

Migration as an adaptive strategy to climate variability: a study of the Tonga-speaking people of Southern Zambia

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There is increasing consensus that the effects of extreme weather conditions in the form of drought, flooding and extreme temperature will have increasingly devastating impacts on those who depend on climate-sensitive resources and ecosystems for their livelihoods. The most affected will be the poor in developing countries who have a low adaptive capacity to climate change due to high poverty levels. Despite these projections, there are, to date, insufficient empirical studies linking the relationship between climate change and migration, particularly in the context of southern Africa. Using field-based data collected from two study locations in Zambia, this paper examines the complex relationship between extreme weather events and population movement. It is envisaged that the findings presented in this paper will contribute to current discussions on the complex relationship between extreme weather conditions and population movement specifically in the context of sub-Saharan Africa and other developing countries.

Keywords: adaptation, environment, extreme weather events, migrant households, population movement, Zambia

Introduction

One of the emerging debates within migration studies concerns the relationship between climate change and migration. Environmental degradation resulting from processes such as desertification, ecological deterioration and loss of biodiversity are, arguably, major factors that compromise the ability of individuals and whole communities, particularly the poor, to obtain sustainable livelihoods (Potter et al., 2008). It is also argued that although such individuals and communities have developed various adaptive strategies to reduce the impacts arising from environmental stress, there is increasing evidence that local knowledge is becoming inadequate to deal with the frequency and intensity of such extreme weather events (such as floods and drought) (Singh, 2000).

Within the broad subject of migration, for example, there is a growing literature that aims to document the migration–environment relationship. However, there is still no consensus on how the two themes are connected due to inadequate evidence on the causes of environmental change, and the general lack of appropriate data for analysing such relationships (Black, 2001). Renaud et al. (2007, p. 11) argue that ‘the evidence put forward so far to link environmental factors to forced migration is often not scientifically or factually rigorous and has been dismissed by the detractors

of the concept' (see also Black, 2001). Contrary to this argument, Castles (2002) states that environmental factors can be very important in triggering population movement in certain circumstances. This view is supported by Oliver-Smith (2006) who observes that nature (which can be understood as the co-existence of nature and society) could be among several factors triggering population movement.

The lack of consensus on the migration–environment relationship stems from how the concepts of environmental change and/or degradation have been conceptualised. But a much bigger problem, as observed by Henry (n.d.), has been how to identify individuals or groups of people that can be considered 'environmental migrants'. Renaud et al. (2007, p. 11), for example, argue that 'there is no accepted definition of what an environmental migrant is'. The main reason for the lack of a definition is linked to the difficulty of isolating environmental factors from other drivers of migration, such as economic, cultural or social conflicts. Dun and Gemenne (2008), however, argue that environmental migration commonly presents itself where there is a slow-onset of environmental change or degradation process affecting people who are directly dependent on the environment for their livelihood and causing them livelihood stress.

In view of the above observations, this paper uses empirical data from 30 households of Tonga¹ migrants from Southern Province of Zambia to examine how perceived changes in climatic conditions triggered their movement to Central Province. Emphasis is placed on how extreme weather events such as drought and occasional flooding impacted their livelihood systems as well as their general well-being and therefore acted as triggers for their movement. The paper aims to raise some important empirical evidence that will contribute to contemporary debates on climate change and migration and inform policy formulation in a wider context of developing countries, with specific relevance to Zambia.

Methodological issues

The paper is based on data that was collected using a participatory research methodology. The research was carried out between November 2009 and March 2010 in Mukonchi and Lunchu settlements in Central Province² with 30 Tonga migrant households originally from Southern Province. The 30 households were also part of an earlier study conducted between May and August 2003, which involved 400 households in Zambia's Southern Province. This earlier study used the post-harvest survey³ data and investigated the impacts of post-structural adjustment programmes on food production and food security in four selected districts (Choma, Kalomo, Monze and Sinazongwe) of Southern Zambia.

It is important to bear in mind that the 30 migrant households on which this paper is based may not be representative of the original study sample (that is, the 400 households). However, they are all closely linked to Southern Province both socially and culturally. For purposes of this paper, the 30 households must be considered as outliers of the original study population. It is also important to note that the 2003

study highlighted a number of issues that required further investigation particularly in aspects relating to how local people were adjusting and coping with extreme weather conditions. It is in this context that in 2008 the authors of this paper conducted another study that examined the various adaptation strategies employed by some of the 2003 research participants against extreme weather conditions. It was during the 2008 study that it was further discovered that some of the individuals and households interviewed in 2003 had migrated across district and provincial boundaries to other parts of Zambia.

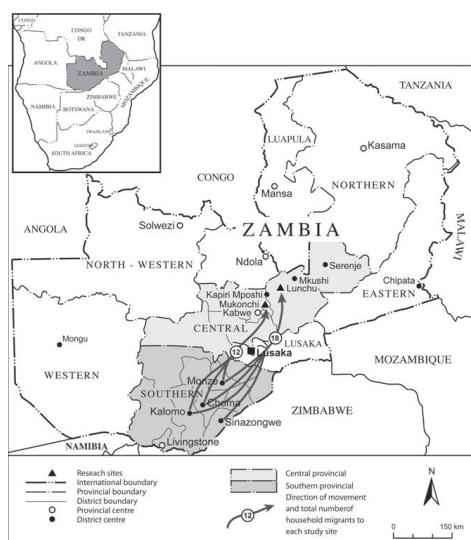
A follow-up study was thus conducted between 1 November 2009 and 30 March 2010 to identify those people who had migrated from Southern Province to other parts of the country. The purpose of the study was to investigate factors and processes that motivated and triggered the relocation of the 30 migrant households from four districts in Southern Province to Lunchu and Mukonchi in Central Province (see Map 1). Using existing contacts from both the origin and destination areas, eight households were initially identified by the researchers as having migrated to Central Province. Of these households, five had settled in the Mukonchi area while three had settled in the Lunchu area (see Map 1). Having identified these households, we decided to contact each of the eight households by mobile phone and then visit them at their respective farmsteads between 1 November 2009 and 30 March 2010. On these visits we talked to members of the households to ascertain what factors had motivated their movement across district and provincial boundaries.⁴

Initial discussions with the eight migrant households resulted in the identification of an additional seven households in Mukonchi and 15 households in Lunchu, all of

which were part of the 2003 study. This brought the total number of research participant households in both Lunchu and Mukonchi areas to 30. Focus group discussions were held with members of each household, and data was collected using tools inspired by the tradition of participatory research. These included transect walks, matrices, listing of general problems, ranking and brainstorming activities. The participatory research methods were complemented by semi-structured interviews using open-ended questions. All discussions were conducted in Tonga.⁵

It is acknowledged that a comparison of views between those households that migrated from Southern Province and those that did not may have added value to the argument presented here. But the interest of this paper is on understanding

Map 1. Map showing the direction of movement of the 30 migrant households from southern and central Zambia



Source: Wendy Phillips (2013).⁶

the views of the *movers* and not the *stayers*. Thus, it primarily discusses the reasons for migrating and not for staying in the areas of origin. Such a comparison will be the focus of a forthcoming paper.

