

Exploring Migration as a Climate Change Adaptation Strategy for Agro-pastoralists in Kasulu District: Benefits and Challenges

*Saumu I. Mwasha**

Abstract

Migration is acknowledged, promoted and widely regarded as one of the adaptation strategies to environmental change in different parts of Africa. However, its benefits and challenges have not been contextually examined and exhaustively analysed. This study employed the push and pull migration theory to investigate opportunities and challenges that result from migration to understand its strengths and weaknesses, and how its implications are linked to issues of migrants' climate change adaptations in Kasulu District, Tanzania. Purposive sampling was used to select the study district, participants for focus group discussions, and key informants. Observation, key informant interviews and six separate FGDs were conducted to both agro-pastoralists and farmers. The findings demonstrate that agro-pastoralists exploited opportunities in the places of destination through asset accumulation and by performing different livelihood activities. However, in pursuit of their livelihoods, they also contributed to resource degradation and conflicts with local farmers; which were a result of the migrants' inappropriate integration in the host society, and which were influenced by different actors, including individuals from both host and migrant communities, as well as institutions in host societies. All this challenges the notion that agro-pastoralists migration is an effective form of adaptation to environmental change in general, and climate change in particular. Migration has a potential of being an effective climate change adaptation strategy; however, it requires the government to coordinate the movement and regulate its activities to reduce conflicts with host communities, as well as resource degradation.

Keywords: *adaptation, climate change, livelihood, agro-pastoralists, migrants*

1. Introduction

Migration is widely acknowledged and promoted as a form of adaptation to environmental risks (Upadhyay, 2014; Gebeyehu et al., 2022). Environmental migrants are individuals, or groups of individuals, who—because of compelling circumstances involving an abrupt or gradual change in the environment that negatively impacts their lives or living conditions—are forced to leave their customary homes, either temporarily or permanently, and relocate domestically or internationally (IOM, 2007). Reports by the United Nations (UN) show that climate-induced—or environmental—migration in general is on the growing

*Geography Department, University of Dar es Salaam, Tanzania: saimwa8@yahoo.com

trend. This happens in different forms depending on the type of hazard, and also whether it is planned or spontaneous. Globally, as many as 216m people could move within their own countries due to slow-onset climate change impacts by 2050 (Clement et al., 2021). The slow onset of climate disasters, such as climate variability and droughts, are characterized by individuals from the same location moving to different destinations, or sometimes the same destination, but in different time periods (Dun & Gemenne, 2008).

Different international frameworks acknowledge migration as a climate change adaptation strategy. They include the 2011 Framework Convention on Climate Change (Sakdapolrak et al., 2016), and the Sendai Framework for Disaster Risk Reduction adopted in 2015. At the regional level, the treaty establishing the African Economic Community firmly establishes the concept of free movement of people, recognizing the significance of such movement to economic progress in Africa (Abuja Treaty). Article 43 gives AU members the freedom to take the required action to gradually achieve free movement of persons, and guarantees that their citizens can exercise their rights to residence and establishment within the community, whether on individual, bilateral, or regional basis (WHO, 2010; Amadi & Vundamina, 2013). The government of Tanzania also provides the right to free movement of Tanzanians to any part of the country, which also involves the right to establishment. The Tanzanian Constitution of 1977, as amended by Act No. 15 of 1984 – as stipulated in Article 17 under the heading ‘fundamental right to freedom of movement’ – provides rights to free movement of Tanzanian citizens. However, upon arrival at destinations, migrants intending to stay in another region are required to report to the respective local government authority for a number of reasons, as stipulated in the Local Government Act of 1982. Agro-pastoralists, like other communities in Tanzania, enjoy the right to move freely in the country as a means to adapt to changing climate, especially in Shinyanga region (Bushesha, 2020).

This article is informed by the pull and push theory by Everest Lee as a lens to understanding how households make decisions to adapt through migration. The theory suggests that people migrate due to a combination of factors that push them away from their current locations, and others that pull them towards new locations. Environmental factors such as changing climate in the form of droughts or floods, together with other socioeconomic factors, may push people from their places of origin; but also a favourable climate may pull people to certain destinations. For instance, migration from northern Ghana to southern Ghana was explained by environmental factors (Van der Geest, 2011). It was learnt that many migrants in this area moved from the north because of poor agro-ecological conditions, and were attracted to move south because of easy access to fertile land and favourable climate (ibid.). Hence, the pull and push theory was used to understand the nature of agro-pastoralist migration as this group makes a deliberate choice to migrate in response to a hazardous situation, after assessing all available options.

Many literature sources suggest that migration induced by global environmental change leads to both positive and negative consequences (Venturini, 2012). The positive part is mainly from opportunities brought by migration. For agro-pastoralists, migration provides access to different livelihood assets such as fertile land, water and good climate favourable for agricultural activities (Gebeyehu et al., 2021; Msigwa, 2013). It also provides opportunity to do things differently because migrants move with their new knowledge and experience to destination areas, thereby enhancing productivity (Jensen, 2014). Migrants' knowledge may revolve around their cultural crops, and their experience with different environmental conditions and farming systems (Klocker et al., 2018). Their skills may also include expertise to rejuvenate and introduce irrigation farming on abandoned land because of salt intrusion and water logging, and the development of new crops such as rice farming (ibid.). Opportunity to diversify livelihoods contributes to beneficial livelihood outcomes (Warner & Afifi, 2014).

