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1. Introduction

As the world's climate changes, the livelihoods of farming communities, who are directly dependent on natural resources, will be affected. One possible consequence is accelerated rural-urban migration (Devereux, 1999, Barrios et al., 2006), which is a concern to policy makers in less developed countries (LDCs). This is because rapid urbanisation already presents challenges for housing, transport, and social infrastructure such as health and education facilities (Cohen, 2006, Tacoli, 2009, Alirol et al., 2011). Despite this, there is little empirical evidence to support the idea that climate change will induce urban migration (Lilleør and Van den Broeck, 2011). Although the impact of climate change on migration patterns is hotly debated, the debate remains largely theoretical. Consequently, much is unknown about the impact of climate change on urbanisation.

Understanding the impact of rural-urban migration on urbanisation is complicated by the idea that most migrants in Sub-Saharan Africa (SSA) move back and forth between a sending and receiving area as they attempt to access distant resources that are not linked to the local economy (Potts, 2010) , thus protecting a family from agricultural shocks and stresses (Massey et al., 1993). Given that these "circular migrants" return to their rural households, it is assumed that urbanisation does not occur as migrants do not stay in the city permanently (Potts, 2010). However, in predominantly rural countries where climate change threatens rural opportunities, urban areas may be seen to offer a better life (Barrios et al., 2006, Warner, 2010, Parnell and Walawege, 2011). This may lead to an overall reallocation of labour from rural to urban areas in the form of more permanent migration patterns (Barrios et al., 2006, Collier et al., 2008).

To tease these issues apart, this paper examines how climate change may affect rural-urban migration and urbanisation in Malawi, Southern Africa. We begin by reviewing the global literature on climate and migration before focusing on Malawi. We follow this by presenting the 'migration system' (Mabogunje, 1970) that provides a theoretical framework for our research before outlining our data collection methods. We then present data that examine our three research questions:

(i) Who are Malawi's migrants?
(ii) How are sending and receiving areas linked?
(iii) How long do migrants stay in town and at what point do they become permanent?

For each of our research questions, we also consider how climate change may affect our findings. Finally, we conclude the paper with a discussion on the impact of climate change on Malawi's migration system.

2. Climate, environment and migration

The link between migration, environment and climate is complex. This is partly because migration decisions are made against a backdrop of political, social, cultural, economic and environmental issues (Black et al., 2013). This means that different populations (and different communities within a population) are likely to respond to a single environmental pressure in different ways. This complexity is reflected in the empirical literature from across the globe. For example, Barrios et al. (2006) report that a combination of rainfall change and policy reform in post-colonial Africa led to urbanisation. Conversely, using the same method specifically in Burkina Faso, Henry et al. (2004) found no such relationship. They did, however, find that men were more likely to leave their village

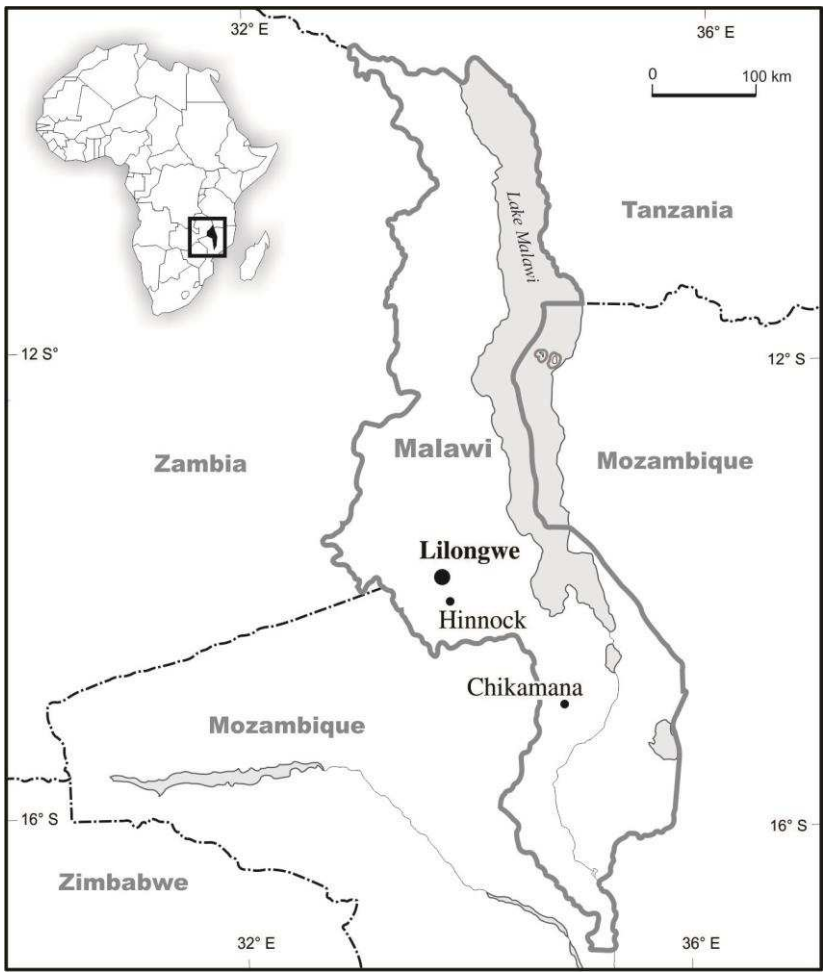
for a new rural area following poor rainfall, whereas women were less likely to leave at this time. Feng et al. (2012) report a relationship between climate-driven reduced crop yield in the US Corn Belt and youth migration to urban areas. However, Gray and Mueller (2012) find that, in Bangladesh, household level crop failure does not result in migration due to loss of assets needed to migrate, as well as the requirement for increased labour during crisis.

