

# SLURC/DPU Action-Learning Alliance

## Strategic pathways to disrupt risk in Freetown

MSc Environment and Sustainable Development  
Practice Module 2019-20

### POLICY BRIEF N<sup>o</sup>7

#### Key points

- Freetown's solid waste management practices are associated with multiple risks such as flooding, fires, contamination and diseases, coastal land collapse and occupational hazards, caused by the accumulation of waste in water bodies and landfills.
- In order to effectively disrupt waste-related risk traps, centralised and decentralised initiatives in Freetown provide windows of opportunities for the government to anchor and propagate strategic pathways that will create a more efficient integrated solid waste management system.
- Although relocating Freetown's landfills provides opportunities to disrupt current risks and hazards, it requires large investments and expertise. Therefore, in the meantime, Freetown has an advantageous opportunity to reduce waste accumulation by strengthening pro-environmental behaviours and sustainable consumption choices.
- Freetown can grow existing waste-as-resource enterprises to reduce indiscriminate waste disposal which disproportionately affects residents of informal settlements. Engagement in participatory mapping and studies of disaggregated waste could also better inform policies and investments to scale up integrated waste management practices to underserved areas of Freetown.

### Integrated Solid Waste Management: Strategic Entry Points to Disrupt Risk Traps



Figure 1: Children in Kroo Bay, an informal settlement in Freetown. Photo Credit: Clare Kendall

#### Introduction

Freetown's geographical and social contexts play a role in the accumulation of waste-related risk traps and hazards. It is a peninsula between the sea and the hills with a total population of about 2 million living in hillside, coastal and in-land settlements<sup>1</sup>. With 500 illegal dumpsites, official waste collection only accounts for 40% of waste generated in Freetown and door-to-door collection services require households to pay a subscription fee<sup>2</sup>. As most of Freetown's population is characterised as low-income and is concentrated in informal settlements, this leaves a large amount of waste that inadvertently ends up in water bodies when coupled with the limited capacity of Freetown's waste management system in addressing the rate of waste production as well as the flows and displacement of waste.

This policy brief uses a socio-environmental justice to outline strategic entry points through which the Freetown City Council (FCC) and other stakeholders such as the United Nations Development Programme (UNDP), research bodies like the Sierra Leone Urban Research Centre (SLURC)<sup>2</sup>, and local community development groups and disaster management committees, can partner with community-led local initiatives to disrupt waste-related risks and hazards. A mixture of central and decentralised initiatives can foster both behavioural and institutional change to drive the use of waste as a resource, ultimately contributing to a reduction in the amount of waste generated in the city and alleviating social and environmental challenges faced by Freetown's most vulnerable populations.

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# 1. Overview

Historically, the governance landscape of Freetown's waste management system has been led by multiple institutions and supported by international actors like the World Bank and UNDP<sup>2</sup>. This system took a central approach to planning, implementing and monitoring waste management initiatives. Moreover, the short-term nature of the initiatives and the frequent changes in management have left Freetown's government struggling to meet waste-management demands of the city's residents, especially in high density informal settlements with restricted access. However, the government has recently recognised a need to incorporate decentralised approaches into its municipal waste management system. Such a step could be more effective in ensuring an active role for the primary stakeholders (i.e. the communities), while alleviating the pressures on municipal-led waste management services and creating a more socio-environmentally just system.

The highest population densities, as well as the concentration of informal settlements and hazards are found around the coastal areas, as illustrated in *Figure 1*. Higher-altitude settlements offset their waste management challenges using the natural flow of river channels from higher to lower ground. Major road networks where official skips are located run parallel to the coast but do not extend into the low-lying and high-altitude settlements. Coupled with the Municipality's limited sanitation infrastructure and equipment, and its reliance on a central

