

Santos: setting the scene of the local waste management system



COMBATE ÀS FONTES DE
POLUIÇÃO MARINHA POR
RESÍDUOS SÓLIDOS



CONCEPT AND COORDINATION

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ABRELPE is a non-profit organization that gathers and represents companies that operate in the urban cleansing services and management of municipal solid waste. Its mission is based on the principles of environmental preservation and sustainable development and its main objective is to promote technical and operational development of the solid waste sector in Brazil.

In an international context, ABRELPE is the representative in Brazil of the ISWA – International Solid Waste Association, the main global entity dedicated to the solid waste matters; it's also the head office of the Regional IPLA Office for South America (International Partnership for the development of waste management services together with local authorities), a well-known program supported by the UN through the UNCRD – United Nations Centre for Regional Development. Moreover, ABRELPE is part of the Municipal Solid Waste Initiative of the CCAC (Climate and Clean Air Coalition), an international partnership for the environment agenda that operates on several fronts to reduce short-lived climate pollutants and fight against climate change.

INTRODUCTION

The city of Santos, located on the coastal area of São Paulo State, has its origins related to the arrival of the first Portuguese settlers around 1540. Its foundation was carried out by Brás Cubas, who arrived in Brazil through the expedition of Martim Afonso de Souza, creator of the land settlement around São Vicente island.

Santos was officially founded in 1546 with over 470 years of history, but its anniversary is celebrated on January 26, 1846 – when the city was granted the status of village.

As one of the oldest cities in the country and due to its strategic location on Brazilian coast, Santos has reached important historical milestones in several sectors:



Figure 1. Reproduction of the mural of Benedito Calixto, located in the Bolsa Oficial do Café. Portraying Santos in 1822 (LO). Source: FAMS Collection.

- The port of Santos, the largest in Latin America, has moved huge volumes of goods to all parts of the world since its foundation in February 1892; as historical milestone of its importance for the period of great exports of coffee, in 1909 it moved 13,130,933 of bags of the product towards Europe, being responsible for the operation of 787,856 tons, which represented 95.8% of the movement of the port (SINDAPORT, 2017);

- The port also decisively influenced the entry of immigrants of different nationalities, mainly Portuguese, Spanish, Italian, Turkish and Japanese, between 1850 and 1930. Approximately four and a half million immigrants entered the country via Santos (SOURCE GUIDE FOR THE HISTORY OF SANTOS, 2012);

- In basic sanitation, Saturnino de Brito is who implemented a pioneering sanitation system in the country, whose plan included an extensive sewage system with no connections to the rainwater drainage system known as “Separador Absoluto” system. In addition, he was responsible for the design of the nine rainwater drainage canals in the city of Santos (Figure 2), which were built between 1905 and 1927, solving the sanitary crisis of the time, due to poor water supply; lack of a piped sewage system; accumulation of waste in streets and streams; and the existence of wetlands due to the characteristics of flat and impermeable soil. These factors led to epidemics such as yellow fever and malaria. In 1890, 22,000 deaths were recorded because of these diseases, representing more than half of the population at the time. In addition, when he made the plan of the city with the drainage canals, he also idealized and planned its urban expansion (OLIVEIRA e SANTOS, 2015).



Figure 2. Plan of the drainage canal system in Santos, Saturnino de Brito project. The figure also shows the drawing of rain gauges in the region of the city center. Source: FAMS Collection - Reproduction given to the documentary "Canals of Saturnino".



Figure 3 - Inauguration of the canal conceived by Saturnino de Brito in 1907. View of canal 1, in the stretch of the current Campos Sales Avenue, Vila Nova neighborhood. Source: José Marques Pereira. FAMS collection.

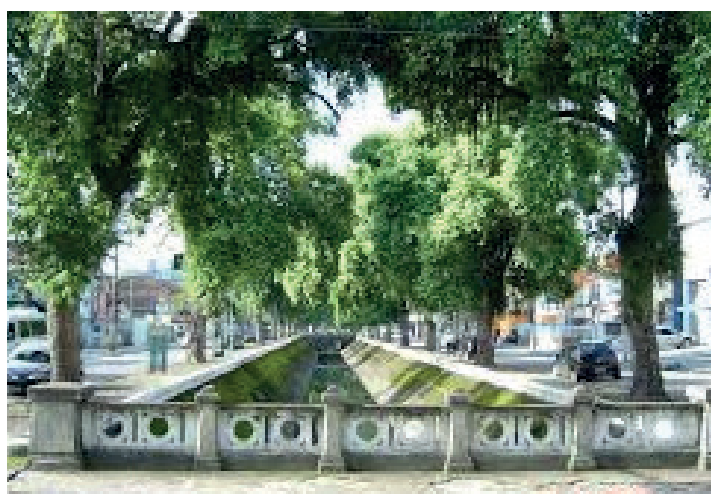


Figure 4. Currently view of canal 3. Source: Wikimedia Commons.

- With regards to urban environmental subjects, it was one of the first municipalities to lead the creation of a Local Agenda 21 in 1994, behind only the city of São Paulo, which began its creation in the same year of the United Nations Conference on Environment and Development (UNCED), the Rio 92.

The local Agenda 21 was elaborated in partnership with the organization ICLEI - Local Governments for Sustainability and had as objective to reverse the environmental degradation that affected the economic and social conditions of the municipality, as well as to promote the improvement of the quality of life for the local population and tourists (KOHLE, 2003; SILVA, 2007).

In terms of development of the municipality, Santos has progressed fast in many aspects and is considered one of the best cities to live in Brazil, registering a Human Development Index (HDI) of 0.840 (IBGE, 2010). However, there are still sensitive issues to the quality of life of its residents, especially those who live in areas with a lack of urban infrastructure directly impacting the estuarine system in the continental area of the municipality. Both the insular and continental areas have problems due to irregular occupations and constructions on stilts, especially in regions of mangroves. These problems include inadequate disposal of waste, lack of basic sanitation, and proliferation of waterborne diseases, among others.

Regarding solid waste management, the main challenges currently faced by the city are:

- Due to the closure of the Sítio das Neves Sanitary Landfill and the unavailability of suitable sites for the construction of a new facility, the municipality faces the challenge of finding alternative areas for waste disposal, and at the same time recognizes the importance of increasing the recycling rates, thus lowering the amount of waste disposed in landfills.
- Despite the progress observed in the last years, the recycling rates are still low compared to the total dry recyclable waste generated.
- Another challenge faced by the municipality, as well as throughout the coastal region of the country and around the world, is the fight against marine littering. According to international studies, 80% of the waste found in the seas and oceans have land origin. Among the main causes is the absence of waste management structures able to carry out treatment and correct destination, as well as the lack of awareness of the population about the impacts of littering both in the outlying residential areas and during leisure and recreation activities on the beach and coastal zones. Therefore, preventing marine pollution requires effective improvement in the management of urban sanitation in cities.

And it is to help the local administration to think about solutions to these new challenges that the **project Fighting the land sources of solid waste marine pollution**, implemented by **ABRELPE** in partnership with the Swedish Environmental Protection Agency (**SEPA**) and the Municipal Secretariat of Environment (**SEMAM**), presents its **second report**.

The purpose of this document is to contextualize the municipality of Santos in the different economic, social and environmental aspects, with a **brief visit to the past**, already carried out above, but with firm feet in the **present**, bringing current data of Santos reality and the necessary elements for an **outlook for the future**, which will be briefly developed in the concluding remarks, but finalized in future reports.

SUMMARY

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1. INTRODUCING SANTOS

1.1. GEOGRAPHICAL ASPECTS

The city of Santos is located in the State of São Paulo, in the Metropolitan Region of Baixada Santista, 72 km from the capital, with geographical boundaries with Santo André and Mogi das Cruzes to the North, Atlantic Ocean and Guarujá to the South, Bertioga to the East and Cubatão and São Vicente to the West (Figure 5).

The territory consists of an insular area, with an extension of 39.4 km², and the continental area, with 231.6 km², with total area of 271 km². The climate is tropical, hot and humid, with an average annual temperature of 22 °C. The rainy season covers a period of three months, from January to March, and the least rainy months from June to December, with an average rainfall of 2,500 mm/year, considered one of the highest in the country due to the meeting of Atlantic tropical and polar fronts, and to the orographic effect of Serra do Mar.



