SLURC/DPU Action-Learning Alliance

Understanding urban risk traps in Freetown

MSc Environment and Sustainable Development

Practice Module 2018-19

POLICY BRIEF No 2 The Risks and Drivers of Inland Flooding in Freetown

Key points

• Deforestation, waste management and river channel modifications are major drivers of inland flooding. If Disaster Risk Reduction (DRR) is expected to have positive results, it should target these drivers using a coordinated, collaborative and participatory process.

• Inland flooding affects informal settlements both acutely and chronically. This affects water and sanitation conditions, food security and social protection systems. These effects are felt most by women and children.

• Community and local alliances and actions are fundamental in addressing inland flooding and its impacts. Individual efforts are not enough and in some cases can even displace and exacerbate risks downstream.

• International aid and governmental initiatives are mainly targeting prevention and post recovery of flooding effects, but not effectively addressing the underlying causes of risk accumulation. More attention is needed to coordinate efforts towards inland flooding preparedness, enhancing community capacities and creating networks for collaboration and communication.

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Photo: Inland Flooding in Kroo Bay, Freetown in 2015 [1]Photo Credit: Crisis Response [31]

1. Introduction

Freetown's geographical location, topography, abundance of rivers, and heavy seasonal rainfall make the country susceptible to multiple natural hazards, among which inland flooding has been a problem with serious impacts and of deep concerns. Inland flooding in Freetown occurs during the rainy season, from July to September, and is especially severe in August. This excessive rainfall results in localised flooding and/or causes rivers to exceed their capacity, resulting in flash flooding and river and stream overflow [2].

Freetown's population has grown rapidly in recent history. During the civil war, the city's population tripled. Further, since 2001, the population has continued to expand as a result of both rural-to-urban migration driven by the economic upturn and natural growth [3]. Demand for resources and land has led to the establishment of informal settlements in risk prone areas. Many of the informal settlements are located along river channels, thus, both contributing to, and are most vulnerable to, inland flooding in the city. This policy brief will focus on the underlying drivers of inland flooding in Freetown and their impacts, especially to those who are most vulnerable, and outline how factors such as human activities have exacerbated the risk of inland flooding in Freetown, through producing and reproducing risk traps.

"The pattern of floods has been changing every year. The worst flood this year was in June. Comparing the floods in July and August, the one in August was more severe. The climate is changing. The rains have been coming more than before and the weather has been getting hotter."

- Mrs Fatu Turay, Kroo Bay community, Freetown, Sierra Leone [4]

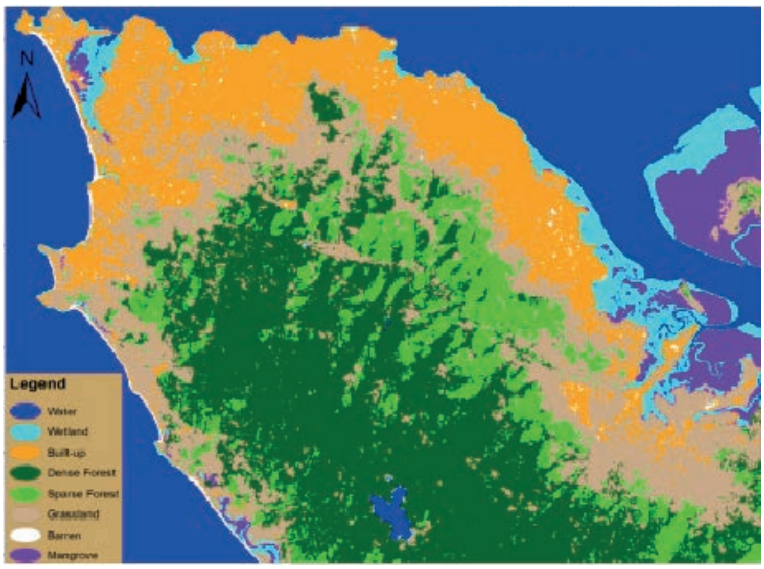
2. Drivers of Inland Flooding

The drivers of inland flooding in Freetown are multifaceted. This brief has identified three key drivers which should be addressed urgently so as to reduce the risk of inland flooding: deforestation, solid waste management, and physical modification of rivers.

