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Full Length Research Paper

Return migration and development in rural communities: The case of Nzega and Magu districts, Tanzania

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This study examines the effects of both internal and cross-border re-migration on rural development in Tanzania mainland. Four rural communities drawn from Nzega and Magu districts were selected based on a high magnitude of rural-to-urban and cross-border labour migration; and distance from the district headquarters. 648 re-migrants were sampled from the four communities. The theoretical framework applied in this study is a structural approach to re-migration. The analysis draws on data collected by using a descriptive cross-sectional design, adopting a mixed methods approach and a Probit regression technique used to estimate the effects of total domestic and overseas savings on various expenditure categories. Results confirm the overall hypothesis that return migration has an influence on rural development in the study areas. The study recommends for policy makers to improve the resource capacity of current migrants and their beneficiaries by stimulating rural economies through rural enterprise activities.

Key words: Return migrants, rural poverty, entrepreneurship, savings, rural development.

INTRODUCTION

Return migration has become an important livelihood strategy for many poor people across the world. Population mobility is a prerequisite condition for sustainable rural development and poverty alleviation in Africa. In the recent past, it has received increased attention from destination and origin countries due to both groups being interested in leveraging return migration to their economic advantage. Previous research on re-migration has come out with three basic channels through which return migrants can facilitate rural development of their home countries. The first channel is

through their garnered financial capital which can be invested upon return (Piracha and Vadean, 2010; De Vreyer et al., 2010) and invigorate the transfer or adoption of new technologies (Plaza and Ratha, 2011). The acquired knowledge, skills and familiarity with recent technologies which can be utilised upon return provide a second channel (Mahuteau and Tani, 2011; Kuschminder and Butcher, 2012). Thirdly, the augmented social capital of return emigrants can stimulate rural development through establishing new networks, perspectives as well as norms and values (Castaldo et al., 2012).

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An overview on labour migration in Africa

Migration is a routine livelihood strategy of poor households which helps to smooth seasonal income fluctuations and earn additional money to meet contingencies or increase disposable income. It is one of many activities in the diversification portfolio of households and is undertaken if and when there is surplus labour in the household and when it can be combined successfully with other activities either in parallel or in sequence. Migration in Africa is driven by the often interrelated push factors of poverty, mismanaged economies, unemployment, unstable politics, insecurity and violent conflicts, rapidly growing populations as well as environmental deterioration. The remarkable economic growth rate recorded by many African countries in the last decade has been adversely affected by falling commodity prices and the weaker global economy; and besides the challenge to make growth more inclusive especially for the young population, it has not helped uplift poor people from poverty. Poor living conditions have rendered real wages well below the requirements for mere survival. In many of these countries, living conditions are even worse now than they were at independence in the 1960s and early 1970s. Unemployment across the continent ranges from 18 to 50%, mostly among youths, who are willing to do any work, anywhere and at any wage (Adepoju, 2010).

Africa is a continent of contradictions: though it is rich in resources, the sheer numbers of Africans living in poverty have grown, a fact reflected in the rapid growth of Africa's population (World Bank, 2015a). Emigration from the continent takes two forms: firstly, emigration of skilled professionals and, secondly, emigration of intermediate-skilled, semi-skilled and unskilled persons (Adepoju, 2015b). The last of these groups in particular is composed of both regular and irregular migrants. Within the continent, a large portion of the migrants from Uganda, Kenya, Ghana and Nigeria to Southern Africa, especially to Namibia, Botswana and the Republic of South Africa, consist of professors, engineers, accountants, pharmacists and kindred professionals who help staff the universities and other tertiary institutions of the destination countries (Adepoju, 2010; Oucho, 2015). These skilled workers have usually chosen to move because of political and economic crises in their home countries, as well as inadequate wages and a poor working environment.

Migration in Tanzania

Similar to other countries in the region, there is a long history of internal migration in Tanzania, dating to the colonial and especially pre-colonial times. The nation has witnessed significant labour recruitments historically from the neighbouring areas to provide a workforce for

plantation agriculture. Socialism development cut down the rural to rural distance migration owing to policy focus on community level farming. However, seasonal labour migration occurred in rustic areas as extra labour required during the harvesting, counter example is to where there were communal sisal farms near the coast. Migration in Tanzania continued to increase during the government decentralization and creation of new regional capitals in the 1970s. The economic liberation in the 1980s accelerated the rural to urban migration, which became permanent with migrants investing profits in venture in or near the town rather than remitting to their areas of origin.

Historically, there was little emigration of Tanzanians towards the western world. Currently, there are clear indications that there is a soaring number of Tanzanian migrant workers, both women and men working abroad. Tanzania is experiencing significant out-migration of the youths from low productivity agriculture to urban informal service sectors, where productivity is just as low. Rural areas in Tanzania are characterized by many factors which trigger massive population growth in urban areas, some of the rural characteristics include lack of employment opportunities, lack of business opportunities, poor social services, poor production, low income, lack of access to market, low price of agriculture output and high price of agriculture inputs and economic hardship. The movement is composed of legal and illegal as well as skilled and unskilled migrants. A significant proportion of the skilled Tanzanians migrate to more developed economies particularly in North America and Western Europe. However, it is important to state here that migration from Tanzania to Europe is a rather recent phenomenon, taking off mainly in the 1990s and 2000s (UNHCR and IOM, 2010).

A significant number of Tanzanians also proceed to SADC countries mainly Botswana, South Africa and Swaziland. Most of the unskilled Tanzanians migrate to South Africa. Other research reports-such as that of Delius (2017) underscore the point that most Tanzanians who move to countries within the South African Migration System originate from rural localities. In Tanzania almost double as many leave the country than enter in comparison with the sub-Saharan Africa average. This is frequently due to native Tanzanians migrating for labour opportunities.

Return migration in Tanzania

Given their strong attachment to home areas and transient residence at the career destination, whether rural or urban, African workers tend to visit or migrate back to their homes after a period away. Research reports on re-migration to Tanzania are inadequate in the literature. However, the dearth of such literature carries scanty information which explains that there have been some movement streams returning from the well-

endowed countries of the SADC region to the less endowed rural localities of Tanzania (Thomas and Inkpen, 2013).

More recent reports indicate that there is now an increasing trend of migrants returning home from overseas notably from European countries (Avato et al., 2010). The apparent shortfall is that available literature on returnees to Tanzania does not carry sufficient information pertaining to their economic well being.

The potential of return migrants

It is often pointed out that returnees can make a substantial contribution to rural development in the sending countries not only by investing the money they accumulated in their host country but also by stimulating the transfer of technological and managerial know-how. High economic growth rates can in turn stimulate return migration, leading to a virtuous cycle to the benefit of the sending country. Thus, next to remittances, the return of high skilled migrants is often regarded as one of the primary means of making migration work for economic development in the sending countries.

Although there is now a growing trend of returnees investing in neighbouring urban centres rather than their native villages in Tanzania as documented by Mbonile (2002), Fagerlund (2010) and Msigwa and Mbongo (2013) and that this return is in a substantial way linked to unsuccessful migration as Hirvonen and Lilleør (2015) have unpacked in their research report which used a 19 year tracking data; there is a substantial proportion of returnees investing in their places of origin and this paper makes reference and uses them to argue in favour of investments in native villages. Additionally, it is claimed that those who out-migrated do not seem to be more outstanding in entrepreneurship than those who remained at home (Hirvonen and Lilleør, 2015). However, systematic and rigorous reviews in the literature on international migration, provide that migrants who come back home appear to more business-oriented contrary to those who never moved out of their home communities.

Several reviewed empirical analyses have concentrated on the labour market performance and entrepreneurial skills of international migrants after their return, and these studies have generally found that return migrants outperform non-migrants; either due to selection or to skills reaped during the period of migration (De Vreyer et al., 2010).

Several researches that have investigated the capacity of migration to have an effect on the use of agricultural skills, methods, and processes of rural households have also delivered conflicting perspectives. The limited availability of labour emanating from rural out-migration presented by the pessimistic stance underscores the point that this limitation gives rise to the breakdown and deserting of the long established agricultural technologies

which require a large workforce by households of migrants (Zimmerer, 2014; Garcia-Barrios and Garcia-Barrios, 2016). Labour scarcity has also been reported to inhibit uptake of ingenious agricultural technologies (Black et al., 2011). Deane et al. (2013), on the contrary, present the argument that migration paves the way to technology innovation and development in the countryside through the unearthing of new ideas and knowledge and investment of accumulated capital repatriated by returnee labour migrants. Supplementary research reports also point out to the finding that households of labour migrants are more inclined to adopt new farming skills, methods and processes than those of non-migrants on increasing agricultural productivity (Mendola, 2008; Ratha et al., 2016). Labour migration has been contemplated by households to augment earnings and support the livelihoods of members of households living in rural areas (Semyonov and Gorodzeisky, 2008). Resource accumulation is the most crucial element in migration and rural development (Ratha et al., 2011; Mendola, 2010).

The increase of studies on migration and rural development in migrant-sending areas has received newest interest by policy makers since early 2000 (de Haas, 2010; Adams and Cuecuecha, 2013). A common agreement has been circulating around which endorses the argument that return migration together with earnings accumulated and invested in rural areas of origin contribute substantially to reducing poverty and boosting the standard of living of the people in the countryside. Households of migrants (particularly those with capital invested back home) have proved to have earnings and expenditures of an upper level opposite to those of non-migrants (Schmook and Radel, 2008; Wouterse and Taylor, 2008).

In spite of the significant potential of return migration for rural development, limited research has been conducted to understand the determinants and impact of return migration. The few available studies have not yet been able to generate important information on returnee labour migrants and reintegration as well as effective utilization of remittances. Additionally, the topic of return migration between Tanzania and Europe is particularly under researched, with only a limited number of empirical studies on return migration to Tanzania. The need for gathering sufficient and quality data on return migration in Tanzania cannot be ignored if a satisfactory analysis of this topic is to be achieved. The requirement of carrying out a diligent and systematic research into this subject matter is highly important and timely. This paper attempts to close this gap by contributing to the existing literature as part of a wider debate on migration and rural development in Tanzania. To this end, the objective of this paper is to determine whether or not return migration can influence rural development in Tanzania. The specific objectives of this study were to: (i) determine the probability of returnees becoming entrepreneurs. (ii)

assess the extent to which re-migrants employ themselves in the agricultural sector and (iii) assess the extent of involvement of re-migrants in local development projects.

The paper sought to advance the scholarly discussion on human labour mobility and rural development by methodically examining three separate hypotheses. The first hypothesis states that native labour migrant returnees from distant urban centres have a high probability of being involved in entrepreneurship in contrast to migrants whose purpose for moving out is not getting employed. This dichotomy of conception is anticipated owing to the fact that precedent studies indicate that native labour migrants are anticipated to demonstrate higher levels of self-employment versus migrants who move out for purposes other than employment. The reason behind this contention is that, as local inhabitants, they stand a better position to utilize the local circumstantial elements known to affect self-employment with certainty (Naudé et al., 2017).

In examining closely the extent to which return migrants are likely to engage themselves in agriculture, a second hypothesis was formulated which posits that native labour re-migrants from well endowed rural areas closer to their homelands are expected to employ themselves in the agricultural sector contrary to taking non-farm self-employment. To some extent, this anticipation is attributed to the fact that short distance migration is presumed to be cheaper contrary to long-distance migration (Ghatak et al., 2008; Msigwa and Mbongo, 2013). Considering such disparities in expenses incurred, groups with a low stock of skills and knowledge from rural areas are thus deemed to make use of short-distance migration to well endowed and benign rural areas for all intent and purposes of accumulating capital in support of agricultural self-employment back home. The third hypothesis states that native migrant returnees are more likely to involve themselves intensely in volunteer local development projects belonging to the societies of their rural native lands. This anticipation is grounded on the fact that migrant returnees have been found to engage themselves in community developmental projects like school renovations and construction of rural health facilities (Chukwuedozie and Onokala, 2013).

THEORETICAL FRAMEWORK

There is an assortment of theoretical paradigms for contemplating return migration. Each of these presents a different postulation which mainly comes from theories some of which are neoclassical economics, structural approach, trans-nationalism, the new economics of labour migration and social network. This study focused exclusively on one of the economic theories namely 'The Structural Paradigm to Re-migration'. This relational model presents that return is not only examined in

relation to the observation that the individual's experience of the migrant is of prime importance, but also the analysis is in relation to social and institutional factors in heritage countries. This paradigm underlines the influence of the financial and economic resources repatriated back to the homeland following the decision to go back in addition to the reunification of the re-migrants to their local societies. However, this structural framework does not only conceptualize return as an individual's experience of the migrant but contends that return migration should also be examined within the social and institutional context in the sending country (de Haas, 2010).

