

Original Research Article

Agricultural Land Access and Use in Burundi

Thierry Keringingo^{1*}, Zuhail Kayakayaci¹¹Department of Agricultural Economics, Faculty of Agriculture, Selçuk University, Konya 42250 Turkey

Article History

Received: 06.01.2023

Accepted: 11.02.2023

Published: 17.02.2023

Journal homepage:

<http://www.easpublisher.com>

Quick Response Code



Abstract: Agricultural land accessibility and use in Burundi has been reviewed and analyzed in this study. SWOT and SOR analysis have been used to examine its strengths, weaknesses, opportunities and threats and some strategies that can lead to sustainable agriculture have been determined. It has been observed that Burundi has a serious problem with agricultural land atomicity. More than 40% of agricultural households cultivate plots less than 0.25 ha. Kayanza and Ngozi are most densely populated provinces. 44% of the agricultural land is on sloping hills and a total of 145.3 tons/ha of arable land is lost every year. However, thanks to the efforts of land development projects, arable land has increased and reached 79.17% of total area of the country in 2018. Unfortunately, it has been shown that the growth rate of agricultural production over the last decade was lower (2%) than the population growth rate (2.6%-3%). It is desirable to implement a land consolidation policy, especially in densely populated areas. For eroded soils, it is ideal to strengthen anti-erosion practices to protect soils and save water. Government of Burundi and NGOs should support agricultural sector by disseminating methods and techniques that will ensure sustainable management of agricultural land.

Keywords: Agricultural land, Land accessibility, Land use, SWOT and SOR analysis.

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Burundi is a small landlocked country in East Africa with steep mountainous terrain and humid tropical climate (ADB, 2022). The population was estimated at 8,060,000 people in 2008 and 51% were women, with more than 90% of the total population living in rural areas. The population of Burundi is estimated to have reached 10.2 million in 2016. The average annual population growth rate over the past seven years is 3% (PAM, 2016 and ISTEERU, 2015). With a population of more than 300 inhabitants per km², Burundi is one of the most densely populated African countries. In the central-western provinces of the country (Kayanza and Bujumbura), the population density is more than 500 people per km². Less than about 10% of the country's population lives in urban areas and almost 46% of the population is under the age of 15 (BM, 2019; WFP, 2016 and ISTEERU, 2015).

Agriculture is the heart of Burundian economy, representing 40% of national GDP, employing more than 90% of the population and covering 30% of total export revenues. Burundi is a major exporter of coffee (21%) and ranks second after

gold exports (49%) (FSIN, 2019). Other agricultural exports include tea (8%), wheat (4%), processed foods (1%) and tobacco (1%) (Grebmer *et al.*, 2020).

Livestock plays an important role in Burundian agricultural system, contributing 12% to national GDP (Jeniček *et al.*, 2016) and providing income, food and fertilizer as well as a traditional form of household savings for rural families (Kearney, 2010). Per capita income is below approximately 1\$ /day and 85% of total households live in food insecurity (EGAE, 2014). In 2020, more than 70% of Burundians live below the international poverty line at \$1.90/day; almost 64% are in national poverty line and live below the limit of \$0.88/day and 65% of young people are unemployed (WFP, 2019).

Analysis of the economic situation in Burundi was primarily based on sectoral contributions to growth in terms of GDP and then expanded to other growth indicators. Main economic sectors are currently Agriculture, Industry and Crafts, Forestry and Energy. Agriculture and Forestry sectors contribute 40% and 2% respectively to GDP. Industrial and energy sectors

*Corresponding Author: Thierry Keringingo

Department of Agricultural Economics, Faculty of Agriculture, Selçuk University, Konya 42250 Turkey

contribute 18.3% and roughly 4.6% (1% with electricity) respectively to GDP (MINAEGRIE, 2018).

Minani (2014) argued that population growth inevitably leads to a decrease and overuse of arable land. Therefore, the soil fertility declines and crop production decreases in an already limited area. According to the author, demographic pressure reduces pastures by giving priority of the scarce land resources to agriculture use.

Intensive agriculture and grazing on steep, heavily eroded hills, combined with high soil acidity and few agricultural inputs, lead to low soil fertility and low agricultural yields. Against these constraints, this study is conducted to examine the accessibility and use of agricultural land in Burundi. This article reviews a wide range of strengths, weaknesses, opportunities, and threats to highlight the pathways to improve access to and use of agricultural land.

MATERIAL AND METHOD

To carry out this study, the qualitative and quantitative data are compiled from the web sites of different institutions and organizations, scientific articles, theses, books and reports. The in-depth literature review focussed on the land distribution and

population pressure, the agricultural system and land use, the availability of arable land, the degradation and loss of arable land. However, the primary data were obtained through surveys conducted in the focus groups. In addition, secondary data were also used when writing and discussing the results of this research study.

Data and information obtained from different sources were examined, evaluated and interpreted in accordance with the purpose of the land access and use situation. Moreover, based on the relevant literature, the classification and organization of quantitative data was compared to facilitate a simple and understandable information.

SWOT analysis is a method used to show and identify strengths, weaknesses, opportunities, and threats that concern the organization or any industry. This analysis was performed using both primary data provided by surveys and secondary data from literature and institutions. SWOT and SOR analyses have been used to determine the internal and external impacts and strategies to be adopted for Burundian agricultural sector. SWOT analysis matrix lay out is given in table 1.

Table 1: SWOT analysis table

	Factors	In terms of impact	
		Positive	Negative
From the sourcing point of view	Internal factors	Strengths	Weaknesses
	External factors	Opportunities	Threats

SOR analysis is a method used in various fields to evaluate the production, management and performance processes of activities (Vermeire and Gellynck, 2009). SWOT is the process of strategy development using the results of analysis (Rajasekaran, 2009). In this research, SWOT and SOR analysis have been performed on the status of agricultural land in

Burundi. Strengths and opportunities are listed, then strategies are developed to prevent and mitigate weaknesses and threats. After that, the strategic orientation matrix (SOR) determines which strengths has been used for each proposed solution and which weakness has been identified. Table 2 illustrates a summary of the presentation of the SOR analysis.