There were two common characteristics of all the 30 participant households in this study. First, they had all migrated from Southern Zambia (as shown in Map 1).⁷ Second, they were all directly dependent on agricultural production and livestock as their primary source of livelihood, both in their emigration and immigration areas. The field-based data was complemented by a limited amount of station data on rainfall and temperature collected from the Meteorological Department of Zambia and other sources. This enabled us to triangulate the views that were expressed by the 30 migrant households.

Some theoretical perspectives

Migration, according to Fellmann et al. (1995, p. 82), may be forced or voluntary, or, in many instances, reluctant relocations imposed on the migrants by circumstances. The founding father of modern migration research and analysis, E.G. Ravenstein (1885), suggested that migration is caused by economic development. This argument is supported by Todaro (2000, p. 305) who is of the view that, 'migrants consider various labour market opportunities available to them in the rural and urban sectors and choose the one that maximises their expected gains from migration'. The major weakness in this argument is the emphasis on economic factors and wealth maximisation and the neglect of other factors such as environmental processes, kinship and social ties, and security issues. Within these perspectives, there is a general tendency to portray a potential migrant as an unconstrained actor whose motives to migrate are solely influenced by economic factors (Castles and Miller, 2009). This conventional way of categorising population movement impedes our understanding of the nature and drivers of migration processes. The simple categories and dichotomies suggested by classic theories of migration to characterise population movements primarily in economic terms reflect bureaucratic and legal taxonomies that conceal the often complex, mixed and shifting motivations of migrants.

There is now a movement towards studying contemporary migration processes from a theoretical perspective that involves three levels of analysis; the macro, meso and micro levels. The three levels of analysis provide a more comprehensive framework from which to identify structures or mechanisms/factors that influence the decision to migrate (see Cliggett, 2000; Massey et al., 1993). The micro level, for example, rests on the assumption that the decision to migrate or not to is entirely a matter of choice for a potential migrant. An individual or group of individuals make decisions based on their autonomy and freedom of choice aimed at improving and securing their lifestyle, status, comfort, wealth, stimulation and affiliation. At the micro level, the decision to migrate is conceptually perceived as a function reflecting the potential migrants' values, desires and expectations in both areas of emigration and immigration (see Cliggett, 2000; Massey et al., 1993; Maystadt and Mueller, 2012).

The macro level focuses on opportunity structures and explains the decision to migrate from economic, political, cultural, demographic or ecological perspectives (Massey et al., 1993). According to the analysis at this level, political, economic, cultural and ecological structures denote an array of factors in the emigration and destination areas. Massey et al. (1993), supported by Castles (2002), observe that the macro level analyses migration from a triadic relationship between governments and authorities in the emigration and immigration areas, the migrants' associations and sometimes international organisations, all of which have varying degrees of influence on the decision to migrate.

The meso level focuses on a set of social and symbolic ties among movers and groups, and the resources available to them (Massey et al., 1993; Maystadt and Mueller, 2012). The analysis here is anchored in the structure, strength and density of social ties on the one hand, and their content on the other hand. The decision to migrate is seen as a rational decision facilitated by the social and symbolic ties among stayers and migrants, with units and networks in the areas of origin and destination, and their relations between collective actors: for example, *inter alia* kinship groups, religious groups, households, ethnic communities and nations (Massey et al., 1993; Maystadt and Mueller, 2012).

Although there may be other approaches that could be employed to explain various population movements, the value of the micro, macro and meso levels of analysis cannot be underestimated, particularly when investigating the relationship between migration patterns and environmental factors. Studies such as those done by Dun and Gemenne (2008), Renaud et al. (2007) and Castles (2002) allude to the fact that there is evidence suggesting that environmental hazards are increasingly displacing large sectors of the population globally. Hunter (2005), for example, suggests that: '[. . .] over the last two decades, environmental disasters have displaced increasing numbers of people'. She further points out that, 'natural calamities also often "push" migrants from rural to urban areas [. . .] such that an unusual increase of beggars and people looking for work in cities and towns is part of the aftermath of such calamities' (Hunter, 2005, p. 274).

El-Hinnawi (1985) and Jacobson (1988) have used the term 'environmental refugees' to denote people forced to leave their homes temporarily or permanently due to environmental problems that either threatened or compromised their quality of life (see also Myers and Kent, 1995). However, the term, as observed by Black (2001), has been vigorously criticised by scholars such as McGregor (1993) and Kibreab (1994) for being poorly defined and legally meaningless and confusing. Black (2001) observes that:

Although environmental degradation and catastrophe may be important factors in the decision to migrate, and issues of concern in their own right, their conceptualisations as a primary cause of forced displacement is unhelpful and unsound intellectually, and unnecessary in practical terms (Black, 2001, p. 1).

However, using a 15-year panel data to explore the relationship between population mobility, flooding and crop failure in rural Bangladesh, Maystadt and Mueller (2012) argue that drought rather than flooding had the strongest effects on mobility. They further observe that, 'households in communities with widespread exposure to drought are more likely to move than ones limited to their own, personal exposure' (Maystadt and Mueller, 2012, p. 3).

