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Climate change adaptation in Lusaka, Zambia: A case study of Kalingalinga and Linda Compounds

Global Urban Research Centre Working Paper #6

By Danny M. Simatele

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The views expressed in this working paper do not necessarily reflect the official position of GURC.

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Executive summary

In Lusaka, weather-related events – such as severe floods, extreme temperatures, as well as cold spells – have become more frequent and intense. This has had serious consequences on the urban poor and their assets in Kalingalinga and Linda Compounds. Severe flooding (resulting from heavy precipitation) has been identified as the single most challenging weather condition facing the urban poor in the two informal settlements. Participants, during focus group discussions, revealed that floods have had a devastating impact on both human health and property. Some of the impacts include: destruction of houses and roads, loss of household property, and an increase in water-borne diseases such as dysentery and cholera.

In spite of the impact of severe weather, the urban poor in Kalingalinga and Linda Compounds are not passive. They are actively involved in developing coping and adaptive strategies, including modifying their assets in order to minimise the impact of severe weather conditions. In both study sites, for example, housing was identified as the most important asset that provided protection against the impact of severe weather conditions. Housing was also identified as performing a number of functions which include, among others, income generation and contributing to the accumulation of a household's wealth or assets. Because of the multiple functions performed by housing, many participants considered it to be the most important asset for adapting to severe weather conditions.

Despite this, an analysis of institutional and policy frameworks revealed that there are no formal government structures supporting adaptation in these circumstances by the urban poor. At both the national and local level, a lack of climate-change-specific legislative instruments and policies has meant that the most vulnerable people are left to fend for themselves when faced with weather-related crises. It is suggested in this working paper that until Zambia, as a country, develops legislative instruments and policies that are climate-change specific, the challenges emanating from severe weather will always be an immense task and will compromise both local and national development.

Key words: Severe weather conditions, asset adaptation, Kalingalinga Compound, Linda Compound.

1 Introduction and objectives of the study

It is now widely acknowledged that cities in the developing world, particularly those in sub-Saharan African countries, are increasingly becoming home to a large proportion of people who are vulnerable to different stressors[1]. In Lusaka, the capital of Zambia, severe weather events are having a telling effect on the urban poor, especially those who are living in informal settlements, as they continue struggling to adapt to frequent flooding, heat waves, and shortages of water and energy.

In spite of the dangers and challenges posed by severe weather conditions, the urban poor in Lusaka are not passive actors. They are involved in adapting their assets in different ways in order to reduce the effects of severe weather events on their welfare and livelihood. In view of this observation, and with the support of a research grant from the Ford Foundation, this working paper presents views expressed by research participants in two of Lusaka's informal settlements, namely Kalingalinga and Linda Compounds, on how they respond and adapt their assets against the challenges posed by changes in the weather. Of particular interest, was the identification of critical assets that the urban poor people use to build their adaptive capacity and resilience against severe weather conditions, including institutions that either facilitated or impeded the adaptive processes.

The objectives of the study were, therefore, twofold. First, an asset-based adaptation framework is used to undertake empirical participatory research, and understand the different strategies and responses employed by the urban poor in Kalingalinga and Linda Compounds in adapting their assets against the impacts of severe weather conditions. Second, institutions that may facilitate or impede the asset adaptation practices of the urban poor in Kalingalinga and Linda Compounds against the impact of severe weather events are appraised.

In view of the thematic and objectives of the study, this working paper is divided into five broad sections. The first section discusses the conceptual framework and a background to the research sites. The second section discusses community perception of severe weather, highlighting the views of the participants in terms of what they consider as contributing to changes in climatic conditions. The third section focuses on three categories of assets and how they are affected and adapted against severe weather conditions. The fourth and fifth sections focus on an appraisal of institutions and the conclusion. It is envisaged that the issues raised in this working paper will contribute to contemporary and future climate change and policy debates, including the formulation of climate-change-specific legislation and policies, not only in the context of Lusaka and Zambia, but also on a global level.

1.1 A conceptual framework: the participatory climate change asset adaptation (PCCAA) and the rapid risk and institutional appraisal (RRIA).

The participatory climate change asset adaptation appraisal (PCCAA) framework, developed by Moser and Stein (2010), and which builds on the accumulation of assets, was the main analytical framework used for data analysis. The PCCAA uses the principles and practices of

[1] A stressor is something that either speeds up a reaction rate or keeps the reaction rate the same. In the field of environmental science, there is concern about multiple stressors that impact on people's livelihoods. Climate change may be an important factor in increasing people's vulnerability, but it is the combination of a change in climate with other stressors (such as changing pressure from land degradation, recurrent experiences from drought, or sudden shocks from floods or landslides) that will determine how the stressor can be coped with. The impacts of these stressors create multiple stresses that are specific to the agent or system (see Bunce et al. 2009).

participatory research (PR), and is an extension of the asset-based vulnerability and adaptation framework, initially developed by Moser and Satterthwaite (2008) on „pro-poor adaptation to climate change' in urban centres of developing countries. The asset-based vulnerability framework highlights the role that assets play in building the adaptive capacity of the most vulnerable groups of people to severe weather conditions (Prowse, 2008; Moser and Satterthwaite, 2008).

The PCCAA framework comprises two components. First, the *asset analytical framework* which identifies the links between different vulnerabilities and assets of the urban poor, including the various practices employed to cope with, recover and build resilience against internal and external stressors. Second, the *asset adaptation operational framework* which identifies concrete measures taken by individuals or households to increase their resilience and reduce vulnerability in the face of long-term changes, as well as immediate shocks that result from changes in climatic conditions (Moser and Stein, 2010).

The PCCAA provides a three-stage analysis of the impact of severe weather, and the associated adaptive practices employed by the urban poor. The first stage, labelled the „before stage', involves the identification of assets that are at risk to severe weather and the adaptive strategies that the urban poor use to protect these assets *before* a weather-related event occurs. The second stage focuses on what happens during (i.e. the „during stage') the period when the weather event occurs, and what the urban poor do to protect their assets. The third stage is the „after stage' which attempts to identify assets and actions that are considered critical in the recovery process and in building long term adaptive capacity and resilience to severe weather conditions (see Moser and Stein, 2010).

The emphasis on assets, as a potential avenue of understanding the impact of climate change on the urban poor, stems from the recognition that income and expenditure can vary without much change in people's underlying condition of vulnerability, while the assets of a household are often more stable and, consequentially, they can reveal much more about the vulnerability of a household or community (Prowse, 2008). Furthermore, assets can tell us who is likely to remain poor and who may accumulate, or is more likely to adapt to changes in weather patterns (Prowse and Scott, 2008). In light of these observations, Bebbington (1999) says that assets are not simply resources that people use to build livelihoods: they give them the capability to be and to act. He further suggests that assets are the agents of power to act, to reproduce, challenge or change the rules that govern the control, use and transformation of resources.

Closely connected to the PCCAA, is the rapid risk and institutional appraisal (RRIA) developed by Moser *et al.* (2010). The RRIA identifies both formal and informal institutions or organisations that can either facilitate or impede the adaptive capacity of the urban poor against severe weather conditions. It is argued by Moser and Stein (2010:7), for example, that the "RRIA provides a top-down review of the policy domain, in terms of the institutions tasked to deal with climate change, the relevant national, regional, and municipal level policies, regulations and mandates relating to climate change, as well as associated programmes – and budgetary allocations".

It is important to conduct an RRIA because institutions play a significant role in shaping the vulnerability of the urban poor (Tanner *et al.* 2008). This is because the impact arising from the same weather event, (e.g. flooding), may not be the same across all locations within a city. Institutions shape the way whole communities respond to extreme weather because they link individuals and households with collectives and provide the framework within which the urban poor choose how to adapt. Communities that, for example, lack access to capital assets and infrastructure may find it difficult to invest in building materials that would minimise the impact of severe weather on their household assets.

Finally, institutions usually act as intermediaries for external support for the adaptation of the urban poor (see Tanner *et al.* 2008; Agrawal, *et al.* 2008). It is, therefore, imperative to identify the local institutions including the legislative instrument, policies, and programmes that have a bearing on issues relating to climate change on a local community. It is through a better understanding of such processes that appropriate pro-poor adaptation policies can be formulated or enhanced.

1.2 Undertaking the PCCAA and the RRIA in Kalingalinga and Linda Compounds.

The PCCAA was conducted in two phases. The first phase was carried out from 1 July to 28 August 2009. This phase involved the collection of information on adaptation of household assets against the impact of severe weather conditions in Lusaka. Prior to collecting data from the grassroots in Kalingalinga and Linda Compounds, a pilot study involving a total of eight (i.e. four from each site) focus group discussions from two different informal settlements, namely Garden and Kanyanma Compounds was conducted (see Figure 1). The pilot study which was conducted over a period of four days (i.e. from 1 to 6 July 2009[2]) was undertaken to test the PCCAA tools in order to modify and adapt them to the local context of Lusaka. (It should be noted that the information collected from the pilot study has not been included in the findings of this working paper.) From 7 to 29 July 2009 a total of 19 focus group discussions were conducted in Linda Compound. An additional 12 focus group discussions were conducted in Kalingalinga Compound from 2 to 27 August 2009, bringing the total number of all focus group discussions conducted during the first phase of the PCCAA to 31.

In additional to the focus group discussions, two community workshops were held in each study site: one on 30 July 2009 in Linda Compound, and the other on 28 August 2009 in Kalingalinga Compound. The purpose of the workshops was to share preliminary research findings with the participants and also to receive more input from them. In Kalingalinga, 20 participants attended the workshop, while in Linda Compound 28 participants attended the meeting.

The second phase of the PCCAA was carried out from 8 to 12 February 2010 in Kalingalinga and Linda Compounds. The purpose of the second phase of the PCCAA was to fill the gaps that were identified in the first PCCAA data set. This phase facilitated the collection of data on community assets and small businesses assets, information that was not collected during the first phase of the PCCAA. A total of 10 focus group discussions were conducted in each of the study sites, bringing the total number of all focus group discussions held during the second phase of the PCCAA to 20.

Overall, the PCCAA data set used in this working paper is based on information collected from 51 focus groups in the two study sites: 29 from Linda and 22 from Kalingalinga Compounds. Each focus group comprised six participants on average. Of the 51 focus groups, 13 included adult women participants, 17 were men only, and 19 consisted of both men and women participants, all aged between 19 to 85 years. The remaining two focus groups were composed of school children, aged between 13 and 16 years old.

Before entering the two study sites, researchers established contacts with the two area Members of Parliament (MPs), who in turn introduced them to local community leaders, elders, and the police. It was important to make contact with the MPs due to political issues within the context of Lusaka. At the community level in the two sites the Ward Development

[2] The 3/4 July 2009 was a weekend.

Committee (WDC) members and Zone[3] leaders are among the key actors. Initial discussions, focusing on demographic characteristics and development activities including challenges in the two sites, were held with the WDC members and Zone leaders. After these discussions, transect walks were carried out with the help of WDC members and Zone leaders. From the transect walks, researchers were able to identify areas and households within the study sites that were most at risk to severe weather conditions. With the help of Zone leaders, representing the identified locations that were more vulnerable to changes in climatic conditions, researchers were introduced to different households and businesses where they carried out discussions with various households and individuals.

Two basic methods, namely *focus group discussions* and *semi-structured interviews,* facilitated the use of various PCCAA tools shown in Table 1. It has been suggested that, "at the heart of all good participatory research … lies sensitive interviewing. Without it, no matter what other methods you use, the discussion will yield poor information and limited understanding" (Milimo *et al.* 2002:7). On the other hand, focus group discussions could be described as semi-structured interviews with a group applying the same basic principles as semi-structured interviews (see Cook, 1997; Chambers, 1994). Thus both methods, particularly focus group discussions, provided a large proportion of the information that has been used in this working paper.

In additional to focus group discussions, open-ended questions were frequently used to solicit additional information from the participants using the „six helpers' – what? when? where? who? much? and why? It is important to point out here that the rationale behind using the PCCAA tools in the Lusaka study was multi-purpose. *First*: to engage in cumulative learning of all stakeholders involved in the study (i.e. both the participants and researchers). *Second*: to have a range of perspectives on the social dimensions of severe weather conditions affecting the urban poor in the two study sites and how they adapt to these conditions using different assets. *Third:* the process of understanding the complexity of the world of lived experiences is often context specific, and group analysis and interaction is one possible avenue through which to unveil this complexity.