Despite this complexity, one common theme emerges; that migration in response to environmental stresses and shocks follows pre-established labour migration networks (Findley, 1994, Mortreux and Barnett, 2009). However, severe and prolonged ecological change may begin to create new migration patterns, for example a shift from dry-season migration to wet-season migration amongst poorer farmers (Rademacher-Schulz et al., 2012), or very short distance movements by the most vulnerable (Wrathall and Suckall, 2014). Whether or not environmental change will affect the flow of migrants to urban areas is very likely to depend on the country context.

3. Case Study: Malawi

3.1 Climate, environment and migration in Malawi

Given the context specific nature of migration decision-making we respond to a suggestion from Black et al. (2008) to conduct research that explores how climate change may affect current migration patterns using locally-specific case studies. We do this in Malawi, a small landlocked country in Southern Africa bordered by Mozambique, Tanzania and Zimbabwe (Figure 1).



We focus on Malawi for three reasons (1) the country is home to a large rural population that directly depends on farming for food and income (ref); (2) climate change and variability threaten rural livelihoods by causing a decline in agricultural productivity as well as increasing the frequency of extreme events; and, (3) given the absence of alternative rural livelihood options outside of agriculture, it is certainly possible that climate associated changes may prompt rural dwellers to move to the country's rapidly expanding urban areas (Schensul et al., 2013) where workers earn over two thirds of the median earning of their rural counterparts (NSO, 2014). However, there is currently little evidence to suggest this is the case. We expand on these points below.

First, of the country's 13 million citizens, 81.2% are rural farmers (NSO, 2008) of whom 97% rely on maize for food and income (Bezu et al., 2014). Maize productivity is low and most families operate below subsistence with significant impacts on well-being (Denning et al., 2009, GoM, 2006). Second, well-being is likely to be further affected by climate change and variability as a result of both declining crop yields and increased frequency of extreme events. Exactly how Malawi's climate will change over the next decades is not fully understood partly because of a poor understanding of the complex interactions between the drivers of the African climate and partly due to a lack of local weather data (Conway, 2009). Data that do exist, show temperatures have increased by 0.9°C between 1960-2006, with projections suggesting an increase of up to 5°C by the 2090s (McSweeney et al., 2010). Changes in rainfall patterns are harder to establish due to variability (Vincent et al., 2014), but observations suggest there has been no change in onset, duration or amount of rain (Simelton et al., 2013). However, models consistently project a decrease in dry season rainfall and an increase in wet season rainfall, mostly as a result of heavy rainfall events (McSweeney et al., 2010). Overall, climate change and variability is likely to have significant implications for rural livelihoods and well-being. For example, regional estimates suggest maize yields will fall by 1% for each growing day spent above 30 °C and as much as 1.7% under drought conditions (Lobell et al., 2011). This is likely to be compounded by a shorter growing season (Vizy et al., 2015). Well-being will be further compromised by more frequent floods and droughts (Conway, 2009). Malawi is already prone to extreme events, for example, drought in 2002 was one factor in a serious food crisis throughout the country (Devereux, 2002). More recently, flooding in early-2015 displaced 230,000 people and resulted in over 100 deaths (Unicef, 2015).

Third, empirical evidence detailing how Malawian households use rural-urban migration to deal with climate change and variability is lacking. However, there is some evidence that households use rural-rural migration to deal with environmental stress (Potts, 2006b, Lewin et al., 2012). There is also evidence that intra-rural moves are influenced by environmental conditions in the potential destination. For example, Lewin et al. (2012) observe that Malawian migrants are less likely to move to areas that have had high rainfall variability during the last ten rainy seasons, or where drought has occurred in the last five years. Historically, Christiansen (1984) suggests rural-rural migrations have been influenced by low population density in destinations as farmers search for land. However, if climate change alters the rural landscape on a wide scale, favourable rural environments are likely to become scare. Taking this into account, the Government of Malawi has suggested that diminishing land holdings, a lack of off-farm economic opportunities, natural disasters and environmental degradation are already contributing to urbanisation (Brown, 2011).

