International Journal of Social Science Research and Review

http://ijssrr.com
editor@ijssrr.com
Volume 8, Issue 6
June, 2025
Pages: 317-331

Land Use Planning and Food Security in Rural Tanzania: Case of Masimavalafu village in Ludewa District

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http://dx.doi.org/10.47814/ijssrr.v8i6.2663

Abstract

The Southern Highlands Zone of Tanzania is among the big five corridors which produce large amount of food in Tanzania. The country is, therefore, trying to ensure that under constant weather conditions these areas ensure food security even during the drought seasons. Basing on this idea, this paper investigates village land use planning as one of the land administration and management tools in the context of increasing food security to villagers and the country at large. This study aimed at finding out whether village land use planning has enhanced food production and security in rural areas or not. Data were captured though interviews with villagers, leaders and various groups, mapping and spatial analyses of crop production trends in the periods in the village. Results have showed an increase in food production and security after the preparation of a village land use plan. This success was manifested by external donors who facilitated the preparation and implementation of the Village Land Use Plan (VLUP), and diving further to the registration of land rights and issuance of title deeds for each land parcel including communal lands in the village. The study draws its conclusion basing on the scientific approaches of preparing VLUPs and implementation of appropriate land management measures. In most cases, these steps are not carried out due to insufficient fund.

Keywords: *Land Use Planning; Food Security; Rural Areas; Participatory Approach*

1.0 Introduction

The Millennium Development Goals of the United Nations, which galvanized a global campaign from 2000-2015 only applied to developing countries, aimed to address extreme poverty and hunger (UN, 2000). The Sustainable Development Goals (SDGs), the centerpiece of the 2030 Agenda for Sustainable Development, were adopted by the United Nations Sustainable Development Summit and apply universally to all UN member states, and are considerably more comprehensive and ambitious than the MDGs (UN, 2015). While the first and second goals of the SDGs address poverty and hunger, the 15th goal discourses issues related to life on land. In particular, Goal 15 seeks to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. In efforts to address these problems, different

countries particularly developing ones, have devised strategies. Mwatawala et al. (2016) note that in developing countries agriculture is mainly rain-fed and production is currently threatened by several factors including climate change and variability as well as progressive land degradation associated with human-induced activities. Further, Berardy et al. (2020); Bullock et al. (2017); and Horton et al. (2017) provide that food systems are part of the physical, social, and economic structures of the world and should thus be studied in a holistic way across disciplines, spatial scales, and methods. This poses a serious challenge to agricultural, irrigation and water sectors, which requires specific interventions to increase and sustain productivity. Likewise, the inclusion of food systems does not seem to be common in land use plans nor agricultural production research or plans (Mui et al., 2018; Ruben et al., 2019).

In attempt to address continuing hunger, malnutrition and poverty, and to deliver agriculture-based economic and social transformation, African countries have made an unprecedented commitment to place agriculture at the centre (NEPAD, 2012). A recent report on the Comprehensive Africa Agriculture Programme (CAADP) of the New Partnership for Africa's Development (NEPAD), a programme of the African Union. The CAADP commitments aim to increase public investment in agriculture to a minimum of 10% of their national budgets and promote agricultural growth to a rate of 6% per year, based around four key pillars. The first pillar is on sustainable land and water management; the second focuses on market access while the third and fourth concentrate on food supply and hunger; and agricultural research (Rampa, 2012; Byiers, 2013). One approach to boost productivity is to promote greater trade and investment in agricultural inputs, production and support services. This requires actions not only to implement signed regional trade agreements, but also to address non-tariff barriers and harmonise standards, to promote the commercialisation of agriculture more broadly, to improve infrastructures, and lower the bureaucracy associated with trade more broadly. It also requires measures to directly address challenges faced by smallholders and informal traders (AU, 2012). In response to the issues above, a study in Ethiopia in 2012 suggested that the use of improved hybrid maize could help quadruple productivity. Suggestions from the study indicate that if just half the farmers achieved the productivity associated with using hybrid seeds, the domestic production would replace commercial imports (World Bank, 2012).

FAO's State of Food Insecurity report refers to four elements of food security: food availability, food accessibility, food utilization and food system stability. Availability focuses on food production whereas accessibility focuses on the ability of people to obtain food, either through production, purchase or transfers (FAO, 2001). Food utilization focuses on the nutritional value of food, the interaction with physiological condition and food safety. Food system stability focuses on stability of supply and access, as well as the ability to respond to food emergencies. As captured in the 2008 State of Food Insecurity report, there are nearly one billion people who are undernourished. The overall proportion of the population suffering from undernourishment in Sub-Saharan Africa remains persistently high at 30%, and is over 50 % in some countries. Also, undernourishment affects more than a fifth of the population of South Asia (21%), and many Caribbean countries at 23% (FAO, 2008b). Although the rate of global population growth is declining, the UN projects that total population will increase by more than 30% by 2050, i.e. from the current 6 billion to approximately 9.1 billion in 2050 (UN, 2009). Most of the increase is projected to occur in South Asia and Sub-Saharan Africa. Both regions have a large share of the world's food insecure population, dependent on agriculture for their livelihoods while at the same time FAO projects that global agricultural production will need to grow by 70% overall by 2050 (Bruinsma, 2003).

