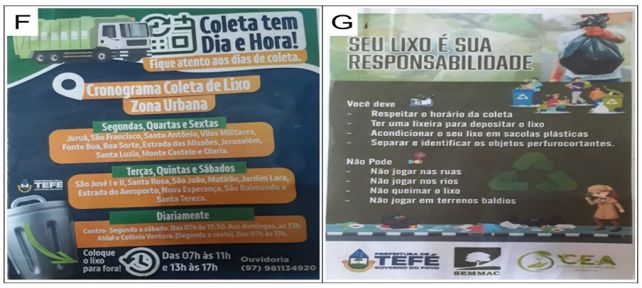

Figure 5 Mosaic of methods used to guide neighborhood and city residents, collection and awareness.

Source: SEMMAC, organized by the authors (2024).

Based on the schedule (Figure 5 "F"), showing that every Monday, Wednesday and Friday, collections are made in the Monte Castelo neighborhood and others, in the morning and afternoon, these communications are precisely to guide the days that the collector passes through the streets. The pamphlet (Figure 5 "G") produced by the Municipal Department for the Environment and Conservation informs the city's population about what should and shouldn't be done with solid waste. Collections are made by compactor trucks and a pick-up truck that helps collect the waste.

Another issue observed during the research was that, when walking through the streets of the Monte Castelo neighborhood, it was noted that most of the houses do not have garbage garbage cans, and those that do are improvised with the remains of washing machines and wood, in the open, leaving the garbage open to animals. In some supermarkets and stores, the accumulation of waste is greater, as shown in (Figure 6).

Figure 6 Mosaic of unsuitable garbage cans distributed in the Monte Castelo neighborhood.

Source: Authors' own elaboration (2024).

Figure 6 highlights the inadequacy of the garbage cans available in the Monte Castelo neighborhood, which are insufficient to meet the population's demand. The garbage cans, which are often damaged or poorly positioned, not only compromise urban aesthetics, but also facilitate the dispersal of waste, contributing to visual and environmental pollution. As suggested by Carvalho et al. (2017), the implementation of adequate infrastructure is fundamental to the effectiveness of waste management policies, as the availability of appropriate equipment can reduce inappropriate waste disposal. However, simply installing garbage cans is not enough; it is necessary to accompany these actions with ongoing and effective management, which includes regular collection and maintenance of the equipment.

Through interviews with some residents who live in the risk areas, they reported that the biggest concern is when it rains, the risk areas suffer flooding, compromising the houses that are in low areas, since then, these problems have been occurring for a long time, the cause of these problems is garbage. For Santaella et al.,[22] it is through the disposal of waste that the private becomes public and ceases to be an isolated point and becomes an environmental issue, a public health problem. When we talk about environmental problems caused by solid waste, we think of it as part of man's action on the space in which he is inserted, and inappropriate waste disposal becomes yet another environmental problem. Figure 7 shows the amount of solid waste produced per year in the city of Tefé-Am in 2022, please note:

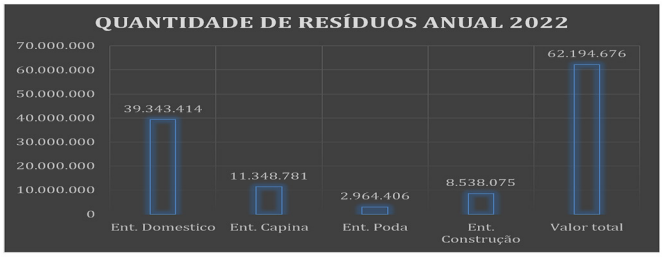

Figure 7 Graph (Amount of solid waste produced per year in Tefé-Am, 2022).

Source: Authors' own elaboration (2024).

