Waste management in Sèmè-Podji

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Content

1 Introduction

According to United Nations projections, the world's population will be 8.5 billion in 2025, with 5.2 billion (61.2%) in urban areas (United Nations, 1993). Most people will live in cities if they do not already do so, and these cities will face the whole range of problems that form part of urban living – housing, security, health, etc. Among these problems is how to deal with waste management, because *"an increase in population means an increase in the generation of waste"*. Waste management is an issue that affects all aspects of urban development and, if well organised, creates the conditions for a healthy environment, enjoyable living conditions, sustainable jobs and economic prosperity. Failure to manage waste results in the proliferation of waste in urban areas, undermines the quality of life and health of residents, and may lead to spatial and environmental injustices that cause social crises.

At the global level, the situation is not very encouraging. According to the recent World Bank report "What a Waste 2.0", which reviews the global waste management situation in the period up to 2050, the world generates 2.01 billion tonnes of solid waste annually. The equivalent figure for 2010 was 1.3 billion tonnes, a 55% increase in eight years. There is a danger that global waste will increase by another 70% by 2050 to 3.4 billion tonnes if there is no paradigm change able to curb this pernicious trend.

Even though Sub-Saharan Africa is only the second smallest generator of waste (174 million tonnes annually), waste management is problematic because of inadequate municipal waste management policies and operational infrastructures. In low income countries, waste management on average accounts for 20% of municipal budgets and yet over 90% of waste is not well managed. About one third of domestic waste is burned or dumped illegally. The increase in the generation of waste is in part due to changes in the patterns of consumption, urbanisation and generalised globalisation that has flooded markets with ever cheaper products. Nevertheless, 3 billion people are unable to access a healthy diet on a regular basis, 690 million people are undernourished and every second more than 41,200 kilos of food is thrown away. That is 1.3 million tonnes of food per year, equivalent to one third of global production of food for human consumption.

The issues linked to waste management are enormous. Overexploitation, overproduction, overconsumption, growth, waste, the polarisation of resources, inequalities are all factors that require a systemic approach to the implementation of effective waste management policies and operational mechanisms. The life-cycle of urban waste is often divided into five stages in time and space: waste generation, sorting and collection, recycling, treatment of the remaining waste and the final disposal of eco-compatible residue at managed sites (KPLE, 2015). This is how it happens in industrialised countries, which have put in place the necessary organisational structures, equipment, financial management and regulations over the last twenty years (Matejka, Bouvet et al. 2005).

The situation is altogether different in the global South, where waste management is either not well organised or practically non-existent. Waste management is handled in many different ways and the impact on the quality of the urban environment is clearly visible in these places. The example of Sèmè-Podji in Benin is revealing.

In Benin, after years during which waste has scarred the urban landscape, the Benin government decided to address the situation and start a solid domestic waste management modernisation project, with a provisional budget of FCFA 57 billion, to provide a sustainable plan for cleaning up the cities, improve public health and welfare and stop the proliferation of waste and effluent in the urban environment. In a context of climate change, the public health situation, degraded by solid waste pollution, especially along the coast, will exacerbate the impact of climate hazards, which will have devastating consequences for human health and security.

In November 2018, the Greater Nokoué Waste Management and Urban Health Company (SGDS-GN SA) was created with the mission to oversee the collection, sorting, recycling, treatment and valorisation of waste in the five communes of the Greater Nokoué: Cotonou, Porto-Novo, Ouidah, Abomey-Calavi and Sèmè-Podji. The aim was to do more than simply manage waste, but also to create a key actor supporting local government strategy for cleaning up urban areas. Greater Nokoué was to be the first stage in an extensive waste management modernisation programme to be implemented in the rest of the country in the years to come.

In the context of the World Bank report on waste management, "What a Waste 2.0", the first part of this article, presents an overview of waste management in the city of Sèmè-Podji. It describes the urban, environmental and socio-economic framework as well as the development issues that stem from the commune's strategic position on the Benin coast. Analysis of the interplay between stakeholders (Crozier, 1977) and waste management mechanisms both before and after the creation of the SGDS-GN highlights the progress made and the difficulties encountered in undertaking structural reform. In fact, before the creation of SGDS-GN SA, the Emergency Urban Environment Management Project 2012-2019 (PUGEMU), financed by the World Bank, helped the city's attempt to restructure the waste management sector. This project also covered Greater Nokoué towns subject to flooding and aimed to strengthen their resilience to climate change with sanitation, solid waste management and capacity building of actors. It funded the purchase of waste collection equipment, the creation of intermediate waste collection points (IWCPs) and a transfer centre. A plan defining the roles of actors led to participating NGOs (exact number unknown) becoming small and medium sized enterprises (SMEs), supervised by the Solid Waste Management Group of Non-Governmental Organisations

(COGEDES). Looking at the current context, the article will map the actors and their roles and assess how to build on the achievements of PUGEMU. This analysis has suffered from a lack of data and documents prepared during implementation of the household solid waste management modernisation project.

The article will then deal with waste management in the context of urban planning and sustainable development issues, with a view to understanding how operational levers and tools could promote healthy and sustainable living conditions. Following in the footsteps of Tanguay and Fayol (2011), we based our analysis on a series of urbanisation indicators in order to assess sustainable development in cities in general as accurately as possible.

Finally, it looks at the activities of the DEALS project in Sèmè-Podji, discusses possible changes to these activities in the current context of waste management governance in the commune and highlights good practices used at the national and regional levels as well as in other cities participating in the DEALS project that could be used by Sèmè-Podji.

