

# Livelihood and Food Security of Vulnerable People with Limited or no Land in Northern Rwanda: A Land Use Consolidation

## Programme analysis

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### Abstract

*The aim of this paper was to investigate the effects of the Land Use Consolidation (LUC) programme on livelihood and food security of vulnerable local communities with limited or no land. It analyzed the experiences of vulnerable local communities and food security during implementation. It investigated the role of farming cooperatives with a focus on agricultural production and price fluctuation, access to credit, land rental market and social integration. The study identified two categories of vulnerable local people in the LUC programme. First, there are local communities with limited land who were in the LUC programme as their land was selected as suitable sites for the LUC programme. Secondly, there are people with no land who farm for other farmers or who have joined farming associations or cooperatives. The study also identified two different geographical areas, the low and high land. In the LUC programme, vulnerable local communities with limited land faced food insecurity in case all land is within the LUC programme. In contrary, those whose land is not in the selected sites for the LUC programme may have the opportunity to farm other than non-selected crops and feed their families.*

**Keywords:** LUC, livelihoods, food security, vulnerable, communities, Northern Province, Rwanda

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Ghana Journal of Geography Vol. 11(2), 2019 pages 103-126

## **Introduction**

Smallholder agriculture is a major source of livelihoods in rural areas of developing countries and Africa in particular where poor people with limited land live (World Bank, 2008; Fischer & Qaim, 2012; Bezu & Holden, 2014; Davis, Di Giuseppe & Zezza, 2014). In fact, in comparison with many regions of the developing world, Africa has long been seen as a continent of abundant land-related resources. However, it no longer applies to much of areas in Africa even though it was true some decades ago. This has resulted in three principal trends affecting the viability of the small farm in this continent. First, one of the most important trends in African smallholder agriculture is a steady decline in land-to-person ratios (Jayne, Chamberlin & Muyanga, 2012; Headey & Jayne, 2014). Secondly, the rapid population growth in Africa is seen as inevitable for many decades to come and is taking place in many African countries with already various land restrictions related to tenure systems for instance (Jayne, Chamberlin & Headey, 2014; Headey & Jayne, 2016; Kariuki 2018; Ntihinyurwa, 2019). Thirdly, it is the inequitable distribution of available land between smallholder farmers, large scale and state farms, and generally farm households nearly becoming landless (Jayne et al., 2003; Collier & Dercon, 2014).

Based on the definition of Chamberlin (2008), in the context of this study dealing with land issues for a specific group of vulnerable people, vulnerable people with limited land (or landless) could be defined as poor farmers with lower levels of market orientation who have smaller amounts of land (or landless) available to them leading to vulnerability and risk, the degree of probability of loss of welfare.

Smallholder agriculture still remains important for economic development and poverty reduction in developing countries and Africa in particular (Jayne, Chamberlin & Muyanga, 2012; Andersson Djurfeldt, 2018). However, there is need of institutional innovations to overcome challenges encountered by the development of the sector. There is a revived interest from scholars and development practitioners in farming cooperatives and they are seen as institutional vehicles to improve the smallholder performance (World Bank, 2008; Hounkonnou et al., 2012; Abate, Francesconi, & Getnet, 2014; Fischer & Qaim, 2012; Verhofstadt & Maeartens, 2014). For

instance, they may benefit smallholder farmers by reducing transaction costs of agricultural inputs at the market (World Bank, 2008; Hounkonnou et al., 2012; Abate, Francesconi, Getnet, 2014).

In fact, farming cooperatives in particular play an important role in enhancing productivity of smallholder farmers. They contribute to food production and distribution, and in supporting long term food security. They also provide benefits that smallholder farmers would not be able to achieve individually such as increasing productivity and income by buying seeds and fertilizers collectively, gaining better market opportunities, bargaining power and resource sharing that lead to food security (Abate, Asfaw et al., 2012; Fischer & Qaim, 2012; RSA, 2012; Francesconi, Getnet, 2014; Shiferaw, 2014; Sinyolo & Mudhara, 2018).

