2 Background, Definitions, Concepts and Indicators

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What the reader can expect

Chapter 2 provides insights into the Africa Waste Management Outlook, which provides the first comprehensive analysis of waste management on the African continent, including challenges and opportunities. It aims to make the cogent case that sound waste management is essential and politically expedient for ensuring public health and environmental protection, the benefits of which are likely to outweigh the costs of inaction for African countries. The definition of "waste" used in this regional outlook is aligned with that used in the Global Waste Management Outlook and the Basel Convention. While the focus of the Africa WMO is largely on municipal solid waste, other problematic general and hazardous waste streams emerging as wastes of concern for Africa are also addressed. These include electronic waste, used lead acid batteries and marine litter, especially plastics. The waste management hierarchy has been adopted as an analytical framework for waste management; hence many of the chapters of the Africa WMO are structured around the categories of the hierarchy, from prevention to final disposal.

Key messages

The following are the key messages regarding background, definitions, concepts and indicators:

- A multi-stakeholder participatory approach in the development of the Africa WMO, patterned against the Global Waste Management Outlook (GWMO), resulted in the identification of three additional chapters that were considered important for the African context.
- One of the limitations of the Africa WMO is the lack of reliable, comprehensive and up-to-date waste data for Africa, which is a constraint to effective waste management on the continent.
- Another limitation is the scarcity of empirical data on the impacts of unsound waste management (e.g. exposure to hazardous substances) on human health and receiving environments. Of particular concern are the risks to a large informal waste sector.
- It is difficult to develop performance indicators for waste management in Africa in a vacuum of waste-related data. The lack of data may be sequel to the fact that data on waste generation and disposal has not been recognized by the public and private sectors as valuable in waste planning and management.
- As definitions of "municipal solid waste" vary between countries, it is important to establish at the outset how MSW is considered by the authors. For the purposes of the Africa WMO, the authors have adopted the definition of MSW used by the United Nations Human Settlements Programme (UN-Habitat).
- The diversity of actors in the waste sector in Africa also requires that the Africa WMO include both the public and private sectors, and the formal and informal sectors.

2.1 An overview of the Africa Waste Management Outlook

2.1.1 Aims and objectives

The Africa WMO provides the first comprehensive analysis of waste management on the African continent. It forms part of a series of regional waste management outlooks prepared by the United Nations Environment Programme (UNEP). These regional outlooks stem from the GWMO, which provided a comprehensive global overview of the state of waste management around the world (UNEP 2015).

Acknowledging waste management as a political priority for Africa (**chapter 1**), the Africa WMO explores the current *drivers* of and *pressures* on waste generation in Africa. It attempts to quantify the *state* of waste generation, recycling and disposal on the continent and the associated *impacts* of poor waste management on human health and the environment (**chapters 3, 4 and 5**). In line with international trends, the Africa WMO unpacks the socio-economic opportunities of waste-to-wealth and employment creation and poverty alleviation in Africa, recognizing the critical role of the informal sector in the waste management value chain (**chapter 6**). Finally, delving into the appropriateness of social and technological innovation for Africa (**chapter 7**) and the financing of waste management infrastructure investment (**chapter 8**), the Africa WMO provides a *response* of proposed solutions and recommendations to address the waste management challenges facing Africa (**chapter 9**).

The Africa WMO aims to make the cogent case that sound waste management is much more than merely desirable, it is absolutely essential and politically expedient for ensuring public health and environmental protection. While limited findings exist for Africa, global insights show that the cost of inaction of poor waste management is significant. By recognizing waste management as a significant contributor to sustainable development and climate change mitigation, the benefits of correctly managing waste now are likely to outweigh the costs of inaction for African countries.

In light of this, the outlook recognizes the role of analytical frameworks such as integrated sustainable waste management (ISWM) and various assessment tools such as cost benefit analysis (CBA), environmental impact assessment (EIA) and life-cycle analysis (LCA) in the effective management of end-of-life products, to prevent and minimize waste and transit to a circular economy.

