PLASTIC WASTE MANAGEMENT IN AFRICA

AN OVERVIEW

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INTRODUCTION

There has been a brewing crisis in waste management in recent years. Rapid urbanisation and consumerism have led to an increase in plastic waste across the world. As plastic waste generation accelerates at an alarming rate, waste management systems across the world are grappling with ways to address the consequential problems. Littered plastic waste on land and areas surrounding aquatic environments, has been finding its way into water bodies, gravely affecting marine ecosystems. Discussions and deliberations regarding the adverse effects of plastic waste, and the mitigation measures and strategies needed to deal with the problem, have also been growing simultaneously. Yet, huge quantities of plastic continue to be produced, used and mismanaged. According to a study published in 2017 titled, *Production, use, and fate of all plastics ever made*, nearly 8.3 billion tonnes of plastic have been produced globally.[1] The same study reported that as of 2015, approximately 6.3 billion tonnes of plastic waste had been generated. Out of which, only nine per cent of the plastic has been recycled and 12 per cent incinerated, and a monumental 79 per cent have ended up in landfills.[2] Around 4.9 billion tonnes of plastics—amounting to 60 per cent of all plastics ever produced—were discarded and are now accumulating in landfills or in the natural environment.[3]

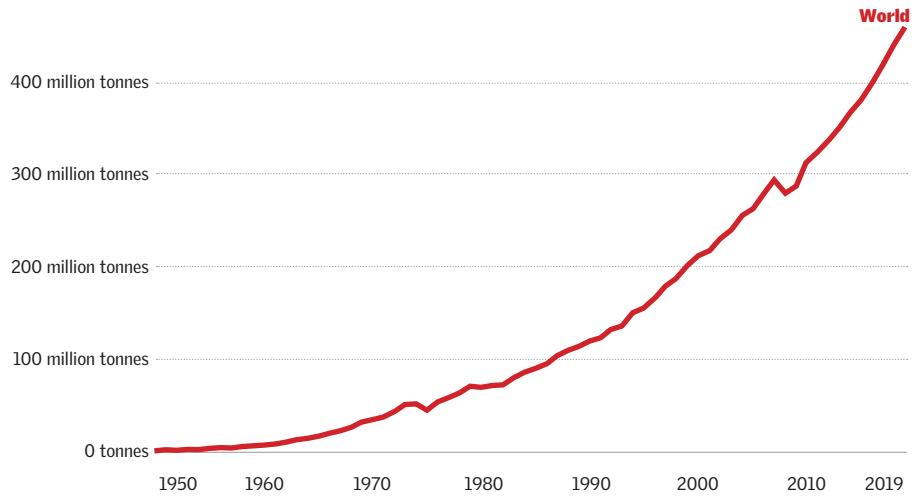
Plastic waste generation primarily depends upon plastic consumption and the operational life of the plastic product. Due to a sharp rise in the global plastic production, the quantum of plastic waste that is generated has also grown in tandem over the years. In 1950, the world produced only two million tonnes of plastic per year.[4] Since then, the annual production has increased nearly 230-fold, reaching 460 million tonnes in 2019.[5] There was a decline in the annual production of plastic in 2009–10 but that could be mainly attributed to the 2008 global financial crisis.

According to a report published by the United Nations Environment Programme (UNEP) in 2021, titled, *From pollution to solution: A global assessment of marine litter and plastic pollution*, it is highlighted that plastic pollution in oceans and other water bodies continues to rise sharply, and could double by 2030.[6] The report also points out that there is a growing threat of plastic pollution across different ecosystems, and provides a strong scientific case for urgent action. Riverine and marine litter, especially plastics and microplastics, have become a burning issue due to the transboundary movement of waste, and the associated impacts on health and society.

Synthetic polymers, also termed "plastics," primarily include seven main categories—polypropylene, polyethylene, polyvinyl chloride, polystyrene and polyethylene terephthalate.[7]

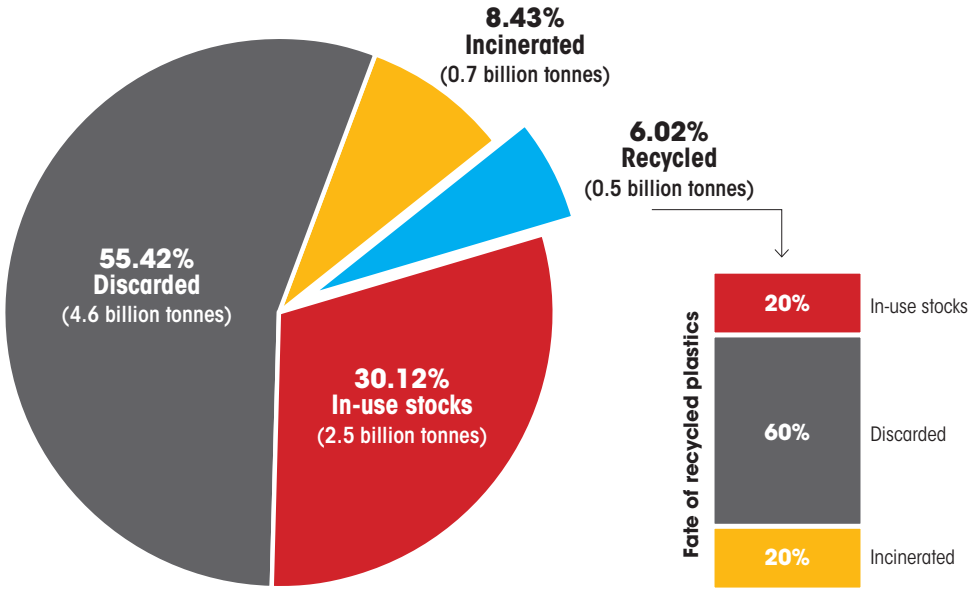
Plastic waste is often distinguished on the basis of its size (in diameter): (1) microplastics which are smaller than 5 mm, (or than 1 mm in some studies) and (2) macroplastics which are larger than 5 mm in size.[8] Plastic bags usually fall within the category of macroplastics. Different end-of-life plastic products can be classified according to their sizes. Macroplastics can be found in sources like rivers, streams and areas close to seashores that see intense human activities, such as tourism. Whereas, microplastics can be generated in two forms: (i) primary microplastics are tiny particles designed for commercial use, such as industrially manufactured small-sized microbeads used in personal care products, industrial scrubbers, plastic powders,

Graph 1: Global plastic production



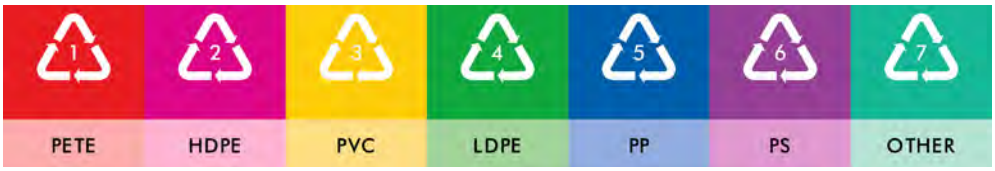
Source: https://ourworldindata.org/plastic-pollution

Graph 2: Global production, use and fate of polymer resins, synthetic fibers and additives (1950 to 2015)

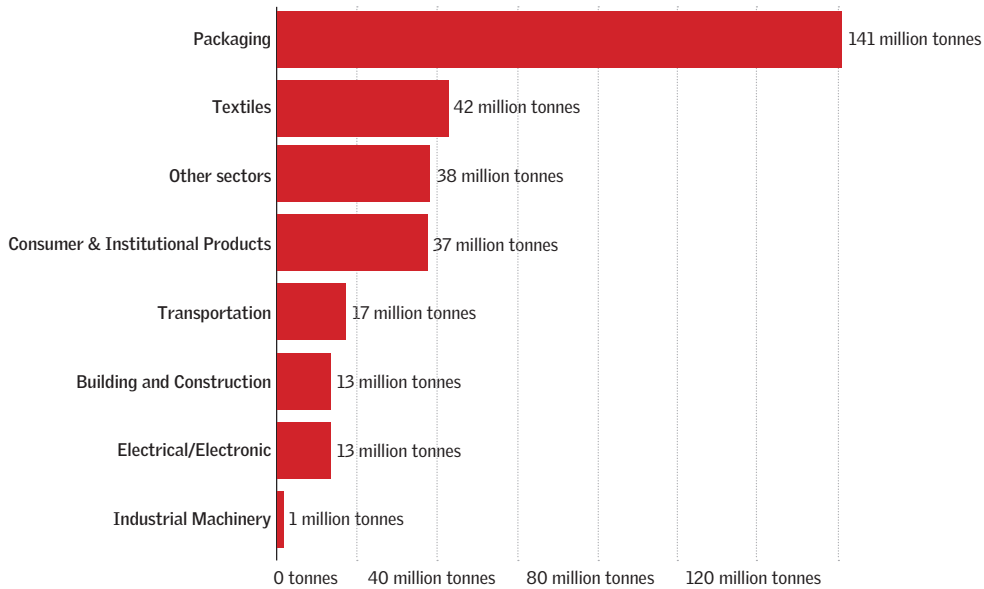


Source: Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. Science advances

Plastic resin identification codes (RIC)



Graph 3: Plastic use by sector



Source: https://ourworldindata.org/plastic-pollution

etc. (ii) secondary microplastics are particles that are created from the fragmentation of larger plastic items, such as water bottles, textiles, tires etc. The fragmentation of plastic items into smaller microplastics is caused by environmental factors such as solar radiation and ocean waves. The issue of microplastic pollution is growing and studies have indicated that microplastics have found their way into items like salt, sea food, crops etc.

The problem with both macroplastics and microplastics is that they are non-biodegradable by nature. They do not readily break down into harmless molecules. Plastics can take hundreds to thousands of years to decompose—and in the meantime, wreak havoc on the environment. On beaches, microplastics can be found as tiny multi-coloured plastic bits in the sand. In the oceans, microplastics are often consumed by marine animals. Once they are released into the environment, plastic bags take up to 1000 years to break down, and they photodegrade instead of biodegrade—which means they break down into smaller and smaller pieces. Plastic bags constitute more than a third of the plastics used by humans.[9] Since plastics are lightweight, strong, durable and cheap, they are also widely used in manufacturing a range of products,such as pipes, footwear, fabrics, public health equipment and furniture.

PLASTIC WASTE BY SECTOR

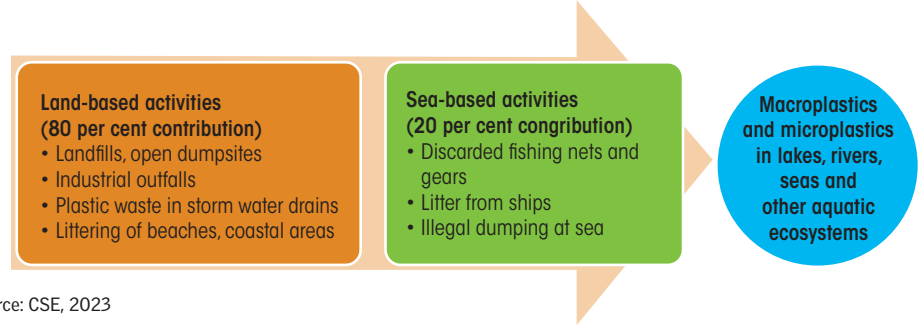
Graph 3 represents sector-wise generation of plastic waste. It is important to note that plastic waste generation is not only determined by primary plastic use, but it also depends on the product's operational life. Packaging, for example, has a very short 'in-use' lifetime (typically around six months or less). This is in contrast to building and construction material, where plastic use has a mean lifetime of 35 years.[10] As a result, the packaging sector is the leading generator of plastic waste and is responsible for almost half of the total plastic waste generated globally. In 2015, the total primary plastic production was 407 million tonnes and the total plastic waste generation was 302 million tonnes.

TOXINS IN PLASTIC WASTE

Due to properties such as lightweightness, strength, durability, affordability, resistance towards corrosion and cost-effectiveness, there have been several gainful applications and benefits associated with polymers in the past. Humanity's reliance on plastics for a variety of applications increased over the years, beginning with the first experiments with natural polymers, horn, waxes, natural rubber and resins—until the nineteenth century, when the development of modern thermoplastics began.[11] Plastic eventually became a problem due to its unsustainable and irresponsible use driven by the growing demands of urbanisation and consumerism. In the last two decades, plastic has become a menace as most developing economies, including those of African countries, are practicing the linear economy model based on the principle of "take-make-dispose". In such a scenario, a huge quantity of waste, including plastic waste, is generated and they eventually end up in dumpsites. Mismanagement of plastic waste has an adverse impact on human health, and leads to loss of livelihoods, greenhouse gas emissions, biodiversity loss and compromised ecosystems in all of Africa's land and seascapes.

Presently, a wide range of additives are used along with plastic to manufacture various products and commodities. This is creating an environmental and health crisis. For instance, products such as plasticizers, flame retardants, antioxidants, acid scavengers, light and heat stabilisers, lubricants, pigments, antistatic agents, slip compounds, and thermal stabilisers are blended with plastics to impart certain properties which lead to different hazards. Many additives, especially plasticizers such as adipates, polymerics, trimellitates, 1,2-cyclohexanedicarboxylic acid diisononyl ester, citrates, phthalates, etc. are used in plastic products which can can cause health and enviromental hazards. It is reported that the long-term exposure to phthalates such as dibutyl phthalate and diethyl hexyl phthalate, that are relatively less toxic, may still lead to liver and kidney damage, and can have carcinogenic impacts.[12]

Figure 1: Major sources of plastic waste



Source: CSE, 2023

Plastic from households: Many researchers across the globe have indicated that land-based activities that contribute the most to macro- and microplastic pollution are un-collected and mismanaged solid waste that finds its way into land and marine ecosystems. In developing countries, plastic waste generated from households, such as plastic bottles, multi-layered plastic packaging material, carry bags etc. are typically not collected by a formalised system. Some fraction of the waste that is recyclable in nature is picked-up by the informal sector (waste pickers). However, a significant part of it, mainly the non-recyclable fractions, remain un-collected and end up in dumpsites or as litter in the surrounding environment. As reported by the Africa Waste Management Outlook Report (2018), plastic waste accounts for nearly 13 per cent of the total municipal solid waste generated in the Sub-Saharan region.[13]

Plastic from the fishing sector: Along with land-based sources of plastics that enter the ocean, waste generated from Africa's shipping and maritime activities, such as aquaculture and fishing, also contribute heavily to ocean litter. It has been reported that obsolete fishing gear, such as various types of plastic nets, contribute to an estimated additional 640,000 tonnes of marine debris globally.[14] According to a 2020 study conducted by the UNEP and IUCN (International Union for Conservation of Nature), it was highlighted that between 12–36 per cent of the plastic that is consumed in the fishing sector (including fishing nets and packaging used on board) leaks into the marine and coastal ecosystem, contributing to plastic pollution in seas and oceans.[15] However, it is also to be noted that leakage from fishing activities usually contributes less than one per cent to the total plastic leakage.

Table 1: Types of plastics, their properties and health impacts

Symbols	Table of Plastics	Common Uses	Properties	Negative Health Effect	Recycled Into
	Polyethylene terephthalates	Water bottles, soft drinks, salad dressing and domes, containers and biscuit trays	Tough, clear, solvent resistant, a barrier to moisture and gas softens at 80 °C	Causes carcinogens, vomiting, diarrhoea	Sleeping bag and pillow filling, carpeting, clothing, soft drink bottles, building insulation
	High-density polyethylene (HDPE)	Freezer and shopping bags, buckets, shampoo, ice cream and milk containers, juice bottles, chemical and detergent bottles, rigid agricultural pipe, crates	Hard to semi-flexible, resistant to chemicals and moisture, waxy surface, opaque, softens at 75 °C, easily coloured, processed and formed	Stomach ulcers	Recycling bins, compost bins,
	i. Polyvinyl chloride (PVC) ii. Plasticized polyvinyl chloride PVC-P	Cosmetic containers, plumbing pipes and fittings, electrical conduct, blister packs, wall cladding, roof sheeting, bottles, garden hose, shoe soles, cable sheathing, blood bags and tubing	i. Strong, tough, softens at 80 °C, can be solvent welded and clear. ii. Flexible, clear, elastic, can be solvent welded	Interferes with hormonal development	Compost bins
	Low-density polyethylene (LDPE)	Refuse bags, irrigation tubings, mulch film, cling wrap, garbage bags, squeeze bottles	Soft flexible, waxy surface, translucent, softens at 70 °C, scratches easily	Not recyclable	Bin liners, pallet sheets
	Polypropylene (PP)	Lunch boxes, microwave dishes, garden furniture, kettles, bottles and ice cream tubs, potato chip bags, straws and packaging tape	Hard and translucent, softens at 140 °C, withstands solvents, versatile	No known effects	Pegs, bins, pipes, pallet sheets
	i. Polysterene (PS) ii. Expanded polysterene (PS)	CD cases, plastic cutlery, imitation glassware, low-cost brittle toys, video cases/foamed polystyrene cups, protective packaging, building and food insulation	i. Semi-tough glassy rigid clear or opaque, material, it softens at 95 °C, affected by fat, acids and solvents, but resistant to salt solutions and alkalis, low water absorption, when not pigmented it is clear, odour- and taste-free. ii. Special types PS are available for special applications	Takes a thousand years to degrade	Recycle bins
	Polycarbonate and others	Automotive and appliance components, computers, electronics, cooler bottles, packaging	Includes all resins and multi-materials (e.g., laminates) properties dependent on plastic or combination of plastics	Obesity, cancer, endocrine problems in foetuses and children	Recycle bins

Source: Adeniran, A. A., & Shakantu, W. (2022). The health and environmental impact of plastic waste disposal in South African townships: A review. International Journal of Environmental Research and Public Health, 19(2), 779.

https://www.downtoearth.org.in/news/waste/when-oceans-fill-apart-60629

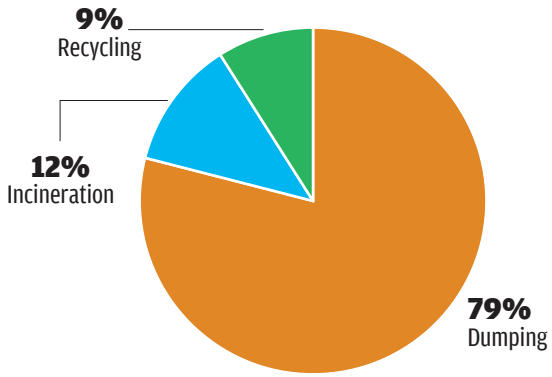
Marine litter due to plastic waste

Plastics and marine litter: Marine plastic litter has been drawing global attention as an emerging environmental concern. According to a 2018 UNEP report, "more than 8 million tonnes of plastic end up in the oceans, wreaking havoc on marine wildlife, fisheries and tourism, and costing at least US $8 billion in damages to marine ecosystems".[16] A study conducted by the University of Georgia and the University of California in 2015, reported that nearly 275 million tonnes of plastic waste was generated in 192 coastal countries in 2010, with 4.8 to 12.7 million tonnes entering the ocean. It is projected that with the current consumption pattern, by 2050, plastic consumption will account for 20 per cent of the total oil production in the world.[17] This will act as a huge threat to the ambitious targets set by nations across the world for tackling climate change. Reportedly, every part of the ocean, including unchartered territories, are now deeply affected by plastic pollution. Marine litter and its effects can impact benthic environments, leading to the loss of biodiversity and impacting overall ecosystem functions.[18] [19] [20] It is estimated that 267 species are affected by marine litter globally, of which 86 per cent are sea turtle species, 44 per cent are seabird species and 43 per cent are marine mammal species.[21] Plastic litter in particular, is estimated to lead to mortality, either directly or indirectly through entanglement or ingestion, among one million seabirds, 100,000 marine mammals (including 30,000 seals) and 100,000 turtles globally every year.[22] Secondary long-term impacts are usually associated with the fate of and interactions with in-situ debris over a prolonged period of time. Ecosystem deterioration can result from a combination of these impacts, such as habitat damage (physical damage, fishing gear), reduced population size (bio-accumulation of toxins, increased competition from invasives, higher mortality rates) and biodiversity loss.

STRATEGIES AND APPROACHES TO MANAGE PLASTIC WASTE

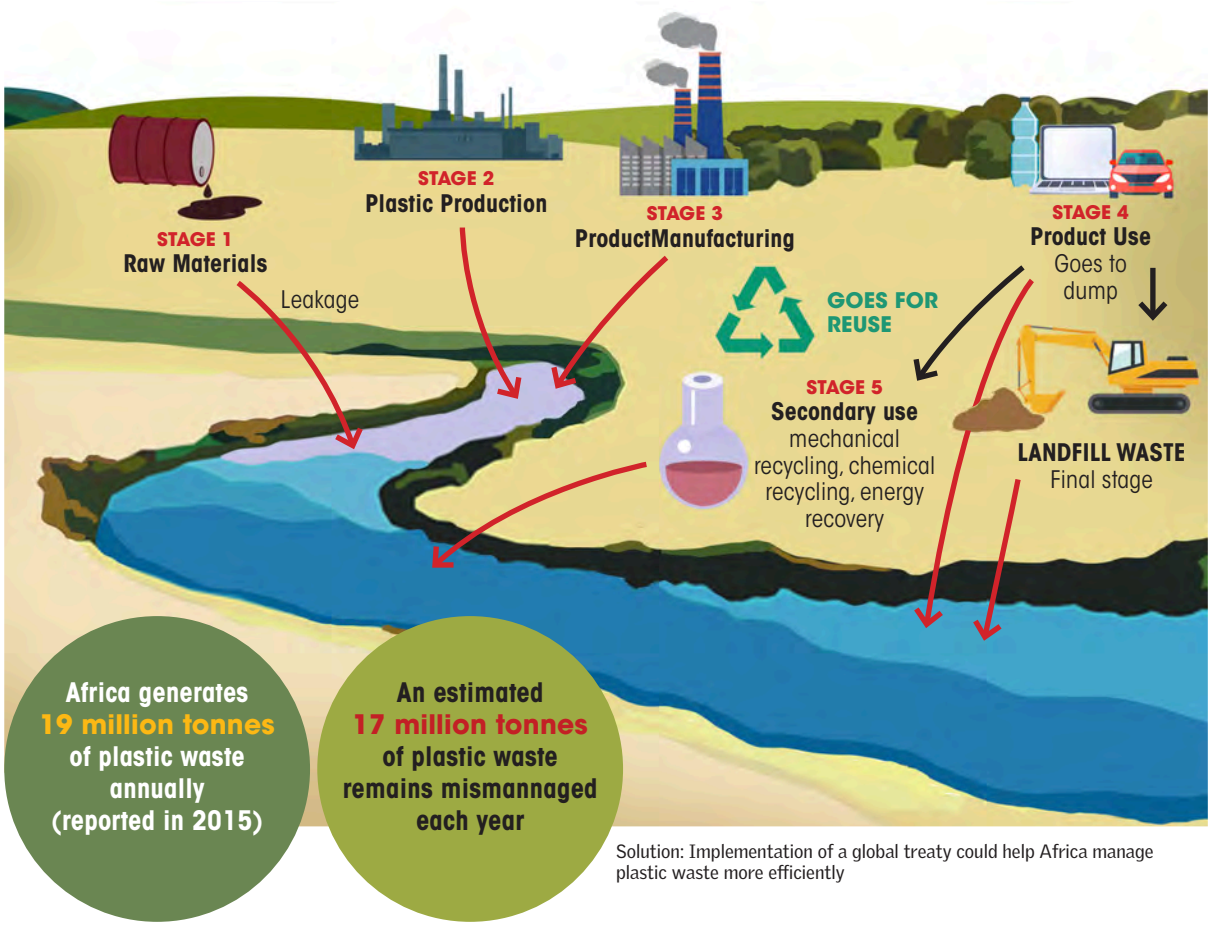
To comprehensively address plastic waste and its ever-growing impacts, it is important to realise that the production, consumption and impact of plastic waste on the environment are a result of multiple activities that need the involvement of several stakeholders. This makes the challenge of managing plastic waste systemic in nature, which implies that solutions need to be built and integrated at multiple fronts, starting with regulatory mechanisms. It also requires the implementation of closed loop measures such as the promotion of alternatives to plastics, certifications and standardisation of plastic-alternative products, eco-designs, and digitalisation to enable transparency and accountability in plastic waste management systems among others. Furthermore, strategies to encourage citizens towards reduced plastic use—especially single-use plastics—and helping them shift to viable and sustainable alternatives are urgently needed. Additionally, the informal waste sector needs to be strengthened to ensure holistic plastic waste management in developing countries, especially in Asia and Africa. Schemes and policies like Extended Producer Responsibility (EPR) can ensure that plastic producers undertake the

Graph 4: Fate of plastic waste across the world



Source: Sadan, Z. and De Kock, L. 2021. Plastic pollution in Africa: Identifying policy gaps and opportunities. WWF South Africa, Cape Town, South Africa

Figure 2: State of plastic waste in the environment



Solution: Implementation of a global treaty could help Africa manage plastic waste more efficiently

Source: https://mg.co.za/article/2022-02-24-south-africas-support-for-strong-global-plastic-treaty-hailed-as-progressive/

responsibility (of plastic products) of creating better material collection, take-back schemes, improved recycling and recovery rates, and contribute to minimising the leakage of plastics into the environment.

Despite recent efforts, plastic recycling continues to be an economically marginal activity. On a global scale, only nine per cent of the total plastic waste that is produced gets recycled and the majority of it gets dumped into landfills.

Presently, many countries have adopted thermal treatment as a way to deal with a significant fraction of collected plastic waste. Incineration is an alternative to open dumping and landfilling plastic waste. However, since the combustion of plastics releases dioxins, furans and polychlorinated biphenyls (PCBs) into the atmosphere, there are increasing concerns about the possibility of hazardous chemicals, such as halogenated additives and polyvinyl chloride[23] being released during the process which may adverse health effects such as a damaged nervous and respiratory system, skin issues and affecting the overall immune system. In addition to this, the particles that are released during incineration tend to settle on the soil, water and plants. These particles may later percolate into the soil, destroying soil quality, affecting the quality of aquifers, and also entering the food chain through their absorption into plant tissues and eventually, the bodies of humans and animals. Contrary to recycling and landfilling, the incineration of plastic is less commonly used for waste management due the higher potential of causing immediate pollution.

The global approach to tackling marine litter needs to be multifolded, bringing together policy, financial and technological measures. The Convention on Biological Diversity, in its 20th meeting held in Canada, lists out the overarching framework on mitigating plastics pollution covering the entire lifecycle with upstream and downstream approaches as illustrated in the following figure.

Overarching framework on mitigating plastic pollution

UPSTREAM Approaches	Improved product and packaging design
	Reduced usage of plastic in packaging
	Economic instruments such as fees for single-use items
	Regulatory measures to prevent marine debris
	Bans on certain items (e.g., plastic bags, microbeads);
	Engaging with the industry on sustainability, including plastics disclosure policies
	Innovation: new materials, manufacturing, recycling and product design using alternatives as opposed to conventional plastics (incorporating life cycle approach, having comparable performance characteristics; are fully biodegradable under ambient conditions)
	Providing viable alternatives to synthetic plastic (e.g., bioplastics and natural compounds);
	Eco-labelling/certification schemes
	Encouraging reuse and reduction models
Improving awareness and capacity building on marine debris	
Potential use of waste as a resource (ensuring resource efficiency)	DOWNSTREAM Approaches
Deposit return programmes	
Improving waste management infrastructure to prevent debris leakage to natural systems	

Source: CBD (2016): Marine Debris: Understanding, Preventing and Mitigating the Significant Adverse Impacts on Marine and Coastal Biodiversity, CBD Technical Series No. 83, Montreal: Secretariat of the Convention on Biological Diversity

PLASTIC WASTE MANAGEMENT IN AFRICAN COUNTRIES

According to a 2021 WWF report titled, *Plastic Pollution in Africa: Identifying policy gaps and opportunities,* the per capita plastic consumption in Africa in 2015 was 16 kg per person, compared to the global average of 45 kg per person and 136 kg per person in Western Europe.[24] Plastic waste generation in Sub-Saharan Africa is dependent on many factors such as urbanisation, economic development etc. The population of sub-Saharan Africa is around 1 billion (as of the year 2019), the quantity of total waste generated in Sub-Saharan Africa is 180 million tonnes, out of which 17 million tonnes of plastic waste is generated annually, as reported by the University of Johannesburg, the University of Botswana and the City East Campus, University of South Australia.[25]

Recently a study was conducted by the International Union for Conservation of Nature (IUCN) and the United Nations Environment Programme (UNEP) to estimate plastic flows and plastic leakage rates in four African countries, including Kenya, Mozambique, South Africa and the Republic of Tanzania. The study reported that a total of 190,000 tonnes of plastic leaked into the marine environment from these countries in 2018, with South Africa contributing the largest volume (107,000 tonnes) and Mozambique the least (17,000 tonnes).[26]

Proper disposal is particularly important when it comes to plastics. The majority of post-consumer plastic waste that gets collected, ends up in open dumpsites and (unscientific) landfills. The plastic waste crisis is getting aggravated in low-and middle-income countries, and especially in developing economies. This can be mainly attributed to less developed infrastructure, lack of human resources, lack of equitable allocation of economic resources, and systemic poverty.[27] Other challenges include lack of financial and human resource support for government institutions to build, manage and enforce waste management policies. Informal stakeholders are crucial in these developing economies where their major focus is on primary collection and sale of recovered products. It is often seen that the plastic and packaging materials recovered by the informal sector have immediate market potential as well as profitability (thus naturally prioritising higher value over lower value plastics). Flexible plastics, especially the multilayer materials, are difficult to collect, store and process.

EFFECTIVE STRATEGIES FOR PLASTIC WASTE MANAGEMENT IN DEVELOPING COUNTRIES

Globally, it has been recognised that a single policy measure or one specific targeted intervention is not sufficient to monitor and manage plastic waste. A series of actions and collective efforts from a diverse set of stakeholders is needed. Effective plastic waste management demands collaboration and coordinated efforts when it comes to planning and execution. In addition to this, many developing countries have banned single-use plastic (SUP) products as a common regulatory measure to address the plastic waste crisis.

Plastic waste ending up into the Pugu dumpsite in Dar-es-Salaam in Tanzania

Currently countries with a ban on single-use plastic bags include Senegal, Côte d'Ivoire, Mali, Ghana, Kenya, Ethiopia, Malawi, Mauritius, Zanzibar (Tanzania) and Uganda. However, it has been observed that the enforcement and execution of the bans is quite challenging. Additionally, a major reason for the failure of the plastic ban is lack of consumer action, weak enforcement plans and non-availability of cheaper alternatives.

POLICIES GOVERNING PLASTIC WASTE ACROSS THE GLOBE

Plastic pollution has become a widespread problem due to unsustainable patterns of plastic production and consumption. To address this issue, governments must effectively try to create and implement a variety of policy instruments to target appropriate points across the lifecycle of plastics. The production of plastics has accelerated in the last few decades, but policies have lagged behind. Most rules and regulations mainly focus on bans and levies as tools to reduce plastic waste.

A good example of a regulatory framework that was created to tackle plastic pollution is the levy on plastic bags that was implemented in Denmark in the early 1990s.[28] By early 2000s, several countries like Bangladesh, Rwanda, and China also imposed bans on plastic bags.

As far as as the transboundary movement/import of plastic waste is concerned, the Basel Convention and the Bamako Convention are important and legally-binding instruments that specifically address the issue of hazardous waste and plastic waste globally. The Bamako convention is a response to Article 11 of the Basel convention which encourages parties to enter into bilateral, multilateral and regional agreements on hazardous waste to help achieve the objectives of the convention which is regulation of import and transboundary movement of waste having hazardous characteristics. The Bamako Convention is a treaty of African nations prohibiting the import of any hazardous (including radioactive) waste into Africa. The convention came into force in 1998. In addition, the discussions on a plastic treaty negotiating for a global agreement on plastic pollution and the mandate of the international negotiating committee (INC) to be established are futuristic steps that will aid in the global commitment to tackle plastic pollution.

When it comes to global collective action on tackling marine litter and plastic pollution, the G20 Osaka Leaders' Declaration (2019) had laid out a vision to address the issue of littering, and to preserve the natural ecosystem. "Osaka Blue Ocean Vision," envisages that by 2050, pollution by marine plastic litter needs to be reduced to zero by adopting a comprehensive life-cycle approach. This includes improving waste management systems and promoting innovative solutions while recognising the important role plastics play in society. The G20 group of countries have also planned for a set of actions, as illustrated in the following figure.

Figure 3: G20 vision to tackle plastic pollution

	Prevention and reduction of plastic waste generation (e.g. establishing EPR systems, addressing the use of SUPs at regulatory or voluntary levels, promoting environmentally-friendly product design, and regulating the use of microbeads for cosmetic and personal care products)
	Environmentally-sound waste management and cleanup of marine plastic litter
	Promotion of innovative solutions (such as for product design, resource efficient and circular approaches)
	Multi-stakeholder involvement and awareness-raising
	Sharing scientific information and knowledge: R&D and monitoring (e.g., mapping of marine litter and microplastics, and technology development for alternative materials to plastic)
	Promotion of international cooperation

Source: https://g20mpl.org/wp-content/uploads/2019/10/G20-Report-on-Actions-against-Marine-Plastic-Litter_First-Information-Sharing-based-on-the-G20-Implementation-Framework.pdf, accessed on 22 February 2022

Command and control (C&C), or other regulatory measures

These measures can be adopted and enforced by public authorities to ensure that the level of performance required or the technologies to be used and to restrict the production or consumption of particular materials or products.

This may inlcude bans, emission standards, discharge/effleuents or input thresholds or limits, as well as product design standards or certifications which can be applied at different (or multiple) points across the plastic value chain

Market-based instruments (MBIs)/ economic/ price-based instruments

These are designed to incentivise producers and consumers to ensure a behaviour change, adopt resource efficent approaches and reduce negative impacts. The various measures may include a variety of instruments such as
* taxes and fees that account for the externalities associated iwth production or consumption activities
* adoption of systems like deposit-refund schemes;
* provision of subsidies to encourage sustainble manufacture to encourage design and use of better products (e.g. a reusable product over a single use one);
* implementation of mandatory labelling or design requirements for particular products

There is a clear requirement to holistically implement policies and technological interventions that could foster a resilient system for plastic waste management. According to the World bank (2022), government policy to manage plastic pollution can be primarily categorised into command-and-control (C&C) measures, market-based instruments (MBIs), and a variety of other instruments designed to improve governance, drive behavioural change and stimulate investment.[29]

With the developments on tackling the issue of plastic pollution, currently out of 54 states in the African continent, nearly 34 nations have imposed restrictions on single-use plastic bags, as highlighted in the figure below. A key issue faced across countries is the implementation, especially with relation to the financial resources required for managing the end-of-life of plastics. It is also to be noted that there is less harmonisation when it comes to efforts for a coordinated approach for the implementation of regulations across countries in the continent. This leads to leakage of plastic waste in ecosystems and also creates a black market for such products. In order to realise a true circular economy for plastics, it is imperative to act on stakeholder management and the implementation of policy and financial instruments like Extended Producer Responsibility (EPR). A strategic framework for waste management that covers the legal, financial and institutional aspects needs to be multidisciplinary and cross-boundary especially in the African continent. To ensure circularity for plastics, responsible authorities and key stakeholders need to develop and adopt short, mid and long-term strategies and targets as well as distribute roles and responsibilities amongst the public and private actors to ensure collection, processing and safe disposal of waste.