2.1 Deforestation

To the south, Freetown borders the Peninsula Forest Reserve. Human activities such as urbanisation, slash-and-burn agriculture, extraction of charcoal and firewood, legal and illegal logging and land grabbing mean that the city is encroaching into the forest [5]. As such, 31% of dense forest has been lost from deforestation between 2001 and 2015 alone (figure 1)[3]. For every 10% of trees removed in the forest, the risk of flooding becomes 28% higher [6]. Without trees, there is no canopy to disperse rainfall, soil is unstable and unable to retain water, and the denuded land is eroded. Rainfall events result in a higher volume of water entering rivers which increases the incidence of flash flooding [6]. Additionally, more sediment is transported downstream due to high rates of erosion. This sediment blocks drains and accumulates in river channels, increasing the risk of flooding. Furthermore, the steep topography increases the risk of mudslides which occur when heavy rainfall rapidly saturates the ground causing it to become unstable, resulting in a surge of rock and soil pulled downhill by gravity. Mudslides, caused by saturation of denuded land, have led to major disasters in Freetown, such as the landslide in Regent 2017 [7].

a)



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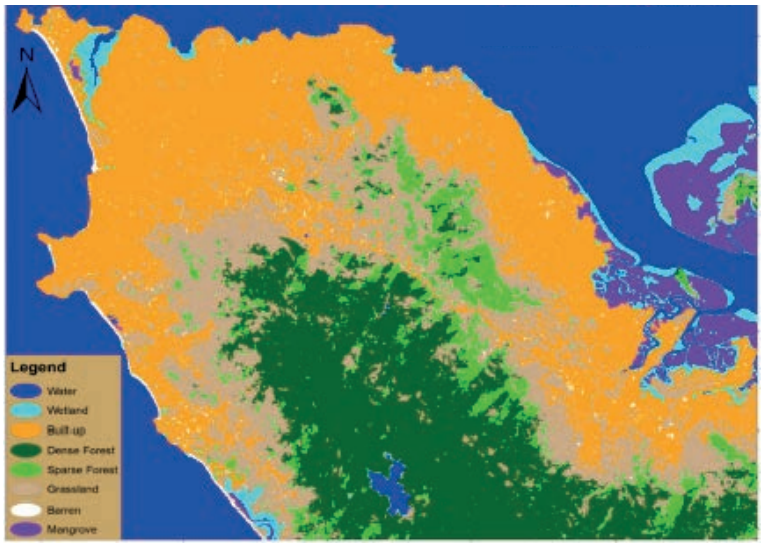

Figure 1: Deforestation over time in the Western Peninsula Forest Reserve. a) is 2001 and b) is 2015 [3].

In 2012, with funding from the EU, the Government approved the re-demarcation of the forest borders and the reserve was later upgraded to a National Park [8]. However, the relatively ineffective communication between government agencies at both national and local levels has resulted in inadequate funding being released to the Ministry of Agriculture, Forestry and Food Security (MAFFS) who, amongst other departments, are responsible for managing the forest's protection [5]. Consequently, forestry staff lack credibility at a community level so communities are not incentivised to uptake management responsibilities [5]. Therefore, the forest continues to be encroached. While responsibility is held at a national level, consequences are borne at a local level. Further, over allocation of logging permits combined with illegally forged land tenure certificates, especially in the Regent area - where wealthy individuals are seeking prime real estate on the outskirts of the city - are exacerbating the rate of deforestation and hindering policies that aim to protect the forest [30].

2.2 Solid Waste Managemen

Solid waste management is an ongoing challenge in Freetown. There are deficiencies in waste collection

points because of the narrow streets in informal settlements, the lack of funding and equipment, and insufficient human resources. The distribution of pickup points were skewed to be located in West and Central Freetown (figure 2). As seen in the map below, few formal waste collection points are located in the east of Freetown. As a result, this leads to open dumping of garbage, in streets, gutters and river courses. This blocks drains which are meant to collect rainwater during the rainy season, causing aggravated flooding events and water stagnation that facilitate the spread of health risks across the city [9]. Operation Clean Freetown (OCF) is an initiative that aims to manage waste collection, however, it entails regular paid subscription regardless of a resident's capacity to pay [7].

Furthermore, the two official dumpsites in Kingtom and Granville Brooke are located in small river estuaries (figure 2), thus, blocking the flow of water in rivers. Consequently, water accumulates and floods nearby settlements, facilitating the spread of vector-borne diseases such as malaria, dengue, yellow fever, cholera, and diarrhoea [10]. Therefore, informal settlements located near dumpsites face an increased risk of flooding and require urgent upgrading.