**Table 1:** Strategic Entry Points to disrupt waste-related urban risk traps

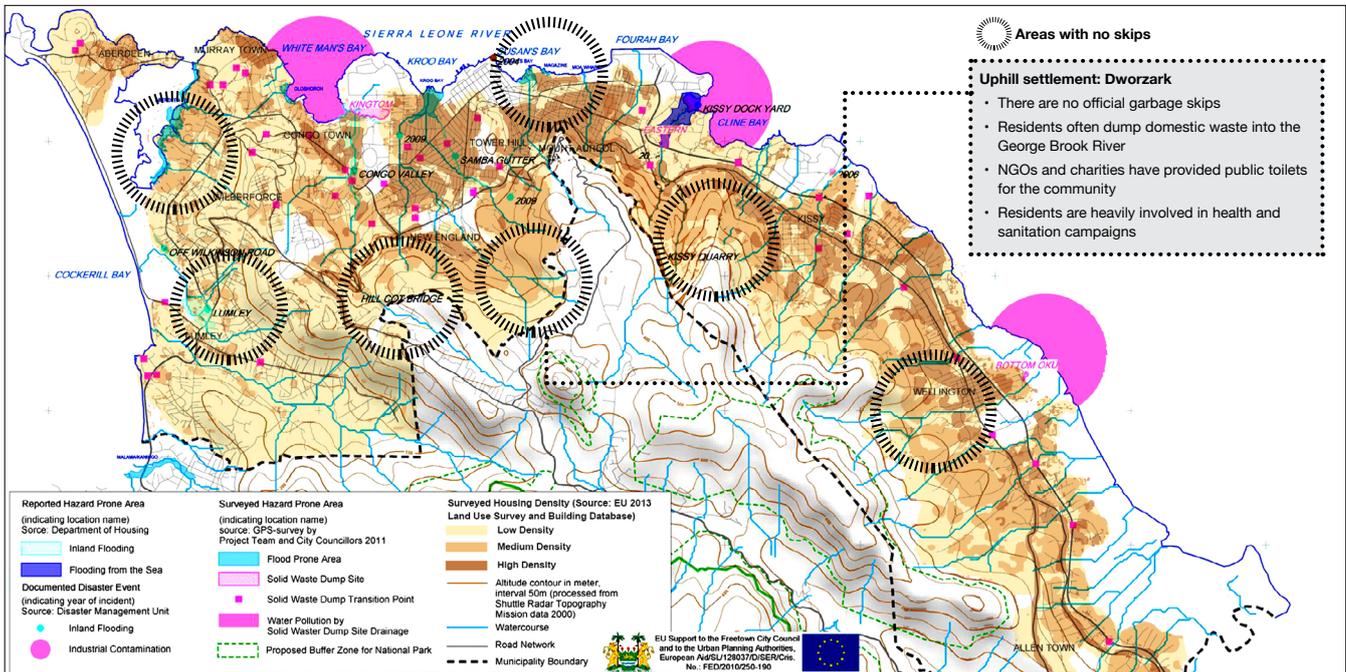


waste management system, this drives dependency on rivers and incineration for waste disposal in informal settlements<sup>2</sup>. This in turn leaves both residents of formal and informal settlements vulnerable to environmental risks of flooding, diseases and fires.

The resourcefulness and resilience of low-income dwellers in informal settlements results in the use of waste to cope with social and economic inequalities. Residents of coastal informal settlements also use waste collected from nearby landfills for land banking to create more space for housing, and engage in metal scrap collection, composting and upcycling of waste into marketable products to generate income<sup>3</sup>. However, this exposes them to multiple risks such as contamination from hazardous medical and industrial waste coastal land collapse<sup>2</sup>.

This policy brief proposes a combination of initiatives (termed 'entry points') aimed at knowledge production, strengthening urban planning and closing the city's urban metabolism loop as seen in *Table 1*. The entry points are contextualised to formal and informal settlements, hill-side and coastal settlements, as well as the nature of solid waste content. Each entry point details the following:

- Intended and unintended outcomes of current waste management practices in Freetown,
- Case studies of similar practices that have been successful in other cities and lessons applicable to Freetown,
- Suggestions for engaging stakeholders in expanding initiatives,
- The risk drivers they would disrupt, and the extent to which they would achieve environmental and social justice.



**Figure 1:** Spatial Mapping of formal waste management systems, related hazards and population densities (using data from EU, 2013 and ReMap Risk, 2018)

## 2. Entry Points

### 2.1 Knowledge Production

#### 2.1.1 Participatory Mapping

Since 2004, the Government of Sierra Leone has made incremental efforts to implement its Disaster Risk Management (DRM) policy and with support from UNDP, it commissioned a number of risk assessment studies of disasters across the country<sup>4</sup>. In parallel, ReMapRisk, a community-led mapping methodology was independently established by Urban Ark and SLURC to spatially and temporally document risk traps and inform action-planning<sup>4</sup>.