GLOBAL FORUM OF CITIES FOR CIRCULAR ECONOMY (GFCCE)

Considering the emerging global challenges around solid waste management, the Centre for Science and Environment (CSE), a New Delhi-based global think tank, felt the need to have a 'Global Forum of Cities for Circular Economy (GFCCE),' focusing especially on the Global South, including the countries in Sub-Saharan Africa. The core objective of GFCCE is to provide a global platform to countries where they can share evidence-based learnings, policy interventions, institutional frameworks and implementation modalities. The aim is to enable countries to establish sustainable solid waste management ecosystems based on the principles of circular economy. The GFCCE was, therefore, conceived as a bridge to connect countries and cities in the pursuit of achieving sustainable solid waste management practices that can eventually emerge as good practice to inspire and influence others. Ten nations in Sub-Saharan Africa—Eswatini,

Ethiopia, Ghana, Kenya, Mozambique, Namibia, Rwanda, Tanzania, Uganda and Zambia—joined GFCCE at the time of its launch in July 2022. Between July 2022 and January 2023, many more nations, especially from Asia, have expressed their interest in joining GFCCE to make it an inter-continental forum. A dialogue of this scale can help cities reinvent their waste management systems with the help of evidence-based research and best practices.

This document is a secondary scoping research on the state of plastic waste management systems and practices in fifteen African Nations—Eswatini, Ethiopia, Ghana, Kenya, Mozambique, Namibia, Rwanda, Tanzania, Uganda, Zambia, Democratic Republic of Congo, Nigeria, South Africa, Côte D'Ivoire and Cameroon. Of the fifteen countries, the first ten are already part of GFCCE. Five new countries have been added to extend the forum in the coming years. This report captures insights into a diverse ecosystem of regional, local and national challenges that confront these countries in terms of plastic waste management through the existing basket of policy interventions.

Based on information available in the public domain, the study is an attempt at assessing the current state of preparedness that countries are quipped with to deal with ever-increasing plastic pollution coupled with marine litter. Through the review, the study also looks into various policy interventions and implementation challenges with regard to existing institutional arrangements that are in place to combat plastic pollution.

Cameroon's pristine natural beauty hides the fact that it generates one of the highest amounts of plastic waste in central Africa

CAMEROON

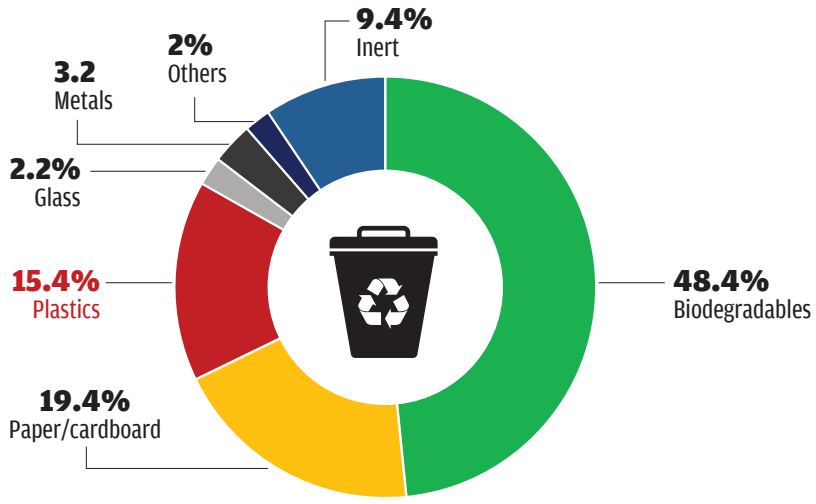
Vital stats	Information
Estimated population	27.20 million
Area	475,442 sq km
Total MSW generated	6 million tonnes per annum
Estimated plastic waste generated	600,000 tonnes per annum
Rate of recycling	Less than 20 per cent
Disposal methods	Open dumping, burying and burning

Source: compiled based on the literature cited in the report

The scourge of accumulating plastic litter is becoming an ubiquitous phenomenon in Sub-Saharan African countries, including the Republic of Cameroon. Data on plastic waste generation, composition and management is often insufficient when it comes to large urban or peri-urban populations. Plastic waste management is a complex issue in the Republic of Cameroon. The subject is understudied, and reliable data and information are mostly non-existent. The waste management system is inefficient as evidenced by heaps of uncollected waste on street sides or ubiquitous illegal dumps. This poses a serious risk to the environment, as well as to public health.

Cameroon generated 335,305 tonnes of plastic waste in 2010, with per capita plastic waste generation amounting to 0.05 kilograms per person per day.[1] According to a 2022 report by the Ministry of Environment, Nature Protection and Sustainable Development, the country generates six million tonnes of waste per year, of which plastic waste amounts to about 600,000 tonnes—roughly amounting to ten per cent of the total waste, the highest in central Africa.[2] This figure has almost doubled in ten years. Among the countries mismanaging plastic waste, Cameroon ranks

Graph 1: Waste composition in Douala—the largest city and economic capital of Cameroon



Source: Municipal solid waste generation, composition, and management in the Douala municipality, Cameroon

sixteenth in the world. It mismanages 578,798 tonnes of plastic waste per year, with the per capita mismanaged plastic waste amounting to about 22.37 kg per person.[3] This waste is mostly littered, inadequately disposed or even burned. This is predominantly due to the fact that the plastic waste recycling industry of Camroon—consisting of about ten companies—remains weak, with less than 20 per cent of plastic waste being recycled every year.[4]

About 10,671 tonnes of plastic waste from Cameroon makes its way into the ocean every year. Of this, 0.41 kg of plastic waste is emitted per person per day. Overall, Africa channels 78,252 tonnes of plastic waste into the ocean of which 13.6 per cent is produced by Cameroon alone, the second highest in Africa, after Nigeria. Globally, Cameroon ranks twelfth among countries that channel the highest amount of plastic waste into the ocean. The Wouri river carries the most amount of plastic waste into the ocean, with about 0.29 per cent of the total global share. Piles of plastic have ended up in the river making it the third most polluted river in Africa after the Nile and the Niger.

Cameroon relies mostly on the import of single-use plastics, but lacks a recycling industry. Cameroon imported 113 tonnes and exported 400 tonnes of plastic waste in 2018.[5] In the same year, the country imported plastics worth US $190.86 million. In 2020, the country imported plastic products worth US $256 million, plastic bottles and flasks worth US $11.8 million and plastic boxes worth US $3.58 million, primarily from three sources: India (US $1.19M), China (US $694k) and Egypt (US $219k). Furthermore, the country imported plastic waste worth US $179k: primarily from China (US $150k), South Africa (US $27.8k) and Benin (US $1.73k), among others.[6]

According to a research article titled, *Municipal solid waste generation, composition and management in the Douala municipality*, the amount of disposed plastic waste was estimated at 441,817 tonnes in 2013. This represented a staggering 15.4 per cent of Douala's waste stream. In 2017, they produced more than 20,000 tonnes of plastic waste per day, of which only about three per cent was collected and two per cent was recycled.

PLASTIC POLICY ECOSYSTEM

The Government of Cameroon has formulated a plethora of laws to control the production, use and waste of plastics in Cameroon. The 1996 Environmental Management Law is the main instrument that regulates environmental activities in the country. However, subsidiary bodies exist,[7] to lay down conditions for the sorting, collection, transport, recovery, recycling, treatment and the final disposal of waste; as well as to to lay down requirements for obtaining an environmental permit concerning waste management, among others.[8]

Table 1: Directives related to plastic waste management in Cameroon

Directives related to plastic waste management	Highlights
Joint Ministerial Order No.0041/ MINEPDED/ MINCOMMERCE of 24 October 2012, relating to the manufacture, import and commercialisation of non-biodegradable packages	Joint order signed by the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED) and the Ministry of Trade (MINCOMMERCE) takes into consideration Section 58 of the Environmental Law of 1996. The order prohibits the manufacture, import, possession and free sale or distribution of non-biodegradable plastic packaging of less than 60 microns. The production, import, holding and marketing of non-biodegradable plastic packaging of more than 60 microns and the granules used in their manufacture are subject to the obtaining of an environmental permit. The order also forbids the burning, burial and littering of plastics in the open.[9]
Circular No.096/c/CAB/ MINEPDED of 10 April 2014	Relating to the control of conformity and the repression of the violators of Joint Order No.004/MINEPDED/MINCOMMERCE of 24 October 2012 and the prohibition of plastic packaging of less than 61 microns.
Circular No.00036/NC/CAB/ MINEPDED of 28 August 2014	Relating to small scale violators of Joint Order No.004/ MINEPDED/MINCOMMERCE of 24 October 2012

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT CAMEROON HAS ACHIEVED SO FAR

The country's major waste management—from the collection of waste to its disposal—is carried out by one contractor—the Cameroon Hygiene and Sanitation Company (HYSACAM), as part of a partnership between the private company and local authorities. However, its services are limited to certain regions and cities such as Yaoundé, Douala, Buea, Maroua, Bafoussam, Limbe, Ebolowa, Bertoua, Bangou, Ngaoundere, Bangate, Meyomesala /Sangmelima, Kribi and Garoua. Moreover, the waste collection process in Cameroon is not sustainable and lacks segregation at source and an adequate sorting mechanism for plastic bags from bottles. Furthremore, this is coupled by a lack of adequate public awareness on the need to separate plastics from mixed waste.

Even though article 9 of the 1996 Law on Environmental Management—that came into effect on 24 April 2014—explicitly prohibits the littering, burial and open burning of plastic as means of disposal, single-use plastic, mostly comprising bags and bottles, remain a conspicuous part of litter. This has only worsened in recent years. At the time of drafting the regulation on plastics, major stakeholders such as manufacturers, importers, retailers were excluded or not consulted.

In 2012, the inter-ministerial meeting by MINEPDED came out with a report that stated that plastic, when burnt, has been polluting the air in the country. Plastic litter also prevents water filtration into the soil and on agricultural lands, blocking drains and causing floods in many cities during the monsoon. The report further revealed that 58 per cent of plastic users dispose their plastic wastes in the environment. While 22 per cent of consumers empty their waste through appropriate methods such as handing over their waste to waste collectors or disposing the waste in bins, about 20 per cent dispose their plastic waste by burning it in the open. In the past years, Yaounde—the capital city of Cameroon—has suffered some of the worst floods on record. This has occurred partly due to plastic waste clogging up rivers and blocking gutters. According to city authorities, River Mfoundi Canal, constructed as a major route to drain away floodwater, is regularly blocked by plastic waste.[10]

In 2018, to commemorate World Environment Day, the Minister of Environment, Nature Protection and Sustainable Development of Cameroon, Hele Pierre, reiterated the government's resolve to end the use of non-biodegradable plastics and warned people against the circulation and use of plastics, and that inspections would be carried out across the country. In August 2018, the Ministry of Environment, Nature Protection and Sustainable Development sanctioned about 395 companies for violating environmental laws, including businesses using and distributing non-biodegradable plastics.

Plastic waste pollution no longer affects only the mainland, but also the banks of the Wouri river. In the Wouri Estuary that is surrounded by mangroves, the amount and variety of plastic litter is staggering. Since 2019, an association called Matanda Écotour, meaning "Friends of the Mangrove", has been making efforts to solve the plastic problem by cleaning up the Wouri River. In 2021, the group collected 12,416 kilograms of plastic in five months, and aimed to reach a target of 700,000 kg by the end of that year.[11] The waste is then taken to one of the few recycling factories in the country where it is transformed into flakes that are eventually used to compose other plastic products. In total, 3,000 tonnes of plastic have been recycled by NAMé Recycling, a Belgian-Cameroonian company and the leading plastic collection and recycling center in the country.[12]

There are many reasons behind the ineffectiveness of plastic policies in Cameroon. Some of these reasons are regulatory challenges, and the lack of financial resources, an alternative market and fines or punishment for defaulters. The absence of stakeholder involvement, lack of public awareness about the ban, inadequate enforcement, poor waste disposal infrastructure and governance, and the lack of personnel to undertake field visits are also contributing factors. Furthermore, the absence of regulatory plastic policies in countries bordering Cameroon, coupled with the porous nature of its borders, has opened routes for the smuggling and black marketeering of plastics. This also hinders government interventions to manage plastic waste.

In fact, there have been records of seizures indicating that customs officials are making efforts and carrying out their border policing and port surveillance duties in the country. In 2014 and

NDONGKEH NELSON MAINEH

Waste disposal in Bamenda city ("Ngen" junction to be precise), Cameroon. The situation is particularly bad in Bamenda because the Anglophone crisis has greatly crippled the activities of HYSACAM and the local/urban councils. Till date, some parts in Bamenda are no-go zones for government institutions because of the presence of armed anti-government groups

NDONGKEH NELSON MAINEH

Dumping of mixed waste, including dry recyclables such as plastics in Bamenda Mile 2, Cameroon Northwest Region

2015, over 200 people were arrested for smuggling plastic into the country. The operations, which led to the impounding of 60 tonnes of contraband worth over US $483 000, were carried out by the environment ministry, customs officials and the Ministry of Trade in the Southwest Region.[13]

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **Namé Recycling:** Namé Recycling is a Belgian-Cameroonian company and the leading plastic collection and recycling center in Cameroon. It operates as a profitable sustainable business in the West African region. In 2016, the NGO started a PET plastic recycling operation based in Limbé, in the southwestern region of Cameroon. In June 2017, the company extended its services to the city of Yaoundé, where plastic and packaging waste, generated by households and companies, was collected and recycled into reusable products. Nestlé Cameroon was able to collect and recycle more than 50 tonnes of plastic waste at the end of the first quarter of 2021 in its partnership with Namé Recycling. About 100 tonnes of plastic waste was recycled.

Namé Recycling partnered with Sociétés Anonymes des Brasseries du Cameroun (SABC), and in their three years of collaboration (2017-2020), managed to collect and recycle 100 million plastic bottles in Cameroon. According to Roblain Namegni, the General Manager of NGO Namé Recycling," the pollution from 100 million plastic bottles equal emissions from 1,480 polluting cars removed from road traffic, or 7,700 tons of carbon dioxide captured from the atmosphere." As per current data, the NGO has three recycling plants that have collected 218,602,714 plastic bottles, and by doing so avoided 16,796,000 kg of CO_2 emissions into the environment.[14] [15]

2. **International Centre for Environmental Education and Community Development (ICENECDEV):** The organisation aims to educate and change the attitudes and perception of people on ecological issues. It is championing the fight against litter and plastic pollution in Cameroonian coasts. In 2016, ICENECDEV joined forces with the United Nations Environment Program (UNEP) to combat marine plastic pollution and micro plastics. They mobilised more than 200 community members, including waste pickers involved in the Plastic Collection campaign along the West Coast of Cameroon. For instance, ICENECDEV embarked on a campaign to educate locals on the need to reduce plastic pollution and maritime litter in Batoké. The Batoke beach clean up campaign saw the collection of about 165 kg of plastic waste which was sold to NAMé Recycling which fights against climate change and also owns a recycling plant in the country. In another instance, in the coastal village of Isobe Idenau, ICENECDEV partnered with the Discovery Networks Norway and jointly managed to clean up and collect 10,048 kg of plastic waste. Of the various plastic waste collected, 1,162 kg were soft plastics and 40 kg was fishing net.

CONCLUSION

Cameroon already has some regulations on plastic waste management. Few cities also hold clean-up programmes for plastic litter, but the adoption or use of a single intervention cannot significantly reduce dependence and consumption on SUPs, neither can it reduce waste generating from the use of such products. For the regulation to be effective, economic and market-based instruments such as tax to be paid by producers, or fee paid by consumers must be adopted. Furthermore, communicative instruments such as awareness campaign and educational programmes must also be given a priority. In addition to this, initiatives such as promoting alternatives to plastics, incentivising low-plastic living and reusing plastic products by highlighting the aesthetic and economic benefits to the community, must also be implemented simultaneously.

Home to the world's largest Christian church in Yamoussoukro, Cote d'Ivoire is also one of Africa's largest plastic polluters

CÔTE D'IVOIRE

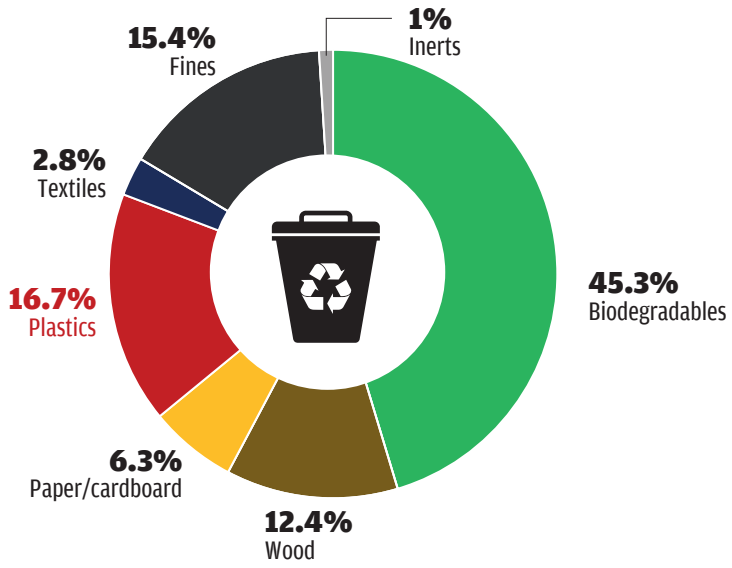
Vital stats	Information
Estimated population	26 million
Area	322,462 sq km
Total MSW generated	2.9 million tonnes per annum
Estimated plastic waste generated	0.6 million tonnes per annum
Rate of recycling	Less than 20 per cent
Disposal methods	Open dumping, burying and burning

Source: compiled based on the literature cited in the report

Like many other African countries, plastic waste has been on the rise in Cote d'Ivoire. The hub of commercial activities in West Africa and the world's leading cocoa and cashew nut producer, Cote d'Ivoire is also one of the largest plastic polluters in the continent. The "2006 Ivory Coast toxic waste dump" was a terrible health crisis in the country, and now the country is inching closer to another—the plastic waste crisis. Each year, Cote d'Ivoire produces 200,000 tonnes of plastic bags, of which 40,000 tonnes go directly into the trash.[1] In 2010, the country generated about 766,988 tonnes of plastic waste, with a per capita generation of 0.1 kg per person per day.[2] In 2015, the total solid waste generated was estimated to be 2,996,537 tonnes for an urban population of 9,753,573 inhabitants at the level of the 34 localities of the country. Recyclable materials represented a quantity of 367,525 tonnes, consisting of 144,458 tonnes of plastics.

As per estimates made in 2019, plastic waste is reported to constitute about 13 per cent of the total municipal solid waste generated in the country, with a daily generation rate of 637,000 kg, of which 82 per cent is inadequately managed, and about 12,748 kg of plastic waste leaks into the environment per day.[3] The country mismanages 291,614 tonnes of plastics per year, which is

Graph 1: Waste composition in Abidjan—the economic capital of Cote d'Ivoire



Source: Gevalor (2015)

0.47 per cent of the total global share of mismanaged plastic waste, roughly amounting to 11.34 kg per person.[4]

Cote d'Ivoire dumps 4,784 tonnes (which is 0.49 per cent of the total global share) of plastic waste into the ocean annually, which roughly amounts to 0.19 kg per person.[5] The Ebrie Lagoon, regarded as the "Pearl of Lagoons" and which abuts the country's economic capital Abidjan, is a sick and sorry sight. The Ebrie Lagoon dumps 0.34 per cent of the total plastic that finds its way into the oceans through rivers across the world, ranking 12th globally.[6] Discarded bottles, wrappers and other plastics have accumulated on the banks of the lagoon. There are no more fish in several parts because of the pollution and, so, fishing has also been abandoned.

As per Coliba Africa, out of the 460,000 tonnes of plastic waste generated each year in the country, 290,000 tonnes originate in Abidjan alone. Only three per cent of this waste is recycled and reused. The rest ends up in the natural environment, particularly the lagoon. The floor of the lagoon is carpeted with plastic waste 30 cm thick.

In keeping with the trend prevalent in West Africa, Cote d'Ivoire is also a net importer of plastics. In 2019, over 241 million kg of plastics was imported into the country, with PE, PP, and PVC making up about 99 per cent of the imports, while, only 4.4 million kg of plastics was exported from Cote d'Ivoire that very year, 74 per cent of which was PVC.[7]

As of 2019, there were 110 plastic manufacturing firms operating in Abidjan. According to Anteja, 63 plastic recycling businesses operate in Abidjan. Currently, both PE and PP plastic waste are locally recycled to produce nonfood articles such as plastic bags and other household items.

PLASTIC POLICY ECOSYSTEM

The preamble of Cote d'Ivoire's Constitution of 2016 states that the State is committed to 'safeguarding our sovereignty over national resources and ensuring an equitable management thereof for the well-being of everyone', and 'contributing to climate protection and to maintaining a healthy environment for future generations'. The Ministry of Environment and Sustainable Development (MESD) came into existence on 10 July 2018, replacing the previous Ministry of Salubrity, Environment and Sustainable Development. The MESD has two Directorates: Environment and Sustainable Development. The mandate of the Environmental Directorate is: 1) planning and control of environmental policy, evaluation, studies and plans; 2) implementation of the Environment Code and the legislation for the protection of nature and the environment,

among others. The National Environmental Agency (NEA) was created by Decree No. 97-393 of 9 July 1997. It is one of the associated agencies within the MESD with a mission to coordinate the execution of environmental development projects. Environmental management and environmental impact assessment are covered in the Environment Code, Law No. 96-766 of 3 October 1996. The rules and procedures for carrying out environmental assessments for development projects are contained in Decree No. 96-894 of 8 November 1996. The aims of the Environment Code are to plan and execute activities that may have a significant impact on the environment, including the 'polluter pays' principle, a commonly accepted practice that those who pollute should bear the costs of managing the pollution to prevent damage to human health or the environment. Centre Ivoirien Antipollution (CIAPOL) is responsible for setting environmental standards and quality objectives. Order No. 01164/MINEEF/CIAPOL/SDIIC of 4 November 2008 sets out the regulations on waste and emissions.[8]

The Ministry of Environment and Sustainable Development is responsible for municipal waste management in Cote d'Ivoire. Currently, waste management in Cote d'Ivoire is driven by the following law: Framework Act 96-766 under the Environmental Code, 1996. This law highlights the legal framework provisions for the collection and management of waste.

The management of solid waste in Cote d'Ivoire is the responsibility of the National Waste Management Agency (ANAGED), which is a public establishment of an industrial and commercial nature created according to Decree No. 2017-692 issued on 25 October 2017.

As stated Official Journal of the Republic of Cote d'Ivoire, the Prime Minister and the Minister of the Economy, Finance and Budget are responsible for the execution of the decree on plastics.

Table 1: Directives related to plastic waste management in Cote d'Ivoire

Directives related to plastic waste management	Highlights
Decree No. 2013-327 of 22 May 2013 prohibiting the production, import, marketing, possession and use of plastic bags	This decree calls for a partial ban on the production, importation, commercialisation, possession and the use of any non-biodegradable plastic bags that are made of lightweight polyethylene, or similar plastic derivatives with a thickness of less than 50 microns. Violators risk jail term of between 15 days and 6 months or a fine of between 100,000–1,000,000 CFA francs (US $170–17,000). Additionally, the Decree also included an EPR requirement. However, the ban was poorly enforced and revoked.
Decree No. 2013-803 of 22 November 2013 prohibiting the production, importation, marketing, possession and use of plastic bags[9]	A new period of six months was granted to companies producing, importing and marketing plastic bags as well as plastic bag users, to comply with the provisions of Decree no. 2013-327 of 22 May 2013.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT COTE D'IVOIRE HAS ACHIEVED SO FAR

In Cote d'Ivoire, there is an immense need to find alternatives to plastics, which have become an environmental curse for the country. In several cities, used plastic bags and bottles are clogging gutters and float in water bodies, causing floods, sanitation problems and health hazards. But even as the government is trying to make a concerned and conscious effort to find solutions, these attempts are being heavily opposed. For instance, in May 2013, the government announced a ban on several types of plastic bags, including water sachets. But a pushback from the plastic industry forced the government to back down and postpone the ban until August 2013, while trying to find solutions to the industry's concerns. A demonstration was called by the water sellers' union, which

Garbage dump in Akouedo, Cote d'Ivoire

said the ban would put thousands of water sellers out of work. As per estimates made in 2014, the local plastic production and distribution industry generates approximately US $400 million per year. The government could not simply ignore over 7,500 jobs and an industry worth about 50 billion CFA (US $97 million). The ban was only applied in August, which allowed the industry enough time to produce biodegradable bags and develop alternatives. The government also tried to ensure that the market was ready for the transition. The industry has also had more time to invest in producing biodegradable bags and more effective recycling infrastructure. However, the enforcement was very poor, and ultimately the ban was suspended following a storm of protests

from manufacturers of plastic products, industry workers and traders.

While the country is experiencing one of the fastest sustained economic growth rates in Sub-Saharan Africa in nearly a decade, as per the World Bank estimates, over 45 per cent of a population of roughly 26 million inhabitants are living below the national poverty line. A vast majority of the people work in the informal sector, and around a quarter of the working population remains unemployed. As people do not have the money to buy an entire bottle of oil or water or any other product, so these products are divided into small portions and packaged in plastic bags for sale and convenience. People suggest that it is an economical problem. People do not have the money to buy larger or reusable containers. Those plastic bags are cheap. Reusable boxes are expensive. Moreover, reusing bags means cleaning them—which people want to avoid.

In addition to this, barely half of the population has adequate access to safe drinking water, and the situation with regard to basic sanitation is worse. Population explosion, similar to the one witnessed in Abidjan, along with a fall in local purchasing power, has encouraged the production and sale of the now popular 500ml polyethylene water sachets. One water packet sells for 50 francs CFA (US $0.002). They are usually sold ice-cold. Once the water has been drunk, the bags are discarded. As per Environment Minister Remi Allah-Kouadio, such packages constituted much of the waste generated throughout the country.

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **Conceptos Plasticos:** In 2019, UNICEF, in partnership with Colombian social enterprise *Conceptos Plasticos* which transforms plastic waste into construction materials, installed a first-of-its-kind factory to convert plastic waste collected in Cote d'Ivoire into modular plastic bricks. The easy-to-assemble, durable, low-cost bricks have been used to build classrooms in the country. Till now the enterprise has recovered and transformed over 3,000 tonnes of plastic from waste (a 50 cm brick is equal to 3.3 kg of collected material), built more than 500 homes and classrooms, and given employment to more than 600 waste collectors. The structures built have low energy transmission, are natural-conditioned spaces because of heat, fireproof, aseismic (light and flexible) and with a modular system.[10]

2. **AfricWaste:** Every day, Abidjan produces 288 metric tonnes of plastic waste, including a large number of plastic bottles. In the absence of a real waste management policy, the recycling rate is just 5 per cent. All other bottles end up in open dumps and rains. To reduce this pollution, AfricWaste set up a structured plastic waste collection and recovery sector in the city, starting with PET bottles. Created by Veolia and the construction group PFO Africa, the project aimed to maximise the informal collection system, an essential link in the recycling chain in Cote d'Ivoire. The purpose of this operation was to optimise the informal sector—a system with a real organisation that works efficiently but doesn't fulfil its maximum potential. A first pilot project was set up in the Akouédo landfill. A storage point allowed informal collectors to sell the plastic bottles they collected from private individuals and merchants. Between October 2017 and March 2018, 15 metric tonnes of PET were recovered and recycled every month.

3. **Nestlé's initiative:** Nestlé's Ivorian division opened a project at the Wassakara market in Yopougon—one of the 15 communes in Abidjan, to install 200 sqm of paved pathways. The initiative was carried out by Manage & Paste, a local company that specialises in garbage recycling. The solid waste accumulated during the "Au marché je trie mon plastique (At the market, I sort my plastic)" operation was turned into paving stones by the company. These materials are less expensive than concrete paving stones. Between 2020 and 2021, the programme helped Yopougon collect and recycle 60 tonnes of plastic waste, primarily in the Wassakara, Sicogi and Selmer markets, while also creating 15 jobs for collectors and supervisors. The company's goal for 2025 is to eliminate the accumulation of recyclable or reusable packaging in the environment Cote d'Ivoire. Nestlé funded the "Collecteurs indépendants" initiative in Abobo and Cocody, as well as the "Plastock" project in the Abidjan municipality of Port-Bout, in addition to the "Au marché je trie mon plastique" project, which was implemented in the councils of Treichville and Yopougon. Nestlé collected a total of 587 tonnes of plastic in Abidjan in 2020.[11]

CONCLUSION

Cote d'Ivoire is considered as, "one of the best bets in Africa" with a diverse sector for investment. And this should translate to the waste sector too. Some projects have attempted to change the status quo, but failed: the 2013 ban on plastic bags in the country, including water sachets, was a complete fiasco, given the economic consequences of shutting down an industry that provides some income to up to a million people, according to estimates. In 2014, Prime Minister Daniel Kablan Duncan launched a plastic bag collection, processing and recycling project, with an ambition to improve the plastic waste management system and create long term jobs in the country. However, as small plastic pouches are used widely in Africa, including Cote d'Ivoire, to package water, the water sellers' union protested the ban, citing that it would potentially put thousands of water sellers out of work. The NGO Afrik Environment has also planned to create a plastic waste recycling centre in the town of Abidjan in 2010, however, it has not seen the light of day. Regrettably, the government has not yet found a suitable solution to the plastic crisis in a country that is urbanising rapidly and whose population is exploding.

The Congo river, DRC's lifeline, has become a hotspot for leaking mismanaged plastic waste into the ocean

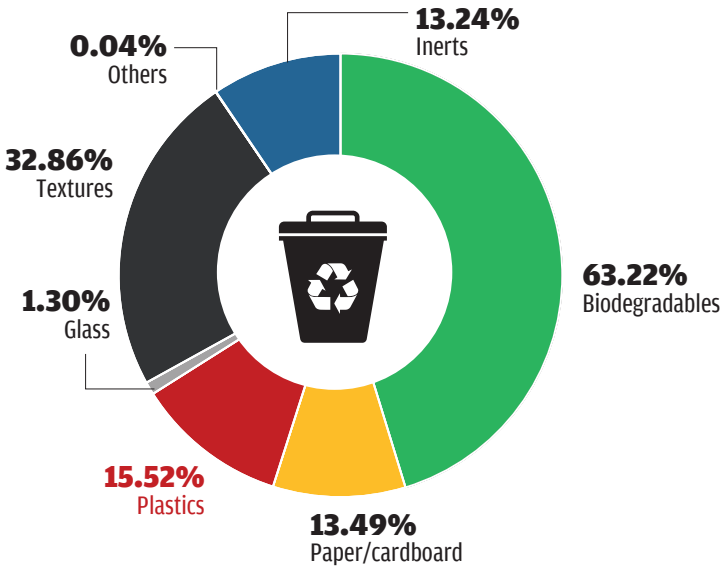
DEMOCRATIC REPUBLIC OF CONGO

Vital stats	Information
Estimated population	108 million
Area	2,344,858 sq km
Total MSW generated	3,440,125 tonnes per annum
Estimated plastic waste generated	1.06 million tonnes per annum
Rate of recycling	Less than 15 per cent
Disposal methods	Open dumping, burying and burning

Source: compiled based on the literature cited in the report

The Democratic Republic of Congo (DRC) is the largest country in Sub-Saharan Africa by area, and the second largest country in Africa. It is also the fourth most populated country in Africa. According to estimates made in 2010, the country generated 1.06 million tonnes of plastic waste per year, which roughly accounted to 0.04 kg per person per day.[1] According to a report by the World Bank, the country generates 9,425 tonnes of municipal solid waste per day, which amounts to around 3.5 million tonnes per year.[2] The inadequate supervision of plastic waste is a widespread problem in cities across the DRC. According to estimates made in 2019, the country mismanages 1.37 million tonnes of plastic waste every year, ranking ninth in the world and third in Africa.[3] The Democratic Republic of Congo mismanages ten per cent of the total plastic waste mismanaged in Africa and 2.2 per cent of the global share.[4] The per capita mismanaged plastic waste is about 15.78 kg per person per day, ranking DRC twenty-eighth among countries with the highest per capita mismanaged plastic waste. The country emits 420 tonnes of plastics, which is 0.04 per cent of the total global share of plastics that make their way into the ocean annually.[5]

Graph 1: Waste composition in Butembo city, DRC



Source: Climate and Clean Air Coalition Municipal Solid Waste Initiative[10]

Forty per cent of the plastic used by the people of the Democratic Republic of Congo is single-use in nature. According to studies conducted by the UNEP (2015) in the country, 48,154 kg of plastic waste (plastic bottles, bottle caps, food packaging, plastic bags, lids, straws, etc.) is produced on a daily basis, of which, 85 per cent of the waste is poorly managed. Plastic packaging alone represents 9.89 per cent of the plastic that is produced.[6] Another study reveals that almost 30 per cent of the household waste in DRC constitutes plastic packaging.[7] There is a lack of concern among consumers regarding where their waste ends up, and this ignorance affects even some of the biggest producers. The volume of mismanaged plastic waste has been constantly increasing in DRC and this has led to a rising debate on the management and effective treatment of plastic waste in the country.

A study on the problem of poor management of plastic packaging and its environmental risks in Basoko city revealed that 50 per cent of the respondents who were interviewed, burnt their plastic packaging after use, while 33 per cent dumped the packaging—particularly plastic bags—on the streets. Unfortunately, the city has no measures in place to recycle discarded plastic packaging.[8]

According to reports on the two big cities of Kinshasa and Lubumbashi, there are limited formal waste management services, particularly in areas that are largely populated by informal settlements. As a result, households practice crude plastic disposal methods such as open dumping, burying and burning.

According to the Technical Directorate of the National Agency for Meteorology and Remote Sensing by Satellite (METELSAT), despite natural disasters brought about by heavy rainfall in the country, plastic waste has penetrated soil and water streams since ages, including the Congo River. Plastic bags tend to block pipes and make the soil impermeable, preventing the infiltration of rainwater. As a result, water flows upwards to the surface, causing the overflow of gutters that are already obstructed by plastic waste. The Congo River is vital for the survival of the people living in DRC's capital city, Kinshasa. However the, river and its tributaries are drowning in plastic pollution with plastic bottles choking river banks and floating in the water. The Congo River is one of the 14 major rivers around the world that is leaking mismanaged plastic waste into the ocean. It is also one of the four major plastic leakage hotspots in the African continent and a potential carrier of plastic waste to other African countries. In Bukavu as well, plastic bottles are thrown into the Ruzizi River routinely, clogging the hydropower station's turbines, and shutting it

down for months. According to a 2018 report by UNEP, plastic waste traps water and clogs sewer lines. This results in the stagnation of water which acts as a breeding ground for diseases such as malaria and cholera.