In Tanzania, more than two - thirds of all households are employed in agriculture and fisheries, with 81.7% living in rural areas (URT, 2009). Furthermore, poverty remains overwhelmingly a rural phenomenon, with some 83% of individuals below the basic poverty line being resident in rural areas. For instance, in 2009, over one third (37.6%) of rural households were reported to live below the basic needs' poverty line compared with 24% of households in other urban areas and 16.4% in Dar es Salaam (URT, 2009). UNDP and URT (2013) note that in 2013 the level of food poverty in Tanzania was among the

highest in the world as it stood at 17% when the population growth rate was 2.9%. During this time, about half (43%) of the population were children whereby six million lived below the basic needs' poverty line and three million below the food poverty line. In addition, the 2010 Hunger Index ranked the situation as alarming for children in rural areas suffered substantially higher levels of malnutrition and chronic hunger than their urban counterpart. Owing to this, the country had much to do to reduce extreme hunger and malnutrition. In response to this situation, the government prepared the Five-Year Development Plan ad MKUKUTA II which became the flagship programmes of the government in response to poverty eradication and promoting pro-poor growth. SAGCOT was part of these plans under the *Kilimo Kwanza* (Agriculture First) initiative to promote agriculture development sector through government and donor engagement with the private sector to better strategize on how to agri-business could be stimulated to improve the livelihood of smallholders (State of East Africa Report, 2012). At a national level, SAGCOT which included four crop production regions by then namely Morogoro, Iringa, Mbeya and Rukwa was established to transform the areas' productivity, better link agriculture to infrastructure and improve the capacity and commercial operations of value chain actors (Wilson and Lewis, 2015). Of recent, two regions, Njombe and Katavi have been added after the division of Iringa and Mbeya regions respectively.

Wang et al. (2022), Chen et al. (2023), and Mehari et al. (2023) argue that land is the spatial carrier of all sorts of human life and it shapes a community's socio-political and economic establishments through the interplay of use and value under a given tenure system. At any scale, the spatial configuration of land use is a physical manifestation of the distribution of the structure of benefits and costs to a society (Anas and Kim, 1996; Andersson and Samartin, 1985). Also, the enforcement of fair distribution of such benefits and costs among communities and among the groups and individuals within a community is one fundamental reason that land use must be planned (Jones, 2014; Mehari et al., 2023). Li et al. (2021) and Liu et al. (2022) opine that changes in the relation of use–value drives land use land cover change, where such alteration of ecosystem services can cause changes to the spatial relation of human activities (human–spatial interactions). This is the fundamental reason that calls for the effective planning of land use (Mehari et al., 2023). Literature has shown how land use planning can trigger agricultural production and increase crop production. Building on the above arguments, Chaturvedi et al. (2021) advises on the importance of acknowledging that land use planning is instrumental in alleviating the potential for incompatible changing of regional/rural land into land use that detrimentally affects the productivity of the primary food supply and ecological services and alleviates land scarcity within the built environment through different use policies. In general, Chen et al. (2023) contend that as a human economic development carrier resource, as a natural endowment and ecological services provider, and as an institutional entity that shapes the socio-political behavioral relations of humans by tenure conditions, both rural and urban land require effective planning for their sustained productive use. Above all, the relational analysis on land use planning, sustainable food production and rural development by Jónsdóttir and Gísladóttir (2023) shows that, first, in most cases rural land use planning for food production is lacking a sustainability perspective and hence sustainable rural land use and food production needs to be integrated. Secondly, food system research has focused on availability and access over rural land use while sustainable land use for food production as public good is not widely recognized. Hence, it is recommended that policies for rural land use and agri-food production should be integrated.

As discussed above, there is a strong link between agriculture production and land use planning. In practice, fertile land in rural areas continually becomes scarcer due to population growth, pollution, erosion and desertification, effects of climate change and variability, and urbanization. The optimal use of natural resources available particularly in rural areas depends mainly on the potential of people to utilize and manage them; their priorities; the socio-economic conditions and the carrying capacity of the natural resources. GIZ (2011); Nukala and Mutuz (2015); and Salazar-Quitalig and Orale (2016) demonstrate that land is a scarce resource, progressively being affected by the competition of mutually exclusive uses. Land use planning, which can help to find a balance among these competing and sometimes contradictory uses, is a remedy. This balance is achieved through a systematic and iterative procedure to create an

enabling environment for sustainable development of land resources which meets people's needs and demands. Therefore, the land use planning process assesses the physical, socio-economic, institutional and legal potentials and constraints on an optimal and sustainable use of land resources by and large empowering people to make decisions about how to allocate those resources (FAO/UNEP, 1999). IFAD (2014) describe land-use planning as the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land-use options with the main purpose of selecting and putting into practice land uses that best meet the needs of the people while safeguarding resources for the future. IEED (2010) add that in carrying out land use planning, Participatory Land Use Planning (PLUP) is crucial and it is meant to ensure that local land users are given the opportunity to play a central role in decision-making processes concerned with the land and resources they use and depend upon. PLUP brings stakeholders together to develop a common vision and to agree upon a way forward – as part of this, land-use conflicts could be resolved. In particular, it provides an opportunity for marginalized groups to take part, including women, young people, pastoralists, fishers and hunter- gatherers (The National Land Use Planning Commission, 2013; IFAD, 2014; Eilola et al., 2021).