Cerase in Kunuroglu et al. (2016) provides four contrasting kinds of re-migrants, paying attention to their ambitions and expectations. "Return of innovations" undoubtedly forms the most active classification of re-migrants in Cerase's classification. This category refers to migrants who are "prepared to make use of all the means and new skills they have acquired during their migratory experiences" in the hope of attaining their expectations in their places of origin which, in their understanding, offer lucrative opportunities to meet their aspirations. Cerase comments that these re-migrants consider themselves to be ingenious; for they tend to take it that the skills obtained overseas in addition to their saved earnings will have turned them into "change agents". The advocates of this theory (Hunter, 2010; Farrell et al., 2012) present that returnees' success or failure is analysed by establishing a relationship between the condition of the people and the economic status of the home and the aspirations of the re-migrants. In the structural approach, Gibson and McKenzie (2009) contend that the resolution to re-migrate is to a great extent tied to factors such as family, belonging to an ethnic community, and home attachment, contrary to the income opportunities available in overseas countries.

MATERIALS AND METHODS

Study area

The territory covered for the study comprises four rural villages drawn from Nzega and Magu districts (Figure 1). The villages taken from Nzega District include Itobo and Mbogwe while those taken from Magu District include Nsola and Ngasamo. They show uniform environmental and agriculturally suited climatic characteristics. Nzega District is located between latitudes 4° 20' 00" south of the equator and longitude 33° 05' 00" East of the Greenwich meridian whilst Magu District lies between 2° 30' 00" South of the equator and longitude 33° 30' 00" East of the Greenwich meridian. The population inhabiting the rural villages used in this study according to the 2012 population census is made up of 298,171 males and 295,051 females.

The study communities were picked commensurate with two criteria. The first one considers the high magnitude of rural-to-rural, rural-to-urban and across national border labour mobility; and secondly the distance from the district headquarters as a criterion for the picking of the rural areas. Both of these criteria escalate the

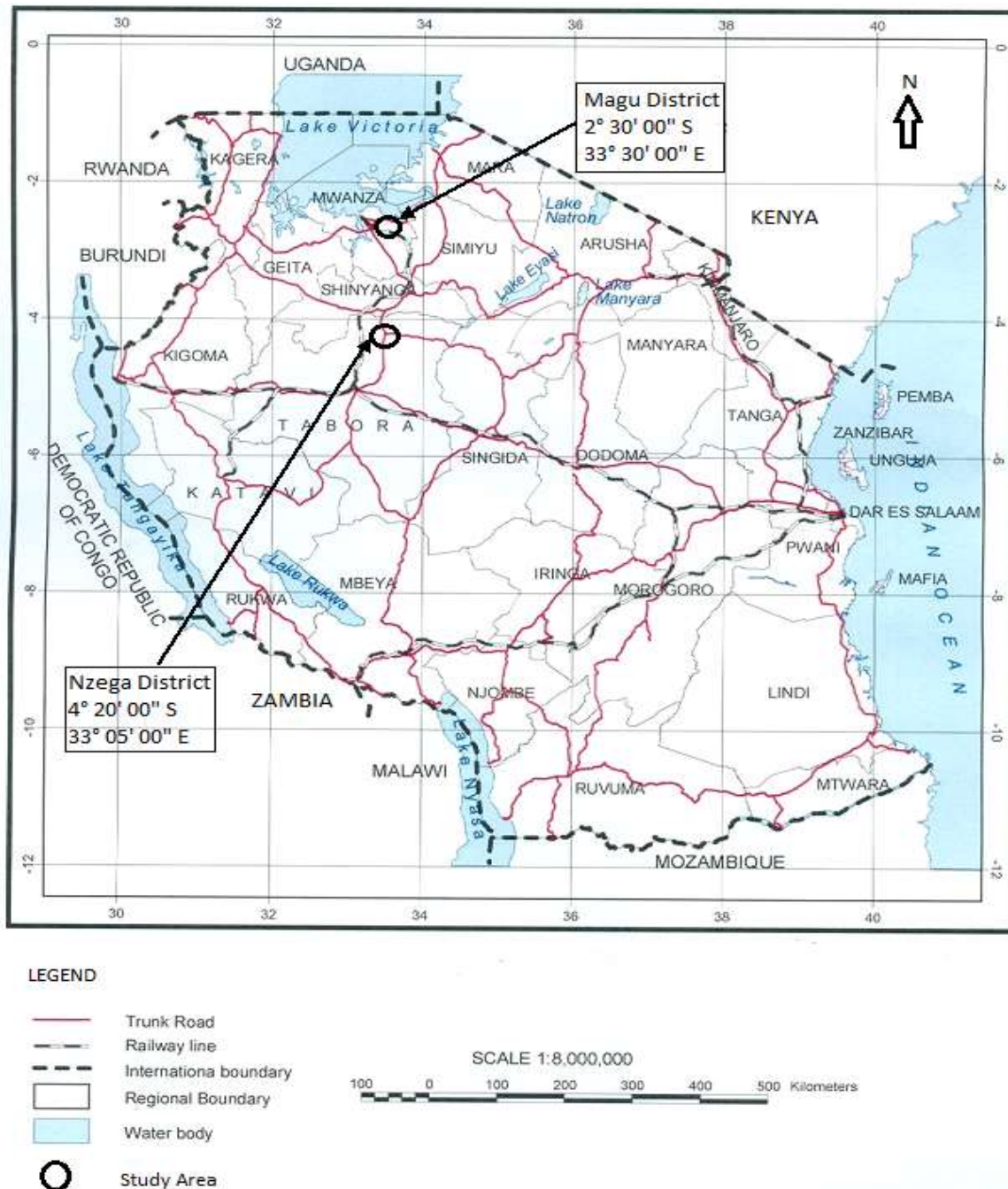


Figure 1. Map of Tanzania showing regions and location of study areas by districts as indicated by arrows.

integration of rural labour out-migration and the rural environment and thus can assist in the understanding of how rural urban labour migration influences rural development.

Sample size and sampling procedure

The multi-stage sampling procedure was applied in this study. In the first stage, a list comprising all households was compiled in the company of leaders of villages. Nsola had 387; Ngasamo, 813;

Itobo, 358 and Nata, 530 households respectively. The total households were 2088. The second stage involved subdividing the households into two categories subject to their labour migration status. Households having a minimum of one migrant member were categorised as labour-migrant households, whilst those consisting of all relatives present for the period were assigned as non-labour-migrant households. The total number of households with labour-migrants in all four villages was 832. According to the 2012 Population and Housing Census of Tanzania (URT, 2013) Nsola village had an average household size of 5.5, Ngasamo had 5.8, Itobo had 4.9 and Nata had 5.1. Assuming the average sizes of

these households did not change significantly over the 6 year period since the last census was taken, the population who are potential candidates for sampling would be 847 for Nsola, 1879 for Ngasamo, 701 for Itobo and 1076 for Nata village; thus making a total of 4503 for the 832 households with labour-migrants. Each labour-migrant household was required to produce one migrant who was eligible for the interview.

For valid inferences, the minimum sample size was calculated using a formula by Godden (2004) which helped to arrive at a representative number of respondents when the population estimate is known.

$$n = \frac{z^2 \times (p) \times (1-p)}{c^2} \quad (1)$$

Where; n = sample size $z = z$ -value^a (e.g., 1.96 for a 95% confidence level; p = the proportion of occurrence of the variable of focus (which is 0.5 where the figure is not known^b); c = marginal error or confidence interval of ± 4 % (± 0.04). A Z-values (Cumulative Normal Probability Table) stand for the probability that a sample will fall within a certain distribution.

The Z-values for confidence levels are: 1.645 = 90% confidence level; 1.96 = 95% confidence level; 2.576 = 99% confidence level. Substituting for the formula; $n = (1.96)^2 \cdot (0.5) \cdot (0.5) / (0.04)^2 = 600.25$. Since the target population was below 50,000 the following formula was used;

$$\text{New sample size} = \frac{n}{[1 + n^{-1} / \text{population}]} \quad (2)$$

Now the population being 4503, therefore, the new sample size = 600.25 but considering a refusal rate of 8%, the final estimated sample was rounded up to 648 respondents all drawn from the labour-migrant households. The proportionate allocation of eligible respondents was 122 for Nsola, 270 for Ngasamo, 101 for Itobo and 155 for Nata. Before commencing the study, the institutional ethical clearance was observed and taken.

Data sources and design

This study employed descriptive cross-sectional design adopting quantitative and qualitative approaches for data collection, synthesis, examination, and elucidation. During the process of collecting the primary data for this research, the household questionnaire was administered to the respondents so as to derive information on households' demographic conditions, migrants' attributes, uses of savings accumulated and saved in destination areas by the return migrants, returnees' entrepreneurial investments and rural societal development schemes accomplished by re-migrants in their rural places of origin. After the completion of the survey, the filled questionnaires were checked for errors, completeness, and accuracy before embarking on the processing and analyzing exercise.

Descriptive statistics were applied for analysing the socio-economic and demographic profiles of re-migrants. A multivariate analysis technique mainly the probit model was used to assess the probability of entrepreneurship and engagement in rural community development projects with the help of STATA 9. In addition, one key informant and one opinion leader well-thought-out to be adequately knowledgeable in each of the sampled rural villages were interviewed. Consequently, two interviews were administered

in each study area giving a total of four for both districts. Interviews were administered to gather ethnographic information, especially those which may be cumbersome to be adequately captured by questionnaires because African communal inclinations do not often find a suitable representation numerically (Nzeadibe et al., 2012). As a result, illustrative quotes from key informant interviews (KIs) were used to reinforce the quantitative data.

Analytic model and empirical specification

The unit of analysis or subject of the study is a re-migrant who is 18 years and above. The reasonable ground for interviewing individuals with an age of 18 years or older lies on the fact that in Tanzania, the age of consent is 18 years and is considered that people of this age and above are physically and mentally mature. Return migrants mean those people who worked overseas or domestically at another richer area at least for one year or more and returned to this country, more specifically to their areas of origin within the past five years. The coming back to their native home places may be either temporary or permanent.

Entrepreneurship is governed by many factors such that the set of written questions in the questionnaire was split into three segments to facilitate understanding of the re-migrants' circumstances ahead of out-migration. An additional inquiry was made on knowledge, and skills garnered overseas and undertakings in the native home community after coming back from overseas. Entrepreneurship relies chiefly on the re-migrants' demographic attributes, education, skills, experiences, new values, ideas and savings accumulated overseas. Subsequently, in the questionnaire, the first sub-division gathered data that included re-migrants' age, sex, birth-place (classified by rurality or urbanity), work sector in the rural area of origin, education level, reasons for migration, and total migration expenses incurred.

The second section collected information on total overseas savings, skills acquired overseas and period of stay in the foreign country. The third sub-division solicited information concerning usage of saved earnings which was categorized into 4 sections namely home consumption (food, clothing, house construction), social services consumption (health, education), entrepreneurial consumption (business investment, commercial agriculture), and volunteer local community development schemes (school renovations and construction of rural health facilities).

Return migrants' probability to become entrepreneurs was gauged by applying the Probit model. In this particular analysis, an enterprise is regarded to be a dependent or response variable whilst re-migrants' demographic characteristics, earnings garnered overseas, the duration of stay and skills acquired overseas are captured as independent or predictor variables (Gubert and Nordan, 2011; Wahba and Zenou, 2012).

However, this study added some predictor variables such as education level, marital status, types of destination countries and length of stay abroad and time since the migrant returned to the area of origin. These points are important for explaining entrepreneurship. This paper used these variables to see what determines entrepreneurship and engagement in community development projects among return migrants.

Analytically, entrepreneurship differences were examined among migrants. Statistics on individual's involvement in entrepreneurship were then applied to construct a dichotomous dependent variable (entrepreneur = 1; otherwise = 0). This dependent variable was utilised in the Probit regression model which is specified below.

$$Y = \beta_0\text{Age} + \beta_1\text{Gen} + \beta_2\text{Mar} + \beta_3\text{Hsize} + \beta_4\text{Ed} + \beta_5\text{S} + \beta_6\text{Dstay} + \beta_7\text{Skill} + \beta_8\text{ReturnT} + \beta_9\text{ReturnC} + \varepsilon$$

In this model, Y is denoted as the response variable measuring the outcome of becoming an entrepreneur after coming back, and $\beta_0 \dots \beta_8$ are the independent variables or explanatory variables and ε is the residual.

