



Urban Agenda Platform

The global platform for sharing progress, action and knowledge on the implementation of the New Urban Agenda to achieve sustainable urban development.

Advancing organic waste composting in São Paulo, Brazil

Region	Latin America and the Caribbean
Award Scheme	Others
Themes	Waste Management
Start Year	2015
Sustainable Development Goals	Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable
New Urban Agenda Commitments	Environmentally Sustainable and Resilient Urban Development Mobilization of Financial Resources

Summary

The city of São Paulo has significantly improved its waste management by introducing a low-cost local composting technology. Instead of sending organic waste to distant landfills, up to 100 tons per day of market organic waste and tree pruning are now composted in five facilities within the city. The compost is used for public green spaces and urban gardens, increasing plant health and crop yields and is also donated to citizens, farmers, schools, and non-governmental organizations.

Background and Objective

Every day, São Paulo, Brazil's most populated city, produces over 20,000 tons of municipal solid waste. Organic waste constitutes the highest share (47%). São Paulo has about 1,000 street markets that generate a total of almost 100,000 tons of nitrogen-rich organic waste per year, mainly from fruits and vegetables. Furthermore, São Paulo also generates nearly 100,000 tons of carbon-rich organic waste from city pruning per year. Both are necessary for a successful composting process. São Paulo started a pilot project to treat organic waste from street markets and tree pruning in 2015, consisting of a relatively simple composting technology and low investment costs. The biggest challenge was that São Paulo's citizens were prejudiced against composting plants due to an unsuccessful project in the past, where the installation of urban composting plants had led to strong odors and the spread of diseases in the city. The key objective of the current initiative was to treat the organic waste resulting from street markets and tree pruning.

Actions and Implementation

The project started with one composting plant in the city district of Lapa, which initially composted 170 tons of organic waste per year from 26 street markets. Environmental education has been an important component of the project from the start. The city works with local cleaning companies who provide environmental education teams to raise awareness of street market vendors on how to separate their waste adequately. The vendors are provided with special compostable bags to dispose the organic waste, which is then collected by the cleaning company when the market closes. This helps the vendors to keep their stands and the surrounding area clean. The composting plants are open to the public, and visitors are informed about the composting process and its benefits. This has not only led to local learning but also South-South cooperation through visits from other emerging countries, including Angola, Mexico, and Peru.

Outcomes and Impacts

Under this project, in 2020, 10,000 tons of waste have already been composted and a total of 20,000 tons since the beginning of the project in 2015. This has led to the reduction of 14,176 tons CO₂eq. Compared to disposal or dumping of organic waste into a landfill (emitting about 819,1 kg CO₂eq/t), using this composting technology results in GHG emission reductions of 87% (emitting ca. 110,3 kg CO₂ eq/t). Air pollution has also been reduced in the city as less organic waste needs to be transported to distant landfills. In addition, the project has created awareness among citizens about composting. Furthermore, the fertilizer produced in the composting plants supports crop yields within the city's urban gardening project and increased plant health in public green spaces. Some of the most important factors that contributed to the project's success were its relatively low cost, both in CAPEX and OPEX, the fact that it is easily replicated, in addition to its reasonably simple scalability. In addition, given the fact that the production of odors and disease



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vectors is practically non-existent, the composting plants could be built inside the city, in residential neighborhoods, close to the street markets where organic waste comes from, which significantly reduces the cost and impacts of transport. Another important point is access to source segregated waste. Street fairs and marketers are trained and prepared to separate and segregate the waste at the source (without this, the project would be much more challenging to be implemented), and organic waste from municipal pruning is a widely available resource in the city that is also already segregated. The city of São Paulo has a large number of small farmers on its outskirts. It also has several community urban gardens in the suburbs coordinated by NGOs. The fertilizer produced in the composting plants is fully donated to rural producers and community urban gardens in the regions where it is located, generating income to these groups, since they will save resources on the purchase of fertilizers and increased productivity, also giving economic sustainability to these groups of citizens. In addition, the use of organic compost allows for the production of healthy food and reduces the need for synthetic fertilizers (avoiding additional GHG emissions).