2.1.2 The development process

The Africa WMO has been developed through a multi-stakeholder process. An editorial team of seven lead authors with considerable experience across the continent was identified by the UNEP Regional Office for Africa. A preparatory workshop consisting of the co-ordinating lead author (editor) and lead authors, the UN Environment Regional Office for Africa (Nairobi), the UNEP International Environmental Technology Centre (UN Environment IETC) (Osaka, Japan), the United Nations Office for Project Services (Nairobi), the Climate and Clean Air Coalition, and international development partners from UN-Habitat took place in Nairobi from 22–24 February 2016.

Through a participatory process, the workshop participants identified a number of waste issues and challenges perceived as significant for the continent, including a number of emerging issues. These issues were clustered, discussed and mapped against the structure of the GWMO. The participants considered this important, both to ensure consistency of approach between the outlooks and to allow the Africa WMO to build on the global understanding of waste through a regional lens. **Table 2.1** provides a comparison of the themes addressed by the GWMO and Africa WMO.

Table 2.1 Comparison of themes addressed by the Global Waste Management Outlook and the Africa Waste Management Outlook

Global Waste Management Outlook	Africa Waste Management Outlook
1 Waste management as a political priority	1 Waste management as a political priority
2 Background, definitions, concepts and indicators	2 Background, definitions, concepts and indicators
3 Waste management: Global status	3 State of waste in Africa
4 Waste governance	4 Waste governance
–	5 Impacts of waste in Africa
–	6 Waste as resource, unlocking opportunities
–	7 Appropriate solutions for Africa
5 Waste management financing	8 Waste management financing
6 Global waste management – way forward	9 Africa waste management – way forward

Based on the waste priorities identified for Africa, three new chapters considered important for the African context were added. These include chapter 5, which summarizes the impacts of solid waste on human health and receiving environments; chapter 6, which recognizes waste as a secondary resource that provides socio-economic opportunities for the continent; and chapter 7, which explores the appropriateness of technologies for Africa, including social and technological innovation. In this way, the Africa WMO provides a storyline of the challenges and opportunities of solid waste management in Africa.

2.1.3 Limitations of the Africa Waste Management Outlook

Every author contributing to the Africa WMO has highlighted the lack of reliable, comprehensive and up-to-date waste data for Africa, at a local, national and regional scale. This lack of data significantly hampered the authors' ability to present the current state of waste management in Africa. The lack of waste data is not a new issue, however. Reports on waste management in Africa consistently cite the lack of data and information as a constraint for effective waste management (Achankeng 2003, Godfrey and Nahman 2007, Mwesigye *et al*. 2009). The lack of comprehensive data is further compounded by different approaches to data collection (DEA 2012). This raises the question: If this issue has been recognized for at least the past two decades, why have adequate measures not been put in place to ensure the generation and reporting of reliable, comprehensive waste data for Africa? Practical recommendations for addressing the waste data void in Africa are further discussed in **section 2.3.2**.

One of the main methods of capturing empirical waste data is by recording the tonnes of waste disposed of to landfill. As will be pointed out in chapter 3, much of Africa's waste is disposed of in uncontrolled dumpsites. Most of these sites do not have weighbridges, with the result that no accurate disposal tonnages are recorded. Recycling systems in Africa are often informal, as discussed in **chapters 3 and 6**, with little to no accurate information being captured on tonnages recycled. Where data is collected, it is not consolidated in central repositories. In the absence of weighing, practitioners are forced to model waste generation tonnages based on population, per capita waste generation, GDP growth, etc. This has been the case for the Africa WMO, which is based heavily on modelled data.

Scientifically proven relationships between waste and environmental and human health impacts are also difficult to source for Africa. The scarcity of data on human health risks related to exposure to hazardous substances in waste and on environmental pollution arising from unsound waste management, especially for the informal sector, is noted by Osibanjo *et al.* (2016).