The main categories of farming co-operatives are situated into normal agricultural activities including supply of agricultural inputs, joint production and agricultural marketing. Members manage the cooperative collectively and membership is based on a reasonable small value of shares to allow access of poor members in the cooperative (Chambo 2009; Barraud-Didier, Henninger & Akremi, 2012; Fischer & Qaim, 2012; Verhofstadt & Maeartens, 2014). In economic terms of farming, cooperatives improve conditions of life of members including food security as a priority, improve access to credit, and marketing products, raise employment in agriculture and generally help reduce poverty. Socially cooperatives advocate for the disadvantaged including the old, widow and children, provision of vital financial services, offer insurance for health hazards and life and by pooling risk together (Birchall & Simmons, 2004).

In the Rwandan context, more than 80% of the population is in the subsistence agricultural sector characterized by high population pressure, land scarcity, land fragmentation and low productivity (Barraud-Didier, Henninger & Akremi, 2012; Shiferaw, 2014; Sinyolo & Mudhara, 2018). In order to deal with these challenges, the Rwandan Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS) were established. One of the main pillars of the above policies is the social transformation through agriculture that requires shifting from subsistence farming to market-oriented agriculture. They foresee eradicating poverty and hunger by transforming the agriculture into on a productive, high value and market-oriented sector (GoR, 2000, 2009, 2013). In this regard, a land use consolidation (LUC) programme was initiated in 2008

and it includes provisioning of improved seeds of selected crops, subsidized fertilizers and extension services. It requires joint cultivation of individual farming areas to increase agriculture productivity but each landholder retains his/her rights to land. LUC programme is seen as a tool to ensure the efficient use of agricultural inputs in farming areas to increase the agricultural production (Kathiresan, 2011, 2012).

There are some macros level studies at national level and official assessments made, usually of a quantitative and economic character. The official reports indicate considerable increases both of land areas under the LUC programme and in yield of the six selected food crops, but also discusses the challenges encountered during the implementation (IFDC 2010; Muhinda Mbonigaba & Dusengemungu, 2011; Kathiresan, 2012; Musahara et al. 2014). There is therefore need of empirical research at local level and for most vulnerable people with limited land or no land to evaluate the effectiveness and socio-economic impact of the programme for that particular group of people in the local communities (IFDC,2010; Kathiresan, 2012). There are, so far, only a few studies that investigate the views and voices from below on the impacts of the LUC programme during the initial stages of implementation of this new agricultural policy. These studies raise serious critique, such as authoritarian implementation of the new policies, negative effects on food security from mono-cropping few selected crops, and increasing rural socio-economic differentiation (Des Forges, 2006; Ansoms,2008,2009,2010; Huggins, 2010; Ansoms & Rostagno,2012; Pritchard, 2013; Van Damme, Ansoms & Baret, 2013). It is therefore of great interest to research into its effects at local and household levels for poor people at a later stage of implementation. Some questions worthy of investigation include the following (i) Do poor people with limited land or no land cope with food security as a result of their participation in the farming cooperatives within the LUC programme? (ii) Do they rather experience negatives effects of the programme on food security and on income due to exclusion in the LUC programme? (iii) Are there different experiences of the effects of the LUC programme among vulnerable poor people? If so, is it possible to find patterns among them who are positive and those who are negative to the programme?

The aim of this paper is to investigate the effects of the LUC programme on livelihoods and food security of vulnerable local communities with limited or no land. It analyses specifically the

experiences of vulnerable communities with limited land or no land on the LUC programme. It also investigates the role played by farming associations or cooperatives to increase the livelihoods and food security of vulnerable local communities with limited land or no land during the implementation of the LUC programme.

The following two research questions are formulated for the study:

1. How is the LUC Programme implemented in the study area and what are the experiences of vulnerable local communities, people with limited or no land on the LUC programme?
2. What are the effects of farming cooperatives within the LUC programme on livelihoods of vulnerable communities, people with limited or no land?

## **Methodology**

The paper draws on 45 individual and 22 focus group discussions with local farmers (women and men), and local key informants in five sectors in Musanze district carried out in 2013 and 2014. To capture possible geographical differences, the study area comprises three sectors located mainly in the highland, Kimonyi, Shingiro and Gataraga, and two sectors located mainly in the lowland; Gacaca and Muko (see Figure 1).