2.3 River Modification

Most of the river encroachment occurs around informal settlements where the natural stretch of river is modified due to the high density of people building on the river banks. Previous attempts to evict densely populated informal settlements proved to be unsuccessful as the settlers would return afterwards. This is due to affordable renting price, lack of alternative vacant land, strong bonding among community and proximity to water resources and work opportunities [14]. Residents of informal settlements build fencing, often using sandbags, that changes the river flow. Additionally, unplanned municipal works upstream also play a major role in river encroachment. Major municipal developments and businesses were implemented in Dwarzak and New England, resulting in the encroachment of the George Brook Stream. Resilience structures fencing urban major facilities, a Bottling Company for instance, modify the river flow upstream and thus aggravate the risk of flash flooding downstream by increasing the water discharge [15].

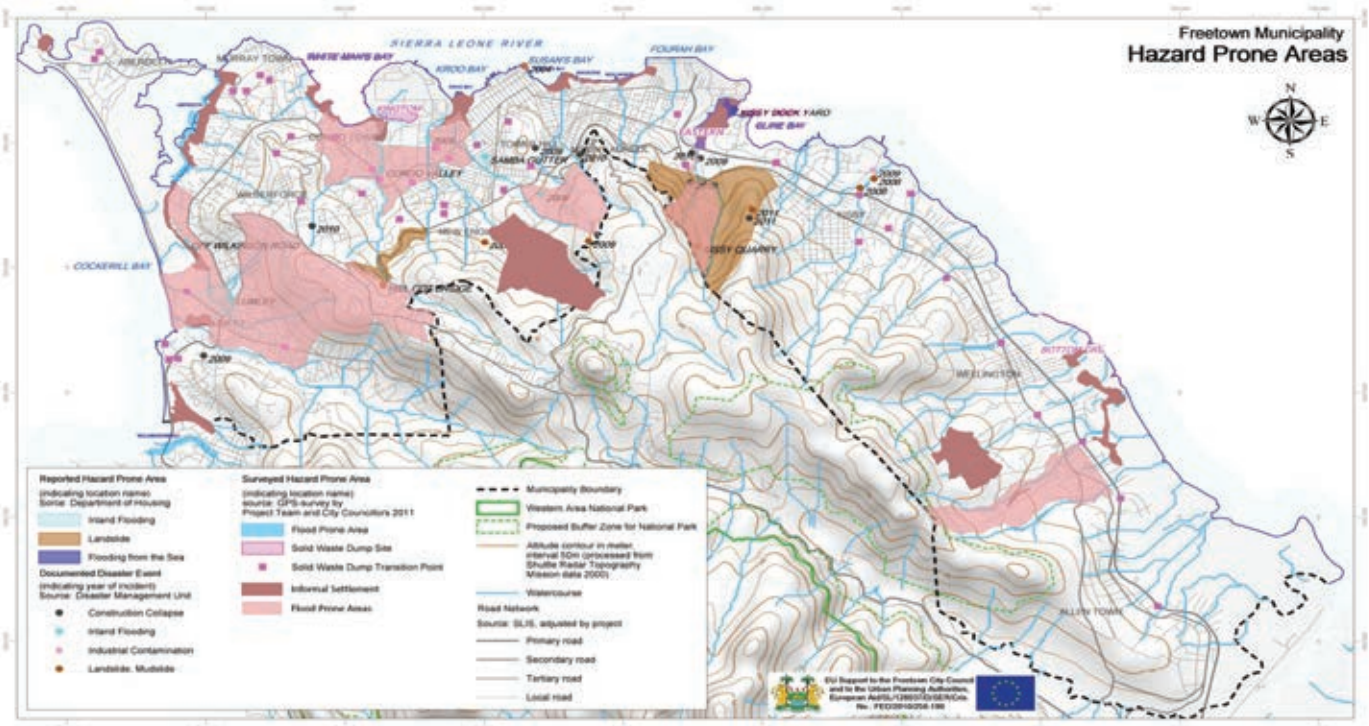

Figure 2: A spatial view of inland flooding and associated risks in Freetown. Adapted from [11], [12], and [13].

3. Who is Most Vulnerable to Inland Flooding?

3.1 Spatially

Although inland flooding negatively impacts both formal and informal settlements, the latter suffer more greatly due to their limited capacity to cope and their close proximity to rivers. As figure (2) shows, the main informal settlements in Freetown are situated next to at least one river. The rivers in Freetown have many tributaries which increase the volume of water entering the main river channels which can make them more likely to overflow their banks, especially during periods of heavy rainfall [16]. This is exacerbated by river encroachment, which interrupts the natural flow of the rivers.

Vulnerability to inland flooding varies both within and between informal settlements. Upstream, informal settlements are affected mostly by flash flooding, as the river channels are narrower and on a steeper topography, making upstream informal settlements more vulnerable to structural damage due to the high velocity of flood water.