2.2 Defining the scope and coverage of the Africa Waste Management Outlook

2.2.1 What does the Africa Waste Management Outlook mean by waste?

In the absence of a single definition or unified understanding of waste, the Africa WMO endorses the GWMO's standpoint that waste is a broad concept with multiple definitions and meanings, depending on the respondent answering the "*What is waste*?" question. In simplest terms, "*waste*" may be considered as "*stuff people throw away*", having little economic value (UNEP 2015). The definition of waste in the Basel Convention, the only global convention on waste, has been adopted in this document. The Basel Convention defines "waste" as "*substances or objects which are disposed of or are intended to be disposed of, or are required to be disposed of by the provisions of national law*" (UNEP 1989). This includes "*substances or objects which are subject to disposal operations which either lead to or do not lead to the possibility of resource recovery, recycling, reclamation, direct re-use or alternative uses*" (UNEP 2015:22). Where it exists, national waste legislation in African countries is generally piece meal, not comprehensive and holistic, and does not cover waste of high risk to human health and the environment (Babayemi *et al*. 2016).

2.2.2 The progression of waste disposal

Terms such as "*open dumping*", "*uncontrolled dumping*", "*controlled dumping*", "*controlled disposal*" and "*sanitary engineered landfilling*" are used throughout this Africa WMO. For the purposes of clarity, the various terms as used in the context of this document are defined in **Table 2.2**. The International Solid Waste Association definition of "open dumping", as used in the key-issue paper on "Closing of open dumps", has been adopted (ISWA 2016).

Table 2.2 Definitions of terms used in the African Waste Management Outlook

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 minimize impacts. Includes, e.g. liners, leachate collection systems, and landfill gas recovery
Progression in the management of waste →			

2.2.3 Scope of Africa Waste Management Outlook

The scope of the Africa WMO, or the "system boundary" for what each chapter has considered, is summarized in **Table 2.3**. As in the case of the GWMO, the Africa WMO promotes the pragmatic view of waste as a "*resource*", espousing a paradigm shift from a linear to a circular economy, by designing waste out of the system (prevention) and keeping resources in circulation (material flows) for as long as possible through reuse, repair, refurbishment, recycling and recovery of end-of-life products, and at the same time ensuring a solid foundation of good city cleansing and safe disposal of residual waste to sanitary engineered landfills.

The focus of the Africa WMO is largely on MSW, although chapters do address other problematic general and hazardous waste streams emerging as wastes of concern for Africa. These include e-waste, used lead acid batteries (ULAB) and marine litter, of particular relevance to coastal countries and small island developing States (SIDS) (see **chapters 3 and 5**). As definitions of MSW vary between countries, it is important to establish at the outset how MSW is considered by the authors. For the purposes of the Africa WMO, the authors have adopted the definition of MSW used by UN-Habitat (2010:6) which is "*wastes generated by households, and wastes of a similar nature generated by commercial and industrial premises, by institutions such as schools, hospitals, care homes and prisons, and from public spaces such as streets, markets, slaughter houses, public toilets, bus stops, parks, and gardens'. This working definition includes most commercial and business wastes as municipal solid waste, with the exception of industrial process and other hazardous wastes.*"

Given the challenges facing Africa, especially with regard to uncontrolled dumping, and the opportunities provided by bulky waste streams, it is necessary to include general commercial and industrial waste; construction and demolition waste; and organic waste streams, such as food waste, the organic fraction MSW, and agricultural and forestry wastes within the scope. The diversity of actors in the waste sector in Africa also requires that the Africa WMO include both the public and private, and the formal and informal, sectors (**Table 2.3**).

2.2.4 Geographical Scope of the Africa Waste Management Outlook

The Africa WMO focuses on solid waste management (SWM) on the Africa continent, including associated SIDS, although these are covered in more detail in the SIDS Waste Management Outlook. The Africa WMO presents data for both North Africa and sub-Saharan Africa; however, as noted by Hoornweg and Bhada-Tata (2012:8), "*data are particularly lacking for Sub-Saharan Africa.*" Where North Africa data is available, it is often part of the combined data for the Middle East and North Africa (MENA) region, making it difficult to extract only North Africa data.

The Africa WMO addresses waste management primarily at the local (city), regional and national levels. As most waste is generated in or near cities, and waste presents greater public health and environmental risks when in proximity to people, as in cities (UNEP 2015), urban areas are prioritized for focus in the Africa WMO.

