AFRICA SOLID WASTE MANAGEMENT

DATA BOOK 2019

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Preface

In 2017, the Ministry of the Environment of Japan (MOEJ), the Japan International Cooperation Agency (JICA), the City of Yokohama, the United Nations Environment Programme (UNEP) and the United Nations Human Settlements Programme (UN-Habitat) jointly established the "African Clean Cities Platform (ACCP)" with the aim of improving waste management in African countries.

Activities implemented under the ACCP to date include training activities aimed at human resource capacity development, the sharing of knowledge and experience in waste management, and field surveys and pilot projects in the field.

In order to manage waste properly, it is important for each country and city to collect and maintain data on not only socio-economic aspects such as population and industrial structure, but also waste management aspects such as the composition and amount of generated waste. It is also effective to organise and share information on the regulatory and disposal systems concerning solid waste management, and to mutually learn from these between neighbouring countries.

The 2019 African Waste Management Data Book was created as a part of the ACCP's activities with the cooperation of the ACCP member countries and cities. It compiles data on a variety of matters including the composition and amount of generated waste in African countries, as well as their regulatory and disposal systems.

We encourage all stakeholders involved in solid waste management in Africa, including the central and local governments of African country, private companies, and international organisations, to use this Data Book to improve the waste management of every country.

Japan and Africa have a long history of building up friendly relations. TICAD7, based on the theme of African development, will be held in Yokohama from August 28 to 30, 2019. Japan is committed to continuing to support the development of Africa, and the MOEJ will continue to promote the activities of the ACCP to improve the solid waste management in African countries.

Vice-Minister for Global Environmental Affairs, MOEJ
MORISHITA Satoru

Acknowledgement

Much of the data in this document is based on information provided by the representatives of ACCP member countries and cities ("focal points"). In many member countries and cities, data on waste management remains underdeveloped or uncompiled, while communication also tends to be erratic. We would like to express our appreciation to the focal points and those who assisted them for preparing the country profiles and city profiles, as well as for answering the questionnaire surveys.

The Ministry of the Environment of Japan (MOEJ), the United Nations Environment Programme (UNEP), United Nations Human Settlements Programme (UN-Habitat), and the City of Yokohama have not only helped in preparation of this book, but also provided support for a variety of ACCP activities including ACCP meetings, training in Japan, and also training and seminars held in various African countries.

We have received technical reviews and invaluable comments from UNEP and UN-Habitat.

Please note that this book is not intended to provide a whole picture of solid waste management across Africa. However, we believe that even the process itself – namely, the people striving day in and out at waste management sites through various trial and error approaches to collect the latest information, organise it, and compile the results into profiles – has made this book worthwhile.

In Africa, socioeconomic changes, including economic development and rising urban populations, is continuing to change the environment surrounding waste. By each country and city continuing to assume a primary role in repeatedly collecting and analysing data as well as making the data development process a regular habit, we can expect these efforts to lead to the consideration and practical application of solid waste management based on highly reliable data, thereby contributing to improvement of urban environments.

We are hopeful that these efforts will not only broaden the knowledge of those involved in waste management, but also that this book will connect those who have chosen to read it, and it will serve as a catalyst for new collaborations and co-creation.

We would like to express our sincere gratitude to the many people and organisations who helped make this book possible.

African Clean Cities Platform (ACCP) Secretariat
Director General, Global Environment Department, JICA
MUTO Megumi

List of Abbreviations

3R	Reduce, Reuse, and Recycle
ACCP	African Clean Cities Platform
CBE	Community-based enterprise
CBO	Community-based organisation
EEE	Electrical and electronic equipment
EPR	Extended producer responsibility
EU	European Union
e-waste	Electrical and electronic equipment waste
GDP	Gross domestic product
GNI	Gross national income
HCRW	Health care risk waste
IMF	International Monetary Fund
IT	Information technology
JICA	Japan International Cooperation Agency
MBT	Mechanical and biological treatment
MOEJ	The Ministry of the Environment of Japan (MOEJ)
MRF	Materials recovery facility
MSW	Municipal solid waste
NGO	Non-governmental organisation
NPO	Non-profit organisation
O&M	Operations and Maintenance
OECD	Organisation for Economic Co-operation and Development
PAYT	Pay-As-You-Throw
POPs	Persistent organic pollutants
PPP	Public-private partnership
PSW	Plastic solid waste
RDF	Refuse-derived fuel
SDGs	Sustainable Development Goals
SNS	Social networking service
SW	Solid waste
SWAN	Solid Waste Management Advisers Network (Japanese NPO)
SWM	Solid waste management
TICAD	Tokyo International Conference on African Development
UN	United Nations
UNEP	United Nations Environment Programme
UN-Habitat	United Nations Human Settlements Programme
UNSD	United Nations Statistics Division
USEPA	United States Environmental Protection Agency
VAT	Value-added tax
WIS	Waste information system
WtE	Waste-to-energy

1 About this Data Book

1.1 Purpose

This Data Book was compiled to introduce the efforts of member countries and cities of the African Clean Cities Platform (ACCP), in combination with relevant analyses, with the aim of contributing to the promotion of appropriate and sustainable waste management in African countries.

This book is also expected to serve as a practical reference for development institutions and/or private sector entities that are considering engaging in development cooperation or pursuing business opportunities related to waste management in the countries and cities of Africa.

To date, the ACCP has published a pamphlet entitled the 'Basics of Municipal Solid Waste Management in Africa,' as well as 'A Guidebook for Environmental Education on Solid Waste Management in Africa'. Readers are advised to refer to the pamphlet in conjunction with this book, when needed, as the topics covered are closely related.

1.2 Structure

This chapter introduces the purpose and structure of this book, explains how the information was acquired, and lists the ACCP member countries/cities.

Chapter 2 provides general observations on the factors underlying the waste issues in developing countries. The chapter identifies unique waste issues facing Africa in the present and future, such as the population boom and resulting increase in waste volumes.

Chapter 3 describes the status of waste management in Africa based on information provided by ACCP member countries/cities. The chapter analyses Africa's waste management situation from socio-economic, geographical, waste flow and other viewpoints with reference to relevant information and documents.

Chapter 4 organises the issues raised from the analyses of Africa's current waste management situation in Chapter 3 and discusses the expected roles and contributions of the ACCP in addressing those issues.

1.3 Information Sources

In general, information received from ACCP member countries and cities has been listed without modification. Accordingly, the quantity and quality of the information varies somewhat between countries and cities. Readers should bear this point in mind.

As of the end of July 2019, 36 countries and 65 cities have registered as ACCP member countries and cities, as shown in Table 1-1. Each country and city appoints 'focal points' from the organisations/agencies in charge of waste management. These focal points serve both as the main contact channels for ACCP and as major sources of information for this book.

At the Preparatory Meeting for establishing ACCP in Maputo, Mozambique in April 2017, participants confirmed their common understanding of the need to comprehend the present situation and analyse problems of waste management in each country. Before the first annual ACCP Meeting in Rabat, Morocco in June 2018, participants took part in a questionnaire survey over the internet. Supplementary surveys were also conducted via questionnaires, direct interviews, and other available channels targeting countries and cities that did not present at the above meetings. By integrating these outcomes, basic information on waste management in 29 countries and 41 cities has been compiled in the Country Profiles and City Profiles listed in

the Annex of this book. Note that some countries and cities prepared their profiles by themselves.

The charts shown in Chapter 3 are based on information obtained through the above process. Therefore, they do not encompass the facts of all countries/cities in Africa nor all member countries/cities of ACCP. Note that the information is generally posted as received from the focal points. When the information received was apparently inaccurate, it was corrected or deleted by the ACCP Secretariat.

That being said, as the information received from the ACCP member countries and cities was still limited, additional efforts were made to give readers a more understandable overview and background information by supplementing the information received with existing reports from ACCP partner organisations, especially UNEP and UN-Habitat.

1.4 ACCP Member Countries and Cities

Listed below are the ACCP member countries and cities. Please refer to the annex for the country profiles, city profiles, and methods used to gather information from the respective countries and cities.

Table 1-1: List of ACCP Member Countries and Cities

Country	City
*Angola	-
*Benin	-
Botswana	Kweneng
Burkina Faso	Ouagadougou
Cameroon	Yaoundé
Central African Republic	Bangui
*Chad	-
*Comoros	-
Congo	Brazzaville
Côte d'Ivoire	Abidjan
Democratic Republic of the Congo	Kinshasa
**Djibouti	Djibouti
Egypt	Alexandria
**Eswatini	Mbabane
Ethiopia	Addis Ababa
**Gabon	Libreville
Ghana	Tema
*Guinea	-
Kenya	Kiambu, Nairobi

Country	City
Lesotho	Maseru
**Liberia	Monrovia
Madagascar	Antananarivo, Toamasina
Malawi	Blantyre
*Mauritius	-
Morocco	Tiznit
Mozambique	Alto Molocue, Angoche, Beira, Catandica, Chimoio, Dondo, Gondola, Gurué, Ilha de Moçambique, Inhambane, Lichinga, Macia, Malema, Manica, Maputo, Matola, Milange, Mocimboa da Praia, Mocuba, Mueda, Nampula, Quelimane, Quissico, Sussundenga, Tete, Vilankulo, Xai-Xai, Provincia Cabo Delgado, Provincia Gaza, Provincia Inhambane, Provincia Maputo, Provincia Nampula, Provincia Tete, Provincia Zambezia
Namibia	Windhoek
Niger	Niamey
Nigeria	Abuja, Kaduna
*Senegal	-
South Sudan	Juba
Sudan	Khartoum
**Uganda	Kampala
*United Republic of Tanzania	-
Zambia	Lusaka
Zimbabwe	Bulawayo, Harare

* Only the country is member. ** Only the city is member.

(as of July 2019)

African Clean Cities Platform (ACCP) Member Countries

2 Waste Issues in Africa

2.1 Background

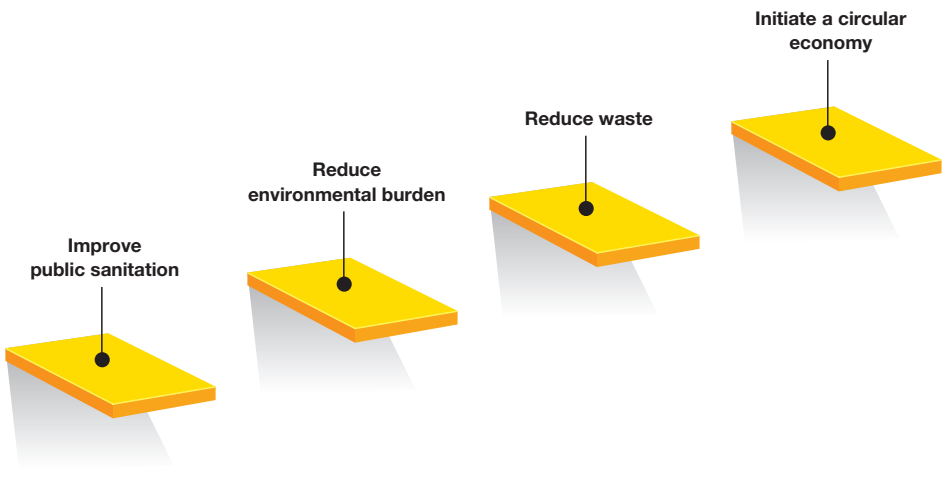
Countries and cities around the world face their own waste issues. The issues are certainly not confined to the countries and cities of Africa.

Generally speaking, waste issues tend to increase in composition and severity as urbanisation becomes more developed. Traditionally, most waste in rural areas was composed of organic waste such as food residue and excrement, and therefore could be reused as livestock feed or fertiliser. Even if the waste was overabundant, the excess could be buried in the ground to degrade naturally, or in some cases incinerated on the premises. In other words, the natural environment around farming areas used to fulfil the function of disposing of waste. However, in line with the advance of economic development and logistics, growing amounts of plastics and other substances that do not decompose naturally have spread in rural areas, and this has led to problems in the disposal of waste. In short, as long as the type and quantity of waste fit within the range of what the environment is capable of assimilating naturally, the waste itself will not cause serious problems.

In contrast, cities with dense populations have faced serious solid waste management challenges from long ago. In ancient Rome, garbage and excrement were dumped into pits in the city outskirts. This not only created a stench around the pits, but also incubated communicable diseases such as plague, resulting in many deaths. Epidemics spread due to deteriorating public sanitation in medieval London, as well.[1] Given the vast number of people living and working in cities, the generation of massive amounts of various waste is inevitable. Unless the waste is managed by human intervention, problems will arise.

The purpose of solid waste management is to implement the following measures in accordance with the social and economic situation of the era and the country's level of development: (1) remove waste from living areas quickly to maintain a suitable living environment for inhabitants and improve public hygiene, (2) dispose of waste properly to prevent negative impact on the environment, and (3) reduce the amount of waste by recycling or minimising waste generation. With the prevalence of mass consumption in recent years, (4) the countries of the world aspire to become sound material cycle societies by conserving natural resources and reforming the social systems of production and consumption. This shift to recycling will contribute to measures to respond to global environmental crises such as climate change and marine plastic debris.

Figure 2-1: Multi-stage Development of Solid Waste Management[2]



In developed countries, solid waste management methods have developed in stages over many years. In Japan, for example, separated waste collection was first implemented in the 1970s. As time passed, waste segregation was gradually established among Japanese citizens as a daily practice. Although belatedly, legislation on emissions control and recycling was enacted in the 1990s. After that, various laws based on the principle of 'extended producer responsibility (EPR)'[3] were developed to handle waste that required special control and treatment, such as home appliances. Accordingly, the people and organisations targeted by the legislation also changed their behaviours and social systems. Other developed countries have generally gone through similar processes of development. Taking the example of separation and discharge of waste, almost half a century has passed to develop the system in place today. In the meantime, technologies such as collection and treatment have evolved, legislation has developed, and a culture, in which people cherish conducting separation properly and consuming less natural resources, has been cultivated.

In many developing countries, multiple problems associated with waste have been occurring simultaneously. Some cities address recycling and climate change mitigation initiatives such as biogas capturing, yet do so without having first solved more fundamental issues in waste collection and disposal. While some cities have been implementing solid waste management properly, other cities face concerns about health hazards to their citizens.

Each region, country, or city has its own unique history, culture, and background regarding waste issues. Waste issues may look similar on the surface, but their characteristics are rooted in different cultures and socio-economic systems. The difficulty of solid waste management lies in the absence of a universal solution or panacea.[4]

2.2 Waste Issues in Africa

2.2.1 Current Issues of Concern

Ensuring public health and concern over health hazards

The population has been growing faster in Africa than in any other part of the world in recent years, climbing by as much as 150% from the year 2000 to 2015. The rise in the urban population, which requires municipal solid waste management, has been more pronounced, reaching about 170% over the same period. Moreover, the ongoing trend of rapid workforce migration from rural areas is accelerating the concentration of population in cities.[5]

A rapid increase in population is usually associated with an increased amount of waste generated. The governments of many African countries, however, are still unable to provide waste collection and disposal services to keep up with the greater demand. This gap is especially apparent in Sub-Saharan Africa, where approximately half of the waste remains uncollected, damaging both sanitary conditions and the aesthetics of the cities.[6]

Regardless of the size of cities, it is common to see waste strewn on the streets in Africa, or scattered around overflowing waste collection containers. Areas not covered by public services, such as back alleys and vacant land, are also common sites for the illegal dumping of waste.

Organic waste, the main component of waste in Africa, attracts insects and pests. In regions with high temperatures, waste tends to promote the breeding of flies and gastrointestinal pathogens that can cause the spread of diseases such as gastroenteritis, hepatitis, and cholera. In addition, accumulated water in plastic waste can encourage the breeding of mosquitoes, creating a source for spreading dengue, malaria, and yellow fever.[7] When blocking waterways and rivers, these problems can also be a source of flooding.

Waste scattered around the city (Kinshasa, February 2019)

Waterway blockage (Kinshasa, February 2019)

Environmental degradation from improper waste disposal

Even when collected, waste is improperly disposed of in many cities. At least 70% of waste in Sub-Saharan Africa is disposed of in open dump sites.[8] According to information received from 29 member cities of ACCP, 9 cities use open dumps, 5 cities use controlled disposal sites, 12 cities use sanitary landfills, and 3 cities answered unknown.[9] Moreover, some dumpsites that were originally planned as sanitary landfills actually harm the surrounding environment because of improper operation.

Open dumping often causes multiple problems. Besides the above-mentioned problems of insects and pests, other problems such as the contamination of surface and ground water from leachate, offensive odours, and fires are commonly observed. Open dumping sites without controls in place also release methane generated by decomposing organic waste into the atmosphere, which contributes to climate change. Worse still, mountains of waste have collapsed in numerous cities in recent years as a consequence of improper disposal site management and the excessive piling of waste at open dump sites, leading to the loss of many lives.

Open dump site (Bahir Dar, January 2018)

Table 2-1: Major Disposal Site Accidents in Recent Years

Month/Year	City/Country	Number of victims	Accident cause
September 2016	Cotonou, Benin[10]	Over 100	Fire
March 2017	Addis Ababa, Ethiopia[11]	115	Collapse
August 2017	Conakry, Guinea[12]	9	Collapse
February 2018	Maputo, Mozambique[13]	17	Collapse

Increase of difficult-to-dispose of waste

While organics traditionally accounted for much of the waste composition in Africa, lifestyle changes and increased imports brought about by economic growth are pushing up the amount of waste requiring special disposal measures such as electrical and electronic products, plastics, and tires.

Large volumes of used electrical and electronic products are imported from developed countries, many of which no longer work. After usage, only a small fraction of these products is collected and recycled. Most of the plastic is simply discarded as waste.[14]

Many African countries lack adequate techniques and legal systems for the proper disposal of the waste that requires special treatment. Health problems from harmful metals and chemical substances such as lead and dioxin have been reported as a result of improper disposal of electrical and electronic waste.[15] Plastic waste uses up disposal capacity at landfill sites because of its resistance to natural decomposition and tends to fragment into micro-plastics if spilled into the ocean. Micro-plastics can easily adsorb harmful chemicals and may cause bioaccumulation in living organisms.[16] Some countries import plastic waste and used electronics despite their immature recycling systems. The establishment of proper solid waste management systems is an urgent issue in those countries.[17]

Electrical and electronic waste (Ethiopia, November 2017)

2.2.2 Future Issues of Concern

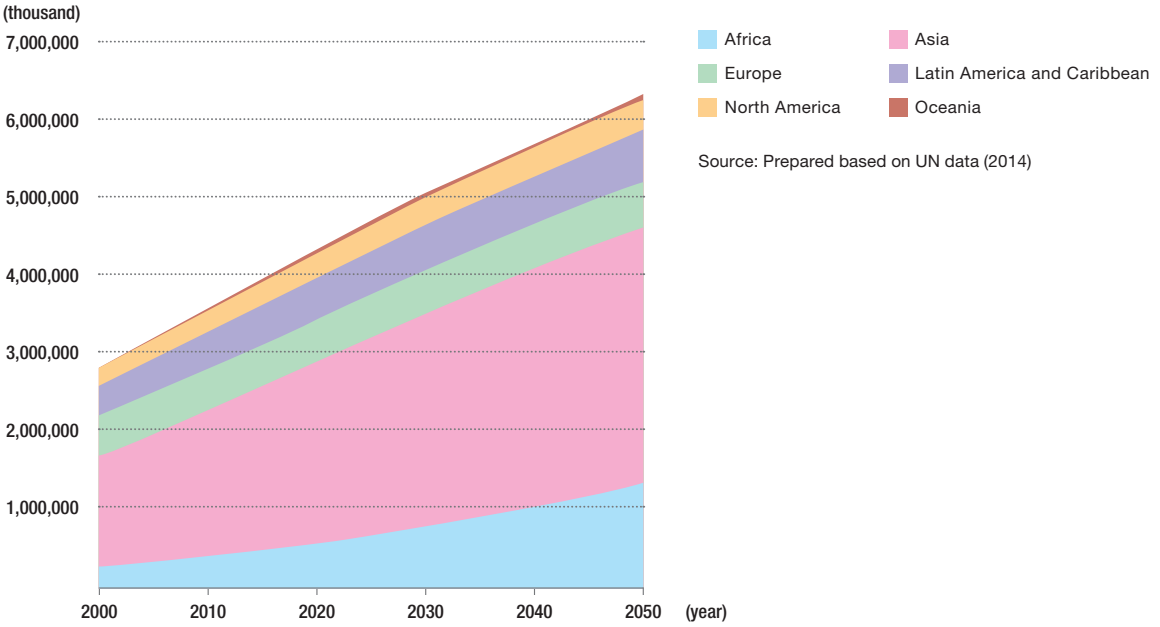
Over many years, developed countries have gradually solved their waste issues through measures aimed at public health improvement, environmental pollution control, and the realisation of sound material cycle societies. African countries, however, are facing these problems all at once within a short period of time. Many of the problems require immediate action.

Further increase of waste

The nominal GDP per capita in Africa in 2018 was roughly USD 2,000 per year.[18] The amount of urban waste generated in most ACCP member cities in the same year was under 0.6 kg/person/day. Although this amount is much smaller than that in developed countries, the above-mentioned issues are a huge challenge for African countries as they struggle with the underdeveloped solid waste management systems and limited administrative capacities.

Africa's population is expected to continue growing. The total population is projected to double from 2015 to 2050, and the urban population is expected to triple over the same period.[19] The amount of waste generated is also projected to roughly triple, from 174 million tons in 2016 to 516 million tons in 2050.[20] Unless immediate measures are taken, the situation will inevitably get worse.

Figure 2-2: Worldwide Urban Population Forecast



Source: Prepared based on UN data (2014)

Increase in environmental damage

As the amount of waste increases, so does the amount of methane gas generated as a result of improper landfill disposal, a significant contributor to rising greenhouse gas emissions. Improper solid waste management on land is also regarded as a major source of the plastic waste discharged into oceans. According to estimates by Jambeck et al.,[21] five African countries were among the main contributors to plastic marine debris in 2010, namely, Egypt, Nigeria, South Africa, Algeria, and Morocco. If solid waste management systems remain underdeveloped, the amount of plastic waste discharged into the oceans will inevitably increase further. The negative impacts of regional problems, such as improper landfill disposal and waste strewn and dumped around the cities, are not confined within the immediately affected regions. To the contrary, these impacts aggravate global environmental issues such as global warming and increased marine plastic debris.

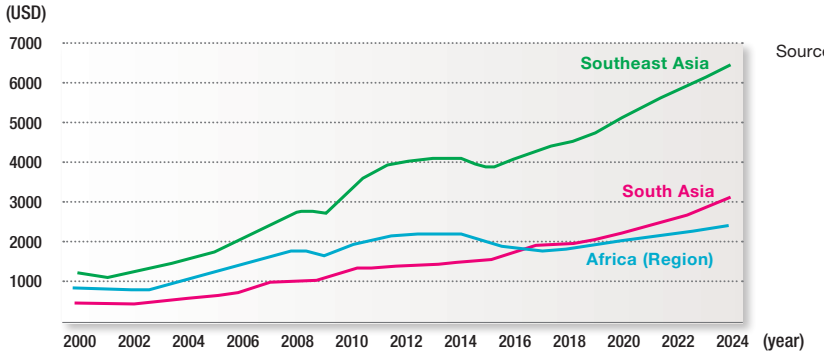
Plastic waste fills a river (Kinshasa, February 2019)

Securing revenue sources

Proper solid waste management is usually expensive. Although developed countries spend large amounts of budget on solid waste management, the expenditure will have little overall impact on government finances given the sizes of their economies. For a developing country having numerous number of high-priority social issues beyond solid waste management, the cost required to realise proper solid waste management can be a large burden, even if the amount is relatively small. Worse still, the growing volumes of waste requiring special treatment, such as plastics, discarded home appliances, vehicles, etc., will further raise the cost of disposal.

Although Africa's economy is on a growth trend, as shown in Figure 2–3, the pace of growth is rather modest compared to other regions. In addition, the GDP per capita of Sub-Saharan Africa is still under USD 1,600 (2017),[22] a level too low to allow most countries to secure budget for proper public services. As described later in Chapter 3, many ACCP member countries and cities have been unable to obtain enough financial resources to cope with the increasing amounts of waste. Financing solid waste management will continue to be a major challenge for these countries.

Figure 2-3: Projection of GDP per capita, current prices



Source: Prepared based on IMF data (April 2019)

1 Shigeki Nakajima (1980). Eisei kōgaku nyūmon (in Japanese) – Jōgesuidō/Haikibutsushori (Introduction to Sanitation Engineering - Water and Sewage and Waste Management), Asakura Publishing, p.174
2 Prepared using the following reference material: JICA (2017). JICA Strategy Paper on Solid Waste Management (Position Paper on Solid Waste Management) Ver.4
3 Refers to the idea of extending the physical and economic responsibility of producers of a product until after the use of the product rather than just the distribution stage.
4 JICA Institute for International Cooperation (2004). Supporting Capacity Development for Solid Waste Management in Developing Countries - Towards Improving Solid Waste Management Capacity of Entire Society, p.9
5 UN (2014). World Urbanization Prospects, https://population.un.org/wup/ (last viewed: January 10, 2019)
6 World Bank (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050, p.79
7 Peter Harvey, Sohrab Baghri and Bob Reed (2002). Emergency Sanitation, p.105
8 World Bank (2018). p.82
9 In general, “open dumps” are plots of land where waste is simply dumped without any environmental protection facilities in place; “controlled disposal sites” are disposal sites protected with environmental protection facilities, such as bunds, where the waste is compacted or covered with soil; and “sanitary landfills” are disposal sites that have impermeable bottom liners and other environmental conservation facilities in place, where the waste is compacted and covered with soil. These general definitions apply to these terms as they appear throughout this document.
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3 Current State of Solid Waste Management in Africa

3.1 Waste Generation and Composition

3.1.1 Data on Waste Generation Amount and Composition

- Information on the waste generation amount and composition is essential for considering methods to manage the collection, intermediate treatment, and final disposal of waste, as well as for determining the necessary facilities and their capacities.
- Although most of the cities that responded to the web questionnaire (91%, 22 valid responses) have data on amounts of generated waste, the amounts have not been quantitatively measured. The reliability of the data is therefore open to question.
- Many cities that responded to the web questionnaire (82%, 22 valid responses) have data on the amount of waste generated per person. The reliability of the data is questionable, however, as the source of the data is indicated as unknown in most of the cases (89%, 18 valid responses).
- Solid waste management officials in many cities that responded to the web questionnaire (79%, 16 valid responses) have some understanding of the composition of waste in their city. However, nearly half of the cities are unable to identify the source of their data.
- While the abovementioned data is essential in formulating policies and plans, there is concern that unreliable data may lead to inappropriate decisions.

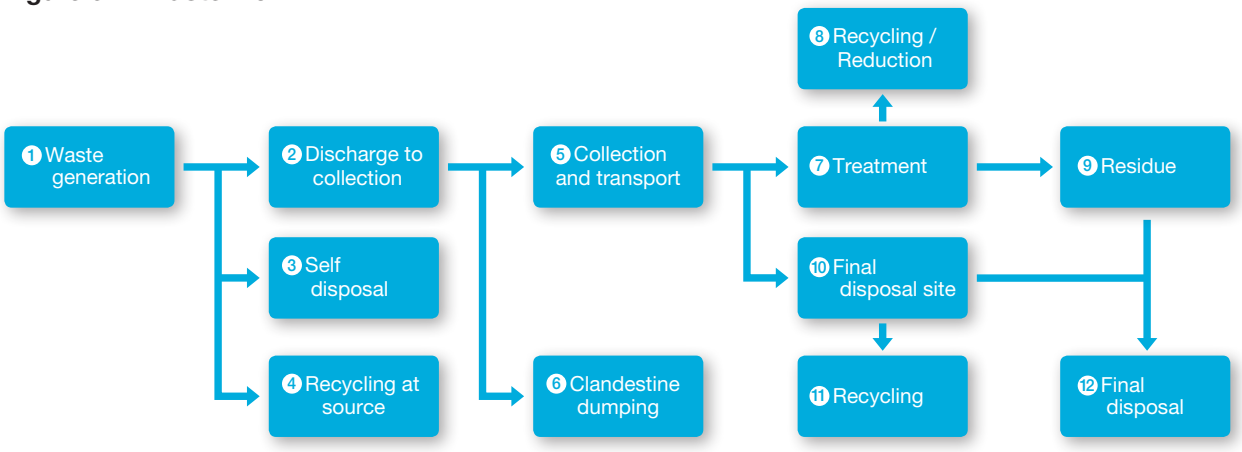
Data on waste generation amount

Understanding waste flow, including the amount of generated waste, is the first step towards achieving appropriate solid waste management. Data on the composition and bulk density of waste, including food waste, plastic, paper, metal, sand and fine particles, etc., is essential for determining the type and capacity of collection containers and vehicles, intermediate treatment methods, and other measures. Data on the amounts of waste is also necessary to determine the number of containers, number of collection vehicles, capacity of the intermediate treatment facilities, and capacity of the disposal sites.

Municipal solid waste includes waste discharged from homes, waste similar in nature to household waste from offices and shops, and waste generated by the cleaning of public spaces. Not all generated waste is discharged: some can be used as a source of livestock feed or compost, or handed over to recycling businesses as a marketable good. In such cases, waste minus these amounts is discharged and must be collected. However, a common problem among African countries is a failure to properly collect and transport waste because of factors such as illegal dumping.

The total amount of municipal waste is calculated by tallying the amount of waste from each waste source. This is mostly obtained by estimation rather than direct measurement. The typical method for estimating waste amounts is as follows: data from survey results on waste generated from households, self-disposed amounts obtained from questionnaire responses, and data from weighbridges at recycling facilities/disposal sites are incorporated into the waste flow (Figure 3-1), then the entire waste flow is estimated. These results are used to estimate the total amount of waste.

Figure 3-1: Waste Flow



The amount of self-disposed waste in most developed countries is very limited and has little impact on the total waste flow even when not included. Moreover, collected wastes are typically transported to recycling, incineration, or disposal sites where there is usually a system in place to weigh waste using a weighbridge. In other words, the waste amounts can be estimated with high accuracy because almost all of the quantitative data, beyond the amount of waste generated itself, is available.

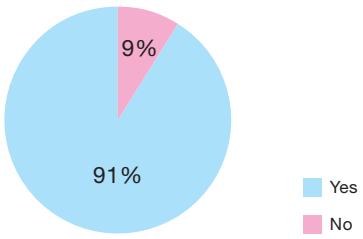
In contrast, massive amounts of waste never enter the formal waste service flow in many cities in Africa. This waste may be burned in open air, for example, or collected as marketable goods in the informal sector, or dumped illegally. Moreover, the quantitative data generally cannot be obtained even when the waste is collected, as no weighbridges are installed at the disposal sites. Although data from surveys on household and business waste is important quantitative data for estimating the amounts of waste generated in such situations, these surveys are rarely conducted systematically or on an ongoing basis.

In fact, 91% of survey takers answered "Yes" in response to the question, "Do you know how much waste your municipality generates?". Only 20% of these respondents, however, actually had quantitative data from a weighbridge. And although 82% of those surveyed answered "Yes" in response to the question, "Do you know the waste generation rate in your municipality?", 89% provided "no answer" on how they obtained the data.

In other words, although data exists on waste generated per person in solid waste management, the source of this data is unclear and the reliability of data has not been established. As 45% of cities have been estimating citywide waste generation using such figures, the reliability of the calculated total waste generation is questionable.

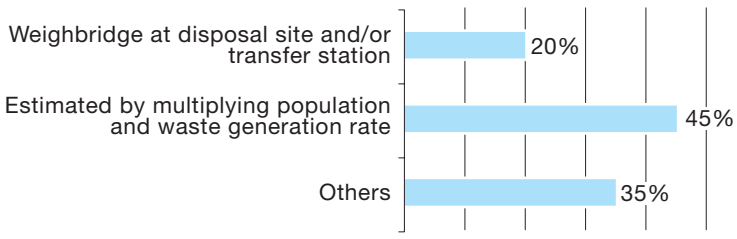
Do you know how much waste your municipality generates?

Valid responses: 22



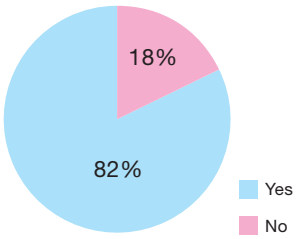
How do you get the data?

Valid responses: 20



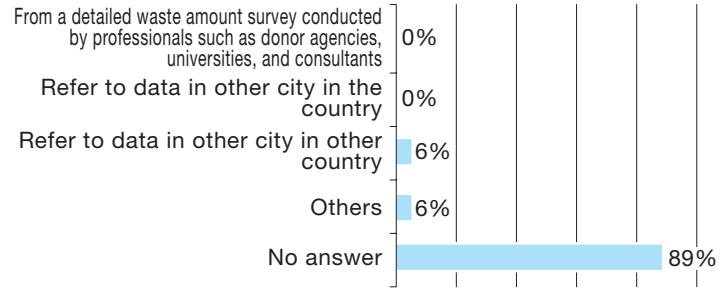
Do you know the waste generation rate in your municipality?

Valid responses: 22



How do you get the waste generation rate?

Valid responses: 18



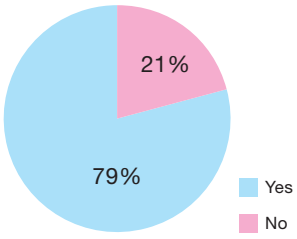
Data on Waste Composition

In response to the question, "Do you know the composition of the municipal solid waste in your municipality?", roughly 79% of the focal points at the city level answered "Yes". This high rate of "Yes" responses indicates that most city solid waste management officials have a certain level of awareness of waste composition in their cities. More than half responded that the source of information was obtained by surveys conducted by donors and external experts.

Meanwhile, nearly half of the focal points were unable to identify the source of the data. This not only raises doubts about the reliability of the data, but also the concern that faulty decisions may be reached if such data is used in policy making and planning.

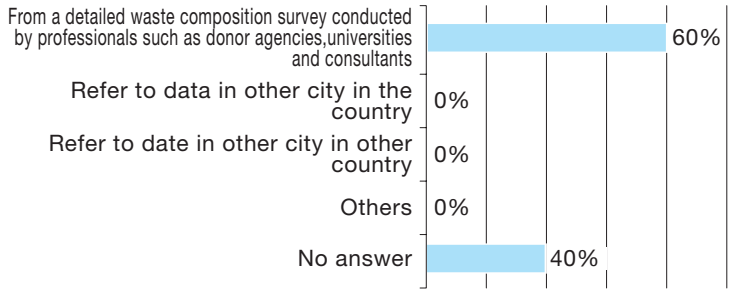
Do you know the composition of the municipal solid waste in your municipality?

Valid responses: 16



How do you get the waste composition data?

Valid responses: 15

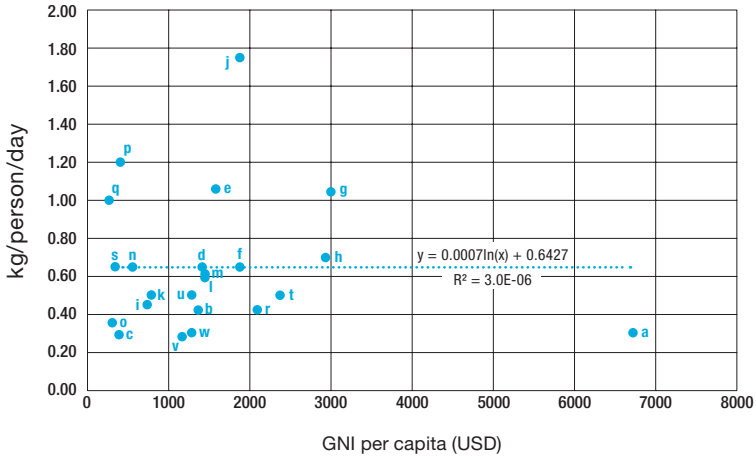


3.1.2 Waste Generation Amount in Africa

- **Data on the amount of waste generated per person was obtained from 23 cities. The average value was 0.6 kg/person/day and the median value 0.55 kg/person/day. There was no apparent correlation between these amounts and the economic levels of the cities. In African countries where GNI per capita falls below USD 3,000, the specific situations of countries or cities may have a larger impact on the amount of waste generated than the slight differences in economic levels.**
- **Globally, waste generation tends to increase as the economy develops. Since Africa is expected to continue seeing economic and population growth, a sharp increase in waste amounts can be projected.**

In the data obtained from 23 cities, the average waste generated per person was 0.6 kg/person/day, with a median value of 0.55 kg/person/day. The plot of the relationship between the waste generated per person and economic level in Figure 3-2 shows no apparent correlation between them. Data from various countries around the world demonstrates a correlation between waste generated per person and economic level. However, in African countries where the GNI per capita falls below USD 3,000, the characteristics of the country/city are assumed to have a larger impact on the amount of waste generated than slight differences in economic levels.

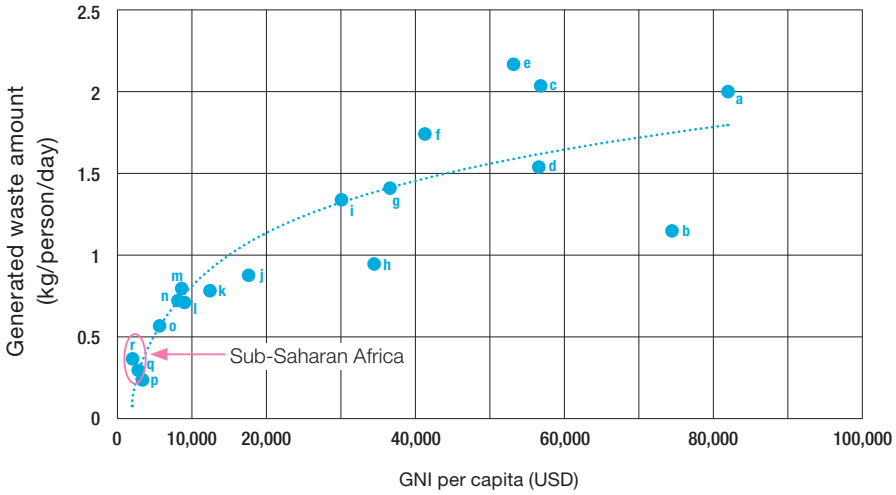
Figure 3-2: Amount of Waste Generated in African Cities as Obtained in this Survey (2018-19)



Cities plotted: **a)** Kweneng (Botswana), **b)** Yaoundé (Cameroon), **c)** Bangui (Central African Republic), **d)** Brazzaville (Congo), **e)** Abidjan (Côte d'Ivoire), **f)** Djibouti (Djibouti), **g)** Alexandria (Egypt), **h)** Mbabane (Eswatini), **i)** Addis Ababa (Ethiopia), **j)** Tema (Ghana), **k)** Conakry (Guinea), **l)** Kiambu (Kenya), **m)** Nairobi (Kenya), **n)** Monrovia (Liberia), **o)** Blantyre (Malawi), **p)** Maputo (Mozambique), **q)** Niamey (Niger), **r)** Abuja (Nigeria), **s)** Juba (South Sudan), **t)** Khartoum (Sudan), **u)** Lusaka (Zambia), **v)** Bulawayo (Zimbabwe), **w)** Harare (Zimbabwe)

Source: City profiles

Figure 3-3: Economic Development and Generated Waste Amount



Sources: GDP per capita is from World Bank, Popular-Indicators. Waste amounts are from OECD and World Bank (2012).
World Bank (https://databank.worldbank.org/data/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators# (last viewed: May 3, 2019)); OECD.Stat (Municipal waste, Generation and Treatment, Municipal waste generated, https://stats.oecd.org/ (last viewed: May 3, 2019)); World Bank (2012) What a Waste, A Global Review of Solid Waste Management
Countries plotted (selected in consideration of economic scale): **a)** Switzerland, **b)** Norway, **c)** USA, **d)** Australia, **e)** Denmark, **f)** Germany, **g)** France, **h)** Japan, **i)** Italy, **j)** Czech Republic, **k)** Poland, **l)** Malaysia, **m)** Mexico, **n)** Brazil, **o)** Thailand, **p)** Indonesia, **q)** Philippines, **r)** Vietnam
The circled Sub-Saharan countries are taken from Figure 3-2.

Figure 3-3 shows the relationship between waste generated per person in countries of varying economic scale and GDP per capita. As the figure shows, generally speaking, waste generated per person rises in accordance with economic development. The rise is dramatic during the initial stage of economic development, particularly until GDP per capita reaches USD 10,000 per person.[1] The rise has plateaued or even declined slightly in some developed countries as their economies have matured, but the GDP per capita of Sub-Saharan African countries falls below USD 1,600 (2017) and the amount of waste generated per person remains at around 0.6 kg/person/day.[2] From this figure, we can predict that the waste generated per person will continue to increase in line with economic growth, and that waste amounts will rise rapidly as a result of increasing population.

3.1.3 Waste Composition in Africa

- **Data on waste composition was obtained from 21 cities. In most cities, organic waste accounts for about half of waste composition. The proportion of paper is lower than in developed countries, while the proportion of plastics differs little from that in high- and middle-income countries.**
- **The proportion of "others" is higher in some cities. The inclusion of sand and fine particles from road cleaning is considered to be the most significant factor explaining this difference.**

Table 3-1 summarises the information obtained from 21 cities on waste composition. About 50% of waste is composed of food waste, just over 10% is plastics, and just under 10% is paper waste. One distinctive characteristic of the waste composition in African cities is that "others" accounts for 20% of the waste. Reports indicate that large volumes of sand and fine particles must be removed by road cleaning in several cities, including Niamey in Niger at the southern edge of Sahara Desert. UN-Habitat (2010)[3] has reported a high proportion of "others" in the waste of Bamako (Mali) and Lusaka (Zambia), where "others" consists mostly of sand and fine particles. Similarly, the World Bank (2018)[4] reported that "a quarter of waste is typically inert waste such as sand and fine particles". The majority of African cities, especially those with low-income populations, have many unpaved roads. This kind of urban infrastructure is thus assumed to be reflected in the proportions of "others" in waste.

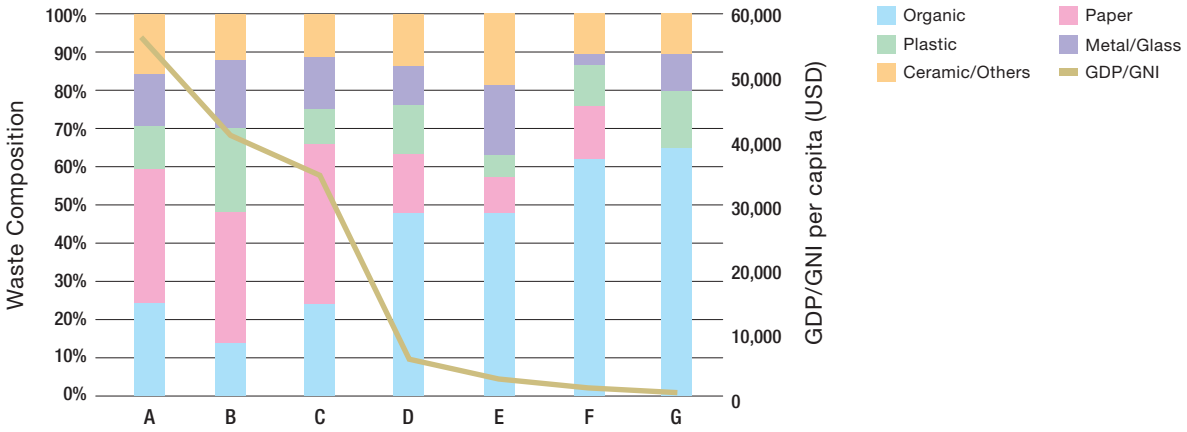
Table 3-1: Waste Composition of African Cities (%)

Country	City	Food	Plastics	Papers	Textile/Wood/ Rubber/Leather	Metal/Glass	Ceramic/Others
Botswana	Kweneng	2	42	31	14	9	2
Burkina Faso	Ouagadougou	22	5	6	0	0	67
Congo	Brazzaville	32	10	7	12	9	30
Côte d'Ivoire	Abidjan	49	8	6	3	4	30
Djibouti	Djibouti	37	6	2	9	16	32
DR Congo	Kinshasa	65	15	0	6	9	5
Egypt	Alexandria	50	7	11	15	18	5
Ethiopia	Addis Ababa	65	5	5	5	3	17
Ghana	Tema	51	26	15	8	0	0
Kenya	Nairobi	62	11	14	0	2	11
Liberia	Monrovia	43	13	10	11	3	21
Madagascar	Antananarivo	85	4	3	5	2	0
Malawi	Blantyre	70	6	4	4	3	13
Mozambique	Maputo	68	10	2	2	5	12
Namibia	Windhoek	19	16	16	5	15	29
Niger	Niamey	31	0	3	1	1	51
Nigeria	Abuja	43	15	8	5	4	24
Nigeria	Kaduna	54	10	8	0	5	0
Sudan	Khartoum	50	13	5	4	13	8
Zambia	Lusaka	50	5	5	0	4	37
Zimbabwe	Bulawayo	38	15	9	5	10	23
Average		47	12	8	5	6	20

Notes: Some cities do not total to 100% as the data from the focal points has been posted as is.
Kweneng (Botswana) has an extremely low percentage of food waste (2%), but the data from the focal point has been posted as is.
Reference: UNEP (2018). p.22: "The average composition of MSW in Africa (sub-Saharan Africa) is about 57 per cent organic, 9 per cent paper/cardboard, 13 per cent plastic, 4 per cent glass, 4 per cent metal and 13 per cent other materials. The higher organic content relative to paper and packaging is typical of MSW in developing countries. However, the composition of MSW in Africa does vary from place to place, depending on consumer attitude, income level, culture, etc."

Figure 3-4 compares the waste composition in different countries at various levels of economic development. Much like developing countries in other parts of the world, the waste of African cities contains a high proportion of organic waste and low proportion of recyclables such as of plastics, papers, metals, and glass. We see a particularly low proportion of paper. While the proportion of plastic in waste in many of the African countries ranges from 10 to 20%, this proportion varies less between cities of different economic levels. UN-Habitat (2010), which surveyed 20 cities at different economic levels in the world, found that plastic accounted for around 10% in all cities, regardless of the economic level.[5]

Figure 3-4: Economic Development and Waste Composition



A America, B Germany, C Japan, D Thailand, E Egypt (Alexandria), F Kenya (Nairobi), G Democratic Republic of the Congo (Kinshasa)

Sources: GDP per capita is from World Bank as of 2015 (https://databank.worldbank.org/data/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators# (last viewed: May 3, 2019)), the data on waste composition is from World Bank (2012) What a Waste - A Global Review of Solid Waste Management; the African data is taken from Table 3-1: Waste Composition of African Cities (%).

3.2 Solid Waste Management Systems

3.2.1 Self-disposal at the Source and Discharge

- **In peri-urban areas with high self-sufficient livelihoods such as harvesting crops and raising livestock, household composting is useful. In fact, composting is the most commonly seen self-disposal method in more than half of the cities that responded to the web questionnaire (60%, 20 valid responses).**
- **Marketable goods from households are mostly handed directly over to recycling businesses. Meanwhile, the introduction of separate collection led by local governments seems to be spreading, as does waste separation at the source.**

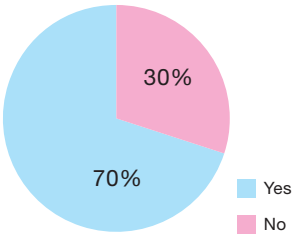
Self-disposal

Waste reduction at the source is being seen in many cities (70%, 20 valid responses). This includes giving marketable goods directly to recycling businesses, composting organic waste, and using waste in livestock feed. The open burning of waste is also commonly practised.

Many people living in peri-urban areas have migrated in from rural areas and live self-sufficient lifestyles, typically by harvesting crops or raising livestock. Household composting is recommended for such areas.

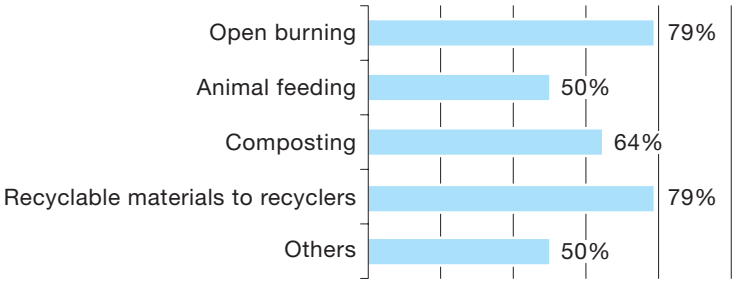
Are self-disposal activities performed at houses and elsewhere?

Valid responses: 20



What is practised?

Valid responses: 20



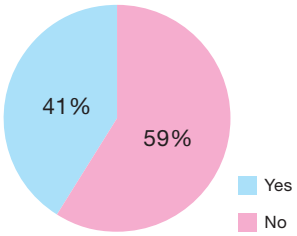
Waste separation at source

Sorting is at the foundation of recycling. Regulatory systems, for example, have been enforced in Japan and other European countries over the past 30 years. Environmental education in schools and public-led and private-led awareness campaigns have facilitated the establishment of the regular practice of separating waste in the country.

In contrast, recycling in developing countries is carried out based on financial incentives. In many cases, waste that contains marketable goods will be collected by a recycling business for profit. In light of these circumstances, the need to introduce separated waste collection, a process that increases collection costs, is not necessarily high if the existing direct-collection systems, both formal and informal, are already functioning at a certain level. For this reason, waste separation by citizens is seen in few cities and countries. Yet in response to the question, 41% of the cities that responded to the web questionnaire indicated that they have introduced separated waste collection. These users are assumed to be separating waste in conformance with their separated waste collection systems.

Is separate collection practised?

Valid responses: 22



3.2.2 Collection and Transport

- The collection rate in Africa is estimated to stand at around 50% on average, but this varies between countries, cities, and even within cities. Note also that only a limited number of cities know their collection rates based on quantitative data.
- All of the cities send out crews to clean public areas. Many of these cities collect at least three times a week in the city centres and at least once a week in residential areas.
- Most cities have indicated that they know the amounts collected and numbers of people benefiting from collection services, but the accuracy of the data is questionable.
- Some cities have set up large numbers of small-scale transfer stations for primary collection performed manually or by donkey.
- In many cities, the operating rate of collection equipment is roughly 50%.

Collection rate

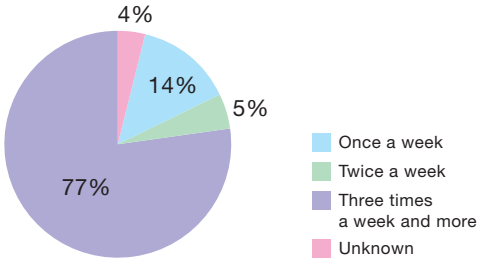
Waste collection is not sufficiently carried out in most African cities. Generally speaking, the collection rate is higher in high-income countries and lower in low-income countries. While the waste collection rate is at least 90% in North America, it is reportedly only 44% in Sub-Saharan Africa.[6] In data obtained on 11 cities, the collection rates range from 14 to 100% and average 52%.

Another problem is the variation in collection rates between the different parts of a city. According to the World Bank (2018), "although the collection rate in low-income countries is 48%, it falls to 26% in suburban areas".[7] Wilson et al. (2013) also reported that "Within many cities, the central business district and affluent neighbourhoods have near 100% coverage, while low-income and illegal settlements often have none. This clear gap in the performance of the least developed cities means that improving collection must still be their first priority, together with water and sanitation, if public health is to be protected".[8]

Even among ACCP member cities, 65% of the areas in the city of Brazzaville (Congo) are inaccessible by vehicle. As mentioned above, Windhoek (Namibia) also has areas where no collection service is provided. Depending on the climate and such, uncollected food waste is likely to rot and emit offensive odour. While self-disposal via composting and burying is possible in areas where land is available, dense residential areas are likely to resort to open burning or illegal dumping. As described later in this book, measures should be taken to improve collection frequency and collection rates uniformly throughout entire cities regardless of the limitations in equipment and human resource structures.

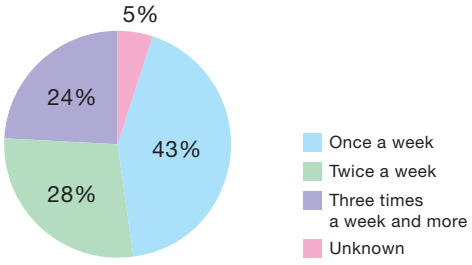
How often do you collect waste in the city centre?

Valid responses: 22



How often do you collect waste in residential areas?

Valid responses: 21



Collection and transport equipment

One cause of low collection rates and irregular collection service is the general lack of collection and transport equipment. With regard to individual equipment conditions, waste in developing countries contains more organic waste than waste in developed countries, which translates into a higher water content. Due to the heavy specific gravity, the types of waste compactor vehicles typically used in developed countries are unable to function effectively in developing countries. Oftentimes upwards of half of the equipment on hand in a city is non-operational because of maintenance difficulties. These difficulties include a lack of technical capacity, complicated mechanisms within the equipment, and a lack of the time or budget needed to import parts.[9]

The cities that provided information also reported that their collection and transport equipment were only about 50% operational, largely due to inadequate maintenance and shortages of spare parts.

Outfitting and Establishing a Maintenance System in Khartoum State, Sudan

In Khartoum, the capital city of Sudan, waste collection services have been unable to keep up with the rapid surge in the urban population, resulting in concern over unsanitary living conditions.

JICA procured 98 collection/transport vehicles and heavy equipment for final disposal through a grant aid project. Also, JICA conducted a technical cooperation project from 2014 to 2017 in order to improve the solid waste management from collection/transport to final disposal.

The improper use and insufficient maintenance of collection vehicles and disposal equipment is likely to accelerate the failure and deterioration of the equipment, thereby impeding waste management efforts. In the above project, a system for the proper use and maintenance of equipment was established by building a workshop for regular maintenance, providing mechanic training, and conducting daily inspections and safe driving training for the drivers of collection vehicles.

Workshop

Regular maintenance being conducted on a collection vehicle

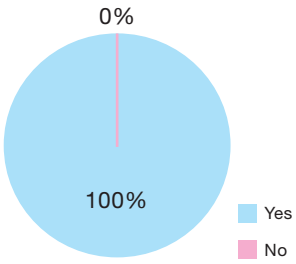
Cleaning of public areas

Every city that responded to the web questionnaire indicated that it is cleaning public areas in an effort to maintain the city's aesthetics and sanitation. While most intensive around city centres and parks, the cleaning works extend to residential areas in about half of the cities. In some cities such as Niamey and Kinshasa, public organisations and NGOs are deploying clean-up activities as a job creation initiative for the impoverished.

Waste in roads and other public areas is often mixed with sand and fine particles. In Niamey, public area cleaning costs have reportedly ballooned to 60% of the collection service costs, largely for the removal of these large amounts of sand debris.

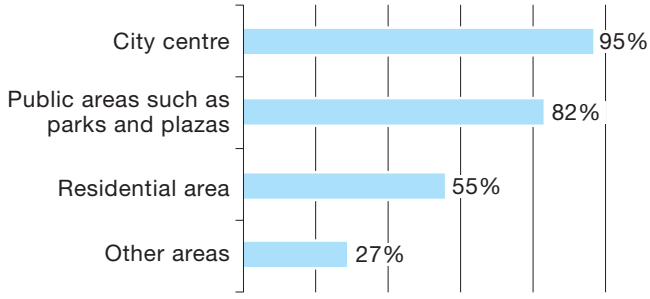
Are the public areas cleaned in your municipality?

Valid responses: 22



Places where public areas are cleaned

Valid responses: 22



Transfer points

Roughly one in three survey takers responded "Yes" to the question, "Are there waste transfer stations?" Transfer stations can be categorised into two types: large-scale facilities that handle large volumes of waste, and small-scale facilities called transfer points.

Large-scale transfer stations are designed to reduce costs by improving collection and transport efficiency. Waste collected by waste compactor vehicles is transferred to large trailers for transport over long distances to disposal sites, etc.

In some cases, a transfer point is simply a container. Waste collection is often performed by wheelbarrow or donkey cart in African cities. Although these methods allow for thorough waste collection, they are not capable of long distance transport. In some cases, therefore, systems have been adopted in which transfer points are set up, primary collection is performed by wheelbarrow or donkey cart, and waste is later collected by vehicle (secondary collection or transport).

Transfer points or containers enable flexible primary collection. They can easily become a nuisance in a city, however, if not managed properly. Waste may pile up or scatter around an area when pickup is delayed, adversely affecting both the environment and sanitation.

A transfer point inundated by waste
(Kinshasa, October 2017)

Wheelbarrow used for primary collection
(Kinshasa, October 2017)

3.2.3 Intermediate Treatment

- More than half of the cities that responded to the web questionnaire (58%, 19 valid responses) answered that they possess recycling facilities. The primary facilities are Materials Recovery Facilities (MRF) and composting facilities. This indicates that major cities are beginning to promote recycling.
- Nevertheless, none of the respondents indicated that they engage in energy recycling processes such as the capture of methane gas from the anaerobic decomposition of organic waste, the capture of methane gas at disposal sites, or the reduction of waste plastic into oil.

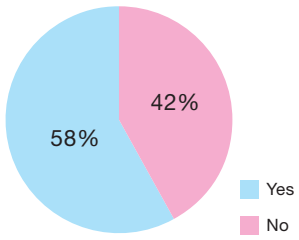
Material recycling

According to UNEP (2018), "The African Union has called on African cities to commit to recycling at least 50 per cent of the municipal waste they generate by 2023 and to grow municipal waste recycling industries."[10] The same book also describes a lack of knowledge about waste recycling and associated opportunities: "In general, waste recycling is not a priority for most municipalities. The average MSW recycling rate in Africa is estimated at only 4 per cent. Recycling is commonly done by waste recycling businesses, supported by a large, and active, informal sector that includes itinerant buyers and waste pickers."[11]

Although the recycling rate is only 4% in African countries, roughly 60% of the 19 cities (11 cities) that responded to the web questionnaire indicated that they have recycling facilities. The primary facilities are MRF and composting facilities. This indicates that major cities are beginning to promote recycling. One response indicated the existence of incineration facilities, but these facilities are dedicated to the disposal of medical waste.

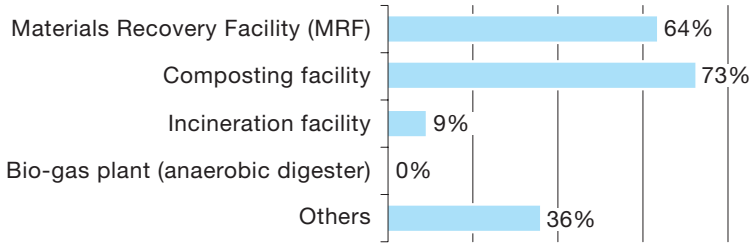
Are there recycling/treatment facilities in your municipality?

Valid responses: 19



What type of recycling facilities?

Valid responses: 11



Energy recycling

In addition to the recycling of materials such as plastics, paper, and metals, heat or electricity can be obtained from waste through a process of energy recycling. Although not found among ACCP member cities, energy recycling includes the capture and utilisation of methane gas from the anaerobic decomposition of organic waste, the capture and utilisation of methane gas at disposal sites, and the reduction of waste plastic into oil.

For the many cities in Africa that have not yet been able to solve open dumping problems (see Chapter 2), energy recycling is a high hurdle in terms of both technology and cost. Many of the cities are nonetheless conducting feasibility studies on Waste-to-energy (WtE), a technology that would be especially difficult for them to apply on a practical basis. Nairobi is one of those cities. Given the high proportion of organic materials it contains, African waste is poorly suited to WtE. Even if the waste could be used to generate enough electricity to sell, renewable energies such as sunlight and wind power pose stiff competition. WtE is generally regarded as the most expensive technology for either disposing of waste or generating electricity.[12]

Mechanical and Biological Treatment (MBT)

MBT is a technology used mainly in Europe that applies mechanical and biological treatment methods to reduce the amounts of hazardous waste and the amounts of mixed municipal waste not collected separately as resources. In the usual process, mixed waste is first mechanically crushed and sorted, whereupon the plastics, metals, etc. are removed. The residue, which mostly consists of organic matter, is then injected into biological processes such as aerobic stabilisation, drying, or methane fermentation. The stabilised or dried residue, which is rich in combustibles such as wood waste, fibres, and plastics, is used as fuel in energy recovery facilities.[13] MBT is accordingly known as both a material recycling technology and energy recycling technology.

Although MBT is a well-established technology, it was developed in Europe, where the waste tends to have a relatively low moisture content and energy recovery facilities to support the technology are in place. Many MBT implementations in Egypt are likely to provide a point of reference for other countries in Africa that seek to apply the technology.

3.2.4 Final Disposal

- **Even large cities with major economies and populations tend not to incorporate multiple disposal sites. If a disposal site becomes completely unusable for any reason, there is a risk that waste trapped in the city will harm the health of the citizens, compromise the city aesthetically, and impose tremendous adverse impacts on the country's socio-economic situation.**
- **Among countries with GNI per capita under USD 3,000, there seems to be no correlation between the type of disposal site (open dump, controlled disposal site, sanitary landfill) and economic level. The existence of international intervention seems to be a more significant factor than the economic level.**
- **While some cities are degrading the surrounding environment by using open dumps, there is a trend underway of introducing sanitary landfills. There is room for improvement, however, in the operation of these landfills.**

The cities currently participating in ACCP are mostly the capital cities or major cities of equivalent scale, and hold large populations. Still, most of the cities have only one disposal site. According to questionnaire responses, only three cities have multiple disposal sites: Khartoum (Sudan), Kiambu (Kenya) and Harare (Zimbabwe). If a disposal site becomes completely unusable for any reason, there is risk that waste trapped in the city will harm the health of the citizens, compromise the aesthetics of the city, and impose tremendous negative impacts on the country's socio-economic situation.

Table 3-2 shows the development states of disposal sites and economic levels of the ACCP member cities where they are located. Types or categories of disposal sites are as follows: sites with impermeable bottom liners are categorised as 'sanitary landfill'; sites with no impermeable liners but some kind of environmental protection facilities are categorised as 'controlled'; and sites with no environmental protection facilities are categorised as 'open dump'. Although only three countries have a GNI per capita of over USD 3,000, all of the cities are regarded to properly operate sanitary landfills, taking all due steps to compact the waste and cover it with soil. Besides these, there is no clear correlation between the economic level and development state of disposal sites. International cooperation seems to be a more significant factor than the economic level. The European Union, for example, is providing support in Kinshasa (Democratic Republic of the Congo), while the African Development Bank is providing support in Ouagadougou (Burkina Faso).

In a few cities such as Nairobi (Kenya) and Blantyre (Malawi), there are concerns that the open dumps are degrading the surrounding environments with offensive odours, leachate, and scattered dust. The responses indicate that about 12 cities, including Kweneng (Botswana) and Ouagadougou (Burkina Faso), continue to introduce sanitary landfills with impermeable liners underneath. Yet even at the sanitary landfills, it remains open to question whether the sites are being operated properly. A field survey conducted in 2019 in Kinshasa (Democratic Republic of the Congo), for example, found overflowing waste in the landfill area and no appropriate soil-covering operations underway. Conditions such as these make it difficult to call these sites "sanitary landfills".

Table 3-2: Development State of Disposal Sites and Economic Levels

Country	City	GNI per capita	Type of landfill	Type of operation
Malawi	Blantyre	320	Controlled	-
Niger	Niamey	360	Open dump	-
Central African Republic	Bangui	390	-	-
South Sudan	Juba	390	Controlled	Soil cover
Madagascar	Antananarivo	400	Controlled	Compaction
Mozambique	Maputo	420	Sanitary landfill	Compaction
DR Congo	Kinshasa	460	Sanitary landfill	Compaction
Burkina Faso	Ouagadougou	590	Sanitary landfill	Compaction
Liberia	Monrovia	620	Sanitary landfill	Soil cover
Ethiopia	Addis Ababa	740	Open dump	Compaction
Guinea	Conakry	790	Open dump	-
Zimbabwe	Harare	1170	Controlled	Soil cover
Lesotho	Maseru	1210	Open dump	-
Zambia	Lusaka	1290	Sanitary landfill	Compaction
Zimbabwe	Bulawayo	1290	Sanitary landfill	Soil cover
Cameroon	Yaoundé	1370	Sanitary landfill	Compaction
Congo	Brazzaville	1430	Open dump	-
Kenya	Kiambu	1460	Open dump	Compaction
Kenya	Nairobi	1460	Open dump	-
Côte d'Ivoire	Abidjan	1580	-	-
Djibouti	Djibouti	1880	Sanitary landfill	Compaction
Ghana	Tema	1880	Sanitary landfill	Soil cover
Nigeria	Abuja	2100	Controlled	Compaction
Nigeria	Kaduna	2100	Open dump	-
Sudan	Khartoum	2380	Open dump	Soil cover
Eswatini	Mbabane	2950	-	-
Egypt	Alexandria	3010	Sanitary landfill	Soil cover
Namibia	Windhoek	4570	Sanitary landfill	Soil cover
Botswana	Kweneng	6730	Sanitary landfill	Soil cover

Notes: The GNI per capita comes from the World Bank, Atlas method (2017 value in current USD).
"-" indicates no information.

Gradual Improvement of Final Disposal Sites

It is technically and financially difficult for cities in developing countries to make the leap from open dumps to sanitary landfills. The more realistic method is to apply gradual improvements. Standardising phased-in landfill improvements and making the benefits of environmental improvement visible help to open up the possibility of mobilising domestic and foreign funding.

Since the late 1980s, JICA has been proposing a phased-in classification of disposal sites and providing technical cooperation for phased-in development of a type appropriate to the circumstances of developing countries. UNEP also categorises disposal sites under a similar concept. The definitions used by JICA and UNEP are shown below.

Phased-in classification of disposal sites by JICA[14]

Level 0: Open dump
Level 1: Controlled tipping
Level 2: Sanitary landfill with a bund and daily soil
Level 3: Sanitary landfill with leachate recirculation system
Level 4: Sanitary landfill with leachate treatment facilities

Definitions of terms used by UNEP in the Africa Waste Management Outlook[15]

Fly-tipping or "indiscriminate" dumping	Open or uncontrolled dumping	Controlled disposal	Sanitary engineered landfilling
Waste is deliberately, often illegally, dumped in open spaces in cities, towns, rural areas or rivers	Waste is indiscriminately deposited at a designated site with either no, or at best very limited measures to control the operation and to protect the surrounding environment	Waste is deposited at a designated site, which has access control, cover and compaction, but no liners, leachate collection systems, etc.	Waste is deposited in an engineered, controlled facility, designed and operated to minimise impacts. Includes, e.g. liners, leachate collection systems, and landfill gas recovery
(Lower) Progression in the management of waste (Higher)			

3.2.5 Hazardous Waste Management

According to UNEP (2013), "Potentially hazardous chemicals prevalent in Africa are agrochemicals, mercury, and persistent organic pollutants (POPs), while chemical stockpile, e-waste, and petroleum waste streams are proving to be increasingly problematic in many countries in the region."[16]

Health care risk waste (HCRW) is one of the hazardous wastes that often gets mixed in with municipal waste. According to UNEP (2018), "Health care waste management is of particular importance because of the dire and wider impacts it can have if not managed properly. Most African countries have ratified the Stockholm, Basel, and Rotterdam conventions and are committed to ensuring proper treatment and disposal of health care waste and other hazardous waste. However, health care waste management facilities in many African countries are inadequate, with sub-standard treatment and disposal."[17]

In some ACCP member countries, national agencies such as the health ministries are responsible for the treatment of medical waste (i.e. Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Madagascar, Malawi, Mozambique, Zambia, etc.). Kweneng (Botswana) and Mbabane (Eswatini) incinerate their medical waste.

Electrical and electronic equipment waste also contains heavy metals and other harmful substances. According to the UNEP (2018), "about 2.2 million tons of e-waste was generated in Africa in 2016. […] The quantity of e-waste is increasing rapidly in Africa owing to increases in electrical and electronic equipment (EEE) demand and supply."[18]

3.3 Solid Waste Management Legislation and Governance

- Of the 25 countries from which information was obtained, 16 (64%) have established basic laws on municipal solid waste management that clearly define municipal solid waste and the responsibilities of interested parties. However, due to budgetary constraints and insufficient understanding by relevant parties, it is difficult to say that the legislation is being enforced properly.
- The establishment of laws for hazardous waste, industrial waste, and medical waste is in process. Very few countries have established laws regarding renewable energy (including recycling and waste-to-energy (WtE)). In addition, a growing number of countries have moved to legislate plastic regulations in recent years.
- In nearly all countries that responded to the web questionnaire (96%, 25 valid responses), the central government provides the local governments with support in the form of technical assistance, etc. for the enforcement of laws. Some of those countries are providing budget support. In many of the countries, the central government is also monitoring and evaluating the status of law enforcement reflecting the results in the budgets, activity plans, and the like for the following year.
- Many cities that responded to the web questionnaire (68%, 22 valid responses) have established individual local ordinances for solid waste management. It will be important not only to establish legislation and governance at the national level, but also local legislation (ordinances, etc.) at the city level to reflect the cities' individual circumstances in actual solid waste management, as well as effective systems for implementing the legislation.
- Many countries that responded to the web questionnaire (71%, 24 valid responses) have systems by which the central government gathers waste data from local governments. Many of the cities, however, are not equipped with scales, hence the data they provide is likely to be unreliable.

Establishing laws for municipal solid waste

Laws for municipal solid waste have been established in pursuit of the public health of the citizens as a primary goal. Nowadays, moreover, particularly in developed countries, the laws correspond to a solid waste management hierarchy that proceeds from controlling the generation of waste to the reuse, recycling, and disposal of the waste. These basic laws that cover all aspects of solid waste management are generally used to establish individual laws that target containers and packaging, waste electrical and electronic equipment, and the like, and local ordinances by local governments for providing solid waste services and penalties and fines for illegal dumping and the like.

