

SLURC/DPU Action-Learning Alliance

Understanding urban risk traps in Freetown

MSc Environment and Sustainable Development
Practice Module 2018-19

POLICY BRIEF No 4 . Landslides and Building Collapse

Key points

- Rapid urbanisation has caused massive changes to land use and has contributed to a shortage of available land, forcing people to build housing of varying durability in unstable hillside areas.
- A lack of clarity regarding land planning policies is a contributing factor to inhabitants settling in lands that are at high risk to landslides. This is a result of insufficient coordination between the key stakeholder institutions responsible for managing the development of Freetown.
- Disaster Risk Reduction has not received as much attention as post-disaster recovery. Insufficient data on informal settlements contributes to a reduced capacity to implement prevention techniques as there is currently no comprehensive understanding of how landslide risk impacts different communities.
- The effects of landslides are a cross-cutting issue that affect all social groups. However, some disparities arise in the ways in which these social groups are impacted and how they are able to recover.
- The responses to the 2017 landslide undertaken by a variety of institutional actors has shown that urban risk traps have not been effectively disrupted. Building in landslide prone areas has continued and many victims of the disaster have not been effectively rehomed.

Key Words

Landslides; Building collapse; Urban Risk Traps; Disaster Risk Reduction; Capacity to Act; Social Vulnerability



Landslide 2017. Photo Credit: Manika Kamara, 2017.

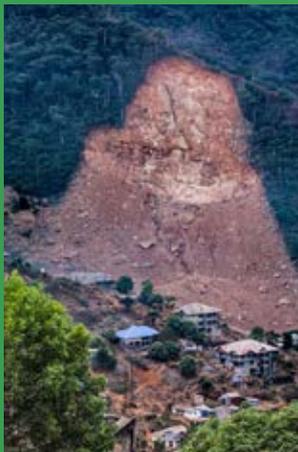
Summary

The topographical features of Freetown mean that the hillside areas of the city are prone to small and large scale landslides. The hazard is increased by anthropogenic drivers such as unplanned urbanisation which promotes deforestation and increases physical stresses on the already unstable slopes. Unlike other environmental hazards in Freetown, which may have a greater impact on those who cannot afford better services, the damage caused by landslide and building collapse cuts across wealthy and low-income inhabitants since robust, multi-storey houses and informal settlements are both built in landslide-prone areas. The occurrence of landslides in elevated regions creates displaced risks manifesting further down the slope, creating a discrepancy in how communities experience associated risks, depending on their location. This policy brief examines how landslides and building collapse affect certain groups differently across Freetown and how the policies and capacities of national and international stakeholders / organisations / institutions may be harnessed to mitigate the accumulation of risk. It should be noted that there are multiple triggers for building collapse in Freetown including fire and inland and coastal flooding, therefore the focus of this brief, landslides, should be considered in conjunction with other environmental hazards.

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Box 1: 2017 Landslide



Landslide 2017. Photo credit: Tommy Trenchard for NPR, 2017.

In August 2017, rainfall in the city was three times heavier than usual; a major contributing trigger to a large-scale landslide in the Regent area below Sugar Loaf Mountain on August 14th. After the event, 1,149 people were declared dead or missing and a total of over 6,000 people were directly affected. Overall, 901 buildings were impacted by the event which included 59 schools. 349 buildings were completely destroyed, the vast majority of which were residential. Transport was also severely affected as roads and bridges were destroyed. The landslide and the floods it caused represent an estimated economic loss of more than USD 31 million (World Bank, 2017).

Although the 2017 landslide is a unique case that occurred in a specific area of Freetown, its underlying structural causes are relevant to the entire city and provide an entry point to understanding landslide risk in the city. It is the most documented landslide in Freetown's history and therefore offers information that can be used to better understand landslide hazards as a whole. Indeed, the plethora of drivers that triggered the large scale event in 2017 also affect many other areas of the city and cause smaller scale landslides on a more regular basis. By gaining an understanding of what caused the event in Regent, measures can be taken to directly tackle the structural drivers and consequently reduce the probability of an event of this magnitude occurring again.