Against a backdrop of environmental change, Malawi's 2008 population census (NSO, 2008) shows inter-censual annual growth (from 1998) in the four major cities, including the capital, Lilongwe,

which grew by 4.3%. Currently, around 25% of all migrations by household heads are to urban areas (Lewin et al., 2012). It is noted that not all urbanisation can be attributed to migration. Aside from natural city growth through urban births, it is generally assumed that migration in Malawi is like other Southern African nations and is temporary and circular with (Orr and Mwale, 2001, Englund, 2002, Bryceson and Fonseca, 2006, Mtika, 2007, Potts, 2010). Similarly, it is generally accepted that, as part of a household insurance strategy, circular migrants remit part of their income back to the rural house (Davies and Davey, 2008, Davies et al., 2009, Davies, 2011). Remittances are unidirectional (urban to rural) and although some bi-directionality has been noted it is usually between rural households (Davies and Davey, 2008).

3.2 Study sites

To understand migration patterns more fully, we chose Malawi's capital Lilongwe to represent our urban receiving region. Lilongwe was selected for inclusion in the study as it is home to a sizeable population of migrants (Englund, 2002, Potts, 2006b). Its position as a migrant centre was confirmed at the start of the first field season through interviews with local experts from the UNDP and the University of Malawi. To locate suitable rural sending regions, we used census data (NSO, 2008) to select one district that had experienced increased out-migration between the 1998-2008 censuses and one district that had experienced insignificant or static migration between the censuses. We then approached the district level agricultural extension team to identify villages that had been exposed to the types of shocks and stresses that are common in Malawi. Specifically, we selected Chikamana in Balaka Distirct, Southern Region where migration has increased since 1998, and Hinnock in Lilongwe District, Central Region where migration has remained static. To ensure each village was representative of other villages in the district, and, therefore, relatively typical of Malawi as a nation (i.e. a nation dominated by subsistence maize-farmers who are extremely vulnerable to climate change), we conducted focus groups in at the start of the first field season in each village. During focus groups, we established that maize farming was the key livelihood activity with cotton growing a secondary activity in Chikamana and tobacco production a secondary activity in Hinnock. Respondents reported a decline in agricultural productivity and increasingly pronounced hungry season that they attributed to temperature increases, delayed and short rains and decreased soil fertility. Both villages also reported sudden and acute shocks, specifically a severe hunger and flooding following heavy rain.

4. Framework and data collection

4.1 Theoretical framework

To understand how movements between rural and urban regions in Malawi may be affected by climate change, we use the concept of the migration system. Migration system theory was introduced in a seminal paper by Mabogunje (1970) who outlined a theory that focused on explaining why "any person from any village would want to migrate to the city" and why they would become a permanent urban dweller (Mabogunje, 1970: 11) .

In a migration system, a sending region (usually rural) and a receiving region (usually urban) are linked by the movement of people (i.e. migrants) and the flows of goods, capital (e.g. remittances), materials, ideas and information (Mabogunje, 1970, Bakewell et al., 2011, Bakewell, 2013, Curtis et al., 2015). However, not all of the community in a sending region will activly participate in the migration system. Mabogunje (1970) suggested that the size of the pool of potential migrants in a sending region may be affected by characteristcs such as age, wealth and family position. Furthermore, changing wages and job opportunities in the receiving region determine whether individuals in the pool of potential migrants actually migrate. As De Haas (2010: 18) points out "whether migration occurs, crucially depends on the skills and knowledge of migrants and conditions in the specific economic sectors where they are likely to find employment both at the origin and destination." However, it is acknowledge that people's perceptions of what the city may offer, rather than the reality they actually face when they arrive in town, is an important factor and this can explain 'irrational' moves toward economically unstable environments (Harris and Todaro, 1970).

The theoretical foundation of the migration system is that a change in one part of the system, such as the creation of new businesses in a receiving region, or an environmental event in a sending region, will have repercussions throughout the entire system (Curtis et al., 2015). Following such a change, the 'flows and counterflows' that connect places reinforce migration amongst some pathways and to discourage it amongst others (Mabogunje, 1970). Established migration systems can self-perpetuate, re-structure or decline (de Haas, 2009). In terms of self-perpetuation, foreign migrant communities in urban areas may form a 'critical mass', such as ethnic businesses and communities that attract more ethnically similar migrants (Bakewell et al., 2011). For example, the Eastleigh area of Nairobi became known as 'Little Mogadishu' and was characterised by a high demand for Somali labour (Campbell, 2006). Similarly, Mabogunje (1970) described how information about migrants' progress at their destination is transmitted back to the place of origin with positive infomtion encouraging further migration. However, there is little understanding of the internal mechanisms that drive migration systems, including how they come to decline (de Haas, 2009, Bakewell et al., 2011).