After the horrific floods in December 2022, it was reported that there is no formal plastic waste collection system or infrastructure in Kinshasa city. In the absence of a plastic waste collection system or waste disposal sites, people who live close to the river often throw their waste into it. Moreover, people also use plastic as a defense against the flood by stacking small piles of plastic along the river bank to protect their homes from a flooding river. However, the plastic prevents the river from draining properly, and when it rains, floods quickly follow. Across Kinshasa, there have been instances when flooded water, filled with waste, has reached up to two meters in height or up to the roofs of people's houses. Furthermore, where there's flooding, waterborne diseases, such as cholera and diarrhoea, are not far behind. It is common for people, including children, to fall sick due to stagnated, unclean water.[9]

PLASTIC POLICY ECOSYSTEM

The Ministry of Environment and Sustainable Development (Ministère de l'Environnement et Développement Durable, MEDD) along with the Department of Health (Direction d'Assainissement, DAS) is responsible for the national sanitation sector, and in particular, for the municipal waste management in the country. In addition to this, the 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 are responsible for the development of road drainage and urban sanitation.

In the Democratic Republic of Congo, solid waste is treated within the framework of sanitation and the preservation of public health. A draft law on sanitation was formulated in 2017, but it is not specific to plastic waste. In fact, plastic waste management is covered by the National Sanitation Policy (Politique Nationale d'Assainissement, PoNA) as well, but policies and plans specific to plastic waste management have not yet been formulated. Related policies include National Sanitation Policy (Politique Nationale d'Assainissement, PoNA), 2013, Draft National Sanitation Strategy (Stratégie Nationale d'Assainissement, SNA) for the implementation of PoNA approved in March 2018, and the National Development Plan (Plan National de Stratégie de Développement, PNSD).

The DRC is also one of the ten African nations that has endorsed the Ministerial Statement committed to "working towards the timely establishment of an Intergovernmental Negotiating Committee (INC) on Marine Litter and Plastic Pollution at UNEA-5.2" at the Ministerial Conference on Marine Litter and Microplastics conference hosted in September 2021.[11]

Table 1: Directives related to plastic waste management in the DRC

Directives related to plastic waste management	Highlights
Decree No. 17/018 30 of December 2017 of the DRC	Article 1 paragraph 1 states that the production, import, marketing and use of bags, sachets, films and other plastic packaging for the sale of food, water, and any other beverage are prohibited in the DRC.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT DRC HAS ACHIEVED SO FAR

It is enough to make a small tour of the cities such as Kinshasa and Kisangani to realize the incredible amount of plastics that has accumulated in the vicinity of markets and streets. Organic Law No. 08/016 of 2008 of the DRC states that it is the duty of each decentralised entity (urban, municipal and sectoral councils) in the country to organise the collection and treatment of waste, including plastic waste.[12] However, due to the DRC's long-running civil conflict in most territories in the country, waste management is poor or non-existent due to a lack of funding and infrastructure. For instance, the city of Goma still carries out "salongo"—a local term for a civic

activity whereby local people actively clean-up their neighbourhoods on a Saturday—a task that was obligatory by law from 1965 to 1997. This civic clean-up is encouraged and sometimes still enforced by local authorities to raise public awareness about environmental problems. This also saves local authorities from spending their limited funds on plastic waste management. Due to the lack of an adequate waste collection system and indiscriminate dumping, the residential areas of lower income groups are especially affected and suffer in poor conditions.

In 2017, the DCR government published a decree "prohibiting the production, import, marketing and use of plastic bags, sachets, films and other packaging".[13] The decree banned plastics used in the sale of food, water or any beverage. The decree also banned, "bags, sachets, films and other non-biodegradable plastic packaging". However, due to too many exemptions, the decree has come under heavy criticism. Critics claim that there are too many inconsistencies, limitations, contradictions and inaccuracies in the decree. While it has been reported that the plastic ban has resulted in a reduction of the plastics being circulated in the city of Goma, the local market has been struggling to find cheap alternatives, with some turning to the illegal smuggling of plastic bags.[14] Despite the law recommending that the government expand their monitoring of plastic waste, study its health effects, and invest in its management, nothing has been done on the ground. According to the Social Justice Issue Report (2021), the governments are also encouraged to adopt and strengthen the implementation of the ban on single-use plastics and facilitate plastic reduction, recycling and reuse.[15] Unfortunately, for the DRC, this decree has remained a dead letter.

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **OK PLAST:** OK PLAST is a company that has partnered with Kinshasa city for the Kin TOKO project to be implemented in the city. The company installed the first plastic recycling unit in the city with a capacity of 50 tonnes per day and a stock of 5,000 tonnes of compacted bottles. The plastic bottles are recycled into bottle caps, crates for local breweries, chairs, coolers, water pipes, and bottles of various sizes. OK Plast collects the used plastic bottles through containers that they installed in several corners of Kinshasa. Till date, the city has 21 collection points. For each kilogram of plastic bottles brought in, the collector receives 100 Congolese francs (less than one euro cent). The entire project required an investment of 15 million euros. In addition to preserving terrestrial and aquatic biodiversity, the OK Plast project is a source of employment for many young people in the city of Kinshasa. The company signed a partnership agreement with the DRC government on 9 March 2022. In 2021, the company collected 22 tonnes of plastic waste per day.[16]

2. **RecoPlast Congo Sarl:** This is a Congolese start-up operating in the plastic waste upcycling sector. RecoPlast Congo Sarl turns plastic waste into plastic beams which is a perfect alternative to ordinary wood and an essential product in the fight against deforestation. The ecological beams produced by the start-up are called "Ecowood" and can be used to make durable and affordable chairs, tables, pallets, and any item that can be made with ordinary wood. RecoPlast Congo was founded based to address the increasing amount of untreated plastic waste in the city of Kinshasa.

CONCLUSION

Data reveals that despite a decree issued by the Prime Minister abolishing the production of plastics, the use and management of plastic packaging poses many problems in DCR. The decree of 2017 (mentioned above) was notified with the specific goal of protecting the environment against non-degradable materials such as plastics. Policymakers and local governments must uphold the decree and address the issue of plastic waste by empowering people to become active agents of change. To this end, environmental education through awareness campaigns and capacity building of institutions is imperative. Moreover, while Polyethylene terephthalate (PET) is the most sought-after, high-value plastic globally, the Democratic Republic of Congo lacks the infrastructure to process it. Therefore, there's little market for it. If a strong market for PET is created in the DCR, people will begin to see it as a resource instead of trash to be discarded.

Urbanisation is on the rise in Eswatini, yet its cities lack a formal and effective waste management system

ESWATINI

Vital stats	Information
Estimated population	1.15 million
Area	17,364 sq km
Total MSW generated	0.23 million tonnes per annum
Estimated plastic waste generated	0.04 million tonnes per annum
Rate of recycling	Not available
Disposal methods	Dumping, burying and burning

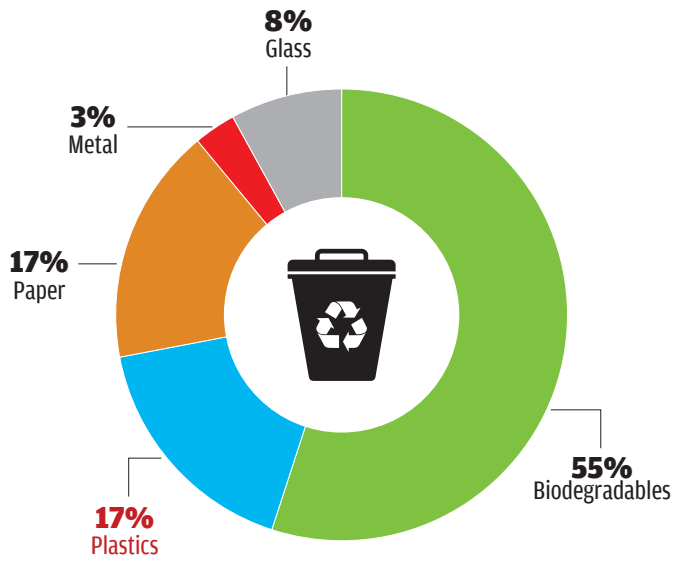
Source: compiled based on the literature cited in the report

In Eswatini, the amount of waste generated is increasing in tandem with the rise in population density and rate of urbanisation. It is expected that waste management will become even more challenging and expensive for the government, local authorities and urban residents, than it is now. Around 50–55 per cent of the waste generated in Eswatini comprises of organic waste, and the remaining 45–50 per cent includes recyclable waste (such as paper, plastic, metal, glass, etc.).[1]

PLASTIC POLICY ECOSYSTEM

In Eswatini, cities and major towns dispose of their solid waste at dumpsites, while smaller towns burn their solid waste in the open.[2] Once the waste reaches a landfill or dumpsite, recyclables are extracted by waste pickers, who collect different types of plastics from these sites. These waste pickers work independently of the establishment, without any direct linkage to authorities responsible for the dumpsite or landfill. As a result of the lack of a formal system, there

Graph 1: Waste composition in Eswatini



Source: Eswatini environmental authority (EEA) and UNIDO report, 2017

are times when they are not given access to the dumpsites. Moreover, despite contributing so significantly to the waste recycling process in Eswatini, they do not have access to sanitation facilities or protective equipment.

Table 1: Directives related to plastic waste management in Eswatini

Directives related to plastic waste management	Highlights
Waste Regulations, 1999	• These regulations guide authorities in matters related to the management of various types of waste. They mandate proper storage of waste in urban areas and the use of waste receptacles such as bins and skips (in inaccessible areas) for different categories of waste (household, commercial, recyclable). They also mandate the collection of solid waste at least once a week and the transportation of different streams of waste to approved disposal facilities. Mandates waste disposal only in designated landfills or dumpsites and lists penalties in case of non-compliance.
National Solid Waste Management Strategy	• Has set goals for stakeholders (with a cross-sectional approach) to achieve effective and efficient waste management services based on a waste hierarchy approach. Has provisions to implement waste management hierarchy; 100 per cent source segregation programmes; divert recyclables from landfills by creating material recovery facilities, buy-back centres, sorting centres, etc; and ensure access to waste management services for all in urban and rural areas.

Directives related to plastic waste management	Highlights
Litter Regulations, 2011	• These regulations have provisions to manage littering in urban and peri-urban areas—dumping, depositing, dropping, throwing, discarding or littering in any public or private property, river stream or any other body of water in the country is prohibited, unless otherwise stated.
The Control of Plastic Bags Regulations, 2021	• The objective of these regulations is to regulate the production, importation and use of plastic carry bags with an aim to ultimately ban plastic bags below 24-micron thickness in a span of two years. It mandates businesses who intend to manufacture plastic bags below 24 microns to seek authorisation for production. It also includes a provision for levying a 20–35 cents charge on plastic bags, depending on thickness.

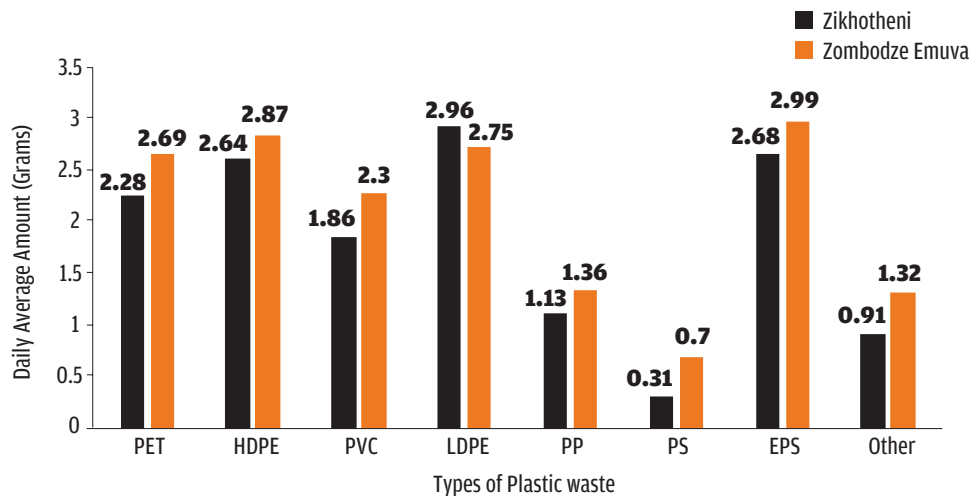
Source: compiled from various sources

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT ESWATINI HAS ACHIEVED SO FAR

There are no control and disposal mechanisms in place for plastic waste management in either urban or rural areas. Plastic bag bans and levies, if properly deliberated and imposed, are some measures that can efficiently counter the over-exploitation of plastic materials and bags and ultimately restrict plastic pollution. However, this has not been very successful in Eswatini, where attempts to ban and curb the use of plastic bags have produced little to no results. Instead, it has led to massive misunderstandings between the government and citizens.

Many campaigns have been launched in Eswatini to reduce non-essential usage of plastic bags to protect the environment and stimulate changes in consumer behaviour.[3] These campaigns have failed due to opposition from industries, retailers, groceries and the plastic industry. One such failed campaign was the plastic bag tax policy introduced in 2015 by the Environment Management Act (EEA), Control of Plastic Bags Regulation Notice. The Act proposed a 35-cent charge for every plastic bag handed out to consumers. The regulation met with massive resistance especially by the plastic industries. The Government succumbed under pressure from the industry and retracted the policy at the time. The regulations were finally passed in 2021, in the form of 'The Control of Plastic Bags Regulations, 2021".

Graph 2: Daily average amount of plastic waste in rural areas of Eswatini



Source: Nxumalo et. al. (2020). Plastic waste management practices in the rural areas of Eswatini.

Formally, there are only two buy-back centres in Mbabane and one in Matsapha, five plastic recycling facilities located in Matsapha and one glass recycling facility located at Ngwenya. The recovery of valuable materials such as glass, polyethylene terephthalate (PET), cans, paper, cardboard, shrink wrap and metals is primarily done by informal scavengers at collection and disposal sites, usually illegally by trespassing. Informal scavenging or sorting of valuable waste from collection sites or informal dumpsites is a common practice. Plastic waste remains a major challenge in rural Eswatini, with a household generating a daily average of 15.9 g, which is about 5.8 kg per annum.[4]

Reportedly, there has been very little deliberation on plastic waste management issues on a local scale. Very few studies utilise data to understand these issues from a geographical point of view.

INITIATIVES TO COMBAT PLASTIC POLLUTION

The "Phatsa Sakho Nawe" Campaign, launched on 25 November 2020 by the Ministry of Tourism and Environment Affairs, is an advocacy initiative to reduce the use of single-use plastic bags in Eswatini. Research shows that Eswatini utilises approximately 1.8 million free single-use plastic bags per month, through three of the largest retail franchises in the country.[5]

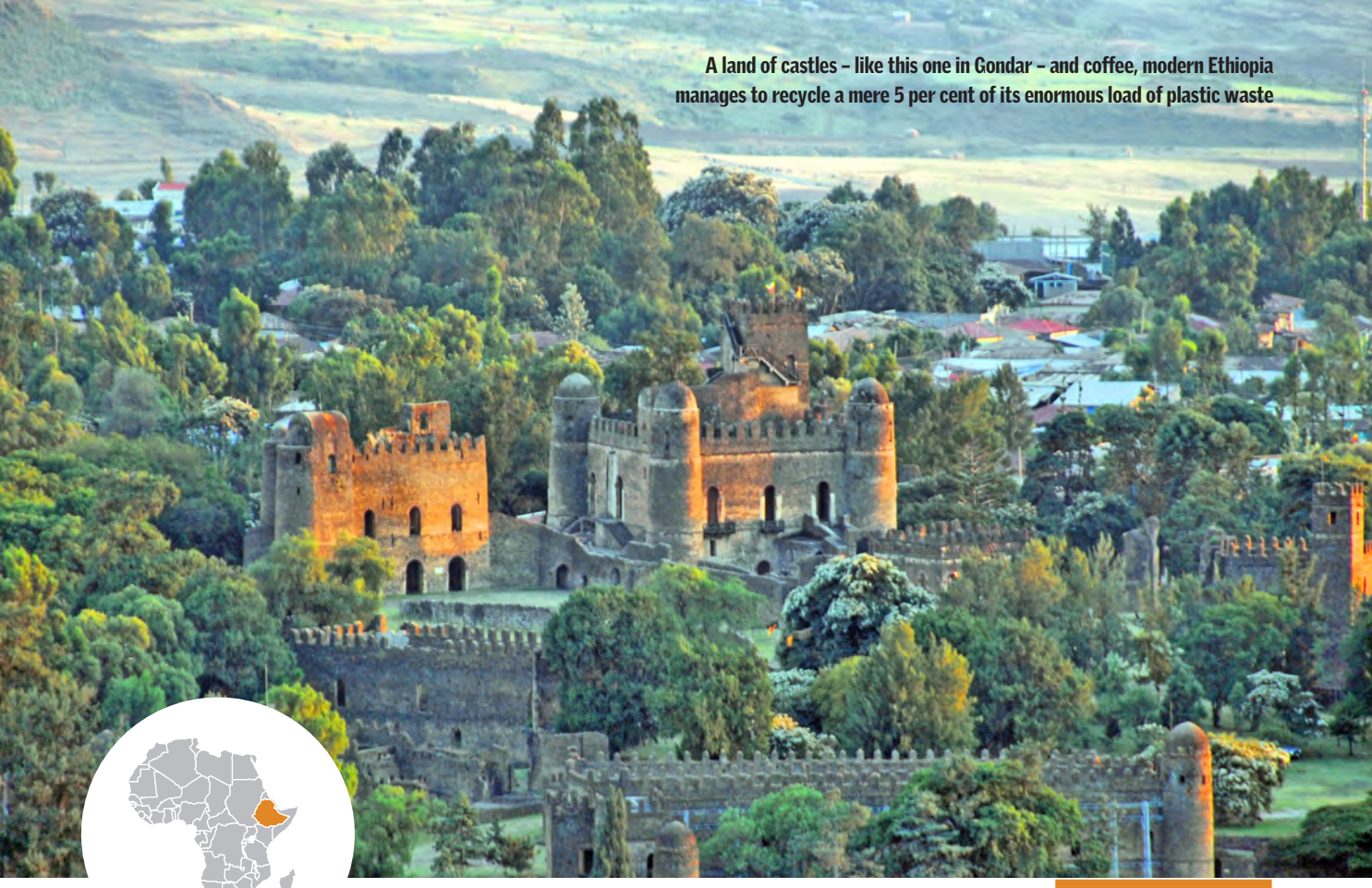
The campaign seeks to advocate three key aspects around the use of single-use plastic in Eswatini: 1) control the plastic waste problem through reduction of the free distribution of single-use plastic bags; 2) monitor behavioural change of consumers; and 3) encourage authorised local manufacturers, SMEs, and rural women to supply locally-made multiple-use shopping bags.

The campaign, which was originally launched as a three-month long drive, has been extended beyond its timeline to involve citizens and local businesses. Consumers are encouraged to bring their own reusable shopping bags to market places to reduce the use of plastics, especially carry bags. Although plastic bags are made available to citizens upon payment of the plastic levy charges, shoppers are still encouraged to support the campaign by continuing to bring or buy the reusable shopping bags whenever shopping. The campaign also complements the ongoing Clean Eswatini Campaign by the Ministry of Tourism and Environment. The "Phatsa Sakho Nawe" Campaign has enabled a rural women project to generate close to E120,000 (US $8,000.00) within three months from the sale of reusable bags to supermarkets.[6]

The Vukani BoMake Project (VBP) is one of the business initiatives that took advantage of the resounding success of the campaign implemented by UNDP Eswatini's Accelerator Lab in partnership with Eswatini Environmental Authority, the Ministry of Tourism and Environmental Affairs, and five major supermarkets in the country. VBP was established by Business Women Eswatini (BWE), under the wing of Business Eswatini, with the aim of equipping unemployed rural women with sewing skills so that they could start businesses within their communities. The multiple-use shopping bags these women produce are made from the waste generated by textile companies at the Matsapha Industrial Site. Instead of throwing away their waste, which used to end up in a landfill, the textile companies now supply VBP with the scrap material. This also means that the Vukani BoMake Project has succeeded in helping the country's textile industry acquire a sustainable waste management option. Apart from shopping bags, the women also make reusable masks and sanitary towels.

CONCLUSION

Plastic waste materials generated by urban and rural households in Eswatini constitute different types, at different scales. The plastic waste quantum might be higher in urban areas but the type of plastic waste generated in rural areas is comparable to urban areas. Primitive waste management practices are the main forms of waste disposal in most rural households of Eswatini, with very few households engaged in modern and recommended waste management methods, such as upcycling. Building a robust waste disposal infrastructure is still a major challenge in rural Eswatini, and proper waste disposal and waste management remains lacking.



A land of castles – like this one in Gondar – and coffee, modern Ethiopia manages to recycle a mere 5 per cent of its enormous load of plastic waste

ETHIOPIA

Vital stats	Information
Estimated population	117 million
Area	1,104,300 sq km
Total MSW generated	2.2-7 million tonnes per annum
Estimated plastic waste generated	0.176-0.56 million tonnes per annum
Rate of recycling	5 per cent
Disposal methods	Dumping, burying and burning

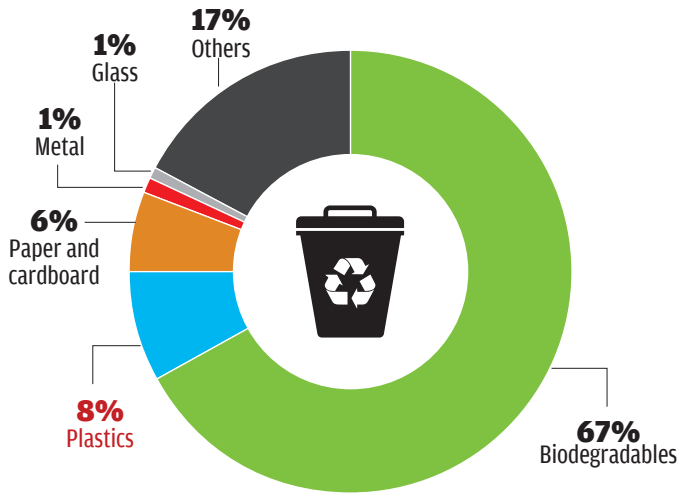
Source: compiled based on the literature cited in the report

With a population of approximately 117 million, Ethiopia is the second most populous country in Africa next to Nigeria. Since the amount of waste generated is directly proportional to population size, Ethiopia produces a higher amount of waste than other African nations. In addition to population size, rapid urbanisation has also had a significant impact on the amount of waste generated in the country.

The plastic industry in Ethiopia is growing at a rapid pace. Ethiopia is the second largest importer of plastic raw materials from east and central African countries. Currently, the annual consumption of plastics in Ethiopia is about 386,000 tonnes per year.[1] The annual consumption of plastic products has been increasing significantly since 2011 and has more than tripled since then. The industries that produce the highest amount of plastic waste in Ethiopia are the packaging industry (58.4 per cent), construction (9.4 per cent) and the automotive industry (6.6 per cent).[2]

However due to lack of technological and policy interventions and insufficient investment, merely four to five per cent of waste—including plastic waste—is recycled, and that too under extremely hazardous conditions.[3]

Graph 1: Waste composition in Ethiopia



Source: Teshome, F. B. (2021). Municipal solid waste management in Ethiopia; the gaps and ways for improvement. Journal of Material Cycles and Waste Management, 23(1), 18–31.

PLASTIC POLICY ECOSYSTEM

Ethiopia has made high commitments towards socially and environmentally sustainable economic development. The Ethiopian Constitution itself along with the Environmental Policy, the Climate Resilient Green Economy Strategy and the Growth and Transformation Plan, focuses extensively on greener and cleaner development and long-term environmental sustainability. In order to address the issue of plastic litter, several rules, standards and guidelines have been issued. These pertain to pollution control, effective municipal solid waste management, allowable plastic bag thickness, and fishing and fishing net material. Table 1 below provides an overview of some of the regulations and proclamations that are broadly related to the issue. The institutions overseeing these policies, strategies, regulations, standards and guidelines are: Environment Forest and Climate Change Commission, Ministry of Urban Development and Construction, Ministry of Trade and Industry, Ministry of Agriculture and Ministry of Culture and Tourism.

Table 1: Directives related to plastic waste management in Ethiopia

Directives related to plastic waste management	Highlights
Solid Waste Management Proclamation No.513/2007	• Prohibited from granting permits for the manufacture or import of any non-biodegradable plastic bags with a wall thickness of 0.03 mm. • Any manufacturer, importer or seller who violates the provision of this proclamation commits an offense and shall be liable according to the relevant provision in the criminal code.
Integrated urban sanitation and hygiene strategy (2015)	• Recycling and reuse: Reuse of waste including plastics is carried out by the informal sector who are called "Korkoro Yalew". They should be supported with appropriate marketplaces and training. • Provide incentives and assistance to formal and informal enterprises and to large scale recycling (such as furniture and clothing made from recycled plastics).

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT ETHIOPIA HAS ACHIEVED SO FAR

Ethiopia has shown remarkable progress in the last few years and become a regional leader in solid waste management. The country has recently converted the Koshe dumpsite in Addis Ababa into a new waste-to-energy plant—a first-of-its-kind project in the African continent.[4] As reported by the United Nations Environment Programme (UNEP), the waste-to-energy plant in Addis Ababa deals with up to 1,400 tonnes of waste every day (80 per cent of the city's MSW generation) meeting 25 per cent of the city's electricity needs.[5]

Despite these efforts, the current status of waste management, including the management of plastic hazards, remains the same in Ethiopia. The current policies for an environmentally sound management of plastic waste are still at a very nascent stage in terms of implementation. They remain ineffective in preventing contamination of water, soil and air resources, and illegal dumping of waste.[6] Countries such as Kenya and Rwanda—two of the other fastest growing economies in sub-Saharan Africa—are seeing policy shifts towards the reduction of plastic consumption and an all-out ban on single-use plastic products. On the contrary, Ethiopia is seeing a rise in its plastic consumption and production. It is expected that Ethiopia will produce waste amounting to 386,000 tonnes by 2022 and the per capita consumption will rise to reach 3.8 kg.[7] As a result, a huge quantity of plastic waste is likely to be generated in the near future with no substantial plans in place to deal with the impending crisis.

The African Union Commission has called on African cities to develop waste recycling industries and commit to recycling 50 per cent of the waste generated by 2023. However, Ethiopia is a long way off from achieving the target. Ethiopian cities—including its capital, Addis Ababa—recycles only five per cent of its waste and the country is yet to see any substantial industrial development when it comes to waste recycling.[8]

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **CIFA's project on minimising the plastic litter:** Plastic pollution is a direct consequence of Ethiopia's economic growth. CIFA's project, "100% Plastic—Development of the Collection and Recycling System of Plastic Waste in Hawassa city, Ethiopia," was launched on April 2017 to ordain plastic recycling and improve waste management in Hawassa city. CIFA, an international NGO based in Italy, developed the project to tackle plastic pollution in Ethiopia.[9] The objective of the project was to create a business chain for PET plastics in order to address litter issues and solid waste dispersion in the environment.[10]

   According to CIFA, a sustainable plastic waste recycling management process has been created and is currently in operation with 100 per cent effectiveness. Along with the creation and activation of the new plastic collection centre and the implementation of an efficient logistics plan, 400 people have been employed as collectors. The awareness programme on waste and environmental preservation initiated by the centre involved more than 30,000 primary and secondary school students.[11]

   CIFA first gained experience and trust working with solid waste collectors and local government officials engaged in solid waste management through the self-sustaining business chain of PET plastics that is still in operation. They also installed 297 litter bins within Hawassa in order to improve the collection and segregation of waste. Collectors receive the PET bottles from waste producers (citizens as well as public and private institutions) for free, or collect them along the street or from the lake area. Later, the collectors sell the waste to a Solid Waste Association (SWA) which runs one of the "Recyclable Storage Centers" set up by the CIFA project. The SWA eventually sells the collected plastics to a recycling company in Addis Ababa. The price paid by the recycling company in Addis Ababa (around 0.25 euro per kg of PET) allows the SWA to cover expenses such as the purchasing costs paid to the primary collectors, the running costs of the collection site, and the transport costs of transporting the plastics to Addis Ababa. This system keeps the town clean from plastic bottles without additionally burdening the municipality. It also generates income for solid waste collectors. CIFA was authorised to promote the business chain through various awareness and communication campaigns.

2. **PETCO:** PETCO Ethiopia Recycling Community Organization (PETCO Ethiopia) was legally established in 2019 as a non-profit national organisation registered by the Ethiopian Civil Society Organizations Authority. It represents the Ethiopian plastic industry's joint effort to promote the corporate social responsibility of plastic waste in the country.[12] The objective of PETCO Ethiopia is to enhance sustainability measures so that the environmental,

social and economic impacts of plastic waste are minimised. Installing a life-cycle plastic management approach supports existing plastic waste management initiatives, encourages the establishment of new collection and recycling initiatives, and promotes a strong focus on public and consumer awareness creation programs.[13]

PETCO Ethiopia is headquartered in Addis Ababa and operates throughout Ethiopia. The organisation uses a circular economy approach that allows the conversion of plastic waste through a fully functioning, closed-loop system by linking all key stakeholders in the value chain. This allows for both individual and collective efforts towards effective plastic waste management.[14]

CONCLUSION

More than 50 per cent of the total waste generated in Ethiopia remains uncollected, and openly burned or disposed of in unauthorised areas. The major challenges identified by many researchers are poor policy enforcement, inadequate capacity, low public awareness and minimal cooperation among stakeholders.[16]

Despite there being a restriction on plastic thickness, the major obstacle in the poor implementation of the plastic ban policy is the lack of coordination amongst the various ministries (at the federal level) and their representatives at the Regional Government and City Administration levels (namely bureaus and departments/offices). An even bigger problem is weak enforcement capacity of the regulations, proclamations, standards and guidelines. For example, enforcement of Proclamation No. 513/1999—which translates to a ban on the production and import of plastic bags with less than 0.03 mm thickness—has become so difficult that the government has been considering a push for an absolute ban on plastic instead of a partial one. Similar challenges surround the regulation of fishing nets, both in terms of allowable specifications and numbers as per the sustainable carrying capacity of the water bodies.

In addition to hard policy instruments (e.g., regulations, proclamations, by-laws, enforceable standards), there are no market-based instruments to enable sustainable production and consumption of single-use packaging materials such as PET water bottles and plastic shopping bags. The effectiveness of deposit and refund systems (on non-return bottles) and levies/eco-tax (on single-use plastic bags) has been satisfactorily tested in several countries around the world. There is, therefore, a need to experiment with market-based (economic) instruments to complement command-and-control regulation and standards.[17]

Known for its waterfalls and beaches, Ghana generates nearly one million tonnes of plastic waste annually, 23 per cent of which ends up in the sea

GHANA

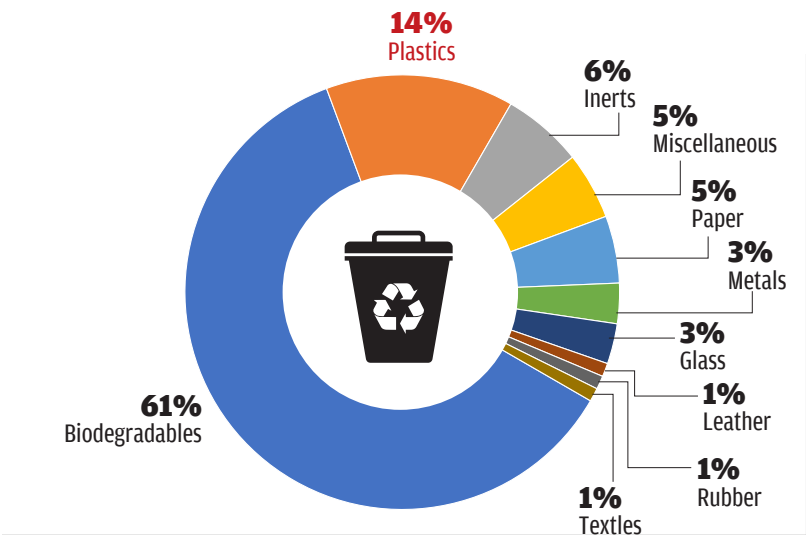
Vital stats	Information
Estimated population	31 million
Area	238,535 sq km
Total MSW generated	4.6 million tonnes per annum
Estimated plastic waste generated	0.64–1 million tonnes per annum
Rate of recycling	9.5 per cent
Disposal methods	Dumping, burying and burning

Source: compiled based on the literature cited in the report

Over the last few decades Ghana, like its other neighbouring countries, has been battling various environmental hazards posed by the exponential growth in plastic use and its alarming mismanagement. This includes widespread littering and indiscriminate dumping that have caused serious risks to the environment and public health. Although Ghana has shown remarkable economic development over the years by striving hard to attain full middle-income country status, the future of the nation will depend on the way it sustainably manages the ever-increasing menace of plastic waste.