2 Sémé-Podji, the "archipelago city"[1]

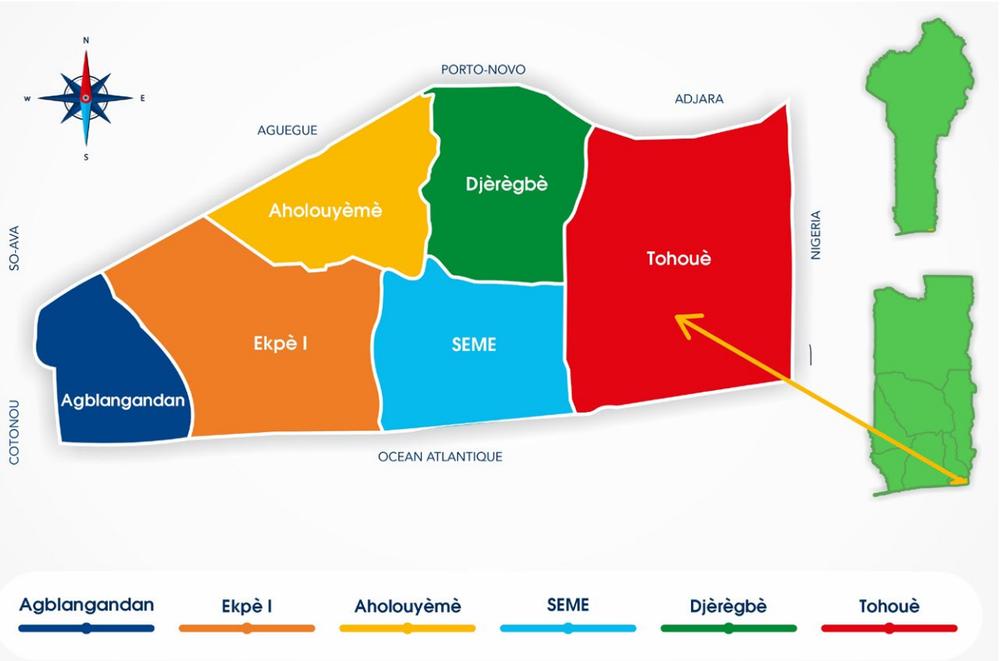
2.1 Geography

Located between parallels 6°22′ and 6°28′ of Northern latitude and meridians 2°28′ and 2°43′ of East longitude, the Sèmè-Podji commune forms part of the Ouémé department on the Atlantic coast in the southeast of the Republic of Benin. It covers an area of 250 km². Sèmè-Podji occupies a strategic position on the border with Nigeria (Africa's largest economy), and between Benin's economic and political capitals, respectively Cotonou and Porto-Novo. Its geomorphological location between the ocean and a lake provides a picturesque natural setting.

The Sèmè-Podji Commune has 55 villages and urban suburbs, divided into six districts *(arrondissements)*: Agblangandan, Aholouyèmè, Djèrègbè, Ekpè, Sèmè-Podji and Tohouè.

1 INTA Panel Report, 2012

Map 1: Geography of the Commune



Source: Topographic base IGN, 1992 Field data, October 2017
Conception: Sèmè-Podji PDC Elaboration consultant

2.2 Water: an under-exploited potential

Sèmè-Podji is on a coastal plain surrounded by a series of water bodies comprising Lake Nokoué, Porto-Novo lagoon (which extends to the east as far as Lagos in Nigeria), the River Ouémé and the Atlantic Ocean[2]. It is served by a river system that is well stocked with fish. Bathing in a subequatorial climate, with two dry seasons (December to February and August to September) and two rainy seasons (March to July and mid-November to December), and subject to coastal winds, Sèmè-Podji is one of the areas with the most rainfall in southern Benin with average annual rainfall over 1100 mm.

Sèmè-Podji is low-lying, varying between 0 and 6 m in altitude. Its location between two low-lying strips of sand does not promote the run-off of rain water and creates marshes and ponds (marshes form 65% of the territory).

The extensive presence of water makes the area vulnerable to flooding and coastal erosion. Flooding is the commune's main challenge in terms of sustainability. It has multiple causes, the main ones being the rising water levels of Lake Nokoué (when it is in spate) and rainwater. The impact is increasingly aggravated by urbanisation and the occupation of areas unsuitable for habitation.

For the moment, water remains a major urban development problem for Sèmè-Podji. But a change of paradigm involving improved urban planning and management by urban actors, based on the conservation and use of wetlands as part of a comprehensive and systemic policy, will make these water resources an asset in the promotion of quality living conditions and the sustainable urban development of this archipelago city. The water bodies could be used for nautical sports and recreational activities. Walkways could be established on raised platforms along the banks to ensure they remain above water levels. These walks could be made more attractive by providing viewpoints and a range of interesting installations. Identifying uses for the water bodies would integrate them into urban planning, promote the recreational use of the city's water

2 Monograph by Sèmè-Podji commune, April 2006

resources, provide opportunities to improve the city's quality of life and develop this economic sector.

2.3 An urban landscape scarred by the proliferation of waste

According to the results of studies analysing the sustainability of Sèmè-Podji, conducted during the identification stage of the City-DEALS project in 2018, waste management is Sèmè-Podji's biggest problem, after flooding. These two phenomena interact – attempts to improve the urban environment are hampered by waste obstructing run-off water from draining away.

Before 2018, standards of cleanliness in the suburbs were poor because only 24% of households (PHAC 2014) subscribed to the waste collection service and many residents threw their rubbish onto open spaces. Malfunctioning of the waste collection system forced each person to dispose of waste according to their means, without consideration for healthy living conditions. Waste management remained ineffective, whether in the markets, car parks or at home. 78.1% of households in Sèmè-Podji threw their waste onto open spaces, illegal dumps or the street (INSAE, 2013). Illegal dumps were a common sight while some residents used waste collected by the current system as fill-in when building their house or to act as a barrier to water courses in marshy areas. During the rainy season, run-off rainwater carries waste from these rubbish dumps and contaminates the water in wells, causing waterborne diseases. A 2013 survey found 84 illegal rubbish dumps in the commune, with more than 4,208 tonnes of waste. The situation improved slightly with PUGEMU, which was the first attempt to organise the sector, to build infrastructure, such as the IWCPs and the transfer centre, as well as equipping the household collection service with vehicles. However, the inaccessibility of several IWCPs due to the poor state of the roads encouraged the persistence of illegal dumps and the use of waste as fill-in, because there was nowhere to take the waste after collection.

