Platform for Agricultural Risk Management

Burundi

Agricultural risk assessment study in the Burundi maize value chain

Main report

January-July 2024

AFD · Agenzia Italiana per la Cooperazione allo Sviluppo · IFAD Investing in rural people · KFW · AUDA-NEPAD African Union Development Agency


PARM
PLATFORM FOR
AGRICULTURAL RISK
MANAGEMENT

Platform
for Agricultural
Risk Management

Managing risks to improve farmers' livelihoods

Platform
for Agricultural
Risk Management

Burundi

Agricultural risk assessment study in the Burundi maize value chain

Main Report

January-July 2024

Contents

List of Figures

1_ Executive summary

The agricultural risk assessment studies on the Burundi rabbit, maize, and rice value chains were conducted for the Government of Burundi by the Platform for Agricultural Risk Management (PARM) through the Ministry of Environment, Agriculture and Livestock (MINEAGRIE) from January to July 2024. The preliminary results of the study were thoroughly discussed and validated in two workshops held in Bujumbura on 23 and 24 May 2024, with the participation of key stakeholders and oversight and support institutions for the three value chains.

Burundi maize sector

In 2024, maize was one of the two main cereals grown and consumed in Burundi. Production has risen sharply over the past decade, from 125,000 to over 600,000 tons in 2021. In particular, this growth is boosting Burundi's food self-sufficiency and diet diversification, historically dominated by tubers and bananas that contain less qualitative nutritional intake.

Despite the robust growth of the maize sector, it faces several risks.

Main risks identified

An analysis of the risks and the capacity for risk management of the stakeholders in Burundi's maize value chain revealed that the sector is particularly vulnerable to four main risk types:

- **Weather risks**: although Burundi's climate has two to three successive agricultural seasons during which maize can be grown, seasonal drought and excessive rainfall cause frequent and often severe damage. Faced with these risks, producers are already implementing mitigation strategies, but these need to be supported and strengthened to reduce their level of vulnerability which remains very high.
- **Market risks**: as maize production intensifies, the sector's exposure to market risks, both in terms of price volatility and input accessibility, is increasing sharply. To date, public institutions and private schemes for regulating the cereal market have been ineffective, and stakeholders remain highly vulnerable to both intra- and inter-annual price volatility. In addition, the fertilizer market's monopoly makes supplying the national market particularly unstable and risky.
- **Plant health risks**: the frequency and intensity of insect invasions, particularly Lepidoptera, is tending to increase due to the effect of the arrival of new pests (the fall armyworm) and climate change. Although chemical control methods are developing in Burundi, the ability to identify pests and prevention and control methods remains limited. This pressure makes the sector highly vulnerable and is often combined with meteorological risks.
- **Machinery risks**: While the upstream and downstream parts of the sector are becoming increasingly mechanized, the stability of the power grid and, for some items, access to spare parts and experienced mechanics, are leading to more frequent and significant losses. To enable the value chain to grow, it is essential to reduce the risk vulnerability of stakeholders who invest in equipment, particularly for fertilizer production and maize processing.

The figure below demonstrates the risk analysis identified for each of the industry's stakeholders and the entire value chain.

