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Chapter

Solid Waste Management in Africa: Governance Failure or Development Opportunity?

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Abstract

Waste management is a social, economic, and environmental problem facing all African countries. If the 2030 Agenda for sustainable development is to be achieved, sustainable waste management approaches must be an environmental and public health imperative deserving political priority. Current reasons for the poor management of waste in Africa, include, amongst others, weak organizational structures; lack of appropriate skills; inadequate budgets; weak legislation; lack of enforcement; low public awareness; corruption, conflict; political instability; and lack of political will. At the heart of the problem, is a failure in governance. However, through these gaps, many social and technological innovations have emerged. Innovations that recognize the opportunity that waste provides as a secondary resource. Diverting waste away from dumpsites and landfills towards reuse, recycling and recovery can improve the livelihoods of thousands of informal waste reclaimers, while also creating new jobs and business opportunities for the continent. Reintroducing secondary resources such as polymer, fiber, metals and nutrients back into local value chains has the potential to strengthen manufacturing economies and reduce the economic burden on product imports. Bringing waste under control in Africa and unlocking the opportunities that “waste” provides as “resource” will require immediate intervention by government, business and civil society.

Keywords: solid waste, infrastructure services, green jobs, recycling

1. Introduction

Africa is facing a growing waste management crisis. While the volumes of waste generated in Africa are relatively small, compared to developed regions, the mismanagement of waste in Africa is already impacting human and environmental health. However, Africa is set to undergo a major social and economic transformation over the coming century as its population explodes, cities urbanize and consumer purchasing habits change. This is expected to lead to exponential growth in waste generation (**Figure 1**), which will put considerable strain on already

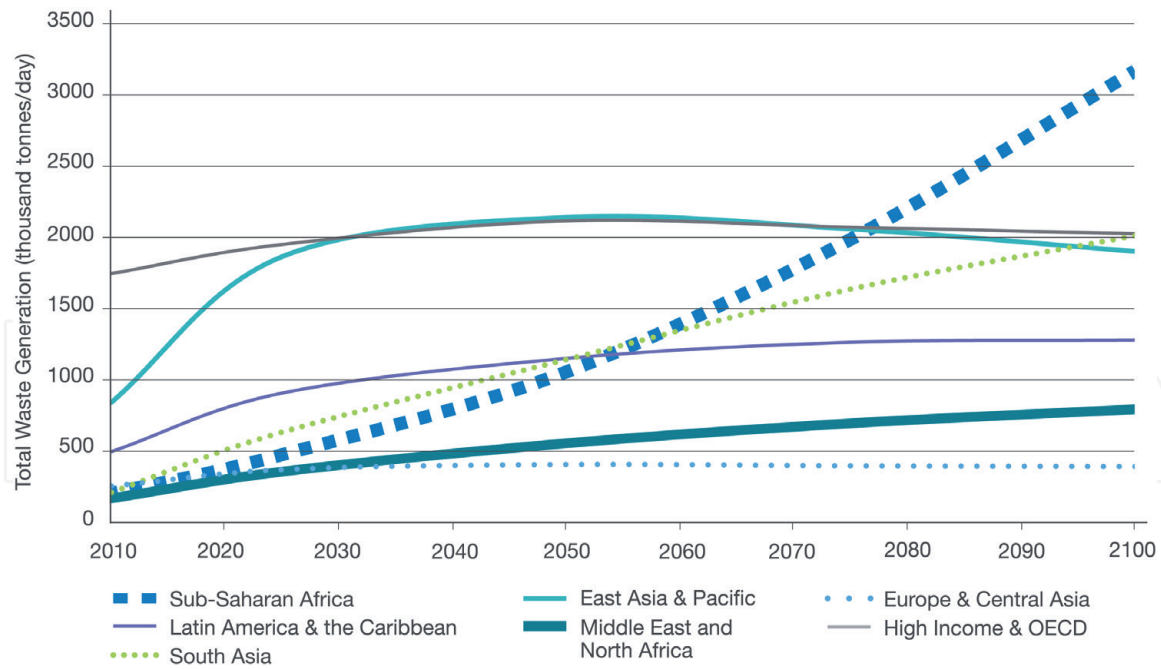


Figure 1.
Total municipal solid waste generation by region (adapted from [1]).

constrained public and private sector waste services and infrastructure, and further exacerbate the current state of waste management. In fact, the rate of growth in waste generation in Africa is expected to be so significant that any decrease in waste generation expected in other regions globally will be overshadowed by Africa, particularly Sub-Saharan Africa.