4.2 Data collection

Data were collected over two field seasons (2009 and 2010) in both sending and receiving areas. To understand the first research question, 'what are the characteristics of the current pool of potential migrants in Malawi?' we conducted quantitative rural surveys to collect data on migration intentions. We then divided our rural population into two groups – the pool of potential migrants and the potential non-migrants based on whether they indicated in the survey that they wanted to move to town (Table 1). In Hinnock, a third group, potential rural-rural migrants, emerged, however, we exclude this group from analysis as they fall outside of our objectives. Our rural surveys also collected data on social, human and financial capital. Social capital was proxied by the presence of urban contacts. Human capital was proxied by the number of years spent in education. Finally, financial capital was proxied by two elements. The first element examined how close to self-sufficiency a household was (i.e. smallholder productivity) based on the Government of Malawi's categories of net food buyers, intermediate farmers and net food sellers (Chirwa et al., 2006). The second element examined the household's relationship with *ganyu* (off-farm work); usually, better-

off households with more land employ poorer households to carry out *ganyu* (Vaughan, 1987, Bryceson, 2006). Accordingly, households were classed as better-off, intermediate or poor. Urban surveys used the same format as the rural surveys. However, migrants were asked to report on their social, human and financial capital at the time of their migration rather than their current situation.

To understand the second research question 'how are sending and receiving areas linked?' we used data from the surveys, the in-depth interviews and the focus groups to examine how tangible (i.e. produce and money) and intangible (i.e. ideas and information) goods flow between sending and receiving areas.

To understand our third research question 'how long do migrants stay in town and at what point do they become permanent?' we used data from the urban surveys, as well as the in-depth interviews and focus groups to examine the duration of migration and the factors that influnce permenance or circualarity. Finally, to understand the impact of climate change on all three of our research questions, we used focus groups in the sending areas and receiving areas and in-depth interviews in sending and the receiving areas to probe more deeply into migration decision-making. When discussing how climate change may affect future decision making, repondents were asked to think about how they had reacted to previous stresses and shocks. Table one provides a full breakdown of the number of interviews, focus groups and surveys conducted in each region.

Table 1 – characteristics of the study sites and sampled population

	Receiving region	**Sending regions**	
	Lilongwe	**Chikamana**	**Hinnock**
Population	680,000	216 households	280 households
Inter-censual population change between 1998 – 2008 (Lewin et al. 2012)	Net in-migration	Net out-migration	Net-out migration
Distance from Lilongwe	0km	310 km	22 km
Sampling			
Surveys	97	87	57
Interviews	25	25	25
Focus groups(total participants)	23	55	45
Average age of sampled population	22.6	41.8	34.6

All data were collected by a local research team in the local language, Chichewa. The field team had extensive rural and urban field experience. Rural data collection focused on the area around the homesteads to avoid disturbing those at work in the field. Appropriate permission for the study was granted by the headman of each village. Urban data collection took place in Lilongwe's informal housing areas, as well as in the market area – a location where urban experts suggested was dominated by migrants. In all three study sites, data collection began with the surveys. Survey sampling was random; members of the research team called at every fifth house or every fifth market stall. In Lilongwe, the research team confirmed that each respondent was a migrant (defined as someone who had moved into the city after the age of 16) before data collection began. Following the surveys, focus groups took place in urban areas, as well as in the sending regions. In

the sending regions, focus group participants were split into two groups; potential migrants and potential non-migrants. Finally, in-depth interviews took place with potential migrants and non-migrants in all three study sites. Transcripts from the interviews and focus data were translated into English and were then coded and analysed for common themes by the principal researcher. Quantitative data from the survey were cleaned and entered into SPSS (Version 20) where Chi Squared and t-tests were performed.

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5. Results: Current migration system and possible impacts of climate change

5.1 Who are Malawi's migrants?

Our data show that the pool of potential migrants in the sending region had a higher level of financial, human and social capital than those who did not wish to migrate (Table 2). In terms of financial capital, those from intermediate households were more likely to belong to the pool of potential migrants than those from poor households. However, this finding may be misleading. Specifically, in Hinnock village, 53.8% of people from better-off households belonged to the pool of potential migrants, compared to 12.9% of people from intermediate households and 25% of people from the poorest households (p=0.01). In Chikamana, there was no significant relationship between migration intention and financial capital, possibly due to the generally low level of human capital (proxied by education) amongst all wealth groups that meant that even better-off households felt they would be unlikely to migrate. This may be because people of all wealth categories believe that education is essential for migration (Wrathall and Suckall, 2014). Within Chikamana, potential migrants had 2.1 years more education than those outside the pool (p=0.02). In terms of social capital, 54.8% of those in the pool of migrants had a contact in town compared with just 19.5% of potential non-migrants (p=0.00). Finally, household heads were less likely to belong to the pool of potential migrants than other household members – 18.7% of potential migrants were non-heads compared to 25% in the potential non-migrants, although this is not statistically significant (p=0.4)