The RRIA was conducted from 15 February to 18 March 2010. It involved interviews with officials from various government departments and non-governmental organisations (NGOs), and was concluded with a workshop that brought together stakeholders from various institutions. A total number of 30 officials were drawn from different environmental care and natural resource management institutions, local government, town and country planning departments, educational institutions, the meteorological department, justice departments, disaster response, and relief agencies.

[3] These are small sub-divisions within the community and each Zone is made up of 12 households. Each Zone chooses a Zone leader who represents them at the WDC level. Thus, Zone leaders make up the WDC. The WDC is chaired by an elected Zone leader who represents the whole community at the Municipal level.

Table 1 PCCAA tools and frequency of use in the study sites

Tool	No. of exercises		Comment
	Kalingalinga Compound	Linda Compound	
Transect walks	3	4	Useful in verifying information from discussions with focus groups and also identifying the most vulnerable locations within the research communities. Was also used to check for facts after discussions with focus groups (i.e. revisiting the community)
Participatory community risk mapping	2	3	Useful in identifying the most vulnerable areas as perceived by the respondents themselves. Respondents needed guidance on which items to plot on the map (e.g. flooding versus crime)
Matrix on general community data	2	4	For obtaining community information
Listing of general problems	13	19	Used by participants to list general problems
Matrix of social organisation	2	2	Used to learn about how the community is socially organised and identify the power structure.
Ranking/grouping of general problems	12	10	Used to understand both the local people's perceptions and the severity of the general problems in their community.
Causal flow diagrams	8	13	Used to discover and analyse causes and impacts and the links between them.
Venn (institutional) diagrams	5	9	Used to depict key institutions, organisations and individuals, and their relationships to each other and to the local community. The relative size of the circle represents the relative importance of the institution.
Historical profiles (timeline: 1 year)	2	2	Used to describe conditions, techniques and practices in adapting to climate change over a 12-month period using diagrams convenient to the respondents
Historical profiles (timeline: decade)	1	2	Used to describes conditions, techniques and practices in different time periods using diagrams convenient to the respondents
Matrix of strategies (pre-disaster, immediately before, immediately after, and post after)	15	10	Used to learn about people's criteria for choosing between different options, expressing their preference from a range of alternatives to adjust to the impacts of climate change.
Brain-storming	5	8	Useful in quick overview of rough assessment of people's knowledge of climate-change-related problems and solutions. Was important in discovering the "what" of local knowledge in climate change adaptation including exploring the "why, how, who, when and where".
Strengths and weaknesses appraisal	5	5	Was important for self criticism of the techniques that people use to adapt to climate change
Listing of solutions to climate change problems	7	12	Useful in understanding how climate change impacts can be addressed from the local people's own perspective
Community workshops	1	1	For triangulation purposes.

The identification of key environmental care and natural resource management institutions, including other relevant departments and organisations, was initially done with the help of officials from the Zambia Climate Change Facilitation Unit (ZCCFU) in the Ministry of Tourism, Environment and Natural Resources (MTENR). The ZCCFU which was established in the year 2009 has the mandate of developing a climate change profile and associated climate change policies and strategies for Zambia, while the MTENR is the mother ministry responsible for co-ordinating all environment-related activities and programmes. Once the relevant institutions and key informants within key organisations were identified, necessary appointments were made and discussions were held with the key informants in the tradition of semi-structured interviews. Issues arising from these discussions were followed by the snowball technique which was implemented to solicit additional information.

The purpose of participatory research is to empower local people. This may be inconsistent with researchers conducting activities to meet their own objectives (Chambers, 1994). In view of this observation, data analysis from both the PCCAA and the RRIA exercises used in this working paper benefited from the involvement of the participants and researchers. Two main participatory methods, namely exploratory and descriptive analysis, were employed in the analysis of the data set used in this paper. These methods involved disaggregating and grouping the data with similar features into different categories and then counting each data set to detect the main patterns and surprising observations in them. These methods were complemented by other methods such as institutional mapping which involved participants listing and ranking the data set according to their perceptions. Analysis of variances, followed by tabulation of means and application of means as percentages, was then carried out to obtain formal measurable statistics to provide estimates of what is implied in the data.

1.3 Background to Kalingalinga and Linda Compounds in Lusaka.

Kalingalinga[4] Compound is a settlement to the east of the city of Lusaka, while Linda is located on the southern side and straddles Lusaka and Kafue districts (see Figure 1).

Kalingalinga Compound was originally developed as a farming site for a group of Asian farmers, while Linda Compound was a farm for one European farmer before Zambia attained political independence from Britain in 1964 (see Van den Berg,1986; Williams, 1986; Sampson, 1959). In the 1940s and until the early 1960s, both settlements increasingly became recognised as residential areas as more new native migrants took up urban residence in Lusaka (Williams, 1986). With increased demand for housing, coupled with institutional failures in colonial structures in providing housing for the local people, European and Asian farmers with vast pieces of farm land started engaging in what become known as *kafir*[5] farming (Tait, 1997; Williams, 1986). By the beginning of the 1970s, both settlements were gazetted as illegal settlements by the Lusaka City Council (LCC) (Williams, 1986).

[4] The name Kalingalinga refers to an individual with no fixed abode. It literally means someone who moves from place to place.

[5] Kafir is a derogatory term used during the colonial era by the white settler community to refer to native people.

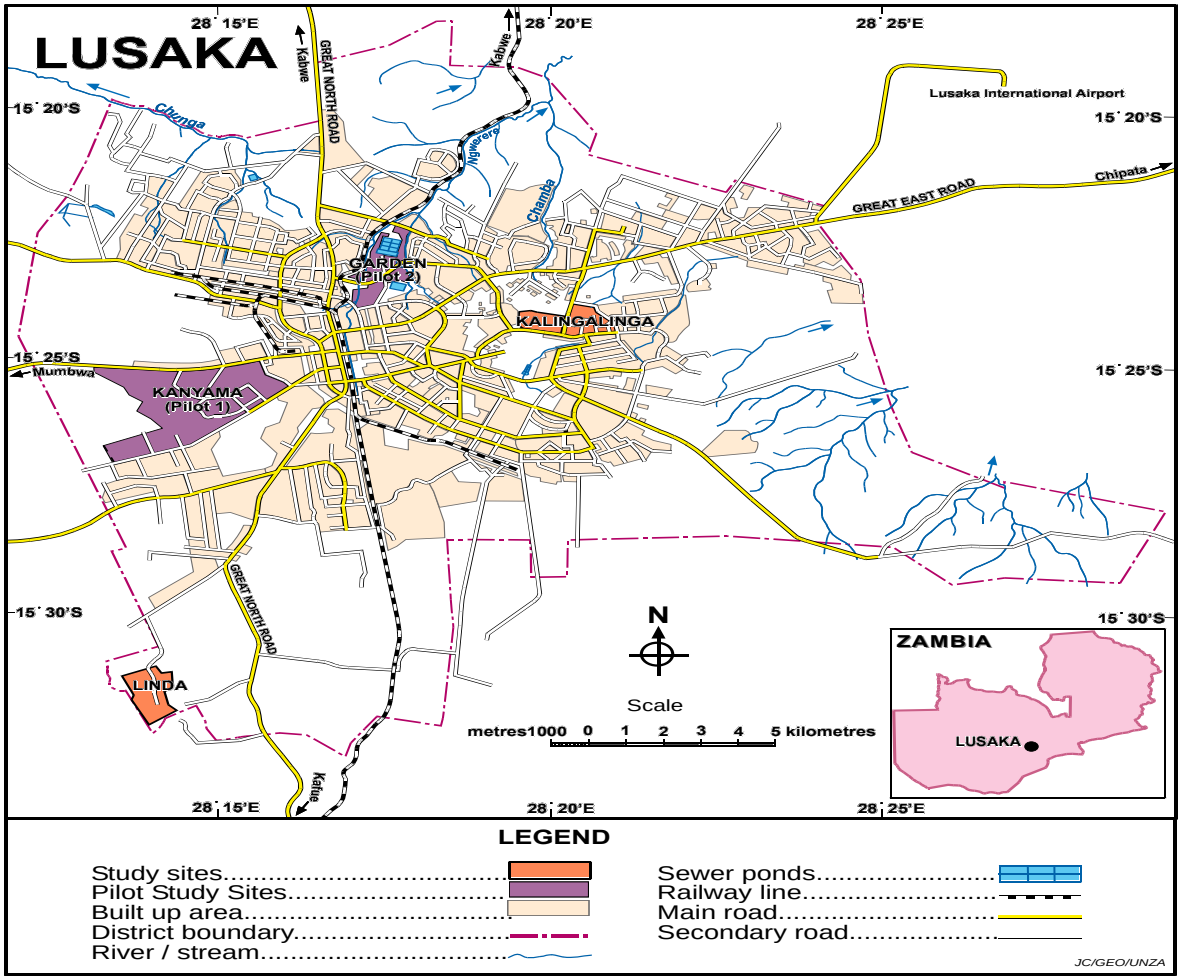


Figure 1 Location of Kalingalinga and Linda Compounds in Lusaka

Source: Joseph Chalila (2010), Cartographic Unit, Geography Dept., University of Zambia, Lusaka

Although Kalingalinga and Linda are both informal settlements and share a number of characteristics, some significant differences exist. Kalingalinga, with an estimated population of between 35,000 and 45,000 in 2007, and which previously was omitted from the Lusaka Urban District (LUD)/World Bank (WB) upgrading programme in 1985, benefited from the LUD and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) project which took place in 1991 (LCC, 2008; Mulenga, 2003). The upgrading scheme included: the provision of a school, clinic, market and community centre; installation of water standpipes to groups of families; roads; street lighting; house improvement loans through community revolving funds; core house materials loan programme through community revolving funds; secure land titles; and promotion of informal economic activities and income generation through micro-loans which presently employs about 80 per cent of the population in this location (see Mulenga, 2003; LCC 2008). The scheme also included the re-alignment of dwellings, and efforts to lower population-density and allow for street-widening.

Linda Compound, on the contrary, is a settlement that has not benefited from any government development efforts or strategies since it was established as residential. The area is normally described as having a split personality because it straddles two planning authorities, and raises questions on which local authority is responsible for the provision of both social and economic facilities. With an estimated population of 25,000 people, only 2,000 of these have any form of formal employment (LCC, 2008). The limited socio-economic services available in this community, such as the installation of public water standpipes, roads, and health

amenities, are normally a result of community-based initiatives in collaboration with external organisations and concerned citizens.

Linda Compound, compared to Kalingalinga Compound and other informal settlements in Lusaka, has continued to lag behind in terms of development projects and it is a community that exhibits significant rural characteristics. Compared to Kalingalinga Compound, the residents of Linda Compound are heavily dependent on peri-urban agriculture and other natural resources for their livelihoods. This dependency on natural resources has placed many of the residents in this settlement at high risk to any changes in climatic conditions, notably changes in rainfall patterns.

2 Community perceptions of weather in Kalingalinga and Linda Compounds

This section explores the different perceptions of the weather by residents in Kalingalinga and Linda Compounds and also the perceived changes, if any, in weather patterns.

It is important to note that local perceptions of weather conditions significantly determine how a community responds or adapts to the serious risks that are associated with these weather patterns. McLeman (2009), for example, observes that although adaptation to climate change can take any number of forms or actions, these responses, which may be proactive or reactive, are basically a function of the information available, and the knowledge that affected communities have been able to accumulate over time. In view of this argument, this section provides a background on which to draw some in-depth understanding of a number of community-based adaptation strategies employed by residents in Kalingalinga and Linda Compounds.

2.1 Perceptions of weather conditions in the two sites

Although a year in Zambia can be divided into two distinct seasons, „dry' from May to October and „rainy' from November to April, participants from one focus group discussion in Linda Compound comprising three women, were asked to identify the different weather conditions that they experienced over a 12-month period. By taking into account temperature variations, for example, this group divided the year into four seasons of unequal duration as seen in Table 2.