Age, on the other hand, expresses return migrant's age, *Gen* is a short form for gender which refers to masculinity or femininity, which again is a dual variable with assigned values of male = (1) and female = (0). *Mar* indicates marital status, which is divided into 2 categories [married =1, single =2]. *Hsize* is divided into three categories [Small family (1-3) Medium family (4-9) and Large family (>10)], *Ed* denotes re-migrant's level of education (expressed in completed school years), which is a dichotomous variable [less or equal to secondary level, above secondary level]. *S* indicates total earnings saved overseas, which is a continuous variable. *Dstay* means duration or period of stay overseas or in another intra-country area which once again is a continuous variable. In the model, *Skill* is considered as a latent variable expressing the degree to which a re-migrant acquired new competences overseas. *ReturnT* refers to the length of time since migrants returned to places of origin and *ReturnC* indicates from which country or domestic area a migrant returned. ε is the error term (Devkota, 2016).

The model applied carries three basic assumptions. First, returnees who accumulated sufficient financial resources overseas are more inclined to become enterprisers upon their return. Likewise, Migrants who tend to live abroad for a long-term can save more money. Saving stimulates investment. Second, educational qualification also influences entrepreneurship. If a returnee is more educated, he/she is more likely to allocate more saved money for investment and less for other consumption headings. Third, fresh returnees are unconvincingly unable to turn entrepreneurs contrary to those who came back home over a year ago. It is also expected that a bigger household size is better positioned to offer a migrant than a nuclear family. Finally, skills obtained overseas are also essential for enterprising in the area of origin. This study also applied the qualitative method to investigate the importance of a return migrant's role in development projects such as construction and renovations of societal facilities in their own localities.

RESULTS AND DISCUSSION

Salient socio-economic characteristics of the respondents

The social, economic and demographic profile of the respondents is anchored on variables such as age, gender, education status, marital status, family size and whether returned to his/her rural area of origin. Salient attributes of the respondents are shown in Table 1.

The first column in the table presents a list of predictor variables. Subsequent columns present values for the mean and corresponding standard deviation. Survey data indicate that re-migrants' age ranged from 25 to 62, whereas the mean age is 36. Of the total number of re-migrants, only six percent were females whereas 94% were males. The majority of the returnees (63%) had moderate family sizes, followed by small families (27%) and large families (10%).

In excess of half of the surveyed migrants (56%) had

not finished secondary level education, whereas the remainder went over and above secondary education. Average overseas saved earnings in the past 5 years were higher (four times) than the average non-migrant savings in Tanzania. The mean period of time lived by out-migrants overseas was about 5 years. Majority of return migrants (52%) got employed in the construction (machine operators, painters, electricians) manufacturing and domestic (home, restaurant, and hotel) industries. A noteworthy proportion (72%) of re-migrants acquired new skills. Returnees from the US, Germany, Poland and the UK accounted for 43% while internal migrants (57%) came from mining areas. Sixty-seven percent of these returnees returned to their places of origin one year before the interview, while the remaining proportion returned 3 to 5 years earlier to the survey.

Estimation of results

The first hypothesis which states that migrant natives returning from distant urban centres have a higher probability of being involved in entrepreneurship contrasted to non-migrants was tested utilising variables such as the overall savings, the span of stay, the percentage of total savings repatriated and the skills learned overseas. Probit results (Table 2) indicate that all these variables showed a positive marginal effect, further implying that these factors could trigger the starting of commercial activities and as a result re-migrants with such qualities stand a better chance to becoming entrepreneurs. A study by Rivera and Reyes (2011) established that migrants' overseas money transfers back home were unfavourable (but significant) in motivating entrepreneurship. The repatriation of accumulated savings back to their hometowns, actually, could be regarded to be statistically significant at 10 per cent level. This consideration strongly suggests that the longer the period of time overseas migrants take to work overseas, the higher the chances that they will start up an enterprise in their home country.

Table 2 further presents the Probit estimates of re-migrants turning into enterprisers. Results show that overseas earnings saved, and individuals who returned back home earlier than 2 to 5 years ago in Tanzania in addition to those who returned back home during the time preceding the same span of time from intra-country mining areas are extremely important for entrepreneurship at the level of one percent. Amongst re-migrants, those who stood a good chance of being entrepreneurs were youthful males. Female migrants on the other hand were likely to emerge entrepreneurs after return, holding other conditions unchanged.

Turning to the variable of age, its anticipated influence on entrepreneurial behaviour is unclear. Age was found to be unfavourably correlated with the probability of self-

Table 1. Salient characteristics of return migrants.

Variables	Mean	Standard
Deviation		
Age	36.0	7.88
Gender		
Male	0.94	0.27
Female	0.6	0.27
Marital Status		
Married	0.67	0.47
Single	0.32	0.47
Family size		
Small family (1-3)	0.27	0.43
Medium family (4-9)	0.63	0.47
Large family (>10)	0.10	0.28
Education level		
= Secondary level	0.56	0.48
> Secondary level	0.44	0.47
Total savings overseas (in thousands Tshs, 2017)	100140.0	102260.0
Total savings in richer intra-country areas (in thousands T.shs. 2017)	30620.0	32415.0
Length of stay overseas (in years)	6.07	4.9
Skill learned overseas	0.72	0.45
Returned from		
US and European countries	0.16	0.36
Developing Countries	0.29	0.46
Richer intra-country areas	0.55	0.50
Returned (Rural areas of origin)		
1 year ago	0.67	0.46
2-3 years ago	0.19	0.37
4-5 years ago	0.14	0.35
N	648	

Source: Author's calculation based on Return Migration survey data (2017).

employment and in particular entrepreneurship. This result was found as a contradiction to Marchetta (2012), who argues that older people due to their larger professional experience and holding more connections have a higher probability of turning an entrepreneur. With regard to marital status, results show that married individuals had more chances being entrepreneurs in comparison with single groups. This finding is similar to what Luchyk (2017) concluded in his study of Polish returnees, that is being married reduces the chances of non-participation in the labour market and increases the chances of being entrepreneurs after the return.

The probability of changing into an entrepreneur after returning to the home of origin seems to be exceedingly higher in both categories of returnees such as those who got a career and technical education during the time they were overseas and for those who came back home

without the influence, control or guidance of others. People who received more education are apparently likely to become entrepreneurs compared to re-migrants bearing less education. First, the well-educated migrants stand a better chance of getting employed in high wage paying jobs in the host countries which translates to additional income resulting in added savings. Secondly, they keep updating themselves on ongoing development schemes at home as they communicate with close friends or significant others from time to time. Communication performs a fundamental function for entrepreneurship. Thirdly, people that are well-educated have the managerial capacity of a higher quality than people with little education. This study finding is in agreement with the results of several previous studies (Gubert and Nordman, 2011; Hamdouch and Wahba, 2012).

Table 2. Probit model of becoming an entrepreneur after return.

Variables	Marginal effect	Z-stat.
Age	0.250**	-0.026
Gender (reference: female)		
Male	0.092	1.291
Marital Status		
Single = 1	-0.0162	0.026
Married =2	-0.0134	0.022
Family size (reference: small family)		
Medium family (5-10)	-0.027	-0.541
Large family (>11)	0.219**	1.738
Education level (reference: = secondary level)		
> Secondary level	0.0086	0.022
Post-return experience		
Log total savings overseas	0.113***	3.277
Span of stay overseas	0.050***	0.171
Skill learned overseas	0.002	0.004
Returned from (reference: Europe)		
Richer areas in Tanzania	0.203*	1.732
Developed Countries	0.281*	1.684
Returned (Tanzania) (reference: one year ago)		
2-3 years ago	0.287***	3.353
4-5 years ago	0.329***	3.312
Constant	-0.350	-1.30
Pseudo R- Squared	0.263	
N	648	

Source: Author's calculation based on Return Migration survey data (2017).

Notes: ***Significant at 1% level, ** 5%, and * 10% level.

The aggregate earning saved overseas stands out to be another notable element for the likeliness of entrepreneurship occurrence. More investment practice has been observed amongst the old re-migrants (those who came back home over two years ago) than fresh returnees. In contrast to theoretical predictions, sending remittances back home was not found to be a factor responsible for influencing the probability of a migrant returning. However, what the study found was that the stronger the family ties a migrant had with the home of origin, the more likely the migrant is to return. Similar evidence was found by Hedberg (2009); Bijwaard, Schluter, and Wahba, 2012; and Pungas et al. (2012). Some migrants having lived overseas for a long time, have succeeded collecting money, and eventually returned to their homes of origin with some business plans. An anticipated favourable outcome of being an enterpriser before migration is clearly built for returnees: Previous enterprisers are about 29 per cent destined to continue being enterprisers after returning to their homes of origin and this result supports the findings of Piracha

and Vadean (2010); Démurger and Xu (2011); Giulietti et al. (2013). Furthermore, the key informant interview in Nsola Village confirms the findings as one returnee from the U.S.A. stated:

I successfully started an irrigation farm as a commercial enterprise and have reached a point where I am now a reliable supplier of vegetables in the horticultural industry. Additionally, I have managed to distribute fruit and plant seedlings to over 2000 families in the village with an aim of supporting small-scale farmers to engage in fruit irrigation farming thus increasing their incomes and livelihoods together with presenting growth opportunities for them. Source: Key informant interview, CM.

The second hypothesis posits that native migrant returnees from richest natural resource-laden rural areas which are closer to their home villages have a higher chance of being engaged in agricultural self-employment in contrast to the rural non-farm economic sector. This hypothesis was tested using two variables, namely

Table 3. Marginal effects for the probability of investing in agriculture after return.

Variables	Marginal effect	z-stat.
Migrant characteristics		
Age (years)	0.094	1.592
Gender: (reference: female)		
Male (= 1)	0.177	1.371
Education (years)	0.026***	0.483
Owning land dummy	0.247	0.182
Migration experience		
Years of migration	0.026	1.361
Job changes	0.281***	2.622
Post-return experience		
Skills acquired during migration (=1)	0.284***	2.732
Repatriated savings (Tshs)		
Mining areas	0.014*	1.743
Non-mining areas	0.007	1.364
Span of stay abroad	0.010	0.071
Return duration (years)	0.027*	1.673
Productive Assets		
Land holding (hectares)	0.197***	0.781
Dummy for irrigated land		
Agric capital (log)	0.082***	1.551
Living capital (log)	0.337***	2.253
Village characteristics		
MbogweVillage (=1)	-0.439***	-3.082
Itobo Village (=1)	-0.568***	-6.322
Nsola Village (=1)	-0.406***	-3.044
Ngasamo Village (=1)	-0.442***	-3.063
Pseudo R ²	0.34	
N	648	

Source: Author's calculation based on Return Migration survey data (2017).

Notes: *: Significant at 10%. **: significant at 5%. ***: significant at 1%

savings accumulated from mineral-rich rural areas and the probability of purchasing more land for agricultural undertakings accommodating irrigation. Results show that return migrants from the well-endowed rural areas, especially mining areas are characterized by certainty at the level of 10%; it is suggestive of a significant effect that warrants investing in agriculture. This result does not support the finding by Luchyk (2017) who reported that males from the rural areas in general had a smaller chance to become self-employed in comparison to individuals from cities, even though working in the agriculture is associated with the highest chances of being agriculturally self-employed. Production in mining areas is generally irregular and consequently hard to determine. Nevertheless, by looking at the amount of wealth that has been collected and the proportions of disbursement by the possessors of pits (some maintain to

be paying out to the tune of Tshs. 2,000,000/=(\\$887) per month to support human resources and operate the equipment), their earnings are quite substantial. The average earnings per month per mineshaft was estimated to be Tshs. 2,000,000/=(\\$887). This earning indicates that the area of variation between upper and lower limits is substantially higher in the mining areas contrasted to the non-mining areas. Subsequently, higher earnings result in higher investment possibilities. All things being equal, the results of marginal effects indicate that a one-unit addition in the aggregate number of internal re-migrants from rich rural areas who have accumulated monetary capital increases the probability of land purchase by 20% (Table 3). Lastly, the value of Pseudo R- Squared stipulates that independent variables in the Probit model predicted 34 per cent of lack of consistency in entrepreneurship. This result corroborates the findings

Table 4. Probit estimates of engaging in rural development projects.

Variables	Engagement in rural development projects	
	Marginal effect	Z-stat.
<i>Migrant characteristics</i>		
Return migrants (=1)	0.104*	1.64
Age (years)	0.033*	1.73
Gender: (reference: female)		
Male (=1)	-0.148***	3.48
Marital Status: married = 1	-0.072***	1.31
Education (years)	0.041***	4.13
Location of migrant's household (1= rural)		
<i>Migration experience</i>		
Span of stay overseas	0.019***	2.89
Span of stay in intra country richer areas	0.014**	2.73
<i>Productive Assets</i>		
Land holding (hectares)	0.109**	2.33
Constant	0.187**	0.435
Pseudo R ²	0.19	
N	648	

Source: Author's calculation based on Return Migration survey data (2017).

Notes: *: Significant at 10%. **: significant at 5%. ***: significant at 1%

by Davis and Lopez-Carr (2014) and Devkota (2016).