In Ghana, the two major components of municipal solid waste are biodegradables and plastics. Evidently, the second largest fraction in terms of weight is plastic waste, mainly PET (Polyethylene Terephthalate), LDPE (Low density polyethylene), HDPE (High density polyethylene) and PS (Polystyrene) due to increasing use of plastic products in packaging.[1] Plastics are also being used as stretched HDPEs in sachet water packaging, PET bottles for bottling drinks and water, and LDPEs and PS are used as bags. This development has seen the setting up of many plastic

Graph 1: Waste composition in Ghana



Source: Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B., & Mensah, M. Y. (2015). Municipal solid waste characterisation and quantification as a measure towards effective waste management in Ghana. Waste management, 46, 15–27.

industries in Ghana. The plastic composition in the waste stream of Accra increased from 1.4 per cent in 1979, to 4 per cent in 1993, 5 per cent in 1997 and 8 per cent in 2000.[2] A recent study titled, *Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana,* published in 2015, reported that the percentage of plastic waste in the total municipal solid waste generated in the country has increased up to 14 per cent.[3]

Overall, Ghana generates nearly one million tonnes of plastic waste annually. Out of this, only two to five per cent gets recycled. The rest ends up in landfills (38 per cent), land (28 per cent), sea (23 per cent), or is burnt (11 per cent).[4] A joint study conducted by the Ghana Institute of Management and Public Administration Accra reported that rubber, tin and plastic are the main constituents of waste generated by households in Accra.[5]

PLASTIC POLICY ECOSYSTEM

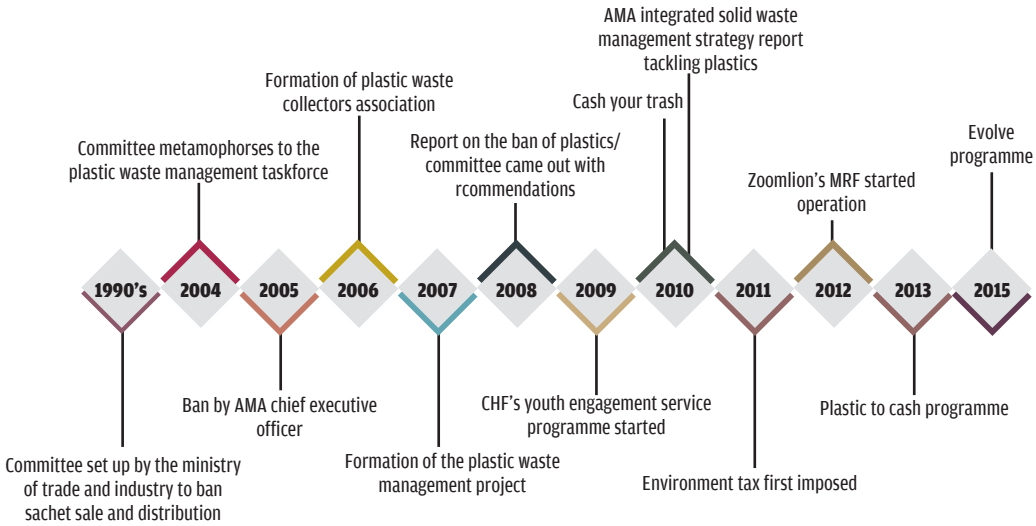
UNICEF and WHO ranked Ghana as the seventh dirtiest country in the world in 2015. Due to its coastal location, Ghana's capital Accra has been facing the hazards of marine litter. This prompted the Government of Ghana to set a target of zero plastic leakage into oceans and waterways.[6]

Additionally, in 2019, Ghana became the first African nation to join the Global Plastic Action Partnership (GPAP) by announcing the launch of the Ghana National Plastic Action Partnership (NPAP) and the National Plastic Policy. GPAP works in collaboration with the Ministry of Environment, Science, Technology and Innovation, and their main objective is to develop a national roadmap for the sustainable management and reduction of the country's plastic waste, while continuing to boost its economic growth.

Table 1: Directives related to plastic waste management in Ghana

Directives related to plastic waste management	Highlights
National Plastic Management Policy, 2020	• This National Plastics Management Policy is built on four focal areas that, when used together, will achieve a comprehensive system for managing plastics and contribute positively to natural capital, environmental protection and socio-economic development. The following strategic actions represent an integrated approach for systems-level structure and support to collectively enable the achievement of the four focus areas of this policy: (1) Behavioural change, (2) Strategic planning and cross-sectoral collaboration, (3) Resource mobilisation towards a circular economy, and (4) Good governance, inclusiveness and shared accountability. • The policy shall guide the work of all governmental, statutory, industrial, non-governmental and civic entities that are involved in, or those that may seek to become involved in the import and export, manufacture, use, management, recycling and disposal of plastics, particularly activities addressing the adverse effects caused by plastics on the environment and human health. • Development of national, regional, district-level and local action plans. • Establishment of an Extended Producer Responsibility (EPR) scheme. • Establishment of a certification system and database. • Development and implementation of a resource mobilisation framework. • Promotion of local research and development (R&D) in plastic management. • Promotion of a trading system.

Figure 1: History of plastic waste management initiatives in Ghana



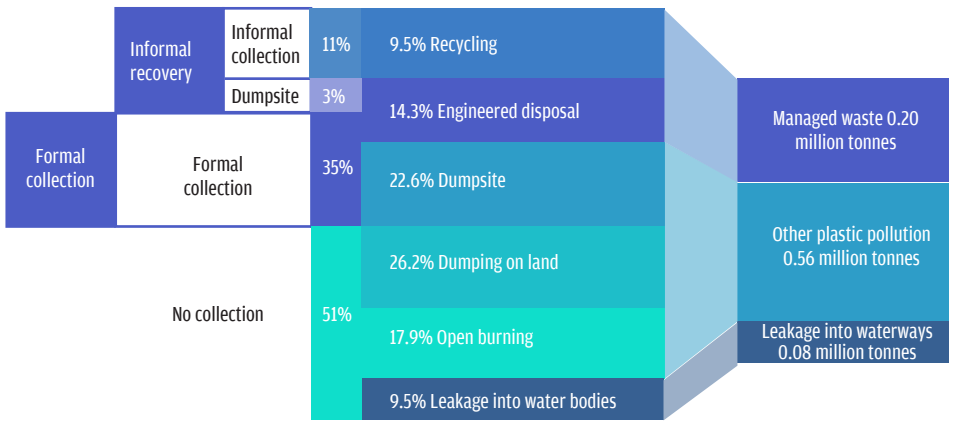
Source: National plastic management policy 2020

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT GHANA HAS ACHIEVED SO FAR

It has been recognised that Ghana's National Plastic Management Policy 2010 will minimise the hazards caused by plastic, and help in transitioning to a circular plastics economy by supporting the public, private and civil sectors. It is expected that this will be achieved by fundamentally reshaping the way plastics are produced, used and re-used. Under the policy framework, the government, businesses, civil societies and think tanks should work in collaboration to stop plastic pollution from source to sea by 2025, by fast-tracking circular economy-oriented solutions for plastic management. In addition, in 2019, the President of the Republic of Ghana launched the Ghana National Plastics Action Partnership aimed at the minimisation of global plastic pollution, and also ensuring, amongst others, that plastics do not find their way into the country's marine bodies.[7]

However, despite these efforts, the current situation of Ghana, in terms of plastic waste management, is far from satisfactory. Due to the poor implementation of laws and regulations, a huge quantity of plastics enter terrestrial and aquatic ecosystems. Heaps of plastic waste can be found choking storm water drains in all major cities and polluting the beautiful beaches and forests of the country.[8] Hazardous substances and chemicals from plastics enter the digestive systems of aquatic animals destroying fish stocks and causing low fish yields.

Figure 2: Where Ghana's plastic waste ends up today (percentage of total plastic waste generated)



Key drivers of plastic leakage
- Uncontrolled dumping of waste at dumpsites
- Waste deliberately
- Plastic dumped on terrestrial places that get dislodged into drains

Source: Ghana National Plastic Partnership, A roadway for radical reduction pf plastic pollution in Ghana available at <https://www.wacaprogram.org/sites/waca/files/knowdoc/NPAP_Ghana_Action_Roadmap.pdf>

INITIATIVES TO COMBAT PLASTIC POLLUTION

Asase Foundation: Founded in 2017, Asase Foundation is a legally registered non-governmental organisation (NGO) in the Greater Accra Region of Ghana. The main objective of this NGO is to enable Ghanaian women entrepreneurs to play a key role in cashing in on the plastic waste trash of Accra for the benefit of their own communities. They support women-centric social enterprises in plastic waste management by offering seed money and building capacity so that they are able to build their own plastic waste reprocessing plant and manage it as a social enterprise.

Under this initiative, women and men from underprivileged communities get access to seed money and knowledge (technical and business) to start a social enterprise and sustainably manage it. These enterprises are known as "CASH IT". The objective of these enterprises is to make the waste fit for recycling. A certain percentage of the profit will be paid back to the Foundation to

help other such plants across Accra and Ghana. In addition to this, an equal amount of profit earned from enterprises will be given to the community for community development projects.[9]

Between January to September 2021, this initiative has been able to divert around 600 tonnes of plastic waste from various streams, which include collection centres, schools where they run educational programmes on plastic waste sorting, and monthly clean-ups conducted along Accra's coastline.[10]

Women workforce in one of the Cash it! recycling plants

Source: https://asasegh.com/blog/

Plastic Punch: Plastic Punch is a not-for-profit organisation founded in 2018 in Accra, which aims to raise awareness about the hazards of plastic for the environment, wildlife and humans, and to provide innovative and sustainable waste management strategies to deal with the problem. Plastic Punch is currently running projects in Ghana, with the aim of replicating the mission in other countries once the business model is fully functional. Plastic Punch engages in a variety of activities that contribute towards reducing the burden of plastic waste and educates the Ghanian public about the dangers of plastic, as well as the importance of sustainable practices for plastic waste minimisation by using tools such as beach clean-ups in turtle nesting beaches, plogging, up-cycling workshops and sea turtle conservation. Their mass media tools include drama, theatre, videos, music and games for community engagement.[11]

Beach clean-up activity by plastic punch

Source: https://plasticpunchngo.org/about-us/

CONCLUSION

Ghana can potentially minimise its plastic pollution by adopting effective strategic actions under the National Plastic Waste Policy (2019). There is an urgent need to create a national roadmap for the adoption of a plastic policy and the strategic actions required to support it. Simultaneously, efforts are needed to promote potential investors, both domestic and foreign, to partner with the government in order to provide appropriate technological interventions and services. The Ghanian government should perform its regulatory and monitoring role diligently to ensure that service providers (contractors responsible for waste management) deliver on the agreed principles. Even though the usual overarching concern of waste management companies is to get the waste out of site, it is equally important that customers are satisfied with the services they are paying for.[12]

Additionally, a robust regulatory framework along with an implementation plan, a communication plan, and a monitoring and evaluation framework are required to be mandated under this policy. This would include the operationalisation of the Resource Recovery Secretariat, which will be the muscle behind most other strategic actions for the pragmatic achievement of these policy objectives.

The fight against marine pollution by plastic in Ghana will require a significant investment of at least US $4.3 billion. As a first step, the Ghanaian government could dedicate US $1.3 billion to set up a comprehensive system that would eliminate all traces of plastics in Ghana's coastal areas by 2040.[13]

Kenya has managed to save its beautiful beaches from getting clogged with plastic by focusing on recycling plastic waste since the 1990s

KENYA

Vital stats	Information
Population	44 million
Area	569,137 sq km
Total MSW generated	8 million tonnes
Estimated plastic waste generation	0.8 million tonnes
Rate of recycling	10–15 per cent
Disposal methods	Dumping, burying and burning

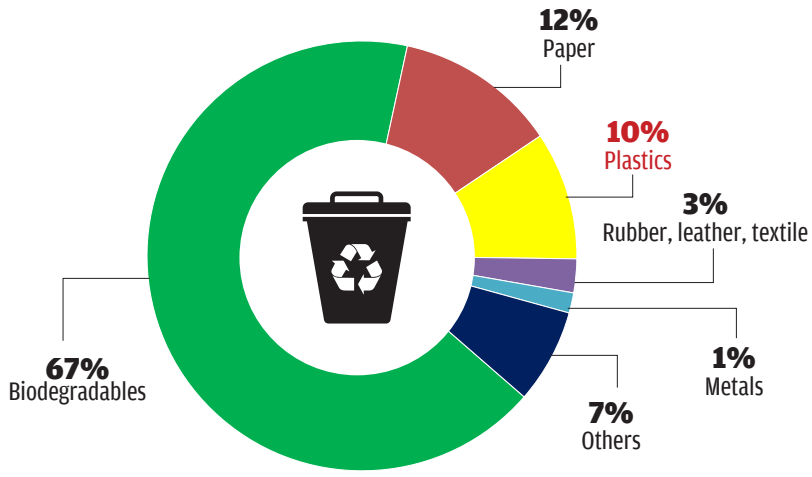
Source: Compiled based on the literature cited in the report

When it comes to waste management, Kenya is one of the more forward-looking countries in the African continent. It has a solid waste collection coverage of 45 per cent, and a recycling rate of 10–15 per cent which takes place largely with the help of its informal sector. Packaging, textile and automative industries are the main industrial sources of plastic waste in Kenya. The principal pathways through which single-use plastic (SUP) enters the environment are littering, storm water pathways, wind and water currents, and tides. Out of the total municipal solid waste generated in the country, nearly ten per cent are plastics[1] that consist of polypropylene (PP), polyethylene terephthalate (PET) and polyester. Most of these come from bottles, lids/caps and dairy packaging which are common polymers leaked into the environment.[2]

PLASTIC POLICY ECOSYSTEM

Kenya has a history of good plastic waste management, with a key focus on recycling. Their plastic waste management strategies include both regional and national drivers. Plastic recycling has been practised in Kenya by private actors since the 1980s.[3,4] The first ban on plastic under the

Graph 1: Waste composition in Kenya



Source: KEPRO- Kenya Extended Producer Responsibility Organization, www.kepro.co.ke/

Nairobi City Council Solid Waste Management Act (2015) prohibited the manufacture of plastic bags with a thickness of less than 30 microns. Plastic bags that were smaller than 8x12 inches, or in colours not in keeping with the Kenyan standard, were also prohibited. Outside of explicitly targeting plastics, Kenya imposed an environmental levy of two per cent of the property rate to be applied to improve the waste management and the quality of the environment. Later, many other rules and policies to regulate the use of plastics were also introduced. The government of Kenya has been trying to address plastic pollution through a set of legal and regulatory frameworks such as the Plastic Bag Ban for Secondary Packaging (2017), Plastic Bag Control and Management Regulations (2018), National Sustainable Waste Management Bill (2019) and Ban on Single Use Plastics (2020). These rules have ensured the enforcement of the bans as well as helped in driving behavioral change amongst the public. The Ban on Single-Use Plastics (2020) was put in place to prioritise the ban on the use and littering of SUPs, especially in key protected areas such as national parks, forest areas, biosphere reserves, Ramsar sites, world heritage sites and conservation areas.[5] Kenya's ban on plastic bags is considered one of the harshest plastic bag bans in the world, with high penalties and prison sentences for non-compliance. According to the Kenyan government, there was a reduction in the use of plastic bags after implementing the bans, and the ownership of reusable bags has tripled on average, with more than two-third of Kenya's population supporting the policy.

The Kenyan government has also launched a plastics pact called the "Kenyan Plastics Pact" to develop financial and innovation support to manage plastic waste in Kenya. The pact also promotes activities such as workshops, awareness campaigns, etc., and brings in key players such as Kenya PET Recycling Company (PETCO), Nairobi Waste Collectors Association and KEPRO.

The Kenya Association of Manufacturers (KAM) also launched the Kenya Extended Producer Responsibility Organization (KEPRO) in 2021 in order to bring together players in the waste value chain to address the issues related to various types of post-consumer waste. The country has also launched several programmes such as "Clean & Green Kenya" and "Clever Green Kenya" to support the end-of-life management of plastic waste along with promoting Extended Producer Responsibility (EPR) schemes.[6] Kenya's 2019–20 budget provided incentives to businesses for plastic recycling such as exemption from the 16 per cent value-added tax for all services offered included in plastic recycling plants and the cost of machinery and equipment to build plastic recycling plants. For corporates operating plastic recycling plants, Kenya has also reduced corporate tax from 30 per cent to 15 per cent for the first five years of the plant's operation.[7]

Table 1: Directives related to plastic waste management in Kenya

Directives related to plastic waste management	Highlights
Plastic Bag Ban for Secondary Packaging (2017)	• Prohibits the manufacture, import, distribution and use of single-use plastic (SUP) bags for retail or household packaging • Includes recommendations for alternatives such as plasti-based reusable bags, cotton bags, paper bags, jute bags, canvas bags and 100% biodegradable bags • Includes fines between US $20,000 and US $40,000 (two to four million KSh) and/or one to four years in prison for non-compliance.
Plastic Bag Control and Management Regulations (2018)	• Bans the manufacture, import, export, use, or offer for sale of plastic bags unless someone has a permit or has paid a fee. • If a user has been permitted to sell plastics bags, they must develop and maintain a plan that includes performance measures and public education programs about the collection, recycling, and reuse of plastic bags which must be submitted yearly to the National Environment Management Authority (NEMA). • All plastic bags that have been approved for production must include at least 30 per cent of total recycled content, and manufacturers must print a legible label on the bag. • A fine of two to four million Ksh (US $18,500) or a conviction of one to four years in case of non-compliance with regulations.
Ban on Single Use Plastics (2020) (also known as Gazette Notice 4858 or the Wildlife Conservation and Management Act)	• The Act was put in place to ban the use and littering of single use plastics in all protected areas, including national parks, beaches, forests, world heritage sites, biosphere reserves, Ramsar sites and conservation areas. • This Act is an expansion of the 2017 Plastic Bag Ban on Secondary Packaging. The Action Plan is implemented by ME&F, Ministry of Interior and Coordination of National Government, Ministry of Devotion and ASALS (Arid and Semi-Arid Lands), and Ministry of Tourism and Wildlife (ME&F 2020). • Includes guidelines for SUP management, mainstreaming plastic issues into curriculums, and running public campaigns to change consumer perceptions through radio broadcasting, social media, brochures and posters. • Promotes economic incentive schemes such as increasing the fees associated with SUPs. Additionally, the Action Plan aims to make the management of post-consumer SUPs more efficient in order to eliminate their drifting into protected areas.
National Sustainable Waste Management Bill (2019)	• Implements deposit-refund take-back schemes, where products can be returned after use and reused by the seller for packaging products. This applies to all producers and importers. • Littering or irresponsible waste disposal is also prohibited, and people found responsible for contravening the law can be charged with a fine of 200,000 Ksh (approximately US $1,855) and/or one year of imprisonment. • Includes award schemes for reporting illegal littering and for those who have been compliant with the bill (Sustainable Waste Management Bill 2019).
Kenya Extended Producer Responsibility Organization (KEPRO)	• The major highlight in terms of plastic waste management is Extended Producer Responsibility (EPR). This involves entities engaged in the production, conversion or importation of products and packaging. These entities are required to take extra steps to ensure that their products have minimal environmental impacts. • Some of the measures under the EPR include the responsibility of the producer to design environmentally friendly and recyclable products and packaging, ensure physical collection and management of waste, and provision of financial contributions to a collective scheme. • Act calls for the use of special labeling, return to the seller, producer, importer, brand owner, or agent after the post-consumer use of the products as requirements under the EPR program

Kenya's public and private sector as well as its civil society can provide the tools for capacity building and organise awareness programmes to integrate communities in the country. Several civil society and non-governmental organisations that were traditionally focused on progarmmes concerning ecosystem conservation are now showing renewed interest in plastic waste management and addressing the issue of littering to tackle the global problem of marine pollution.[8]

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT KENYA HAS ACHIEVED SO FAR

Like many countries across the world, Kenya was struggling with plastic waste which was adversely impacting its coastal areas and water bodies. According to UNEP, in Mombasa—the country's second-largest city with a population of approximately two million people—3.7 kilos of plastic per capita leach into water bodies annually.[9]

Working closely with communities and in partnership with the private sector as well as UNEP, Kenya's national and devolved county-level governments are establishing a plastic waste management programme—one that could be scaled and replicated across the East African community and beyond.

In 2017, Kenya grabbed headlines when it banned single-use plastic bags. That was preceded by the country's decision to sign on to the Clean Seas initiative, making it one of the first African nations to commit to limiting plastic in its waterways. Kenya has had an 80 per cent success rate when it comes to enforcing their 2017 plastic bag ban. After the implementation of the ban, the the Kenyan government estimated that 6.2 billion bags were eliminated from the waste stream.[10]

As of June 2020, visitors to Kenyan national parks, beaches, forests and conservation areas are no longer allowed to carry plastic water bottles, cups, disposable plates, cutlery or straws.

Additionally, the country was also an early adopter of the "Green University Initiative". For over a decade, universities around Kenya have focused on greening their campuses alongside enhancing student engagement and learning. Options for higher education in environmental science, management and policy are also available at both public and private institutions.

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **Mr. Green Africa (MGA):** MGA is a for-profit company that was established in 2014 and is located in Nairobi. The company is based on the "technology enabled, human-centered" model and is involved in channelising, processing and trading plastic wastes that have been sourced from

Informal sector (waste pickers) collecting plastic waste for MGA

HTTPS://WWW.FACEBOOK.COM/MRGREENAFRICA/PHOTOS/PB.100063704191837.-2207520000./535806303423820 3/?TYPE=3

HTTPS://WWW.MRGREENAFRICA.COM/

Worker at Mr. Green Africa

local informal recyclers (waste pickers, scrap dealers, etc.). The end products include shredded and hot-washed flakes of post-consumer polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET) in different colours, with the plastic flakes being sold mainly to local plastic converters.[11]

When it comes to informal solid waste management, MGA believes that waste pickers are "invisible heroes" due to their positive contributions to both the local environment and the local economy. According to the company, waste pickers enable sustainability and a circular economy in the waste management sector by extracting the recyclables particularly plastics from mixed municipal solid wastes.

Informal recycling typically consists of multiple middlemen engaged in unfair trade practices with individual waste pickers and the recyclers. In order to make this system organised, the company is trying to set-up proprietary trading points throughout Nairobi where waste pickers sell collected recyclable plastic wastes at fixed rates to MGA buying clerks. The selling price is fixed at the rate of 19 Kenyan Shillings (KSh) per kilogram of plastics and therefore, not subject to market price volatility. The fixed price is transparent and openly communicated. The price is very competitive in comparison to the price offered by other local scrap traders.[12]

A mobile application run by MGA assigns personal supplier profiles to waste pickers and also records and analyses supplier productivity and reliability. There are a number of welfare schemes available for waste pickers who trade regularly with MGA. They are eligible for a supplier loyalty program that grants premium price in exchange of meeting monthly supply targets. Personal interactions between waste pickers and MGA agents also enable the education of waste pickers about the different types of plastic wastes to collect. The company maintains a relatively steady supply of pre-sorted, post-consumer plastics.

2. Environment Justice and Development (CEJAD): CEJAD is a public interest non-government organisation aimed at protecting the natural environment and welfare of the Kenyan people—especially vulnerable populations—by promoting the sound management of chemicals and waste.[13]

The NGO has been implementing a project, "Zero Plastic Waste Islands" in the coastal areas of Kenya to reduce plastic pollution in those areas.

Most plastics that pollute the sea come from land-based activities like public littering. CEJAD is actively working with coastal communities to promote sustainable plastic waste disposal practices and policies. The objective is to establish a system where solid waste is segregated at the source itself, and then plastic is recovered from bins and recycled or reused. The reused and recycled plastic is used to make items of economic value for three women groups that have a total membership of 645 women.[14]

CONCLUSION

Although Kenya has been successful in banning single-use plastics, experts have suggested that there needs to be stricter implementation and enforcement in order to prevent the import of illegal plastic and the trade of other plastics. Although the impact of existing plastic policies and regulations has been assessed, the effects of emerging policies related to extended producer responsibility and prohibition of single-use plastics in protected areas are not yet known.[15]

There have been some challenges in the implementation of existing bans. For example, some polyethylene bags remained in use under license by the National Environment Management Authority (NEMA). Experts suggest that due to the lack of an extended producer responsibility system targeting all plastics, it is difficult to appropriately manage single-use plastic products.

The effectiveness of Kenya's policies and regulations on the use of plastic bags demonstrates that policy design, implementation and enforcement can affect compliance with and support for dedicated plastics policies. Community support and strong administrative and political will are important contributors to the successful implementation of such regulations. Further research on the implementation and enforcement of such policies in lower-middle income economies will be important in understanding how many countries can begin and continue to target plastics.

With an annual plastic generation of 0.42 million tonnes, Mozambique's cities – such as Maputo here – are severely lacking in recycling facilities

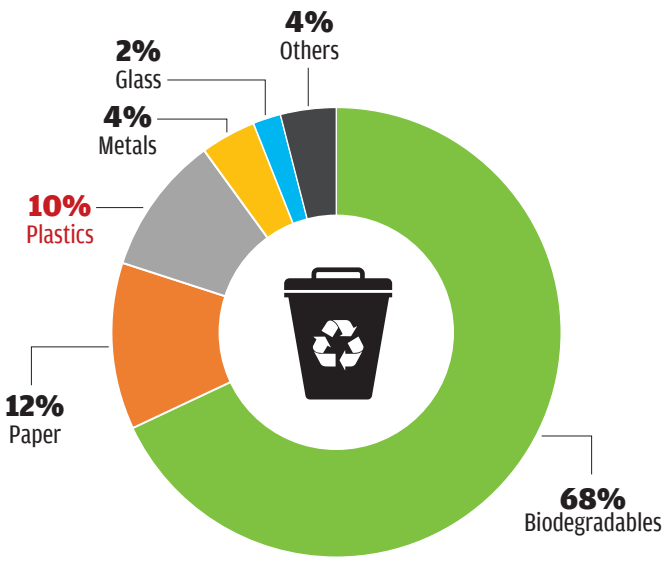
MOZAMBIQUE

Vital stats	Information
Estimated population	30.6 million
Area	801,590 sq km
Total MSW generated	4.2 million tonnes per annum
Estimated plastic waste generated	0.42 million tonnes per annum
Rate of recycling	1 per cent
Disposal methods	Dumping, burying and burning

Source: Compiled based on the literature cited in the report

Solid waste generation has been on the rise in Mozambique. This can be attributed to population growth and rampant urbanisation. With the increase in solid waste, the amount of plastic waste that is generated—particularly in Mozambique's cities—has swelled up. With a low collection rate of roughly 30 per cent[1] and a dearth of plastic recycling facilities in the country, most of the plastic waste in Mozambique ends up being dumped, buried or burnt openly, leading to different kinds of environment and health hazards. Most of the plastic products used in Mozambique are not manufactured locally but imported from neighbouring countries in the form of plastic pellets or finished plastic products.[2] A major portion of this plastic is designed to serve a low mean service time and becomes a part of the waste stream in a short span of time. Plastic constitutes ten per cent of the total solid waste in Maputo city,[3] and four per cent in the suburban areas of Maputo. Waste characterisation studies have been carried out only in and around the major cities of Mozambique.

Graph 1: Waste composition in Mozambique



Source: Tas A and Belon A, A comprehensive review of the municipal solid waste sector in Mozambique, Associação Moçambicana de Reciclagem, (AMOR), 2014

Table 1: Directives related to plastic waste management in Mozambique

Directives related to plastic waste management	Highlights
Decree 16/2015 of June - Regulation on Plastic Bag Management and Control	• The regulation applies to all public entities, private companies and citizens involved in the production, import, sale and use of plastic bags. It prohibits the production, import, sale and use of plastic bags whose thickness is less than 30 microns. It also prohibits the free distribution of plastic bags in market places and discontinues the use of plastic bags that contain more than 40 per cent recycled material for food grade applications. • It provides an exception to plastic bags used for the purpose of weighing food material in market places, and the ones used for the disposal of solid waste. Production of the banned plastic bag has however been exempted in free (trade) zone for exportation. • Heavy fines have been proposed to be levied for the infringement of each of the prohibited activities. The fines, once imposed, should be paid within a period of 20 days at the treasury receipt of the area of jurisdiction of the establishment. The collected fines are routed to the state budget (40 per cent), environment fund and supervisory entity (30 per cent each).
Decree 79/2017 of 29 December - Regulation on the Extended Responsibility for Producers and Importers of Packaging	• The regulation applies to all public and private entities, engaged in the production, import and management of plastic and other material used for packaging. All packaging (including plastics) is obligated under this regulation, including commercial and domestic packaging, and the packaging waste produced. • The Ministry for the Environment is responsible for the drafting and disclosure of rules and procedures in the context of the production and import of packaging and packaging waste. The Ministry for Industry and Commerce is responsible for establishing rules and standards applicable for the import and production of packaging. Furthermore, under the regulation, the Ministry for Finance is responsible for the collection of fees and fines, as well as the supervision of rules applicable to packaging in the context of clearance goods. • Producers and importers of packaging waste are responsible for the management of packaging waste; through a payment of fees for the management of packaging waste and facilitating the return (buy back or deposit schemes) and recovery of packaging waste, whether directly or through organisations created for bringing back waste into the recycling systems. • The EPR framework works through three systems: Internal Management System, Packaging Environmental Fee System, and Packaging Standardisation System.

PLASTIC POLICY ECOSYSTEM

According to a 2020 report by the International Union for Conservation of Nature, the total plastic waste generated in Mozambique is roughly 183,000 tonnes.[4] This figure includes 4,000 tonnes of plastic waste that is imported into the country.[5] The plastic waste generation in the country is 6.1 kg per capita per year.[6] In 2015, Mozambique banned the production, import and retail sale of plastic bags whose thickness is less than 30 microns and in 2017, Mozambique introduced the Extended Producer Responsibility (EPR) for waste that comes from plastic packaging. The plastic bag ban however, is not applicable to the free zone for exportation or the free trade zone which benefits Mozambican companies through reduced trade barriers and tariffs on export to other countries.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT MOZAMBIQUE HAS ACHIEVED SO FAR

The efficiency of the plastic waste collection system of Mozambique is gradually increasing, especially in large cities, according to the officials in the Ministry of Land and Environment-National Directorate of Environment, Mozambique. However, a lot of solid waste lies uncollected even in major cities like Maputo and Beira. The uncollected waste results in the accumulation of waste in drainage canals and illegal disposal sites.

The data on waste generation at the municipal level is limited, and only a handful of municipalities have carried out reasonable estimations. The bright side is the presence of compositional survey figures for urban, peri-urban and rural areas in all the municipalities where studies have been conducted. Currently, Mozambique has a ban on the production, distribution and use of plastic bags whose thickness is less than 30 microns. However, certain exemptions have been provided which substantially dilute the regulation. On 13 June 2022, the Minister of Land and Environment of Mozambique, said that the Mozambican government will ban plastic bags by 2024.[7]

For the past three decades, Mozambique has seen the involvement of multi-lateral donors to improve the existing system for solid waste, which includes plastic waste. Mozambique is also one of the few countries that has proposed a system for extended producer responsibility. However, implementation of the existing rules and regulations has been poor. This can be attributed to limited capacity and funds available to government officials.

Waste recovery and recycling activities takes place in almost all major cities, albeit at low levels and mainly through the informal sector. Formal recycling industries are largely absent and limited to a handful of plastic recyclers who are mainly concentrated in the capital Maputo. There are several companies and NGOs that collect recyclable materials and transfer them to recycling industries in Maputo, and outside the country.

EUNIKA SOPOTNICKA

Plastic waste lying on the streets of Maputo, Mozambique

INITIATIVES TO COMBAT PLASTIC POLLUTION

AMOR (Associação MOçambicana de Reciclagem) is an NGO in Mozambique that advocates and works to promote community recycling. AMOR set up a network of "eco-points" (known as ecopontos in Portuguese), in the capital city of Maputo, and they simultaneously provide employment for marginalised groups of society (HIV-positive women and ragmen). AMOR was formed in 2009 by Mozambican environmentalists and international recycling specialists, to promote and organise recycling of solid waste through community participation. Their initiatives also focused on recycling of plastic waste.

The eco-points act as collection, storage and trading points for plastic waste. Each eco-point offers a waste collection service for its neighborhood, with mobile collectors that collect and pick up potentially recyclable waste. An eco-point is managed by two managers and one mobile waste collector, all of whom are self-employed people who profit from the sale of recyclable material.

In order to facilitate the task of waste collectors, AMOR provides collection tricycles to each of them. The recyclable waste diverted to eco-points are channelised to aggregators for further sorting, processing and recycling. There are at least 6 eco-points installed by AMOR, where more than 60 waste pickers are engaged and help in recycling 50 to 100 tonnes of waste every month.[8] Once the staff are trained, the installed eco-points function independently in a self-sustaining manner with respect to resources and finance. With the extension of the eco-point network, AMOR consolidates the social integration system of marginalised groups.

ASSOCIAÇÃO MOÇAMBICANA DE RECICLAGEM

An eco-point set up by AMOR

CONCLUSION

The import, production and use of plastic products is growing in Mozambique. However, the plastic recycling eco-system is struggling to match pace with the flow of plastic products. This is creating a huge amount of plastic waste accumulation in Mozambique. Close to 100,000 tonnes of plastic waste are disposed annually in the environment, polluting the it and posing a risk to human health.[9] Of this, 17,000 tonnes of plastic waste enter into water bodies every year.[10]

While small scale initiatives to promote plastic recycling and material recovery are operational in Mozambique, they need to be up-scaled with interventions from the local and national government. The existing rules also need to be enforced and implemented to improve the state of plastic pollution in the country.

While Windhoek looks like an idyllic city, plastic bags and packaging litter in disposal sites have become a major deterrent to tourism, and a threat to human and animal health

NAMIBIA

Vital stats	Information
Estimated population	2.54 million
Area	824,292 sq km
Total MSW generated	0.25 million tonnes per annum
Estimated plastic waste generated	0.02 million tonnes per annum
Rate of recycling	Not available
Disposal methods	Dumping, burying and burning

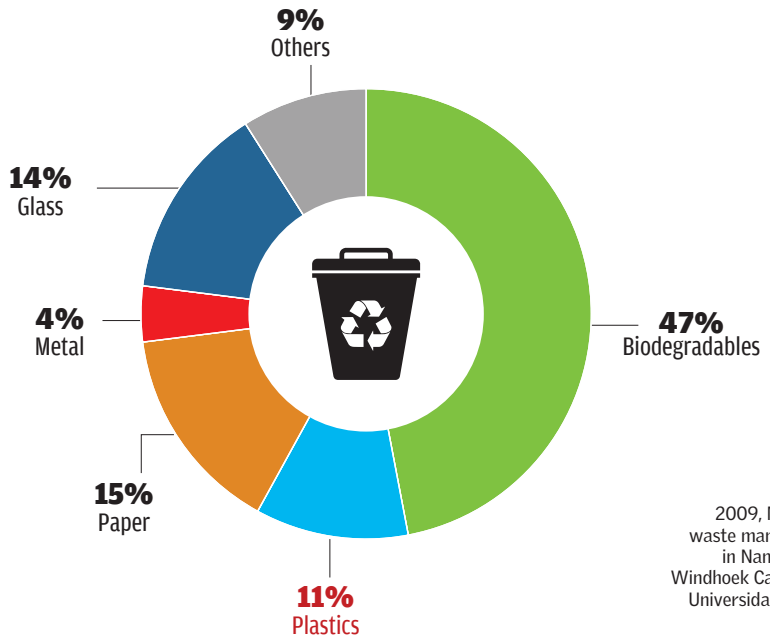
Source: Compiled based on the literature cited in the report

Namibia is faced with numerous challenges when it comes to solid waste management. These concern waste collection, littering, recycling and disposal, as well as resource crunch faced by local governments. Very few towns in Namibia have reliable waste statistics. Waste composition studies are limited to a handful of towns and cities in the country. A composition study was conducted in 2007 for Windhoek, which found the quantum of biodegradable waste to be the highest in the city's total waste.[1]

PLASTIC POLICY ECOSYSTEM

Plastic waste generation in Namibia is less than 100 tonnes per day.[2] However, the actual quantity of plastic waste generation is not known. Based on waste audits conducted in 2004, it has been estimated that the Windhoek's households produce 24,861 tonnes of waste every year.[3] According to waste composition studies, this means that the annual plastic waste generation in Windhoek was roughly 2,734 tonnes.

Graph 1: Waste composition in Namibia



Source: 2009, Municipal waste management in Namibia: The Windhoek Case study; Universidad Azteca.