Of the 25 countries that responded to the web questionnaire, 16 (64%) indicated that they have national basic laws on municipal solid waste management. Nearly all of these laws clearly define municipal solid waste and the responsibilities of interested parties. Some responses, however, indicate that budget shortfalls and insufficient understanding among the relevant people and organisations hinder the proper enforcement of the legislation: e.g. Ghana, "The legal framework related to SWM seems to have been well established but poorly implemented due to a lack of appropriate budget"; Malawi, "The law is not implemented well due to a lack of understanding among stakeholders, lack of specialised facilities, inadequate expertise, and lack of appropriate budget allocation"; Mozambique, "Though the legal framework related to SWM seems to be thoroughly established, a lack of understanding among stakeholders and shortfalls in budget hinder implementation."

Although many laws related to solid waste and other aspects of the environment have been established in Africa, it has been pointed out that the laws often function ineffectively due to a lack of institutional capacity for monitoring, evaluation, and other elements.[19] It remains unclear how the African solid waste management authorities can increase their capacities with their limited human and financial resources, and how the effectiveness of their laws can be ensured.

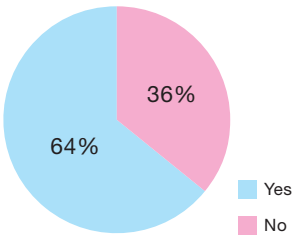
Establishing laws for other waste

In addition to municipal solid waste, ACCP member countries are proceeding with the establishment of laws for hazardous waste, industrial waste, and medical waste. Several countries have laws for construction waste. The relatively smaller number of countries that responded to the questions on this topic (18 countries) can probably be explained by the fact that waste other than municipal solid waste is outside the scope of the affiliate organisations of the focal points. For example, the health ministries in Egypt, South Africa, and Zambia have jurisdiction over medical waste. Cameroon, Ghana, Mauritius, Namibia, South Africa, and Zambia indicated that they have laws related to recycling. Côte d'Ivoire, Madagascar, and Namibia indicated that they have laws related to renewable energy. Thus, very few countries have established laws regarding recycling and renewable energy. This dearth of laws in recycling and renewable energy probably reflects that the needs in these areas have yet to increase in African countries.

Conversely, the number of countries restricting single-use plastic has increased in recent years. In the web questionnaire, 10 countries indicated that they have laws that restrict plastic. According to UNEP (2018), 30 African countries are enforcing or have approved such legislation.[20]

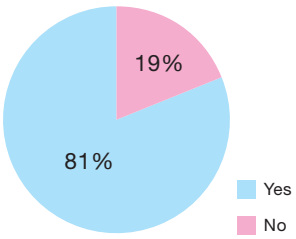
Is there a national basic law on municipal solid waste management?

Valid responses: 25



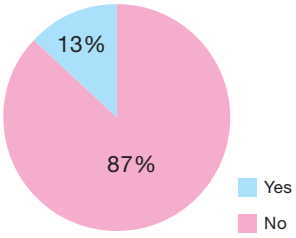
Does the law clearly define responsibilities of stakeholders?

Valid responses: 16



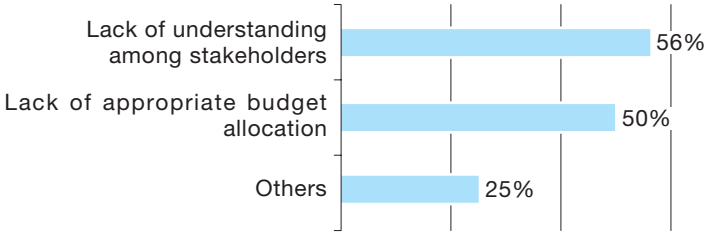
Is the law appropriately implemented?

Valid responses: 16



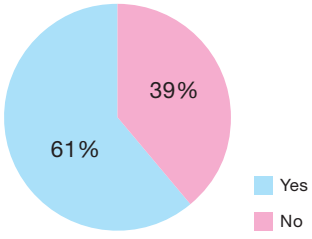
For what reason(s)?

Valid responses: 16



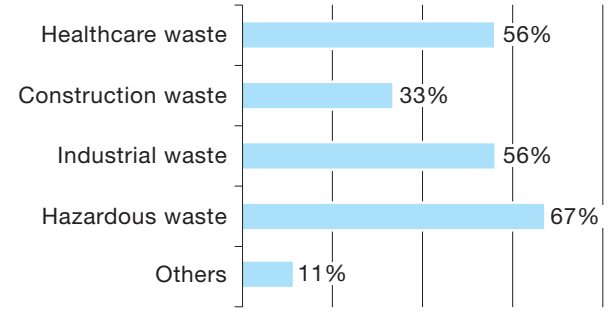
Is(are) there law(s) on management of other waste(s)?

Valid responses: 18



For which type of waste?

Valid responses: 18

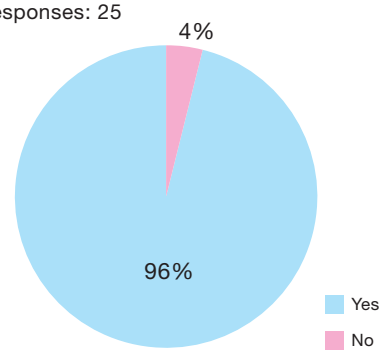


Supervision of local governments regarding the enforcement of laws

Nearly all government agencies in charge of solid waste management at the country level indicated that they communicate with local governments and provide technical assistance and budget support regarding the enforcement of laws. In addition, most countries indicated that the status of law enforcement is monitored and evaluated through the dispatch of officers from central government and reviews of reports by local governments and other documents. These results are reflected in the budgets and activity plans of the following year and in the steps taken to improve the local governments' methods of instruction. Yet as explained in the previous section, some responses indicated that the legislation exists but is not necessarily being enforced properly. This insufficient enforcement points to the need to fully understand the actual effectiveness of the central governments' guidance and supervision over the local governments.

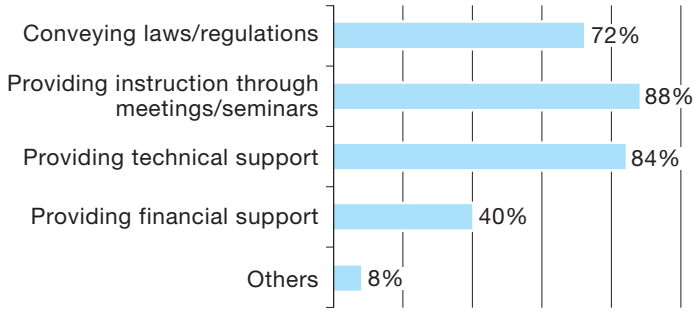
Do you communicate with local governments for implementing laws/ regulations?

Valid responses: 25



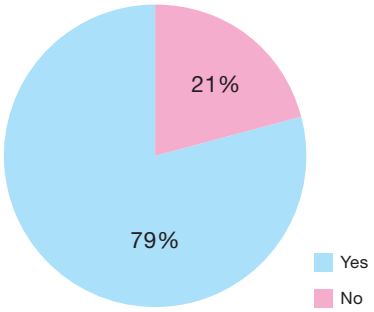
How do you communicate?

Valid responses: 25



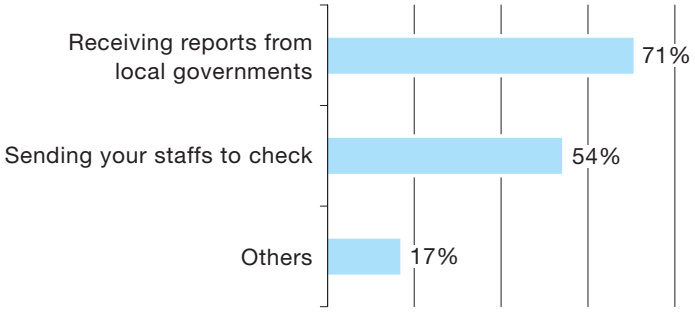
Do you monitor/evaluate the implementation of laws/regulations in cities?

Valid responses: 24



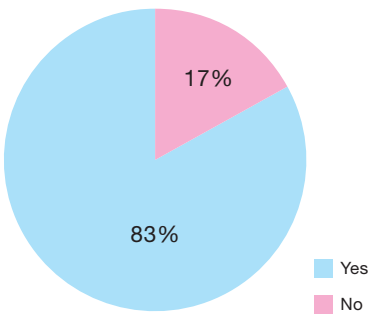
How do you monitor/evaluate?

Valid responses: 24



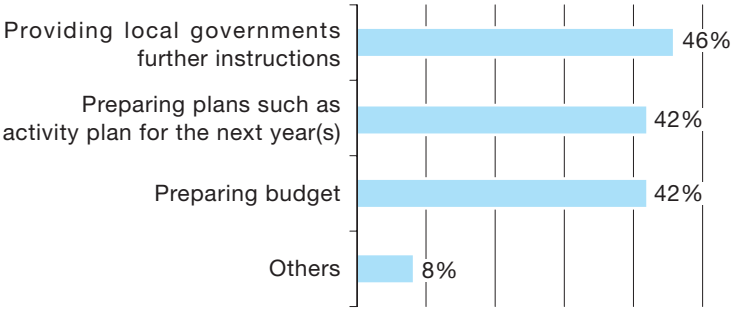
Do you use the results of the monitoring/evaluation of the enforcement of the laws in any way?

Valid responses: 24



What do you use the results for?

Valid responses: 24



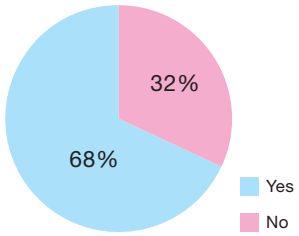
Establishment of local ordinances regarding waste

Among the 22 cities that responded to the web questionnaire, 68% (15 cities) indicated that they have established local ordinances for solid waste management.

It will be important to establish not only legislation and governance at the national level, but also local ordinances for cities that reflect their individual circumstances, as well as effective systems for implementing the legislation. Cities that have not established their own local ordinances and face challenges in applying national-level laws are advised to establish their own local ordinances.

Does your municipality have a code/regulation on municipal solid waste management?

Valid responses: 22



Gathering and managing data about waste

In solid waste management, data is undoubtedly important for making decisions, planning, and conducting evaluations properly. It can be difficult, however, to obtain reliable waste data, particularly in Africa.

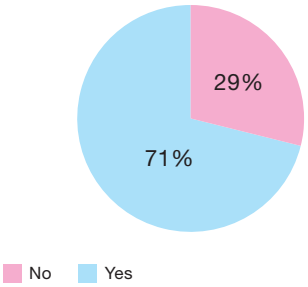
In many countries that responded to the web questionnaire (71%, 24 valid responses), the central governments have systems for gathering waste data from local governments for the purpose of formulating action plans and budget plans for the following fiscal year. Roughly one in four countries (Egypt, Mauritius, Mozambique, Senegal, and Zimbabwe) indicated that their systems cover not just their capital cities, but cities throughout their countries. Regarding the frequency, a majority of those countries indicated that they gather data at least once per year. The main data comprises the volumes of waste generated, collected, and disposed. Of the 22 cities that responded to the web questionnaire, however, only half (11 cities) indicated that they have scales at disposal sites. Given the lack of scales in many of the cities, the data provided may not be highly reliable. Some of the cities not outfitted with scales, however, estimate the volumes using the number of collection truck trips (according to interviews with Addis Ababa, and the like). This type of data management effort will eventually contribute to proper solid waste management. Information on waste generation, collection, recycling, treatment, and disposal is collected in many cities in South Africa. The South African Waste Information Centre website[21] provides access to information related to SWM in South Africa, including data collected from local governments and the private sector.

Developed countries have established methods of estimating volumes of municipal solid waste generated in line with various methodologies that correspond to the development of solid waste management systems and the organisation of socioeconomic data such as population. Each country's methods are based on long-term trial and error, and thus are different. Many cities in Africa are in the process of organising solid waste management data acquired from cities in developed countries. As demonstrated in Section 3.1: Waste Generation and Composition, the calculation and estimation processes can be confounded by the various limitations African cities face in organising waste data. In some cases the base units of waste generation volumes are determined by unknown sources, while in others workplace statistics are unavailable or influxes of people in the ongoing process of urbanisation change the demographics of a city.

However, the effective use of experience, IT technology, and other proven tools in developed countries can enable African cities to organise solid waste management data rapidly and at lower cost. For example, exploratory efforts are being made to develop methods of systematically estimating volumes of waste in relation to the indicators of SDG Target 11.6. The establishment and diffusion of these systematic methods may contribute to the improvement of solid waste management in many African cities.

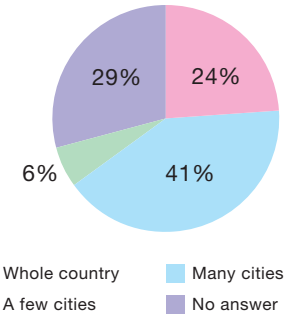
Do you have established systems/procedures for the collection of SWM data from local governments?

Valid responses: 24



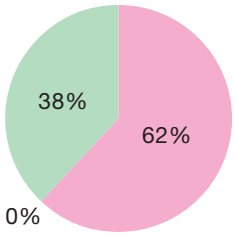
Coverage of data collection system

Valid responses: 17



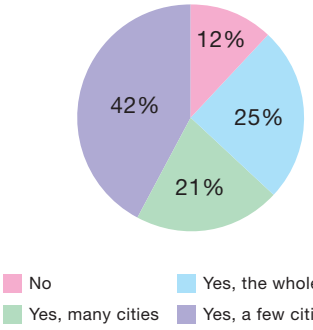
How often do you collect the SWM data?

Valid responses: 21



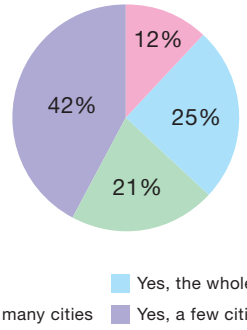
Amount of waste generated

Valid responses: 24



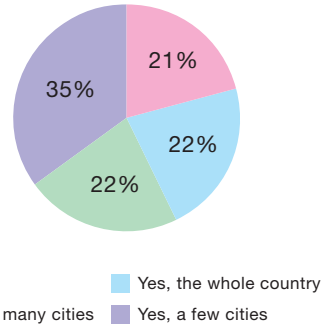
Amount of waste collected

Valid responses: 24



Amount of waste disposed of

Valid responses: 23



Data on waste of countries around the world

Nowadays, waste data for many countries can be accessed through various websites. The main institutions that provide such data are listed below (with their URLs).

- EU, eurostat: https://ec.europa.eu/eurostat/data/database
- OECD, OECD.Stat: https://stats.oecd.org/
- UNSD, Environment Statistics: https://unstats.un.org/unsd/envstats/country_files
- Bank, What a Waste 2.0: http://datatopics.worldbank.org/what-a-waste/

Beware that there is no unified definition and standard for waste data. Therefore, the meaning of the data may differ between these resources, even when comparing the same countries.

The sites listed above were accessed for the last time on: 8 August 2019

3.4 Organisations and Personnel Implementing Solid Waste Management

- In more than half of the countries that responded to the web questionnaire (64%, 25 valid responses), the control of solid waste management falls to the environmental ministries, the bodies mainly responsible for handling environmental issues. In some countries, the control of solid waste management falls to local government offices, public works, and utilities ministries, and others.
- In roughly half of the central governments that responded to the web questionnaire (46%, 25 valid responses), the departments in charge of solid waste management have fewer than 10 staff members (these are small-scale departments). Staff members include people who have studied solid waste management or related subjects at universities.
- Nearly all organisations that engage focal points at the city-level and responded to the web questionnaire (95%, 22 valid responses) directly provide solid waste services and employ many staff members. Over 60% of them are engaged in operations.

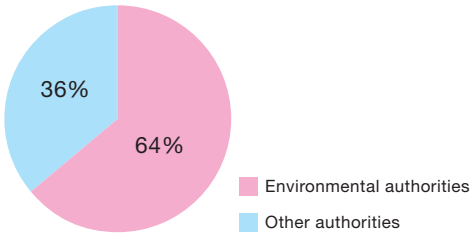
Countries and central governments

Supervising government offices

The central government offices that supervise solid waste management differ from country to country. Their jurisdiction also differs depending on the type of waste. Because local governments bear most of the responsibility for municipal solid waste in many countries, government offices known as ministries of home affairs supervise the local governments in some of the countries. There are also cases where responsibilities are divided for waste disposal that requires special considerations (for example, environmental ministries for hazardous waste and health ministries for medical waste).

To which organisation do you belong?

Valid response: 25



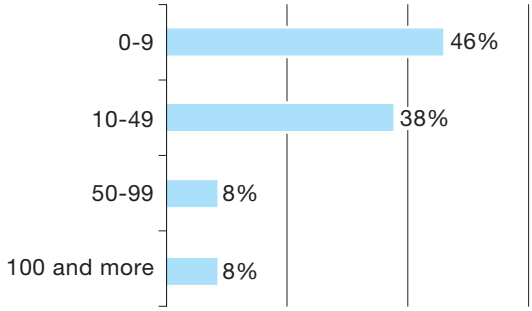
In more than half of the 25 countries that responded to the web questionnaire, the entities that handle environmental issues, such as the environment ministries, are in charge of solid waste management. In other countries, solid waste management is controlled by local government ministries, public works and utilities ministries, and the like. In most of those latter cases, the entities control not only solid waste management, but also health and sanitation, residential and urban development, pollution control, and more. In addition, the collaborating government offices in many countries include health ministries and local government ministries. Angola and Egypt have established specialised agencies for solid waste management. In Egypt, an integrated solid waste management function is headed by The Solid Waste Management Regulatory Agency under the country's Ministry of Environment. This Agency manages all types of solid waste, including municipal solid waste. The Agency is responsible for communicating with the local governments and supporting the implementation of laws and regulations by providing technical and financial support. A SWM unit is now being established in each local government as a counterpart institution of the Agency.

Staff members

Although there are some exceptions, there are fewer staff members responsible for solid waste management in the central government departments than in the local governments. Nearly all organisations have fewer than 50 staff members, and half of them have fewer than 10. In addition, 24 of the 25 countries that responded to the web questionnaire indicated that the staff members include people who studied solid waste management or related subjects at universities. Although a good number of countries offer opportunities to study solid waste management in some form or another, issues were noted in the development of programmes focusing on solid waste management.

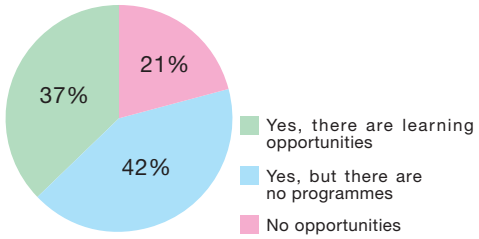
What is the total number of staff members in the department or section in charge of SWM?

Valid responses: 24



Are there opportunities to learn about SWM?

Valid responses: 19



The Need for an Interdisciplinary Approach to Solid Waste Management

In the past, solid waste management issues were often discussed in terms of technical systems for storage, collection, transport, treatment, and disposal from the perspective of treating waste. Nowadays, however, solid waste management is discussed as a broader concept in terms of economics, systems, and culture, more than the technology itself.

George Tchobanoglous and others explained that "Solid waste management is a field of study that strives to limit the generation of, store, collect, relay and transport, treat, and dispose of waste using optimal methods in terms of public health, economics, engineering, aesthetics, and the environment. Its scope includes business management, finance, law, planning, engineering, and all other fields required for addressing issues, and in the course of resolving issues, it is necessary to take an interdisciplinary approach that spans the fields of political sciences, urban and regional planning, geography, economics, public health, sociology, demography, information engineering, engineering, material engineering, and more."[22] This suggests that cooperation from knowledgeable people from various sectors, and an understanding of different fields by each person to enable cooperation, are important for the realisation of proper solid waste management.

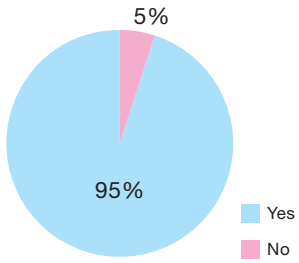
Cities and local governments

In many countries, responsibilities related to providing solid waste services fall to local governments. The organisations in charge of waste in each city provide services either directly or through contracts with private entities.

In nearly all cities that responded to the web questionnaire (95%, 22 valid responses), the cleaning authorities provide solid waste management services directly, mainly operating the services of waste collection, the cleaning of public areas, and waste disposal. The cleaning authorities employ large numbers of cleaning workers, drivers of collection vehicles, and others to manage their operations. Over 60% of their employees engage in cleaning operations in the field.

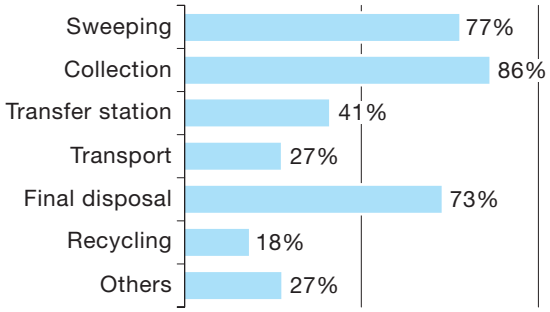
Does your department/section provide SWM services directly?

Valid responses: 22



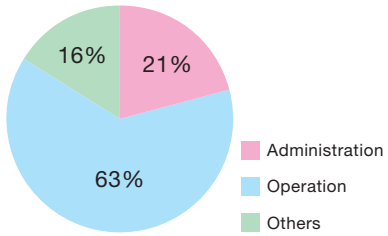
What types of solid waste management services are operated?

Valid responses: 22



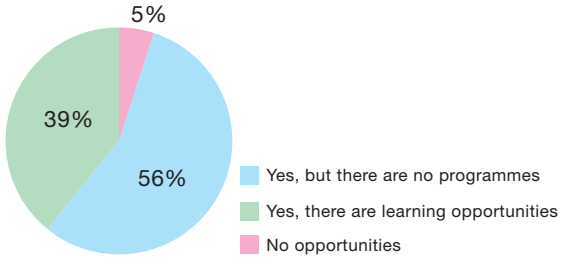
What is the distribution of staff members in your department?

Valid responses: 22



Does your organisation provide opportunities for you to deepen your knowledge of SWM?

Valid responses: 22



3.5 Financial Management of Solid Waste Management

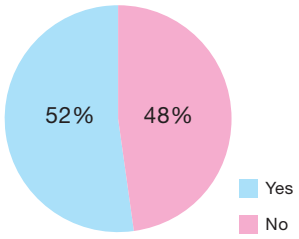
- Roughly half of the countries that responded to the web questionnaire (52%, 21 valid responses) have financing systems for solid waste management such as national budgets, taxes for waste, and subsidies for local governments.
- Introducing taxes for waste at a central level can mitigate the restricting factor of budget shortfalls, thereby facilitating the proper enforcement of laws.
- Cities that responded to the web questionnaire understand information related to expenditures to a certain extent (76%, 17 valid responses), but few of them fully understand the expenses for waste per unit of weight, one of the most important pieces of data for solid waste management (28%, 18 valid responses).
- Many cities (76%, 21 valid responses) collect fees for collection services mainly as individual fees for waste collection. In addition, many cities collect disposal fees at disposal sites.

Countries and central governments

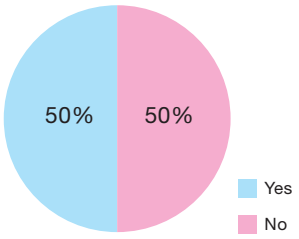
Roughly half of the countries that responded to the web questionnaire indicated that they have financing systems for solid waste management such as national budgets, taxes for waste, and subsidies for local governments. Angola, for example, has a national budget for SWM and taxation on SWM (as part of utility payments for electricity, water, etc. approx. 500-1000 Kwanza/household/month). Egypt pays local governments a subsidy related to SWM to fund equipment procurement and operations. The Congo levies a waste collection tax of XAF 1,000 (EUR 1.52) per month on the salary of every working person to raise revenue to pay a private company. The central government in Tanzania pays local governments subsidies to fund the operation of solid waste management services and the procurement of collection vehicles, while exempting SWM services from the VAT.

As stated in Section 3.3: Solid Waste Management Legislation and Governance, many countries that have established laws for municipal solid waste indicated that the laws are not properly enforced. Of the eight countries that cited a lack of budget to explain the poor enforcement, only one levies taxes for solid waste management. Introducing taxes may therefore resolve or mitigate the budget shortfalls that are impeding the implementation of solid waste management on a national level. Detailed study and analysis of this matter should reveal effective recommendations for countries facing budget shortfalls.

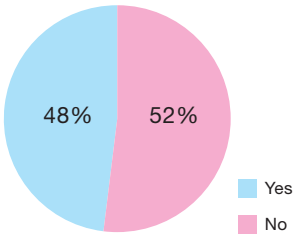
Is there a national budget for SWM in your country?
Valid responses: 21



Is there any tax related to SWM?
Valid responses: 24



Is there any subsidy related to SWM for local governments?
Valid responses: 23



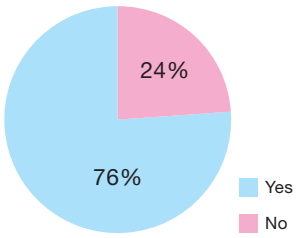
Local governments

Income and expenditures

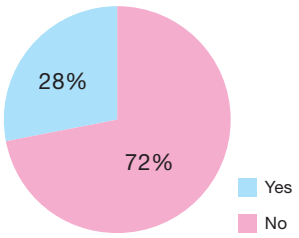
Financial constraints are a core solid waste management issue in African countries.[23] The establishment of appropriate budgets can be helpful in overcoming financial constraints, but requires a thorough understanding of income and expenditures. The departments in charge of solid waste management generally do not deal with income, and few of them fully understand how much income they receive or generate from waste service taxes, fees, government subsidies, general municipal budgets, and the like.

In addition, very few departments fully understand the expenditure data associated with solid waste management data. Departments in charge of solid waste management in ACCP member cities understand information related to expenditures to a certain extent, but few of them fully understand expenses for waste per unit of weight, one of the most important pieces of information for solid waste management.

Do you know how much is spent for waste services?
Valid responses: 17



Do you know how much is spent per ton of waste?
Valid responses: 18



Fee collection

Many cities that responded to the web questionnaire (76%, 21 valid responses) collect waste collection service fees, and the main method of collection is to collect individual fees for waste. Water supply and electric power utilities can suspend services to individual beneficiaries when they do not pay their fees; this penalty makes it easier to motivate them to pay their fees. In contrast, suspending waste collection services to individual sources of discharge can result in illegal dumping, and thereby compromise the sanitary environment of the city. Therefore, it is not possible to suspend services, which results in the issue of freeloaders.

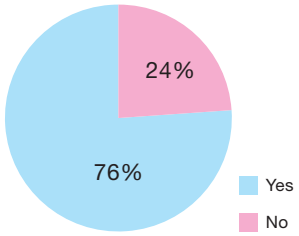
Bundling waste fees with water and electricity fees for collection is an effective way to mitigate these types of issues. Although there are few case examples, some ACCP member cities are bundling fee collection. In Abidjan, Côte d'Ivoire, waste collection fees are collected through electricity bills. In Egypt, almost all governorates apply a collection fee which is usually charged as part of the electricity bill.

Many cities charge different collection fees based on the type and scale of discharger. In many cases, higher fees are charged to commercial facilities, factories, and other large-scale sources of discharge, and business-related sources of discharge, than to households. For example, in Djibouti City, Republic of Djibouti, 3,600 DJF/month collection fees are charged for household waste; 4,500 DJF/month for commercial waste; and 15,000 DJF/month for institutional waste.

Many cities collect disposal fees (tipping fees) at disposal sites. It was not possible to examine details of charging system in this survey, but conceivable examples include charging places of business and the like when they use their own vehicles to carry waste to disposal sites. In these cases, setting disposal fees too high could result in illegal dumping to avoid paying the fees. Conversely, if the fees are too low, they will not cover disposal site operations. It is necessary to set appropriate fees, establish monitoring systems and management mechanisms to prevent illegal dumping.

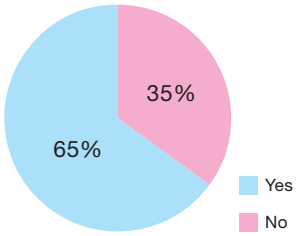
Do you charge for waste collection service?

Valid responses: 21



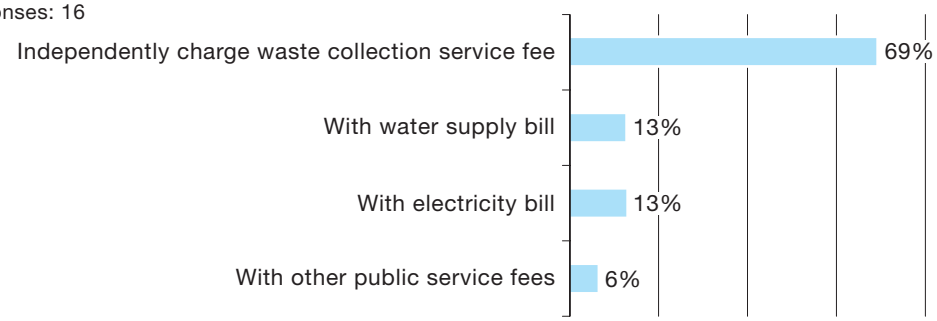
Do you charge at disposal site / tipping fee?

Valid responses: 20



How do you charge the collection service fee?

Valid responses: 16



3.6 Public-Private Partnership

- **Private entities are involved in solid waste services in nearly all cities that responded to the web questionnaire (95%, 22 valid responses). However, they do not necessarily uphold appropriate standards of service.**
- **In many cities (95%, 22 valid responses), municipal authorities provide solid waste services directly in spite of the involvement of the private sector in those services. This is thought to help maintain and improve the quality of services and avoid monopolisation by certain private companies.**

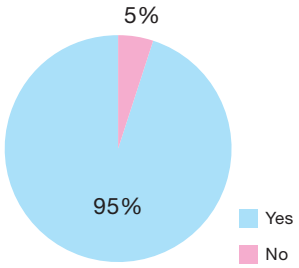
Though not necessarily strictly for the purposes of solid waste management, many respondent countries have established laws for public-private partnerships. The private sector is involved in solid waste services in nearly all of the cities that responded to the web questionnaire (95%, 22 valid responses). Private entities are most often involved in collection services, followed by the cleaning of public spaces, recycling, final disposal, transfer stations, and transport. In nearly all of these cities, the work is outsourced through written contracts with private entities.

It would be hard to say that private entities provide solid waste services properly. The shortcomings in their services stem from a lack of strict supervision from the governments, a lack of written contracts, vague contract content, and a lack of proper payments to the private entities. Alexandria, Egypt, for example, reported that all aspects of SWM operations are undertaken by the private sector. While this private sector work is performed under a contract, the system runs poorly because the contract is unclear.

In many cities, the private sector is not responsible for all services; municipal authorities also provide services directly (see 3.5). In developing countries where both private entities and municipal governments lack the capacity to fulfil their respective responsibilities, the municipal government provides the base services, private entities maintain and improve the quality of the services, and monopolisation by any one private company is avoided. In Ouagadougou, Burkina Faso, for example, the city is divided into three parts, one part covered by the municipality and the other two covered by the private sector. In Lusaka, Zambia, municipal authorities also provide solid waste services, but private operators and community-based enterprises (CBEs) are also involved in waste collection and disposal. Private operators collect waste from planned settlements and CBEs collect waste from unplanned settlements.

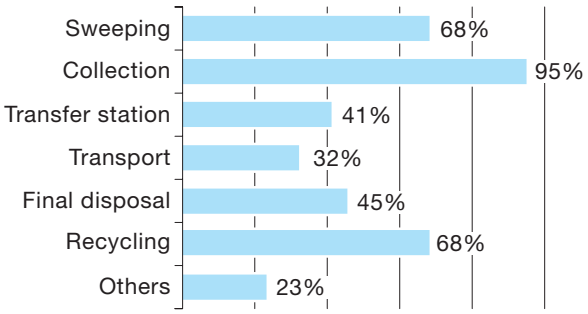
Does the private sector participate in the provision of SWM-related services in your municipality?

Valid responses: 22



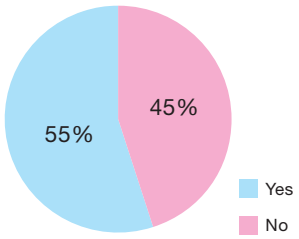
In which types of services do they participate?

Valid responses: 22



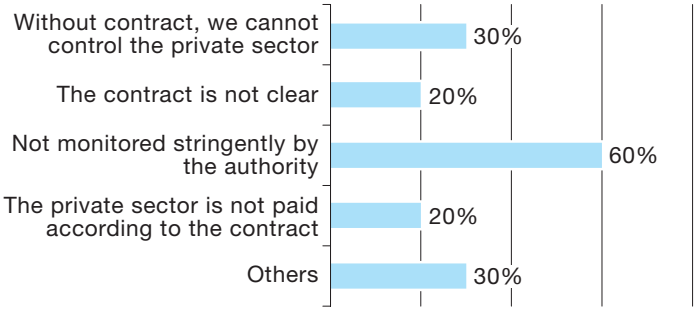
Do you think that the private sector works well?

Valid responses: 22



If "No", why does the private sector NOT work well?

Valid responses: 10



3.7 Cooperation and Communication with the Informal Sector and Residents

- The informal sector is active in nearly all cities, and some cities (48%, 21 valid responses) provide employment opportunities, vocational training, and economic assistance. In contrast, few countries have policies or laws to support waste pickers in the informal sector at the national level.
- All cities that responded to the web questionnaire (22 valid responses) inform their residents of the methods used to discharge waste. Resident assemblies are the most common method of conveying the information. Some cities use social media.

Municipal governments are generally responsible for municipal solid waste management, but the private sector, informal waste pickers, community-based organisations (CBOs), and NGOs now play key roles. It is extremely important for local governments to build positive relationships with these stakeholders in order to properly implement solid waste management.

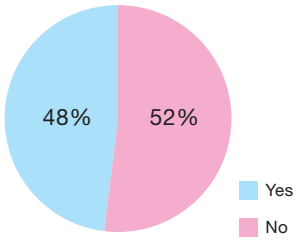
Informal sector

While the economies of Africa are growing, low wages and high unemployment rates persist in many countries, and the bulk of economic activity is in the informal sector.[24] The informal sector has a huge presence in solid waste management. In many African cities, waste pickers can be seen engaging in informal resource recovery activities on the streets and at disposal sites. Collectors in the informal sector also receive payments directly from households and others to collect waste, essentially supplementing primary collection services. These collectors generally work individually and face the risk of illness, accidents, and other risks while earning their livelihoods on low incomes. Activity by waste pickers and informal sector operators can be seen in nearly all ACCP member cities. Roughly half of the cities have policies to support the informal sector and provide employment opportunities, vocational training, and economic assistance.

Addis Ababa, Ethiopia, has organised waste pickers and incorporated them into primary waste collection, while also providing vocational training opportunities and other forms of assistance. Brazzaville, Congo, provides subsidies for purchasing collection machinery and assistance with vaccinations and the opening of bank accounts.

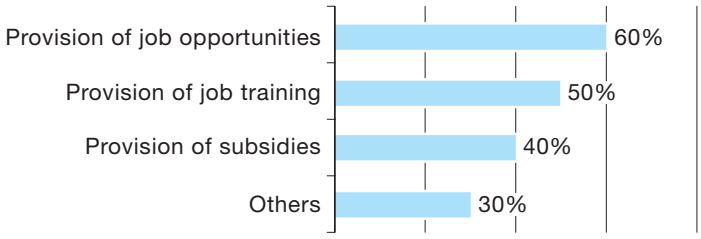
Is there any policy for supporting the informal sector?

Valid responses: 21



What kind of policy do you have for supporting informal sector?

Valid responses: 10



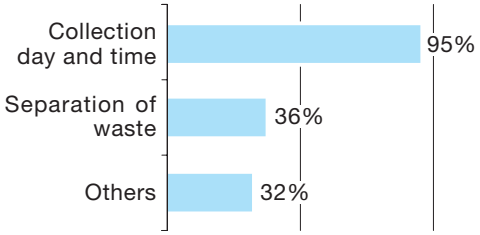
Public education and awareness, and communication with residents

Waste separation and discharge on scheduled collection dates and times and other forms of cooperation from residents are vital for realising efficient collection services to keep cities clean. In addition, cleaning campaigns and other efforts to improve residents' awareness and education are crucial means of communicating with residents.

All cities that responded to the web questionnaire inform their residents of the methods used to discard waste. Some cities inform their residents about separation in addition to the collection dates and times. Resident assemblies are the most common method of conveying the information. Cities also use leaflets and other media, and there are cases where they use the social media messaging application known as WhatsApp. In February 2017, for example, the government of Abidjan, Côte d'Ivoire, launched a city-cleaning campaign called "Big Cleaning Operation" as a tool for mobilising the population and raising its awareness on behaviour change. The clean-up operation takes place on the first Saturday of every month. In Kiambu, Kenya, meetings for public awareness raising and clean-up activities with residents and students, etc. are held on "Community action days." In Maputo, Mozambique, information is disseminated through theatres, music venues, and public expositions. There are also campaigns for cleaning the city with community participation.

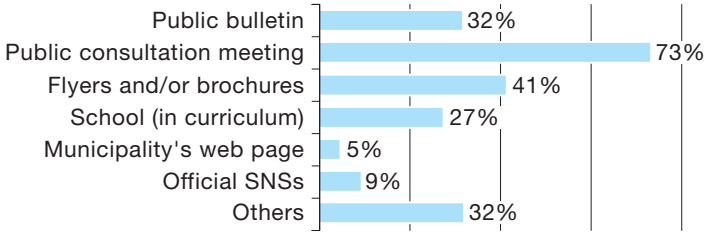
What are they informed about?

Valid responses: 22



How are they informed?

Valid responses: 22



3.8 Improvements Needed

3.8.1 Countries and Central Governments

- The following trends regarding national-level and central-level improvements needed in the legal/policy, institutional, technical, financial, and social sectors were noted from the findings from the 29 country profiles.
- In the legal/policy sector, the most common improvements needed are the establishment and revision of solid waste management laws.
- In the institutional sector, the most common improvement needed is capacity improvement. Countries indicated a need to improve the capacities of local government staff members, as well as those of the staff working in the central government waste authorities.
- In the technical sector, the most common improvements needed are related to treatment and recycling. Nonetheless, few countries indicated that they needed to improve final disposal, a function that appears to require improvement as soon as possible.
- In the financial sector, many countries indicated a need to secure financing for implementing solid waste management. Some countries view public-private partnerships as a way to bolster financial resources.
- In the social sector, many countries indicated a need to improve awareness and education. This probably indicates that countries view improved awareness and education as a role for central government authorities to fulfil.

Legal/Policy

Matters related to solid waste management laws are the most common improvement needed in the legal/policy sector. Twelve of the 14 countries that identified this need cited a need to establish new laws (or something that can be interpreted as such a need), while the other two cited a need to revise existing laws. One survey question asked whether basic laws for solid waste management exist in the respondent's country. Nine countries indicated that they have no basic laws for solid waste management. Seven of them indicated a need to establish new laws, which suggests that they are aware of the importance of basic laws for solid waste management.

Only two countries, Egypt and Malawi, indicated a need to assist local governments in the establishment of local ordinances. Egypt launched a central government-level organisation dedicated to controlling solid waste management in order to provide guidance and assistance to local governments. Although it is best for cities to establish local ordinances in line with their respective characteristics, coherence with national policy is also important. Central government assistance to support the establishment of local ordinances by the local governments should therefore contribute to improved solid waste management throughout the country.

Table 3-3: Improvements Needed in Countries and Central Governments (Legal/Policy)

Country	Legal/Policy	Existence of basic law	Establish	Revise	No but Needed
Angola	Revision of the strategic plan. Implementation of the strategic plan.	No	-	-	-
Benin	-	Yes	-	-	-
Botswana	Review of the Waste Management Act.	-	-	●	-
Burkina Faso	Solid waste recycling framework. Establish procedures using the polluter pays principle.	Yes	-	-	-
Cameroon	Establishing a law on solid waste management.	No	●	-	●
Central African Republic	-	-	-	-	-
Chad	Creation of the SWM basic law.	-	●	-	-
Comoros	Establish waste management laws.	No	●	-	●
Congo	Establishment of a legal and regulatory framework is urgently needed.	Yes	●	-	-
Côte d'Ivoire	Develop legislation on waste management and disposal.	No	●	-	●
DR Congo	-	Yes	-	-	-
Egypt	Consolidating the legal system by preparing a SWM law, by-laws, standards, etc.	Yes	●	-	-
Ethiopia	-	Yes	-	-	-
Ghana	Revision of national laws on waste management.	Yes	-	●	-
Guinea	-	Yes	-	-	-
Lesotho	Preparation of a SWM basic law.	-	●	-	-
Madagascar	Clarification of the roles and responsibilities of ministerial departments (still vague). Sector Policy and Strategy, Sustainable Management Plan.	Yes	-	-	-
Malawi	Developing by-laws at local governments' level.	Yes	-	-	-
Mauritius	Development of legislation pertaining to waste management.	No	●	-	●
Mozambique	Preparation of National Law on SWM.	Yes	●	-	-
Namibia	Support on the implementation of the National Solid Waste Management Strategy.	Yes	-	-	-
Niger	Policy and Strategy, Programmes and Action Plans on SWM.	Yes	-	-	-
Nigeria	Development of basic laws and policies on SWM.	No	●	-	●
Senegal	Preparation of a SWM basic law.	No	●	-	●
South Africa	Compliance and enforcement of laws/regulations.	Yes	-	-	-
South Sudan	Implementation of the legislation.	-	-	-	-
Sudan	A strategic plan needs to be developed. The linkage between the government at the national level and the state just started with a national workshop in 2018. This needs to be developed.	No	-	-	-
United Republic of Tanzania	Prioritise SWM at policy level. Prepare a basic SWM law to more clearly define roles and responsibilities of stakeholders in SWM.	No	●	-	●
Zambia	-	Yes	-	-	-
	Total	Yes 14 No 9	12	2	7

Institutional

Fifteen countries indicated a need for capacity improvement. Legal, technical, financial, educational, and other topics were raised in response to the various targets of this capacity improvement, that is, individuals, organisations, institutions, and communities. Although the content was not necessarily identical, most respondents indicated a need to improve the capacities of the staff members of the central government waste authorities and local governments. As seen in 3.4, the staff members of the central government waste authorities include people who studied solid waste management or related subjects at universities. Because of their expert knowledge, they should feel the need to further improve their own capacities as well as those of other staff members. Ghana, for example, indicated a need to raise the standard for the capacities of people involved in solid waste management at all levels, including the central government level.

Seven countries expressed a need to establish organisations dedicated to controlling solid waste management. Botswana and three other countries intend to launch such an organisation at the central government level. Egypt and one other country intend to launch such an organisation at the regional level. Ghana intends to launch such organisations at both the central government and regional levels. Namibia opined that solid waste management is a priority issue at the regional level, which suggests that the importance of solid waste management in that country is increasing.

Table 3-4: Improvements Needed in Countries and Central Governments (Institutional)

Country	Institutional	New Organisation at central level	New Organisation at local level	Capacity Development	Others
Benin	Staff capacity building.	-	-	●	-
Botswana	Establishment of a fully fleshed department under the Ministry of Local Government and Rural Development to deal with solid waste management.	●	-	-	-
Cameroon	Institutional Reform through the creation of a Waste Management Agency and the National Waste Exchange.	●	-	-	-
Central African Republic	A training project including a course on waste management for all Regional Directors and Prefectural Inspectors in order to raise awareness on national level.	-	-	●	-
Chad	Capacity development of SWM officers.	-	-	●	-
Comoros	Institutional capacity building.	-	-	●	-
Congo	Capacity development such as provision of practical solutions through education and training of various parties is necessary.	-	-	●	-
DR Congo	A series of programme type projects, such as assistance for master plan preparation, technical cooperation and financial cooperation for implementation of master plan, are recommended in Kinshasa City.	-	-	●	-
Egypt	Institutional reform: defining clearly the responsibilities of the stakeholders, and establishing and supporting a SWM Unit in each governorate.	-	●	-	-
Ghana	Have a clear-cut stand-alone institution to manage waste at all levels. General capacity building for waste management staff at all levels.	●	●	●	-
Lesotho	Capacity development of SWM staff members.	-	-	●	-
Malawi	Enforcement is difficult due to absence of an autonomous agency that would enforce the legislation. Council personnel require technical training.	●	-	●	-
Mozambique	Train municipal waste management technicians. Promote the exchange of experiences between municipalities at national and international level.	-	-	●	-
Namibia	Personnel in charge of solid waste management should ensure that solid waste management becomes a priority in all municipalities and local authorities, and that the National Solid Waste Management Strategy get implemented country wide.	-	-	-	●
Niger	Reinforcement of technical and financial capacity.	-	-	●	-
Nigeria	Institutional reform.	-	-	-	●
Senegal	Creation of a national agency for SWM. Capacity building for SWM stakeholders.	●	-	●	-
South Africa	Administrative and technical capacity development.	-	-	●	-
Sudan	The national government is calling upon the state governments to establish Cleaning Corporations. Staff/institutional capacity needs to be developed.	-	●	●	-
United Republic of Tanzania	Provide skills and knowledge on SWM at grassroots level.	-	-	●	-
	Total	5	3	15	2

Technical

Three countries indicated the importance of establishing systems for gathering waste-related data. However, as demonstrated in Section 3.3: Solid Waste Management Legislation and Governance, there is much room for improvement in the systems and procedures used for gathering data in those countries that have established them. There is concern that the many countries that did not cite a need for improved data gathering do not fully recognise its importance.

Regarding the needs in solid waste management flow (collection/transport, treatment/recycling, final disposal), the most common was treatment/recycling, indicated by nine countries. Three countries expressed a wish for improved collection/transport, and three wished for improved final disposal. Although reducing waste volumes through recycling is vital for realising proper solid waste management, valuables make up such a small proportion of waste that there is concern that the countries and cities of Africa, where relevant business is not yet mature, are placing excessive expectations on recycling. As explained in Chapter 2, the circumstances at African disposal sites are dire and require efforts toward improvement at the earliest possible opportunity.

Table 3-5: Improvements Needed in Countries and Central Governments (Technical)

Country	Technical	Data	Collection/ Transport	Treatment/ Recycling	Disposal	Others
Angola	Collection and recycling.	-	●	●	-	
Botswana	Establishment and development of waste recycling centres to reclaim recyclable waste, such as waste transfer stations and sorting centres. Introduction of technologies such as combustible waste incineration and bio methane production technologies.	-	-	●	-	●
Cameroon	System of waste segregation and sorting during pre-collection and collection of solid wastes.	-	-	●	-	-
Comoros	Establish system of segregating and waste recycling.	-	-	●	-	-
Ethiopia	Establishment of waste management system in local cities.	-	-	-	-	●
Lesotho	Transition from open dumping to controlled dumping is necessary. Construction of recycling/treatment facilities.	-	-	●	●	-
Mauritius	Promotion of waste segregation at source. Development of materials recovery facilities.	-	-	●	-	-
Mozambique	Promote the construction of landfills controlled by Fukuoka method.	-	-	-	●	-
Niger	Choice of management system for the recovery and recycling of waste. Provision to municipalities of collection and transport equipment.	-	●	●	-	-
Senegal	Construction of recycling/treatment facilities. Implementation of a national information system platform.	●	-	●	-	-
South Sudan	Set-up of a waste data collection system.	●	-	-	-	-
Sudan	Database needs to be developed. Collection and transport capacity (equipment) need to be enhanced. Technology needs to be developed (along with capacity development to utilise new technology) in the following areas: recycling technology, landfill technology, transfer station technology, and maintenance.	●	●	●	●	
Zambia	Adequate resources for life cycle management of waste.	-	-	-	-	●
	Total	3	3	9	3	3

Financial

Twelve countries indicated a need to secure financial resources for implementing solid waste management: six countries indicated a need to access financial resources and six indicated a need to establish systems for fees and taxes. These responses suggest that the financial resources for executing solid waste management at the central government level are insufficient. As demonstrated in Section 3.5: Financial Management of Solid Waste Management, the introduction of taxes should resolve or mitigate the budget shortfalls now impeding the implementation of solid waste management on a national level. Studies and analysis of this matter are recommended as means of forming suggestions to countries dealing with the issue of insufficient financial resources.

Five countries indicated a need to improve public-private partnerships (PPP). Although some countries indicated the importance of economic incentives to encourage private-sector involvement in solid waste management, other countries view PPP as a way to bolster insufficient financial resources.

Table 3-6: Improvements Needed in Countries and Central Governments (Financial)

Country	Financial	Access to finance	Tax/Fee	PPP	Cost
Angola	Development of fee system and applying waste tax system.	-	●	-	-
Benin	Stable access to finance for SWM.	●	-	-	-
Botswana	Introduction of incentives for promoting waste management.	-	-	●	-
Cameroon	Broadening the tax base for waste management by introducing an “eco-tax” on certain products based on the principle of extended producer responsibility.	-	●	-	-
Chad	Development of PPP.	-	-	●	-
Egypt	Creation of an attractive investment environment for the private sector, e.g. by providing incentives. Consolidating the financial resources by applying fees or a tax related to waste.	-	●	●	-
Ghana	Establish statutory funding for waste management.	●	-	-	-
Madagascar	Establishment of National Fund for Sanitation.	●	-	-	-
Malawi	Promotion of PPP as a strategy to address the issue of financing waste management.	-	-	●	-
Mauritius	Development of a landfill tax for industrial and commercial waste.	-	●	-	-
Mozambique	Financial issues: promote waste management activities at the national level.	●	-	-	-
Namibia	Adding a levy on plastic.	-	●	-	-
Niger	Implementation of a system of financing waste management.	●	-	-	-
Nigeria	Development of a waste tax system.	-	●	-	-
Senegal	Facilitation of PPP.	-	-	●	-
South Africa	Full cost recovery.	-	-	-	●
Zambia	Appropriate budget allocation.	●	-	-	-
	Total	6	6	5	1

Social

Sixteen countries indicated a need to improve awareness and education at the central government level, whereas only six cities indicated the same need at the local government level (see 3.8.2). These rates of response suggest that compared to cities, more countries view improved awareness and environmental education as a role for central government authorities to fulfil. Some countries wish to promote recycling and improved awareness/ environmental education on handling waste, while others aim to promote understanding among people involved in solid waste management.

Four countries wished to see improved social inclusion of waste pickers, fewer than the number wishing for improved awareness and education.

Table 3-7: Improvements Needed in Countries and Central Governments (Social)

Country	Social	Informal sector	Awareness/Education		
			Recycling/3R	Stakeholder	General
Angola	Social inclusion of waste pickers.	●	-	-	-
Benin	Promote awareness about SWM.	-	-	-	●
Botswana	Promotion of the economic value of waste by educating and empowering the communities on waste recycling and reuse initiatives.	-	●	-	-
Burkina Faso	Environmental education.	-	-	-	●
Chad	Popularisation of environmental education such as waste separation.	-	●	-	-
Congo	Awareness raising: the current problems should be taken into account by the population and the decision makers.	-	-	●	-
Côte d'Ivoire	Increase public awareness. Support the informal sector.	●	-	-	●
Egypt	Social inclusion of waste pickers by organising them into micro and small enterprises.	●	-	-	-
Ghana	Law enforcing environmental education.	-	-	-	●
Lesotho	Dissemination of environmental education such as waste separation.	-	●	-	-
Madagascar	Citizen education on hygiene.	-	-	-	●
Mozambique	Promote awareness campaigns and environmental education.	-	-	-	●
Namibia	Raising awareness in schools and in the surrounding communities about the negative impact of waste on people and the environment.	-	-	-	●
Niger	Strategy/methods of influencing social behaviour change of the population.	-	-	-	●
Senegal	Public awareness campaign.	-	-	-	●
South Africa	Inclusion of the informal sector.	●	-	-	-
South Sudan	Awareness raising and capacity building to increase stakeholder understanding.	-	-	●	-
United Republic of Tanzania	The community needs to be made aware of the value of handling SWM in a sustainable manner.	-	●	-	-
Zambia	Promote understanding among stakeholders.	-	-	●	●
	Total	4	4	3	10

3.8.2 Cities and Local Governments

- Municipal-level and local government-level improvements needed in the legal/policy, institutional, technical, financial, and social sectors were extracted from the 30 city profiles:
- In the legal/policy sector, many cities indicated a need to establish or revise local ordinances.
- In the institutional sector, many cities indicated a need for the same types of capacity improvement indicated at the national level. In contrast to the case at the central government-level, local governments are mainly aware of the need to improve the capacities of the staff members of their own organisations.
- In the technical sector, many cities indicated a need to improve collection/transport, recycling/treatment, and final disposal. Meanwhile, only four cities mentioned the need to improve waste data.
- In the financial sector, many cities indicated a need to improve access to financial resources. The financial resources are mainly needed to construct treatment facilities and purchase machinery and equipment.
- Few cities indicated any need for improvements in the social sector. The low rate of concern for the social sector is not unexpected, as the focal points are the agencies implementing the solid waste services, and thus are not responsible for public awareness or environmental education functions.

Legal/Policy

Twelve cities indicated a need to establish or revise local ordinances, and three indicated a need to improve enforcement. Kinshasa, Democratic Republic of the Congo wishes for the establishment of local ordinances for items that are difficult to dispose of, while Libreville, Gabon wishes for the establishment of laws for extended producer responsibility (EPR). The cities also cited the need for effective law enforcement and other overall improvements, however, and the nature of those improvements differed according to the circumstances of each city.

Table 3-8: Improvements Needed in Cities and Local Governments (Legal/Policy)

City	Legal/Policy	Existence of by-law	Establish/ Improve	Implement
Brazzaville (Congo)	Strengthening of the legal system in SWM.	No	●	-
Abidjan (Côte d'Ivoire)	Finalisation of the legal texts on SWM and empowerment of local authorities and citizens through specific decrees.	-	●	-
Kinshasa (DR Congo)	To develop a legal system for difficult-to-handle waste at an early stage.	Yes	●	-
Libreville (Gabon)	Approval of the Extended Responsibility regulation.	-	●	-
Tema (Ghana)	Effective enforcement of the by-laws.	Yes	-	●
Maseru (Lesotho)	Formulation of laws and regulations related to SWM.	Yes	●	-
Antananarivo (Madagascar)	Improvement is necessary in the areas of legislation, technique, and finance.	Yes	●	-
Maputo (Mozambique)	Approval of extended producer responsibility regulation.	Yes	●	-
Windhoek (Namibia)	Compilation of strategies and guidelines for priority waste (e-waste, tyres, hazardous waste, HCRW, recyclables). / Implementation of a licencing & registration system for the industry.	Yes	●	●
Niamey (Niger)	Establishment of a legal system on SWM.	No	●	-
Abuja (Nigeria)	Preparation of basic laws and regulations on SWM.	Yes	●	-
Juba (South Sudan)	Lack of legislation and policies specific to solid waste management.	No	●	-
Khartoum (Sudan)	Implementation of laws on SW.	No	-	●
Harare (Zimbabwe)	Improving legislation to effectively regulate waste management.	Yes	●	-
	Total	Yes 8 No 4	12	3

Institutional

Thirteen cities indicated a need for capacity improvement. Their responses tended to differ from those of central governments, in that they are mainly aware of the need to improve the capacities of the staff members of their own organisations. Two cities indicated a need to establish new organisations, two cities indicated a need for monitoring/inspection, and two cities indicated other needs. Given that local government authorities are involved in the actual work of solid waste services on a daily basis, they tend to put more emphasis on dealing with the issues that organisations presently face than on launching new organisations.

Table 3-9: Improvements Needed in Cities and Local Governments (Institutional)

City	Institutional	New organisation	Capacity development	Monitoring/ Inspection	Others
Kweneng (Botswana)	Staff capacity in solid waste management.	-	●	-	-
Ouagadougou (Burkina Faso)	The municipality needs technical support.	-	●	-	-
Yaoundé (Cameroon)	Improve staff technical capacity.	-	●	-	-
Abidjan (Côte d'Ivoire)	Capacity building of the Environment Department of the Autonomous District of Abidjan.	-	●	-	-
Djibouti (Djibouti)	Institutional issues.	-	-	-	●
Alexandria (Egypt)	Developing monitoring mechanisms.	-	-	●	-
Mbabane (Eswatini)	Strengthen the waste minimisation programme through capacity building and roll-out of a citywide composting and recycling programme.	-	●	-	-
Addis Ababa (Ethiopia)	The city has begun to work on recycling, composting, etc., and the operation of waste-to-energy (WtE) is about to begin. Learning about waste management in Japan would help to improve capacity in these areas and thus enable the city to deal with issues and challenges that can be expected to emerge as these facilities are operated in the future.	-	●	-	-
Libreville (Gabon)	Technical issues: capacity building.	-	●	-	-
Tema (Ghana)	Prioritising solid waste management. Strengthening the waste management department with skilled staff.	-	●	-	-
Nairobi (Kenya)	Need for independent institutional management of solid waste through an established company. / Need to build the technical capacity of staff.	●	●	-	-
Monrovia (Liberia)	Institutional issues.	-	-	-	●
Maputo (Mozambique)	Technical issues: capacity building.	-	●	-	-
Windhoek (Namibia)	Establishment and implementation of an integrated waste management system. Improved inspection, monitoring, and control of illegal dumping and littering.	-	-	●	-
Juba (South Sudan)	Institutions and organisations should be more stable, lack of skilled staff and reliable data.	-	●	-	-
Khartoum (Sudan)	Need capacity building and training centre for operation workers.	-	●	-	-
Lusaka (Zambia)	Institutional arrangement: need to create a more independent solid waste unit.	●	-	-	-
Harare (Zimbabwe)	Skills & Capacity building.	-	●	-	-
	Total	2	13	2	2

Technical

Eleven cities indicated a need to improve collection/transport, 11 cities indicated a need to improve recycling/treatment, and 10 cities indicated a need to improve final disposal. Many respondents actually implement solid waste services, which suggests that they put emphasis on dealing with the challenge of overcoming the issues right in front of them.

Meanwhile, only four cities mentioned a need to improve waste data. As seen at the national level, many cities do not fully understand waste flow. This is a cause for concern, as they may fail to sufficiently recognise the importance and urgency of waste data.

Table 3-10: Improvements Needed in Cities and Local Governments (Technical)

City	Technical	Data	Collection/ Transport	Recycling/ Treatment	Disposal
Kweneng (Botswana)	Waste segregation and recycling system.	-	-	●	-
Bangui (Central African Republic)	Reduce transport: no longer transport soil and optimise transport. Reduce landfill by recycling reusable materials. Introduce sorting at source.	-	●	●	-
Kinshasa (DR Congo)	Equipment for waste collection. Need for a plan to construct multiple disposal sites. Intermediate treatment and recycling in the future.	-	●	●	●
Alexandria (Egypt)	Expansion of refuse derived fuel (RDF) production lines. Developing fertiliser plants. Producing electrical energy from waste, especially in landfills and transfer stations.	-	-	●	●
Mbabane (Eswatini)	Construction of new landfill cells. Planning, establishing and operationalising waste recycling programmes. Landfill leachate and trade effluent (abattoir waste water): pre-treatment or full treatment. A waste recycling plant. Improve accessibility in all areas, especially in the informal settlements for waste collection improvement.	-	●	●	●
Tema (Ghana)	Planning final disposal sites.	-	-	-	●
Conakry (Guinea)	Construction of a waste treatment plant for household waste.	-	-	●	-
Kiambu (Kenya)	Establish a transfer station. Waste separation. Material recycling and composting.	-	●	●	-
Maseru (Lesotho)	Data collection. Assistance for the construction of a new sanitary landfill. Procurement of waste collection vehicles.	●	●	-	●
Blantyre (Malawi)	Development of the recycling industry, including technology transfer and development of waste separation system. Procurement of basic waste collection vehicles and containers (for squatter area) and improvement/rehabilitation of final disposal site.	-	●	●	-
Windhoek (Namibia)	Waste Information System (WIS). Provision of infrastructure: new transfer station, extension of the landfill. Research and Investigations.	●	●	●	-
Niamey (Niger)	Improvement of the discharge manner. Procurement of collection and transport equipment.	-	●	-	-
Abuja (Nigeria)	Waste collection and transport improvement plan. Landfill Improvement Plan. Improvement in data collection about vehicles. Daily scheduling of dumping area and control of scavenging operations.	●	●	-	●
Juba (South Sudan)	Need to improve waste collection and disposal, waste should be discharged in a controlled landfill and not dumped illegally.	-	●	-	●
Khartoum (Sudan)	Need trailers to transport waste from transfer station to dump site.	-	●	-	-
Lusaka (Zambia)	Final disposal of waste needs to be improved.	-	-	-	●
Bulawayo (Zimbabwe)	The current cells at the disposal site are almost full, so there is a need to develop the remaining half of the landfill and to construct waste diversion facilities such as MRF and WtE. / The Waste Management Information System is mostly manual and has limited ability to improve decision making.	●	-	●	●
Harare (Zimbabwe)	Separation of domestic waste at source offers huge opportunities to reduce waste going to disposal sites. Harare City Council needs to identify and develop engineered landfill site(s).	-	-	●	●
	Total	4	11	11	10

Financial

Eleven cities indicated access to financial resources, explaining that the resources are mainly needed to construct treatment facilities and purchase machinery and equipment. Meanwhile, only three cities indicated a need to introduce fee systems for securing financial resources. This is probably because the focal points, the respondents, are the agencies implementing the solid waste services, and other central government organisations are normally responsible for finances. The need for charges based on EPR and the need for an independent accounting system for solid waste management were each mentioned by one city.

Table 3-11: Improvements Needed in Cities and Local Governments (Financial)

City	Financial	Access to finance	Fee	EPR	Accounting
Kweneng (Botswana)	Revenue collection.	-	●	-	-
Ouagadougou (Burkina Faso)	The municipality needs financial support.	●	-	-	-
Yaoundé (Cameroon)	Access to finance for SWM.	●	-	-	-
Brazzaville (Congo)	Strengthening of financial basis.	●	-	-	-
Abidjan (Côte d'Ivoire)	Financial resources for the acquisition of organic waste composting units and fuel production units from plastics.	●	-	-	-
Mbabane (Eswatini)	Financial and technical support for the construction of new landfill cells. Technical and financial support in planning, establishing and operationalising a waste recycling plant.	●	-	-	-
Libreville (Gabon)	Financial resources for the acquisition of various waste treatment equipment and better functionality of the institution.	●	-	-	-
Tema (Ghana)	Availability of funds to operate.	●	-	-	-
Nairobi (Kenya)	Inadequate funding for proper solid waste management, particularly in collection, transport and final disposal.	●	-	-	-
Blantyre (Malawi)	Enforcement of waste generator responsibility to finance waste management through charging system for commercial/industrial waste.	-	-	●	-
Maputo (Mozambique)	Financial resources for acquisition of solid waste management equipment and for better functionality of the institution.	●	-	-	-
Kaduna (Nigeria)	Need a sustainable income system to cover waste operation cost, in short term.	●	-	-	-
Juba (South Sudan)	Introduction of a tariff system for collection services; lack of resources to finance SWM operations, such as maintenance of vehicles, provision of necessary equipment, payment of salaries, etc.	-	●	-	-
Lusaka (Zambia)	Need to have an effective system of collecting fees.	-	●	-	-
Bulawayo (Zimbabwe)	There is shortage of capital finances to develop the SWM system.	●	-	-	-
Harare (Zimbabwe)	Ring-fencing waste management accounts can result in improved operation and maintenance (O&M).	-	-	-	●
	Total	11	3	1	1

Social

Only six cities cited a need for improvements in the social sector. This was quite small in comparison to the numbers of cities wishing for improvements in the last four sectors covered. Even though most of the contact with the informal sector occurs at the city level, no respondent city expressed a need for improvement in this field. This is because the focal points, which are the agencies implementing the solid waste services at the city level, may not be necessarily responsible for public awareness and environmental education functions.

Table 3-12: Improvements Needed in Cities and Local Governments (Social)

City	Social	Informal sector	Awareness/Education		
			Recycling/3R	Stakeholder	General
Brazzaville (Congo)	Cooperation and demarcation among stakeholders.	-	-	●	-
Kiambu (Kenya)	Raise public awareness. Waste reduction, 3Rs.	-	●	-	●
Blantyre (Malawi)	Need a robust public awareness system and commitment of waste producers to take their responsibilities and pay for the collection of their waste.	-	-	-	●
Windhoek (Namibia)	Education and awareness raising programmes within schools, industries, institutions, and in public places.	-	-	-	●
Khartoum (Sudan)	Need public education on SW. Community should be involved in cleaning work.	-	-	-	●
Bulawayo (Zimbabwe)	Considering the city offers a stable refuse collection schedule, more waste education and behaviour change activities are needed to curb littering and illegal dumping.	-	-	-	●
	Total	0	1	1	5

1 UNEP (2015). Global Waste Management Outlook, p.52
2 World Bank, Indicator Code NY.GDP.PCAP.CD, Indicator Name GDP per capita (current US$), last updated 2019/4/24, 2017
3 UN-Habitat (2010). Solid Waste Management in the World's Cities
4 World Bank (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050, p.79
5 UN-Habitat (2010). p.12, Table 2.2
6 World Bank (2018). p.4
7 World Bank (2018). p.4
8 Wilson et al. (2013). p.58
9 Wilson et al. (2013)
10 UNEP (2018). p.2
11 UNEP (2018). p.23
12 UNEP (2018). p.135
13 Prepared using the following reference material: Japan Society of Material Cycles and Waste Management, "Haikibutsu shigen junkan gakkaishi (Material Cycles and Waste Management Research) Vol.27 No.5 2016" (in Japanese)
14 JICA (2012). Mareishiakoku haikibutsu umetate shobunjō no anzen heisa oyobi kaizen ni kakaru chōsa, jizen chōsa hōkokusho (Study on the Safe Closure and Rehabilitation of Landfill Sites in Malaysia: Preliminary Survey Report) (in Japanese)
15 UNEP (2018). p.15
16 UNEP (2013). Africa Environmental Outlook 3: Summary for Policy Makers, p.11
17 UNEP (2018). p.93
18 UNEP (2018). pp.45-46
19 UNEP (2013). p.4
20 UNEP (2018). pp.57-60
21 South African Waste Information Centre website, http://sawic.environment.gov.za
22 Tchobanoglous, G., Theisen, H and Vigil, S.A. (1993). Integrated Solid Waste Management, McGraw-Hill, Inc., USA, p.7
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4 Towards Improving Solid Waste Management in Africa and the Roles of the ACCP

As described in previous chapters, waste causes significant problems in Africa. Inappropriate waste discharge by residents and insufficient waste collection and transport services are degrading public health and living environments in urban areas. Mismanagement, open dumping, and other illegal and inappropriate forms of disposal at unregulated final disposal sites are polluting the environment. These issues, coupled with increasing population and continuous urbanisation, are becoming more and more serious.

Behind these waste issues, there is a lack or insufficiency of solid waste management capacity in each country and city. To prevent these circumstances from worsening further, these countries and cities urgently need to establish effective solid waste management systems in a sustainable manner and to comprehensively develop the capacities required for solid waste management at the individual, organisational, institutional, and societal levels.

The following is a summary of the insufficient capacities and efforts required in light of the results discussed in Chapters 2 and 3. Actual cases of specific solutions are introduced as references to inform the current and future efforts toward the realisation of appropriate and sustainable solid waste management in each country and city.

4.1 Solid Waste Management Issues in Africa

Table 4-1 presents the solid waste management issues confirmed in countries and cities in Africa and the capacities and efforts required to resolve those issues. The issues are organised by the stages in which they arise in the solid waste management flow (waste generation/discharge, collection/transport, recycling/intermediate treatment, and final disposal).

The top row of Table 4-1 lists the major issues that appear in each stage of solid waste management: Waste Generation/Discharge, Waste Collection/Transport, Intermediate Treatment, and Final Disposal. These issues could eventually contribute to global environmental problems by increasing the emissions of greenhouse gases or by widening the spread of marine plastic waste.

The presence of these issues signifies that the solid waste management capacity in each country and city is lacking or insufficient in some way or another. The lower part of Table 4-1 summarises these currently insufficient capacities at the individual, organisational, institutional, and societal levels.[1]

The solid waste management issues facing each country and city have unique backgrounds and are deeply connected to cultures, institutions, and social systems formed over many years. The issues arise in different ways, depending on the conditions of the countries and cities they affect. Not all of the issues and capacity development issues shown in Table 4-1 apply to all of the countries and cities. By organising common and similar issues, however, we can provide clues to inform our approaches to resolve these issues.

Table 4-1: Solid Waste Management Issues observed in Africa, and Approaches for Resolving Them in Each Stage of the Waste Flow

	Waste generation/ discharge	Waste collection/ transport	Intermediate treatment	Final disposal
Major waste management issues observed in Africa	- Generation of large amounts of waste - Disordered waste discharge and dumping - Hazardous waste mixed in with other wastes without separation - Scattering of waste in and around residential areas	- Generation of uncollected waste - Variation in collection rates between areas and districts - Deterioration of public health and loss of amenities - Increasing cost of transport	- Generation of items that are difficult to treat - Low recycling rates - Increasing cost of facility construction and operation/ maintenance	- Environmental pollution caused by open dumping (water contamination, foul odours, etc.) - Generation of greenhouse gases - Collapse of waste mound and fire outbreak - Outflow of disposed waste and spread of marine pollution by plastic wastes
	Financial vulnerability, insufficient land for waste treatment facilities, conflict over the siting of waste treatment facilities			

Capacities to develop and approaches to undertake for improving waste management				
Individual level	Residents' awareness on waste issues	Technical competency of waste collection and transport workers	Technical competency of intermediate treatment workers/ engineers	Technical competency of final disposal site workers
Organisational level	Community awareness on waste issues and education	Operation and management system for waste collection and transport	Operation and management system for intermediate treatment facilities	Operation and management system for final disposal sites
	Institutional structure of waste management organisations, intellectual assets (analysis of current situation, monitoring, data, plans, etc.), physical assets (facilities, machinery, materials, etc.), financing/financial capacity, public awareness and public relations capacity, human resource development			
Institutional level	Rules and norms about waste discharge/self-disposal	Rules and norms about collection and transport	Rules and norms about intermediate treatment/recycling	Rules and norms about final disposal
	Laws, standards, and municipal ordinances about waste management, fee collection, regulatory system for extended producer responsibility (EPR), system for enforcement/ operation of related laws and regulations			
Societal level	Compliance and participation/ cooperation in communities	Established social infrastructure necessary for waste management	Collaboration with private recycling industries (Public-private partnership, PPP)	Collaboration with waste pickers at dumpsites
	Social norms and basic legislation about environmental conservation, environmental education, media/communication			

Waste generation/discharge stage

As explained in Chapter 2, the amount of waste generated is rapidly increasing in most African countries and cities. In order to prevent further increase, emphasis has been placed on reducing the amounts in the generation/discharge stages and on public education and awareness-raising activities focused on the dischargers, particularly residents and businesses. One approach is to minimise the generation of post-consumer waste. Another is to separate waste from recyclables at the generation source before discharging it.