In 2013, 20 individual interviews with farmers were conducted, as well as 14 focus group discussions with three types of informants. In a focus group discussion participants are stimulated by each other to exchange ideas about an issue (Bryman, 2012) which was especially valuable when interviewing women about the use of land. First, focus group discussions were made with one group of male and one group of female farmers in each of the five sectors, making a total of ten in total (involving 70 people). Secondly, one focus group discussion included key informants in administration of the programme: two executive secretaries and two agronomists from two selected cells in each of the five sectors were interviewed jointly (20 people). The third type of focus group discussion was carried out with representatives of local organizations involved in activities related to land use consolidation; one interview with one representative of Savings and

credit cooperatives (Saccos) from three sectors (Kimonyi, Shingiro and Gataraga), one interview with one representative of farmers' cooperatives from three sectors (Muko, Gacaca and Shingiro), and one interview with heads of women's associations from three sectors (Kimonyi, Shingiro and Gacaca). The selection of participants for the third type of interviews was based on their availability. Individual interviews were undertaken to collect detailed data on smallholder farmers' experiences of the implementation of the LUC programme. According to Ritchie (2013), individual interviews open up for more detailed exploration of people's personal perspectives and experiences, aiming for a deeper understanding of the context of the research topic. For this paper, individual interviews were made with four heads of households in each of the five sectors, where two men and two women were selected based on an estimated household characteristic (poor and relatively better-off).

In 2014, 25 individual and 8 focus group discussions collective semi-structured interviews were conducted to follow-up on previous fieldwork. The Focus group discussions were undertaken with one group of two men and one of two women in four sectors respectively, excluding Gataraga where more detailed individual follow-up interviews were conducted. In Gataraga, the land areas and land use of five households in four different geographical zones were mapped and household heads interviewed in 2012. These 20 household cases were re-visited and interviewed in 2014 with much focus on land use consolidation. Additionally, the agronomists in each of the five sectors were interviewed individually.

The paper draws on data collected in 2013 and 2014 for a PhD training undertaken in Gothenburg University, Sweden which will be finalized soon. Findings are still relevant as there were few studies at the beginning of the implementation of the Land use consolidation programme in 2009 both at national level and specifically in Musanze district, the study area. Findings are still needed and could be based on to carry out further research after some years of its implementation.

Thematic analysis was used to identify and analyze patterns in the qualitative interview data. The interviews were transcribed from Kinyarwanda to English and were coded by themes. Two themes were identified and used for structuring the findings.

***Study area description***

Musanze District is one of the five Districts of the Northern Province of Rwanda comprising fifteen sectors. However, the study covers five sectors, three in highland (Kimonyi, Shingiro and Gataraga) and two in lowland (Muko and Gacaca). The district is characterized by hilly mountainous terrain mainly, where steep slopes are mixed with flatter plateau areas between the Volcano Mountains. The whole region is vegetated, with no bare soil visible. As a whole, the average altitude of Musanze District is 2000 m including the chain of the volcanoes such as Kalisimbi (4507 m) and Muhabura (4127 m) etc. The Musanze District generally has a tropical climate of high altitude with an average temperature of 20°C; the rains are abundant and annual precipitations vary between 1400 mm and 1800 mm. According to the Musanze District report, its population was almost 315 000 inhabitants on a surface of 530 square kilometer with average density of almost 600 inhabitants per square kilometer.