3 Socio-economic indicators

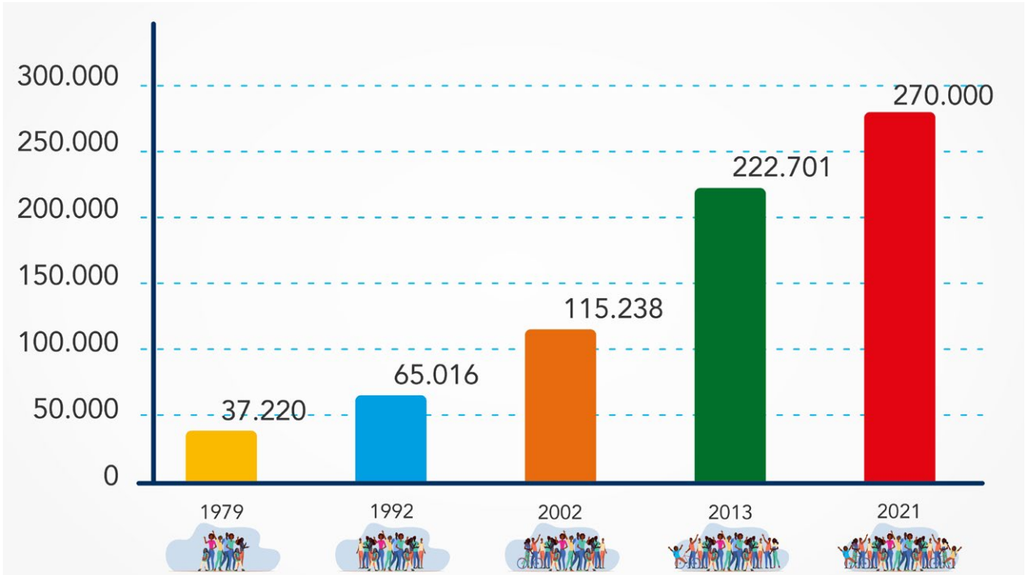
3.1 Strong population growth

Sèmè-Podji has considerable advantages, making it one of Benin's most dynamic communes. Its population has doubled in less than ten years. According to the general population and household census number 3 (RGPH 3,2002), the population of Sèmè-Podji was 115,238 with an annual rate of growth between censuses of 5.06% (1992-2002). The 2013 census showed Sèmè-Podji commune's population had grown to 222,701 (113,107 women and 109,594 men) with an annual inter-census growth rate of 6.0%. This population was 68.1% urban. The average household size was 4.5, slightly below the departmental average of 4.73 and national average of 5.5. With an annual rate of growth of about 2.9%, the commune's population was estimated at 280,241 in 2021.[3] This demographic growth is in part due to the commune's geographic location. The availability of plots of land attracts people from Greater Nokoué who are looking for somewhere to live. Sèmè-Podji commune is a good option given the shortage and high cost of housing in the big cities of Cotonou and Porto Novo. Another attraction is its location on the border with Nigeria and within the Abidjan-Lagos corridor, a focus for commerce and trade.

3 RGPH 3 projections for Sèmè-Podji were 257,101 in 2018. This gives a growth rate (TAN) of 2.9%. We have used this rate to project the figure for 2021.

However, this dynamic growth could threaten sustainable urban development if governance is inefficient. The commune has reaffirmed, in its Commune Development Plan 2018-2022, its commitment to improving governance of economic, environmental, security, social and gender matters[4], ensuring urban services are accessible and improving living conditions so as to ensure sustainable urban amenities.

Figure 1: Population growth in Sèmè-Podji



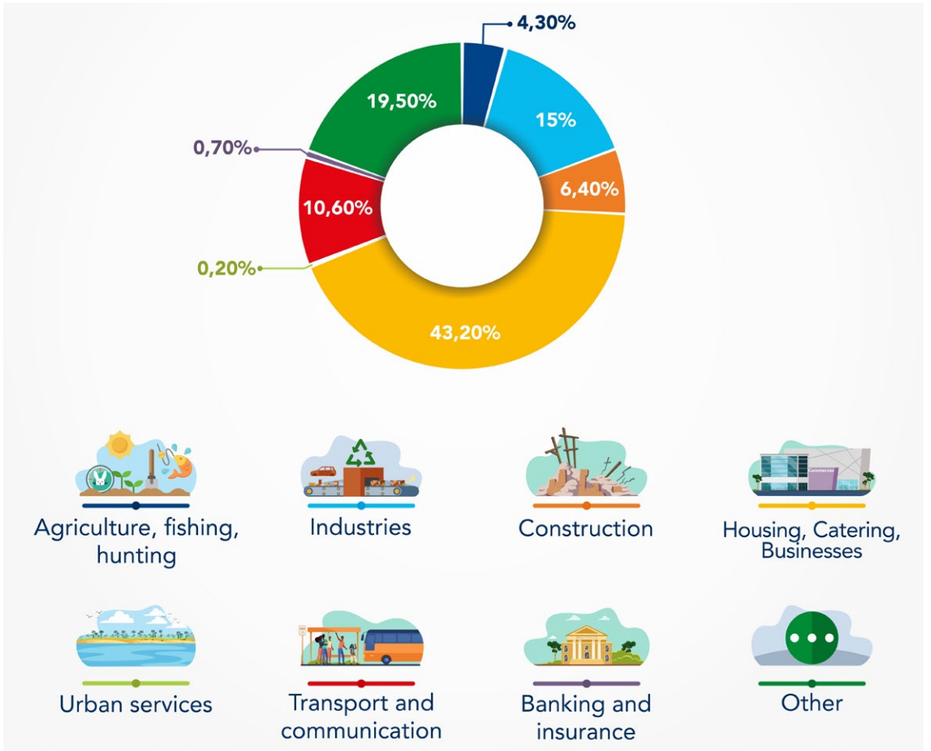
Source: INSAE 1979, 1992, 2002, 2013 and estimate for 2021

4 Extract from the speech of former mayor Charlemagne Honfo at the validation of the Commune Development Plan 2018-2022: https://villedesemepodji.com/validation-du-pdc-troisieme-generation-seme-podji-sur-lorbite-du-developpement/

3.2 Structural changes to the local economy

In 2002, agriculture was the main activity and the industrial sector was almost non-existent (RGPH 2002). In 2013, more than 67.5% of the active population in the 15-64 age group was working in the services sector, of which 43.2% were in commerce, restaurants and hotels. Agriculture, fishing and hunting accounted for 4.3% of the active population while the secondary sector, including manufacturing, employed 14.9%. Economic activity in the commune is predominantly in the informal sector (88.1%). Unemployment stands at 1.5% (INSAE, 2016).

Figure 2: Distribution of the working population by industry



Source : INSAE 2013

Sèmè-Podji's geographical location has put it at the heart of the development of national and international trade and its economy has therefore undergone a structural transformation, leading to a reduction in local agricultural production. This trend is also due to the urbanisation of agricultural areas and the gradual reduction in yields caused by climate change (PDU, 2008). In addition, Sèmè-Podji is the home of many economic projects, including important national and even subregional industrial projects, such as the deep water oil, mineral and commercial port and industrial free trade zones, all of which have consolidated these structural changes.

The Human Poverty Index (HPI) in Sèmè-Podji commune is 24.3% with a multidimensional poverty rate of 16.2% (INSAE 2016).

4 Waste indicators

There is not much up-to-date data on waste in Sèmè-Podji commune.

4.1 Generation and composition of household solid waste (DSM)

“Household waste” includes all waste generated by households, such as food leftovers and waste generated in food preparation, sweepings, household objects, newspapers and other paper, small sized metal packaging, bottles, paper and plastic packaging, clothes and other textiles, etc. It also includes garden waste.
Other waste is often included in household waste because of its similar nature or because it is generated close to home

Household waste is usually divided into three components.