The importance of financial, human and social capital was even more prominent when looking at those who had already left the village. Almost half (49.2%) of those surveyed in Lilongwe had left better-off households. Surveyed migrants had spent 7.9 years in school compared to the national average of 3.2 years, and all had access to an urban social network before migration took place. Finally, data from the urban survey shows that the majority (74.3%) of migrants in Lilongwe were not household heads. Instead, they are the younger sons and daughters of better-off rural families.

Given that the potential migrants are relevantly better off than those who do not wish to migrate it is clear that migration aspirations are not due to resource scarcity. Instead, our interview and focus group data suggests that the pool of potential migrants were motivated by pursuit of a life outside of farming, a life that is only available to those with enough resources to pursue it. For example;

> *"Why would I want to stay in the village and carry water on my head? … Why would I want to be a farmer? I went to school so I can be a secretary here in the town. I have money and I*

can drink beer at the bar! What is there for me in the village? Nothing. My life is here in this town."

(Female, 38, secretary at an agricultural organisation, Lilongwe)

Table 2: Capital assets of respondents

	National average	Migrants in Lilongwe	Pool of potential urban migrants	Potential non-migrants
		(n=97)	(n=34)	(n=110)
Access to urban social network	n/a	100	54.8	19.5
Better off **(%)**	10	49.2	20.9	21.2
Intermediate **(%)**	30	37.7	58.1	48.4
Poorest **(%)**	60	13	20.9	30.3
Years at school	3.2	7.9	5.1	2.9
Household head (%)	-	25.8	18.7	25
Age	-	22.6	28.2	42.2

5.2 The possible impact of climate change on potential migrants

Data gathered during focus groups and interviews suggest two ways that climate change may reduce the ability of the pool of migrants to enter the migration system. The first was by reducing the potential migrants' ability to acquire the human and financial capital that migration depends on. The second was that climate change may reduce employment opportunities in urban areas, which in turn affects potential migrants' access to urban social networks (see section 5).

In terms of the first point, focus group data revealed how climate change threatened both human and financial capital. In terms of human capital, focus group respondents argued that drought and floods reduced poor families' ability to send children to school. For example;

"Hungry children won't go to school. I know this has happened before. The children were too hungry to walk to school. And they were too hungry to sit and to learn."

(Interview with the chief of Chikamana)

Financial capital was also threatened by climate change since environmental stresses and shocks reduce agricultural productivity on which people depend for income. This is important given that 53.6% of rural survey respondents funded their migration by engaging in agricultural activities within their own village. When rural income is reduced, migration becomes less likely;

"If I get a good harvest next year, then I will be able to sell my crops and just go to town. If I get no luck I will just stay because I need money from the crops to leave."

(Male, potential rural-urban migrant, Hinnock – Focus group statement)

Overall, therefore, our findings suggest that in terms of who the migrants are: (1) it is only relatively well-off people (where being well-off is a function of both human and financial capital) who are able to migrate and (2) in as much as climate change reduces human and financial capital then climate change may increase barriers to urban migration.

5.3 Links between sending and receiving regions

Data reveal (1) that the flow of tangible assets (i.e. money and goods) between sending and receiving areas is bilateral; and (2) that intangible assets such as information about urban opportunities are an important factor in the decision-making process amongst potential migrants.

With regard to our first point, our survey data show that urban -rural flow of money, or remittances, was the most prominent form of exchange; 77.7% of respondents regularly sent money home to rural families (Table 3). There was a correlation between time spent in town and ability to remit money with more experienced migrants (those who had been in town over ten years) more likely to remit than new arrivals ($p=0.03$). Focus group data suggested that this was less a function of a new migrant's struggle to find employment, and was simply indicative of the fact that new migrants had not yet had a chance to visit their rural homes. For example;

> *"I haven't sent any money home yet because I will take it when I visit and I have not been back. I will go next month and then I will take my family some money. If you have friends going back to the village, they can take the money for you. But I will take it myself."*
>
> (Male, Focus Group Statement, Lilongwe)

Furthermore, once a migrant became established in town, they were able to send money home to support others' migration. In Lilongwe, 46.4% of migrants had funded their move after receiving such a 'gift'.