As of now, Tanzania has more than a decade of experience with participatory land use planning. Nonetheless, about 26.79% of Tanzania's villages have prepared Village Land Use Plans [VLUPs] (NLUPC, 2024) but the implementation of such plans, particularly those which were prepared and funded by local agencies, has not been very effective (OECD, 2013). The ineffectiveness of these land use plans largely hinges on the way such plans are prepared. In this regard, villagers, through VLUM and Village Council members make decisions on which land parcel should be assigned what type of land use. The scientific approaches such as land capability or suitability analysis to inform decisions are not employed during the planning process. As a result, even if the plans are implemented, the main objectives of preparing such plans, including increasing productivity in specific land uses, are not realized. Other obvious advantages of preparing VLUPs include conserving priority and environmentally [ecologically] sensitive areas, reserving land for investment, minimizing land use conflicts between villages and land users in the same village, increasing land tenure security and establishing a market for land thereby boosting rural economies (URT, 2007; NLUPC, 2011; Magina and Kanyawanah, 2019). As opposed to the above practice, donor funded village land use planning projects are objective-oriented and hence strive to adhere to and comply with the preliquisite procedures of preparing VLUPs as well as during the implementation of such plans. From the foregoing narrative, this study examines and postulates the link between an effective and participatory land use planning process with facilitation from external agencies and the state of food security. This departs from the well-known advantages of VLUPs of accelerating development and improving economic conditions for many village members through granting of CCROs which can be used as collaterals to access loans from financial institutions (Hart et al., 2014). Based on the discussion above, it can be deduced that food systems do not seem to be common in land use plans nor agricultural production research or plans. This study seeks to emulsify the importance of participatory land use planning and how such plans can increase agricultural productivity in rural areas.

2.0 Theoretical Discourse

The work considered and adopted a collaborative approach in framing. Tyler (2014) argues that collaborative planning can be referred as a conceptual base for resolving complex, multi-stakeholder planning scenarios. As such, the approach is often applied to planning for the purposes of encouraging public participation, and resolving and mediating stakeholder disagreements. While literature notes challenges in evaluating collaborative planning, Gunton and Day (2003) suggest four common criteria to measure its effective use. These include the ability to successfully reach agreement, efficiency in the collaborative process, stakeholder satisfaction in the planning outcome and achievement of social capital among stakeholders. In planning profession, collaborative planning involves different parties affected or affecting a plan through decision making in the course of formulation to the implementation stages of land use planning assignments. In particular, the approach is now perceived to be more productive as

planning mandate is on local people's hands while professionals are just facilitators. In this regard, the approach helps to investigate how collaborative land use planning at village level can help solve food production and insecurity in rural agriculture production areas.

3.0 The Study Area

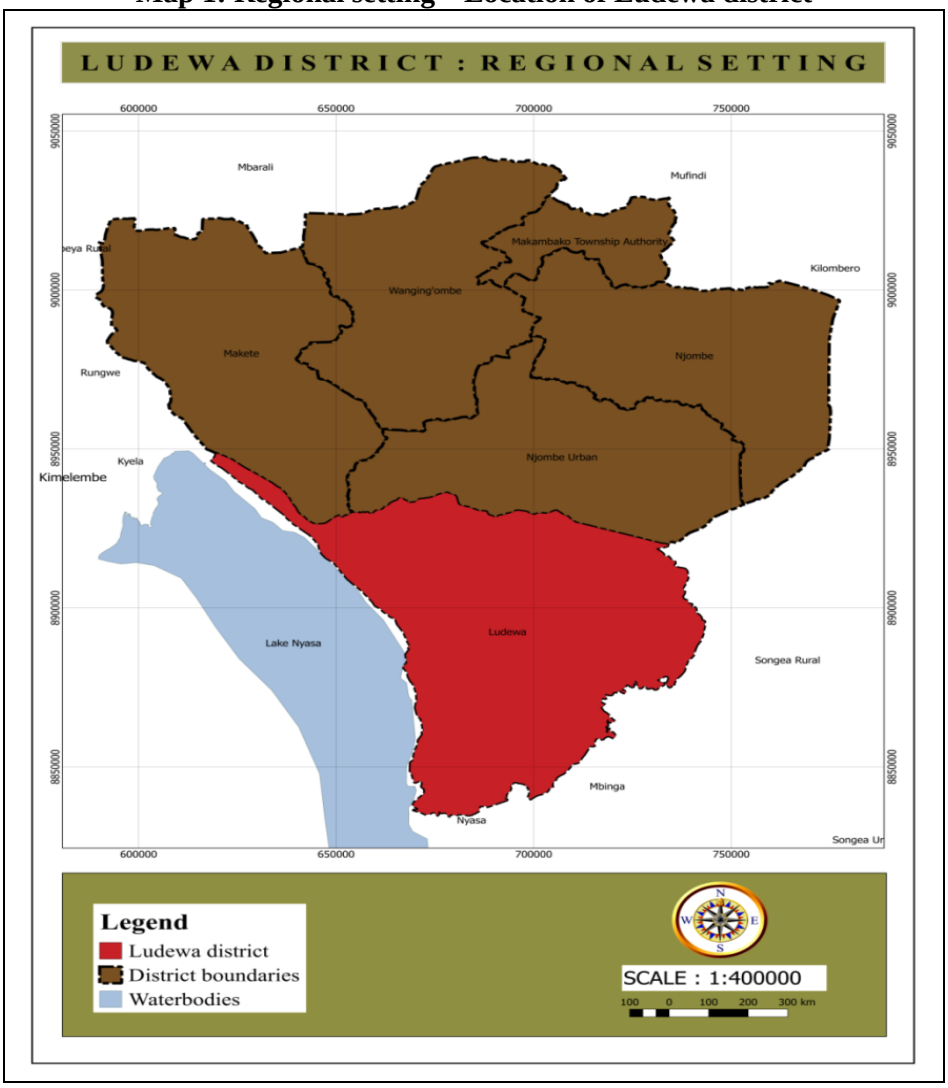
3.1 Location and Description of Masimalavalafu Village

Masimavalafu village is located in Ibumi ward, Liganga division, Ludewa district in Njombe region (see Map 1). The village is 59 kilometres from Ludewa town which is the headquarters of Ludewa district. In the North Masimavalafu village is bordered by Ibumi village, in the Eastern side by Amani village, in the Western side by Nkomang'ombe village and in the Southern part there is King'ole village. The village occupies a total area of 53,690.2Ha equivalent to 134,225.5 acres.