While migration may have positive impacts as reported above, these benefits do not necessarily reach all migrants or other people in contact with migrants (Yaffa, 2013). Some of the consequences involve health effects, erosion of the natural resource base, deaths of many animals on transit, selling of animals to pay for transportation and other costs while on transit, reduction in the adaptive capacity of the local agent, the generation of negative externalities to other local groups in the host communities, and the lagging behind of household members (Alarima & Obikwelu, 2018).

However, these impacts do not necessarily affect people in the community in the same way. Women and the young, particularly school-age children, are the most vulnerable following migration due to challenges associated with sustaining their livelihoods. Women are sometimes forced to endure issues that are not acceptable to them (Oyilieze et al., 2022). On the part of the youth, school dropouts, early marriages, engagement in smuggling and other immoral behaviours (John, 2022): all these may arise as a result of migration. Since migration is not considered successful adaptation if it leads to negative consequences, we need to learn from the experiences of past migrations to ensure that future movements lead to successful adaptations (Adger et al., 2011; Jakobson et al., 2019). Effective adaptation is demonstrated by reducing risk to climate change impacts; enhancing social relationships and community well-being; improving ecosystem health, environmental quality, and natural resources; increasing people's income and access to economic resources; and strengthening institutional connections, influencing policies, and improving governance practices (Owen, 2020; Singh et al., 2022).

Agro-pastoralist migration in Tanzania has also been on a growing trend as people engage in open space livestock keeping. The Sukuma, Maasai and Dakota ethnic groups take the lead (Salemo et al., 2017). Sukuma agro-

pastoralists, for example, started a southward movement in 1970 in search for pasture land mostly in virgin lands (Izumi, 2017). A part of this group included those who moved to Lake Rukwa in a large unutilized swampy land, where they established large-scale farming alongside livestock keeping (ibid.). Other pastoralists/agro-pastoralists were evicted from the Ihefu wetland because of their involvement leading to land degradation. They moved to Rufiji, which led to the deaths of many animals; on top of incurring other costs while on transit to Rufiji. Further, there were conflicts between these migrants with local farmers (Mwambene et al., 2014; Komba & Mahonge, 2020; Walwa, 2020).

However, different opportunities were available for these agro-pastoralist migrants, including access to livelihood capital necessary for livestock keeping, and support from government institutions (Msigwa, 2014). Although many studies have recorded the consequence of migrant movements, the implication of such movements, and what influences the outcome of migration in the context of climate change adaptation, require further investigation. Using the perspective of the integration theory, this study aims to uncover the consequences of agro-pastoralists migration in response to environmental change, and assess the effectiveness of migration as a climate change adaptation strategy. The article is organized in four sections: material and methods come just after this section; followed by the results section which presents the nature of agro-pastoralists migration, and opportunities that come with migration and its challenges. The final part presents the conclusion.

2. Material and Methods

The article is based on a study that was conducted in Kantundu village, which is located in Nyamidaho ward, Kasulu district, in Kigoma region, Tanzania. The study village was selected because it received agro-pastoralists migrants in the adaptation to environmental stress. Purposive sampling was used to select key informants and focus group participants. With the support from the village leaders, members who participated in the focus group discussion (FGDs) were selected based on the following criteria: gender, level of education, and age. Methods used for data collection included FGDs, key informants interviews (KIIs), and observation. Six separate FGDs were conducted with men, women, youths, agro-pastoralists (migrants), and the host communities. FGDs had between 8-10 participants. The KIIs were conducted to people in the government that had knowledge about the livelihood of agro-pastoralist migrants. These were the District Agriculture Officer, District Livestock Officer, District Environmental Officer, and the Village Executive Officer. Thematic analysis was used for data analysis. The process involved getting familiar with the data, generating initial codes, searching for themes, reviewing themes, and finally defining and naming themes.

3. Results and Discussion

3.1 Nature of the Agro-pastoralists Migrants in Kasulu District

Since migration is expected to increase in future, it is important to learn from the existing nature of the migration process to unveil its enablers. Agro-pastoralist migrants in the study area were dominated by the Sukuma originating from Shinyanga, Mwanza, Geita and Tabora regions. The migrants had been living in the study area for a period ranging from 5 to 17 years, i.e., from 2007 to date (2024); and the highest peak of migration was recorded in 2012. The time and speed of movement is determined by the severity of disasters such as drought, and everyone moves depending on one's ability for adaptation. The migration of Sukuma agro-pastoralists from regions like Shinyanga, Mwanza, Geita, and Tabora suggests that these communities have already adopted migration as an adaptation strategy. The sustained migration over several years underscores the need to recognize mobility as a viable adaptation strategy for climate resilience, allowing communities to seek better conditions and maintain their livelihoods (Gebeyehu et al., 2022).