While finding evidence of urban - rural flows is unsurprising, data also demonstrates that rural - urban flows are extremely important. More particularly, reverse remittance, where rural households send money or food to their urban members, were reported by over half of the urban survey respondents. Focus group discussions revealed two explanations for this. First, urban focus group participants described how fluctuations in urban food prices meant that they often struggled to purchase enough food to meet their needs and needed loans from rural family members. The second explanation was the idea that rural households are keen to ensure their urban member remained close, despite physical distance. In this way, reverse remittances are an investment as the urban recipient is more likely to reciprocate by sending money home. For example, a young vender explained;

> *"Even a 'big man' in town will receive a bag of maize when he goes home. It is so he does not forget his rural family"*
>
> (Female, 19, phone card vendor, Lilongwe – Interview statement)

Our focus group data also show for many migrants, the way they obtained an urban income was by selling the products of rural labour such as food, fire wood or handicrafts. In this way, rural produce flowed from the rural to urban areas where it was sold in the market. For example, as one respondent noted;

"I sell fruit in this market. I buy boxes of tomatoes from the next district along and I come to town and sell them. I stay with my sister in town, but if I have a lot of tomatoes to sell and I want to sell early, I sleep in the market with the other women."

(Female, 40, vegetable seller, Lilongwe – Focus group statement)

As a result, we conclude from these data that to a large extent, urban migrants at least partly depend on the economic activity and labour of their rural family members.

Table 3: Rural-urban linkages

	All migrants %	New arrivals (<1 year in town) %	Experienced migrants (>1 year and <10 years in town) %	Dedicated urbanites (>10 years in town) %
Remits goods back to the village*	77.1	64.3	86.1	100
Receives goods from the village	50.7	21.4	55.5	57.9
Returns to help with farming	24.6	35.7	19.4	26.3
Has visited the village since moving to town	85.5	78.6	94.7	97.2

*Statistically significant (p=0.03)

5.4 The possible impact of climate change on rural-urban linkages

Our data reveal that climate change impacts are likely to impact on rural-urban linkages in three main ways: (1) the price and quality of goods available in town; (2) the direction of remittances between sending and receiving regions; and (3) the flow of negative information from the receiving to the sending regions.

In terms of the first point, focus group participants described how changes to prices and goods in town could be as a result of direct climate impact within town, as well as impacts that took place in the rural areas. Direct urban climate impacts included urban flooding that led to the direct loss of productive assets and/or illness that in turn leads to an inability to work;

"When it rains for a long time, everything is affected. The charcoal and other things are wet. No one wants wet charcoal. Business drops a lot and then you have no money. Last time the river flooded, my friend's chickens were swept away."

(Female, 35, roadside charcoal seller, Lilongwe – Interview statement)

Indirect impacts that originated in rural areas included floods and droughts in districts that supply the city with rural goods, such as food, firewood or timber. Either way, focus group participants argued that climate change could affect commodity prices if demand exceeded supply. The impact of this was noted by all urban respondents;

"When there is a problem like a drought in some place, food costs so much more than in good times. There is still food here in town. We can see the food for sale but we cannot afford to buy it."

(Female, 39, tomato seller, Lilongwe – Interview Statement)

Similalrly, heavy rains in rural areas increase the price of goods in town as transport links are affected;

"Our business can suffer if there are lots of rains because the roads are slippery. We don't get to make more coffins for these people who die on the road! No! It is the other way; we are unable to get trees for the coffins because of the poor road conditions. Also, the trees are wet and it is hard for us to use them."

(Male, 33, Coffin maker, Lilongwe – Interview Statement)

In terms of the second point, participants argued that rural-urban (i.e. reverse) remittances would increase following flooding or drought. Where a rural flood or drought occurred, many urbanites would lose access to products to sell and would have to be supported by the rural family members who were also coping with a loss of assets in the rural environment. If the climate problem affected the urban area, then the loss of assets would again require rural family members to support their urban relations. This was because nearly all those employed in the urban informal sector depended on agriculture regardless of whether or not they sold rural produce directly. The urban survey data showed only 15.4% of respondents sold crops and a further 12.3% sold processed food (such as donuts). A third (33.8%) of respondents were involved in services (e.g. security guards). Over a quarter of respondents (26.1%) sold non-food items such mobile phone credit, clothing, and hardware. Finally, 12.3% worked on an ad-hoc basis in whatever role they could get. However, interview and focus group data revel that all groups would be negatively affected by climate impacts;

"*During the rains money is scare. People don't want to spend. They don't want to go to the café because they have to save their money. After the rains they come back."*

(Female, 27, waitress/cook, Lilongwe – Interview statement)

Focus group participants also explained that when times were hard in town, they were more likely to rely on their rural family to send them food;

"We need help from our family because in town we are poor. In town, food costs money, but in the village it is free. If our farms in the village are producing food, we should be able to have this food!"

(Male, 33, car parts trader, Lilongwe – Focus group statement).

At the same time, as migrants become more reliant on their rural families, the financial assistance (e.g. money for transport) and practical assistance (e.g. finding employment) that urbanites once offered to their rural friends is withheld. One potential-migrant explained;

"My friend in Lilongwe was going to send me money for transport to move to town to stay with him. But he started having problems in town. Then last year when it rained here and in town, his business suffered. He didn't have the money to support me."