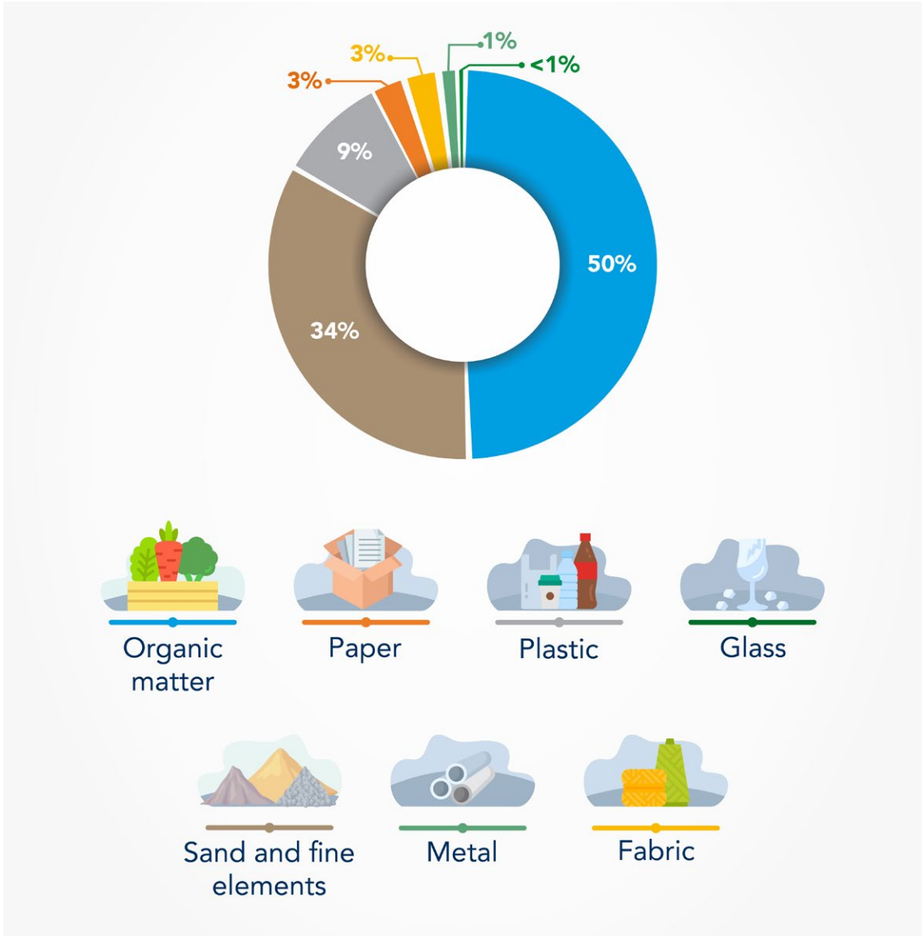
- Biodegradable waste. Matter that degrades through the agency of microorganisms within a set time: plants, food waste, fruit, cellulose-based products and biodegradable plastics.
- Inert waste. Matter that is not biodegradable within a set time: glass, stone, ceramics, non-biodegradable plastics, synthetic textiles, rubber, etc. This waste is more harmful than chemical pollution.
- Contaminants. Matter that releases chemical contaminants, for example, heavy metals, into the environment and that is not biodegradable or not very biodegradable: batteries, non-ferrous metals, solvents, paint, oil, ink, materials containing sulphates (plaster etc.), etc.

INSAE data (2016) shows that 78.1% of households in Sèmè-Podji throw their waste into open spaces. In 2012, it generated 94 tonnes of waste per day, that is, more than 34,324 tonnes per year, including more than 14,000 tonnes in urban areas. The areas generating most waste are the suburbs of Agblangandan, Sèmè-Podji and Tohoué (TPE-CAI, 2012). Daily generation of waste in Sèmè-Podji commune is estimated at 0.4 kg/day/person[5].

The following graph does not include data specifically on Sèmè-Podji, but shows the composition of waste at the national level according to the National Waste Management Strategy in 2008.

Plastic is the main component of DSM. The high number of bags is because they are used as packaging in all the town's supermarkets, bars, restaurants, hotels, markets and other production units.

Figure 3: **Composition of waste at the national level** Source: SNGD 2008



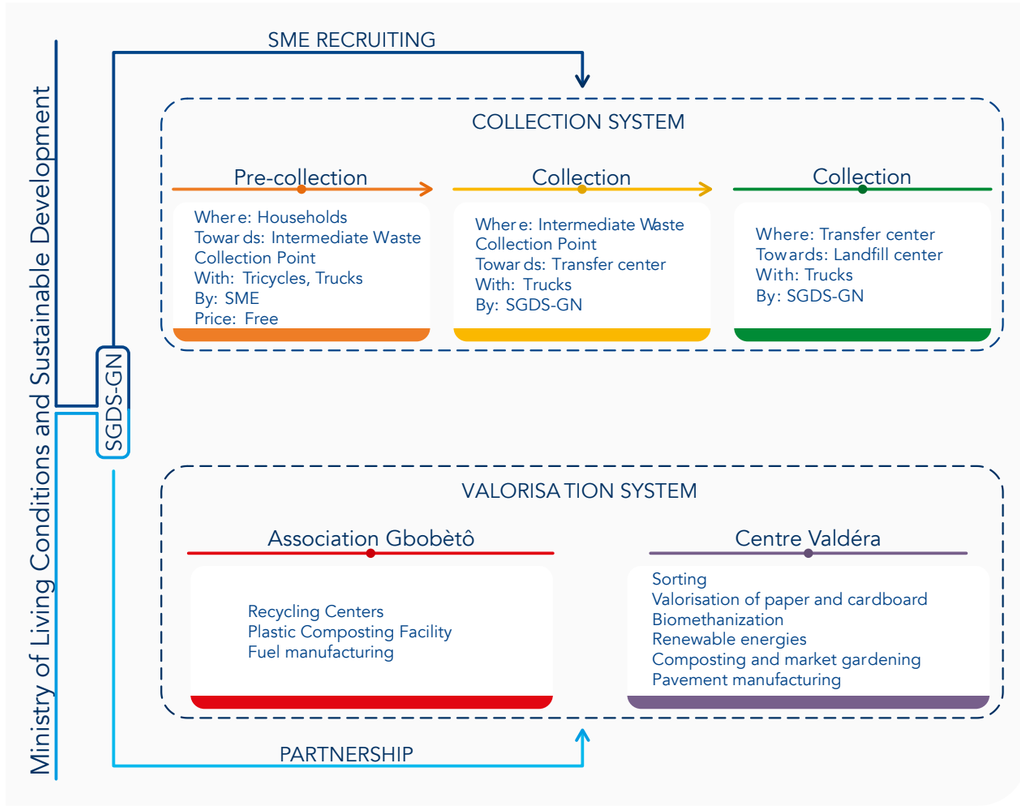
5 Consultant (Carrefour Environnement et GEO-Environnement), 2012.