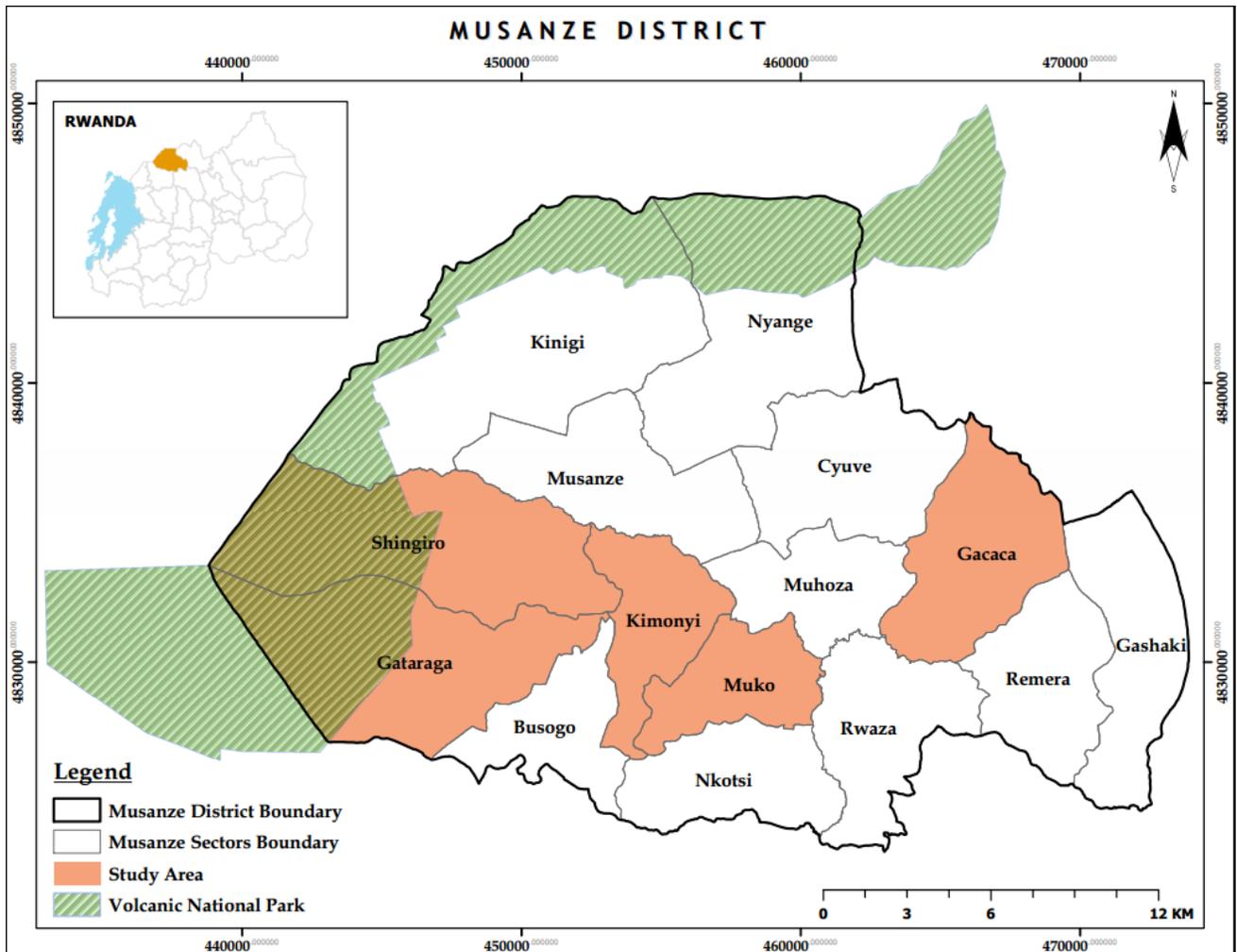


Figure 1: The study area: the five sectors in Musanze District

Source: Centre for Geographic Information Systems and Remote Sensing, University of Rwanda (CGIS/UR). (2018)

## Results

### *Implementation of the LUC programme: experiences of vulnerable local communities and food security*

As already pointed, there are two categories of local vulnerable people in the LUC programme that were identified during the field work. First, there are local communities with limited land who were in the LUC programme as their land was selected as suitable sites for the LUC programme.

Secondly, there are people with no land or landless who farm for other farmers or who have joined farming associations or cooperatives.

The land use consolidation programme is one of the main components of the Crop intensification programme (CIP). The LUC is implemented by joining individual adjacent parcels on a large land area. Sites and crops to be cultivated are selected based on agro-ecological conditions of each sector. Local population together with the agronomist at the sector level, the cell and village chief agree on the selected sites and crops for the LUC programme in village meetings.

As the agronomist in Muko sector states:

*The selection of<sup>3</sup> priority crops is discussed in the village meeting and it is based on the agricultural seasons. In their respective villages, farmers themselves select the crops they want to grow in a particular season. The agronomist has the responsibility to explain to farmers that farming in the land use consolidation programme aims to increase the production in order to feed the household, for the market and to decrease poverty. We cultivate beans, maize banana, Irish potatoe, as selected crops and tomatoe and fruits. (Interview with the agronomist, 2014).*

The provision of agricultural inputs in the LUC programme includes provision of seeds and fertilizers. Since the beginning of the LUC programme in 2008, farmers whose land is within the LUC programme are given free seeds for “priority crops”, maize and wheat in the study area, and subsidized fertilizers.