When asked about the reason for migrating, all migrants admitted that drought was the main disaster, affecting crop production; followed by the lack of adequate pastureland, and food insecurity (caused by drought). The impact of drought was intensified by increased land degradation, overgrazing and increased human population; all limiting people's ability to adapt. Migrants informed that they hardly harvested enough food to meet all their food requirements. They reported that they were eating one meal a day just to survive the drought period. This means that since all the migrant respondents mentioned drought and other related problems—such as food shortage and shortage of grazing land—migration could have been the last in the series of coping strategies. This brings urgency to analysing migration as an activity that is not exclusive only to an adaptive approach, but signals the limits to adaptation within sites (Etana et al., 2022).

The main reason for choosing Kigoma region as the destination area was because of the perceived availability of fertile land and good climate favourable for crop production and animal keeping, and the presence of business opportunities. These opportunities pulled agro-pastoralists to the Kasulu district in Kigoma region. One migrant reported the reasons for moving thus:

I moved here because the soil is rich and fertile, and I can now grow a variety of crops like maize, beans, and groundnuts. Back at home, the soil is too poor, and we could only grow a small amount of food (Men, Migrant FGD, November 2023, Kantundu Village).

Although agro-pastoralists have been using migration as a part of their livelihood strategies, the current movement is different from that of the past generation because of distance. Migrants now cross regions as opposed to the past where movement was within districts of the same region. Population increase and drought impacts, which affect many parts of the country, are the reasons for the

long-distance movements. Because population has risen and climate-related drought has become widespread, changes in the nature and scale of agro-pastoralists' mobility from local, district-based movements to regional ones suggest that climate impacts are growing across regional boundaries.

Agro pastoralist migrants make a deliberate choice to move and plan for the same. The plan is around where to move, who moves first, and whether men or women should move first. The knowledge about where to move to, was from two main sources: acquaintances who had lived in the destination area; and through sending elderly people from the family (particularly the father) to travel to different regions and explore available opportunities. Early migrants came as business people selling agriculture inputs and clothes, and others came to buy crops. These groups of entrepreneurs were the source of information for some pastoralist migrants in this area.

Households that received information from elderly persons usually tended to send a group of youths with livestock to live and explore more about the availability of arable land to encourage the whole family to move. This suggests that agro-pastoralists do plan migration; and that they employ different sources of information to make sense of areas that have the potential to support their livelihoods. Thus, social networks, individual actions and the availability of financial resources are particularly important to enable migration. Social networks can make the migration process possible through providing information concerning available opportunities for migrants; the opportunities and threats associates with the migration process; and the possible methods of coping with the challenges. During one FGD, one participant pointed out the following in this regard:

I have ten years here in Mvugwe village since I arrived from Shinyanga region. The majority of us are from Mwanza and Shinyanga, while a few are from Geita. As part of the preparation for movement, we sell our harvest if we have any, and keep the seeds like maize and groundnuts. According to family plans within the Sukuma tribe, we have two ways of moving. The first is when we move cattle first and the family later; or others may move cattle and the family at the same time. Elders play a great role in informing the family where to move to, or sometimes people use their relatives or friends to decide on the destination. A lot of the Sukuma are moving because of drought and land degradation, which affect crop production and pasture for livestock. And we tend to invite each other when we discover an area with opportunity for our livelihoods (Men, Pastoralists FGD, November, 2023, Kantundu Village).

Although some migrants might intend not to move further in the future, the majority would still consider potential for future movement as the number of the livestock increases. Some have already started moving to other regions, especially those with high numbers of livestock, and those that depended much on local forests for feeding their livestock. Migration patterns are dynamic and influenced by changing environmental and economic conditions

(Black et al., 2011). The following sub-sections present the findings regarding the intentions and behaviours of migrants, particularly their potential for future movement and the factors influencing these decisions.

3.2 Opportunities Available through Migration

Migrants exploit opportunities in the areas of destination, and because of these benefits, they perceive migration to have benefits to their livelihood. These opportunities are explained through resource optimizations, livelihoods diversification, knowledge transfer, access to employment opportunities, and social networks.

3.2.1 Improved Agricultural Productivity

Migration often allows migrants to move to areas with more fertile soil, better rainfall, and favourable farming conditions. As said earlier, migrants move because their land become infertile, degraded, or is no longer capable of supporting agricultural activities due to climate impacts like droughts and soil erosion. When the migrants arrived in the new regions, they found productive land for agricultural purpose, as well as animal-rearing; which enhanced their food security and economic status. This was explained by one pastoralist thus:

.... the land for grazing is better, and our animals are thriving. In our previous home, the land had become too dry for grazing.....the pasture here is better than where we came from, and we can find water for our cattle. Our livestock have become healthier since we moved (Men, Pastoralists FGD, November, 2023, Kantundu village).

Migrants also had the ability to expand their farming activities, grew different types of crops, and changed their crops from time to time to preserve soil fertility. This not only increased productivity, but also minimised their exposure to crop failure due to climate change, as reported by one migrant:

I now grow vegetables and maize alongside other crops, which has made farming more stable (Women, Migrant FGD, November, 2023, Kantundu Village).