Table 2 Twelve-month seasonality in Linda Compounds

Season	Type of weather condition	Duration
Winter (Icikungulu-pepo)	Cold (Ipepo), strong winds and cyclones (ichimwela notu vuluvulu), cloud cover (Ichikubi)	Jun – Aug
Pre-rainy (Ulusumba)	Hot weather/heat (Ukukaba/kupya) (but dry)	Sep – Oct
Rainy season (Amaisa)	Hot weather/heat (Ukukaba/kupya) (but wet)	Nov – Mar
Post-rainy (Inshita ya kutabula)	Mild temperatures (Ukukabe/kupya panono), mild winds (nomwela panono)	Apr – May

Source: Based on discussions with three women in Linda Compound (July 2009).

It was important, however, to have a broader and in-depth understanding of whether the participants in the two study locations had observed any significant changes in weather patterns. To achieve this, participants were asked to list and group the different weather conditions that they experienced, and then rank them according to the severity of the

challenges that these weather conditions presented. Table 3 shows the results from this exercise.

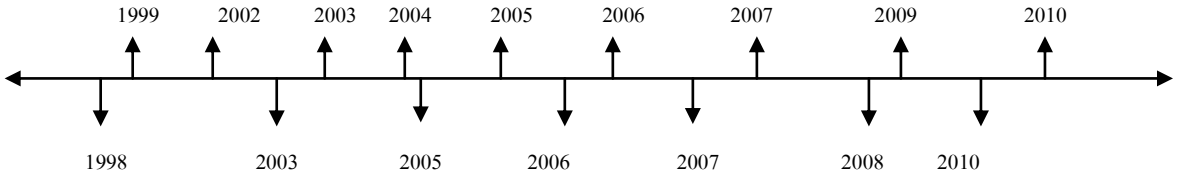
Almost half of all the responses (or citations) in both compounds identified heavy rainfall as the most severe weather condition identified "heavy rainfall (i.e. mvula yamatalala)"[6] as the first and most severe weather condition that participants in the two sites frequently faced. Severe heat (i.e. kumpya), was identified second and represented at 27 and 37 per cent respectively, while the cold or chilly weather (i.e. Ipepo/Mpepo) was identified third and represented at 25 and 14 per cent respectively.

Table 3 Listing and ranking of weather in the study sites

Community	Type of weather	Total no. of citations	%	Rank*
Linda Compound	Heavy rainfall (Mvula yamatalala)	76	49	1
	Heat (Kupya/Zuba)	57	37	2
	Cold/chilly weather (Pepo)	21	14	3
Total Linda		**154**	**100**	
Kalingalinga Compound	Heavy rainfall (Mvula yamatalala)	62	48	1
	Heat (Ukukaba/kupya)	35	27	2
	Cold (Ipepo/pepo)	32	25	3
Total Kalingalinga		**129**	**100**	

*1 = Most severe; 2 = Second most severe; 3 = Third most severe.
***Source**:* Based on 51 focus group discussions in Linda and Kalingalinga Compounds – Lusaka, Zambia (August 2009)

In view of the above weather conditions, another area of interest for the researchers was to establish the frequency of these events. With help of a time-line, a group of five men in Kalingalinga Compound demonstrated the frequency of the two main weather conditions experienced in Kalingalinga during the last 12 years.



Note: The length of an arrow signifies neither the intensity nor the duration of the weather event.

Figure 2 A Twelve (12) year timeline of severe weather for Kalingalinga Compound (1998 - 2010)

Source: Focus group of five men in Kalingalinga Compound, all engaged in the trade of crushed stones. (February 2010).

Figure 2 shows that, over a 12-year period, the residents of Kalingalinga Compound experienced a total number of nine years of severe flooding and seven years of severe heat. Another scenario suggested by Figure 2 is the frequent shift from severe flooding to severe heat.

[6] Refers to a heavy downpour lasting normally a number of days before it stops.

Further in-depth discussions with different focus groups in Kalingalinga and Linda Compound revealed that many of the participants said that significant drifts in the rainy season pattern had taken place since the 1980s. They argued that traditionally the first rains used to fall in October or the first week of November and was characterised by a light to a medium rainfall. Participants in Linda Compound, who are heavily dependent on rain-fed urban agriculture for their livelihood, for example, argued that it was this first rain that enabled them to prepare their fields and plant the seed to ensure that their crops[7] reached maturity before the cessation of the rainy season. They pointed out that, in recent years, the rain season has tended to start in the second (11^{th} – 20^{th} day) or third (21^{st} – 31^{st} day) parts of November. Equally, they observed that there has been a trend towards early cessation of the rains, and by the end of March the rains have virtually stopped in most parts of the city.

Some participants in both Kalingalinga and Linda Compounds thought that the recent shifts in the traditional patterns of the rainy season have wreaked havoc in the standard of urban life due to more frequent water shortages resulting in sanitation problems and increased food prices. A female participant from Linda Compound, engaged in urban agriculture, for example, made a striking comment during a focus group discussion when she stated that: "Life is very difficult for us. It is like we don't have any weather to enjoy; everything is bad … In October, it is very hot and there are many mosquitoes that make us get malaria. In June (winter) it is very, very cold and whatever we wear or cover with is not warm … one wonders what is happening to the weather". Another participant in his mid 30s and a resident of Kalingalinga commented: "In all the 15 years we have lived in Lusaka, we have never seen the rains like this season has brought. I have had to send my wife and children away to stay with relatives because our house is in water and there is nowhere to sleep or do any basic domestic things like cooking. I am sleeping on the table, and eating out at the market …"

2.2 Community perceptions of causes of severe weather conditions in Kalingalinga and Linda Compounds.

In light of the views expressed by participants in the previous section, another important aspect that researchers considered important was the need to have a detailed understanding of how the participants in the two sites understood the drives of the frequent changes in the climatic conditions that they experienced. Using a combination of PCCAA tools, such as *brainstorming* and *story telling*[8], participants were asked to think about and say why the weather changes (including the frequency) they had observed were taking place.

With the help of these tools, an elderly woman, during a focus group meeting with a group of elders in Linda Compound (i.e. three women and one man, and all aged between 75 and 85 years) pointed out that: "I remember when I was young that our elders and spiritual leaders warned us about the current situation regarding these floods and the heat. This was about 50 years or so ago, when we all started leaving the villages and coming to live and work in the white man's farms and shops. The elders said: if you forget your traditional ways, you will be beset with bad luck and ‚miyoba' (i.e. floods) and vilala (droughts/heat) are now here".

Another female participant shared a similar view when she said: "our children and grandchildren are dying like chickens and rats due to drinking that dirty brown water that comes with heavy rain. Boys queue up at any pit latrine that they can find in the compound

[7] Maize is the main staple of both urban and rural people in Zambia and is the most common crop upon which many people are dependent for a livelihood and income generation.

[8] Brainstorming and story telling are participatory techniques that allow the researcher to discover and understand, ‚the what, how, who, and why' of local knowledge (Cook, 1997).

because of bad tummies. Those that can't find one, do it in Shoprite[9] shopping plastic bags. A lot of them die from dysentery. I am afraid our girls will not find men to marry. It is a *curse* … nothing else".

A third participant (i.e. the male participant) also commented that: "the frequent heavy rainfalls that come year after year, and the heat, including the sudden shifts between the two weather conditions are clear signs of a *curse*. Women must stop wearing trousers, playing football, boxing and going to taverns. They should respect their husbands". He further stated that: "humanity has committed and continue to engage in sinful acts against God. The holy books, the Bible and the Koran, have the most accurate information about these disasters. We are responsible for all our problems. We must change our ways because we have a chance to prevent such disasters".

In another focus group discussion with a group of male participants working as builders and aged between 25 and 35 years in Kalingalinga, they believed that the severe weather events being experienced in Lusaka were a result of global warming or climate change. Asked to say where they heard of, or what they knew about, climate change, they argued that they had heard of it through the radio, but did not know if this was a local or a global phenomenon or problem. They however expressed the opinion that they had heard that climate change was a man-made phenomenon. The assertion that climate change is man-made persuaded one participant to decry the combined wisdom of the world's scientists when he said: "How can man change the climate or weather and make it stop raining or rain heavily like it does these days? It is *God's* will that has brought all these changes and not man. Who is man? God made the world and He is in charge of all the seasons".

Although the two focus groups seem to perceive the causes or drivers of severe weather events differently, they both identify and strongly suggest that climate change is a result of some divine power (God) or intervention. These perceptions are not surprising in a city and country that is deeply religious and traditional, and where faith and beliefs are used as the basis for explaining any process or event that takes place in the community. This situation is clear when one participant, a practising Muslim in Kalingalinga Compound, stated that: "the rampant destruction of the environment is prohibited in Islam because everything is connected to the environment. Environmental destruction is to blame for all these changes in the weather patterns". Supporting this perception, a Christian participant also said that:

> "You can call it climate change or whatever you want. It doesn't matter. Here in Lusaka we are safaling (i.e. suffering) from „mvula yamatalala na Kupya' (heavy rainfall and heat) and dats (that is) why we have fulads (floods). All des (thse) things are in de (the) hands of Jehovah de Almighty God. When we watch movies on TV, we see de ice in Amelica (America); does anyone know where it comes from? Who formed de Viktolia (Victoria) falls? Can anyone try to form dem (them)? Does anyone know who withholds or creates rain? It is all in de power of God, man. Man can't pulidiked (predict) de weather for next year, man. Jehovah man is de one. Lead (read) de Bible, man, and you have all de answers in Job 30 verses 22, 23, 25. God speaks at last in des fulads and de heat".

The views expressed by the participants above seem to suggest that although man's actions, in terms of using natural resources, are partly to blame for the changes in climatic conditions and frequency in weather related events, the community perceive these changes as being a result of divine intervention.

[9] This is one of the largest supermarkets in Zambia. It is equivalent to supermarkets like ASDA and TESCO in the UK and it is common in most southern African countries.

2.3 Household, small business and community assets' vulnerability to severe weather.

Vulnerability to climate change or severe weather conditions has been described as: "the degree to which a system is susceptible to or unable to cope with, adverse effects of climate change, including climate variability and extremes" (Adger *et. al,* 2007; Riche, 2007). Vulnerability can thus, be conceptualised as being a function of the sensitivity of a given population (and its social, political, economic and institutional systems) to particular impacts or perturbations associated with or caused by severe weather; the degree and nature of the exposure of members of the population to those impacts; and the capacity of an exposed population to adapt to or cope with those impacts (Adger, 2006).

Kalingalinga and Linda Compounds, like other unplanned settlements in Lusaka, have experienced their share of adverse impacts arising from the weather-related events discussed above. From focus group discussions, the participants identified weather events such as floods and extreme temperatures as having significant impact on their livelihood activities and human health. A female participant and mother to four children in Linda Compound, for example, commented during a focus group discussion:

> "When the rain comes, it pours continuously for several days, causing damage to crops, houses and anything. The weather pattern is in disarray. There is either too much rain causing floods, destroying houses and washing away fields, roads, and bridges, or there is drought. The situation is getting worse every day".

Using historical timelines and the story-telling techniques, participants in both sites argued flooding has become part of the urban landscape in Lusaka. In 2003/04, for example, participants argued that floods left an estimated 12,000 residents in Linda and 5,000 people in Kalingalinga Compounds homeless because their houses either collapsed or were extensively damaged. The following year, on 4 February 2005, disaster struck the city of Lusaka and more than 300 housing units in Linda Compound collapsed, while 60 houses in Kalingalinga suffered extensive damage following heavy rainfall. Kalingalinga Compound and other neighbouring settlements like Helen Kaunda suffered repeated floods, cold and hot weather during this period, and was completely cut off from the rest of the city after all the roads were flooded, and some were washed away.

In 2006, an estimated 30 houses collapsed in Linda Compound, and more were collapsing as some homeless families tried frantically to rebuild their structures in the midst of a heavy downpour. In Kalingalinga Compound, participants revealed that 100 houses were extensively damaged due to heavy rainfall, and left an estimated 300 people homeless. On 5 February 2007 (i.e. the following year), a disaster of a different but related nature struck Kalingalinga Compound when two children aged two and four drowned in the floods that swept across the settlement. At the same time an estimated 6,000 residents in the location were affected as their homes were flooded and household property and food was damaged.