Table 2.3 Scope of the Africa Waste Management Outlook: Setting the 'system boundary'

No.	Category	Main focus within the Africa WMO	Also considered	Outside the scope
1	**Receiving environmental media**	Air, water and soil, but with a focus on "solid waste" to land	Ecosystems and biodiversity	Gaseous emissions to air and wastewater discharges
2	**Waste as a resource**	Scope includes waste prevention, reduction, reuse, recycling and recovery	Related aspects of sustainable consumption and production	N/A
3	**'Source' of waste**	Some focus on MSW, including waste from households and smaller businesses and institutions Commercial and industrial (C&I) waste, and construction and demolition (C&D) waste, from larger waste generators	Agricultural and forestry (A&F) wastes	N/A
4	**Responsibility for waste**		Public and private waste sector	
5	**Types of waste**	Non-hazardous waste (general waste) and hazardous wastes (including hazardous health care and household hazardous wastes)	e-waste, ULAB, nano-waste, contaminated soil, post disaster waste, marine litter, obsolete stocks of POPs and containers	N/A
6	**Specific types of waste**	MSW (including mainline recyclables: paper, plastics, glass, metal), e-waste, ULAB, tyres, food waste, obsolete POPs and other agricultural wastes, disaster wastes, marine litter	Emerging waste streams, such as nano- and micro- wastes	Radioactive (nuclear) waste
7	**Public and private sectors**	Waste managed by both public and private sector operators. Private sector includes: waste generators, producers and distributors, waste industry, industrial value chain recyclers and agricultural value chain	N/A	N/A
8	**Formal and informal sectors**	Both formal and informal sectors, including both waste management and recycling	N/A	N/A
9	**Geographical scope**	Urban waste on the African continent Considers the local, regional and national levels, with a primary focus on national policy. Local and global markets for materials for recycling	Waste generated in rural areas	N/A

Key : N/A = Not Applicable

2.3 An analytical framework for the Africa Waste Management Outlook

The Africa WMO promotes the transition from waste management to resource management, which fits with the thinking of an integrated waste management system, taking into consideration the environmental, social and economic costs and benefits (McDougall *et al*. 2001). Many of the chapters of the Africa WMO are structured around the categories of the waste management hierarchy, from prevention to final disposal. While its limitations are recognized, the waste management hierarchy provides a useful framework for structuring the discussions on the state of waste management in Africa and the appropriate alternative waste treatment technologies to support the increased diversion of waste away from landfill towards prevention, reuse, recycling and recovery.

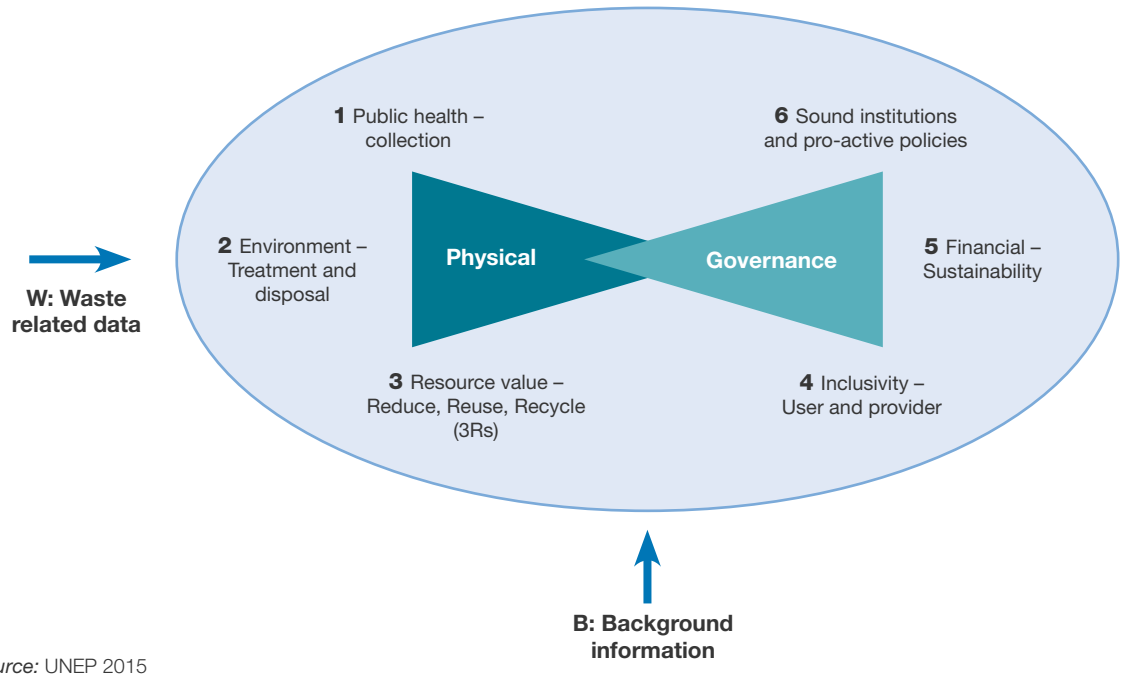
Tools such as LCA, EIA, CBA, and risk assessment are also applied in waste management, but still to a limited extent in Africa. These are all useful tools whose application needs to be strengthened in Africa; however, this will require further skills development and the generation of Africa-specific datasets as input to ensure that outcomes are relevant to Africa.