2. Background

The first Global Waste Management Outlook, published by the United Nations Environment Programme (UNEP) and the International Solid Waste Association (ISWA) in 2015 [2], highlighted the need for greater detail on the generation and management of waste at the regional level. The first Africa Waste Management Outlook published by the UNEP in June 2018 was in response to this global call [3]. The Africa Waste Management Outlook sets out the current state of solid waste management in Africa, including the state of waste governance; the associated environmental, social and economic impacts of waste; and the opportunities that waste provides through appropriate solutions and financing mechanisms. This chapter summarizes the key findings of the Africa Waste Management Outlook and places them within the context of development in Africa.

3. State of waste in Africa

Available data shows that 125 million tonnes per annum of municipal solid waste (MSW) was generated in Africa in 2012, of which 81 million tonnes (65%) was from sub-Saharan Africa [4]. This is expected to grow to 244 million tonnes per year by 2025. However, with an average waste collection rate of only 55% (68 million tonnes) [4], nearly half of all MSW generated in Africa, remains within our cities and towns, dumped onto sidewalks, open fields, stormwater drains and rivers. The average MSW collection rate in sub-Saharan Africa is lower at only 44%, although

the coverage varies considerably between cities, from less than 20% to well above 90% (**Figure 2**). The average MSW collection rate for the continent is expected to increase to only 69% by 2025 [4].

Good waste collection services are often only found in the city centres, while municipal waste services in suburbs and peri-urban areas are usually poor. The situation is much worse in rural areas where often no formal waste collection services exist. Current MSW collection services in most African countries are therefore completely inadequate resulting in the leakage of waste into the environment, including the freshwater and marine environment.

Considering that an estimated 80–90% of the MSW generated in Africa is recyclable, it makes little sense that more than 90% of the waste generated in Africa is still disposed of to land, typically to uncontrolled and controlled dumpsites. With so little regard for the opportunity that waste presents as secondary resource, only 4% of the waste generated in Africa is currently recycled, often by very active, but typically marginalized, informal reclaimers.

On average, 57% of MSW in Africa is wet, biodegradable, organic waste (**Figure 3**). This high organic waste content, relative to paper and packaging, is typical of MSW in developing countries. Biodegradable organic waste, such as food and garden waste, can be easily processed into valuable products such as compost or biogas, yet it remains largely an untapped resource for the continent. As a result, there is a growing move internationally, including in Africa, towards the decentralized management of organic waste through small-scale composting and anaerobic digestion due to the failures in municipal waste collection services [8].

A waste stream of growing concern for Africa is waste plastic, with an estimated 13% of the MSW generated in Africa being plastic (**Figure 3**), the bulk of which is also dumped to land [9].

Waste streams in Africa are also changing as consumer behavior changes and as new markets in a growing middle class emerge, with increasing volumes of packaging and waste electrical and electronic equipment (WEEE) being generated, often with inadequate end-of-life solutions for these products [10, 11]. Cheap and sub-standard products are increasingly being imported into African countries leading to new and emerging waste streams. The amount and types of hazardous waste are also increasing, with little awareness of its nature or management.

Food losses and waste in Africa are significant, occurring primarily at the early stages of the food supply chain [12]. In sub-Saharan Africa, roughly 37% of all the