Table 1: Directives related to plastic waste management in Namibia

Directives related to plastic waste management	Highlights
Regulations Relating to the Exploitation of Marine Resources No. 241 of 2001	In its Regulations Relating to the Exploitation of Marine Resources, the Namibian government has made it illegal to discard fishing gear. It is illegal for fisher folks in Namibia to leave any fishing gear or other non-biodegradable object used for harvesting marine resources on or in the sea or on the sea beach following the conclusion of harvesting without the Minister's written authorisation.
Environmental Management Act 7 of 2007	Section 3 of the Environmental Management Act 7 of 2007 contains principles of environmental management of which section 3(1) (i) promotes the 3 R's, namely recycle, reuse and reduce.
National Solid Waste Management Strategy	Provides framework for the implementation of international commitments relevant to solid waste management, including plastic waste. The strategy plans to levy a charge on plastic bags in the short term and focus on increasing the levels of source separation for recyclable fractions, including plastics. Also provides scope for assessment of potential for deposit refund schemes for plastic bottles.
Plastic bag levy, 2019	The Namibian government introduced a plastic bag levy, on 2 August 2019 by making an amendment to the Customs and Excise Act 20 of 1998. Under the plastic bag levy, shops were charged 50 cents for every plastic shopping bag. To recover the money, many shops started charging 50 cents or more for every plastic bag given to customers. However, some shops continue to give plastic bags away for free. The objective of the plastic bag levy is to discourage the use of plastic bags, and ultimately reduce their use, thus controlling plastic pollution. The monetary collections from the plastic bag levy is credited to the Environmental Investment Fund (EIF). The fund is used to improve waste management in the country.

CURRENT STATUS OF MANAGING PLASTIC WASTE: WHAT NAMIBIA HAS ACHIEVED SO FAR

Namibia has a handful of policies to deal with both land-based plastic pollution and marine litter. However, most of these policies have not been enforced and implemented. Practices like open burning and mixed waste dumping are common across the country.

Specific interventions have been undertaken in protected areas, but waste management, including the management of plastic waste, continues to be a significant challenge due to the increasing number of visitors. As part of the Etosha National Park solid waste management programme, recyclable waste is collected at the resorts and staff quarters and transported out of the park to Rent-a-Drum in Windhoek. Unfortunately, the success of the project still depends on transport and personnel availability, which sometimes slows down progress. Some other parks also recycle waste at a small-scale. During 2019, Etosha National Park transported a total of 36.6 tonnes of recyclable material out of the park to Rent-a-Drum in Windhoek (31.9 tonnes of glass and 4.7 tonnes of mixed materials comprising metal and plastic).[4] In towns and cities, plastic waste management continues to be a challenge and illegal dumping of waste is a common occurrence.

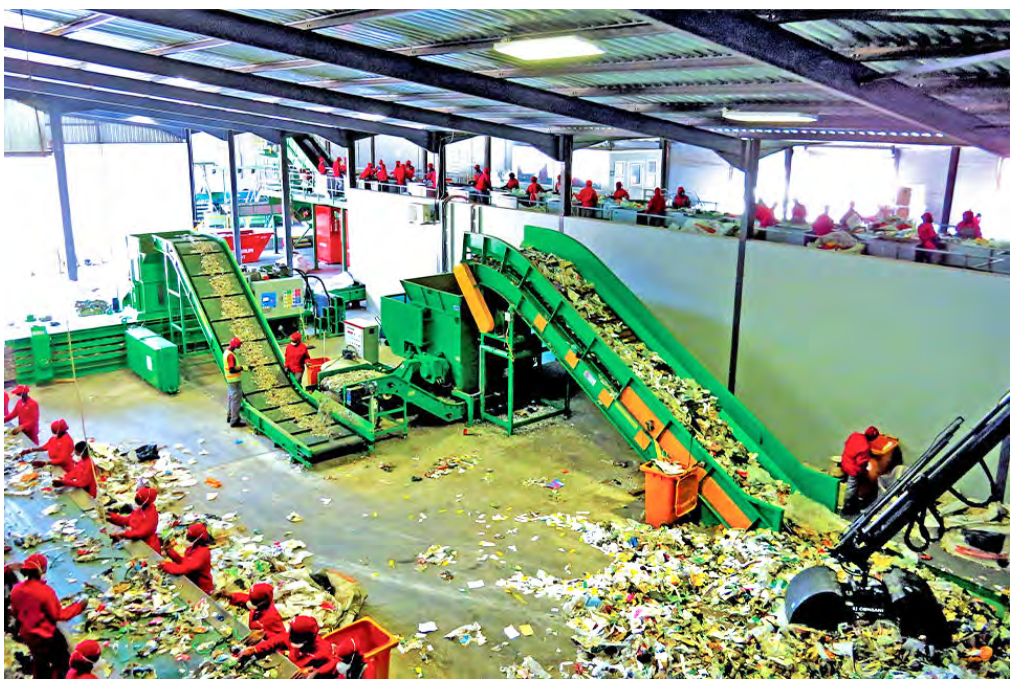
The first privately owned and operated material recovery facility (MRF) was launched in the capital city of Windhoek in 2010. The second MRF was launched in 2017 in Swakopmund. In 2019, the first refuse derived fuel (RDF) plant was set up by a private company. The operations of the material recovery facilities are limited to small catchment areas due to which the amount of waste collected, sorted and processed is way less as compared to the generation.

INITIATIVES TO COMBAT PLASTIC POLLUTION

Established in 1989, Rent-a-Drum is currently the leading organisation for waste management in Namibia. It works with city corporations in Namibia to offer waste management services. Some of the cities where they operate are Windhoek, Swakopmund, Walvis Bay, Oshakati, Oranjemund and Rundu.

Rent-A-Drum sorts and bales recyclables—which include PET bottles, HDPE bottles, LDPE plastics, LLDPE plastic—at their material recovery facility. The waste is sorted into 22 different categories before being dispatched to recycling companies in South Africa. On an average, 2,500 tonnes of recyclables are sent to South Africa every month.[5]

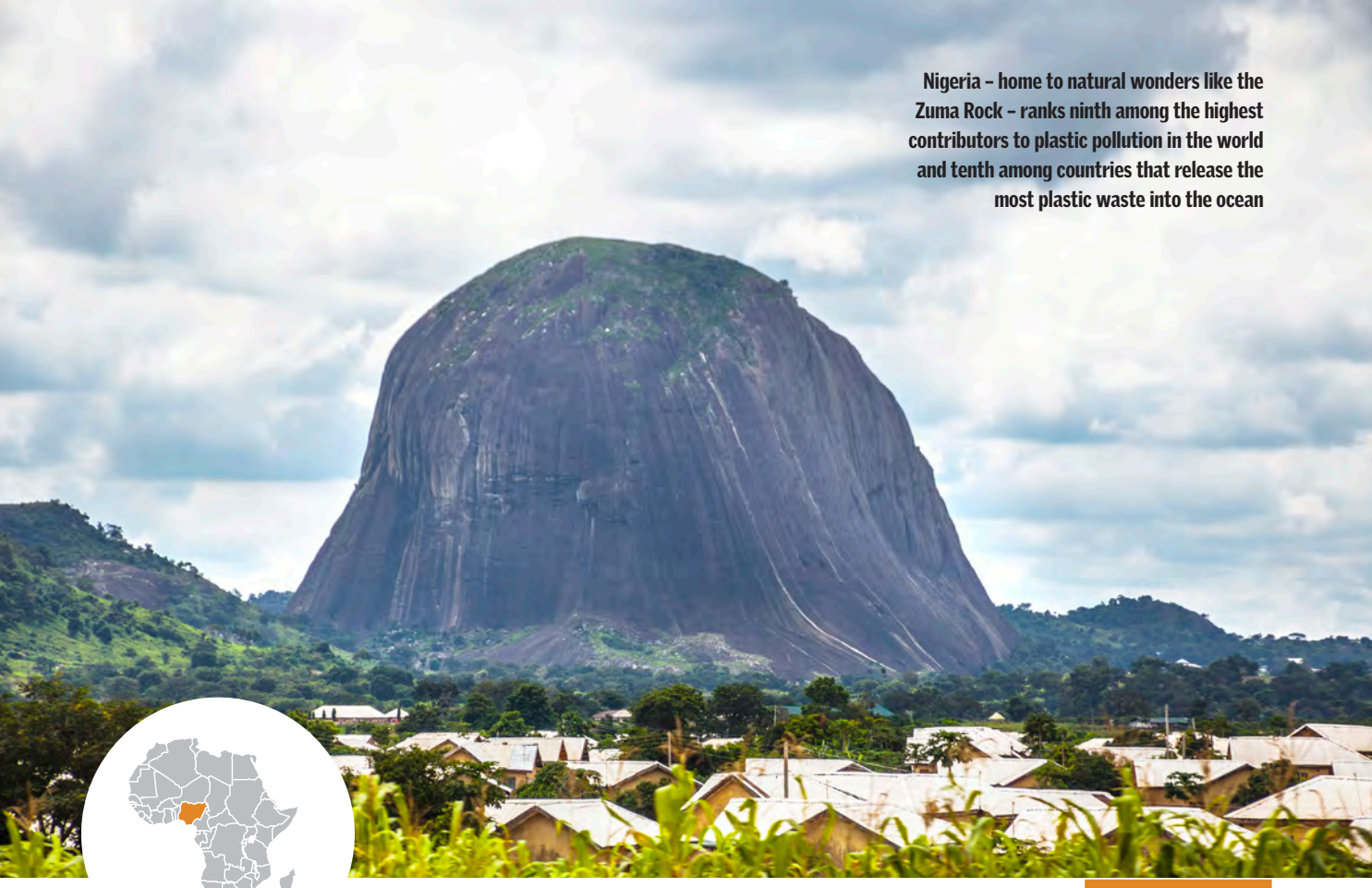
Material recovery facility owned and operated by Rent-a-Drum in Windhoek city



Rent-a-Drum has also launched Namibia's first refuse derived fuel (RDF) plant in 2019. RDF is a fuel produced from various types of waste like plastic having a high calorific value to replace the use of conventional fossil fuels like coal. The alternative fuel is used in energy intensive industries like cement plants. The company plans to process about 12,000 tonnes of non-recyclable material and send it to Ohonronga cement plant for co-incineration.[6]

CONCLUSION

Plastic bags and packaging litter are a ubiquitous presence in solid waste disposal sites in Namibia. It is a deterrent to tourism, a threat to domestic animals and wildlife, and a human health issue. The complete impact of plastic waste mismanagement is yet to be determined in Namibia due to scarce data and weak processes and systems to enforce existing policies. There is a clear need to conduct studies on the extent of plastic pollution and the effectiveness of legal measures adopted to prevent plastic pollution in Namibia.



Nigeria – home to natural wonders like the Zuma Rock – ranks ninth among the highest contributors to plastic pollution in the world and tenth among countries that release the most plastic waste into the ocean

NIGERIA

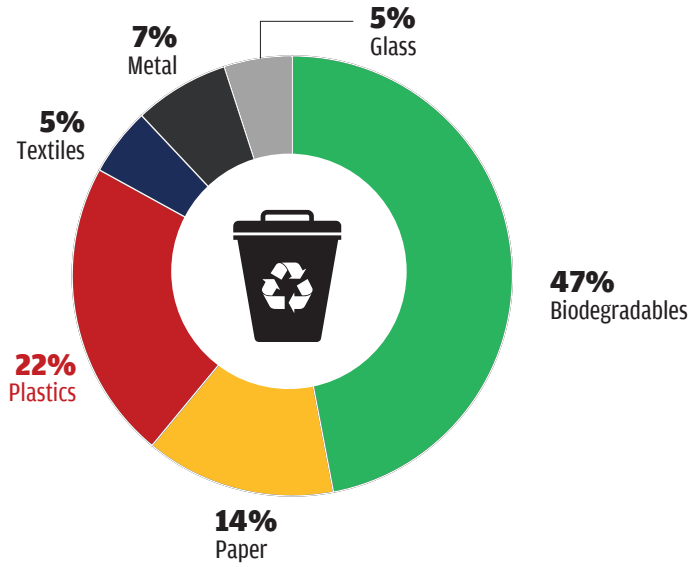
Vital stats	Information
Estimated population	218.5 million
Area	923,768 sq km
Total MSW generated	32 million tonnes per annum
Estimated plastic waste generated	2.5 million tonnes per annum
Rate of recycling	less than 10 per cent
Disposal methods	Open dumping, burying, burning, incineration and landfilling

Source: compiled based on the literature cited in the report

Nigeria, a country located in the West African region, has an estimated population of 218.5 million.[1] As of 2021, it is estimated that the total municipal solid waste generated per annum was around 32 million tonnes[2] of which, 2.5 million tonnes was plastic waste.[3] It is estimated that the people of Nigeria use over a billion plastic bags and PET bottles yearly.[4] The per capita consumption of plastics has grown from four kilograms in 2007 to 6.5 kkilograms in 2017, an annual growth of five per cent over the last ten years. Nigeria accounts for 17 percent of the total consumption of plastic in the African continent. The country is one of the largest producers, importers and consumers of plastic polymers and products, and also one of the top countries in the continent leaking plastics into the environment.

Polyethylene, polypropylene, polyvinylchloride, and polyesters constitute the four main categories of plastic imported by Nigeria. Together, they account for about 75 per cent of the total plastics imported in primary form and as products. Nigeria imported more than 20 million tonnes of plastics between 1996 and 2017.[5] At this rate, its plastic imports are expected to reach 40 million tonnes by 2030. The main exporters of these plastics to Nigeria are the United States

Graph 1: Waste composition in Abuja—the capital of Nigeria



Source: Abuja Environmental Protection Board (AEPB) Report, Abuja, Nigeria, 2015

of America (17 per cent), the Republic of Korea (13 per cent), and India (9 per cent), among others. In the years from 2008 to 2015, the import of raw plastic materials increased annually by 7.2 per cent—from 464,000 tonnes to 754,000 tonnes.[6]

Nigeria also produces a considerable amount of plastic products locally, and their production has been increasing at an alarming rate. In 2013, there were over 3,000 companies producing plastic, and they had a collective production capacity of over 100,000 tonnes per year. The number of companies, and their production capacities, are expected to have more than doubled since then. The country produced 2.3 million tonnes of primary plastics between 2009 and 2015, ranking third in Africa.[7]

The use of bottled or sacheted drinking water is also a growing business in the country. Nigeria's pilot brand of bottled water was launched in 1981. As market competition increased, many water vendors chose disposable polyethylene sachets. The polyethylene sachets cost less to produce and appeared more hygienic and convenient than nylon bags or bottles that can be returned after use. Moreover, these sachets were portable and affordable. The water packaged in these sachets was called, "pure water", and endorsed by the National Agency for Food and Drug Administration and Control (NAFDAC) in 2000. Today, the annual turnover of the industry is estimated to be over 20 billion naira.[8] In 2017, NAFDAC reported that Nigerians consumed 10 million sachets of "pure water" per day. A 2014 review of urban flood risk management efforts in Lagos identified pure water sachets as one of the major contributors to drainage clogging.[9]

According to a report by the United Nations Industrial Development Organization (UNIDO), Nigeria generates over 32 million tonnes of waste per year.[10] The estimates range from as low as 7.5 kg per capita per year to 45 kg per capita per year for large cities like Lagos.[11] According to a 2019 report by the *Voice of America*, the country generates over 2.5 million tonnes of plastic waste every year. An estimate made by the Lagos Waste Management Authority suggests that plastic accounts for 10–15 per cent of the total municipal solid waste generated in the country. Of the total plastic material consumed by application, the packaging industry is the leading cause of plastic waste generation with about 54 per cent, followed by the construction industry (16 per cent) and the automotive industry (six per cent).[12] Plastic bottles (PET), lids, caps and empty water sachets (LDPE or HDPE) are the major sources of plastic leakage. However, less than ten per cent of this plastic waste is recycled.[13] With an upsurge in waste generation and haphazard dumping across the country, the problem of inefficient plastic waste management is endemic. More than 80 per cent of the uncollected plastic waste finds its way to road sides, ubiquitous illegal dumps, drainage lines and landfill sites.

The country's shores are also highly threatened by plastic waste as most of the plastic lingers for years in the aquatic environment due to its inability to naturally degrade. According to research, 121 to 170 micro plastic particles found in 50 grams of dry sediment from Nigerian beaches were largely made up of plastic fragments, followed by pellets and fibers.[14] Tourism is the main cause behind plastic pollution in Nigeria's sea shores. More than 130,000 tonnes of plastic ends up in Nigerian water bodies every year. Three of the top 20 polluting rivers across the world are located in Nigeria—the Cross River, the Imo and the Akwa Ibo river. These three rivers transport 40,300, 21,500 and 11,900 tonnes of plastic waste to the Atlantic ocean respectively.[15] Globally, Nigeria ranks ninth among countries with the highest contribution to plastic pollution and tenth among countries that release the most plastic waste into the ocean.[16] According to a 2021 report by UNIDO, Nigeria contribute 83 per cent of the total volume of land-based plastic waste that ends up in the oceans. An estimate of over 200,000 MT of plastic waste from land-based sources in Nigeria is discharged into the Atlantic Ocean annually.[17]

Among the many factors contributing to poor waste management in Nigeria, the leading one is high population density. Nigeria has the largest population in the African continent and is one of the most densely populated countries in Africa. Furthermore, Nigeria also has one of highest unemployment rates in the country—over 30 per cent—and its plastic value chain provides jobs to a large proportion of the country's unemployed or vulnerably employed population which includes including women and youth.

PLASTIC POLICY ECOSYSTEM

In Nigeria today, the Federal Ministry of Environment (FMEnv) is the apex organisation responsible for the articulation of policy regulations and guidelines for plastic waste management and sustainable development. The country was the first in Africa to establish a national institutional framework for environmental protection. The Federal Environmental Protection Agency (FEPA) Act, 1998 included plastic material and synthetic industry, but it was limited to effluents, emissions and discharge of hazardous substances.After the Federal Environmental Protection Act of 1988 was repealed, the National Environmental Standards and Regulations Enforcement Agency Act 2007 (NESREA Act) became the major statutory regulation guiding environmental matters in Nigeria.

On 21 October 2020, the Federal Executive Council adopted the National Policy on Plastic Waste Management. This policy derives its strength from existing policies. The basis of the plastic policy is contained in the 1999 Constitution of the Federal Republic of Nigeria. Section 20 of the Constitution empowers the state to protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria. The National Policy of Environmental Sanitation, 2005, National Environmental (Sanitation and Wastes Control) Regulation, 2009, National Policy on Solid Waste Management, 2020 together aimed at reducing solid waste in cities and rural communities, promoting reduce, reuse, recycle and recovery initiative, and creating wealth and employment from waste management. These policies provide the necessary background support and strength to the recent plastic policy.

While developing the National Policy on Plastic Waste Management, a Stakeholders' Consultative Forum was organised by the Federal Ministry of Environment to sensitise relevant stakeholders across the country on the proposed initiative, and consequently their inputs were taken in, reviewed and validated to prepare the final policy document. This document is to be reviewed periodically every five years.

2020 onwards, the country introduced the setting of national and state-wide targets for the plastic waste that is collected, recycled and reused for various applications and volumes to be achieved every five to ten years. The targets for 2030 include: recycling 65 per cent of municipal solid waste; 75 per cent of packaging waste; 50 per cent of total plastic waste; and each state to reduce use of plastic bags per person by 50 per cent.

According to the policy, the Federal Ministry of Environment must apply mandatory Extended Producer Responsibility (EPR) schemes on all packaging items, and a nationwide bottle deposit requirement by December 2021, five per cent deposit refund schemes for beverage containers, and five per cent charge on all single-use grocery bags by 2022.

In 2017, the Africa Circular Economy Alliance was established, which also includes Nigeria. The alliance aims to steer African countries in their transition to circular economies, and deliver economic growth, jobs and positive environmental outcomes. Plastic packaging falls within the broader theme of manufacturing, which is one of three priority sectors.

Nigeria is also a signatory of the Sustainable Development Goals (SDGs), and party to the

Basel and Stockholm Conventions which have expressed concerns over the impact of plastic waste, marine plastic litter and micro plastic, and emphasised the importance of reducing the consumption of plastics, and ensuring the environmentally sound management of plastics. However, Nigeria has not ratified the Bamako Convention as it may hinder its recycling economy which involves the trans-boundary trade of goods, including plastic waste. (*Table 1 below provides an overview of some of the regulations and proclamations broadly related to the issue.)*

Table 1: Directives related to plastic waste management in Nigeria

Directives related to plastic waste management	Highlights
National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations, 2011	Aims to prevent and minimise pollution from all activities of the domestic and industrial plastic sector by facilitating reduce, re-use and recycling; states that all recyclable, damaged and disused packaging materials such as plastics shall be recycled; lists prevention and control measures for plastic manufacturing processes; all manufacturers and importers of plastics shall establish effective EPR program.
Plastic Bags (Prohibition) Bill	The bill aims to prohibit the use, manufacture and import of all single-use plastic bags used for commercial and household packaging, and prescribed heavy penalties for offenders, including of imprisonment. Although the House of Representatives passed the bill in 2019, it was never signed into law.
National Policy on Plastic Waste Management, 2020	Aims to limit the impact of littering of certain single-use plastic packaging product and waste materials; generate database on plastics from production to usage to disposal; promote sustainable alternatives to single use plastics e.g. jute bags, leaves, paper glass bottles etc. from May 2020; levy user charges on single use plastic under the Extended Producer Responsibility from May 2021; reducing plastic waste generation by 50 per cent of its baseline figure of 2020 by year 2025; reducing global warming and greenhouse effects associated with plastic production by 60 per cent by year 2030; banning four categories of single-use plastic such as plastic bags, cutlery, styrofoam, straws from January 2025; phasing out single-use plastic bags and styrofoam less than 30 micron by December 2028.[18]

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT NIGERIA HAS ACHIEVED SO FAR

From the figures it is evident that plastic consumption and littering is rising in Nigeria. Policymakers considered implementing the Plastic Bags (Prohibition) Bill in 2019 to prohibit the use of plastic bags. Regrettably, the bill is still in limbo, and has not yet been enacted as a law. Consequently, plastic bags are being indiscriminately used in the country. In the past, the majority of plastic waste collected in Nigeria used to be exported to other countries, such as China, to be processed and turned into raw materials like textile, pipes and home furnishings. However, in 2018, China placed a ban on the import of waste materials. On a positive note, this has translated into an opportunity for local recycling companies in the country.

Nigeria's plastic recycling market stood at 2.04 million tonnes in 2020 and is expected to reach 3.47 million tonnes by 2030.[19] While plastic waste management and recycling, as a tool, is growing in Nigeria, the practice is largely confined to a few cities in the southwestern region of the country, such as Lagos, Ogun, and Oyo, and in the middle belt such as the Federal Capital Territory of Abuja. The plastic recycling industry faces challenges due to a lack of public awareness about the recycling value chain, inadequate collection infrastructure—especially in remote locations, high cost of logistics such as transportation, and a lack of financial support. The low rate of recycling is also partly due to the fact that most categories of plastic waste—such as polystyrene waste, polyurethane foam, light packaging polymers or wastes of polyvinylchloride—are not sought after by recyclers as these products are said to be locally "unrecyclable". It is these plastics that constitute a large portion of the plastic waste that is found in dumping sites.

So far, the EPR program of NESREA has been the closest working government policy tackling plastic waste on the ground and wherein the efforts to hold companies in the beverage industry accountable for their contribution to the plastic crisis is laudable. However, these efforts need to be more efficient and have a wider implementation. Many manufacturers responsible for plastic waste generation have been slow to sign-up to the alliance. There is also a lack of understanding, inadequate information, and poor communication between the government and industry.

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **Nigeria's voluntary EPR scheme:** In 2014, the National Environmental Standards and Regulations Enforcement Agency (NESREA) published operational guidelines to enforce an Extended Producers Responsibility (EPR) programme in consultation with stakeholders in the food and beverage industry in Nigeria, and commenced operation in 2016.[20] Before that, in 2013, the Food and Beverage Recycling Alliance (FBRA), a not-for-profit collaboration was set up to drive a self-regulatory, post-consumer food and beverage packaging waste recovery and recycling system. The alliance has companies that include the Nigerian Bottling Company Limited/Coca-Cola Nigeria Limited, Nigerian Breweries Plc., Seven-Up Bottling Company Limited, Nestle Nigeria Plc., Guinness Nigeria Plc., Intercontinental Distillers Limited, International Breweries Limited, Tulip Cocoa, and Prima Caps and Preforms, all collaborating under a strategic action plan that includes public outreach, technological innovation, recycling, reuse, marine drainage clean-ups and recovery, and buy-back schemes.[21]

   In 2018, FBRA collaborated with the Lagos state government, through the Ministry of Transportation, to rid the state's waterways of plastic and packaging waste. The MoU was a three-year partnership aimed at cleaning the Lagos' inland waterways by focusing on the evacuation and recycling of packaging waste collected from the four inland waterways—Five-cowrie Creek to Lekki; Marina through Elegbata and Osborne to Oworonshoki, waterways from Apapa through Kirikiri, Mile 2, Festac to Oke-Afa, and the Ikorodu Axis, which covers Ipakodo, Ibeshe, Baiyeku, Ijede and Badore. FBRA provided funding for equipment, gears and personnel training, while the Lagos State Government was responsible for structural civil works, managing execution, personnel, waste sorting centres and enforcement. FBRA and Lagos State Government jointly funded public awareness campaigns and advocacy on appropriate packaging of waste disposal systems. Their efforts recorded recycling of almost one billion bottles into fiber, created over 1,800 direct jobs on an average income of US $6 per day, and created synthetic fiber for local industries and export.

   In 2021, the Lagos Waste Management Authority (LAWMA) also commemorated the 2021 World Clean-up Day, along with a network of corporate bodies NGOs and government organisations, during which 75,000 plastic bottles, weighing 1,250 kg., were cleaned up, along a five km stretch of the Ilashe beach in the outskirts of Lagos. Organisations at the event included the Food and Beverage Recycling Alliance (FIBRA), the Nigerian Maritime Administration and Safety Agency (NIMASA); Lagos State Waterways Authority (LASWA), the Nigerian Ports Authority and the Lagos Ferry Service, among others.

2. **Wecyclers**: Wecyclers is a local start-up based in Lagos. It runs a rewards-for-recycling platform incentivising recycling for people in low-income communities. They accomplish their objectives using a fleet of relatively cheap and locally assembled cargo bikes called "wecycles", which the collectors use to pick up recyclable waste from households and deliver it

to collection, sorting and processing hubs around the city. When households hand over plastic materials such as empty plastic bottles, they receive points per kilogram of recycled waste, which they can exchange for money to purchase essential goods such as food and household goods. Today, almost 20,000 households participate in this initiative. The company employs over 100 full-time staff, 60 per cent of whom are said to be women. Employees who pick up waste earn from US $200 to US $400 a month and sorters make about US $100 a month. The national minimum monthly salary is about US $50.[22] Waste collected is sold to local companies that convert the material into finished products, for instance, plastic bottles are converted into fiber for the clothing market and stuffing for mattresses and pillows.

CONCLUSION

With over 20 per cent plastic waste found in the total waste composition in Abuja, it is imperative that segregation at source should be encouraged to promote recycling and higher resource recovery. The country urgently needs to invest in its waste management infrastructure, capacity and regulatory environment to combat the mounting effects of plastic waste. The recently adopted National Policy on Plastic Waste Management which went through a stakeholders' review process, must also be localised to involve community participation. Moreover, the ban on selected plastic items must also be executed on the ground to avoid the same fate as that of the earlier policies. Overall, despite some efforts by policymakers and the Nigerian government, the necessary reforms are hindered by a lack of political will to follow through, and confront the plastics crisis.

While Rwanda has thus far managed to keep its cities green and beautiful, this is under threat due to a booming population and indiscriminate infrastructure growth

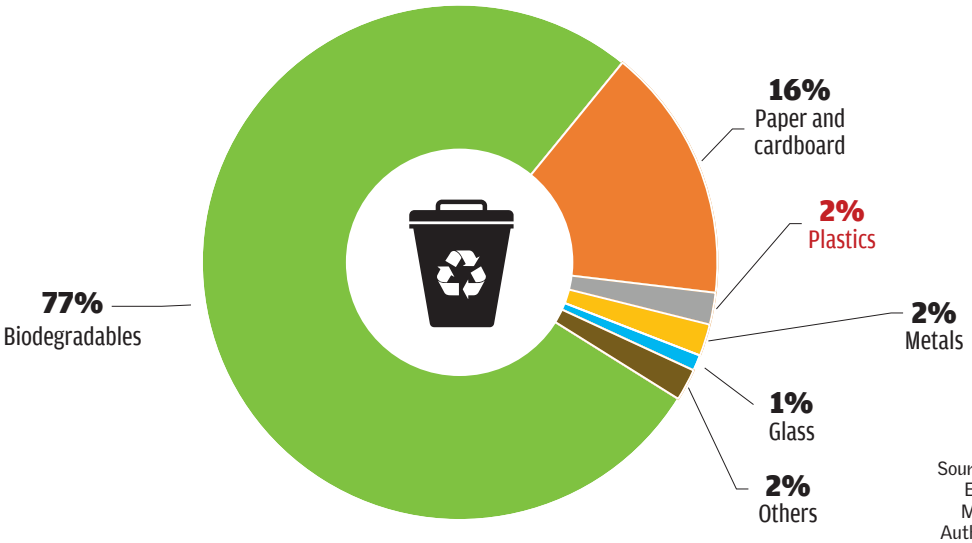
RWANDA

Vital stats	Information
Estimated population	13 million
Area	26,338 sq km
Total MSW generated	2.2 million tonnes per annum
Estimated plastic waste generated	0.04 million tonnes per annum
Rate of recycling	10 per cent
Disposal methods	Dumping, burying and burning

Source: compiled based on the literature cited in the report

Rwanda, situated in the Great Rift Valley of Central Africa, is faced with a problem of increasing solid waste due to population increase and systemic inadequacies. Like other developing economies, Rwanda is also faced with an ever-increasing population that directly affects its waste generation. In the last 25 years, the urban population in Rwanda has grown from 4.6 per cent of the total population to 18.4 per cent.[1] The country's urban population is expected to reach 35 per cent of its total population by 2024. As a result, Rwanda, particularly its capital Kigali, is witnessing a huge increase in its total municipal solid waste (MSW), which includes plastic waste. However, Rwanda has been able to address its plastic waste issues to an extent through a number of strict laws and their implementation.

Graph 1: Waste composition in Rwanda



Source: Rwanda Environment Management Authority, 2013

PLASTIC POLICY ECOSYSTEM

In Africa, Rwanda has been one of the torch bearers of plastic waste management. The tiny East African nation has enacted strict laws prohibiting the use of single-use plastic bags. The laws are so strict that even travellers from foreign countries are not allowed to enter the country with plastic bags. The country has restricted, banned or taxed the use of plastic bags, and its approach to these prohibitions is one of the most extreme among all its neighbours in the African continent.

The country has several national policies and regulations for ensuring environmental sustainability, including, the Rwanda Green Growth and Climate Resilience Strategy (2011), Regulations of Solid Waste Recycling (2015), and the Law on Environment (2018), etc. There are dedicated laws or policies that focus on minimising plastic waste in the country. These include Law No. 57/2008 of 10/09/2008 prohibiting the manufacture, import, use and sale of polythene bags in Rwanda (2008). This ban includes the implementation of strict border control and imposition of fines on anyone who uses plastic bags. Furthermore, the black market for plastic bags that emerged as a reaction to this ban has been closely monitored wherever possible. There are provisions of penalty (fines) on anyone participating in this black market. This legislation came into existence because of plastic bag pollution and its impact on the agricultural sector.

Since 2008, Rwanda has banned the manufacture, import and use of plastic bags or polyethylene bags but with a few exceptions. Products such as hospital plastic aprons, plastic bags used in tree nurseries, plastic reservoirs, cellophane for food wrapping in hotels, etc are exempt from the ban. In addition to this, plastic packages for foods e.g. potato chips, are only allowed for approved companies with a clear business plan detailing how their bags will be collected and recycled.

The government has also made the clearing away of plastic bags in the community environment a priority during the "*Umaganda*" (a monthly community workday). Initially, plastic bag manufacturers in Rwanda were unhappy with the idea of banning their products. However, the government helped them switch their factories from producing plastic products to recycling plastic.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT RWANDA HAS ACHIEVED SO FAR

When it comes to evaluating how the policy functions today, the most visible and obvious evidence can be seen in how spick and span the city streets of Rwanda are. The aspects that stand out are general cleanliness, healthier cattle and clean waterways. In addition, Kigali is often described as being the cleanest city in Africa and several delegations from other countries have visited to learn how Rwanda successfully implemented and achieved the ban on plastic bags.[2] Rwanda's current strong institutional, administrative and political will, legal frameworks and active citizen

Table 1: Directives related to plastic waste management in Rwanda

Directives related to plastic waste management	Highlights
Law No. 57/2008 of 10/09/2008 Relating to the Prohibition of manufacturing, import, use and sale of polythene bags in Rwanda (2008).	• This law prohibits the manufacture, use, import and sale of polythene (or polyethylene) bags in Rwanda. Built on a 2004 government instruction on banning import and manufacture of limited plastic bags, the law also targets consumers.
Law No 17/2019 of 10/08/2019 Relating to The prohibition of manufacture, import, use and sale of plastic carry single-use plastic items	• This law prohibits the manufacture, import, use and sale of plastic carry and single-use plastic items. • The manufacture, importat, use or sale of home compostable plastic items woven polypropylene is allowed subject to prior authorisation from a competent authority. • Environmental levy on imported goods packaged in plastic material or single-use plastic items are subject to environmental levy in accordance with relevant laws. • Every manufacturer, wholesaler or retailer of plastic bags or single-use items must put in place mechanisms to collect and segregate the plastic waste and hand them over to recycling plants. • Under Article 7 of the law, recycling of used plastic carry bags and single-use plastic items must be done in a way that ensures environmental safety and sustainability. Article 13 of the law states that "any person who piles or disposes of plastic carry bag waste and other single-use plastic items on unauthorised public or private place is liable to an administrative fine of fifty thousand Rwandan francs (FRW 50,000) and is ordered to remove such waste repair damages caused by him or her." • If the unauthorised piling or disposing of plastic is done by a person having exceptional authorisation to use plastic carry bags and single-use plastic items, he or she is liable to an administrative fine of five million Rwandan francs (FRW 5,000,000). The authorisation is also suspended or withdrawn.
Guidelines enacted by REMA on procedures and conditions for eligibility to grant exceptional permission to manufacture, use, import or sell single-use plastic items or pack goods in single-use plastics	• Medical use, agriculture and forestry use, waste collection and sanitation use, use in construction industry, industrial use and use in printing houses • Applicant must justify that there is unavailability of an alternative items

Fines imposed on offenders

Offense	Punishment
Factories using plastic bags	Fine of between RWF 100,000 (USD 101.95) and RWF 500,000 (USD 509.77) and owners facing jail time from 6–12 months
Individual selling banned bags	Fine between RWF 10,000 (USD 10.20) and RWF 300,000 (USD 305.86)
Individual purchasing banned bags	Fine between RWF 5,000 (USD 5.10) and RWF 100,000 (USD 101.95)

Source: https://www.no-burn.org/wp-content/uploads/Rwanda_A-global-leader-in-plastic-pollution-reduction_April-2021.pdf

participation foster socio-economic development and environmental protection, especially in dealing with the plastic menace.[3] The plastic ban has drastically eliminated the associated hazards and risks to humans, marine and terrestrial lives caused by plastic pollution.