Topographical Hazards

Despite having a low risk of seismic activity (World Bank, 2018), the geographical location and topographic features of Freetown make it susceptible to recurring landslides of varying scales. Indeed, the coastal plain area and the mountainous landscape just outside the municipality boundary - where most landslides occur - are covered by a shallow soil layer that makes them particularly prone to landslides, especially during the rainy season (Usamah, 2017) due to increasing soil instability.

According to the World Bank (2018), rainfall is the primary trigger factor for landslides in Freetown. The country's seasonal rainfall, which peaks in the wet season between July and September (McSweeney et al., 2010), has been a contributing element to landslides in Freetown. Map 1 shows the high density of historical landslides in the mountainous areas of the peninsula, in particular those South West of the municipal city boundaries of Charlotte, Bathurst, Ghendembu and Hamilton. Moreover, rainfall episodes are becoming more and more intense and unpredictable due to climate change as reflected by the 2017 landslide (see box 1).

The aforementioned physical and topographical features cause the downward flow of water and debris meaning landslides produce a number of displaced risks for individuals exposed lower down the slope including rock fall,

gully erosion, flooding, waste flows and associated waterborne diseases. Individuals experience these risks differently, according to their varying exposure to these hazards, levels of vulnerability, and coping capacity (see box 2).

Anthropogenic drivers for landslides on the Freetown Peninsula

Urbanisation

The damage and collapse of buildings and the subsequent loss of life and economic impacts directly caused by landslides are exacerbated by anthropogenic drivers. Following the end of the 11 year civil war, vast and rapid changes in land use occurred in the Freetown peninsula due to a number of human factors, these included:

- The rural to urban migration of an estimated half a million people into Freetown during the war. This increased requirements for housing, food and energy and led to the inflation in the cost of real estate within the city centre where suitable land for building was already in short supply due to the city's location between the coast and the steep hills south of the municipal boundary.

- Sierra Leone entered a period of post-war economic recovery in 2002,

where investment and infrastructural and real estate development were encouraged with the intention to boost economic growth.

Change in Land Coverage

Real estate development and urban encroachment on the hillside areas at the fringes of the city are key drivers for unregulated deforestation of the slopes as there is an increased requirement for cleared land and timber building materials (Munro, 2009). The removal of dense forest and grassland in order to accommodate the construction of houses and infrastructure contributed to a 20.9% change in land use across a 349.5 km area of the Freetown Peninsula between 1986 - 2001, and a 28.5 % change in land use across the same area from 2001 - 2015 (Mansaray, 2016). Map 1 shows an increase in the amount of land converted during the period following the civil war and also an increase in the rate of change. This suggests that urban encroachment and demand for land on forested, hillside areas has rapidly increased since the end of the war.

Institutional Capacity to Act

There are various ministries, departments and agencies that are directly or indirectly connected to landslide hazards in Freetown. The multi sectoral nature of landslide risk means that coordination and

cooperation between these institutions is essential to reducing the impacts of landslides and preventing future disasters from occurring.

Weak enforcement of land use planning and insufficient management of landslide prone areas have been significant contributors to the production of risk traps in the city. Even though local government is aware of the risk of landslides, inhabitants have been allowed to construct their homes in high risk areas. Land encroachment in these areas is partly due to the absence of comprehensive legislation clearly defining the functions of the Ministry of Lands, Country Planning and the Environment (MLCPE), the Ministry of Housing, Works and Infrastructure and the Freetown City Council (FCC) (World Bank, 2017). Between them, these institutions have not been able to tackle encroachment effectively and accountability for the enforcement of land laws and building codes has remained unclear (Ibid.).

The MLCPE is responsible for the management of land in Sierra Leone but has not been able to translate its mandate into first-rate policies (PSRU, 2010). A functional review of the Ministry conducted in 2010 described limitations due to a lack of comprehensive land policy framework, inadequate institutional capacity for policy implementation and inadequate coordination amongst stakeholder institutions (Ibid.). Furthermore, communication between the MLCPE and the public has not been constructive as the public is unaware of

the functions and procedures of the Ministry (Ibid.) which has resulted in members of the public contacting high ranking officials to request permits. These factors have all contributed to a higher probability of illegal permits being issued.