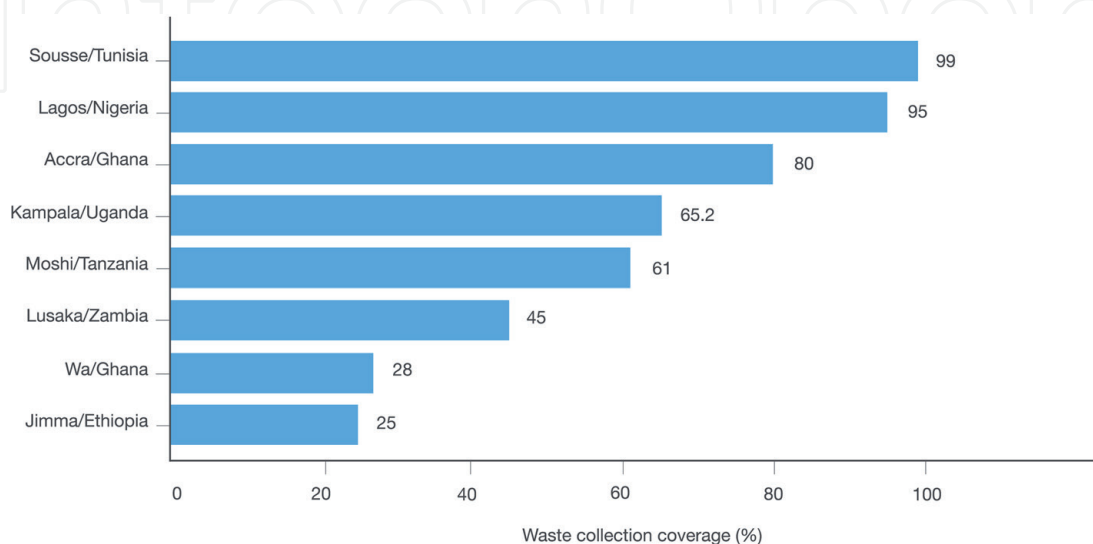


Figure 2.
MSW collection coverage for cities in Africa (adapted from [5–7]).

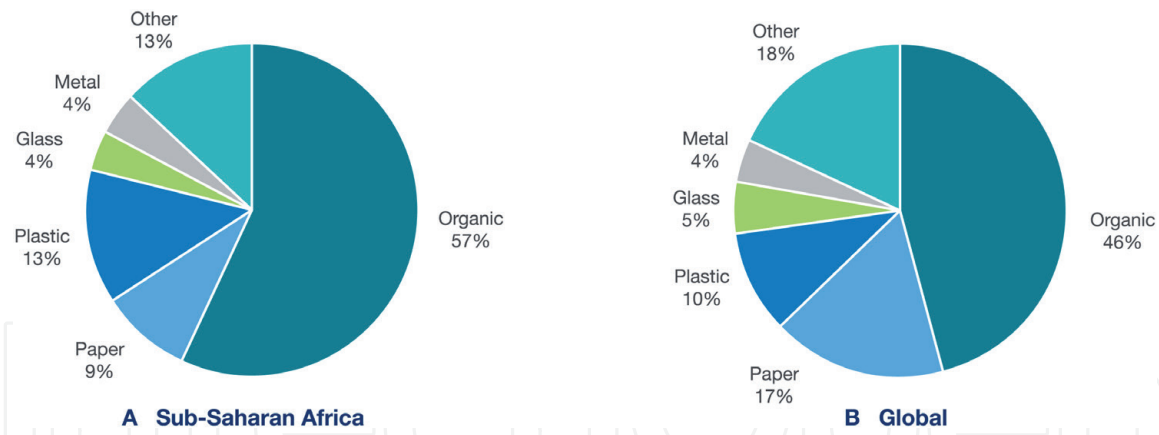


Figure 3. MSW composition in sub-Saharan Africa and global [9].

food produced is lost or wasted [12]. For a continent with high levels of poverty, hunger and malnutrition, the loss and wastage of more than a third of all food produced, is unacceptable.

4. Waste governance in Africa

A number of policies (international, continental and regional) are already in place to address pollution and waste in Africa. However, it remains unclear as to how these policies have been translated into action and what progress, if any, has been made towards achieving their objectives and commitments. The inability of governments to enforce waste and environmental legislation in many African countries has given rise to a culture of impunity and has weakened the effectiveness of waste management in general [13]. What is clear, is the inability of governments and private industry to keep pace with growing waste streams and the timely development of policies and strategies to effectively deal with it [14].



Figure 4. African countries that have implemented local or national bans against waste plastics (dark blue shaded) (adapted from [15]).

As a result, the response from many African countries has been to implement product bans on “problematic” products, particularly on single-use plastics. According to UNEP [15], 29 countries in Africa have already implemented some sort of regulation against plastics either at local or national level (**Figure 4**). These regulations vary from a ban on single-use (thin) plastic bags (and associated requirements for bag thickness) to complete bans on all plastic bags. The growing public outcry against plastic is now sparking action by governments on possible further bans on other single-use plastic products, such as PET beverage bottles and food services industry products such as plastic straws, cups, containers and utensils.

The slow adoption, limited use and poor design of economic instruments in solid waste in Africa, including alternative policy instruments such as extended producer responsibility (EPR) represents a “lost opportunity” [16].