Regardless of the deficiencies in definitions and conceptualisation of who an environmental migrant is, the most crucial question is how does environmental change influence the decision to migrate? While there may be more than one answer to this question, El-Hinnawi (1985) and Castles (2002) both observe that environmental change can force people to migrate (temporarily or permanently) over a period of time when the environment is their only source of livelihood (see also Henry, n.d.; Reuveny, 2005). Ezra and Kiros (2001), for example, argue that a community's vulnerability to food shortages as a result of uncertain natural environments may lead some households to migrate as a family's coping strategy. This view is supported by Osterling (1979, p. 120), who argues that, 'most migrants were compelled to seek employment through migration because the natural disaster had intensified traditional poverty in their villages of origin'. Maystadt and Mueller (2012) also observe that households send migrants to work to reduce the potential losses caused by natural disasters at home.

Furthermore, Hugo (1996) and Jacobson (1998) are of the view that environmental decline, especially in developing regions, may be an important 'push' factor fuelling urbanisation. It is important to note that where environmental changes do influence the decision to migrate, they must not be understood in isolation of other processes taking place at all levels of society. Osterling (1979), for example, argues that:

[. . .] migrants were innovative in responding to the earthquake by capitalising on social networks that facilitated migration to Huayopampa, which is seen as a training ground for preparation for an eventual permanent move to Lima (Osterling, 1979, p. 120).

The discussion above suggests that there is an increase in the consensus that environmental factors do play a role in triggering population mobility. Studies such as those done by Homer-Dixon (1994), Myers (1988), Myers and Kent (1995), Ramlogan (1996), Trolldalen et al. (1992) and, more recently, Dillon et al. (2011), Gray and Mueller (2012a; 2012b) and Marchiori et al. (2012) indicate that exposure and vulnerability to weather variations interact and link population mobility to environmental factors. While this may be the case, there are still very strong arguments regarding the lack of empirical studies that clearly demonstrate the relationship between environmental change and migration. Black (2001), for example, argues that there is no convincing evidence that environmental change leads to large-scale population displacement. Using the case of desertification in the Sahel zone and similar regions, he argues that migration in these areas has been a coping strategy for people for centuries and that it is an essential part of the economic and social structure of the region, rather than a response to environmental decline (Black, 1998). Similarly, Piguet et al. (2011)

observe that little progress has been made with respect to quantifying the consequences of environmental migration, and that quite often dramatic consequences are asserted for political reasons and not based enough on evidence.

The above viewpoints provide a useful framework for studying and analysing the relationship between environmental change and migration, but the focus of this paper is not to define who an environmental migrant is, or to categorise such migrants' attributes. Instead, the paper aims to contribute to contemporary discussions and understanding of how perceived environmental factors associated to extreme weather conditions can combine with other processes to trigger population movement.

A brief overview of population movements in Zambia

Figures from the Central Statistics Office (CSO) of Zambia for the period 1998–2010 suggest a shift in population movement with a decrease in the traditional rural–urban flows and an increase in urban-to-urban and rural-to-rural migrations. These changes in movement seem to have coincided with deteriorations in all sub-sectors of the economy arising from the decline in global prices and demand for copper, which forms the mainstay of Zambia's economy.

Although urban-to-urban migration has remained the dominant form of population change in urban areas of Zambia, rural-to-rural and urban-to-rural as well as rural-to-urban movements are slowly becoming prevalent and are increasing in importance (See Table 1).

While different factors may be responsible for the contemporary patterns in population mobility in Zambia, it is plausible to argue that current stagnations and deteriorations in all sub-sectors of the Zambian economy, particularly in the mining sector—traditionally the largest employer—have contributed to the observed migratory patterns (CSO, 2005, 2010). What is intriguing, however, is that the re-ordering of population movement (for example the urban to rural from 11 per cent in 1998 to 18 per cent in 2009/10) has coincided with huge international investments in the mining industry due to revived global demand for copper, which has resulted in increased copper prices (see Figure 1).

Table 1. Direction of migration flow in Zambia from 1998 to 2010

Direction of migration	Total migration							
	1998		2002/03		2004/05		2009/10	
	%	Number	%	Number	%	Number	%	Number
Rural to rural	35	485,000	41	154,644	32	123,338	39	141,675
Rural to urban	14	–	14	52,436	15	58,186	20	73,268
Urban to rural	11	–	12	44,681	14	54,561	18	62,171
Urban to urban	40	638,000	33	122,254	38	147,036	40	163,112

Source: CSO (1998, 1999, 2004, 2005 and 2010).

In view of this development in the copper industry, one would expect a high influx of migrants and movement towards Copperbelt Province, which traditionally has been one of the two dominant and preferred final destinations—the other being Lusaka—for many migrants. Yet, the emerging pattern, which is skewed towards the less economically developed provinces, requires a rethinking of the factors underlying population movement in Zambia.

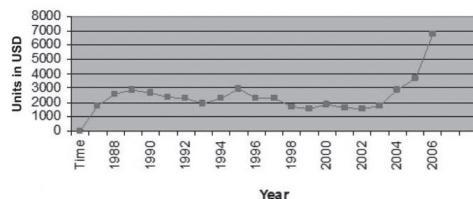
In 1999, for example, of the total 136,012 migrants in Central Province, nine per cent had migrated from other urban centres of Zambia, while during the period 2002 to 2005 the number involved in a similar movement rose from 19 per cent to 24 per cent (CSO, 2004, 2005). Overall, official statistics suggest that migration in Zambia is no longer largely responsive to the purported traditional pull of the economy because the locus of poverty, as observed by Milimo et al. (2002) and Simatele and Simatele (2009), has shifted to include urban areas. This is because urban areas no longer provide the security that they once offered due to high unemployment rates as well as the high cost of living.

A study carried out by the World Bank (2007) on urban poverty and vulnerability in Zambia, for example, reveals that 92 per cent of respondents classified themselves as ‘very poor’ or ‘moderately poor’. Factors identified as attributing to their poverty included general economic conditions of the country, lack of employment opportunities, low wages, lack of capital to start or expand their business enterprise, and high cost of urban living. By contrast, however, official figures from the CSO, as argued by Chibuye (2011), show that urban poverty levels increased from 49 per cent in 1991 to 56 per cent in 1998, but fell significantly thereafter, from 53 per cent in 2004 to 34 per cent in 2006. Despite this decrease, the unprecedented reduction (19 per cent) in urban poverty between 2004 and 2006 has raised controversy (Chibuye, 2011; Simatele and Simatele, 2009). No clear explanations have been offered as to why poverty is shown to have fallen so dramatically within a two-year period (Chibuye, 2011).