Table 4 shows the estimates of hypothesis three which tests returnee's engagement in rural local development schemes in home villages. It was tested using variables, for example, the duration of stay overseas, the percent of total savings repatriated home from abroad and the skills learned abroad. Results show that the intensity of rural development investment appeared to be independent of age, size of land and also the value of productive assets.

In analysing the results, it was observed that the socio-demographic variables of the respondents such as gender and marital status have no influence on the re-migrants' participation in community development schemes. The findings of this study echo previous qualitative researches which argue that when re-migrants come back to their countries of origin, they bring new and innovative thoughts with them, and consequently, promote social development to their communities. Tobit results of this study (Table 4) corroborate the findings of Black and Costaldo (2009) who by using data from Ghana and Côte d'Ivoire, found that return migrants are more likely to start a new enterprise if they had accumulated savings and stayed abroad longer. The results imply that returnees may also accomplish this undertaking through non-monetary means. One example is by eye-opening local members of the communities to alternative ways of looking at the world.

The resultant quantitative trends derived from this study parallel Waddell's (2013) on-the-ground research in Guanajuato (Mexico). As an illustration, while interviewing

re-migrants in the field, this study found they were expected to promote the importance of education. In Itobo which is located in Nzega District, Tanzania, re-migrant leaders demonstrated a feeling of pleasure by showing the school that they had volunteered to fund and renovate. One key informant from Mbogwe village (a returnee from Poland) also narrated how he teamed up with members of his local community to construct a feeder road that would help ferry farmers' produce to a major road. He said:

I was born in this village; I felt it was necessary for all of us in this village to have access to the trunk road so that we could take our produce to different market places. That's why I have spent part of my savings accumulated abroad to hire a bulldozer in the construction of this road. I'm happy that my fellow villagers have offered their physical strength to cooperate with me in this project. Source: Key informant interview, SS.

After separating out the effect of socio-demographic characteristics together with human abilities and skills variables, return migration was found to be statistically significant in ascertaining entrepreneurship, self-farm employment, and community development project engagements. While the data analysis of this study appears to have supported hypotheses 1, 2 and 3, some exceptions need to be reiterated. These include cases of overseas money transfers back home which were found to be unfavourable since the response of the current

policy in Tanzania has been slow in harnessing return migrants' potential to create positive impacts and rural development. Likewise, sending remittances back home was not found to influence the probability of a migrant returning. Considering the empirical evidence of this study, the success rates of these covariates as noted by other similar studies cast doubt as none of these are robust factors and consequently further research along these lines is necessary.

CONCLUSION AND POLICY IMPLICATIONS

This study has demonstrated that re-migration has the capacity to augment community-driven improvement in socio-economic conditions and prospects. Nevertheless, as earlier researches have disclosed (Arce et al., 2011), in most situations modern skills that earlier migrants return with are underexploited. Fundamentally, the extent to which re-migrants affect their native land may, for the most part, be dependent on local people who are involved in making policies. The current low potential use of a re-migrant's resources is likely to be a consequence of local elements such as the absence of state endorsement, inadequate bond markets, and poor infrastructure. Given these premises, the findings from this research have salient future effects for people involved in making policies. As a means of making the best use of development returns of the collective set of skills, knowledge, and experiences of a human being brought back by re-migrants, it would be most beneficial to the Tanzanians to encourage returnees and decrease possible impediments to development within regions with high migration flows.

The results of this study have indicated that in areas where re-migrants settle down in life, non-migrants get the chance of inclusion in development initiatives. Likewise, health facilities get renovated, additional classrooms are constructed and rural roads are initiated. These research findings help expose the capacity of re-migrants in contributing to various development schemes in their home area communities. These novel findings contribute to the growing body of knowledge and literature related to the impact of re-migrants on communities of their native homelands. Local governments in Tanzania therefore can design local economic development policies which are suited to inviting departing and returnee migrants to invest in their villages and also in updating them with on-going government funded or proposed development undertakings in local communities. The local governments can as well initiate entrepreneurial policy reforms and special support geared at creating new enterprises in the localities. Finally, local legislation of new enterprises coupled with land tenure reforms can altogether empower local governments to promote and register a viable environment for business and investment in the re-migrants' home areas.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Full Length Research Paper

Enhancing local livelihoods resilience and food security in the face of frequent flooding in Africa: A disaster management perspective

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Climate change and climate variability are causing frequent flooding in Northern Cameroon with dire consequences for food security and agrarian livelihoods. With projected increases in temperature and rainfall, there is heightened risk for livelihood assets and food security in the region. This article undertakes three tasks. First, it applies and adapts the Sustainable Livelihood conceptual framework to the Northern Cameroon case. Second, evaluating the 2012 floods, considered the worst affecting Northern Cameroon, and lastly, this research investigates the effects of frequent flooding on livelihood assets and food security focusing on two case study sites. Findings indicate that floods usually cause considerable damage to critical infrastructure with dire ramifications for food Security and livelihood assets. Finally, the article draws upon the empirical findings relating to post-2012 flood in Cameroon to facilitate further enhancements to the Sustainable Livelihood framework. The authors argue that there is considerable 'value-added' if the framework accommodates a more explicit disaster management perspective. By integrating an explicit disaster management perspective, further insights are in turn possible into the future role of transforming structures and processes that influence livelihood strategies and outcomes in a food-insecure Cameroon confronted with every more frequent flooding.

Key words: Frequent flooding, climate variability, sustainable livelihoods, disaster management, North Cameroon.

INTRODUCTION

The number of people affected by natural disasters worldwide is on the increase, with climate-driven disasters especially floods being the most disastrous,

widespread and frequent (Guha-Sapir et al., 2016). Scientists have asserted that anthropogenic climate change (CC) is causing climate variability (CV). Climate

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projections, for example, have revealed that the number of days of extremely heavy rainfall has risen by 1 to 2% each decade in the world's driest regions, and that over the next decades, increasing rainfall will lead to more flooding (IPCC, 2014). Higher temperature and changing precipitation levels have implications for human security, and contemporary research on the impact of CV on agriculture in developing countries shows a great threat to Food Security (FS) in many African agrarian economies (Molua, 2012; IPCC, 2014; FAO, 2016a).

In some respects, Cameroon seems to be compatible with these wider African findings. The agricultural sector is the cornerstone of livelihoods, employing 70 to 80% of the country's labour force (Epule and Bryant, 2016). Around 70 to 75% of the sector composes of small-scale peasant farmers that produce about 80% of the country's food crops (Yengoh and Ardo, 2014). In recent decades, food production has not met the rising demand (Yengoh and Ardo, 2014; Epule and Bryant, 2016) and the situation is exacerbated by the omnipresence of CV, which is reinforcing seasonal floods (IPCC, 2014) that seriously affect agricultural production (CERF, 2012).

Flooding has become a major issue in Cameroon. Variations in rainfall patterns, increased population densities in flood prone areas, poor urbanisation, ill-conceived waste disposal practices and weak institutional flood management exacerbate flood frequency and intensity in Cameroon (IPCC, 2014; Balgah et al., 2015; Bang, 2014, 2017; Fogwe and Asue, 2016). This has socioeconomic and environmental consequences including implications for access to adequate and nutritive food. In the arid Northern Cameroon that is dependent on rain fed agriculture, frequent floods have caused increased household-level FS risks (Molua, 2012; Relief Web, 2012; UNICEF, 2012; World Bank, 2013).

To mitigate risks, adequate adaptation measures are required, which, as this article argues, has a stronger focus on the links with disaster management (DM). Despite efforts to understand farmers' responses to CV and CC, research on the likely impact of CV, especially flooding on livelihoods and FS in Northern Cameroon remains limited (Molua, 2012). Moreover, there has been little work regarding the application of conceptual models to Cameroon in general with few drawing conceptual lessons that can inform future understandings of livelihood outcomes. Since frequent flooding is addressed through DM techniques, it is opportune to explore how approaches on FS and livelihoods may benefit from stronger interaction with DM perspectives. The authors argue that this represents a valuable additional contribution to knowledge, particularly if a greater prioritisation of flood management accompanies viable adaptation strategies so that FS improves in practice.

This article undertakes three tasks. First, it applies the Sustainable Livelihood (SL) conceptual framework (Ashley

and Carney, 1999) to the case of Cameroon. Second, it evaluates the 2012 floods, considered the worst affecting Northern Cameroon and third, using the 2012 floods, this research investigates the effects of frequent flooding on livelihood assets and FS by focusing on two case study sites in the region. Findings indicate that floods usually cause considerable damage to critical infrastructure with dire ramifications for FS and livelihood assets. Furthermore, the article draws upon empirical findings relating to the 2012 floods to facilitate further enhancements to the SL framework. The authors argue that there is considerable 'value-added' if the framework accommodates a stronger DM perspective. There is after all, increasing work on Cameroon DM to draw upon (Bang, 2013, 2014, 2016; Miles, Gordon and Bang, 2017; Bang et al., 2017). By integrating an explicit DM perspective, useful insights are possible on future transforming structures and processes that influence livelihood strategies and outcomes in a food-insecure Cameroon confronted with more frequent flooding.

CONCEPTUAL FRAMEWORK

Climate variability and food security

FS remains centre stage in policy discourses especially after the 2007-2008 global food crises (Kakota et al., 2013). CV is seriously affecting agricultural production with continuing threats to rural and farmers' livelihoods in the global South (FAO, 2016a) where subsistence farming is widespread (Nyariki et al., 2002).

There have been many conceptualisations of 'FS' since the concept originated in the mid-1970s (Sen, 1981; Maxwell and Smith, 1992; Allen, 2013). The Food and Agricultural Organisation (FAO) of the United Nations defines FS as:

"a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2013, p. 50).

Key dimensions of FS are availability, access, utilisation and stability (Ericksen, 2008; FAO/IFAD/WFP, 2013). In this article, households are considered food insecure when they lack food availability, have inadequate access to food production and nutritious food, unsafe and unstable supply and distribution of food (Ericksen, 2008; Kakota et al., 2013). Food availability is considered from the perspective of own production critical to ensuring household FS in cases of temporary shortfall in food availability and consumption (transitory food insecurity) or consistent food shortages-chronic food insecurity (Nyariki

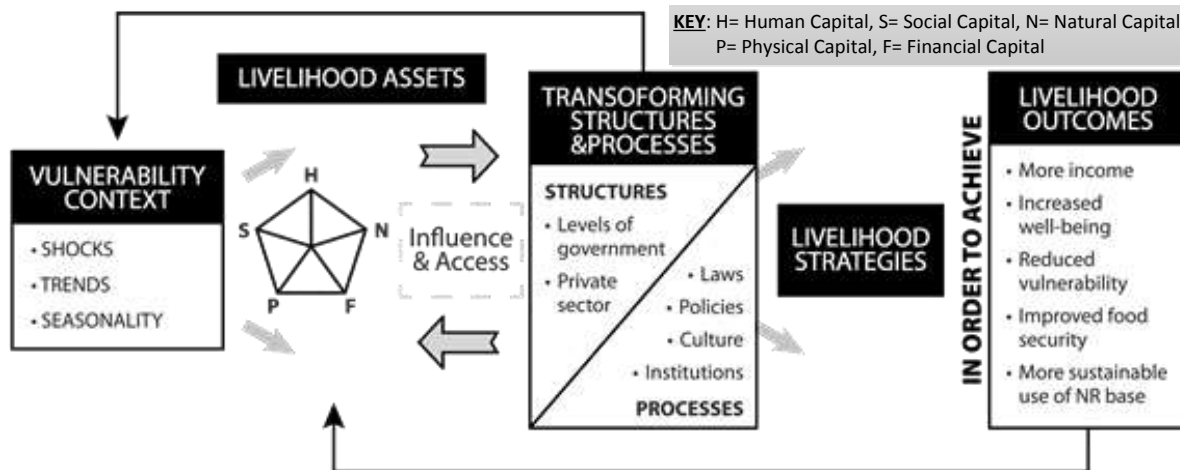


Figure 1. The sustainable livelihood framework.
Source: Ashley and Carney (1999).

and Wiggins, 1997).

Contemporary FS in Africa depends on a food system that is increasingly shaped by a changing climate system. The availability, production, utilization and accessibility of food are climate dependent (Molua, 2012; IPCC, 2014). Africa relies mainly on staple foods to the neglect of foods rich in nutrients (FAO/IFAD/WFP, 2013). The prevalence of severe food energy deficiency is life threatening and children are the most vulnerable demographic group. In the Sahel, some 6.2 million people are severely food insecure (FAO, 2016b).

Continued food insecurity and reduced agricultural yields will only further exacerbate the problem.