Figure 3 Severe flooding in Kalingalinga Compound

(Children going to school in a makeshift boat)

Photo *by* Danny Simatele (03/03/2010)

In another incident, in the same year (2007), 10 children were killed in Linda Compound, and an additional 23 people were seriously injured when part of the market structure collapsed. Many of those affected lost their shops, money and business stock. In 2009, an estimated 80 houses in Linda Compound collapsed, and the main road that connects Linda and the central business district in Lusaka city was extensively damaged leaving nearly all the 25,000 people in the location completely isolated. Participants also stated that many of the affected families had their houses and toilets swept away by continuous heavy rain. A number of families slept under trees, some sought shelter from neighbours, while others found refuge in churches. As the rain increased in intensity, an estimated 400 residents in Linda fled their crumbling homes and took refuge at Mount Makulu Research Station and in church buildings.

In Kalingalinga and in Lusaka in general, many houses were blacked out following a number of power failures. And more recently (2010), an estimated 200 houses were damaged in both Linda and Kalingalinga Compounds, with 55 reported to be extensively damaged in Kalingalinga and 50 completely demolished in Linda Compound. Focus group discussions in Linda revealed that those whose homes were demolished accepted shelter from the community and from relatives and friends in other areas, while others sought refuge in churches.

Table 4, for example, shows the participants' perceived impacts of three weather- related events on household, business and community assets in Kalingalinga Compound. Using a scale of 0 to 4, they assigned each asset with a value that best described their perceived impact of an identified weather event on that particular asset. Where an asset is assigned the number "0", it means that the identified weather event has no erosive impacts on that particular asset, and the number "4" signifies the greatest erosive impacts.

Table 4 (as already seen in Table 3) shows that floods are perceived as the single most severe weather event that have the greatest erosive impact on nearly all the assets, while cold weather was identified as having no impact. Severe heat was perceived as having a medium level of erosive impact.

Table 4 A summary of household, business and community asset vulnerability to severe weather in Kalingalinga Compound (0= no impact; 4=full impact)

RESOURCE/ASSET	SEVERE WEATHER EVENT														
	Cold					Heat					Flood				
	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
Household resources															
House & H/H property	X						X								X
Food			X					X							X
Electronics	X							X							X
Clothes/bedding	X					X								X	
Toilet	X							X							X
Small business															
Shop	X							X							X
Stock/materials	X						X								X
Liquid assets (money)	X					X								X	
Remittances	X					X								X	
Community resources															
Roads	X					X									X
School		X					X								X
Clinic			X				X								X

Source: Based on a discussion and views expressed by 20 participants during a community workshop held in Kalingalinga Compound.

From the views expressed by participants in the two study sites, it is clear that the residents of Kalingalinga and Linda Compounds, including Lusaka in general, are faced with different weather conditions that negatively impact on their general welfare and erode their assets. Increased precipitation, however, often resulting in frequent extensive flooding, is the most severe and most challenging weather event that they encounter. It is suggested by the participants that floods destroy physical, human and business assets, mostly of the urban poor. A number of participants in both study sites claimed that the changes in climatic conditions, and more specifically, the frequency in the occurrence of severe weather related events, are a result of man's careless use of natural resources, and his departure from living according to divine principles originally prescribed by God. The views expressed by a number of participants suggested that the frequent occurrence of severe floods and heat was an act of divine intervention as discussed earlier (see section 2.2).

3 Household, small business and collective asset adaptation to severe weather in the study sites

This section discusses asset adaptation in the context of severe weather conditions in Kalingalinga and Linda Compounds. For the purposes of achieving the overall objective of the study, the different assets owned by the poor in the two study sites have been grouped into three distinct categories, namely: *household assets*, *business assets* and *community assets*. This distinction has been made to facilitate an in-depth understanding of the assets that participants in the two sites consider to be more at risk to changes in weather conditions on the one hand, and on the other, the assets that they consider most critical in building their adaptive capacity and resilience against the impact of severe weather conditions. The discussion suggests that such an understanding, from a policy perspective, is critical in the identification of policy entry points.

3.1 Household asset adaptation in Kalingalinga and Linda Compounds.

According to Potter *et al.* (2008), the term ‚household assets' is traditionally used to refer to the physical, natural, human, and financial wealth of members of a household (see also Chambers, 1997). Moser *et al.* (2007), on the contrary, while agreeing with Potter *et al.* (2008), expand the definition to include social capital which includes intangible resources. In light of these definitions and in the context of this paper, household assets are understood as referring to items of physical, natural, economic and social value to participants in the two research sites.

Using a combination of participatory research tools such as listing, brain-storming and ranking, participants in Kalingalinga and Linda Compounds were asked to list and rank different household assets that they considered most critical for adapting to the severe weather conditions that they experienced. These views are reflected in Table 5.

Table 5 Listing and ranking of important household assets for adapting to severe weather conditions in the two study sites

(**Ranking**: 1 = most critical asset; 4 = less critical asset)

Type of asset	Frequency of asset citations by participants	Total no. asset citations	%	Asset ranking
House/household property	III III III III III III III III III III III III III III III III III III II	68	42	1
Health	III III III III III III III III III III III III I	37	23	2
Children/elderly	III III III III III III III III III	27	17	3
Food/kitchen utensils	III III III	9	6	4
Land	III III II	8	5	4
Money	III III II	8	5	4
Mobile phone	III	3	2	4
Carton boxes	II	2	1	4
Total		**162**		

***Source**:* Based on 51 focus group discussions in Kalingalinga and Linda Compounds.

It is suggested in Table 5 that from a total of 162 asset citations by participants, 42 per cent identified *housing* and *housing property* as the most important assets for adapting to severe weather conditions. Health was identified second, and statistically represented at 23 per cent, while16 per cent of the citations identified children and elderly people as the third most important asset.

It was revealed during discussions with different focus groups that housing, in the context of adapting to the impact of severe weather conditions, fulfils a number of functions, particularly in the creation and distribution of a household's or individual's wealth and wellbeing. Participants in both Kalingalinga and Linda Compounds argued that a house can be used in different contexts to generate other resources that can be used in times of crisis. They argued that a house can be let out for rent, or a room within the house can be converted into a small retail shop, a saloon or barber. Thus, a house can be a source of additional income for a household. The additional financial resources raised from a house, could then complement other resources that are available to a household or individuals and could be used to pay for other services such as medical fees or renting a safe house during times of weather-related disasters.

In a focus group discussion with three men and five women, a male participant in his 20s, and trading in building sand in Kalingalinga, said that: "If someone owns a house, it means they

have already worked. All one needs to do is find ways of making money out of the house. One can rent it out, or sell it to make more money. A house gives you a number of options to survive any situation."

In another discussion with a group of five women, all engaged in selling charcoal at the market in Linda Compound, it was pointed out that a house can be an asset for creating or obtaining financial resources, which can then be used to buy food, pay for health, education services or invest in another strong and better house. One of the participants in her late 40s, for example, commented that: "if you have a good house, it can generate good money for you and your family. You can put it on rent, while you stay in cheaper accommodation, or you can build another better house from it".

Further discussions with various focus groups also revealed that many participants had some knowledge that a house could be used as a potential resource for borrowing money from a financial institution. For example, a group of seven male participants working as carpenters in Kalingalinga Compound stated during a group discussion that: "individuals or households that have good strong houses can use them as equity to borrow money from the banks. They can then re-invest the money into more profitable businesses or pay for health and education services". A similar view was echoed during a discussion with a group consisting of three women and two men in Linda Compound, who suggested that a house is a resource that can be used to finance investments in business, health and education.

In certain instances a house was seen as something that protects the occupants both against adverse weather conditions (e.g. rain, heat or the cold) and also from other social and economic ills in society (i.e. from thieves). An elderly woman engaged in selling crushed stones by the roadside in Kalingalinga Compound for example, commented during a focus group discussion that: "if one has a well-built and strong house, worries of the house collapsing are not there. Even if the house gets flooded, one can still consider themselves safe because they have walls around them". Another elderly woman in Linda Compound pointed out that: "although our houses are not as good as those in the city centre, they do protect us from the heat, cold and rain. God alone knows what would have happened to us during periods of heavy rainfall and heat, had we not owned these ramshackle dwellings. At least they keep us safe from thieves".

In view of the importance of housing, 41 (80 per cent) of the 51 focus group discussions in both study sites said that they had developed some asset adaptation strategies some of which are outlined in Table 6.

In both study sites, participants identified a range of activities that they use to adapt and protect their assets against severe weather conditions. In the case of housing, for example, it was revealed that many households now put building plastic (or black bags or shopping bags) on the foundations during the construction stage to avoid the rising water table damaging the walls of the house when flooding occurs. Some participants also claimed to dig drainage furrows around the house, and raise the base of the house by putting crushed stones, grass and sand around the property to improve drainage.

Table 6 Matrix of focus groups with household asset adaptation strategies in the study sites.

Study site	Type of household asset	Total no. focus groups	No. focus groups with asset adaptation
Kalingalinga	House	29	19
	House property		
	Children		
	Food		
	Mobile		
	Money		
Linda	House	22	12
	Children		
	Household property		
	Food		
	Money		
	Health		
Total		51	41
As % of groups with HH asset adaptation			80%

Source: Based on 51 focus group discussions in Kalingalinga and Linda Compounds.

Other adaptive or coping activities included: covering the house with plastic or reed mats (see Figure 4) during periods of heavy precipitation to prevent rainwater reaching the walls of the house, and using sand bags to block rising water flooding the house. Further discussions with different focus groups revealed that due to the frequency and impact of weather-related events, particularly flooding, residents in the two settlements have started resorting to using stronger building materials. Some participants, for example, argued that they now use burnt bricks[10] and cement blocks[11] (i.e. those that can afford it) to build houses that can survive the impact of heavy rainfall and flooding.

Figure 4 Household asset adaptation in Linda Compound
(Using a reed mat to protect a mud house from heavy rainfall)
***Photo** by* Danny Simatele (July 2009)

A man in his early 30s and owning a small retail shop in Linda Compound commented during a focus group discussion that: "heavy rainfall destroys a lot of houses in this compound

[10] These are bricks that are made from soil particularly clay soil. But they are then subjected to intensive heat (baking them) for a number of days. This process hardens them and makes them stronger and able to withstand water and other damp conditions.
[11] In the Zambian context, these refer to bricks made from a combination of cement and sand.

because many of them are made from mud bricks. When it rains, they simply collapse and people have learned the hard way. If you go around the compound now, people are using burnt bricks or cement blocks because houses built from these are stronger".

From the views expressed by different participants in the two study sites, we can argue that the urban poor in the two study sites do adapt their household assets in various ways in order to reduce the impact of severe weather. These adaptive strategies or actions may not be very visible to outsiders because of the scale and the manner in which they are done. Part of the reason for this, arises from the fact that the impacts of severe weather, as observed by Moser *et al*, (2010), on the urban poor, are gradual and almost insidious (i.e. difficult to observe).

Table 7 shows some of the most common household asset adaptation strategies that some participants from the sites said are used to protect their assets from being eroded by severe weather. Different practices are employed to reduce the impact of weather- related events on these assets. Some of these practices involve digging drainage channels around the house to promote water run-off, sand bags to block water from seeping through and damaging the walls of the house, including moving household property to secure places that are not affected.

Table 7 Household asset adaptation in Linda Compound

Type of asset	Before heavy rainfall	During heavy rainfall	After heavy rainfall
House	▪ Use cement /burnt bricks/blocks ▪ Put building plastic on the foundations ▪ Raise the foundations of the house ▪ Construct drainage channels through the foundations	▪ Dig/or improve existing drainage channels ▪ Put crushed stones, sand & grass to raise the foundations of the house and improve drainage ▪ Cover house with plastics	▪ Clean up and repair the damage. ▪ Sell the house ▪ Move to another area ▪ Put the house on rent
Household property	▪ Nothing is done	▪ Put property in safe places, e.g. on a high table. ▪ Move property to friends or relatives in safe neighbourhoods ▪ Cover with plastics	▪ Clean up and put the property back in the house. ▪ Sell the property
Health	▪ Immunisation ▪ Clean the surroundings ▪ Drink boiled water	▪ Go to the hospital ▪ Drink boiled water & keep surroundings clean	▪ Go to the hospital ▪ Drink boiled water & keep surroundings clean
Children	▪ Teach them about the dangers of dirty water	▪ Keep them in the house and talk to them	▪ Talk to them about the dangers of dirty water

Source: Based on views expressed by a focus group comprising eight participants in Linda Compound

3.2. Small business asset adaptation in Kalingalinga and Linda Compounds

Small business assets are here used to refer to those household or individual enterprises that are privately owned and operated with family labour and with a relatively low volume of sales. A number of participants in the two study sites reported owning a family business operated either in their homes (micro-businesses), or along roadsides, or at an established market.