*In the LUC programme, each individual farmer is subsidized by the Government. The maize and wheat seeds are free and fertilizers are provided using the voucher system where the Government provides 50% and the farmer pays 50% agronomist”. (Focus group discussion, men, 2014).*

The agronomist at sector level was in charge of providing agricultural inputs to farmers within the LUC programme. However, the private sector through agro-dealers through a voucher system was

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<sup>3</sup> A priority crop is a crop for which free improved are provided and chemical fertilizers are subsidized by the Rwandan Government as an incentive to grow it. In the study area priority crops include maize and wheat.

later involved in the provision of inputs and farmers have to pay fertilizers as the Government withdraws the subsidies gradually depending on the LUC implementation in each sector.

*We get maize seeds at the sector and we buy fertilizers at a voucher system but we have to buy Irish potatoe and bean seeds as they were not part of priority crops in the LUC programme. (Individual interview, 2014). We have started to buy seeds and fertilizers and we are sensitized about this. The agronomist told us that the Government will no longer subsidize inputs because we are in the phase of 'Kwigira'(self-reliance) after the period of 'Nkunganire'(Government support) since 2008.*"(Individual interview, 2014).

Considering the difference in the implementation of LUC programme by agro ecological conditions of the sectors, two geographical areas were identified:

In lowland, findings indicate that the majority of farmers especially in lowland have small farming areas and most of them produce for food consumption. This does not mean that food is enough for the household members. Another challenging issue is that when all farming land are within LUC programme, farmers have no possibility of growing non-selected crops, they only rely on selected crops for their livelihood.

Some of the findings show that apart from selected crops, smallholder farmers in lowland specifically face food insecurity as they harvest for household consumption and do not have the possibility of buying additional agricultural products at the market. However, other findings indicate that, there were some sectors which have various agro-ecological conditions with the possibility of growing selected crops in the LUC programme and non-selected crops in non-selected sites. In this case, they do not face the problem of food insecurity as they have the possibility of growing non-selected crops such as sweet potatoes and different vegetables.

As stated by men in Gacaca sector:

*Gacaca has four cells and we have hills and valleys in hills. Some smallholder farmers cultivate non selected crops in the LUC programme such as sweet potatoes and in valleys they cultivate vegetables and fruits. These areas are farmer's land and are not selected sites in the LUC programme (Focus group discussions, men, 2013). Some of us are cultivating in valley others are in hilly zones. I'm cultivating in hilly zones and for us after 2 weeks if the rain is available, we will cultivate the hybrid because we know we will get*

*much production from it. When the programme started, we were not realizing the benefit of the industrial fertilizers but now we know its benefits.* (Focus group discussion, women, 2013).

In the highland, findings show that farmers within the same sector grow different crops depending on the agro-ecological zones and suitability of the soil in the area. For example, in Gataraga, farmers who cultivate selected crops such as Irish potatoes and wheat are very much satisfied with the LUC programme. They get free wheat seeds as a ‘priority’ crop and produce much Irish potato for food consumption and sell its production at the market nationwide. However, in the same sector, farmers are not satisfied with the LUC programme in areas where they cultivate maize and Irish potatoes; they have small land and would prefer to grow Irish potatoes but maize is a ‘priority crop’ not seen as food security and cash crop for the farmers.

Huggins (2010), Ansoms et al. (2009) and Pritchard (2013) critique the mono-cropping in the LUC programme by arguing that a complex farming system based on diversity of crops developed at household level has benefits such as the alternative for a flexible mix of subsistence and commercial production, access food for household consumption, and income generation with sales throughout the year. These critiques are not generalized and according to our findings the mono-cropping in the LUC programme has had positive effects depending on geographical location and soil suitability for selected crops as found as discussed above. In fact, few farmers with big and scattered land do not face a problem of cultivating in the LUC programme as they have the possibility of growing non-selected crops and generating income by renting land to farming cooperatives. However, these are few well-off farmers, or their descendants who were involved in local governance as leaders a long time ago.

Considering the perceptions of people on the LUC programme, two categories of vulnerable people were identified in the community. First, vulnerable local communities with limited land, farm and harvest individually as their land is within the selected sites for the LUC programme.