Sustainable livelihoods

Livelihood assets are vulnerable to CV, with dire implications for FS and SL - a concept that was designed to help understand and analyze poor people's livelihoods (Ashley and Carney, 1999 (Figure 1)). The SL concept combines the vulnerabilities of individual/family survival strategies. These comprise, mainly, people's assets and activities that provide them an adequate standard of living, including other goals such as risk reduction, and the factors that facilitate or inhibit different people from gaining access to assets and activities (Ellis, 2000). The framework starts with the vulnerability context in which people live, and the livelihood assets (human, social, natural, physical and financial capital) they possess. It then looks at how transforming structures and processes generate livelihood strategies that lead to livelihood outcomes (Figure 2) (Ashley and Carney, 1999).

The original framework identified numerous gaps and challenges to be addressed such as, understanding sustainability and the relationship to poverty, and importantly for this article, the need to acknowledge 'uneven emphasis or neglect' (Ashley and Carney, 1999, p. 33) of specific aspects that receive insufficient attention. DM may be one of these. Yet, one strength of the framework is that it stresses building on 'shared principles' and avoids conceptual 'hard selling' (Ashley and Carney 1999, p. 32), providing a gateway to incorporate a stronger DM perspective within its auspices. We would argue, based on the findings of this research, that the impact of frequent flooding in Northern Cameroon does affect the various livelihood assets, requiring alternative livelihood strategies in order to achieve the desired livelihood outcome, one being improved FS, but also one that incorporates a stronger awareness of DM.

But what do we mean by this DM perspective? In brief, it includes three aspects: first, the existence of effective DM bodies inside government and within the respective region that can act as transforming structures. Second, effective DM planning and processes, such as emergency planning and resourcing that can transform situations on the ground. Finally, a stronger appreciation of disaster risk reduction (DRR) measures, particularly those associated with flood management that will ensure practical measures to reduce vulnerabilities and are not simply restricted to immediate disaster response. This more robust DM perspective is applied in relation to the SL framework in weak (unsustainable) (Figure 2) and strong (sustainable) (Figure 7) forms.

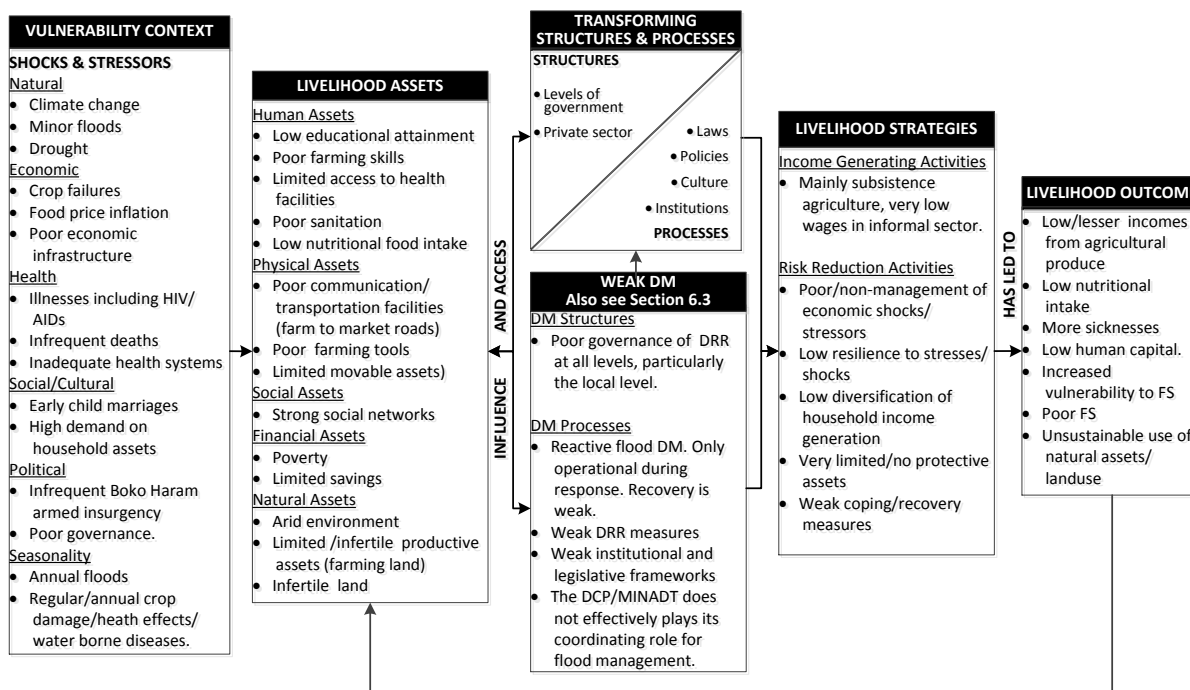


Figure 2. Unsustainable livelihood framework with weak disaster management. Source: Authors.

Enhancing food security: Role for adaptation in the sustainable livelihood framework

Within the SL framework, there is an emphasis on the role of adaptation as part of transforming structures and processes and in shaping livelihood strategies (Figure 1), and particularly since adaptation may mitigate the impact of climate shocks on FS. Adaptation is the process of adjustment to actual or expected climate and its effects (IPCC, 2014). Adaptive capacity increases with declining vulnerability and declines as vulnerability increases (Cutter et al., 2008). Moreover, DM also includes a strong emphasis on adaptation techniques particularly in developing countries like Cameroon (Bang, 2016).

Livelihood diversification, for example, is a complementary adaptation strategy for addressing food insecurity, livelihood collapse and poverty (Ellis and Allison, 2004). It represents ‘the processes by which households construct a diverse portfolio of activities and social support capabilities for survival and in order to improve their standard of living’ (Ellis, 2000). Traditionally it involves farm and off-farm activities including factors that induce people to engage in multiple livelihoods (Khatun and Roy, 2012). Common adaptation methods in developing countries are: the use of new crop and livestock species more suitable for drier conditions, changing cropping patterns, irrigation, trees planted for

shelter, crop diversification, mixed crop/livestock farming systems, adjusting sowing dates, adopting higher-yielding and heat resistant cultivars, the selection and breeding of new hybrids, and increased use of water and soil conservation techniques. Others include policies, financing, and institutional arrangements and land management options that aim at conserving ecosystem services (Tingem et al., 2008; Njondgeb, 2013; Njeru, 2013; Epule and Bryant, 2016). Yet, the extent to which households diversify their livelihoods depends on a variety of factors that include skills, educational attainment level, physical assets, experience, family size and access to credit (Khatun and Roy, 2012). Without adaptation, CV will pose considerable problems for livelihoods and FS in Cameroon (Tingem et al., 2008).

Coping strategies also help households maintain consumption when confronted by shocks. These include using saving and food stocks; sales of personal assets, gifts from friends/relatives or community assistance, government/NGO support and social capital/networks (Ellis, 2000; Khatun and Roy, 2012; Abid et al., 2015).

Climate variability: Implications for Cameroon

Cameroon is already experiencing diverse CC impacts. Since 1930, mean annual temperatures have been

increasing by an average of 0.15°C per decade, with dramatic rises predicted by 2100. Temperature rise is expected to increase northwards, reaching 2.1 to 4.5°C in the Northern Sudano-Sahelian region (Molua and Lambi, 2007; IPCC, 2014). Climate simulations predict the average annual rainfall could increase by as much as 35% between 2010 and 2050 (Mc Sweeney et al., 2012).

Future climate extreme events will probably be the most challenging for farmers. The onset and retreat dates for future rainy season are expected in most cases to be later by about 5 days than in the present climate, affecting the sowing season (Guenang and Kamga, 2012). Most future climate scenarios show a general tendency towards diminishing future maize and sorghum yields in all agricultural regions of Cameroon (Tingem et al., 2008).

The potential ramifications of CV will be to exacerbate poverty since 40% of Cameroon's population (who live below the poverty line) are engaged in subsistence agriculture (World Bank, 2016). Therefore, there is urgency to introduce adaptation and other strategies to mitigate the impact of CV on the agricultural sector (IPCC, 2014). With the potential detrimental effects to agricultural productivity, there are calls for Cameroon to plan for climate contingencies (Ngondjeb, 2013). Indeed, this article highlights that there is a particular need to focus on improved FS as part of any climate contingencies.

Food security in Northern Cameroon

Northern Cameroon is characterised by climatic variations, irregular rainfall and poor soil quality with food production that barely meets the needs of the population. The threat to FS is even greater because food production is mainly in the hands of smallholder farmers with farming practices characterised by small farm size, low capital input, basic tools, limited control of diseases and plant pests, low yields and high labour inputs (Yengoh and Ardo, 2014). Implementation of adaptive and coping strategies has - so far - been rather weak and limited, exacerbated by the high population density, the highest incidence of poverty in the country, and frequent flooding. Moreover, food production, availability, accessibility and supply are vulnerable to climate-related shocks and stressors such as desertification and intense rains - resulting in frequent flooding, which have caused acute food shortages in recent years (Molua and Lambi, 2007; Gergely, 2009; MINDADER, 2014; FAO, 2014, 2016a; WFP, 2016a).

Northern Cameroon is highly dependent on rain-fed agriculture and livestock herding due to its location at the southern edge of the Sahara desert. The region produces a variety of food crops (sorghum, millet, and maize,

cowpea, okra, cereals). Cotton is produced and marketed under the auspices of an enterprise created by the Government in 1974 to produce and market cotton in Northern Cameroon known as SODECOTON (Société de Développement du Coton), and is the main cash crop and income source for the majority of the population (Gergely, 2009; MINADER, 2014).

According to UNICEF (2013), about 15% of the population suffer from food insecurity, and acute malnutrition is highest in the region (5.5% in the North and 6.3% in the Far-North), affecting about 10% of the children (Table 1) (UNICEF, 2012). Because of shocks, stresses, insecurity and displacement, the overall FS situation in the country sharply deteriorated in 2015 and 2016 (2.6 million people being food insecure) with the Far North Region most affected (WFP, 2017).

Similarly, there was increase in malnutrition rates, especially in the Far North, compared to 2013 and 2014 (WFP, 2017). The main causes of malnutrition are inadequate food and diseases, poverty, poor/detrimental health and poor resources/practices, including lack of adequate health information/education (FAO, 2016a).

Other factors that compound the FS problem are locust infestations, elephant destruction, soil/land degradation, overpopulation, conflict, population movement, inadequate labour and poor wages (Gergely, 2009). The civil war in Central African Republic and the Boko Haram insurgency in Nigeria have caused the influx of refugees into North Cameroon. As of February 2016, there was an estimated 169,970 internally displaced persons including some 30,600 persons displaced by flooding and other natural disasters, rendering over 5 million people food insecure in the Lake Chad basin. The situation is worsened by epidemics such as cholera, measles and meningitis (FAO, 2016a, b; WFP, 2016a, b).

These socio-economic challenges pose a serious threat to livelihoods including FS leading to livelihood challenges in the region. Yet, Cameroon, a place already prone to frequent natural hazards (Bang, 2016; Miles, Gordon and Bang, 2017) has also been seeing more frequent and severe flash flooding over the past two decades, transforming from essentially representing a nuisance value to becoming catastrophic flooding. Between 2000 and 2015, floods, exacerbated by poor drainage systems and inadequate waste disposal, affected more than 373,176 people in Cameroon, with climatic variations in Northern Cameroon attributed as the reason for more frequent flooding during the last decade (Guha-Sapir et al., 2016).

Northern Cameroon, though located in an arid environment, has been experiencing recurring devastating annual flash floods in the last decade (Bang et al., 2017). The 1999 and 2012 floods compromised the Lagdo and Maga Dams - forcing the release of water from the reservoir and exacerbating the flooding downstream.

Table 1. Estimated population affected from the nutritional crisis in the north and far north regions

Population Demographics	Total
Total Population	5,891,785
Children (Under 5)	1,178,357
Children (6 to 23 months)	350,089
Pregnant women	368,186
Number of Internally Displaced Persons due to flooding	90,203
Number of primary schools affected (11 in North and 159 in Far North Regions)	170
Number of school children affected	61,646

Source: UNICEF, 2012.

According to Cameroon's Department of Civil Protection (DCP), the worst flooding in Northern Cameroon for over 60 years occurred in 2012 (Relief Web, 2012; UNICEF, 2012). The 2012 floods are analysed in some detail through two case studies that tease out how flood affects livelihoods and food insecurity.

In essence, poor DM of floods in the region heightens an already dire situation and thus a more elaborate appreciation of DM perspectives is valuable, not least since flooding has made livelihoods in the region unsustainable. This situation is represented in Figure 2, which is the modified SL framework variant incorporating weak DM addressing what may cause livelihoods in the region to be unsustainable. Left unchecked the peasant dominated agricultural sector of Northern Cameroon could be completely devastated. Institutional support for agricultural production is imperative and urgent in order to mitigate the risks posed to food insecurity. So far, resilience has been mainly through social networks and humanitarian assistance, which is temporary and has not been that effective.