3.2 Socio-Economic and Physiographic Characteristics

According to 2018 data, the village had 332 people whereby males were 139 constituting 42% and females were 193 constituting 58%. With 83 households, the average household size was four persons. The majority population belongs to Ngoni tribe and Manda tribes whose majority (nearly 99%) are engaged in farming as their primary economic activity while the secondary economic activity is livestock keeping. In dominance, maize, beans, paddy, cassava, and peas (*mbaazi*) are grown. Other activities include trade, charcoal burning and formal employment and constitute 1%. Being located in the Southern Highlands zone, the village receives between 1,000 to 1,350mm of rainfall per annum. The average temperature is usually 21^0C but June to August is the cold period with up to 10^0C. The presence of undulating plains and valleys collect storm water during the rainy season in river valleys while the remaining part is relatively flat. Small rivers such as Masimavalafu, Malkila, Hangasi and Luwengu altogether pour water into Ruhuhu and Ketewaka rivers and make the area suitable for crop cultivation. In flat plains, loam and sandy soils with moderate fertility prevail while loamy clay soil with high moisture is dominant in valleys.

Map 1: Regional setting – Location of Ludewa district



Source: Author's construct, 2019

4.0 Methods

The primary objective of this study was identify food production areas in the village as well as the trend of food production after the preparation of a village land use plan. Therefore, a mixed approach was important in order to meet this objective. The quantitative part was concerned with mapping of agricultural areas while the qualitative approach aimed at documenting crop production in the cultivation areas over time. Field mapping which was facilitated by transects provided insights for land use mapping in order to show the distribution of and uses of land within the village and production areas. On the qualitative approach, key informant and household interviews facilitated data collection. Official interviews included professionals at district level, village leaders and the Village Land Use Planning and Management (VLUM) team. District Land Professionals, Village leaders and VLUM team members aided the collection of data on land use change, the land use planning process. Household interviews involved 83 individual farmers and household heads whereby land use changes and production trends at household level from 2011 to 2018 as per the agricultural zones in the Village Land Use Plan. Most importantly, respondents were required to state the influence of village land use planning on food security at household and village levels. Despite the fact that many crops were grown, the study only concentrated

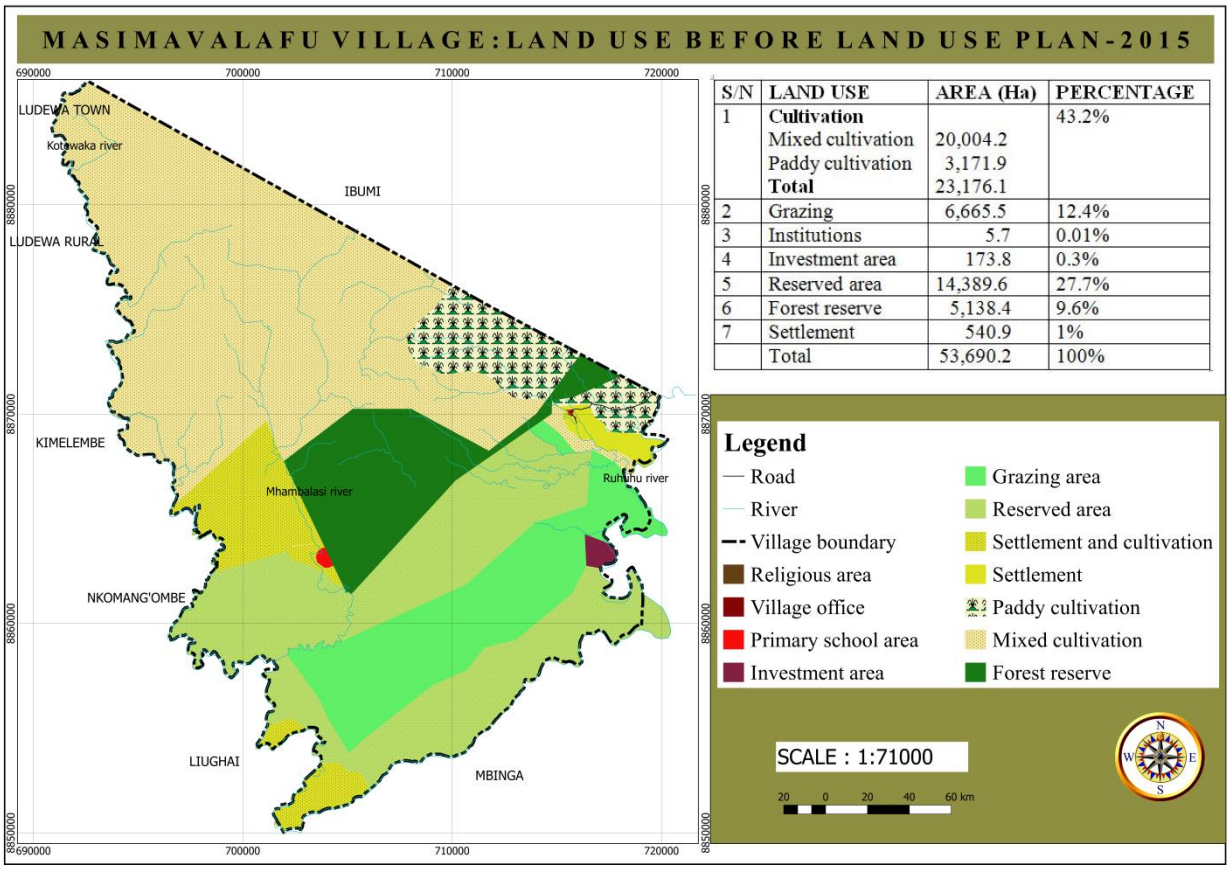
on four main crops grown i.e., maize, paddy, millet and beans. Data collected from households and key informants were qualitatively analyzed whereby opinions and facts were recorded in Microsoft word while the rest were analyzed by SPSS and Microsoft excel. Spatial data were handled by GIS software.