*Here, people used to resist the LUC programme because they had small land and did not want to grow selected crops in LUC sites. At the beginning of the programme there was a low production and farmers cultivated vegetables instead, as I told you. The majority of farmers did not have where to grow non-selected crops because of scarcity of land in this*

*sector. This is a very big challenge of the LUC programme because people with limited land are obliged to grow selected crop when their land is in selected sites and they don't have where to grow the crop they preferred for their food security. (Interview with the agronomist, 2014).*

In this case, local communities farm, harvest and share the agricultural production collectively. This category of vulnerable people however state some positive effects of the LUC programme.

*We harvest together and sell together but we share the production equally for home consumption and we decide the quantity to be used as seeds for the next seasons.” (Individual interview, 2014). Another respondent argued that: “The main benefit of the LUC programme is that when many people are cultivating together, people are afraid to come and take the crops from the field. But when you cultivate independently you become vulnerable. (Individual interview, 2013).*

The majority of vulnerable people with limited land in the LUC programme confirmed that there was an increase of the agricultural production after the introduction of the LUC programme due to the use of improved seeds and mixture of manure and chemical fertilizers although they were expensive to them.

*The production has increased a lot after the introduction of the LUC programme because people are cultivating one crop using improved seed and mixing manure and chemical fertilizers. Before the programme people were mixing many crops and many were not using fertilizers. Even for us who have little land we have noticed the increase of the production after the LUC programme (Individual interviews, 2013).*

Other vulnerable people in this category criticized the LUC programme by arguing that although the agricultural production increased, the LUC programme did not allow them to freely mix the crops they wanted which resulted in food insecurity:

*The former system was good because when we grew maize for instance, we could also grow aside potatoes and we harvested two crops. Now with this LUC programme we only grow one type of crop and if it fails to grow, it becomes a problem for our food security. For example if we grow Irish potatoes on our small land, children are asking me to give them*

*maize and I don't have it and don't have means to buy it! This programme is good for people who have big land area.*

As stated by a respondent in Gataraga sector: (Individual interview, 2014).

The above statement was also emphasized by women in Shingiro sector:

*Sometimes we don't follow the LUC programme because if we have many plots included in a selected site, we may cultivate other non-selected crops because we think we can't survive by cultivating one crop. For instance I have three plots I can't cultivate only maize which takes 8 months to grow. I cultivate also Irish potatoes and I know I'm not following the policy. (Focus group discussion, Women, 2013).*

A second category of vulnerable people in the local communities were people with no land or landless. In order to survive, they have to farm for other smallholder farmers who were or were not in the LUC programme and were paid on daily basis from 7:00 am to 12:00pm. The amount received for this period was the equivalent to 700Frw that is less than a 1 US dollar:

*We have to tell you the truth, like myself I have small land, so I have to farm for another farmer who has big land and he/she pays 700Rfrw (equivalent to almost 1 US dollar) from 7.00 am to 12.00 am. From this labor, I can ask for instance a small loan from an individual and buy my own clothes. (Focus group discussion, women, 2014).*

Local leaders in a Focus group discussion confirmed that landless are encouraged to farm for other in order to survive:

*Those are people who don't have land but we encourage them to work for others in order to get money. (Focus group discussion, local leaders, 2014).*

In this category, the Rwandan Government initiated some programmes to increase the livelihood of people. These included one cow by household programme where most vulnerable and poor household get cows. Another programme to support them is the Vision 2020 Umurenge programme which provides for instance some works e.g. building roads to enable the poorest to generate some income. They have direct financial support in cash from the programme.

### ***Role of farming cooperatives during the implementation of the LUC programme***

In general, vulnerable local communities with limited land are encouraged to form farming associations and cooperatives in order to increase the agricultural production of selected crops which rotate from one season to another. As stated by representative of farming cooperatives:

*Farming cooperative is made of a number of farming associations cultivating mostly the same selected crop. Local communities whose land is within the land use consolidation programme cultivate the selected crops by rotating them based on agricultural seasons. There are many associations in the area and are grouped in cooperatives and the Head of the cooperative is elected by members of the associations. (Focus group discussion, representative of farming cooperatives, 2013).*

### ***Agricultural production and price fluctuation***

Some smallholder farmers stated that there are many benefits for smallholder farmers of being in farming cooperatives as stated in a focus group discussion:

*There are many benefits of being in cooperatives, but let me talk about the main ones. It is easier to buy fertilizers when we are in cooperatives because we get money from our production and we are able to buy them compared to someone buying them individually. We produce much of the selected crops as we cultivate one crop on a big area of land and find the market at a fair price. We also save money from our production in sacco and still we feed our family (Focus group discussion, representatives of farming cooperatives, 2013).*