The two activities of crop farming and livestock keeping had numerous advantages. First, was the nutrient cycling between livestock and the agricultural farms, especially the host community's crops' fields on land that had been left under the fallow system due to loss of fertility. More fertile soils meant increased production of crops, which enhanced food security. Second, diversity in agriculture complemented their livelihood by extending the capacity of the migrants to earn income from the various agriculture related activities. Diversifying agricultural activities also increased livelihood resilience since, even if one crop suffered a climate-related stress, others cushioned it, thus avoid pulling down the whole economy. As a male migrant said:

Since I came here, I have been able to grow crops like maize and beans, and I also raise goats and chickens. This has given me more income sources, reducing my reliance on just one crop (Men, Migrant FGD November, 2023, Kantundu Village).

However, the land access procedures for migrants were informal with many procedures that stem from the informal market. Those who had prior knowledge of the new society's culture, particularly in the usage of land, avoided some unforeseen issues like buying land that was earmarked for investors. One Officer had this to say:

Currently almost all migrants own land, although some did not have land before. Unfortunately, most do not have customary title deeds because the selling and buying was very informal: some did not even report to the village leaders as required. The more migrants came, the more host communities sold them even land that did not belong to them (Kantundu Village Executive Officer, November, 2023).

3.2.2 Improved Water Availability and Irrigation Access

Access to reliable water sources was another key opportunity for migrants. This was beneficial because migrants were coming from areas with inadequate rainfall and reduced water sources; and moving to regions with sustainable water sources like rivers was helpful. Water availability enhanced crop production, livestock health, and thus increased food security. One woman testified to this:

Here, there is enough water for irrigation, which allows me to grow crops all year-round. In my old village, we were always struggling with water shortages during the dry season (Women, Pastoralists FGD, November, 2023, Kantundu Village).

Since migrants also rear livestock, finding water and grazing resources ensured healthy stocks on which the migrants rely for sustenance. One of them gave the following admission:

This area has abundant pasture and reliable water sources, which have helped my cattle thrive. In the past, the land (where we moved from) was too dry to support large herds (Men Pastoralists FGD, Kantundu Village, November, 2023).

3.2.3 Livelihood Diversification

Opportunity to diversify sources of income is one of the ways through which particularly the poor can strengthen the quality of their livelihoods. Besides agriculture, migrants also came with business skills: they started businesses to sell the food they grew, and other goods to both themselves (migrants), and the host community. These businesses ranged from small shops to construction work, which expanded the sources of earning for the migrants. For example, migrants introduced new goods and services that stimulated the local economy. A pastoralist volunteered the following information:

When we came here, we opened a shop to sell food and household goods. This has been a good business, and it supports our family.

Another one said:

We started a butchery here because there were few places to buy meat. Now we can sell fresh meat to both locals and other migrants (Men, Pastoralists FGD, Kantundu Village, November, 2023).

The migrants also provided employment for the youth and women so that they could support themselves. These were employed in farming, cattle herding, or managing businesses; which benefited both the migrants and the local people. The provision of employment also acted as a tool for economic integration between the migrants and the host community. One migrant reported:

I work as a herder for our fellow migrant family. They pay me every month, and it is a stable income. I didn't have this kind of opportunity back home (Youth, Agopastoralists FGD, Kantundu Village, November, 2023).

This access to wage labour and off-farm income activities enabled the migrants to raise their living standards, and therefore build resilience to the impacts to climate change. For example, if yields from agriculture dropped due to adverse weather conditions, the people who had diversified livelihoods were in a better position as far as sustaining their sources of income was concerned. The government has supported the people in various ways, for instance, by putting up a slaughter house for the migrant's community, and issuing business licenses to enhance livestock related business opportunities. This has also been beneficial to the government as a source tax revenues. One Executive Officer testified to this thus:

Pastoralists are the dominant business owners here, and they have contributed much to the village development. Big shops, rice milling machines, and butcher shops are owned by migrants. Because we are aware of them and their economic activities, the government has erected a large slaughter centre to facilitate businesses related to livestock keeping (Village Executive Officer, Kantundu Village, November, 2023).

3.2.4 Migrants as a Source of Knowledge Diffusion

Moreover, migrants introduced changes in how businesses operate, particularly in improving customer service practices within the host communities. These changes reflect innovations that were previously absent in the market environment of the host communities, as reported in one FGD:

Previously, when you went to a shop owned by locals, they would tell you to find your own change. Now, migrant shop owners ensure they provide change to customers without complaints (Men, Host Community FGD, Kantundu Village, November, 2023).

These changes in the management of customer relationships have impacted local business, leading to the development of customer-oriented markets. The early opening of shops introduced by the migrants, together with a service-oriented business culture: all these have significantly benefited both migrants and the host community. This was testified in the following narration:

Before the migrants arrived, local businesses opened late in the day. Now, shops open early in the morning, making it convenient for residents to buy essentials (Men, Host Community FGD, Kantundu Village, November, 2023).

Furthermore, migrants have innovatively utilized wetlands for farming, demonstrating resourcefulness in adapting to local ecosystems and improving agricultural productivity. This was noted by one local farmer thus:

Migrants have shown us how to use wetlands for rice farming, which was previously not practised here (Men, Host Community FGD, Kantundu Village, November, 2023).