5.0 Results

5.1 Food Production Trends Before the Preparation of a Village Land Use Plan (2011-2014)

During this time, the largest part of the food production area was located on the Northern part of the village in which all food crops were grown. On the Eastern side, the availability of valleys and rivers such as Ruhuhu River which are preliquisite for paddy production attract people to grow and produce paddy (see Map 2). During the 2011-2014 period, mixed cultivation of maize, beans, millet and peas was being practiced in the Northern part of the village covering an area of about 20,000Ha. To a small extent, some of these crops, including vegetables, were grown within residential areas. Generally, agricultural activities were being conducted within an area of 23,176Ha which was equivalent to 43.2% of the total village land. This study noted low production trends of crops which emanated mainly from agricultural malpractices, crops destruction particularly by livestock, land use conflicts, soil and environmental degradation. It was observed that the low production was a contribution from the competition with other activities particularly grazing and charcoal burning which were being carried out within food production areas. Map 2 presents land uses which existed before the preparation of a village land use plan for the village in 2015.

Map 2: Land uses and food production areas (2011-2014)



S/N	LAND USE	AREA (Ha)	PERCENTAGE
1	**Cultivation**		43.2%
	Mixed cultivation	20,004.2	
	Paddy cultivation	3,171.9	
	Total	23,176.1	
2	Grazing	6,665.5	12.4%
3	Institutions	5.7	0.01%
4	Investment area	173.8	0.3%
5	Reserved area	14,389.6	27.7%
6	Forest reserve	5,138.4	9.6%
7	Settlement	540.9	1%
	Total	53,690.2	100%

Source: Masimavalafu village, 2019

According to official interviews with the village leaders and VLUM team members, food production suffered a decrease year after year from 2011 to 2014 as Figure 1 presents. As it can be observed from the Figure, production in the 2011-2014 period was relatively low whereby about 289 sacks were produced in 2011 and the production continued to decrease by 19% by the year 2014 where the production stood at nearly 55 sacks. Interviews with farmers and local leaders revealed that local knowledge and traditional land management and administration practices prevailed during this period. At household and village level, maize is the most dependable food and cash crop and hence, each household cultivates maize in large amount than the rest of food crops. Likewise, within the 2011-2014 period, the average maize production per household was 3.7 sacks per acre in 2011 and it dramatically decreased to an average of 3 sacks in 2014. This implies that for four years maize production dropped by 18.9%. Results further revealed that low crop production which the village experienced in 2011 was caused by an extreme drought period which occurred in that period.

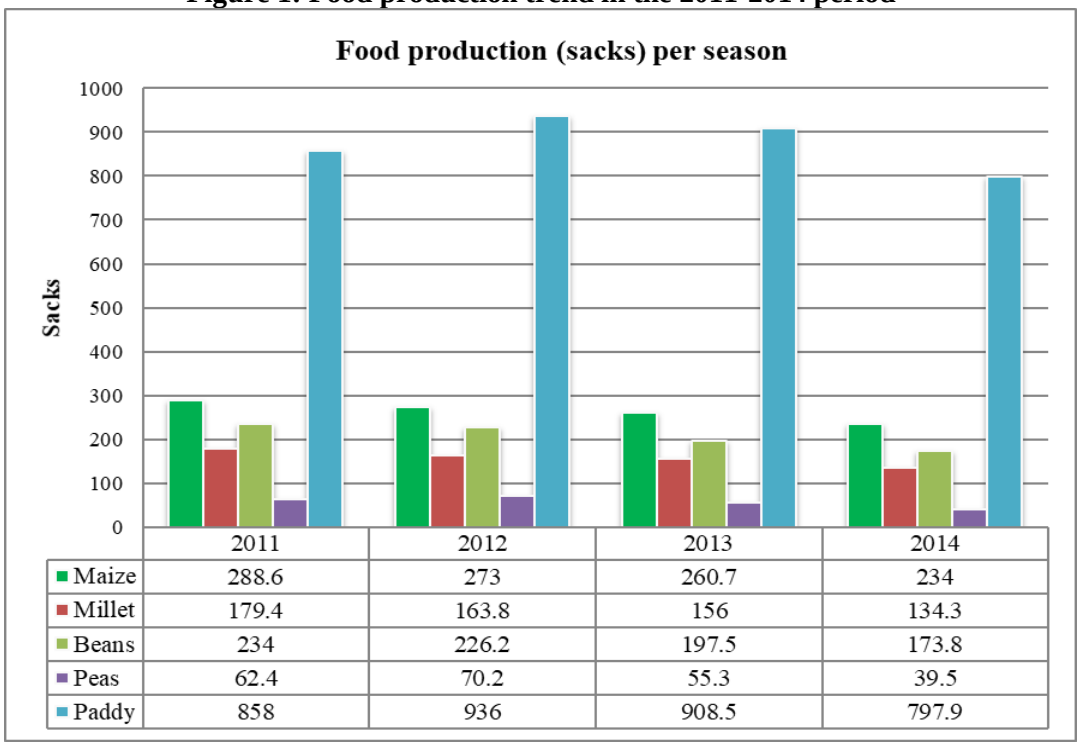
The trend of millet and beans production also suffered a decrease during this period. At household level, millet has multiple uses as it is used for food, making local brew and for sale to earn income and livelihood improvement. The decrease in millet production seems not to be notable since the crop withstands drought as well as competition of nutrients with weeds. For the case of beans, statistics show that the decrease in production during the four-year period was approximately 26%. Also, being one of the staple food crops in the village, the production trend was relatively similar whereby production at household level stood at 3 sacks in 2011 to 1.1 sacks in 2014.