Table 2: SOR matrix summary

Points	What is its significance?	What can be done?
The total score is calculated for each S (Strength), W (Weakness), O (Opportunity) and T (Threat)	How important are the different S, W, O, T?	The development of two or three strategies around the most important opportunities and threats to maximize external factors.
Calculation of each of the scores	How to convert S, W, O or T?	Development of strategic objectives for the combinations that achieve the highest scores.
Combination	What are the general solutions?	High S-O: Attack; high chance. High ST: Defense; we have the strength to deal with threats. High W-O: Work on weaknesses to take advantage of opportunities. High W-T: The threats are heavy; it is difficult to produce solutions.

RESULTS AND DISCUSSIONS

Current situation of Burundi's agricultural land

In this part of the study, information about Burundian agricultural lands has been presented. Most of the results of this research are focused on the distribution of Burundi's land by regions and types of use. The impacts of the population density on the evolution of agricultural land have been examined.

Land distribution and population pressure

Burundi's geographical and demographic characteristics, exacerbated by climate risks, have exerted strong pressure on rural lands. Most of the country's land is rugged and mountainous, and natural forests cover 10-12 percent of its territory (WFP, 2021). The country has other valuable natural assets such as abundant rainfall, dense river network, freshwater lakes, fertile arable land and fertile swamps. However, Burundi has an extremely high population density (about 470 people per/km²) and is the second most densely populated country in Africa, with rapid population growth (an increase rate of 3.3% per year) (PAM, 2016).

With slow urbanization, 87% of the population still lives in rural areas and is mainly engaged in small-

scale agriculture. The result of this has been significant pressure on forests and agricultural land. The steep slopes were increasingly cultivated without erosion control, and with a significant intermediate fragmentation of small plots, intensive agricultural practices due to the reduction of soil fertility and land degradation gradually increased. The situation of agricultural land use has become precarious and unsustainable. The frequency and intensity of landslides in hilly agricultural areas, which are strengthened by climate disasters such as torrential rains, floods and droughts, have increased. This affects arable land and thus increasing the pressure to exploit the remaining forests into agricultural land (WB, 2018). Burundi's economy is mainly based on subsistence agriculture with a predominantly agricultural population (almost 90% of the total population), it is also characterized by fragmentation of farms and very low productivity. The growth rate of agricultural production over the last decade was 2% and was lower than the population growth rate which was between 2.6% and 3% (WFP, 2016). Figure 1 shows the average land ownership per household in each province of the country, according to research by the FCSVA (Comprehensive food security and vulnerability analysis) (WFP, 2008).

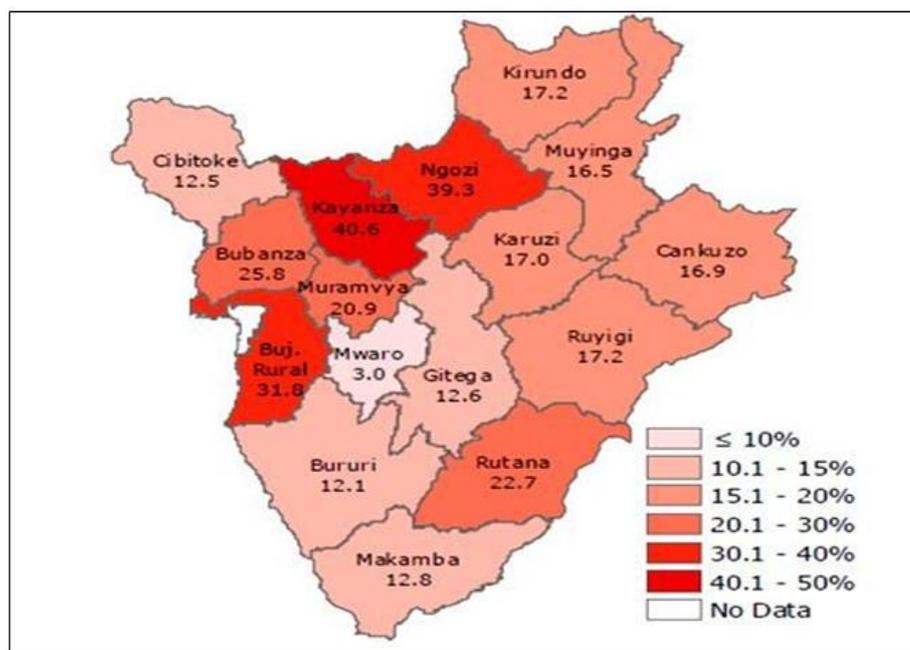


Figure 1: Distribution of households with less than 0.25 ha (hectare) of land by province

Figure 1 illustrates the reports of surveys conducted by the FCSVA in 2008 showing the capacity of households to access land. FCSVA's study revealed that 40.6% of households in Kayanza province have an area of less than 0.25 ha. The provinces of Ngozi and Bujumbura Rural follow with proportions of households of less than 0.25 hectares representing respectively 39.3% and 31.8%. In many provinces of the country, households farming on land smaller than 0.25 ha are

between 15.1% and 20%. The provinces where the rate of access to land is somewhat favorable are those with a particularly low rate of less than 15%, and in Mwaro province, there are large family plots and only 3% of households have an area of less than 0.25 ha (WFP, 2008). Although access to land is widespread, the size of the plots is usually very small. However, strong population growth leads to a continuous decrease in the size of food-producing land. By combining the different

means of access to land (ownership, rental, borrowing), 23.1% of rural people have access to 0.25ha or less of cultivable land. The increase in agricultural production generally remains lower than the rate of population growth. Recent data show that food demand is increasing at an annual rate of 3 to 6%, while agricultural production is predominantly facing a number of constraints related to land scarcity and declining land productivity, which leads to a decrease in per capita food production (Quentin *et al.*, 2008). In Rwanda, the situation of land access uncertainty stimulates members of Domestic Units to be involved in non-agricultural jobs. The average size of land exploited by Domestic Unit in Kimonyi Sector is small (0,25 ha). The land dependency ratio is 4/1 (Mizero, 2022).