In addition, the non-domestication of international agreements is making Africa an easy target for illegal dumping of hazardous waste from outside of the continent [17, 18].

5. Environmental and social impacts of mismanaged waste

Weak waste collection systems in Africa combined with uncontrolled and controlled dumping of waste, often associated with open burning, are causing significant economic, social and environmental impacts. Current waste management practices in Africa are resulting in the leakage of waste into the environment. Furthermore, the indiscriminate dumping of waste in urban areas creates risks of disease, flooding and environmental pollution. Research has shown a correlation between proximity to open dumpsites and incidence of disease, including increased risk of cholera, malaria, typhoid fever, dengue fever and Zika [19–22].

Open burning of waste causes significant air pollution which impacts human health and contributes to changing climates. These impacts are not always local, but can be far reaching. Methane and black carbon released through open burning of waste are short-lived climate pollutants with strong effects on regional and global climate change [2].

Africa has become a dumping ground for waste, particularly hazardous waste, often from developed countries, with many African countries, particularly in west and north Africa, becoming a global destination for end-of-life EEE and vehicles exported from developed countries in North America, Europe and Asia [16, 23, 24, 10]. Current electronic waste recycling practices, often informal, pose potential risks to people and the environment [25, 26]. Children and women are heavily involved in WEEE recycling in Africa, constituting the most vulnerable group for this waste. Recycling of used lead-acid batteries in informal workshops in Africa is a major source of lead pollution, exposing considerable numbers of people and the environment to adverse effects [27, 28].

Plastic as a percentage of MSW for sub-Saharan Africa is higher than the global average, at 13% [9] and is a waste stream of growing concern for the continent. With weak waste collection systems and disposal of waste to uncontrolled and controlled dumpsites, the leakage of plastic into the environment poses a significant threat to the environment and economies [29, 30]. This is compounded by the lack of recycling in Africa.

Improper waste management has serious health and environmental consequences. If it persists, it will undermine Africa’s efforts to achieve the sustainable development goals (SDGs).

6. The opportunities in waste as resource

With only a 4% recycling rate, opportunities to develop a “secondary resources economy” are still largely unexplored in Africa. Current waste management practices have resulted in waste being overlooked for the value that it can provide to local economies. As a result, viable polymer (from plastic), fiber (from paper), metals and nutrients (from organic waste), amongst others, are being lost to Africa’s economy through disposal of waste to dumpsites and landfills. Resources which could have been reintroduced back into local and regional economies to support manufacturing and reduce the economic burden on product imports.

Preliminary calculations suggest that diverting waste away from dumpsites towards reuse, recycling and recovery could, conservatively, inject an additional US\$8 billion every year into the African economy [31]. Creating significant socio-economic opportunities for the continent. And if done responsibly, at the same time address the environmental and human health impacts associated with the current mismanagement of waste. Waste therefore provides considerable opportunity for the continent if only it could be safely collected and directed towards reuse, recycling and recovery.

The informal sector has played a very active role to date in the collection and diversion of reusable and recyclable waste away from landfill in Africa. As such, integrating informal reclaimers into future waste management activities is key to unlocking these opportunities, while also ensuring their improved livelihoods. Labour-intensive collection, sorting and processing of secondary resources could also create many direct jobs and even more indirect and induced employment opportunities at higher levels of pay. Developing local end-use markets that support the local beneficiation of these secondary resources would also ensure that fewer jobs migrate with these secondary resources to other countries.

Because of the gaps that exist in current waste collection and disposal systems, and in waste reuse, recycling and recovery, many social and technological innovations have emerged on the African continent over the past decade. These include innovative waste collection models, such as Wecyclers in Nigeria or Packag-ching in South Africa. Wecyclers uses low-cost, environmentally friendly cargo bicycles called “wecycles” to provide households and businesses in Lagos with convenient collection services for recyclable waste [32]. The Wecyclers and Packag-ching collection programmes reward residents for their recyclables through convenient collection systems, often in areas with no or poor municipal waste collection systems. Innovative end-uses for waste have also emerged on the continent. The Rethaka Foundation’s Repurpose Schoolbag initiative addresses not only waste, but also aims to bring light to families and keep children safe while walking to school. The initiative collects and repurposes plastic waste such as PVC billboards into low-cost, highly visible schoolbags for local disadvantaged students, equipped with a small solar panel [32]. The PET recycling company (PETCO) model of voluntary Extended Producer Responsibility (EPR) for end-of-life PET plastic bottles, has resulted in a 65% post-consumer recycling rate in South Africa [33]. Utilizing both formal and informal actors in the value chain, the PETCO model is now being replicated in other countries in Africa, including Kenya, Ethiopia and Uganda [34].