Figure 5. Location of Santos, São Paulo. Source: Adapted from Melhor de Santos 2010.

The vegetation coverage in the continental area of the municipality is 231.6 km² of Atlantic Forest reserve, which is part of the Serra do Mar State Park, considered an ecological sanctuary because of its biodiversity. The highest point of the city is at 1,136 m of altitude, near the source of Itatinga River, and the lowest point at 2 m of altitude.

In pedological aspects, the insular area has a much-degraded soil from human activities, which makes its characterization difficult, being classified as an urban spot with some portions of Cambisols. On the other hand, in the continental area, the predominance is of Cambisols, containing areas of Gleiosols according to figure 6 below (DATAGEO, 2018).

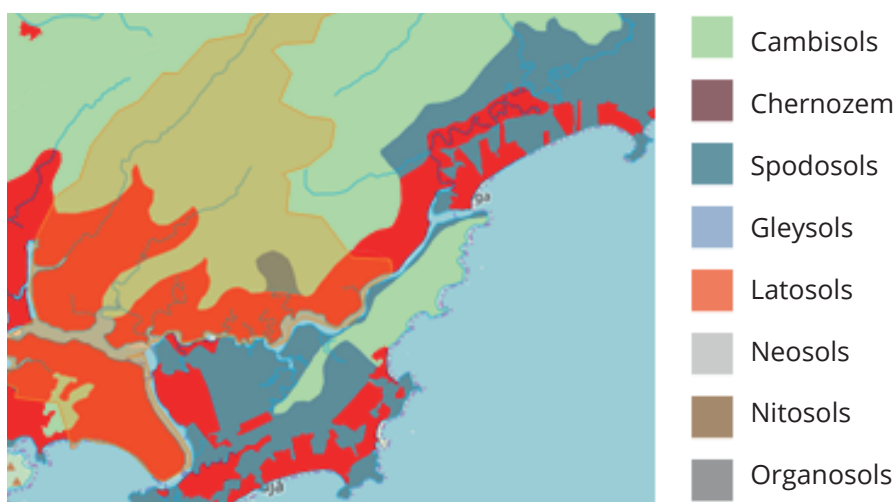


Figure 6. Pedological map of the State of São Paulo. Source: DATAGEO.

In hydrological aspect, Santos has three sub-basins that are integrated in the Water Resources Management Unit of Baixada Santista (UGRHI-7), being part of the Cabuçú River, with 69.65 km² of drainage, Jurubatuba River, with 79.36 km² and Quilombo River, with 86.88 km². According to a survey carried out in 2005, the region had 31 km of mangroves (SCHMIEGELOW et al., 2008), which are of great environmental importance because of the productivity and extensive biodiversity. However, these areas were intensely degraded with the historical occupation of the city and the construction of the port, where a large part of its structures were built on the mangroves. Today, the remaining areas are suffering from the growing threat of irregular settlements.

1.2. ECONOMICAL ASPECTS

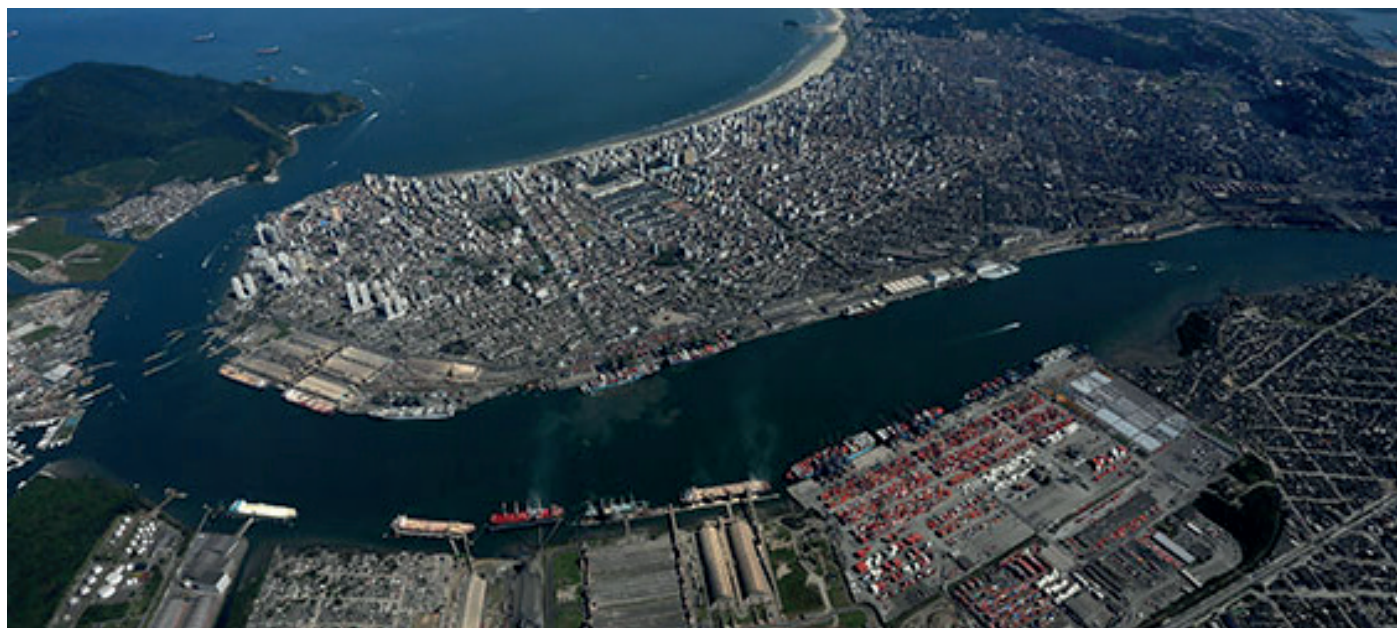


Figura 7. Port of Santos. Source: Companhia Docas do Estado de São Paulo (Codesp).

Santos' economy is heavily based on port activity, harboring the largest port in Latin America, through which more than a quarter of all national cargo harbor passes. Other sectors that influence the dynamics of the municipality's economy are tourism and services. Below are the latest updated data of Brazilian Institute for Geography and Statistics (IBGE) regarding the city's economy:

GDP per capita: \$ 12,260.43¹ (2015)

Percentage of revenues from external sources: 40.3% (2015)

Municipal Human Development Index (IDHM)²: 0.840 (2010)

Total of generated revenue: \$ 703,520.03 (x1000) (2017)

Total of committed expenditure: \$ 663,498.98 (x1000) (2017)

Average monthly salary of formal workers: \$ 773.88 (2016)

1- Equivalent to BRL 46,007.27, according to exchange rate from November 16 2018: 1 BRL = 0.266 US\$

2- Santos occupies the sixth position among the 5,570 Brazilian municipalities according to the IDHM. In this ranking, the highest IDHM is 0.862 (São Caetano do Sul) and the lowest is 0.418 (Melgaço).

1.3. DEMOGRAPHIC ASPECTS

Currently the city has 432,957 inhabitants (IBGE, 2018), with 99.2% living in the insular area of the city and 0.8% in the continental area. According to the Census conducted by IBGE, the population density was 1,491.94 inhabitant/km² in 2010, with a dependency ratio of 44.5% and an aging rate of 14.05%. In addition, the distribution of the population by age-sex is presented in figure 8.