METHODOLOGY

Case study strategy

The trends in FS, as in poverty, may not be fully evident at a national level. This implies the need for regional/local analyses to complement country level investigations. The main aim of this study is to assess the impact of frequent flooding on livelihoods and FS in two study areas in Northern Cameroon. The article utilises case study research that explores a contemporary phenomenon within its natural setting in one or a few sites. It draws upon multiple sources of data - primary interviews (see below), secondary and empirical data, including personal observation, relevant knowledge/experience and inferences that were also detailed and contextualised (Yin, 2003; Stake, 2000; Bhattacharjee, 2012).

Eight interviews were specifically conducted with mid/senior level disaster managers in Cameroon over four weeks in February/March, 2017 - the key research theme for enquiry focused on institutional frameworks and arrangements for flood management. There was intensive search for documentary evidence of challenges to

livelihood assets caused by repeated flooding with the aim to analyse differences and similarities between the case studies using qualitative methods. This requires a logical chain of evidence, and maintaining theoretical coherence by, for instance, identifying patterns and themes, establishing plausibility, counting, clustering, and making metaphors (Miles and Huberman, 1994; Bryman, 2004; Bhattacharjee, 2012). The ultimate aim was to establish the link between CV, repeated flooding, and relates its effect on livelihood assets and consequently FS.

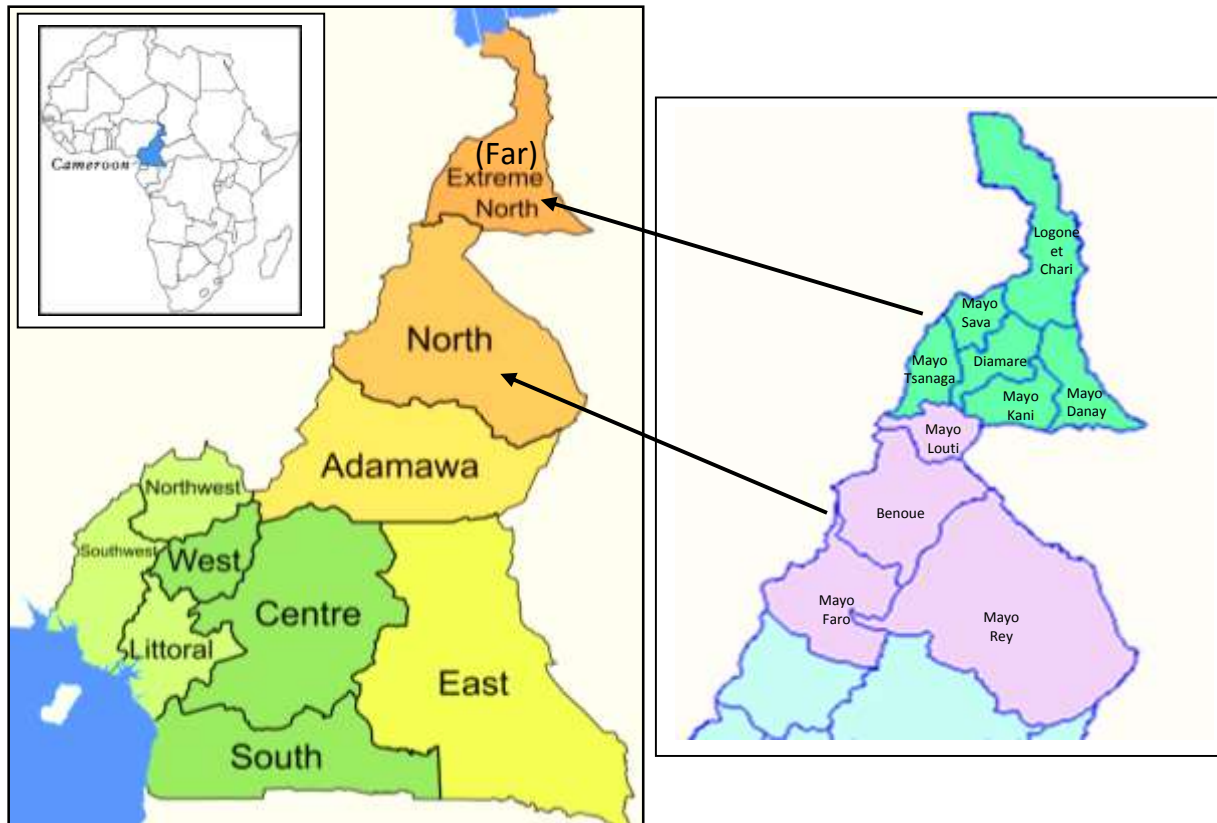
Case study area (Northern Cameroon)

The two study areas are Garoua and Maga in the North and Far North Regions of Cameroon respectively (Figure 3), that collectively represent one of the most densely populated areas in the country (64.8/km²) (Geohive, 2016). Accordingly, the study sites were selected for the following reasons: they were the most seriously affected areas during the 2012 August/September floods; both sites have been experiencing frequent annual flooding during the rainy season and both sites have Dams within their vicinity that greatly influence flash floods. Furthermore, both sites have an agrarian economy-one site is urban and the other rural, thereby enabling findings to cover the effects of flooding in both urban and rural areas, with nonetheless, a similar cultural setting.

In Northern Cameroon, the agricultural cycle begins with the first rains (March-June) and last three to six months. The topography of the region influences the drainage system, which is a key determinant of agricultural activities. Dams and dykes - a vital component of Cameroon's critical infrastructure - were built close to the main rivers for irrigation purposes and to generate electricity for homes and businesses (including agricultural factories) across Northern Cameroon and provide the energy needed to power electric pumps for irrigation. The power is also important for processing the cash and other crops produced in the region. The hydro infrastructures, however, are vulnerable to extreme weather shocks such as floods. The Dams are often damaged during flooding, causing power outages. These effects are set to rise as CC increases the frequency and intensity of extreme weather events (Cervigni et al., 2015).

The 2012 August/September flooding of Garoua town and environs

Garoua, the capital of the North Region, is a port city on the Benue River and the biggest town in Northern Cameroon (population of



Divisions in the North & Far North Regions

Figure 3. Cameroon map showing the ten regions and administrative divisions of the north and far north regions.

436,899). It has an international airport, several textile-processing facilities and host to SODECOTON, which produces cotton, the main cash crop. Cotton contributes nearly a quarter of Cameroon's agricultural exports and about 90% of farmers in the region grow it (Gergely, 2009).

River Benue hosts the Lagdo Dam - a 27 km earth Dam located 80 km from Garoua - with a reservoir capacity of 620 million cubic meters (Figure 4). The Benue River has an extended flood plain that is very fertile for farming and has attracted a high population density including many immigrants (Neba et al., 2010).

In August 2012, heavy rainfall in North Cameroon caused the Lagdo Dam to exceed its high water level and River Benue inundated residential, agricultural and industrial areas in Garoua town and its four administrative divisions, and further downstream in Nigeria (CERF, 2012; Reliefweb, 2012; UNICEF, 2012). The flood affected 118 villages and was the worst in Cameroon for more than 60 years.

The 2012 August/September flooding of Maga village and environs

Maga is a poor, rural settlement in the Far North region (Figure 5), which is seriously deficient in roads, drinking water, sanitation, and

medical and education facilities (magacam.com/about-maga.html). The River Logone and the Maga Dam drain the region. Maga Dam is used for fishing and provides irrigation water for extensive rice fields. Rice is the second most important cash crop produced on a large scale in the Extreme North Region. About 22,000 farmers produce 102,680 tonnes of paddy rice on 13,000 hectares of land; and a 70 km embankment was constructed along the Logone River to protect widespread rice fields from damage during flooding (Njomaha and Piro, 2004). Local food crops are sorghum, millet, onions, gumbo, beans, onions, lettuce, tomatoes, cucumber, lemons, bananas, sweet corn and sugar cane. Overbank flooding of the River Logone is common after heavy rains/storms (World Bank, 2013). Due to the level topography around Maga, the flood usually spreads over a very vast area exceeding 3,000 km², inundating the extensive rice farms (Neba et al., 2010).

Heavy rainfall, from mid-August 2012, led to widespread flooding in many areas of the Far North Region. Flooding was severe in Maga and neighbouring settlements (Doreissou, Begué, Palam, Dougui, Pouss and Tekele) following the Maga Dam's rupture (Figure 5). Agricultural fields and communities near the banks of the Chari/Logone River were inundated (World Bank, 2013). The flooding was the worst natural calamity to hit the Far North Region for the past forty years (Bang et al., 2017).

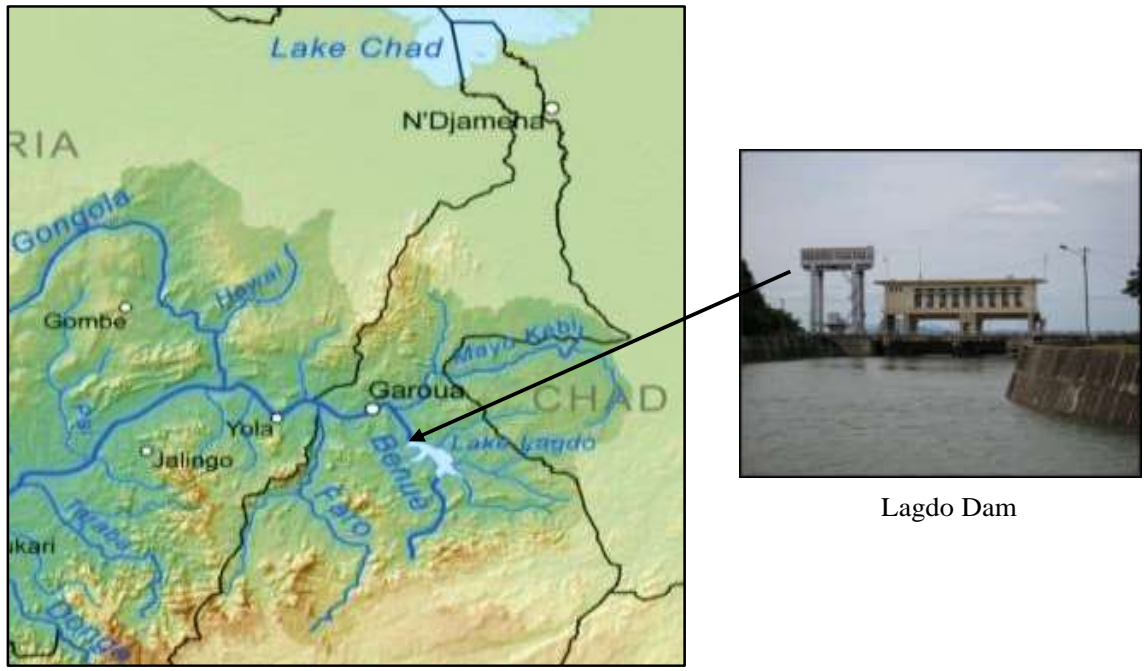


Figure 4. Map showing the Benue drainage basin including the Lagdo Dam along River Benue in North Cameroon.

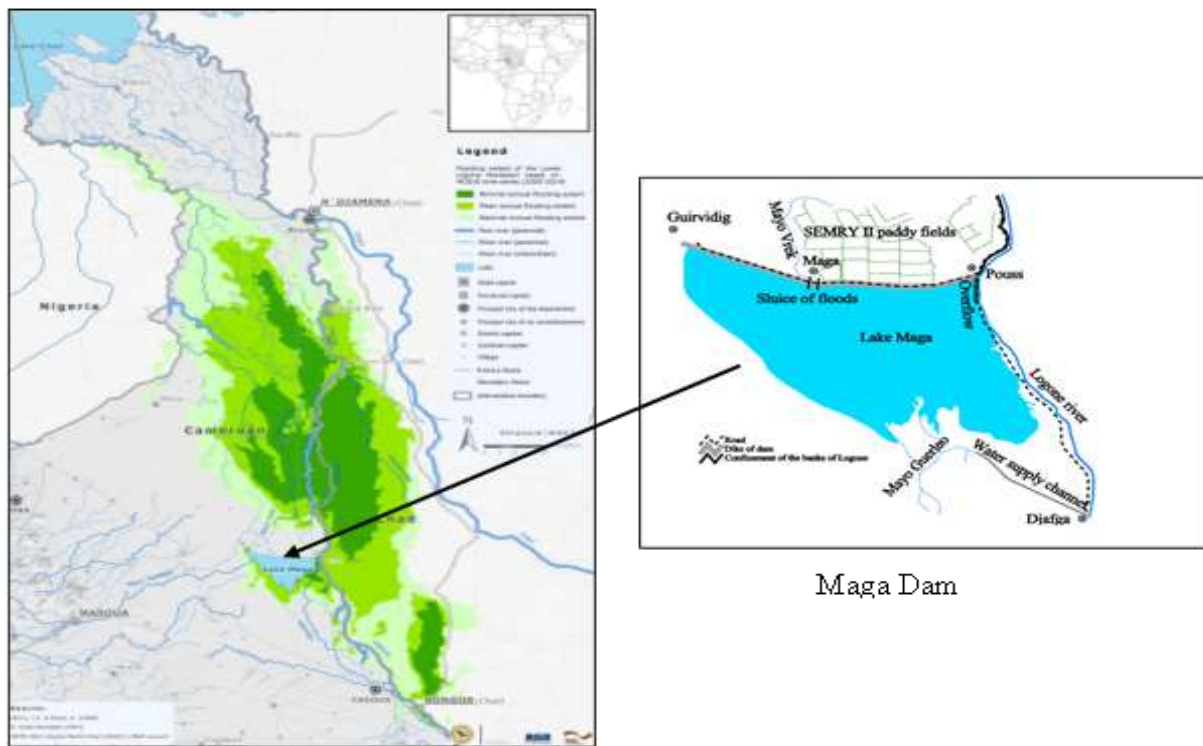


Figure 5. Yaere flood plain of River Logone showing Lake Maga and minimal, mean, and maximal inundated areas for the period 2000-2014. Sources: Francois et al. (2010) and Vassalo and Wilczok (2016).