Africa has however, recently seen investment in large-scale, traditional waste treatment technologies, such as the first waste PET plastic food-grade bottle-to-bottle recycling plant, established by Extrupet in South Africa in 2015. Extrupet has the capacity to recycle over 2.5 million PET bottles per day, converting the waste PET bottles into fiber, thermoforming, food-grade and strapping-grade material, thereby producing high-quality, reliable end-products for use in packaging and other applications [35]. The Reppie 50 MW waste-to-energy plant at the Koshe

dump in Addis Ababa, Ethiopia marks a significant transition in Africa's management of waste, with the establishment of a large-scale, MSW thermal treatment plant [35].

But uptake of alternative waste treatment technologies in Africa has generally been slow, with dumping and open burning of waste remaining the dominant "technology" choice for the management of waste on the continent. While many alternative waste treatment technologies are available worldwide, only some of them are appropriate, or economically viable, for Africa, at least in the short- to medium-term.

Given the current state of waste management in most African cities, conventional waste treatment technologies are often difficult to implement. A combination of small-scale, low-cost, decentralized, community-driven initiatives and larger-scale, higher-cost, centralized initiatives will therefore be required for Africa. Low-technology (and low-cost) solutions such as cargo bicycles, motor tricycles or donkeycarts are often good alternatives for waste collection in African cities, particularly where access is constrained. Recycling technologies are already being implemented for wastes such as plastic, paper, glass, metal, oil, e-waste and organic waste, but need to be significantly scaled up through the development and strengthening of local and regional end-use markets.

Although almost all African countries have some policies that dictate how waste should be managed, there are many factors that constrain the waste management system in Africa. These factors include weak legislation, lack of enforcement, low public awareness, negative attitudes, the poor state of services, corruption, political instability and conflicts [36].

Poor financing is a major constraint to the development of the waste sector in Africa. This is largely due to the fact that the waste sector is still perceived as a high-risk investment in Africa [37]. There are tremendous challenges and constraints to waste management finance and to setting up sustainable revenue models in Africa. Existing waste management financing models currently used in Africa are limited, aggravated by weak institutional frameworks and poor governance of public resources. Strengthening institutions and regulatory frameworks is therefore paramount in reducing the perceived sector risk. There is a huge need for investment finance in the waste sector. However, raising investor confidence is a challenge, particularly in low income countries. Project costing and cost recovery is often poorly understood by government agencies in charge of waste logistics and management.

Estimated investment needs for the sector range from US\$6–42 billion (in 2015), depending on the alternative waste treatment technologies implemented. These figures are expected to triple to US\$17–125 billion by 2040, given current population growth and urbanization patterns and assuming investment in large-scale waste technologies [37]. Public-private partnerships will therefore be key to unlocking the opportunities that waste provides as secondary resource for the African continent.

7. Conclusions

Africa faces many challenges with respect to solid waste management. Factors such as lack of awareness; weak environmental legislation and enforcement; and limited resources, including financial resources, result in inefficient waste management in most African countries, which directly impacts upon human and environmental health. Available evidence suggests that the current poor state of solid waste management is largely due to failures in governance and organizational weaknesses resulting in poor service delivery and a perceived high risk for private

sector investors. The economic, social and environmental costs of inaction—of doing nothing—far outweigh the cost of implementing waste management solutions on the continent, and if the 2030 Agenda for sustainable development is to be achieved, action has to be taken.

While the costs of implementing alternative waste treatment technologies is suggested to be in the range of US\$6–42 billion, diverting waste away from dumpsites and landfills towards reuse, recycling and recovery could inject a potential US\$8 billion per annum of resource value into the African economy. This will result in improved livelihoods for informal reclaimers and the creation of new job and business opportunities for the continent.

But African countries cannot harness the development opportunity that waste provides, if waste remains scattered, uncollected across our environment, and our towns and cities, and if there is no incentive (political, legislative or economic) to divert waste away from dumpsites and landfills into economically productive value chains.