The 2015 National Land Policy of Sierra Leone states that the MLCPE will establish a “comprehensive land use planning and mapping system” and “develop a strategic spatial development plan [...] to stop uncontrolled urbanization” (MLCPE, 2015). This policy document provides the basis for a framework to tackle land encroachment but so far has not been routinely implemented. Laws dealing with land use and tenure need updating and to be directly related to effective management policy so that there are no discrepancies over which areas can be built on (PSRU, 2010). Increased cooperation between the MLCPE, Ministry of Housing and the FCC is necessary to effectively monitor the allocation of building permits and to increase transparency so that building in high risk areas is prohibited. Stricter enforcement of land laws and building codes can help to disrupt risk traps and prevent inhabitants from endangering themselves, and other inhabitants lower down the slope, by constructing their homes in unstable areas. The Office of National Security (ONS) and the Ministry of Forestry also have a responsibility to ensure that the public do not increase the risk of landslides by destabilising the soil when building on unstable land. The combined actions of all these institutions

can help prevent further landslides but the current lack of integration and cooperation has reduced their capacity to act to implement policies.

Disaster Risk Reduction

An important step towards reducing risk in Freetown was made in 2004 when the ONS created the Disaster Management Department (DMD). Between 2005-2015 the DMD followed the (United Nations) Hyogo Framework for Action which contains international guidelines for prioritising Disaster Risk Reduction (DRR). Some progress was made during this period in raising awareness of the importance of DRR at community level (Mye Kamara, 2011), providing a strong opportunity to build on this when following the Sendai Framework for Action 2015-2025. However, there have consistently been limitations in enforcing DRR across sectors due to restraints in finances, human resources and operational capacities (Ibid.).

The National Disaster Preparedness and Response Plan as well as the Sierra Leone Disaster Management Policy were both drafted in 2006 but have not been implemented by the strategic ministries and departments, partly due to the absence of a legal framework to help government agencies integrate DRR into development strategies (World Bank, 2017). The plans also require updating and strengthening if they are to be applied as they currently contain very little or no informa-