Some studies conclude that poverty and food insecurity remain major concerns in Burundi. Moreover, a study on the analysis of household vulnerability revealed that 66% of the population in the northern region of Burundi is poor and 72% of the population is food insecure with a daily food intake of less than 2,100 kcal per person (Niragria, 2009). Based on Quentin's research, the World Food Program estimated that 67% of the national population was poor (Quentin *et al.*, 2008) and 63% faced food insecurity (Baghdad *et al.*, 2008).

General land use

Agricultural systems in Burundi are mainly oriented towards self-sufficiency and involve the combination of several food crops on the same plot. Fallow is rarely noticed. Food crops (excluding cultivated swamps) cover about 1,210,000 ha, which is about 43.5% of the country's total land area, while cash crops represent 104,000 ha, which is 3.7% of the total national area. Cultivated marshes account for about 81,403 ha or 2.9% of the country's total land area (MINATTE, 2008). The forested areas cover 128,375 ha, which is about 4.6% of the national land area. Wood accounts for 97 percent of the fuel used. The rate of deforestation has accelerated over the past 20 years, averaging of 3.2% between 1983 and 1998. Productivity is further weakened by the predominance of less productive breeds. Pastures represent 775,506 ha, which is 27.9% of the total national region (MINATTE, 2008). The decline in livestock has greatly restricted the use of organic fertilizer, the main fertilizer offered to farmers.

Figure 2 has been given for more detailed information on the distribution of Burundian lands according to their usefulness and availability (MAP, 2021 and FAOSTAT, 2022).

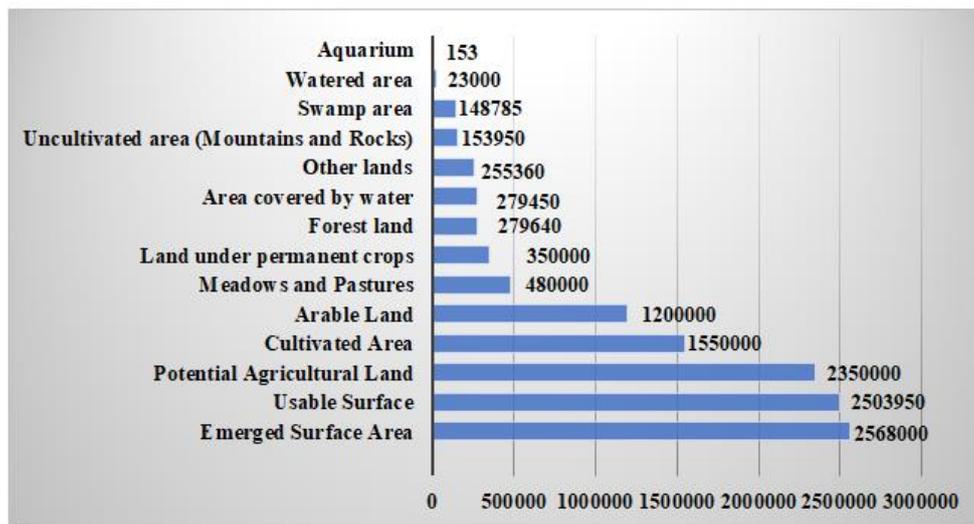


Figure 2: Distribution and land use in 2016 (ha)

Figure 2 represents the territory of Burundi by use. With approximately 2,783,000 ha of land in the country, 2,350,000 ha (80%) is considered as potential agricultural land and 1.2 million ha (46.7%) is arable land. Area of 350,000 ha (17%) are under continuous planting, only 23,000 ha (1%) are irrigated, and 480,000 ha (24%) are permanent meadows and pastures (World Data Atlas 2021). In fact, the area under cultivation is 1,550,000 ha, representing 153,950 ha of non-arable land which cannot be used for agriculture (mountains and rocks) (WFP, 2021). Burundi's forests are heavily exploited for firewood, charcoal and building materials;

they are increasingly being converted to agriculture, because population pressure is competing for scarce resources and covers only 279,640 ha, about 10.9% of the total land. Burundi's forests are heavily exploited for firewood, charcoal and building materials; they are increasingly being converted to agriculture, because population pressure is competing for scarce resources and covers only 279,640 ha, about 10.9% of the total land. The aquarium occupies only 153 ha of the total area of the country (WFP, 2021).

Availability of arable land

At the national level, 94% of households have full or partial access to land, 43% of Burundian agricultural households use land rental in cash and 5% of land rented for remuneration in kind. 48% of land renters represent a large proportion of farmers whose

land is insufficient for plant production (Minaegrie, 2012). Although this combined group is not landless, it does not have enough fertile soil. Table 3 shows the availability of agricultural land of the households interviewed (Minaegrie, 2012).

Table 3: Areas grown by households

Percentage of households (%)	Agricultural area (ha)
21	Less than 0.1
39	0.1-0.25
26	0.25- 0.5
8	0.5- 0.75
5	More than 0.75

Agriculture is dominated by small farms with 86% of households cultivating on plots of less than 0.5 ha. In the table 3, 21% of households use less than 0.1 ha of agricultural land. The results of a survey conducted by MINAEGRIE showed that 10.6% of the plots are exploited by individuals (MINAEGRIE, 2012). According to the same report, only 5% of rural households have a parcel of more than 0.75 ha. Burundi

had many challenges in agriculture due to the country's geography, unsustainable agricultural practices, underdeveloped infrastructure, and poor government and institutional capacity (Collins *et al.*, 2013). These arable lands are topographically distributed on the territory and the Figure 3 shows the location and relative percentage of farmland.