In both sites, participants argued that severe weather conditions impacted their business assets negatively. In Linda Compound, for example, two men, (aged 32 and 13 years respectively) running a family business locally referred to as a „katemba'[12] commented that: "We always have problems when it rains too much, or when it is very hot. Both the rain and heat usually damages our business stock[13]. The rain will wash away and wet the stock, while the heat will scorch it, making the stock look old. Customers will then think its old stock and won't buy it".

In another discussion with a group of six men working as carpenters in Kalingalinga Compound and aged between 20 and 40 years, they pointed out that: "when it rains heavily, it not only makes us stop working, but the wood that we use becomes wet and it becomes difficult to work with. In most cases the wood is damaged". They illustrated, using the cause-impact diagram (Figure 5), the effects of heavy rainfall on the wood material used in their business enterprise as a primary asset.

It is suggested in Figure 5 that wood wetted by heavy rainfall begins to rot and becomes less valuable to use. The loss of the wood material eventually leads to loss of income and lack of food, thereby compromising the adaptive capacity of these carpenters and their families against the impact of severe weather events. Furthermore, heavy rainfall can lead to fewer customers and this has implications for household food security because of the loss of income.

Similar sentiments were expressed in Kalingalinga Compound by a group of men trading in building sand, who argued that heavy rainfall washes away the sand and makes it difficult for them to trade effectively.

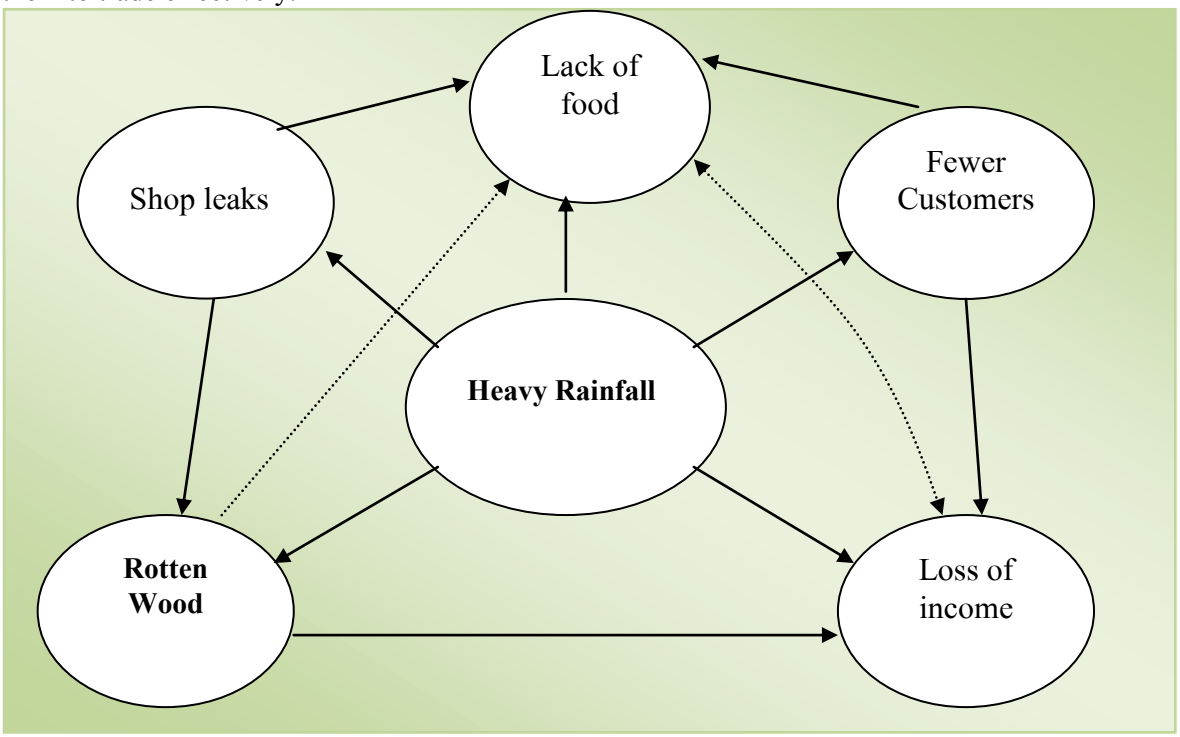


Figure 5 Impact of rainfall on a wood business (Carpentry) in Kalingalinga Compound

Source: Impact diagram drawn by a group of six carpenters in Kalingalinga Compound.

[12] This is a small mobile shop mostly made up of carton boxes, blanks and sacks/plastics. Stock is always moved back to the house after the trading hours and moved back to the katemba in the morning to resume trading.

[13] Such as books, washing powder, cooking oil, matches, pencils, salt and sugar, etc.

A group of women traders in Linda Compound, who have traded in charcoal at Linda market for the last 10 years, also pointed out that: "heavy rainfall wets the charcoal and we can't sell it when it is wet. People tend to use firewood instead".

Using a combination of participatory tools such as listing, grouping and ranking, participants were asked to identify small business assets that they considered critical for adapting to the impacts of severe weather events in Kalingalinga and Linda Compounds. Table 8 shows the results of this exercise.

Table 8 Listing and ranking of important business assets for adapting to severe weather events in the two study sites

(**Ranking**: 1 = most critical asset; 4 = less critical asset)

Type of asset	Frequency of asset citations by participants	Total no. asset citations	%	Asset ranking
House/shop	III III III III III III III III III II	32	23	1
Business materials/stock	III III III III III III III III III III	30	21	2
Farming land*	III III III III III III	18	13	3
Roads	III III III III III III	18	13	3
Financial (money)	III III III III I	13	9	4
Machinery/equipment	III III III II	11	8	4
Customers	III III III I	10	7	4
Mobile phone	III III III I	10	7	4
Total		**142**	**100**	

*Farming land was considered as a business asset because it facilitates the production of agro-products which in turn are sold for income generation.

***Source*:** Based on 51 focus group discussions in Linda and Kalingalinga Compounds, Lusaka.

In Table 8, 23 per cent of the 142 business asset citations by the participants identified housing as the most important asset. The importance of housing as an asset that facilitates adaptation or building resilience against the impacts of severe weather have already been discussed in the previous section.

Business *materials* or *stock,* such as building sand, crushed stones, wood and other tradable materials (e.g. books, salt, cooking oil etc), were identified as the second (i.e. 21 per cent) most critical asset for adapting to severe weather, especially during the post-disaster period. Participants argued that business materials can provide the basis for them to reconstruct their lives after suffering from the impact of severe weather conditions (see Figure 6). The third most important business assets that were frequently cited by the participants and, each statistically represented at 13 per cent, were farming land and roads.

Despite the impact of severe weather conditions on small business assets of the poor in the two sites, 41 per cent (i.e. 21 focus groups) of the 51 focus groups claimed to have some form of business asset adaptation strategies as shown in Table 9. Some of the business asset adaptation strategies that have been developed to reduce the impact of severe weather events are summarised in Table 10. These strategies are based on a discussion with six carpenters in Kalingalinga Compound.

Figure 6 A woman selling tomatoes, salt and cooking oil after being evacuated from the flooded Kuku Compound by the Red Cross

(An estimated 987 individuals from 177 households were housed in tents at the independence stadium in Lusaka)

***Photo** by* Danny Simatele (03/03/2010)

Table 9 Matrix of focus groups with business asset adaptation strategies in the study sites

Study site	Type of business asset	Total no. focus groups	No. focus grps: with asset adaptation
Kalingalinga	House/shop	29	9
	Business materials/stock		
	Roads		
	Transport*		
	Financial (money)		
	Machinery/equipment		
	Mobile		
Linda	Customers	22	12
	Mobile phone		
	House		
	Shop		
	Market		
	Business materials/stock		
Total		**51**	**21**
% of F/grps with business asset adaptation			**41**

Source: Based on 51 focus group discussions in Kalingalinga and Linda Compound.

Table 10 Business asset adaptation strategies in Kalingalinga Compound

Type of asset	Before heavy rainfall	During heavy rainfall	After heavy rainfall
Wood (stock)	▪ Procure more wood to use in the rainy season.	▪ Move the wood to the shade and cover it with a plastic	▪ Buy dry wood. ▪ Dry the wood that got wet.
Customers	▪ Sell as much furniture as possible.	▪ Nothing is done.	▪ Sell as much furniture as possible.
Shop	▪ Buy new iron sheets to fix the workshop.	▪ Fix workshop	▪ Fix workshop

***Source*:** Focus group of six men working as carpenters in Kalingalinga Compound

Table 10 shows that the participants (i.e. carpenters) are actively involved in protecting and adapting their business assets to deal with the changes in weather conditions at different periods during the occurrence of a crisis. Among the strategies participants identified is the procurement of more wood ‚before' the rainy season comes, in order to ensure that they had enough supplies of stock. And during heavy rainfall participants stated that they move the wood to a secure place inside the workshop to prevent it from getting wet. And after the rains, they normally buy dry wood or dry the wood that got wet.

Table 11 Business asset adaptation in Linda Compound.

Type of asset	Before heavy rainfall	During heavy rainfall	After heavy rainfall
Welding machine	▪ Use the machine ▪ Secure it on stones so that they are not in contact with water.	▪ Move the machines inside the house	▪ Bring back the equipment to continue working. ▪ Secure it on stones so that it is not in contact with water.
Health	▪ Buy protective clothing such as gloves.	▪ Put cloth on hand to provide insulation ▪ Switch off equipment	▪ Replace protective clothing if they are worn out.
Electricity	▪ Fix electric cables with plastics	▪ Switch off equipment and move it inside	▪ Switch off power. ▪ Make sure the earth wire does not touch the ground.

***Source*:** Focus group comprised of two men working as welders in Linda Compound.

Similar views or actions were argued across all focus groups with business asset adaptation measures. Two men, for example, both aged between 30 and 40 years, and owing a welding business in Linda Compound demonstrated the various strategies that they employ to adapt to heavy rainfall (see Table 11).

Table 11 suggests that the two participants are aware of the dangers associated with electricity and wet conditions. As a result of this knowledge, they deliberately ensure that all electrical cables are fixed before it rains. During periods of heavy rainfall, they normally switch off the electricity and the welding machine to avoid accidents. They also pointed out that, to increase their safety, they invest in protective clothing and ensure that the equipment being used is well insulated and positioned in a secure and safe place.

3.3 Community asset adaptation in Kalingalinga and Linda Compounds

Community assets are here considered as referring to those resources that are communally owned, or have some implications for the welfare of the entire community. In other words, they are understood as assets that are owned either by the state, government, or the community. It is speculated in this working paper that community assets can be important in our understanding of how the poor in the context of an urban community, responds or adapts to the impacts of either external or internal stressors. They can thus be useful in identifying entry points for the formulation of pro-poor urban adaptation policies to severe weather events.

Participants in both study sites pointed out that community assets are among the most vulnerable assets to severe weather conditions in Lusaka. They argued that the very fact that these assets are communally owned meant many people do not seem to take full responsibility for them. Responsibility for them is usually considered as either the jurisdiction of the local authority or any other formally established unit. A woman aged between 20 and 30 years, for example, pointed out during a group discussion in Kalingalinga Compound that: "no one in our community thinks of these roads until they get flooded and we have nowhere to pass. Then the roads become a big deal and fingers start being pointed at different people who should have taken responsibility for them" (see Figure 7).

Figure 7 A flooded road in Kalingalinga Compound

Photo by Danny Simatele (06/03/2010)

In another focus group discussion with three women who were found running retail and saloon shops in Linda Compound, one woman pointed out that: "when the flood waters come, there is nothing that can be done to protect things that are communally owned because we are all worried about protecting our personal things such as our house and the shop".