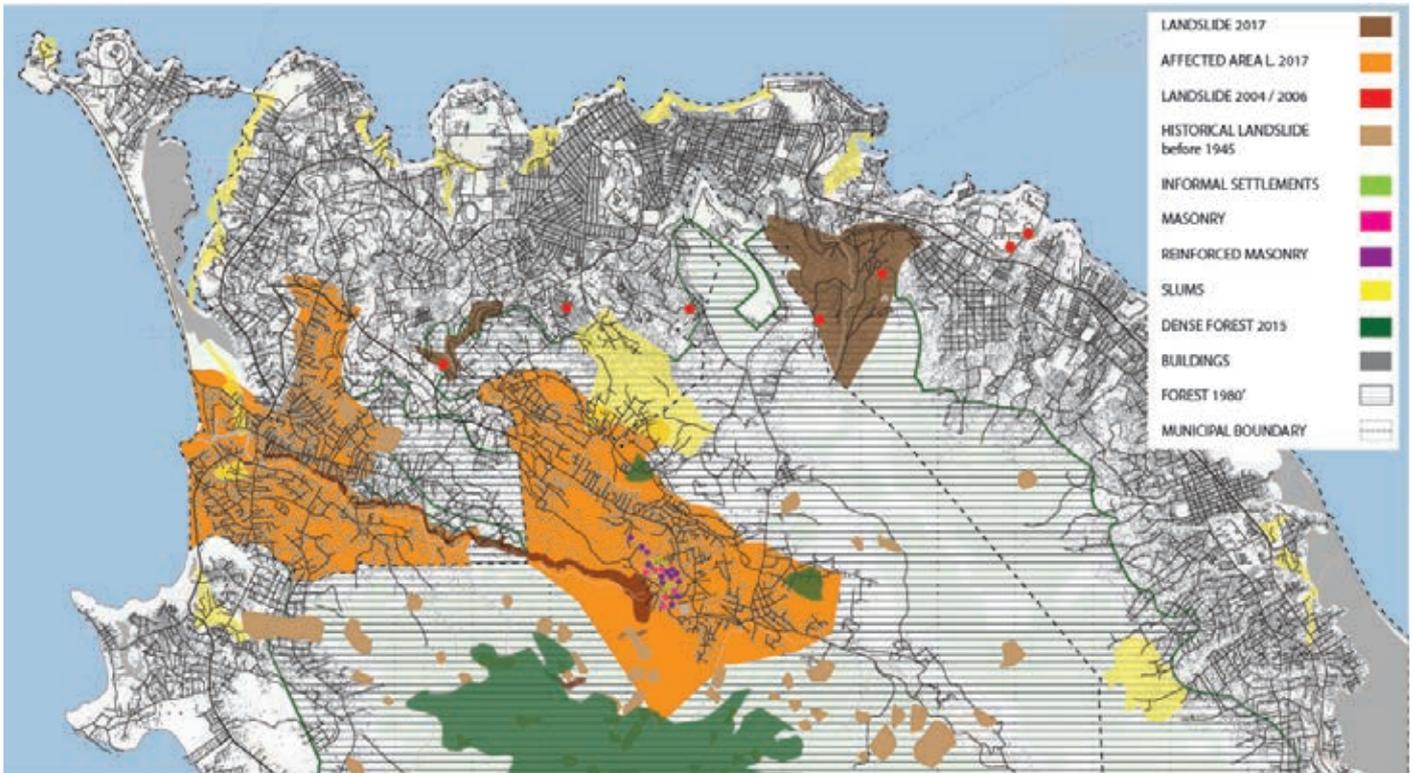
Box 2: Urban Risk

$$\text{Risk} = \frac{\text{Vulnerability} \times \text{Exposure}}{\text{Coping Capacity}}$$

This formula expresses how individuals and groups experience risk differently, according to their exposure and vulnerability to hazards, and their capacity to cope with the effects. According to UNISDR, risk is defined as “the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions” (UNISDR Terminology, 2009).

The accumulation of risks over time, combined with an eroded capacity to act, results in the production of an Urban Risk Trap. An Urban Risk Trap is defined as “the sum over time of the articulation and reproduction of vulnerability and daily and episodic dangers or threats coupled with eroded capacity to act.” (Allen et al, 2018). Without direct efforts to disrupt them, risk traps are continually reproduced, particularly within low income communities.

Risk traps relating to landslides manifest over a period of time as various spatial and economic factors drive inhabitants to live in areas that are permanently at risk to landslide. On top of this, individuals have little coping capacity as landslide events are triggered by complex topographical and physical conditions.



Map 1: Mapping the Landslide, Affected Area, Forestry and Buildings . Map Credit: Policy Brief N°3, Landslide and Building Collapse, 2017 -2018 and data adapted by authors.

tion pertaining to landslides.

As well as having no legal framework, the DMD does not receive an official budget allocation from the government. The majority of funding is received from international donors that tend to support post-disaster recovery rather than disaster prevention. DRR does not receive as much attention as other everyday issues and lacks strong stakeholder commitment (Ibid.). This is partly due to the fact that a large proportion of responsibility has been devolved down to the FCC to undertake DRR and the FCC is not well equipped to undertake such tasks (PSRU, 2010). The devolution of such functions down to local councils has not been matched by the provision of sufficient resources by the national government (PEFA, 2010). It is evident that there is a need to improve resource mobilisation within Freetown, this requires earmarking the necessary funds for DRR to appropriate institutions.

The Freetown Development Plan 2016-2018 states that DRR must be “developed, disseminated and institutionalized for the use of all stakeholders at all levels” (FCC, 2016). With the DMD already established, there is an opportunity to develop, in conjunction with the Sendai Framework for Action, a legal, institutional and operational framework for DRR that involves all relevant

stakeholders across sectors. This requires a shift in approach so that more attention is given to prevention techniques rather than just post-disaster response.