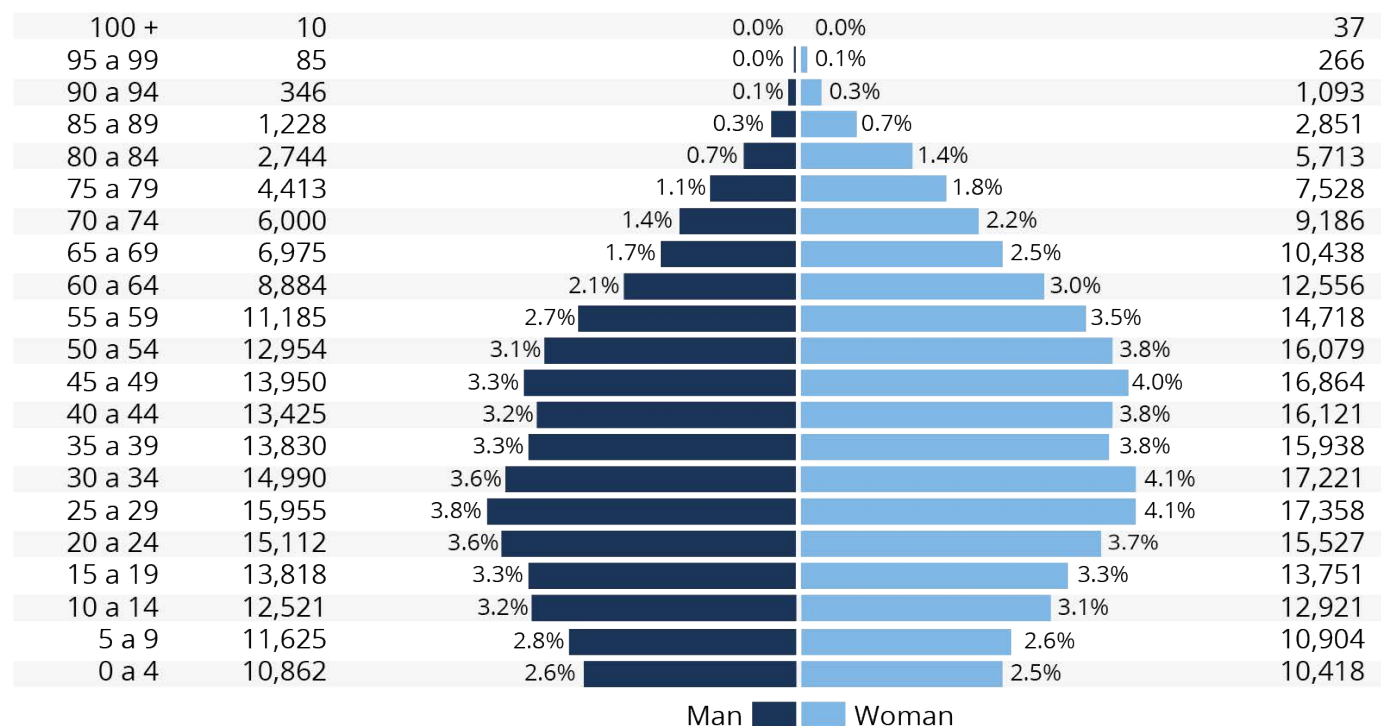


Figure 8. Age pyramid. Source: IBGE, 2010.

As for the administrative division, the city is divided into 59 neighborhoods, of which four concentrate the majority of the population according to the Master Plan of Development and Urban Expansion - LC 731/2011. These areas are located in the Eastern and Northwest sides of the insular area of Santos, in the neighborhoods of Campo Grande, Embaré, Aparecida and Rádio Clube. The ANNEX I illustrates the administrative division with the blue color referring to East Macrozone, yellow to Center Macrozone, green to Hill Macrozone, and beige to Northwest Macrozone.

2. MUNICIPAL SOLID WASTE MANAGEMENT

An in-depth analysis of Brazilian Federal Constitution of 1988 allows us to conclude that the municipalities have been given a number of responsibilities over local interests, including municipal solid waste (MSW) management.

One of the main points is set out in section VI of art. 23, which shows the municipality's constitutional duty to adequately protect natural resources in its territory. In addition, the Federal Constitution assigns to municipalities, in accordance with the Union and the states, the competence to promote the improvement of basic sanitation, as per item IX, of art. 23.

Another relevant issue in the Federal Constitution is found in item I of art. 30, which gives municipalities the power to legislate on matters of local interest such as solid waste management. In addition to the legislative nature, subsection V of the same art. 30 of the Constitution, imposes on municipalities the obligation to provide public services on local interests, directly or by concession, such as services related to solid waste management.

In turn, the National Policy on Solid Waste (Federal Law 12305/2010) consolidated the responsibility to municipalities for the management of waste generated in their territory:

Article 10. The Federal District and the municipalities are responsible for the integrated management of solid waste generated in their respective territories, without prejudice to the control and oversight powers of the federal and state bodies of SIS-NAMA, SNVS and SUASA, as well as the responsibility of the generator for the waste management, according to what is established in this Law.

Competences in the municipal management of MSW

In the case of Santos, the organizational chart below (Figure 9) shows the allocation of responsibilities for MSW management in different secretariats.

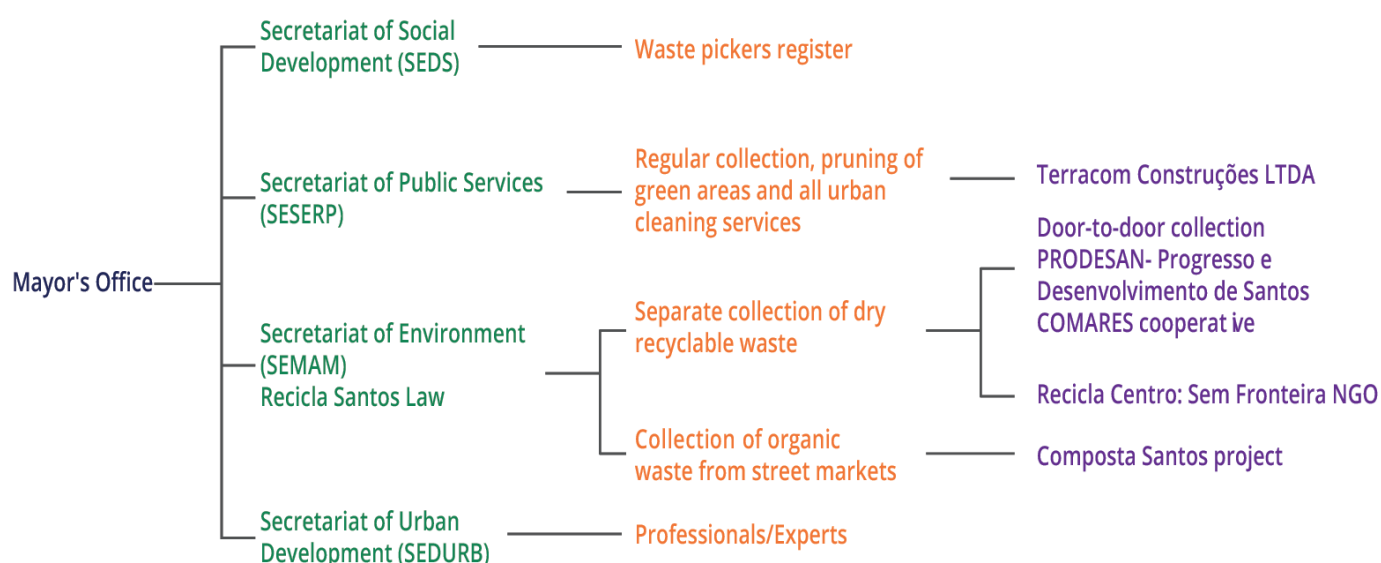


Figure 9. Organizational chart on the MSW management attributions.

Responsibilities for waste management in the city are assigned to four public bodies (SEDS, SESERP, SEMAM and SEDURB), a private company (TERRACOM), a mixed economy company (PRODESAN) and civil society organizations such as non-governmental organizations (NGOs) and cooperatives, as explained below and throughout the document.

- SEDS is responsible for managing the Social Assistance System (SUAS), offering services, programs, projects and benefits of social protection for families, individuals, as well as promoting racial equality and the protection of rights of individuals and racial ethnic groups, and to coordinate free legal aid services. In this way, its responsibility in waste management concerns the registration of wastepickers and cooperatives.

- SESERP is responsible for the management of regular collection and final disposal of waste, as well as other cleaning services that are currently commissioned to the private company Terracom Construções LTDA, owner of the sanitary landfill.

- SEMAM is responsible for the elaboration and implementation of public policies for the environment, aiming at the protection of the urban and natural environment. In solid waste management, the secretariat is responsible for the enforcement of Recicla Santos Municipal Law and the selective waste collection service, which implementation is delegated to PRODESAN. In addition, it promotes projects such as Composta Santos, which aims to encourage the recycling of organic waste.

- SEDURB is responsible for conducting plans, legislation, projects and programs aimed at sustainable socioeconomic progress of the municipality, as well as drawing up the guidelines established by the Urban Development and Expansion Master Plan and coordinating revitalization programs. Its performance in solid waste management is not yet established, however, it has the potential to carry out projects related to the subject, with improvements in socioeconomic environment and in the coordination of urban expansion.