(Male, 34, potential rural-urban migrant, Hinnock – Interview statement)

With regard to our third point, the flow of non-tangible goods such as information, between sending and receiving regions, our data show that details about urban opportunities flowed through migrants' social networks back to the pool of potential migrants. Where this information was negative, this reduced the desire of the potential migrants to follow through with their migration plans:

> *"I would not go to town if my friends told me life was bad there. Of course when you hear those things it makes you think 'If my friends have no money in town, what is the point of going to that situation?'"*
>
> (Male, 26, potential rural-urban migrant, Chikamana - Interview statement)

In summary, data suggest that although climate change may reduce livelihood prodicivity in both rural and urban areas, it seems likely to affect (and even reverse) the flow of remittances from the city and into the country. Therefore, our results suggests that climate change may undermine urban life more than it undermines rural livelihoods. Further, climate change may create barriers to urban migration.

5.5 Duration of migration

Data from the urban survey suggests that Malawi's migrants are not as circular as the literature suggests. For instance, in Lilongwe, over half (52.1%) of respondents we interviewed had been in town for more than ten years; 27.5% of respondents had been in town between one and five years; and 20.3% had been in town for a year or less. Furthermore, 87.1% of migrants had only migrated once, suggesting that migration is a single, linear event.

Urban survey respondents were asked if they planned to leave Lilongwe within the next five years. Almost half (45.8 %) said they planned to remain in town permanently. A further 16.4% said they planned to move to a new city or make an international move to South Africa or Zimbabwe. A further 4.1% of respondents were unsure of their next move. Finally, a third (33.3%) of respondents suggested they would return back to their village. However, only 38.6% of respondents who were considering leaving town said they would return to the same house that they left behind. Instead, most suggested that they would move to a new house with the family they created in town. This suggests that rural-urban migration, even where the proximate cause is economic, is more than a livelihood diversification strategy where one member of household temporarily moves to town. Instead, there seems to be a separation between migrants' new lives and the homes that they left behind.

For those who wished to remain in Lilongwe permanently, strong emotional and economic connections the city were behind the decision;

> *"I am too in invested in town to leave. I will go back to visit my family, but I cannot give up my land and work in town. We built a house here; I don't have a house in the village!"*
>
> (Male, 37, sells tools, Lilongwe – Interview statement)

However, our qualitative data also show rural allegiances remain strong. Respondents described how they were able to visit their rural families by using Malawi's relatively cheap and frequent mini-bus service; 85.5% of all respondents had made at least one visit to the rural home since their migration. Of those who had been in town for ten years or more, 97.2% had visited home. Respondents also described how advances in mobile communications meant participating in rural life was possible despite physical distance;

> *"When my sister's husband died, I had to decide where the children would live and what would be best for the family. She had a lot of problems but I did not have to stay with her in the village for an extended period of time. Instead, I could direct her from here in town."*
>
> (Male, 33, car parts trader, Lilongwe– Interview statement)

5.6 The possible impact of climate change on permanence

According to the focus group discussions, both direct and indirect climate change may create a situation where urban life becomes more difficult, resulting in the return migration of those unable to sustain an urban livelihood. For example, 28% of potential permanent migrants indicated that they would return to the village if urban life become any more difficult than it currently was. Conversely, 45.4% of potential returnees indicated that they would remain permanently in town if they could secure a more sustainable livelihood.

Urban respondents who were considering a move home were aware that they could not escape the impact of climate change in rural areas. However, focus group data revealed a preference for being in one's own community during economically challenging times;

> *"[In town] If you don't make money then you don't eat. There is nothing to do. You just don't eat. No one will help you in town. You're on your own. You will starve. At least in the village when times are hard some food like okra is free. And you know your neighbours may help you if you beg to them."*
>
> (Male, 23, farmer, Chikamana – Interview statement)

6. Discussion – The impact of climate change on Malawi's migration system

Two key results stand out as important lessons from this data in terms of developing a more generalized understanding of how migration and climate change may affect urbanization. The first is that migration, in Malawi at least, is currently more permanent and less circular then most of the literature would lead us to expect. The second key point is that, inasmuch as climate change may undermine rural livelihoods, we would expect migrants to leave cities like Malawi's capital Lilongwe. This may lead to a collapse of the migration system upon which future rural-urban migration depends.