This way, both migrants and locals have been able to tap into unused areas, leading to improved food production and earnings. Moreover, migrants' search for new land has also enabled the discovery of suitable lands for certain crops such as rice and sunflower. These have revolutionized agriculture in the destination areas as reported:

Migrants discovered areas with adequate water supply and fertile soil for rice farming (Men, Host Community FGD, Kantundu Village, November, 2023).

This innovation has significantly increased the volume and quality of rice production in the region.

3.2.5 Social Integration and Support Networks

One of the important benefits experienced was the establishment of new social relationships during the migration process. The established social relations particularly helped during bad weather seasons, disease outbreaks, or even during financial hardships in the households. Because of their small numbers in the village, the migrants lived together in groups that provided for one another, by offering things like property, information, as well as counselling on issues affecting them. An agro-pastoralist had this to say:

When we first arrived, we didn't know anyone, but now we have formed a strong community with other migrants. We help each other with food, shelter and other resources (Men, Agro-pastoralists FGD, Kantundu Village, November, 2023).

These support networks have been an invaluable source of comfort to migrants as they go about their daily activities in the new places. Over time, migrants and host communities interacted more and intermarried, leading to the assimilation of each other's cultures. A respondent gave the following statement:

Some of us have married local people, and this has helped us feel more connected to the community. It has made us feel at home (Youth, Agro-pastoralists FGD, Kantundu Village, November, 2023).

Social integration strengthens social cohesion, which is essential for long-term adaptation to climate change, as communities are more likely to collaborate in the face of shared environmental challenges.

Generally, migration presents a variety of opportunities to migrants' livelihoods. If one considers the opportunities brought about by migration and its outcome to the livelihoods alongside the indicators of successful adaptation, it becomes apparent that there is success of migration as a climate change adaptation of agro-pastoralists who were successfully integrated into host communities. As already mentioned, some indicators include perceived increase in migrants' income, as well as the reduction of climate change impacts to migrants' livelihoods (Owen, 2020; Singh et al., 2022). Migrants' income increased by performing livelihood activities such as crop farming, livestock keeping, and other on-farm income generating activities. Drought impacts were reduced through migration that helped exploit resources elsewhere that could sustain their livelihoods (Gebeyehu et al., 2021, Msigwa, 2013). All these opportunities have put the livelihoods of the agro-pastoralists in a better condition compared to the one before migration. Other studies that recorded migration as a successful adaptation method observed that migration supports adaptation through access to different livelihood assets, opportunity to use knowledge and skills to innovate livelihood strategies in the destinations, and opportunity to diversify livelihood activities (Msigwa, 2013; Jensen, 2014; Warner & Afifi, 2014; Klocker et al., 2018; Gebeyehu et al., 2021).

3.3 Migrants Threats to Livelihood

While migrants enjoy the benefits that come with movement, there are also some threats that question the effectiveness of migration as an adaptation strategy to climate change in the context of agro-pastoralists. Threats result from issues around the environment, and their relationship with host communities. Migrants' ownership and use of the land has had some negative consequences such as conflicts and resource degradation. The conflicts have been between migrants, the government, and the local people. There were grievances held by some agro-pastoralists regarding eviction by the government, caused by the dishonesty of some local people who sold government land to agro-pastoralists. In this issue of land, another category of migrants that experienced difficulties was that of temporal migrants, particularly those who did not own land, and did not have permanent settlements. These had temporary sheds, and fed their cattle in other people's farms, and/or in the local forest reserve. A respondent explained about the categories of pastoralists thus:

We have different categories of pastoralists. There are those who migrate to a place, feed their cattle, and when the pasture is finished, they move to another place. Usually, these do not move with their families. They have a large number of cattle, mostly from one hundred plus. Because they are not planning to settle, they normally don't care about feeding their cattle in other people's farms, even if there are food crops. When they arrive, they mostly stay in the forest and not in the villages. They don't even report to the village leaders upon their arrival. If the government punishes them

heavily after destroying the forest, they then come to the village and buy some virgin land, mostly reserved for investors. (Men Agro-pastoralist FGD, Kantundu Village, November, 2023).

3.3.1 *Conflicts with the Host Community*

Some conflicts arise because of ideological differences between migrants and the host community on the use of fallow as a land management strategy. Agro-pastoralist migrants perceive the use of fallow as a waste of land and inability to properly manage land fertility, so its abandonment is perceived as a misuse of land. This land management practice resulting from different cultural backgrounds intensifies farmers' conflicts with agro-pastoralists. Pastoralists use fallow land to graze their livestock instead of leaving it to regain its fertility. While the host community practices the fallow system to ensure soil fertility, migrants agro-pastoralists who do not have adequate grazing land cannot leave their cattle starve while there is pasture land around, even if it does not belong to them. So, variation in culture contributed to land conflicts, requiring migrants to understand and respect host community's practices, and find their own grazing land.