Building Technical Capacity

Building capacity related to DRR is hindered by the lack of available and reliable data on natural hazards (World Bank, 2018). Improved data collection combined with structured urban policy and planning will enable a better understanding of risks and potential opportunities to mitigate such risks. Currently, the FCC’s mechanisms for collecting and analysing data are not well developed (World Bank, 2018). This is reflected by the fact that the boundaries of informal settlements are not clearly defined. Without accurate demarcation there is a limited ability to generate appropriate development reports and to have accurate figures for these communities, such as data on population, education, access to basic services, illnesses, economic activities and different poverty groups. Without detailed information about informal settlements, there is a lack in understanding of the capacities and knowledge that already exist within the community. Developing data, especially within informal settlements, can provide a better understanding of how

landslide hazards impact communities. Recognising the diverse needs of vulnerable groups can help to inform policy planning and reduce their exposure to risk (Macarthy et al., 2017). Furthermore, there is currently little data pertaining to small scale landslides and as a result there is a gap in knowledge of how residents are affected by smaller, more regular events.

A key way to build technical capacity is through developing the skills and capabilities of government officials. Training programmes for the FCC and the Ministry of Lands were organised by GOPA in 2014 to help build the capacities of staff members to better address urban planning challenges (Macarthy & Koroma, 2016). However, in most cases the programmes were too general and did not focus on any specific organisational needs (Ibid). Therefore, it is clear that more programmes aimed at data management/analytical skills, resource mobilisation (grant writing skills and funding sources), risk and vulnerability assessment approaches and participatory methodologies for data collection are necessary to help build capacity of government actors to directly address the reproduction of risk in the city (Ibid).

Community Capacity

The uncertainty in the occurrence of a

landslide reduces the capacity of people and institutions to prevent this type of event. So it is necessary to prepare as much as possible, starting with an equal distribution of knowledge, and working closely with all members of the community in order to plan the future growth of the city.

A key way to harness the capacity of local communities is through the empowerment of Community Based Disaster Management Committees [CBDMC]. There are currently a number of CBDMCs across Freetown that comprise of members from both local CBOs such as FEDURP and local youth advocacy groups (YMCA, 2015). While CBDMCs activities have usually been limited to post disaster recovery, with the appropriate resources put in place they can also play a key part in DRR. As previously mentioned, there is a distinct lack of data regarding landslide risks across Freetown, community networks therefore are crucial in the communication and articulation of information regarding potential risk. An example of this can be seen in Dworzack where CBDMCs members played a key role in disaster prevention by identifying and removing large boulders which posed a threat to nearby buildings due to potential landslides or slipping (Y Care International, 2012). This shows how local communities are often best placed to reduce potential hazards as they possess local knowledge of the physical environ-

ment surrounding them.

In order for the role of CBDMCs to be fully realised, they require technical and financial support from both local government and NGOs. A key step to doing this is to provide them with legal designation, as they are currently not classified as legal entities and therefore have issues accessing reliable funding (Macarthy et al., 2017). Similarly, essential in the success of CBDMCs is the engagement of the young population. Freetown has a large youth population, take for example the areas of Kroo Bay and Dworzack where over 65% are under the age of 30 (Y Care International, 2012). Engaging this demographic in community projects will greatly contribute to collectively reducing risks. One example of communities being encouraged to take an active role in DRR was seen when the Environmental Protection Agency of Sierra Leone (SLEPA), with the support of UNDP, created a radio jingle as a way to raise awareness about floods, mudslides and landslides throughout Sierra Leone (UNDP, 2017). This is one example of how increasing the knowledge of inhabitants can encourage community engagement and action.

Social Vulnerability

Landslides are cross-cutting hazards

that affect both poor and wealthy inhabitants in Freetown, but the impacts of the disaster can have different repercussions among these two groups. Although both social groups share many negative impacts, the effect of human, material and economic losses are likely to be more severe on poorer residents whereas wealthy residents are more likely to be affected by indirect consequences such as the closure of roads and bridges and the suspension of certain business activities.

Furthermore, the process of recovery after a landslide event is different between these two social groups. Whilst it takes many years for poorer residents to mobilise both the material and financial resources needed to rebuild their homes and to achieve decent living standards, wealthier inhabitants have the economic resources to recover faster and to ensure that their livelihoods and material possessions are retained. This illustrates how urban risk traps have a greater effect on lower income economic groups.