Figure 6. Displaced flood victims sheltering in schools and flooded areas in the North Region during the August/September 2012 Floods. Sources: UNICEF/2012/Iker (1st two photos), Thomson Reuters Foundation and Cameroon Red Cross respectively (3rd and 4th photos).

FINDINGS

Impact of frequent flooding on livelihood assets and food security

Findings - taken from a detailed analysis of the literature review, case analyses, and interviews, reveal that the flooding had notable impact upon the various livelihood assets (Figure 6). According to the interviewees, the 2012 floods caused considerable damage to livelihood assets in Northern Cameroon including crops and livestock worth billions of FCFA francs (also CERF 2012; Relief Web, 2012). The 2012 flooding seriously affected natural capital in both study areas. Since the floods hit during the peak of the farming season, food, and cash crops, food stocks and livestock assets were completely lost. This caused severe harvest shortfalls and shortages of food supply in the region (Gergely, 2009; CERF, 2012; Relief Web, 2012). According to SODECOTON, 45,000 tonnes of cotton, worth 900 million FCFA, the main cash crop of the region, was ruined. SEMRY also estimated that 450 million FCFA worth of rice was also destroyed (*Economist Intelligence Unit News, edition of 27 September 2012*).

Physical capital of the region also suffered serious damages. About 12,000 homes - as well as critical infrastructure - were damaged in the North and Far North regions. In the North Region, the flooding weakened the Lagdo Dam significantly (World Bank, 2013), and diminished its operational effectiveness causing consistent power outages. The power outages led to inadequate water supply to irrigate fields, delaying factory processing and production of crops and other agricultural services in the region. To prevent Dam failure, floodwaters were released, exacerbating flooding downstream (UNICEF, 2012). In the Far North Region, the Maga Dam ruptured, flooding neighbouring areas (Figure 7). Floodwaters damaged roads and bridges, and disrupted local and international transportation, as well as

bringing down power lines and causing power outages to thousands of homes (Ngalame, 2012; *Cameroon Tribune, edition of 16 September 2012*). Infrastructural and agricultural damage was expected to come to billions of FCFA (*CNN news, edition of 17 September 2012*).

According to the interviewees, human capital – a key livelihood asset identified in the SL framework was seriously affected. Food insecurity of the population already reliant on staple foods of very low nutritious value, and suffering malnutrition levels above the national average (UNICEF, 2012; Ponka et al., 2015, p. 183) worsened due to flooding induced food shortages. The flooding caused more than thirty fatalities, displaced about 60,000 people (some sought shelter in schools that were not flooded (Figure 6) and affected more than 120,000 people (Relief Web, 2012; CERF 2012; UNICEF, 2012; *Cameroon Web regional news, edition of 22 December 2014*). The damage to other school premises affected education delivery, delaying the reopening of schools in the region for the 2012/2013 academic year (*Cameroon Tribune, edition of 16 September 2012*; Relief Web, 2012; UNICEF, 2012).

In addition, the flooding increased health risk for diseases, with 3,000 people hospitalised due to flood related illnesses (*CNN News, edition of 17 September 2012*). It caused a cholera epidemic and measles outbreak that threatened the health of the affected population (CERF, 2012; Gergely, 2009; Relief Web, 2012).

Flood damage to crops/food stocks has dire consequences for financial capital. High poverty levels in the region are exacerbated by further agricultural losses, and changes in land use due to flooding. With ruined farms/food stocks and reduced crop yields, small-scale farmers have very limited food to eat and no excess to food stocks able to generate extra income. The population also regularly use their limited resources to cope with the impacts of flooding, exhausting their financial abilities, constraining their capacities to

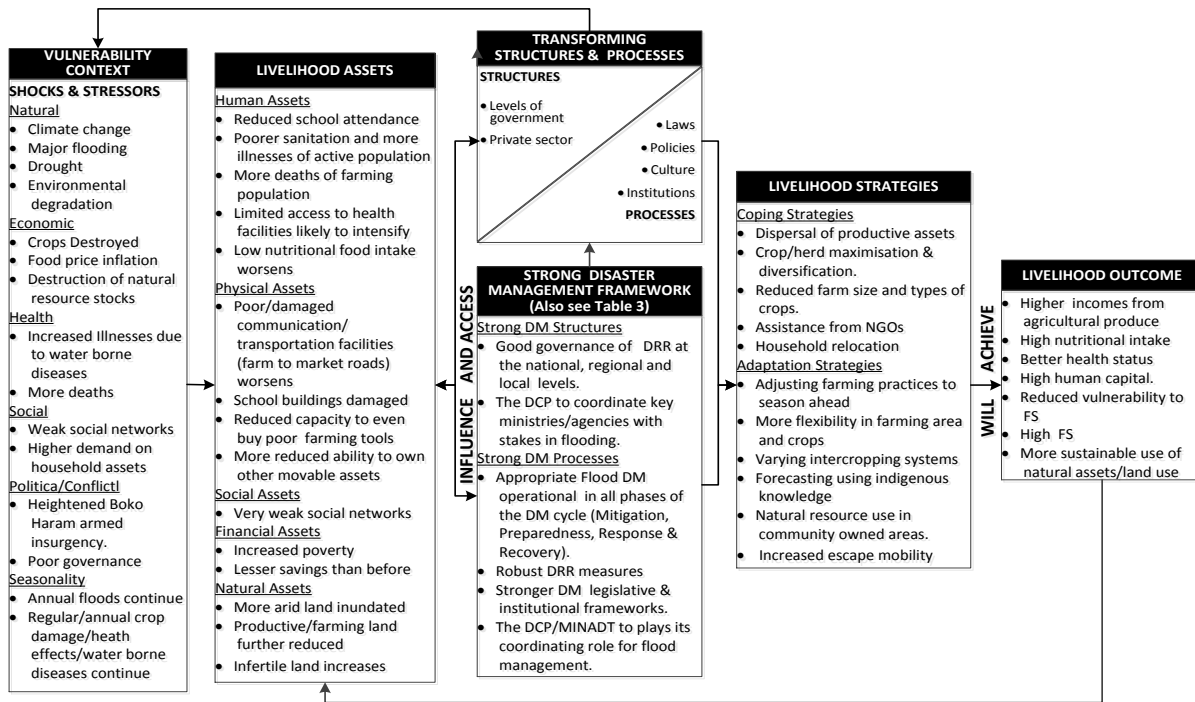


Figure 7. Proposed Disaster Management with Sustainable Livelihoods (DMSL) framework.

implement other livelihood strategies, and deepening poverty at individual and household levels.

Damages to financial and human capital had ramifications for social capital. There are examples of coping measures that enhance FS - such as using family networks and assistance from relatives - that represents a common form of African community resilience. These networks, are however, seriously weakened during floods. The death of family heads (income generators) and displacement of people weakened the social networks in Northern Cameroon, making the population more vulnerable to flooding impacts. Constrained financial resources, arising from agricultural losses, also affect social capital since there is little free cash for personal use. In such circumstances, people have limited abilities to help each other.

Equally, the flood problem is made worse by the high poverty in the region. The population have limited financial resources to engage in alternative livelihoods and to acquire nutritious food when they persistently suffer agricultural loss. It also implies that where there is high vulnerability, the frequency of disasters such as flooding further constrains the already limited capacity of farmers to diversify in order to facilitate to developmental change.

Analysis reveals remarkable similarities, trends and impacts on livelihood assets in both study regions.

Findings are also similar to limited studies covering other parts of the country that showed that destruction of homes, crops, livestock loss from flash floods causes production and income loss (Molua, 2012; Balgah et al., 2015; Bang et al., 2017). This adds credence to the generality of the results. Considering the case studies provide a snapshot of the impact of flooding for a few months in one year, the cumulative impact of frequent flooding for several years would have dire ramification for livelihood assets and FS because it reduces the ability of smallholder farmers to respond to and recover from shocks. This also has wide-ranging implications for regional economic development considering the main export, cash and staple crops are highly vulnerable to flooding.

Assistance to food security

Frequent flooding induced devastation often-precipitate requests for donor-provided food aid to mitigate the ravages of hunger, malnutrition and food shortages. In the context of the SL framework, there is an important role for transforming structures and processes, such as governmental agencies and DM bodies, to administer this food aid (Figure 2).

No consistent national strategies exist to enhance FS in

the region, and thus transforming structures and processes are weak. According to the interviewees, those that exist are largely associated with DM functions and strong corroboration of the need to incorporate a durable DM perspective into the SL framework. Institutional assistance for livelihood challenges and FS has been mainly through post-crises/disaster relief without adequate proactive measures. Interviewed DM respondents said the government remained reactive when providing food aid and financial assistance to flood victims. Nevertheless, they highlighted that FS is not guaranteed. Food aid remains temporary and relief assistance is vulnerable to corruption and embezzlement so many disaster victims receive only a proportion of assistance or even not at all. This lapse in DM has made livelihoods in the region unsustainable (Figure 2).

Of course, one of the main ways to enhance livelihood assets and address food insecurity in Northern Cameroon is through international assistance (see Molua and Lambi, 2007; FAO, 2016a). Post 2012-flooding assistance arrived from many sources including UNHCR, WFP, UNICEF, WHO, UNDP, the governments of Morocco, Japan and NGOs such as PLAN and the Red Cross (*Cameroon Tribune, edition of 26 October 2014*). After the 2012 floods, the WFP responded in 2013 to food insecurity and malnutrition concerns in northern Cameroon by improving the grain storage capacity of the communities and providing school meals to 55,000 pupils annually (WFP, 2016a). By March 2016, 30,000 children under five had benefited from malnutrition prevention activities - illustrating that adequate post-disaster relief can improve livelihoods (WFP, 2016b). This is also in line with the contentions of the new suggested Disaster Management with Sustainable Livelihood (DMSL) framework (Figure 7). In the same token, the Food and Agricultural Organisation of the United Nations have been improving FS in Northern Cameroon by boosting cereal production through the provision of improved seeds, tools and training (FAO, 2016a). Yet, these efforts have been largely transient and temporal and often undermined by the increased frequency of flooding. It is increasingly important to recognise that domestic flood management and protection measures have to accompany international assistance if they are to enhance livelihood assets and FS. Aid measures alone have not been nor will be sufficient to sustain livelihood assets and enhance FS (Figure 7).

In developing countries, FS or hunger is mainly due to poverty (FAO, 2016a, b). Intermittent attempts made through externally funded poverty reduction projects have had very limited or no success. Due to the high poverty level and over dependence on agriculture for livelihoods, frequent damage to agricultural produce risks keeping the populace trapped in a vicious cycle of hunger and poverty for several decades. However, adaptation strategies

and/or coping measures, supported by a viable DM system are viable options to reduce smallholder farmer's risk to poverty. However, these strategies are hard to implement since poverty and vulnerability are highly correlated with over-dependence on subsistence agriculture (Ellis and Allison, 2004; Khatun and Roy, 2012).