Coastal settlements receive the greatest impacts as risks accumulate downstream. For example, water naturally slows as the river channel widens and the topography flattens, increasing the chance of flooding. Further, waste discarded into the river from the upstream communities accumulates in the lower settelments and increases the risk of flooding, which will not only cause possession loss but the spread of diseases through standing water. This phenomenon

is known as displacement of risk. In both cases, the probability of water reaching a critical flood height, the number of people affected, and the cost of repairs are all reduced with increasing distance from the source of flooding [17].

3.2 Specific Groups

Although inland flooding impacts a wide demographic, the Freetown Hazards Profile has identified females and children between 0-14 years old as being most vulnerable. Developing on the previous policy brief [7], this document has identified some further specific factors that make children and women vulnerable to inland flooding [18]. Children and youth are particularly prone to post-flooding water borne diseases, reduced access to education and emotional distress related to the flooding event. Women and girls can face a reduced level of social protection due to the diversion and breakdown of security resources and female-headed households can be vulnerable to reduced food security.

The following table outlines the key vulnerable groups during inland flooding events.

Children and youth	**Health** • In the 2017 floods, 16% of affected people were 5 years old or younger, and 26% were between 6 and 14 years old [19]. • They are at higher risk of waterborne diseases such as cholera, due to weaker immune system. • Originally high risk of outbreaks of water-borne diseases is further exacerbated due to destruction of WASH (water, sanitation and hygiene) facilities by flooding.
	Education • Financial constraints after a flooding event may mean that school fees for children are not prioritised [19]. This may lead to children not attending school for a long period of time or not being enrolled in school at all. • Schools are destroyed in flooding events and are also used as emergency shelters, reducing access to school education. The 2017 floods affected 59 schools and 6 schools were used as emergency shelters. This affected the attendance of 3190 school children [19].
	Youth first-responders • The youth are key first responders in post-flooding events. Youth volunteers play a critical role in recovering and burying bodies which causes emotional and mental distress which can often be overlooked during emergencies of flooding events [19].
Women and girls	**Breakdown of social protection systems** • During disaster events, police and security resources are re-allocated to the emergency area. This has led to a greater risk of women and girls facing gender-based violence, especially in post-flooding temporary shelters with close living quarters and a lack of privacy [19]. • Women, girls and children are separated from their communities and families during the evacuation process [20]. This leads to the breakdown of community and family protection systems.
	Women and farming • Flooding negatively impacts people's food security. This affects both men and women, however, female-headed households suffer more greatly as farming is often the main source of income. Loss of crops during flooding events reduces their food security [21].

3.3 Livelihood

Although certain groups such as children and women face specific risks to flooding, flooding also has a wider impact related to the type of livelihoods that people are engaged in. More than half of adults in affected households are petty traders and street vendors [22]. They greatly depend on the conditions of the city's infrastructure in order to continue their work. Furthermore, damage to houses results in the loss of working tools, assets, and loss of goods meant for selling. This affects the capacity of families to earn a living - only one in three adult members had been able to return to their economic activities more than 2 weeks after the 2017 flood [22]. This further exacerbates the vulnerabilities that families previously faced such as low quality housing and food insecurity. This consequently leads to a cycle, wherein families are trapped in a condition where they face an even greater vulnerability to future flooding events.

4. Action taken by local and international agencies

Local, governmental and international organisations have been working in Freetown to reduce the scale and likelihood of inland flooding risk and increase the coping capacity of informal settlements. Local based organisations have focused on post-flooding responses, city-level and national interventions on mitigation of the impacts of flooding and international organisations primarily on prevention. Despite seeming complementary, more efforts in assessing the underlying causes of risk accumulation, alongside deepening coordination and furthering communication channels between actions and actors should be pursued.

Local based organisations such as Community Disaster Management Committee (CDMC), Community Disaster Management and Emergency Response Team (COD MERT) and the Community Health Workers Committee (CHWs) have focused on post-flooding disaster management and emergency responses [7]. Their efforts have contributed to better distribute resources to areas in need, enable local communities to be more sensitive to issues related to risk and vulnerability, and promote DRR within the settlements.

International organisations address flooding prevention throughout programmes that seek to empower the community. For example, the United Nations Development Programme (UNDP) has established a training programme in an effort to reduce waste in Freetown as 80% of the waste can be recycled or composted. To achieve this goal, UNDP has started a multifocal programme that focuses on different actors within Freetown's informal settlements. Its training programme on waste recycling skills has reached 150 youth in 8 slum communities. It also collaborates with local women's organisations to provide funds, establish waste management committees, and supply the volunteers with clean up tools and storage [24].