It can be effective to enforce policy using economic instruments such as pay-as-you-throw (PAYT) programmes (also known as unit pricing or variable-rate pricing), where residents are charged for the collection of municipal solid waste based on the amounts they throw away.[2] Waste generators pay a variable rate depending on the level and extent of the solid waste management services they receive. Municipalities with programmes in place have reported significant increases in recycling and reductions in waste, mainly thanks to the waste reduction incentive created by PAYT.[3] This economic instrument helps not only to discourage dischargers from generating waste but also to raise the revenues municipalities need to cover their solid waste costs. If less waste is discharged and more is recycled, fewer natural resources need to be extracted. One of the most important advantages of a variable-rate programme may be its inherent fairness. When the cost of solid waste management is hidden in taxes or charged at a flat rate, residents who recycle and prevent waste indirectly subsidise their neighbours' wastefulness. Under PAYT, residents pay only for what they throw away.[4]

The present survey revealed that fees for waste collection have been instituted in some way or form in 76% of the countries and cities (22 valid responses) that responded to the web questionnaire. Although the low collection rate is an issue, the findings demonstrate that basic conditions are being established to introduce PAYT programmes in African cities. Some countries have actually adopted a system that does not rely on general financial resources (taxes) but charges fees that vary according to the waste generator type (for general households, for profit-making businesses, etc.), whereby major waste generators are subject to higher fees, as in the case of South Africa.[5]

As discussed in Chapter 3, residents generally have a low income level and low willingness to pay fees in cities in the initial stages of economic development. Therefore, charging businesses fees proportional to the amounts of business-related waste (waste from commercial facilities, business offices, etc.) they discharge should reduce the amounts of waste more efficiently than charging at a flat rate for the general public and businesses. This is because the proper setting of fees functions as an indirect incentive to minimise waste generation. The municipality-designated paid rubbish bag systems and waste fee systems in Japan are well known to have resulted in a drastic short-term reduction of waste discharge.[6] In African countries and cities where direct payment of fees as compensation for solid waste management services is already widespread, the introduction of these economic tools coupled with ingenious system solutions could spur the development of policies to reduce the generation of waste in the future.

Another strategy for limiting the generation of waste is to use the extended producer responsibility (EPR)[7] approach, an "upstream" approach to solid waste management under which producers are given a significant responsibility – financial and/or physical – for the waste treatment or disposal of post-consumer goods. South Africa, for example, has adopted a special tax (product tax) for packaging-related products as a method to use policy to promote, develop, and distribute merchandise that generates less waste.[8] Introducing fees for plastic bags at stores and measures to prohibit the manufacture of plastic bags are similar approaches. Thirty-one countries in Sub-Saharan Africa have recently undertaken measures to prohibit the manufacture of plastic bags in some way or form.[9] However, collaboration with the private sector and appropriate monitoring and implementation by the government are vital for ensuring the effectiveness of these policy instruments.

Regarding the promotion of source separation before discharge, the government or municipality must first create rules governing what waste to sort and how to sort it. Once the rules are drawn up, public relations and public education and awareness-raising activities must be conducted to disseminate them among communities and regions. A separate collection system also has to be established, and recycling channels corresponding to the respective types of collected recyclables have to be put in place. In that sense, it is important to keep in mind that further divisions of categories for separation raises the cost of collection and transport and the solid waste management workload of the dischargers. Self-disposal of waste separated at the source is possible by

various means and can substantially reduce the amount of waste introduced into the solid waste management flow. Organic waste such as food scraps, for example, can be turned into feed for pigs and other livestock, or into fertiliser (home compost, community compost). The applicability of these measures depends largely on the circumstances of the area and the understanding and cooperation of the local communities. The measures are not likely to succeed unless preparatory surveys are duly conducted, rules are created in advance, and technical follow-up services are provided.

The South African government calls these measures for waste separation at the generation sources "Zero Waste Scheme". To promote recycling and waste separation at the source,[10] the government has established rules for the separation of recyclables from waste at the generation sources and set up facilities (drop-off centres) for purchasing sorted recyclables from residents and waste pickers. Similar recycling stations have been established on a trial basis in Maputo, Mozambique.[11]

The reduction of waste at the generation sources through these efforts is expected to reduce the cost of collection and transport, extend the service lives and reduce the scale of intermediate treatment facilities, and thereby substantially reduce administrative expenses, while at the same time conserving resources and reducing environmental burdens. This is why "Reduce" is regarded as the highest priority of the 3Rs for solid waste management.

Encouraging the participation of residents and businesses, the producers of the waste, and improving capacity at the institutional and societal levels (see Table 4-1) are particularly important issues in the waste generation/discharge stage.

Waste collection/transport stage

The main task in the waste collection and transport stage is to improve the waste collection rate, the ratio of the amount collected to the total amount of waste generated in the service area, through the enhancement and streamlining of the collection and transport capacity. As explained in Chapter 3, many African cities show low collection rates. The average waste collection rate across Sub-Saharan Africa is estimated to stand at just 44%.[12] These figures indicate that waste is scattered and lost or illegally dumped across over half of the region, with no effective collection services in place. Major public health issues inevitably emerge as a result. Another problem is the extreme disparity in collection rates between areas within cities.

Given these circumstances, governments or municipalities must first gain a full and detailed understanding of collection areas and collection rates (see 4.1.1. A full accurate understanding of waste flow) and develop clear improvement goals, establish appropriate collection and transport routes and relays, and formulate collection plans. Improved collection rates lead to improvements in public health and amenities, which in turn deepens the understanding and cooperation of residents and increases the service fees collected. Containers, vehicles, and other machinery absolutely must be procured and equipped in order to improve collection and transport capacity. The required budgetary measures present an unavoidable challenge, whether the operations are managed directly by municipalities or with cooperation from the private sector. In African cities and countries, which generally lack sufficient public funds, it is especially vital for high level decision-makers and assemblies to understand these aspects of solid waste management. In addition, as explained in Chapter 3, the operating rate of collection and transport machinery has stalled at roughly 50% in the cities of Sub-Saharan Africa. Another major objective is to strengthen the systems for repairing and maintaining the machinery in order to improve efficiency. The city of Abidjan in Côte d'Ivoire is establishing a primary collection system that mobilises an informal sector (street waste pickers) to collect waste from households in order to expand collection areas and improve collection rates.[13] The city of Addis Ababa in Ethiopia is collaborating with small, private businesses (microenterprises) engaged in primary collection business in an effort to streamline collection and transport.[14]

As explained in Chapter 3, 95% (22 valid responses) of the countries that responded to the web questionnaire are contracting (outsourcing) collection and transport work to private companies in some way or form. In these cases, contract management, monitoring, and supervision of private businesses are critically important for optimising and streamlining collection and transport. Gaborone, Botswana improved efficiency substantially by entering a blanket agreement for the collection and transport of commercial waste (roughly 50% of the overall total) with a private company (in the formal sector), but the government had to establish criteria and conduct appropriate monitoring, supervision, and strict evaluations in order to realise the improvement.[15] When the

transport and collection work is to be largely outsourced to the private sector, note that direct investments by donors, such as provision of machinery in the public sector, should be decided carefully. Such investments may cause disputes originating from a sense of unfairness among private operators who have procured equipment at their own expense to fulfil existing agreements.

Capacity improvement at the organisational level is another issue in the collection and transport stage. Specifically, monitoring of the collection and transport work must be intensified in order to develop a full and accurate understanding of collection rates, contract management, and supervision. In addition, the work outsourced to private entities must be evaluated appropriately, the departments in charge of maintaining machinery must be urged to improve, and the operation rates and efficiency of the collection and transport machinery must be raised.

Intermediate waste treatment stage

The private sector (mostly the informal sector) handles much of the material recycling in Africa. As explained in Chapter 3, however, the development of facilities such as compost manufacturing facilities and materials recovery facilities (MRF) is steadily spreading. In total, 60% (19 valid responses) of the countries that responded to the web questionnaire have facilities of this type (see the box article "Intermediate Treatment in Rabat, Morocco"). Recycling is implemented by private businesses for the purpose of profits in nearly all cases and governed by market economy principles. There is concern, therefore, that poor profitability could force these businesses to withdraw if the costs of facility construction and operation management become excessive. Although recycling is largely a private business, it plays a significant role in the whole solid waste management system. It will therefore be important for the administrative bodies responsible for solid waste management to monitor and supervise recycling operations and to implement policies to promote sustainable recycling operations. Developed countries have enacted green purchasing laws (systems obligating government agencies and public institutions to preferentially purchase recycled products) to spur market demands for recycled products and have granted subsidies and offered corporate tax reductions and exemptions to promote the recycling industry. Interest in establishing these economic instruments is increasing across Africa and has led to consideration of their introduction in South Africa[16] and Zambia.[17]

The recycling of biodegradable organic waste, which represents more than 50% of municipal solid waste in Africa, is one of the main objectives from the perspective of both recycling and reduction. Compost production is a typical method of recycling, and the number of composting facilities is increasing throughout Africa. Properly managed compost production not only benefits solid waste management, but also provides soil conditioners to the forestry and agriculture sectors and can substantially reduce the potential for the generation of greenhouse gases. Moreover, given that the cost of introducing composting facilities is relatively low, they are a viable option for intermediate treatment in Africa.[18] Examples of compost production activities have been reported in Kampala, Uganda, in Yaoundé, Cameroon, and in several cities in Ethiopia. However, many countries in Africa and elsewhere have been forced to close their composting facilities due to deteriorating operating conditions caused by poor technical capacity in ensuring the quality of compost products, excess stock due to receding demand caused by inconsistency in compost quality, changes associated with urbanisation and other factors, and location problems caused by foul odours, pollution, etc. in the areas around the facilities. The process of introducing composting facilities requires multifaceted surveys and careful consideration of the methods used to separate waste, the raw material composing compost, production technology, the understanding of residents, compost product demand and consumption conditions, etc.

Interest in waste-to-energy (WtE) is on the rise throughout Africa as well as the rest of the world. The two major methods of WtE that have been established to date are power generation through waste incineration, and power generation from biogas emitted by biodegradable organic waste. It cannot be denied, however, that governments are increasingly attracted to the notion of WtE as a self-serving ‘fantasy’ of sorts, wherein the free resource of waste can be used to generate power that can be sold to generate revenue to cover the cost of waste disposal. Government authorities in search of quick solutions to these issues are particularly keen to buy into this fantasy. The initial investment for constructing these facilities is extremely high, however, and the cost of maintenance is much higher than that of conventional treatment technology. These cost increases lead to additional financial burdens on citizens, the ultimate beneficiaries. Therefore, collaboration with the private sector

and outsourcing to the private sector are vital in terms of both investment and the technical aspect of operation management. In addition, given that waste in Africa generally comprises abundant organics with high moisture but very little paper (see Chapter 3.1.3), the calorific value of the waste itself is thought to be too low to permit self-combustion without supplementary fuel. When making decisions about introducing WtE, it will be important to conduct comprehensive assessments on multifaceted aspects (social aspects, resident understanding, systemic aspects, government governance capacity, financial aspects, technical aspects) based on solid survey results.[19]

The other WtE method of biogas production in Africa has already been introduced in Rwanda, Kenya, Ethiopia, and Tanzania, and introduction is being considered in South Africa and Namibia. As of 2014, however, operations at most facilities in these countries were reported to have been suspended for unavoidable reasons to do with design issues, technical aspects, and operation management.[20] Biogas production technology optimises and controls the process of gas generation by microbes. The success of the process hinges on whether the required organic matter can be secured consistently and quantitatively throughout the year, and whether the facility can be stably operated to maintain the temperature, pH, and other conditions suitable for microbial activity. The treatment of any densely concentrated effluent or residue (sludge) must also be duly considered in the design state, as there are cases where these materials cannot be directly used as liquid fertiliser or soil conditioners in their unaltered state. These cases require meticulous surveys, careful designs, and technically advanced operation management.

In light of the above, there are many issues to be addressed in the intermediate treatment stage. Beyond a full understanding of the basic information, the process requires careful monitoring, the collection of technical information, and the formulation of plans at the organisational level. Improving the capacity for collaboration with the private sector and similar issues on the societal level may also be challenging. Note, further, that these issues are closely related to the problems arising in the waste generation stage described previously in Section 4.1: Waste generation/discharge stage. Power generation through waste incineration and power generation from biogas entail both high technical hurdles and high costs. Particularly careful judgment is therefore required to introduce these solutions.

Intermediate Treatment in Rabat, Morocco [21]

The Landfill and Recycling Centre of Oum Azza, located about 20 km south of the capital city Rabat, handles some 850,000 tons of waste generated each year by 13 municipalities, including Rabat. Pizzorno Environnement, a French-based company, has been commissioned to carry out intermediate waste treatment designed to take into account the environment and society.

Organic waste (100,000 tons/year) from sources such as the pruned branches of street-side trees is converted to compost. Meanwhile, a portion of the domestic waste from households (90,000 tons/year) is converted in refuse-derived fuel (RDF) and used as fuel in cement plants. Although the introduction of such recycling methods requires a certain level of management capacity, the initial investment is lower than that of an incineration power plant, and the technology is thought to be highly suitable for introduction in African countries.

A union consisting of around 200 waste pickers who were active at the former disposal site now engages in sorting work at the Materials Recovery Facility (MRF). The wages of the union members are covered by proceeds from the sale of the recyclables (5,000 tons/year) recovered at the MRF. In many cases, waste pickers are vulnerable people in society who face difficulties in gaining employment as immigrants or as persons lacking basic education due to poverty.Disorganised picking activities hinder the safe and efficient operation of disposal sites and are a problem commonly shared among many African countries. This initiative may serve as a precedent that not only creates stable employment by organising these people, but also helps to improve the recycling rate.

Sorting work at the MRF

Final disposal stage

The introduction of sanitary landfills is proceeding in African cities, but it is difficult to say that these sites are being operated appropriately throughout Sub-Saharan Africa. The improvement of the management and operation of landfills is an urgent task, and many cities must take the first step of transitioning from open dumpsites to controlled landfills. Efforts toward improvement start with conducting environmental assessments to gain a full understanding of the present state of the open dumpsites such as the current waste amounts, geological properties, and hydraulic structures of the land, precipitation, and other meteorological conditions, as well as incoming waste amounts projected for the future. Only after these factors are fully understood will it be possible to design, operate, and manage disposal sites that minimise environmental burdens. Detailed surveys[22] of open dumpsites in Juba, South Sudan conducted to date have revealed cases of improvement to controlled landfills through relatively low-cost, simple civil engineering projects.[23] Unfortunately, the ensuing civil war has led to a resumption of open dumping in Juba. Sustained operation management is clearly needed after the disposal sites and construction works for improvement are completed.

Among the environmental burdens posed by landfills, a major issue related to climate change is the emission of methane and other greenhouse gases. In 2019, open dumpsites across Africa are expected to emit an estimated 1.3 million tons of greenhouse gases (calculation converted to carbon dioxide).[24] In order to minimise greenhouse gas emissions from dumpsites going forward, it will be necessary to minimise the direct landfilling of biodegradable organic wastes that emit greenhouse gases. As explained in the previous section on intermediate treatment, methods such as composting are extremely effective countermeasures on this point. Efforts are being made throughout the world to stabilise waste through large-scale composting by introducing mechanical biological treatment (MBT) plants. In Africa as well, analyses are showing that the introduction of MBT is a highly cost-beneficial strategy for limiting the generation of greenhouse gases.[25] While the microbes breaking down the biodegradable organic waste disposed of in landfills emit abundant greenhouse gases, many countries throughout the world are properly recovering and burning these landfill gases as sources of heat energy. Although there are still few examples of landfill gases recovery projects in Africa, South Africa is taking the lead in implementing these efforts.[26]

African countries and cities are outsourcing the operation management of final disposal sites to the private sector in many cases. To ensure proper, sustainable operation, administrative bodies responsible for solid waste management must monitor and supervise the status of disposal site operation management in a timely fashion. There are cases where landfills serve as vast areas for the recovery of valuables by the informal sector, and it is said that over 100,000 waste pickers are pursuing this activity throughout Africa.[27] Although this informal sector is clearly contributing to recycling activities in the solid waste management system, they are not necessarily positioned in formal systems. Their roles must be proactively recognised by the solid waste management authorities, and groups of dump waste pickers must be organised in order to prevent the unnecessary open burning, assure efficient landfill operation, and avoid damage and death due to mishaps such as the collapse of waste mounds or traffic accidents involving collection and transport vehicles.

When planning the construction of a new final disposal site in a country of Africa or elsewhere, whether advanced or developing, siting problems and consensus-building with surrounding communities and local residents can be challenging. The initial stages of construction of a new sanitary landfill in Accra, Ghana generated much conflict with local residents. The strengthened government capacity in consensus-building gained from formulating comprehensive land use and development plans from broader perspectives, introducing participatory approaches, conducting strategic environmental assessments in the planning stage, disclosing and sharing information, and coordinating land ownership based on plans is thought to be important for preventing and resolving this kind of conflict and facilitating the construction of sanitary landfills.[28] Note also that opposition from neighbouring residents and communities cannot be avoided even when attempts are made to secure new land for disposal sites, now that the improper management of existing final disposal sites has caused foul odours, scattered waste, negative environmental impacts, and the risk of dumpsite collapses. The proper management and safe closing of existing disposal sites is vital for the consensus-building required for new disposal sites.

Regarding the final disposal stage, the planning of technically viable designs based on a full, accurate understanding of site conditions is vital, while the development of engineers and capacity improvement at the

organisational level are essential for proper operation management. In addition, the capacity for consensus-building with local communities for securing land must be addressed as a societal-level issue.

Cross-sectional issues (cross-cutting issues)

Previous sections of this Data Book have discussed issues in each stage of the waste flow. The following section discusses cross-cutting issues that relate to all aspects of solid waste management.

1. A full, accurate understanding of waste flow

The concept of waste flow encompasses the status of solid waste management – waste generation amounts, collection amounts, and disposal amounts – and often forms the foundation for drafting implementation plans that set out the extent to which collection amounts and disposal amounts must increase in the future in response. A full understanding of waste flow is also fundamental for calculating Indicator 11.6.1 of the SDGs ("Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities"). Unfortunately, many cities in Africa – especially Sub-Saharan Africa – do not sufficiently understand waste flow. The poor understanding of waste flow probably stems from a lack of monitoring systems, lack of experience in managing contracts with relevant entities, and, on a technical level, a lack of necessary equipment (such as weighbridges) in place for accurate measurements, in the organisations implementing solid waste management.

A full understanding of the waste flow and quantitative monitoring of the amounts and compositions of waste are two of the most important organisational-level capacities for solid waste management organisations (these are described as "intellectual assets" in the item "Organisational level" in Table 4-1). In spite of this fact, there remains ample room for improvement in African countries and cities.

This issue can be resolved through efforts such as human resource development alongside the establishment of a waste flow monitoring system. Some cities in Botswana, for example, are using waste flow to monitor solid waste management data on a trial basis.[29] When there are limits to this kind of self-help, training-style assistance for management-level personnel should be an effective way to improve the understanding of the importance of data gathering, to better ensure the necessary budgets and personnel, and to expedite facility development.

2. A full understanding of the expenses required for solid waste management, and securing revenue

Expenses are always required to provide solid waste management services. Table 4-2 shows standard expenses for solid waste services indicated by the World Bank (2018). A comparison of the total expenditure on waste collection and transport services and final disposal, the services that should be provided at minimum, revealed that low-income countries spend 22 to 70 USD per ton for these services, while high-income countries spend 130 to 300 USD per ton. In terms of treatment price per ton of waste, high-income countries clearly spend more on solid waste services.

When tabulated as percentage of the gross national income (GNI), however, these rates range from 2.1% to 6.8% of GNI in low-income countries (assuming an annual income of 1,025 USD per person) versus 1.0% to 2.4% in high-income countries (assuming an annual income of 12,476 USD per person). Taking these economic levels into account, low-income countries spend more than twice as much as high-income countries.

Assuming that 0.5 kg of urban waste is generated per person per day in low-income countries, versus 1.5 kg per person per day in high-income countries, this would mean that the standard annual expense of solid waste services in low-income countries ranges from 4 to 13 USD per person per year, or 0.4% to 1.2% of GNI, while that in high-income countries ranges from 71 to 164 USD per person per year, or 0.6% to 1.3% of GNI. Given these figures, it has been posited that roughly 1% of household income in low-income countries and roughly 2% of household income in middle-income countries are sustainable levels of spending on waste.[30] Government authorities must consider these types of income restrictions and cultivate the capacity to draft financial plans based on the amounts people are able to pay for service fees, and the projected revenue, which includes general municipal financial resources and central government subsidies.

As explained in Chapter 3, most departments responsible for solid waste management in African countries understand the expenses required for solid waste management as individual expense items. Many of them,

however, do not grasp the overall expense of all aspects of solid waste management activities from collection to final disposal, or the unit cost (cost per ton of waste) of each waste flow process. The insufficient understanding of waste flow described previously may stem from this lack of knowledge. While expanding collection service areas, improving disposal sites from open dumpsites to controlled landfills, and making other efforts to incrementally improve solid waste management systems, unit costs are vital information for proper decision-making in terms of management and the foundational tools for analysing the solid waste management business in financial terms.

Table 4-2: Standard Expenses for Solid Waste Management Services[31] (USD/ton)

Service	Low-income countries	Lower-middle income countries	Upper-middle income countries	High income countries
Collection and transfer	20-50	30-75	50-100	90-200
Controlled landfill to sanitary landfill	10-20	15-40	20-65	40-100
Open dumping	2-8	3-10	-	-
Recycling	0-25	5-30	5-50	30-80
Composting	5-30	10-40	20-75	35-90

Definition of income level according to World Bank estimates of 2015 GNI per capita: Low (USD 1,025 or less); Lower middle (USD 1,026-4,035); Upper-middle (USD 4,036-12,475); High (USD 12,476 or more)

Improving capacity related to financing becomes all the more important as outsourcing to the private sector and collaboration between the public and private sectors progress in solid waste management businesses. In the municipal solid waste management business of the regional Ethiopian city of Bahir Dar, the increase in the quality of solid waste management services and clean city streets achieved through collaboration between the public and private sectors since 2008 has also rapidly increased expenditures.[32] The city has undertaken four countermeasures in response to these financial issues: (1) improving service fee collection rates from the present rate of 50%, (2) expanding the value chain for by-products of biodegradable organic waste, (3) striving to diversify sources of revenue and investments for increasing annual receipts (beneficiary charges, cross subsidy, business revenue), and (4) reducing and streamlining expenditures. Although efforts will differ depending on the conditions of individual countries and cities, these are specific examples of efforts to improve the capacity to deal with financing and finances for sustainable solid waste management service.

In sum, while a full understanding of the per-unit expenses is one of the most important organisational-level capacities for solid waste management organisations (see the fifth row from the bottom of Table 4-1, the organisational-level capacity “financing/financial capacity”), there is room for improvement in most African countries and cities. Improving that capacity will be a major challenge.

This issue can be resolved through human resource development alongside the introduction of solid waste management accounting systems and other efforts to create basic accounting systems and rules, develop accounting forms, and use waste flow to make calculations. When necessary, training-style assistance can also be effective.

3. Collaboration with the private sector and informal sector

The private sector is actively involved in various solid waste services (collection and transport, intermediate treatment, and final disposal site operation management) in nearly all African cities. This has improved the quality of services. In Dar es Salaam, the largest city in Tanzania, for example, private-sector involvement in waste collection, transport, and recycling has improved the collection rate from 10% to 40%.[33] Due to factors mainly on the government side, however, solid waste management services cannot always be provided properly: the government is failing to properly supervise operations, contracts have not been concluded, the contents of contracts are vague and poorly managed, and private-sector entities are not being properly paid. In other words, governments must improve their capacity to properly utilise the private sector. Systematically speaking, public-private partnership projects succeed when economic incentives exist for private-sector entities and the projects are under proper government management and supervision.

In addition, informal sector activity has been noted in nearly all cities surveyed. In some cities, employment opportunities, vocational training, and economic assistance are being provided through the government, aid agencies, NGOs and others. The informal sector plays a major role in informal residential areas not served by official collection services. Coexistence with the informal sector is vital for African cities with resource restrictions if they are to implement successful collection and recycling activities. There are various case examples of governments collaborating with the informal sector based on a full understanding of circumstances: the formalisation of the informal sector through the formation of waste picker cooperatives in Malawi,[34] internalisation in Côte d'Ivoire,[35] and integration in South Africa.[36] In Nigeria, however, the government failed to sufficiently support the waste pickers. To the contrary, it imposed restrictive policies upon the waste pickers which gave rise to wretched, unsanitary working conditions and a lower quality of recovered materials.[37] Social awareness is low in cases such as these, and collaboration between the public and private sectors progresses poorly.

In light of the above, there is a need to improve the societal-level capacity to collaborate and cooperate with the private sector and informal sector, and also to improve institutional-level capacities such as incentive systems that support collaboration and cooperation, and organisational-level capacities such as proper contract management (see Table 4-1).

4. Improving the capacity to enforce legislation/standards

In all countries, municipal solid waste management is implemented as a public service for which the government or municipality is accountable. In that sense, it is normal to clearly set out parameters such as accountability, authority, scopes of operation, regulations, standards, and other elements of solid waste management in the form of established legislation and standards. In total, 36% of the countries that responded to the web questionnaire (25 valid responses) have not established sufficient legislation or standards for solid waste management. Even among countries that have established legislation and standards to some degree, 87% (16 valid responses) have legislation and standards that are ineffective. This indicates that the institutional-level capacity of "establishing legislation/standards" is a fundamental issue, and that making the legislation and standards effective after establishing them – that is, improving enforcement capacity by which legislation and standards form the basis for the government's creation of specific policies, strategies, plans, and detailed regulations, and monitoring, guidance, regulation, and supervision of projects and the like – is an extremely important issue. This illustrates the need to improve the capacity of government personnel, and also to improve the organisational-level capacity to formulate specific plans and implement work in line with the given legislation and standards. These issues were intensively discussed at the conference to establish the ACCP in Maputo, Mozambique in April 2017, and the First ACCP General Meeting in Rabat, Morocco in June 2018. While acknowledging that the development of capacities (facilities, machinery, and technology) required to deal with solid waste management correlates with a country's economic development and human development index, it was pointed out that the enforcement capacity and institutional-level capacities are deeply impacted by politics and decision-making processes and require efforts distinct to the conditions in each country and city.[38] This includes the issue of multifaceted public awareness and education focused on spreading awareness and understanding of the importance of solid waste management among policymakers, high-level decision-

makers, and assemblies, and also on defining how residents and society at large should implement solid waste management.[39] While 16 of the ACCP members have established national basic laws such as policies or strategies on solid waste management of some form or another (see 3.3), nearly half of the members overall have yet to do so. This absence of policies and strategies is presumed to be one factor behind the aforementioned assessment ("legislation is not effective") from the results of this survey.

The issues faced in using legislation and standards to formulate policies, strategies, and plans, and in improving the capacity to enforce the same, mainly revolve around institutional-level issues of coping capacity. They also involve capacity improvement in general, however, not only in the implementing agencies and government organisations, but in societal level at large (see Table 4-1).

5. Personnel development

Personnel development is the final cross-sectional issue to discuss in this section. As explained in Chapter 3, the number of universities and organisations providing education in the field of solid waste management in African countries is increasing. This education, however, has yet to supply sufficient personnel to meet the demand for overall capacity improvement in solid waste management. There is a growing need to develop personnel who are not only educated and trained in individual technologies, but also have a holistic view of solid waste management as a system and are capable of proper planning and operations management. It has also become more important than ever to improve the quality of education, conduct regional training courses, workshops, and seminars, and create opportunities to exchange information among experts in the respective countries. In order to create incentives, it will likewise be necessary to consider introducing national qualification systems and systems for assignment and licensing based on those qualifications.

Personnel development is an individual-level issue (see Table 4-1), and improving it directly leads to improved organisational-level capacities.

4.2 Roles and Direction of Activities of ACCP

As shown in Table 4-1, it is possible, to a certain extent, to classify by type of the issues faced by many African countries and the approaches required to improve on them. As multiple issues pile up, however, the question of how to prioritise, select improvement methods, secure budgets, ensure organisational and personnel systems, and undertake other specific efforts yields different answers that depend on the circumstances of each country and city. When considering countermeasures, it is important to properly understand the social and economic structures in place, the history of the city's development, the status of its organisations and systems involving waste, geographic and structural characteristics, and other elements in the environment surrounding waste. In addition to a willingness to improve at the grassroots level, the involvement of government decision-makers and the existence of upstream policies and national plans in waste and environmental management are vital elements for realising the effectiveness of the countermeasures. In other words, it would be extremely difficult to achieve sustainable solid waste management without ownership by countries and cities or the leadership of decision-makers.

The ACCP began with the establishment of the African Solid Waste Management Seminar, a side event at the Sixth Tokyo International Conference on African Development (TICAD VI) held in Nairobi, Kenya in August 2016. The participants at this seminar discussed the present state and issues of solid waste management in Africa and approaches to contribute to the achievement of SDGs by improving upon them. Through the discussion, the participants agreed to establish a platform made up of a diverse range of stakeholders as a framework for supporting and promoting solid waste management improvement policy based on the active participation of African countries.

Given this background, the sharing of knowledge and experience amongst a diverse range of stakeholders has been the foundation of the ACCP's activities since its establishment. The members of the ACCP have

devoted energy to expediting the creation of new innovation not only from successful examples established in developed countries, but also from gathering and sharing ongoing efforts in Africa. The member countries and cities have thus been able to learn from, cooperate with, and stimulate one another.

ACCP general meetings, TICAD, and other international conferences are also viewed as good opportunities to strive to promote improved policy prioritisation and fund mobilisation. Efforts have been made to encourage the participation of representatives of member countries in addition to donor countries, international agencies, private companies, and other stakeholders, and to move towards the expansion of a more flexible, effective network.

These approaches were confirmed in the Maputo Declaration, the outcome document from the meeting held to establish the ACCP, in Maputo, Mozambique, and also in the Rabat Declaration, the outcome document of the First ACCP General Meeting held in Rabat, Morocco in June 2018. Below are the main functions and future direction of the ACCP, along with examples of specific efforts by partner organisations and member countries and cities.

4.2.1 Network Strengthening Toward More Open Collaboration

As explained in Chapter 2, solid waste management nowadays is not an issue confined to regions. To the contrary, solid waste management is deeply connected to the global issues of maintaining and preserving surrounding environments and natural resources, reforming production, consumption, and social systems toward the realisation of sound material cycle societies, and measures to combat climate change and marine plastic waste.

With co-organising institutions (the Ministry of the Environment of Japan, JICA, UNEP, UN-Habitat, and the City of Yokohama) fulfilling coordinating roles, the ACCP is making efforts to expand wide-reaching partnerships with countries, local governments, international agencies, corporations, civic groups, and other entities with an interest in these issues.

With these diverse partners positioned as helpful resources, the ACCP will leverage their strengths in presentations and exhibitions at relevant conferences, lectures at themed seminars and workshops, and field visits, as opportunities to contribute to improved solid waste management.

4.2.2 Gathering/Sharing Knowledge

Using various media

In addition to presenting and sharing information face-to-face at meetings and in the field, the ACCP disseminates information via websites and social media and creates and publishes this Data Book including country profiles and city profiles on solid waste management, a publication entitled the 'Basics of Municipal Solid Waste Management in Africa,' and 'A Guidebook for Environmental Education on Solid Waste Management in Africa,' and more.

The foregoing publications are the culmination of primary data collection from countries and cities based on cooperation from the focal points, information gathered through the activities of co-organising institutions, and knowledge and experience gathered from affiliated groups, local governments, and others. The publications serve as practical tools for the practitioners attempting to improve solid waste management. In addition, official websites and social media enable the timely and two-way sharing of information through reports on relevant activities such as cleaning campaigns implemented in each country, webinar streaming, and more.

Sharing experiences from developed countries

Learning from the experiences of developed countries and cities is effective not only for imparting technical know-how, but also for enabling the entities responsible for solid waste management in each country and city to clarify goals and visualise what they want their solid waste management to look like. Through “Sustainable Solid Waste Management in African Countries” (JICA Group and Region-Focused Training), the ACCP welcomed 33 trainees from 25 countries to Japan from 2017 through February 2019. With full cooperation from the City of Yokohama and other Japanese municipalities, this training enabled trainees to gain a comprehensive understanding of the administrative systems, legislation, and medium-term and long-term financial structure of solid waste management; the technologies underlying waste collection and transport, organic waste treatment, waste incineration, intermediate treatment, final disposal, and facility and equipment maintenance; the technologies of private companies; the activities of local governments and communities; and more. The trainees are using the lessons they learned in the training to devise action plans for improving solid waste management in their cities and are expected to share and refine their plans with affiliated institutions and translate their plans into specific activities back in their home countries.

Using local African resources

The host cities of the ACCP meetings, namely Maputo, Mozambique and Rabat, Morocco, have made enormous contributions by presenting their solid waste management efforts and allowing onsite observation. In addition, a study tour for final disposal site improvement based on the Fukuoka Method was implemented in Addis Ababa, Ethiopia in December 2018.

Even now, exposure to the efforts underway in neighbouring countries in Africa and the lessons they have learned from the on-the-ground realities and trial-and-error efforts provide good opportunities for countries and cities to learn and notice things more autonomously by substituting their own conditions into those situations, asking themselves how they would respond, and exchanging opinions with other participants. The ACCP intends to continue efforts to unearth local resources and encourage proactive sharing from member countries.

Study Tour in Addis Ababa, Ethiopia

A study tour on landfill management was held in Addis Ababa, Ethiopia from December 10 to 14, 2018. Approximately 30 practitioners in solid waste management from 14 African countries attended.

In a tragic accident that struck at the Koshe dumpsite in Addis Ababa in March of 2017, a section of a 50-metre high waste pile collapsed, killing a large number of waste pickers and nearby residents. In response, grant aid from the Japanese government was mobilised in a project to stabilise the waste pile and prevent future collapse. A Japanese grant aid project has been implemented by UN-Habitat and a Japanese NPO, Solid Waste Management Advisers Network Fukuoka (SWAN-Fukuoka), since April of 2018. The participants visited the dumpsite during the study tour. One team member was Professor Matsufuji (Emeritus Professor of Fukuoka University) from SWAN, an active proponent of technical transfer in developing countries for over 40 years and one of the developers of the "Fukuoka Method" focused on the design of semi-aerobic landfills. Professor Matsufuji explained a method for minimising steep slopes by creating terraces, as well as gabion-based drainage systems, and other matters.

Improper disposal site management and the risk of landfill collapse are common problems among African countries. The site visit and lectures at Addis Ababa provided a highly engaging learning experience with enthusiastic exchanges of question and discussions among all participants.

Visit to the Koshe landfill

4.2.3 Exploratory Efforts to Promote Investment

Most African countries have constraints to their public budgets that could become serious bottlenecks in their efforts to implement solid waste management measures. To better assure sustainability and independent development, the ACCP itself forgoes any role as a funding provider. The organisation does, however, encourage the proactive acquisition of external funding from member countries and cities. Specifically, the platform is exploring various opportunities to acquire funding through the formulation of projects with donor countries and international agencies that endorse ACCP's vision, and the promotion of collaboration with corporations that have an interest in environmental and solid waste businesses in Africa.

4.2.4 Gathering Data and Monitoring SDGs Achievement

This Data Book represents the first attempt to gather information directly from the organisations responsible for solid waste management in each country and city through web questionnaires and profile compilation. As the endeavour started from scratch, great contributions from the focal points were required to gather the extensive amounts of information needed. The process itself, however, could help the entities responsible for solid waste management to objectively understand the present state of solid waste management in their own countries and cities. Further, the use of the standardised forms to gather and publicise information for each country enables interregional and intraregional comparisons and is useful in confirming the progress of countermeasures.

Although improved reliability and regular updating of the data remain key issues, the profiles will serve as a basis for combining the standardisation of data collection and calculation methods, the creation of manuals, the implementation of workshops and training, and more, and thereby lead to improved solid waste management capacity based on quantitative data. In addition, this data should be used effectively to monitor SDG indicators.

4.2.5 Consolidating the Foundation for Implementation in Africa

Consolidating the foundation for solid waste management in Africa is essential for implementing the aforementioned activities, particularly for utilising and spreading positive examples and lessons from African countries. The ACCP will endeavour to further improve ownership among member countries and to develop activities that are more deeply rooted in Africa by steadily transferring the functions of the ACCP Secretariat to the region.

End

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ANNEX

Country Profiles (29 countries)
City Profiles (41 cities)

Country Profile and City Profile

Country profiles and city profiles have been prepared based on information provided by the focal points of ACCP member countries and cities. Basic information on waste management in 29 countries and 41 cities are succinctly summarised in a common form. It will help readers to easily understand the overview of waste management in each country and city, and to compare the differences in situation between the countries and the cities. The methods used to gather information from the respective countries and cities are explained in Chapter 1, Section 1.3: Information Sources.

Analysed Countries and Cities

The analysis of the current state of waste management in Chapter 3 mainly focused on capital cities or major cities of equivalent scale. Although information from smaller cities has been also collected in some countries, the data have not been included in the analysis because waste management in provincial cities and large cities is different.

Common Items for Country Profiles

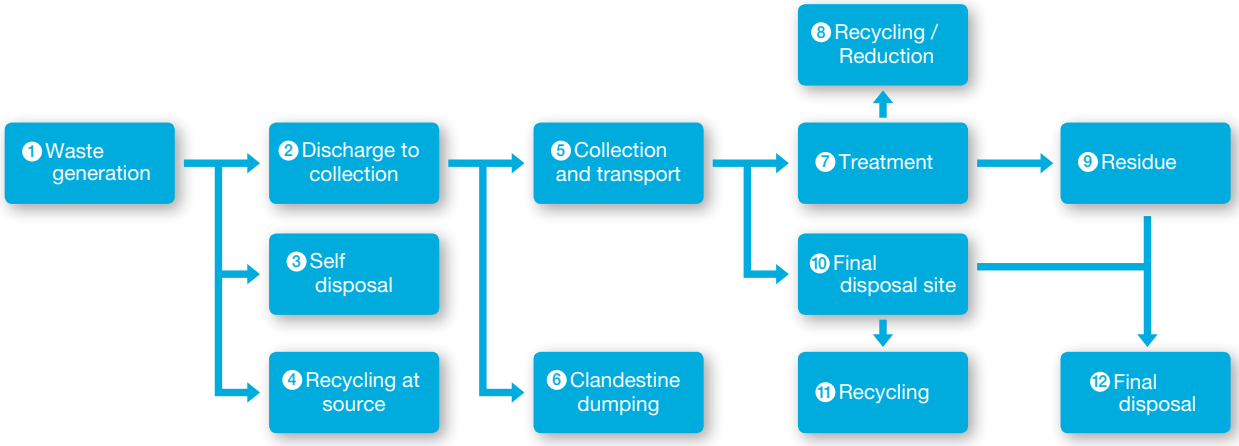
"Status of Access to Basic Services (in Urban Area)" is defined as follows:

Water	At least access to drinking water from an improved source, provided collection time not more than 30 minutes for a round trip, including queuing. Improved sources include piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water.
Sanitation	At least access to improved facilities that are not shared with other households. Improved facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, composting toilets, or pit latrines with slabs.
Hygiene	Access to handwashing facilities on premises with soap and water. Handwashing facilities may be fixed or mobile and include a sink with tap water, buckets with taps, tippy-taps, and jugs or basins designated for handwashing. Soap includes bar soap, liquid soap, powder detergent, and soapy water but does not include ash, soil, sand, or other handwashing agents.
Electricity	A household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average. A basic bundle of energy services means, at a minimum, several lightbulbs, task lighting (such as a flashlight), phone charging, and a radio.

Sources: Water, Sanitation and Hygiene: WHO/UNICEF (2017) Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG baseline.
Electricity: International Energy Agency, Energy Access Outlook 2017: From Poverty to Prosperity

Common Items for City Profiles

"Waste Amount at Each Stage of Waste Flow" corresponds to the figure below.



Country Profiles

Country	Survey Methods				Page
	On-site	Inter-view	Web quest.	Submit form	
Angola		●	●		3
Benin			●		5
Botswana			●		7
Burkina Faso			●		9
Cameroon			●		11
Central African Republic				●	13
Chad				●	15
Comoros			●		17
Congo		●	●		19
Côte d'Ivoire			●		21
Democratic Republic of the Congo	●		●		23
Egypt		●	●		25
Ethiopia	●		●		27
Ghana			●		29
Guinea			●	●	31
Lesotho		●			33
Madagascar	●		●		35
Malawi		●	●		37
Mauritius			●		39
Mozambique			●		41
Namibia			●		43
Niger			●		45
Nigeria			●		47
Senegal		●	●		49
South Africa		●	●		51
South Sudan		●			53
Sudan		●	●		55
United Republic of Tanzania		●	●		57
Zambia	●		●		59

City Profiles

City	Country	Survey Methods				Page
		On-site	Inter-view	Web quest.	Submit form	
Kweneng	Botswana			●		61
Ouagadougou	Burkina Faso		●	●		63
Yaoundé	Cameroon			●		65
Bangui	Central African Republic		●	●		67
Brazzaville	Congo			●		69
Abidjan	Côte d'Ivoire			●	●	71
Kinshasa	Democratic Republic of the Congo	●	●	●		73
Djibouti	Djibouti	●	●	●		77
Alexandria	Egypt		●	●		79
Mbabane	Eswatini			●		81
Addis Ababa	Ethiopia	●		●		83
Bahir Dar*	Ethiopia	●				85
Hawasa*	Ethiopia	●				87
Libreville	Gabon			●		89
Tema	Ghana		●	●		91
Conakry	Guinea			●	●	93
Kiambu	Kenya		●	●		95
Nairobi	Kenya			●		97
Maseru	Lesotho		●	●		99
Monrovia	Liberia		●			101
Antananarivo	Madagascar	●	●	●		103
Blantyre	Malawi		●	●		105
Beira*	Mozambique				●	109
Gurué*	Mozambique				●	111
Inhambane*	Mozambique				●	113
Maputo	Mozambique			●		115
Matola*	Mozambique				●	117
Quelimane*	Mozambique				●	119
Quissico*	Mozambique				●	121
Sussundenga	Mozambique				●	123
Tete*	Mozambique				●	125
Vilankulo*	Mozambique				●	127
Windhoek	Namibia		●	●		129
Niamey	Niger		●	●		131
Abuja	Nigeria		●	●		133
Kaduna	Nigeria		●	●		135
Juba	South Sudan		●	●		137
Khartoum	Sudan		●	●		141
Lusaka	Zambia	●	●	●		143
Bulawayo	Zimbabwe			●		145
Harare	Zimbabwe			●		147

* Not included in the analysis in Chapter 3.

Angola

Angola, officially the Republic of Angola, is a country in Southern Africa. It is the seventh-largest country in Africa, bordered by Namibia, the Democratic Republic of the Congo, and Zambia, with the Atlantic Ocean to the west. The capital and largest city of Angola is Luanda. Independence was achieved in 1975 as the Marxist-Leninist People's Republic of Angola. Angola is divided into 18 provinces (províncias) and 162 municipalities. The municipalities are further divided into 559 communes (townships). Angola has vast mineral (diamonds, gold, copper) and petroleum reserves.*
The National Waste Agency was established in 2014 based on the Strategic Plan for the Management of Urban Waste, 2012. However, implementation of the strategy is not taking place at local government (municipal) level. Some financial systems for cost recovery of SWM are in place, particularly for collection of industrial (commercial) waste.

Source: * Wikipedia, Angola, accessed 27 February 2019, <https://en.wikipedia.org/wiki/Angola>

Information

Population*	29.78 million (2017)
Population growth (annual %)*	3.3 (2017)
Area (km^2)*	1,246,700
GDP (current USD)*	122.12 billion (2017)
GDP growth (annual %)*	-0.1 (2017)
GNI per capita, Atlas method (current USD)*	3,570 (2017)
Main industries**	Mining and natural resources (diamonds, oil, gold, copper)
Currency***	USD 1 : AOA 312.6 (Angolan kwanza) (February 2019)

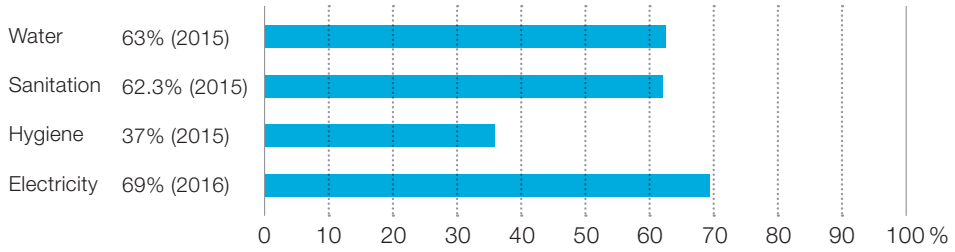
Sources: * World Bank, Angola, accessed 14 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=AGO>
** Wikipedia, Angola, accessed 27 February 2019, <https://en.wikipedia.org/wiki/Angola> *** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is a Basic Law of the Environment No. 5/98 of June, published in the Official Journal No. 27, I Series. This law does not have provisions on SWM (i.e. this means there is no basic law on SWM). ● Related policies are outlined under: 》Presidential Decree No. 196/12, of August 30, approving the Strategic Plan for the Management of Urban Waste, pages 4787 to 4862, published in the Official Journal No. 168 of Series I. 》Presidential Decree No. 190/12, of August 24, approving the Regulation on Waste Management, from page 3770 to 3809, published in the Official Journal No. 164 of the I Series.
Policy/Plan	● Strategic Plan for the Management of Urban Waste, 2012. This Plan needs revision because the implementation is not in accordance with the Plan. ● There are also other related Strategic Plans: the Strategic Plans on Construction Waste 2014, and the Strategic Plan on Medical Waste 2014. ● The National Waste Agency was established based on the Strategic Plan. Provincial level and municipal level planning have not been in line with the Strategic Plan developed at the national level. The existing municipal level plans do not reflect the reality of the municipalities, hence the Plan requires revisions so that the Plan reflects realistic pictures at the municipality level.
Implementation system	● The National Waste Agency is in charge of SWM at the national level. It also has mandates to provide technical support for implementation of environmental policies in accordance with the principles of waste management at the local level, which has been difficult to fulfil. ● 30 staff members are working at the National Waste Agency. There are three board members, and seven department heads, all of whom have been trained in SWM at university level. They are primarily acting in advisory roles to the Ministry as implementation issues have prevented them playing roles vis-à-vis local government. ● Ministry of Health, Ministry of Petroleum and Ministry of Industry are also relevant in implementation of SWM policies. ● Informal sectors are involved in collection of recyclable materials at disposal site and scrap marketing. ● There is a sanitary landfill, but no data is available.

Item	Outline
Financial system	● There is national budget for SWM and taxation (as part of utility payment) on SWM (approx. 500-1000 kwanza/household/month). ● Industrial (commercial establishment) waste collection is charged.
Donor support	● There is no donor support available on SWM.
Areas for improvement	● In terms of legal/policy issues, implementation of Strategic Plan is not going as planned and revisions are required. ● In terms of technical issues, collection and recycling are high priority issues. ● In terms of financial issues, development of fee system and applying waste tax system are important. ● In terms of social issues, social inclusion of waste pickers is important.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

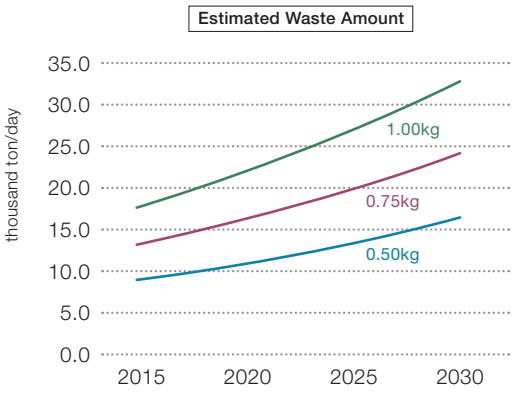
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	27,859	32,827	38,431	44,712
	Urban	17,676	21,937	26,848	32,437

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	8.8	11.0	13.4	16.2
	0.75 kg/pers/day	13.3	16.5	20.1	24.3
	1.00 kg/pers/day	17.7	21.9	26.8	32.4

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Benin

Benin is in West Africa, and is bordered by Togo to the west, Burkina Faso and Niger to the north, Nigeria to the east, and the Bight of Benin to the south. Benin covers an area of 114,760 square kilometres and has a population of 11.18 million. About 46% of the population reside in urban areas. The highest concentration of people in the country reside in and around the cities on the Atlantic Coast. Benin's economy is highly dependent on subsistence agriculture, cotton production, and regional trade. Cotton accounts for about 80% of export earnings.
The Agency for Territory Development under the Office of the Presidency of the Republic is responsible for solid waste management. SWM strategy in the country is addressed as part of the 2016-2021 Government Action Plan. However, there is no national budget for SWM. There is informal sector participation in SWM but there are no specific policies for supporting this sector.

Information

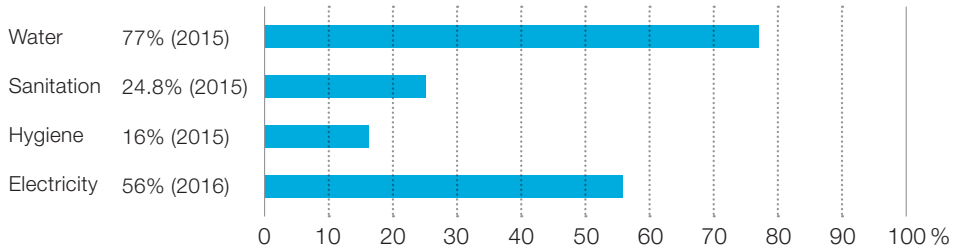
Population*	11.18 million (2017)
Population growth (annual %)*	2.8 (2017)
Area (km^2)*	114,760
GDP (current USD)*	9.25 billion (2017)
GDP growth (annual %)*	5.8 (2017)
GNI per capita, Atlas method (current USD)*	800 (2017)
Main industries**	Textile, food processing, construction materials
Currency***	USD 1 : XOF 577.81 (West African CFA franc) (February 2019)

Sources: * World Bank, Benin, accessed 14 March 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=BEN>
** Wikipedia, Benin, accessed 2nd August 2018, <https://en.wikipedia.org/wiki/Benin>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Law No. 97-029 of 15 January 1999 on the organisation of municipalities in the Republic of Benin (Articles 93, 94, 95 and 96 of Chapter 3) specifies the commune's environmental competencies.
Policy/Plan	● SWM is addressed in the 2016-2021 Government Action Plan.
Implementation system	● The Agency for Territory Development is responsible for solid waste management. ● Other institutions involved in solid waste management include: » Ministry of the Living Environment. ● Number of staff in the department: » Three people work in the department. » Three people studied SWM or a related course at university. » One person has worked in the SWM sector for five years or more. ● Informal sector participation: The informal sector participates in solid waste management through the collection of recyclable materials, but there is no specific policy for supporting this sector. ● Sanitary landfills: Data not provided. ● Collection of SWM data: There is no data on the amount of waste generated, collected, disposed of, or recycled. However, there is a system for collecting SWM data, but the data is not collected frequently.
Financial system	● There is no national budget for SWM. ● There is no subsidy related to SWM. ● There is tax related to SWM.
Donor support	● There is no donor support.
Areas for improvement	● Staff capacity building. ● Stable access to finance for SWM. ● Promote awareness about SWM.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

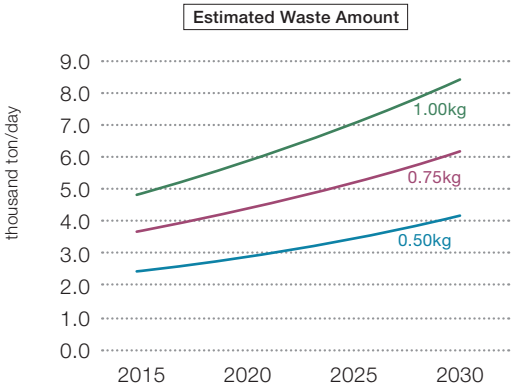
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	10,576	12,123	13,809	15,628
	Urban	4,833	5,869	7,076	8,461

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	2.4	2.9	3.5	4.2
	0.75 kg/pers/day	3.6	4.4	5.3	6.3
	1.00 kg/pers/day	4.8	5.9	7.1	8.5

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Botswana

Botswana is in southern Africa, positioned between South Africa, Namibia, Zambia and Zimbabwe. It has an area of 581,730 square kilometres and a population of about 2.29 million. Gaborone is its capital and largest city. About 67% of the population reside in urban areas. The population is concentrated in the east with a focus in and around the capital Gaborone, and the far central eastern city of Francistown.*

SWM is the responsibility of the Department of Waste Management and Pollution Control, under the Ministry of Environment, Natural Resource Conservation and Tourism. The Ministry is responsible for formulating policies and legislation, and for monitoring the waste sector to prevent and control pollution. Botswana has enacted waste management legislation and has developed waste management policies and strategies. There is an established system for collection of SWM data, but the system covers only a few cities. Currently, there are fourteen sanitary landfills in the country. Although Botswana has made significant progress in SWM, SWM legislation, the institutional set-up, and waste recycling system all need to be reviewed.

Sources: * Wikipedia, Botswana, accessed 2nd August 2018, <https://en.wikipedia.org/wiki/Botswana> and World Bank, Botswana, accessed 29 March 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=BWA>

Information

Population*	2.29 million (2017)
Population growth (annual %)*	1.8 (2017)
Area (km^2)*	581,730
GDP (current USD)*	17.4 billion (2017)
GDP growth (annual %)*	2.4 (2017)
GNI per capita, Atlas method (current USD)*	6,730 (2017)
Main industries**	Mining, tourism, agriculture
Currency***	USD 1 : BWP 10.65 (Botswana pula) (August 2018)

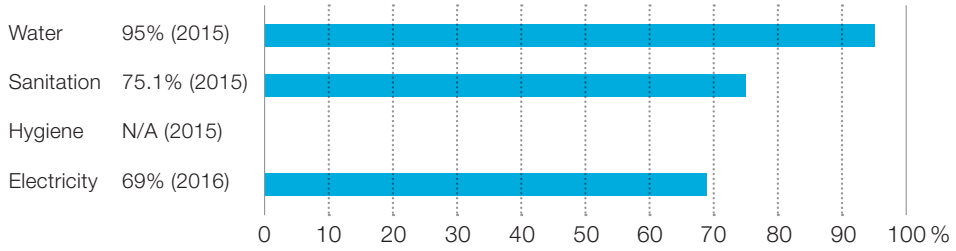
Sources: * World Bank, Botswana, accessed 29 March 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=BWA>
** Wikipedia, Botswana, accessed 2nd August 2018, <https://en.wikipedia.org/wiki/Botswana>
*** Cuex.com

Current SWM Situation

Item	Outline
Legal system	● Waste Management Act 1998 ● Statutory Instrument for the Plastic Ban 2018 ● Energy Regulatory Policy ● Environmental Impact Assessment Act 2011 ● Public Health Act 2013
Policy/Plan	● Waste Management Policy of Botswana 1998 ● Waste Management Strategy of Botswana 1998 ● Generic Waste Management Plans prepared for the local authorities in 2017
Implementation system	● The Ministry of Environment, Natural Resource Conservation and Tourism is responsible for solid waste management. The Ministry is responsible for the following: » Regulating and monitoring the waste sector to prevent and control pollution of the environment by inappropriate waste management practices. » Formulating policies and legislation. » Promoting the economic value of waste. » The department is responsible for all types of waste including radioactive waste, clinical waste, wastewater, and chemical waste. ● Other institutions involved in waste management include: » The National Health Sciences: offers courses on environmental health. » University of Botswana: offers courses on toxicology, environmental impact assessment, and microbiology. » JICA Office: offers training courses on solid waste management.

Item	Outline
	● Number of staff in the SWM department: » Total number of staff: 99 » Number of staff that took SWM and/or related course at university: 75 » Number of staff that have worked in the SWM sector for over five years: 25 ● Sanitary landfill: there are 14 sanitary landfills. ● System for collection of SWM data: there is a system for collecting SWM data, but the system only covers a few cities, not the whole country.
Financial system	● The national budget for SWM is USD 11,200,000 per year. ● There is an annual recurring budget allocation from the Government. ● There are no SWM-related subsidies available to local governments. ● There is no tax related to SWM.
Donor support	● Swedish Trade Council: Air Quality Strategy Framework Project. ● Japanese sponsorship through JICA Botswana.
Areas for improvement	● Review of the Waste Management Act. ● Establishment of a fully fleshed department under the Ministry of Local Government and Rural Development to deal with solid waste management. ● Establishment and development of waste recycling centres to reclaim recyclable waste, such as waste transfer stations and sorting centres. ● Introduction of technologies such as combustible waste incineration and biomethane production technologies. ● Promotion of the economic value of waste by educating and empowering the communities on waste recycling and reuse initiatives. Introduction of incentives for promoting waste management.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

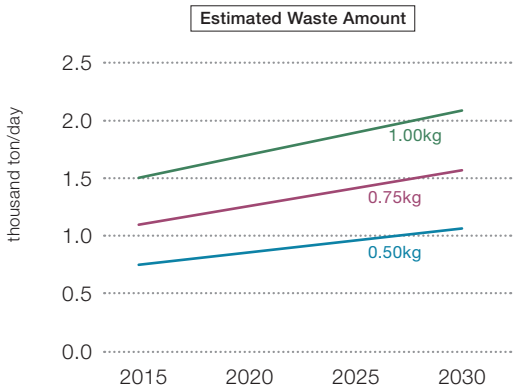
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	2,209	2,416	2,614	2,800
	Urban	1,484	1,712	1,937	2,151

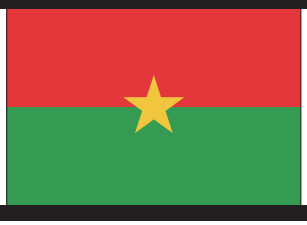
unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	0.7	0.9	1.0	1.1
	0.75 kg/pers/day	1.1	1.3	1.5	1.6
	1.00 kg/pers/day	1.5	1.7	1.9	2.2

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.



Burkina Faso

Burkina Faso is a landlocked country in West Africa. It borders Mali to the north, Niger the east, Benin to the southeast, Togo and Ghana to the south, and Côte d'Ivoire to the southwest. Burkina Faso covers an area of 274,220 square kilometres, has a population of 19.19 million, and about 27% of the population reside in urban areas. The population is concentrated in the central and southern parts of the country, while the east, north, and southwest are less populated. Nearly 80% of the population is engaged in subsistence farming, and cotton is the main cash crop.

SWM is the responsibility of the General Directorate of Environmental Conservation, under the Ministry of Environment, Green Economy and Climate Change. The Directorate is responsible for all types of waste. Other institutions involved in SWM include the Ministry of Health (responsible for biomedical waste), Ministry of Agriculture (responsible for agricultural waste), and municipalities (responsible for municipal waste). There is a basic law on SWM and there is a national SWM policy. However, there is no national budget for SWM.

Information

Population*	19.19 million (2017)
Population growth (annual %)*	2.9 (2017)
Area (km^2)*	274,220
GDP (current USD)*	12.32 billion (2017)
GDP growth (annual %)*	6.3 (2017)
GNI per capita, Atlas method (current USD)*	590 (2017)
Main industries**	Agriculture, mining
Currency***	USD 1 : XOF 577.81 (West African CFA franc) (February 2019)

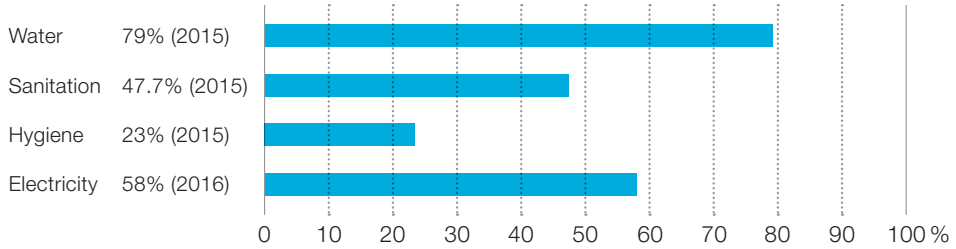
Sources: * World Bank, Burkina Faso, accessed 8 April 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=BFA>
** Wikipedia, Burkina Faso, accessed 2nd August 2018, <https://en.wikipedia.org/wiki/Burkina_Faso>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Decree 98-323/PRES/PM/MATS/MIHU/MS/MTT. The decree regulates the collection, storage, transportation, treatment, and disposal of urban waste (1998).
Policy/Plan	● National Sanitation Policy and Strategy adopted in 2007.
Implementation system	● The General Directorate of Environmental Conservation under the Ministry of Environment, Green Economy and Climate Change, is responsible for solid waste management (SWM). The Directorate is responsible for all types of waste, including municipal and hazardous waste. ● Other institutions involved in waste management include: » Ministry of Health: responsible for biomedical waste. » Ministry of Agriculture: responsible for agricultural waste. » Municipalities: responsible for municipal waste. ● Number of staff in the SWM Department: » Thirty people work in the SWM department. » Twenty people studied SWM and/or related course at university. » Five people have worked in the SWM sector for five years and more. ● Informal sector participation: There is informal sector participation in SWM through collection of recyclable materials, but there is no specific policy for supporting this sector. ● Collection of SWM data: There is no established system for the collection of SWM data from local government. ● Final disposal: Data not provided.
Financial system	● There is no national budget for SWM. ● There is no subsidy related to SWM. ● There is no tax related to SWM.
Donor support	● UNEP supports the municipalities and associations in the management and recovery of waste. ● The World Bank has supported the municipalities of Ouagadougou and Bobo Dioulasso for the development of schemes for the management of waste and construction of technical landfills.

Item	Outline
Areas for improvement	● Solid waste recycling framework. ● Establish procedures using the polluter pays principle. ● Environmental education.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

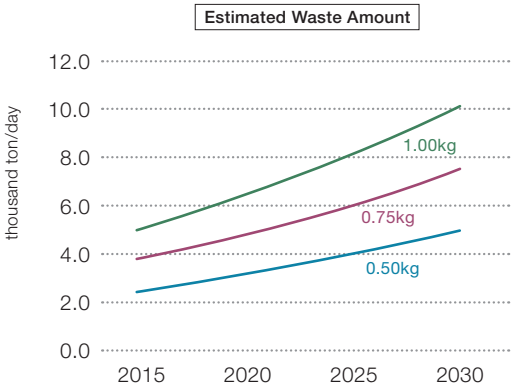
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	18,111	20,903	23,991	27,382
	Urban	4,986	6,398	8,113	10,163

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	2.5	3.2	4.1	5.1
	0.75 kg/pers/day	3.7	4.8	6.1	7.6
	1.00 kg/pers/day	5.0	6.4	8.1	10.2

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Cameroon

Cameroon, officially the Republic of Cameroon, is in West Africa, bordering Nigeria to the west and north, Chad to the northeast, the Central African Republic to the east, and Equatorial Guinea, Gabon, and Congo to the south. Cameroon covers an area of 475,440 square kilometres and has a population of about 24.05 million people. About 55.8% of the population in the country reside in urban areas. The population is concentrated in the west and north, with the interior of the country sparsely populated. Cameroon has a market-based diversified economy featuring oil and gas, timber, aluminium, agriculture, mining and the service sector. Oil remains Cameroon's main export commodity.*

The Department of Standards and Control under the Ministry of Environment is responsible for solid waste management (SWM). Other institutions involved in waste management include the Ministry of Health (responsible for medical waste), and the Ministry of Habitat, which is responsible for municipal waste management. A national strategy for SWM exists and there is a national budget of about XAF 4 billion for SWM. However, there is no basic law on municipal SWM, no sanitary landfill except the Nkolfoulou Landfill in Yaoundé and no established system for collection of SWM data from local governments. The following areas need attention: institutional set-up, system of waste segregation and recycling, and sources of income for waste management.

Sources: * World Bank, Cameroon, accessed 14 March 2019 <http://databank.worldbank.org/data/reports.aspx?source=2&country=CMR> and Central Intelligence Agency, Cameroon, accessed 14 March 2019 <https://www.cia.gov/library/publications/the-world-factbook/geos/cm.html>

Information

Population*	24.05 million (2017)
Population growth (annual %)*	2.6 (2017)
Area (km^2)*	475,440
GDP (current USD)*	34.92 billion (2017)
GDP growth (annual %)*	3.5 (2017)
GNI per capita, Atlas method (current USD)*	1,370 (2017)
Main industries**	Oil, gas, timber, agriculture, mining
Currency***	USD 1 : XAF 577.81 (Central African CFA franc) (February 2019)

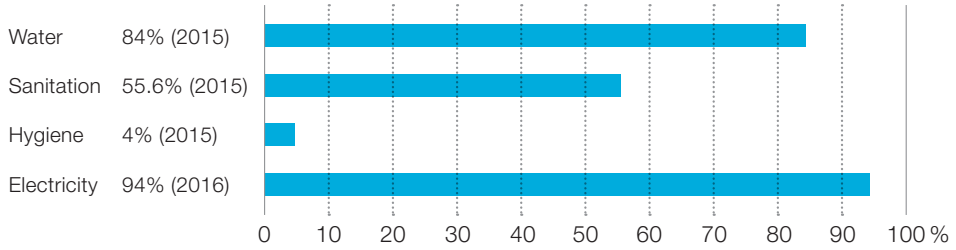
Sources: * World Bank, Cameroon, accessed 14 March 2019,<http://databank.worldbank.org/data/reports.aspx?source=2&country=CMR>
** Central Intelligence Agency, Cameroon, accessed 14 March 2019, <https://www.cia.gov/library/publications/the-world-factbook/geos/cm.html>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no basic law on municipal solid waste management. ● Decree N° 2012/2809/PM of 26 September 2012 sets the conditions for sorting, collecting, storing, recovering, recycling, treating and final disposal of waste. ● Decree N° 001/MINEPDED of 15 October 2012 fixes the conditions for obtaining an environmental permit in matters of management of waste.
Policy/Plan	● National Strategy for Waste Management, 2007.
Implementation system	● SWM is the responsibility of the Department of Standards and Control, under the Ministry of Environment. ● Other institutions involved in waste management include: » Ministry of Health: responsible for medical waste. » Ministry of Water and Energy: responsible for liquid waste. » Ministry of Habitat: responsible for municipal waste management. ● Informal operators are involved in collecting recyclable materials from the streets. ● Number of staff in the SWM department: » Total number of staff: 5 » Number of staff that took SWM and/or related course at university: 3 » Number of staff who have worked in SWM sector for over 5 years: 2 ● System for collection of SWM data: A system for collection of SWM data from local governments exists, but the system does not cover the whole country. ● Sanitary landfill: The only sanitary landfill that meets acceptable standards in the whole country is the Nkolfoulou Landfill in Yaoundé, the capital city of Cameroon.

Item	Outline
Financial system	● There is a budget of XAF 4 billion for SWM. ● There is a subsidy of about XAF 2 billion on solid waste management. ● There is no tax related to SWM.
Donor support	● Yaoundé sanitation project: African Development Fund (ADF) loan. ● Global Environment Facility (GEF) grants. ● French Development Agency (AFD).
Areas for improvement	● Establishing a law on solid waste management. ● Institutional reform through the creation of a Waste Management Agency and the National Waste Exchange. ● System of waste segregation and sorting during pre-collection and collection of solid wastes. ● Broadening the tax base for waste management by introducing an “eco-tax” on certain products based on the principle of extended producer responsibility.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

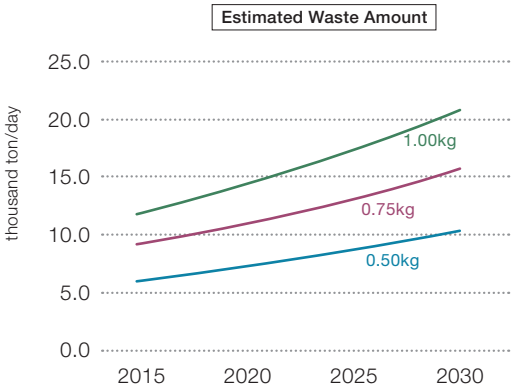
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	22,835	25,958	29,339	32,980
	Urban	12,463	14,942	17,740	20,857

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	6.2	7.5	8.9	10.4
	0.75 kg/pers/day	9.3	11.2	13.3	15.6
	1.00 kg/pers/day	12.5	14.9	17.7	20.9

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Central African Republic

The Central African Republic (CAR) is, as its name suggests, located in the centre of the African continent. It is a bilingual country, with Sango and French both commonly spoken. It is a landlocked country, bordered by Chad to the north, Sudan to the northeast, South Sudan to the east, the Democratic Republic of the Congo to the south, Congo to the southwest and Cameroon to the west.*

The CAR covers an area of approximately 623,000 square kilometres and has a population of about 4.66 million, which represents an average density of 7.5 inhabitants/km^2. The annual population growth rate is 1.4%. The distribution of the population is uneven, with the density ranging from one inhabitant/km^2 in the east and north-east, 11 inhabitants/km^2 in the west and north-west to 10,000 inhabitants/km^2 in Bangui, which has a population of nearly 800,000. However, the military-political crises CAR is experiencing continue to cause an unprecedented population displacement at the national level, and an additional study to characterise the current situation of the population in the country is necessary.