- PRODESAN, as a mixed economy company, is responsible for the implementation of separate collection services in the insular and continental areas, and cleaning of the drainage system of rainwater canals and galleries. It is also the responsibility of the agency to supervise the implementation of public cleaning services.

MSW Generators

According to Municipal Law 952/2016, waste generators in the municipality of Santos are categorized into small and large generators, as shown below.

- **Small generators**

Waste generated by households and small businesses, such as markets, bars and restaurants, have to be segregated between wet waste, which are collected by regular collection service, and dry recyclables waste, which are separately collected. For these generators, the collection is carried out by the municipality.

- **Large generators**

Large waste generators, such as hotels, hospitals, malls, with an amount of up to 120 kg or 200 L per day, are responsible for contracting the collection, transportation and final disposal services from private providers; in the case of dry recyclables waste, the municipality carries out the collection service with prior authorization.

Quantitative generation and composition of MSW

The municipality of Santos collects approximately 174,756 tons per year of MSW (2017), including waste from households, small businesses and public cleaning services. From these, 4,562 tons are dry recyclables waste segregated at source and collected. The per capita generation is 391.5 kg/inhabitant/year. Table 1 shows the waste composition

The fraction of organic waste includes food waste and green waste; and dry recyclables are mainly plastics, which account for about 27% of total waste generated or about 47,000 tons per year.

Table 1. MSW composition.

Type of material	%
Plastics	11.19
Plastic film	15.47
Tetra Pak	1.29
Cardboard	2.97
Paper	13.27
Non-ferrous metals	0.80
Ferrous metals	1.43
Wood	1.65
Glass	1.04
Leather	2.30
Textile	1.74
Others	10.82
Organic waste	36.03

Source: PRGIRS, 2018.

MSW collection coverage and type

The waste collection services in Santos encompass the following activities:

1. Services contracted and/or done by the municipality

Table 2. Collection services of different types of waste contracted and/or done by the Municipality.

Type of waste	Municipal service	Frequency of service
Mixed waste	For households and small businesses	Six days per week
Dry recyclables waste	Selective waste collection for households, small businesses and large generators that have prior authorization	Once/twice a week in each neighborhood
Mixed waste	Beach cleaning	Daily
Bulky waste	Collection by "Cata Treco" service, in limited to 1m ³ for C&D waste	On demand
Construction and Demolition (C&D)		
Healthcare waste	For municipal health posts, hospitals and clinics the collection is charged with a fee and performed under contract with the company TERRACOM. Medical offices, dental clinic and pharmacies collection services are covered without charge.	Variable as generator

2. Services carried out by the private generators:

- Collection and final disposal of industrial waste, ports, roads and rail terminals. The private providers have to be contracted by the generators.
- Materials drop-off sites located in commercial establishments for delivery of fluorescent lamps, medicines, paraffin, radiological films, tires, batteries, electronic waste, used cooking oil and bicycles. The municipality requires that establishments that sell these materials offer their own collection boxes or areas and transport them to the final destination.

The maps referring to the plan for collecting and transporting household waste, manual sweeping of roads and streets are available in ANNEXES II and III.

Final disposal

All waste generated in Santos and in seven other municipalities in the Metropolitan Region of Baixada Santista are currently been disposed at Sítio das Neves Landfill, which activities began in 2002 and has an operating life until 2021. The landfill is located in the mainland area of the city, 30 km far from the city center in the island, and is owned and operated by Terrestre Ambiental, a private company. In addition, the municipality has a transfer station, located nearby the area of the closed Controlled Landfill of Alemoa, 40 km from the operating landfill (Figure 10).

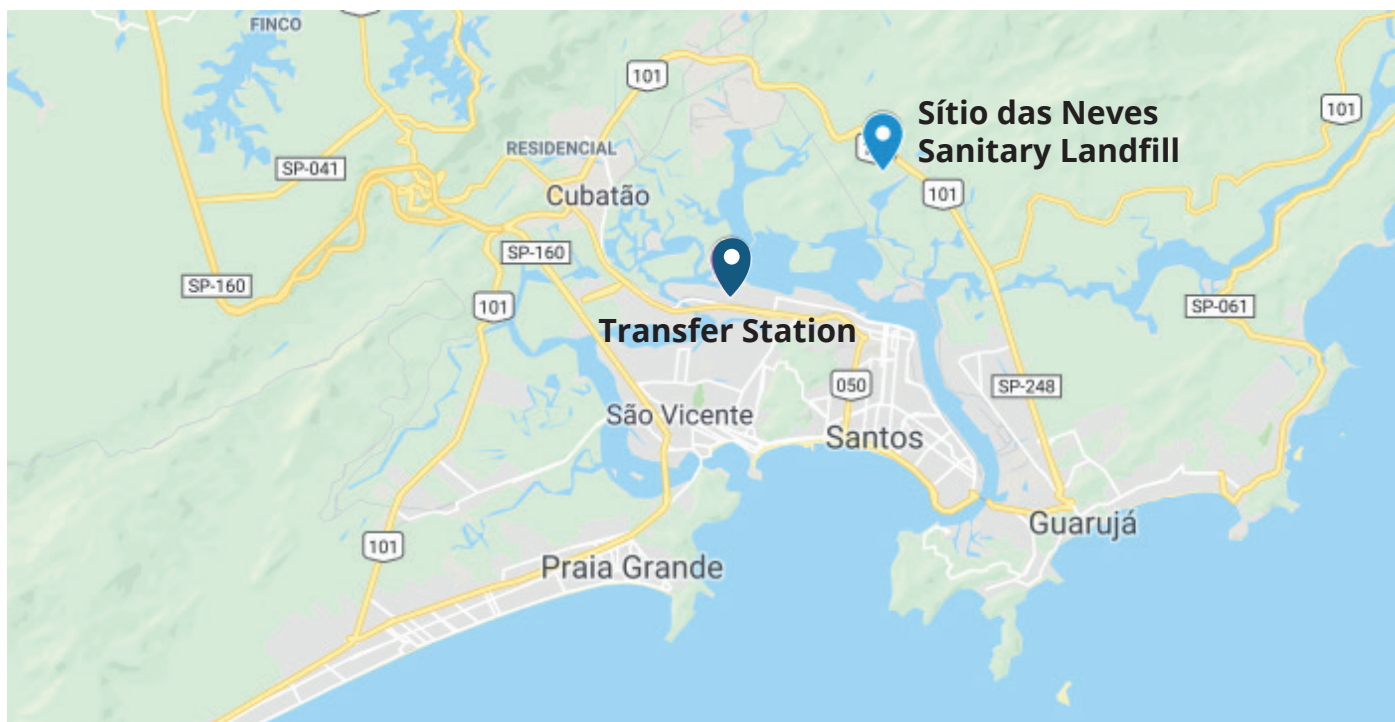


Figure 10. Location of the transfer station and Sítio das Neves sanitary landfill in the municipality of Santos.

Financing of MSW

The expenditures for carrying out public cleansing services, including solid waste management, was approximately R\$ 136 million in 2017.

An annual waste fee is charged from households and small businesses according to the property area, sent together with the Urban Land and Building Tax.

Legal Framework

Among the municipal laws related to MSW management in Santos, it is worth mentioning the Recicla Santos Law 952/2016, Complementary Law 779/2012 and Complementary Law 1010/2018.

The “Recicla Santos” Law establishes the obligation of waste separation at source into two fractions, dry and wet, and non-compliance results in the application of fines. In addition, large commercial generators are defined as responsible for the collection and final disposal of their waste.

Complementary Law 779/2012 obliges establishments to install materials drop-off sites located in commercial establishments for delivery of fluorescent lamps, medicines, paraffin, radiological films, tires, batteries, electronic waste, used cooking oil and bicycles. The municipality requires that establishments that sell these materials offer their own collection boxes and transport to the final destination.

Finally, Complementary Law 1010/2018 prohibits the sale and distribution of plastic straws in the commercial establishments of the municipality, as well as prohibits the use and supply to customers of ketchup, mustard and mayonnaise in individual, disposable and hermetically sealed packages starting 1 of January 2019.