Although there have been increased interest and investment in the copper mines in Zambia, the impact of these large-scale mining activities on local communities has largely been negative. Simutayi (2008), citing Dansereau (2007), argues that they have contributed to social conflict, the destruction of livelihoods, the dislocation and displacement of local communities and environmental damage. It must be noted, however, that mining can also have a positive impact on the local economy, which in turn would act as a pull factor for migrants. The new mining activities in Zambia have the potential to stimulate economic activities through sub-contracting services and supplying goods, thereby creating employment opportunities for local people and improving the livelihoods of the local community.

However, the development agreements signed between the Zambian government and the new owners of the privatised mining companies allow them to reduce costs

Figure 1. Copper prices in Zambia



Source: Central Bank of Zambia (2006).

in order to increase profitability (Simutayi, 2008). To do this, mines have scaled down on employment and little has been done to compel the new mine owners to engage more permanent employees. Simultaneously, working conditions in the privatised mines have deteriorated and are thus not attractive to potential migrants.

From Southern Province to Mukonchi and Lunchu in Central Province

Until the early 1990s, Southern Province was known for its ideal farming conditions. It was known as the bread basket of Zambia and supplied the country's staple food crop (maize) (Cligget, 2000). Many of the farming activities in this region, particularly small-scale and peasant farming, are dependent on rainfall and any changes in precipitation have negative effects on agricultural productivity (Kasali, 2007; Milimo et al., 2002). The weather in Southern Province and over Zambia as a whole is influenced by the Inter-tropical Convergence Zone (ITCZ). During the rainy season (November to April) the ITCZ moves over the area on a day-to-day basis, always resuming its standard position. This then leads to intervals of rainfall and dry days (see Kasali, 2007). After the ITCZ has moved further north and the retreat movements are no longer compensated for, strong south-easterly winds spring up and bring dry air. During the next few months (May to September) there is a high-pressure belt over Zambia especially in Southern Province, which results in dry weather conditions.

Over the past four decades, the ITCZ has slowly moved northwards to the equator, thereby resulting in increased rainfall variability and reduced rain days across Zambia as a whole (see Table 2). It is suggested in Table 2 that of all the nine provinces

Table 2. Annual rainfall and rain days in Zambia (1973–2006)

Province	Average annual rainfall (mm)	Average annual rain days (days)	Maximum annual rainfall (mm)	Maximum annual rain days (days)	Minimum annual rainfall (mm)	Minimum annual rain days (days)
Lusaka	857	77	1,318	108	527	48
Copperbelt	1,231	111	1,752	138	667	84
Central	1,192	100	1,418	118	566	59
N-Western	1,173	118	1,516	142	799	87
Western	808	87	1,300	111	441	57
Southern	737	72	1,179	97	366	41
Luapula	1,259	123	1,666	143	833	98
Northern	1,138	107	1,546	129	730	72
Eastern	961	93	1,362	114	625	71
Total average	1,001	97	1,432	122	616	68

Source: Kasali (2007).

in Zambia, Southern receives the least annual average rainfall (737 millimetres) and has the fewest rain days (41) compared to other provinces such as Central, which receives an average of 1,192 millimetres, and North-Western, which receives an average of 1,173 millimetres.

Within Southern Province, the districts of Choma, Kalomo, Mazabuka and Monze have been home to many subsistence as well as ‘emergent’⁸ farmers, who have traditionally depended on rain-fed agriculture (Simatele, 2006). It would be plausible to argue, then, that climate variability in the form of reduced rainfall and drought episodes, particularly in the 1990s, has subjected a significant number of Tonga farming households to harsh environmental conditions. These weather conditions, according to Simatele (2006) and Milimo et al. (2002), have resulted in reduced crop yields, loss of livestock and other assets,⁹ and have contributed to corresponding increases in poverty.

Table 3 is a summary of the main weather conditions identified by the 30 migrant households in Lunchu and Mukonchi as constraining their farming activities in Southern Province or influencing their decision to migrate to Lunchu and Mukonchi in Central Zambia.

Table 3 suggests that 35 per cent of the responses identified drought episodes as a major weather event that constrained the research participants’ involvement in agriculture, while intense heat was identified second and statistically represented at 28 per cent. Further discussions with the participants revealed that the impacts of drought had devastating impacts, particularly on cereal crops such as maize, which forms the main source of livelihood and household incomes. A female participant aged between 30 and 40 years who migrated to Lunchu from Monze with her family in the 1990s stated:

It was very difficult to cultivate any crops in Monze because of poor rainfall. The soils were always too hard to till, the water-wells and rivers frequently dried up, and we were frequently finding ourselves in desperate situations as we had no food.

Another participant aged between 40 and 50, who originally migrated from Mazabuka and settled in Mukonchi area, stated:

Table 3. Weather events constraining farming in Southern Province

Type of weather	Number of responses	Percentage	Ranking
Frequent and severe drought episodes	28	35	1
Intense heat	22	28	2
Occasional flooding or heavy rainfall	18	23	3
Cold episodes accompanied by frost	12	15	4
Total	80	100	–

Note: ranking: 1 = most critical; 4 = least critical.

Source: based on discussions with 30 focus groups in Mukonchi and Lunchu (February, 2010).

My problems in Mazabuka were bigger than the ocean. I now have no oxen, no goats and no plates or chairs. The cattle I had before I migrated here died from starvation and thirst due to drought. I was forced to search for better pastures and farming land to save both my few remaining animals and family.

The two views expressed above suggest that drought played a significant role in the decision by the two research participants to migrate. In both cases droughts not only compromised their livelihoods but also eroded some of their important assets. The erosion of these productive assets, coupled with poor rainfall, compromised the ability of these individuals (and whole communities) to obtain meaningful livelihoods. This situation may have facilitated the need for them to relocate to central Zambia in search of better livelihood options. If this assertion holds true, it is plausible to argue that the need to migrate to areas of less environmental stress is an appropriate fit with the micro and macro levels of analysis as stipulated in the three-tier theoretical framework above. Of particular relevance here is the reference by the two research participants to the need for asset protection (animals and land) as well as improved access to secure and sustainable livelihood options. This confirms the argument presented in the three-tier theoretical framework of migration analysis that would-be environmental migrants and their decision to migrate is triggered by a combination of factors, among which are ecological factors, personal values and aspirations, and desires and expectations of opportunities that may be present in both emigration and immigration destinations.