The African Union has set an aspiration that “*African cities will be recycling at least 50% of the waste they generate by 2023*” [38, 39]. The authors of the Africa Waste Management Outlook fully support the goal of the African Union and believe that even higher rates can be achieved, by developing appropriate collection systems and end-use markets for the following opportunity waste streams

- i. Composting, bioenergy recovery (e.g. anaerobic digestion) or higher value product recovery (biorefinery) of organic waste
- ii. Reuse and recycling of paper and packaging e.g. plastic, paper, metal, glass
- iii. Refurbishment, repair, reuse, recycling of electronic waste

The Africa Waste Management Outlook has set out a vision for Africa to “*Extend regular and reliable waste collection services to all, with safe disposal of residual waste to engineered landfills, while maximizing the recovery of secondary resources from these waste streams through social and technological innovations appropriate for Africa.*”

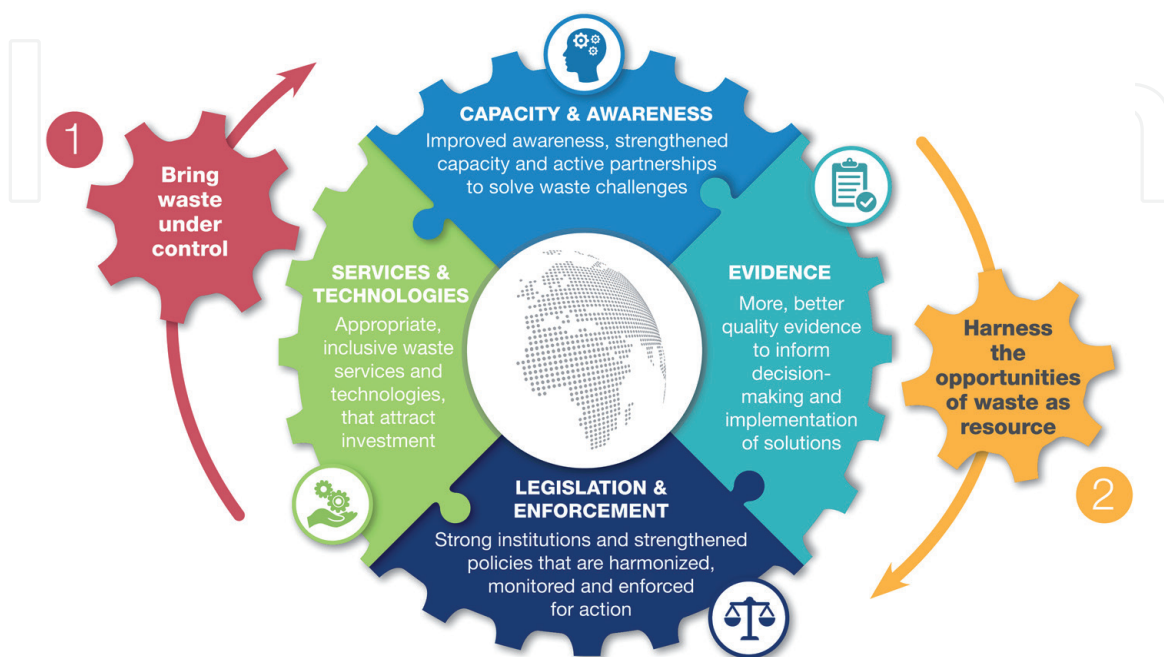


Figure 5.
Proposed approach to addressing solid waste in Africa [3].

This requires that government, business and civil society “*bring waste under control*” (i.e. collection services for all and safe disposal of waste to engineered landfills), while simultaneously “*harnessing the opportunities of waste as resource*” through reuse, recycling and recovery. This will require a clear strategy for (i) capacity development and awareness raising, (ii) evidence generation and use in support of decision-making and policy development, (iii) strengthening institutions, policies and enforcing legislation, and (iv) adopting appropriate, inclusive waste services and technologies (**Figure 5**).

Good governance is crucial for creating an enabling environment for sustainable materials management (including waste management) [40]. As such, there is a need to strengthen capacity (financial, institutional, technological and infrastructural) to drive environmentally sound waste management [41]. Since solid waste management is a sustainable development issue that cuts across socio-economic activities, it must be considered a political priority for Africa.

Finally, regional and sub-regional approaches to solving solid waste issues in Africa, with sharing of information and experiences, must be explored as capacity and resources vary greatly between countries.

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