Municipal Solid Waste Master Plan

The Municipal Solid Waste Master Plan (PGIRS) was launched in 2012 and is currently being reviewed. The document's main goal is to be in line with the guidelines, strategies, goals, programs and actions defined in the National Solid Waste Law of August 2010. The main structural goals established by the PGIRS are:

Table 3. Structural goals established by the PGIRS (2012) and their respective status.

Goal	Status
To provide conditions for the reverse logistic schemes for solid waste to be in place	Achieved through the establishment of materials drop-off sites in commercial establishments for lamps, medicines, paraffin, radiological films, tires, batteries, electronic waste, used cooking oil and bicycles
A broader discussion about the regionalization of solid waste management in the Metropolitan Region of Baixada Santista	Achieved through the development of a regional solid waste master plan launched in 2018
Increase the separate collection	Achieved with the "Recicla Santos" Law
Implementation of two materials drop-off sites for dry recyclables	Achieved partially by one material drop-off site of the program "Recicla + Santos"
Incorporation of wastepickers' cooperatives in the separate collection schemes	The municipality commissioned the operation of the materials recovery facility to Comares and Sem Fronteira cooperatives
Evaluation of the adoption of new treatment and disposal systems for MSW	The project "Composta Santos" will make it possible to divert the waste from the street markets to composting instead of sending this amount to landfilling

Regional Solid Waste Master Plan of Baixada Santista (PRGIRS-BS)

The PRGIRS-BS was published in February 2018 with the purpose of discussing the regionalization of waste management in the metropolitan region.

Regarding marine litter, PRGIRS-BS brings the following goal: expansion of the MSW management services coverage (beaches, sweeping, floating, material, among others). Regarding destination and final disposal, the goals set in PRGIRS-BS are the same established in the National Solid Waste Plan (short and medium term), which are:

- Reduction of 42% of the dry recyclables waste disposed in landfills by 2023 and 50% by 2031, based on the national characterization of 2013 for the Southeast region;
- Reduction of the percentage of wet waste disposed in landfills, through the introduction of biological treatment processes, in addition to the development of new technologies for energy use. For the Southeast region, where Santos is located, this should reduce the disposal by up to 45% in 2023 and by up to 55% in 2031.

3. SOLID WASTE MANAGEMENT PROGRAMS AND PROJECTS IN SANTOS

Below are the programs and projects related to waste management developed in the municipality.

3.1. ORGANIC WASTE

“Santos Sustentável”: Composting and Urban Agriculture

In 2017, the city of Santos received a financial grant from the National Environmental Fund for the “Santos Sustentável” Project: Composting and Urban Agriculture, which ranked third place in a list of 11 cities aiming to promote environmental education and improvement on the use of organic waste generated by households, street markets and urban pruning, thus diverting this material from landfill. The activities established by the project are: visits to the street markets by SEMAM agents, in order to inform the vendors about the potential of reuse and disposal of organic waste; to establish and monitor a municipal forum to discuss the subject; and the creation of a monitoring and research system with a database on the use of organic waste in the municipality.

In addition, the program “Composta Santos”, which aims to promote composting and urban agriculture encourages the recycling of organic waste generated in households, schools and street markets, also diverting this waste from landfill and promoting urban agriculture with the use of the compost produced. It was launched in June 2018 and is in the implementation phase. Among its guidelines, it foresees the implementation of a pilot plant for composting green and organic waste from street markets, with a capacity of up to 10 tons per day. The program has already delivered 40 vermicomposters to NGOs, schools and houses that will be multipliers agents.



Figure 11. Vermicomposters donated to schools under the “Composta Santos” program. Source: Diário do Litoral.



Figure 12. Environmental education activity performed at the Maria Patrícia municipal school. Source: Municipality of Santos.

3.2. DRY RECYCLABLES WASTE

Catamarã project

The “Catamarã” project (Figure 13) began in 2008 and had its operations officially closed in 2017. Its objective was to collect the floating waste that enters the Bay of Santos as a result of the irregular disposal both in Santos and in neighboring cities like Guarujá and São Vicente.



Figure 13. Catamarã collecting tons of waste in Santos. Source: Municipality of Santos.

Most of the materials intercepted by the catamarans were mainly composed of pet bottles, plastic bags and cans. The collected waste was discharged on piers, transported to the transfer station and, finally, sent to the sanitary landfill. The company responsible for the operation of the vessels was Prodesan and the management was carried out by SESERP.

On average, four tons of waste were collected between the ferry boat and canal 6.

Recicla Centro

The “Recicla Centro” project was created by SEMAM in 2018 and it commissioned the “Sem Fronteira” NGO to carry out the collection of dry recyclables waste from local businesses in downtown area of Santos, which is done under a service request made through an online registration. The project was developed with resources of the Municipal Fund for the Preservation and Recovery of the Environment of Santos (FMPRMA), invested in the purchase of personal protective equipment (PPE), uniforms and bicycles adapted for the collection of waste (Figures 14 and 15), known as “recicletas”, which facilitate transportation and avoid emissions of climatic pollutants.

The collection with “recicletas” is carried out five days a week in different neighborhoods of the downtown area, collecting materials such as cardboard, glass, metal, plastic, styrofoam and aluminum. Each “recicleta” has an average capacity of 150 kg per trip, costing approximately R\$ 2,000 each for acquisition. In addition to the revenue from the selling of materials, the worker receives an aid of R\$ 250.00 per month from the municipality.



Figure 14. “Recicletas” used for collection. Source: Municipality of Santos.



Figure 15. Sem Fronteira NGO collecting cardboard from commercial generator. Source: Municipality of Santos.

Door-to-door separate collection

The city’s separate collection scheme began with the “Lixo Limpo” program in 1990, collecting dry recyclables waste across the beachfront region. In 1995, its coverage was expanded to 100% of the insular area and the program was known as “Separate Collection”. In 2016, with the promulgation of Law 952/16, the socioenvironmental program “Recicla Santos” was established, which defines the obligation of segregation at source in two fractions, dry and wet, and non-conformity may result in fines. In addition, large generators are defined as responsible for the collection and final disposal of their waste but can count on the public service if they obtain prior authorization from the municipality.

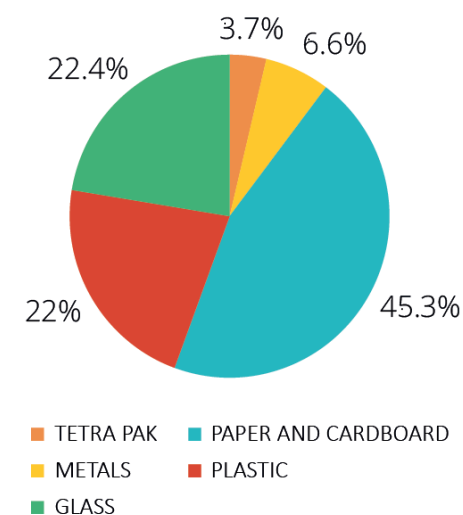


Figure 16. Comares cooperative carrying out segregation of dry recyclables waste. Source: Municipality of Santos.



Figure 17. Separate collection truck in Santos, SP. Source: Municipality of Santos.

The “Recicla Santos” program mentioned above, which includes the “Recicla Centro” and “Door-to-door separate collection” projects, recorded 4.5 thousand tons of dry recyclable waste collected between June 2017 and June 2018, and the composition is presented below. It is important to remember that, in addition to “Sem Fronteira” NGO and COMARES, “Reciclar é Viver”, “Relva Recicláveis” and “ABC Marbas” (Brazilian Association of Waste Pickers of Baixada Santista) organizations also contributed to this result.



Graphic 1. Dry recyclables waste composition.

3.3. BULKY WASTE AND C&D

Cata treco

The “Cata Treco” service (Figure 18) aims to collect bulky and C&D waste on demand, in order to avoid inadequate disposal, especially in canals, mangroves and beaches. The service covers all the neighborhoods of the insular area and collects waste such as furniture, appliances and rubble (maximum of 1 m³). According to the municipality, the service collected approximately 36,646 tons in 2017.



Figure 18. Collection of bulky waste. Source: Municipality of Santos.

EcoFábrica

Part of the waste collected by “Cata Treco” service is used in the EcoFábrica project (Figure 19), created in 2016 by a partnership between SEMAM, SESERP, Secretariat of Communication (SECOM) and Santos Club Design. Located in the Municipal Market, the project aims to enable citizens to reuse the wood of the discarded furniture, thus reducing the volume sent to final disposal.