Source: * Wikipedia, Central African Republic, accessed 15 March 2019, <https://en.wikipedia.org/wiki/Central_African_Republic>

Information

Population*	4.66 million (2017)
Population growth (annual %)*	1.4 (2017)
Area (km^2)*	622,980
GDP (current USD)*	1.95 billion (2017)
GDP growth (annual %)*	4.3 (2017)
GNI per capita, Atlas method (current USD)*	390 (2017)
Main industries	Agro-industry: production of palm oil, beer, soft drinks, drinking water, sugar, soap, detergents, food oil, coffee roasting and manufacture of cigarettes, forest industry (Source: Ministry of Commerce and Handicrafts)
Currency**	USD 1 : XAF 577.81 (Central African CFA franc) (February 2019)

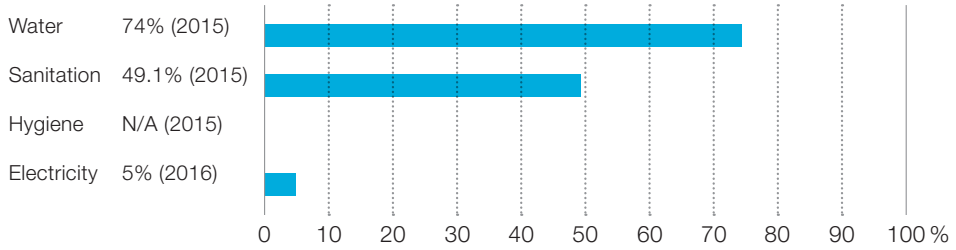
Sources: * World Bank, Central African Republic, accessed 15 March 2019,<https://databank.worldbank.org/reports.aspx?source=2&country=CAF>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● The Central African Republic has not yet completely developed a system for the management of solid waste. However, funding from the World Bank has assisted with the provision of solid waste collections in the capital of Bangui through subcontractors and the municipalities of the eight arrondissements under the control of the Ministry of Environment and Sustainable Development. The Ministry also coordinates the environmentally sound management of biomedical waste and expired pharmaceutical products. Partly because of this deficiency, the CAR government, with the support of partners such as the World Bank, has recently established (in 2018) the activities of the Ministry of Environment and Sustainable Development throughout the country. For the first time, they have appointed state officials in all the prefectures to assess the current situation and prevent risks related to mismanagement of waste, including of the components of the biosphere in relation to population growth. To that purpose, there is: 》The Central African Environmental Code. 》The Hygiene Code. 》The Law on Radioactive Materials. 》The Draft Law on Waste concerned by the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.
Policy/Plan	● Signature and ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, and of the Bamako Convention on the ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa. ● Decree on the organisation and functions of the Ministry of Environment and Sustainable Development of 13 April 2018 extending its scope to the national level. ● A plan for the implementation of the Basel Convention for waste management led to the draft Waste Law including the inventory of waste at the national level.

Item	Outline
Implementation system	● The CAR has drafted a policy letter on Environment and Sustainable Development that takes waste management into account. ● Creation of a National Environment Fund to finance various activities. ● Creation of partnerships with the sectors involved in waste management, such as the Ministry of Public Health and Population, the Ministry of Commerce and Handicrafts, the Ministry of Agriculture and Rural Development, the Ministry of Livestock, and the city of Bangui, as well as partnerships with the World Bank, the European Union (EU), the Development Bank of the Central African States (BDEAC) and some national private institutions such as the Agency for the Works of Public Interest in the Central African Republic (Agence des Travaux d'Intérêt Public en Centrafrique, AGETIP CAF). ● Training and stakeholders' involvement from Ministerial sectors and non-governmental organisations (NGOs).
Financial system	● Activities on waste are financed by the National Environment Fund and the Central African State from the national budget.
Donor support	● The World Bank has financed the Emergency Project of Urban Infrastructure Rehabilitation (Projet d'Urgence de Réhabilitation des Infrastructures Urbaines, PURISU), the solid waste treatment project in Bangui. ● The Basel Convention Secretariat has financed a project under the Basel Convention Implementation Plan. ● The EU has financed the Urban Development Project (Projet d'Appui au Développement Urbain, PADU). ● BDEAC provided the city of Bangui with ten skip loaders, two vacuum trucks, one backhoe loader, one loader excavator, one water tank truck, and one crawler loader for the landfilling of waste.
Areas for improvement	● A training project including a course on waste management is planned by the Ministry of Environment and Sustainable Development for all Regional Directors and Prefectural Inspectors in order to raise awareness on national level. ● The Municipality of Bangui is strongly involved in the sanitation of the city of Bangui and its surroundings, including some NGOs engaged in the environmental field. ● However, much work remains to be done in solid waste management throughout the country because a lack of systems poses a real threat to the living environment and the components of natural ecosystems such as soil, subsoil, water streams, air (open air incineration), wildlife and lakes. ● It should be noted that all the above-mentioned projects only take place at the level of four of the eight arrondissements in the city of Bangui.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

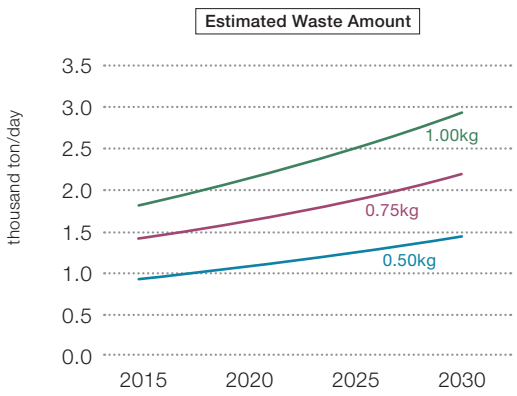
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	4,546	4,921	5,489	6,124
	Urban	1,831	2,077	2,452	2,918

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	0.9	1.0	1.2	1.5
	0.75 kg/pers/day	1.4	1.6	1.8	2.2
	1.00 kg/pers/day	1.8	2.1	2.5	2.9

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Chad

Chad, officially the Republic of Chad, is a central African country. It is bordered by Libya to the north, Sudan to the east, the Central African Republic to the south, Cameroon and Nigeria to the southwest, and Niger to the west.

The Ministry of the Environment, through its Directorate of Sanitation is responsible for:

- Identifying and designing the project management of all activities related to sanitation.
- Identifying and designing the project management of sanitation programs and projects (wastewater, rainwater, solid waste, and excreta) in collaboration with the services involved in this sector.
- Studying, controlling, and approving all sanitation works.
- Coordinating with the public, para-public and private services involved in the sanitation sector.
- Designing and implementing sanitary sewer systems.
- Fighting against water pollution, in relation with other public health services.
- Implementing the national legislation, conventions, agreements, protocols, and regional and international treaties related to sanitation.

Several ministries are involved in SWM, especially:

- The Ministry of Spatial Planning, Housing Development and Town Planning (Ministère de l'Aménagement du Territoire, du Développement de l'Habitat et de l'Urbanisme) is responsible for the formulation and implementation of the National Policy of Territorial Planning and Regional Development. It supports local municipalities in their development programs and projects. It is in charge of the planning and the management of the urban and rural space.
- The Ministry of Territorial Administration and Local Governance (MATGL, Ministère de l'Administration du Territoire et de la Gouvernance Locale) supervises the decentralised local authorities. As such, it regulates the activity of the urban municipalities responsible for public sanitation services in urban areas.

Apart from N'Djamena, urban municipalities have very few resources. In the context of decentralisation, they are especially responsible for works of municipal interest, hygiene, public health, and flood prevention.

Information

Population*	14.9 million (2017)
Population growth (annual %)*	3.0 (2017)
Area (km^2)*	1,284,000
GDP (current USD)*	9.87 billion (2017)
GDP growth (annual %)*	-3.0 (2017)
GNI per capita, Atlas method (current USD)*	640 (2017)
Main industries	Breweries, textiles, soap factories, cement plants, petroleum
Currency**	USD 1 : XAF 577.81 (Central African CFA franc) (February 2019)

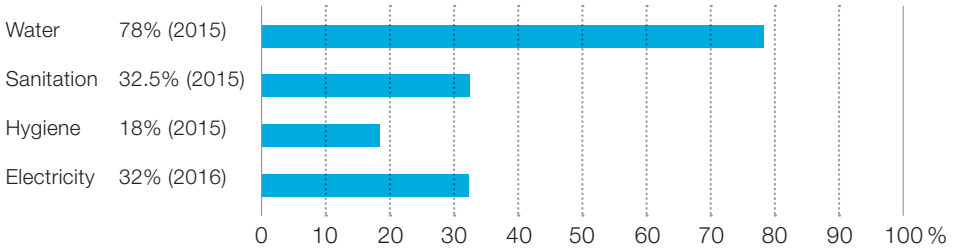
Sources: * World Bank, Chad, accessed 18 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=TCD>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● The Constitution in its article 210. ● Law No. 33/PR/2006 on the separation of powers between the State and the decentralised territorial communities. ● Law No. 014/PR/98 defining the general principles of the protection of the environment. ● Decree No. 904/PR/PM/MERHM/2009 of 17/08/1998 regulating pollution and nuisances to the environment. ● Order No. 007/MCPI/SE/DC/DCE of 22/05/1993 prohibiting the import of non-biodegradable plastic packaging throughout the country. ● Local regulations: case of the city of N'Djamena: » Order No. 104/M/SG/DVA/2012 of 23 April 2012 on the general regulation of solid waste management in the city of N'Djamena. » Order No. 105/M/SG/DVA/2012 of 23 April 2012 on the delimitation of collection areas. » Order No. 106/M/SG/DVA/2012 of 23 April 2012 on the internal regulations of the transfer centres. » Specifications regulating the conditions of intervention of the Sanitation Committees (CA, Comité d'Assainissement) in waste management. » Standard contract for waste services delegation.
Policy/Plan	● Master Plan for Water and Sanitation (SDEA) 2003, pending for update. ● Chad now has a National Policy and Strategies for Sanitation (PSNA). The creation of the PSNA started in 2010 and has been subject to several regional workshops, including in N'Djamena. The latest updated version has been submitted to the Minister's Council on 17 January 2017 and adopted by the highest authorities of the Republic on 28 July 2017. ● Regional Investment Plan (PIR). ● National Development Program (PND).

Item	Outline
Implementation system	● The Ministry of the Environment is responsible for the design, coordination, implementation, and monitoring of the Government's environmental policy. ● The Ministry of Public Health is responsible for Information, Education, and Communication (IEC) on health and sanitation, including the promotion and strengthening of the strategy for community participation to the activities of health services and their management. ● The Ministry of Spatial Planning, Housing Development and Town Planning (Ministère de l'Aménagement du Territoire, du Développement de l'Habitat et de l'Urbanisme) is in charge of the formulation and implementation of the National Policy of Territorial Planning and Regional Development. It supports local communities in their development programs and projects. It is in charge of the planning and management of the urban and rural space. ● The Ministry of Infrastructures and Disenclavement (MID, Ministère des Infrastructures et du Désenclavement) is responsible for the national public infrastructures, with the exception of hydraulic and military facilities. It should be noted that MID's mission is "technical support to the various ministerial departments for the design, monitoring and control of infrastructure". ● The Ministry of Territorial Administration and Local Governance (MATGL, Ministère de l'Administration du Territoire et de la Gouvernance Locale) is in charge of the supervision of the decentralised local authorities. As such, it regulates the activity of the urban municipalities which are responsible for public sanitation services in urban areas. ● The Ministry of Finance and Budget defines and establishes the fiscal policy, exercises financial oversight over all public institutions and oversees the preparation of the program budgets by the ministerial departments. ● The Ministry of Economy and Development Planning (MEPD, Ministère de lÉconomie et de la Planification du Développement) aims to carry out the Government's strategic orientations into development plans and programs as well as coordinates and implements them.
Financial system	● The effective implementation of the PSNA roadmap will attract national and international funding. ● Percentage of the national budget allocated to SWM: unknown. ● Tax on waste disposal: under study. ● Grant for SWM from the Central Government to Local Governments: still undefined.
Donor support	● The French Development Agency (AFD) finances storm water drainage projects in some cities of Chad, for example the Flood Control Project in Moundou (PLIM, Projet de lutte contre les inondations à Moundou). ● The African Development Bank (AfDB) finances projects for access to water and sanitation: Drinking Water Supply and Sanitation Project in Secondary Centres (PAEPA-CS) and Semi-urban and Rural Drinking Water Supply and Sanitation Programme (PAEPA SU-MR) as well as in other sectors. ● The European Union (EU) contributed to the improvement of roads and helped the sanitation and water sectors through funding (8th, 9th, 10th and 11th European Development Fund (EDF)). ● World Bank finances water and sanitation projects under the 2015 Millennium Development Goals (MDGs). ● UNICEF finances water and sanitation projects. ● Other humanitarian financial partners are present (Oxfam, Médecins Sans Frontières (MSF), etc.).
Areas for improvement	● Technical issues: Capacity development of SWM officers. ● Legal issues: Creation of the SWM basic law. ● Social issues: Popularisation of environmental education such as waste separation. ● Organisational issues: Development of public-private partnerships (PPP).

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

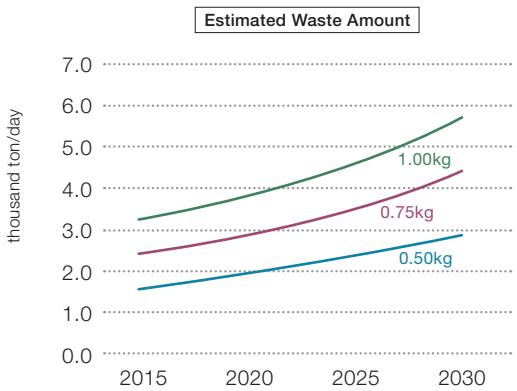
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	14,009	16,285	18,776	21,460
	Urban	3,154	3,830	4,701	5,819

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	1.6	1.9	2.4	2.9
	0.75 kg/pers/day	2.4	2.9	3.5	4.4
	1.00 kg/pers/day	3.2	3.8	4.7	5.8

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Comoros

Comoros, officially the Union of the Comoros, is a sovereign archipelago island nation in the Indian Ocean, located at the northern end of the Mozambique Channel off the eastern coast of Africa between north-eastern Mozambique and north-western Madagascar. Moroni is its largest city, federal capital, and seat of the government. The country covers an area of 1,861 square kilometres and has a population of 813,912. About 29% of the population reside in urban areas. Agriculture, including fishing, hunting, and forestry, accounts for about 50% of GDP, employs a majority of the labour force, and provides most of the exports. Export income is heavily reliant on the three main crops of vanilla, cloves, and perfume essence.*

The Directorate General of the Environment under the Ministry of Agriculture, Fishery, Environment and Energy, is responsible for solid waste management (SWM) planning. The department monitors/evaluates the implementation of waste management according to the related regulations in the cities. Other institutions involved in SWM include the Environmental Commissioners of the Island. Town Halls (Municipalities) and private companies are in charge of the implementation of the solid waste management in and around the capital. There is no national basic law on municipal solid waste management, no specific budget for waste management and no sanitary landfill in the country. The following areas need attention: national basic law on SWM, the institutional set-up for SWM and waste segregation and recycling.

Sources:* World Bank, Comoros, accessed 14 March 2019 <https://databank.worldbank.org/data/reports.aspx?source=2&country=COM> and Central Intelligence Agency, accessed 14 March 2019 <https://www.cia.gov/library/publications/the-world-factbook/geos/cn.html>

Information

Population*	813,912 (2017)
Population growth (annual %)*	2.3 (2017)
Area (km^2)*	1,861
GDP (current USD)*	1.07 billion (2017)
GDP growth (annual %)*	2.7 (2017)
GNI per capita, Atlas method (current USD)*	1,280 (2017)
Main industries**	Agriculture
Currency***	USD 1 : KMF 449.14 (Comorian franc) (September 2019)

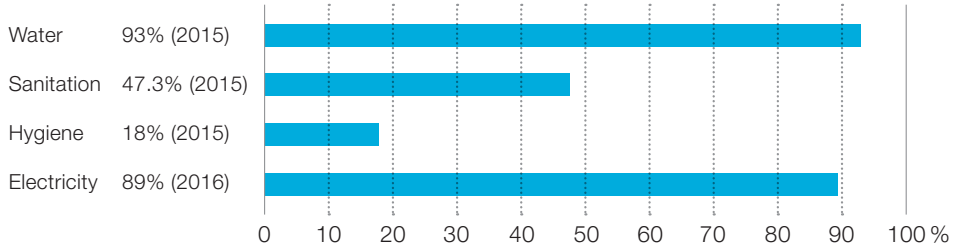
Sources: * World Bank, Comoros, accessed 14 March 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=COM>
** Central Intelligence Agency, Comoros, accessed 14 March 2019, < https://www.cia.gov/library/publications/the-world-factbook/geos/cn.html>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no basic law on SWM. ● A law on plastic waste has just been voted at the assembly.
Policy/Plan	● There is no policy on SWM but there are ministerial and municipal policies.
Implementation system	● The Directorate General of the Environment is responsible for SWM. ● Other institutions involved in SWM include: » The Environment Commission of the Islands. » Town Halls (Municipalities): execute action plans. » Private associations: recovery and recycling of solid waste. ● Number of staff in SWM department: » Total number of staff: 5 » Number of staff that took SWM course at university: 2 » Number of staff who have worked in the SWM sector for over 5 years: 2 ● System for collection of SWM data: There is no established system for collection of SWM data from local governments. ● Sanitary landfill: There is no sanitary landfill. ● Informal sector: Informal sector participates in SWM but there is no policy for supporting the informal sector.
Financial system	● There is no budget for SWM. ● There is a subsidy related to SWM for local governments. ● There is no tax related to SWM.

Item	Outline
Donor support	● There is support from Italian Ministry of the Environment.
Areas for improvement	● Establish waste management laws. ● Institutional capacity building. ● Establish system of segregating and waste recycling.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

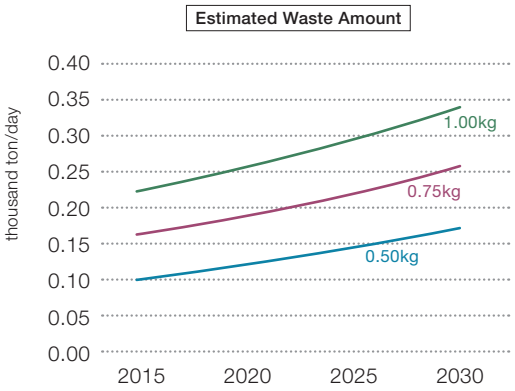
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	777	870	965	1,062
	Urban	221	255	296	345

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	0.1	0.1	0.1	0.2
	0.75 kg/pers/day	0.2	0.2	0.2	0.3
	1.00 kg/pers/day	0.2	0.3	0.3	0.3

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Congo

Congo, officially the Republic of the Congo, is a country in Central Africa. It is bordered by five countries: Gabon, Cameroon, the Central African Republic, the Democratic Republic of the Congo and the Angolan exclave of Cabinda. It is 342,000 square kilometres in size and has a population of around 5.26 million. The capital is Brazzaville. The country is divided into 12 departments, which are divided into communes and districts.
Municipal waste management in Congo is under the supervision of the Ministry of Construction, Urban Planning and Housing, and some of responsibilities are shared by the Ministry of Interior and Local Governments, Ministry of Tourism and Environment, and Integrated Health Care Centres. There is no national basic law on municipal solid waste management. The establishment of a legal and regulatory framework is urgently necessary.

Sources: * Wikipedia, Republic of the Congo, accessed 15 March 2019, <https://en.wikipedia.org/wiki/Republic_of_the_Congo>
and World Bank, 2016, Republic of the Congo, accessed 15 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=COG>

Information

Population*	5.26 million (2017)
Population growth (annual %)*	2.6 (2017)
Area (km^2)*	342,000
Climate	Continental
GDP (current USD)*	8.70 billion (2017)
GDP growth (annual %)*	-3.1 (2017)
GNI per capita, Atlas method (current USD)*	1,430 (2017)
Main industries**	Petroleum, forestry
Currency***	USD 1 : XAF 577.81 (Central African CFA franc) (February 2019)

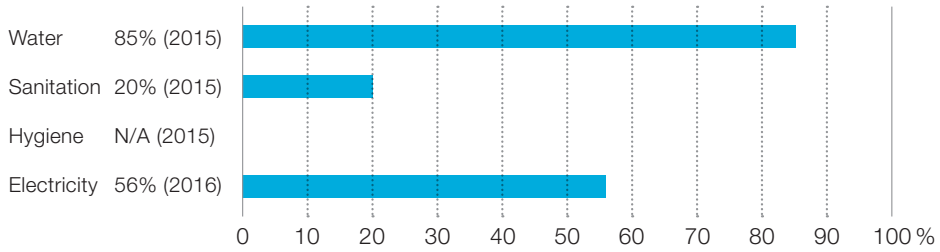
Sources: * World Bank, Republic of the Congo, accessed 15 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=COG>
** Wikipedia, Republic of the Congo, accessed 15 March 2019, <https://en.wikipedia.org/wiki/Republic_of_the_Congo>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no national basic law on municipal solid waste management. Related law is Environment Law. Therefore, the current legal system does not make clear: » The definition of waste. » The responsibilities of stakeholders. ● In addition, there is no regulation related to environmental impact assessment for construction or operation of SWM facilities.
Policy/Plan	● A Master Plan for SWM was prepared in 2008 and covers the period until 2018. However, it has not been implemented well because of lack of stakeholder participation, financial problems, under-prioritisation in comparison to other urban services, etc.
Implementation system	● The Ministry of Construction, Urban Planning and Housing is the main organisation responsible for waste. This includes both municipal waste and other types of waste, because waste management is considered as one of the urban services/infrastructures. The Ministry works with other related ministries depending on their responsibilities, such as: » Ministry of Interior and Local Governments. » Ministry of Tourism and Environment. » Integrated Health Care Centres. ● Basically, it is considered that municipalities have responsibility on municipal SWM. The Ministry of Construction, Urban Planning and Housing leads initiatives in planning and designing of important SWM facilities, such as selection of disposal sites, transfer station sites, etc. ● In the country, there are two major cities, Brazzaville and Pointe-Noire. A private company provides SWM services such as sweeping, collection, transport, and final disposal. The company has contracts with the city governments. However, they are paid for and controlled by central government.

Item	Outline
Financial system	● There is a tax for waste collection. XAF 1,000 (EUR 1.52) per month is levied on salary of each person. The revenue becomes a financial resource for the payment to the private company. ● In addition to the SWM services provided by the private company, micro and small enterprises (MSEs) are working in the primary collection service which collects waste from the generation sources, such as houses and shops. They get XAF 100-1,000 (EUR 0.15-1.5) per collection from a house or a shop, depending on the amount of waste.
Donor support	● A project for sorting/treatment of waste was carried out by the United Nations Development Programme (UNDP) with finance from the French Development Agency (AFD). However it was not continued due to management/financial problems.
Areas for improvement	● Establishment of a legal and regulatory framework is urgently needed. ● Awareness raising: the current problems should be taken into account by the population and the decision makers. ● Capacity development such as provision of practical solutions through education and training of various parties is necessary.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

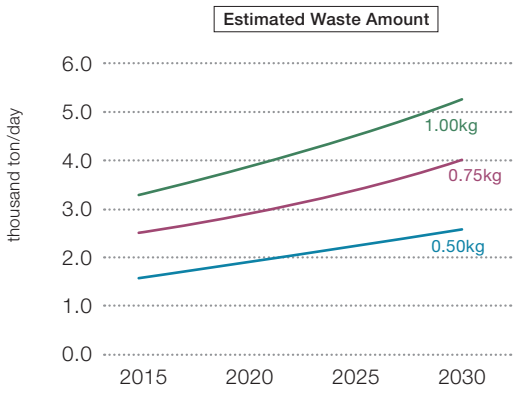
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	4,996	5,687	6,455	7,319
	Urban	3,274	3,857	4,524	5,290

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	1.6	1.9	2.3	2.6
	0.75 kg/pers/day	2.5	2.9	3.4	4.0
	1.00 kg/pers/day	3.3	3.9	4.5	5.3

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Côte d'Ivoire

Côte d'Ivoire, officially the Republic of Côte d'Ivoire, is located in West Africa, bordered by Guinea and Liberia to the west, Burkina Faso and Mali to the north and Ghana to the east. Côte d'Ivoire covers an area of 322,460 square kilometres and has a population of 24.29 million. About 50.3% of the population lives in urban areas. The population is mainly located in the southern forests, with the highest concentration of people residing in and around cities on the Atlantic coast. Most of the savannah in the north remains sparsely populated, with higher concentrations located along transport corridors. The economy of Côte d'Ivoire is highly dependent on agriculture. The country is the world's largest producer and exporter of cocoa beans, and a major producer and exporter of coffee and palm oil.

The Directorate of Salubrity, under the Ministry of Salubrity, Environment and Sustainable Development, is responsible for solid waste management (SWM). The Ministry of Health, the Ministry of Industry, and the Ministry of Agriculture are also involved in SWM. The informal sector is involved in SWM through waste collection and recycling, but there is no specific policy to support this sector. At present, there is no national basic law on SWM and no SWM policy, but there is a national SWM budget.

Information

Population*	24.29 million (2017)
Population growth (annual %)*	2.5 (2017)
Area (km^2)*	322,460
GDP (current USD)*	37.35 billion (2017)
GDP growth (annual %)*	7.7 (2017)
GNI per capita, Atlas method (current USD)*	1,580 (2017)
Main industries**	Agriculture
Currency***	USD 1 : XOF 577.81 (West African CFA franc) (February 2019)

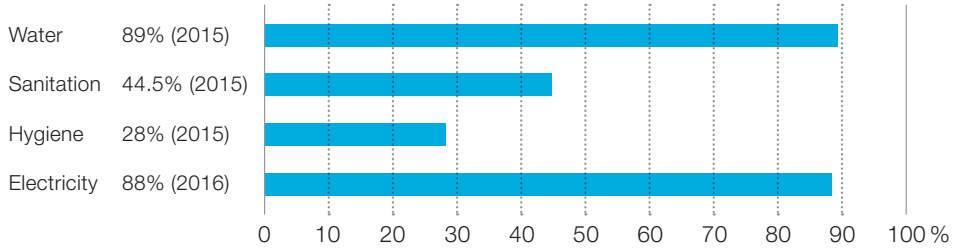
Sources: * World Bank, Côte d'Ivoire, accessed 15 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=CIV>
** Wikipedia, Côte d'Ivoire, accessed 27 February 2019, <https://en.wikipedia.org/wiki/Ivory_Coast>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no national basic law on SWM.
Policy/Plan	● There is no SWM policy. A SWM policy is undergoing preparation.
Implementation system	● The Directorate of Salubrity, under the Ministry of Salubrity, Environment and Sustainable Development, is responsible for solid waste management. ● Other institutions involved in the management of solid waste include: » The Ministry of Health: responsible for the implementation of the biomedical waste management policy. » The Ministry of Industry: responsible for the implementation of the industrial waste management policy. » The Ministry of Agriculture: responsible for the implementation of the agricultural residues management policy. ● Number of staff in the SWM department: » 68 staff are in the department. » 15 staff studied SWM and/or a related course at university. » Five staff have worked in the solid waste management sector for five years and more. ● Participation of the informal sector: the informal sector is involved in solid waste management but there is no specific policy to support this sector. ● Final disposal: no data provided. ● SWM data collection: there is no established system for the collection of data on SWM from local government. Data on the amount of waste generated, collected and disposed of is collected in a few cities.
Financial system	● There is a national budget of XOF 24 billion for SWM. ● There is a tax related to SWM. ● There is no subsidy related to SWM.

Item	Outline
Donor support	● There is no donor support.
Areas for improvement	● Develop legislation on waste management and disposal. ● Increase public awareness. ● Support the informal sector.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

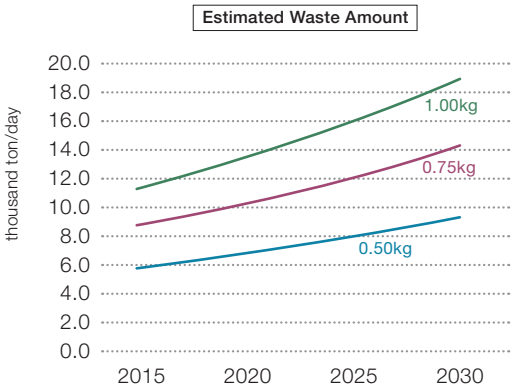
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	23,108	26,172	29,591	33,337
	Urban	11,426	13,532	16,022	18,912

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	5.7	6.8	8.0	9.5
	0.75 kg/pers/day	8.6	10.1	12.0	14.2
	1.00 kg/pers/day	11.4	13.5	16.0	18.9

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Democratic Republic of the Congo

The Democratic Republic of the Congo (DRC) borders the Central African Republic and South Sudan to the north, Uganda, Rwanda, Burundi and Tanzania to the east, Zambia to the south, Angola to the southwest, and Congo and the Atlantic Ocean to the west. It is the second-largest country in Africa (largest in Sub-Saharan Africa) by area and 11th largest in the world. With a population of over 80 million, the DRC is the fourth most-populated nation in Africa and the 17th most populated country in the world.

The Ministry of Environment and Sustainable Development (Ministère de l'Environnement et Développement Durable, MEDD) through the Department of Health (Direction d'Assainissement, DAS) is responsible for the national sanitation sector and in particular for municipal waste management, and in this sense it is responsible for regulating the sector. A number of ministries are involved in SWM. This includes the Ministry for Infrastructure, Public Works and Reconstruction (Ministère des Infrastructures, Travaux Publics et Reconstruction, MITPR) via the Office of Roads and Drainage (Office de Voirie et de Drainage, OVD) which takes care of dredging gutters, rivers and big waste collectors. Due to the dumping of garbage on roadsides and in drains, the sanitary environment of low income and poor residential areas is especially in poor condition.

Information

Population*	81.34 million (2017)
Population growth (annual %)*	3.3 (2017)
Area (km^2)*	2,344,860
Climate	Wet tropical and equatorial
GDP (current USD)*	37.64 billion (2017)
GDP growth (annual %)*	3.7 (2017)
GNI per capita, Atlas method (current USD)*	460 (2017)
Main industries	Mining (copper, cobalt, diamond, gold, tin stone, coltan, crude oil etc.), cosmetics, forestry, agriculture (palm oil, cotton, coffee, wood, natural rubber, etc.), and manufacturing industry (cement, steel, etc.)
Currency**	USD 1 : CDF 1,640.31 (Congolese franc) (June 2019)

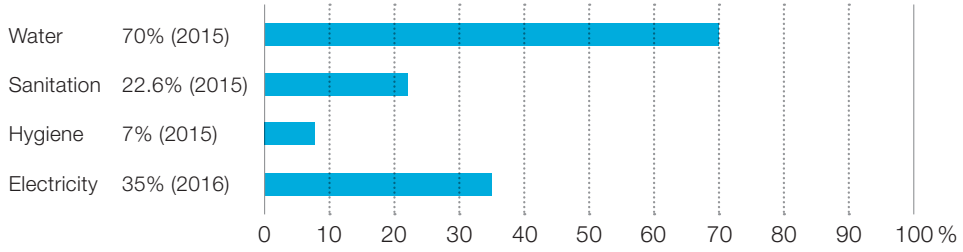
Sources: * World Bank, Democratic Republic of the Congo, accessed 28 June 2019, <https://databank.worldbank.org/reports.aspx?source=2&country=COD>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● The DRC government promotes administrative reform and decentralisation under the new Constitution in 2006. Draft Law on Sanitation has been formulated but it is expected that laws specific to solid waste will be formulated in the future. The relevant regulations are as follows: 》Draft Law on Sanitation (Projet de loi sur l'assainissement), 2017. 》Constitution of the DRC (Constitution de la RDC), 2006 (revised in 2015). 》Organic Law N° 08/016 of 2008 regarding Composition, Organisation and Functioning of ETD (Decentralised Territorial Entities) and their Relationships with State and Province (Loi organique n° 08/016 de 2008 portant composition, organisation et fonctionnement des ETD (Entités Territoriales Décentralisées) et leurs rapports avec l'État et les Provinces). 》Law N° 11/009 of 09 July 2011 regarding Fundamental Principles Relating to the Protection of the Environment (Loi n° 11/009 du 09 juillet 2011 portant principes fondamentaux relatifs à la protection de l'environnement). ● Formal guidelines for environmental impact assessment have not been formulated in the DRC.
Policy/Plan	● In the DRC, solid waste is treated within the framework of sanitation and the preservation of public health. SWM is covered by the National Sanitation Policy (Politique Nationale d'Assainissement, PoNA), but policies and plans specific to waste management have not yet been formulated. Related policies are as follows: 》National Sanitation Policy (Politique Nationale d'Assainissement, PoNA), 2013. 》The Draft National Sanitation Strategy (Stratégie Nationale d'Assainissement, SNA) for the implementation of PoNA was approved in March 2018. 》The National Development Plan (Plan National de Stratégie de Développement, PNSD).

Item	Outline
Implementation system	● Ministry of Environment and Sustainable Development (Ministère de l'Environnement et Développement Durable, MEDD) through the Department of Health (Direction de l'Assainissement, DAS): Main organisation responsible for waste management. ● Ministry of Health (Ministère de la Santé Publique et la Direction de l'Hygiène, MSP): Involved in waste management from a public health perspective. ● The National Action Committee on Water, Hygiene and Sanitation (Comité National d'Action de l'Eau, de l'Hygiène et d'Assainissement, CNAEHA): Responsible for coordinating water and sanitation sector and belongs to the Ministry of Planning (Ministère du Plan). ● Ministry of Energy and Hydraulic Resources (Ministère de l'Énergie et Ressources Hydrauliques, MERH): Responsible for urban water sector policy. ● Ministry of Infrastructure, Public Works and Reconstruction (Ministère des Infrastructures, Travaux Publics et Reconstruction, MITPR) and the Office of Roads and Drainage (Office de Voirie et Drainage, OVD): MITPR is responsible for infrastructure development of road drainage and urban sanitation. OVD designs, constructs, improves and researches urban infrastructure in the sub-sectors of roads and drains under MITPR.
Financial system	● Ratio of SWM budget allocated within national budget: According to MEDD's financial report in 2016, 0.23% of the national budget was allocated to the MEDD headquarters, of which only 0.06% had been allocated to the sanitation sector, but the funds were not disbursed. ● Tax on waste disposal: A sanitation tax in Kinshasa City is under discussion. ● Subsidies from central government to local governments: None.
Donor support	● EU: Supported road improvements and assistance to the hygiene sector from 2007 to 2015 in Kinshasa City as part of the PARAU Project (Projet d'Appui à la Réhabilitation et l'Assainissement Urbain, PARAU). It covered all the necessary expenses such as equipment, facilities, salaries for staff and private collectors. The Régie d'Assainissement de Kinshasa (RASKIN), formerly Régie d'Assainissement et des Travaux Publics de Kinshasa (RATPK) took over the project. ● World Bank: Implementing two projects in the sanitation sector. One is specialised in wastewater, and the construction of a wastewater treatment facility and a sludge disposal site in Kinshasa City is planned. The second one is a comprehensive urban development project including improvement of infrastructure such as wastewater for the N'Djili River basin where many poor people are susceptible to flood damage, strengthening capacity of communes, etc. It also includes solid waste components. ● KfW/GIZ: Implementing the Water Sector Programme (Programme du Secteur de l'Eau, ProSecEau) with the purpose of supplying water and sanitation for Mbuji-Mayi and Kikwit with a budget of approximately 5 million euros.
Areas for improvement	● A series of program type projects, such as assistance for master plan preparation, technical cooperation and financial cooperation for implementation of master plan, are recommended in Kinshasa City.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

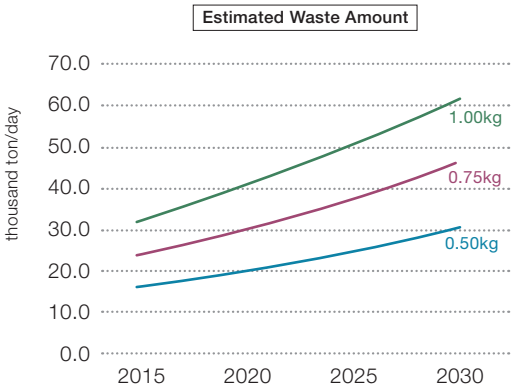
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	76,197	89,505	104,221	120,443
	Urban	32,567	40,848	50,723	62,343

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	16.3	20.4	25.4	31.2
	0.75 kg/pers/day	24.4	30.6	38.0	46.8
	1.00 kg/pers/day	32.6	40.8	50.7	62.3

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Egypt

Egypt, officially the Arab Republic of Egypt, is a Mediterranean country bordered by Sudan, Libya, the Gaza Strip, and Israel. It is around one million square kilometres in size and has a population of around 97.55 million. The capital and largest city is Cairo. Egypt is divided into 27 governorates, which are further divided into regions containing towns and villages. Each governorate has a capital, sometimes carrying the same name as the governorate.*

The Solid Waste Management Regulatory Agency, under the Ministry of Environment, is in charge of integrated solid waste management in the country. The Agency covers municipal waste and all other types of waste. The Agency works with other ministries such as Ministry of Local Development, Ministry of Health, and others. There is a system to collect waste data from the local governments.

Source: * Wikipedia, Egypt, accessed 14 August 2018, <https://en.wikipedia.org/wiki/Egypt>

Information

Population*	97.55 million (2017)
Population growth (annual %)*	1.9 (2017)
Area (km^2)*	1,001,450
GDP (current USD)*	235.37 billion (2017)
GDP growth (annual %)*	4.2 (2017)
GNI per capita, Atlas method (current USD)*	3,010 (2017)
Main industries**	Textiles, food processing, tourism, chemicals, pharmaceuticals, hydrocarbons, construction, cement, metals, light manufacturing
Currency***	USD 1 : EGP 17.27 (Egyptian pound) (March 2019)

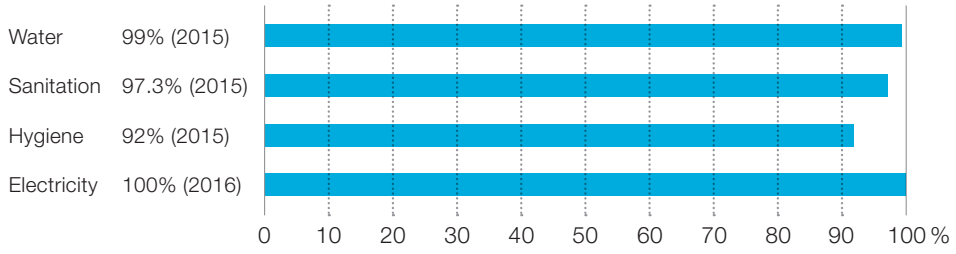
Sources: * World Bank, Egypt, accessed 8 April 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=egy>
** Central Intelligence Agency, accessed 14 August 2018, <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/eg.html>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Law No. 38/1967 (General Public Cleaning Law) and Law No. 4/1994 (Environmental Law) are the national basic laws covering municipal solid waste management. These laws clearly define municipal waste and the responsibilities of the stakeholders. ● The Environmental Law 1994 requires administrative authorities to undertake Environmental Impact Assessment (EIA). Also, it covers healthcare waste, construction waste, industrial waste and hazardous waste. ● Currently, a new basic law, the Solid Waste Management Law, is under preparation.
Policy/Plan	● There is a national policy and plan, requiring an Integrated Solid Waste Strategy and Master Plan for all governorates. ● A national program for the preparation of SWM master plans is currently being trialled in four governorates.
Implementation system	● The Solid Waste Management Regulatory Agency, under the Ministry of Environment, is in charge of Integrated Solid Waste Management in the country. The Agency covers all types of waste, including municipal waste. ● The Agency is responsible for communicating with local government and supporting the implementation of laws and regulations by providing technical and financial support. ● Establishing a SWM unit in each local government is in progress. The unit will be a counterpart institution of the Agency. ● The Agency has 25 staff and provides them with training programs. ● The Agency works with other ministries: 》Ministry of Local Development (in charge of municipal waste). 》The Ministry of Health (in charge of medical waste). 》The Ministry of Agriculture (in charge of agricultural waste). 》The Ministry of Industry, Housing and Development (in charge of industrial waste). ● There is a system to collect data from local government. It covers many cities.
Waste data	● Waste generation amounts (million ton/year): 》Municipal 21 》Agricultural 31 》Construction and demolition 5.8 》Industrial 4.9 》Hazardous 0.55 》Medical and healthcare 0.52 》Sludge 2 》Waterways and canals 25 》Total 90.76

Item	Outline
	● Average municipal waste generation rates: 》Urban areas: 0.7 kg/capita/day 》Rural areas: 0.4 kg/capita/day ● Composition of municipal waste: 》Organic 56% 》Paper/cardboard 10% 》Plastics 13% 》Glasses 4% 》Metals 2% 》Others 15% ● Average collection efficiency nationwide: 55-65% ● Disposal manner: 》Open dumping 81% 》Landfill 7% ○ Four landfills in Cairo and Alexandria. ○ Two are operated by private companies and two by local government. ○ One is for hazardous waste. 》Recycled & treated 12% ○ 66 recycling facilities with many of them applying mechanical biological treatment (MBT). ○ A significant part of the recycling is carried out by the informal sector. Most of the figures above are taken from surveys for preparing master plans in various governorates.
Financial system	● There is no specific tax on waste. ● Almost all governorates apply a collection fee which is usually charged as part of the electricity bill. ● There is a subsidy related to SWM for local governments. It is used for equipment procurement and operations. ● The private sector is expected to invest in facilities. ● Average Costs: 》For collection and transportation EGP 100-150 per ton. 》For treatment and final disposal EGP 250-350 per ton.
Donor support	● KfW Group. ● German Corporation for International Cooperation (GIZ). ● European Union.
Areas for improvement	● Consolidating the legal system by preparing a SWM law, by-laws, standards, etc. ● Institutional reform: defining clearly the responsibilities of the stakeholders, and establishing and supporting a SWM Unit in each governorate. ● Creation of an attractive investment environment for the private sector, e.g. by providing incentives. ● Consolidating the financial resources by applying fees or a tax related to waste. ● Social inclusion of waste pickers by organising them into micro and small enterprises.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

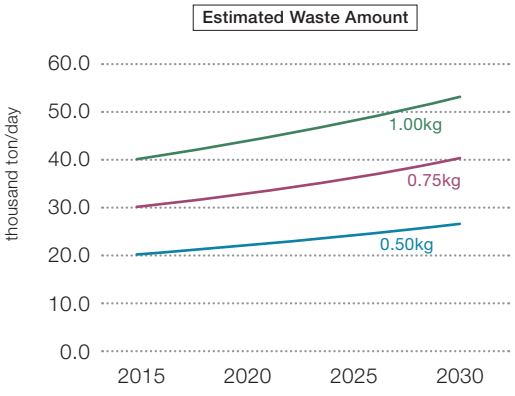
unit: thousand persons

		2015	2020	2025	2030
Population	Year				
	Total	93,778	102,941	111,471	119,746
	Urban	40,123	44,041	48,427	53,613

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	20.1	22.0	24.2	26.8
	0.75 kg/pers/day	30.1	33.0	36.3	40.2
	1.00 kg/pers/day	40.1	44.0	48.4	53.6

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Ethiopia

Ethiopia is a federal republic nation located in East Africa. It is an inland country, sharing borders with Eritrea to the north and northeast, Djibouti and Somalia to the east, Sudan and South Sudan to the west, and Kenya to the south. The capital city is Addis Ababa. The population is approximately 104.98 million, the second largest population in Sub-Saharan Africa, following Nigeria. It is located in the tropics, but the majority of the country is highlands centered on the Ethiopian Plateau with an average annual temperature of 13°C. The Ethiopian Plateau has a lot of precipitation and the annual rainfall is over 1200mm. Usually, the rainy season is from mid-June to mid-September.

Municipal waste management in Ethiopia is under the supervision of the Ministry of Urban Development and Housing (MoUDH), and it is shared by Ministry of Environment, Forest & Climate Change (MoEFCC) and Ministry of Health (MoH). The MoUDH provides guidance to local governments for the formulation of waste management plans and regularly monitors them. By incorporating the private sector into waste services, the country considers the creation of employment opportunities for the poor and low-income group.

Information

Population*	104.98 million (2017)
Population growth (annual %)*	2.5 (2017)
Area (km^2)*	1,104,300
Climate	Tropical climate (depending on altitude)
GDP (current USD)*	80.56 billion (2017)
GDP growth (annual %)*	10.2 (2017)
GNI per capita, Atlas method (current USD)*	740 (2017)
Main industries	Agriculture (grain, beans, coffee, oil), floristry, leather (cattle, sheep, goat).
Currency**	USD 1 : ETB 28.55 (Ethiopian birr) (June 2019)

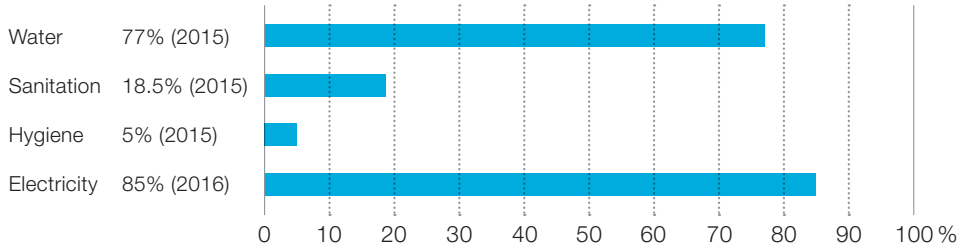
Sources: * World Bank, Ethiopia, accessed 28 June 2019, <https://databank.worldbank.org/reports.aspx?source=2&country=ETH>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Regarding waste management, the following two regulations are important: » Solid Waste Management Proclamation No 513/2007. » National Urban Solid Waste Management Standards. ● The related regulations are as follows: » Federal Democratic Republic of Ethiopia (FDRE) Constitution, 1994. » Environmental Protection Organs Establishment Proclamation No 295/2002. » Environmental Pollution Control Proclamation No 300/2002. » EIA Proclamation No 299/2002. » Regulation on Prevention of Industrial Pollution No 159/2008. » Standards for Industrial Pollution Control, 2013.
Policy/Plan	● Regarding waste management, the following three policies are important: » Urban Solid Waste Handling and Disposal Strategy, 2014. » National Integrated Urban Sanitation and Hygiene Strategy, 2017. » 2nd Growth and Transformation Plan (GTP-2 for 2016-2020). ● The related policies are as follows: » Environmental Policy of Ethiopia, 1997. » Urban Development Policy, 1991. ● There is no privatisation policy on waste management.

Item	Outline
Implementation system	● Ministry of Urban Development and Housing (MoUDH): Main organisation responsible for waste management. ● Ministry of Environment, Forest and Climate Change (MoEFCC): Responsible for overseeing the formulation and implementation of policies, strategies, laws and standards concerning the overall environment. ● Ministry of Health (MoH): Involved in waste management from a public health perspective. ● Ministry of Water, Irrigation and Electricity (MoWIE): Organisation responsible for formulation of policies, strategies and implementation of capacity building related to water resources development, urban water supply and sewerage. ● Ethiopia Standard Agency (ESA): Organisation that sets and manages various standards. ● Ethiopia Water Technology Institute (EWTI): Established by JICA, mainly disseminates technologies related to excavation and management of wells, but also conducts waste management courses.
Financial system	● Ratio of SWM budget allocated within national budget: Data not provided. ● Tax on waste disposal: None. ● Subsidies from central government to local government: None.
Donor support	● Prepared "National Integrated Urban Sanitation and Hygiene Strategy, 2017" with the support of the World Bank. ● Prepared "National Urban Solid Waste Management Standards" with the support of GIZ.
Areas for improvement	● Support for establishment of waste management systems in local cities.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

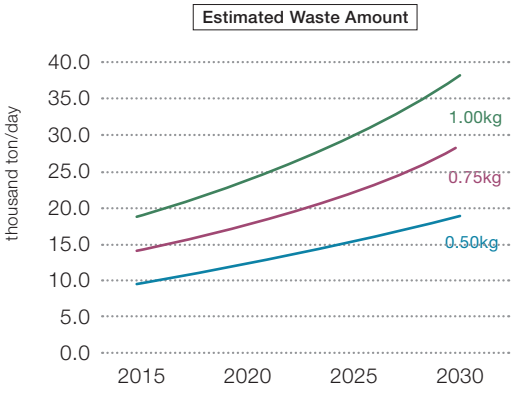
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	99,873	112,759	126,121	139,620
	Urban	19,403	24,463	30,487	37,496

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	9.7	12.2	15.2	18.7
	0.75 kg/pers/day	14.6	18.3	22.9	28.1
	1.00 kg/pers/day	19.4	24.5	30.5	37.5

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Ghana

Ghana, officially the Republic of Ghana, is a unitary presidential constitutional democracy located along the Gulf of Guinea and Atlantic Ocean, in the subregion of West Africa. Ghana is bordered by the Côte d'Ivoire in the west, Burkina Faso in the north, Togo in the east, and the Gulf of Guinea and Atlantic Ocean in the south. Ghana means “Warrior King” in the Soninke language. Ghana is divided into ten administrative regions, subdivided into 216 districts.*
Municipal Solid Waste Management (SWM) in Ghana is supervised by the Environmental Health and Sanitation Directorate under the Ministry of Sanitation and Water Resources (MSWR). The legal framework related to SWM seems to have been well established but not well implemented due to lack of appropriate budget allocation.

Source: * Wikipedia, Ghana, accessed 26 March 2019, <https://en.wikipedia.org/wiki/Ghana>

Information

Population*	28.83 million (2017)
Population growth (annual %)*	2.2 (2017)
Area (km^2)*	238,540
Climate**	Tropical
GDP (current USD)*	58.99 billion (2017)
GDP growth (annual %)*	8.1 (2017)
GNI per capita, Atlas method (current USD)*	1,880 (2017)
Main industries**	Manufacturing, petroleum and natural gas, mining, cocoa.
Currency***	USD 1 : GHS 5.09 (Ghanaian cedi) (March 2019)

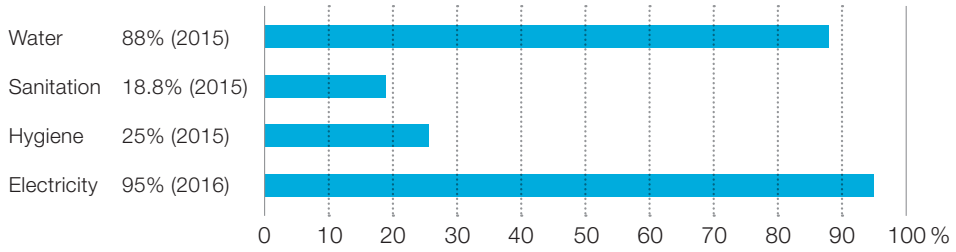
Sources: * World Bank, Ghana, accessed 26 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=GHA>
** Wikipedia, Ghana, accessed 26 March 2019, <https://en.wikipedia.org/wiki/Ghana>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Laws and regulations related to SWM are as follows: » Environmental Protection Agency Act, Act 490 of 1994 » Environmental Assessment Regulation, 1999, LI 1652 » Environmental Assessment (Amendment) Regulation, 2002, LI 1703 » Pesticides Control and Management Act, Act 528 of 1996 » Management of Ozone Depleting Substances and Products Regulations, 2005, LI 1812 » There is no specific law on recycling nor for encouraging renewable energy. » Governance Act, Act 936 of 2016: regulates the use of plastic bags. » Law on Public-Private Partnership (PPP).
Policy/Plan	● Environmental Sanitation Policy, June 2010 ● National Environmental Sanitation Strategy and Action Plan (NESSAP-2010) ● Health Care Waste Management Guidelines, 2006
Implementation system	● Ministry of Sanitation and Water Resources (MSWR): » Develop Policy on Environmental Sanitation including Waste Management. » Provide technical backstopping. » Regulation monitoring and evaluation. ● Environmental Health and Sanitation Directorate: deals with municipal solid waste, liquid waste, wastewater, and hazardous waste under the MSWR. There are eight staff members in the Directorate. ● Ministry of Local Government and Rural Development: in charge of providing administrative oversight of Municipal Assemblies. ● Office of the Local Government Services: in charge of managing the human resources of the Municipal Assemblies. ● Municipal Assemblies: manage all types of waste, supervise and regulate solid waste service providers, manage waste management contracts, enforce laws on waste, and monitor and evaluate activities. ● There are informal activities in the collection of recyclable materials on the streets and at the disposal sites.

Item	Outline
Financial system	● SWM budget allocated within national budget: USD 45,000. ● Tax on waste disposal: None. ● No subsidies related to SWM from central government to local government.
Donor support	● There is no donor assistance in SWM sector.
Areas for improvement	● Financial issues: Establish statutory funding for waste management. ● Technical issues: General capacity building for waste management staff at all levels. ● Institutional issues: Have a clear-cut stand-alone institution to manage waste at all levels. ● Legal issues: Revision of national laws on waste management. ● Social issues: Law enforcing environmental education.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

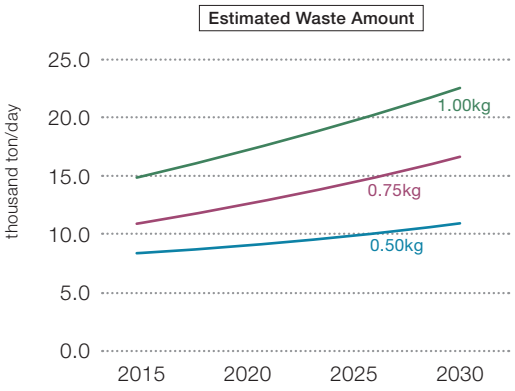
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	27,583	30,734	33,970	37,294
	Urban	14,918	17,626	20,539	23,641

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	7.5	8.8	10.3	11.8
	0.75 kg/pers/day	11.2	13.2	15.4	17.7
	1.00 kg/pers/day	14.9	17.6	20.5	23.6

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Guinea

Guinea, officially the Republic of Guinea, is located in southwest of West Africa, and covers an area of 245,857 square kilometres. It is a coastal country with 300 km of Atlantic coastline. It is bordered to the west by the Atlantic Ocean, to the south by Sierra Leone and Liberia, to the east by Côte d'Ivoire and Mali and to the north by Guinea Bissau, Senegal, and Mali. The population is estimated at 12.72 million (2017). It is characterised by a two-season climate whose duration varies according to the regions from three months (in the north) to nine months (in the south-east). Rainfall ranges from 4,000 mm (coastal region) to 1,300 mm (Upper Guinea), and precipitation peaks everywhere in July and August.
Solid waste management is under the authority of the Ministry of Territorial Administration and Decentralisation and is shared with the Ministry of Environment, Water and Forests, which designs and participates in the implementation of solid waste management policy and strategies in Guinea. The private sector is also involved in this sector through pre-collection and collection.

Information

Population*	12.72 million (2017)
Population growth (annual %)*	2.6 (2017)
Area (km^2)	245,857
GDP (current USD)*	10.47 billion (2017)
GDP growth (annual %)*	10.6% (2017)
GNI per capita, Atlas method (current USD)*	790 (2017)
Main industries	Mining, steel, textiles, manufacturing, agriculture and mineral production
Currency**	USD 1 : GNF 9,080 (Guinean franc) (February 2019)

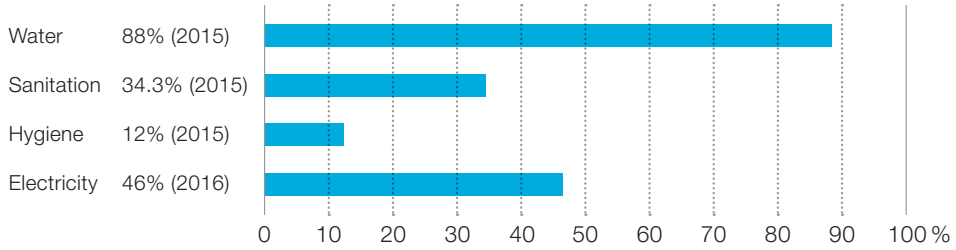
Sources: * World Bank, Guinea, accessed 18 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=GIN>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● With regard to waste management, there are: » Code of the Environment. » Proclamation No. 045/PRG/87 of May amended by Ordinance No. 022/PRG/89 of March 1989. » Decree No. 201/PRG/SGG/89 of 8th November 1989 concerning the prevention of the marine environment against all forms of pollution. » Law L/98/017/PRG/SGG concerning the town planning code.
Policy/Plan	● With regard to waste management, there are: » National Sanitation Policy. » National Strategy for Solid Waste Management. » Wastewater Management Strategy. » National Community-Led Total Sanitation (CLTS) Strategy. » National Strategy for Medical Waste Management. » Conakry Environmental and Sanitation Improvement Program: Strategies and Action Plan (1994).
Implementation system	● Ministry of the Environment, Water and Forests: responsible for developing policies and strategies related to the management of waste of all categories. ● Ministry of Territorial Administration and Decentralisation. ● National Service of Water Points (Service National des Points d'Eau, SNAPE): in charge of wells and boreholes. ● Public Hygiene: in charge of hand washing and sanitation in health centres in the rural communes. ● National Agency for Sanitation (Agence Nationale de l'Assainissement et de la Salubrité Publique, ANASP): currently in charge of waste management. ● National Directorate of Sanitation and Improvement of the Living Environment (Direction Nationale de l'Assainissement et de l'Amélioration du Cadre de Vie, DNACV): responsible for the development of the national sanitation policy and strategies, and currently in charge of the CLTS program.

Item	Outline
Financial system	● Ratio of the budget allocated to SWM within the national budget: unknown. ● Tax on waste disposal: no tax. ● Subsidies from the central government to the local governments: 50 billion Guinean francs (USD 500,000).
Donor support	● Islamic Development Bank (IDB). ● European Union (EU).
Areas for improvement	● Data not provided.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

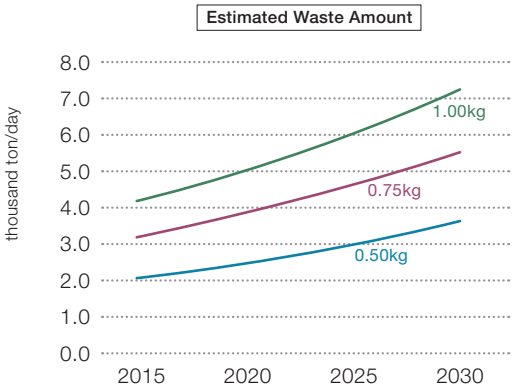
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	12,092	13,751	15,612	17,631
	Urban	4,249	5,071	6,083	7,300

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	2.1	2.5	3.0	3.7
	0.75 kg/pers/day	3.2	3.8	4.6	5.5
	1.00 kg/pers/day	4.2	5.1	6.1	7.3

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Lesotho

Lesotho, officially the Kingdom of Lesotho, is an enclaved country within the border of South Africa. It is just over 30,000 km^2 in size and has a population of around 2.22 million. Its capital and largest city is Maseru. Lesotho is divided into ten districts, each headed by a district administrator. Each district has a capital known as a "camptown". The districts are further subdivided into 80 constituencies, which consist of 129 local community councils.*
Municipal waste management in Lesotho is under the supervision of the Ministry of Local Government and Chieftainship (MOLGC), together with the National Environmental Secretariat (NES). Due to the dumping of garbage on roadsides and in drains, the sanitary environment in low-income and poor residential areas is particularly poor.

Source: * Wikipedia, Lesotho, accessed 29 March 2019, <https://en.wikipedia.org/wiki/Lesotho>

Information

Population*	2.22 million (2017)
Population growth (annual %)*	1.3 (2017)
Area (km^2)*	30,360
Climate**	Temperate
GDP (current USD)*	2.58 billion (2017)
GDP growth (annual %)*	-2.3 (2017)
GNI per capita, Atlas method (current USD)*	1,210 (2017)
Main industries***	Agriculture, livestock, manufacturing, mining
Currency****	USD 1 : LSL 13.85 (Lesotho loti) (February 2019)

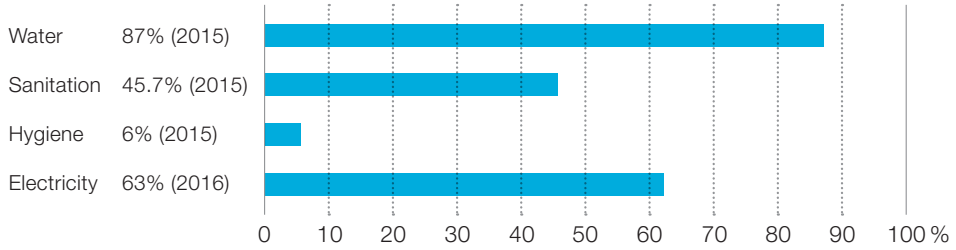
Sources: * World Bank, Lesotho, accessed 29 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=LSO>
** Central Intelligence Agency, Lesotho, accessed 29 March 2019, <https://www.cia.gov/library/publications/the-world-factbook/geos/lt.html>
*** Wikipedia, Lesotho, accessed 29 March 2019, <https://en.wikipedia.org/wiki/Lesotho>
**** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no national basic law on municipal solid waste management. ● The related laws and regulations are as follows: » National Constitution 1993 » Local Government Act 1997 » Public Health Order 1970 » Environment Act 2008 ● There is no regulation related to Environmental Impact Assessments.
Policy/Plan	● There is no national SWM policy or plan, but the Ministry of Local Government and Chieftainship (MOLGC) set up the Strategic Plan 2015-2019 to ensure efficient and sustainable management of land, as well as rural and urban development through the promotion of appropriate policies and guidelines, and capacity development of Councils and other relevant stakeholders. ● The related policies are as follows: » Decentralisation Policy 2014 ● There is no privatisation policy on waste management.
Implementation system	● Ministry of Local Government and Chieftainship (MOLGC): Main organisation responsible for municipal waste management. ● National Environmental Secretariat (NES): Responsible for the formulation of environmental policies and standards. ● There are four levels of decentralised political structures in Lesotho: 10 District Councils, 1 Municipal Council, 11 Urban Councils and 64 Community Councils. » District Council: Consists of councillors indirectly elected through electoral colleges. » Municipal Council: Consists of councillors representing wards within an urban area categorised as a Municipality. » Urban Council: The councils of the designated urban areas at district level. » Community Council: The lowest formal governmental structure in the government hierarchy. ● Councils are mandated to identify their own dumping sites. There are no standards, conditions, or policy that must be satisfied by these sites.

Item	Outline
Financial system	● Ratio of SWM budget allocated within national budget: Data not provided. ● Tax on waste disposal: None. ● Each council is given an annual budget of USD 23,440. ● Subsidies from central government to local government for operation, procurement of collection vehicles, construction of landfill, etc.
Donor support	● There is no donor support of SWM.
Areas for improvement	● Preparation of a SWM basic law. ● Capacity development of SWM staff members. ● Transition from open dumping to controlled dumping is necessary. ● Construction of recycling/treatment facilities. ● Dissemination of environmental education such as waste separation.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

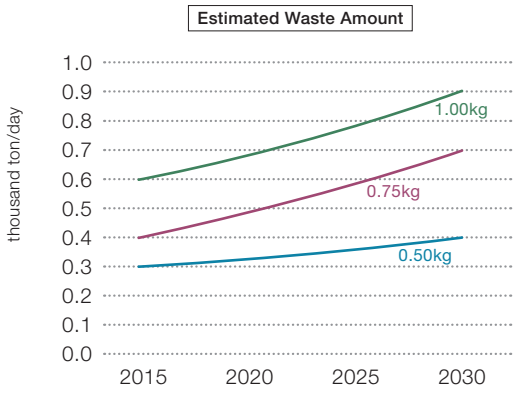
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	2,175	2,322	2,466	2,608
	Urban	585	674	774	887

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	0.3	0.3	0.4	0.4
	0.75 kg/pers/day	0.4	0.5	0.6	0.7
	1.00 kg/pers/day	0.6	0.7	0.8	0.9

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Madagascar

Madagascar, officially the Republic of Madagascar, is an island country in the Indian Ocean, off the coast of East Africa. The country covers an area of 587,295 square kilometres and has a population of 25.57 million. About 35% of the population reside in urban areas. Most of the population live on the eastern half of the island, with a significant cluster in the central highlands and eastern coastline.

The Directorate of Sanitation under the Ministry of Water, Energy and Hydrocarbons is responsible for solid waste management (SWM). Other institutions involved in SWM include the Ministry of Health and the Ministry of Territorial Development. There is a basic law on SWM but there is no policy nor national budget. The informal sector participates in SWM through the recycling of waste but there is no specific policy for supporting this sector.

Information

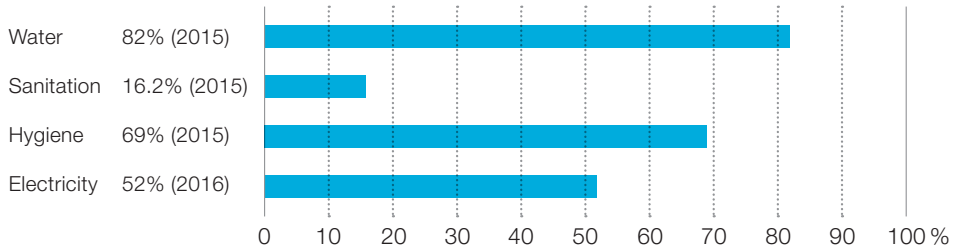
Population*	25.57 million (2017)
Population growth (annual %)*	2.7 (2017)
Area (km^2)*	587,295
GDP (current USD)*	11.50 billion (2017)
GDP growth (annual %)*	4.2 (2017)
GNI per capita, Atlas method (current USD)*	400 (2017)
Main industries**	Agriculture, tourism, manufacturing
Currency***	USD 1 : MGA 3,681.25 (Malagasy ariary) (September 2019)

Sources: * World Bank, Madagascar, accessed 9 April 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=MDG>
** Wikipedia, Madagascar, accessed 2nd August 2018, <https://en.wikipedia.org/wiki/Madagascar>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Code of Water (Law 98-029 of January 1999). ● Urban Sanitation Management and Royalties (Law 95-035 of 1995). ● Charter of the Environment.
Policy/Plan	● There is no policy on SWM.
Implementation system	● The Directorate of Sanitation, under the Ministry of Water, Energy and Hydrocarbons is responsible for SWM. Other institutions involved in SWM include the Ministry of Health and Ministry of Territorial Development. ● Number of staff in the SWM department: » 5 people work in the department. » 3 people took SWM or related course in university. » 5 people have worked in the SWM sector for over five years. ● Collection of SWM data: There is a system for collecting SWM data from the local governments. The system covers many cities, but data is not collected frequently. ● Informal sector participation: The informal sector participates in SWM but there is no specific policy for supporting this sector. ● Disposal: No data on sanitary landfill.
Financial system	● There is no national budget for SWM. ● There is a tax related to SWM. ● There is a subsidy related to SWM, for a waste collection service in the capital.
Donor support	● French Development Agency (AFD).
Areas for improvement	● Clarification of the roles and responsibilities of ministerial departments (still vague). ● Sector Policy and Strategy, Sustainable Management Plan. ● Establishment of National Fund for Sanitation. ● Citizen Education on Hygiene.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount (estimate)

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

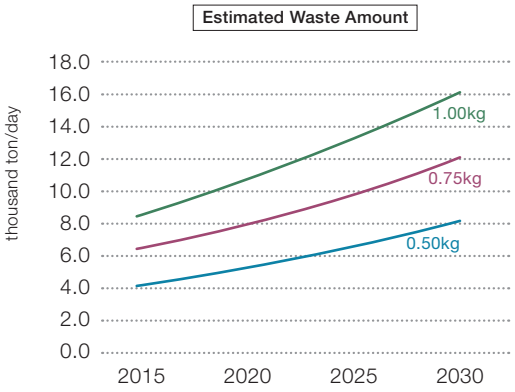
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	24,234	27,691	31,500	35,592
	Urban	8,529	10,670	13,200	16,102

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	4.3	5.3	6.6	8.1
	0.75 kg/pers/day	6.4	8.0	9.9	12.1
	1.00 kg/pers/day	8.5	10.7	13.2	16.1

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Malawi

Malawi, officially the Republic of Malawi, is a landlocked country in southeast Africa that was formerly known as Nyasaland. It is bordered by Zambia, Tanzania, and Mozambique. The capital is Lilongwe, which is also Malawi's largest city. In 1964 it became an independent country and two years later it became a republic. Upon gaining independence, Malawi became a totalitarian one-party state until 1994. At present, Malawi has a democratic, multi-party government. Malawi is divided into 28 districts within three regions. Malawi is among the world's least-developed countries. The economy is heavily based on agriculture, with a largely rural population.*

With respect to SWM, the Environment Management Act of 2017 was enacted and the Waste Management Strategy of 2017-2022 came into effect. The Act established the Malawi Environmental Protection Agency, an autonomous body under the Ministry of Natural Resources, Energy and Mining. The Agency is expected to be established in a few years to take over the national level SWM supervisory roles from the Environmental Affairs Department. Local governments/municipalities are responsible for SWM at the local/municipal level.