Table 4 shows the listing and ranking exercise done by three focus groups in Lunchu, demonstrating how drought episodes affected different resources that constituted their main sources of livelihoods in their original areas of emigration in Southern Province.

Table 4 indicates that drought not only affected *agricultural production* but also resulted in the loss of *financial resources*, statistically represented by 30 per cent and 24 per cent of all responses respectively. We can therefore argue that although climate variability was an important factor in influencing the decision to migrate, the loss

Table 4. Listing and ranking the impacts of drought on key livelihood sources in Southern Province

Type of resource	Number of responses	Percentage	Ranking
Loss of financial income	20	34	1
Decline and loss of livestock due to disease and starvation (cattle) due to water scarcity	18	30	2
Decline and loss of fish stocks	13	22	3
Decline in wild fruits, roots and vegetable	8	14	4
Total	59	100	—

Note: ranking: 1 = most critical; 4 = least critical.

Source: based on three focus group discussions in Lunchu (August, 2009).

in financial resources in the form of household income appears to have been another significant contributing factor. This scenario seems to be a natural fit with suggestions in most of the literature on population movement that migration is a function of economic processes (see Castle and Miller, 2009; Todaro, 2000).

The three-tier framework of analysis discussed above also identifies economic issues as one of the key factors influencing the decision by potential migrants to move to new areas. It is important to note that economic processes are often shaped by a complex combination of factors, among which political processes are paramount. Collinson (2009), for example, observes that patterns and dynamics of migration are highly varied, complex and context specific. Understanding these dynamics in specific contexts might be improved by exploring the interaction of local-level factors immediately influencing peoples' migration decisions and strategies (linked to livelihoods). Interacting political, economic and social processes at different levels affect vulnerability and/or opportunities of migrants. The three-tier framework provides a platform from which to draw such an analysis.

Focus group discussions as illustrated in Table 4 indicate that inadequate water resources resulted in the loss of livestock due to diseases and starvation. This view is statistically represented by 21 per cent of all the responses given during focus group discussions. From the macro perspective, the lack of adequate water resources can be understood as denoting an array of ecological factors, which may either have direct or indirect impacts on individuals or households. Maystadt and Mueller (2012) suggest that environmental degradation and resource depletion arising from water shortages may play a contributing role in affecting population movement, often filtered through contexts of poverty, food deficiency, conflicts and inequity over land resources such as grazing pastures for cattle.

Natural resources have played a significant role in many violent conflicts in sub-Saharan Africa. In the context of the study informing this paper, focus group discussions indicated that inequalities in access and use of common grazing grasslands and water resources in many parts of Southern Province are rampant and a source of recurring conflict. A female participant in her late 50s who has settled in Mukonchi said:

Every time my sons or husband went out to herd cattle when we were in Zongwe,¹⁰ I was not sure if they would all come back in one piece. People used to fight over fields and dug-out wells to graze and water the animals. Those areas were battle zones and it was like the end of the world had come [. . .] Moving away was the most viable option for us.

In another discussion, a man aged between 45 and 50 years old pointed out that, 'It is better for a man not to have a family, than not to have cattle'. The two observations suggest that livestock, particularly cattle, among the Tonga is an important resource: if it is threatened it can trigger different responses, in particular migration. It is important to note that cattle are symbolic of wealth, power and social status in the community (see Cligget, 2000). Individuals or households with large numbers of animals have greater access to and control of both natural resources (for example, land) and political power within the community.

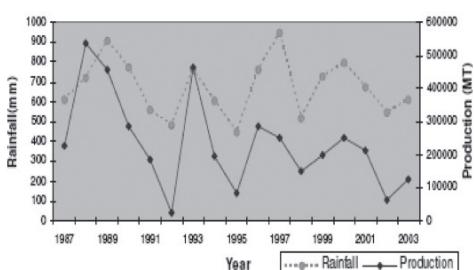
The above observation is supported by the theoretical assertion embedded in the macro perspective of population movement in which political, economic and cultural structures are believed to influence the decision to migrate. Political power in this case can be seen as a key factor in the control of resources such as natural assets (pastures and water resources). This means that households lacking the power to influence decision making with respect to resource use will be marginalised and migration then becomes an option for them.

In addition to social status, cattle are used for different purposes such as payment of dowry, settling social conflicts within the community, transport and draught power for agricultural purposes. Livestock also contributes significantly to food supply and nutrition. Animals are a major source of food, particularly of high-quality protein, minerals, vitamins and micronutrients for the majority of the Tonga people. Animals also make indirect contributions to improving food security among the Tonga because cash incomes obtained from the sale of animals are regularly used to buy non-livestock food items and inputs to farming. Thus, the loss of cattle has serious implications for the welfare of many Tonga households and communities, and has the potential to trigger population movement in the direction of less stressful locations, where availability of water resources and vegetation can sustain cattle and other livestock upon which the Tonga people depend.

Milimo et al. (2002) claim that the impacts of drought have been felt across the country in different ways, and are mostly related to declining livelihood security and increased poverty among rural populations. CEEPA (2006, p. 3) observes that, 'crop production in Southern Province has faced the negative impacts of extreme climate events, which are believed to be manifestations of long-term climate change'. These changes, notably in the form of reduced precipitation, could be argued to have contributed to fluctuations in maize production particularly during the 1990s. It is suggested in Figure 2 that maize production in 1992, 1995 and 2003 was severely affected due to insufficient rainfall. During these years, the incidence of poverty in southern Zambia is reported to have risen from 79 per cent in 1991 to 87 per cent in 1993, and from 76 per cent in 1995 to 80 per cent in 2004 (CSO, 2005).

The difference in poverty levels between the first and second droughts are nine per cent and four per cent respectively, so it is plausible to argue that changes in precipitation affects agricultural productivity, and this has implications on food security of households and whole communities. Repeated food insecurities and rainfall variability can play a key role in influencing the decision of individuals and households either to migrate or to stay. A male participant aged between 40 and 50 years old who had migrated from Kalomo to Lunchu in 1994 stated:

Figure 2. Rainfall and maize production for Southern Province



Note: MT = amount.

Source: CEEPA (2006).

I retired from the police a few years ago and had to make a decision whether to remain in the land of my birth and lose everything I had worked for my entire working life. I had to make a choice whether to stay or chase the rain in the northern part of the country.