Moreover, conflicts also arise when agro-pastoralists take their cattle to drink in water sources, causing not only degradation of water sources; but also the livestock feeding on farmers' crops. This sometimes leads to physical fights between agro-pastoralists and farmers that causes injuries, and sometimes deaths. One participant narrated how his brother-in-law was killed by an agro-pastoralist, leaving his wife to fend for the children on her own. When food crops are destroyed by livestock, this seriously affects household food security; and also causes a shortage of financial capital that would have accrued from selling surplus crops. Another impact is the disruption of marriage plans since farmers prefer to marry when they are food-secure. Another misunderstanding with farmers results from agro-pastoralist using water catchment areas to feed their livestock, while local farmers preserve such areas so as to conserve water sources. In more serious situations, angry farmers hack to death livestock found feeding in such areas. One officer made the following comment:

The relationship between farmers and agro-pastoralists is not good. Although there is some improvements, still there are hostile relations to the extent that most agro-pastoralists do not even attend village meetings. Part of the reason is because they know they are not here legally, and they are the source of conflicts with farmers (Village Executive Office, Kantundu Village, November, 2023).

3.3.2 *Conflicts with Government Officials*

Conflict with government officials arises because some agro-pastoralists invade the forest reserve (Kakere North) to feed their livestock, contributing to forest degradation. Agro-pastoralists do not believe cattle can degrade a forest because they claim that cattle do not cut or eat trees. As a consequence, these immigrants

receive heavy punishments from the government that include beating and heavy fines, which in turn force them to sell a good number of their cattle to be able to pay fines. Research on the conflicts between herders and the government over forest resource has made the government be accountable because of administrative and corruption problems (Brockinton, 2001; 2008).

Agro-pastoralists use their land for farming and not for animal grazing, and the ongoing restriction on using the local forest is difficult to keep as they cannot sustain their livestock unless they change their livelihood strategies. The government has allocated them land for grazing, but the agro-pastoralists have major concerns over this land. First, they have been complaining that the allocated land is far away from their homesteads, which is not friendly with the way they manage and use their livestock. To them, cattle are also used for farming, and so it becomes difficult to use them if they are kept far away from homesteads. Second, they have been complaining that the allocated area does not have good pasture that is favourable to the type of animal species they keep. Third, the soil quality is reduced because of the large influx of free moving livestock, lowering its potential for crop production and also the growth of pasture. Unfortunately, in all FGDs with agro-pastoralists, they complained that they had neither received any education about environmental conservation, nor taken part in any environmental conservation activity, including tree planting. A participant described this situation thus:

High influx of migrants with their livestock contributes to land degradation and the growth of vegetation as this area is no longer the same because of livestock movement. Free movement of livestock to the agricultural land destroys land quality (Agriculture Extension Officer, Kantundu Village, November, 2023).

Enhancing social relations is an important part of successful adaptation. The migrants and the host community are from two different tribes, and so have some differences in some of the ways they carry on with their life. There were differences in the way migrants (Sukuma people) used to deal with conflicts compared to the way host communities resolved the same. In Sukuma traditions, local elders are the ones who resolve conflicts, and there is a huge respect for this system. However, when misunderstandings arise, the local people immediately go to the police without first attempting to find the solutions between themselves. When such cases are referred to the police, the migrants (Sukuma) see it as a big problem because of the possible consequences; including sometimes being tortured when in police custody.

3.3.3 *Migration Impact on Health*

Moreover, migration affects the health of people and animals, particularly during transition. The health consequences are associated with the lack of clean and safe water, exposure to malaria mosquitoes, and violence between farmers and agro-pastoralists that causes injuries, and even deaths. Because of these

challenges, which mostly impact the youth, people do not wish to see their future generations embarking on regular migration because of its costs: socially and economically. Also, constant migration denies the youth access to education since, in addition to spending time moving with livestock, they have also been brought up to like animal rearing more than schooling. This is evident from the narration below:

Although we acknowledge that our life is better now than before, we experience a lot of challenges. The harsh environment while on transition, and conflicts with farmers, are our biggest challenges. We do not have a way out, because what our parents do is to count the number of cattle and tell us where we have to go. And they (the parents) insist that if we can't take good care of the livestock we will have to find cattle of our own to pay for dowry when we plan to marry. Because of that, we have to bear all these consequences as we do not want to struggle desperately when we need to begin our own family. I cut school and my dad told me I would resume when we arrive here; but since we arrived, there has never been any attempt made to help me join school again. I do not wish this life on my children (Youth Focus Group Participants, Kantundu Village, November, 2023).

As mentioned earlier, some of the challenges resulting from agro-pastoralists migration were caused by poor performance by government institutions. Although these institutions partly supported migrants' integration, they also contributed to the complications that surrounded the integration process due to the lack of management and coordination within government units, and misunderstanding of the needs of migrants. Village officials acknowledged that the early migrants reported to the village office to introduce themselves on arrival, but other groups had not done the same as required. Also, reports on the arrival of migrants did not reach the district officials until problems arose concerning these migrants in their new settlements. For example, important stakeholders in the district—such as the District Agriculture Extension Officer, and Environmental Officer—were not aware of the presence of some migrants until they noticed problems such as forest degradation and conflicts with the host community. A Livestock Officer commented thus:

We were not aware of the presence of agro-pastoralist migrants until we went to the village to provide extension services, and the commencement of the farmers and migrants conflicts (Livestock officer, Kantundu Village, November, 2023).