Community participation in the form of "*Umuganda*" is a classic example of how home-grown solutions of mutual collaboration between the government and the local community can achieve targeted environmental and social goals. Along with the formulation of scrupulous plastic-related laws, the *implementation* has been successfully monitored by government agencies. Law enforcement (imposition of fines, detaining traffickers and smugglers of banned plastic items, etc.) has proved very effective in eradicating the scourge of plastics bags.

Public awareness campaigns such as formation and promotion of environmental clubs in schools and colleges, green education, environmental awareness programmes in institutes and government offices continue to enable mechanisms for successfully dealing with plastic pollution. The national motto for sustainable environmental management is "whatever cannot be recycled or reused must not be produced."[4]

INITIATIVES TO COMBAT PLASTIC POLLUTION

EcoPlastic: EcoPlastic is one of Rwanda's leading companies engaged in plastic recycling, and the production of new plastic products from plastic waste. Founded in 2010, the company provides plastic recycling services to citizens of Rwanda. It produces a number of different products for use in various applications in different sectors such as including agriculture, construction and industrial production.[5]

Through partnerships with individuals, businesses and the government, EcoPlastic gains

Products manufactured from plastic waste by EcoPlastic

Rubbish bag
Different kinds of bags used to collect waste according to the type of waste. These can be produced in different colors and with properties according to client needs.

Sheeting and roofing
This is a plastic sheet that is used to cover (and keep dry), for instance crops or materials in agriculture, or for any other application that requires plastic covering, in the case of per example a natural disaster.

Silage bag
Silage bags are hermetic bags that are used to store forage/feed for livestock.

Hermetic bags (PICS)
These are bags used to store grains. They provide a simple, low-cost method to reduce prevalence of postharvest insects and thus losses of crops.

Tubing
These are bags used for the multiplication of small trees in agriculture.

Packaging
EcoPlastic offers packaging for industrial production in multiple fields, and adapts this product according to client needs–in terms of colors, prints and logos.

Source: https://ecoplasticrwanda.com/-Products-#

https://ecoplasticrwanda.com/-Gallery-

Washing and drying of plastic waste at Ecoplastics

access to used plastic that can be turned into new raw material. The major suppliers of this plastic waste include companies and individuals who collect plastic waste, commercial establishments and businesses (restaurants, hotels, etc.), hospitals, and airports. Once the waste arrives at the factory, it goes through a process of sorting, washing, drying before the actual recycling process begins. The recycling process involves crushing the plastic, heating it with additives, cooling it in water (rainwater used and recycled to the extent possible) and finally cutting it into pieces. The recycled raw material then serves as primary input for a new production process, thus ensuring a minimal impact on the environment from the necessary use of plastic that still exists in Rwanda.[6]

Rwanda Plastic Waste Web Portal: The Global Green Growth Institute (GGGI) in collaboration with the Rwanda Environment Management Authority (REMA), the Foreign, Commonwealth and Development Office (FCDO) and Save The Environment Initiative (SEI) officially launched the Plastic Waste Web Portal in 2022. The objective of this web portal is to provide a common platform for data availability related to plastics in order to track the generation of plastic waste. The portal aims to support efforts to map the plastic waste value chain, identify plastic waste aggregators and recyclers, and contribute to the valorisation of plastic waste. The portal has been designed based on international best practices to promote recycling, increase resource recovery of plastic, and to introduce Extended Producer Responsibility.[7]

Since lack of data around the quantities and types of plastic waste restricts the coordinated action and effective mechanisms needed for minimising the hazards posed by improper plastic waste management in Rwanda; on many occasions, plastic waste ultimately finds its way into drainage systems and landfills and causes flooding. The web portal, therefore, is expected to serve as a tool to increase the capacity to identify gaps, opportunities, and challenges in the plastic waste value chain by connecting the producers of plastic with recycling companies, potential entrepreneurs, investors, and the private sector that can make use of plastic as a material for new products.[8]

This intervention is extremely important and has the potential to act as a decision-support tool for policymakers to take necessary actions for plastic waste management in the country.

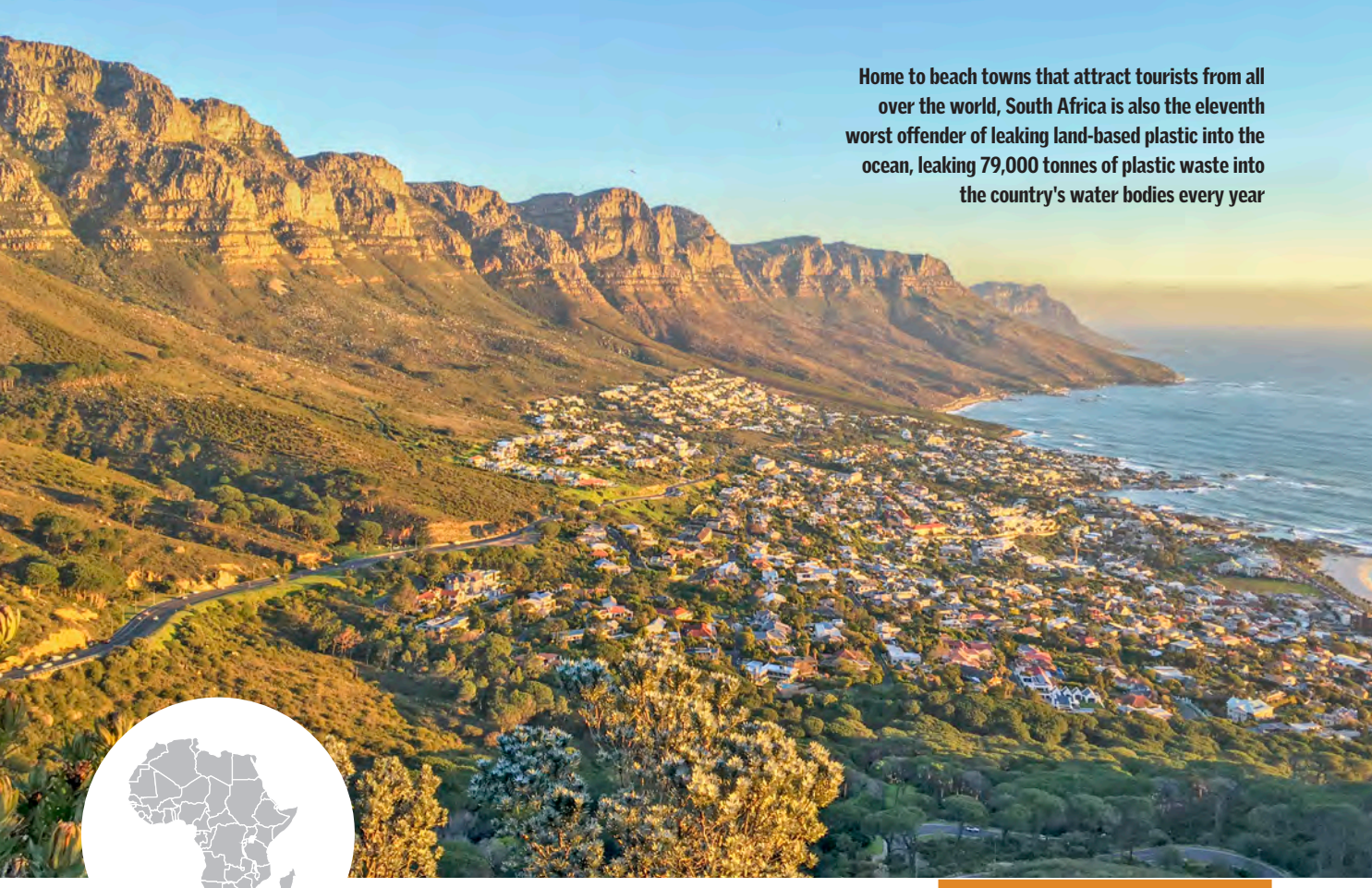
CONCLUSION

Despite the remarkable success story in terms of getting rid of the plastic menace in Rwanda, the delivery of waste management services in Rwanda continues to face significant challenges as governments, industries and businesses do not invest and develop effective and efficient waste management systems.[9]

According to a World Bank Report published in 2020, there is a lack of data and data management systems for waste management contributing to a poor assessment of the impact of plastic policies on plastic waste recycling reduction in Rwanda.[10] The availability of a data management system is critical for tracking waste management (waste accumulation, tonnage recycled, recovered and landfilled without treatment), facilitating policy performance measurement and improvement.

Besides, the country also needs to implement separation of waste at source, increase landfill tipping fees, penal provision for illegal dumping, deposit refund schemes and other financial schemes, which will encourage households and commercial establishments to separate recyclable plastics from other wastes, reduce landfill disposal and curb illegal dumping in Rwanda.

Finally, efforts are needed to enhance the marketability of materials derived from recycled plastics. The country needs to develop operative mechanisms and provide financial incentives to support local industries to use recycled pellets or plastic products in their manufacturing processes and products.



Home to beach towns that attract tourists from all over the world, South Africa is also the eleventh worst offender of leaking land-based plastic into the ocean, leaking 79,000 tonnes of plastic waste into the country's water bodies every year

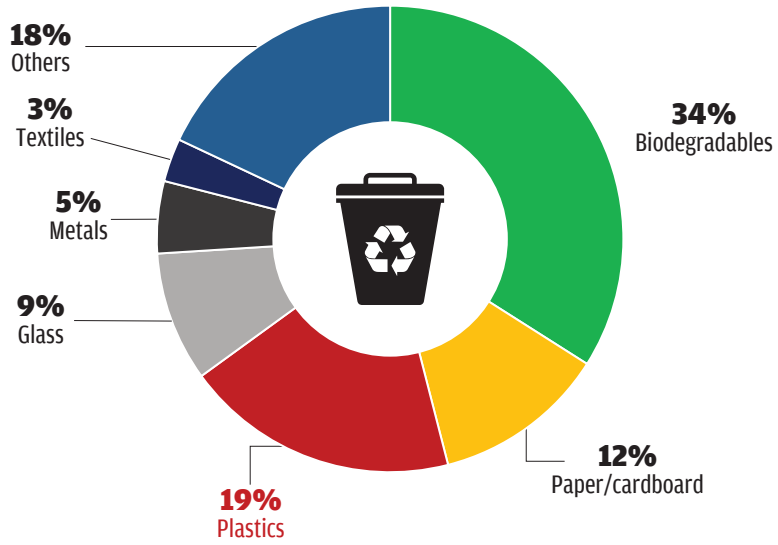
SOUTH AFRICA

Vital stats	Information
Estimated population	60.14 million
Area	1,221,000 sq km
Total MSW generated	12.7 million tonnes per annum
Estimated plastic waste generated	2.4 million tonnes per annum
Rate of recycling	14 per cent
Disposal methods	Open dumping, burying, burning, incineration and landfilling

Source: compiled based on the literature cited in the report

South Africa has an estimated population of 60.14 million[1] and generates solid waste amounting to around 12.7 million tonnes per year,[2] of which around 2.4 million tonnes is plastic waste. In South Africa, the share of plastic in the total waste composition is 18 per cent. The per capita plastic waste generation in the country is 41 kg per person per year, which is significantly above the world average of 29 kg. Out of this only 14 per cent is recycled. About 40 per cent of this waste is mismanaged, with three per cent directly leaking into the environment. This means that on an average, every citizen leaks at least 1.4 kg of plastic to the environment per year.[3] Slumping growth and international secondary market contexts have driven the price of recyclable plastics down, while new plastics products made up of virgin material are still being produced and are flooding the South African market. Lack of public waste bins, especially in low-income areas, has led to indiscriminate littering across the country. Extreme meteorological events, such as above-average rainfall, are also common in the country and they aggravate plastic leakage. According to a 2021 World Wildlife Fund (WWF) report, *Plastics: The Costs to Society,*

Graph 1: Waste composition in South Africa



Source: Municipal Solid Waste Composition Determination in the City of Johannesburg – Proceedings of the World Congress on Engineering and Computer Science 2016 Vol II, WCECS 2016, October 19-21, 2016, San Francisco, USA

Environment and the Economy, the cost that the environment and society pays for plastic use is at least ten times higher than its market price. The minimum cost that was imposed on South Africa for the plastic produced in 2019 is approximately US $60.72 billion. This includes damage to livelihoods and key economic industries such as tourism and fisheries, clean-up costs incurred by the government, and threats to the population's health. A study conducted in Cape Town, South Africa, found that plastic pollution on beaches has a major impact on the tourism sector, potentially reducing tourism revenue and employment by up to 91 per cent.[4] The city of Cape Town spends R 13 million (US $819,000) on regular beach clean-ups every year. By doing so, the city avoids damages that amount to an estimated R 8.5 billion (US $536 million) to the local tourism sector. For every rand (US $0.06) spent on beach clean-ups, 1.9 grams of plastic litter are collected, and R 665 (US $42) is saved in tourism revenue.[5]

In 2010, the country generated 4.47 million tonnes of plastics, roughly accounting to 0.24 kg per person per day. According to the 2018 South African State of Waste report, the total waste generated in South Africa in 2017 was 54.2 million tonnes, which is one tonne per capita for a population of 56.5 million people. South Africa generated 1.1 million tonnes of plastic waste in 2017. This equates to 19 kg of plastic per capita per year, or 53 grams per person per day.[6]

A survey conducted by Plastics SA reveals that in 2018, South Africa converted 18,76,250 tonnes of polymer into plastics products—an increase of 4.9 per cent from 2017. This figure stands for the total quantity of locally produced, imported and recycled polymers sold to local convertors in South Africa. Locally recycled polymer made up 18 per cent of this total. South Africa recycled 3,52,000 tonnes of plastics into raw material in 2018. Compared to Europe's recycling rate of 31.1 per cent, South Africa has an input recycling rate of 46.3 per cent for all plastics. More than 300 plastics recyclers were included in this survey. 20 per cent of these recyclers converted 70 per cent of the total plastic procured. 27 per cent of the recyclers have been around for less than three years, whereas 24 per cent of the companies have more than 20 years' experience in plastic recycling in South Africa. While most of them are based in Gauteng (58 per cent), 17 per cent is based in KwaZulu-Natal and 14 per cent is based in the Western Cape. Only 5.6 per cent of the recycled raw material was exported to plastic convertors in neighboring countries.[7]

Another survey conducted in 2019 reveals that in that very year, South Africa converted 18,41,745 tonnes of polymer into plastics products, a decrease of 1.8 per cent from 2018. Locally recycled polymer made up 18.3 per cent of the total domestic consumption. The country recycled 3,52,500 tonnes of plastic into raw materials. Of this, 14,755 tonnes were exported to converters

outside the country, while 3,37,745 tonnes were converted in South Africa. The total quantity of recyclate used in local manufacturing was 3,37,700 tonnes, of which 1,19,000 tonnes were used to manufacture new packaging items. In total, 5,03,600 tonnes of plastic waste were collected for recycling, including 3,62,800 tonnes of packaging and 17,000 tonnes of imported recyclables from other countries. This constituted an input recycling rate of 45.7 per cent. 24 million tonnes of waste were recycled into raw material again. Around 2 billion rand was injected into the informal sector through the purchase of recyclable plastics waste, creating 58,750 income opportunities. Plastics recycling saved 244,300 tonnes of CO2—equivalent to emissions by 51,000 cars in the same year. Tonnages landfilled, material not collected and value chain fall out, decreased by 2.2 per cent since 2018. Approximately 5,8750 informal income opportunities were sustained through plastics recycling in 2019. These include waste pickers and employees of the smaller entrepreneurial collectors. At an average buying price of R 4.10 for polyolefins, a total of R 2,065 million was contributed to the informal collection industry by the recycling industry. 52 per cent of the recyclers, who recycled 60 per cent of the plastic waste, are based in Gauteng, and 11 per cent of the recyclers, who recycled 14 per cent of the plastic waste, are based in the Western Cape.[8]

According to estimates made in 2019, South Africa mismanages 708,467 tonnes of plastic waste per year, which amounts to 12.2 kilograms per person. This puts South Africa nineteenth among the top plastic waste producers in the world. The country also channels 4,266 tonnes of plastic into the ocean every year, which roughly amounts to 0.07 kg per person. With a global share of 0.44 per cent, South Africa ranks twenty-second globally when it comes to the amount of plastic waste emitted into the ocean.[9] [10]

According to the National Guidance for Plastic Pollution Hotspotting and Shaping Action report, December 2020,[11] South Africa generates 2,371,000 tonnes of plastic waste annually. Per capita plastic waste generation is around 41 kg per capita per year, which is above the global average of 29 kg per capita per year. In 2018, a total amount of 3,52,000 tonnes of plastic waste were recycled (15 per cent of the total 23,89,000 tonnes of plastic waste), from which 18,000 tonnes of plastic waste came from imported waste. The remaining 334,000 tonnes of recycled plastic waste came from domestically generated waste. The collection rate of plastic waste was 70 per cent, of which only 14 per cent was recycled, 45 per cent was disposed of in dumpsites, sanitary landfill or incineration facilities.

Approximately 40 per cent—about 9,59,000 tonnes of plastic waste—is mismanaged in South Africa. Burning of waste is also practiced in the country, but less widespread than in other African nations. Although there is no specific data on burning in the country, a rough estimate based on assumptions made in the *Breaking the Plastic Wave* report suggests that 60 per cent of uncollected plastic waste and 13 per cent of plastic waste at dumpsites is burnt on an average worldwide.[12] We can surmise that in South Africa, 48 per cent of the mismanaged plastic waste, which is apporximately 460,000 tonnes, ends up polluting the air through open burning. Out of the total mismanaged plastic waste in South Africa, PET bottles constitute 24 per cent, and PS food containers and PET trays constitute four per cent each.[13] Except for Gauteng, populated areas are usually located close to a waterway or the coast. This only increases the likelihood of plastic leaking into the marine environment. It is also common for the city cleaners to push the waste into drainage systems and waterways. This only increases plastic leakage, and leads to clogging and floods during rains.

A 2020 report by the World Wide Fund for Nature (WWF), reveals that South Africa is the eleventh worst offender of leaking land-based plastic into the ocean. A study by the International Union for Conservation of Nature (IUCN) revealed that South Africa contributed the largest volume (107,000 tonnes) of plastics released into the marine environment in 2018. Another study highlighted that the country released 79,000 tonnes of plastic waste into rivers and oceans, which amounted to 1.4 kilograms of per capita leakage. The annual leakage of South Africa's mismanaged waste is 71,801 tonnes. Micro-plastic leakage accounts for eight per cent of the overall country plastic leakage. This leakage corresponds to three per cent of the quantity of plastic waste generated in the country per year. The most critical polymers generated and causing leakage are PET (bottles, food wrappings), PP (hot food containers, sanitary pad liners) and LDPE (bags, container lids). 41 per cent of PP, 36 per cent of PET and 35 per cent of LDPE are mismanaged, either because they are not collected or they are improperly disposed of. LDPE and PET cause four per cent leakage each, i.e. 17,000 tonnes and 13,000 tonnes respectively, while PP causes three per cent leakage (16,000 tonnes). LDPE is the top leaking polymer because it constitutes almost 70 per cent of the plastic that is used in the packaging sector. The main factor contributing to PP ranking second despite PP waste generation being the same as LDPE (4,68,000 tonnes), is that only half of the PP waste comes from the packaging sector.[14]

About 52 per cent of the plastic raw material produced in and imported to South Africa is used for packaging applications. The packaging sector contributes to almost 60 per cent of the total plastic leakage, with 46,000 tonnes of packaging waste leaking into oceans and waterways. It is the most mismanaged waste sector, contributing to 39 per cent of the total plastic waste mismanaged by any sector, since the packaging sector has the highest plastic consumption and, unlike other sectors, all of the products used are single-use in nature.[15] There has been a more-than-50 per cent increase in processed and packaged food that is available and consumed in South Africa since 1994. In 2017 alone, the South African crisps market increased by 10.4 per cent. Some 1,600 tonnes of plastic packaging waste is generated annually in South Africa due to a billion units of crisps, biscuits and chocolates being sold through formal retail markets in the country.

Two out of the nine provinces are responsible for 50 per cent of the plastic leakage. Plastic waste generation is concentrated around Pretoria, Johannesburg, Durban and Cape Town areas where the population density is higher. Together, out of the total waste they generate, 18 per cent is plastic. Almost all plastic that is consumed in South Africa is manufactured in the country from locally produced or imported primary or secondary plastic.

South Africa is one of the six African nations who are jointly consuming 75 per cent of the total plastic imported in the continent.

In South Africa, after a heavy rainfall event, authorities are often forced to close the Durban port due to the accumulation of large volumes of plastic and other wastes. This also causes damage to the engines of the ships that dock in the area, all of which result in high costs when it comes to clean-up and repair.

PLASTIC POLICY ECOSYSTEM

The Department of Environment, Forestry and Fisheries (DEFF) has a mandate to ensure that human health and the environment are protected by providing measures for the prevention of pollution and ecological degradation according to the National Environmental Management: Waste Act 59 of 2008 (Waste Act). The Waste RDI roadmap was initiated to provide strategic direction, and manage and coordinate South Africa's investment in six clusters of Waste RDI activity. The vision of the roadmap is to stimulate waste innovation (technological and non-technological) and human capital development through investment in science and technology. In 2017, plastic packaging was defined as priority waste, and since 2019, it is included in materials where Extended Producer Responsibility (EPR) will apply according to the terms stated in section 18 of the Waste Act. The national treasury has the mandate to coordinate macroeconomic policy and support the allocation and utilisation of financial resources to promote economic development and social progress. Plastic has featured on the national treasury's radar, specifically when it comes to the plastic bag levy.

In 2008, the National Environmental Management: Waste Act 59 of 2008 was promulgated. The Waste Act aligns with circular economy principles to adopt an integrated solution. The ultimate aim is to maneuver waste out of the system and, if waste is generated, to ensure that it is reused, recycled or recovered before safe disposal. The National Environmental Management: Waste Amendment Act 26 of 2014 was created to rectify the shortcomings of the Waste Act. Despite the amendments to the Waste Act, many obstacles still exist that make material recovery from mixed waste and waste diversion difficult.

The National Environmental Management Waste Act of 2008, as amended in 2014 (Waste Act) is the umbrella legislation for the environment. It is based on the principles and provisions contained in the National Environmental Management Act of 1998 (NEMA). The purpose of the Waste Act is to provide for national norms and standards for the regulation of the management of waste in all spheres of the government, and to provide specific waste management measures. Its inception was in fulfilment of section 24 of the Constitution of the Republic of South Africa, 1996 (Constitution), which provides all citizens with the right to environmental protection and the right to live in an environment that is not harmful to their health and well-being.

The National Waste Management Strategy (NWMS) was drawn up by the Department of Environment, Forestry and Fisheries and as a legislative requirement of the Waste Act. It is aimed at achieving the objectives of the Waste Act. It was developed to systematically improve the way industry stakeholders manage waste in South Africa. The strategy notes the fine balance that exists in South Africa between the social and economic development of an unequal society and the need to protect and conserve the country's natural resources.

The development of an Integrated Waste Management Plan (IWMP) is a requirement for all levels of government that are responsible for waste management according to the Waste Act. Plastic is not currently a focus area in the IWMPs and the diversion of waste is constrained due to inadequate capacity, competence and cost.

Table 1: Directives related to plastic waste management in South Africa

Directives related to plastic waste management	Highlights
National Environmental Management: Waste Act 59 of 2008 Section 28, Notice published on 6 December 2017	• Packaging was declared a priority waste by the government and the plastics industry was required to submit an Industry Waste Management Plan (IndWMP) to the government by September 2018. All producers were also required to register with the government by 6 February, 2018. In December 2019, the Section 28 Notice was withdrawn and all IndWMPs were dismissed. None of the submitted plans complied with the criteria in the Section 28 Notice, specifically with reference to the pricing strategy. The new approach undertaken was the extended producer responsibility as contemplated under section 18 of the Waste Act.
National Waste Management Strategy (2020 NWMS)	• Outlines the government's strategic approach to reduce littering and illegal dumping, and to "reducing the production of single-use plastics such as food wrappers, disposable cups, and straws that are currently destroying marine habitats in South Africa".

South African Plastic Bag Levy: In 2003, the then Department of Environmental Affairs introduced an environmental tax that was levied on plastic carrier bags in South Africa. The intention was to reduce consumption, mitigate the increasing prevalence of plastic bags in the environment, and address the growing volumes of solid waste. Overall, consumption initially declined but ultimately increased again. The levy continued to increase over subsequent years to address the high levels of consumption, bringing millions of rand into the national treasury. The levy was introduced along with a ban on bags with a thickness below 24 micorns. Due to the charge on bags at formal retailers, overall consumption initially declined, but before long, the cost of the carrier bags was included in household budgets and consumption increased again. The heavier gauge was intended to promote recycling through the establishment of a non-profit organisation, Buyisa-e-Bag. The mandate for Buyisa-e-Bag was to promote waste minimisation and awareness initiatives in the plastics industry, expand collector networks and create jobs, as well as kick-start rural collection. In 2003, three cents per bag was levied to subsidise Buyisa-e-Bag, which increased to four cents in 2010. Buyisa-e-Bag was closed in 2011 due to maladministration with financial losses estimated at R 100 million. It was subsequently wound up and its functions absorbed into the then Department of Environmental Affairs. In April 2018, the levy per bag increased by 50 per cent (12 cents) to address the high levels of consumption, bringing in R 24.13 million compared to R 41.2 million in 2004. The levy was increased to 25 cents per bag in 2020. The increased use of recycled content in plastic bags is a major step forward in the transition to a circular plastics economy in South Africa. However, this trend came under tremendous threat due to the dip in oil prices due to the COVID-19 crisis and the geopolitical situation between oil-producing countries in the Middle East and Russia. This made the manufacture of plastic bags from virgin plastic a much cheaper option than bags made from recycled material. The plastic bag levy was thus generally unsuccessful in reducing the consumption of plastic bags.

At the 14th Conference of the Parties, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal—of which South Africa is a part—adopted a decision to incorporate certain categories of plastic under its scope. This includes giving parties the right to prohibit the import of plastic at the end-of-life as well as requiring parties to obtain prior written informed consent for the export of plastic of this nature. To be traded, waste plastic has to be clean and must consist of single or clearly defined plastic polymer types that can be recycled.

Floating litter boom from the Litter Boom Project used to collect plastic litter in the Black River, Cape Town, South Africa

The African Ministerial Conference on the Environment (AMCEN) held in Durban in November 2019, saw 54 member states endorse a declaration calling for global action on plastic pollution. Among the options to be further explored was a suggestion for a new global agreement to combat plastic pollution. The South African Minister of the Environment, Barbara Creecy, held the AMCEN presidency for 2020–21, which served as an opportunity for South Africa to take the lead on a number of topics, including addressing the plastic pollution challenge.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT SOUTH AFRICA HAS ACHIEVED SO FAR

Collaboration with the plastics industry has brought growth in the country, and boosted its recycling industry. It is the first country in Africa to also have a food grade PET recycler with European Food Safety Authority (EFSA)'s positive opinion, an agency that provides independent scientific advice coomunicates on existing and emerging risks in food chain. in 2015. Due to the location of the country, focus has mostly been on the domestic recycling market as trade to other regions has not been as effective. There is no formalised existing or expected deposit-return scheme in relation to packaging or plastics in South Africa. Companies such as Coca Cola, Dow, Nestlé, Diageo and Unilever have launched initiatives with a local focus to improve waste collection in a region where there is little access to a formal waste management system.

PET bottles are the most recycled plastic products in the country. While PETCO announced that 98,649 tonnes of PET bottles were recycled in 2018, Plastics SA announced only 74,328 tonnes of recycled PET bottles for the same year. Plastic bags are not regarded as a major plastic hotspot in the country, which supports the fact that continuous efforts on plastic bags regulations paid off. However, plastic bags are regarded as harmful and must continue to be monitored.

The plastics value chain provides several formal and informal jobs, but accurate and up-to-date data on the number and types of jobs in the plastics value chain in African countries is scarce.

In South Africa, the total number of formal jobs provided by plastics converters (manufacturers) was approximately 60,000 in 2018. Furthermore, the plastics recycling sector sustained 7,892 formal jobs in recycling factories. The tonnages per employee dropped to 44.5 tonnes. It is estimated that 58,470 workers received an income through the supply chain, 6,000 more than in 2017. These include self-employed waste pickers and employees of smaller entrepreneurial collectors. Researchers estimate that there are up to 215,000 waste reclaimers in the country.

In 2019, South Africa achieved a 62 per cent collection rate for PET bottles, whereas it was only 24 per cent in 2007.

The upside is that South Africa has a large informal waste sector. According to the Waste Pickers Association, South Africa has more than 90,000 waste pickers—a highly valuable human resource when it comes to recovering plastics.

The Africa Circular Economy Alliance was established by the governments of Nigeria, Rwanda and South Africa in 2017. It aims to steer African nations in the transition to a circular economy and to deliver economic growth, jobs and positive environmental outcomes. Plastic packaging falls within the broader theme of manufacturing, which is one of three priority sectors. The IUCN/UNEP compiled national plastic pollution hotspotting guidelines and assessment reports for South Africa.

Various environmental and social civil society organisations are involved in advocacy work on plastic pollution. Interventions are largely focused on clean-ups and raising awareness. Some examples include beach clean-ups and data collection of items that are commonly found on beaches, through citizen science, eco-bricking projects: recycling plastics used in PET bottles to make building materials, such as for for schools, garden and seating, andwareness-raising campaigns such as Plastic Free July, #RethinkTheBag, #StrawsSuck, among others.

Faith-based organisations such as the Green Anglicans and the Southern African Faith Communities' Environment Institute (SAFCEI) are advocating for individuals and communities to turn the tide on the increasing levels of plastic pollution by refusing problem plastics They are also calling on the government to ban these items.

The Department of Environmental Affairs is also considering a total ban on all single-use plastics in the country.

INITIATIVES TO COMBAT PLASTIC POLLUTION

1. **South African Plastics Pact:** The South African Plastics Pact was launched in January 2020 , and has been the first of its kind in Africa to exchange knowledge and collaborate to accelerate the transition to a circular economy for plastic. The South African Plastics Pact is managed and implemented by GreenCape, with the founding members committed to a series of ambitious targets for 2025 to prevent plastics from becoming waste or pollution. Members from the plastics industry have collaborated to achieve a circular economy for plastic packaging and meeting four targets by 2025. These targets are reducing problematic or unnecessary plastic packaging, making 100 per cent of plastic packaging reusable, recyclable or compostable, ensuring that 70 per cent of plastic packaging is effectively recycled, and 30 per cent recycled content is used across all plastic packaging.

2. **Mandatory EPR scheme:** South Africa evolved from a voluntary to a mandatory EPR scheme in May 2021. Initially, a limited number of plastic packaging formats were covered by the scheme and there were several producer responsibility organisations (PROs). According to the Section 18 Notice in the National Environmental Management: Waste Act 59 of 2008, the government selected the packaging, e-waste and lighting waste streams to be regulated under EPR and required that the funds be managed by the industry. In 2021, EPR plans were being developed by the PROs or individual company schemes for government approval and subsequent operational implementation in 2022. It will also provide the necessary financial and/or operational capacity to the inadequate solid-waste management function currently provided by municipalities in the country.

3. **PET Recycling Company (PETCO):** industry-led collaboration in South Africa, co-created and funded by industry members including Coca-Cola. Established in 2004, PETCO took on the role of EPR for the South African PET industry involving brands, retailers, converters, producers, consumers and recyclers. The voluntary EPR fee supported PET recycling by investing in infrastructure, collection and recycling PET waste.

4. **Beach Co-op:** a not-for-profit company that has been collecting marine debris in Muizenberg, Cape Town since 2015. From 2017 to 2021, of all the items found, 27.6 per cent were plastics. Of the plastics found sweet wrappers, cold drinklids, lollipop sticksstraws, chips' packets, earbuds, cold drink bottles and water bottles accounted for the maximum waste. In 2020 alone, the team removed 434 kilograms of waste from Cape Town's coastline and waterways, which included 9,127 cold drink lids, 7,447 lollipop sticks, and 5,422 individual sweet wrappers.[16]

CONCLUSION

Lack of waste segregation at source is a key barrier in reducing the collection and recycling rate of plastics in the country. Increasing plastic segregation in households and public spaces is the key. The lack of re-use or deposit scheme contribute to a high consumption of single-use plastics. Many different plastic packaging applications (including PET bottles) leak throughout the country due to very high use of plastic in the packaging sector. PP leakage is high because of high consumption and lower recycling rate compared to other polymers such as LDPE or PET. LDPE and PET are widely consumed polymers and could benefit from even higher recycling rate to reduce leakage. The low demand for recycled material on the domestic market does not create enough incentive (market price) for the informal sector to increase collection. Plastic leaks into the rural and peri-urban areas because of low collection rates (especially in informal settlements). Even while it waits for collection, plastic waste is prone to leakage because of extreme meteorological events (wind/flooding). Increase recycling capacity for domestic plastic waste – PP, LDPE and PET must be a priority, while reducing the use of single-use plastics. The country must avoid producing/importing plastics that do not benefit from recycling in the country and promote alternate materials. There is a need for more field monitoring and implementation in areas prone to plastic leakage (markets, informal settlements, and so on). The informal sector waste pickers are crucial to the African recycling industry and must be incorporated and supported in any solutions related to its development. With more investment, the recycling industry will be able to take advantage of the large volumes of plastic waste available.