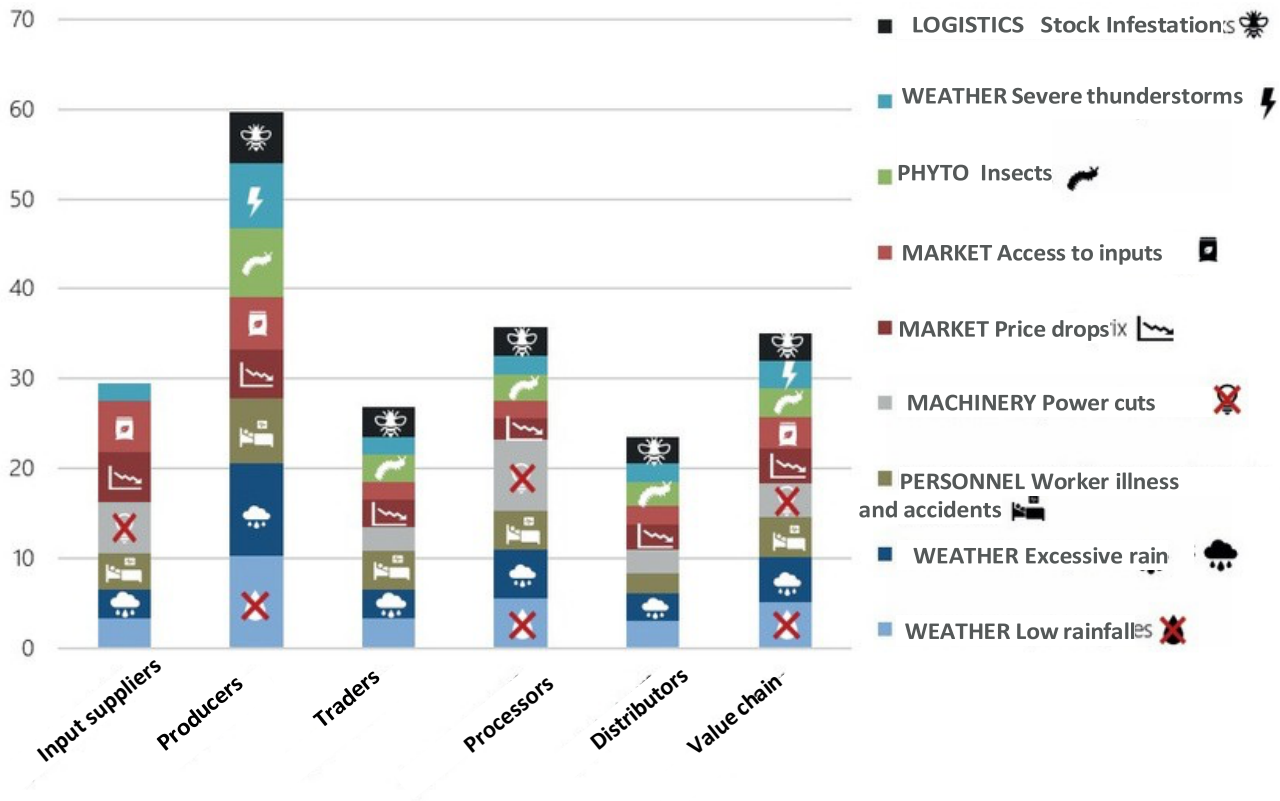


Figure 1: Graphic illustration of the main risks for each stakeholder category

To address these risks, the study recommends the implementation of a risk management programme targeting 6 major activities, as illustrated below.