Causes and Consequences of Building Collapse

When landslides and building collapse occur there is an inequality of impacts due to different building materials.

Box 3: Institutional Memory

Institutional memory is the collective knowledge and learned experiences of a group or organisation (IGI, 2009)

There already exists a considerable amount of knowledge regarding the causes of landslides in Freetown and there is potential to build on existing institutional capacities to disrupt risk traps. It is important to create a strong institutional memory so that current and past knowledge and capacities are not lost but can be drawn upon when planning for the future.

The various policies and plans pertaining to land use and land disasters that have been produced across the institutions have not been consistently documented. The creation of a well organised and accessible catalogue of land use and housing policies would help to create a stronger institutional memory in Freetown. With all the information collated in one area, various stakeholders can have a better understanding of the work that has already been achieved and identify where there are policy gaps. In order to strengthen land policy and guide future development, it is important to be able to learn from past mistakes.

Furthermore, it is difficult to carry out long term projects in the city if information is not preserved or shared between different actors over time (The Lost Freetown Collective, 2018). The research produced by outside organisations that have come to Freetown should be documented and connected to previous work on environmental issues so that there is a strong collective base of information that can be accessed by current and future groups. The exchange of knowledge and information between government ministries, agencies and other external actors will significantly improve cooperation between institutions and strengthen their capacity to act. Shared learning can highlight the strengths and experiences of each institution and demonstrate how they can contribute to reducing risk in the city. A deeper institutional memory can illustrate the development of the city over time and highlights the interconnectedness of different actors.



Samuel Senessie. Photo credit: Tommy Trenchard for NPR, 2017.

Firstly, the difference between building types causes uneven exposure to risk. Reinforced buildings are stronger than those found in informal settlements where building structure is usually pan-body (walls and roofs constructed with thin metal sheets). 60 % of the informal structures in Freetown are made from less durable materials such as zinc sheet, cardboard, and plastic which increases the vulnerability of the building to collapse and consequently endangers those living inside (BBC News, 2013; Johnson, 2009). Looking at the scale of landslides and structural resistance of buildings, a World Bank report from 2018 shows that informal residential buildings are much more affected by landslides

than heavier buildings (educational, government and industrial facilities etc.). However, in the case of the 2017 landslide, residents living in reinforced masonry and residents living in non-permanent structures were both affected. Map 1 shows that there are several buildings constructed from reinforced masonry and relatively few informal settlements around the Regent slopes. The heavy weight of the masonry buildings puts greater pressure on the slope and causes soil instability, which becomes a potential trigger for a landslide. Over the short term, weaker structures are more likely to collapse due to soil instability whereas buildings with stronger structures remain standing. Therefore, the

heavier buildings play an important role in displacing risk as they contribute to the destabilisation of the slope as a whole and increase the possibility of a landslide occurring, but it is the people in less durable buildings that are the first to suffer the consequences of an event. This demonstrates an unequal exposure to risk on the hillside, as heavier buildings owned by wealthier residents can cause damages to informal settlements built further down the slope, whilst their own buildings are protected. However, over a longer time period the stronger buildings are also at risk and may also eventually collapse due to the soil instability.

Box 4: Occupational Hazard

Different social factors, such as an individual's occupation, intersect with economic status to create specific vulnerabilities and accumulated risks for certain groups of people. When landslides occur during the day, people are more likely to be killed or seriously injured if they are located outside of a building rather than if they are protected by a structure because they are more likely to be buried under rubble or hit by falling rocks (World Bank, 2018). Urban residents employed in low-skilled, low-wage occupations that require them to be outside are exposed to a higher risk of death and injury due to their spatial proximity to rock-fall prone areas. Occupations such as stone-breaking and quarrying, which are based on the collection of freely available resources, are an important source of fall-back income for members of urban poor communities with limited assets (Development Planning Unit and SLURC, 2017). The exposure to landslide associated rock-fall hazards is therefore increased for urban, low-income individuals employed in this type of work.