Source: * Wikipedia, Malawi, accessed 27 February 2019, <https://en.wikipedia.org/wiki/Malawi>

Information

Population*	18.62 million (2017)
Population growth (annual %)*	2.9 (2017)
Area (km^2)*	118,480
Climate	Tropical
GDP (current USD)*	6.3 billion (2017)
GDP growth (annual %)*	4.0 (2017)
GNI per capita, Atlas method (current USD)*	320 (2017)
Main industries**	Largely agricultural
Currency***	USD 1 : MWK 719 (Malawi kwacha) (February 2019)

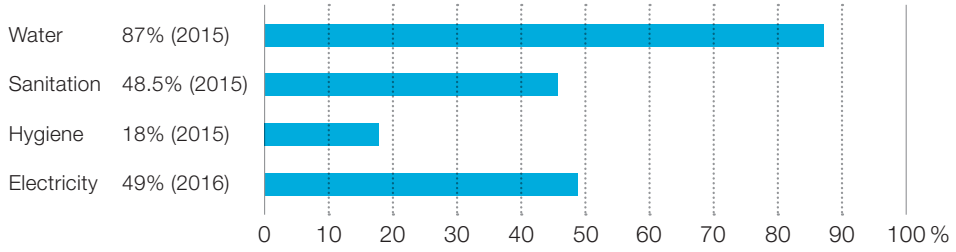
Sources: * World Bank, Malawi, accessed 14 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=MWI>
** Wikipedia, Malawi, accessed 27 February 2019, <https://en.wikipedia.org/wiki/Malawi>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is a framework law on SWM: Environment Management Act of 2017. The law clearly defines responsibilities of the stakeholders. ● There are three Regulations (2008): 1. Waste management and sanitation. 2. Chemicals and toxic substances. 3. Regulation on Ban of Thin Plastics. ● Local Government Act of 1998 assigns the municipalities to be responsible for SWM (this law is presently under review). ● The law is not implemented well due to lack of understanding among stakeholders, lack of specialised facilities, inadequate expertise, and lack of appropriate budget allocation.
Policy/Plan	● The overall SWM strategy is outlined under the Waste Management Strategy of 2017-2022 (the policy development was supported by Basel Convention). ● The Waste Management Strategy identifies priority issues and parties for Malawi in SWM (please see Areas for improvement, below.)
Implementation system	● At present, the Environmental Affairs Department of the Ministry of Natural Resources, Energy and Mining is in charge of SWM at the national level. The Department interacts with local government for conveying laws/regulations, providing instructions, and providing technical support. It monitors the status of SWM at municipalities and uses the information to provide local government with further instructions and to plan for the next year. ● At the local level, the local government/municipalities are responsible for SWM. However, sometimes environmental issues are low on the priority of Local Councils, thus actions tend to be slow. ● Other relevant authorities for SWM include the Ministry of Local Government and Ministry of Health. ● The informal sector as well as small-scale private operators are involved in collection of waste on the streets, transfer stations, and at disposal sites. Guidelines and licensing requirements for private operators have been developed under the Regulation on Waste Management and Sanitation (since 2016). The private sector operators have been trained as well.

Item	Outline
	● Average waste generation rate for Malawi is 0.5 kg/person/day. Estimated waste generation is approximately 8,500 tons/day for the whole country. ● There is supposed to be some data available on waste generation amount, collected waste amount, disposed waste amount, and waste amount put into incineration facility for the cities of Blantyre and Lilongwe, though data is not gathered often. Data collection of the four main cities is being planned by the Environmental Affairs Department. ● There is no sanitary landfill in the country.
Financial system	● There is national budget for SWM but no taxation on SWM. There is some financial assistance system (i.e. SWM project funds are provided by the Ministry of Finance to local government for specific projects). ● Waste collection rate is still very low -30% collection rates in major cities (as of 2016). Private sector involvement should continue to improve the collection rate. The Department of Environment is aiming to raise this rate to above 70%. A higher collection rate is expected to attract larger private sector companies' to operate in Malawi (e.g. waste-to-energy).
Donor support	● JICA is providing capacity development support. ● Global Environmental Fund through United Nations Development Programme (UNDP): Climate change activities that are linked to SWM, e.g. improvement of disposal sites, establishment of waste transfer stations. ● EU: Establishment of a waste disposal site in Mzuzu City (implementation by Plan International). WaterAid: Supported waste transfer station.
Areas for improvement	In the order of priority from the view point of the Environmental Affairs Department: ● Legal issues: Some councils are in the process of developing by-laws. Some cities (such as Lilongwe) are faster in taking action, while other cities are slower due to internal bureaucracy. Once local by-laws have been enacted, the legal system will be complete. ● Financial issues: Promotion of public-private partnerships (PPP) as a strategy to address the issue of financing waste management. ● Technical issues: Council personnel require technical training. ● Institutional issues: Enforcement is difficult due to absence of an autonomous agency that would enforce the legislation. Under the Environment Management Act of 2017, it has been decided that Malawi Environmental Protection Agency (MEPA) is to be established as an autonomous body under Ministry of Natural Resources, Energy and Mining. Such an agency might be established by 2020 or so.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

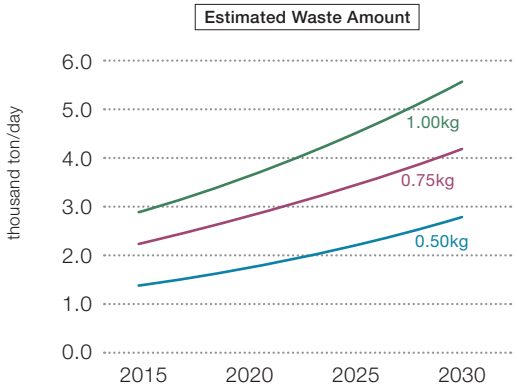
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	17,574	20,284	23,277	26,578
	Urban	2,867	3,535	4,407	5,551

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	1.4	1.8	2.2	2.8
	0.75 kg/pers/day	2.2	2.7	3.3	4.2
	1.00 kg/pers/day	2.9	3.5	4.4	5.6

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Mauritius

Mauritius, officially the Republic of Mauritius, is an island nation in the Indian Ocean, about 2,000 kilometres off the southeast coast of the African continent. The country covers an area of 2,040 square kilometres. The main islands of the Republic are Mauritius, Rodrigues, Agalega and St. Brandon. Port Louis, the capital and most populated city, is situated on the main island of Mauritius. As of 2017, the country had a population of 1.22 million with 41% of the population residing in urban areas. The economy of Mauritius depends mainly on sugar, tourism, textile, financial services, and the ICT sector.

The Solid Waste Management Division in the Ministry of Environment and Sustainable Development is responsible for solid waste management. The Ministry of Health and Quality of Life is involved in healthcare waste management. Mauritius does not have a national basic law on municipal solid waste, but regulations do exist with regards to waste management under the Environment Protection Act and the Local Government Act. Additionally, there is a solid waste management strategy and a national budget for solid waste management. The informal sector is involved in collecting and recycling of recyclable materials but there is no policy for supporting this sector.

Information

Population	1.22 million (Source: Statistics Mauritius, 2017. Population & Vital Statistics, Ministry of Finance and Economic Development.)
Population growth (annual %)*	0.1 (2017)
Area (km^2)*	2,040
GDP (current USD)*	13.27 billion (2017)
GDP growth (annual %)*	3.8 (2017)
GNI per capita, Atlas method (current USD)*	10,130 (2017)
Main industries**	Sugar, tourism, textiles
Currency***	USD 1 : MUR 34.6 (Mauritian rupee) (November 2018)

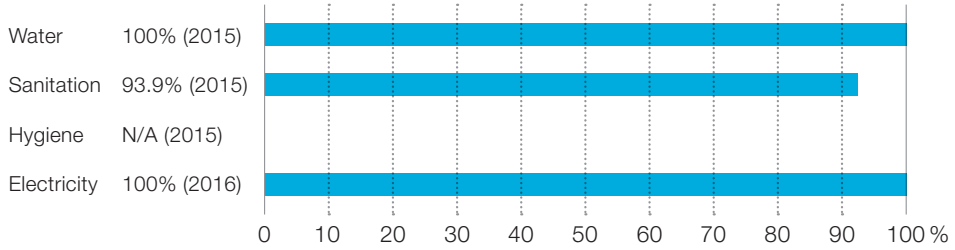
Sources: * World Bank, Mauritius, accessed 15 March 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=MUS>
** Central Intelligence Agency, Mauritius, accessed 22nd November 2018, <https://www.cia.gov/library/publications/the-world-factbook/geos/mp.html>
*** Cuex.com

Current SWM Situation

Item	Outline
Legal system	● There is no national basic law on municipal solid waste. ● Local Government (Registration of Recycler and Exporter) Regulations 2013. ● Environment Protection (Banning of plastic bags) Regulations 2015. ● Environment Protection (Standards for hazardous wastes) Regulations 2001. ● Local Government (Dumping and Waste Carriers) Regulations 2003. ● Public Private Partnership Act (2004).
Policy/Plan	● Solid Waste Management Strategy 2011–2015.
Implementation system	● The Solid Waste Management Division of the Ministry of Environment and Sustainable Development is responsible for solid waste management. ● Other organisations involved in solid waste management include: » Ministry of Health and Quality of Life: responsible for medical waste » Universities ● Number of staff in the Solid Waste Management Division: » Total number of staff in the SWM department: 45 » Number of staff that took solid waste management course in university: 10 » Number of staff who have worked in the SWM sector for 5 years and more: 25 ● There is no policy for supporting the informal sector. ● There is one sanitary landfill.
Financial system	● The national budget for solid waste management is USD 45 million.

Item	Outline
Donor support	● French Development Agency (AFD). ● United Nations Environment Programme (UNEP).
Areas for improvement	● Development of legislation pertaining to waste management. ● Promotion of waste segregation at source. ● Development of materials recovery facilities. ● Development of a landfill tax for industrial and commercial waste.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.75, 1.0, and 1.25 kg/person/day*.

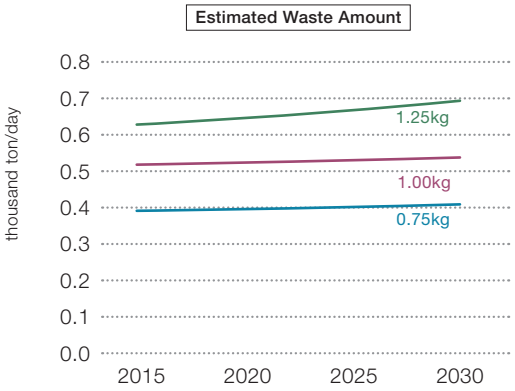
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	1,259	1,274	1,283	1,287
	Urban	516	519	527	539

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.75 kg/pers/day	0.4	0.4	0.4	0.4
	1.00 kg/pers/day	0.5	0.5	0.5	0.5
	1.25 kg/pers/day	0.6	0.6	0.7	0.7

Waste Amount = (generation rate) x (urban population)



* As of Dec. 2017, 496,729 tons of solid wastes were generated in Mauritius and the population stood at 1.22 million. This corresponded to a waste generation rate of 1.11 kg/person/day.

Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Mozambique

Mozambique, officially the Republic of Mozambique, is a country in Southeast Africa bordered by the Indian Ocean to the east, Tanzania to the north, Malawi and Zambia to the northwest, Zimbabwe to the west, and Eswatini (Swaziland) and South Africa to the southwest. On the east, it is separated from the Comoros, Mayotte, and Madagascar by the Mozambique Channel. The capital of Mozambique is Maputo. Mozambique is divided into ten provinces and one capital city with provincial status. The provinces are subdivided into 129 districts. The districts are further divided in 405 administrative posts and then into localities, the lowest geographical level of the central state administration.*

Municipal SWM in Mozambique is under the supervision of the Ministry of Land, Environment and Rural Development (MITADER). The Ministry deals with urban/municipal waste and hazardous industrial waste. The legal framework related to SWM seems to be thoroughly established. However, it is not properly implemented, due to lack of understanding among stakeholders and lack of appropriate budget allocation.

Source: * Wikipedia, Mozambique, accessed 14 March 2019, <https://en.wikipedia.org/wiki/Mozambique>

Information

Population*	29.67 million (2017)
Population growth (annual %)*	2.9 (2017)
Area (km^2)	801,590
Climate	Tropical savanna
GDP (current USD)*	12.65 billion (2017)
GDP growth (annual %)*	3.7 (2017)
GNI per capita, Atlas method (current USD)*	420 (2017)
Main industries	Mineral industries (aluminium, beryllium, and tantalum), natural gas, tourism
Currency**	USD 1 : MZN 62.09 (Mozambican metical) (February 2019)

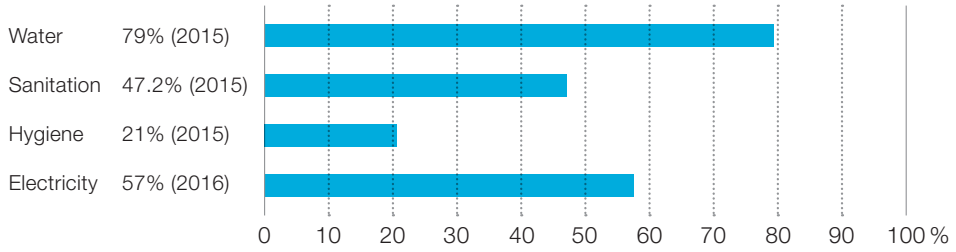
Sources: * World Bank, Mozambique, accessed 14 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=MOZ>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● The related laws and regulations for SWM are as follows: 》Regulation on Urban Solid Waste Management of 2014. 》Regulation on Management of Hazardous Industrial Waste of 2014. 》Regulation on Plastic Bag Management of 2015. 》Technical Directive for the Implementation of Sanitary Landfill in Mozambique of 2010. 》Regulation on Management of Hazardous Industries Waste. 》Regulation on the Management of Biomedical Waste. 》Environmental Impact Assessment Law of 2015. 》No specific law on recycling. 》No law/regulation specific to encouraging renewable energy. 》Law on Public-Private Partnership (PPP) of 2011.
Policy/Plan	● National Strategy for Integrated Urban Solid Waste Management in Mozambique of 2013: clearly defines municipal waste and the responsibilities of the stakeholders but does not regulate the preparation of the national plan for municipal solid waste management (MSWM). ● Methodological Guide for the elaboration of municipal plans for the integrated management of urban solid waste.
Implementation system	● Ministry of Land, Environment and Rural Development (MITADER): 》Proposes policies, legislation and standards for the correct use of environmental components and control of environmental quality. 》Elaborates, promotes, and implements policies, strategies, directives, programs and integrated plans for the sustainable development and preservation of the environment. 》Ensures the integration of environmental aspects related to waste management into sectoral policies, strategies, programs, and plans. 》Provides technical assistance to all levels of governance in waste management and the environment. 》Establishes standards, guidelines, and procedures for the preparation of environmental management plans for socio-economic

Item	Outline
	development projects in the waste area. » Promotes the elaboration and implementation of plans and programs for the management of green spaces, waste, and liquid effluents. ● MITADER deals with urban/municipal waste and hazardous industrial waste. There are 12 staff in the Division of Waste Management and Green Spaces of the National Directorate of Environment under the MITADER. ● Ministry of Health: in charge of overseeing policies on medical waste. » Proposes policies, legislation, and standards for the sanitary management of biomedical waste. » Elaborates, promotes and implements policies, strategies, directives, programs, and integrated plans for the management of biomedical waste. » Ensures the integration of public health issues into sectoral programs and plans. » Provides technical assistance at all levels of governance in health matters. ● Ministry of Public Works, Housing and Water Resources: » Proposes policies, legislation, and standards for the water and sanitation. » Develops, promotes and implements policies, strategies, directives, programs, and integrated plans for the management of water resources including water supply and sanitation. » Ensures the integration of environmental sanitation into sector programs and plans. » Provides technical assistance to all levels of governance in environmental sanitation and technical assistance to municipalities in sanitation. ● Ministry of Education and Human Development: » Proposes school health policies, legislation, and standards. » Promotes and implements policies, strategies, directives, programs, and integrated plans for school health. » Ensures the integration of environmental issues in curricula and sectoral education programs and plans at all levels. » Provides technical assistance to all levels of environmental governance in relation to environmental sanitation. ● There are informal activities in collection of recyclable materials on the streets and at disposal site.
Financial system	● Ratio of SWM budget allocated within national budget: unknown. ● Tax on waste disposal: only in some municipalities. ● No subsidies related to SWM from central government to local government.
Donor support	● Support for some municipalities. (No support for national level.)
Areas for improvement	● Financial issues: promote waste management activities at the national level. ● Technical issues: » Train municipal waste management technicians. » Promote the exchange of experiences between municipalities at national and international level. » Promote the construction of landfills controlled by Fukuoka method. ● Legal issues: preparation of National Law on SWM. ● Social issues: promote awareness campaigns and environmental education.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

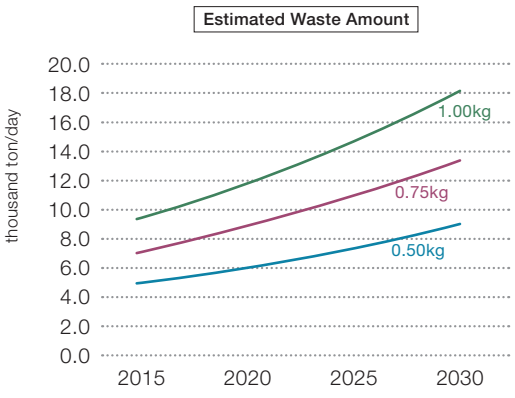
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	28,011	32,309	37,116	42,439
	Urban	9,636	11,978	14,811	18,195

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	4.8	6.0	7.4	9.1
	0.75 kg/pers/day	7.2	9.0	11.1	13.6
	1.00 kg/pers/day	9.6	12.0	14.8	18.2

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Namibia

Namibia is a country in southern Africa, bordering Zambia and Angola to the north, Botswana to the east, and South Africa to the south and east. Namibia covers an area of 824,290 square kilometres, and Windhoek is its capital and largest city. As of 2017, Namibia had a population of 2.53 million with 49% of the population residing in urban areas.*

SWM is the responsibility of the Department of Environmental Affairs, part of the Ministry of Environment and Tourism. Other institutions involved in solid waste management include the Ministry of Health and Social Services, the Ministry of Urban and Rural Development, and the Ministry of Works and Transport. The informal sector is involved in collecting and recycling recyclable materials, and there is a policy for supporting this sector. Namibia has enacted SWM legislation and has a national SWM budget.

Sources: * Wikipedia, Namibia, accessed 9 April 2019, <https://en.wikipedia.org/wiki/Namibia>
and World Bank, Namibia, accessed 9 April 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=NAM>

Information

Population*	2.53 million (2017)
Population growth (annual %)*	2.2 (2017)
Area (km^2)*	824,290
GDP (current USD)*	13.25 billion (2017)
GDP growth (annual %)*	-0.9 (2017)
GNI per capita, Atlas method (current USD)*	4,570 (2017)
Main industries**	Mining, agriculture, manufacturing, tourism
Currency***	USD 1 : NAD 15.17 (Namibian Dollar) (September 2019)

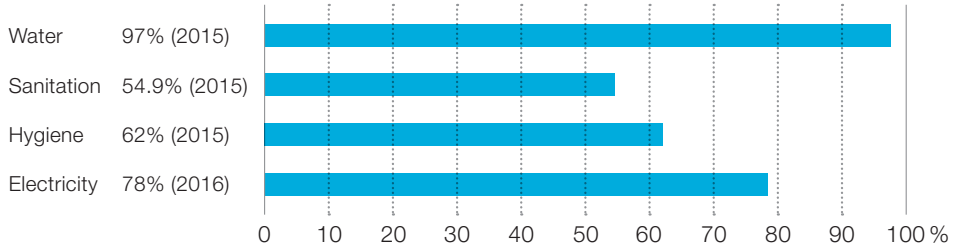
Sources: * World Bank, Namibia, accessed 9 April 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=NAM>
** Wikipedia, Namibia, accessed 9 April 2019, <https://en.wikipedia.org/wiki/Namibia>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Environmental Management Act (No. 7 of 2007)
Policy/Plan	● The following policies / plans are important: » Namibia's Pollution Control and Waste Management Policy, 2003 » National Solid Waste Management Strategy, 2018 » Namibia Integrated Health Care Waste Management Plan, 2011 » Energy White Paper, 1998 » Public Private Partnership Act 4 of 2017
Implementation system	● The Department of Environmental Affairs in the Ministry of Environment and Tourism is responsible for solid waste management. ● Other organisations involved in solid waste management include: » Ministry of Health and Social Services: in charge of medical waste. » Ministry of Urban and Rural Development: in charge of solid waste in local authorities. » Ministry of Works and Transport: in charge of marine waste. ● Number of staff in the department: » Three staff work in the department. » Three staff took SWM and/or related course at university. » No staff have worked in the SWM sector for five years and more. ● The informal sector is involved in collecting and recycling waste, and there is a policy for supporting this sector. ● There are two sanitary landfills, and three more in planning phase.
Financial system	● There is a national budget on solid waste management. ● There is no tax related to solid waste management. ● There is no subsidy related to solid waste management.
Donor support	● Data not provided.

Item	Outline
Areas for improvement	● Support on the implementation of the National Solid Waste Management Strategy. ● Adding a levy on plastic. ● Raising awareness in schools and in the surrounding communities about the negative impact of waste on people and the environment. ● Personnel in charge of solid waste management should ensure that solid waste management becomes a priority in all municipalities and local authorities, and that the National Solid Waste Management Strategy get implemented country wide.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

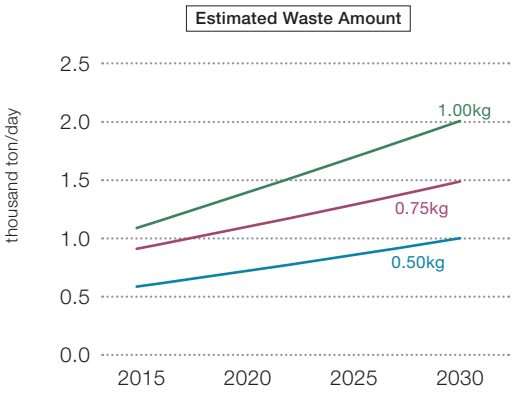
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	2,426	2,697	2,970	3,246
	Urban	1,138	1,403	1,684	1,972

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	0.6	0.7	0.8	1.0
	0.75 kg/pers/day	0.9	1.1	1.3	1.5
	1.00 kg/pers/day	1.1	1.4	1.7	2.0

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Niger

Niger, officially the Republic of the Niger, is a landlocked country in Western Africa, bordered by Libya to the northeast, Chad to the east, Nigeria and Benin to the south, Burkina Faso and Mali to the west, and Algeria to the northwest. Niger covers an area of 1,267,000 square kilometres and has a population of about 21.48 million, of which about 16% reside in urban areas. Most of the population reside in the south and west of the country. Niger's economy depends on subsistence farming, livestock, and some of the world's largest uranium deposits. Agriculture comprises approximately 40% of GDP and provides a livelihood for over 80% of the population.*

SWM is the responsibility of the General Directorate of Salubrity, under the Ministry of the Environment, Urban Salubrity, and Sustainable Development. Other institutions involved in SWM include the Ministry of Health (responsible for the management of biomedical waste), the Ministry of Mines and Industry (responsible for industrial and hazardous waste), and the Ministry of Hydraulics and Sanitation (responsible for urban planning). The following areas need attention: SWM policy and strategies, finance for SWM, and waste recycling.

Sources: * World Bank, Niger, accessed 15 March 2019, <http://databank.worldbank.org/data/reports.aspx?source=2&country=NER>
and Central Intelligence Agency, Niger, accessed 2nd August 2018, <https://www.cia.gov/library/publications/the-world-factbook/geos/ng.html>

Information

Population*	21.48 million (2017)
Population growth (annual %)*	3.8 (2017)
Area (km^2)*	1,267,000
GDP (current USD)*	8.12 billion (2017)
GDP growth (annual %)*	4.9 (2017)
GNI per capita, Atlas method (current USD)*	360 (2017)
Main industries**	Agriculture, mining
Currency***	USD 1 : XOF 577.81 (West African CFA franc) (February 2019)

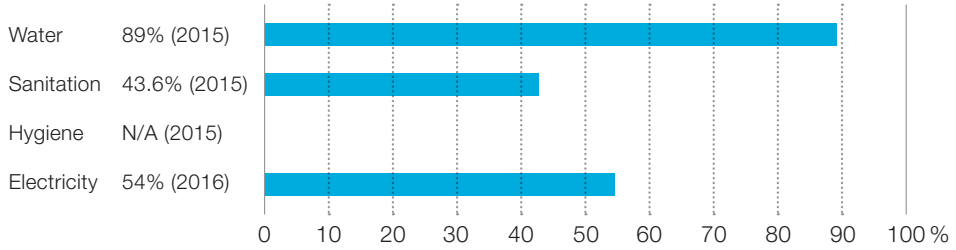
Sources: * World Bank, Niger, accessed 15 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=NER>
** Wikipedia, Niger, accessed 2nd August 2018, <https://en.wikipedia.org/wiki/Niger>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● Article 35 of the Constitution of 25 November 2010 ensures the right to any person to live in a healthy environment. ● Framework law No. 98-56 of 29 December 1998 on Environmental Management (Articles 62 to 69). ● Code of Public Hygiene (Ordinance No. 93-13 of 2 March 1993). ● The law governing the water regime in Niger modified and supplemented by Ordinance No. 2010-09 of 1 April 2010.
Policy/Plan	● There is no policy specifically on waste management but the National Environment Plan for a Sustainable Development (Plan National de l'Environnement pour un Développement Durable) partly concerns waste and the living environment, and there is a strategy for the management of plastic waste. However, the strategy has not been implemented because of lack of resources.
Implementation system	● The Directorate of Salubrity, under the Ministry of the Environment, Salubrity, Urban and Sustainable Development is responsible for the management of solid waste. Other institutions involved in the management of solid waste include: » Ministry of Health: responsible for biomedical waste. » Ministry of Mines and Industry: responsible for industrial and hazardous waste. » Ministry of Hydraulics and Sanitation. » Ministry of Interior. » Ministry of Commerce. ● Private operators, NGOs, associations and Economic Interest Groups (GIE) also work in this sector.

Item	Outline
	● Number of staff in SWM department: » Total number of staff in SWM department: 13 » Number of staff that took SWM and/or related course at university: 4 » Number of staff who have worked in the SWM sector for over 5 years: 5 ● System for collection of SWM data: There is no system of collection of SWM data from local government. ● Informal activities: Informal sector is involved in SWM but there is no specific policy for supporting it. ● Sanitary landfill: There is no sanitary landfill.
Financial system	● There is no budget for SWM. ● There is tax related to SWM. ● There is subsidy related to SWM.
Donor support	● United Nations Development Programme (UNDP), German Corporation for International Cooperation (GIZ), World Bank, etc.
Areas for improvement	● Policy and Strategy, Programmes and Action Plans on SWM. ● Choice of management system for the recovery and recycling of waste. ● Implementation of a system of financing waste management. ● Strategy/methods of influencing social behaviour change of the population. ● Reinforcement of technical and financial capacity. ● Provision to municipalities of collection and transport equipment.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

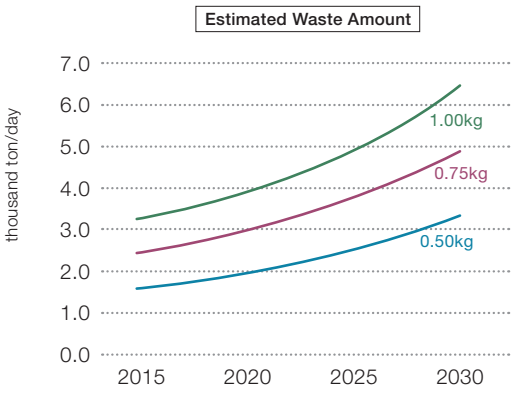
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	19,897	24,075	29,079	34,994
	Urban	3,233	4,003	5,068	6,542

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	1.6	2.0	2.5	3.3
	0.75 kg/pers/day	2.4	3.0	3.8	4.9
	1.00 kg/pers/day	3.2	4.0	5.1	6.5

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Nigeria

Nigeria is in West Africa, and borders Benin in the west, Chad and Cameroon in the east, and Niger in the north. The country covers an area of 923,770 square kilometres and has a population of about 190.89 million people, making it the most populous nation in Africa. About 49.5% of the population reside in urban areas. With a GDP of USD 375.75 billion (in 2017), Nigeria is one of the largest economies in Africa. The economy relies heavily on oil as its main source of foreign exchange earnings and government revenues.*

SWM is the responsibility of the Department of Pollution Control, Solid Waste Management and Technology, under the Ministry of Environment. The Department is responsible for municipal, medical, and hazardous waste. Other institutions involved in solid waste management include the Ministry of Health (responsible for medical waste), the Ministry of Agriculture and Rural Development (responsible for agricultural waste), and Abuja Environmental Protection Board (in charge of waste within the federal capital territory).

Nigeria has a national policy on solid waste management and a national budget for solid waste management. However, there is no basic law on municipal solid waste, and there is no sanitary landfill.

Sources: * Wikipedia, Nigeria, accessed 9 April 2019, <https://en.wikipedia.org/wiki/Nigeria> and
World Bank, Nigeria, accessed 9 April 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=NGA>

Information

Population*	190.89 million (2017)
Population growth (annual %)*	2.6 (2017)
Area (km^2)*	923,770
GDP (current USD)*	375.75 billion (2017)
GDP growth (annual %)*	0.8 (2017)
GNI per capita, Atlas method (current USD)*	2,100 (2017)
Main industries**	Agriculture, oil, telecommunications, financial services, transport, mining
Currency***	USD 1 : NGN 361.2 (Nigerian naira) (February 2019)

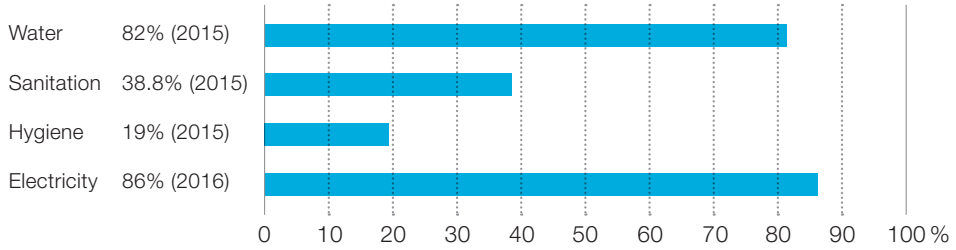
Sources: * World Bank, Nigeria, accessed 9 April 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=NGA>
** Wikipedia, Nigeria, accessed 9 April 2019, <https://en.wikipedia.org/wiki/Nigeria>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● No national basic law on solid waste management
Policy/Plan	● National Policy on Solid Waste Management 2017
Implementation system	● The Department of Pollution Control, Solid Waste Management and Technology, under the Ministry of Environment, is responsible for waste management. ● Other institutions involved in solid waste management include: » Ministry of Health: responsible for medical waste. » Ministry of Agriculture and Rural Development: responsible for agricultural waste. » Abuja Environmental Protection Board: responsible for waste within the federal capital territory. » Informal operators collect recyclable materials in the streets and disposal sites. The national policy on solid waste management covers issues related to informal operators. ● There is an established system for the collection of SWM data. However, data is collected infrequently and only in few cities. ● Number of staff in the SWM department: » Total number of staff: 23 » Staff that took SWM course in university: 21 » Staff that worked in SWM sector for five years or more: 5 ● Sanitary landfill: There is no sanitary landfill.

Item	Outline
Financial system	● There is a budget of NGN 150,000,000-500,000,000 for SWM. ● There is no tax related to solid waste. ● There is a subsidy for intervention projects on waste management.
Donor support	● UNIDO: Development of a policy and institutional framework for sustainable integrated municipal solid waste management. ● JICA: Human development (Training).
Areas for improvement	● Institutional reform. ● Development of basic laws and policies on SWM. ● Development of a waste tax system.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

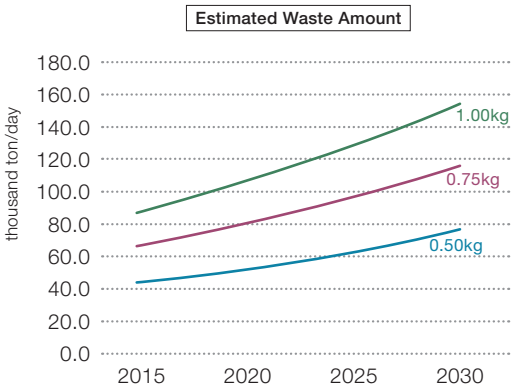
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	181,182	206,153	233,692	264,068
	Urban	86,673	107,113	130,312	156,300

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	43.3	53.6	65.2	78.1
	0.75 kg/pers/day	65.0	80.3	97.7	117.2
	1.00 kg/pers/day	86.7	107.1	130.3	156.3

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Senegal

Senegal, officially the Republic of Senegal, is a country in West Africa. It is bordered by Mauritania, Mali, Guinea, Guinea-Bissau and The Gambia. The capital of Senegal is Dakar, which is also the largest city. The country is divided into 14 Regions, 45 Departments and 113 Arrondissements.*

Municipal waste management in Senegal is under the supervision of the Ministry of Territorial Governance, Development and Spatial Planning. Currently, the national SWM programme is updated and several measures have been taken, such as procurement of trucks and planning of landfill construction. However, the country does not have a basic law on SWM. There is still room to improve the sector such as preparation of a SWM basic law, creation of a national agency for SWM, capacity development for SWM staff, and development of Public-Private Partnership.

Source: * Wikipedia, Senegal, accessed 27 February 2019, <https://en.wikipedia.org/wiki/Senegal>

Information

Population*	15.85 million (2017)
Population growth (annual %)*	2.8 (2017)
Area (km^2)*	196,710
Climate	Continental
GDP (current USD)*	21.07 billion (2017)
GDP growth (annual %)*	7.2 (2017)
GNI per capita, Atlas method (current USD)*	1,240 (2017)
Main industries**	Agricultural and fish processing, phosphate mining, fertilizer production, petroleum refining, zircon and gold mining, construction materials, ship construction and repair
Currency***	USD 1 : XOF 577.81 (West African CFA franc) (February 2019)

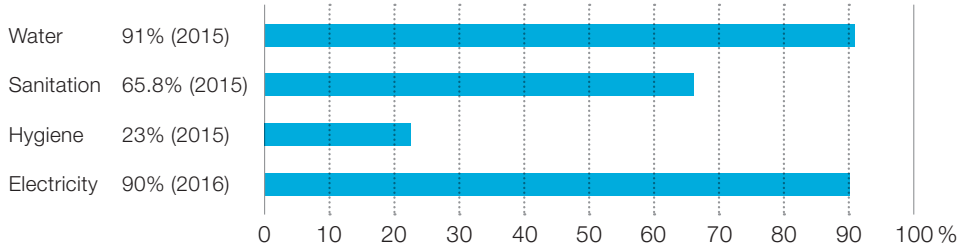
Sources: * World Bank, Senegal, accessed 14 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=SEN>
** Central Intelligence Agency, Senegal, accessed 2 August 2018, <https://www.cia.gov/library/publications/the-world-factbook/geos/mp.html>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no national basic law on municipal solid waste management. ● There is an Environmental Code, which stipulates environmental impact assessment. There is also the Water Code, Local Collectivities Code, and the Hygiene Code.
Policy/Plan	● The National Solid Waste Management Programme which was prepared in 2013 has been updated in the period between 2016 and 2018. The target year of the programme is 2025.
Implementation system	● The National Waste Management and Coordinating Unit, under the Ministry of Territorial Governance, Development and Spatial Planning, is responsible for municipal solid waste management at the country level. ● The Unit has 2,500 staff. ● 80% of the budget is for the implementation of the SWM in Dakar, which has a population of 5 million and generates an average of 2,200 tons of waste per day. ● SWM data is collected every week from municipalities, and a monthly report is submitted to the ministry. ● The current disposal site is a dumpsite. ● Three sanitary landfills are under construction and will be completed in 2019.

Item	Outline
Financial system	● National budget for SWM is XOF 15 billion (approximately USD 26 million). ● Municipalities receive a subsidy for SWM. However, it covers a very small portion of the total cost.
Donor support	● World Bank. ● Islamic Development Bank.
Areas for improvement	● Preparation of a SWM basic law. ● Creation of a national agency for SWM. ● Capacity building for SWM stakeholders. ● Facilitation of Public-Private Partnership. ● Construction of recycling/treatment facilities. ● Implementation of a national information system platform. ● Public awareness campaign.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

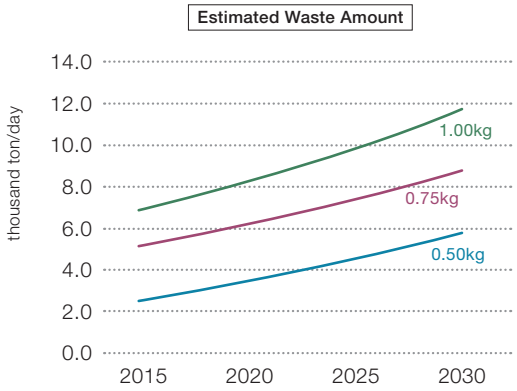
unit: thousand persons

Population	Year	2015	2020	2025	2030
	Total	14,977	17,200	19,577	22,123
	Urban	6,869	8,277	9,904	11,778

unit: thousand ton/day

Waste Amount	Generation rate	2015	2020	2025	2030
	0.50 kg/pers/day	3.4	4.1	5.0	5.9
	0.75 kg/pers/day	5.2	6.2	7.4	8.8
	1.00 kg/pers/day	6.9	8.3	9.9	11.8

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

South Africa

South Africa, officially the Republic of South Africa, is the southernmost country in Africa. It is bordered by Namibia, Botswana, Zimbabwe, Mozambique and Swaziland, and it surrounds Lesotho. It is around 1.2 million square kilometres in size and has a population of around 56.72 million. There are three capitals: Cape Town is the legislative capital, Pretoria is the administrative capital, and Bloemfontein is the judicial capital. The largest city is Johannesburg. The country is divided into nine provinces which are in turn divided into 52 districts: eight metropolitan and 44 district municipalities. The district municipalities are further subdivided into 226 local municipalities.*
The National Department of Environmental Affairs is responsible for the development of waste policies and strategies, as well as for the collection, verification and management of waste data nationally. The department works with the Ministry of Trade and Industry, Ministry of Health, and other ministries through the Intergovernmental Forum. Waste data is collected from local government, and the department has an understanding of waste amounts in many cities.

Source: * Wikipedia, South Africa, accessed 15 August 2018, <https://en.wikipedia.org/wiki/South_Africa>

Information

Population*	56.72 million (2017)
Population growth (annual %)*	1.2 (2017)
Area (km^2)*	1,219,090
GDP (current USD)*	348.87 billion (2017)
GDP growth (annual %)*	1.3 (2017)
GNI per capita, Atlas method (current USD)*	5,430 (2017)
Main industries**	Mining (world's largest producer of platinum, gold and chromium), automobile assembly, metalworking, machinery, textiles, iron and steel, chemicals, fertilizer, foodstuffs, commercial ship repair
Currency***	USD 1 : ZAR 15.17 (South African rand) (September 2019)

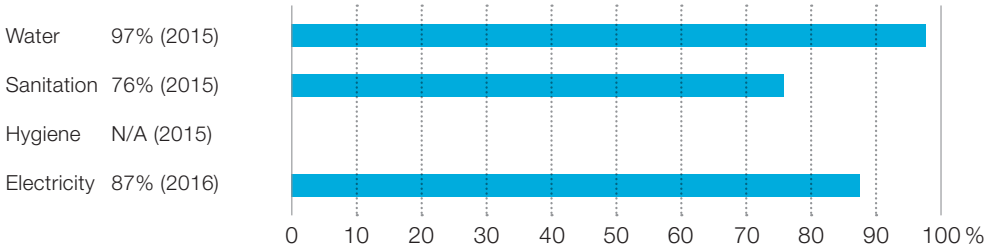
Sources: * World Bank, South Africa, accessed 29 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=ZAF>
** Central Intelligence Agency, South Africa, accessed 15 August 2018, <https://www.cia.gov/library/publications/the-world-factbook/geos/mp.html>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● National Environmental Management: Waste Act (NEMWA), Act 59 of 2008 is the national basic law on municipal waste management. The Act clearly defines what is municipal waste and the responsibilities of stakeholders. The Act regulates the preparation of the national plan for Municipal SWM both in the short and long term. ● NEMWA 59 of 2008 was amended as National Environmental Management: Waste Amendment Act 26 of 2014. ● Regulations under NEMWA are as follows: 》Plastic Carrier Bags and Plastic Flat Bags Regulations (GN 24839 GG 24839 of 9 May 2003). 》 Waste Tyre Regulations (GN 31901 GG 31901 of 13 February 2009). 》Regulations for the prohibition of the use, manufacturing, import and export of asbestos and asbestos-containing materials (GN 30904 GG 30904 of 28 March 2008). 》List of waste management activities that have or are likely to have a detrimental effect on the environment (GN 921 GG 37083 of 29 November 2013). 》Waste Information Regulations (GR 625 GG 35583 of 13 August 2012). 》Waste Classification and Management Regulations (GR 634 GG 36784 of 23 August 2013). ● Norms and standards under NEMWA: 》National domestic waste collection standards (GN 21 GG 33935 of 21 January 2011). 》Standards for the storage of waste (GR 926 GG 37088 of 29 November 2013). 》Standards for extraction and flaring or recovery of landfill gas (GR 924 GG 37086 of 29 November 2013). 》National standards for the scrapping and recovery of motor vehicles (GR 925 GG 37087 of 29 November 2013). 》National norms and standards for the assessment of waste for landfill disposal (GR 635 GG 36784 of 23 August 2013). 》National norms and standards for disposal of waste to landfill (GR 636 GG 36784 of 23 August 2013). 》National norms and standards for the sorting, shredding, grinding, crushing, screening, or baling of general waste (GR1093 GG 41175 of 11 October 2017).

Item	Outline
Policy/Plan	● Policies and plans under NEMWA: » National Policy on thermal treatment of general and hazardous waste (GN 777 GG 32439 of 24 July 2009). » National Policy for the provision of basic refuse removal services to indigent households (GN 413 GG 34385 of 22 June 2011). » National Organic Waste Composting Strategy. » National Waste Management Strategy (GN 344 GG 35306 of 4 May 2012). » Municipal Solid Waste Tariff Strategy (DEA, May 2012). » National Pricing Strategy for Waste Management (GN 904 GG 40200 of 11 August 2016).
Implementation system	● The National Department of Environmental Affairs is responsible for the development of waste policies and strategies, as well as for the collection, verification, and management of waste data nationally. ● The department covers hazardous, non-hazardous, and medical waste. ● The department has a function to communicate with local government in order to implement laws/regulations by conveying them and providing technical assistance. ● The department monitors the implementation of laws/regulations in cities based on reports received from local governments. The information obtained is used for providing instructions to the local government, preparing plans, etc. ● The department has 50 staff members and provides them with training programmes. ● The department works with other ministries such as the Ministry of Trade and Industry (who is in charge of import and export of waste) and the Ministry of Health (who is in charge of medical waste). ● The department collects information on waste generation, collection, recycling, treatment, and disposal for many cities. ● The South African Waste Information Centre website <http://sawic.environment.gov.za> provides access to information related to SWM in South Africa, including data collected from local governments and the private sector.
Financial system	● There is no specific tax on waste. ● There is subsidy related to SWM for local government, which is from the National Treasury. ● At the local government level, solid waste service charges are set in several cities.
Donor support	● German Corporation for International Cooperation (GIZ).
Areas for improvement	● Compliance and enforcement of laws/regulations. ● Inclusion of the informal sector. ● Full cost recovery. ● Administrative and technical capacity development.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

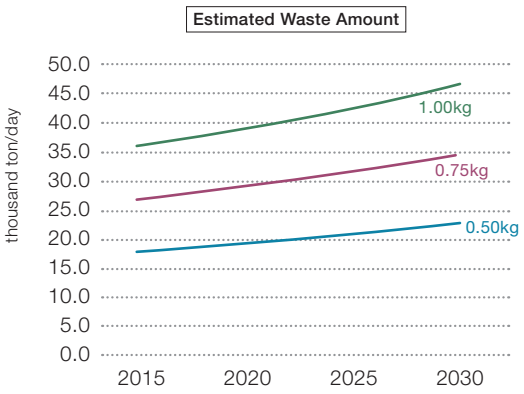
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	55,291	58,721	61,790	64,466
	Urban	35,844	39,551	43,113	46,457

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	17.9	19.8	21.6	23.2
	0.75 kg/pers/day	26.9	29.7	32.3	34.8
	1.00 kg/pers/day	35.8	39.6	43.1	46.5

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

South Sudan

South Sudan, officially known as the Republic of South Sudan, is a landlocked country in East-Central Africa. The capital and largest city is Juba. South Sudan is approximately 620,000 square kilometres in size and has a population of around 12 million. The country gained independence from the Republic of the Sudan in 2011, making it the newest country with widespread recognition. As a new nation, South Sudan has the dual challenge of dealing with the legacy of more than 50 years of conflict and continued instability, along with huge development needs. It has significant oil wealth. The country is governed through a multi-party political system. South Sudan consists of a devolved three tier system made up of a national government, over thirty State Governments and several local governments, with defined roles and responsibilities, and powers are separated between the executive, legislature, and judiciary.*

There is a basic law on SWM and a long-term plan on SWM at the national level. The concentration of population in cities, towns and camps requires appropriate resources, infrastructure and services to treat solid and liquid waste. In fast-growing urban areas, waste management has become increasingly important as the strain on infrastructure and treatment facilities can directly impact the environment and subsequently human health (UNEP, 2013).

Source: * Wikipedia, South Sudan, accessed 29 March 2019, <https://en.wikipedia.org/wiki/South_Sudan>

Information

Population*	12.58 million (2017)
Population growth (annual %)*	2.8 (2017)
Area (km^2)**	619,745
Climate**	Tropical
GDP (current USD)*	2,904 billion (2016)
GDP growth (annual %)*	-13.8 (2016)
GNI per capita, Atlas method (current USD)*	390 (2016)
Main industries**	Mainly agriculture, timber, oil
Currency***	USD 1 : SSP 130.26 (South Sudanese pound) (March 2019)

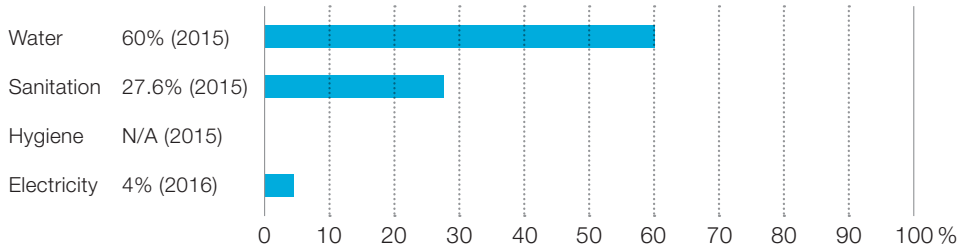
Sources: * World Bank, South Sudan, accessed 29 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=SSD>
** Wikipedia, South Sudan, accessed 29 March 2019, <https://en.wikipedia.org/wiki/South_Sudan>
*** Cuex.com

Current SWM Situation

Item	Outline
Legal system	● There is a basic law on MSWM. The law defines municipal waste and the responsibilities of the stakeholders, and regulates the preparation of a national plan for municipal solid waste management. ● There is no specific law on recycling. ● There is a specific law/regulation to encourage renewable energy.
Policy/Plan	● The overall development plan is outlined under the 2011-2013 South Sudan Development Plan (SSDP), entitled “Realizing Freedom, Equality, Justice, Peace and Prosperity for All.” (The Plan’s implementation period has been extended until 2016.) ● The overall environmental policy is outlined in the National Environment Policy. ● There is a long-term MSWM plan. ● Top priorities for MSWM policy include: » Maintain public sanitation in cities by improving waste collection. » Reduce environmental burdens by improving waste disposal. » Reduce disposal amount by composting.
Implementation system	● The National Ministry of Environment and Forestry is the lead agency for environmental management at the national level, responsible for guiding, directing, and coordinating stakeholders with its vision, “To ensure a clean and healthy environment for all the people of South Sudan”. ● The Ministry of Environment and Forestry also monitors and evaluates the status of SWM in municipalities through reports and site visits.

Item	Outline
	● At the State level, the State Ministry of Health and Environment is the coordinating agency with regard to environmental management. States are governed by Local Government Councils (LGCs). Local Government's mandates are provided by the following laws and regulations: » Interim Constitution of Southern Sudan of 2005. » Transitional Constitution of the Republic of South Sudan. » Local Government Act of 2009. ● Regulation and management of environment at the State/local level is under the jurisdiction of the local governments. The State and local governments' responsibilities include: » Enforcement of environmental policy at the State level. » Identifying training needs. » Conducting environmental and social impact assessments. » Implementing environmental education. ● The above-mentioned basic law on MSWM is not being enforced very well due to lack of understanding among the stakeholders. ● There seems to be no available data on SWM.
Financial system	● No taxation on SWM. ● Lack of government funding and financial resources in SWM sector. ● No subsidy provided to municipalities.
Donor support	● Data not provided.
Areas for improvement	● Implementation of the legislation. ● Set-up of a waste data collection system. ● Awareness raising and capacity building to increase stakeholder understanding.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

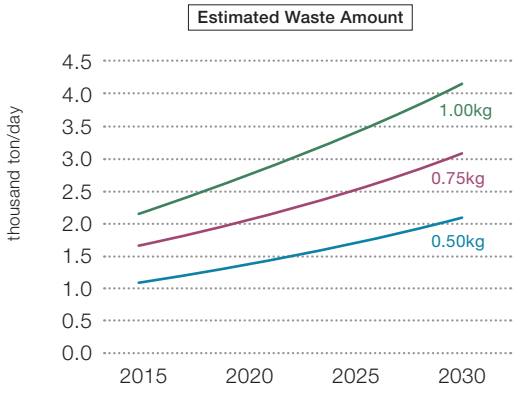
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	11,882	13,610	15,395	17,254
	Urban	2,240	2,749	3,378	4,164

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	1.1	1.4	1.7	2.1
	0.75 kg/pers/day	1.7	2.1	2.5	3.1
	1.00 kg/pers/day	2.2	2.7	3.4	4.2

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Sudan

Sudan, officially the Republic of the Sudan, is also known as Sudan or North Sudan (since South Sudan's independence). Sudan is located in North Africa, but is also considered part of the Middle East politically as well as geographically. It is one of the largest countries in Africa (1,861,484 square kilometres in size) and has a population of 40.53 million. The capital city is Khartoum, which is also the largest city. Sudan is divided into 18 states (wilayat, sing. wilayah) that are further divided into 133 districts.*

Uncontrolled sprawl, chronic solid waste management problems, and the lack of wastewater treatment are the leading environmental problems facing Sudan's urban centres (waste generation amount of 18,000 tons/day). Sewage treatment is grossly inadequate in all of Sudan's cities, and solid waste management practices throughout the country are uniformly poor. The main mode of waste disposal is open dumping, and there is hardly any waste collection system in many towns and villages. Public awareness of SWM issues is limited, and open burning is a common method to deal with the growing amounts of waste. At the national level, there is no law/strategy/plan of municipal SWM. However, there is some municipal SWM system in some larger states, such as Khartoum and Gadarif (controlled final disposal). Khartoum State has an Environmental Protection Law 2008 issued by the Khartoum State Ministry (which regulates the waste management at the state level) and a Master Plan for waste management was prepared in 2013. Khartoum has a Cleaning Corporation.

Sources: * Wikipedia, Sudan, accessed 15 March 2019, <https://en.wikipedia.org/wiki/Sudan> and World Bank, Sudan, accessed 15 March 2019, <https://databank.worldbank.org/reports.aspx?source=2&country=SDN>

Information

Population*	40.53 million (2017)
Population growth (annual %)*	2.4 (2017)
Area (km^2)**	1,861,484
Climate	Hot desert (mainly)
GDP (current USD)*	117.49 billion (2017)
GDP growth (annual %)*	4.3 (2017)
GNI per capita, Atlas method (current USD)*	2,380 (2017)
Main industries	Pollutant industries include petroleum refining, textile and food processing. There is significant horticultural and livestock-rearing activity within the urban areas.
Currency***	USD 1 : SDG 47.50 (Sudanese pound) (February 2019)

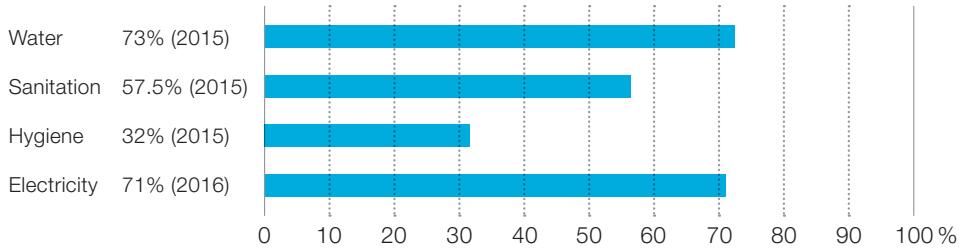
Sources: * World Bank, Sudan, accessed 15 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=SDN>
** Central Intelligence Agency, Sudan, accessed 15 March 2019, <https://www.cia.gov/library/publications/the-world-factbook/geos/su.html>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no legal document on water and air pollution protection and waste management.
Policy/Plan	● No national level policy or strategy on SWM.
Implementation system	● At the national level, the Ministry of Environment, Natural Resources and Physical Development is responsible for waste management. ● Municipalities are responsible for waste collection under the supervision of the state government. ● Environmental impact assessments (EIA) are supposed to be applied to final disposal sites in general but actual implementation is only in Khartoum (in Khartoum, 'closed' final disposal sites are being considered in order to minimise negative health impact on citizens).
Financial system	● Fee collection from business establishments, which does not cover the costs. The balance is covered by budget of the state government and the national government. ● Tax on waste disposal: none.
Donor support	● JICA Project for Strengthening Solid Waste Management 2014–2017 » Technical cooperation for institutional capacity development, management of transfer stations, and landfill. » Grant aid of equipment for waste collection and transport.

Item	Outline
Areas for improvement	● A strategic plan needs to be developed. The linkage between the government at the national level and the state just started with a national workshop in 2018. This needs to be developed. ● Database needs to be developed. ● Staff/institutional capacity needs to be developed. ● The national government is calling upon the state governments to establish Cleaning Corporations. ● Collection and transportation capacity (equipment) need to be enhanced. ● Technology needs to be developed (along with capacity development to utilise new technology) in the following areas: recycling technology, landfill technology, transfer station technology, and maintenance.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

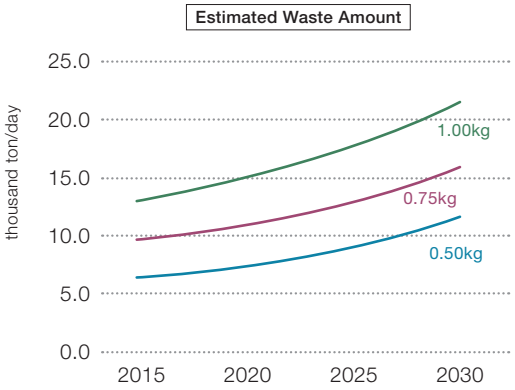
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	38,648	43,541	49,000	54,842
	Urban	13,099	15,349	18,220	21,775

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	6.5	7.7	9.1	10.9
	0.75 kg/pers/day	9.8	11.5	13.7	16.3
	1.00 kg/pers/day	13.1	15.3	18.2	21.8

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Photographs:

Disposal site

New vehicles provided by JICA

United Republic of Tanzania

Tanzania, officially the United Republic of Tanzania, is a sovereign state in eastern Africa within the African Great Lakes region. It borders Kenya and Uganda to the north; Rwanda, Burundi, and the Democratic Republic of the Congo to the west; Zambia, Malawi, and Mozambique to the south; and the Indian Ocean to the east. Mount Kilimanjaro, Africa's highest mountain, is in north-eastern Tanzania.*
Mainland Tanzania is divided into twenty-six regions (Mikoa in Swahili). Each region is subdivided into districts (Wilaya) and local government authorities (also called Councils). The districts and Councils are subdivided into divisions (Tarafa) and further into local wards (Kata). Wards are further subdivided for management purposes: for urban wards into 'streets' (Mitaa) and for rural wards into villages (Kijiji). The villages are further subdivided into hamlets (Vitongoji).
Municipal SWM in Mainland Tanzania is under the supervision of the President's Office - Regional Administration and Local Government. Apparently, dumping of garbage on roadsides and in drains is largely under control. Following a number of initiatives by the government and particularly local government authorities on environmental cleanliness, heavy investments in country-wide urban infrastructure services and intense public awareness and inclusion, the sanitary environment of most parts of urban areas has improved.

Source: * Wikipedia, Tanzania, accessed 15 March 2019, <https://en.wikipedia.org/wiki/Tanzania>

Information

Population	54,199,163 (National Bureau of Statistics (NBS), 2018)
Population growth (annual %)	3.1 (NBS, 2018)
Area (km^2)	947,303
Climate	Tropical climate but divided into four main climatic zones: the hot humid coastal plain, the semi-arid zone of the central plateau, the high-moist lake regions, and the temperate highland areas.
GDP (current USD)	56.66 billion (Bank of Tanzania, 2018)
GDP growth (annual %)	7.1 (NBS, 2017)
GNI per capita, Atlas method (current USD)*	910 (2017)
Main industries	Agricultural processing, mining
Currency**	USD 1 : TZS 2,330 (Tanzanian shilling) (February 2019)

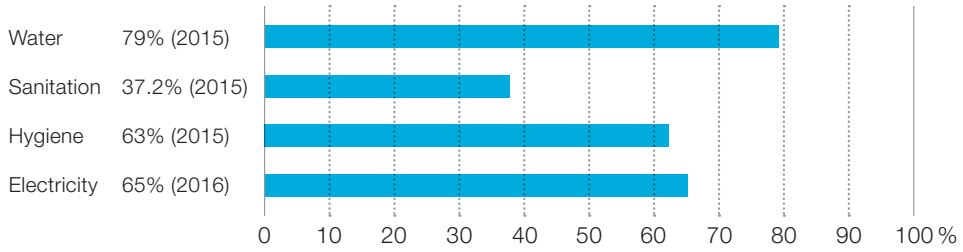
Sources: * World Bank, Tanzania, accessed 15 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=TZA>
** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● There is no national basic law on municipal solid waste management. Related laws and regulations are as follows: 》Environmental Management Act (EMA) 2004: Environmental and Social Impact Assessment (ESIA) is stipulated in the EMA. 》Local Government (Urban Authorities) Act of 1982 (revised in 2002). 》Public Health and Sewerage Act 2007: covers sanitation issues. ● There are laws and programmes for supporting the informal sector as follows: 》Business Activities Registration Act 2007: SWM is a part of this Act. 》Property and Business Formalization Program, 2004 to date: deals with social inclusion of informal sectors. 》The Local Government (Urban Authorities) Development Control Regulations No. 242 of 2008.
Policy/Plan	● There is a strong political will, right from the highest levels of government, for every Tanzanian to adhere to the very basics of environmental sanitation. ● The related policies are as follows: 》National Environmental Management Policy, 1997. 》National Solid Waste Management and Action Plan, 2010.
Implementation system	● President's Office - Regional Administration and Local Government: 》Promote rural and urban linkage, and ensure equity and equality in production and consumption of locally available resources and in accessing of social and economic services for a balanced growth. 》Coordinate, advise, monitor, and evaluate results-based implementation of sectoral development policies and legislations in urban and rural areas. 》Enhance capacity of Regional Secretariats and Local Government Authorities in operationalisation of urban and rural development initiatives. 》Oversee and facilitate Regional Secretariats and Local Government Authorities in preparation and management of urban and rural development projects and programs and as well promote investment opportunities at grassroots level. 》Coordinate, monitor, and nurture growth of emerging small towns' trajectory from village to urban settings in the urbanisation process. ● Vice President's Office (VPO) - Union and Environment: 》Oversee environmental management specifically on National SWM and Action Plan.

Item	Outline
	» Approve Strategic Environmental Assessment and ESIA. ● VPO - National Environment Management Council: conduct ESIA which includes addressing matters on solid waste. ● Ministry of Health, Community Development, Gender, Elders and Children: oversee Environmental Sanitation, which includes municipal and medical waste.
Financial system	● Ratio of SWM budget allocated within national budget: less than 5% (recurring budget). ● Tax on waste disposal: Local Government Authorities charge tipping fee for each incoming truck. ● Local Government Authorities charge a fixed rate for waste from low-income areas, but a higher rate from higher-income areas. ● Subsidies from central government to local government are provided for the operation of the waste management services and the procurement of collection vehicles, and VAT is exempted for all SWM. ● The Government is encouraging various stakeholders to exploit the potential of decomposing solid waste for Climate Change Mitigation through biogas flaring and electricity generation.
Donor support	● World Bank: » Urban Sector Rehabilitation Project in 1990s: besides urban infrastructure, this project also dwelt indirectly on improving urban drainage and accessibility as a leverage in refuse transfer. » Local Government Support Project in early 2000s literally opened up settlements, which eased handling of urban waste. » Tanzania Strategic Cities Project (TSCP) 2010-2020: includes the construction of seven new landfills and the procurement of heavy machines for these sites. » Urban Local Government Strengthening Program (ULGSP) 2013-2019: program-for-results approach (P for R) in funding for improvement of open dump site to controlled dump site (18 urban authorities). Tipping trucks and other equipment were procured. » Dar-es-Salaam Metropolitan Development Project (DMDP) 2013-2020: proposing construction of a new landfill site and procurement of equipment. ● Danish International Development Agency (DANIDA): capacity enhancement for SWM. Institutional setup in both national, regional and local government, 2010-2016. ● JICA: conducted intensive studies on urban SWM. ● UN-Habitat: conducted several participatory studies SWM in 1990s and early 2000s.
Areas for improvement	● Social issues: the community needs to be made aware of the value of handling SWM in a sustainable manner. ● Policy issues: prioritise SWM at policy level. ● Institutional issues: prepare a basic SWM law to more clearly define roles and responsibilities of stakeholders in SWM. ● Technical issues: provide skills and knowledge on SWM at grassroots level.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

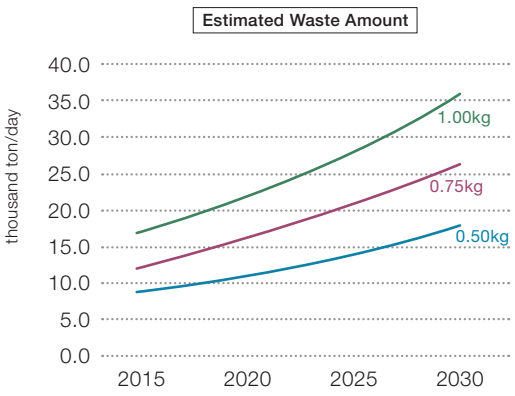
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	53,880	62,775	72,681	83,702
	Urban	17,035	22,113	28,245	35,529

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	8.5	11.1	14.1	17.8
	0.75 kg/pers/day	12.8	16.6	21.2	26.6
	1.00 kg/pers/day	17.0	22.1	28.2	35.5

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Photograph:

One of the landfills

This information was confirmed by the focal point in October 2018.

Zambia

Zambia, officially the Republic of Zambia, is a landlocked country in south-central Africa, neighbouring the Democratic Republic of the Congo to the north, Tanzania to the north-east, Malawi to the east, Mozambique, Zimbabwe, Botswana and Namibia to the south, and Angola to the west. The capital city is Lusaka, which is located in the south-central part of Zambia. The population is concentrated mainly around Lusaka in the south and the Copperbelt Province to the north-west, the core economic hubs of the country. Zambia is divided into ten provinces, which are further divided into 117 districts, 156 constituencies and 1,281 wards.*

Municipal SWM in Zambia is a responsibility of the local authorities in each district, while Zambia Environmental Management Agency (ZEMA) provides regulatory supervision. The local authorities deal mainly with non-hazardous solid waste, and specialised private firms deal with hazardous waste. ZEMA issues licences to local authorities and private firms under the Environmental Management Act No. 12 of 2011 for both hazardous and non-hazardous waste. The legal framework related to SWM seems to be relatively well established. However, it is not properly implemented due to lack of understanding among stakeholders, lack of appropriate budget allocation, and inadequate resources for life cycle management of waste.

Source: * Wikipedia, Zambia, accessed 29 March 2019, <https://en.wikipedia.org/wiki/Zambia>

Information

Population*	17.09 million (2017)
Population growth (annual %)*	3.0 (2017)
Area (km^2)*	752,610
Climate**	Humid subtropical or tropical wet and dry
GDP (current USD)*	25.87 billion (2017)
GDP growth (annual %)*	3.4 (2017)
GNI per capita, Atlas method (current USD)*	1,290 (2017)
Main industries**	Copper mining, agriculture, tourism
Currency***	USD 1 : ZMW 13.09 (Zambian kwacha) (September 2019)

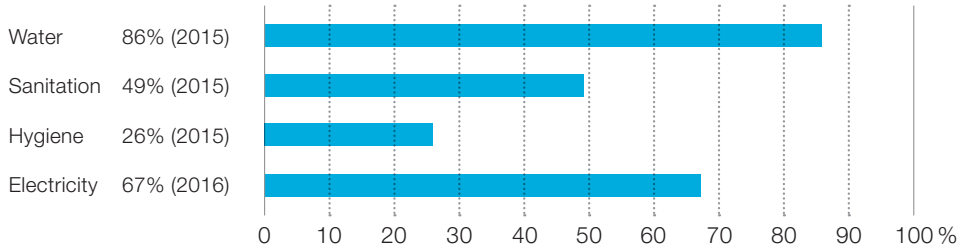
Sources: * World Bank, Zambia, accessed 29 March 2019, <https://databank.worldbank.org/data/reports.aspx?source=2&country=ZMB>
** Wikipedia, Zambia, accessed 29 March 2019, <https://en.wikipedia.org/wiki/Zambia>
*** Oanda.com

Current SWM Situation

Item	Outline
Legal system	● The related laws and regulations for SWM are as follows: » Environmental Management Act No. 12 of 2011: clearly defines municipal waste, responsibilities of the stakeholders, and regulates the preparation of a national MSWM plan. » Environmental Management (Licensing) Regulations No. 112 of 2013. » Environmental Impact Assessment No. 28 of 1997. ● No specific law on recycling. ● No specific law/regulation to encourage renewable energy. ● No law/policy to support the informal sector.
Policy/Plan	● Data not provided.
Implementation system	● Zambia Environmental Management Agency (ZEMA): » In charge of environmental management, pollution prevention, pollution control, and waste management. » Also responsible for issuing licences for various waste management activities such as generation, storage, transport, treatment and disposal to Local Authorities. » Deals with both hazardous and non-hazardous waste. » There are ten staff members in the Environmental Protection Department of the ZEMA. ● The Ministry of Local Government is in charge of policy-making on solid waste, commercial waste, and non-hazardous industrial waste. ● The Ministry of Sanitation and Environment is in charge of overseeing policies on hazardous and non-hazardous waste. ● The Ministry of Health is in charge of overseeing policies on medical/healthcare waste. ● There are informal activities in the collection of recyclable materials on the streets and at the disposal site.

Item	Outline
Financial system	● Ratio of SWM budget allocated within national budget: Unknown. ● Tax on waste disposal: None. ● No subsidies related to SWM from central government to local government.
Donor support	● Data not provided.
Areas for improvement	● Promote understanding among stakeholders. ● Appropriate budget allocation. ● Adequate resources for life cycle management of waste.

Status of Access to Basic Services* (in urban area)



*The definition of each basic service is on page 1 of ANNEX.

Estimated Waste Amount

The future amount of waste generation is estimated based on the projection of urban population at three waste generation rates, i.e. 0.5, 0.75, and 1.0 kg/person/day.

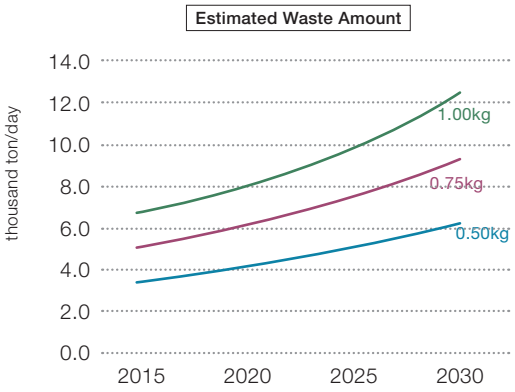
unit: thousand persons

	Year	2015	2020	2025	2030
Population	Total	16,101	18,679	21,594	24,859
	Urban	6,747	8,336	10,257	12,549

unit: thousand ton/day

	Generation rate	2015	2020	2025	2030
Waste Amount	0.50 kg/pers/day	3.4	4.2	5.1	6.3
	0.75 kg/pers/day	5.1	6.3	7.7	9.4
	1.00 kg/pers/day	6.7	8.3	10.3	12.5

Waste Amount = (generation rate) x (urban population)



Source for population: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

Botswana

Kweneng

Kweneng District is located in the south-eastern part of Botswana. It borders Central District in northeast, Kgatleng District on the east, South-East District in southeast, Southern District in south, Kgalagadi District in the west, Ghanzi District in the north. The district is administered by a district administration and district council which are responsible for local administration. The seat of the district's government is Molepolole.*

Kweneng District Council (KwDC), through its Public Health Department is responsible for solid waste management in the district. KwDC provides waste collection and disposal services in some parts of the district. In other parts of the district, solid waste is collected by private operators under a franchise agreement with KwDC. In the district, there is one incineration facility (only for medical waste) and one engineered sanitary landfill located 30 kilometres from the district centre. The landfill is a regional landfill, i.e. solid waste from Kweneng District and other surrounding districts, including the capital Gaborone, are disposed at this landfill.