Paddy is also a food and cash crop in the village and Njombe Region at large and, therefore, its importance draws more attention. In this village, paddy was cultivated on the Eastern side of the village within an area amounting to 3.2Ha which has potentials (valleys and rivers) for its growth. Despite the availability of these endowments, production had never been regular. As it can be seen on Figure 1, the average paddy production at village level was satisfactory in 2011 and 2012. Interviewees held with farmers revealed that in these two years the increase in production was a result of the heavy rains in Mbinga District whose water flowed down Masimavalafu village. In 2013 and 2014, paddy production dropped insignificantly by nearly 3% and 15% respectively due to a decrease in rainfall and competition over the resources present in the valleys. When farmers were asked to provide reasons for the decrease said:

> *"…In 2013 and 2014, it [rain] did not drop much, the soil was relatively dry for paddy. Due to drought, livestock were grazing around farms and in some cases, grazed in farms as there were no restrictions on where should which activity could be conducted…."* (Interview with farmers at Masimavalafu village, April 2018).

From these results it can be seen that between 2011 and 2014, changes in paddy production occurred at an average of 0.9 sacks which is equivalent to 8%. When compared with other crops, the production change of paddy is minimum due to the fact that the land in which paddy is cultivated and produced is characterized by permanent water from rivers which flow from the highland areas as opposed to other land uses which are located in elevated areas with limited water contents. The results render to statistics from FAO which show that existing climatic variability is likely to be exacerbated by longer-term climate change. Although its impact is hard to quantify, climate change is likely to increase the unreliability of farming systems particularly in rain-fed areas. Therefore, weather conditions especially rainfall amount and reliability have significant influences on productivity of both maize and paddy (FAO, 2004; Mwatawala et al., 2016).

Figure 1: Food production trend in the 2011-2014 period



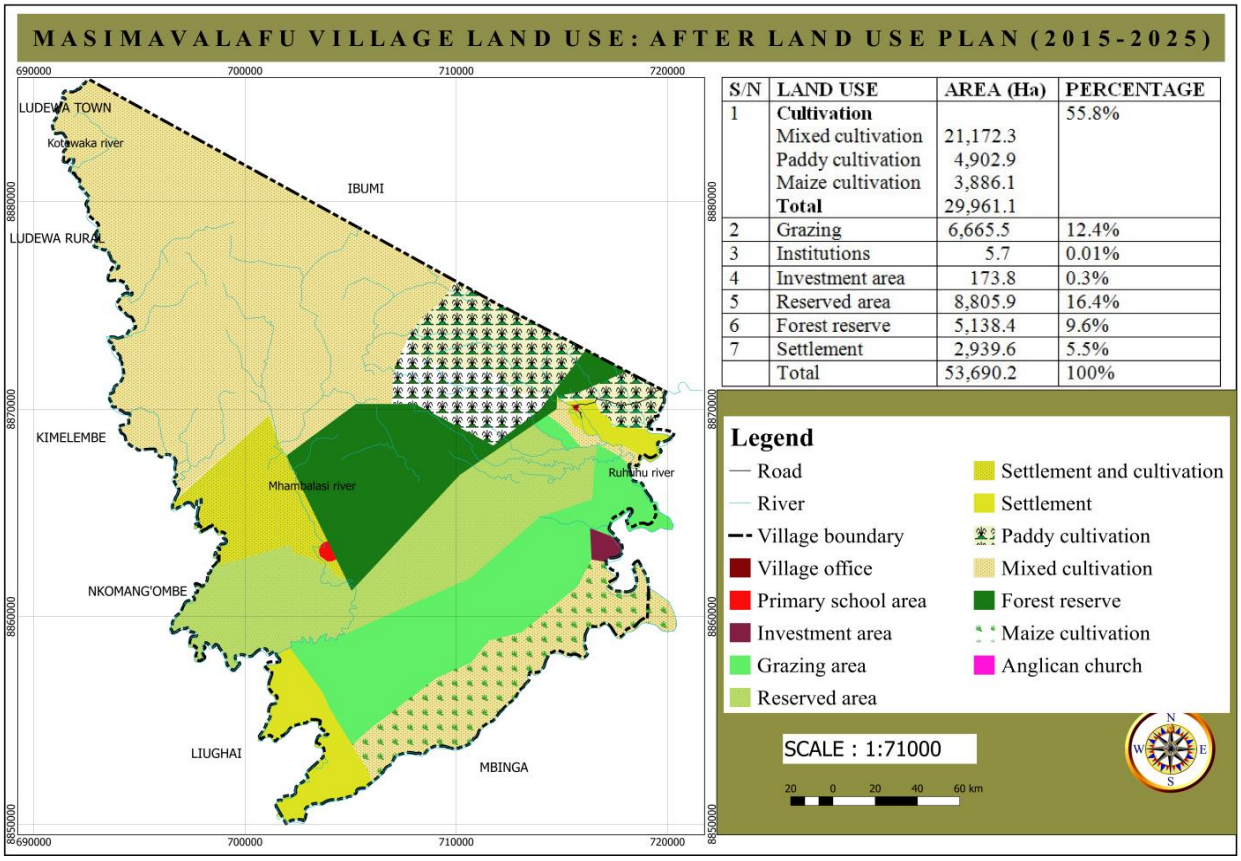
	2011	2012	2013	2014
Maize	288.6	273	260.7	234
Millet	179.4	163.8	156	134.3
Beans	234	226.2	197.5	173.8
Peas	62.4	70.2	55.3	39.5
Paddy	858	936	908.5	797.9