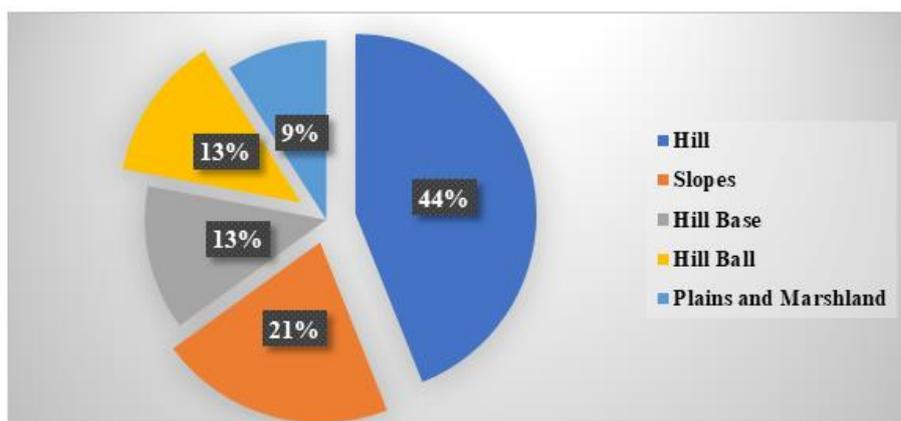


Figure 3: Topography of agricultural land

Burundi's mainly green landscape plays an important role in agriculture. The majority of agricultural activities are carried out on sloping hills at a rate of 44%; 21% of agricultural operations are carried out on hill bases; 13% of agricultural activities are carried out simultaneously on hills and plains while 9% of agricultural land is in swamps (MINAEGRIE, 2012). Due to the rugged terrain of the country, the use of mechanized agriculture is marginal, which leads to lower productivity per manual worker (Collins *et al.*, 2013). Moreover, the agricultural tools are poor and less robust to allow competitive land management at the large scale.

Higher agricultural productivity can make it possible to get out of poverty if the size of production and the income generated are large enough. If the farms are of minimum size even if the yield is large, it would

not meet the growing food demand (Valdés and Foster 2010). Access to land is often considered as a key problem for sustainable livelihoods in Burundi (Pedro, 2011). Scientists consider access to land as an important determinant of food security, vulnerability to risks and disasters, and income potential (Ricker-Gilbert *et al.*, 2014).

Degradation and loss of arable land

Forests cleared for agricultural production represent more than 6.6% of the country's territory (WB, 2018). The steep hills are increasingly cultivated, without erosion control and a significant fragmentation of the land into small plots. Since most agricultural activities take place on steeply sloping hills, the risks of loss of arable land are enormous. Table 4 shows the amounts of arable land lost each year due to erosion.

Table 4: Soil degradation and loss by ecological zone

Ecoregions	Erosion (t/ha/year)	Alan (ha)	Share of total area
Imbo	2.5	194,000	7%
Mumirwa	100	270,000	10%
Congo-Nile Basin	21.5	410,000	15%
Central plateau	18	1,237,000	44%
Northeast Depressions	2.6 - 4	670,000	24%

Table 4 shows that Mumirwa is very vulnerable to erosion, with an average loss of 100 tons of soil per ha per year. Congo-Nile basin also recorded a significant loss of 21.5 tons/ha/year. Despite its flat expansion, Imbo has also been eroded, resulting in a loss of 2.5 tons of soil/ha/year. As a result, an average loss of 145.3 tons of arable land per hectare is recorded in these ecological regions as indicated in table 4 each year (World Bank 2018). Intensive cultivation has led to serious problems of soil erosion and productivity, and therefore limits to the scope of sustainable concentration (Oketch and Polzer 2002).

According to Rwanga *et al.*, (2017), 90% of the population lives in rural areas of Burundi. This has

led to significant pressures on rural natural resources and rural land degradation due to significant fragmentation of rural areas for vital subsistence needs (Niyuhire, 2018).

SWOT analysis of the general situation of agriculture in Burundi

The strengths and weaknesses of Burundian agriculture and the external influences affecting its sustainability were identified. The SWOT analysis was carried out to examine the opportunities and threats that cause the under use of and limited access to agricultural land resources. All these characteristics are mentioned and grouped below in Table 5.

Table 5: SWOT analysis of Burundian agriculture

STRENGTHS		WEAKNESSES	
S1	Good climatic conditions for diversified agricultural production.	W1	Lack of reliable and up-to-date agricultural data.
S2	Low labor costs.	W2	Limited access to agricultural financing.
S3	Strategic location for export to 4 countries via Tanganyika Lake.	W3	Uncertain land system with a growing land shortage population.
S4	Strong comparative advantage in the production of cash products (sugarcane, coffee, tea, dates, cotton, etc.)	W4	Poor rural transport infrastructure.
S5	The presence of 4 different agricultural season.	W5	Poor water management and soil degradation.
S6	The presence of undeveloped marshes	W6	Low economic power.
S7	Agricultural business potential.	W7	Low land productivity.
S8	Water potential.	W8	Low active population.
S9	The presence of the land law of 2011 regulating the agricultural sector.	W9	The weakness of technology in the agricultural sector.
S10	Presence of environmental law, water law, forestry law, mining law, etc. The existence of complementary legal frameworks to land for the promotion and conservation of natural resources.	W10	High rural population and pressure on natural resources.
		W11	More mountainous and hilly lands susceptible to erosion.
		W12	Although translated into the national language, the Land Code is not disseminated and popularized at all levels of the population.
		W13	A very impressive number of cases of land disputes at the court level (about 70% of registered land disputes from the courts of residence).
		W14	Low level of private investment in agriculture and processing of agricultural products (agribusiness, agro-industry).
		W15	Inadequate capacities of the departments responsible for land management (human, technical and material resources).