In the same line, the agronomist in Kimonyi sector said:

*We were also producing much before the land use consolidation programme, but because of the fertilizers, we are using now, I can say that the production after the land use consolidation programme has much increased. As an example if we were producing 50 kg of maize before the land use consolidation programme now on the same land we are producing 150 kg of maize. (Interview with the agronomist in Kimonyi, 2014).*

Other smallholder farmers grouped in a farming association or cooperative are satisfied with the implementation of the LUC programme, but they had experienced a low price of the agricultural

products due to the fact that after the harvesting period one crop is only available on the market and this lowered the prices as stated by men in Shingiro sector:

*It is a very good programme for us, but we still have a problem of low prices of our production at the local markets. For irish potatoes however, sometimes we get much production and people from Kigali came to buy from here. There are regular markets around here or on the main road. Another problem is the lack of rain which stop as to cultivate or a lot of rain during agricultural season which destroy our production. (Focus group discussion, men, 2013).*

A respondent in Gacaca sector described the situation stating that:

*The price of maize was 300Rfrw equivalent to 0.4 dollars per kilogram and we had business people who came to buy our production when we were in the farming association but now that we are not in the farming the price is 200Rfrw equivalent to 0.2 dollars (Individual interview, 2013).*

At the beginning of the LUC programme smallholder farmers experienced also bad quality of maize seed specifically and this had negative impacts on the agricultural production as stated by a respondent in Shingiro sector:

*We have had a problem of maize seeds because they have been contaminated and don't provide any production. We asked the agronomist if we can get pesticides and he told us that he is also going to ask this question to the RAB/MINAGRI. The problem was not solved and we didn't harvest anything. (Individual interview, 2013).*

They also indicated that sometimes some of the production is sold to RAB and it was used for the next agricultural season:

*Our production is sold to RAB (Rwanda Agriculture Board) as it needs to provide seeds to local communities for free for the next season especially for maize seeds. However, RAB sometimes promises us to buy our produce, but never come. In this case, if we have a chance we get a market but a low price and we lose instead of gaining (Focus group discussion, representative of farming cooperatives, 2013).*

### ***Access to credit, land rental market and social integration***

Farmers who are in farming associations or cooperatives have easy access to loans as they could pay back after harvesting. Those who are not in farming associations or cooperatives have difficulties to request loans, most of them lack the mortgage. There are of course, some few farmers who are rich and can request for loans individually. As stated by women in Muko sector:

*It is not easy to request a loan when you are not in a farming association or cooperative because you have to provide collateral. For us who are poor but who are in cooperatives, the cooperative itself request loans at our behalf as a cooperative member and I have to pay back the amount to the cooperative. The money I got is used to rent a plot and after the harvesting time I pay back the cooperative. (Focus group discussion, women, 2014).*

In order to increase the agricultural production, farming association or cooperative members expand their farming areas by renting land on a year basis. Renting is a common type of land market used mainly by smallholder farmers grouped in farming associations or cooperatives to get additional farming area. Buying is not common as by the traditional local communities are not used to sell land seen a family asset. A respondent in Gataraga sector described his experiences:

*As cooperative members, my neighbours and I have written a project of growing Irish potatoes because it is difficult to get its seeds. We were 10 people and we requested 750 000Rfrw and we used this amount to buy seeds and fertilizers. We are about to finish paying the 5% of interest to the SACCO. (Individual interview, 2014).*

Findings indicate that selling land is not common based on traditional customs but land is sometimes sold in difficult situations.

As indicated by Respondent:

*selling is not common but it is done for example for people who have problems of paying school fees and decide to sell plot(s). The buyers are the neighbors who have means to buy such plot(s) at that time.” (Interview with the agronomist, 2014).*

Apart from the benefits related to the increase of the agricultural production, farming cooperatives play also a role in the social integration of vulnerable groups in local community as stated by women:

*Now cooperatives don't reject poor people like us as before the land use consolidation programme. We are now all, poor and well off people mixed in the cooperatives. The benefits of joining the cooperatives is that after harvesting together we currently sell the production at the market and feed our respective families because the production has increased (Focus group discussion, women, 2014).*