Source: * Wikipedia, Kweneng District, accessed 15 April 2019, <https://en.wikipedia.org/wiki/Kweneng_District>

Information

Population	726,056 (2017)
Population growth (annual %)	N/A
Area (km^2)*	35,890
Climate	Hot, semi-arid climate
Main industries*	Agriculture, mining, construction
Currency**	USD 1: BWP 10.65 (Botswana pula) (August 2018)

Sources: * Wikipedia, Kweneng District, accessed 15 April 2019, <https://en.wikipedia.org/wiki/Kweneng_District>
**Cuex.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The Waste Management Act (1998).
Policy/Plan	● Currently, there is no waste management plan.
Implementation system	● KwDC provides sweeping, waste collection and disposal services. ● Private operators – under franchise agreements with KwDC – collect and dispose solid waste from some parts of the district. ● Other institutions involved in solid waste management (SWM) include: » The Ministry of Environment, Natural Resources Conservation and Tourism: responsible for the formulation of policies on SWM. » The Department of Waste Management and Pollution Control: responsible for policy formulation on SWM and licencing of operators. ● The council has partnered with Gaborone City Council to operate the Kweneng regional landfill.
Technical System	
Waste generation amount & characteristics	● About 87,719.17 tons/year is generated (estimated at a rate of 0.3kg/person/day and a population of 726,056). ● The composition of the waste collected is as follows: » Food waste: 2.2%, plastic waste: 42.2%, paper: 30.8%, textile: 4.8%, wood: 8.2%, rubber, leather: 0.7%, metal: 4.8%, glass: 4.6%, other items: 1.7%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Waste amount collected at the disposal site is 87,719 tons/year (240 tons/day). Note: KwDC operates a regional landfill ● There are nine transfer stations. ● The council uses the following vehicles for the service: » 4 compactor trucks with a capacity of 9 m^3, 2 compactor trucks with a capacity of 12 m^3 and 2 compactor trucks with a capacity of 15 m^3. In addition, the council has 1 top loader with a capacity of 5 m^3 and another top loader with a capacity of 8 m^3. ● Franchisees use 7 trucks (flat beds).
Intermediate treatment/ Recycling	● There is one incineration plant. Location: S 24°29'00" E 25°42'43". ● The plant has a capacity of 3.2 tons/day. ● A total of 0.83 tons/day is delivered to the facility.

Item	Outline
Final disposal	●There is one final disposal site. Location: S 24°29'03" E 25°42'44". ●The disposal site is located 30 km away from the district centre. ●87,719 tons/year is disposed of. ●The landfill was designed to handle 65,000 tons/year. ●The site has the following features: » Bottom liner, leachate collection pipe, enclosed bund/embankment, leachate treatment facility, a weighbridge, a gate, a fence, drainage to prevent rainwater from getting to the waste, monitoring boreholes, and a tyre cutter. ●At the disposal site, waste is compacted and covered with soil.
Financial system	●The council charges a monthly fee for waste collection: the charge is 10 BWP/month for 80L bag and 20 BWP/month for a 210L bin. ●The council also charges a tipping fee for each waste category, e.g. 40 BWP/ton for domestic waste. ●The council collects 9,325,000 BWP/year in revenue. ●Total expenditure is 4,066,000 BWP/year. ●Note: The total revenue and expenditure is not for SWM.
Environmental and social considerations	●The council has a policy of supporting small and medium waste service providers. ●Communities are informed about proper waste management and the need to pay for waste collection services through public consultation meetings and flyers.
Donor support	●JICA: cooperation through citizen participation, skills and knowledge transfer.
Areas for improvement (in order of priority)	●Revenue collection. ●Staff capacity in solid waste management. ●Waste segregation and recycling system.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	240	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	240	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	0.75	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	0.21	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	1.28	Recycled at disposal sites.
⓬ Final disposal	239	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page 1.

** Figures include estimated values.

Location of Waste Management Facility and Related Photographs:


Weighbridge


Leachate pond


Landfill area


Incinerators


Tyre area

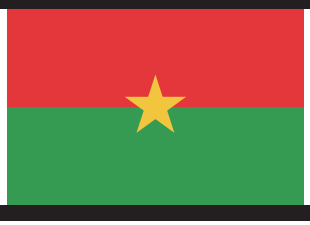

Tyre cutter


Compactor


Donkey cart in a rural area


Scrap metal


Final Disposal Site (coordinates: S 24°29'03" E 25°42'44")



Burkina Faso

Ouagadougou

Ouagadougou is the capital of Burkina Faso and is the administrative, communications, cultural, and economic centre of the nation. It is also the country's largest city, with a population of 2.2 million in 2015. The city's name is often shortened to Ouaga, and the inhabitants are called ouagalais.*
SWM services are provided by the municipality and the private sector. There are many collection and sorting centres across the city. These centres function as a buffer between the primary collection and the secondary collection (transport). In addition, the city has an engineered sanitary landfill.

Source: * Wikipedia, Ouagadougou, accessed 5 March 2019, <https://en.wikipedia.org/wiki/Ouagadougou>

Information

Population*	2.2 million (2015)
Population growth (annual %)*	4.8 (2010-2015)
Area (km^2)**	219
Climate**	Hot semi-arid climate
Main industries**	Food processing and textiles
Currency***	USD 1: XOF 577.81 (West African CFA franc) (February 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Ouagadougou, accessed 5 March 2019, <https://en.wikipedia.org/wiki/Ouagadougou>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The municipality does not have specific regulations for SWM. ● The Ministry of Environment, Green Economy and Climate Change is responsible for preparing legal documents.
Policy/Plan	● Municipal Waste Management Project. ● Solid Waste Management Public Awareness Project.
Implementation system	● The municipality directly provides waste services: sweeping, collection, recycling, and final disposal. ● The city is divided into three parts. One part is covered by the municipality and the other two are covered by the private sector. ● The Ministry of Environment, Green Economy and Climate Change is responsible for the implementation of laws related to environment. ● The Ministry of Water and Sanitation is responsible for waste management, including sludge. ● The Ministry of Health is responsible for medical waste.
Technical System	
Waste generation amount & characteristics	● Waste characteristics: food 22%, plastics 5%, paper 6%, others 67%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Sweeping is carried out in the city centre and public areas. ● Waste amount collected is 600,000 tons per year (1,640 tons per day). ● Collection service is provided three times a week or more in the city centre, and twice a week in the residential area. ● 35 collection and sorting centres are distributed throughout the city.
Intermediate treatment/ Recycling	● There is one materials recovery facility (MRF) and one composting facility. ● Separate collection is conducted for municipal market waste and commercial and institutional waste. ● Household waste is sorted at the collection and sorting centre.
Final disposal	● There is one final disposal site, a sanitary landfill, with facilities such as: bottom liner, leachate collection pipe, leachate treatment facility, embankment, weighbridge, tyre washer, gate, and fence. ● It has a capacity of 6,000,000 m^3. ● The site is called CTVD (Centre de Traitement et de Valorisation des Déchets, or Waste Treatment and Recovery Centre).

Item	Outline
Financial system	● Each household pays XOF 1,000 per month to the service provider (i.e. the municipality or the private sector contractor). ● Industries, especially the mining industry, pay for the waste services.
Environmental and social considerations	● The informal sector collects recyclable materials. The municipality provides job training and subsidies. ● Communities are informed about waste collection day and time.
Donor support	● The African Development Bank (AfDB) provides financial support for the collection and sorting centres, and for the CTVD.
Areas for improvement (in order of priority)	● The municipality needs financial and technical support.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	1,640	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Cameroon
Yaoundé

Yaoundé is Cameroon's capital city and its second-largest city after the port city of Douala. The city sits at an elevation of about 750 metres, covers an area of 180 square kilometres, and has a population of 3.1 million.
Yaoundé City Council, through the Department of Environment and Hygiene, is responsible for solid waste management (SWM). The council provides sweeping, waste collection, and waste disposal services. These services are also provided by the private sector under contract to the city council. The informal sector is also involved in SWM through collection and recycling of waste materials, but the city council does not have a policy to support this sector. The city has a sanitary landfill which is located 11 kilometres from the city centre.

Information

Population*	3.1 million (2015)
Population growth (annual %)*	5.7 (2010-2015)
Area (km^2)**	180
Climate**	Tropical wet and dry climate
Main industries**	Tobacco, dairy products, brewery, lumber
Currency***	USD 1: XAF 577.81 (Central African CFA franc) (February 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Yaoundé, accessed 9 September 2018, <https://en.wikipedia.org/wiki/Yaoundé>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Data not provided.
Policy/Plan	● Waste Management Strategy of Yaoundé City, adopted in 2012.
Implementation system	● The Department of Environment and Hygiene at Yaoundé City Council is responsible for SWM. The department provides the following services: sweeping, waste collection, and disposal services. ● Number of staff in the department: » In administration: 8. » In operations: 20. » Two staff members took SWM or related course in university. » One staff member has worked in the SWM sector for 5 years and more. ● Other institutions involved in SWM: » Ministry of the Environment and the Protection of Nature: responsible for making policies. » Ministry of Urban Development: responsible for the technical supervision of communities. » Ministry of Public Works. ● Private sector participation in SWM: Yaoundé City Council has contracts with private operators who provide sweeping, waste collection, waste transportation to transfer stations, and waste recycling services. ● Informal sector participation in SWM: Informal operators collect recyclable materials from the settlements. There is no policy designed to support the informal sector. ● Community involvement: Community members are informed about waste collection days and time through public consultation meetings and bulletins.
Technical System	
Waste generation amount & characteristics	● The city generates about 1,310 tons of waste per day. ● There is no data on waste composition.
Storage and discharge/ Collection and transportation/ Road sweeping	● The city council has access to the following vehicles: » 40 compactor trucks with a capacity of 20 tons. » 10 dump trucks with a capacity of 5 tons. » Five skip loaders. » Two road sweepers. ● Only 40% of the compactor trucks and 30% of the other waste collection trucks are operational because of a lack of spare parts.
Intermediate treatment/ Recycling	● There is no recycling/treatment facility.
Final disposal	● The disposal site is 11 kilometres from the city centre. ● The disposal site has the following features: bottom liner, leachate collection pipe, enclosed embankment, leachate treatment facility, landfill gas capture facility, weighbridge, tyre washer, gate and fence.

Item	Outline
Financial system	● Revenue: The total revenue for waste services is XAF 8,000,000 per year. ● Expenditure: The total expenditure is XAF 8,000,000 per year. ● The council does not charge for the collection service and there is no tipping fee at the disposal site.
Environmental and social considerations	● Data not provided.
Donor support	● AFD funding.
Areas for improvement (in order of priority)	● Access to finance for SWM. ● Improve staff technical capacity.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	1,310	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Central African Republic

Bangui

Bangui, the political and economic capital of the Central African Republic (CAR), is located between N 4°21' and N 4°26' latitude and E 18°32' longitude. It is limited to the north by the commune of Begoua, located ten kilometres from the city centre, to the south by the Oubangui River, which delimits the border with the Democratic Republic of the Congo, to the west by the urban commune of Bimbo, located seven kilometres from the city centre, and to the east by the rural commune of Landja. Bangui covers an area of 67 square kilometres and consists of eight arrondissements with a population estimated at about 1.5 million.*

The city of Bangui is currently facing a serious household waste collection problem. The current collection system does not cover all arrondissements, and the informal settlements are (almost) not part of the system. Three collection chains coexist: one is managed informally by waste collectors solicited in unstructured areas or working-class neighbourhoods, but also by some well-off households. They proceed with the pre-collection of waste with rudimentary equipment (push cart (pousse-pousse)) and the dumping takes place on wasteland or in rainwater evacuation channels. Another chain is managed by the City Hall who possess 12 skip-handler trucks and a wheel loader excavator. It mainly covers the administrative sector and some well-off neighbourhoods close to the city centre. Waste is discharged at the municipal landfill, which is a Technical Landfill Centre (CET) located six kilometres from the city centre. The last chain is performed by the private company HYSACA, who obtained the municipal authorisation for this purpose. The company covers a part of the city near the city centre as well as some working-class areas. HYSACA is a well-structured company and signs direct contracts with household who pay for the services. HYSACA also disposes of the waste at the municipal landfill.

Source: * Les Ateliers de Maîtrise d'Œuvre Urbaine de Bangui, July 2018

Information

Population	1.5 million
Population growth (annual %)	2.7 (RGPH 88)
Area (km^2)	67
GDP (current USD)	1.99 billion (World Bank)
Climate	Tropical climate
Main industries	Manufacturing
Currency*	USD 1: XAF 577.81 (Central African CFA franc) (February 2019)

Sources: RGPH (General Census of Population and Housing) 88 / World Bank
* Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Law No 03.04 of the 20/01/2003 on Environmental Hygiene Code: pollution of water, ground, air, management of solid and liquid waste.
Policy/Plan	● There is an Environmental Management Plan under the supervision of the Ministry of the Environment.
Implementation system	● The Municipality, through the Direction of Major Works or the Technical Direction, Environment Section, has as its main mission the management of the waste of the commune and to ensure the cleanliness of the city.
Technical System	
Waste generation amount & characteristics	● The daily production is estimated at 930 m^3/day » 2008-2010: 113,975.6 m^3 » 2011-2013: 198,006 m^3 » 2014 : 97,530 m^3 » 2015 : 114,493 m^3 » 2016 : 67,756 m^3 ● Waste density: 0.5 ton/m^3. Composition: about 60% are organic materials. Plastic materials have been increasing in recent years.
Storage and discharge/ Collection and transportation/ Road sweeping	● 41 transfer stations, spread over five arrondissements, where the waste is accumulated before being transferred to the landfill. ● Transport is carried out by technical services, using 12 skip handler trucks. ● Street and sidewalk sweeping is carried out by temporary municipal agents, mostly women. Weeding the main roads is also performed by temporary agents. The department has about 250 agents.
Intermediate treatment/ Recycling	● Discussions are ongoing to introduce selective sorting of waste at the transfer station level.
Final disposal	● The city has a Technical Landfill Centre (CET) commissioned in 2011. This facility is located in the sixth arrondissement, and the area is 36,980 m^2. The CET is designed in 16 landfill cells, with each cell is two metres deep and five metres high.

Item	Outline
Financial system	● The collection service is partly financed by the municipality and partly by the beneficiaries. The current budget does not fully cover the operating expenses, which are estimated at XAF 1.4 billion for the collection of 60% of the waste produced by the city.
Environmental and social considerations	● There is a hygiene code that regulates the environmental and social aspects. However, its implementation remains difficult due to lack of human and financial resources. There is also a waste collection strategy document that defines the conditions and the responsibility of the parties.
Donor support	● The commune benefited from the support of the World Bank from 2004 to 2015, and from the European Development Fund from 2015 to 2017. These supports enabled the development of the Technical Landfill Centre (CET) and the provision of collection equipment to the department in charge of waste management.
Areas for improvement (in order of priority)	● Reduce transportation: no longer transport soil and optimise transport. ● Reduce landfill by recycling reusable materials. ● Introduce sorting at source.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (m^3/day)	Remarks
❶ Waste generation	930	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	320	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	320	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Congo
Brazzaville

Brazzaville is the capital and largest city of the Republic of the Congo and is the financial and administrative centre of the country. The city is situated on the north side of the Congo River, opposite Kinshasa (the capital of the Democratic Republic of the Congo). Over a third of the population of the Republic of the Congo lives in Brazzaville, and it is home to 40% of non-agricultural employment. The city is divided into nine arrondissements.*
SWM services are provided by the municipality, the private sector, and the informal sector. A large private company has contracts for the collection and final disposal with the central government. The city centre is covered by the collection service, but the rest of the city is not due to lack of accessible roads to vehicles. Therefore, the municipality is now trying to strengthen the collection service by formalising the informal waste collectors.

Source: * Wikipedia, Brazzaville, accessed 29 August 2018, <https://en.wikipedia.org/wiki/Brazzaville>

Information

Population*	1.96 million (2015)
Population growth (annual %)*	4.4 (2010-2015)
Area (km^2)**	264
Climate**	Tropical wet and dry climate
Main industries**	Machine shops, textiles, tanning, and manufacturing. The city works as a key port on the Congo River.
Currency***	USD 1: XAF 577.81 (Central African CFA franc) (February 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Brazzaville, accessed 29 August 2018, <https://en.wikipedia.org/wiki/Brazzaville>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The municipality does not have specific regulation for SWM. However, the Urban Household Waste Management Law is currently being proposed. ● Legislation documents are examined at three levels, i.e. central, departmental, and municipal.
Policy/Plan	● There is no sector plan.
Implementation system	● SWM services are undertaken by the municipality, the private sector, and the informal sector. ● The private sector works in the collection and final disposal under contract with the public sector. ● The informal sector works in primary collection. ● Related agencies and their responsibilities are the following: » Ministry of Tourism and Environment: preparation of bills to Parliament, and validation of plans and studies in the environmental sector. » Departmental Direction of Environment: control of quality standards, and validation of proposed legislation.
Technical System	
Waste generation amount & characteristics	● Waste generation amount is approximately 1,200 tons per day (372,482 tons per year). ● Waste generation rate is 0.65 kg/person/day. ● Waste characteristics: food 32%, plastic 10%, paper 7%, glass 6%, textile 5%, wood 5%, rubber/leather 2%, metal 3%, ceramic 1%, others 29% (incombustible 6%, fine elements 12%, and others).
Storage and discharge/ Collection and transportation/ Road sweeping	● Sweeping is carried out in the city centre, public areas, and residential areas. ● 35% of the city area has roads accessible to vehicles and 65% is not accessible. The accessible roads are covered by a collection service. ● Waste in containers placed along main avenues is collected every day. ● The collection service is provided three times a week or more in the residential areas. ● The service uses 80 compactor trucks with different capacities. ● Five small-size transfer points have been installed experimentally. ● One large transfer site is operated and located 35 km to the final disposal site. ● Transport is carried out by ten dump trucks.
Intermediate treatment/ Recycling	● There is no recycling facility. However, there are recyclable material collectors.
Final disposal	● Final disposal is located at S 4°03'28.0" E 15°22'02.7". It is operated by a private company and supervised by the Ministry of Tourism and Environment. ● A weighbridge was installed six months ago.

Item	Outline
Financial system	● The private operator who runs the collection service and the final disposal is paid by the central government. ● Residents pay EUR 0.15-0.76/time for the authorised waste collection and/or the unauthorised informal waste collection.
Environmental and social considerations	● Formalisation of the informal waste collectors is in a process. If a collector pays 25% of the cost for procuring wears and equipment for waste collection, the municipality subsidises 75% and provides vaccination and supports the collector in opening a bank account. ● So far, 145 collectors have been authorised and are working in primary collection. ● Communities are informed about waste collection day and time by banners, announcements, during events, etc.
Donor support	● African Development Bank (AfDB).
Areas for improvement (in order of priority)	● Strengthening of the legal system in SWM. ● Cooperation and demarcation among stakeholders. ● Strengthening of financial basis.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	1,200	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Final Disposal Site (coordinates: S 4°03'28.0" E 15°22'02.7")

Côte d'Ivoire

Abidjan

Abidjan is the economic capital of Côte d'Ivoire, while the administrative and political capital is Yamoussoukro. Abidjan is the most populous city in French-speaking West Africa. The agglomeration of Abidjan, also known as the Autonomous District of Abidjan, lies on the south-east coast of the country, on the Gulf of Guinea. The city is located on the Ébrié Lagoon. The Autonomous District of Abidjan covers an area of 2,119 square kilometres. Abidjan is composed of northern Abidjan and southern Abidjan, consisting of ten formal boroughs (or communes), and four sub-prefectures. According to the 2014 census, the Autonomous District of Abidjan has a population of 4,707,000, which is 21% of the overall population of the country, and accounts for 60% of the country's gross domestic product. Abidjan is experiencing a strong growth and is characterised by a high level of industrialisation and urbanisation.*

The SWM services for household and similar solid waste of the Autonomous District of Abidjan are managed by the Ministry of Sanitation through the National Agency for Waste Management (Agence nationale de la gestion des déchets, ANAGED). Since 2017, Côte d'Ivoire has proceeded to a public service delegation for the cleanliness of the Autonomous District of Abidjan. For this delegation, an international call for tenders was organised, and the Autonomous District of Abidjan was subdivided into three lots. The call for tenders resulted in the selection of two qualified operators. These have started their activities in some communes, especially in Treichville, and were expected to cover all the communes of Abidjan by the end of 2018. The operators selected in Abidjan are building and will operate modern transfer centres according to the technical, environmental, and sanitary requirements. The main objective is to optimise waste collection, eventually reaching a rate of 95%, and to reduce transport costs. The Ministry in charge of sanitation has also appointed an operator to create a Technical Landfill Centre (CET). The CET should only receive residue from recycling stations or sorting centres. The CET was expected to be operational before the end of 2018. Data from the CET:

- The operator has an area of 150 hectares in the sub-prefecture of Songon in the Autonomous District of Abidjan, two kilometres from the village of Kossihouen.
- The cells will have in average an area of three hectares and a depth of about 16 metres.
- The operating life time of the CET is 47 years.
- Ancillary works will be made: roads, weighbridge, workshops and offices.
- The operator worked with technical and financial partners for the implementation of this project.
- The landfill of Abidjan, Akouédo, was almost full and was scheduled to be closed on 15 December 2018 according to the Ministry in charge of sanitation.

Sources: * Wikipedia, Abidjan, accessed on 28 November 2018, <https://fr.wikipedia.org/wiki/Abidjan> and <https://en.wikipedia.org/wiki/Abidjan>

Information

Population*	4,707,000 (2014 census)
Population growth (annual %)*	6
Area (km^2)*	2,119
Climate*	Tropical wet and dry climate
Main industries*	Construction and public works with the presence of major international groups
Currency**	USD 1: XOF 577.81 (West African CFA franc) (February 2019)
Other*	Abidjan has one of the biggest ports in the sub-region (West Africa) and the second-biggest in Africa (after Durban in South Africa). It is a container trans-shipment port.

Sources: * Wikipedia, Abidjan, accessed on 28 November 2018, <https://fr.wikipedia.org/wiki/Abidjan> and <https://en.wikipedia.org/wiki/Abidjan>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The laws and regulations related to SWM are as follows: » Code of the Environment of the Republic of Côte d'Ivoire. » There is no legislation specific to SWM. » The national Code of Sanitation and the Cleanliness Charter are being finalised.
Policy/Plan	● There is no specific SWM policy or plan in the Autonomous District of Abidjan.
Implementation system	● Ministry of Sanitation: in charge of the legislation and implementation of the sanitation policy. ● ANAGED, a structure under the supervision of the Ministry of Sanitation, is the entity in charge of the entire SWM sector. It has contracted companies with the collection, transport, and recovery of household waste. ● Ministry of the Environment: in charge of hazardous industrial waste. ● Ministry of Health: in charge of medical waste management. ● The private sector is responsible for its waste that it contracts to organisations approved by the competent Ministries (Environment, Sanitation and Health).
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 5,000 tons/day (source: National Agency for Waste Management (ANASUR) 2016). ● Waste generation rate in residential area: 0.8 kg/person/day (source: ANASUR 2016). ● Waste collection amount: 3,000 tons/day (data obtained from the weighbridge at the Akouedo landfill site, Abidjan, ANASUR). ● Composition of the waste: food 49%, plastics 8%, paper 6%, textile 3%, metals 2%, glass 2%, sand 18%, others 12%. Study conducted by BURGEAP in 2010.

Item	Outline
Storage and discharge/ Collection and transportation/ Road sweeping	● Modern transfer centres are under construction. ● The Technical Landfill and Recovery Centre (Centre de valorisation et d'enfouissement technique, CVET) of Kossihouen was expected to be in operation before the end of 2018. ● The main objective of the new system is to optimise waste collection, eventually reaching a rate of 95%, and to reduce transport costs. ● Operators are not only in charge of the collection but also pre-collection, sweeping, gutters cleaning, and the recovery and landfilling of end waste. ● No sorting at source. ● Number of collection vehicles: the Ministry received 150 vehicles in July 2018.  Example of vehicle received
Intermediate treatment/ Recycling	● The new system is based on the construction of infrastructure, namely, transfer centres and a waste recovery and disposal centre, which were expected to be operational by the end of 2018. ● The operators will undertake waste recovery at the landfill centre through the production of electricity or compost.
Final disposal	● There is a landfill in the District of Abidjan: » Landfill of Akouedo (53 ha), that was scheduled to be closed on 15 December 2018. ● The Technical Landfill and Recovery Centre (CVET) of Kossihouen was expected to be in operation before the end of 2018. » Owner: Ministry of Sanitation. » Location: 42 km west of the Hôtel du District Autonome d'Abidjan. » Area: 150 hectares. » Operation hours: 24 hours. » Waste disposal amount: 4,900 tons/day. » Data sources: ANASUR 2016. » Facilities: ongoing. » Operation plan: there is a plan. » Operation: waste screening, production of electricity or compost.

Financial system	● Total revenue from waste services: Data not provided. ● Cost of waste management in Abidjan: XOF 16 billion, or approximately USD 28 million in 2016 (source ANASUR, replaced by ANAGED). ● Total expenditure for waste services: for the Autonomous District of Abidjan, the annual budget for the management of household and similar solid waste allocated by the State is about XOF 42.259 billion (USD 73 million). A new system is underway. ● ANAGED collects waste collection fees through electricity bills. The amount is 2.52 XOF/KWh and is only applied to subscribers of low voltage electricity by the Ivorian Electricity Company (CIE). The amount collected totals XOF 1.2 billion (USD 2 million). ANAGED receives state budget subsidies.
Environmental and social considerations	● There is no policy or law to support the informal sector through job creation or training opportunities. ● There are approximately 3,000 waste pickers and recyclers in the Autonomous District and at the Akouedo landfill site. Waste pickers will be denied access to the new CVET landfill. ● The community is informed about the waste disposal practices such as collection days and time. ● There is also a campaign to clean up the city, called "Big Cleaning Operation", set up by the government in February 2017 as a tool for mobilising and raising awareness of the population about behaviour change. This operation takes place on the first Saturday of every month.
Donor support	● World Bank: financial assistance for SWM for the "Abidjan Clean City" operation in 2012.
Areas for improvement (in order of priority)	● Legal issues: finalisation of the legal texts on SWM and empowerment of local authorities and citizens through specific decrees. ● Technical issues: capacity building of the Environment Department of the Autonomous District of Abidjan. ● Financial issues: financial resources for the acquisition of organic waste composting units and fuel production units from plastics.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	5,000	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	3,500	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	3,500	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	3,500	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	3,500	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Democratic Republic of the Congo

Kinshasa

Kinshasa City, the capital of the Democratic Republic of the Congo (DRC), is situated on the left bank of the Congo River and has multiple functions, in particular administrative, industrial, commercial, cultural and touristic. It is a megalopolis with a population of 12 million. The population was 1,600 in 1920, but in 1959 just before independence it became about 400,000 people, after independence the population growth rate further increased, with an average population increase of 5% per annum.

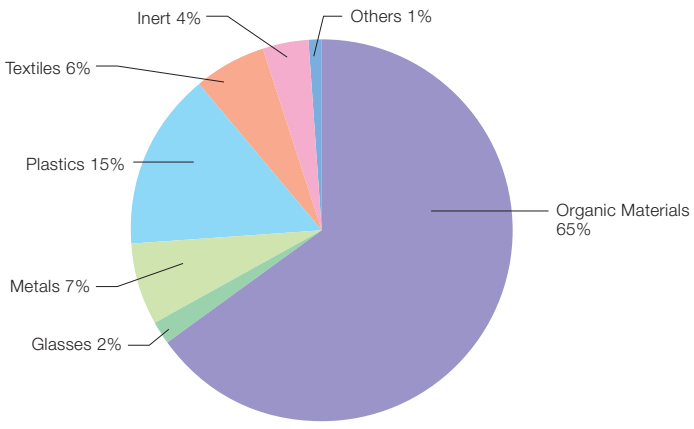
The Sanitation Authority for Kinshasa (Régie d'Assainissement de Kinshasa, RASKIN), formerly known as the Sanitation and Public Works Department of Kinshasa (Régie d'Assainissement et des Travaux Publics de Kinshasa, RATPK) is the local government's technical body responsible for sanitation and waste services in Kinshasa City. It is under the supervision of the Provincial Ministry which is in charge of the environment. The waste services of Kinshasa City have been supported by the EU for many years, through the PARAU project (Projet d'Appui et de Réhabilitation des Infrastructures Routières en RDC et d'Amélioration de l'Assainissement Urbain de Kinshasa), but now the project is over, the situation has become serious due to lack of financial resources. To overcome this situation, the city began to introduce Sanitation Tax.

Information

Population	12 million (estimated in 2017 by the JICA study of the Transport Master Plan for Kinshasa)
Population growth (annual %)	5 (average after independence in 1960)
Area (km^2)	9,965 (City-province); 583 (Urban)
Climate	Humid tropical climate with clear dry season (mid-May to August) and rainy season (September to mid-May)
Main industries	Administration, commerce, transport, agriculture (market gardening), manufacturing (bread making, brewery, metalwork, cosmetics, pharmaceuticals, plastics…), tourism, culture, sport
Currency*	USD 1: CDF 1,640.31 (Congolese franc) (June 2019)

Source: * Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● By law, municipalities (counties) are obliged to collect, transport, and dispose of waste, and to construct treatment facilities. But in Kinshasa they don't have the financial means to deal with this problem. ● There is the 003/2013 Edict from 9 September 2013 regarding the sanitation and protection of the environment and a number of provincial by-laws that relate to waste management in the city of Kinshasa. ● There is also the Ordinance Law No 13/001 of 23 February 2013, fixing the provincial taxes, charges, levies, and fees and decentralised territorial entities as well as their terms and conditions for distribution, instituting a tax for sanitation, waste removal and household waste.
Policy/Plan	● National Sanitation Policy (Politique Nationale d'Assainissement, PoNA) was formulated in 2013, solid waste is one of the sectors. A national sanitation strategy (draft) for its implementation is prepared in 2017, but it has not been enforced.
Implementation system	● At a central level the Ministry of Environment and Sustainable Development (Ministère de l'Environnement et Développement Durable, MEDD) through the Department of Sanitation (Direction d'Assainissement, DAS) is responsible for waste management. In this way they're responsible for regulating the sub-sector of solid waste. ● In Kinshasa City, RASKIN is in charge of waste management. ● In the context of decentralisation, the communes deal with the operational aspects of SWM.
Technical System	
Waste generation amount & characteristics	● If the waste generation amount per person is 0.7 kg/person/day and the population is 12 million people, waste generation per day would be 8,400 tons. The organised collection rate is estimated to be 25%. ● Humidity level: 60-70% ● Municipal waste composition of Kinshasa City: 

Storage and discharge/ Collection and transportation/ Road sweeping

- NGOs or MSEs (Micro and Small Enterprises) in exchange for payment collect household waste by push-carts, etc. and transport them to 61 transfer stations installed by the EU project.
- Waste at transfer stations is transported by RASKIN's skip loaders or dump trucks to final disposal site about 35 km (approximately 1 hour) away from the city centre (Gombe).
- Due to deterioration and breakdown, there is little equipment procured by EU that can still be used. Therefore, there is a shortage of equipment.
- The main road is kept usually clean by the sweepers. In addition to RASKIN, about 60 NGOs clean up the roads in five communes with expenditures from BCECO, a related agency of the Ministry of Finance.

Push-carts used for primary collection

Transfer station installed by EU

Collection of recyclable materials at the transfer station

Skip loaders donated by EU (container vehicles)

Road sweeper

Newly procured collection trucks (white ones)

Intermediate treatment/ Recycling	● Small-scale recyclers of plastics, e-waste and compost (often referred to as NGOs) are gradually being established. The city of Kinshasa supports them by lending the land free of charge.  Recycling of e-waste  Recycling of plastic materials
Final disposal	● The final disposal site constructed by EU is located 35 km east away from the centre of the city. Amount of collected waste by RASKIN is approximately 1,500 tons/day (estimate), and some waste is transported directly by waste generators to the landfill site. ● The disposal site is equipped with fences, gates, workshops with offices and minor equipment. However, weighing machines are not installed. ● There are no waste collectors active at the site but the city receives many requests from operators especially for energy production.  Disposal site  Heavy equipment (Bomag Sheepsfoot Compactor) at the disposal site (out of order)

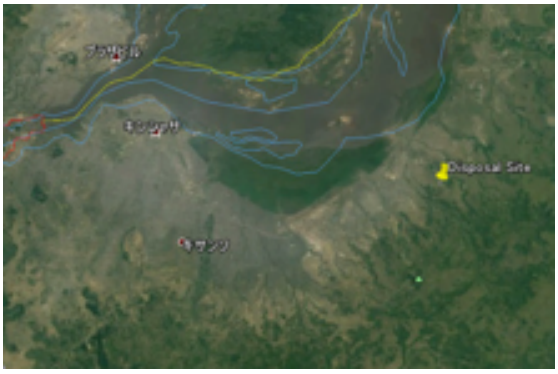
Item	Outline
Financial system	● Currently, waste generators such as households and shops pay directly to waste collectors. ● RASKIN is operated with general budget of the state government of Kinshasa. ● A regional organisation called FONAK has been set up to collect fees for the hygiene sector. They have now started to gather some funds on behalf of their partners.
Environmental and social considerations	● Due to the dumping of garbage on roadsides and in drains, the sanitary environment of low income and poor residential areas is particularly bad.
Donor support	● The European Union (EU) supported the improvement of dirt roads in the regions of the former Bandundu, Equateur and Kasai Occidental and the improvement of the urban sanitation sector from 2008 to 2015. It covered all the necessary expenses such as procurement of equipment, repairs and maintenance, roadworks, construction of collectors, dredging, the construction and operation of transfer stations, the construction and operation of CET (road access, compartments and reservoirs) and salaries for staff. RASKIN took over the solid waste management component of the project. ● The World Bank intends on implementing two projects in the hygiene sector. The first specialises in the pre-collection, collection, disposal and recycling of solid waste in the villages of Kimbanseke, Masina, N'djili, Kisenso, Matete, Lemba, Limete and Mont-Ngafula. The second one is the construction of a sludge treatment plant in Kinshasa city. ● The French Development Agency (AFD) also intends on implementing a project for pre-collection, collection, disposal and recycling of solid waste in two districts in Limete and one district in Masina.
Areas for improvement (in order of priority)	● Regarding waste collection, equipment procured by the EU project is in short supply due to deterioration and so on, and waste accumulates in the community. Improvement might also be urgently needed to prevent the spread of waterborne infectious diseases from the viewpoint of public health. ● Regarding final disposal site, because the disposal site constructed by the EU is in operation, the need for emergency assistance is low. However, since the city has a population of over 10 million people and is expected to reach nearly 20 million in 2030, there seems a high need for a plan to construct multiple disposal sites. ● At the moment there are only some small recycling companies but considering the size of the city and the amount of waste, the necessity of reducing waste through intermediate treatment and recycling in the future seems high. ● In the future, it is anticipated that the economic activity will become active and the urbanisation will continue, and since the scale is also large, it might be important to develop a legal system for difficult-to-handle waste at an early stage. ● A series of programme type projects, such as assistance for master plan preparation, technical cooperation and financial cooperation for implementation of master plan, are recommended in Kinshasa City.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	8,400	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	2,100	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:



Final Disposal Site

Djibouti
City of Djibouti

The city of Djibouti is the capital and largest city of the Republic of Djibouti on the Horn of Africa. The city covers an area of 630 square kilometres and has a population of 531,499 inhabitants. Djibouti is a financial centre for many industries, including construction, retail, import-export, and money transfer. The fishing operations in the port of Djibouti constitute the main economic activity of the city, as the port is situated inside of the city's borders.
The Office de la Voirie de Djibouti (OVD) provides sweeping, collection, and disposal services. The informal sector is involved in Solid Waste Management (SWM) through the collection of recyclable household waste in poor neighbourhoods. The private sector, however, does not participate in SWM. The city of Djibouti's dumping site is located 15.5 km from the city centre. The waste brought into the disposal site is compacted and covered with soil.

Information

Population*	531,499 inhabitants (2015)
Population growth (annual %)*	1.9% (2010-2015)
Area (km^2)**	630
Climate**	Arid climate
Main industries**	Freight operations, construction, retail, import-export
Currency***	USD 1: DJF 177.71 (Djibouti franc) (September 2019)
Other****	In antiquity, Djibouti was part of the territory known to the ancient Egyptians as Punt (God's land), whose first mention dates back to XXV century BC. In the new era, Djibouti is described as a cosmopolitan country lodged between Arabia, the Indian Ocean, and Ethiopia. It is also one of the smallest states (23,000 km2) in continental Africa; only Eswatini and The Gambia are smaller in terms of land.

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Djibouti, accessed 9 September 2018, <https://en.wikipedia.org/wiki/Djibouti_(city)>
*** Oanda.com
**** Wikipedia, Geography of Djibouti, accessed 20 February 2019, <https://en.wikipedia.org/wiki/Geography_of_Djibouti>

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The related laws and regulations for SWM are as follows: » Code of Djibouti City Waste Management: basic principles and norms for solid waste.
Policy/Plan	● Sanitation Policy in Djibouti City (2012-2019).
Implementation system	● The Office de la Voirie de Djibouti (OVD) is in charge of managing solid waste in the city (street sweeping, collection, final disposal site operation, and road sign management). ● Number of employees in the department: » 59 people work in administration offices. » 590 people work in field operations. » 15 people have taken courses on GDS and/or related courses at university/college. » 396 people have been working in the GDS sector for 5 years or longer. ● The Ministry of the Interior is in charge of SWM. ● The Ministry of Health is responsible for the management of bio-medical waste. ● Private sector: The private sector is not involved in SWM. ● Informal sector: The informal sector is involved in SWM through the collection of household waste in poor neighbourhoods.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 344 tons/day (data source: AFP, 2014). ● Waste generate rate in residential areas: 0.7 kg/person/day (data source: AFP, 2014). ● Waste collection amount: 299 tons/day (data obtained by a weighbridge at the disposal site). ● Waste composition: 37% food waste, 6% plastic, 2% paper, 4% textile, 5% wood, 3% metal, 13% glass, 32% other (e.g. ceramic, wood, rubber, and sand) (data source: JICA, 2015).
Storage and discharge/ Collection and transportation/ Road sweeping	● Waste collection and road sweeping services are provided by the OVD in the city centre, residential areas, and major public areas. ● Waste from households: collected 7 days per week under a door-to-door collection system. ● Waste from commercial areas: collected 7 days per week. ● Waste collection ratio: 87% of the waste generated in Djibouti City is collected (data source: JICA, 2015). ● Separate collection systems are in place for municipal market waste, commercial and institutional waste, household waste, and pruned trees and grass. ● Number of collection vehicles: » 26 dump trucks with a capacity of 10 m^3. » 8 dump trucks with a capacity of 15 m^3. » 6 tippers with a capacity of 10 m^3. » 4 hooklifts with a capacity of 20 m^3. » All vehicles are operational (100%). » The waste collection coverage rate is 100%.

Item	Outline
Intermediate treatment/ Recycling	● Project underway: a materials recovery facility (MRF) and 7 transfer centres are under construction in the commune of Balbala (the most populated area).
Final disposal	● There is one dumping site in the city: Douda dump site. » Owner: OVD. » Location: Douda. » Area: 11 hectares. » Operation hours: 20 hours daily. » Waste disposal amount: 344 t daily. » Data source: obtained by weighbridge. » Installed facilities: geo-membrane, weighbridge, gate, fencing, etc. » Operation plan: a mid-term plan is established. » Operations in practice: compaction of waste and coverage with soil.

Financial system	● Subsidies related to SWM from the central government to the local government: 3,798,540 USD/year.
Environmental and social considerations	● Number of waste pickers working at final disposal sites: 50 waste pickers at the Douda landfill site. ● Public awareness-raising activities: The community is informed of the collection days, collection hours, and other details on how to discharge waste, through media outlets.
Donor support	● JICA: Supply of waste collection equipment, equipment for landfill operation, specialised equipment, and spare parts. ● European Union (EU): Construction of the Technical Burying Centre (TBC). A project to extend the TBC is currently underway. ● French Development Agency (AFD): Rehabilitation of the technical base in the neighbourhood of 'Quartier 7'.
Areas for improvement (in order of priority)	● Financial issues: Since the amount of waste generated is expected to increase as the population grows: » A sorting centre is required to decrease the amounts of waste sent to the dump site. » The collection points are disparately located, so transfer centres are required for better waste management. » Elsewhere, more collection and transportation equipment (e.g. trucks for regions such as Arta) are necessary to preserve the environment. ● Technical issues: » The current final disposal site is an open dump, requiring heavy machinery for compaction and soil coverage. » JICA's insight is much needed, which redoubles the need to build technical cooperation. ● Social issues: » More sensitisation programmes are necessary, as the city is planning to introduce systems for waste separation at source.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	344	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	299	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	344	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Egypt
Alexandria

Alexandria is the second-largest city in Egypt and a major economic centre, extending about 32 kilometres along the coast of the Mediterranean Sea in the north-central part of the country. Alexandria is an important industrial centre because of its natural gas and oil pipelines from Suez. Alexandria is also a popular tourist destination.
The Environmental Department of the Municipality is not in charge of SWM services, but there are more than 200 staff members in the Department and about 100 staff members who have been trained in SWM.

Information

Population*	4.79 million (2015)
Population growth (annual %)*	2.0 (2010-2015)
Area (km^2)**	2,679
Climate**	Hot desert climate
Main industries**	Natural gas, oil, tourism, international shipping, international trade
Currency***	USD 1: EGP 17.27 (Egyptian pound) (March 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Alexandria, accessed 19 March 2019, <https://en.wikipedia.org/wiki/Alexandria>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The municipality has a code/regulation on municipal solid waste management.
Policy/Plan	● No plan.
Implementation system	● All aspects of SWM operations are undertaken by the private sector: sweeping (city centre, public areas and residential areas), collection, transfer station, transport from the transfer station to the disposal site, final disposal, and recycling. ● The work of the private sector is performed under a contract, but this system is not running well because the contract is unclear. The Ministry of Environment entered into a general contract for the period 2017-2019 for two cities (including Alexandria) but there is no specific contract with the city authority. In addition, the monitoring of the work is not conducted properly, as no monitoring procedures have been established.
Technical System	
Waste generation amount & characteristics	● 15,000 m^3/day or 5,000 tons/day (as of 2016), which is calculated by the weighbridge at the disposal site and/or transfer station, and estimated by multiplying population and waste generation rate. ● Composition of waste: food waste 50%, plastic 7%, paper 11%, textile 6%, wood 5%, rubber and leather 4%, metals 8%, glass 10%, ceramics 5%. This composition is known from a detailed waste composition survey conducted by donor agencies, universities and consultants.
Storage and discharge/ Collection and transportation/ Road sweeping	● Amount of waste collected: 3,500 tons/day. ● 700,000 people, or 15% of the city's residents, are covered by waste collection services. ● Private sector companies are hired for the transportation of waste from the transfer station to the disposal site. Collection vehicles are the property of the private companies. ● There is a sweeping service in the city centre (three times a week). ● There are three transfer stations in the city. ● 2,000 tons/day of waste is transported from the transfer station to the disposal site (measured by the weighbridge at the transfer station). ● There are 20 trailers (capacity of 4 m^3). Of these, 70% are functional. ● There are two dump trucks (capacity of 4 tons). They are functional 70% of the time. ● There are 12 container trucks. Of these, 10% are functional. ● There are 75 small trucks. Of these, 2% are functional. ● 20% of the compactor trucks and 80% of the other waste collection trucks are functional. ● The malfunction is due to lack of maintenance. ● Collection vehicles are also not running properly due to a lack of fuel.
Intermediate treatment/ Recycling	● There is a recycling/treatment facility. It is a composting facility. ● Separate collection is practiced. ● Self-disposal is not practiced.

Item	Outline
Final disposal	● There is one final disposal site, ten kilometres from the city centre. It has a capacity of 3 million tons. ● 1,000 tons/day of waste is delivered to the final disposal site. ● The disposal site has the following equipment: bottom liner, leachate collection pipe, weighbridge, tyre washer, gate, fence, and drainage to prevent rainwater from entering the waste disposal area. ● The disposal site is operated 24 hours/day and has daily operation plans. ● Operations include: compaction of waste, covering waste with soil or other material immediately or within a week, and intermediate soil cover for areas which are not used for several months.

Financial system	● Total revenue and expenditure amounts are unknown. ● Expenditure for services: » Collection and transportation: EGP 10 million. » Sweeping: EGP 8 million. » Treatment/recycling: EGP 8 million. » Final disposal: EGP 11 million. ● Waste collection is charged with electricity bills: » Household waste: EGP 20. » Commercial waste: EGP 150. » Institutional waste: EGP 3,000.
Environmental and social considerations	● Data not provided.
Donor support	● There is no donor support at present.
Areas for improvement (in order of priority)	● Expansion of refuse derived fuel (RDF) production lines. ● Assistance in developing fertiliser plants. (The existing fertiliser plant was established in 1997 with a grant from JICA.) ● Assistance for producing electrical energy from waste, especially in landfills and transfer stations. ● Assistance in developing monitoring mechanisms in accordance with the modern advanced methodology for integrated and sustainable SWM in light of SDGs through training programmes.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	5,000	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	3,500	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	2,000	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	1,000	Waste amount brought into disposal sites.
⓫ Recycling	0	Recycled at disposal sites.
⓬ Final disposal	1,000	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Eswatini
Mbabane

The city of Mbabane is located in the north-west of the Kingdom of Eswatini (previously Swaziland) in the Hhohho Region, 26 kilometres from the nearest border gate with the Republic of South Africa (Ngwenya-Oshoek border gate), and 38 kilometres away from the country's hub city, Manzini. Mbabane is the capital and largest city in Eswatini and is made up of 12 wards. The municipality has an estimated 19,490 households.

Mbabane's population stands at about 61,940 people, which is about 6% of the country's total population, and 25% of the country's total urban population. About 54% of the city's population is under the age of 20, while 90% of the total population is under the age of 50, which shows a young population, typical of Sub-Saharan African countries. The north and north-east of the city is predominantly made up of market and residential areas whilst the eastern and southern part of the city is predominantly low cost/informal settlement housing which tend to be densely populated.

Information

Population*	61,940
Population growth (annual %)	0.83
Area (km^2)*	150
Climate**	Subtropical highland climate
Main industries**	Tourism, sugar export, light industry
Currency***	USD 1: SZL 14.38 (Swazi lilangeni) (March 2019) USD 1: ZAR 14.38 (South African rand) (March 2019)

Sources: * City Baseline Report 2015, accessed 19 March 2019, <https://www.mbabane.org.sz/city/>
** Wikipedia, Mbabane, accessed 18 February 2019, <https://en.wikipedia.org/wiki/Mbabane>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The laws and regulations related to SWM in the Municipal Council of Mbabane are as follows: » Litter Regulations, 2011. » Swaziland Environmental Action Plan, 2007. » Environment Management Act, 2002. » Waste Regulation, 2000. » National Solid Waste Management Strategy, 2000. » Public Health Act, 1969. » Urban Government Regulations, 1969.
Policy/Plan	● The following are SWM policies, strategies, and initiatives undertaken by the city: » Mbabane State of the Environment Report (SOER) 2016. » Town Planning Scheme 2016. » Integrated Development Plan (IDP) 2019-2023 (Strategic Theme: Environmental Sustainability). » Waste Management Strategy 2012 (8 Pillars, priority on Waste Minimisation). » HCRW Plan 2016-2019. » Analysis and Determination of the Cost of Waste Collection and Disposal (Cost per Tonne) Study, 2016. » School Health Standard 2018.
Implementation system	● The Municipal Council of Mbabane (MCM) is responsible for SWM in the city, and is in charge of street sweeping, waste dump monitoring and clean-up, waste collection and transportation, final disposal of waste (landfilling), and landfill site operations. ● MCM is also responsible for civic environmental education, and for preparing and executing Municipal Waste Management Plans. ● The Council has 20 refuse collectors, including the supervisor and heavy duty drivers, and seven landfill operation staff. Street sweeping and litter picking has been outsourced. ● The Ministry of Tourism and Environmental Affairs is in charge of environmental legislation and supervision. Supervision is done through the Eswatini Environmental Authority.
Technical System	
Waste generation amount & characteristics	● Landfill of incoming waste: 40.2 tons per day (measured through weighbridge, calibrated annually). ● Waste collection coverage is estimated at 81% (SOER, 2016). ● Waste generation is estimated at 0.7 kg/person/day (SOER, 2016). ● Waste are categorised as follow: » Household Waste » Commercial Waste » Industrial Waste » Construction Waste » Health Care Risk Waste » Garden/Yard Waste » Recyclable Waste » Street Litter Waste » Food Waste » Hazardous Waste ● Waste composition is not determined.

Item	Outline
Storage and discharge/ Collection and transportation/ Road sweeping	● Road sweeping service, clandestine waste dumps clean-up and litter picking in main arterial roads leading in and out of the city is undertaken by MCM using service providers in the city centre. ● Waste is stored in standard size domestic bins (80L) and 6 m^3 communal waste skips in household and commercial areas. ● Waste is collected through kerbside collection using three compactor trucks. Three skip master trucks provide a skip collection service in designated communal areas, and one LDV is used in inaccessible areas. ● Waste is collected twice a week in residential areas and six times a week in the central business district. ● Waste skips are collected at least once a week depending on demand. Currently, the Council has about 89 skips located in strategic points. ● Waste is transported for disposal at the landfill located 14 km (on average) away from the city centre. ● Waste collection coverage is estimated to be at 81%, but this rate is expected to drop over time as the urban population is increasing daily.
Intermediate treatment/ Recycling	● Waste collection for recycling is done in an ad hoc manner by private companies and individuals not contracted by MCM. ● There are two waste buy-back centres (operated by private companies) and two community recycling centres (the one in Msunduza is operational). ● There is one pilot facility for composting food and garden waste (established in October 2018). ● Health care risk waste is incinerated, and ashes are disposed of at the landfill. ● There is a lack of recycling industries/companies in the city and in the country. ● There are 37 drop-off points established to facilitate waste separation and recycling. ● There is no waste transfer station in the city. ● There is no Materials Recovery Facility (MRF) in the city.
Final disposal	● Waste is finally disposed of by landfilling. The landfill is located about 14 km (on average) from the city centre. ● The landfill was constructed and commissioned for operation in 1998, with a capacity of 25 years. It is externally audited twice a year. It is a licensed facility. ● Landfill air space remaining is +/- 2 years (decommissioning). ● New landfill cell is at design stage.

Financial system	● About USD 1,211 million was spent in 2013-2016 for waste collection, transportation and disposal. Of this, 70% was spent on collection and transportation, including vehicles' repair and fuel, and 30% was spent on disposal. ● Total estimated revenue for waste collection and disposal is USD 200,000 (2017). This is billed and collected through rates. ● MCM charges a waste collection fee (USD 1 per household per month), but no disposal fees are charged.
Environmental and social considerations	● The landfill is licensed and is audited four times per year (twice externally and twice internally). ● Surface and ground water monitoring is done monthly by a laboratory. ● There is a policy through the Local Economic Development (LED) programme for supporting the informal sector by providing job opportunities and training. ● There is ongoing training on climate smart gardening, waste reuse and recycling. ● The number of informal waste pickers and recyclers in the city is unknown because some of them come from outside the city. ● The community is informed on how to dispose of waste, such as collection days and waste separation, through a waste collection schedule, public consultation and community meetings, school visits, school environmental clubs and competitions, flyers and brochures. Information is disseminated through radio and print media as well as on the Council's website. There are also campaigns for cleaning the city with community participation.
Donor support	● European Union (EU): Funding of EUR 250,000 (approximately USD 284,000) in 2018 for "Waste Minimization Initiatives: Focusing on waste recycling and food waste composting practices in Mbabane" project. The project timeline is three years from 2018.
Areas for improvement (in order of priority)	● Financial and technical support for the construction of new landfill cells. ● Technical assistance in planning, establishing and operationalising waste recycling programmes and/or plants to better support and strengthen already established waste recycling initiatives. ● Landfill leachate and trade effluent (abattoir waste water): pre-treatment or full treatment. ● Technical and financial support in planning, establishing and operationalising a waste recycling plant to support initiatives of waste minimisation through recycling and establishing markets for recycled products. ● Improve accessibility in all areas, especially in the informal settlements of the city (road infrastructure and waste collection resources) for waste collection improvement. ● Strengthen the waste minimisation programme through capacity building and roll-out of a citywide composting and recycling programme.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	48.4	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	40.2	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	Incineration of HCRW: 0.02 ton, 8.4 tons recycled waste (2017)	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	17.4%	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	Incineration of HCRW: 0.02 ton ash	Residue from treatment facilities.
❿ Final disposal site	40.2	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	40.2	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Ethiopia
Addis Ababa

Addis Ababa is the capital city of Ethiopia, meaning “new flowers” in Amharic. It is one of the world’s most cosmopolitan cities in Africa, and is the second biggest economic, political and cultural centre in East Africa, following Nairobi. Although the population growth rate was 2.1% per year in 2000-2015, it is expected to increase by 4.0% per year from 2015-2030, and the estimated population of 3.2 million in 2015 is expected to reach 6 million in 2030. Naturally, an increase in waste generation amount is expected as well.
SWM in Addis Ababa City is organised systematically and in line with the waste flow under the Mayor’s Office. As of November 2017, the Rappi(Koshe) disposal site has continued to be used in spite of a collapse accident in March 2017. The Sandafa sanitary landfill site has been constructed and used for a few months in 2017 but was shut down due to political intervention as of November 2017. In addition, the city has taken timely and appropriate measures such as setting up the first large-scale waste-to-energy facility in Africa and a transfer station with a recycling facility, which will be a good model for other African metropolitan cities.

Information

Population	3,238,000 (2015 estimated)
Population growth (annual %)	2.1 (2000-2015)
Area (km^2)*	527
Climate*	Subtropical highland climate
Main industries	Food processing, beverages, textiles, leather, chemicals, metal processing, cement
Currency**	USD 1: ETB 28.55 (Ethiopian birr) (June 2019)
Other*	Addis Ababa is where the African Union is based and also hosts the headquarters of the United Nations Economic Commission for Africa (ECA). It is therefore often referred to as “the political capital of Africa” for its historical, diplomatic and political significance for the continent.

Sources: * Wikipedia, Addis Ababa, accessed 27 June 2019, <https://en.wikipedia.org/wiki/Addis_Ababa>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Basically follows the federal legal system, but the city is implementing its own more detailed waste management ordinance. It also has an ordinance to control illegal activities on waste.
Policy/Plan	● Establishes Addis Ababa solid waste policy to realise appropriate waste management and formulates the waste management plan every five years.
Implementation system	● There are two organisations, the Cleansing Management Agency (CMA), and the Solid Waste Recycling and Disposal Project Office (SWRDPO) under the Mayor’s Office. The former is responsible for waste collection and road sweeping, the latter is responsible for recycling and final disposal. ● Under the CMA, 10 sub-cities and 116 woreda work together. Household waste is collected by organising micro and small enterprises (MSEs), and waste from large generators are collected by private enterprises licensed by the CMA.
Technical System	
Waste generation amount & characteristics	● Waste generation amount is approximately 1,400 tons/day, waste generation rate is 0.45 kg/person/day (however, values are estimates based on the number and volume of incoming collection vehicles to the disposal site). ● Organic waste 65%, recyclable waste 15%, other 20% (based on interviews with municipal officials).
Storage and discharge/ Collection and transportation/ Road sweeping	● Approximately 50-litre capacity bags are distributed to ordinary households. ● Large waste generators are contracted with private collectors. ● Waste from households is collected and carried to a collection point (Skip Points) by MSEs. The city directly carries it to the disposal site from there. ● MSEs use push carts or small trucks. The city and private companies use cars specialised for bulk garbage transport such as compactors and container vehicles. ● Waste collection rate is 75% (based on interviews with municipal officials). ● The Rappi disposal site under service is located in the western part of the city and the new Sandafa sanitary landfill site (closed as of November 2017) is located in the Oromia state adjacent to Addis Ababa City. ● Main roads are kept clean by 20 road sweeping vehicles and 5,000 street sweepers (people).  Collection vehicles  Collection vehicles

Item	Outline
Intermediate treatment/ Recycling	● Recyclable materials such as plastics are recovered by MSEs at the collection point and by the waste pickers at the Rappi disposal site. ● Two transfer stations with sorting facilities for resources are under construction. ● An incinerator with power generation of 1,400 tons/day was built adjacent to the Rappi disposal site (not yet operational as of November 2017).  Rappi incinerator with power generation  Bole Transfer station (under construction)
Final disposal	● Currently Rappi disposal site is still in service. Heavy equipment is in operation, but it is basically an open dumping site. There is no measuring facility installed. ● Sandafa sanitary landfill site has been constructed, but is now closed, as of November 2017. ● In March 2017, a waste collapse accident occurred at the Rappi disposal site, killing more than 130 people.  Rappi disposal site  Sandafa sanitary landfill

Financial system	● Construction of transfer stations, disposal sites, incineration facilities, etc. is funded by direct investment by the Government or the city and with a donor loan. ● Collect waste collection fee from beneficiaries, but the city bears the deficit.
Environmental and social considerations	● The city takes measures that take into consideration of the poor, such as organisation of MSEs and vocational training for the waste pickers. ● Sandafa sanitary landfill site is located in Oromia State, therefore, to use the site will require political intervention.
Donor support	● The French Development Agency (AFD) supports construction of Sandafa landfill site and closure of Rappi disposal site by loan and grant aid. ● UN-Habitat is proposing an improvement plan by the Fukuoka method at Rappi disposal site.
Areas for improvement (in order of priority)	● The city began working on recycling, composting, etc., and the operation of waste-to-energy (WtE) is about to begin. Therefore, learning about waste management in Japan would help to improve capacity in these areas to deal with issues and challenges that can be expected to emerge as they operate these facilities in the future.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	1,400	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Final Disposal Site

Ethiopia
Bahir Dar

Bahir Dar in Ethiopia is the capital of the Amhara Regional State and consists of 6 sub-cities. It is approximately 600 km north-northeast of Addis Ababa, the altitude is about 1,800 metres. It is located on the southern coast of Ethiopia's largest Lake Tana, the source of the Blue Nile. The population was about 220,000 in 2007, but increased to about 340,000 in 2017, the population growth rate during this period was as rapid as about 4.4% per year.
From the viewpoint of waste management, the Bahir Dar City is kept clean, but some organic waste is scattered on market streets. On the other hand, waste can hardly be found in front of residential areas. Although the current final disposal site is open dumping, there are plans to build a new sanitary landfill. Material recycling and composting have just started in the city, but there is a need for technical improvement and procurement of equipment.

Information

Population	301,000 (2015 estimated, UN)
Population growth (annual %)	6.6 (2010-2020)
Area (km^2)	213.43
Climate*	Tropical savanna climate (very similar to a subtropical highland climate)
Main industries	Agriculture, tourism
Currency**	USD 1: ETB 28.55 (Ethiopian birr) (June 2019)
Other*	In 2002 the city was awarded the UNESCO Cities for Peace Prize.

Sources: * Wikipedia, Bahir Dar, accessed 27 June 2019, <https://en.wikipedia.org/wiki/Bahir_Dar>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The city basically follows the legal system established by the Federal Government. However, by-laws that supplement the Federal Government Basic Law can be set independently. ● An ordinance on revising the waste collection fee is currently under preparation.
Policy/Plan	● As of January 2018, under the instruction of Amhara Regional State Urban Development and Housing Bureau, an Urban Structure Plan is under preparation.
Implementation system	● Environmental Protection, Sanitation & Beautification Office in Bahir Dar City Administration is in charge of solid waste management.
Technical System	
Waste generation amount & characteristics	● Waste collection amount is 120,000 m^3/year (approximately 330 m^3/day). Assuming that the density is 0.3-0.5, it is estimated to be 100-160 tons/day. Collection coverage rate is 82% (estimate).
Storage and discharge/ Collection and transportation/ Road sweeping	● 5 Micro and Small Enterprises (MSEs) collect waste from each household mainly with push carts and then reload waste to dump trucks to transport to the final disposal site. A private company also provides collection service. ● Road sweeping is conducted by street sweepers (178 people) employed directly by the city.  Push carts for primary collection  Only one skip loader is in operation  Skip loader under repair
Intermediate treatment/ Recycling	● Small scale recycling and composting activities are conducted by MSEs and private companies. ● Construction of a new compost facility adjoining the disposal site has just started with the support of UNDP.  Plastic materials stored at MSE  Compost plant operated by MSE

Item	Outline
Final disposal	● There is an open dump site used for more than 20 years. ● It is planned to implement projects for improvement of the current disposal site. There are also plans to design a new landfill site with the support of UN-Habitat where Fukuoka methods will be applied.

Waste loading at disposal site

Transportation of waste into disposal site

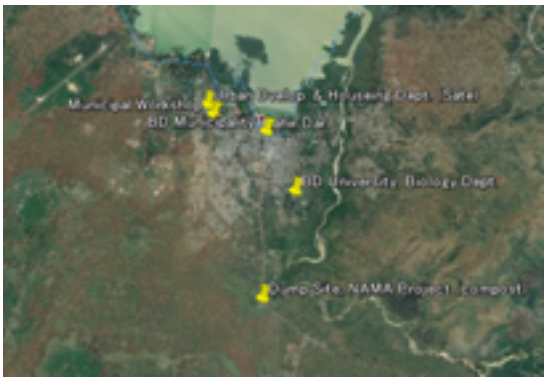
Financial system	● The city collects a waste collection fee and pays for MSEs and private enterprises.
Environmental and social considerations	● The city has measures that take into consideration of the poor such as organisation of MSEs. ● There are plans for constructing a sorting facility and several small-scale transfer stations equipped with compacting and packing equipment.
Donor support	● UN-Habitat supports an improvement of the current disposal site and design of a new landfill site. ● The World Bank plans to provide financial support for the construction of a new landfill site.
Areas for improvement (in order of priority)	● Rapid increase of population and waste generation amount is expected to continue increasing into the future. Since the current waste collection system is barely catching up with this trend, there seems a need for supporting waste collection machineries and equipment. ● Due to a lack of weighbridge there is no quantitative data available upon which to base (baseline data) waste management. This might need to be improved.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	120–200	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	100–160	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:



Final Disposal Site

Ethiopia
Hawassa

Hawassa in Ethiopia is the capital of the Southern Nations, Nationalities, and Peoples' Region, and is located on the eastern shores of Lake Hawassa in the Great Rift Valley. Although the estimated population in 2017 was about 390,000 people, it is said that the actual population is more than that as the population increases rapidly along with the development of the Hawassa Industrial Park (HIP).
From the viewpoint of waste management, Hawassa city is kept very clean. Dumped garbage cannot be seen on the roadside. On the other hand, since the final disposal site is an open dumping site, the surrounding environment is deteriorating. Material recycling and composting have only just been initiated recently, but Hawassa City supports its institutionalisation and operation.

Information

Population	357,000 (2015 estimated, UN)
Population growth (annual %)	3.5 (2000-2015)
Area (km^2)*	50
Climate*	Tropical savanna climate (borders on subtropical highland climate)
Main industries	Agriculture, textiles
Currency**	USD 1: ETB 28.55 (Ethiopian birr) (June 2019)
Other	With the opening of the HIP in January 2017, the population rapidly flows into the city. Currently about 13,000 people are employed but the ultimate target number will be 150,000.

Sources: * Wikipedia, Awasa, accessed 27 June 2019, <https://en.wikipedia.org/wiki/Awasa>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Waste management in Hawassa City basically follows the legal system established by the Federal Government. However, rules that supplement the Federal Government Basic Law, such as penalties, can be set independently.
Policy/Plan	● As of January 2018, under the instruction of the Ministry of Urban Development and Housing (MoUDH), the City is preparing a waste management plan based on Solid Waste Management Strategy and Standard set by MoUDH, which includes construction of a new sanitary landfill site and three transfer stations.
Implementation system	● Waste Management and Greenery Core Processing provides waste service and belongs to the Municipality Department which provides public service. Municipal Service Delivery Core Processing also supports Waste Management and Greenery Core Processing.
Technical System	
Waste generation amount & characteristics	● Waste collection amount is 150-200 tons/day; collection coverage rate is 80% (estimate). ● Waste generation rate is 0.43 kg/person/day (USAID).
Storage and discharge/ Collection and transportation/ Road sweeping	● 23 MSEs collect waste from each household using three-wheel cars, donkey carts, and push carts. Then, they either transport waste directly to the final disposal site or transport to a skip point equipped with containers. ● The city transports waste from skip point to final disposal site by skip loader and truck. ● Road sweeping is conducted by street sweepers (1,096 people) employed directly by the city using tractors.


Door-to-door collection by donkey cart


Tractor for street sweeping


Three-wheel car for waste collection


Only one skip loader is in operation

Item	Outline
Intermediate treatment/ Recycling	● There are 5 MSEs for recycling. ● Three of the above MSEs are located next to the current disposal site: 1) Composting 2) Plastic recycling 3) Recycling of industrial waste.  Composting facility  Plastic recycling  Recycling of industrial waste
Final disposal	● Current disposal site is a closed quarry site in the city and open dumping.  Current disposal site

Financial system	● Households, shops, etc. pay a collection fee directly to the MSEs. However, the city sets the tariff. MSEs have their own bank accounts for managing collected fee.
Environmental and social considerations	● The city has measures that take into consideration the poor such as organisation of MSEs. ● A new sanitary landfill is planned to be built.
Donor support	● Any donor's activity has not been identified. However, it is said that GIZ shows interest to support the construction of a new sanitary landfill site.
Areas for improvement (in order of priority)	● Since the waste generation amount is expected to increase according to the population growth, more waste collection vehicles seem necessary. ● As the current disposal site is an open dumping site, technical improvement such as compacting and covering using heavy machines seems necessary. ● Establishment of a waste management system based on actual waste generation amount and quantitative data seems necessary.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	190–250	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	150–200	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Final Disposal Site


Street cleaning by residents

Gabon

Libreville

Libreville is the political and administrative capital of Gabon, and home to about half of the country's inhabitants. Its population growth is rapid and its development rather disordered. Urban infrastructure is not keeping pace with new construction developments. Located on the estuary of Gabon on the northwest coast of the country, Libreville is the capital of the Estuaire Province. Libreville is surrounded by a huge forest and is regularly beset by large floods, especially during the rainy season.
The General Directorate of the Environment of the City Council of Libreville is in charge of solid waste management in the city. The private sector is involved in the provision of waste services. 600 tons of waste are collected every day, and disposed of in an uncontrolled disposal site.

Information

Population*	747,259 (2015)
Population growth (annual %)*	2.9 (2010-2015)
Area (km^2)**	189
Climate**	Libreville has a tropical savanna climate with dry winter (Aw according to the Köppen classification). The average annual temperature is 26.3°C and the average rainfall is 1,970.6 mm per year. July is the driest month with 14 mm of precipitation and October the wettest month with 307 mm of precipitation.
Main industries**	Forestry, manganese
Currency***	USD 1: XAF 577.81 (Central African CFA franc) (February 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Libreville, accessed 12 April 2019, <https://fr.wikipedia.org/wiki/Libreville>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Laws and regulations related to SWM are the following: » Environmental Code in the Gabonese Republic. » Decree No 001/2000 of 1st February 2000 for the sanitary regulation of hygiene and public health for the Municipality of Libreville.
Policy/Plan	● There is no specific SWM policy or plan for the city.
Implementation system	● General Directorate of the Environment of the City Council of Libreville: in charge of solid waste management in the city (road sweeping, monitoring of the collection, and civic and environmental education). ● General Directorate of the Environment of the Ministry of the Environment. ● The private sector is involved in the provision of waste services, including waste collection, sweeping, and transport of the waste to the disposal site.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: Data not provided. ● Waste generation rate in the residential area: Data not provided. ● Waste collected amount: 600 tons/day (data obtained by the weighbridge at the disposal site, source: Clean Africa). ● Waste composition: Data not provided.
Storage and discharge/ Collection and transportation/ Road sweeping	● Road sweeping services are provided by the City in the city centre, on the main roads and in public spaces. Collection services are provided by the State through a private provider. ● Waste is collected twice a day: day collection and night collection. ● Door-to-door collection is conducted once a week. ● Waste collection coverage: Data not provided. ● Selective collection is carried out for municipal market waste, commercial and institutional waste, household waste as well as for green waste such as grass and from tree pruning. ● Number of collection vehicles: Data not provided. ● Waste sorting at source: none.
Intermediate treatment/ Recycling	● None.

Item	Outline
Final disposal	● There is an uncontrolled landfill in the city. ● Landfill of Mindoubé: » Owner: Libreville City Council. » Area: about 6 hectares. » Hours of operation: 24 hours a day. » Quantity of waste disposed of: 600 tons/day. » Data sources: weighbridge, Clean Africa. » Facilities: weighbridge. » Operation plan: uncontrolled. » Operations: spreading of waste without soil covering.

Financial system	● Data not provided.
Environmental and social considerations	● In development.
Donor support	● Ongoing.
Areas for improvement (in order of priority)	● Legal issues: approval of the Extended Responsibility regulation. ● Technical issues: capacity building. ● Financial issues: financial resources for the acquisition of various waste treatment equipment and better functionality of the institution.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	600	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Ghana
Tema

Tema, locally nicknamed the “Harbour City”, is a city on the Bight of Benin and Atlantic coast of Ghana. It is located in the region of Greater Accra, 25 kilometres east of the capital city of Accra. Tema is the capital of the Tema Metropolitan District.*
Tema Metropolitan Assembly (TMA) collects and disposes of solid waste from institutions, commercial entities, and schools. Private operators collect solid waste from households and dispose of the waste at a landfill, under franchise agreements with TMA. TMA supervises and monitors these contractors and their operations. There is one composting facility, one biogas plant, and one sanitary landfill. The landfill is located 7.5 kilometres from the city and is managed by a private operator under a franchise agreement with TMA.