6.1 Interdependence of rural and urban areas

In Malawi, migration is less circular and more permanent than others have suggested. However, rural and urban areas remain linked. One interpretation of this is that the town and the village are two interconnected spaces with shared resources. More specifically, the town and the village are connected by a migration system, in which Bakewell et al. (2011: 5) suggest "people, families, and communities [become linked] over space in what today might be called transnational or translocal communities." In this "translocal space", resources and strategies overlap. Hence, our research should be seen as confirming conclusions made by Crush (2013: 63) that households are not "static self-contained rural or urban units but fluid entities with permeable boundaries"

In Malawi, the manifestation of these fluid boundaries is that the urban economy becomes an extension of the rural economy. Large quantities of rural produce are sold throughout urban markets to urban residents (Mkwambisi, 2009, Mkwambisi et al., 2011). This includes food, firewood and timber. Instead of migrants consistently circulating through the system along with the goods that they sell, they are able to remain in contact with their rural families through electronic communication, and through a relatively efficient local bus service. This means that rural-urban migrants can remain in town on a permanent basis without severing their rural allegiances. Instead, both an urban lifestyle and a strong rural allegiance are compatible. Although this is interesting from a sociological perspective, from a climate change perspective it means that urban migrants depend on the rural economy. And this suggests that if climate change undermines either urban or rural livelihoods, then remaining in the city may no longer be an option.

6.2 Collapse of the migration system

Our results show that when the price of rural goods increases in response to rural and urban shocks and stresses, urbanites may be as (if not more) affected than rural residents. When regional scale floods or droughts affect the country, commodity prices in both rural and urban areas rise as demand outstrips supply (Roe, 1992, Devereux, 1999, 2007, Pauw et al., 2010). A relatively small shortfall in marketed supplies can cause major increases in food prices (Devereux, 2007). This is both a function of low productivity and because roads linking urban markets with commodity supply sources become impassable leading to shortages of good in urban areas (Dorward and Kydd, 2004). Rising commodity costs place a substantial burden on the urban population and are particularly burdensome as food expenditure makes up the biggest share of all urban household spending (Mkwambisi et al., 2011). Furthermore, agricultural markets are negatively affected by problems in transport and communications infrastructure (Dorward and Kydd, 2004), which become worse during a flood. At this time, the urban poor aim to cushion price shocks by reducing spending in other areas (Cohen and Garrett, 2010). This has further negative repercussions throughout the informal economy and causes instability in urban livelihoods.

The inability of urban migrants to sustain urban livelihoods has two impacts on the functioning of the migration system. The first is that urban migrants are unable to fund migration of family and friends. The second is that information about the difficulties faced by urban dwellers in town is transmitted back to potential migrants in the sending region, either by migrants who return to the village, or through stories transmitted across social networks (Bakewell et al., 2011). Mabogunje (1970) stresses the importance of these feedback mechanisms in shaping migration systems.

Through the spread of negative migration-related knowledge to family and friends within the village, the internal moment of the system can be broken lowering aspirations to migrate (Massey and Zenteno, 1999, Kandel and Massey, 2002). This is because when urban livelihoods deteriorate, and when rural populations are aware of this, the advantages of staying in the village start to outweigh the financial, psychological and social costs of migrating (de Haas, 2009).

In many ways, therefore, our results, which suggest that climate change may reduce rural-urban flows is contrary to much of the conventional climate change literature that posits a flood of urban-bound environmental refugees. Although this position is under represented in the literature, our paper echoes Potts' (2006a) study in Zimbabwe on structural adjustment programs that suggests the effects of the nation's Structural Adjustment Policy (SAP) was to create high food prices that undermined urban livelihoods. This exposed the vulnerability of Harare's rural-urban migrants who began to exhibit stronger rural linkages and many intended to return to their villages.

7. Conclusion

Aspects of the literature on climate change impacts postulate that deteriorating environmental conditions in rural areas may trigger a rise in urban migration as people leave degraded rural environments in the hope of a better life in the city. But this common narrative on migration fails to account for at least two potentially important factors: (1) the urban livelihoods on which migrants depend are often based on the products of the rural economy; (2) potential urban migrants face substantial barriers and it is only the relatively wealthy, educated and well-connected who are able to move to the city.

The contribution this study makes is to provide empirical evidence on how climate change may affect future migration patterns in light of these two factors. In particular, if climate change undermines rural livelihoods, this may reduce urban economic opportunities. This is because if climate change reduces crops yield and sources of firewood, or undermines people's ability to produce handicrafts, then potential migrants will have less to sell in the city. Next, if climate change affects the ability to maintain a livelihood, this may increase the barriers a potential migrant faces. Taken together, our study suggests that climate change, at least in a country like Malawi, may actually have the effect of reducing urban migration.

However, caution should be taken when apply these results to other LDCs, especially those with urban economies that are at least partially divorced from agriculture. In cases where there are economic opportunities in the city for rural residents that not tied with the rural economy, we would expect to find different results. However, inasmuch as Malawi's case is representative of rural countries without much urban economic activity, then it seems plausible to hypothesize that climate change may have the effect of preventing migration rather than accelerating it.

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