On the other hand, city and national level efforts have been centred on mitigation plans and raising awareness. The Freetown City Council (FCC) initiated a flood mitigation plan to reduce the impacts of flooding. The plan, supported by various national and international organisations, includes different initiatives such as a 15-day cleaning project to clean drainages and gutters (figure below) by encouraging local communities to establish their own specific mitigations plans [25]. It also includes a very well accepted "Cleanest Zone Competition Baseline Survey" across 322 zones, with the aim to determine the current state of cleanliness in these areas [26].

National efforts initiated in 2018 by President Bio of Sierra Leone led to a month-long campaign with the purpose of promoting the awareness of the negative impacts of deforestation and the importance of forest preservation in mitigating inland flooding effects [27].

Despite the numerous efforts revolving around flooding prevention, mitigation and awareness, there seems to be less discussion about communication channels within communities, or about the creation of spaces of dialogue that connect efforts and the sharing of best practices. The efforts of the different organisations also seem to leave out multi-scalar approaches and the creation of partnerships between different actors to engage city and national governments into co-operating actions that have effects on the everyday lives of citizens. Bringing these considerations to the table would be helpful in constructing a cohesive thread of flooding awareness, adaptation and mitigation actions that involve addressing underlying causes of flooding vulnerabilities in Freetown as a whole.

Photo: Freetown City Couuncil Cleaning Project. Photo credit: [23]

5. Conclusion

Inland flooding is a recurrent event in Freetown and already, many initiatives are in place to try to address this issue. However, in order for these measures to be impactful, it is crucial to understand the effects they have on Freetown, its population, and their livelihoods by paying attention to the underlying structural causes of the drivers of inland flooding. There is enough evidence to notice that risks of inland flooding are being produced and reproduced within Freetown's informal settlements, where vulnerable communities face the gravest impacts as they are located in close proximity to inland flooding. Their limited capacity to deal with the impacts, and their diminishing assets and resources, makes them fall prey to inland flooding risk traps. This makes them even more susceptible to future environmental hazards.

Collaboration between different actors, as well as local capacities must be considered and coordinated to disrupt the risk cycles. Overall, this can be done by innovating processes that contribute toward more socio-environmentally just processes. The following are suggestions as to how participatory planning could work in collaboration with existing collective action and local experience to disrupt man-made cycles and the accumulation of risks of inland flooding.

Governance:

• Forest protection agencies could be streamlined to give greater power to MAFFS and therefore, increase the amount of and access to funding.

• Leaders of each informal settlement could be chosen as permanent members of a DRR council to improve communication between the community and city level.

• Coordinated efforts to reduce risk are also considered as the key to strengthen capacity. Campaigns such as Transform Freetown Campaign by the new Mayor as well as Tree Planting measure should be supported and upgraded.

• Post-disaster temporary shelters could be incorporated with a safe space for women and children with their own toilet facilities to increase privacy.

Community:

• Community stewardship of the forest and the establishment of knowledge sharing networks between communities and agencies would aid forestry staff and MAFFS in protecting the forest. It would be both more effective and economic to encourage local communities to engage in preserving the forest.

• Redistribution of people closely located to the river to less dense areas has been shown to reduce the risk of flooding as well as the after-effects of it [28]. This creates buffer zones, which could be designated as public open spaces such as parks, and maintained by grassroots organisations. Local committees should be involved in the redistribution process [29].

Funding/Economics:

• The local-based collaborations between vulnerable communities and international organisations are proven to be sustainable and resilient. Scaling up projects such as the initiative by the UNDP for waste recycling that integrates environmental management and livelihoods could be considered by deploying funding on such kind of initiatives.

• Building financial capacity can be considered to help cope with instant economic impacts from flooding among citizens. A national disaster insurance scheme initiated particularly for developing countries could help cover the loss of assets and economic activities, which would facilitate the recovery of flooding.

Database:

• It is necessary to build a comprehensive and open access database by collaborating with stakeholders at all levels, particularly communities, regarding information about deforestation, informal settlements, historical flooding records, waste collection points, etc, in order to enhance the capacity of early warning and resilience on both city and community level.

• It is important to create information channels through which information can be disseminated, e.g., through community leaders.

International Support:

• The communication among international agencies in Freetown could be promoted in order to better coordinate a coherent planning approach and thus to better deploy resources and avoid overlapping of projects.

• The local government is encouraged to provide continuing institutional and administrative facilitation to encourage long term programme visions with stable fundings developed by international agencies.

6. Acknowledgement

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