The analysis of the quantitative data presented in Figure 7, which shows the amount of solid waste produced in Tefé/AM in 2022, reveals the magnitude of the challenge faced by the municipality. The total of 62,192,676 kg of solid waste produced highlights the urgent need for robust and sustainable public policies that integrate education, infrastructure and collection services. The excessive production of waste, especially in a small city like Tefé, reinforces the importance of approaches that consider not only the disposal of waste, but also its reduction at source and the promotion of sustainable consumption practices.[1]

Figure 7 shows the amount of solid waste produced in 2022, with the amount of waste characterized as domestic being much higher than the rest; hypothetically, with population growth, this waste production tends to increase. It is known that all this waste is harmful to the urban environment, to the health of society and to the soil where it is deposited. When the Municipal Department for the Environment and Conservation collects waste from the city's streets, it is directed to the open-air dump located on Estrada da Agrovila, where all kinds of waste are concentrated, causing the soil to become contaminated and contaminating the springs, which are often used by the population for leisure, through the leachate.

Some actions have been carried out with positive results, such as handing out pamphlets to make residents aware of the problems, visits, changing manholes, information available in grocery stores and supermarkets, and talks at school. We know that these actions will not put an end to the problems, but they will help to raise awareness among residents so that they fight and seek a better quality of life. It is necessary to create solutions to combat the socio-environmental problems in the Monte Castelo neighbourhood.

The literature emphasizes the relevance of an integrated approach that considers community participation, environmental education and the implementation of consistent public policies.[16] Therefore, the analysis of the data collected shows that Tefé/AM faces a series of structural and cultural challenges in the management of its solid waste. To improve the situation, it is essential that the strategies adopted are interdisciplinary and intersectoral, promoting collaboration between the government, civil society organizations and citizens. Through this integration, it will be possible to create an environment conducive to building a culture of sustainability, where solid waste management is seen as a collective problem that requires collective solutions.[15]

Based on the data analyzed and the theoretical discussion presented, it can be concluded that solid waste management in the Monte Castelo neighborhood and in Tefé/AM requires immediate and integrated actions that go beyond simple garbage collection. These actions must include environmental education, the promotion of adequate infrastructure, effective supervision and the engagement of the population, in order to guarantee a healthier and more sustainable environment for all residents. Implementing such measures will not only contribute to improving the community's living conditions, but will also promote environmental preservation and local sustainability.[27–30]

Final considerations

The final considerations of this study highlight the importance of collaboration between government institutions, residents and researchers in the search for solutions aimed at improving the quality of life of the population of the Monte Castelo neighborhood in Tefé-AM. It was noted that the Secretary for the Environment and Conservation (SEMMAC) and the Secretary for Infrastructure and Works (SEMIO) are engaged in initiatives to improve living conditions in the region. However, it is essential that these efforts are accompanied by a collective commitment that involves the local community in formulating and implementing strategies aimed at reducing the impacts caused by the disorderly accumulation of solid waste.

Public policies must be strengthened and aimed at mitigating the problems related to waste management, especially in critical areas such as those that house sewers and near homes. The accumulation of waste in inappropriate places is not only a reflection of human action, but also a manifestation of the need for a more efficient and conscious waste management system. The intervention of public authorities, in partnership with the population, is essential to create an environment conducive to sustainable development, where citizens feel they are an active part of conserving and protecting the environment.

The preliminary results of the actions already implemented, such as the delivery of pamphlets, visits to homes and the replacement of manholes, indicate that raising awareness is a crucial step in fostering behavioral change in relation to waste disposal. The promotion of newsletters in supermarkets and other points of community interaction has proved effective in disseminating relevant information about the importance of proper waste disposal and its implications for the local ecosystem.

It can be concluded that residents' commitment to adopting correct disposal practices not only benefits public health, but also preserves the integrity of the environment. It is therefore essential that educational and awareness-raising actions are continued and expanded, ensuring that the population understands its active role in solid waste management. Community involvement is crucial to ensure that the necessary changes are sustainable and that the benefits extend to future generations. In this way, every citizen will be able to contribute to a cleaner and healthier future, where the environment and quality of life go hand in hand.

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Conflicts of interest

The authors declare that they have no conflict of interest for the publication of this scientific article.

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