ReMapRisk promoted a deeper understanding of risks, vulnerable groups and capacity levels to act per settlement, and documented existing initiatives aimed at disrupting such risks across Freetown. Majority of the waste management related initiatives documented were government-led, such as the provision of health and educational facilities, individual toilets, retention walls and flood control mechanisms like cleaning of overflowing gutters and drainage channels<sup>4</sup>. Also, centralised initiatives like Operation Clean Freetown established by-laws in 2017 to punish 'anti-social' behaviour, which exacerbated socio-environmental injustices by criminalising coping mechanisms (like waste incineration and dumping in waterways) employed by residents of settlements underserved by the municipality's waste management system.

On the other hand, existing decentralised initiatives like composting, metal collection, and plastic recycling have not been extensively mapped out across Freetown. The case of Cambodia proves useful here as community leaders and residents, supported by Water Aid and AID Australia, mapped existing water and sanitation facilities in informal settlements of Siem Reap<sup>5</sup>. The mapping exercise revealed areas lacking in provision, informed community action plans to meet residents' needs, and allowed an equitable allocation of resources across the city<sup>5</sup>. Similarly, by leveraging already existing participatory mapping structures like ReMapRisk, the FCC can understand the landscape and stakeholders of current decentralised initiatives, and identify underserved areas. Ultimately, this will allow strategic channelling of DRM focused initiatives to collectives and local initiatives aimed at alleviating Freetown's waste management challenges.

Furthermore, the FCC could build upon existing mappings of skip sites, such as the one illustrated in *Figure 1*, with information on the frequency of waste collection and waste segregation practices at collection level. The current distribution of skips along roads like Monteque street, Lewis Street, and PWD at Tower Hill means areas within the eastern and central part of the city have a higher frequency of waste collection compared to the western part of the city<sup>6</sup>. Also, residents, embassies and private businesses within certain neighbourhoods like Signal Hill, Wilkinson and Fourbay Road<sup>6</sup> have the capacity to pay for regular house-to-house waste collection services by the municipal garbage trucks or youth waste collection enterprises. Therefore, rather than transferring waste directly from skips to landfills, it could instead be segregated at household collection level and distributed to nearby recycling industries. Limiting this to areas where residents have the capacity to pay for collection services will also be more socially just and will allow a more equitable spatial distribution of waste management initiatives across the city.

**Figure 2:** Homes Built on Plastic, Freetown, 2018. Photo Credit: Deborah Torr



#### 2.1.2 Study of Disaggregated waste

Currently there is insufficient data about disaggregated waste for Freetown, with figures of 70% organic waste, and the other 30% representing industrial, household and medical waste<sup>7</sup>. However, this data is not fully broken down into waste components nor is it available for different parts of the city. Therefore, a study conducted by sampling and surveying different components of waste will give a more accurate insight into Freetown's waste composition. It will allow the classification of skips by type of waste to promote a more strategic disposal of waste

in landfills in each area of the city. Additionally, this would inform government interventions targeted at specific types of waste in different parts of the city as well as guide private sector investment in recycling facilities and enterprises.

The informal settlement 'Las Fincas' on Cozumel Island, Mexico provides insight into how studying disaggregated waste informs the design of integrated waste management systems<sup>8</sup>. Through an initial in-depth study of disaggregated waste at the household level led by the University of Quintana Roo, Mexico along with assistance from external agencies, investments were channelled into appropriate nearby disposal facilities as well as waste-as-resource enterprises that had the potential to thrive<sup>8</sup>. This study revealed that waste sampling at the point of communal skips was inadequate as large quantities of household waste were illegally incinerated or disposed. This could be an important consideration for informal settlements in Freetown as it shows how a greater understanding of waste and how it is handled can help community leaders make informed decisions about waste

management priorities. This could be especially beneficial in coastal (eg. Kroo Bay and Susan's Bay) and hillside informal settlements (eg. Dworzark and Kissy Brook), which are currently underserved by the centralised collection system<sup>4</sup>. Collaborations with research bodies like SLURC and other community-based organisations in Freetown could, therefore, provide opportunities to harness this approach to inform waste management policies, training facilities and investment channels aimed at increasing the coverage of waste management services across the city.