OPPORTUNITIES		THREATS	
O1	Creation of new techniques to improve the productivity and quality of agricultural products.	T1	Increase in competition from the EAC (East African Community) countries for local agricultural producers and industries.
O2	Low-cost micro fertilization allowing the improvement of land preparation techniques.	T2	Restrictions of harmonization of agricultural products.
O3	Excavation of the land on steep slopes.	T3	Unpredictable weather conditions and the lack of historical data hamper the development potential of agricultural insurance.
O4	Reduce post-harvest losses by transforming the harvest into a marketable food product.	T4	Free entry of products, programs and food aid from donor countries can disrupt internal exchanges.
O5	Development of value chains of cash crops	T5	The 2015 elections created uncertainty about the preservation of peace and stability.
O6	Rapid population growth (increased food demand, labor force)	T6	Great support and financing of the agricultural sector of the other EAC countries.
O7	Possibility of irrigable land and development of marshy land.	T7	Increased urbanization in fertile agricultural areas.
O8	Existence of national and international organizations that support the agricultural sector.	T8	Conflicts caused by the lack of land registration.
O9	Students in foreign countries to develop the agricultural sector.	T9	Congested land for small and medium-sized farmers.
O10	Establishment of common land services throughout the country.	T10	Depletion of natural resources.
O11	Delimitation of public and private lands.	T11	The insufficiency or almost absence of the commitments of agricultural institutions and financial institutions in the granting of loans.
O12	Accessibility of local land services in terms of proximity and also in terms of the cost of a local land document.	T12	Low soil protection at the level of watersheds.
O13	Increase in the level of investment in agriculture due to better land security.	T13	Low selling price of agricultural products in the harvest period.
O14	The possibility of converting the land document into a title deed according to the specified modalities (the provisions of the Land Law Article 410)	T14	Persistence of the land inheritance system favourable to extremely land fragmentation.
		T15	A system of traditional land inheritance discriminating the women and girls that has not been definitively solved.

With this analysis, the table 5 try to synthesize as clearly as possible the strengths, weaknesses, opportunities and threats of the Burundian agricultural land access and use. As a result of the analysis, 10 strengths, 15 weaknesses, 14 opportunities and 15 threats were identified. The strengths and opportunities include the availability of agricultural labor, the rainfall status to take into account the possibility of having a cycle of 2 crops per year with 4 growing seasons, the presence of various ecosystems allows a very diverse agricultural system (food and commercial crops, development of the value chain of animal and fish production), 120,000 ha of marshy area that can be drained, irrigated plains of Imbo and Mosso agro-ecological regions. The presence of a wide network of rivers and the abundant rainfall are such a potential of optimal water supply in the Burundian agricultural systems.

Despite the high potential of Burundian agricultural systems, the agricultural sector has many weaknesses and threats, such as: low soil fertility which limits productivity; low input utilization, land fragmentation; inadequate supervision of the agricultural sector, poor water management, problems of crop processing and conservation and poor agricultural mechanization, inadequate technological innovations; inadequate water resources management techniques for irrigation, inadequate technology for the processing and preservation of agricultural products, and inadequate rural electrification. Demographic pressure, low agricultural credit and insufficient quantity and quality of inputs are the main constraints that make it difficult to access land. In this field, there is also the difficulty of implementing structural reforms and insufficient participation of the private sector in

financing the sector. About agri-food processing, the processing capacity is limited by several factors, in particular; lack of power supply, lack of product certification, technical weaknesses related to processing procedures and low storage capacity.

Despite their higher productivity, most households are limited by the atomicity of the land. Consumption and income appear as increasing functions of the size of the farm. Therefore, it is difficult to appreciate how the inverse relationship between the size of farms and land productivity can

strengthen almost landless households or how livelihoods can be decoupled in small farms in Burundi (Niragira, 2018).

With the results of the SWOT analysis and to determine which strategy to develop to take the best position of an opportunity or a weakness to be transformed in a strong way to prevent and avoid threats and reduce weaknesses, the SOR analysis has been carried out. The scores of each element of the analysis were taken from the results of surveys.

Table 6: SOR analysis of Burundian agriculture

Strengths	Points	Weakness	Points	Opportunities	Points	Threats	Points
S1	86	W1	76	O1	64	T1	63
S2	82	W2	72	O2	58	T2	71
S3	54	W3	90	O3	71	T3	78
S4	46	W4	63	O4	60	T4	53
S5	50	W5	71	O5	70	T5	60
S6	40	W6	45	O6	91	T6	47
S7	36	W7	51	O7	77	T7	59
S8	77	W8	43	O8	77	T8	49
S9	38	W9	62	O9	56	T9	68
S10	30	W10	73	O10	53	T10	90
		W11	78	O11	50	T11	66
		W12	29	O12	33	T12	32
		W13	48	O13	58	T13	84
		W14	74	O14	41	T14	51
		W15	56			T15	48

According to the SOR analysis, diversified agricultural production for good climatic conditions (S1: 86 points), low labor costs (S2: 82 points) and water potential (S8: 77 points) turned out to have great advantages for Burundian agriculture. Indeed, the presence of environmental law, water law, forestry law, mining law, etc. is also essential. Although they are important, the existence of complementary legal frameworks to land for the promotion and protection of natural resources (S10) and the existence of the legal framework established by the Land Law of 2011 (S9) come last. The growing population and the shortage of land, the existence of an uncertain land tenure system (W3), more mountainous and hilly areas (W11) and a lack of reliable and up-to-date agricultural data (W1) are the main weaknesses that plague the agricultural sector.

Logically, in the list of 14 opportunities cited, rapid population growth and an increase in the food demand for labor (O6), the existence of irrigable land and the development of marshes (O7), as well as international organizations supporting the agricultural sector (O8) are the most visible on agricultural land in Burundi. Important opportunities are available to agricultural companies. In this regard, the depletion of natural resources (T10), lack of access to a good price for rural agricultural producers and unpredictable

weather conditions (T13), the lack of historical data jeopardize the development potential of agricultural insurance (T3) these are the threats that hinder the country's agriculture. Based on the SOR analysis, it is ideal to make significant contributions and facilities in the process of determining the management and decision-making strategy to develop the agricultural sector.