Source: * Wikipedia, Tema, accessed 6 March 2019, <https://en.wikipedia.org/wiki/Tema>

Information

Population	351,214
Population growth (annual %)	N/A
Area (km^2)	121
Climate*	Tropical savanna climate
Main industries*	Aluminium, steel, processed fish, refined petroleum, textile, chemicals, food products, and cement
Currency**	USD 1: GHS 5.09 (Ghanaian cedi) (March 2019)

Sources: * Wikipedia, Tema, accessed 6 March 2019, <https://en.wikipedia.org/wiki/Tema> ** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Environmental Sanitation By-laws, 2017. ● Licensing of Service Providers By-laws, 2017. ● Liquid Waste Collection and Disposal By-laws, 2017. ● Sullage and Storm Water Drainage By-laws, 2017. ● Litter Control By-laws, 2017. ● Control of Pollution By-laws, 2017.
Policy/Plan	● National Environmental Sanitation Strategy Action Plan (NESSAP). ● Metropolitan Environmental Sanitation Strategy Action Plan (MESSAP). ● Revised National Sanitation Policy (2010).
Implementation system	● TMA is responsible for formulating environmental sanitation by-laws, licencing service providers, litter control and control of pollution. ● TMA collects and disposes of waste from institutions and commercial entities. ● Private operators collect and dispose of household waste. ● The disposal site is managed by a private operator under a franchise agreement with TMA. ● TMA supervises and monitors the operations of private operators. ● Other institutions involved in SWM include: » Ministry of Sanitation and Water Resources: responsible for formulating sanitation policies and ensuring compliance. » Ministry of Health: responsible for medical waste. » Environmental Health and Sanitation Unit: enforces by-laws.
Technical System	
Waste generation amount & characteristics	● The municipality generates 800 tons/day at the rate of 0.9 kg/person/day. ● The composition of the waste is as follows: » Organic waste 50.7%, plastics 26%, textile 7.2%, wood 1.2%, paper 14.9%
Storage and discharge/ Collection and transportation/ Road sweeping	● Waste collection is 672 tons/day. ● About 70% of the residents have access to the waste collection service. ● The municipality uses the following vehicles for the collection service: » One compactor truck with a capacity of 15 m^3. » One side loader with a capacity of 12 m^3. » 323 skip containers with a capacity of 15 m^3.
Intermediate treatment/ Recycling	● 2% of the waste collected is recycled. ● There is one biogas plant.

Item	Outline
Final disposal	● The disposal site is 7.5 km from the city centre. ● The site covers an area of 15 ha and has a design capacity of 500 tons/day. ● The site has the following features: weighbridge, bottom liner, leachate collection pipe, gas removal pipe, leachate treatment facility, landfill gas capture facility, tyre washer, gate, and fence. ● Waste is compacted and covered with soil. ● There is one composting plant. The plant treats 500 tons of faecal waste co-composted with solid organic waste per year.

Financial system	● The municipality collects GHS 100,000/year. ● The charge for the waste collection service is GHS 23/ton for commercial waste and GHS 12/month for institutional waste. The tipping charge is GHS 24/ton. ● The total budget for waste management is GHS 3,735,000 (USD 778,125). ● The expenditure distribution is as follows: » 25% communal collection. » 40% vehicle maintenance. » 10% monitoring and evaluation. » 10% franchise collection and management. » 25% landfill management.
Environmental and social considerations	● Communities are informed about how to discharge waste and about collection day and time.
Donor support	● World Bank/International Development Association (IDA): Urban Environmental Sanitation Project, UESP2, Design and Construction of Landfill Site. ● JICA: capacity building on integrated solid waste management. ● World Bank/IDA: provision of sanitation facilities.
Areas for improvement (in order of priority)	● Technical issues: planning final disposal sites and strengthening the waste management department with skilled staff. ● Institutional issues: prioritising solid waste management. ● Financial issues: availability of funds to operate. ● Legal issues: effective enforcement of the by-laws.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	800	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	672	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Guinea
Conakry

Conakry is the capital and the largest city of the Republic of Guinea. It is a port city opened on the Atlantic Ocean. The city has prospered by port services, especially after the construction of the railway line leading to Kankan, in the centre of the country. It is also the headquarters of the institutions and the administrative, political, economic and cultural centre.
SWM system of Conakry is as follows: pre-collection and collection are conducted by the households and SMEs, while the transport of the waste to the landfill is performed by ANASP. Since the collapse of the landfill of La Minière in August 2017, which claimed nine victims, waste management has become a national priority for the Guinean authorities. The site was closed for a while but reopened due to the lack of other facilities. Currently, the European Union is financing feasibility studies and the construction of a new EUR 25 million landfill in Ballitodé in Coyah, 50 kilometres from Conakry. The city of Conakry has small recycling units for plastic waste. However, the city lacks a treatment plant for solid waste from households.

Information

Population*	1.71 million (2015)
Population growth (annual %)*	2.5 (2010-2015)
Area (km^2)**	450
Climate**	Tropical savanna climate
Main industries**	Export of alumina and bananas, import, manufacturing (food products, cement, metal goods, and fuel products)
Currency***	USD 1: GNF 9,080 (Guinean franc) (February 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Conakry, accessed on 28 January 2019, <https://en.wikipedia.org/wiki/Conakry>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Due to the change in administrative supervision, the legal texts regulating the sector still face an implementation problem.
Policy/Plan	● Conakry Environmental and Sanitation Improvement Programme: Strategies and Action Plan (1994).
Implementation system	● There is a National Sanitation Agency under the Ministry of Territorial Administration. This Agency is currently responsible for waste management. ● There are NGOs and Small and Medium Enterprises that deal with the pre-collection and collection of waste.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: about 1,200 tons/day (0.5 kg/person/day). ● Amount of waste collected per day: 67%. ● Amount of waste disposed of per day: 2 tons. ● Amount of material recycled per day: 2 tons.
Storage and discharge/ Collection and transportation/ Road sweeping	● Households use plastic bags and empty rice bags to discard their waste. 
Intermediate treatment/ Recycling	● Recyclable materials, such as plastics and iron, are recovered by waste pickers at the disposal site, in the streets, and at households in Conakry. ● Sodia Plaste. ● Kim Plaste. ● Currently, the city does not have a treatment plant for household waste.  Kim Plaste  Sodia Plaste
Final disposal	● Despite the accident in 2017, the La Minière landfill is still open and overfull. ● Due to the lack of other disposal sites, the landfill of La Minière continues to receive the solid waste generated in the capital. ● Construction of the new controlled landfill of Ballitodé in Coyah (by the European Union).  La Minière landfill

Item	Outline
Financial system	● Data not provided.
Environmental and social considerations	● Data not provided.
Donor support	● European Union (EU). ● Islamic Development Bank (IDB).
Areas for improvement (in order of priority)	● Construction of a waste treatment plant for household waste.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	1,200	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Kenya
Kiambu

Kiambu County is adjacent to the northern border of Nairobi County and has a population of 1,623,282. The county is 40% rural and 60% urban owing to Nairobi's consistent growth northwards. Its capital is Kiambu and its largest town is Thika.*
SWM service is provided by both the county and the private sector. There are two disposal sites: one is in Kiambu and another one in Thika. The county is preparing an ordinance for municipal solid waste management.

Source: * Wikipedia, Kiambu County, accessed 16 August 2018, <https://en.wikipedia.org/wiki/Kiambu_County>

Information

Population*	1,623,282 (2009)
Population growth (annual %)	N/A
Area (km^2)*	2,449.2
Climate**	Average rainfall is 1,200 mm per year
Main industries	Steel manufacture, detergent, textile, etc.
Currency***	USD 1: KES 99.56 (Kenyan shilling) (March 2019)

Sources: * Wikipedia, Kiambu County, accessed 16 August 2018, <https://en.wikipedia.org/wiki/Kiambu_County>
** County Government of Kiambu, accessed 16 August 2018, <http://www.kiambu.go.ke/>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The county is preparing an ordinance for municipal solid waste management.
Policy/Plan	● A solid waste management policy is under preparation. ● Five-year Strategic Plan.
Implementation system	● The county provides solid waste services such as sweeping, collection and final disposal directly. ● Number of staff: six in administration, 16 in operations, and 450 others. ● The private sector also participates in solid waste services such as collection and recycling. ● Youth groups collect waste from households, sort manually for recycling, and transport it to the dump site. ● The county works with the Wangari Mathaai Institute for Peace and Environment for research activities, with the Ministry of Health for medical waste, and with the National Environmental Management Authority, Ministry of Environment, for the preparation of regulations.
Technical System	
Waste generation amount & characteristics	● Waste generation amount is estimated at 900 tons/day. ● Waste generation rate is estimated at between 0.53 and 0.65 kg/person/day. ● Waste characteristics are unknown.
Storage and discharge/ Collection and transportation/ Road sweeping	● Sweeping is carried out in the city centre, public areas, and residential area. ● Waste amount collected is around 680 tons/day. ● 75% of the total population has access to the collection service. ● The collection service is provided three times a week in the city centre and once a week in the residential area. ● The service uses 40 collection trucks with a capacity of seven tons each. ● There are ten trucks with a loading capacity of five tons each. ● Only 50% of the trucks are functional due to lack of manpower for repairing.
Intermediate treatment/ Recycling	● The county does not have any recycling facility. ● Private companies operate material recycling facilities. ● A private company operates a pyrolysis plant for generating oil. ● There are small plastic recycling activities.
Final disposal	● There are two disposal sites, one in Kiambu and the other in Thika. The former has an area of five acres and is operated between 6:00 am and 6:00 pm. The latter has an area of 100 acres and is operated between 6:00 am and 6:00 pm. ● Two other disposal sites are temporarily closed.

Item	Outline
Financial system	● Annual budget for SWM: » Environmental education: KES 300,000. » Segregation of waste at source: KES 5,000,000. » Environmental training: KES 2,500,000. » Waste management facilities: KES 30,000,000. » Environmental management policies: KES 12,000,000. » Transport and infrastructure: KES 30,000,000. » Decommissioning and rehabilitation of dumpsite: KES 30,000,000. » Organic waste hub: KES 6,000,000. » Thika Kang'oki upgrading: KES 10,000,000. ● Households are not charged for the waste collection service, but other wastes are charged as follows: » Commercial waste: 3,000 KES/ton. » Hazardous waste: 25,000 KES/ton. ● There is a tipping fee at the disposal site of 100 KES/ton for household waste, and 1,500 KES/ton for industrial waste.
Environmental and social considerations	● The informal sector collects recyclable materials. Approximately 1,500 waste pickers are working in the streets and 400 are at the disposal site. ● Communities are informed about collection day and time. No separate collection is applied. ● Community action days: meetings for public awareness raising, organisation of clean-up activities with residents, students, etc.
Donor support	● JICA provides cooperation in capacity development of solid waste management, e.g. training in Japan. ● UN-Habitat project using the Fukuoka Method. ● Japan provided heavy equipment and compactor trucks.
Areas for improvement (in order of priority)	● Raise public awareness. ● Establish a transfer station. ● Waste separation. ● Material recycling and composting. ● Waste reduction, 3Rs.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	900	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	680	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Cleaning and public awareness raising activities

Kenya
Nairobi

Nairobi is the capital and the largest city of Kenya. The name comes from the Maasai phrase Enkare Nyrobi, which translates to “cool water”, a reference to the Nairobi River which flows through the city. The city is popularly referred to as the Green City in the Sun.*
SWM services in the Nairobi City are managed by the Department of Environment, Water, Energy and Natural Resources of the Nairobi City Council (NCC). The final disposal site is open dumping and not operating in good condition, therefore the surrounding environment seems to be deteriorating.

Source: * Wikipedia, Nairobi, accessed 21 February 2019, <https://en.wikipedia.org/wiki/Nairobi>

Information

Population*	3.91 million (2015)
Population growth (annual %)*	3.9 (2010-2015)
Area (km^2)	696.1
Climate	Subtropical highland climate
Main industries**	Clothing, textiles, building materials, processed foods, beverages, and cigarettes
Currency***	USD 1: KES 99.56 (Kenyan shilling) (March 2019)
Other	United Nations Environment Programme (UN Environment) and the United Nations Office at Nairobi (UNON) are located in Nairobi.

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Nairobi, accessed 21 February 2019, <https://en.wikipedia.org/wiki/Nairobi>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The related laws and regulations for SWM are as follows: » Nairobi City County Solid Waste Management Act 2015: Provides for the management of solid waste in the County and for related matters.
Policy/Plan	● Integrated Solid Waste Management Plan (ISWMP).
Implementation system	● Sector of Environment, Water, Energy and Natural Resources of the Nairobi City County (NCC): in charge of SWM in the city (street sweeping, collection, and final disposal site operation) and preparing the Integrated SWM Plan and SWM Act. The current workforce is 533. ● Ministry of Environment and Forestry: in charge of coordination and giving policy direction for national environmental and forestry concerns. ● National Environmental Management Authority: in charge of national regulation and control of environmental concerns. ● Ministry of Health: responsible for management of medical waste.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 2,500 tons/day (estimated by multiplying population and waste generation rate). ● Waste generation rate in residential area: 0.61 kg/person/day (refer to data in 2010). ● Waste collection amount: 800 tons/day (data obtained by weighbridge at disposal site). ● Waste collection coverage rate: 72% (estimated with the percentage of waste disposed at the final disposal site). ● Waste composition of recyclables (weighted average): » Food 62.4%, plastics 10.9%, papers 14%, metal 0.7%, glass 1.5%, other (textile, ceramic, wood, rubber, leather) 10.5 % (study conducted by professionals, 2010).
Storage and discharge/ Collection and transportation/ Road sweeping	● The private sector participates in provision of waste collection, sweeping services, and disposal site operation. However, they are not working well because their activities are not stringently monitored by the authority, they are not paid according to the contract, and the contractor doesn’t provide adequate resources. ● There are over 4,000 waste pickers at the final disposal site. There are also people who collect recyclables from waste collection points and are involved in the pre-processing and re-use of recyclables. ● The community is informed about how to discharge waste (e.g. collection day and time), separation of waste, and the hazards associated with mismanaged waste through public consultation meetings and waste collection service providers. ● A road-sweeping service is provided by the city in the city centre and major public areas. ● Waste is collected three times a week or more in the city centre and twice a week in residential areas. ● Separate collection is in place but by individual initiatives. ● Hauling distance from the city centre to the disposal site is about 14 km (Location: S 1°14'53.9" E 36°53'46.7"). ● There is no transfer station in the city. ● The NCC has one compactor truck of 20 tons capacity, which is non-functional 50% of the time due to irregular maintenance. ● The NCC also has other waste collection trucks (13 15-ton tippers, 29 6.5-ton side loaders, and 17 four-ton skip loaders). Of these, 44% are functional and 56% are non-functional due to inadequate maintenance, scarcity of spare parts, and frequent breakdowns as a result of the poor state of the final disposal site. ● The NCC has 13 dump trucks, of which 50% are non-functional due to inadequate maintenance, scarce spare parts and poor state of the final disposal site. ● The NCC has 47 other trucks of different types for the transportation of waste, of which 32% are functional but 68% are non-functional due to inadequate maintenance, scarce spare parts, and poor state of the final disposal site.

Item	Outline
Intermediate treatment/ Recycling	● There is no Materials Recovery Facilities (MRFs) nor composting facility in the city. ● Self-disposal at home exists, and includes open burning, animal feeding, composting, burying, and selling recyclable materials to recyclers. ● There are many waste sorting sites. ● There are many licensed recycling firms.
Final disposal	● There is one designated dump site managed by the NCC: » Location: S 1°14'53.9" E 36°53'46.7". » Capacity: 1.8 million m³. » Operation hours: 24 hours. » Waste disposal amount: 800 tons/day. » Data obtained by weighbridge. » Facility: weighbridge. » Operation plan: daily operation plan exists. » Operation: compaction of waste but no covering with soil.

Financial system	● Total revenue for waste service: KES 106,600,000/year. ● Total expenditure for waste service: KES 700,000,000/year. ● Amount to be spent per ton of waste: KES 1,850/ton. ● The NCC charges independently waste collection fee. ● Tipping fee of KES 100/ton is charged.
Environmental and social considerations	● There is a policy or law for supporting the informal sector through the provision of job opportunities and empowerment of youth and women groups.
Donor support	● The European Union Delegation is supporting a pre-feasibility study for Energy-from-Waste as of 2018. ● The World Bank is supporting Consultancy on Solid Waste Management in Kibra informal settlement and 3R and Composting in Nairobi County. ● Danish Government through Danish Embassy provided Funding and and Technical support on Strategic Sector Corporation on Green and Circular Economy for Industries in Ruaraka Sub-County. ● Japan International Cooperation Agency supported Capacity Development of SWM of Nairobi City
Areas for improvement (in order of priority)	● Financial issues: Inadequate funding for proper solid waste management, particularly in collection, transportation and final disposal. ● Institutional issues: Need for independent institutional management of solid waste through an established company. ● Technical issues: Need to build the technical capacity of staff.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	2,500	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	800	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	800	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Final Disposal Site (coordinates: S 1°14'53.9" E 36°53'46.7")

Lesotho

Maseru

Maseru is the capital and largest city of Lesotho, and is also the capital of the Maseru District. The city is located on the Caledon River, and lies directly on the Lesotho-South Africa border. The city was established as a police camp and assigned as the capital after the country became a British protectorate in 1869. When the country achieved independence in 1966, Maseru retained its status as capital. The name of the city is a Sesotho word meaning "red sandstones".

SWM services in the Maseru City are managed by the Department of Health and Environment (DHE) of the Maseru City Council (MCC). MCC has a four-pillar waste management strategy that stands as follows:

- Lease contract: where private contractors have been engaged for SWM in earmarked areas.
- Force Account: where MCC uses its own resources (equipment, personnel, etc.) for waste management in areas earmarked for MCC.
- Community Contracting: where the community is engaged for SWM, mainly in the councillors' wards.
- Community Day: MCC sets up the Community Day, where all council employees and councillors go out to clean an area identified for cleaning once a month.

Information

Population*	330,760 (2016 census)
Population growth (annual %)*	3.5 (1986–1996)
Area (km^2)*	138
Climate*	Subtropical highland climate
Main industries*	Manufacturing, textile, clothing, footwear, food and beverages
Currency**	USD 1: LSL 13.85 (Lesotho loti) (February 2019)

Sources: * Wikipedia, Maseru, accessed 21 February 2019, <https://en.wikipedia.org/wiki/Maseru>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● There are no by-laws for SWM in the city. The municipality instead uses national legislation, such as: » Local Government Act 1997 as amended: stipulates the responsibilities of the Local Authorities » Public Health Order 1970 » Environment Act 2008
Policy/Plan	● Municipal Waste Management Strategy ● Departmental Annual Work Plan ● Community Sensitisation Plan
Implementation system	● Department of Health and Environment (DHE) of the Maseru City Council (MCC): in charge of SWM in the city (collecting litter, street sweeping, collection and transportation, transfer station and final disposal site). They have three administration staff, nine operations staff, and 37 labourers and supervisors. ● Ministry of Local Government: in charge of the decentralisation and supervision of local authorities. ● Department of Environment: in charge of the national environmental issues. ● Ministry of Health: in charge of health-related issues including public health.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: unknown. ● Waste generation rate: unknown. ● Waste collection amount: unknown. ● Waste collection coverage rate: 40%. ● Waste characteristics: unknown.
Storage and discharge/ Collection and transportation/ Road sweeping	● There are 21 private companies involved in street sweeping, waste collection and transportation services, transfer stations, final disposal, and recycling activities in areas earmarked for such companies/contractors. However, there are earmarked areas where MCC provides WM services. ● There are about 40 waste pickers collecting recyclable materials at the disposal site. ● The community is informed of the collection day and time, waste management in general, the benefits of living in a clean environment, and waste separation through public consultation meetings, radio, and the school curriculum. ● Self-disposal at generation source (open burning, animal feeding, and composting) exists. ● Waste separation at source is not practiced in the city. ● Waste is collected daily in the city centre and once a week in residential area. ● Hauling distance from the city centre to a transfer station is about 3 km. ● Hauling distance from the city centre to the disposal site is about 6 km. ● The MCC has two compactor trucks of 12 m^3, of which one is non-functional due to lack of maintenance and spare parts. ● The MCC also has four waste collection trucks (two skip loaders, one flatbed truck and one tractor), of which half are non-functional due to lack of maintenance and spare parts. ● There are two transfer stations in the city which were introduced as part of a pilot project. Waste is collected door-to-door in most of the city.

Item	Outline
Intermediate treatment/ Recycling	● There is no Materials Recovery Facility (MRF) or composting facility in the city.
Final disposal	● There is one dump site managed by a private contractor but financed by the MCC. » Location: S 29°18'50.5" E 27°32'25.2". » Area: unknown. » Operation hours: 24 hours. » Waste disposal amount: unknown. » Facility: drainage to prevent rainwater from coming into the waste disposal area, fence and gate. » Operation: compaction of waste and soil covering but not frequently operated.

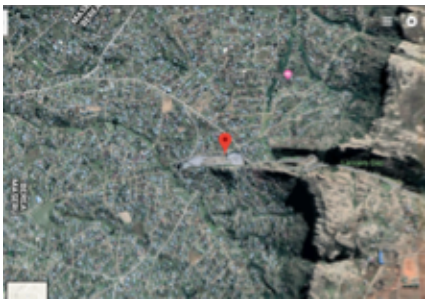
Financial system	● Total revenue for waste service: unknown. ● Total expenditure for waste service: unknown. ● Subsidy from the central government to the local authorities in general: LSL 23 million (USD 1,963,614). ● They charge waste collection fee 40 maloti/month for household waste, 210 maloti/month/200 litre drum for commercial waste, and 1,100 maloti/month/6m³ skip for institutional/industrial waste.
Environmental and social considerations	● There is no policy nor law supporting the informal sector.
Donor support	● United Nations Development Programme (UNDP): » Conducted waste characteristic survey. » Assisted in capacity development for the Local Authorities but not specific to SWM.
Areas for improvement (in order of priority)	● Financial issues: procurement of waste collection vehicles. ● Technical issues: 1) data collection; 2) assistance for the construction of a new sanitary landfill. The site has been selected (45 km away from the city centre) and EIA has already been completed. ● Legal issues: formulation of laws and regulations related to SWM.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:



Current Final Disposal Site
(coordinates: S 29°18'50.5" E 27°32'25.2")

Planned New Sanitary Landfill Site
(coordinates: S 29°34'07.6" E 27°22'57.0")

Collection truck

Liberia

Monrovia

Monrovia, located on the Atlantic Coast at Cape Mesurado, is the capital city of the West African country of Liberia. It is Liberia's largest city and its administrative, commercial, and financial centre. About one third of the population of Liberia live in Monrovia.*
Monrovia City Corporation (MCC) is responsible for solid waste management (SWM). MCC is responsible for enacting SWM policies and regulations as well as supervision and technical oversight. The collection and disposal of solid waste is carried out by community-based enterprises (CBEs) and private operators. CBEs operate under franchise agreements with MCC to collect waste from households in densely populated areas and dispose of the waste in containers at communal collection points. CBEs collect fees from their customers and pay an annual fee to MCC. Private operators, also operating under franchise agreements with MCC, collect waste from the central business district, small businesses, and schools. The city has two transfer stations and two final disposal sites. One of the final disposal site is an open dumpsite, and the other is an engineered sanitary landfill, located 15 kilometres from the city centre and with the following features: bottom liner, leachate collection pipe, weighbridge, tyre washer, gate and fence.

Sources: * Wikipedia, Monrovia, accessed 20 August 2018, <https://en.wikipedia.org/wiki/Monrovia>

Information

Population*	1.27 million (2015)
Population growth (annual %)*	3.8 (2010-2015)
Area (km^2)**	194.25
Climate**	Tropical monsoon climate
Main industries**	Administrative, commercial, financial
Currency***	USD 1: LRD 154.25 (Liberian dollar) (August 2018)

Source: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Monrovia, accessed 20 August 2018, <https://en.wikipedia.org/wiki/Monrovia>
*** Cuex.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Environmental Protection Agency Act. ● Environmental Protection and Management Law.
Policy/Plan	● Solid Waste Management Plan.
Implementation system	● Monrovia City Corporation is responsible for SWM. ● Community-based enterprises collect waste from high density areas. ● Private operators collect waste from the central business district, small businesses and schools. ● Other institutions involved in SWM include: » Ministry of Public Works: helps with the cleaning of waterways and alleys, road infrastructure, city management planning, and supports the city in developing ordinances and regulations. » The Environmental Protection Agency: responsible for enforcing environmental laws and regulations and liaising with the City Corporation in developing city plans. » Liberia Water and Sewerage Agency: responsible for ensuring adequate supply of clean water to all Liberians and supporting the City Corporation in developing city plans to ensure waterways are protected. » The Ministry of Health: responsible for integrating disease programs into the Solid Waste Management Plan. » The Ministry of Justice: supporting the prosecution of violators of solid waste management regulations.
Technical System	
Waste generation amount & characteristics	● The city generates 756 tons of waste per day at the rate of 0.65 kg/person/day. ● The waste composition is as follows: » Food waste 43%, plastic 13%, paper 10%, textile 6%, wood 4.6%, rubber and leather 0.2%, metal 2%, glass 0.6%, ceramics 0.6%, other items (clothes, mixed) 20%.
Storage and discharge/ Collection and transportation/ Road sweeping	● About 325 tons/day is collected. ● There are two transfer stations. ● The City Corporation uses seven compactor trucks, two flatbed trucks with a capacity of 10 m^3, and five container trucks.
Intermediate treatment/ Recycling	● There is no recycling/treatment facility.

Item	Outline
Final disposal	● There are two final disposal sites. The first one is an open dumpsite and the second one is an engineered sanitary landfill, 15 kilometres from the city centre. ● The sanitary landfill has following features: bottom liner, leachate collection pipe, tyre washer, gate, fence, and drainage to prevent rainwater from getting to the waste disposal area. ● The waste at the sanitary landfill is covered with soil immediately/or within a week.

Financial system	● The city charges a fee for waste services. For commercial waste, the charge is USD 15 per ton. ● At the disposal site, there is a tipping fee of USD 10 per ton.
Environmental and social considerations	● Community members are informed about waste collection days and time, separation of waste, and punitive measures for violators of regulations. ● Information is passed through public bulletins, public consultation meeting, flyers and/or brochures, radio, TV and through schools (in curriculum).
Donor support	● Irish Aid, JICA, United Nations Development Programme (UNDP), United States Agency for International Development (USAID), World Bank, Australian Aid (formerly AusAID).
Areas for improvement (in order of priority)	● Institutional issues. ● Technical issues. ● Financial issues.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount ** (ton/day)	Remarks
❶ Waste generation	756	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, to recyclers.
❺ Collection and transport	325	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of at somewhere.
❼ Treatment	120	Material recycle, composting, incineration, etc.
❽ Recycling/Reduction	80	Recycled and/or reduced waste amount by material recycle, composting, incineration, etc.
❾ Residue	40	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	205	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Community-Based Enterprise

Small-Medium Enterprise

Solid waste compressor

Temporary collection

Transport to landfill

Landfill

Madagascar
Antananarivo

Antananarivo, also known as Tana, is the capital and largest city of Madagascar. It is the political, economic, and cultural centre of the country. The city is located 1,280 metres above the sea level in the centre of the island and has been the country's largest population centre since at least the 18th century.*
SWM services are mainly provided by a private company supervised by the central government. The municipality also carries out sweeping and collection services. There is one final disposal site, which is located approximately 15 kilometres away from the city centre. One materials recovery facility (MRF) and one composting facility are in operation at the final disposal site.

Source: * Wikipedia, Antananarivo, accessed 6 March 2019, <https://en.wikipedia.org/wiki/Antananarivo>

Information

Population*	2.62 million (2015)
Population growth (annual %)*	5.3 (2010-2015)
Area (km^2)**	88
Climate**	Subtropical highland climate
Main industries**	Soap production, food and tobacco processing, brewing, textiles, and leather manufacturing
Currency***	USD 1: MGA 3,681.25 (Malagasy ariary) (September 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Antananarivo, accessed 6 March 2019, <https://en.wikipedia.org/wiki/Antananarivo>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The municipality does not have regulation specific for SWM. There is a related Municipal Hygiene Code.
Policy/Plan	● Plan of evacuation of the city in case of flood.
Implementation system	● The municipality provides sweeping and collection services. ● Related agencies and their responsibilities are as follows: » The Ministry of Water, Sanitation and Energy prepares policies, strategies and plans for this sector, and provides support for community strengthening. » The Ministry of Land Planning considers the integration of sectorial plans into land use planning. » The Ministry of Health is in charge of medical waste management. ● The private sector participates in the following services: » Collection service. » Transfer station.
Technical System	
Waste generation amount & characteristics	● Waste generation amount is between 1,900 and 2,100 m^3 per day. ● Waste characteristics: food 85%, plastics 4%, paper 3%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Sweeping is carried out in the city centre, public areas, and residential areas. ● Waste amount collected is 1,500 m^3 per day. ● 2,180,000 citizens in 12 zones, i.e. 70% of the total population has access to the collection service. This rate has been identified through a waste collection area map. ● The collection service is provided three times a week or more both in the city centre and the residential areas. ● The service uses 50 collection trucks with a capacity of 15 m^3. ● The trucks carry waste to the disposal site, which is located 15 km from the city centre.
Intermediate treatment/ Recycling	● There is one MRF and one composting facility at the final disposal site.
Final disposal	● There is one final disposal site which is located at S 18°54'44.8" E 47°34'36.7". The site has an area of 18 ha. ● Although the site does not have a bottom liner, it has leachate collection pipes, enclosed bund, weighbridge, tyre washer, gate, and fence. ● An operation plan has been prepared. ● Waste is compacted, but daily cover is not practiced.

Item	Outline
Financial system	● The waste collection fee is applied independently from other public services. ● The fee is managed by a national agency. ● Tipping fee on the disposal site is not applied.
Environmental and social considerations	● The informal sector collects recyclable materials. There is no policy for supporting this sector. ● Communities are informed about waste collection day and time by public consultation meetings and/or flyers/ brochures.
Donor support	● World Bank and the French Development Agency (AFD) provide technical cooperation in solid waste management capacity development.
Areas for improvement (in order of priority)	● Improvement is necessary in the areas of legislation, technique, and finance.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (m^3/day)	Remarks
❶ Waste generation	1,900–2,100	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, to recyclers.
❺ Collection and transport	1,500	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of at somewhere.
❼ Treatment	N/A	Material recycle, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycle, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Final Disposal Site (coordinates: S 18°54'44.8" E 47°34'36.7")

Malawi

Blantyre

Blantyre is Malawi's centre of industry and commerce, and its second largest city, with 994,517 inhabitants as of 2018. It is sometimes referred to as the commercial and industrial capital of Malawi as opposed to the political capital, which is Lilongwe. Blantyre is the capital of the country's Southern Region and of the Blantyre District.
SWM services in the Blantyre City are managed by the Department of Health and Social Services of the Blantyre City Council (BCC). The centre of the city is kept clean, but the sanitary environment of low income and poor residential areas is in particularly poor condition due to the dumping of garbage on open spaces, streams, roadsides, and in drains. The final disposal site is open dumping, and the surrounding environment is deteriorating.

Information

Population	994,517 (2018, National Statistical Office)
Population growth (annual %)	4.1 (2008-2018)
Area (km^2)*	228
Climate*	Tropical savanna climate
Topography*	Varied topography with altitude ranging from an elevation of 780 to 1,612 metres above sea level comprised of hills, plateau and ridge, and a natural drainage system
Main industries	Finance, banking, retail trade, construction, transport, food and textile manufacturing, motor vehicles sales and maintenance
Currency**	USD 1: MWK 719 (Malawi kwacha) (February 2019)

Sources: * Wikipedia, Blantyre, accessed 21 February 2019, <https://en.wikipedia.org/wiki/Blantyre>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The related laws and regulations for SWM are as follows: » General Cleanliness, Refuse and Rubble By-Law 2003: prescribes the duties and responsibilities for waste generators in the City of Blantyre and standards for waste containers, types of waste to be deposited in containers for collection, and the various offences. » The Local Government Act 1998. » The Environmental Management Act 1996, amended in 2017.
Policy/Plan	● There is no specific SWM policy or plan in the city. ● The Decentralization Policy 1996. ● The Blantyre City Council Strategic Plan (2013-2018): covers general plan for most sectors and includes SWM as part of sanitation and public nuisance.
Implementation system	● Constitutionally, SWM is the responsibility of local councils in Malawi. ● Department of Health and Social Services (DHSS) of the Blantyre City Council (BCC): responsible for SWM in the city (street sweeping, collection and transportation, final disposal site operation). There are four administration staff, 423 operations staff (including both permanent and temporary) and 13 collection drivers. ● Environmental Affairs Department in the Ministry of Natural Resources, Energy and Mining of the Government of Malawi: responsible for preparation of the Environmental Management Bill and for enforcement of the Environmental Management Act and Regulations, including environmental pollution control and regulation of waste management facilities. ● Ministry of Health: responsible for medical waste. ● Pharmacy, Medicines and Poisons Board (Regulatory Authority): responsible for drugs and medicinal substances. ● Sanitation Department in the Ministry of Agriculture, Irrigation and Water Development: responsible for preparation of sanitation policy which prescribes roles and responsibilities for institutions in relation to implementation of sanitation activities. ● Pesticides Control Board: responsible for regulating the handling and disposal of pesticides.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 472 tons/day (estimated by multiplying population and waste generation rate, 2014). ● Waste generation rate in residential area (household MSW): 0.37 kg/person/day (study conducted by National Commission for Science and Technology in 2014). ● Waste collection amount: 89 tons/day from residential area, 24 tons/day from business industries (estimated by multiplying collection truck capacity in tonnage and number of trips made per day to the disposal site). ● Waste collection coverage rate: 45% (calculation based on the collection area map and the population distribution, between formal residential areas and squatter/informal residential areas). ● Waste characteristics in residential area: » Organic (putrescible) 70%, plastics 6%, papers 4%, metals 1%, glass 2%, cardboard 5%, rubber, wood and textile 4%, ceramics, soil, rubble, ash, diapers 3%, biomedical, oil filters, and batteries 1.5%, others 3.5% (study conducted by NCST, 2014). ● According to the SWM by-law, garden waste, grass, and hedge trimmings are not collected.

Item	Outline
Storage and discharge/ Collection and transportation/ Road sweeping	● The private sector participates in provision of waste collection services (especially for industries) and recycling activities. ● There are about 100 waste pickers collecting recyclable materials on the street and at disposal site. They form the major suppliers of recyclable materials to the private recycling companies. ● The community is informed how to discharge waste such as collection day and time through neighbourhood information sharing and direct public inquiry at the City Council by the residents. ● Self-disposal at generation source (open burning, waste pit disposal in the backyard and open dumping) exists. ● Waste separation at source is not practiced in the city. ● A road sweeping service is provided by the city in the city centre and major public roads. ● Waste is collected every day in the city centre and once a week in residential areas. ● Hauling distance from the city centre to the disposal site is between 5 and 20 km from the nearest to farthest collection area respectively. ● The BCC has six compactor trucks (two seven-ton compactor trucks, one three-ton compactor truck and three two-ton compactor trucks), of which five are functional but three are now experiencing frequent breakdown due to old fleet and high cost of maintenance. ● The BCC also has seven waste collection trucks (three seen-ton skip handler trucks, two seven-ton non-compactor container trucks and two three-ton trailer tractors), of which five are functional. The non-functionality of the vehicles is due to old fleet and high cost of maintenance. ● There is no transfer station in the city but there are 50 skip points, mainly for the market areas. In addition, there are 19 skip points owned by private collection providers.
Intermediate treatment/ Recycling	● There are nine Materials Recovery Facilities (MRFs). Additionally, there are small-scale composting activities being piloted utilising waste from selected markets and residential areas. ● MRF 1 (Plastic recycling): » Location: S 15°46'17" E 34°59'11". » Capacity: 2 tons/day. » Operation hours: 24 hours. » Waste amount: 2 tons/day (estimated from weighing scale). ● MRF 2 (Plastic recycling): » Location: S 15°47'01" E 35°04'33". » Capacity: 3 tons/day. » Operation hours: 12 hours. » Waste amount: 0.3 tons/day (estimated from weighing scale). ● MRF 3 (Steel recycling): » Location: S 15°47'02" E 35°04'23". » Capacity: 7 tons/day. » Operation hours: 12 hours. » Waste amount: 4 tons/day (estimated from weighing scale). ● MRF 4 (Plastic recycling): » Location: S 15°47'26" E 35°01'03". » Capacity: 1.5 tons/day. » Operation hours: 24 hours. » Waste amount: 1 tons/day (estimated from weighing scale). ● MRF 5 (Rubber recycling): » Location: S 15°49'20" E 35°03'43". » Capacity: 2 tons/day. » Operation hours: 24 hours. » Waste amount: 30 kg/day (estimated from weighing scale). » Mostly operate in-house factory reject waste material and virgin products. ● MRF 6 (Plastic recycling): » Location: S 15°47'30" E 35°04'41". » Capacity: 4 tons/day. » Operation hours: 13 hours. » Waste amount: 2.6 tons/day (estimated from weighing scale). » Recycles factory rejects. ● MRF 7 (Plastic recycling): » Location: S 15°46'00" E 35°05'37". » Capacity: 2.7 tons/day. » Operation hours: 24 hours. » Waste amount: 950 kg/day (estimated from weighing scale and production capacity). ● MRF 8 (Steel Recycling): » Location: S 15°47'20" E 35°01'54". » Capacity: 30 tons/day. » Operation hours: 9.5 hours. » Waste amount: 2 tons/day (estimated from weighing bridge). ● MRF 9 (Plastic recycling): » Location: S 15°47'45.3" E 35°01'08". » Capacity: 7 tons/day. » Operation hours: 10 hours. » Waste amount: 0.8 tons/day (estimated from weighing scale). ● Composting facility: » Location: S 15°49'36" E 35°00'33.0". » Capacity: 4 tons/day from market waste. » Operation hours: 10 hours. » Waste amount: 0.5 tons/day (estimated from weighing scale).
Final disposal	● There is one dump site managed by the BCC: » Location: S 15°46'52.45" E 35°5'49.89". » Area: 20 hectares (currently only 5 hectares used since 1995). » Operation hours: 10 hours. » Waste disposal amount: 113 tons/day. » Facility: embankment only. » Operation: intermediate soil cover for area which is not used for several months.

Item	Outline
Financial system	● Total revenue for waste service: MWK 37,217,800. ● Total expenditure for waste service: MWK 593,658,395. » MWK 182,219,304 for collection and transportation. » MWK 12,849,094 for sweeping. » MWK 15,088,118 for final disposal. » MWK 401,589,997 for salaries and wages. ● Waste collection fees are not charged for household waste and institutional waste, but industrial waste is charged MWK 70,000/vehicle of 7 tons. ● Commercial and industrial waste is charged a tipping fee of MWK 40,000/truck of 7 tons.
Environmental and social considerations	● There is no policy or law for supporting the informal sector.
Donor support	● Grant Aid by Government of Japan: donation of three compactors.
Areas for improvement (in order of priority)	● Financial issues: procurement of basic waste collection vehicles and containers (for squatter area) and improvement/rehabilitation of final disposal site. ● Legal issues: enforcement of waste generator responsibility to finance waste management through charging system for commercial/industrial waste. ● Technical issues: development of the recycling industry, including technology transfer and development of waste separation system. ● Social issues: need a robust public awareness system and commitment of waste producers to take their responsibilities and pay for the collection of their waste.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	472	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	113	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	113	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Skip point

Waste pickers in the disposal site

Final Disposal Site (coordinates: S 15°46'52.45" E 35°5'49.89")

Mozambique
Beira

The port city of Beira, the capital of Sofala Province, is located about 1,190 kilometres north of Maputo in the centre of the coastline along the Mozambique Channel. Beira covers an area of 633 square kilometres, has an average altitude of 14 metres above sea level, and is located at the coordinates 19° 50' south and 34° 51' east. The city is bordered by the Dondo district in the north and west, the Indian Ocean in the east, and the Buzi district in the south. The terrain is swampy and close to the estuary of Pungwe River, with stretches of sand dunes along the Indian Ocean coast. The natural flora is characterised by lowlands and coasts with mangroves. The city is divided in five administrative posts: Urbano nº 1, Urbano nº 2, Urbano nº 3, Urbano nº 4, and Urbano nº 5. The administrative posts are divided into 26 boroughs: Macuti, Palmeiras, Ponta Gea, Chaimite, Pioneiros, Esturro, Matacuane, Macurungo, Munhava-Central, Mananga, Vaz, Maraza, Chota, Alto da Manga, Nhaconjua, Chingussura, Vila Massane, Inhamízua, Matadouro, Mungassa, Ndunda, Manga Mascarenha, Muave, Nhangau, Nhangoma and Tchonja.*
The Council of Municipal Management and Equipment is responsible for the different municipal solid waste management services provided. An under-equipped fleet of vehicles collects garbage from 6 m^3 containers along the city streets and waste deposition points on the ground.

Source: * Wikipedia, Beira, <https://pt.wikipedia.org/wiki/Beira_(Mo%C3%A7ambique)#Patrim%C3%B3nio_da_cidade_da_Beira>

Information

Population	656,871 (2017 census)
Population growth (annual %)*	2.1 (2010-2015)
Area (km^2)**	633
Climate**	Tropical savanna wet rainy climate
Main industries**	Food, beverages, cement, chemicals (soap), oil products, etc.
Currency***	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other**	The population consists of mostly Christians, with significant numbers of Muslims and Hindus, as well.

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Beira, <https://pt.wikipedia.org/wiki/Beira_(Mo%C3%A7ambique)#Patrim%C3%B3nio_da_cidade_da_Beira>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● There are two major laws and regulations related to municipal solid waste management in the city: » Regulation on Municipal Solid Waste Management (Decree 94/2014, 31st of December). » Municipal Stance on Solid Waste Management (approved on the 15th of December, 2016).
Policy/Plan	● A comprehensive Solid Waste Management Plan is being drawn up.
Implementation system	● The Direction is in charge of solid waste management in Beira city and the Council of Municipal Management and Equipment is responsible for hygiene and sanitary services (including: waste collection; street sweeping, weeding and dogs; garbage management) and monitoring and inspection planning services for the city. The council engages 29 decision makers (councilmen, directors, and chiefs), 383 operational employees (drivers, sweepers, waste pickers, foremen, etc.) and 27 administrative employees (secretaries and servants). ● The Beira Municipal Council collects biomedical waste.
Technical System	
Waste generation amount & characteristics	● Quantity of waste generated: 554.65 tons/day (draft estimates from the Comprehensive Solid Waste Management Plan). ● Waste generation in residential areas (2016 study): » Concrete city with buildings: 0.61 kg/person/day. » Concrete city with townhouses: 0.94 kg/person/day. » Suburban areas with access: 0.57 kg/person/day. » Suburban areas without access: 0.57 kg/person/day. » Rural areas: 0.44 kg/person/day. ● Waste composition (2016 study): » Urban area: inert 38.17%, organic 22.77%, green/wood 25%, textile products 4.91%, plastic 6.44%, paper/cardboard 3.27%, glass 2.49%, metal 1.10%, debris 2.43%, composite materials 0.56%, hazardous 0.25%. » Suburban area: inert 28.05%, organic 33.31 %, green/wood 19.9%, textile products 4.74%, plastic 5.39%, paper/cardboard 3.11%, glass 1.11%, metal 1.07%, debris 1.96%, composite materials 0.93%, hazardous 0.44%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Street sweepers clean the streets of the urban areas with buildings and townhouses (the sweepers are divided by group and borough in accordance with implementation targets). ● Municipal waste is collected in three shifts every day. ● Number of vehicles: six container trucks, five compactors, one tractor, and two dumpers.

Item	Outline
Intermediate treatment/ Recycling	● There is no treatment. ● There is a small number of waste pickers (exact number unknown). ● There is no transfer station in the city.
Final disposal	● There is one open dump covering an area of about 7 hectares. It is located in Munhava borough, close to the sewage treatment plant, about 7 km from the city centre, and is owned by the Beira Municipal Council. It is operated 24 hours per day and receives 225.12 tons of waste per day (estimate based on daily loading of the vehicles).

Financial system	● Financial resources are managed under the direction of the Council of Finances. ● The chief expenditures are: » Staff salary and benefits: MZN 25,339,586.35 » Fuels and lubricants: MZN 2,595,730.57 » Vehicle maintenance: MZN 3,698,730.02 » Equipment procurement: MZN 9,439,889.16 ● Revenues: » Garbage fees: MZN 23,840,582 » Special collection: MZN 918,178.29 » Disposal at the dump: MZN 639,393.65 ● The Beira Municipal Council charges a fee of MZN 25 for waste services through EDM (Mozambique Electricity). EDM takes a commission of 25% from this fee.
Environmental and social considerations	● The Beira Municipal Council supports research and promotes the recycling of solid waste through a multipurpose centre specialised in renewable energies (ex. coal production from waste, biogas from animal excrement, etc.). ● Information and awareness campaigns for the municipality.
Donor support	● CAM: Provides technical and institutional assistance to the Beira Municipal Council.
Areas for improvement (in order of priority)	● Legal issues: Definitions for different regulations specific to the sector. ● Technical issues: Staff development and training. ● Financial issues: Sustainability of the sector.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	554.65	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	225.12	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	225.12	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique

Gurué

Gurué district is located in the north of Zambezia Province, in the Alta Zambezia region. It borders the districts of Milange, Namarroi, Errego, and Alto Molocue in the same Province, and Malema district of Nampula Province and the Mecanhelas district of Niassa Province in the north. Gurué district covers an area of 5,688 square kilometres and has 264,572 inhabitants (according to 2017 census estimates). The city itself covers an area of 107 square kilometres and has 123,000 inhabitants.
Municipal solid waste management services are managed by the Council of Sanitation Urban Management and Funeral Management under the Municipal Council of Gurué City (CMCG). The city centre is kept fairly clean. Residents are aware of good environmental sanitation practices and the regulations requiring households to be equipped with latrines and sanitary landfill, etc. They also understand the importance of washing their hands before eating and after using toilets.

Information

Population	123,000
Population growth (annual %)	N/A
Area (km^2)*	107
Climate	Tropical climate
Main industries	Food, beverage, tea processing
Currency**	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other	The milling industry is strongly represented in Gurué.

Sources: * Wikipedia, Gurué, accessed 12 April 2019, <https://pt.wikipedia.org/wiki/Guru%C3%A9>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The laws and regulations related to municipal solid waste management are the following: » Stance of the Municipal Council of Maputo on Waste Management (updated in 2004): fundamentals and norms on solid waste. » Comprehensive Municipal Solid Waste Management Plan (PGIRSU) 2013-2018 and Regulation of Municipal Solid Waste Management (MICOA/MITADER) (Decree 13/2006, 15th of June). Regulation on Environmental Quality Standards and the Emission of Flue Gases (Decree 18/2004, 2nd of June).
Policy/Plan	● The Municipal Council of Gurué City (CMCG) has a plan for the active participation of the residents in solid waste management.
Implementation system	● Solid waste management awareness campaign: community, religious leaders and secretariats are trained to define sanitation good practices as persons who represent various populations and are both listened to and followed by residents.
Technical System	
Waste generation amount & characteristics	● Most of the generated waste in Gurué city is organic. It is difficult to quantify the total amount of waste generated by residents, as some residents are already aware of the need to have sanitary landfill and to treat household waste themselves for the production of fertilisers for farming. Therefore only data based on the waste collected can be provided: » Daily: 15.71 m^3 » Monthly: 47.58 m^3 » Annually: 5,658.96 m^3 ● There is no waste separation and residents do not currently separate waste at disposal.
Storage and discharge/ Collection and transportation/ Road sweeping	● The municipality provides street sweeping services in the main public areas of the city. ● Municipal solid waste is collected on a daily basis in the city centre and at deposit points previously identified by the Council of Sanitation Urban Management and Funeral Management. ● Collection coverage: nearly 90,000 people have access to the collection service (estimate based on daily activity). ● There are separate collections for municipal markets, commercial and institutional waste, domestic waste, and the pruning of trees and grass. ● Number of collection vehicles: three complete tractors and four trailers.
Intermediate treatment/ Recycling	● No waste treatment or recycling activities are carried out at present. The Municipal Council wishes to establish such activities but lacks trained waste composting and recycling technicians.
Final disposal	● Municipal open dump.

Item	Outline
Financial system	● Total revenue for waste management service: 1,000.00 MZN/month. ● Total expenditure for waste management service: 250,000 MZN/month. ● CMCG charges every customer an electricity fee of 36.00 MZN.
Environmental and social considerations	● A household sanitation group and activists help the communities adopt good practices for environmental sanitation.
Donor support	● PRODEM (Programme for Municipal Development), supported by DANIDA, Irish AID, SDC and SIDA.
Areas for improvement (in order of priority)	● Training of technicians to meet the demand. ● Field material equipment for technicians. ● The involvement of technicians of all types in all activities related to solid waste management. ● The higher authorities need to prioritise the sanitation sector on their agenda.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (m^3/day)	Remarks
❶ Waste generation	5,658.96	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	5,000	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	5,658.96	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique

Inhambane

Inhambane city is the administrative capital of Inhambane Province and is located in the provincial centre. It is bordered by Inhambane Bay in the north and west, the Jangamo district and nearby Guiua River in the south, and the Indian Ocean in the east. The city is located at 23° 50' latitude and 35° 30' longitude, between the Indian Ocean and Inhambane Bay. It covers an area of nearly 192 square kilometres and has a population of 79,724 inhabitants (2017 census). The city is a tourist destination with an economy focused on commerce and tourism. It is divided into 22 main boroughs.*
Municipal solid waste management services are managed by the Municipal Council of Inhambane Environmental Sanitation and Salubrity Department. The city centre is kept fairly clean, thanks to the clearly defined collection routes and the planning of organised group activities. Efficient and sustainable management has been achieved as a result.

Source: * Conselho Municipal da Cidade de Inhambane, <https://www.cmci.gov.mz>

Information

Population*	79,724 (2017 census)
Population growth (annual %)	N/A
Area (km^2)*	192
Climate*	Wet tropical climate impacted by altitude
Main industries*	Chemistry (soap)
Currency**	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other*	Inhambane is a cultural and touristic city. Beaches with attractive, crystal-clear waters put Inhambane on the map as a national and international tourist destination. Bantu and Portuguese cultures predominate, but Arabic, Indian, and Chinese influences are also present.

Sources: * Conselho Municipal da Cidade de Inhambane, <https://www.cmci.gov.mz> and Inhambane City Master Plan
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Laws or regulations related to municipal solid waste management: » Municipal Stance of the Municipal Council of Inhambane City for Waste Management (updated in 2016).
Policy/Plan	● No specific master plans or operation plans are in place for solid waste management in the city.
Implementation system	● Environmental Sanitation and Salubrity Department: responsible for municipal solid waste management in the city (street sweeping, collection, operation of the final disposal facility, and environmental education) and the drafting of management plans. ● Municipal solid waste: » Forty-four persons provide municipal solid waste services, including three technicians, 33 street sweepers and collectors, three inspectors, and five drivers who transport waste from the collection points to the final disposal facility. » Ministry of Health: responsible for supervision of hygiene and cleaning. » Ministry of Environment: responsible for solid waste management inspection. ● Three associations with 67 members also participate in the collection and street sweeping. Associação da Alma carries out selective collection and recycling.
Technical System	
Waste generation amount & characteristics	● Quantity of waste generated: 23.6 tons/day (estimate based on the number of borough residents who have access to cleaning services) (Source: Operation Plan, 2016). ● Waste collection: 15.6 tons/day (data based on truckload counts for the waste disposed at the final disposal facility).
Storage and discharge/ Collection and transportation/ Road sweeping	● The streets are swept in the city centre, densely populated suburbs, and main public areas. ● Waste is collected every day in the city centre. ● Collection coverage: almost 47% of the city (estimate based on daily activity). ● Number of collection vehicles: four dump trucks, including two Tata brand vehicles with 8.5 m^3 capacities and two Toyota and Hino brands with 4.5 m^3 capacities. Solid waste management services are delegated to the private sector.

Item	Outline
Intermediate treatment/ Recycling	● The city has no transfer stations. In Josina Machel Praia do Tofo borough, recyclable waste is separated. ● Important recyclable materials and commercially valuable materials include cardboard, bottles, plastic, and bottle caps. Some of the recycled materials are used for decorative objects while others, such as the bottles and plastics, are sold in Maputo. ● For treatment in the controlled landfill, organic waste is buried in preparation for later excavation for soil fertilisation in municipal green areas (because Inhambane soils are sandy and have low arability). ● The controlled landfill has two drying boxes for faecal sludge. Once deposited in boxes, the sludge goes through two evaporation processes. The liquid is exposed and filtered, allowing the dry and solid part to be removed and mixed with organic waste for compost production. The boxes are a new infrastructure and still at the experimental stage.
Final disposal	● There is one controlled landfill: » Owner: Municipal Council of Inhambane City. » Location: Guitambatuno borough in Inhambane city. » Area: 200 m^2. » Operation hours: from 6 am to 6 pm. » Quantity of disposed waste: 15.6 tons/day. » Data source: from truckload counts at disposal. » Installations: landfill liner, gate, and fence. » Operation: waste landfilling.
Financial system	● Total revenue for waste management service: 250,000 MZN/month. ● Total expenditure for waste management service: 7,484,010.30 MZN/year. ● The Municipal Council of the city charges a fee for waste collection through EDM (Electricity of Mozambique). The fee ranges from MZN 10 for household consumption to MZN 50 for commercial consumption and MZN 150 for tourism consumption. EDM charges a 25% commission on the collected garbage fee.
Environmental and social considerations	● Policies and laws are in place to grant support to the informal sector through work opportunities and training. ● Communities receive information on collection hours and methods for the proper disposal of waste through public consultations on commemorative dates and leaflets and stickers distributed to collective transport providers. Information is also propagated through Inhambane discussions on TVM (Television of Mozambique) and the Inhambane Province radio station.There are also city cleaning campaigns with community participation.
Donor support	● Wetterskip Fryslan, a Dutch company based in Friesland Province, Netherlands, provides support through the Frisian Urban Sanitation project. The FACE de Água e Saneamento association also provides major support. These two entities support waste collection through activities at different levels such as training through the promotion of environmental groups in primary schools, door-to-door awareness-raising in the boroughs, the construction of public baths in the urban area and in the 17 primary schools, controlled landfill construction in Inhambane, etc.
Areas for improvement (in order of priority)	● Waste collection in Inhambane city is provided using dump and non-dump trucks and tractors. Collection is a lengthy process, since the waste is first deposited manually into barrels or silos before being transferred into the trucks and later to the dump site. The collection process takes nearly 30 minutes per silo. The great challenge will be to replace the silos with skip loader containers and to replace the trucks with container trucks. The flexibility of renewed equipment will allow a great expansion of the service to uncovered areas and will improve the time management efficiency. ● It will be necessary to strengthen the technical sector by deploying one car and three motorbikes to monitor operations and improve plans. This measure will enable the real-time inspection of street sweeping, collection, and green area management, as well as interactions with borough structures and local partners in the solid and liquid waste management processes.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	23.6	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	15.6	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	15.6	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique

Maputo

Maputo is the capital and most populous city of Mozambique. It is located near the southern end of the country, within 120 kilometres of the Swaziland and South African borders. The city has a population of 1,101,170 (2017 census) distributed over a land area of 347 square kilometres. The Maputo metropolitan area includes the neighbouring city of Matola, and has a total population of 2,717,437. Maputo is a port city, with an economy centred on commerce. The city is divided into seven main administrative divisions. Each of these consists of several smaller city quarters or bairros.
SWM services in the Maputo City are managed by Municipal Directorate for SWM of the Maputo City Council (MCC). The centre of the city seems to be kept clean but the sanitary environment of low income and poor residential areas is in poor condition due to the dumping of garbage on roadsides and in drains. The final disposal site is open dumping, and the surrounding environment seems to be deteriorating.

Information

Population*	1,101,170 (2017 census)
Population growth (annual %)**	0.1 (2010-2015)
Area (km^2)*	346.77
Climate*	Tropical savanna climate
Main industries	Food, beverages, chemicals (fertiliser, soap, paints), petroleum products, textiles, cement, glass, asbestos, and tobacco
Currency***	USD 1: MZN 62.09 (Mozambican metical) (February 2019)

Sources: * Wikipedia, Maputo, accessed 26 February 2019, <https://en.wikipedia.org/wiki/Maputo>
** United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The laws and regulations related to SWM are as follows: » Code of Maputo City Waste Management (revised in 2004): basic principles and norms for solid waste.
Policy/Plan	● There is no specific SWM policy or plan in the city.
Implementation system	● Municipal Directorate for SWM of the Maputo City Council (MCC): in charge of managing SWM in the city (street sweeping, collection, final disposal site operation, and civic environmental education), and prepares Municipal Waste Management Plans. It has 40 administration staff and 130 operations staff. It also has 30 supporters of Municipal Districts for cleaning process. ● Ministry of Environment - National Directorate of Environment: responsible for environmental legislation and supervision. ● Ministry of Health: responsible for the management of biomedical waste.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 1,500 tons/day (estimated by adding the number of people living in the city to the number of those coming to work in the city, and multiplying by the waste generation rate). ● Waste generation rate in residential area: 1.2 kg/person/day (updated in 2018). ● Waste collection amount: 1,200 tons/day (data obtained by weighbridge at disposal site). ● Waste collection coverage: 80% of the population has access to collection service (estimation resulting from daily activity). ● Waste composition: » Food 68.4%, plastics 9.9%, paper 2.4%, textiles 2.3%, metal 1.8%, glass 3.3%, other (ceramic, wood, rubber, sand) 11.9% (Source: JICA 2016).
Storage and discharge/ Collection and transportation/ Road sweeping	● The private sector participates in provision of waste collection, sweeping services, transport of waste from the transfer station to the disposal site, and recycling activities. ● There are about 1,000 waste pickers and recyclers in the city. ● The community is informed of how to dispose of waste such as collection day and time, and separation of waste through public consultation meetings, school curriculum, flyers, and brochures. Information is also disseminated through theatres, music venues, and public expositions. There are also campaigns for cleaning the city with community participation. ● The city provides a road sweeping service in the city centre, residential areas, and major public areas. ● Waste is collected three times a week or more in the city centre and in residential areas. ● Separate collection is in place for municipal market waste, commercial and institutional waste, household waste, and pruned trees and grass. ● The hauling distance from the city centre to a disposal site is about 7 km. ● Number of collection vehicles: the number of trucks cannot be identified since waste management services are delegated to the private sector. ● There is no transfer station in the city.

Item	Outline
Intermediate treatment/ Recycling	● There is one Materials Recovery Facility (MRF) in the city. » Location: Hulene Area between Julius Nyerere and Beira Avenues. » Capacity: 10 tons. » Operation hours: 8 hours/day. » Amount of waste treated in the facility: 7 tons a day. Another 43 tons/day of waste from Maputo is treated in other municipalities. ● There is one composting facility in the city which belongs to Maputo Municipality. » Location: Costa de Sol area next to Conferência Joaquim Chissano. » Capacity: 20 tons in 3 months. » Operation hours: 8 hours/day. » Amount of waste treated in the facility: 10 tons in three months (estimate). ● Self-disposal at generation source (open burning, animal feeding, composting, and selling recyclable materials to recyclers) exists.
Final disposal	● There is one dump site managed by the MCC. » Location: Hulene Area at Julius Nyerere Avenue, near the Hulene Area MRF. » Area: 17 hectares. » Operation hours: 24 hours. » Waste disposal amount: 1,200 tons/day. » Data obtained by weighbridge. » Facility: bottom liner, weighbridge, gate, and fence. » Operation plan: mid-term plan exists. » Operation: compaction of waste but no covering with soil.

Financial system	● Total revenue for waste service: USD 250,000/month. ● Total expenditure for waste service: USD 550,000/month (USD 384,000/month for collection and transportation, USD 50,000/month for sweeping, and USD 116,000/month for final disposal). ● Amount spent per ton of waste: USD 27/ton. ● The MCC charges waste collection fee of USD 200,000/month for household waste, USD 25,000/month for commercial waste and USD 25,000/month for institutional waste. ● Tipping fee for waste disposal is USD 1.70/ton.
Environmental and social considerations	● There is a policy or law for supporting the informal sector by providing job opportunities and training.
Donor support	● JICA supported capacity development on SWM and promotion of 3R including preparation of master plan.
Areas for improvement (in order of priority)	● Legal issues: Approval of extended producer responsibility regulation. ● Technical Issues: Capacity building. ● Financial issues: Financial resources for acquisition of solid waste management equipment and for better functionality of the institution.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	1,500	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	1,200	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	1,200	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique
Matola

Matola is one of the most populated cities in Mozambique. The city covers a total area of 375 square kilometres in the southern region of the country and is bordered by the Moamba district in the northwest and north, the Boane district in the west and southwest, Maputo city in the south and east, and the Maracuene district in the northeast. The city belongs to category B, with 1,616,267 inhabitants (2017 census). The city consists 42 boroughs divided into three administrative posts: Matola Sede, Machava, and Infulene.
The Department of Municipal Solid Waste Management in the Matola Municipal Council is responsible for municipal solid waste management in the city and the drafting of municipal waste management plans. There is one municipal open dump but no treatment facility nor transfer station. Several private companies recycle plastics.

Information

Population*	1,616,267 (2017 census)
Population growth (annual %)**	9.2 (2010-2015)
Area (km²)***	375
Climate	Tropical climate
Main industries	Beverages, food, textile products, cement, glass, tobacco, chemicals (fertilisers, soap, paints), oil products
Currency****	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other information	Matola is considered the largest industrial park of Maputo Province.

Sources: * Wikipedia, Matola, accessed 12 April 2019, <https://pt.wikipedia.org/wiki/Matola>
** United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
*** City Population, accessed 12 April 2019, <http://citypopulation.de/Mozambique-Cities.html>
**** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● A Municipal Stance on Municipal Solid Waste Management is established and has recently been updated.
Policy/Plan	● There is no specific policy or plan for solid waste management in Matola city.
Implementation system	● The Department of Municipal Solid Waste Management in the Matola Municipal Council: responsible for municipal solid waste management in the city (street sweeping, collection, final disposal facility operation, and environmental education) and the drafting of municipal waste management plans. The Council of Sanitation engages 15 staff in administration and 82 staff in operation. Another 300 operational employees are engaged in the three Administrative Posts. ● Ministry of the Environment - National Directorate of the Environment: responsible for environmental legislation and supervision. ● Private sector: provides municipal solid waste management collection and transport services and organises recycling activities.
Technical System	
Waste generation amount & characteristics	● Quantity: based on the number of houses and family households, Matola city is estimated to produce nearly 1,200 tons of solid waste per day. ● Waste composition: organic matter, plastic, paper, cardboard, glass, metal, ceramic, wood, rubber, debris, etc.
Storage and discharge/ Collection and transportation/ Road sweeping	● Street sweepers dispatched by the Municipal Council of Matola sweep the main streets and some public areas. ● Solid waste is collected every day in the city centre and three times a week in other locations of the city by collection service providers. ● Solid waste collection service is provided to 32 boroughs, but not to the totality of their territory.
Intermediate treatment/ Recycling	● There is no treatment facility or transfer station of solid waste in Matola. ● Several private companies recycle plastics.
Final disposal	● There is one municipal open dump of 100 ha in the city, in Malhampsene borough. Operation is limited to daytime hours (6 am to 5 pm) because of poor conditions such as a lack of electric lighting, a lack of shelter, and no scales for weighing the waste.

Item	Outline
Financial system	● The Municipal Council of Matola includes a fee for waste collection in the city's electricity bills. The fee varies from MZN 10 for customers who consume less than 100 kWh of electricity to MZN 70 for customers who consume more than 500 kWh. ● EMD (Mozambique Electricity) collects about MZN 5,000,000.00 for Matola city. The money is managed by the General Finances of the city, not by the Council of Sanitation.
Environmental and social considerations	● There should be a large mobilisation in regards to environmental civic education on municipal solid waste management issues.
Donor support	● There is no support from donors for municipal solid waste management in Matola city.
Areas for improvement (in order of priority)	● Technical issues: Development of institutional capacity, knowledge, and experience. ● Legal issues: It will be necessary to update the existing stances and create a plan for municipal solid waste management. ● Financial issues: The financial resources with which to acquire the means and equipment for municipal solid waste management.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	1,200	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	800	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	1,200	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique
Quelimane

The city of Quelimane is the capital of Zambezia Province and is located about 20 kilometres from the estuary of the Bons Sinais River. The city's population has grown very quickly, leading to significant difficulties in land management and activities to improve sanitation conditions. According to the 1997 population census (National Statistics Department), the city of Quelimane had a population of 150,116 inhabitants and a population density of approximately 1,057 inh/km^2. The population censuses of 2007 and 2017 indicate a growth of the city's population from 193,343 to 349,842 over that ten-year period, with a corresponding change in the population density from about 1,362 inh/km^2 to 2,464 inh/km^2, respectively. The current population growth rate is approximately 4% per year.
The Municipal Sanitation Company (EMUSA) is responsible for municipal solid waste management in the city and the preparation of Municipal Solid Waste Management Plans. There is an open dump in the city, a composting plant is being installed and some small scale recycling and reuse activity take place.

Information

Population*	349,842 (preliminary data from the 2018 census)
Population growth (annual %)*	4
Area (km^2)*	142
Climate**	Tropical savanna climate
Main industries*	Farming, industry, tourism, fishing, and commerce
Currency***	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other	Quelimane city and its surroundings are situated in a region of predominately savannahs and meadows. The native flora outside of the meadows is gradually being replaced by exotic fruit trees such as coconut, papaya, mango, and banana trees, along with fields cultivating rice, beans, and sweet potatoes. Quelimane is served by a hydrographic network totally influenced by the sea formed by the rivers Cuacua (Bons Sinais) in the south, Motiva, Chipaca, and Baza in the east, and the main river Lagoa Segunda in the north. Lagao Segunda has a constant (permanent) regime all year round.

Sources: * INE and Volume 1 of Diagnostico do Plano de Estrutura Urbana
** Wikipedia, Quelimane, accessed 11 April 2019, <https://en.wikipedia.org/wiki/Quelimane>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● There are three major laws and regulations related to municipal solid waste management in the city: » The Comprehensive Municipal Solid Waste Management Plan (PGIRSU) 2013-2018. » The Regulation on Municipal Solid Waste Management (MICOA/MITADER) (Decree 13/2006, 15th of June). » The Regulation on Environmental Quality Standards and Emission of Flue Gases (Decree 18/2004, 2nd of June).
Policy/Plan	● The Comprehensive Municipal Solid Waste Management Plan of Quelimane city is the only plan that serves as a road map for solid waste management in the city.
Implementation system	● The Municipal Sanitation Company (EMUSA): responsible for municipal solid waste management in the city (street sweeping, solid waste collection, disposal of solid waste in the landfill, management of the solid waste final disposal facility, and environmental education to communities on good hygiene and sanitation) and the preparation of Municipal Solid Waste Management Plans. EMUSA has 22 staff in administration and 131 staff in operation. ● Ministry of the Environment - National Directorate of the Environment: responsible for environmental legislation and supervision. ● Ministry of Health: responsible for biomedical waste. ● Private sector provides collection services and transports municipal waste from the source to the final disposal facility. ● There is some recycling and reuse activity, though it is still emergent and very small in scale.
Technical System	
Waste generation amount & characteristics	● Amount of waste generated: 190 tons/day (MCA document / Hydroconseil Social Development Consulting report – July 2013 for MCA). ● Waste collection: 130 tons/day (according to studies by MCA in 2012 based on estimates from the weights of loaded municipal solid waste trucks weighed on scales). ● Waste composition: organic 68.9%, glass 4.94%, plastic 2.40%, metallic materials 4.80%, batteries 5.05%, other 13.91% (according to a study conducted by 4th-year students in the Environment Management and Community Development course at Universidade Pedagógica (UP) in 2016).

Item	Outline
Storage and discharge/ Collection and transportation/ Road sweeping	● The Municipal Sanitation Company (EMUSA) provides street sweeping service in the city centre, residential urban areas, all of the markets, and the main squares and public parks. ● Municipal solid waste is collected every weekday. The collection services cover mainly the urban area of the city, along with every market. ● Collection coverage rate: solid waste collection services cover about 30% of the city area (estimated based on daily activity). ● Number of collection vehicles: four container trucks, one micro tractor with a front shovel and one small tractor for garbage cans.
Intermediate treatment/ Recycling	● The city is installing a composting plant that currently processes about 300 kg of organic solid waste per day. When ready and fully operating, the plant will process about two tons of solid waste per day. ● There are individual collection initiatives for plastic, metallic materials, glass, etc. No quantitative data on these initiatives are available.
Final disposal	● There is an open dump in the city (Tecane 1 dump) owned by the Municipal Council of Quelimane.
Financial system	● Total revenue for waste management services: 1,420,000.00 MZN/month. ● Total expenditure for waste management services: 1,980,575.00 MZN/month. ● The Municipal Council of Quelimane charges a fee of MZN 30 for waste collection per electric metre, billed together with the electricity. This fee is uniform for all installations, whether it is industrial, domestic, or commercial. The FIPAG, Fundo de Investimento e Patrimonio do Abastecimento de Agua, charges MZN 36.00 in the monthly water bill for all consumers.
Environmental and social considerations	● There is an unspecified group of individual waste pickers and recyclers besides an association that is dedicated to composting with guidance from the Clean Quelimane project. ● Eight groups of farmers, organised in an equal number of associations, have been taught to produce organic compost using organic waste. ● Collaboration with environmental clubs in schools that promote good practices of environmental sustainability. ● There are also two theatre groups (the Relampagos and Retratistas) that disseminate information on good environmental practices through theatre and public exhibitions. ● City cleaning campaigns with community participation.
Donor support	● European Union (EU) through the Clean Quelimane project that ends in May 2019.
Areas for improvement (in order of priority)	● Establishment of a landfill. ● Definition of routes. ● Domestic solid waste management methods (packaging, reuse, and recycling). ● Primary deposit of commercial and industrial waste. ● Capacity management. ● Rising income mechanisms. ● Financial matters: financial resources for the maintenance of municipal solid waste management equipment and the improvement of institutional functionality.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	140	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	130	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	140	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique

Quissico

Quissico town is located in the southern region of the Republic of Mozambique, in the southeastern part of Inhambane Province, at the coordinates 24°42'58.95" south latitude and 34°44'23.89" east longitude. The town covers a total area of 219.8 square kilometres. Favoured by its good location in the road network, Quissico town has been established as an organisation and support centre for economic activities of the Zavala district and serves as the district capital. The town is located in the development corridor defined by the N1 crossing the Zavala district from the south to north. It has direct links with the major urban areas Xai-Xai in the south and Maxixe and Inhambane (points of influence in product disposal and town development) in the north. Tourism and agricultural-livestock activities in the area have good development potential. Quissico town is located 140 kilometres from the capital of Inhambane Province (Inhambane City) and 130 kilometres from Gaza Province (Xai-Xai City) through N1.*

Municipal solid waste management services are provided by the Council of Urbanisation, Infrastructure, and Environmental Sanitation under the Municipal Council of Quissico Town. Many of the roads and paths of Quissico town are somewhat degraded by rainwater drainage facilities built superficially along them according to local topographic conditions. Some routes in town centre have craters caused by runoff. Nontoxic domestic and industrial solid waste is disposed of in an open-air dump located in Ticongolo borough. The site was previously loaned out by the municipality and is currently encircled by households that lack fencing or other forms of protection. The lack of fencing is one of several factors that put the communities neighbouring the dump at sanitary risk. The site also lacks incinerators, which contributes to environmental pollution.