Since the beginning of its implementation, the project has already trained 60 people, as well as reused about three tons of wood which would have been disposed at the landfill.



Figure 19. EcoFábrica students. Source: Blog A Tribuna.

3.4. PARTNERSHIP WITH OTHER INSTITUTIONS

“Recicla + Santos” program

The “Recicla + Santos” program was created in 2017 as the result of a partnership between the municipality and the 3E Engenharia private company, which implemented an exchange station (Figure 20) where citizens can deliver voluntarily dry recyclables (glass, metals, plastics and paper/cardboard). By means of an individual register, the equivalent weight for each type of material corresponds to credits that can be accumulated and exchanged for discounts on local commercial establishments. The company temporarily stores the waste and sells it to recycling partners; the revenue is returned to the company, which invests in the maintenance of the station. The program received 87 tons of dry recyclable waste between 2017 and 2018.



Figure 20. Recicla + Santos Exchange station. Source: Recicla Mais Santos.

Clube do Condomínio

Created by the BioSantos Institute, the project aims to encourage the correct segregation of dry and wet recyclable waste generated in condominiums in the municipality. Their operation takes place through the registration of the interested condominiums, which receive containers for dry recyclables waste. In addition, project’s staff visit the condominiums twice a week in order to weigh and collect the amount stored. The project has approximately 320 condominiums registered.

Benefits from this initiative include the exchange of credits (biocoin) for money and each kilo of collected waste is equivalent to one biocoin, which corresponds to R\$ 0.20. The registered condominiums also have access to discounts on local partners affiliated to the project, such as markets, cinemas, pharmacies and construction material stores. Currently, there are approximately 80 local companies affiliated to the initiative.



It was created by the NGO “Consciência por Cidadania” (CONCIDADANIA) in August 2017 and financed with municipal funds; the objective is to carry out consultancy on sustainability approaching waste management, energy efficiency and rational use of water subjects in order to identify improvements that can be implemented in the apartment buildings at the beachfront of Santos. In addition, the project aims at the education and environmental awareness of the residents focusing on the change of habits and behaviors.

3.5. COMMUNICATION

Environmental Station

The “Environmental Station” project started in 2016 and aims to increase the population consciousness on environmental issues, in order to enable community involvement in the development of a culture of environmental co-responsibility. One of the themes addressed in the project is the generation of waste. For this purpose, activities are promoted to reflect on the importance of separate collection. The project contemplates awareness raising actions in schools, street markets and neighborhoods.

To publicize the Recicla Santos Law, door-to-door visits were conducted covering 3,700 people and delivering 5,000 copies of magazines and comics; around 37,500 people visited the temporary tent set by the Environmental Station project, and 2,000 copies of magazines and comic books were delivered.



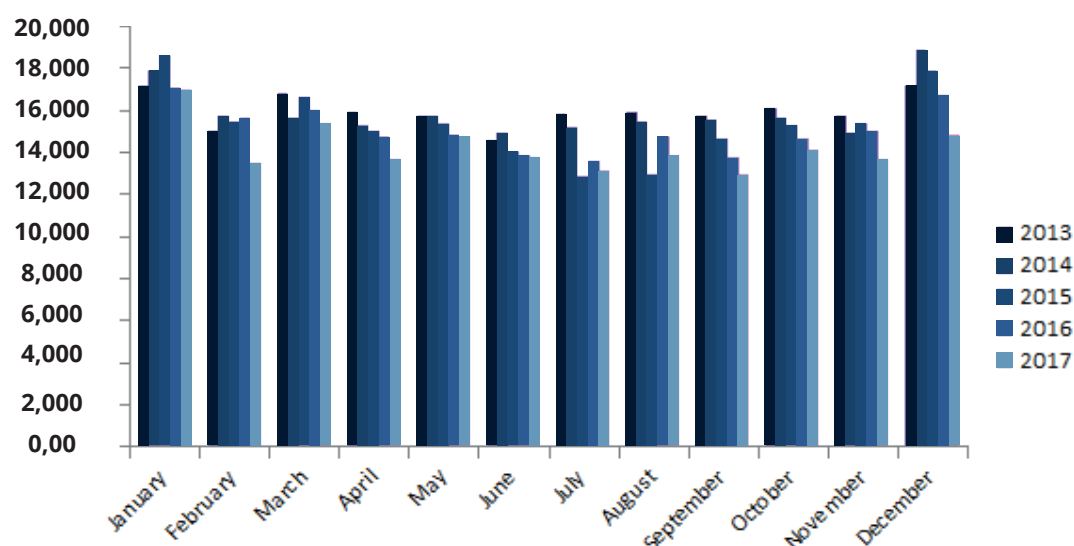
Figure 21. Environmental station project. Source: Municipality of Santos.

4. ANALYSIS OF DATA AND CONSIDERATIONS FOR THE NEXT STEPS

Santos is not considered a small city in terms of population, with more than 430,000 inhabitants concentrated almost entirely in its insular area; carries out all operations of the largest port in Latin America and receives a contingent of tourists during the summer months (December to February), which may represent a 15% increase in its population during the holidays.

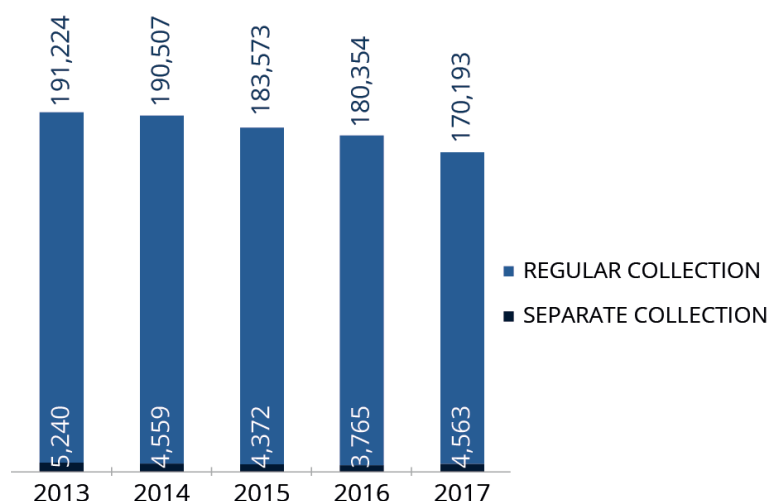
According to the information described throughout the report, MSW management in Santos has a varied coverage of collection, transportation and final disposal of different waste streams, mostly provided by contracts between private companies and municipality. Households, small and large private generators, streets and the beachfront reportedly are covered by the collection service. But it is necessary to go beyond the description and carefully analyze the data obtained with the municipality on the results of the services provided.

Graphic 2 establishes a historical series from 2013 to 2017 with a demonstration of the total amount of monthly collected waste (regular and separate collection), in which it is possible to compare the results achieved each year. And where it is evident, the months with higher amounts of collected waste, like January and December.



Graphic 2. Total amount of household waste collected between 2013 and 2017 (tons).

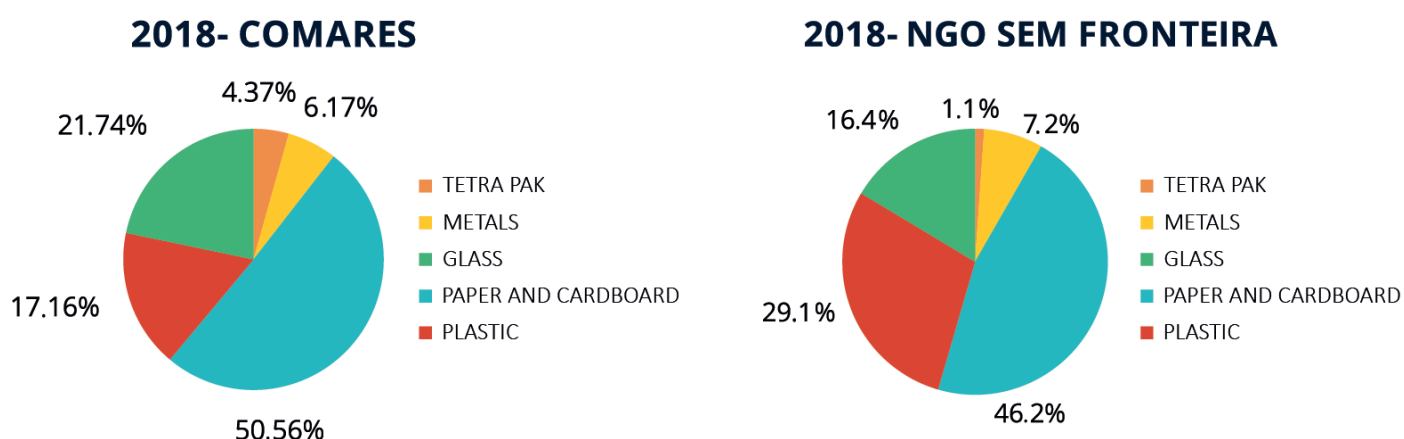
Graphic 3 shows the same historical series with the total amount of mixed household waste collected and the comparison with the quantity reached by the separate collection.