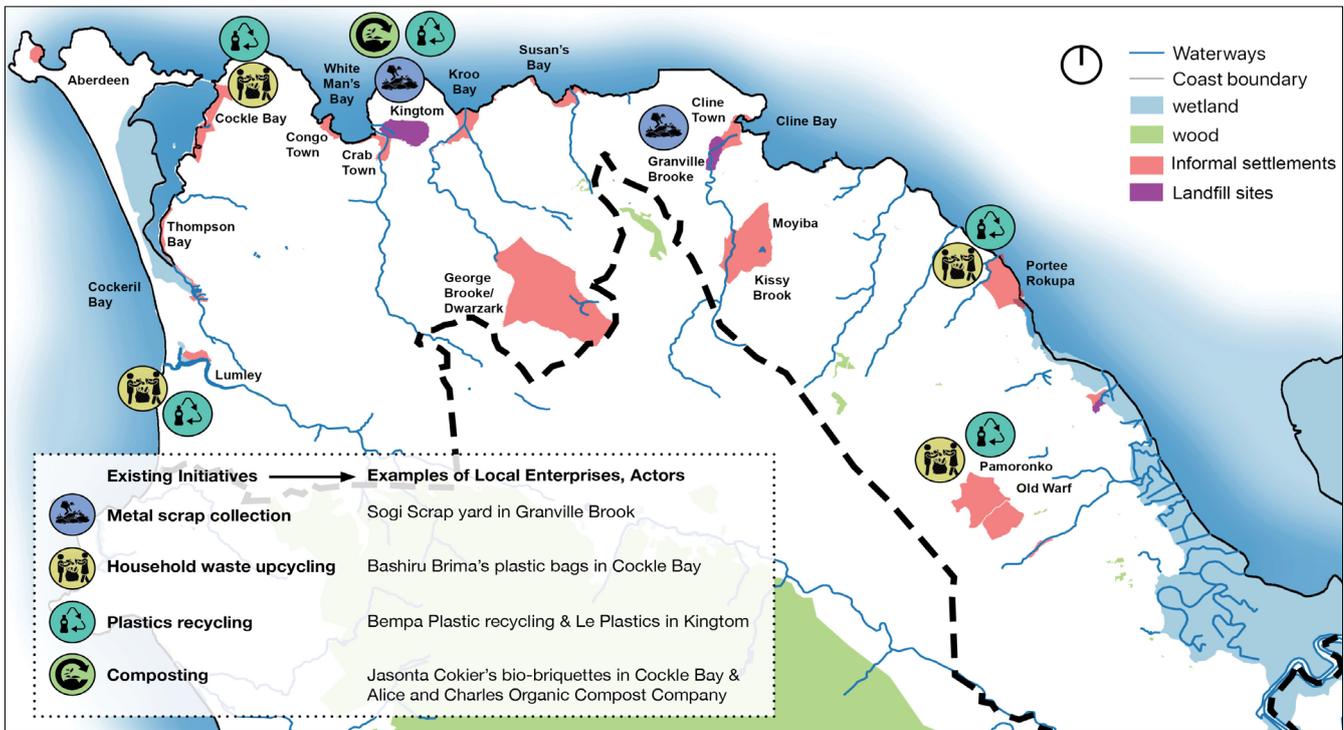


Figure 3: Spatialising existing initiatives in Freetown

## 2.2 Strengthening Urban Planning

### 2.2.1 Moving Landfill

Freetown has three major landfill sites<sup>6</sup>: Granville Brook and Bottom Oku in the east and Kingtom in the west of the city as illustrated in *Figure 3*. All three sites are in highly dense residential areas in proximity to informal settlements, urban agriculture sites and bodies of open water. Dumping of waste at these landfills is indiscriminate and is not done by category of waste, which proves extremely dangerous to the nearby low-income residents as earlier mentioned<sup>2</sup>. As the landfills are nearing their maximum capacity, the FCC's 2016 to 2018 development plan<sup>9</sup> included compacting landfills, starting with Granville Brook, creating a new disposal site further east in Allen Town, and fencing the Kingtom landfill to prevent pollutants from spilling out into nearby residences and fishing areas<sup>9</sup>. However, the implementation of this plan has been affected by bottlenecks such as spatial restrictions preventing the creation of a new landfill site in Allen Town and limited resources to compact, fence and regulate the use of existing landfills<sup>9</sup>.