Adaptation to climate shocks and food insecurity in Northern Cameroon

Adaptation is an important livelihood strategy. Faced with the effects of climate shocks on agriculture, farmers in Northern Cameroon have made efforts to mitigate risks to food production, food availability and food accessibility. Some studies in Northern Cameroon reveal that communities are trying to enhance FS at the local levels by adjusting their farming practices to the seasons ahead, by increasing flexibility in the choice of farming areas and crops, by varying inter-cropping systems and through diversified socioeconomic changes. The main strategies include the use of indigenous knowledge or traditional ways of forecasting (Tingem and Rivington, 2009); the use of natural resources, including food in community owned or private lands/forest (Tingem et al., 2008); crop management, water management, and soil management techniques, including farming operations and socio-cultural activities (Molua, 2012; Ngondjeb, 2013). However, around 39% of the farming population do not employ adaptation techniques (Ngondjeb, 2013). Pastoralists in Northern Cameroon also developed survival strategies to mitigate the impact of rangeland degradation (for example flooding of the Yaere flood plain in the Far North Region) to their cattle. Herd maximisation and diversification, and increased/escape mobility to search for water availability are common coping methods used by herders in the region (Pamo et al., 2005). Table 2 shows the main adaptation and/or coping strategies employed by small-scale farmers in Northern Cameroon.

Research findings also reveal that attempts to adapt to the effects of Climate shocks to agriculture in the region have several limitations. Ngondjeb (2013) identified five main constraints to adaptation in the region and quantified them in percentages as follows: Lack of Information (13%), lack of money (22 %), shortage of labour (16%), land tenure (43 percent) and poor potential of irrigation (6%). It is notable that since adaptation is expensive, most of these constraints are linked to poverty.

Limited finances prevent small scale farmers from acquiring the necessary resources needed to facilitate adaptation (Ngondjeb, 2013), and to recover and bounce back following climate shocks like flooding. Epule and

Table 2. Adaptation and coping strategies for enhanced FS in Northern Cameroon due to CC and CV.

	Main Strategies	Adaptation/Coping choices
Farming	Indigenous and traditional knowledge	Interpreting natural events and phenomenon. Seasonal cropping calendars, crop choices influenced by traditional forecasting; e.g. heights of ant nests informed forecasting of rainfall and rainy season
	Crop management	Use of different crop varieties, mixed-cropping, mono-cropping, and plant protection, e.g. staking, shading & shelter, Seed treatment, application of pesticides, drought tolerant varieties
	Land and Soil management	Altering locations of planted crops, applying soil amendments, e.g. farmyard manure, pesticides, fertilisers, changing farm sites, soil conservation, tree planting.
	Water Management	Rainwater harvesting, manual watering, increased irrigation, water conservation practices.
	Farming Operations	Adapting sowing techniques, early/late crop harvesting, planting early maturing short-duration varieties; adjusting sowing time and sequence; storage prompt marketing, seasonal plant spacing and row orientation.
	Socio-cultural activities	Traditional ceremonies, religious prayers, migration
	No adaptation strategies	Substantial proportions of farmers (39% do not employ adaptation techniques.
Herding	Herd Maximisation and Diversification	Using different livestock species in different ecological niches where they can graze certain plant species.
	Increased mobility and Escape mobility	Increasing mobility of dispersed forage resources at times of rarity. Escape mobility involves long distance migration to escape combined effects of range degradation and decreased rainfall.
Others	Natural resource use	Use of natural resources, in community owned or private lands/forests, including food and other livelihood assets to strengthen adaptation at the local level

Source: Authors, culled from Ngondjeb (2013); Molua (2006; 2012); Tingem et al. (2009) and Pamo et al. (2005).

Bryant (2015) assessed the responsiveness of Cameroon's maize production to climate and land use change, and suggested that adaptation strategies highlight the level of forest area change. However, this poses problems because land use in Northern Cameroon is under pressure due to the influx of refugees, which has limited available cultivable farm sizes. Lack of measures to sensitise and educate the population, coupled with the very high illiteracy rate of the region prevents the inhabitants from learning adaptation measures that could improve their livelihood assets. Therefore, the findings reveal the need for a strategic approach to adaptation to food insecurity and a robust flood management that can facilitate the process.

Flood management in Cameroon

Existing institutional and legislative arrangements, which correspond to transforming structures and processes in the SL framework (Figure 2); have not so far mitigated

the ramifications of frequent flooding for livelihood assets including FS, thus limiting adaptation measures. The Sendai Framework for Disaster Risk Reduction (DRR) urges governments to invest in DRR for resilience (UNISDR, 2015). Flood management in Cameroon, designated to the Department of Civil Protection (DCP) in Cameroon's Ministry of Territorial Administration and Decentralisation, suffers from notable deficiencies hindering effective flood management; most notably the weak inclusion of DRR into legislation (Bang, 2014; 2016). Interviewed disaster managers highlighted that, despite frequent flash flooding, no adequate plans exist to strengthen the capacity of local community structures to cope, resist and recover from floods, with no dedicated budgetary provisions to manage flood hazards. This statement corroborates earlier research by Bang (2014) that found that organisational structures do not provide funding mechanisms to mitigate and prepare for natural hazards. Interviewed respondents also acknowledged that the legislative framework does not prioritise flood hazards, despite governmental recognition that floods

represent the most frequent natural hazards in the country and affects the greatest number of people. All disaster managers agreed that institutional arrangements have a narrow focus on flood response rather than risk reduction.

Referring specifically to North Cameroon, interviewed disaster managers emphasised the necessity to incorporate further structural mitigation measures into legislative and administrative frameworks since hydrological structures in the region exacerbate flooding. The research also found that, although the administrative architecture for natural DM exists at the national, regional and local levels where a crisis committee can be created to manage flood events, the devolution of resources for crisis management to local structures is limited (Bang, 2016). Another concern expressed by respondents is weak institutional coordination and cooperation since multiple government ministries have varied and sometimes conflicting interests in flood management. For example, while the Ministry of Environment and Forests prioritises environmental conservation, the Ministry of Mines, Water and Energy focuses on water resources management, and the Ministry of Agriculture is concerned about impacts of flooding on agricultural production and FS (Sighomnou, 2005). So far, diverging interests have not been properly coordinated and translated into practical measures to mitigate the impact of flooding on livelihoods and FS.

Given these aforementioned limitations in DM, we argued for the inclusion of a more robust DM perspective in order to improve the livelihoods of the inhabitants (Table 3) facing uncertain and vulnerable environmental conditions.

Moreover, we argue that a more robust, explicit DM perspective that has the ability to improve the livelihood assets and strategies, especially after intense shocks/stressors, and leading to better livelihood outcome should be incorporated into the SLF, representing what we identify as the proposed Disaster Management with Sustainable Livelihood (DMSL) framework (Figure 7).

Conclusion

Findings reveal the threat pose by CC and CV to livelihoods and FS is real in Northern Cameroon, and emanating directly from increases in the frequency and severity of climate shocks. As the 2012 floods have shown, too much water even in arid Northern Cameroon demonstrates that, rather than being a salvation, flooding can be a limitation on enhancing FS.

Resilience to sustainable livelihoods and FS are extremely low in Northern Cameroon for several reasons, and look to remain so. Extreme poverty in the region restricts livelihood activity mainly to subsistence

agriculture. When floods strike frequently, the regular damaging of crops and killing of livestock, ensures the local populations suffer persistent food insecurity. With continuous damage to livelihood assets and agricultural produce, there is a risk that the population may be trapped in a vicious cycle of poverty and food insecurity. Therefore, FS policies should be central to poverty reduction efforts if the population is to avoid permanent entrapment in poverty.

The article also shows that with CC forecasts predicting even worst weather shocks with increasing temperatures, the effects on livelihood assets and FS in Northern Cameroon will be dire. Notable also, is that although floods are often short-lived, their cumulative effects can cause long-term damage to livelihood assets. This also poses a high risk of permanent socio-economic damage in the region, which might continue to aggravate poverty, and food insecurity.

As the findings in both study sites show, FS problem is made worse due to Northern Cameroon already suffering from substantial reliance on staple foods, and registering the highest prevalence rate of chronic/acute malnutrition in the country (Ponka et al., 2015, p. 183). With frequent flooding likely to cause more food shortages, this will inevitably compound water borne related health diseases including malnutrition. Diversification should - in theory - be the answer. Nevertheless, this is limited because some crops are more resilient in arid environments resulting in narrower variety of food sources, hence lesser food nutrients (Azam-Ali, 2007). Yet, floods damage the few nutritious crops and poverty limits access and utilisation of a balanced nutritious diet. Already, government's reactive post-flooding assistance is diverting funds that could be used to improve the transforming structures and processes, particularly DM. To increase sustainable food production and enhance FS, viable adaptation and/or coping strategies are needed, with strong, transformative institutional support (Figure 7).

During flooding, fatalities, including the prevalence of diseases coupled with limited access to healthcare, education, and clean water have a serious toll on social and human capital. This diminishes the quantity/quality of human capital available for agricultural activities. The large number of affected/displaced people during flood events distorts social networks, a useful resource that local communities utilise for assistance. Equally, floodwaters damage physical capital - roads and bridges disrupting transportation and communication, degrading the regional economy and diverting funds that could be used to enhance FS to repair work.

Influx of refugees into Northern Cameroon has increased the population density of the fertile flood plains in the region, which has not been matched with food supply. With dwindling crop yields and food/livestock

Table 3. How disaster management can positively affect livelihood strategies/outcome.

Disaster Management		Effects on Livelihood Strategies (including Adaptation/Coping Choices)	Livelihoods Outcome
Key DM Phases	Key Activities		
Mitigation (Robust DRR measures)	Early warning systems (EWS) for floods/hazards	Scientific EWS enhances traditional forecasting and understanding of seasonal cropping calendars, crop mixes and choices.	Higher agricultural produce leads to higher incomes, greater nutritional intake and/or better standards of living.
		Facilitate increased mobility and escape mobility for herders when severe weather predicted.	Higher incomes from livestock production can translate into better nutrition, increased household physical/natural/economic assets.
	Maintenance of Hydraulic infrastructures	Dam repairs prevent Dam breakage and downstream flooding.	Farming, agricultural produce and human resources and assets will be preserved and flourish.
	Legislative Framework	Land use management and building codes to guide hazard/flood prone areas.	Reduce vulnerability to natural shocks, with greater preservation of assets (physical, natural, financial)
Preparation	Education & Information Dissemination	Raise knowledge awareness of local communities on regional vulnerabilities and safety protective measures.	Lead to less effects, damages, or losses during shocks/natural hazards, thereby enhancing chances of livelihood survival post-hazards.
	Training/Simulation Exercises	Frequent evacuation drills for flash floods involving population & emergency services saving lives	Increase propensity to save lives and livestock (vital livelihood resources).
Response	Evacuation-Coordination of relief agencies	Swift evacuation of flooded/ risk areas saves lives of people/ livestock.	Preservation of human resources provides numerous economic and social benefits.
	Relief Aid-provision and coordination of relief aid/assistance	Ensure contingency planning in place (including budget) to provide relief aid to affected populations in case of natural shocks/stresses	Relief assistance provides financial/material aid to buffer against shocks/stresses to short-term sustainable livelihoods.
Recovery	The DCP in MINATD to coordinate inter-agency & inter-ministerial recovery efforts after disasters	Appropriate cooperation and collaboration of key stakeholders managing flood protection like respective ministries. Enhance stakeholder cooperation with local communities.	Enhances livelihood resilience at community and household levels to minimise any long-term damage to livelihoods assets.

Source: Authors.

availability caused by recurrent floods, food insecurity is bound to increase. These challenges have had very limited and inconsistent response.

FS, to a certain extent, rests on government assistance albeit with food policy failures (World Bank, 2013). Government has not instituted DRR measures that will mitigate the impact of flooding to livelihoods on a long-term basis. Poor, mainly reactive DM strategies, lack of credit facilities, a poor asset base, lack of awareness and knowledge, low educational attainment and limited skills

in non-farm sector, lack of rural infrastructure and over dependence on agriculture as primary source of livelihood tend to compound food insecurity in the region. The government and many NGOs provide relief assistance during crisis, which is insufficient and has not been able to sustain the food needs of the region.

We argue that the FS challenge hinges on livelihood assets. As such, the government needs policies and strategies that enhance livelihood assets and facilitate crop production. Adaptation and coping measures should

be a proactive as well as a reactive strategy that should provide cushioning for households security. As such, public investment in both structural and non-structural measures should be increased and hereby a stronger DM perspective is required. Considering that floods pose a serious risk to Dam infrastructure, continued investment in Dam resilience will also enhance livelihoods and FS.

This article's findings highlight, not only the relevance of mainstreaming resilience into livelihood assets and FS, but also that flood management must become an integral, increased priority, especially when confronting recurrent shocks as we have argued in DMSL framework. This is relevant for SL considerations (Figure 7) for future generations given the damning effects of CV.

Since CC and CV is an unavoidable future for all, it should not be a permanent limitation for Northern Cameroon to achieve its full livelihood/FS potential. This worrying situation can be better handled if the government adopts a strategic approach that specifically incorporates a stronger proactive DM perspective.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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