Graphic 3. Total amount of household waste (in tons) of regular collection x dry recyclable waste from separate collection between 2013 a 2017.

In 2013 the separate collection reached 2.7% of the total MSW generated, an index that was reached again in 2017 after the decrease registered between 2014 and 2016. In absolute numbers, however, it is a smaller quantity than the one of 2013 and the achieved index of 2.7% is due to the drop also observed in the total amount of mixed waste collected. Thus, in five years there was a 12.3% decrease in the collection of MSW in Santos that cannot be related to population decrease (which remained stable in the same period) or to the reduction of waste generation at that time. It is also not possible to relate this negative index to the diversion promoted by the separate collection, which amount in absolute numbers registered an even greater drop, of 15% from 2013 to 2017.

The dry recyclables collected have different composition recorded by the two organizations that perform their segregation, as shown in graphics 4 and 5.



Graphics 4 e 5. Comparison of the waste composition segregated by COMARES and Sem Fronteira in the first six months of 2018.

The waste composition registered by COMARES shows dry recyclables waste generated by household, segregated at source and collected by compactor type truck; paper and cardboard correspond to more than half of the waste received by that cooperative, and the fraction of glass represents a larger slice than the set of plastics. These data, however, do not reflect the quantity that is effectively recycled. According to the verbal information obtained, the quantity of waste that is disposed in the landfill is 30% to 40% of the total amount received - in the first six months of 2018 were 1,436.60 tons.

The waste composition of “Sem Fronteira” NGO reflects the type of dry recyclables waste generated by local businesses, because its operation is done exclusively by “recicletas” and through agreements with commercial establishments located in the downtown area. It is noticed that the plastic fraction increases considerably and exceeds the glass; paper and cardboard remain highlighted. In the first six months of 2018, the NGO collected 692.23 tons, of which the amount of rejects was not recorded.

The analyzes carried out above focused on: i) the variation of the monthly quantity collected in the last five years, evidencing a seasonality that demands adequacy of services coverage; ii) the percentage reached by the separate collection of dry recyclables waste in relation to the total waste collected, which can still be considered low after 30 years of service offered by the municipality; iii) the decrease recorded over the last five years in both the total collected (-12.3%) and in the absolute amount of dry recyclables waste from separate collection (-15%), without one or more clear causes monitored by the municipality; iv) the difference in composition of the recyclable fraction that is the object of the door-to-door collection and of the collection made available to commercial establishments, without being clear on what is actually sold as valuable materials and what is considered residue and sent to the landfill.

In the context of the project **Fighting the land sources of solid waste marine pollution**, this assessment reflects the information made available by the municipality to meet the challenge of pollution prevention. However, two aspects also raised by the report should be retrieved and contextualized here:

- There are about 40 tons of mixed waste (recyclables and residues) collected daily on the beach;
- While operating, the Catamarã project collected up to six tons of floating waste on only one stretch of sea from the shoreline, corresponding to two of the five miles of its length.

In this sense, the hypothesis raised is that there is a clear leakage of solid waste to the marine environment, originated in areas with some failures in the collection services coverage - although the maps attached to the report show that all neighborhoods are covered. This leakage can occur through points dispersed throughout the urban territory, in ways that end at the edge of the beach; in areas of residential concentration on the edge of the water resources that surround the island; by beach frequenters who deposit their waste irregularly in the sand and/or directly into the sea.

Therefore, the following report will investigate potential waste leakage hotspots in areas of the municipality with these characteristics and will try to find out where the waste found in the sea comes from.

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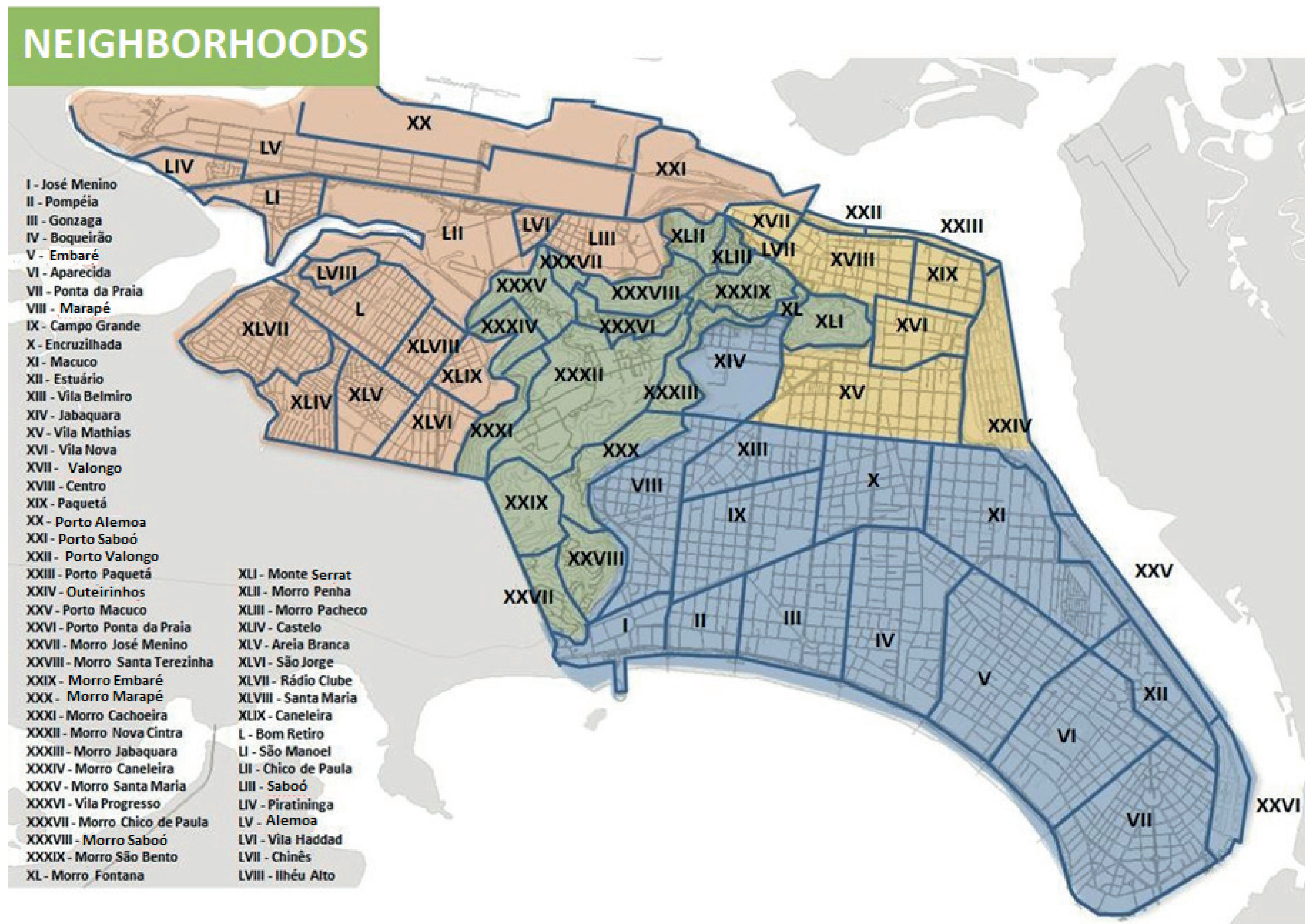


Figure 22. Santos territorial division plan: Macrozones and neighborhoods. Source: Municipality of Santos.