This matter of migrants not following formal procedures on arrival, together with ineffective coordination by government institutions in the host community: all these create problems in settling the migrants, and managing their interaction with the host community. This makes migration an ineffective form of climate change adaptation strategy as it goes against the indicators of successful adaptation, such as improving the health of natural resources, community wellbeing, and enhancing social relations (Owen, 2020; Singh, 2022). Elsewhere, health effects, resource degradation, deaths of animals while on transit, and

negative consequences to host community are recorded to challenge migration as an effective adaptation strategy (Osbaahr et al., 2010; McKune & Silver, 2013; Mwambene et al., 2014; Upiyo et al., 2015; Alarima & Obikwelu, 2018). Since migration will continue to be used as a climate change adaptation strategy in the future, it is important to improve migrant integration as it is the main cause of problems surrounding migration as climate change adaptation.

4. Conclusion

This article set out to investigate benefits and challenges of migration as an adaptation strategy to environmental change, and climate change in particular, using experience from Sukuma agro-pastoralist migrants in Kigoma Region. Given the projected trend in climate change, more agro-pastoralist will migrate in the future, and so increase the need to make migration be a successful adaptation. Through identification of the nature of agro-pastoralists, it was learned that agro-pastoralists plan for migration to adapt to drought impacts that affect their regions. The Kigoma Region was chosen because of the perceived livelihood opportunities, that include the availability of agricultural land, together with a good climate that favoured both crop production and livestock keeping.

The article also documents some indicators in the study area of migration as a successful adaptation move, as it contributes to increased income and ability to adapt to climate change impacts of migrants' livelihoods. However, there were also issues of environmental degradation and conflicts with the government and host farming community, which are indicators of unsuccessful adaptation. Government officials need to build models that involve migration as a critical component of climate adaptation measure, to guarantee that both the host and the destination regions are prepared for the movement of people while preserving resource capacity. With migration, the demand for resources like land, water and pasture to support a growing human population will also be on the rise in host communities. This means there is a need to ensure proper use of available resources while catering for the needs of migrants and the local people. These should involve land-use planning, resource conservation measures, and agro-techniques that would allow plant and animal production to feed more people. This might require the development of regional adaptation strategies across regional migration flows in both sending and receiving regions.

Acknowledgement

This study was funded by IDRC through the Research Chair on Forced Displacement, University of Dar es Salaam, Tanzania.

References

- Adger, W. N., Brown, K., Nelson, D. R., Berkes, F., Eakin, H., Folke, C., Galvin, K., Gunderson, L., Goulden, M., O'Brien, K. & Ruitenbeek, J. (2011). Resilience implications of policy responses to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 2(5): 757–766.
- Alarima, C. I. & Obikwelu, F. E. (2018). Assessment of utilization of primary health care services among settled Fulani agro-pastoralists in Ogun State, Nigeria. *Agro-Science*, 17(1): 27–34.
- Amadi, V. T. & Vundamina, M. N. (2023). Migration and climate change in Africa: A differentiated approach through legal frameworks on the free movement of people. *Law, Democracy and Development*, 27: 31–54.
- Bennett, G., Thomas, S. M. & Beddington, J. R. (2011). Migration as adaptation. *Nature*, 478(7370): 447–449.
- Brockington, D. (2001). Communal property and degradation narratives: Debating the Sukuma immigration into Rukwa Region, Tanzania. *Cahiers d'études africaines*, 20: 1–22.
- Brockington, D. (2008). Corruption, taxation and natural resource management in Tanzania. *The Journal of Development Studies*, 44(1): 103–126.
- Bronen, R. & Chapin III, F. S. (2013). Adaptive governance and institutional strategies for climate-induced community relocations in Alaska. *Proceedings of the National Academy of Sciences*, 110(23): 9320–9325.
- Bushesha, M. S. (2020). Climate change-induced migration. *Journal of Science and Sustainable Development*, 7(1): 13–29.
- Clement, V., Rigaud, K. K., de Sherbinin, A., Jones, B., Adamo, S., Schewe, J., Sadiq, N. & Shabahat, E. (2021). *Groundswell Part 2: Acting on internal climate migration*. Washington, DC: World Bank.
- de Sherbinin, A., Grace, K., McDermid, S., van der Geest, K., Puma, M. J. & Bell, A. (2022). Migration Theory in climate mobility research. *Frontiers in Climate*, 4: Article 882343.
- Dun, O. & Gemenne, F. (2008). Climate change and displacement. *Forced Migration Review*, 31,10–11.
- Etana, D., Snelder, D. J., Wesenbeeck, C. F. V. & Buning, T. D. C. (2022). Climate change, in-situ adaptation, and migration decisions of smallholder farmers in central Ethiopia. *Migration and Development*, 11(3): 737–761.
- Gebeyehu, A. K., Snelder, D., Sonneveld, B. & Abbink, J. (2021). How do agro-pastoralists cope with climate change? The case of the Nyangatom in the Lower Omo Valley of Ethiopia. *Journal of Arid Environments*, 189: Article 104485.
- Gemenne, F., Zickgraf, C., Hut, E. & Castillo, B. T. (2022). *Forced displacement related to the impacts of climate change and disasters*. Oxford University Press.