2.3.1 Integrated sustainable waste management

Recognizing that establishing an integrated sustainable waste management system is complex, the GWMO suggests that for such a system to be sustainable in the long-term, the following three elements must be considered individually and collectively, in an integrated manner: (i) infrastructure, (ii) all the stakeholders involved and (iii) all the strategic aspects, including the political, health, institutional, social, economic, financial, environmental and technical facets (UNEP 2015).

The term "*integrated waste management*" has been widely used, but often refers only to integration across the physical elements. ISWM systems that explicitly bring all three dimensions together are gradually becoming the norm in the discussion of solid waste management in developing countries (Davidson 2011). In the Africa WMO, the primary analytical framework used is a simplified form of ISWM, first developed for the UN-Habitat "*Solid Waste Management in the World's Cities*" (2010) publication, and adopted by the GWMO (UNEP 2015). This is shown schematically in **Figure 2.1** as two overlapping triangles that explicitly bring together all three dimensions.

Figure 2.1. The integrated sustainable waste management framework



Source: UNEP 2015

2.3.2 Waste-related data and indicators

Indicators are essential tools for tracking environmental progress and performance of environmental infrastructure, monitoring data flow, supporting policy evaluation or governmental decisions, driving investments and industry strategy, and informing the public (UNEP 2012). However, when it comes to waste generation, recycling or disposal, the underlying data sets that should populate indicators are difficult to obtain, and are virtually non-existent in Africa. Three globally agreed indicators are: (i) quantity and types of waste managed or finally disposed of; (ii) waste generation per capita; and (iii) amount of waste recycled (UNEP 2012). These indicators are meant to help Governments, municipalities and industry measure performance and progress in improving the waste situation.

It is difficult to develop performance indicators for waste in Africa in a vacuum of waste-related data. Data on waste generation and disposal has not been recognized by the public and private sectors as valuable in waste planning and management. Valuable materials such as scrap metals (e.g. aluminium, iron, copper) recovered from waste are roughly weighed for their economic and market value, largely by buy-back centres or recyclers. It is therefore urgent to mandate stakeholders to create the infrastructure needed to record waste flows (e.g. weighbridges at landfills, scales at recyclers), establish waste information systems to support national planning purposes and assess the performance of waste management systems. Since waste generation is forecast to double by 2025 (Mwesigye *et al.* 2009), it is crucial to deal with the waste data vacuum so that meaningful plans can be made to effectively manage the anticipated increase in volume of waste.

Furthermore, because waste is now seen as a potential resource, waste data and indicators should be more closely linked to economic and social information systems and material flow accounting. The measurability issue is critical to assessing waste generation (municipal, industrial, agricultural, mining, radioactive, etc.). Data on transboundary movements of hazardous waste are not readily available from the Secretariat of the Basel Convention (SBC) because many African countries do not submit annual returns on hazardous waste to the secretariat. UNEP has developed a training manual on waste data collection that provides a ready-made tool for capacity-building to bridge the waste-data gap on the Africa continent (UNEP 2009).