Nearly 96 per cent of about 319,000 tonnes of plastic waste generated in Tanzania is mismanaged, threatening the country's diverse wildlife

TANZANIA

Vital stats	Information
Estimated population	59.73 million
Area	945,087 sq km
Total MSW generated	12.1–17.4 million tonnes per annum
Estimated plastic waste generated	0.84–1.21 million tonnes per annum
Rate of recycling	4 per cent
Disposal methods	Dumping, burying and burning

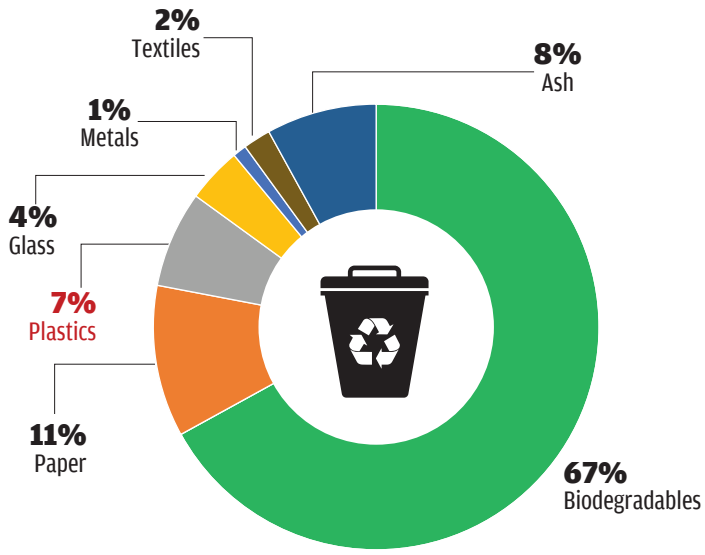
Source: compiled based on the literature cited in the report

Tanzania is the latest country to join 33 other African nations that have banned plastic carrier bags. According to government sources, Tanzania has a solid waste collection coverage of roughly 40 per cent and a recycling rate of ten per cent.[1] At 75 per cent, household waste is the largest source of waste in Tanzania, although there is evidence that local companies are also increasingly using plastics to package their products.[2] Household waste typically consists of food products, personal care products, and other household products packaged in plastics such as PET, polyethylene, polypropylene, and polystyrene. Of the total municipal solid waste generated, roughly seven per cent are plastics.[3]

PLASTIC POLICY ECOSYSTEM

According to the National Environmental Master Plan for Strategic Interventions (2022–32), it is estimated that Tanzania generates 150,000 metric tonnes of plastic waste annually.[4] Plastic recycling in the country is limited to specific types of polymers such as PET and HDPE, and the recycling rate for them is between 20–30 per cent.

Graph 1: Waste composition in Tanzania



Source: Vice Presidents Office, Tanzania, 2020

In May 2019, the Union Government of Tanzania revoked the Environmental Management (Control of Plastic Bags) Regulations, 2015 when it notified the Environment Management (Prohibition of Plastic Carrier Bags) Regulations, 2019 which came into force on 1 June, 2019. The 2015 regulations had a partial ban on plastic carrier bags under 30 microns (or 0.03 mm) thickness. The 2019 regulations imposed a total ban on plastic carrier bags irrespective of their thickness.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT TANZANIA HAS ACHIEVED SO FAR

A report by the International Union for Conservation of Nature (IUCN) and Quantis estimates that 319,000 tonnes of plastic waste was generated in Tanzania in 2018.[5] The report also estimates that the per capita plastic waste generation in Tanzania is 5.6 kg per year, and that only four per cent of the plastic waste is being collected for recycling.[6]

Tanzania has since introduced several stringent regulations on plastic carrier bags like other countries in eastern Africa (Rwanda and Kenya). These regulations have enabled the country to significantly limit the use of plastic carrier bags, which were one of the most prominent sources of visible litter in the country. The ban has been enforced effectively by the National Environmental Management Council (NEMC) and local governments. Plastic carrier bags have now been replaced by non-woven polypropylene bags in retail stores and small paper bags in smaller shops.

In 2016, the National Environmental Management Council (NEMC), through Government Notice no. 139 declared the last Saturday of every month as National Cleanliness Day. All sector ministries, government departments, the National Environment Management Council, National Environmental Advisory Committee, City, Municipal or District Environmental Management Committee, Agency, or any other public or private institution are empowered to organise, supervise and coordinate cleanliness activities. This has encouraged public participation, ownership and accountability amongst citizens towards cleanliness.

Despite these policy-level efforts, Tanzania still has a long way to go in terms of waste management since close to 96 per cent of the plastic waste in Tanzania is mismanaged. 29,000 tonnes of plastic waste (nine per cent of the total plastic waste generated) has leaked into oceans, rivers and lakes in 2018.[7] Open burning of plastic waste is also a common practice that the country has not been able to control.

In October 2021, the Minister of State in the Vice President's Office (Union Affairs and Environment) had issued a ban on the use of plastic drinking straws, and soft plastic covers on

Table 1: Directives related to plastic waste management in Tanzania

Directives related to plastic waste management	Highlights
Environmental Management Act, 2004	This parent Act is divided into 20 parts. Each part of this Act deals with a broader subject related to environment management. Part IX is dedicated to waste management. Part V talks about encouraging the return of plastics for recycling and also product charges on plastic packaging to ensure collection. and thus recycling.
Environmental Management (Prohibition of Manufacture, Importation and Use of Plastic Sachets for Packaging Distilled & Other Alcoholic Beverages) Regulations, 2017	These regulations imposed a total ban on the manufacture, import, and use of plastic sachets for packaging distilled and other alcoholic beverages, regardless of their thickness.
Environmental Management (Prohibition of Plastic Carrier Bags) Regulations, 2019	These regulations imposed a total ban on the import, export, manufacturing, sale and use of plastic carrier bags regardless of their thickness in Mainland Tanzania.
The Environmental Management (Hazardous Waste Control and Management) Regulations, 2021	These regulations, notified in 2021, lists solid plastic waste in the B3 (B3010) category of hazardous waste, aligning its position with the Basel Convention and the Bamako Convention.
Environmental Management (Fee and Charges) Regulations, 2021	These regulations revoke the 2016 amendment with the same title. They specify the registration fees for environmental experts and annual fees for environmental monitoring and audit for 29 sectors including recycling plants listed under the waste treatment industry. They also prescribe fees for solid waste permits, which includes a fee for application, setting up collection, transportation and disposal facilities as well as transfer stations.

Source: compiled from various sources

the caps of soft drinks and mineral water bottles.[8] The ban had a deadline of six months for implementation. However, there is no update on the status of the ban.

INITIATIVES TO COMBAT PLASTIC POLLUTION

Nipe Fagio, which literally translates to "give me the broom", is a symbolic phrase in Swahili that calls for individuals to be the change. It is also the name of a not-for-profit organisation working in Tanzania since 2013 that is involved in policy implementation and advocacy. Nipe Fagio brings together communities, the private sector and the government by identifying the needs and opportunities related to sustainable development. They also help in building the capacity of each social sector to add value, and engage in a win-win integrated solution for waste management and environmental pollution.

In order to enable communities to view their role as environmental stewards and managers of waste, Nipe Fagio has developed a Youth Empowerment Programme, training Youth Ambassadors (YAs) to be agents of change. YAs carry the essential responsibility of spreading environmental and health awareness, teaching best waste practices and inspiring Community Action Groups (CAGs) to take leadership roles within their communities by promoting scalable knowledge and behaviour change.

Nipe Fagio's material recovery facility in Bonyokwa, Dar es Salaam.

Material composting centre in Bonyokwa, Dar es Salaam

Nipe Fagio is leading six different projects and campaigns in various parts of the country to implement a zero-waste model, which is based on the principle of circular economy. The zero-waste model can be owned by local waste picker groups and community members by establishing co-operatives societies at Mtaa (street) level. An example of the zero-waste model is being implemented in Bonyokwa Street, a middle-income community, part of the Ilala Municipal Council in Dar es Salaam. The pilot serves roughly 3,000 households, who hand over source-segregated waste to waste collectors from Nipe Fagio. The wet waste is composted using black soldier flies (BSF) and the dry waste is further sorted into metal, glass, plastics and other categories before being sent for recycling.

Nipe Fagio also works with not-for-profit groups of other east African countries in the single-use plastic-free East African Community campaign to enforce existing legislations around plastic bag ban in countries such as Rwanda, Kenya, and Uganda. The group constantly pushes for better legislation and improved enforcement of existing legislation.

Nipe Fagio also conducts clean-ups, brand audits, and a marine litter monitoring program (MLMP) with a goal to establish the first information database on marine litter. The data extracted from brand audits are used to hold top plastic polluters in the country accountable for plastic production and plastic waste generation. Nipe Fagio also runs a 'Value Waste Pickers' campaign with an aim to empower and amplify the voices of waste pickers and recognize them as essential workers in the community. The organisation also has the largest database for Dar es Salaam and for the country through its various initiatives.

CONCLUSION

Tanzania has taken some bold steps by introducing sound policies at the national-level to combat plastic pollution and ensure a robust implementation of the issued directives, especially since the plastic carrier bag ban was introduced in 2019. The country has proven that it is trying to address the issue of plastic waste by prioritising human health and the environment.

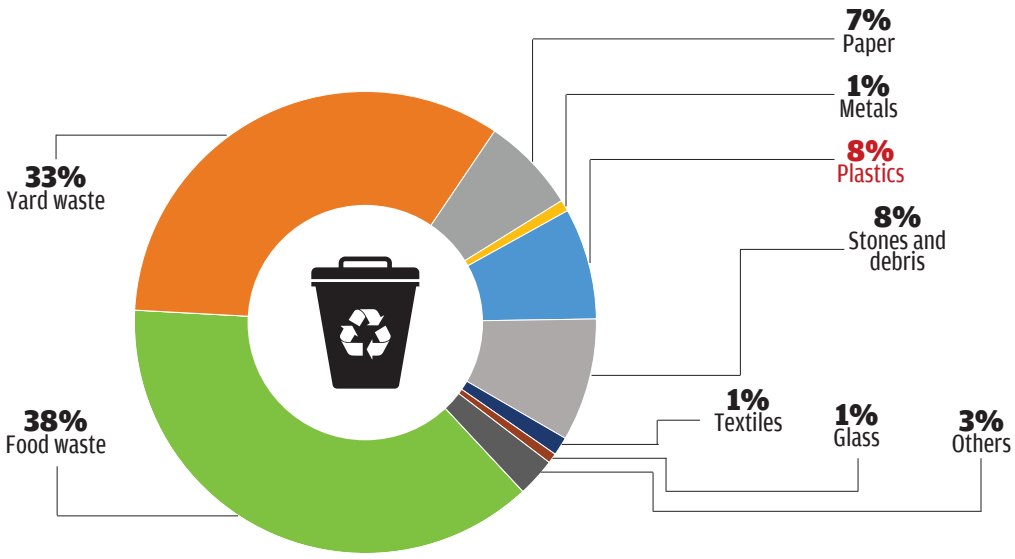
Out of the 600 tonnes of plastic generated in Uganda daily, 60 per cent remains uncollected, choking the country's waterways

UGANDA

Vital stats	Information
Population	47 million
Area	241,555 sq km
Total MSW generation	6.6 million tonnes per annum
Estimated plastic waste generation	0.52-0.6 million tonnes per annum
Rate of recycling	Not available
Disposal methods	Dumping, burying and burning

With an estimated population of around 47 million[1] in 2022, and a total area of 241,555 sq. km, Uganda is the eighth largest African country by population and the fourth in the eastern Africa. According to the National Environment Management Authority (NEMA), Uganda generates 600 tonnes of plastics daily.[2] Out of the total plastic waste generated, nearly 60 per cent remains uncollected which leads to various environmental and health hazards. A fraction of the recyclable plastic is typically picked up by the informal sector in Uganda. Waste pickers collect plastics and other recyclables from households and itinerant waste buyers purchase the recyclable waste, which includes plastic waste. The recovered items are then sold to middlemen or scrap dealers. Plastics are bought from waste pickers at US $0.1 per kg and sold to recyclers at about US $0.3 per kg.[3] It is important to note that these prices are not fixed or controlled but are negotiated between the sellers and buyers. Overall, low collection rates, unsound plastic waste disposal, and poverty-driven informal recycling are the common issues that threaten the environment and society in Uganda.[4]

Graph 1: Waste composition in Uganda



Source: Rotich, H. K., Yongsheng, Z., & Jun, D. (2006). Municipal solid waste management challenges in developing countries: Kenyan case study. Waste Management

PLASTIC POLICY ECOSYSTEM

In Uganda, the Finance Act 2009 was a pioneering legal instrument that was created with the aim of protecting the environment. The act aimed at restricting the use of polythene carrier bags popularly called, "kaveera," in Uganda. Urban as well as rural areas experienced uncontrolled polythene littering.

As a result, the first plastic bag ban was announced in 2007. However it was completely overlooked until 2009. In 2009, then-Finance Minister Syda Bbuma, in her 2009–10 national budget speech, announced the decision to ban kaveera (or plastic materials) of less than 30 microns and proposed an excise duty of 120 per cent on all plastic products. However, it led to a huge protest due to the influence of big businesses and industrial actors that included traders and manufacturers.[5] In April 2015, Uganda's National Environment Management Authority (NEMA) tried again to implement a ban on the manufacture and use of polythene bags of less than 30 microns thickness, but that too was not successful.

Eventually, NEMA became more rigorous and conducted several inspections and raids on shops selling plastic bags, and closing factories after impounding plastic products. In June 2018, a decision was again taken by the Ugandan government to implement a ban on plastic bags, ordering 45 plastic manufacturers to stop the manufacture, distribution, sale and use of plastics. Finally, the National Environment Act of 2019 completely prohibited the importation, exportation, local manufacture, use or re-use of specific categories of plastics. The act also prohibits the use of single-use carrier bags with a thickness of lesser than 30 microns.[6]

Additionally, the country has imposed Extended Producer Responsibility (EPR) as part of polluter-pays principle. The law has defined the duties and collaborative actions of different stakeholders such as the Office of the Prime Minister, the National Bureau of Standards, Uganda Revenue Authority, National Environment Authority who would together implement the provisions of the law on plastic pollution. The government has also mandated that all plastic manufacturers are required to establish recycling plants and ensure that they follow the complete life-cycle of the plastic product they are manufacturing and recycling.

Table 1: Directives related to plastic waste management in Uganda

Directives related to plastic waste management	Directives related to plastic waste management
The Finance Regulations Act of 2009	• This act prohibited the importation, local manufacture, sale or use of polyethylene bags and materials. • The ban specifically affected plastic carrier bags used for the conveyance of goods. • The law did not provide for specific restrictions on for thickness of plastic bags.
National Environment Act 2019	• The Act under section 76 (1) prohibits the importation, exportation, local manufacture, use or re-use of categories of plastics and prohibits the use of single-use carrier bags with a thickness of lesser than 30 microns. The Act also requires makers of polythene bags and plastics to recycle plastic waste and label the polythene bags. • Corporate companies that litter plastic waste are required to pay a penalty of 10 million shillings (US $2,850) under the new amendment. • Imposed Extended Producer Responsibility (EPR) as part of "the polluter pays" principle. This will ensure that producers of products with the potential to pollute will also be obligated to follow the management of their product through its life cycle.
The Uganda Standard; US 773:2007 Plastic carrier bags and flat bags	• Specification covers the thickness and printing requirements of the bags and also sets the material thickness to 30 microns as the minimum requirement for flat and plastic carrier bags. The standard further stipulates the following: • Defects; The bags shall be free from defects such as gels, streaks, pinholes, and particles of foreign matter, in-dispersed raw materials, cuts and tears that would impair the performance of the bags. • Colour and opacity: the colour and level of opacity of the bags shall be as agreed to between the purchaser and the supplier. • Ease of opening: the bags shall be capable of being opened readily by hand. • Odour: The polyethylene or polypropylene bags used in the manufacture of bags shall not impart any objectionable odour.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT UGANDA HAS ACHIEVED SO FAR

Uganda has made multiple attempts to re-implement existing plastic bag ordinances. However, despite bans being announced on several occasions, implementation continues to be inefficient even today. There is a lack of state capacity and suitable alternatives for plastic bags. As a result, plastic pollution continues to be a huge problem for the country.

However, NEMA and Uganda National Bureau of Standards (UNBS) have regularly undertaken the inspection and certification of manufacturing facilities. The certification process involves educating manufacturers on the requirements of the Standard; US 773:2007, plastic carrier bags and flat bags specification etc. As of today, 47 factories have been inspected, out of which 21 were found to be non-compliant. These factories were suspended from production and were required to implement corrective actions before resuming production. The majority of factories were concentrated in Kampala, Wakiso, Jinja and Mukono.[7]

In addition to this, the education sector has taken a lead by imposing a total ban on plastic carrier bag in all educational institutions. As reported by the UNEP, Uganda is conducting extensive capacity building and awareness campaigns in environment education. Some of these initiatives include eco-schools, Education for Sustainable Development (ESD), School

Environment Education programmes (SEEP), UNESCO Associated Schools Network Project (ASPnet), Lake Victoria Environment Education Programme (LVCEEP) and the Sustainable Lifestyles.[8]

INITIATIVES TO COMBAT PLASTIC POLLUTION

ECOAction Uganda: Founded in 2011, ECOAction is an environment movement with a vision of creating a "zero waste" community with the help of skill development initiatives, advocacy and awareness campaigns regarding plastics management. ECOAction implements its activities for under the "reduce, re-use and recycle," principle for plastic waste management. It is set up in Banda—in the suburbs of Kampala which is the capital of Uganda. ECOAction's tagline is "beyond trash" and it aims to promote the benefits of an eco-friendly society, where empowered and responsible citizens live in harmony with the environment. This initiative also helps marginalised and vulnerable groups by creating income avenues and livelihood opportunities through innovations in waste management.[9] Different tools of communications including capacity building sessions, direct presentations, print and broadcast media (Televisions, radios, press-newspapers etc.), active Twitter handle, and an active website are often used by the volunteers to spread the message of sustainable plastic waste management.[10]

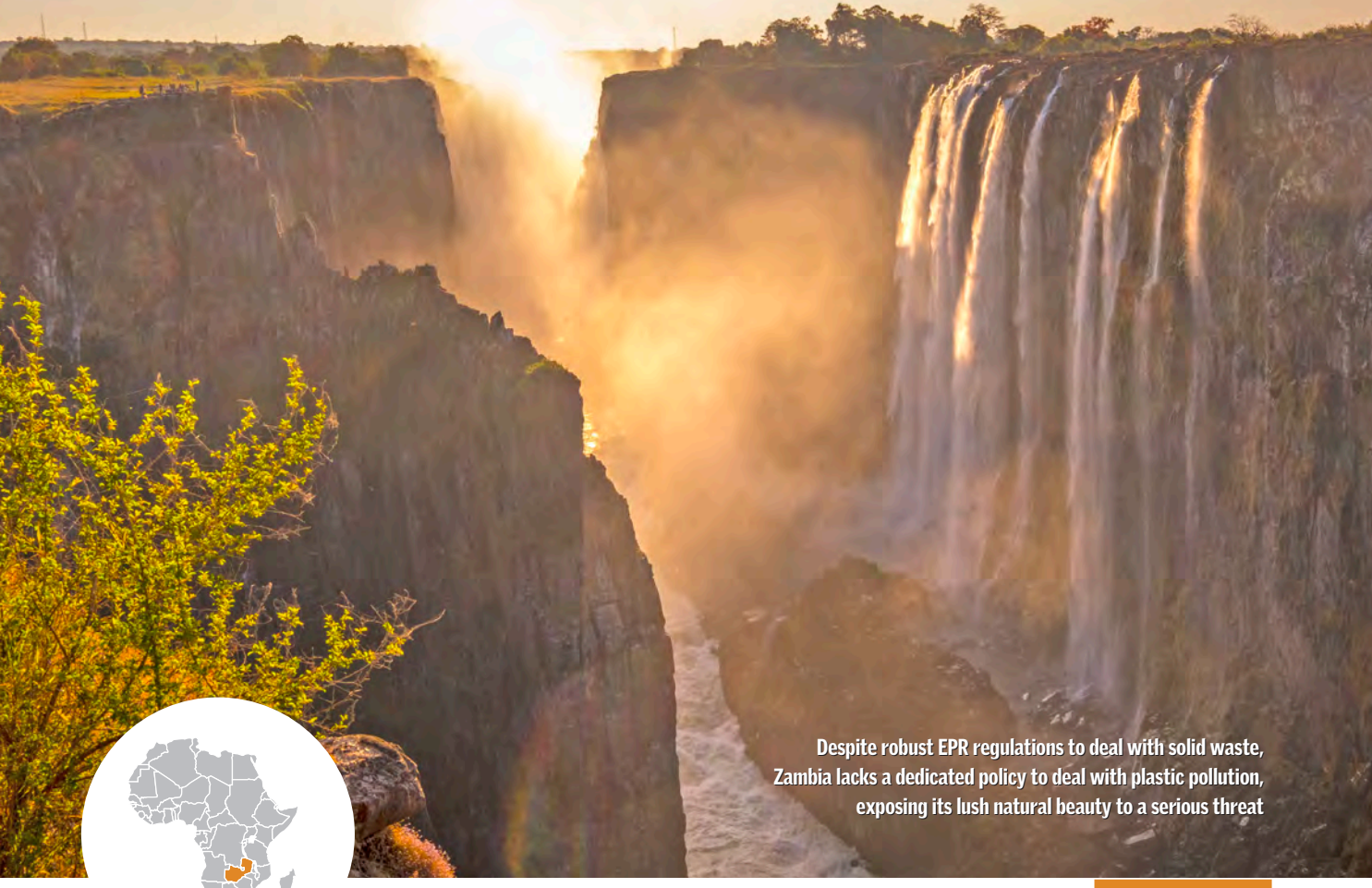
Under their initiative, they have sensitised communities in Banda about proper waste management, including source segregation and sorting. They also help in providing livelihood opportunities to the youth and women who engage in waste collection and reuse. Tonnes of plastic waste have been collected and diverted, preventing them from reaching dumpsites or landfills.

Takanaka Plastics: Takataka Plastics was founded in 2017 in the city Gulu, Uganda to provide a solution to the plastic waste problem, and to employ and provide a supportive working environment for survivors of the Lord's Resistance Army (a Christian fundamentalist movement that has been active in Uganda since the late 1980s). Located in northern Uganda, Gulu is the second largest city in the country with a population of about 140,000.[11]

Most of the plastic waste generated in the city used to be dumped in the countryside and on the streets of Gulu. PET bottles, in particular, would litter the city's sidewalks. However, with the intervention of Takanaka plastics—a local start-up—machines have been developed that sort, crush and melt plastic to make building materials and, more recently, protective visors for medical personnel fighting Covid-19. The machines are based on open-source designs but modified so that they cane be made with locally available parts and manufacturing techniques.[12]

CONCLUSION

Despite the government's long-standing interest in regulating plastic pollution and an existing policy, along with legal and institutional frameworks for achieving the objective, what is lacking in Uganda is the implementation. For example, despite the law banning plastic bags in 2009, no evidence of implementation was visible even until 2015. Ten years later, the law had to be translated to the National Environment Act of 2019. The institutional frameworks which govern implementation are not clearly definedand lacking in coordination. A multi-sectoral approach, coupled with more effective coordination between various stakeholders, is extremely important for the implementation of the existing legislation in order to deal with current and future challenges of plastics pollution in Uganda. In addition to all this, massive awareness campaigns and widespread education are needed for the communities so that they understand the hazards of plastic waste pollution.



Despite robust EPR regulations to deal with solid waste, Zambia lacks a dedicated policy to deal with plastic pollution, exposing its lush natural beauty to a serious threat

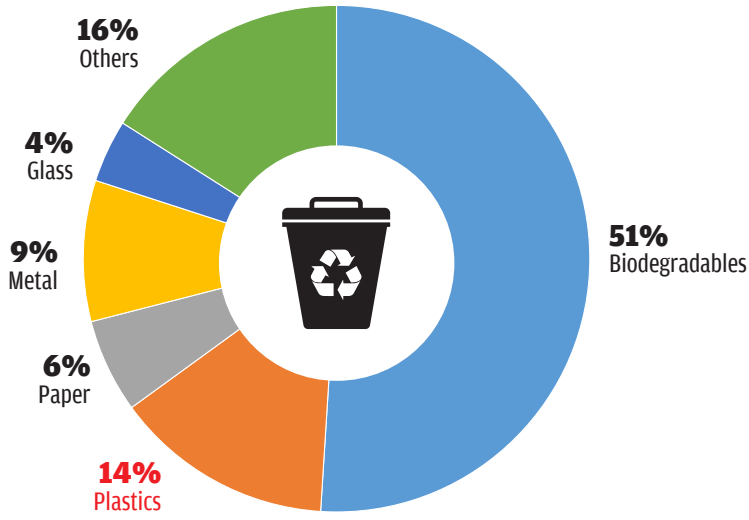
ZAMBIA

Vital stats	Information
Estimated population	18.38 million
Area	752,618 sq km
Total MSW generated	2.6 million tonnes per annum
Estimated plastic waste generation	0.36 million tonnes per annum
Rate of recycling	1–3 per cent
Disposal methods	Dumping, burying and burning

Source: Compiled based on the literature cited in the report

Zambia is a southern African country with a low rate of source-separation when it comes to waste. However it has an established market for plastic recycling. In Zambia, plastic waste management is carried out by various entities such as private players, city councils and community-based enterprises (CBEs). Together they have achieved a collection rate of roughly 59 per cent.[1] The presence of entities who shred and pelletise plastic waste ensures that some amount of recycling happens, albeit on a very small scale compared to the amount of plastic waste that is generated. The plastic recycling ecosystem is mostly localised in Zambia, but some amount of waste is diverted to neighbouring countries for recycling. Zambia also happens to be one of the few African countries that has included Extended Producer Responsibility (EPR) policy in their legislation, thus assigning responsibility to producers for the post-consumer phase of plastic goods.

Graph 1: Waste composition in Zambia

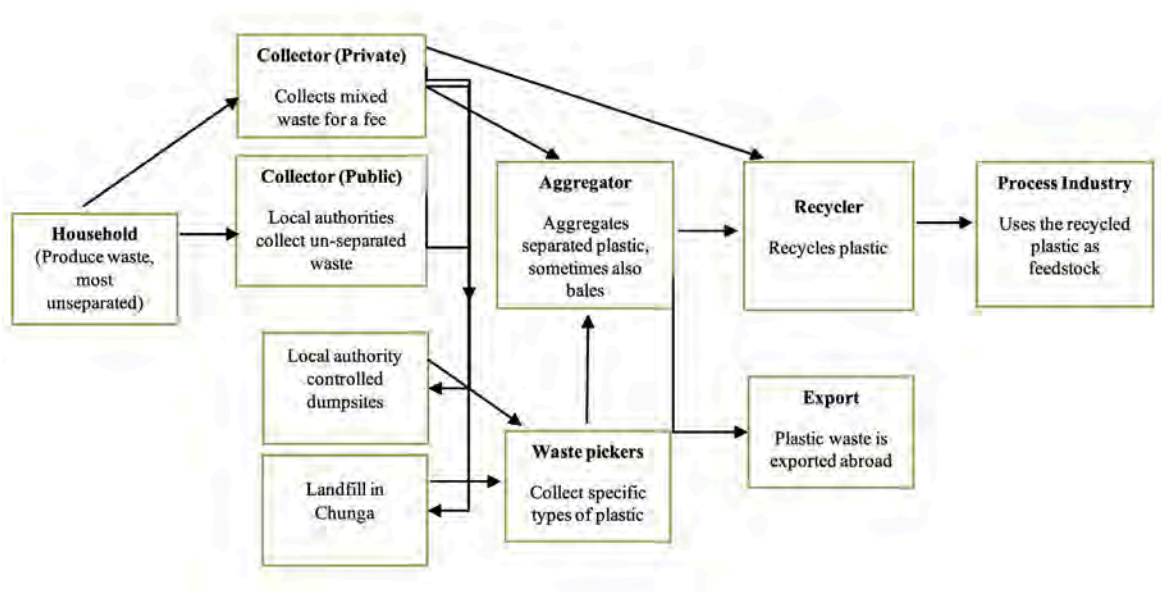


Source: Sub report Output 5 national roadmap for a circular economy in plastic waste management, 2022, The Netherlands organisation for applied scientific research (TNO)

PLASTIC POLICY ECOSYSTEM

According to research conducted by UN-Habitat in 2010, the amount of waste generated per capita per day in Zambia was around 0.53 kg.[2] According to data from the World Bank, the amount of waste generated in Zambia in 2018 was 2.6 million tonnes.[3] Zambia has an ecosystem and market for recycling of plastics as well as other waste streams like paper and metal. However, as recycling is not common in the country, most of the plastic used in Zambia still comes from virgin sources. Most of the plastic recycling in the country is carried out with the help of informal workers who collect plastic waste like PET, HDPE and PP from dumpsites and sell it to plastic recycling facilities.

Figure 1: Plastic value chain



Source: Sub report output 2, baseline assessment and analysis of existing circular economy initiatives and key players in Zambia, 2022.

Table 1: Directives related to plastic waste management in Zambia

Directives related to plastic waste management	Highlights
National Solid Waste Management Strategy of Zambia, 2004	The key objectives of the strategy are to minimise waste and increase recycling, create a waste database and waste classification system, and finally, reduce the amount of waste that reaches the dumpsites in order to safeguard public health.
Environmental Management Act No. 12 of 2011	Provides for integrated environmental management, including plastic waste management. The Act consists of 135 sections divided into 12 parts. Part IV is dedicated to environmental protection and pollution control. Part IV is further divided into 8 divisions, one of which is waste management, including plastic waste.
Solid Waste Regulation and Management [No. 20 of 2018 353]	Section 28 of the regulations state that a waste generator shall separate waste into different groups such as organic waste, plastic waste, paper waste, glass waste, metal waste or any other stream of waste that may be specified in the regulations issued by the minister.
Statutory instrument no.65 on Extended Producer Responsibility regulations, 2018	Banned the manufacture, trade and commercial distribution of domestically produced and imported plastic carrier bags and flat bags that are less than 30 microns in thickness. However, this directive allows the use of plastic carrier bags that conform to National standards (ZS719) developed by the Zambia Bureau of Standards.

Compiled from various sources

A 2017 study titled *Waste as a Resource* conducted by the International Labour Organization (ILO) found that in the capital city of Lusaka, a total of 14 for-profit recyclers were active,[4] of which four companies were actively involved in the recycling of plastic waste. Through a 2018 directive, Zambia has also banned plastic carrier bags and flat bags that are less than 30 microns in thickness.

CURRENT STATE OF MANAGING PLASTIC WASTE: WHAT ZAMBIA HAS ACHIEVED SO FAR

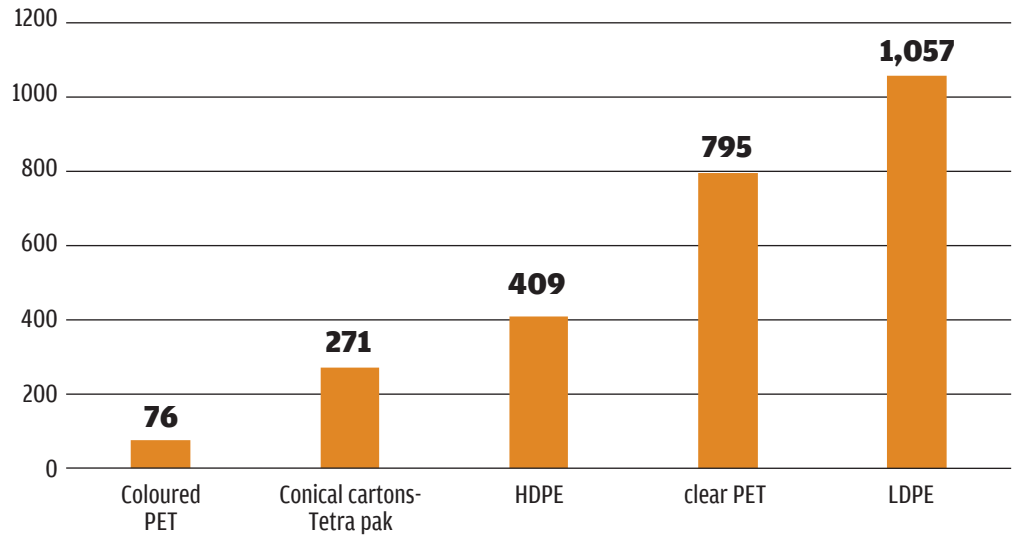
While the country has a robust policy to deal with solid waste—including plastic waste—there is no dedicated policy to deal with plastic pollution. Zambia introduced the regulation to ban plastic carrier bags and flat bags that are less than 30 microns in thickness in 2018. This is a drawback when compared to other sub-Saharan countries that have declared a blanket ban on the use of plastic carrier bags due to their enormous use, littering and low recyclability. Due to the low value of discarded plastic carrier bags, they are not collected by waste-pickers and end up polluting the environment in various capacities, posing a risk to humans and non-humans alike.

The existing policies related to solid waste and the regulation of plastic carrier bags have not been enforced in the right spirit in Zambia. This can be attributed to limited budgets and poor infrastructure. Zambia is one of the few countries where Extended Producer Responsibility (EPR) has been anchored in policies for over 10 years. However, the implementation of these policies is limited to only a few pockets around major cities where the quantity of waste generation is high.

INITIATIVES TO COMBAT PLASTIC POLLUTION

The Manja Pamodzi Foundation Limited, which translates to "hands together," was launched in 2015 as a response to tackle the issue of the omnipresent, post-consumer plastic waste. The foundation incentivised community-based initiatives that are helping clean up post-consumer packaging waste from the environment. These initiatives are improving sanitation and also adding

Graph 2: Total plastic waste collected in tonnes (2015–2018)



Source: https://www.mcc.gov/resources/doc/evalbrief-072720-zmb-igp-breweries

to community livelihoods by promoting existing market linkages for waste. The foundation fosters collaboration between communities, and public and private stakeholders. Community-based enterprises are encouraged to collect source-separated waste and sell it to local aggregators who pay a price for the recyclable material. The foundation also helps waste aggregators identify land and set up operations. As a matter of practice, the materials are sorted on the basis of colour and material type, and then passed on for recycling where they are shredded, melted and converted to pellets.

The initiative is working closely with the Lusaka city council, ministry of local government, Zambia Environmental Management Agency (ZEMA) and other government agencies. It is also trying to mobilise the Extended Producer Responsibility (EPR) legislation mentioned in the directives and partner with businesses to help them fulfill their EPR liabilities by enhancing collection and recycling.

The goal is to hold businesses accountable for the waste that they put in the Zambian market and help them transition to 100 per cent refillable/returnable, recyclable packaging by 2025.

CONCLUSION

Zambia has immense potential for instituting circularity in waste management—including plastics—primarily because of the existing EPR legislation. However, the institutional capacity to implement EPR is currently at a nascent stage with even the policy makers having very little clarity on the modalities of the proposed EPR scheme. The existing policies related to plastic waste management have also not been implemented effectively, especially the regulation related to plastics below 30 microns thickness.

One of the basic drawbacks in the existing legislation for waste management is the focus on collection and disposal of waste in dumpsites and landfills. Although policies do talk about source-separation, reuse and recycling, it is not a priority for regulators and the local governments. The non-separation of waste does not work in favour of small-scale projects that are mostly located in catchment areas with high waste generation. The market linkages for selling recovered materials for recycling are weak. It is due to challenges like these that the existing initiatives around promoting recycling are mostly small-scale and do not break even financially.