Another participant referring to the impacts of repeated drought episodes expressed the view that:

People can always withstand bad harvests and bad rain, but when it happens so often, like it did in Kalomo, it is hard. Every year it happened, we became a bit weaker. Every year we became poorer. That was the big problem.

The arguments suggest that vulnerability and/or the loss of various household assets due to a specific event, such as a drought, or a combination of extreme events, can influence the decision to migrate. This is because the loss of assets owing to changes in extreme climatic conditions can affect all four dimensions of food security: food availability, food accessibility, food utilisation and food systems stability. Individuals or households who lose their assets will have their livelihood options compromised, as their food production and distribution channels will be affected. This will then have a knock-on impact on household incomes and purchasing power, as well as market flows. The combined effects of such a situation would then be manifested in high poverty levels, compromised health and poor well-being.

Reverting to the views expressed by the two research participants above, it is credible to argue that in times of stress, some individuals and households that are affected by drought and vulnerable to food insecurity and poverty are more likely to migrate to places of less stress, which offer alternative and secure livelihood options.

Table 5 is a summary of all the responses given by the respondents as influencing their decision to migrate.

Thirty-one per cent of the responses from the 30 migrant households identified drought as the single most extreme weather condition that forced them to migrate.

Table 5. Factors influencing the decision to migrate

Factor	Number of responses	Percentage
Frequent and severe drought episodes resulting in reduced crop yields	43	31
Problems of access to resources and conflicts over natural resources especially land	37	26
Persistent poverty due to reduced agricultural productivity and loss of financial incomes	26	19
Loss of animals (cattle) due to starvation and diseases	21	15
Personal reasons	13	10
Total	140	100

Source: summary based on 30 focus group discussions in Mukonchi and Lunchu (March, 2010).

This is followed by problems associated with access to resources resulting in conflicts over natural resources such as pasture and land, which are statistically represented at 26 per cent of all 140 responses. It is important to note that poverty, resulting from reduced agricultural productivity as well as reduced income, was identified third and statistically represented at 19 per cent.

Table 5 also shows that the decision of the 30 households to migrate was influenced by a combination of factors such as events associated with extreme weather conditions, difficulties in accessing natural resources, conflicts over resources, repeated episodes of loss of household incomes, persistent or chronic poverty and loss of livestock. Although drought episodes appear to have significantly influenced the decision for the 30 households to migrate to central Zambia, it should be noted that since 2000, Southern Province has also suffered repeated floods.

In January 2008, for example, more than 13,000 families and households were displaced and evacuated in the Magoye (Mazabuka) area, when torrential rains flooded homes and destroyed farmlands (BBC, 2008). A male participant aged between 40 and 50 years old, who had migrated from Mazabuka in 2001 and settled in Mukonchi, stated during a focus group discussion that, 'in the 1990s we suffered from severe droughts [...] but nowadays flooding has been added to our problems. It looks like the Gods have become crazy'. Another male participant in his 50s, who migrated from Sinazongwe and settled in Lunchu said:

The sudden shift from drought to floods left many of us helpless because our crops were destroyed. In addition to worsening our food insecurity, the floodwaters brought us diseases, destroyed houses, schools, hospitals, roads and even drowned our animals.

It was revealed in many focus discussions that flooding, like drought, often resulted in crop failure due to crops being washed away, seeds failing to germinate or crops failing to reach maturity due to waterlogged soils. An added impact of flooding identified during the discussions with the respondents was that flooding had multiple impacts as it made it impossible for households to deploy informal safety nets or adaptive strategies. This is because flooding often destroys infrastructure such as roads and houses and renders the victims helpless—delivering relief to affected areas is extremely difficult. Kasali (2007) argues that as the frequency and intensity of floods increase in Zambia peasant farming has become less viable, thereby undermining the ability of the poor to come out of poverty and adapt to climate change. Consequently, they are left trapped in ever-deeper cycles of hunger, poverty and vulnerability.

Although many of the research participants identified extreme weather events associated to climate variability as triggers to their decision to migrate, it was important to determine the underlying factors or enablers that facilitated the movement for the 30 migrant households. Using the participatory research method of listing, participants were asked during focus group discussions to identify key enablers¹¹ for their movement. These are shown in Table 6.

Table 6. Movement enablers: from Southern to Central Province

Movement enabler	Number of responses	Percentage
Kinship ties in Central Province	63	68
Friendship/marriage to a native of Central Province	25	27
Political networking	3	3
Savings	2	2
Total	93	100

Source: based on discussions with the 30 migrant households (March, 2010).

Table 6 shows that the main factor (68 per cent) facilitating the migrants' movement was having kinship ties in the immigration destinations. The second most important enabler (27 per cent) was having other social ties such as friendship or marriage with a native of Central Province.

A women aged between 40 and 50 years old, married and with nine children, pointed out during a focus discussion in Mukonchi that, 'we decided to move here because we had friends and family who had already settled here in the 1980s. They spoke to the local chief for us and we were given land and this is where we are now'. Another male participant in his late 40s, who originally migrated from Sinazongwe and who upon retirement from the civil service settled in Lunchu, stated:

After I retired, the next thing for me was farming. But farming in Sinazongwe is hard these days. But some old workmates and friends connected me to the traditional rulers here and I bought a piece of land here in Lunchu.

From the views expressed above, we can argue that although climate variability related events played a significant role in the decision to migrate by the 30 households, it is the social ties or connection to relatives and friends in the destination areas that facilitated or enabled them to relocate from Southern to Central Province. This development is consistent with the meso level of migration analysis in which social and symbolic ties among movers and groups of people are considered as resources available to them and facilitating the decision to migrate or not to. In this case, it could be argued that it is the social networks and kinship ties in the destination areas that played a key role in the decision of the 30 research households to migrate and settle in the two research sites.

From the views expressed by research participants above, it is important to note that changes in climatic conditions have an impact on households that are dependent on natural resources and rainfall for their livelihoods. Thus, the combined effects of extreme weather events such as repeated droughts and flooding can negatively affect a household's ability to obtain secure livelihoods. This is because changes in climatic conditions can adversely affect the limited assets that poor and vulnerable rural households have access to. This assertion presupposes the assumption that the decision for a household or individual to migrate is normally taken after the involved victims

evaluate the assets available to them, and what the implications of extreme weather events are on them. When these resources are considered to be under threat and leading to compromised livelihoods or adaptive capacity of households and individuals, then migration can become one of the responses as a way of reducing their vulnerability and building their resilience against severe weather conditions.