4.2 Waste collection coverage

Since 2019, the SGDS-GN is exclusively responsible for waste management in Sèmè-Podji and the four other communes in Greater Nokoué. It is supported by the Benin subsidiary of the French group COVED/PAPREC, which provides expertise, advice and support to SGDS-GN and companies providing waste management services.

Thanks to these activities, the waste management sector has been restructured in Sèmè-Podji commune and in all the communes covered by the plan. The Economic Interest Groups (GIEs) and SMEs who won contracts from SGDS-GN divide the area into seven zones, ensuring complete coverage, and provide a free service to households. However, the SGDS-GN states that the free service (covered by the government) is in effect for stage 1 of the project and the introduction of a financial model is being studied[6]. The following diagram shows the solid waste management system for the commune, along with the recycling component partnerships that are in the course of development.

Figure 4: Simplified diagram of the current waste management system in Sèmè-Podji



6 Communiqué on a return to normal activities, 23 September 2020

Photo 1: Tricycle formerly used for pre-collection by the GIE UVA

Photo 2: Tricycles for waste pre-collection supplied by the SGDS-GN to SMEs

In 2018, when the PUGEMU ended, the city was equipped with six IWCPs, 16 tricycles, two waste collection lorries and a transfer centre.
The tricycles were transferred to the COGEDES in February 2018 for use in waste collection. Observation in the field shows that the SMEs are no longer using them.[7] Only the infrastructure was retained when the sector was reformed.

The SGDS-GN again provided each waste collection provider with equipment composed of six tricycles, the cost of which is gradually deducted from payments made to them for their services.

The IWCPs installed by the PUGEMU were not operational for long because they were not accessible due to the state of the access roads. The DEALS project initially supported the installation of two temporary waste collection sites equipped by the SGDS-GN with skips to make them operational. Awareness raising activities were conducted with the SMEs and residents regarding the use of skips for collection before their transfer for final disposal.

7 These tricycles are no longer operational. They suffer from frequent engine breakdowns. For some SMEs, these tricycles are definitively in the garage. The SMEs we met said that the tricycles provided by the PUGEMU are not adapted to the poor condition of the roads.

With regard to inclusive governance in line with the DEALS project, this was one of the first successful partnership with local actors on solid waste management.

Photo 3: Collection centre in Sékandji

Through the SGDS-GN, Sèmè-Podji commune made the following IWCPs operational: the waste bin reception centre at Kpakpakanmè; the IWCP at Akpokpota; and the waste removal platform at Tohouè, not forgetting the one at Èkpè-Houéssi[8].

Difficulties remain

The public complains that some collectors do not come to their homes to pick up their waste because of the difficulties of access for vehicles. It is reported that the household collection enterprises do not fulfil their contract to provide two weekly collections. Households end up cluttered by their waste and have no other option but to resort to informal means to get rid of the waste for a fee.
After the operationalisation of the IWCPs, the problem that remained was that the ampliroll lorries were slow to pick up household waste bins. The SGDS-GN has 50 ampliroll lorries but finds it difficult to find qualified drivers to put them into service[9]. This has a knock-on effect on the entire chain. Waste bins are left full at the IWCPs for a long time. The waste causes unpleasant smells for the public and health risks, given that the IWCPs are close to residential and other public areas.
The SGDS-GN has asked the commune mayors covered by the project to make available land for construction of new IWCPs but that will take time.[10] The company has therefore installed mobile improvised IWCPs to allow them to continue their activities.

4.3 Recycling, disposal and treatment of waste

Waste collected in Sèmè-Podji commune is taken to the Takon Landfill Site (LES), which is being upgraded to become a Technical Landfill Site (CET) as part of the Greater Nokoué household solid waste management modernisation project. This project also is installing a Sorting and Recycling Unit (UTV) next to the Takon CET to reduce the quantity of waste requiring disposal in landfill.

However, the current management system does not yet include selective sorting and recycling. The government decided to postpone construction of the UTVs until the second phase, while waiting to establish an economic model adapted to the operation of this chain. The use of the landfill at the CET is the only strategy at the moment. The landfill rate has increased from 23% in 2018 to 87%, according to the Director of the SGDS-GN, Valery Lawson. This poses the risk of overloading the CET unless the recycling option is not quickly made operational. In Greater Nokoué, 15 IWCPs will sort and recycle plastic waste. The SGDS-GN

8 https://villedesemepodji.com/reddition-de-comptes-a-seme-podji-les-populations-informees-des-actes-poses-par-le-conseil-communal/

9 Emission Le Grand Débat: Gestion des déchets ménagers dans le Grand Nokoué / https://www.youtube.com/watch?v=ULRG941T0ak

10 Emission Le Grand Débat: Gestion des déchets ménagers dans le Grand Nokoué / https://www.youtube.com/watch?v=ULRG941T0ak

envisages partnership with the Valdéra Centre at Abomey-Calavi University and the Gbogbètô Association, which specialise in waste-to-energy and recycling to produce construction materials. The Sèmè-Podji City DEALS project proposed working with the Valdéra Centre to develop the recycling component.

The Gbogbètô Association (litter-pickers in Goun), founded in 2018, is a new actor in the waste management sector. Its main objective is to create permanent and inclusive recycling initiatives. In partnership with the SGDS-GN, Gbobètô is establishing Recycling Centres at the IWCPs. The aim is to create adequate material and health conditions for safe sorting at the IWCPs without hindering household waste unloading and transfer operations. It also aims to formalise the employment status of precarious workers involved in the sorting and resale of recyclable materials, making them into professional and efficient sorting operators. Gbobètô organises technical and health and safety training activities, capacity building and also helps workers enrol in the social security system.