Source: Masimavalafu village, 2019

5.2 Food Production Trends After the Preparation of a Village Land Use Plan (2015-2018)

In 2015, villagers, through their representatives (VLUM team members) prepared the village land use plan under the supervision of PLUM team from the Ludewa District council while funding issues were administered by JAN DERKSEN donors from South Africa. The donor supervised the land use plan preparation process in all stages and even during implementation of the plan. During the preparation process, scientific approaches particularly problem and land suitability analyses were carried out in order to find out which land parcels could be highly suitable for specific activities (uses). Resulting from the analyses, some land uses were proposed to be conducted in different locations and land units by either increasing or decreasing land coverage and some were separated from mixed uses. For instance, due to its importance, land for maize cultivation which was formerly a mixed use before the plan preparation, was re-allocated in the Southern part of the village covering about 3,900Ha (see Map 3). Correspondingly, the area for paddy cultivation increased by about 56% i.e., from nearly 3,200Ha in 2014 to almost 5,000Ha in 2015. Generally, area for food production increased from 23,176.1Ha before plan preparation to 29,961Ha. In addition, mixed cultivation increased form 20,000Ha to 21,172Ha. In as much, land for agriculture increased from 23,176.1Ha before the preparation of a village land use plan to 29,961Ha in 2015. Other land uses with their respective land coverage generated during the preparation of the village land use plan are presented on Map 3.

Map 3: Land uses and food production areas (2015-2018)



S/N	LAND USE	AREA (Ha)	PERCENTAGE
1	**Cultivation**		55.8%
	Mixed cultivation	21,172.3	
	Paddy cultivation	4,902.9	
	Maize cultivation	3,886.1	
	Total	29,961.1	
2	Grazing	6,665.5	12.4%
3	Institutions	5.7	0.01%
4	Investment area	173.8	0.3%
5	Reserved area	8,805.9	16.4%
6	Forest reserve	5,138.4	9.6%
7	Settlement	2,939.6	5.5%
	Total	53,690.2	100%

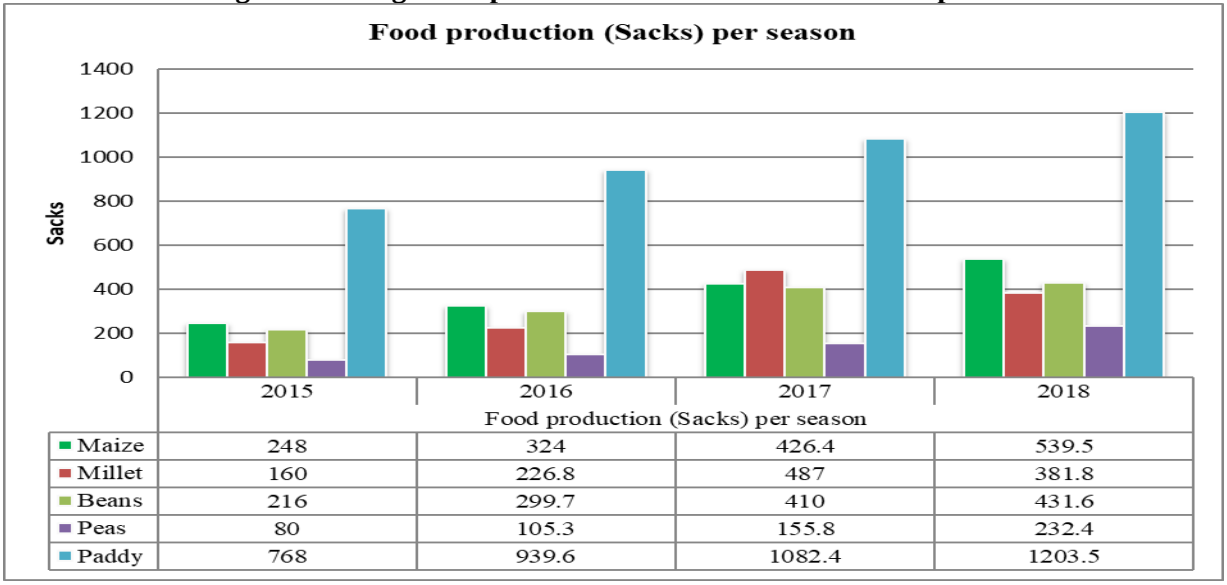
Source: Masimavalafu village, 2019

From the map it can also been observed that cultivation areas were separated from a grazing area as a way to minimize land use conflicts between farmers and livestock keepers. During interviews with village leaders on these success i.e., an increase in productivity mentioned the contribution of external agency during the preparation and implementation of a VLUP. On this aspect they had these to say:

> *"….JAN DERKSEN donors from South Africa have made a great job and helped the villagers in allocating land uses and use their land in a sustainable and productive way. They guided us to make decisions on the best use of the land. They also helped us to lay down workable by-laws to safeguard the proposed land uses and the village leadership uses such by-laws to implement the VLUP…"* (Interview with village leaders, 2018).

Resulting from a systematic allocation and alteration of land uses based on land suitability was an increase in crop production and food security by and large year after year as Figure 2 shows. As it can be observed from Figure 2, there was an increase in each crop yield from 2015 when the VLUP was prepared and the implementation started to 2018 when the study was conducted.