Risk Traps of Landslide and Building Collapse

People continue to build new houses in risk-prone areas after landslide and building collapse incidents. This is not because of the lack of awareness of these risks, but other factors drive people to do so. Firstly, the land price upon hills is relatively low compared with other land in Freetown (World Bank, 2018), which drives people to encroach on the hills regardless of the landslide risk. Secondly, due to rapid urbanization, areas of the city that are relatively safe from landslide risk are already occupied, which thus leaves people with no other choice than to build their new houses on the hills. The need to live in close proximity to work is another reason why inhabitants may choose to live in high risk areas. It is also notable that lower-income families rebuild their new houses using less durable building materials due to financial difficulties, which leads to a weak housing structure that is susceptible to future risk of building collapse (Marino et al., 2018) thus illustrating how the risk trap reproduces.

Response to the 2017 Landslide

By analysing the response to the 2017 landslide it is possible to see how the risk trap cycle endures. Following the landsli-

de, a total of 3,000 people were left homeless. Many of these residents were displaced to two government camps funded by UK aid and the World Food Programme. As part of the 'Freetown Emergency Recovery Process', a program led by the World Bank which aims to rehabilitate selected critical infrastructures and strengthen government capacity in order to better manage disaster risk, an International Development Association (IDA) grant of USD 10 million was approved in February 2018 to support Sierra Leone in its efforts to recover from the severe landslides (World Bank, 2018). However, an important part of the financial assistance was disrupted and roughly a third of the people staying in one camp located at the bottom of the landslide have not yet received funds from the government and others said they only got a portion of what was promised (Trenchard, 2018). If residents affected by the landslide are not adequately assisted or re-homed, then it is possible that they will choose to rebuild their homes in areas that are prone to landslides. Therefore, inhabitants remain vulnerable and are still exposed to the risk of a future landslide.

The government further promised to permanently relocate everyone living in areas considered vulnerable to natural disasters. Therefore, they developed a plan to construct 53 houses on the outskirts of the city as 230 families are still living in an unfinished building at the foot of the landslide, a situation deemed to be emotionally difficult considering the

trauma experienced by the affected communities (Inveen, 2017).

As part of the humanitarian response in Sierra Leone, the significantly increased presence of NGOs activity during the 2014 Ebola crisis has enabled a permanent role of organisations such as 'Save The Children', contributing to disaster management and recovery activities (World Bank, 2018). The institutional presence of NGOs in Freetown, currently under the lead of the national government and the Office of National Security (ONS), helps with the provision of adequate shelter, protection assistance, distribution of food and non-food items and a psychological support to the children left as orphans. The role of NGOs is extremely important to help communities recover from landslide events, however, this should not prevent local government from taking responsibility for rehousing victims. What is more, NGOs tend to offer more support for post-disaster recovery rather than for risk reduction - which is more important for the long term development of the city.

The challenges left by the 2017 landslide underlie the need for all the stakeholders to better coordinate an effective response to the trauma and to ensure that no one is left behind.



Regent Area. Photo credit: Benjamin White, 2018.

Recommendations

Landslide events of different scales occur on a regular basis in Freetown. Some of these landslides may be prevented, or their impacts reduced, if there is coordinated collective action by numerous stakeholders to reduce risk. The following recommendations are designed to highlight how certain strategic changes could potentially help to disrupt risk traps in the city and mitigate the impact of landslides.

- There is a need for improved coordination between the relevant stakeholder institutions (such as the FCC & ONS) on disaster risk management; a shift in focus to include disaster prevention as well as post-disaster response is key. Strengthening institutional memory will enhance the sharing of relevant knowledge and skills which can improve the capacity to implement disaster risk reduction strategies.

- A clear signposting of areas of the city at risk to landslides is needed, based on their physical characteristics (elevation, slope angle and aspect). Signposts highlighting where there has been building encroachment on sloped areas would ensure that there are no doubts over which areas are at high risk to landslides and should not be built on.

- A coordinated effort by the FCC and the Ministry of Lands is required to increase transparency and accountability regarding the issuance of building permits. This will help to prevent inhabitants from building illegally and endangering themselves and others.

- Where relocation is required due to residents living in landslide prone areas, an efficient government response is needed to ensure there are new destinations available with sufficient infrastructure and that allows good access to the city.

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