ANNEX II. Coverage of collection services of household waste

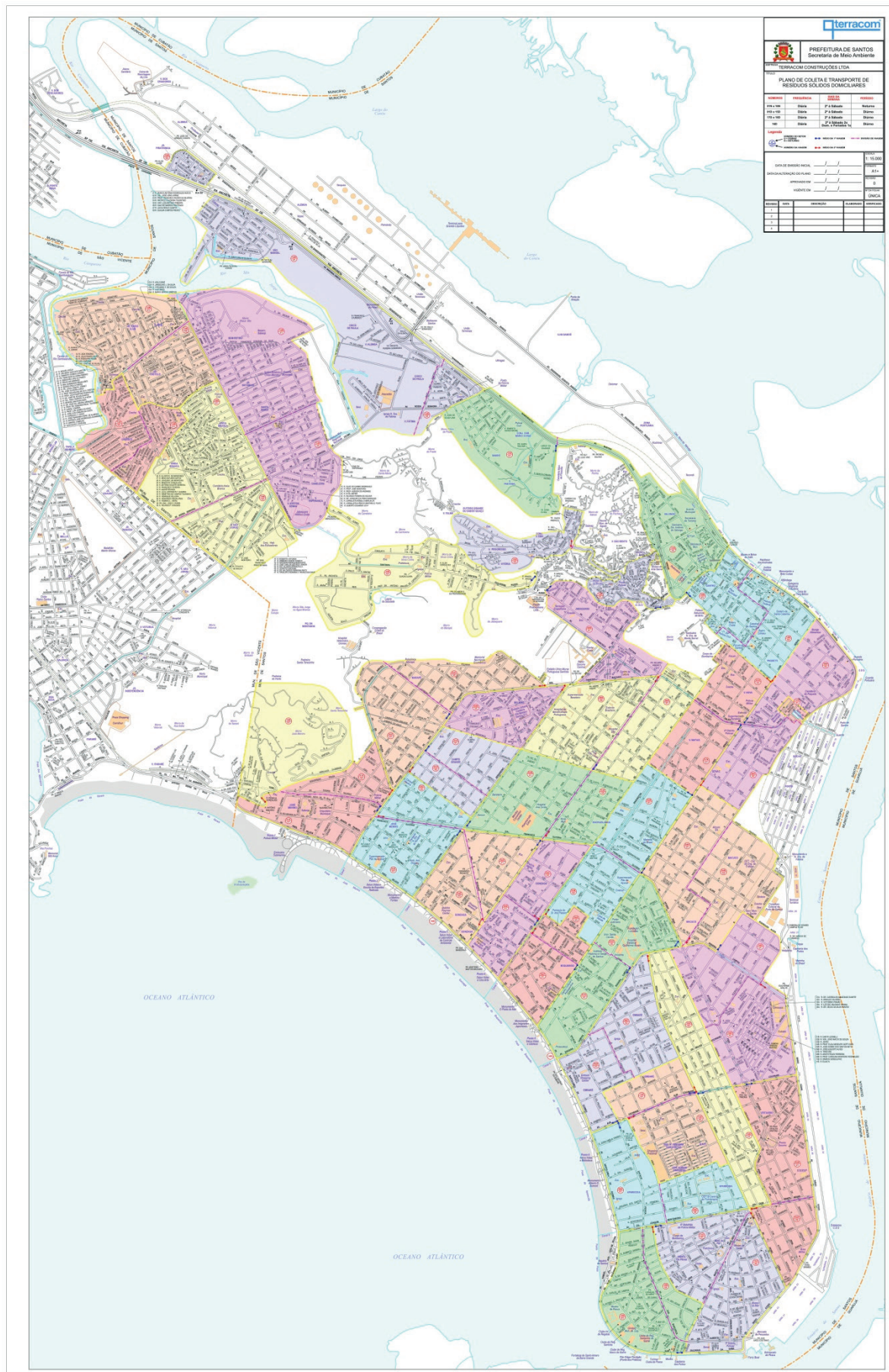


Figure 23. Plan for the collection and transportation of household waste. Source: Municipality of Santos.

ANNEX III. Coverage of manual sweeping service

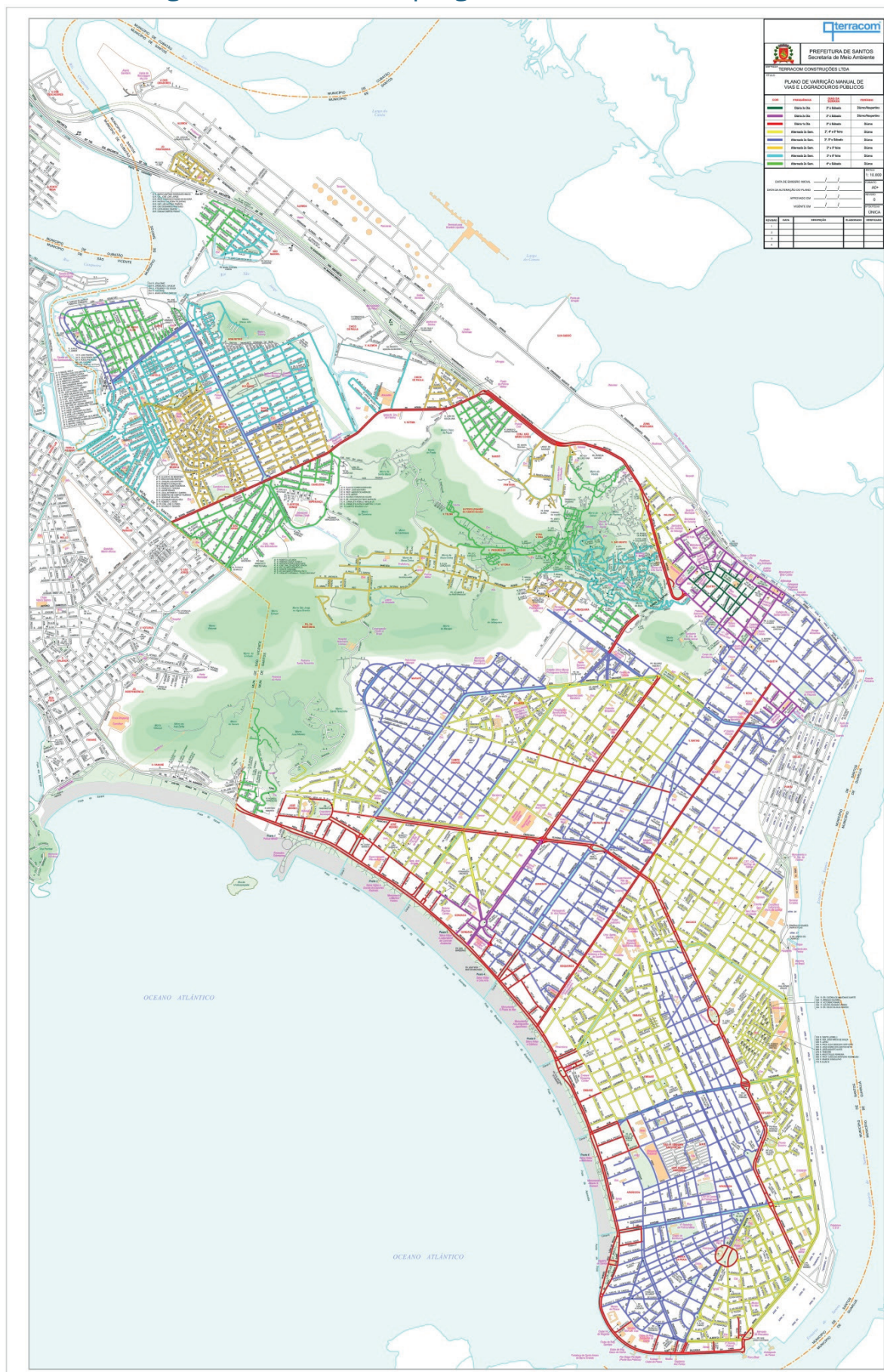


Figure 24. Plan for manual sweeping of public roads and public places. Source: Municipality of Santos.



COMBATE ÀS FONTES DE
POLUIÇÃO MARINHA POR
RESÍDUOS SÓLIDOS



SWEDISH ENVIRONMENTAL
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