The case of Mexico City provides useful lessons for Freetown as it also set out to move its landfill in 2011<sup>10</sup>. The landfill was centrally located, and at maximum capacity, was causing many environmental issues similar to those currently faced in Freetown. Upon site closure, Mexico City's government was criticised for failing

to provide new opportunities for informal waste pickers who previously made a living from the central landfill as the new site was not in equal proximity to the city centre. The allocated site also added an average of 29 kilometres onto the journey time of collection trucks, thereby increasing fuel use and emissions in the city<sup>10</sup>. Therefore, whilst moving the landfill to Allen Town provides opportunities to disrupt current risks and hazards, it requires large investments and expertise, a thorough risk assessment should be completed for the new site to enable the implementation of a system that considers planned displacement of waste out of dense settlements. Community based organisations such as the Dumpsite Scavenger Association of Granville Brook<sup>11</sup> and informal waste pickers should also be engaged in the transition process to ensure income generating opportunities are recreated and sustained.

Similar to Freetown, Mexico City experienced a shortage in landfill area. Therefore, parallel to moving its landfill, the city government set up a dynamic recycling, composting and waste for energy programme<sup>12</sup>. The programme encouraged citizens to segregate organic and inorganic waste, recycle materials and produce compost for gardens and parks. This reduced the amount of household waste generated and in turn reduced pressure on the new landfill. Considering Freetown's spatial restrictions and the feasibility of creating a new landfill, a dynamic recycling programme similar to

the one set up in Mexico City could prove useful in alleviating pressures on Freetown's existing landfills.

Furthermore, upon closure of the central landfill in Mexico City, the government invested in technology that was used to capture methane and generate power for an estimated 35,000 homes<sup>10</sup>. This enabled the city to turn an environmental problem into an energy provision opportunity whilst reducing the future risks and hazards arising from the closed site. In Freetown, funding from international agencies could also be channelled into harnessing methane trapped in Granville Brook and Kingtom landfills. Such an initiative could provide energy for surrounding residents while reducing environmental impacts of the decaying materials in the sites and reducing the accumulation of risks like fire and air pollution due to incineration.

## 2.3 Closing the Urban Metabolism Loop

### 2.3.1 Waste as Resource Enterprises

Freetown has several micro-enterprises working with minimal government support, aimed at recycling and upcycling waste into useful products. An initial scoping of initiatives<sup>13</sup> primarily based in informal settlements is illustrated in *Figure 3*. An example of a successful enterprise is Le-Plastics, who through door-to-door collection of household plastic waste in 2018, converted plastic into road-cover in Kingtom<sup>11</sup>. This reduced



**Figure 4:** Ester Kamara, founder of an upcycling enterprise, 2018. Photo Credit: UNDP

waste accumulation and improved mobility. However, the enterprise faces financial limitations in engaging in larger infrastructure projects<sup>11</sup>. Despite the existence of several waste-as-resource micro-enterprises in Freetown, there are still limitations with initial investment and skill required to start and grow such enterprises. Furthermore, there is limited room for in-house waste separation within informal settlements, limited markets identified for sale of upcycled products and a continuation of negative stigma associated with working with waste<sup>11</sup>. Freetown has opportunities to grow existing enterprises to cover more underserved areas by providing residents of informal settlements with the skills to start and grow waste as resource initiatives. Additionally, by increasing the economic potential of enterprises, and encouraging activity in uphill areas, this could reduce waste disposal in water bodies and disrupt associated risks of flooding. Examples from other cities suggest how the aforementioned barriers might be overcome in Freetown.

In Quezon, Philippines, a government policy on microfinance was set up to support local family-owned enterprises and informal sector workers that turn waste into an economic opportunity and link them to available markets<sup>14</sup>. Firstly, with support from NGOs and Donor agencies, community leaders played a proactive role in identifying and training waste collectors based on the nature of waste they handle to promote better collection and segregation of waste. Secondly, microfinancing was provided for families with available space in their backyards to start small segregation units for particular waste types like plastic and paper<sup>14</sup>. Finally, they were linked to markets and recycling units owned by private sector

companies to best exploit economic opportunities. This example demonstrates how Freetown's government could institute a policy to allow flexibility of engagement between the private sector and micro-enterprises that will facilitate linkages to potential markets like agriculture, recycling, transportation and export industries, as well as the expansion of the waste as resource enterprises illustrated in *Figure 3*.