Figure 2: Village food production trend for the 2015-2018 period



Food production (Sacks) per season	2015	2016	2017	2018
Maize	248	324	426.4	539.5
Millet	160	226.8	487	381.8
Beans	216	299.7	410	431.6
Peas	80	105.3	155.8	232.4
Paddy	768	939.6	1082.4	1203.5

Source: Masimavalafu village, 2019

6.0 Discussion, Conclusions and Recommendations

The results presented in section 5 have shown that notable gradual changes in crop production after the preparation and implementation of the village land use plan i.e., from 2015. For maize, there was an increase in production of 52.3% from 2015 to 2018 as Figure 2 clearly shows. As noted earlier, the main factor for the increase in production was the suitability of the area with favourable conditions for maize cultivation in the South and separation of maize from other crops. The multiplier effect also corresponded to millet production. As such, millet production had multiplied than twice (by 58%) within the 2015-2018 period. Analogous trends persisted in the production of beans as clearly shown in Figure 2. What comes conspicuously from the figure is a two- folds production of beans within four years after the plan preparation and implementation. An increase in land for paddy production, the availability of agricultural extension officers within the ward and the improvement of irrigation schemes fostered the increase in paddy production. For four consecutive years, records have shown that paddy production in the village stepped to 768 sacks in 2015 and reaching about 1,204 sacks in 2018.

The foregoing findings demonstrate that rural land, if well planned, can provide greater value of nature's contribution to people including livelihood for farmers and other users of land resources as well as several types of ecosystem services (Power, 2010; Swinton et al., 2007; Ellis et al., 2019). On the contrary, in the context of larger agricultural settings and monocultural land uses than it does in relation to diversified farming where different functions may coexist, farming may also cause considerable negative environmental impacts (Barinaga-Rementeria and Etxano, 2020; Granvik et al., 2012; Slätmo, 2019). In rural areas, land is valued according to its designated use, location, and market elements such as demand and supply. These call for the need of sustainable rural land use planning in order to safeguard land, its value, the ecosystem and, above all, crop productivity in order to sustain food security in rural areas as well as in urban areas (Jónsdóttir & Gísladóttir, 2023). The findings have clearly shown that the fields of land use, food production and sustainable development seem close, yet their related disciplines may have developed into detached silos. The findings, therefore, suggest to integrate land use and food system planning where sustainability is a targeted goal.

In Tanzania, about 50% of maize is produced in the Southern Highland regions of Morogoro, Iringa, Njombe, Mbeya, Rukwa, Katavi and Ruvuma. In addition, 70% of the Tanzania's population

depends on maize as their staple food while smallholders produce over 95% of Tanzania's maize. However, the majority of smallholders operate at a subsistence rather than commercial level, with an average land holding of about 0.7Ha (Wilson and Lewis, 2015). Results of this study have shown an increase in crop production of four main food and cash crops in the village over a period of four years. The realization of the crop productivity in the village has been influenced by effective land-use planning and land administration practices which are among the generic blocks to development; with great impact on the maize value chain and create concerns across the board for agricultural growth as Wilson and Lewis (2015) observe. In this study, findings reveal an increase in millet production. Yet, this yield is still very low when compared to standardized yields in other countries. For instance, in the One Acre Fund to reintroduce finger millet as an alternative cereal to disease-susceptible maize varieties commonly grown in Western Kenya, between 821 and 1200kg were obtained in one acre (One Acre Fund, 2014).

Aggregate bean yields of bush and climbing beans in Sub-Saharan Africa are commonly below 1,000 kg per hectare (400kg/acre) as opposed to yield potential which should exceed 2,000 and 4,000kg/ha respectively. In similar views, findings of this study have demonstrated that by 2018, farmers in the village were able to produce an average of 5.2 sacks (520kg) from a single acre. Experience from Rwanda also reveals almost comparable trends. In a local bush bean trial in Bugarama agro-ecological region of Rwanda through a One Acre Fund, about 1,3030kg/ha (532kg/acre) were obtained in the same year. On the contrary, in Bungoma South, Western Kenya, an attempt to increase bean production of Rosecoco and KK8 bean seeds gave rise to the ultimate yields per hectare of 213kg/ha (85.3kg/acre) and 217kg/ha (86.8kg/acre) respectively in 2015. These limits are extremely far from yields in Asia and Latin America which routinely exceed 2,000kg/ha amounting to 800kg/acre (Guerena, 2015).

Paddy production at household level in the village has improved from 1,101kg/acre in 2014 to 1,450kg/acre in 2018. These results almost conform to paddy production in the neighbouring Mbarali district whereby the mean yield of paddy was 1,611kg per acre in 2016 (Mwatawala et al., 2016). The mean yields in the two districts are a bit higher than what was reported by Vien (2012) in some regions which produces paddy in Vietnam and the average production per year ranges from 1,000 to 1,500kg per acre depending on the availability of water from the river.

The results indicate that land use planning for rural land and its agri-food production lacks inclusion of sustainability, both for rural living and food production. The main conclusion is that external financial facilitation from JAN DERKSEN donors has substantially enhanced the preparation and implementation of a VLUP which has, in turn, increased food production and security. From this initiative, the scientific procedures in preparing land use plan has made a great contribution to food production and security. In practice, the experience of preparing village land use plans has shown a limited scientific contribution of land professionals in the preparation of village land use plans. During the process, their role has been limited to facilitate the process (orient villagers to the process) particularly helping them identify problems, opportunities and obstacles. Nevertheless, they do not use such information to carry out the scientific land suitability analysis to inform decision-making on the allocation of different land uses to address the problems identified by villagers. Therefore, the main recommendation remains on the importance of land capability and suitability assessment. Yet, the importance of rural land use planning for agri-food production, has not been adequately emphasized in the context of the sustainability perspective.

Acknowledgement

The paper was produced from an in-semester fieldwork which took place in Ludewa through financial support to students through the Higher Education Students' Loans Board (HESLB) and Ardhi University.

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