In the case of the empirical evidence discussed in this paper, it is plausible to argue that processes associated with extreme weather conditions such as reduced yields due to reduced precipitation, social conflicts arising from competition over natural resources and land utility, and food insecurities, are factors that can influence the decision to migrate. However, the decision to migrate is only realised when existing social ties in the emigration areas provide some form of security for the potential migrant. In a nutshell, therefore, it can be argued that it is the hope for a better life in the destination areas that seems to underlie a migrant's decision to relocate. In the case of the 30 household migrants studied in this paper, it is the perceived availability of reliable rainfall and fertile soils, coupled with the perceived potential for high agricultural output and financial returns in the destination areas that acted as ingredients motivating the decision to migrate from southern to central Zambia.

Conclusion

Although there is increased interest in the relationship between climate change and migration, the connection is not yet clearly understood. This is due to the lack of empirical studies demonstrating the link between observed migratory patterns and changes in climatic conditions. Using field-based data this study has attempted to establish the complex relationship between extreme weather events and migration. Despite previous scepticism, the evidence in this paper suggests that migration is one of the common adapting strategies employed by farming households when subjected to the impacts of climate change. The insufficient availability of water, for example, affects not only agricultural productivity but also the survival of livestock, as well as other household assets important in adapting and building resilience against climate change.

Migration related to extreme weather is likely to become a new challenge to policy-makers in the future. One recommendation is to promote policies that aim to make crops and livestock less sensitive and vulnerable to weather stresses and shocks. This may require encouraging farmers to grow more drought-resistant phenotype crops, practising crop and livestock species diversification, large investments in agricultural technology and sciences, educating farming communities on how to protect their assets against extreme weather conditions, and providing training and research for adaptation to local conditions.

Furthermore, institutions mandated to take care of issues relating to climate change, food production systems and natural resource management must endeavour to create formal mechanisms that can mitigate the risks and impacts of climate change. These may include early warning systems and infrastructure development. Such policy responses would minimise the adverse effects of climate change on all sub-sectors of the economy and society.

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Endnotes

- ¹ The Tonga are the major ethnic group in Southern Province of Zambia.
- ² Both Mukonchi and Lunchu are settlements of about 300,000 and 150,000 people in Rural Kabwe and Kapiri Mponshi Districts respectively.
- ³ The post-harvest survey is conducted annually by the Zambian Central Statistics Office to document food production in the country.
- ⁴ Zambia is administratively divided into nine provinces. Each of these provinces has a provincial capital.
- ⁵ Tonga is the main language spoken in Southern Province of Zambia and both authors are fluent Tonga speakers.
- ⁶ Wendy Phillips is the cartographer in the Department of Geography and Environmental Studies, University of Witwatersrand, and was responsible for developing this map for the authors in 2013.
- ⁷ All the 30 migrant households included in this study were Tonga from Southern Province and were linked to the original 400-study population. Although some had retired from government and the mines, they carried out farming activities using relatives or paid labour in their areas of origin in Southern Province of Zambia.
- ⁸ These are farmers who straddle peasant and commercial farming and produce both for domestic consumption and for the market.
- ⁹ In this paper, assets are understood to refer to a stock of financial, human, natural or social resources that can be acquired, developed, improved and transferred across generations. They generate flows or consumption, as well as additional stock.
- ¹⁰ The name Zongwe is popularly used by the Tonga people to refer to Sinazongwe, one of the areas of emigration in Southern Province.
- ¹¹ These are factors that enabled individuals or households actually to migrate.

References

- BBC (2008) 'Zambia declares floods "disaster"'. BBC News, London. 18 January. <http://news.bbc.co.uk/1/hi/world/africa/7196068.stm> (accessed 8 December 2014).
- Black, R. (1998) *Refugees, Environment and Development*. Addison Wesley Longman Limited, Harlow.
- Black, R. (2001) *Environmental Refugees: Myth or Reality?* New Issues in Refugee Research Working Paper No. 34. UN High Commissioner for Refugees, Geneva.
- Castles, S. (2002) *Environmental Change and Forced Migration: Making Sense of the Debate*. New Issues in Refugee Research. Working Paper No. 7. UN High Commission for Refugees, Geneva.
- Castles S. and M.J. Miller (2009) *The Age of Migration: International Population Movements in the Modern World*. Fourth edition. Palgrave MacMillan, Basingstoke.
- CEEPA (Centre for Environmental Economics and Policy in Africa) (2006) Climate Change and African Agriculture. Policy Note No. 39. CEEPA, Pretoria. <http://www.ceepa.co.za/uploads/files/POLICY%20NOTE%2039.pdf> (accessed 8 December 2014).