In Kampala, Uganda, a national government policy supported market studies and the formal registration of several local enterprises with business models that turn environmental problems into development opportunities<sup>15</sup>. One of the enterprises, Lunchacos, collects waste from houses near informal settlements to produce biomass briquettes that are sold to the participating households at a discount, appealing to a clear market audience<sup>15</sup>. Whilst it is important to acknowledge that briquettes do not provide improvements for indoor air quality, this initiative creates a use for organic waste and provides cheaper alternatives for low-income residents of informal settlements. Similarly, Freetown can utilise and update GOAL Sierra Leone's 2013 compost market study to identify customer groups, as well as marketing and pricing determinants, to bolster existing and future compost enterprises<sup>16</sup>. By formally recognising such enterprises and linking them to trainings and equipment, risks associated with mishandling organic matter would be reduced, making it a more attractive employment opportunity. However, as such composting practices would require space, composting enterprises would be more feasibly located within in-land, low-density areas. They would however still require collection of organic waste from nearby households, skips and informal settlements, which could be achieved through the use of door-to-door waste collectors or through distribution from a central waste collection system.

Ultimately, creating more uses from waste, and fostering those that are already in practice in Freetown could reduce the amount of waste reaching landfills and being indiscriminately disposed of. However, whilst providing fiscal support is a vital component of growth, it should be coupled with effectively coordinated and targeted training programmes. This would ensure a fair distribution of support for all small companies, and a proactive mitigation of risks that might arise from waste-as-resource practices.

### 2.3.2 Waste Management Training

A number of waste management training programmes in Freetown are provided in collaboration with international agencies. Since 2017, the Advocacy Initiative for Development Sierra Leone (AID-SL) and the UNDP have implemented a "Skills training on Waste Management and Plastic Recycling" project in four informal settlements in Freetown; Old Wharf, Culvert, Cockle Bay and Funkia<sup>17</sup>. A total of 150 participants with 80% being women have been trained on waste recycling and management knowledge and have gained skills in the production of floor dialettes and bio-charcoal briquettes<sup>17</sup>. AID-SL also facilitates the registration of waste management micro-enterprises and the creation of bank accounts to enable the beneficiaries autonomously run their businesses. FCC and the International Organization for Migration (IOM) also held a short 5-day training with entrepreneurship support for youth micro-businesses on waste treatment in October 2019<sup>18</sup>. Participants were trained in door-to-door household waste collection and the transportation of disaggregated waste such as plastic bottles and water sachets via motorized tricycles to recycling or disposal channels<sup>18</sup>.

Therefore, current theoretical and practical training projects aimed at improving Freetown's cleanliness have contributed to the economic empowerment of women and youth groups residing in informal settlements while promoting positive community transformation. However, a major constraint of operating and managing effective training projects remains limitations within the administration sector. Short-term and small-scale service coverage often suffer from a lack of continuity, limited technical capacity and experience of staff, as well as insufficient budgets<sup>19</sup>. Thus, building human resources through improved training programmes for government staff alongside training and education programmes for community members could contribute to enhancing Freetown's solid waste management system.

As a coastal city, Quezon, Manila Philippines provides experiences of how training programmes targeted at both behaviour change and capacity building can be integrated into a government's waste management policies to ensure sustainability. Quezon's government, assisted by the Mother Earth Foundation (MEF), collaborated with community leaders to hold technical training programmes and



**Figure 5:** Sewing Workshop. Freetown 2018. Photo Credit: Lilah Gaafar

implement a “No segregation, No collection” policy and campaign in 2004<sup>20</sup>. Training practices included the segregation of total wastes into biodegradable and recyclable wastes at household level and the separation of medical waste at health facilities into different colour bags based on hazard type<sup>20</sup>. Skill enhancement was also accompanied by educational strategies to raise awareness on the benefits of reducing waste volume and toxicity, and the importance of reusing, recycling, and composting methods<sup>14</sup>. After segregation, the participating community members and district-level waste management staff were responsible for collecting different types of waste and transporting biodegradables such as agricultural and food wastes to composting industries, and infectious medical wastes and sharps to incinerators<sup>14</sup>.

In the context of Freetown, trainings in classifying waste as reusable or non-reusable and safe or hazardous at the point of generation can motivate positive behavioural change at household, community and institutional levels. Freetown’s organic waste and medical waste needs to be segregated appropriately to boost the local circular waste-economy, as well as ensure the safety and health of waste collectors, especially considering previous Ebola outbreaks and the susceptibility of local people to disease epidemics<sup>11</sup>. Also, building technical capacities of government workers will aid in expanding the pool of experts required to provide practical assistance during training programs for communities and will reduce heavy reliance on external aid agencies for technical assistance.