Source: * Planned Urban Structure / Plan for District Land Use

Information

Population	24,092 (PEU)*
Population growth (annual %)	2.8
Area (km^2)	219.8
Climate	Tropical climate
Main industries	Food, beverage
Currency**	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other	The district owns only a single facility (Miradouro) for cultural activities. The main cultural events are traditional songs and dances (Timbila, Makarra, Xigovilo, Ngalanga, Xinveka, Xingomana, Massessa and Makwaela) practiced on commemorative dates and at major events and traditional ceremonies.

Sources: Plan for District Land Use
* Planned Urban Structure (Plano de Estructura Urbana)
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Stance of the Municipal Council of Quissico Town (updated in 2016): fundamentals and norms on solid waste.
Policy/Plan	● There is no specific policy or plan for solid waste management in the town.
Implementation system	● Council of Urbanisation, Infrastructure and Environmental Sanitation under the Municipal Council of Quissico Town: responsible for municipal solid waste management in the town area (street sweeping, collection, and environmental education). ● District Direction of Health: responsible for biomedical waste.
Technical System	
Waste generation amount & characteristics	● Data not provided.
Storage and discharge/ Collection and transportation/ Road sweeping	● Resident participation in street sweeping and waste transportation to final disposal facilities.
Intermediate treatment/ Recycling	● No recycling treatments are carried out.

Item	Outline
Final disposal	● One open dump operates in the town area.  Open dump

Financial system	● Data not provided.
Environmental and social considerations	● Information is spread through school lectures and local radio announcements. ● The community also takes part in cleaning days in the town.
Donor support	● No support is received from donors.
Areas for improvement (in order of priority)	● Training on municipal solid waste management for the technicians who handle it. ● Financial assistance for waste management areas. ● Fencing around the current dump site. ● Clear definition of a hazardous waste disposal area.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Mozambique

Sussundenga

Sussundenga was one of the 10 towns that were newly elevated to municipal status in 2013. According to census data, the town had in 2007 a population of nearly 19,112 inhabitants and a population density of 70.6 inhabitants/km^2, and a recent survey carried out with the support of community leaders found that the town now has a population of 43,787 inhabitants spread out among its 21 boroughs. Sussundenga town is located in the Manica district, 42 kilometres from Chimoio, the capital of the Manica Province. EN 260, the road that links Mossurize district to Chimoio city, crosses through the town. The town is bordered by Macate district and Matica village to the north, and Munhinga village to the south and east.
Municipal solid waste management services are managed by the Council of Health and Environmental Sanitation, part of the Municipal Council of Sussundenga Town Environmental and Solid Waste Management department. The town's main streets are kept clean by municipal cleaning employees.

Information

Population	43,787 inhabitants (according to a recent survey carried out with the support of 21 borough secretaries)
Population growth (annual %)	N/A
Area (km^2)*	270.9
Climate*	Tropical wet climate
Main industries*	None
Currency**	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other*	The Sussundenga town population is of Bantu origin, and the main ethno-linguistic group is Shona. Chiute is the predominant language. ChiManyika and Ndau are also spoken.

Sources: * SDEJT
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Laws or regulations related to municipal solid waste management: » Stance of the Municipal Council of Sussundenga Town (updated in 2017): fundamentals and norms on solid waste.
Policy/Plan	● No specific policies or plans are in place for solid waste management in the town.
Implementation system	● The Council of Health and Environmental Sanitation of the Municipal Council of Sussundenga Town: responsible for municipal solid waste management in the town (street sweeping, collection, final disposal, and environmental education) and the drafting of municipal waste management plans. The Council engages three staff in administration and 44 staff in operations. Twenty persons working under the Program of Productive Social Action (PASP) from the Health, Women and Social Action and District Service are supporting the cleaning processes. ● Ministry of Land, Environment and Rural Development (MITADER) - National Directorate of the Environment: responsible for environmental legislation and supervision. ● Ministry of Health: responsible for biomedical waste.
Technical System	
Waste generation amount & characteristics	● Quantity of waste generated: 21.9 tons/day (estimate based on the town population plus incoming working population, multiplied by the waste generation rate). ● The levels and types of waste generated in the residential areas are unknown. ● Waste collection: 12.5 tons/day (data based on the tractor trailer capacity and transported loads per day). ● Waste composition: organic (food), plastic, paper, textiles, metal, bottles, other (rubber, ash, and sand).
Storage and discharge/ Collection and transportation/ Road sweeping	● Municipal workers provide street-sweeping services in the city centre, main public areas, and residential areas. ● Municipal waste is collected 3 or more times a week in the city centre and residential areas. ● There are separate collections for municipal markets, commercial and institutional waste, domestic waste, and the pruning of trees and grass. ● Number of collection vehicles: two tractors support solid waste collection in the town.  Vehicle used for waste collection

Item	Outline
Intermediate treatment/ Recycling	● There are no waste treatment or recycling activities.
Final disposal	● One open dump operates in Sussundenga town. ● Nhamawaia Dump: » Owner: Municipal Council of Sussundenga Town. » Area: 17 hectares. » Operation hours: 24 hours. » Quantity of disposed waste: 12.5 tons/day. » Data source: based on tractor trailer capacity. » Installations: open air. » Operation plan: there is an intermediate plan. » Operation: discharge only, no compaction or soil cover.  Nhamawaia Dump
Financial system	● Total revenue for waste management service: MZN 0. ● Total expenditure for waste management service: USD 560/month (fuel for final disposal collection vehicles). ● Expenditure for each ton of waste: USD 27/ton. ● The Municipal Council of Sussundenga Town charges no waste collection fee (it has yet to incorporate a garbage fee in its EDM billing).
Environmental and social considerations	● Communities are taught about waste management through environmental lecturers and school visits. Information is also propagated through debates on the radio. Cleaning days are promoted in town suburbs with community participation.
Donor support	● None.
Areas for improvement (in order of priority)	● Legal issues: the creation of specific regulations on solid waste management. ● Technical issues: training. ● Financial issues: financial resources for the construction of a controlled sanitary landfill, the acquisition of municipal solid waste management equipment (machines for compaction), and the improvement of institutional functionality.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	21.9	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	12.5	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	12.5	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Mozambique

Tete

Tete, the capital of Tete Province, is located between the 16° and 17° parallels of latitude south and the 33° and 64° meridians of longitude east. The city is situated on the banks of the Zambezi River, on a plateau 500 metres above sea level. The Rovubue and Mepumo rivers in the east and Kwiro River in the southeast form natural borders. The city is known for its hot climate and goat-keeping, and has potential for both farming and mining development. The Samora Machel bridge and Base Kassuende bridge allow vehicle passage across the Zambezi River, which in turn allows the movement of people and goods to Zambia.
Municipal solid waste management services are managed by the Basic Sanitation, Environment and Transport Branch of the Municipal Council of Tete.

Information

Population	305,722 (2017, preliminary census data)
Population growth (annual %)	7.0 (2007-2017, census)
Area (km^2)	314
Climate	Dry topical and mountain climate
Main industries	Food, beverages, mining products, cement, glass, tobacco
Currency*	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other	The city is known among locals as Nyungwe or PakaNyungwe, the ancient Mambo (Regulo) name for the Matundo lands.

Source: * Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Laws or regulations related to municipal solid waste management: » The Stance of the Municipal Council of Tete City 2009 describes the fundamentals and norms on solid waste.
Policy/Plan	● No specific policy or plan is in place for solid waste management in the city.
Implementation system	● The Basic Sanitation, Environment and Transport Branch is responsible for municipal solid waste management in the city (street sweeping, collection, transport, operation of the final disposal facilities, and environmental education) and the drafting of municipal waste management plans. The Branch engages 12 administrative employees and 194 employees for operations. ● Ministry of the Environment - National Directorate of the Environment: responsible for environmental legislation and supervision. ● Ministry of Health: responsible of biomedical waste.
Technical System	
Waste generation amount & characteristics	● The quantity of waste generated is 1,223 m^3 (estimate based on the number of inhabitants). ● Waste collection: 438 m^3/day (data based on the capacity and number of containers transported to the municipal dumps). ● Waste composition: organic (food), plastic, paper, textiles, metal, glass, other (ceramic, wood, rubber, sand).
Storage and discharge/ Collection and transportation/ Road sweeping	● The municipality provides street sweeping in the concrete city centre, main public areas, and residential areas. ● Municipal solid waste is collected 6 times a week in the concrete city centre and suburbs. ● Eighty percent of the population is covered by the collection service. ● A total of 13 vehicles, including six containers trucks, five open trucks, and two tractors.
Intermediate treatment/ Recycling	● There is no treatment facility. ● There is no transfer station in the city.
Final disposal	● There are two open dumps in Matundo and Mpadue boroughs and a controlled landfill will open in Mpadue borough. ● An area of 20 hectares for a future sanitary landfill 15 km from city centre in Mpadue borough has been defined and fenced. The environmental impact study, executive project drafting, and fund mobilisation for the works have yet to be done.

Item	Outline
Financial system	● Solid waste management services are covered by generated revenues. ● The Municipal Council of Tete City charges a fee for waste collection through electricity bills. The fee is MZN 10.
Environmental and social considerations	● Policies and laws are in place to grant support to the informal sector through work opportunities and training. ● There are nearly 300 unofficial waste pickers. ● Public consultation meetings are held and leaflets and brochures are distributed to provide the public with information on collection hours, waste separation methods, and other information necessary to properly dispose of waste. Information is also propagated through theatre, music, and public exhibitions. Cleaning campaigns are also held in the concrete city and suburbs in coordination with suburb structures and venues where inhabitants gather to participate in community activities.
Donor support	● There are no donor support for SWM in the city.
Areas for improvement (in order of priority)	● Legal issues: regulation approval on extended responsibility. ● Technical issues: training. ● Financial matters: financial resources for the acquisition of municipal solid waste management equipment and the improvement of institutional functionality. ● Fund mobilisation for the construction of a sanitary landfill.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (m^3/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	438	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	438	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Mozambique
Vilankulo

The town of Vilankulo is located in the Vilankulo district in the northern region of Inhambane Province, south of the Save River, about 700 kilometres from Maputo, the capital of Mozambique. The town can be accessed through HN 240 linking the town to National Highway No 1 at Pambarra village. Four prominent geographical boundaries surround it: Circulo de Chigamane and Machocomane in the north, the Mangalise River in the south, Vilankulo Bay in the east and Circulo de Faiquete in the west. Vilankulo town covers an area near 78.80 square kilometres. The geodesic centre of the town and the Riacho Mangalisse estuary are separated by a distance of 18.75 kilometres, while the coast and the Nhamadjava swamps are separated by a distance 7.5 kilometres. According to the 2007 census, Vilankulo town has an estimated population of nearly 46,691 inhabitants, which represents about 18% of the Vilankulo district population. Young people under 15 years of age, the largest demographic segment, represent 43% of the town's population. Elderly people, the smallest segment, represent 4%. These values are close to the percentages at the provincial level (43.1% and 5.2%, respectively).
Municipal solid waste management services are provided by the Urban Division of the Municipal Council of Vilankulo Town. The town centre is kept fairly clean, but waste dumped on the ground in the streets, together with ditches and sand, make it difficult for waste collectors to serve the suburbs. Sanitary conditions in low-income residential areas are inferior to those in the urban area. Waste is discharged in an open dump not far from a number of households. The dump is already at the final stage of becoming a sanitary landfill, but works are suspended due to a lack of funding.

Information

Population*	46,691 (2017 census)
Population growth (annual %)	N/A
Area (km^2)*	78.80
Climate*	Dry tropical climate
Main industries*	Meat, seafood, and wood processing
Currency**	USD 1: MZN 62.09 (Mozambican metical) (February 2019)
Other*	Vilankulo is an international tourism centre of excellence that welcomes tourists from all over the world.

Sources: * Vilankulo Town Strategic Development Plan 2016-2025
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Laws or regulations related to municipal solid waste management: » Stance of the Vilankulo Town Municipality (updated in 2010): fundamentals and norms regarding solid waste.
Policy/Plan	● There is no specific policy or plan for solid waste management in the town.
Implementation system	● The Urban Division is responsible for municipal solid waste management in the town (street sweeping, collection, operation of the final disposal facility, and environmental education) and the drafting of municipal waste management plans. It engages a workforce of 30 people for operations. Another 20 people from the municipal boroughs are dispatched to support cleaning processes. ● Ministry of Land, Environment and Rural Development through the Inhambane Provincial Directorate of Land, Environment and Rural Development: responsible for environmental legislation and supervision. ● Ministry of Health: responsible for biomedical waste through the Rural Hospital of Vilankulo. ● Private sector participants provide collection and street-sweeping services, transport waste from the transfer stations to the final disposal facility, and carry out recycling activities.
Technical System	
Waste generation amount & characteristics	● Quantity of waste generated: 72,000 tons/year (estimation based on the total of the town population and incoming working population, multiplied by the waste generation rate). ● Waste composition: organic (food) 60%, plastic 10%, paper 8%, metal and glass 15%, work debris 2%, and health facilities and fuel pumps 5%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Street-sweeping service is provided in the town centre and public and residential areas. ● Municipal waste is collected each week from Monday to Saturday in the city centre and residential areas. ● Collection coverage: collection service is provided to households, institutions, and companies that enter contracts with the Municipal Council of Vilankulo Town. ● The company 3Rs is working within a partnership focused on recycling and public awareness of the importance of separated waste collection from municipal markets, commercial facilities, and institutions. ● Number of vehicles: four tractors, three vans.
Intermediate treatment/ Recycling	● 3Rs manages a materials recovery division. In total, 100 kg is treated per day. ● The town has no composting plant. ● The town has no transfer station.

Item	Outline
Final disposal	● The town has one open dump. 》Owner: Municipal Council of Vilankulo Town. 》Location: 5° Congresso borough. 》Operation time: 8 hours/day. 》Quantity of disposed waste: 500 tons/day. 》Data source: estimated from truckload counts. 》Installations: one open dump site. 》Operation plans: there is an environmental management plan.

Financial system	● Total revenue for waste management service: MZN 21,140/month. ● Total expenditure for waste management service: MZN 60,148/month for collection and transport, MZN 32,000 /month for street sweeping, MZN 1,385,290.37/month for final disposal. ● The Municipal Council of Vilankulo Town charges a waste collection fee through contracts. The fee ranges from MZN 30 for households to MZN 250 for service providers or restaurants and MZN 600 for major generators of waste such as tourist resorts and hotels. ● Individuals who drive into the dump to dispose of waste from vehicles are charged a fee of MZN 150.00 per load.
Environmental and social considerations	● Policies and laws are in place to grant support to the informal sector through work opportunities and training. ● The town engages nearly 50 waste pickers and recyclers. ● Activists teach communities waste disposal procedures, the collection hours, and waste separation practices through environmental education meetings and environmental school clubs. Cleaning campaigns are also held in the town, suburbs, rural hospital, and municipal graveyards with community participation.
Donor support	● There is no support from donors.
Areas for improvement (in order of priority)	● Legal issues: updating the Environment Management Plan. ● Technical issues: training. ● Financial issues: financial resources for completion of the sanitary landfill, acquisition of municipal solid waste management equipment, and improvement of institutional functionality.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	200	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	150	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	150	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Type of waste

Type of waste	Composition	Estimation (%)	Yearly volume (tons)	Generation source
Solid	Organic	60	4,320	Households, hotels, markets
	Glass, metal	15	10,800	Small-scale industry
	Paper	08	5,760	Schools, public institutions, offices
	Plastic	10	7,200	Markets and shops
	Debris	02	1,440	Works
Liquids	Other	05	3,600	Health facilities, fuel pumps
Total		100%	72,000	

Source: PDEM (Vilankulo Town Economic Development Plan)

Namibia

Windhoek

Windhoek is the capital and largest city of the Republic of Namibia. It is located in central Namibia at around 1,700 metres above sea level, almost exactly at the country's geographical centre. The population of Windhoek is around 368,000 and growing continually due to an influx from all over Namibia.
SWM services are directly provided by the local government. The local government also has a contract with the private sector for operating some SWM services. From a technical perspective, the SWM system is well modernised: compactor trucks are mainly used for waste collection, two transfer stations are established, and the disposal site is well equipped as a sanitary landfill, except for leachate and landfill gas treatment.

Information

Population*	367,802 (2015)
Population growth (annual %)*	3.2 (2010-2015)
Area (km^2)**	5,133
Climate**	Hot semi-arid climate
Main industries**	Administrative, commercial, and industrial centre of Namibia
Currency***	USD 1: NAD 15.17 (Namibian dollar) (September 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Windhoek, accessed 6 March 2019, <https://en.wikipedia.org/wiki/Windhoek>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The governing legislation for municipal services is the Local Authorities Act 34 of 1992. It empowers service provision. ● Environmental Act 7 of 2007. ● Waste Regulations of 2011. ● Waste Management Policy of 2007.
Policy/Plan	● Integrated Waste Management Plan 2011-2017 (under review). The heart of the policy is the waste management hierarchy: avoid, reduce, reuse, recycle, and dispose.
Implementation system	● The local government directly provides solid waste services, such as collection, transport and final disposal. ● The private sector also provides SWM services, such as sweeping, collection, recycling, and final disposal. ● Ward contractor system: the city is divided into 38 wards and three-year contracts are allocated to community-based organisations in each ward to keep the area clean. ● The Ministry of Environment and Tourism is responsible for all issues related to the environment.
Technical System	
Waste generation amount & characteristics	● Waste characteristics: » Food 19%, plastics 16%, paper 16%, textile 2%, wood 1%, rubber & leather 2%, metals 3%, glass 12%, other 29% (garden 15%, stone 5%, and miscellaneous 9%).
Storage and discharge/ Collection and transportation/ Road sweeping	● Sweeping is carried out in the city centre, public areas, and residential areas. ● Waste amount collected is 7,000 tons/month (233 tons/day). ● The collection service covers 100% of the formal sector and 30% of the informal sector. ● The collection service is provided once a week, both in the city centre and in the residential areas. ● The service uses 25 compactor trucks with a capacity of 22 m^3 and 4 tippers with a capacity of 10 m^3. ● There are two transfer stations. ● Pruning of parks and storm water management are important.
Intermediate treatment/ Recycling	● There is one MRF, which is owned and operated by a private company. ● For recycling, waste separation is practiced in markets, shops/businesses, factories, and households. ● The recycling service covers around 2-5% of the city. ● In addition to the private sector, the informal sector is also involved in recycling.

Item	Outline
Final disposal	● Final disposal amounts are as follows: » General Waste 7,500 tons » Hazardous Waste 650 tons » Building rubble 12,500 m^3 » Garden refuse 7,500 m^3 » HCRW (medical waste) 700 tons (estimated) ● There is one final disposal site, Kupferberg, which is located at S 22°38'14.6" E 17°01'35.9" ● The final disposal site has a capacity of 190,000 tons, is open between 7:00 and 16:30, and receives 7,000 tons of waste per month (233 tons/day). ● The final disposal site is a sanitary landfill with bottom liner, leachate collection pipe, enclosed bund, weighbridge, tyre washer, gate, fence, and rainwater drainage. ● There is a long-term operation plan. ● Waste is compacted. Daily and intermediate covers are applied. ● In addition to Kupferberg landfill, 6 sites are designated for the disposal of garden waste, and construction and demolition waste.
Financial system	● Annual operation budget: NAD 450 million. ● Capital budget: NAD 25 million (for construction and procurement of equipment, etc.). ● Waste services are charged. Tariff is set for various types of services. » Household/Business Refuse Removal Tariffs: NAD 118.00/407.03 per bin per month. » Institutions not for gain: NAD 134.84 per bin/month. » Availability charge: NAD 78.61 per bin/month. » Bulk removal: NAD 1150.80 per load/portion of load. » Solid Waste Management Charge for extra bins. ● Tipping fee at the disposal site is applied.
Environmental and social considerations	● 25 waste pickers collect recyclable materials. ● Communities are informed about waste collection day and time, how to separate waste, etc. through public consultation meetings, in school, flyers/brochures, etc.
Donor support	● There is no donor support.
Areas for improvement (in order of priority)	● Establishment and implementation of an integrated waste management system. ● Compilation of strategies and guidelines for priority waste (e-waste, tyres, hazardous waste, HCRW, recyclables). ● Implementation of a licencing & registration system for the industry. ● Waste Information System (WIS). ● Education and awareness raising programmes within schools, industries, institutions, and in public places. ● Provision of infrastructure: new transfer station, extension of the landfill. ● Research and Investigations. ● Improved inspection, monitoring, and control of illegal dumping and littering.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	233	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	233	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:


Collection


Recycling


Final disposal (coordinates: S 22°38'14.6" E 17°01'35.9")

Education materials

Niger

Niamey

Niamey is the capital and largest city in the West African country of Niger. Niamey lies on the Niger River, primarily situated on the east bank. It is an administrative, cultural and economic centre. The city is divided into five urban communes.*
SWM services are provided by the municipality. The private sector is also involved in a formal way. In addition, the informal sector conducts activities without authorisation. One of the distinctive characteristics of SWM in Niamey is the huge quantity of sand which has to be removed by sweeping. There is no designated disposal site.

Source: * Wikipedia, Niamey, accessed 29 August 2018, <https://en.wikipedia.org/wiki/Niamey>

Information

Population*	1.11 million (2015)
Population growth (annual %)*	3.1 (2010-2015)
Area (km^2)**	239
Climate**	Hot semi-arid climate
Main industries**	The city is located in a pearl millet growing region, while manufacturing industries include bricks, ceramic goods, cement and weaving.
Currency***	USD 1: XOF 577.81 (West African CFA franc) (February 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Niamey, accessed 29 August 2018, <https://en.wikipedia.org/wiki/Niamey>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The municipality does not have specific SWM regulations.
Policy/Plan	● There is no specific SWM plan.
Implementation system	● The municipality directly provides SWM services, such as sweeping and collection. ● Micro and Small Enterprises (MSEs) conduct sweeping under contract with the municipality. ● The informal sector carries out collection services without authorisation. ● Related agencies working with the municipality in SWM are the following: » Ministry of Water and Sanitation. » Ministry of Environment. » Ministry of Health.
Technical System	
Waste generation amount & characteristics	● Waste generation amount is 1,000 tons per day, assuming that the waste generation rate is 1.0 kg/person/day. ● Waste characteristics: organic 31%, others (mostly sand) 50%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Sweeping is carried out in the city centre. ● 400 tons of waste is collected per day. Uncollected waste is picked up when rental trucks are available. ● Only the city centre is covered by the collection service. Communities in the suburban area practice self-disposal such as burning and open dumping. The municipality collects waste in the suburban areas on an irregular base. ● The collection service is provided once a week. ● 12 dump trucks and 20 other trucks are available for the collection service.
Intermediate treatment/ Recycling	● A few plastic recycling activities exist, including converting plastic waste into pavement material.
Final disposal	● There is no designated site for waste disposal.

Item	Outline
Financial system	● SWM services are carried out using the general budget. No tax nor fee related to waste is applied. ● XOF 380 million for collection and XOF 600 million for sweeping are spent per year. There is a huge quantity of sand, which results in high sweeping costs.
Environmental and social considerations	● At least 300 people work in sorting, and at least 300 people work in recovery. ● The municipality provides job opportunities for sewer cleaning. ● Communities are informed about waste collection day and time by public consultation meetings.
Donor support	● Oxfam carried out a waste survey in 2010.
Areas for improvement (in order of priority)	● Establishment of a legal system on SWM. ● Improvement of the discharge manner. ● Procurement of collection and transport equipment.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	1,000	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	400	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Nigeria
Abuja

Nigeria is located in the western part of Africa and has 36 States and a Federal Capital Territory (FCT). FCT is located in the central part of Nigeria, and its territory covers about 8,000 square kilometres. Abuja, the Federal Capital City (FCC), is the capital city of Nigeria and located within the Federal Capital Territory. According to the 2006 National Population Census, FCT had population of 1,406,239 and FCC 776,298. The projection in 2016 shows population of 3,564,100 for FCT and 1,967,500 for FCC.
With the population growth and rapid urbanisation of Abuja, the challenges around SWM in the city are becoming more complicated. The organisation responsible for waste management and sanitation in the FCC is Abuja Environmental Protection Board (AEPB), while the Area Councils are responsible for the zones outside the FCC. A detailed data analysis on SWM-related SDG indicators has been recently undertaken and resulting in an estimated waste collection rate of 45.1%.

Information

Population*	3,564,100 (FCT); 1,967,500 (FCC) (Projection 2016)
Population growth (annual %)*	9.7 (2006-2016)
Area (km^2)*	7,315 (FCT); 1,769 (FCC)
Climate**	Tropical wet and dry climate
Main industries	Public administration, construction industry, Central Bank, banking, real estate
Currency***	USD 1: NGN 361.2 (Nigerian naira) (February 2019)

Sources: * City Population, Nigeria, accessed 20 March 2019, <http://www.citypopulation.de/php/nigeria-admin.php?adm1id=NGA015>
** Wikipedia, Abuja, accessed 20 March 2019, <https://en.wikipedia.org/wiki/Abuja>
*** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Abuja Environmental Protection Board Act, 1997: established the Abuja Environmental Protection Board and its functions. ● Waste Management Regulations 2012: regulation on gazette fees/charges for waste management services payable by all residents of the FCT. ● Guideline and Requirements for Waste Recycling in the FCT (draft).
Policy/Plan	● Solid Waste Management Policy Guideline for FCT (draft). ● Abuja Environmental Protection Board is responsible for developing the Strategic Solid Waste Management Plan 2011-2015 and 2017-2021. It is also proposing FCT a Solid Waste Management Road Map.
Implementation system	● The Environmental Protection Board is directly providing SWM services in sweeping, collection, and final disposal, as well as collection of healthcare waste and waste from Communal Collection Centres. ● There are 106 staff at the SWM department (four in administration, and 102 in operations). ● The Federal Ministry of Environment (FMoE) is a related institution, responsible for: » Formulation of environmental laws, policies, and regulations. » In charge of environmental assessment of trans-boundary projects. » Relate and liaise with State environmental protection agencies for the implementation of environmental laws and regulations. » Responsible for all ecological controls in Nigeria. » Responsible for all international donor coordination in Nigeria. » Responsible for the development of the SWM infrastructure in Nigeria. ● National Environmental Standards and Regulations Enforcement Agency (NESREA) is the enforcement arm of the Federal Ministry of Environment, and is responsible for SWM legislation, standards, and policies. NESREA is also in charge of all pollution control standards and the enforcement of environmental standards. ● The Federal Ministry of Health is in charge of healthcare in Nigeria, including physical verification of environmental nuisances within premises. ● Some SWM operations are contracted out to private sector companies (e.g. the sweeping of city centre, public areas and residential areas, the collection service, final disposal and recycling as well as Litter and Vegetation Control Services). Private sector operation/supervision is working well.
Technical System	
Waste generation amount & characteristics	● Waste generation rate is 0.42 kg/person/day, according to JICA review. ● Waste generation amount is 1,191.9 tons/day, which is estimated by multiplying population and waste generation rate and confirmed by estimating compactor capacity multiplied by compaction ratio. ● Composition of waste: food waste 43.43%, plastic 15.27%, papers 7.76%, textile 1.39%, wood 3.36%, rubber and leather 0.081%, metals 2.02%, glass 2.39%, others 24.18% (soil, ceramics, etc.). These figures are taken from a detailed 2018 waste composition survey conducted by professionals such as donor agencies, universities and consultants.
Storage and discharge/ Collection and transportation/ Road sweeping	● 1,711,419 people (72% of the city's population) receive waste collection service twice a week (estimated by area map without population data). ● There are sweeping services in the city centre, public areas, and residential areas. ● There is no transfer station in the city. ● Collection vehicles: 10 Compactor Trucks (4 compactor trucks of 18 m^3 capacity and 6 compactor trucks of 15 m^3 capacity); 4 Roll On-Roll Off Trucks of 13 m^3 capacity. ● 40% of compactor trucks are functional; and 50% of other vehicles are functional (mechanical breakdowns are due to irregular maintenance and inadequate spare parts). ● Collection work is carried out by the private sector. They have to provide the number of trucks specified in the contract. The government has four trucks in case the private contractor does not provide trucks.

Item	Outline
Intermediate treatment/ Recycling	● Approximately 2,000 people in the city are involved in recycling activities: over 1,000 people involved in collection of recyclable materials on the street, and more than 600 people involved in recovery of recyclables in the central disposal site. ● There is no formal recycling facility. ● Separation of household waste at source is practiced as a pilot scheme in a district called Gwarimpa 1 (Life Camp). ● Self-disposal is practiced (open burning, recyclable materials to recyclers, and the illegal dumping of waste on undeveloped lands).
Final disposal	● There is one final disposal site in the city with a capacity of 90.3 ha. ● The disposal site is equipped with gate and fence. ● It is operated 10 hours/day and has a daily operation plan. ● Operations include: open dumping using D8 Bulldozer to pile up waste.

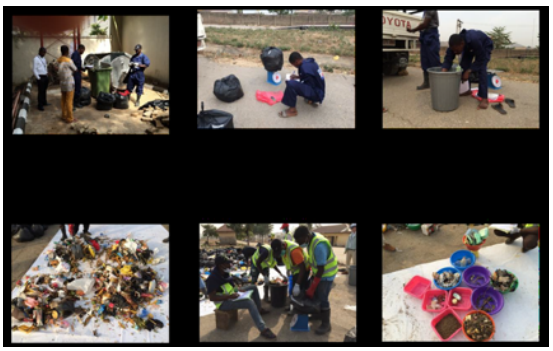
Financial system	● Total revenue: Data not provided. ● Expenditure of NGN 2,700 million/year. Of this, NGN 2,670 million/year is spent on collection/transportation, including sweeping and vegetation control. ● A waste collection fee is charged (Independently charge waste collection service fee): » Household waste NGN 1,200–45,000/year. » Commercial waste NGN 7,800–14,400,000/year. » Institutional waste NGN 240,000–21,600,000/year. » Educational and Religious Institutions NGN 120,000–180,000/year. ● A disposal site fee (tipping fee) of 3% of company contract fee is charged. ● Liquid waste services are charged in the city centre only.
Environmental and social considerations	● There is a policy to provide job opportunities for informal sector and there are Rules and Regulation guiding the scavenger's activities. ● The community is informed on how to separate and discharge waste through public consultations, through schools, and through print and electronic media. General Monthly Sanitation and Community Sanitation Forums are also held for the communities.
Donor support	● JICA: » Capacity development of an integrated SWM system. » Overseas training programs about best practice in SWM. » Improvement of waste disposal operations, semi-aerobic landfill operation (Fukuoka Method). » Improvement in waste collection and transportation services, life camp waste collection, and transportation improvement.
Areas for improvement (in order of priority)	● Development of policies and legal framework on SWM: Preparation of basic laws and regulations on SWM. ● Waste collection and transportation improvement plan: Best practices in collection and transportation of waste using the right sets of tools and routes for maximum efficiency and effectiveness in service delivery. ● Landfill Improvement Plan: Proper ways of compacting waste using bulldozers and landfill compactors, improvement in data collection about vehicles, daily scheduling of dumping area, and control of scavenging operations.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	1,191.9	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	537+38.7	Waste discharged for collection services.
❸ Self disposal	618	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	537+38.7	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	38.7	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	537	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	537	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:



Images of SWM data analysis being undertaken (Source: presentation at the ACCP Meeting, June 2018)

Nigeria
Kaduna

Kaduna, usually referred to as Kaduna State to distinguish it from the city of Kaduna, is a state in Northwest Nigeria. Kaduna State consists of twenty-three Local Government Areas. The major cities are Kaduna (the capital), Zaria, and Kafanchan.
State SWM services are managed through the Ministry of Environment and Natural Resources (MENR) and the Kaduna State Environmental Protection Agency (KEPA). Since the final disposal sites are open dumping sites, the surrounding environment is deteriorating. Only 5% of collected waste streams are recycled. In order to improve revenue from SWM, the State Government is currently trying to implement a new waste charging system from January 2018 (starting in the high-income districts).

Information

Population	6,113,503 (2006 census); 8,000,000 (2016, CIA Factbook)
Population growth (annual %)	1.4 (2006-2015)
Area (km^2)*	46,053
Climate	Tropical savanna climate
Main industries	Textiles, machinery, steel, aluminium, petroleum products, pottery. Kaduna is one of the education centres in Nigeria, with many colleges and the most recognised university in Nigeria.
Currency**	USD 1: NGN 361.2 (Nigerian naira) (February 2019)

Sources: * Wikipedia, Kaduna State, accessed 15 March 2019, <https://en.wikipedia.org/wiki/Kaduna_State>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● The related laws and regulations for SWM are: » Kaduna State Environmental Protection Edict No 1 of 1994. » KEPA Solid Waste Management Regulation No 1 of 2011. » KEPA Regulation No 6 of 2009, Control and Management of Hazardous Substances. » KEPA Environmental Impact Assessment and Audit Regulations No 4 of 2009. » Kaduna State Environmental Protection Authority, KEPA Law of 2010. ● There is a legal framework for PPP, and the Kaduna State Investment Promotion Agency is in charge.
Policy/plan	● Kaduna State Executive Council has approved the first state policy on environment and is presently working on its implementation plan.
Implementation system	● Constitutionally, SWM is the responsibility of local councils. In Kaduna State, KEPA manages waste in urban areas of Kaduna State. ● Local councils are responsible for managing waste in the rural areas. ● The state Governor defines the SWM vision, the Commissioner is responsible for policy and strategy, the private and informal sector operate the services while KEPA regulate the SWM regime as defined by its law and regulations, <www.kepa.org.ng>. ● MENR is responsible for SWM policy and laws. ● KEPA is responsible for monitoring, supervision, and enforcement.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 240 tons/day (2017, DFID). ● Waste characteristics: plastics 10%, paper 8%, metals 5%, organic waste 54%.
Storage and discharge/ Collection and transportation/ Road sweeping	● Access to government collection services in the state is as low as 1.5%. ● Over 50% of the urban population has access to private or informal services for a fee. ● The SWM regime is operated by the government-appointed service contractor, Cape Gate Investments Ltd. ● The Kaduna State Government (KDSG) have appointed a contractor, also Cape Gate Investments Ltd, to clean public spaces for a fee (paid by government). ● Industries, businesses, and households are served by private collectors or the informal sector for a fee. ● Only 10% of municipal waste is collected formally. ● There are more than 6,000 informal waste pickers, including children.


Waste collection by Cape Gate Investments Ltd.


Door-to-door collection by informal collectors

Item	Outline
Intermediate treatment/ Recycling	● There are six community-based Materials Recovery Facilities (MRFs) and transfer stations. All are managed by Cape Gate Investments Ltd. ● There are six waste aggregators (dealers) and nine industrial-scale recyclers. ● Only 5% of collected waste streams are recycled.
Final disposal	● There are two officially designated dump sites (unofficial communal dumps abound in the city) and all are managed by Cape Gate Investments Ltd, as agreed with KDSG. ● There are not so many waste pickers at the final disposal site, but a few farmers collect organic waste for fertiliser use.  Final disposal site

Financial system	● There is a federal government subsidy for private waste enterprises. ● Kaduna State also collects funds from local governments and uses them for waste collection. Therefore, residents do not pay waste collection fee. ● Currently, there is a transition on SWM financing in Kaduna State where the KDSG contributes 40% while Local Government contribute 60% commencing from January 2019. It is expected that local governments will take full responsibility of SWM in their respective areas by 2020.
Environmental and social considerations	● There is now an approved State Environmental policy that will support the informal sector. ● KDSG and Cape Gate Investments Ltd are working together to formalise the informal SWM services.
Donor support	● No donor activity has been identified. However, the Department for International Development (DFID) have previously implemented a liquid waste management project.
Areas for improvement (in order of priority)	● Need a sustainable income system to cover waste operation cost, in short term. ● There is long-term plan on SWM, as captured in the state policy on the environment.

Waste Amount at Each Stage of Waste Flow*

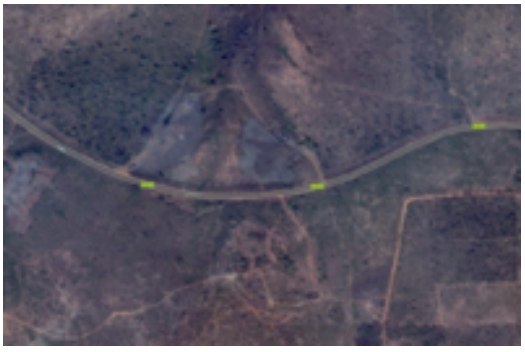
Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	240	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	24	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Final Disposal Site 1 (coordinates: N 10°24'23.4" E 7°23'57.1")



Final Disposal Site 2 (coordinates: N 10°35'51.7" E 7°19'59.8")

South Sudan

Juba

Juba is the capital and largest city of the Republic of South Sudan. The city is situated on the White Nile and also serves as the capital of Jubek State. The city is a river port and the southern terminus of traffic along the Nile. Before the civil war, Juba was also a transport hub, with highways connecting it to Kenya, Uganda and the Democratic Republic of the Congo.*

Juba City Council (JCC) was established in March 2011 and provides its services to the population through three Blocks Councils: Juba, Kator, and Munuki. The Department of Environment & Sanitation of JCC is the main organisation in charge of SWM in the city of Juba. Mixed waste is brought to the main streets by the inhabitants, without any sorting, and Juba City Council is responsible for collecting the garbage along the streets and transporting it to the Juba Controlled Dumping Site that is managed by Rejaf Payam/Rejaf County. However, SWM is not properly implemented due to the deterioration of the security and of the financial situation caused by internal political instability. Illegal dumping and burning are common. As a result, environmental pollution and the spread of diseases have become environmental and public health concerns. SWM is a key priority for Juba City Council, but related costs represent a heavy burden for the city's finances. The council needs expertise to facilitate the implementation of a tariff system for a sustainable collection plan.

Source: * Wikipedia, Juba, accessed 7 March 2019, <https://en.wikipedia.org/wiki/Juba>

Information

Population*	1.5 million (2015 estimation)
Population growth (annual %)*	N/A
Area (km^2)*	71.22 (2012)
Climate**	Tropical wet and dry climate
Main industries*	Crude oil and primary industries (agriculture, forestry, livestock, and fishery)
Currency***	USD 1: SSP 130.26 (South Sudanese pound) (March 2019)

Sources: * JICA report "Data collection survey on solid waste management in Juba"
** Wikipedia, Juba, accessed 7 March 2019, <https://en.wikipedia.org/wiki/Juba>
*** Cuex.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● There is no specific law on solid waste management in South Sudan nor in Juba City. As related laws, there are the National Environment Bill (2013) and the Local Government Act (2009). The National Environment Bill has been prepared by the Ministry of Environment and Forestry but has not yet come into force. It has a comprehensive content that includes waste management. The South Sudan Environmental White Paper (2017) was published in June 2018, emphasising the need for proper disposal of waste as part of environmental policy. The Local Government Act has been formally implemented and describes general matters of public works by local governments. Under the Local Government Act, waste management is considered as one of the public service to be provided by the local governments along with water supply, sanitation, electricity, transportation, communication, etc. ● Juba City Council (JCC) has established its own by-laws on waste management in Juba City. Revision is ongoing to reflect new environmental standards and economic conditions.
Policy/Plan	● National Environment Policy, 2015-2025 (draft). ● National Policy on Medical Waste Management (first draft: November 2011). ● A Waste Management Plan has been established based on a technical cooperation project with the Japanese government. It aims to raise the collection ratio in Juba City Council up to 34% by 2023 and includes procurement of equipment, capacity building, etc. However, due to the tight budget of Juba City and the rapid population growth of the city, the plan is not progressing as planned. ● The Juba City Sanitation Reform and Investment Plan states the need to invest in the waste management area for the purpose of improving public health.

Item	Outline
Implementation system	● The Ministry of the Environment is responsible for developing environmental laws & policies. ● The Department of Environment & Sanitation of JCC is responsible for waste collection, including: » Preparing waste collection plans. » Collecting fees for waste collection. » Implementing collection and transportation, and budget execution. » Providing licences to private companies. » Procuring collection vehicles. » Maintaining collection vehicles. » Raising public awareness and implementing environmental education (together with Kator, Juba and Munuki Block Councils). And for paying the fees for waste disposal. ● Rajaf County is responsible for the operation and management of the final disposal site, including: » Preparing the operation plan for the dumping site. » Implementing disposal works, and budget execution. » Collecting fees for waste disposal. » Procuring equipment for the dumping site. » Maintaining equipment of the dumping site. ● Number of staff in JCC: » Staff related to waste: 174. » Drivers: 5. » Cleaners: 235.
Technical System	
Waste generation amount & characteristics	● Waste generation amount (estimated): about 1,337 tons/day (2017). ● Waste generation rate: about 0.65 kg/person/day (2017, survey data). ● Waste collection amount: about 34.3 tons/day (2017, survey data). ● Waste collection rate: about 2.6%. ● Waste composition: more than 50% of tree leaves, very little food waste due to the economic situation of Juba City.
Storage and discharge/ Collection and transportation/ Road sweeping	● Each block is collecting waste from residential area. Residents are responsible for bringing their waste to the designated JCC main roads. JCC is responsible for the secondary waste collection, i.e. picking-up the waste from the black plastic bags, scattered waste and waste from heaps and transporting it to the final disposal site. ● JCC has about 18 collection vehicles but most of them are out of order because of lack of spare parts and/or maintenance. ● The average number of collection trips is 4 times a day, including a compactor (25 m^3) and a truck (8 m^3). Although the number of trips varies each month depending on the condition of the collection vehicles, it tends to decrease since July 2016. ● The collection efficiency is poor because most of the roads of the city are difficult to access for vehicles. Only 2.2% of the roads are asphalted/paved and they get wet during the rainy season. In addition, roads in residential areas are narrow. Therefore, collection by JCC is mainly carried out along major roads that are asphalted/paved or maintained. ● JCC gives licences to collect waste to private companies. Registered and unregistered companies collect and transport waste, but the services are not properly conducted, and collected waste is (mainly) illegally dumped.
Intermediate treatment/ Recycling	● Recycling is provided in the National Environmental Bill and in the National Environment Policy 2015-2025. ● Some recycling activities exist. ● Self-disposal at generation source (open burning) exists.
Final disposal	● JCC has one landfill site: Juba Controlled Dumping Site. It was established in December 2012 and has an area of 25 ha. It is managed by Rejaf County and Rejaf Payam, and the Juba city government pays disposal costs to Rejaf Payam. ● However, this final disposal site is no longer controlled. The fence around the dumping site was almost completely removed during the July 2016 crisis. Heavy equipment (bulldozer) is out of order, there is no more soil cover activity and waste is burnt in open air to reduce volume. The surrounding environment is therefore deteriorating due to the offensive odours and flies. ● Juba Controlled Dumping Site is located about 13 km from Juba city centre. Nevertheless, due to the bad condition of the junction road, the disposal site is difficult to access, and safety around the site is a concern. The number of collection vehicles reduced drastically, and only 34.3 tons per day are discharged at Juba Controlled Dumping Site. ● Part of the fee collection system is still working. ● Illegal dumping along the access road is expanding. A huge illegal landfill in Gumbo has been formed along the Juba-Nimule Road, causing significant deterioration of the surrounding environment. Gumbo illegal landfill site is estimated to have an area of 0.4 km^2 (about 1.5 km × 0.25 km) and to receive 8.6 tons of waste per day. It is an open dump without any heavy equipment, and waste flows into the river during the rainy season. Another major illegal dump site is located on Juba-Yei Road.

Item	Outline
Financial system	● Revenue: SWM revenues mainly come from three sources, namely (1) waste collection fee, (2) issuing permission to sewerage tankers and waste collection vehicles, and (3) fines and penalties. Most of the revenue comes from the waste collection fees, with the fees collection from markets accounting for 62% of the total. » Markets: SSP 11,159,276 » Hotels: SSP 2,070,000 » Institutions: SSP 492,000 » Issuing Permission to Sewerage Tanker: SSP 3,298,000 » Issuing Permission to Waste Collection Vehicles: SSP 576,000 » Fines and Penalties: SSP 500,000 » Grand Total: SSP 18,095,276 ● Expenditure: The total expenditure amount of the Department of Environment and Sanitation of JCC in FY2016/17 was about SSP 18 million: » Wages & Salaries: SSP 8,382,186 » Use of goods and services: SSP 9,100,290 » Capital Expenditure: SSP 612,800 » Grand Total: SSP 18,095,276 ● Currently, there is no official tariff for waste collection services. Waste management cost represents 30% of the city's budget, a heavy burden for the city's finances. Indeed, the City Council relies on its own budget which is not supplemented by the national government. If the national and state governments were contributing up to 30% to support SWM, it would reduce the financial burden and result in return in the improvement of the service delivery and waste collection system. ● The rate schedule details the financial aspects of expenditures for the service delivery. Tariffs will be paid by the households, private collection service providers, business sectors, government institutions, non-governmental organisations, etc. Today, three Block Councils, operating under the supervision of Juba City Council, have communicated with the citizens about the Waste Collection Fee Policy of the local government/Juba City Council. There has been a positive response from citizens.
Environmental and social considerations	● Environmental education and public awareness creation are provided in the National Environmental Bill and in the National Environment Policy 2015-2025. ● Waste pickers are present, but there seems to be no specific plan to support them.
Donor support	● JICA: development study and implementation of a Master Plan on Solid Waste Management in Juba City. Also, JICA has trained South Sudanese staff in Japan on how to improve solid waste management in the country. They are ready to put their theoretical knowledge into practice. ● UNICEF donated three compactors in September 2016.
Areas for improvement (in order of priority)	● Legislative issues: lack of legislation and policies specific to solid waste management, and the difficult implementation and execution of laws is hindering progress. ● Institutional issues: institutions and organisations should be more stable, lack of skilled staff and reliable data. Collective responsibility is required for timely finalisation of the tariff system and effective service delivery. ● Financial issues: introduction of a tariff system for collection services; lack of resources to finance SWM operations, such as maintenance of vehicles, provision of necessary equipment, payment of salaries, etc. ● Technical issues: need to improve waste collection and disposal, waste should be discharged in a controlled landfill and not dumped illegally.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	1,337	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	34.3	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Sudan

Khartoum

Khartoum State is one of the eighteen states of Sudan. Although it is the smallest state by area (22,142 square kilometres), it is the most populous (5,274,321 in 2008 census). It contains the country's two largest cities by population, Omdurman, and the city of Khartoum, which is the capital of the state as well as the national capital of Sudan. Khartoum contains offices of the state, governmental, and non-governmental organisations, as well as cultural institutions, and the main airport. There are seven localities in the Khartoum state and each locality has Cleaning Offices under the Government Locality.*

SWM services are managed in the state by the Khartoum State Cleaning Corporation (KSCC). This organisation is in charge of waste collection and transportation. However, because of insufficient systems and the deterioration of the equipment, the collection rate remains around 75% of the total waste volume. Therefore, waste mostly remains in the city, which is damaging the hygienic environment, mainly in the low-income areas.

Source: * Wikipedia, Khartoum (state), accessed 28 November 2018, <https://en.wikipedia.org/wiki/Khartoum_(state)>

Information

Population	5,274,321 Metropolitan Area (2008 census); 10 million in 2018
Population growth (annual %)	6.6 (2008-2018)
Area (km^2)*	22,142
Climate*	Hot arid climate
Main industries*	Printing, glass manufacturing, food processing, and textiles
Currency**	USD 1: SDG 47.50 (Sudanese pound) (February 2019)

Sources: * Wikipedia, Khartoum, accessed 28 November 2018, <https://en.wikipedia.org/wiki/Khartoum>
** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Khartoum State Environmental Protection Law of 2008: regulates waste management at the state level. ● Solid Waste Management Regulation of 2013. ● Environmental impact assessment (EIA) system is applied to final disposal sites in the state under the Khartoum State Environmental Protection Law.
Policy/Plan	● The Master Plan for SWM in the state was prepared in 2013.
Implementation system	● Constitutionally, SWM is the responsibility of the local government. ● Khartoum State Cleaning Corporation (KSCC): in charge of managing SW in the state (street sweeping, collection and transportation, transfer station, recycling facilities, final disposal site) and preparation of the SWM Master Plan. KSCC has 104 staff in administration and 400 staff in operation. There are seven municipal cleaning offices in the state and more than 5,000 staff are working in operation. ● Ministry of Health in Khartoum State: in charge of formulation of law on medical waste. ● Ministry of Environment in Khartoum State: in charge of formulation of law on general environment. ● Local governments: in charge of coordination among stakeholders. ● Ministry of Finance in Khartoum State: in charge of budgeting SWM.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 5,000 tons or 10,000 m^3/day (estimated by multiplying population and waste generation rate). ● Waste generation rate: 0.5 kg/person/day (study conducted by JICA, 2013). ● Waste collection amount: 3,500 tons/day, of which 1,000 tons/day directly transported from household to disposal sites and 2,500 tons/day transported from the transfer stations to disposal sites (data from weighbridge at transfer stations and dump sites, 2018). ● Waste collection coverage rate: 75% based on population. ● Waste characteristics: food 50%, paper and plastics 13%, metals 5%, glass 8%, cardboard 5%, rubber, wood and textile 4%, ceramics, soil, rubble, ash, and diapers: 3%, biomedical, oil filters, batteries: 1.5%, others: 3.5% (study conducted by JICA, 2013).
Storage and discharge/ Collection and transportation/ Road sweeping	● Private sector participates in provision of road sweeping and waste collection services. ● There is no informal sector involved in waste services. ● Community is informed of how to discharge waste such as collection day and time through public bulletin by KSCC. ● Road sweeping service is provided by Localities in the city centre, public areas and residential area. ● House-to-house collection in residential area is conducted three times a week, while commercial and institutional waste is collected daily. ● Hauling distance from the city centre to a transfer station is about 8 km, from city centre to a disposal site is about 20 km. ● The KSCC has 220 compactor trucks of 7 m^3, 100 roll-off trucks, 30 tippers, and 20 trailers of 75 m^3. ● There are three transfer stations already, and five new transfer stations are under construction. ● There are 20 trailers of 75 m^3 for transporting waste from transfer station to disposal site, of which 75% are functional and 25% are non-functional due to lack of maintenance and spare parts. ● There are ten 18 m^3 dump trucks, of which 80% are functional and 20% are non-functional due to lack of maintenance and spare parts. ● Waste separation at source is not practiced.

Item	Outline
Intermediate treatment/ Recycling	● There is no Materials Recovery Facility (MRF) but one composting facility with capacity of 1,000 tons/day in Omdurman dump site. ● There are six waste dealers and nine industrial scale recyclers in the state. ● Only 5% of collected waste streams are recycled (data from factory).
Final disposal	● There are three dump sites and all are managed by the KSCC. ● Taiba disposal site: » Area: 2.5 km². » Operation hours: 24 hours. » Waste disposal amount: 600 tons/day (estimated by multiplying collection truck capacity and number of trips). » Facility: open dumping. » Operation: no compaction but covering with soil immediately. ● Omdurman disposal site: » Area: 4 km². » Operation hours: 24 hours. » Waste disposal amount: 1,500 tons/day (weighbridge data at the disposal site). » Facilities: weighbridge, gas removal pipe (but not working) and composting facility. » Operation: compaction and soil covering immediately. ● Hatab disposal site: » Area: 5 km². » Operation hours: 24 hours. » Waste disposal amount: 1,400 tons/day (estimated by multiplying collection truck capacity and number of trips). » Facility: open dumping. » Operation: compaction and soil covering immediately. ● There are about 800 illegal waste pickers in the above three disposal sites.

Financial system	● Total revenue and expenditure for the waste service: Data not provided. ● KSCC charges waste collection fee of SDG 50/month for households independently from other public services. Coverage rate is only 25% in household. ● There is no tipping fee for waste disposal. ● Large generators such as factories are charged a collection fee per ton. ● Ministry of Finance provides budget for SWM.
Environmental and social considerations	● There is no policy or law for supporting the informal sector.
Donor support	● JICA dispatched specialists in 2011, and developed the Master Plan on WM in 2013. The technical cooperation was launched in 2014 to renew the Master Plan and to improve waste collection and transportation, as well as operations of transfer stations, disposal sites, and administrative organisation. ● Japanese Government provided 96 collection vehicles around the same time, which generated a synergistic effect with technical cooperation.
Areas for improvement (in order of priority)	● Financial issues: need trailers to transport waste from transfer station to dump site. ● Technical issues: need capacity building and training centre for operation workers. ● Legal issues: implementation of laws on SW. ● Social issues: need public education on SW. Community should be involved in cleaning work.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	5,000	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	3,500	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	3,500	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Zambia

Lusaka

Lusaka is the capital of Zambia, and the largest city. Due to its administrative role, it is the economic, cultural and transportation centre of the nation. Lusaka City Council (LCC) undertakes SWM in the city. LCC formulates city by-laws and carries out the following services directly in some parts of the city: sweeping, waste collection, and transportation of waste to the final disposal site. Private operators and community-based enterprises (CBE) are also involved in waste collection and disposal. Private operators collect waste from planned settlements and dispose the waste at a landfill under franchise agreements with LCC. CBEs collect waste from unplanned settlements under a Memorandum of Understanding (MoU) with LCC. For places away from the landfill, the CBEs collect the solid waste from households and dispose of the waste in bins placed at strategic locations within the settlements. LCC is responsible for collecting the waste from the bins and transporting it to the final disposal site. For the areas close to the landfill, tractors are used to collect solid waste from the households and it is disposed of directly at the landfill. The LCC is now encouraging CBEs to transport collected solid waste directly to the landfill to avoid accumulation.

Information

Population*	2.19 million (2015)
Population growth (annual %)*	4.9 (2010-2015)
Area (km^2)**	360
Climate***	Humid subtropical climate
Main industries***	Administrative, economic and transportation centre of Zambia.
Currency****	USD 1: ZMW 13.09 (Zambian kwacha) (September 2019)

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Lusaka City Council, accessed 20 March 2019, <https://www.lcc.gov.zm/about-lusaka/>
*** Wikipedia, Lusaka, accessed 20 August 2018, <https://en.wikipedia.org/wiki/Lusaka>
**** Oanda.com

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Lusaka City Council Municipal Solid Waste Management, 2004: the municipal by-law guiding solid waste management in the city. ● The Local Government (Solid Waste Management) Regulation, 2011: national regulation on how waste is to be managed in municipalities.
Policy/Plan	● Lusaka City Solid Waste Strategy. This strategy expired and is under revision.
Implementation system	● LCC formulates city by-laws and provides waste collection and disposal services in some parts of the city. ● Private operators provide waste collection and disposal services in planned settlements under franchise agreements with LCC. ● Community-based enterprises provide waste collection services in unplanned settlements under franchise agreements with LCC. ● Community members pick recyclable waste from the streets and the dumping site. ● Other institutions involved in SWM include: » The Ministry of Local Government: responsible for developing policy at the national level. » Ministry of Water, Sanitation and Environmental Protection: responsible for regulation of hazardous waste. » Ministry of Health: responsible for the control of medical solid waste management.
Technical System	
Waste generation amount & characteristics	● The city generates about 1,200 tons/day at the rate of 0.5 kg/person/day. ● The composition of the waste is as follows: » Organic 50%, paper 5%, plastic 5%, glass 2%, metal 2%, and other 37%. (Source: World Bank, What a Waste: A Global Review of Solid Waste Management, 2012, accessed 20 August 2018, <https://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/What_a_Waste2012_Final.pdf>)
Storage and discharge/ Collection and transportation/ Road sweeping	● About 480 tons are collected per day. ● About 40% of the residents have access to waste collection service. ● The council uses the following vehicles for the services: » 6 compactor trucks with a capacity of 10 m^3. » 2 roll-on-trucks with a capacity of 15 m^3. » 6 skip trucks with a capacity of 5 m^3. » 12 tipper trucks with a capacity of 15 m^3.
Intermediate treatment/ Recycling	● There is no intermediate treatment/recycling. ● Recycling is slowly growing as there are recycling companies operating in the city.

Item	Outline
Final disposal	● There is one landfill located ten kilometres from the city centre. ● The disposal site covers an area of 24 hectares. ● The disposal site is the first engineered landfill in the country, and its design includes following features: a bottom liner, a leachate collection pipe, enclosed bund/embankment, leachate treatment facility, a weighing bridge, a gate and a fence, drainage to prevent rainwater from getting to the waste disposal area. ● The waste is compacted but not covered with soil.

Financial system	● Households are charged ZMW 60 bin/month. ● Commercial entities and institutions are charged ZMW 120 bin/month.
Environmental and social considerations	● About 1,000 people are involved in picking recyclable waste materials from the dump site and from the streets. ● Communities are informed about collection days and time through public consultation meetings, flyers and brochures.
Donor support	● The Millennium Challenge Corporation is assisting LCC in updating the solid waste management plan and establishing an independent solid waste management utility.
Areas for improvement (in order of priority)	● Final disposal of waste needs to be improved. ● Institutional arrangement: need to create a more independent solid waste unit. ● Financial matters: need to have an effective system of collecting fees.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	1,200	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	480	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	480	Waste amount brought into disposal sites.
⓫ Recycling	24	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.
** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Zimbabwe

Bulawayo

Bulawayo is the second-largest city in Zimbabwe. It is the capital of the Ndebele province of Matabeleland (Bulawayo Metropolitan Province). The majority of Bulawayo's population belongs to the Ndebele ethnic and language group (otherwise known as Northern Ndebele). For a long time, Bulawayo was regarded as the industrial centre of Zimbabwe, and it served as the hub to the country's rail network with the National Railways of Zimbabwe headquartered there because of its strategic position near Botswana, Zambia, and South Africa.*

The Health Services Department (Cleansing Section) of the Bulawayo City Council is in charge of street sweeping, rubbish collection, disposal, and waste education. Waste collection and road sweeping services are provided directly by the City of Bulawayo in the Central Business District and in eight out of 29 wards of the city. In 21 wards of the city, door-to-door collection is done by community members through a Community Refuse Removal Program. There is no Materials Recovery Facility (MRF), composting facility or transfer station in the city, but there is one sanitary landfill. However, the cells at the disposal site are almost full, so there is a need to develop the remaining half of the landfill and to construct waste diversion facilities such as MRF and waste-to-energy (WtE) facilities.

Source: * Wikipedia, Bulawayo, accessed 21 January 2019, <https://en.wikipedia.org/wiki/Bulawayo>

Information

Population*	1,200,337 (city council estimates, 2016)
Population growth (annual %)*	2.1
Area (km^2)*	1,707
Climate*	Subtropical climate
Main industries	N/A
Currency*	Uses USD and other world currencies

Source: * Wikipedia, Bulawayo, accessed 21 January 2019, <https://en.wikipedia.org/wiki/Bulawayo>

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Environmental Management Act Chapter 20:27, 2002. ● Public Health Act Chapter 15:09, 2017. ● Bulawayo (Refuse Removal) By-Laws, 1977. ● Bulawayo (Public Health) By-Laws, 1969. ● Environmental Management (Effluent and Solid Waste Disposal) Regulations, 2007. ● Environmental Management (Hazardous Waste Management) Regulations, 2007. ● Environmental Management (Hazardous Substances, Pesticides and Other Toxic Substances) Regulations, 2007.
Policy/Plan	● No specific SWM Plan.
Implementation system	● Health Services Department (Cleansing Section) of the Bulawayo City Council (BCC): in charge of collection, street sweeping, disposal and waste education. The Council employs 184 employees involved in refuse removal, street sweeping and disposal. A further 282 community members are employed to provide street sweeping services in residential areas. ● Ministry of Environment and Tourism: in charge of environmental legislation, national policies and supervision. ● Ministry of Health & Child Care: responsible for health care waste in areas outside city council jurisdiction. ● Private sector: participates in collection of non-MSW and recycling activities.
Technical System	
Waste generation amount & characteristics	● Waste generation amount: 327 tons/day (Source: BCC, Year: 2018). ● Waste generation rate: 0.30 kg/person/day (Source: BCC, Year: 2018). ● Waste collection amount: 242 tons/day (Source: BCC, Year: 2018). ● Waste composition: » Food: 38%, plastics: 15%, papers: 9%, textile: 5%, metal: 5%, glass: 5%, ash/soil: 10%, other (ceramic, wood, rubber, sand): 13% (Source: BCC, Year: 2018)
Storage and discharge/ Collection and transportation/ Road sweeping	● Waste collection and road sweeping services: provided directly by the City of Bulawayo in the Central Business District and in eight out of 29 wards of the city which are mostly low-density areas. In 21 wards of the city, door-to-door collection is done by community members through a Community Refuse Removal Program. Forty-five trucks are involved in the programme. The community members transfer refuse to a Council refuse compactor stationed within the designated temporary transfer point. Street sweeping services are provided by the Council in the CBD and provided through community sweeping groups in 28 of the 29 city wards. ● Waste from household: collected once a week through the door-to-door collection system. ● Waste from commercial area: collected six times a week. ● Waste collection coverage: 98% based on area covered (Data source: BCC, Year: 2018). ● Number of collection vehicles: 18 compactor trucks (12 compactor trucks of 20 m^3, four compactor trucks of 15 m^3 and two compactor trucks of 12 m^3).

Council Vehicle

Community Trucks

Item	Outline
Intermediate treatment/ Recycling	● There is no Materials Recovery Facility (MRF) in the city. ● There is no composting facility in the city. ● There is no transfer station in the city.
Final disposal	● There is one sanitary landfill in the city. ● Richmond Sanitary Landfill: » Owner: Bulawayo City Council. » Location: S 20°05'00" E 28°32'00". » Area: 30 hectares. » Operation hours: eight hours per day. » Waste disposal amount: 275 tons/day. » Data source: obtained by daily volume readings to weight conversion. » Installed facility: bottom clay liner, weighbridge in process of installation. » Operation plan: SOPs exist. » Operation in practice: daily compaction and covering with soil three to four times a week.

Financial system	● Total revenue for waste service: USD 720,000/month. ● Total expenditure for waste service: USD 410,000/month (USD 260,000/month is spent for collection and transportation, USD 80,000/month for sweeping, and USD 70,000/month for final disposal). ● Waste collection fee: the city charges a SWM fee which results in a monthly bill that residents pay to the Council. Fees range from 4.74 USD per bin in high-density areas to 6.60 USD in low-density areas and 14.48 USD in CBD and commercial properties. ● Tipping fee: the city charges USD 9.20/ton at the final disposal site. ● Subsidies related to SWM from central government to local governments: none.
Environmental and social considerations	● Policy or law for supporting the informal sector: there is a national policy for supporting the informal sector to organise into Micro and Small Enterprises (MSEs) through the provision of job opportunities and training. However, this policy does not seem to help the informal waste sector. ● Number of waste pickers in final disposal sites: 242 waste pickers in the Richmond Sanitary Landfill. ● Public awareness raising activities: the community is informed on how to discharge waste such as collection day and time, separation of waste through public consultation meetings, school curriculum, flyers, and brochures. There are also campaigns for cleaning the city with community participation.
Donor support	● None.
Areas for improvement (in order of priority)	● Social issues: considering the city offers a stable refuse collection schedule, more waste education and behaviour change activities are needed to curb littering and illegal dumping. ● Technical issues: the current cells at the disposal site are almost full, so there is a need to develop the remaining half of the landfill and to construct waste diversion facilities such as MRF and WtE. ● The Waste Management Information System is mostly manual and has limited ability to improve decision making. ● Finances: there is shortage of capital finances to develop the SWM system.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	327	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	242	Waste discharged for collection services.
❸ Self disposal	58	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	27	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	242	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	0	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	0	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	242	Residue from treatment facilities.
❿ Final disposal site	242	Waste amount brought into disposal sites.
⓫ Recycling	15	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

Location of Waste Management Facility and Related Photographs:

Richmond Sanitary Landfill
(coordinates: S 20°05'00" E 28°32'00")

Zimbabwe
Harare

Harare is the capital of Zimbabwe and the largest city. The city has a population of 1.5 million and covers an area of 960.6 square kilometres. The city sits on a plateau at an elevation of 1,483 metres above sea level and it is Zimbabwe's leading political, financial, commercial, and communications centre.
Harare City Council is responsible for sweeping, waste collection and waste disposal services. The private sector is also involved in solid waste management (SWM) but there are no contracts between the private sector and Harare City Council. The informal sector is involved in waste recycling, and there is a policy to support the operations of the sector.

Information

Population*	1.5 million (2015)
Population growth (annual %)*	0.3 (2010-2015)
Area (km^2)**	960.6
Climate**	Subtropical highland climate
Main industries**	Financial and commercial centre, trade (tobacco, maize, cotton, citrus fruit), manufacturing (textiles, steel, chemicals), and gold mining
Currency***	Uses USD and other world currencies

Sources: * United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.
** Wikipedia, Harare, accessed 9 September 2018, <https://en.wikipedia.org/wiki/Harare>
*** Wikipedia, Zimbabwe, accessed 21 January 2019, <https://en.wikipedia.org/wiki/Zimbabwe>

Current SWM Situation

Item	Outline
Institutional System	
Legal system	● Waste Management By-law of 1979. ● Anti-Litter By-law of 2016.
Policy/plan	● Integrated Waste Management Plan: Consultant engagement in progress.
Implementation system	● Harare City Council is responsible for SWM. The city provides sweeping, waste collection, and disposal services. ● Other institutions involved in SWM include: » Ministry of Environment Water and Climate: responsible for environmental regulations, including those relating to solid waste management through the Environmental Management Act. » Ministry of Health and Child Care: Regulation of Environmental Health through the Public Health Act. » Institute of Water and Sanitation Development: responsible for capacity building and skills transfer, as well as research and development. ● Number of staff in the SWM department: » 30 people in administration. » 607 people in operation. » One person took SWM and/or related course in university. » 637 people have worked in the SWM sector for five years and more. ● The private sector is involved in sweeping, waste collection, final disposal and recycling services, but there are no contracts between the private sector and Harare City Council. ● The informal sector participates in SWM through the collection of recyclable materials. There is a policy for supporting the informal sector.
Technical System	
Waste generation amount & characteristics	● The city generates 26,621 tons/month at a rate of 0.28 kg/person/day. ● There is no data on the waste composition.
Storage and discharge/ Collection and transportation/ Road sweeping	● 16,288 tons/month is collected. ● The city uses the following vehicles for the services: » 47 compactor trucks with a capacity of 12 m^3. » 10 skip trucks with a capacity of 5 m^3. » 6 tipper trucks with a capacity of 10 m^3. » Only 50% of the vehicles are operational because of inadequate Operations and Maintenance budget.
Intermediate treatment/ Recycling	● There is no intermediate treatment/recycling.

Item	Outline
Final disposal	● There are 2 final disposal sites. ● First disposal site: » About 543 tons/day is discharged at the site. » The disposal site has a gate and a fence. » Waste is compacted and covered with soil. ● Second disposal site: » 246,000 litres/month is discharged. » There is a gate and a fence. » There is no compaction nor covering of waste with soil.

Financial system	● The city has a revenue of USD 12 million per year. ● The city's expenditure is USD 10 million per year. ● The city spends USD 6 million on collection and transportation, USD 600,000 for sweeping, and USD 3 million on final disposal. ● At the disposal site, the city charges USD 20 per ton.
Environmental and social considerations	● Data not provided.
Donor support	● Oxfam: Typhoid response 2017, tools and protective clothing.
Areas for improvement (in order of priority)	● Harare City Council needs to identify and develop engineered landfill site/s. ● Separation of domestic waste at source offers huge opportunities to reduce waste going to disposal sites. ● Ring-fencing waste management accounts can result in improved operation and maintenance (O&M). ● Other areas requiring attention include skills & capacity building, as well as improving legislation to effectively regulate waste management.

Waste Amount at Each Stage of Waste Flow*

Waste flow	Amount** (ton/day)	Remarks
❶ Waste generation	N/A	Waste generated at houses, offices, shops, restaurants, etc.
❷ Discharge to collection	N/A	Waste discharged for collection services.
❸ Self disposal	N/A	Disposal at generation sources, such as burning and burying.
❹ Recycling at source	N/A	Reuse of materials, composting, sold to recyclers.
❺ Collection and transport	N/A	Waste amount collected and transported.
❻ Clandestine dumping	N/A	Waste illegally disposed of in unknown location.
❼ Treatment	N/A	Material recycling, composting, incineration, etc.
❽ Recycling/Reduction	N/A	Recycled and/or reduced waste amount by material recycling, composting, incineration, etc.
❾ Residue	N/A	Residue from treatment facilities.
❿ Final disposal site	N/A	Waste amount brought into disposal sites.
⓫ Recycling	N/A	Recycled at disposal sites.
⓬ Final disposal	N/A	Waste amount finally disposed of at disposal sites.

* Based on the waste flow chart on page.

** Figures include estimated value.

AFRICAN CLEAN CITIES PLATFORM

PLATE-FORME AFRICAINE DES VILLES PROPRES

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