In the commune, the waste recycling stage includes a network for the recovery of plastic materials, bottles and scrap metal. There is also a small amount of production of agricultural fertilizers, in the form of compost. There is a Household Waste Treatment Centre (CTOM) in Tohouè. This centre was created in 1988 by the EMMAÜS community. Gohoto women recycle plastic materials and bottles, selling them at the commune's markets at prices that vary according to the condition of the bottle. Recycling of metals is carried out by young people, mostly of Nigerien and Malian origin. They collect drinks cans, metal chairs, fans, fridges, computers and photocopiers containing reusable metals. They buy them from individuals and resell then to semi-wholesalers, who in turn sell them to wholesalers/exporters. Several enterprises, such as COMAGRI SARL, NEY, ZUNGH and BAETHY export recycled metals.[11] According to a survey conducted by Charly Hessoun on behalf of La Nouvelle Tribune, a Benin digital news outlet, young retailers called **Gan gblé hôtô** can make monthly profits of up to FCFA 300,000.[12]

11 https://www.24haubenin.info/?Le-Business-de-la-gestion-des-dechets-monstres-des-ferraille-Un-mode-de protection de l'environnement

12 https://lanouvelletribune.info/2013/07/commercialisation-des-metaux-usages-au-benin-une-activite-qui-fait-gagner-plus-d-un-million-de-f-cfa-le-mois/

This income a lot higher than a Beninese category A1 civil servant. So it's not a bad job.

Figure 5: Timeline of waste management in Sèmè-Podji

5 Governance and funding of the waste management system

5.1 Governance

5.1.1 The legal framework

Waste management is regulated by a range of laws in Benin. The table below presents the legal texts that regulate household solid waste management and some regulations that apply to the organisation of household waste management in some towns in the Greater Nokoué.

Table 1: Legal framework for solid waste management

Legislation	Scope	Responsibility/ Actor	Current situation
Benin Constitution, 11 December 1990	Article 27: "Every person has the right to a healthy, satisfying and sustainable environment and has the duty to defend it. The State shall ensure the protection of the environment.	MEHU (currently MCVDD): its role is to monitor and manage	Basis of all legal initiatives on environmental management.
Law 87-015 of 21 September 1987 on the Public Health Waste Management Code	This has long been the main legal basis for environmental management. Prohibits the random dumping of all kinds of waste (refuse, rubbish, used water, grease, waste oil, used vehicles) in public places as well as their illegal burial or incineration; sets the installation of controlled landfill at least 5km from residential areas and at least 50m from water sources. The Public Health Code also prohibits mixing of household solid waste with waste from abattoirs and "toxic or pharmaceutical products" (article 97).		
Law 98-030 of 12 February 1999 on the legal framework for the environment	Regulates all household solid waste management activities (Chapter IV, articles 65-73). It states that waste should be treated so as to eliminate or reduce its harmful effects on human health, natural resources and environmental quality to a required level.	MEHU (currently MCVDD): its role is to monitor and manage. Town council - implementation.	Serves as a reference for all environmental projects.
Law 97-02 of 15 January 1999 on the organisation of communes	"The commune is responsible for the collection and treatment of solid waste other than industrial waste.	Town council – implementation.	Effectiveness of the transfer of jurisdiction.
Decree 2003-332 of 27 August 2003 on solid waste management	• Prevent or reduce the generation of waste and harm done by waste; • Promote the reuse of waste, especially through recycling, recovery, use as an energy source; • Organise the disposal of waste; • Limit, monitor and manage the transfer of waste; • Ensure the restoration of sites; • Prevent and limit the generation of waste and the harm done by waste; • Prevent and limit nuisance during waste management; • Regulate waste transfer; • Organise waste planning; • Ensure security in the event of accidents or dangerous events.	MEHU (currently MCVDD): its role is to monitor and manage. Town council – implementation	Implementation of household solid waste management programmes (PGDU 2) PAGIF in 2012.
Order 136/MISAT/MEHU/MS/DC/DE/DA/TC/DUAB of 1995 on regulating waste collection, removal, treatment and disposal.	Regulates the activities of private groups that replace the services of faulty sanitation services.	All signatory structures and town councils are responsible for implementation.	Implementation is weak because the provisions are onerous.
Order 1P/047/SG-SG-SDCD-ST of 9 July 2012 on the creation, powers, organisation and operation of the Commune Waste Management Support Committee (CCAGeD/SEME-PODJI) in the commune of Sèmè-Podji.	Ensure all the activities that contribute to the appropriate management of waste in the commune of Sèmè-Podji.	CCAGeD/SEME-PODJI; Implementation.	Operates for the implementation of zoning in the commune.

Legislation	Scope	Responsibility/ Actor	Current situation
Order 1P/048/SG-SDCD ST authorising COGEDES to collect household solid waste in the commune of Sèmè-Podji.	Has exclusive responsibility for providing household solid waste collection in Sèmè-Podji. Grants and withdraws authorisations to NGO members.	COGEDES: contributes to the organisation of the sector.	Implementation of the system is under way.
Decree 2018-542 of 28 November 2018 on approval of the statutes of the Greater Nokoué Waste Management and Urban Health Company	Attributes waste management powers to the SGDS-GN SA in Greater Nokoué.	SGDS-GN-SA	Activities under way.

Source: Rapport général étude de faisabilité Composante B-PUGEMU, 2012, KPADENOU 2021

5.1.2 A new actor in the management of household solid waste sector

On 28 November 2018, the Benin government issued Decree 2018-542 creating the Greater Nokoué Waste Management and Urban Health Company (SGDS-GN), as part of the of Household Solid Waste Management Modernisation project, one of the flagship projects of the Government Action Projects 2016-2021. With this project, the government aims to improve living conditions and make the territory more attractive. The project also aims to make the achievements of the PUGEMU project permanent and reduce the prevalence of diseases related to the poor state of the environment.

The SGDS-GN aims to:

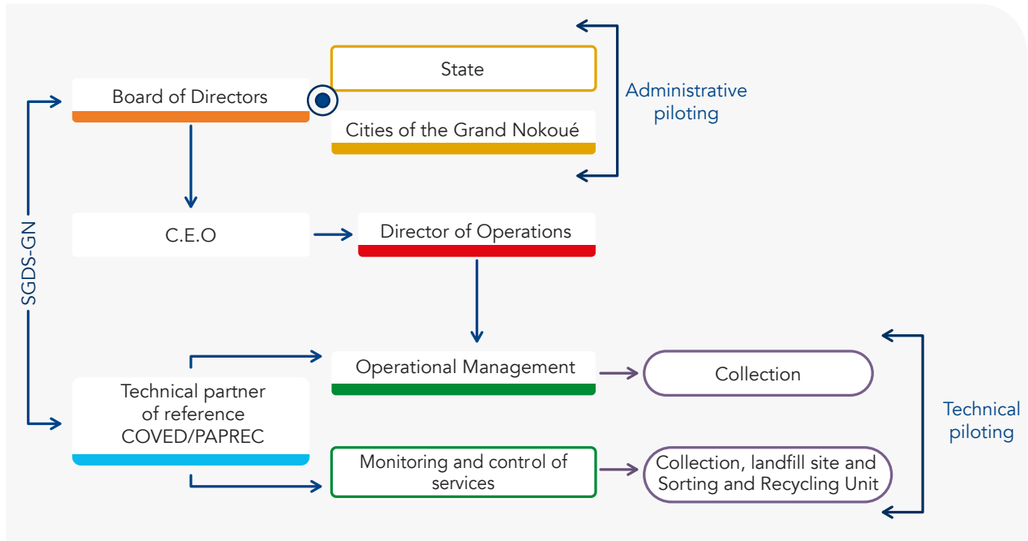
- Ensure the collection, sorting and recycling of waste;
- Treat and recycle waste, in particular household waste, remove waste blocking thoroughfares, dispose of and recycle waste and all connected operations;
- Organise the transport and transfer of waste for disposal by incineration or other means, including safe and efficient landfill;
- Assist the local authorities to implement better waste management and environmental conservation solutions;
- Assist the local authorities with all operations required to maintain a healthy environment, including urban road maintenance, sweeping and signing public highways and other public places, and cleaning gutters;
- Encourage compliance with environmental protection regulations on recycling and clean technologies;
- Participate directly or indirectly in all industrial, commercial, financial, movable and immovable property activities and operations.

The SGDS-GN board is composed of:

- two (2) representatives of the ministry of the environment;
- one (1) representative of the ministry of decentralisation;
- the five (5) mayors representing the communes of Greater Nokoué;
- one (1) representative of the ministry of health;
- one (1) representative of the Presidency of the Republic;
- one (1) representative of the ministry of planning and development.

The first board was appointed by Decree 2019-025 on 21 January 2019. The chair was Mme Olga Prince DAGNON, representative of the ministry of the environment and sustainable development.

Figure 6: Institutional organisation of waste management in the Greater Nokoué



5.2 Funding the waste management system

The waste management system is currently wholly funded by the SGDS-GN. The company has a share capital of one hundred million (100,000,000) CFA francs. The only shareholder is the Benin State. The SMEs that hold contracts for household waste collection are paid a fixed price per kilo of waste collected.

The principle of paying collectors by the kilo or the tonne is a strategy welcomed by all actors because it encourages them to collect as much waste as possible. The household solid waste management modernisation project in Greater Nokoué has a provisional budget of 57 billion (projected 93 billion). It will deploy close to 1,000 light and 80 heavy collecting vehicles, support infrastructure (IWCPs, transfer centre, two landfill sites) with a collection rate of 90% within seven years. About 60% of waste will be recycled. It is envisaged that the programme will create about 3,000 direct jobs.

6 Urban development and waste planning

Faced with the many external (for example, the increase in social inequalities) and internal changes (unprecedented urbanisation, spatial segregation, etc.), cities face many challenges: adaptation to changes in the productive system, control of urban expansion, the revival of city life, the promotion of citizenship, the escalation of the demands of sustainable development, etc. In the context of these demands for sustainable development, waste management remains an important challenge. An appropriate response requires urgent implementation of a properly planned and supported system that takes into account the specificities and realities of the cities in question.

6.1 The construction and development of the intermediate waste collection points

Intermediate waste collection points (IWCPs) have an important role in all solid urban waste systems because of their position in the transfer of waste chain. They act as intermediaries in the areas where they are located and to some extent reduce the distances to be covered. They facilitate the organisation of a rigorous system at the area level, allowing the local authority to exercise control over the system as a whole and ensure complete success in collecting DSU from households. Acting as intermediaries between households and final disposal, the IWCPs are all the more important in a context such as that of Sèmè Podji, where the distribution of housing on the periphery does not facilitate the complete collection of DSU. Construction and development of the IWCPs helps to improve the structure the DSU system and increase the feasibility of collecting a high proportion of the city's DSU. However, this may give rise to another problem related to the choice of sites for the IWCPs, which is why the management of these points must be part of a global urban planning system and included in planning documents. There must also be a high level of support from residents in order to avoid frustration and any feeling that there is a pattern of spatial and therefore environmental injustice.

6.2 Continued quest to destroy illegal dumps

The presence of illegal dumps is often seen as an indicator of the failure of a DSU system. Their destruction is an appropriate response and a sign of the city's commitment to improving the urban environment. The destruction of these hazardous sites should be combined with awareness raising and or punishment of residents. Moreover, the structures for the collection of household waste, which are often the reason why these dumps are created, should be made aware of the problem.

6.3 An urban planning response

Most urban waste is used by residents to fill in the marshy areas where they want to build their homes. This situation results partly from a housing crisis to which the authorities need to find a solution. In addition to the construction of sewers to make it feasible to build in certain areas while not disturbing ecosystems, the commune with the help of specialised institutions should promote technical and architectural specifications allowing construction in humid areas and other initiatives, such as:

- A housing programme that anticipates population growth, responds to current needs and avoids the occupation of land where construction is not feasible. Administrative resources could be used for this. There may also be scope for acquiring plots of land from private landowners and/or develop inclusive property programmes that include landowners, property developers, local authorities, central agencies and future users.
- The promotion of housing types that use less space so as to anticipate population growth and the shortage of land on which to build. The practise of parcelling should be replaced by urban project proposals that will be valid at the communal and intercommunal levels because of their size and to ensure coherent urban growth. At the communal level, urban renewal programmes should make urban life more vibrant in the suburbs, increase building density (high-rise) and redefine the building framework by moving away from the logic of systematic zoning. Urban functions should be mixed to increase the intensity of the use of urban space. A voluntarist urban renewal programme funded by the State and financial partners should be implemented
- The preparation and implementation of a specific plan for sensitive humid areas at the relevant scale for integrated management of space.

6.4 Building the capacities of the actors, cooperation and awareness raising

As things stand, every actor must fulfil their role for the system to function properly. This means that if actors do not carry out their tasks efficiently, there will be a knock-on effect on the entire chain and the effectiveness of the whole system will be brought into question. Capacity building of all actors should therefore take place regularly in order to allow everybody to fulfil their role satisfactorily and ensure they have the necessary skills and their functions do not overlap. For example, the efficient management of information and communication in the sector requires many and varied interventions. Even though the SGDS-GN is exclusively responsible for management of the system, local authority officials are still essential actors in raising awareness and educating the population about new practices. They can also inform the SGDS-GN about the needs on the ground, the problems encountered in previous years of management and the ideal conditions for the appropriation of the system by the various actors. For this to happen, it is necessary to train members of the mayor's communications unit on the production of information (information on best practices in DSM management) and how to improve the dissemination of information (post, telephone, Internet.) and also provide strategic capacity building for those with responsibilities in the household collection structures.