Existing training programs, such as those provided by the UNDP, could be expanded to cover all areas of Freetown (particularly the middle and high-density areas without skips) and implemented

regularly for longer periods. Target groups for trainings could also be diversified to include peri-urban farmers and small-scale waste-generating industries like carpentry workshops to ensure full assimilation of positive waste-generation behaviour into community practices. This would be aided by the aforementioned participatory mapping and study of disaggregated waste to fully inform the most beneficial training in each area.

### 2.3.3 Decreasing Waste

As previously mentioned, certain initiatives in Freetown focused on waste collection and disposal and viewed the increase in waste generation as an inevitability<sup>9</sup>. However, Freetown’s government has an advantageous opportunity to reduce waste accumulation through systemic changes within its urbanisation process. This would require a multi-faceted approach involving increased monitoring and regulations on imported waste to ensure there is domestic capacity of intake whilst promoting circularity in production chains and pro-environmental consumption patterns of residents, city wide.

Single use plastics are among some of the most polluting materials and studies show a prevalence of these contributing to risk accumulation across Freetown<sup>21</sup>. Globally, increases in urban GDP show strong correlations with a rise in single use plastic and general consumption<sup>22</sup>. Although inorganic matter currently only accounts for 30% of Freetown’s waste, the emerging middle-class population is increasingly contributing to Freetown’s landfills reaching maximum capacity through increased consumption of single-use products<sup>21</sup>. Whilst initiatives such as the 2019 Cleanest Zone competition<sup>11</sup> aim to raise awareness about waste through community engagement, there are currently no regulations of resource

use. Plastic bags in Freetown are increasingly used at markets with the majority ending up in landfills, rivers or being incinerated, releasing harmful toxins. Furthermore, there are low provisions of energy to enable sterilisation and therefore, in the wake of the Ebola epidemic, disposable items are often favoured over reusable ones.

The case study of Kigali, Rwanda shows how regulations on single use plastics have been successful in drastically reducing the number of plastic bags in circulation, leading to a cleaner and safer city<sup>23</sup>. Through the introduction of large fines for plastic bag ownership and strict monitoring, the city has reduced pressure on landfills and rivers and has opened up new markets to meet the demand for alternatives. However, there are unintended consequences of the ban to be considered when applying such an initiative to Freetown. The initial implementation of the ban outlined a long list of rules for different types of plastic bags but was not adequately disseminated to informal areas in local languages<sup>23</sup>. Similar to Operation Clean Freetown’s criminalization of ‘anti-social’ waste behaviour, this left many low-income residents confused and punished for misunderstanding the rules, leaving them with fines they were unable to pay. Additionally, the sudden nature of the ban did not consider those with low income who were unable to invest in reusable alternatives for the direct and indirect uses of plastic bags<sup>23</sup>. Therefore, unlike Kigali’s outright ban on plastics, a phased ban for certain higher-income parts of Freetown could be implemented. Coupled with clear simple communications of the ban in local languages, as well as initiatives to support investments in reusable alternatives, this could help Freetown move towards a socio-environmentally just eradication of single use plastics.

To increase the circularity of waste items, promoting innovative designs that ensure products are environmentally friendly, could encourage consumers to make more sustainable choices, and raise producer responsibility. This is currently being achieved by the use of a Cradle-to-Cradle certification, which promotes fully recyclable products and alternatives for plastic and non-biodegradable materials<sup>24</sup>. However, this certification relies not only on monitoring producers who meet its requirements but also on the fiscal and mental capacity of individuals to make such choices. Guwahati Municipal

Corporation in India provides an example of how default linear consumption behaviours were modified to ensure the viability of Cradle-to-Cradle certified products in its markets through the use of incentives like ginger and garlic in exchange for segregated recyclable waste<sup>25</sup>.

Thus, in Freetown, introduction of Cradle-to-Cradle regulations or tax reductions on manufacturers and importers might be more effective when coupled with incentives and education programmes to promote environmentally conscious consumption and waste generation.

Furthermore, by engaging community leaders, large businesses and micro-enterprises the FCC could set a socially just precedent for promoting and monitoring Cradle-to-Cradle production whilst mitigating a possible rise in product prices.