Farmers who are growing jointly the same selected crop in different selected sites group themselves in farming associations or cooperatives. They are formed to support each other including poorest people as local farmers have common interest to develop themselves. This situation may encourage even the ones who resist to the programme to join the LUC programme

## **Discussion**

### ***Crop preferences of small-scale farmers and decision-making implications for farmers***

Findings indicate that maize was a “priority crop” during the implementation of the LUC programme as farmers get free maize seeds and subsidized fertilizers. In fact, maize has many uses including competition with imports, production of animal feed, efficient in fighting hunger as it is easier to store and last a long time (Hoering, 2013; Kumar,2017). However, in the current study, Irish potatoes was preferred by local farmers as it was harvested in a short period of time and provided more income compared to maize. It has been found that, some agronomists were flexible in implementing the LUC programme as they allowed farmers to grow for instance Irish potatoes or vegetables without rotation with other crops. In case flexibility is generalized, there could be risks of not implementing the LUC programme as planned by the State and the objectives of

prioritizing maize including competition with imports, production of seeds for the next season, production of animal feed, efficiency in fighting hunger would not be achieved.

***Farming association (or cooperatives), collateralization and food security***

Researchers have shown there are advantages and disadvantages of both mono-cropping and poly-cropping (Lithourgidis, A. S; 2011; Undie, 2013). However, several studies show that agricultural diversification would enhance household food/nutrition security; Hirvonen & Hoddinott, 2014; Jones et al., 2014; Sibhatu et al., 2015, Bellon et al., 2016; Ecker, 2018), something our findings also support in the context of rotation of selected crops within the land use consolidation programme. In this case, based on agro-ecological conditions of sectors, small scale farmers rotate and produce different crops not only for sale but, often more importantly, also for home consumption, and thus a more diversified production would imply better access to higher food diversity (Ickowitz, Powell, Roland, Jones, & Sutherland, 2019).

Small-scale farmers or vulnerable farmers with limited land or no land often lack the resources and collateral needed to invest in new technologies. Thus, the small scale of farms in Rwanda may prevent the adoption of productivity enhancing techniques (Nilsson, 2019). However, in a farming association or cooperative scheme, some of the benefits associated with the land use consolidation programme could be linked to saving labour input and crop production could dependent on capital inputs rather than labour as access to loans to purchase agricultural inputs is much easier for farming association or cooperative than for an individual.

**Conclusions**

The current study analyses specifically the experiences of vulnerable communities with limited land or no land on the LUC programme. It also investigates the role played by farming associations or cooperatives in increasing their livelihoods and food security.

Two different geographical areas were considered for a better analysis of the study area. In lowland, findings indicate that the majority of farmers especially have small farming areas and most of them produce for food consumption. A challenging issue is that when all small farming

land are within LUC programme, farmers have no possibility of growing non-selected crops, therefore, they face food insecurity as they do not have the possibility of buying additional agricultural products at the market. However, other findings indicate that there were some sectors in lowland which had various agro-ecological conditions with the possibility of growing non-selected crops such as sweet potatoes.

In the highland, findings indicate that in general smallholder farmers within the same sector grow different crops depending on the agro-ecological zones and suitability of the soil in the area. They could cultivate selected crops such as wheat and Irish potatoes. They get free wheat seeds as a 'priority' crop and produce much Irish potatoes for food consumption and sell its production at the market. However, in the same sector, farmers cultivating maize and Irish potatoes are not satisfied with maize; a 'priority crop' but not seen as food security and cash crop for the farmers.

Most people could be classified as vulnerable people with limited land and in this context the LUC programme should be implemented in a way that allows them to maximize the benefits from their small land.

In order to increase the agricultural production, farming association or cooperative members expand their farming areas by renting land on a year basis. Apart from the benefits related to the increase of the agricultural production, farming cooperatives play also a role in the social integration. Poorest and landless people are integrated in farming cooperative and after the harvesting period they get some agricultural production which feeds their families and they avoid loneliness as they are busy farming every day.

Based on the fact that various crops are cultivated in the country depending on different agro ecological conditions, further studies are needed to assess the effects of the LUC programme on livelihoods and food security of people with limited land or no land in other regions of the country.

## **Acknowledgment**

This work was supported by the National University of Rwanda-Swedish international Development Cooperation Agency (Sida)/Sarec Research Cooperation, funded by Sida, Sweden

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