- IOM (2007) Discussion note: Migration and the environment. Background Paper MC/INF/288. Geneva: International Organization for Migration.
- Izumi, N. (2017). Agro-pastoral large-scale farmers in East Africa: A case study of migration and economic changes of the Sukuma in Tanzania. *Nilo-Ethiopian Studies*, 2017(22): 55-66.
- Jacobson, C., Crevello, S., Chea, C. & Jarihani, B. (2019). When is migration a maladaptive response to climate change? *Regional Environmental Change*, 19: 101-112.
- Jensen, P. H. (2014). Understanding the impact of migration on innovation. *Australian Economic Review*, 47(2): 240-250.
- John, R. (2022). Disaster-induced resettlements: The resilience of flood-affected households in Dar es Salaam, Tanzania. *Geography, Environment, Sustainability*, 15(3): 88-98.
- Klocker, N., Head, L., Dun, O. & Spaven, T. (2018). Experimenting with agricultural diversity: Migrant knowledge as a resource for climate change adaptation. *Journal of Rural Studies*, 57: 13-24.
- Komba, C. K. & Mahonge, C. P. 2020. The Influence of In-Migrant Pastoralists on Land Use Change in Rufiji District, Tanzania. *East African Journal of Social and Applied Sciences*. 2(2): 154-166.
- Lee, E. S., Szkudlarek, B., Nguyen, D. C. & Nardon, L. (2020). Unveiling the canvas ceiling: A multidisciplinary literature review of refugee employment and workforce integration. *International Journal of Management Reviews*, 22(2): 193-216.
- Msigwa, G. B. (2014). Changing livelihoods and adaptive capacity of agro-pastoralists evicted from Ihefu in Tanzania. Doctoral dissertation, Sokoine University of Agriculture, Tanzania.
- Owen, G. (2020). What makes climate change adaptation effective? A systematic review of the literature. *Global Environmental Change*, 62, Article 102071.
- Oyilieze, A. A., Joe-Ikechebel, N. N., Okedo-Alex, I. N., Okafor, K. J., Omoruyi, F. A., Okeke, J., Amobi, S. N., Enweruzor, A. C., Obioma, C. E., Izunobi, P. I. & Nwakacha, T. O. (2022). Climate-Driven Temporary Displacement of Women and Children in Anambra State, Nigeria: The Causes and Consequences. *Climate Change in Asia and Africa-Examining the Biophysical and Social Consequences, and Society's Responses*. IntechOpen, 245-260.
- Penninx, R. (2005). Integration of migrants: Economic, social, cultural and political dimensions. *The New Demographic Regime: Population Challenges and Policy Responses*, 5: 137-152.
- Qaisrani, A. & Salik, K. M. (2018). Road to climate resilience: Migration as an adaptation strategy. *Pathways to Resilience in Semi-arid Economies (PRISE)*.
- Sakdapolrak, P., Naruchaikusol, S., Ober, K., Peth, S., Porst, L., Rockenbauch, T. & Tolo, V. (2016). Migration in a changing climate: Towards a translocal social resilience approach. *Die Erde-Journal of the Geographical Society of Berlin*, 147(2): 81-94.

- Salerno, J. (2016). Migrant decision-making in a frontier landscape. *Environmental Research Letters*, 11: Article 044019.
- Salerno, J., Mwalyoyo, J., Caro, T., Fitzherbert, E. & Mulder, M. B. (2017). The consequences of internal migration in Sub-Saharan Africa: A case study. *BioScience*, 67(7): 664–671.
- Singh, C., Iyer, S., New, M. G., Few, R., Kuchimanchi, B., Segnon, A. C. & Morchain, D. (2022). Interrogating “effectiveness” in climate change adaptation: 11 guiding principles for adaptation research and practice. *Climate and Development*, 14(7): 650–664.
- UNFCCC (2010). Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010: Decision 1/CP.16 The Cancun Agreements.
- Upadhyay, H., Kelman, I., GJ, L., Mishra, A., Shreve, C. and Stojanov, R., 2015. Conceptualizing and contextualizing research and policy for links between climate change and migration. *International Journal of Climate Change Strategies and Management*, 7(3): 394–417.
- Van der Geest, K. (2011). North-South migration in Ghana: What role for the environment? *International Migration*, 49: e69–e94.
- Venturini, S., Medri, S. & Castellari, S. (2012). Overview of key climate change impacts, vulnerabilities and adaptation action in Europe. *CMCC Research Paper*, (142).
- Walwa, W. J. (2020). Growing farmer-herder conflicts in Tanzania: The licensed exclusions of pastoral communities' interests over access to resources. *The Journal of Peasant Studies*, 47(2): 366–382.
- Warner, K. & Afifi, T. (2014). Enhancing adaptation options and managing human mobility in the context of climate change. In *Humanitarian Crises and Migration* (pp. 199–220). Routledge.
- World Health Organization. (2010). The Abuja declaration: Ten years on.
- Yaffa, S., 2013. Coping measures not enough to avoid loss and damage from drought in the North Bank Region of The Gambia. *International Journal of Global Warming*, 5(4): 467–482.