NIPE FAGIO

THE WAY FORWARD

Africa generated 19 million tonne (MT) of plastic waste in 2015; of this, 17 MT – almost 90 per cent – was mismanaged.[1] On an average, plastic accounts for 13 per cent of all the municipal solid waste generated in the continent. [2]

While 70-80 per cent of the waste generated in Africa is believed to be recyclable, the continent has only been able to achieve a 4 per cent recycling efficiency.[3] This is far from the vision envisaged by the African Union to recycle 50 per cent of all plastic waste by 2023.[4]

On the positive side, Africa is leading and paving the way when it comes to plastic carry bag legislations, with roughly 35 countries having a partial or complete ban on the manufacture, sale, distribution and use of plastic carry bags.

KEY FINDINGS OF THIS REPORT

The 15 countries studied in this report generate roughly 103 million tonne (MT) of solid waste every year – of this, 11.6 MT (11.29 per cent) constitutes plastic waste. The solid waste collection rate in these countries ranges between 40 to 70 per cent, while the recycling rate varies between 1 to 20 per cent.

However, the data is not uniformly accessible. In some countries like Eswatini, Namibia and Uganda, the recycling efficiency of plastic waste could not be ascertained. Per capita plastic consumption data was found only for a handful of countries such as Ethiopia, Nigeria and South Africa, though the per capita plastic waste generation data was found for most.

All the 15 countries have referred to plastic waste management in their respective environmental policies. However, a majority of these policies are yet to be enforced in letter and spirit – for instance, the EPR policy in Mozambique, on paper for over five years, is yet to be implemented.

Plastic carry bags have been completely banned in four countries of these 15 – Kenya, Rwanda, Tanzania and the Democratic Republic of Congo. Nine countries have put in place a partial ban: they are Ethiopia, Nigeria, South Africa, Uganda, Cameroon, Cote D'Ivoire, Eswatini, Mozambique and Zambia. The partial ban aims to stop the production and use of thin plastic bags (with thickness between 24 and 60 micron or micrometers). Two of the 15 – Namibia and Ghana – do not have any bans to restrict the manufacture, sale and use of plastic carry bags.

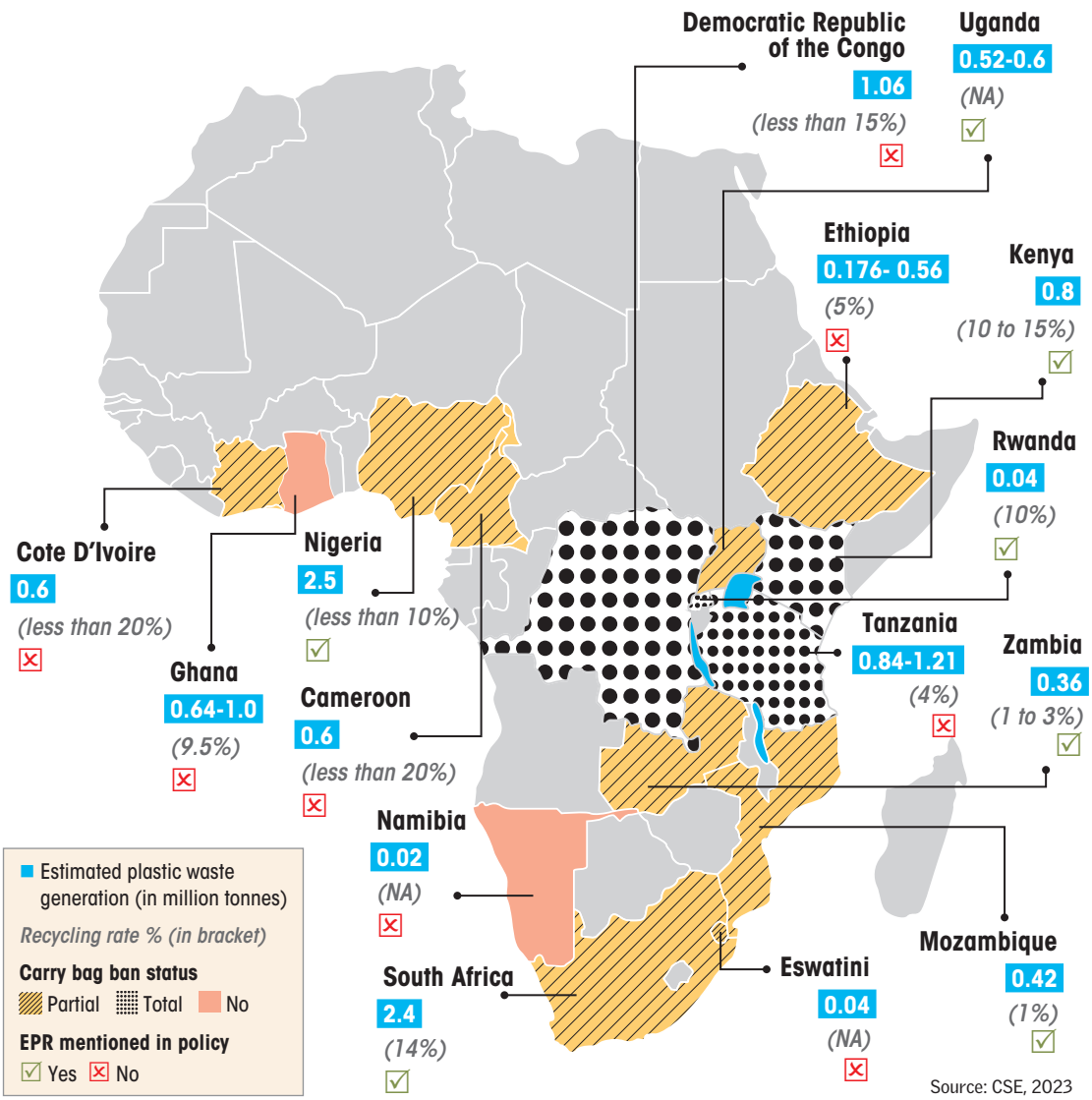
Seven of the 15 countries mention the policy tool of Extended Producer Responsibility (EPR) in directives issued by their national governments. These countries are Kenya, Uganda,

Nigeria, South Africa, Mozambique, Rwanda and Zambia. Kenya's directives also talk about a deposit refund system (DRS) to promote re-use, refill and recycling of plastic waste, mostly beverage packaging.

The modalities of the proposed EPR schemes vary greatly, with some schemes focusing on the design and recyclability of plastic packaging material as in Kenya. The EPR scheme in Mozambique suggests three different models from which businesses can choose to comply with the regulation – most of these revolve around payment of charges for collection and recycling. In Zambia, while the EPR scheme is anchored in the regulations, it has only been implemented in select pockets of major cities such as Lusaka due to a lack of clarity in the modalities and due to the voluntary nature of the policy.

South Africa, with a strong plastic recycling market, focusses mostly on collection, recycling and use of recycled content in new plastic products. In Nigeria, the federal government's National Environmental Standards and Regulations Enforcement Agency (NESREA) had adopted and released guidelines for implementation of an EPR policy in 2014; however, the policy has not been implemented as envisaged.

Status of plastic waste generation, recycling efficiency, and policies governing plastic waste in the 15 African countries studied



Source: CSE, 2023

HOW SHOULD AFRICA MOVE AHEAD?

Develop a dedicated policy for plastic waste management

Of the 15 African countries studied in the report, only Nigeria has a dedicated policy for plastic waste management. In most African nations, waste legislation is largely focused on larger environmental issues, with a small part dedicated to solid waste. Plastic waste is a further sub-part of this part dedicated to solid waste in almost all the directives studied for this report.

Having a dedicated policy for plastic waste management and upgrading it through amendments helps local and national governments combat plastic pollution and streamline the management of plastic waste. The Federal Ministry of Environment in Nigeria had organised a stakeholders' consultative forum to sensitise the stakeholders across the country about the issue; their inputs were taken, reviewed and validated to prepare a final policy document – Nigeria's National Policy on Plastic Waste Management was adopted in 2020. It has been agreed that the policy will be revisited every five years to be modified through a similar stakeholder consultation process.

Similarly, India has a dedicated policy on plastic waste management. The first such policy was introduced in 2011, which was replaced by the Plastic Waste Management Rules of 2016 (which are currently in force). Over the last seven years, the policy has been revised time and again with as many as five amendments. These amendments were done with specific purpose such as introducing a ban on 19 single-use plastic items. The latest amendment of 2022 has introduced an EPR system for managing plastic packaging waste by assigning targets to polluters (businesses).

A dedicated policy on plastic waste management goes a long way in addressing issues such as defining key terminologies to avoid ambiguity; identifying stakeholders and assigning specific responsibilities to them; setting a timeline to achieve a target for enforcing a ban or phasing out problematic materials that have been identified through research; deciding on the modalities of a policy tool, and many more.

Focus on minimising plastic production, especially in sectors like packaging

African nations have been very progressive in the recently concluded First Intergovernmental Negotiating Committee of the on-going talks of the Global Plastic Treaty held in Punta del Este, Uruguay. Rwanda is leading the High Ambition Coalition Group alongside Norway to develop an international legally binding instrument on plastic waste. The treaty calls upon nations to consider the full life-cycle of plastic and not just the downstream issue of plastic waste management. It has been made clear in the discussions so far that plastics are not just a waste management issue, but rather a material production and consumption issue that is being fueled by a handful of companies, businesses and sectors across the globe.[5]

The plastic packaging sector has been identified as a major source of pollution, not only in Africa but across the globe. It is a sector with the highest volume of mismanaged plastic waste and has been identified as a hotspot for Africa.[6] It is predicted that with increasing populations and more African countries opening up their markets for trade coupled with business-as-usual, a rise in the production and consumption of plastic – and hence, plastic waste – is inevitable.[7]

Minimisation of plastic waste, especially in the packaging sector, can be achieved to an extent by introduction of policies like EPR, which should have specific modalities to ensure transparency. They should also include mandates for incorporating design changes. Issuing policies alone will not ensure reduction in plastic from problematic sectors and hence, efforts will have to be put into enforcing and implementing the policies.

Strengthen collection of source-separated waste with the help of the private sector, community-based organisations, and local governments

Source separation is barely practiced in African countries. Where source separation happens, it is restricted to small catchment areas and pockets in a few major cities like Dar es Salaam in Tanzania; these isolated cases are not enough to influence the recovery of recyclables upwards in the rest of the country.

The value of recyclable waste, especially plastics, is inversely proportional to contamination levels. Any contamination of food material or dry fraction of waste like paper, metal or glass will require human intervention for sorting of the waste, thus increasing costs and decreasing the economic viability of recycling.

Low waste collection efficiencies in the African nations also means losing out on a considerable amount of valuable fraction of the plastic waste. If collected, recyclable wastes like plastics can

be sold in open markets and diverted for recycling, thus providing livelihoods and generating revenue for community-based organisations (CBOs) and enterprises. This can only be made possible when the private sector invests in recycling infrastructure, thus ensuring the waste does not have to undergo trans-boundary movement to get recycled; this helps keep the cost of recycled plastic competitive.

Local governments can play an important role in facilitating the entire process by empowering CBOs to collect – thereby ensuring feedstock for investments by the private sector in plastic recycling facilities. For instance, Eswatini has a relatively high waste collection efficiency, mostly concentrated around the cities of Mbabane, Matsapha and others. However, a lack of localised recycling facilities disrupts the path to recycling in Eswatini. Most of its waste is therefore sent to South Africa to be recycled, which eventually increases the cost of the recycled products.

Contracting private vendors and CBOs to collect only a specific type of waste will be a good strategy to adopt. Residents pay for their wet waste collection, while they get paid for dry waste (like plastics). If a household is managing its organic/wet waste itself through home composting, it becomes liable for an incentive by the local government.

Invest in material recovery facilities (MRFs) to tap the true value of plastic waste

Material recovery facilities (MRFs) are designed to act as a transit point for recyclable waste that has ideally been separated at source. The waste may have been received from various types of waste generating sources such as households, markets, commercial establishments, or government and private offices. The MRF is used as facility for sub-sorting of waste – for instance, plastic waste can be sorted on the basis of type of plastic and colour of the material. The facility can also act as a storage point for the sorted waste; this will enable a higher volume and quantum of waste to be traded at a time, thus bringing down the cost of labour and transportation. The sorted plastics are diverted from the MRF either to aggregators (bigger traders) or directly to a recycling facility.

MRFs can be proposed in most of the African cities, as it makes economic sense, especially where the per capita waste generation is high. These facilities, managed by the local government or by a CBO, can provide a source of livelihood to informal wastepickers.

Namibia, Ghana and South Africa are the countries studied in the report which were found to have an active and working MRF. In all the three countries, the MRF has been set up, owned and operated by the private sector. In Mozambique, Associacao Mocambicana de Reciclagem (AMOR) has set up eco-points for plastic waste collection which essentially function like an MRF, but without the sophisticated technology such as conveyor belts and baling machines.

Develop and maintain waste information systems for understanding quantum and composition of plastic waste

The plastic waste production, consumption and recycling inventory of African nations needs a lot of strengthening. Parallel work is needed on understanding the countries' plastic recycling capacities for various types of polymers such as PET, HDPE, LDPE, PVC, PP, PS and others. It is equally important to understand and inventorise the various processes (mechanical, chemical, waste-to-fuel etc) that are used for recycling/processing the plastic waste.

The most crucial part of plastic waste management is the creation of a reliable database on plastic waste quantity and types of plastic based on systematic sampling and scientific analyses. The data can be utilised for purposes ranging from creating MRFs to making localised recycling plans. Data from such waste information systems can also help local governments and decision-making bodies to understand the types of plastics for which localised markets exist in the country, and also explore neighboring countries where plastic waste can be channelised for recycling.

Waste regulations in African countries mandate data collection on various aspects of plastic waste management to monitor compliance and ensure enforcement. However, very limited data on plastic waste has been collected and documented by city authorities or regulatory bodies. For instance, in Eswatini, the Waste Regulations of 2000 mandate data collection on various aspects of waste management including plastic waste, through a waste information system. However, this system is yet to become functional in the country. Had it been implemented, the Eswatini Environment Agency (EEA) could have utilised the collected information for different purposes like making plastic waste management plans, monitoring implementation of existing policies, forecasting future quantities of plastic waste and publishing annual plastic waste statistics.

Efforts must be made to improve the information base in order to facilitate integrated waste management systems in these countries.

Ramp up communications campaigns and programmes targeting specific stakeholders to take action against plastic pollution

Local and national governments in Africa need to invest in behaviour change campaigns with appropriate communication strategies and products. It has been observed such campaigns, when done right, have always been pivotal to the success achieved by local and national governments. Behaviour change aimed at ensuring segregated streams of plastic waste can create an enabling environment for efficient channelisation of the waste to relevant facilities. Such campaigns also help in spreading awareness among citizens around the impacts of plastic pollution on human health and the environment.

The success of any such policy would depend on participation by the community. The Phatso Sakho Nawe campaign in Eswatini has played an instrumental role in bringing communities together not only to keep their surroundings clean, but also to raise general awareness around plastics and plastic pollution. Similarly, the Kenya and the South Africa Plastic Pacts – the only two such plastic pacts in Africa (of the 13 operating across the globe) – are trying to bring businesses together and nudge them to adopt sustainable packaging options by ensuring that plastic packaging is re-usable and/or recyclable by incorporating design changes.

Uganda has made multiple attempts (in the year 2007, 2010, 2015, 2018, 2019) to re-implement existing plastic bag ordinances. However, despite bans being announced on four to five separate occasions, implementation continues to be a challenge due to non-acceptance among communities. To overcome this, launching and implementing behaviour change programmes and campaigns is important to ensure that governments, businesses and citizens are aware and educated enough to support plastic ban and circular economy policies and interventions.

Define single use plastics; focus on problematic single use plastics

Most of the policies in Africa have concentrated on defining and declaring a ban on plastic carry bags. This is an extremely important step. However, it is equally important to pay attention to the other fractions of single use plastics which are equally harmful.

In Africa, water sachets made from plastic are common and available across the continent and are used at a massive scale. The combined consumption of water sachets in Ghana, Nigeria, and Liberia is estimated to be 28,000 tonne a year.[8] The emergence of the single use sachet is often linked to the inability of governments to provide citizens adequate, clean water. These sachets have become one of the many sources of plastic pollution in these countries.

Single use plastic have been defined by many nations across the world, but most have only defined single use plastic carry/carrier bags. A few countries and multilateral organisations have covered all the single use plastic items in their definitions. As per the UN, any plastic that is made from polymers of HDPE, LDPE, PET, PS, PP or EPS is a single use plastic.[9] Australia defines single use plastics as anything that is intended only to be used once and discarded, including shopping bags, cups, straws and packaging.[10] The IEEP (Institute for European Environment Policy) and the European Commission definition says single use plastics can include any disposable plastic item which is designed to be used only once.[11]

Disposable cutlery made from plastic, plastic straws, earbuds, plastic sticks for candies, confectionary and ice-cream etc wreak havoc on the ecosystem just like carry bags, due to their low cost, high littering probability, low rate of collection, high volume, low weight and non-recyclability. All these items fit in perfectly into the definition of single use plastics – hence, it is important to define this terminology in the legislation and chalk out plans to make African nations truly free from single use plastics.

Define multi-layered plastic (MLP) and other non-recyclable plastics

MLP refers to any material used or to be used for packaging and having at least one layer of plastic as the main ingredient in combination with one or more layers of other materials such as paper. It is classified as a Code 7 plastic as per the universally accepted Resin Identification Codes (RIC). Most companies prefer MLPs as they are waterproof, light-weight, reduce shipping volume, and help in increasing the shelf life of products such as fruit juices and sweets by keeping them fresh for extended periods even at room temperature. Businesses, especially in the FMCG sector, have a huge inclination and are increasingly shifting to flexible forms of packaging dominated by MLP.

There is a growing body of knowledge and research that points towards the problems that this kind of plastics can pose. For starters, MLPs are non-recyclable by design and are yet continuing to be used increasingly by the packaging sector. Moreover, they fit the definition of single use plastics – but unfortunately, they are not considered so and are kept out of directives in almost every part of the globe, mostly due to pressure from huge businesses.

The waste management solution to deal with MLP waste usually revolves around burning it in waste-to-energy plants and co-incineration facilities as a secondary fuel, owing to its high calorific value (CV). However, the desired calorific value is strictly limited to clean, segregated, uncontaminated pieces of MLP.

There is, hence, a need to define MLP and explicitly communicate to the consumers about the non-recyclability of this material. India has defined multi-layered plastics, and had also announced a phase-out of non-recyclable plastics in the year 2016. However, in a 2018 amendment, the MLP ban was reversed due to objections from industries.

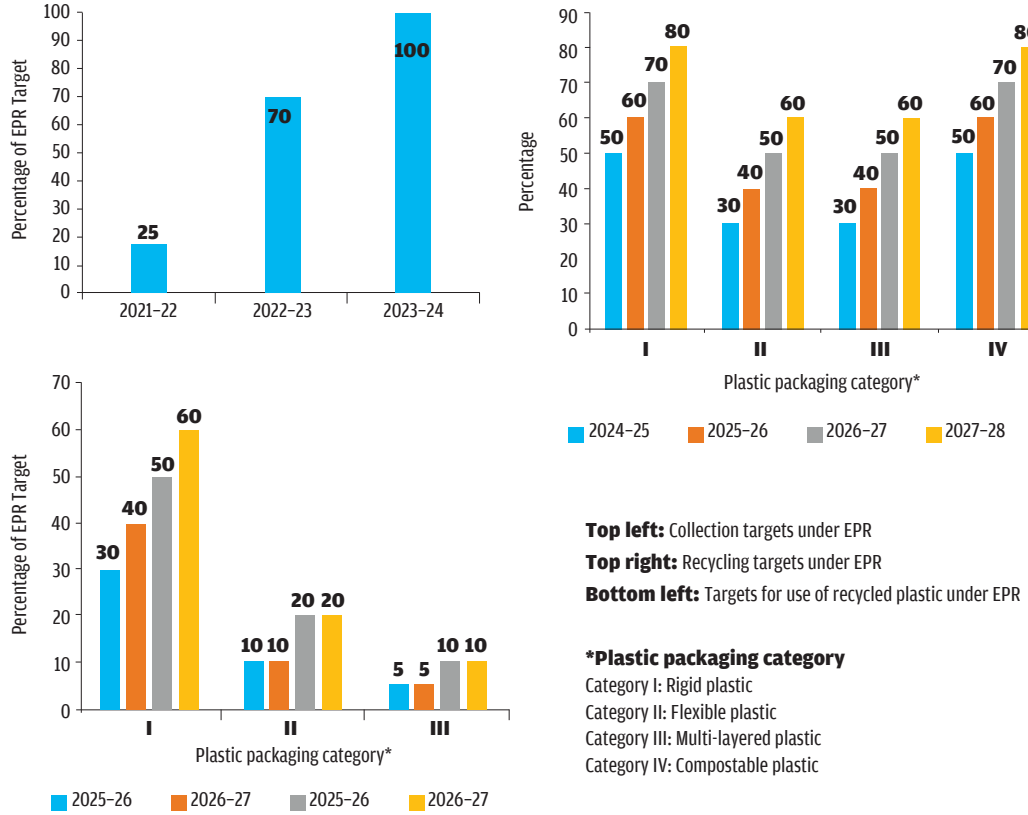
Harmonise EPR policy to promote and incentivise collection, reuse/recycle plastic waste and hold businesses accountable for plastic pollution

Africa is not a stranger to EPR – as many as seven countries from the 15 studied in the report mention EPR in their existing policies. The modalities for implementation of the EPR clause are, however, unclear in most of these countries. Most of the African EPR policies are voluntary schemes and are not mandated by directives.

EPR is based on the principle of 'polluter pays': the polluter here refers to the business that packages its products in plastic packaging. EPR can be implemented through various regimes, some of which are explained here:

- Polluter-funded, but operated by municipalities
- Polluter-funded but operated by waste management agencies/organisations
- Polluter-assigned targets for plastic waste collection, recycling and reuse through directives by the national government

Figure 1: Targets assigned under the EPR regime in India



Top left: Collection targets under EPR

Top right: Recycling targets under EPR

Bottom left: Targets for use of recycled plastic under EPR

***Plastic packaging category**

Category I: Rigid plastic

Category II: Flexible plastic

Category III: Multi-layered plastic

Category IV: Compostable plastic

Source: Central Pollution Control Board (CPCB), India

The cost for EPR should encompass critical services such as waste collection (fleet), transportation (fuel), material recovery and recycling facilities (infrastructure), tangible assets such as land for developing sorting, storage and recycling facilities, and the cost of human resources required across the value chain of plastic waste management.

Over and above this, EPR also should incorporate crucial elements like design changes over a period of time to initiate the transition towards circularity. The EPR policy in every African nation must be strictly mandatory and not voluntary.

The EPR system notified by India's Ministry of Environment, Forest and Climate Change (MoEFCC) in 2022 is a mandatory policy that places accountability on the polluter for collection, recycling and use of recycled content (by assigning year-wise targets) for all businesses that package their products in plastic packaging (see Figure 1). All such businesses are required to register themselves on a portal developed by the Central Pollution Control Board (CPCB), the technical and enforcement arm of the MoEFCC (see Figure 2).

Africa needs to hold its businesses accountable for the plastic waste that they place on the African markets – the Indian EPR system can offer some learnings in this respect.

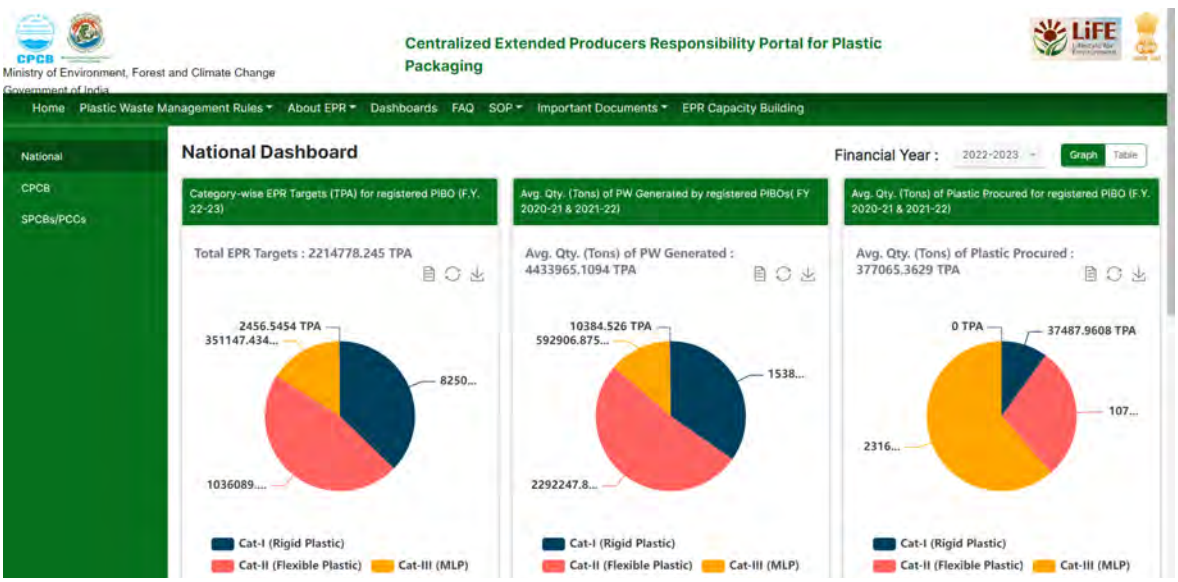
Enforce existing laws and directives on plastic waste by building capacity of government officials

The enforcement and implementation of existing laws around plastic waste management can be improved through a combination of political and administrative willingness and the acumen to understand the simple solutions that can be offered by low-cost technologies.

An approach in which stakeholders are incentivised for compliance and penalised for violations can go a long way in ensuring enforcement. For instance, the plastic bag ban in Kenya has been successful partially because of the heavy penalties that have been levied for violation; stakeholders have been penalised as well on a regular basis in order to implement the ban.

It is of paramount importance to build capacity of local officials to understand the nuances of plastic waste management and to create a resource pool at key leadership positions that can drive the entire initiative to institutionalise a sustainable, environment-friendly plastic waste management system. The process of capacity building needs to be planned in a phased manner to facilitate a 'learn and do' mode of implementation. The process also needs to create a pool of master trainers across various facets of plastic waste management. These master trainers would be responsible for building capacity of local government officials, door-to-door collectors, CBOs and others to develop a common understanding around key parameters of circular economy.

Figure 2: EPR portal developed by the CPCB in India



Source: Central Pollution Control Board (CPCB), India

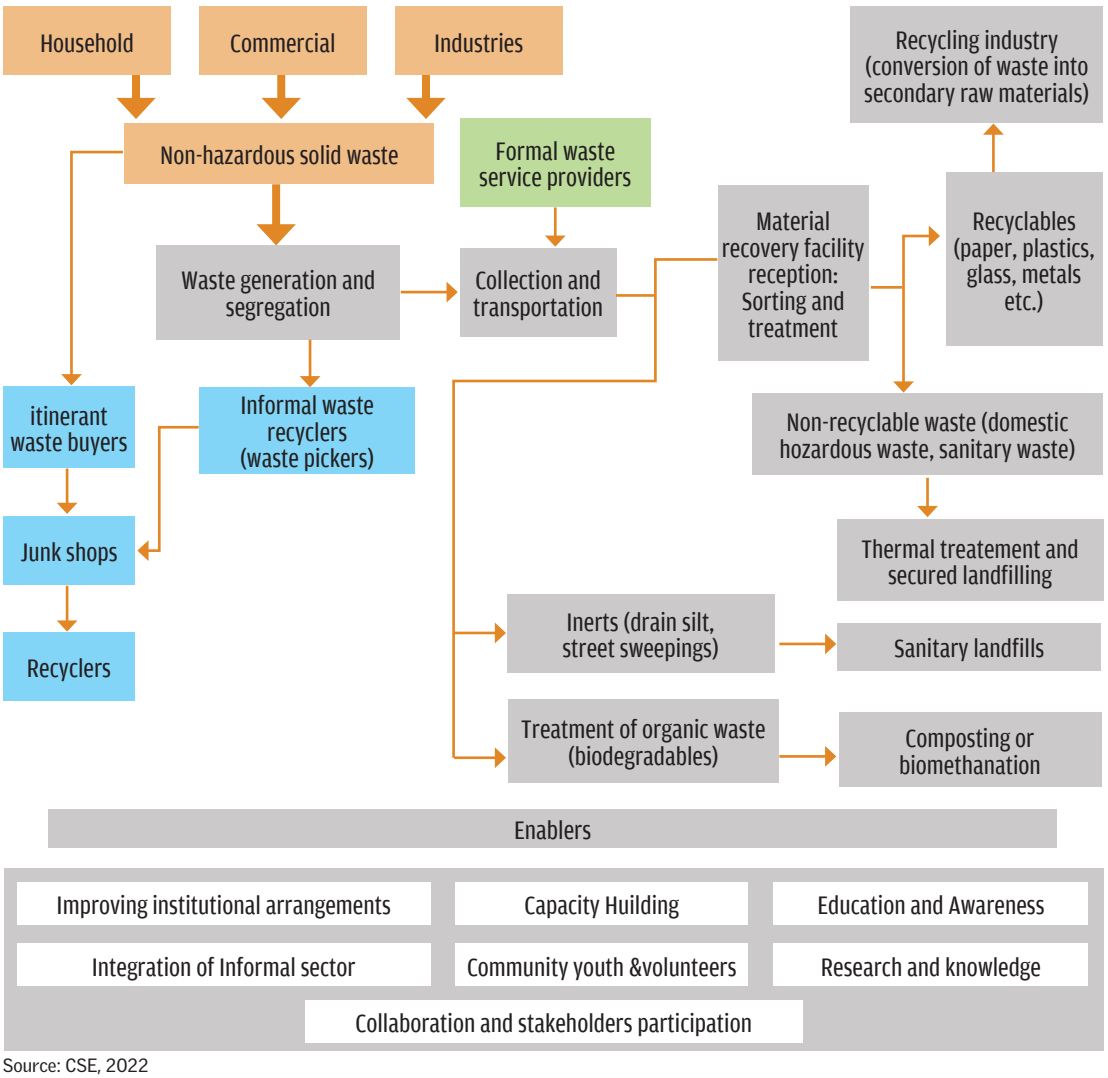
Integrate the informal sector in sustainable plastic waste management

Evidently, in all the countries studied, the informal sector or wastepickers are the critical workforce contributing in waste collection and recycling. Existing policies on solid waste management or plastic waste ordinances should have a provision to integrate this sector to leverage on their skills for securing source-separated collection and secondary separation at material recovery facilities — wherever such options are found to be feasible.

Integration of the informal sector not only creates livelihood opportunities, but also substantially reduces the cost of waste management operations. For instance, according to the Waste Picker's Association, South Africa has more than 90,000 wastepickers working to recover plastic waste. The Pretoria-based Council for Scientific and Industrial Research (CSIR) estimates that informal wastepickers, known as "reclaimers", recycle 80-90 per cent of plastics and packaging in South Africa, "saving authorities up to R750 million (US $53 million) in landfill costs".

It would be important to institutionalise the homogenous (self-help) groups of ragpickers, NGOs or associations/cooperatives, so that their trained and motivated workforce can be redirected towards enhancing and expanding the industry engaged in recycling and reuse of polymeric wastes as well as tackling the problem of non-ideal segregation.[12] For example, the

Figure 3: Proposed model for instituting circularity in waste management including plastic waste for African nations



Source: CSE, 2022

Tema Landfill Recyclable Waste Pickers Association is a body working at the Kpone landfill in Ghana. This association was formed with the help of an NGO, Women in Informal Employment: Globalizing and Organizing (WIEGO). A total of 4,123 tonne of waste is recovered annually by the wastepickers at the three major dumpsites in Ghana.

City authorities in Sub-Saharan African (SSA) countries should first map the entire network of informal waste collectors, including aggregators and dry waste recycling facilities, to gain operational knowledge of the economy of informal waste collectors.[13]

Invest in plastic recycling infrastructure

Mechanical recycling, which involves shredding, washing, melting and remolding plastic waste to make new plastic products, is our best bet to reduce the amount of plastic waste that is mismanaged.

There is a serious dearth of plastic recycling plants in almost all the countries studied in this report – with the exception of South Africa. Plastic waste from Mozambique, Zambia, Namibia and other neighboring countries is collected and sent to Gauteng in South Africa which has a strong recycling market.

Most of the plastic recycling plants operational in Africa are owned and operated by the private sector, which mainly buys its raw material from informal aggregators of plastic waste. There is a cause-and-effect relation that we need to understand. Lack of collection leads to mismanagement like burning and dumping. Most of the collection of plastic waste is done by informal workers from the doorstep or from dumpsites. Due to lack of working and storage space, informal workers sell away the waste to a web of (small and large) aggregators, from where it reaches plastic recyclers.

When local and national governments mobilise resources to ensure segregation, collection, segregated transportation and integration of the informal sector to sort and store at city-owned MRFs, the city would be able to directly sell to recyclers and in turn generate revenue. Revenue can also be mobilised by using funds that will be created by notifying a mandatory EPR system.

In a 2022 report titled Managing solid waste in Africa: A scoping study to prepare the ground for future action, CSE has suggested a conceptual model for waste management (including plastic waste) to move towards a circular economy for African countries (see Figure 3).

Regulate illegal importation and trade of plastic waste

It has been recognised that illegal import and trade in plastic wastes is not efficiently regulated in many of the countries studied in this report. It is important to note that international treaties such as the Basel Convention and the Bamako Convention significantly restrict international trade in plastic scrap and waste to help address the improper disposal of plastic waste and reduce its leakage into the environment. As a result of these changes, trans-boundary shipments of most plastic waste are controlled or regulated.

For instance, in Cameroon there have been records of seizures indicating that customs officials are carrying out their border policing and port surveillance duties in the country. In 2014 and 2015, over 200 people were arrested for smuggling plastics into the country. The operations, which led to the impounding of 60 tonne of contraband worth over US $483 000, were carried out by the environment ministry, customs officials and the Ministry of Trade in the Southwest Region.

African countries that are parties or signatories to international treaties and conventions are required to translate the provisions mentioned in them at the national level in order to restrict trans-boundary movement of plastic waste and its associated hazards.

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KEY FINDINGS AND WAY FORWARD

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Africa generated 19 million tonne (MT) of plastic waste in 2015; of this, 17 MT – almost 90 per cent – was mismanaged. On an average, plastic accounts for 13 per cent of all the municipal solid waste generated in the continent, and a mere 4 per cent of this is recycled. The African Union wants the continent to recycle 50 per cent of all its plastic waste by 2023 – this has remained a dream as Africa steps into the deadline year.

This report profiles plastic waste management in 15 African nations, which together generate more than 11 MT of plastic waste every year. It tries to captures insights into a diverse ecosystem of regional, local and national challenges that confront these countries, and suggests a viable set of policy interventions and operational actions that might help in turning the tide against plastic pollution.

The report is also an effort to strengthen and build the capacity of member countries in the CSE-initiated Global Forum of Cities for Circular Economy (GFCCE), and to enable them to understand that plastic waste is not just a waste management problem, but also a material production and consumption problem.

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