In spite of the views expressed above, in-depth discussions with various focus groups revealed that a significant number of participants in the two settlements are engaged in some form of community asset adaptation practices. Of the 51 focus groups, for example, 14 claimed to have community asset adaptation strategies (see Table 12). This represents almost 27 per cent of all citations that claimed to have community asset adaptation strategies.

Table 12 Matrix of focus groups with community asset adaptation strategies in the study sites

Study site	Type of community asset	Total no. focus groups	No. focus groups with asset adaptation
Kalingalinga	Roads Schools Clinic Health* Church Water	29	7
Linda	Market Roads Church Water Health Community hall	22	7
Total		**51**	**14**
% of F/grps with community asset adaptation			**27**

* Health was argued to be a community asset because the outbreak of a disease such as cholera, dysentery or malaria tends to affect the entire community

Source: Based on 51 focus group discussions in Kalingalinga and Linda Compound.

In view of the community asset adaptation strategies that some participants claimed to engage in, participants were asked to identify community assets that they considered critical for adapting to the impacts of severe weather conditions. From a total of 233 asset citations (see Table 13), 36 per cent identified the church and/or the community hall, as the most important community asset for adapting to severe weather conditions.

During a focus group discussion with a group of four women and three men in Linda Compound, a male participant aged between 30 and 40 years, with a family of six children, and whose house had collapsed due to heavy rainfall, pointedly stated that: "when my house collapsed, my neighbour gave me one of her houses, and that is where I live. Otherwise, I would have moved into a church building or the community hall like everyone else who experienced a similar problem like mine".

Table 13 Listing and ranking of important community assets for adapting to severe weather events in the two study sites

(**Ranking**: 1 = most critical asset; 4 = less critical asset)

Types of asset	Frequency of asset citations by participants	Total no. asset citations	%	Asset ranking
Church/community hall (i.e. house)	III III III III III III III III III III III III III III III III III III III III III III III I	83	36	1
	III III III III III III III III III III III III III III III III III III III III III III III III III III III	56	24	
Health	III III III II			2
Roads	III III III III III III III III III III III III III I	37	16	3
Children	III III III III III III II	20	9	4
Land/farming	III III III III	12	5	4
Water	III III III III	12	5	4
Schools	III III III	9	4	4
Clinic	II	2	1	4
Chilimba*	II	2	1	4
Total		**233**		

* A community-based credit facility system in which members contribute money and loan each other on a rotational basis

Source*:* Based on 51 focus group discussions in Kalingalinga and Linda Compounds.

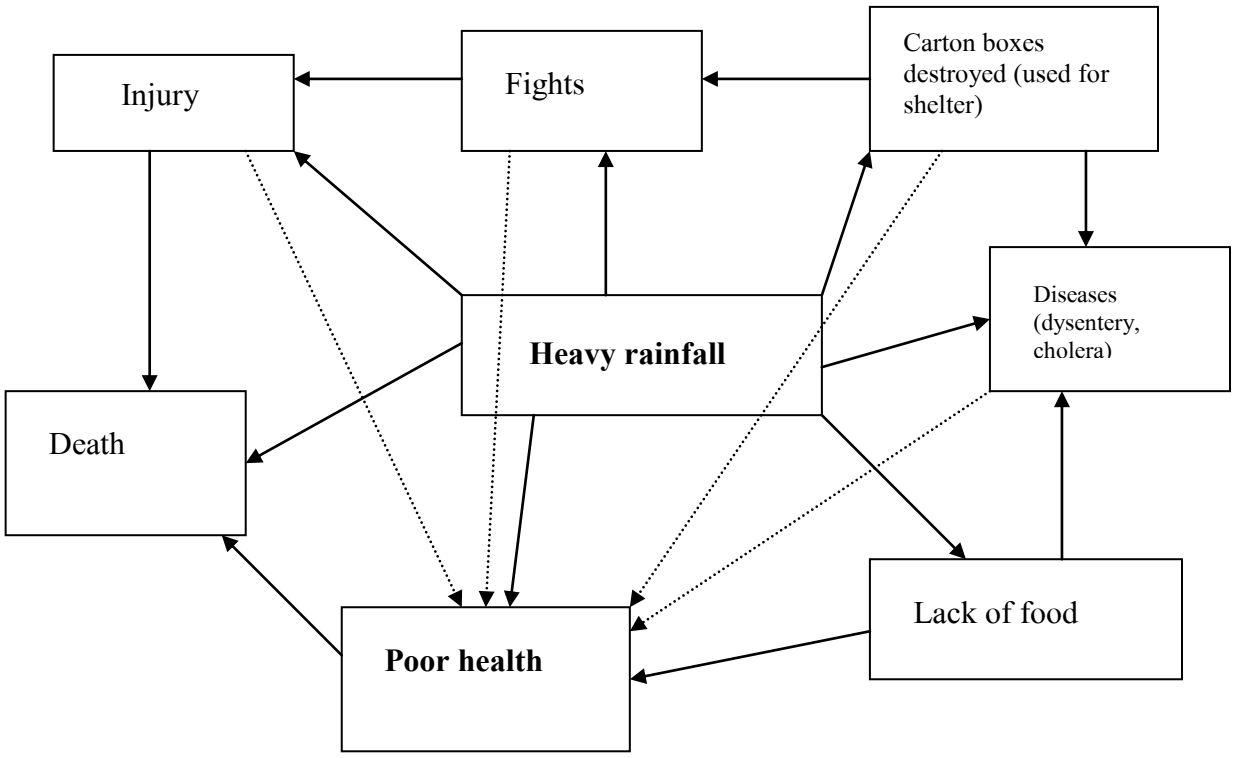


Figure 8 A flow diagram showing the relationship between rainfall and health in Kalingalinga Compound

***Source*:** Focus group of seven street children in Kalingalinga Compound

An additional 24 per cent of asset citations identified health as the second most important asset, while roads (16 per cent) were identified as the third most important asset. With regards to health being a community asset, it was pointed out during a focus group discussion with a group of six elderly women aged between 50 and 70 years, in Linda Compound, who stated that: "when cholera breaks out, it is not only a problem for the affected individual or household: it is a community problem, because the disease will affect every one. The markets and church, for example, get closed when cholera strikes. Life comes to a standstill".

A flow diagram, undertaken by a group of seven street children aged between 10 and 15 years, in Kalingalinga Compound, illustrated the relationship between heavy rainfall and flooding and ill health, as shown in Figure 8. It is suggested in Figure 8 that heavy rainfall leads to poor health and a lack of food. The combination of poor health and a lack of food can result in death.

A further discussion with other focus groups revealed that flooding creates favourable conditions for breeding of malaria-carrying mosquitoes due to water pools that are created by stagnant water after the rain subsides. A group of four elderly women and one man aged between 70 and 80 years in Linda Compound pointed out during a focus group discussion that malaria is more common during the rainy season.

Table 14 Community asset adaptation strategies in Linda

Asset	Before heavy rainfall	During heavy rainfall	After heavy rainfall
Health	▪ Keep the surroundings clean (e.g. cutting grass & other vegetation where mosquitoes rest ▪ Improve drainage along roads.	▪ Nothing is done	▪ Clean up and keep the surroundings clean (e.g. cutting grass, clearing stagnant water) ▪ Repair drainage systems if possible
Church building/community hall (housing)	▪ Improve drainage systems	▪ Improve drainage systems	▪ Repair damage & clean up
Toilets	▪ Built strong toilet facilities with blocks and cement. ▪ Repair broken toilets. ▪ Improve drainage	▪ Use neighbours' toilet facility.	▪ Built strong toilet facilities with blocks and cement. ▪ Repair broken toilets. ▪ Improve drainage
Roads	▪ Clean drainages	▪ Nothing is done	▪ Repair drainages
Transport	▪ Nothing is done	▪ Nothing is done	▪ Nothing is done

***Source**:* Based on a Focus group of eight young men temporarily unemployed due to the impact of floods on the firms they work for.

A number of participants, however, identified a number of ways in which community assets are adapted to reduce the impact of severe weather on them as suggested in Table 14. Other measures, such as improving drainage systems, building strong toilets from cement blocks, and carrying out repairs before and after the crisis has taken place, all combine in ensuring that community-owned assets are protected and enhanced and will withstand the impact of adverse weather in the two sites and Lusaka in general. Whether or not these adaptation actions are a conscious response to climate change, they are indicative of the fact that the urban poor are aware of the changes in their environment and are actively responding to them.

3.4 Institutional response: perceptions from the study sites

Understanding institutional responses to extreme weather events is key to understanding how the urban poor respond and adapt to the various weather-related challenges that they experience. This is because local institutions, as observed by Agrawal *et al,* (2008), have shaped how both rural and urban residents responded to environmental challenges in the past. Institutions are also the mechanisms that will translate the impact of future external and internal interventions aimed at facilitating adaptation to extreme weather conditions in urban areas. It is thus important to note that because adaptation to extreme weather events is a local process, it is critically vital to effectively and better comprehend the role of local institutions in shaping adaptation and improving capacities of the most vulnerable social groups in a community.

In view of the argument above, it was important during data collection to have an in-depth understanding of institutions that participants in the two sites considered important in

facilitating their adaptation to severe weather. Institutions are here understood as referring to both formal and informal organisations, with programmes that either provide relief aid or facilitate the building of long term resilience. These institutions can either be public, civic or private organisations (Milimo *et al.* 2002).

Table 15 Matrix of institutional listing and ranking in Linda Compound from institutional mapping

(**Ranking**: 1= most important; 4 = least important)

Name of community	*Institution*	*Ranking*	*Frequency of citations of institution*	*Total no. citations*	%
Linda Compound	Neighbour/relatives	1	III III III III III III III III II	26	38
	The Church (Irish Sisters)	2	III III III III III II	17	25
	Clinic/hospital (Ministry of health)	3	III III I	7	10
	Kavwumbu Shelter	4	III III I	7	10
	African Housing Project	-	III III	6	9
	Member of Parliament	-	III	3	4
	Zambia National Service	-	II	2	3
Total				**68**	**100**

***Source**:* Based on responses from 29 focus groups in Linda Compound

Discussions with different focus groups in the two sites suggested an absence of formal institutions helping or facilitating the adaptation of the urban poor against the impacts of severe weather conditions. In Linda Compound, for example, participants argued that the only form of formal institutions that are present in the community, and may or may not help during moments of stress, is the church and one local NGO.

In Kalingalinga, on the contrary, participants reported a good presence of both private (banks, business houses) and state-managed institutions (hotels, a university, and a broadcasting radio and TV station) which, the participants believe, do little to reduce the vulnerability of the poor in this informal settlement. Using a combination of various participatory tools such as brain-storming and institutional mapping, coupled with in-depth discussions, participants in both study sites were able to identify a few institutions that they considered to sometimes be instrumental in helping them deal with the impacts of severe weather (see Tables 15 and 16).

Table 16, for example, suggests that neighbours and relatives represented 38 per cent of the citations, and were considered as the most important form of organisation providing relief and support to victims of weather-related stresses. The church was identified second (25 per cent), while the clinic and Kavwumbu Shelter were identified third and statistically each represented at 10 per cent respectively.