It is particularly noteworthy that the government's development policy in Burundi has largely neglected the rural sector, which is the basis of the livelihoods of the majority of the population (Ndikumana, 2001). As a result, this radical change in land use, soil conservation practices and the government's interest in effective land use planning must show that this increases soil erosion and degradation (Vansarochana and Ntakirutimana, 2020). A study conducted in two northern provinces of Burundi revealed an inverse relationship between the size of the farm and land productivity, while showing a strong relationship between the size of the farm and household food security (Verschelde *et al.*, 2013).

In the SOR matrix created with strengths and weaknesses, opportunities and threats, the strategy is determined by taking into account the options with the

highest score in the rating. Table 7 illustrates the ultimate strategies for achieving sustainable agriculture.

Table 7: Strategies for Burundian Agriculture

INTERNAL FACTORS/ EXTERNAL FACTORS	Strengths (S) S1 S2 S8	Weaknesses (W) W3 W11 W1
Opportunities (O) O6 O7 O8	<p>SO Strategies</p> <p>Investing in agriculture to maximize agricultural production in order to meet the growing food needs of the population.</p> <p>Installation of irrigation systems to expand agricultural land and thus fight against the unemployment of the active population.</p> <p>Support and encourage investments in the agricultural industry.</p>	<p>WO Strategies</p> <p>Avoiding the division of land by inheritance, working in cooperatives and putting forward a policy of land consolidation and title deeds.</p> <p>To establish the system for recording and updating agricultural and meteorological databases to minimize agricultural risks.</p>
Threats (T) T10 T13 T3	<p>ST Strategies</p> <p>Awareness and promotion of natural resource management.</p> <p>Promote the dissemination of new agricultural technologies and the harmonization of agricultural products to be competitive on international markets.</p> <p>To regulate market prices taking into account the cost of production of agricultural products.</p>	<p>WT Strategies</p> <p>Stimulate and strengthen the search for non-agricultural sources of income.</p> <p>Direct urbanization plans to non-agricultural land.</p> <p>Development of anti-erosive practices to protect agricultural land.</p> <p>Promotion of agricultural insurance.</p>

Considering that Burundi is a country with agricultural potential, it faces many agricultural weaknesses and threats. However, there are also opportunities and threats that remarkably hinder its development. Table 7 presents different strategies that can lead to a competitive, modern and sustainable agriculture.

CONCLUSION AND PERSPECTIVES

Agricultural policies should strengthen the consolidation of land and prevent the division into very small plots. New irrigation techniques, methods to counteract erosion, the transformation and conservation of crops should be developed. Farmers must be considered and supported by the decision makers. The establishment of agricultural database systems is urgent. The Government and its partners should invest heavily in the agricultural sector and promote the establishment of updated agricultural statistics. It is desirable to create credit banks for farmers with low interest rates. Fundamental changes in agricultural systems and agricultural policy are needed to increase the possibilities of small-scale managed sustainable agriculture and its impact on the country's economy. Moreover, the agricultural sector is considered the backbone of the country's economy and, therefore, its problems require extensive public interventions.

To explain the evolution of Burundian agriculture, it is the Malthusian scheme that is often put forward. Then, the description is very simple: "the demographic explosion", "reduction of cultivable areas" which cause a significant increase in the exploitation of pasture areas and fallow plots to the detriment of the expansion of agriculture. Since agricultural techniques remain unchanged, it is said that the "demographic explosion" will cause a "population / resource imbalance" which will be at the origin of the current and future economic crisis (Hubert, 2020). This interpretation of the recent transformations in Burundian agriculture systems therefore makes the population-land ratio the main variable considered and population growth the source of several constraints of the agricultural sector. A second obstacle to development is also highlighted: the "traditionalist" mentality of farmers has shown their reluctance to the "modern" techniques offered by extension services and a deliberate desire to produce only according to their immediate needs (Hubert, 2020). Our paper has demonstrated that the Malthusian theory is not the best framework to understand the situation of land access and use. The SWOT and SOR framework offer a comprehensive analysis of the Burundian land use system and access. It allows the discussion of different pathways for agricultural land use improvement. However, land access remains a big challenge while

other land types of usage are more competitive in terms of value and strategic investments. Our paper has not developed this aspect of land use conciliation.

Moreover, given the rapid population growth, the small size of farms and the decline in soil fertility, it has become very difficult to ensure household food security. Most households own so little land that even if productivity is high, farming may not be a realistic possibility to earn a living. Farmers are faced with the smallness of their land, insufficient for their agricultural activities. Despite significant productivity in small-scale agriculture, the results raise concerns about the viability of these very small farms in densely populated areas of the country. The ideal would be to implement a policy of consolidation of agricultural land to avoid this challenge. It should be desirable for farmers to strengthen agricultural cooperatives and work together to maximize yields on small plots. The loss of arable land is very common, especially on sloping land, so it leads to the deterioration of land developed for agriculture and the loss of soil fertility, and then leads to a decrease in yield. It should be recommended to install anti-erosive systems on such floors.

Deforested and degraded land should be actively repaired by planting an appropriate vegetation cover to replenish the nutrients lost from the soil and restore the hydrological functions of the soil systems. This will solve the serious shortages of arable land and help facilitate access to agricultural land. It is recommended that the policy in the field of rural development should be rethought to design effective poverty reduction strategies. To implement these strategies, the government should focus its efforts on the following activities: informing and educating all stakeholders on the rational management of natural resources; equipping and training experts in watershed management; support and guide local communities in the mechanization and use of technologies in their farms. Land management will be a priority in national land use planning. It should include the implementation of an occupancy policy with the standards developed by all stakeholders. Awareness-raising programmes should be carried out to encourage village settlements grouped together for the purpose of joint agricultural production.

Finally, the wider adoption of modern agricultural practices also contributes to increasing land productivity, reducing soil erosion and strengthening agricultural sustainability as a whole.

ACKNOWLEDGEMENTS

The author would like to express his gratitude and thanks to all those who voluntarily contributed to making this study possible. My sincere thanks are also addressed to my supervisor and to the professors of the department of agricultural economics of the Faculty of Agronomy of the Selcuk University. To the agricultural

engineers who have given their opinions and their support and to anyone who is at the origin of the accomplishment of this work.