- Central Bank of Zambia (2006) *Quarterly Report*. BOZ, Lusaka.
- Chibuye, M. (2011) *Interrogating Urban Poverty Lines: The Case of Zambia*. Human Settlements Working Paper Series: Poverty Reduction in Urban Areas, No. 30. International Institute for Environment and Development, London.
- Cliggett, L. (2000) 'Social components of migration: experiences from Southern Province, Zambia'. *Human Organisation*. 59(1), pp. 125–135.
- Collinson, S. (2009) *The Political Economy of Migration Processes: An Agenda for Migration Research and Analysis*. Working Paper No. 12. International Migration Institute, Oxford.
- CSO (Central Statistics Office) (1997) *The Evolution of Poverty in Zambia 1991–1996*. Central Statistics Office, Lusaka.
- CSO (1998) *Living Conditions in Zambia: Preliminary Report*. Central Statistics Office, Lusaka.
- CSO (1999) *Living Conditions in Zambia (1998)*. Central Statistics Office, Lusaka.
- CSO (2004) *Living Conditions Monitoring Survey Report 2002–2003*. Central Statistics Office, Lusaka.
- CSO (2005) *Living Conditions Monitoring Survey Report 2004*. Central Statistics Office, Lusaka.
- CSO (2010) *Zambia: Census of Population and Housing*. Central Statistics Office, Lusaka.
- Dansereau, S. (2007) 'Beyond governance and sustainability in South African mining: resource curse, green PR or development?' Paper presented to the Conference on State, Mining and Development in Africa. 13–14 September, Leeds.
- Dillon, A., V. Mueller and S. Salau (2011) 'Migratory response to agricultural risk in northern Nigeria'. *American Journal of Agricultural Economics*. 93, pp. 1048–1061.
- Dun, O. and F. Gemenne (2008) 'Defining "environmental migration"'. *Forced Migration Review: Climate Change and Displacement*. 31, pp. 10–11.
- El-Hinnawi, E. (1985) *Environmental Refugees*. United Nations Environment Programme, Nairobi.
- Ezra, M. and G. Kiros (2001) 'Rural out migration in the drought prone areas of Ethiopia: a multi-level analysis'. *International Migration Review*. 35(3), pp. 749–771.
- Fellmann, J., A. Getis and J. Getis (1995) *Human Geography: Landscapes of Human Activities*. Second edition. WMC Brown Communications, Dubuque, IA.
- Gray, C. and V. Mueller (2012a) 'Drought and population mobility in rural Ethiopia'. *World Development*. 40, 134–145.
- Gray, C. and V. Mueller (2012b) 'Natural disasters and population mobility in Bangladesh'. *Proceedings of the National Academy of Sciences*. 109(16), pp. 6000–6005.
- Henry, D. (n.d.) *Some Questions on the Migration–Environment Relationship*. Unpublished paper. Universitaire Notre-Dame de la Paix.
- Homer-Dixon, T. (1994) 'Environmental scarcities and violent conflicts: evidence from cases'. *International Security*. 19(1), pp. 5–40.
- Hugo, G. (1996) 'Environmental concerns and international migration'. *International Migration Review*. 30(1), pp. 105–131.
- Hunter, L. (2005) 'Migration and environmental hazards'. *Population and Environment*. 26(4), pp. 273–302.
- Jacobson, J. (1988) *Environmental Refugees: A Yardstick of Habitability*. Worldwatch Paper No. 86. Worldwatch Institute, Washington, DC.
- Kasali, G. (2007) *Historical Overview of Climate Change Activities in Zambia*. The World Conservation Union Forest Conservation Programme (IUCN), Gland and Lusaka.
- Kibreab, G. (1994) 'Migration, environment and refugeehood'. In B. Zaba and J. Clark (eds.) *Environment and Population Change*. International Union for the Scientific Study of Population, Derouaux Ordina Editions, Liege. pp. 115–129.
- Marchiori, L., J.F. Maystadt and I. Schumacher (2012) 'The impact of weather anomalies on migration in sub-Saharan Africa'. *Journal of Environmental Economics and Management*. 63(3), pp. 355–374.
- Massey, D. et al. (1993) 'Theories of international migration: a review and appraisal'. *Population and Development Review*. 19(3), pp. 431–466.

- Maystadt, J.F. and V. Mueller (2012) *Environmental Migrants: A Myth?* Research Brief No. 18. International Food Policy Research Institute, Washington, DC.
- McGregor, J. (1993) 'Refugees and the environment'. In R. Black and V. Robinson (eds.) *Geography and Refugees: Patterns and Process of Change*. Belhaven, London. pp. 157–170.
- Milimo J., T. Shilito and K. Brock (2002) *Who Would Ever Listen to the Poor? The Poor of Zambia Speak*. Zambia Social Investment Fund, Lusaka.
- Myers, N. (1988) 'Threatened biotas: hotspots in tropical forests'. *The Environmentalist*. 8, pp. 118–208.
- Myers, N. and J. Kent (1995) *Environmental Exodus: an Emergent Crisis in the Global Arena*. The Climate Institute, Washington, DC.
- Oliver-Smith, A. (2006) *Reflections on Nature, Environment and Society in Vulnerability Research*. United Nations University–Institute for Environment and Human Security, Bonn.
- Osterling, J. (1979) 'The 1970 Peruvian disaster and the spontaneous relocation of some of its victims: Ancashino peasant migrants in Huayopampa'. *Mass Emergencies*. 4, pp. 117–120.
- Piguet, E., A. Pecoud and P. De Guchteneire (eds.) (2011) *Migration and Climate Change*. Cambridge University Press, Cambridge.
- Potter, R., T. Binns, J. Elliott and D. Smith (2008) *Geographies of Development: An Introduction to Development Studies*. Pearson Prentice Hall, Harlow.
- Ramlogan, R. (1996) 'Environmental refugees: an overview'. *Environmental Conservation*. 23(1), pp. 81–88.
- Ravenstein, E.G. (1885) 'The laws of migration'. *Journal of the Statistical Society of London*. 48(2), pp. 167–235.
- Renaud, F., J. Bogardi, O. Dun and K. Warner (2007) *Control, Adapt or Flee: How to Face Environmental Migration?* UNU-EHS Publication No. 5/2007. United Nations University–Institute for Environment and Human Security, Bonn.
- Reuveny, R. (2005) 'Environmental change, migration and conflict: theoretical analysis and empirical exploration'. Paper presented at the Human Security and Climate Change Conference. 21–23 June, Oslo.
- Simatele, M. (2006) *The Impacts of Structural Adjustment on Food Production in Zambia*. Research Papers No. RP_159. African Economic Research Consortium, Nairobi.
- Simatele, D. and M. Simatele (2009) 'The evolution and dynamics of urban poverty in Zambia'. In T. Beasley (ed.) *Poverty in Africa*. Nova Publications, New York, NY. pp. 177–192.
- Simutayi, N. (2008) *Copper Mining in Zambia: The Developmental Legacy of Privatisation*. Institute for Security Studies, Pretoria.
- Singh, M. (2000) 'Environmental (in)security: loss of indigenous knowledge and environmental degradation in Africa'. In D. Tevera and S. Moyo (eds.) *Environmental Security in Southern Africa*. Sapes Books, Harare. pp. 25–34.
- Todaro, M. (2000) *Economic Development*. Pearson Education Limited, Harlow.
- Trolldalen, M., J. Birkeland and P.T. Scott (1992) *Environmental Refugees: A Discussion Paper*. World Foundation for Environment and Development and Norwegian Refugees Council, Oslo.
- World Bank (2007) *Zambia Poverty and Vulnerability Assessment*. Report No. 32573-ZM, Human Development 1, Poverty Reduction and Economic Management 1, Africa Region. The World Bank, Washington, DC.