In Kalingalinga, the Lusaka City Council was identified as the most (37 per cent) important institution that is present in the community (see Table 16). The church was identified second (16 per cent) and NGOs, with 14 per cent, were followed by neighbours and relatives, numerically represented at 9 per cent. What is clear in Fig 9 is the suggestion that an institution may be heavily present in a community, but do very little to facilitate or promote the adaptation of poor urban households against the impacts of adverse weather. An example of this, in the context of Linda, is the church which was identified by 25 per cent of the citations and Kavwumbu Shelter, identified by 10 per cent (see Table 15). Of the two institutions, the latter seems to be closer to the people than the former (see Figure 9). A similar picture is observable in Figure 10 where a health centre (clinic) is considered to do

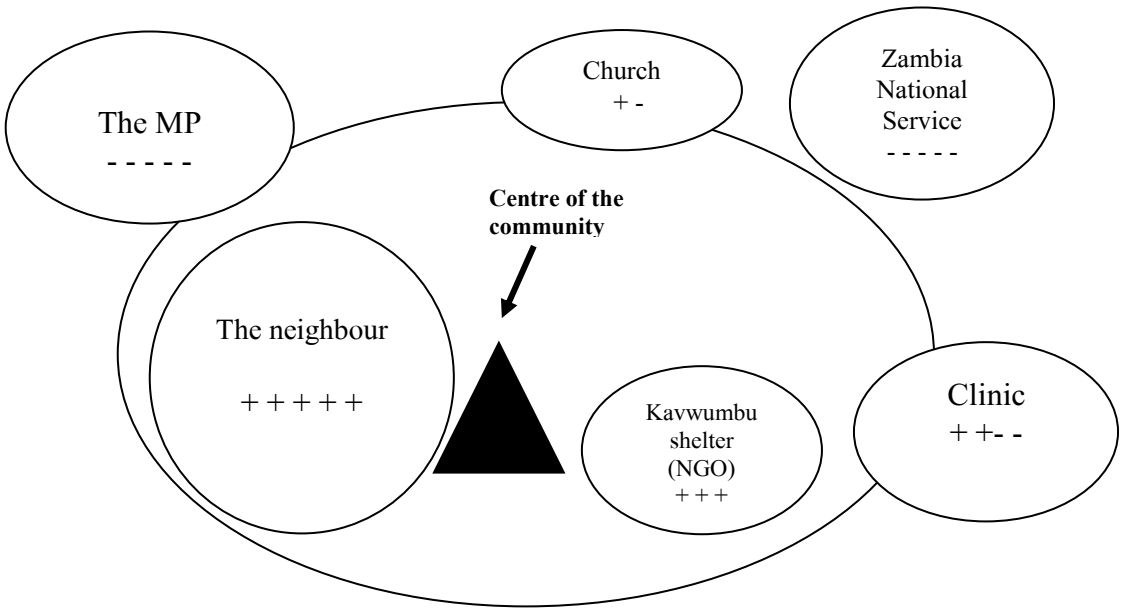
more in facilitating the adaptive capacity against severe weather than the local authority (Lusaka City Council).

Table 16 Matrix of institutional listing and ranking in Kalingalinga Compound from institutional mapping

Name of community	*Institution*	*Ranking**	*Frequency of citations of institution*	*Total no. citations*	%
Kalingalinga Compound	Lusaka City Council (LCC)	1	III III III III III I	16	37
	The church	2	III III I	7	16
	NGOs	3	III III	6	14
	Neighbours/friends	4	III I	4	9
	Ward Development Committee (WDC)	-	III	3	7
	Clinic/hospital	-	II	2	5
	MP/Councillor	-	II	2	5
	The President	-	I	1	2
Total				**43**	

*1= most important; 4 = least important

***Source**:* Based on responses from 22 focus group in Kalingalinga Compound

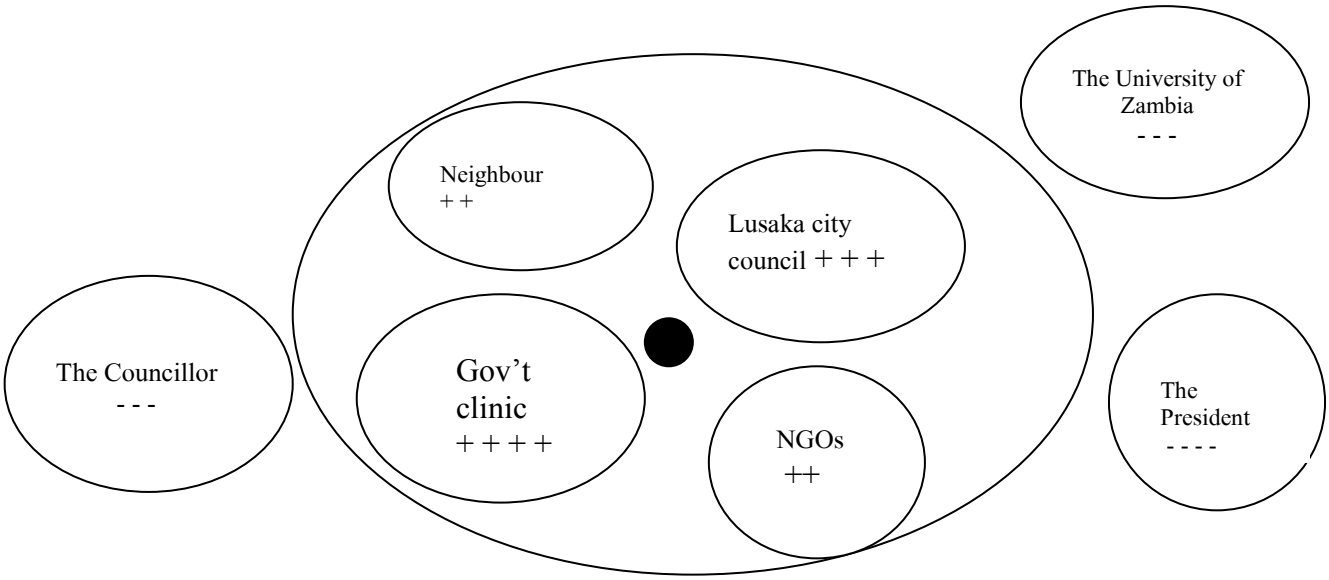


Key

++ = *More helpful institution*; **---** = *Less helpfu*l; + - = *More & less helpful*

Figure 9 Mapping of important institutions for help for adapting to severe weather in Linda Compound

***Source**:* Institutional mapping illustrated by four female participants in Linda Compound engaged in charcoal trading.



Key
++ = More helpful institution; - - = Less helpful; And + - = More & less helpful

Figure 10 Mapping of important institutions for help for adapting to severe weather in Kalingalinga Compound

Source: Focus group of five male carpenters in Kalingalinga Compound.

In summary, therefore, we can argue from the PCCAA information presented above, that the urban poor in Kalingalinga and Linda Compounds are not passive actors. They are actively involved in protecting and adapting their assets to different weather events. Of all the assets available to them, housing seems to be the most important. The multiple functions (i.e. cultivator and accumulator of household wealth, including protector from adverse weather) that it performs, makes it a more valuable asset for adapting to severe weather. Other assets such as health, stock and roads are also among the other important resources that the urban poor in the study sites identified as being important for adapting to the impacts of adverse weather conditions.

A range of different bottom-up strategies to adapt and build their resilience against extreme weather conditions are often used by the urban poor. Some of these strategies and practices include: digging drainage channels, covering the house with plastic or reed mats, putting crushed stones to improve runoff, and boiling drinking water, and keeping their surroundings clean. Although these actions or strategies can be considered as being rudimental in nature, and inadequate to deal with contemporary changes and the frequencies of severe weather events, they however provide a starting point from which both social and scientific methods could be aimed at building the adaptive capacity of the poor against severe weather conditions. Overall, the PCCAA framework, in the context of this study, can be argued to be a useful approach for analysing the impacts of severe weather conditions on the urban poor. On the other hand, the approach is useful for identifying the concrete measures that households and individuals that are more at risk to severe weather, employ in order to reduce or minimise the effects. By focusing on the role that assets play in facilitating the adaptive capacity of the urban poor, the PCCAA can be a useful planning tool for both urban planners and relief agencies working on climate change adaptation and disaster related issues.

4 Climate change institutions and policy framework in Lusaka: a RRIA

The institutional and policy framework can either support or constrain the adaptive capacity of poor households against severe weather conditions in different contexts and places (Agrawal *et al.* 2008). This is because institutions possess both financial and political powers that have a bearing on the decisions and actions that the poor adopt. This section, therefore, is based on the views expressed by different actors from different public institutions and civil society organisations on the position of formal structures on climate change adaptation in Lusaka. The discussion is divided into two broad sections. The first sub-section focuses on the legal and policy frameworks relevant to climate change adaptation in an urban context. The second section gives an overview of key environmental care and resource management institutions and identifies any (if available) of their programmes and activities that are aimed at promoting or enhancing the adaptive capacity of the urban poor in Lusaka against the impact of severe weather conditions. Closely connected to this, is the evaluation of the fiscal situation of these institutions.

4.1 Legislation and policy frameworks in Lusaka.

A review of the existing legislative instruments and policies relating to environmental care and resource management in Lusaka and Zambia in general, coupled with discussions with key informants from different government departments and institutions[14], and non-governmental organisations (NGOs), revealed that no legislation nor policy specific to climate change adaptation exists. However, a few of these documents do have some implications or relevance for promoting adaptation to climate change, albeit not in an urban context.

One such legislative instrument is the "Environmental Protection and Pollution Control Act" (EPPCA) of 1990 which focuses on the management and control of water, air, solid waste, hazardous wastes, pesticides and toxic substances. Associated with the EPPCA, is the *"National Policy on Environment"* (NPE), a supporting policy document developed by the Ministry of Tourism, Environment and Natural Resources[15] (MTENR) in 2007, and launched in 2009.

As a policy document, the NPE provides an overall vision or framework on how to effectively manage and administer Zambia's environment and natural resources, so as to ensure sustainable development and retain the ability to support the needs of the current and future generation. It identifies six main areas of environmental concern: deforestation; wildlife depletion; land degradation; heritage destruction and loss of spiritual and cultural values; air pollution; and inadequate management of water resources, water pollution and sanitation (MTENR, 2007).

Table 17 provides a summary of four selected legislative instruments and policies that were developed to address different environmental issues in Zambia. Although these instruments and policies have a rural orientation, they have some implications on environmental change vis-à-vis adaptation to severe weather in urban centres.

The Forest Act and policy, for example, have provisions that allow for the participation of local communities, traditional institutions, NGOs and other stakeholders in forest

[14] These include; the Zambia Climate Change Facilitation Unit, the Environmental Council of Zambia, and the Ministry of Tourism Environment and Natural Resource Management, including the Ministry of Justice.

[15] The MTENR is the government ministry that co-ordinates all activities related to environmental care and natural resource mandate. It has the parliamentary mandate.

management through schemes such as the "Joint forestry management areas" (JFMAs). Forests, in the context of Zambia, are a common landscape of both rural and urban areas. Promoting the involvement of communities and other stakeholders in the management of forest resources can create awareness of the role that forests play in the ecosystem, and more specifically in regulating atmospheric gases. This can open valuable insights on how community-based adaptation strategies of the urban poor can be enhanced against the impact of severe weather conditions or events.

4.2 The institutional framework in Lusaka

Although no specific legal and policy framework exists for climate change adaptation in Lusaka, a number of existing government institutions and agencies have some mandates that have both explicit and implicit influence on issues relating to climate change. The Ministry of Tourism, Environment and Natural Resources (MTENR), for example, acts as the principal coordinating institution overseeing all activities relating to the environment which are implemented by sector departments, institutions and other agencies. And more recently (in 2009), the government of Zambia established the Zambia climate change facilitation unit (ZCCFU), which is strategically located within the MTENR, with the principal responsibility of developing the climate change profile and adaptation policy for Zambia. These tasks currently await a legislative instrument from parliament. (This information is based on discussions with a senior officer from ZCCFU).

Table 18 shows some of the institutions that were identified as potential organisations for promoting pro-poor adaptation to severe weather conditions in Lusaka. Despite the presence of these institutions, key informants revealed that none of them had developed any explicit strategies or action plans aimed at prioritising pro-poor adaptation of vulnerable urban households to severe weather events. Part of the reason for this inadequacy was identified as the lack of close collaboration among key environmental care and natural resource management institutions.

A senior officer at ZCCFU, for example, argued that: "for a long time now, key environmental institutions have worked in isolation and there has not been a well co-ordinated way of addressing environmental issues". Another officer situated in the planning unit of the Environmental Council of Zambia (ECZ), pointed out that: "there is very little collaboration among key environmental institutions in Lusaka. The only time when we really work together is when there is a crisis".

It is important to note that the lack of collaboration among key environmental care and resource management institutions is a result of a number of factors. One such factor is competition for resources. Many key informants argued that competition for financial resources and the need for institutions to protect and safeguard their budgetary allocation from the central government, and other external sources, were at the centre of the lack of collaboration among them. Informants from key departments such as the ZCCFU, DMMU and the Environmental Council of Zambia (ECZ), for example, argued that climate change is a topic that has generated a lot of global and local interest and is a lucrative source of finances for an institution.