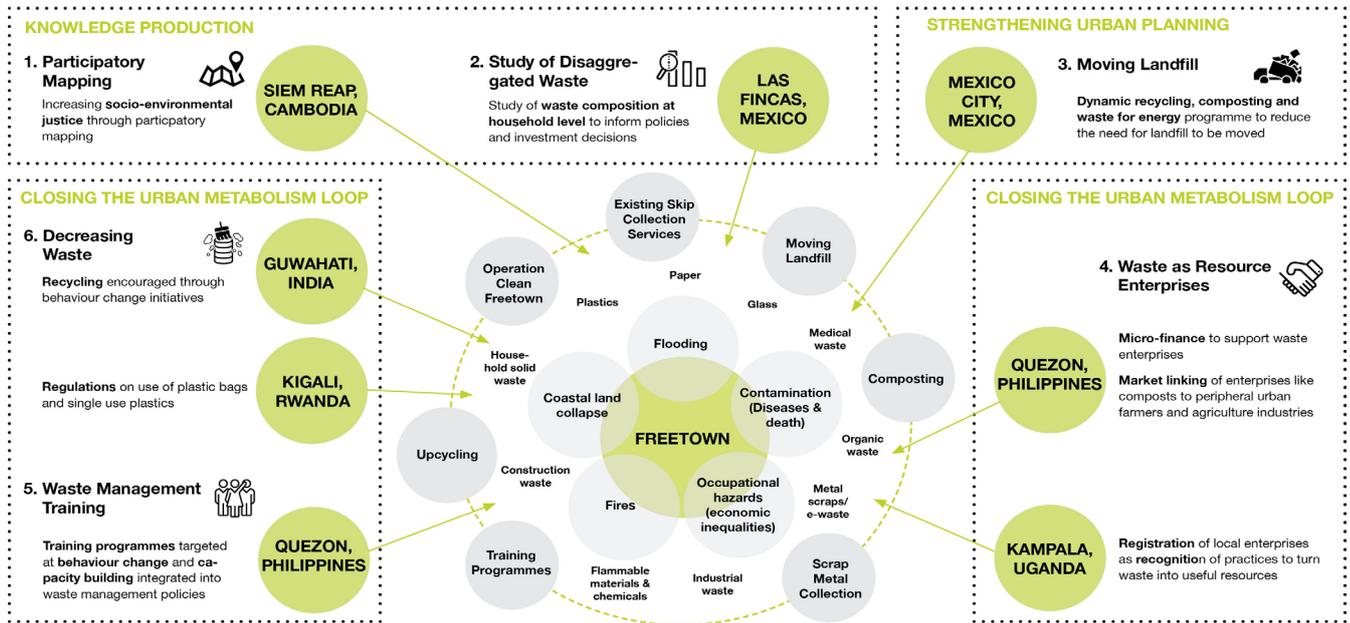


Figure 6: Lessons from city examples applicable in Freetown in relation to existing initiatives

## Conclusion

Both centralised and decentralised waste management methods exist in Freetown as seen in Figure 6. However lessons from city examples show that an integrated solid waste management policy is needed to ensure collaboration between the two methods in order to meet the city's waste demands in a socio-environmentally just way. It will also strengthen the disaster risk management needed to face climate change that is bound to affect a coastal city such as Freetown.

Diversifying Freetown's waste management system as an urban planning mechanism will be beneficial to the municipal waste management authorities as decentralised waste management ventures involved in activities like recycling and composting would reduce the burden on the municipality to independently provide waste management services across the entire city.

However, a closer look reveals that in a largely informal sector driven society, decentralised waste collection ventures need more policy support from the government as well as technical support from NGOs and international donor agencies. Therefore, a dual approach which fosters urban planning improvements and additions to both centralised and decentralised initiatives in Freetown will benefit residents of informal settlements who are most vulnerable to waste-related risks and hazards, as well as residents of higher income settlements who struggle to dispose of their waste safely and appropriately. Additionally, it will foster employment opportunities for waste-as-resource enterprises, leading to a reduction in poverty and economic inequalities across the city.

Knowledge production through participatory mapping and studying disaggregated waste could help inform and channel investments into effective initiatives and

promote occupational and residential safety in a highly dense city with limited land for expansion of waste landfills and communities.

Furthermore, closing the loop in Freetown's urban metabolism through instilling behaviour change methods to reduce waste creation, would allow Freetown to mitigate the recurrence of waste problems such as overflowing landfills, offsetting of waste build-up from higher to lower-altitude settlements, as well as flooding and contamination of water bodies. Thus, by interrupting the risk traps associated with inadequate waste management and the context of Freetown as an Ebola-epidemic stricken city, the government alongside other stakeholders like the Ministry of Health and Sanitation, Local Councils, Civil Society Organisations, and Community Based Organisations, can ensure the health and safety of Freetown's citizens is adequately protected.

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