REFERENCES

- ADB. (2022). African Development Bank. "Burundi Economic Outlook." Text. African Development Bank - Building Today, A Better Africa Tomorrow. African Development Bank Group, 2021. https://www.afdb.org/sites/default/files/documents/projects-and-operations/burundi_country_strategy_paper_2019-2023-rev.pdf. Reviewed on 19.03.2022.
- Baghdadli, I., Harborne, B., & Rajadel, T. (2008). Breaking the cycle; A Strategy for conflict-sensitive rural growth in Burundi. World Bank, Washington D.C. <https://documents1.worldbank.org/curated/en/879151468242065807/pdf/446490PUB0ENGL101OFFICIAL0USE0ONLY1.pdf> Reviewed on 02.08.2022.
- Collins, C., Magnani, R., & Ngomirakiza, E. (2013). Usaid office of food for peace food security country framework for Burundi (FY 2014 –FY 2019). Washington, D.C.: FHI 360/Fanta <https://www.fantaproject.org/sites/default/files/resources/FSCF-Burundi-2013-web.pdf> Reviewed on 12.07.2022.
- EGAE. (2014). Evaluation de la mise en œuvre des politiques agricoles nationales: Défis et perspectives de l'avenir, 175p <https://bi.chm-cbd.net/sites/bi/files/2019-10/eta-gen-agri-el-egae-ed-2014.pdf> Reviewed on 05.03.2022.
- FAOSTAT. (2022) and WFP. (2021). WFP critical corporate initiative: Climate response analysis for adaptation Burundi. <https://docs.wfp.org/api/documents/wfp-000138251/download/> Reviewed on 15.11.2022.
- FSIN. (2019). Food security information network. "Global report on food crisis 2019". https://www.fsinplatform.org/sites/default/files/resources/files/GRFC_2019-Full_Report.pdf Reviewed on 22.04.2022
- Grebmer, K., Von, J., Bernstein, M., Wiemers, K., Acheampong, A., Hanano, B., Higgins, R., & Chéilleachair, N. (2020). Global hunger index: One decade to zero hunger - Linking health and sustainable food systems. FILE:///C:/USERS/SEDAT/DOWNLOADS/GHI_2020.PDF Reviewed on 11.06.2022.
- Hubert, C. (2020). Le secteur agricole au Burundi : Enjeu majeur des politiques de développement. Les crises politiques au Burundi et au Rwanda (1993–1994), 1995. FFHAL-02536734f. <https://hal.archives-ouvertes.fr/hal-02536734/document>. Reviewed on 29.8.2022.
- ISTEEBU. (2015). Profil et déterminants de la

- pauvreté: rapport de l'enquête modulaire sur les conditions de vie des ménages 2013 /2014. <http://www.isteebu.bi/index.php/publications/rapport-s-d-enquetes> Reviewed on 07 March 2017.
- Jacquinet, A. (2012). Vulnérabilité : Catégorisation d'une population paysanne en situation d'insécurité alimentaire au Burundi <https://www.louvaincooperation.org/sites/default/files/2018-10/11%20Me%CC%81moire%20-%20Cate%CC%81gorisation%20population%20paysanne%20situation%20insecurite%CC%81%20alimentaire.pdf> Reviewed on 21.09.2022.
 - Jeniček, V., & Grofová, Š. (2016). "Least developed countries - the case of Burundi." *Agricultural economics (Zemědělská ekonomika)* 61(5), 234–247. <https://doi.org/10.17221/48/2014-agricecon> Reviewed on 11.07.2022.
 - Kearney, J. (2010). "Food consumption trends and drivers." *philosophical transactions of the royal society b: Biological sciences*, 365(1554), 2793–2807. <file:///C:/Users/Sedat/Downloads/rstb20100149.pdf> Reviewed on 28.04.2022.
 - Manirakiza, D. (2021). Impact des coopératives agricoles des cultures vivrières sur les conditions de vie des ménages ruraux au Burundi : Cas des coopératives de la province de Ngozi. <https://orbi.uliege.be/bitstream/2268/258396/1/thesee%20manirakiza%20dismas%202021.pdf> Reviewed on 02.04.2022.
 - MINAEGRIE. (2019). Evaluation des récoltes, des approvisionnements alimentaires pour la saison 2018b et de la mise en place de la saison 2018c rapport provisoire (volume 1). <HTTPS://FSCLUSTER.ORG/BURUNDI/DOCUMENT/RAPPORT-DEVALUATION-DES-RECOLTES-DES-2> Reviewed on 11.03.2022.
 - MINAGRIE. (2012). Enquête Nationale Agricole du Burundi 2011–12. Résultats de la saison A. Gouvernement of Burundi. <https://bi.chm-cbd.net/sites/bi/files/2019-10/enq-nat-agri-bi-2011-2012-sais-c.pdf> Reviewed on 02.04.2022.
 - MINATTE. (2008). Ministry of land management, tourism, and environment) national strategy and action plan for biological diversity. <inecn/undpgef,Burundi> https://info.undp.org/docs/pdc/Documents/BDI/00057554_PRODUC%20GESTION%20DURABLE%20DES%20TERRES%20VERSION%20ANGLAISSE.pdf Reviewed on 22.08.2022
 - Minani, B. (2014). Analyse et stratégies du développement de l'agriculture familiale dans un pays post-conflit: cas de la province de Kirundo au nord du Burundi https://orbi.uliege.be/bitstream/2268/169109/1/Minani%20Bonaventure_2014.pdf Reviewed on 10.07.2022.
 - Mizero, M. (2022). Réformes agraires et paysans rwandais, situation et perspectives d'accès au foncier rural. Thèse de Doctorat en Sciences Agronomiques et Ingénierie Biologique, Faculté de Gembloux Agro-Bio Tech, Université de Liège, Belgique. <https://orbi.uliege.be>. Reviewed on 19.01.2023.
 - Ngaruko, F., & Nkurunziza, J. D. (2000). An economic interpretation of conflict in Burundi. *Journal of African Economics*, 9(3), 370-409 https://www.researchgate.net/publication/247576568_An_Economic_Interpretation_of_Conflict_in_Burundi Reviewed on 03.12.2021
 - Niragira, S., Brusselsaers, J., Jeroen, B., Orshoven, J. V., Ndimubandi, J., & D'haese, M. (2018). Farm size and productivity nexus farmers' welfare in Burundi. https://www.gavinpublishers.com/assets/articles_pdf/1526899071article_pdf342148521.pdf Reviewed on 09.09.2022.
 - Niragira, S. (2011). Optimizing land use among small scale farms through agricultural specialization in the north of Burundi. https://libstore.ugent.be/fulltxt/RUG01/001/789/885/RUG01-001789885_2012_0001_AC.pdf Reviewed on 08.07.2022.
 - Niragira, S. (2009). Contribution à l'étude de la vulnérabilité socio-économique des ménages de la province densément peuplée de Ngozi. mémoire, université du Burundi.
 - Niyuhire, M. C. (2018). Integrated soil fertility management for bean-maize based farming systems in Gitega province, Burundi: understanding and enhancing the agronomic and economic benefits of organic and mineral inputs. file:///C:/Users/Sedat/Downloads/Phd_NiyuhireMarieChantal_May31.pdf Reviewed on 06.08.2022
 - Ntakirutimana, A., & Vansarochana, C. (2020). Land use and land cover change detection using and remote sensing technology in developing country: a case study of Gitega district, Burundi. *Agricultural Sci J*, 51, 1(Suppl.), 86-91. [https://www.agi.nu.ac.th/conference/agiscijournal_vol51_no1\(suppl\)/science/oral/OA-17Audace85-91.pdf](https://www.agi.nu.ac.th/conference/agiscijournal_vol51_no1(suppl)/science/oral/OA-17Audace85-91.pdf) Reviewed on 29.08.2022.
 - Oketch, J. S., & Polzer, T. (2002). Conflict and coffee in Burundi in: Lind J Sturman k (eds.), Scarcity and surfeit, the ecology of Africa's conflicts. Institute for security studies south Africa file:///C:/Users/Sedat/Downloads/Recovering_from_conflict_An_analysis_of_food_produ.pdf Reviewed on 04.06.2022.
 - Pedro, P. S. (2011). Investing in agriculture in Burundi: Improving food security and conditions for women farmers. Oxfam, Bujumbura <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/188591/rr-investing-agriculture-burundi-051211-summ-en.pdf?sequence=3> Reviewed on 28.04.2022.
 - PNIA. (2011). Plan National d'Investissement Agricole(2012-2017)