Sustainability and Scalability

The project is economically sustainable in the long- term because its operating costs are either equal to or lower than the cost of sending organic waste to landfills. There is also a possibility for income generation through the sales of organic fertilizer. In addition, the project is environmentally sustainable as it reduces waste going to landfills and associated GHG emissions and air pollution. Furthermore, it is socially sustainable as the local citizens have embraced this circular economy approach and benefit from free organic fertilizer directly or indirectly through the urban gardening project. This approach can be easily replicated under different circumstances as it is based on a modular system that can be applied flexibly based on the availability of space and volume of organic waste. The composting plant operation can be either completely manual or semi-mechanized in line with the available workforce and budget. The flexibly-sized composting plants were quickly set up, using only organic materials, are aesthetically pleasing, and coexist well with the urban landscape. Top city management commitment is fundamental to the success of this project, as well as an alignment between waste management and environmental departments. Furthermore, having the support of the local population is also essential. Another critical point is working with source-segregated waste in the area where the plant is built. (São Paulo's plants operate with waste from street markets located in the plant area). Since our plants are built inside the city in residential areas, it is also necessary to choose suitable organic residues to avoid odor problems and the proliferation of disease vectors animals (our plants do not process or receive animal protein, for example). For the project to be sustainable in the long term, a PDCA (Plan, Do Check, Act) that includes continuous training and qualification of the street marketers is necessary. Source segregation is key!

Gender and Social Inclusivity

São Paulo is committed to fulfill the UN 2030 Agenda to foster actions to fight poverty and enhance sustainable development, prosperity, and well-being of humanity and all the projects in the city take those into consideration when they are planned. In the specific case of the composting plants, we had hired refugees (such as individuals from Haiti, Bolívia, among other countries) to work on the composting plants giving them an opportunity to work and have an income in the city, as an inclusion policy.

Innovative Initiative

In order to engage the population, the NGOs and the street market owners and workers in the composting plant areas, several actions were taken:

1) Extensive public debates in the local CADES (Municipal Council for the Environment and Sustainable Development) which are consultative bodies on issues relating to the preservation, conservation, recovery and improvement of the natural environment, which has the participation of the public authorities, NGOs and representatives of the population of the region where CADES operates. 2) Monitored visits with the local population and their representatives to explain the composting process and operating details of the plants. 3) Publications in local newspapers explaining the functioning, necessity, and benefits of composting for the city and the environment 4) City-wide dissemination of the project and its processes at all open markets in the territory where the plants are located

Resources devoted to delivery

With a small investment and a relatively simple composting technology, the municipality set up de-centralized composting plants, serviced by efficient waste segregation at source and collection system. Adapted trucks collect the organic waste sorted by market vendors and take it to the composting plants together with the organic waste from city pruning. The composting plants apply a thermophilic composting method that uses natural-aeration static composting piles. The composting piles are formed by the alternating layers of organic waste and straw/green waste from the pruning of urban green spaces. This creates a suitable environment for microorganisms to decompose the organic matter, transforming it into organic fertilizer within about 120



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days. CAPEX for the construction of a compost plant varies between US\$ 150,000 and US\$ 250,000 (land cost not included). This includes the preparation and leveling of the land, the construction of windrows, structures to collect and store the percolate generated by the windrows, a waste reception area, the purchase of a bob cat to assist in the internal movement of waste as well as the construction of a small administrative area. The monthly OPEX is around US\$ 10,000 to US\$ 15,000. This amount includes salary for 6-10 employees (depending on the plant size), utilities, security, and other administrative costs. It is important to note that the costs of transporting waste from street markets to the plant in São Paulo are covered by existing contracts with cleaning companies (and are therefore not included in those values above), but must be taken into account if this is not the situation in the cities where you want to replicate the project. The total area of a patio (which has space for six windrows) is between 3000 and 4000 square meters.

Conclusion

Most importantly, the city realized that there are effective and scalable waste management solutions that do not require any major investments and the lengthy construction of large waste management facilities. Another lesson learned was the importance of engaging all stakeholders, including public authorities, cleaning companies, and citizens.