They pointed out that because of the huge financial benefits that an institution can draw from focusing on climate-change-related issues, many institutions are increasingly developing interests in climate change issues even when they do not have the mandate to do so.

Table 17 Selected legislative instruments & policies with implications for climate change adaption in Lusaka

Legislative instrument	*Supporting policy framework*	Focus of policy and legislation
The Environmental Protection & Pollution Control Act	The National Policy on Environment	- Protection of the environment and control pollution, to provide for the health and welfare of persons, animals, plants and the environment - Act has provisions that can be applied to minimise the adverse impact of climate change and reduce air pollution and greenhouse emissions
The Energy Regulation Act, & the Electricity Act	- The National Policy on Environment, & - The National Energy Policy	-Both Acts provide for measures to minimise the negative environmental impacts of production and supply of energy, transportation, storage and use of fuels. - Both Acts have some provisions that can be used to control activities that emit greenhouse gases. - Both policies promote optimum supply and utilisation of energy, especially indigenous forms, to facilitate the social economic development of the country and maintain a safe and healthy environment
The National Forests Act	- The National Policy on Environment, & the National Forestry Policy	- The Act provide for measures aimed at reducing biomass emission. Cultivation and charcoal are the two main sources of on-site biomass burning emissions. - Both policies aim to improve the management of the forest resources in a sustainable manner so as to maximise benefits to the nation and to forest-dependent communities.
The Disaster Management Action Plan (Presently under Parliamentary debate)	- The National Disaster Management Policy	- The objectives of this plan are, among others, to foster economic growth and development by promoting trade and investment in Zambia. - The policy aims to promote the safety net for protection of the public against disasters through a pro-active, community-based, developmental and multi-sectoral approach that combines disaster preparedness, prevention and mitigation, and integrates disaster management into national development

Sources: DMMU (2005), MTENR (2007), & Kasali (2007)

Table 18 Summary of roles and responsibilities of selected institutions related to climate change adaptation in Zambia

Key institution	*Key roles and responsibilities*	*Legislation and policy that define roles*	*Analysis of roles and responsibilities*
Ministry of Tourism, Environment and Natural Resources (houses the Climate Change Facilitation Unit)	• Focal point for UNFCCC • Policy development • Environment and natural resource management • Public Awareness • Strategy development • Effect international policy and principles	• NEAP • Constitution • National Policy on Environment • Forestry Policy • Wildlife Policy • Zambia Wildlife Act • Forest Act • Tourism Policy • Tourism Act • National Heritage Conservation Commission Act	• State responsibilities derived as directive principles and not justifiable • Constitution does not allow direct implementation of international instruments ratified by Zambia • Institutionalised sectoral approach with the Ministry structure created through legislation means it is difficulty to restructure • Environmental protection and management efforts are fragmented and not well coordinated • Inter-sectoral conflicts • Fragmented and outdated legislation • Poor inter-sectoral coordination • Some duplication of mandate/efforts with other institutions • Bureaucracy slows implementation
Ministry of Finance and National Planning	• National Development Planning • Economic Development • External Resource mobilisation • Resource allocation • Investment and tax incentives	• The Public Finance Act • The Appropriation Act • Fifth National Development Plan	• Investment and financial framework not comprehensive • Combination of roles of planning and economic development • Overlap in some roles with other ministries • Sometimes performs responsibilities of other ministries
Ministry of Health	• Public Health • Policy development	• Public Health Act	• No clear definition or delineation of roles • Outdated legislation

Key institution	*Key roles and responsibilities*	*Legislation and policy that define roles*	*Analysis of roles and responsibilities*
Ministry of Local Government and Housing	• Policy development • Oversee & advisory role to council • Strategy development related to local government (including infrastructure and human settlement) • Approval of development plans	• Local Government Act • Town and Country Planning Act • Decentralisation Policy	• Lack of institutional capacity to execute mandate • Inadequate human resource to provide grants to councils • Limited resource allocation • Fragmented and outdated legislation • Poor funding
Lusaka City Councils	• Solid waste management • Approval for location of waste disposal site • Maintenance of drainage systems • Land use planning • Resource mobilisation • Setting tariffs	• Town and Country Planning Act • Local Government Act • EPPCA • Public Health Act • Rating Act • Decentralisation Policy	• Poor delineation of responsibilities between ECZ and councils • Inadequate institutional capacity • Fragmented and outdated legislation • Weak enforcement mechanism • Improper financial practices • Lack of local waste management plans, natural waste management plan, waste recycling and litter plans
Forestry Department	• Conservation orders • Designation of protected forest areas	• Forests Act • Forestry Policy	• Lack of wetland management standards and plans, and outdated legislation • Poor land use zoning and enforcement • Weak land use and tenure policy
Town and Country Planning Department	• Preparation of development plans • Control of development and subdivision of land • Approval of location of waste disposal sites	• Town and Country Planning Act • EPPCA • Housing (Statutory and Improvement) Areas Act	• Poor environmental standards • High rate of population growth and urbanisation • Poor funding and lack of human resource to deal with settlements more effectively • Outdated legislation & political interference • Unplanned settlements • Poor infrastructure and urban pollution

Key institution	*Key roles and responsibilities*	*Legislation and policy that define roles*	*Analysis of roles and responsibilities*
Disaster Management & Mitigation Unit (DMMU)	• reducing the loss of life and damage to natural resources and property by protecting vulnerable communities from natural and human-induced disasters	• EPPA	• Overlap in some roles with other institutions • Fragmented and outdated legislation • Inadequate institutional capacity
Environmental Council of Zambia	• Coordination of climate change activities • Monitoring and enforcement of environmental regulations • Pollution control & Licensing • Coordinating and advisory roles • Public awareness & International cooperation • Strategy development	• Environmental Protection & Pollution Control Act (EPPCA)	• Overlap in functions between ECZ and other lead implementing sector agencies • Weak coordination and regulatory structure • Inadequate guidelines to regulate all categories of waste generators • Fragmented and outdated waste management legislation • Inadequate resources to carry out mandate • Weak enforcement mechanisms

Furthermore, informants argued that in some instances, competition for financial resources has been a source of programmatic conflict and policy overlaps (see column 4 in Table 18) among key environmental institutions, notably between the ZCCFU and DMMU, two institutions that have the principal mandate for devising strategies that promote adaptation to severe weather conditions.

It is important to note that although some key environmental-care and resource-use institutions do exist in Zambia, the lack of legislation and policy, coupled with poor collaboration among them, have combined to make it difficult for them to respond to the challenges posed by severe weather in Lusaka. Institutional partnerships are crucial for promoting and determining adaptation options for the urban poor. This institutional collaboration can facilitate and enhance informal institutional processes through which adaptation occurs.

Discussions with informants from different government institutions and departments revealed that many of the key environmental care and natural resource management institutions do not have specific programmes that promote adaptation to severe weather conditions in an urban context in Zambia. An official from the Ministry of Finance, and in the planning unit, for example, pointed out that, "the lack of financial resources, and the poor financial position of many institutions has made it difficult for them to develop any form of outreach programme that would sensitise the public and contribute towards poor people's efforts to adapt and build resilience against the impact of extreme weather events".

Despite the lack of financial resources and explicit programmes supporting adaptation of poor urban households against severe weather, an in-depth examination of various institutional out-reach activities revealed that the Environmental Council of Zambia (ECZ), is the only institution that has developed an urban-based programme that is aimed at creating awareness of adapting to severe weather events, and more specifically heat and floods. The *tree planting* programme which involves planting of trees, grass and other vegetation in areas that are vulnerable to flooding and dust storms has been developed to promote drainage, reduce water run-off (and soil erosion) and regulate atmospheric temperatures.

The implementation of the tree planting programme involves public campaigns, and the participation of vulnerable communities so as to reduce the impact of weather- related events. And through a partnership with the British Council, ECZ is also actively involved in the dissemination of information on climate change through the media (i.e. radio, newspapers, and TV programmes), education programmes in schools (i.e. through drama and plays), and other avenues such as community-based programmes, and the distribution of literature (calendars) which outline issues related to climate change.

5 Conclusion: the PCCAA and RRIA in Kalingalinga and Linda Compounds.

It is clear from the PCCAA and RRIA analysis of pro-poor adaptation to severe weather conditions in Kalingalinga and Linda Compounds that, although the urban poor experience different severe weather conditions, flooding is the greatest and most challenging weather-related event that they experience. This is because flooding was identified as having the most devastating impact on nearly all the assets of the urban poor. It is also clear that a number of participants pointed out that these weather events, particularly flooding and heat, were not uncommon in Lusaka. What is new is the frequency and the sudden shifts between them. It is these recurrences that are gradually eroding the adaptive capacity of the urban poor and making them more vulnerable to subsequent events.

Despite the impact of severe weather conditions on the assets of the urban poor, it is clear from the discussion in this paper that many participants in Kalingalinga and Linda Compounds are actively

engaged in protecting and modifying the different assets that they own in order to reduce their vulnerability. Housing was identified as the most important asset that facilitates and contributes towards building the adaptive capacity and resilience of the urban poor against severe weather condition. Other assets that were identified as important include: the health of both individuals and whole communities, physical assets such as roads, and social assets which include factors such as social norms and relations.

In view of the above, the discussion in this paper has revealed that many of the urban poor in the two sites have developed a number of strategies to ensure that their assets are adapted to different impacts of severe weather conditions. In the case of housing, for example, it has been shown that a number of strategies are employed to protect it from, say, the impact of floods. Some of these strategies include sand-bags to block flood water from flooding the house. These asset adaptation strategies, as pointed out in the paper are done at different stages during the occurrence of a weather event "before, during, and after".

In spite of the various asset adaptation strategies employed by the poor to reduce their vulnerability to severe weather, there is, at present, no existing legal or policy framework in Lusaka and Zambia in general, that is climate-change specific, and which could be used to promote the building of the adaptive capacity and resilience of the urban poor. Although a number of institutions have been established, there are no clear legislative instruments and policy upon which these institutions could base their mandate and implement their programmes. Until Zambia, as a country, develops *legislation* that is climate-change specific, it will be difficult to develop any explicit, and climate-change-specific *policies* that will facilitate the adaptation of poor people to severe weather events, or even mainstream such policies into urban development and planning frameworks.

It is important to note that institutions with various environmental mandates and responsibilities may exist, but in the absence of supporting legal instruments, and a lack of resources, it is difficult to envisage how the most vulnerable individuals and households can be supported institutionally to protect their assets and adapt to actual and potential impacts arising from extreme weather events. It is also important to note that legislation would provide the realms and scope within which an institution would operate in promoting the formulation and implementation of pro-poor climate change adaptation policies within which the urban poor would find voice to express their vulnerability and search for solutions. This is because the extent to which different households are linked to various institutions in their locality impacts their access to resources and decision-making, and thereby, their capacity to adapt to extreme weather events.

In view of the above observations, it would seem plausible to argue that without legislation, policies and institutions that are specific to climate change adaptation, urban households will find it more costly to pursue the adoption of effective adaptation practices relevant to their local needs, as well as finding it difficult to increase their information knowledge on adaptation options. In light of this, it is important that different institutions that have a bearing on issues relating to climate change collaborate and harmonise their programmes, and identify entry points that could be used for supporting the development of pro-poor urban adaptation strategies.

Importantly, the effectiveness of a particular institution in coordinating and responding to extreme weather events is not only shaped by the existing legal and policy framework, but by its connections with other local and external institutions. These connections or partnerships can provide greater adaptation for the urban poor because they can afford residents and communities greater flexibility in their choice of asset adaptation, diversification and adaptation strategies. Households that are linked to credit groups, for example, are more likely to benefit more from the support of such institutions – should there be a weather-related crisis. In short, therefore, we can argue that until climate change legislation is put in place, the formulation of pro-poor climate change policies that will facilitate the adaptive capacity and resilience of the urban poor in urban Zambia will remain a fantasy. Thus, legislation for climate change, is one step towards devising community-based strategies that will enhance and safeguard the assets of the urban poor people against extreme weather conditions.

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Appendix: Selected pictures from the study sites

Picture 1: A flooded road in Kalingalinga Compound

Picture 2: Children swimming in flood water in Linda Compound

Picture 3: A flooded road and maize field in Kalingalinga Compound

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