- <https://www.resakss.org/sites/default/files/pdfs/burundi-national-agricultural-investment-plan-2012-50991.pdf>. Reviewed on 12.02.2022.
- Quentin, W., Morris, M., & Dianga, E. (2008). Agricultural recovery: Food security beyond. Munich personal repec archive (MPRA). https://mpra.ub.uni-muenchen.de/15410/1/MPRA_paper_15410.pdf Reviewed on 03.05.22.
 - Rajasekaran, N. (2009). Non-governmental development organizations in India: A SWOT analysis, the ICFAI University journal of managerial economics, 7(2:50-69) <https://ideas.repec.org/a/icf/icfjme/v07y2009i2p50-69.html> Reviewed on 12.11.2021.
 - Valdés, A., & Foster, W. (2010). Reflections on the role of agriculture in 19. pro-poor growth. *World Development*, 38, 1362-1374. <https://www.sciencedirect.com/science/article/abs/pii/S0305750X10001026> Reviewed on 12.06.2022.
 - Vermeire, B., & Gellynck, X. (2009). Strategic orientation training session, Ghent University Faculty of Bioscience, Department of Agriculture Economics, 3. Official meeting of the food cluster <https://biblio.ugent.be/publication/677013>. Reviewed on 11.04.2022.
 - Verschelde, M., D'haese, M., Rayp, G., & Vandamme, E. (2013). Challenging small-scale farming: a non-parametric analysis of the (inverse) relationship between farm productivity and farm size in Burundi. *Journal of Agricultural Economics*, 64, 319-342. <https://onlinelibrary.wiley.com/doi/10.1111/j.1477-9552.2012.00373.x> Reviewed on 30.03.2022.
 - WB. (2018). International development association project appraisal document on a proposed grant in the amount of SDR 20.6 million (US\$30 million) to the republic of Burundi for a Burundi landscape restaurant and resilience project. "https://documents1.worldbank.org/curated/en/946311523671259769/pdf/BURUNDI-PADrev-03232018.pdf" ndi-padrev-03232018.pdf . Reviewed on 05.11.2022.
 - WFP. (2008). Burundi: Comprehensive food security and vulnerability analysis (CFSVA), December 2008. <https://reliefweb.int/report/burundi/burundi-comprehensive-food-security-and-vulnerability-analysis-cfsva-dec-2008> Reviewed on 15.09.2022.
 - WFP. (2016). Analyse de la securite alimentaire d'urgence (EFSA - Emergency Food Security Assessment), March 2016. file:///c:/users/90552/downloads/rapport_efs_a_wfp_versionfinale_24_may_2016.pdf. Reviewed on 11.05.2022.
 - WFP. (2019). "World Food Program Burundi Annual country report 2019". <https://docs.wfp.org/api/documents/WFP-0000113840/download/> Reviewed on 20.05.2022.
 - World Data Atlas. (2018). "Burundi: Arable land as a share of land area, 1960-2020." Knoema, <https://knoema.com/atlas/burundi/topics/land-use/area/arable-land-as-a-share-of-land-area>. Reviewed on 08.07.2022.

Cite This Article: Thierry Keringingo & Zuhul Karakayacı (2023). Agricultural Land Access and Use in Burundi. *East African Scholars J Agri Life Sci*, 6(2), 42-53.