As the role is crucial, and as responsibilities sometimes overlap, building the capacities of actors helps to define and monitor the tasks to be implemented by each of the parties in order to achieve the common objective, which is good DSU management. Given the major advances in waste management during the last two years (2019-2020, since implementation of the modernisation project), the major issues are the need to improve communications strategies, build capacities of the actors and citizens and improve the process of recycling waste. Support for building the technical capacities could include the acquisition of the communal planning and administrative tools and software, the geo-representation of zones (industrial, housing, land unsuitable for building, agriculture etc.).

It will also be necessary to build partnerships that can draw on academic knowledge and experience, especially in the context of the vulnerability of areas facing climate change. Initiatives such as the Zero Waste Week public education campaign initiated by the DEALS project should be taken up and replicated to ensure behavioural changes on the part of the various actors in household solid waste management in Sèmè-Podji. A focus team has also been put in place to coordinate the synergy of actors around waste management.

6.5 Recycling waste

The recycling of household solid waste could be a way of considerably reducing the costs of household solid waste management and could also encourage the exploitation of landfill over a very long period.

In developed countries, reduction in the use of landfill for waste represents one of the main issues in waste management. Reduction in landfill redirects the flow of waste towards treatment and recycling installations. The general trend is to limit storage capacity and increase recycling capacity at treatment and recycling plants. The generalisation of sorting at source of biowaste by all waste generators leads to the implementation of supplementary local composting solutions (individual and shared composting) and/or the separate collection of biowaste by the private sector or, in the case of household waste and similar, by local authorities (door-to-door and voluntary participation), at a pace adapted to the context and to the local situation. The recycling of waste collected separately leads to the creation of new composting and methanisation plants. When recycling is not possible, waste-to-energy is preferred to disposal.

In Sèmè-Podji commune, the recovery of organic and other biodegradable waste such as paper and cardboard is a useful option for reducing the volume of waste to be treated. The development of spaces dedicated to compost can be planned in each district with the assistance of the Valdéra Centre and the Gbobètô Association, which are already taking steps in this direction. With the aim of securing

immediate positive results from household waste management, recycling will enhance and improve sorting points and the establishment of some basic urban services (water, public latrines, etc.). The compost would be used to improve community market gardening.

In view of the new governance system for waste management in Greater Nokoué the development of waste recycling technologies is an opportunity to promote recycling, create industries and jobs, and expedite waste management.

7 Conclusion

The city of Sèmè-Podji abounds with structural projects with national ambition in terms of economic, digital, social and environmental development. As an “archipelago city”, the environmental question is at the centre of the challenges it faces to ensure healthy, sustainable and pleasant living conditions. A major component is an efficient waste management system.

The sustained population growth experienced by the city in recent years in the wake of urbanisation and an attractiveness driven by its proximity to Cotonou, has caused an increase in the quantity of waste and, indirectly, environmental problems because of the system's shortcomings. The difficulties faced by the communes concern the insufficiency of material and financial resources and the lack of qualified personnel, the non-functionality of the sector's infrastructure, disorganised service providers, and the low subscription rate for households in the waste collection service. The PUGEMU, in an attempt to train local authorities, decided to respond to these inadequacies by i) equipping the communes with vehicles and information technology; ii) the construction of collection infrastructure; iii) building the capacities of the different actors and changing the status of NGOs into GIEs. The DEALS project set out to consolidate this approach by creating a synergic framework involving the various actors in inclusive governance and developing economic activities around household solid waste management. Implementation of the household solid waste management modernisation project in Greater Nokoue has optimised and equipped the sector's institutional and technical system. The creation of the SGDS-GN centralises the management of household solid waste in the communes of Greater Nokoué, including Sèmè-Podji, in order to perfect the sector thanks to the support of the qualified assistance by COVED/PAPREC.

Far from seeing in this a desire for "recentralisation", these reforms should ensure the control of waste management policies by the communes and inter-communal authorities with a view to ensuring that the actors take ownership and that there are opportunities for local innovations in response to local issues, close to citizens. Building the capacities of local actors (municipal officers, SMEs, etc.) should not be neglected. They should be used to define the planning strategies for the prevention and management of all waste. Their role is all the more important by including waste management in a global sustainable urban development approach with the promotion of a circular economy. The DEALS project forms part of this inclusive approach by providing advice and support to the communes with the training of their officers, promoting integrated cooperation and an anti-silo approach as well as the development of consultation and awareness raising communications tools.

For the moment, the recycling of waste is the least developed component. Sorting at source of household solid waste might reduce the quantity of solid waste that requires disposal in order to ensure the efficient waste management. The development of recycling, energy and organic recycling, also call for support by the private sector. It is therefore urgent to create an environment of trust and dialogue to encourage the investment needed for the blooming of innovative initiatives.

Abbreviations

CET	Centre d'Enfouissement Technique / Technical Landfill Centre
COGEDES	Collectif des Organisations non Gouvernementales de Gestion des Déchets Solides / Solid Waste Management Group of Non-Governmental Organisations
CTOM	Centre de Traitement des Ordures Ménagères / Household Waste Treatment Centre
DMA	Déchets Ménagers et Assimilés / Household and Similar Waste
DSM	Déchets Solides Ménagers / Household Solid Waste
GIE	Groupement d'Intérêt Economique / Economic Interest Group
INSAE	Institut National de la Statistique et de l'Analyse Economique / National Statistics and Economic Analysis Institute
IWCP	Intermediate Waste Collection Point
HPI	Human Poverty Index
LES	Lieu d'Enfouissement Sanitaire / Landfill Site
MEHU	Ministère de l'Environnement, de l'Habitat et de l'Urbanisme / Ministry of the Environment, Habitat and Urbanism
MCVDD	Ministère du Cadre de Vie et due Développment Durable / Ministry of Living Conditions and Sustainable Development
NGO	Non-Governmental Organisation
PAG	Programme d'Actions du Gouvernement / Government Action Programme
SME	Small and Medium-Sized Enterprise
PUGEMU	Projet d'Urgence et de Gestion Environnementale en Milieu Urbain / Emergency Urban Environment Management Project
RGPH	Recensement Général de la Population et de l'Habitation / General Population and Housing Census
SGDS-GN	Société de Gestion des Déchets et de la Salubrité du Grand Nokoué / Greater Nokoué Waste Management and Urban Health Company
SNGD	Stratégie Nationale de Gestion des Déchets / National Waste Management Strategy
UTV	Unité de Tri et de Valorisation / Sorting and Recycling Unit

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