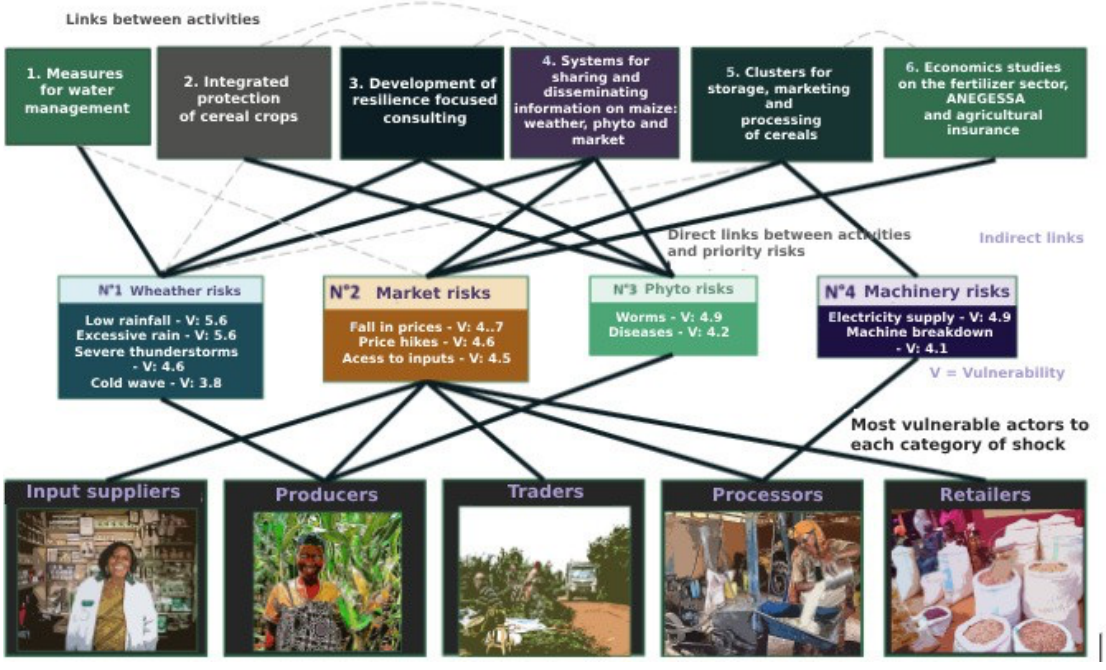


Figure 2: Proposed action to manage priority agricultural risks in Burundi's maize sector

Six proposed actions are presented in the findings of the report:

1. Enhance adaptation to climate risk through improved water management

A holistic approach to improving landscape resilience to rainfall is needed. The objective is to protect the soil and encourage the storage and discharge of excess water, using social and landscape engineering at plot, farming system and watershed level.

2. Promote integrated protection to limit plant health risks

This integrated pest management system will include the following three components:

- Support producers in implementing preventive pest management approaches by influencing crop conditions and maintaining ecosystem regulation capacities.
- Support producers with curative pest management by setting up a network to monitor crop health and providing technical assistance in implementing curative solutions.
- Promote a "landscape approach" to health risk management.

3. Enhance value chain technical advice and support services, focusing on the resilience of farming systems

4. Improve the supply of agricultural, agrometeorological, and commercial information using ICT

5. Promote the Burundi model internationally, while innovating constantly through active monitoring, research, and training

6. Strengthen clusters within the value chain

In addition to the above six main recommendations, there are three further proposals:

7. Conduct a technical and economic study of the fertilizer sector

8. Better define ANAGESSA's intervention methods and draw up a program to strengthen the agency technically and financially, in order to achieve a sustainable policy to regulate market volatility for grains and cereals

9. Analyze the priorities and economic potential of insurance schemes in rural areas

Following this report, a mission to design a program for risk management in the three targeted value chains is expected to propose ways of building, coordinating, implementing and financing these activities.

1_ Background

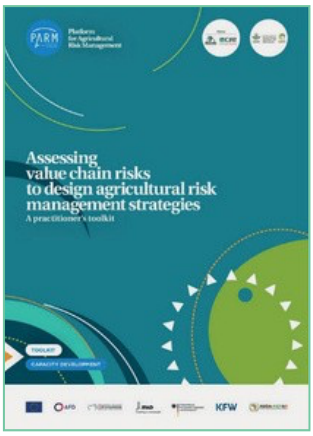
1.1. The Platform for Agricultural Risk Management (PARM)

Launched in 2013, the Platform for Agricultural Risk Management (PARM) aims to make risk management an integral part of agricultural policy and agricultural investment planning. PARM is a G20 initiative, hosted and managed by the International Fund for Agricultural Development (IFAD) and financed by a partnership between the European Commission (EC), the French Development Agency (AFD), the Italian Development Cooperation Agency (AICS), IFAD, and the German Development Bank (KWF). The German Development Bank has supported the partnership between PARM and the African Union Development Agency, formerly known as the New Partnership for Africa's Development (NEPAD) since phase 1 of PARM.

The Platform promotes the application of a rigorous and comprehensive approach to agricultural risk assessment and management in developing countries. It provides factual risk data and tools for agricultural risk management. It also facilitates dialogue between public authorities and stakeholders with a view to:

- Integrate agricultural risk management into agricultural policies and practices;
- Boost investment in agriculture.

1.2. Study objectives



This assessment seeks to ensure the identification, quantification, and prioritization of agricultural risks. In addition, it will lead to the identification of appropriate risk management tools, the conceptualization of a project/programme on Agricultural Risk Management (ARM), and the support of national authorities with the implementation of risk management tools in Burundi.

The assessment uses the PARM methodology outlined in the practical guide: "*Assessing value chain risks to design agricultural risk management strategies"*

1) The **start-up phase** was summarized in an initial report, **targeting the main risks in the three value chains** identified by the government: rice, maize, and rabbits*[1]*.

2) Following this report indicates a **phase of agricultural risk analysis** across the three targeted value chains should lead to the establishment of a risk scoring grid;

3) In parallel, **a study of vulnerability to agricultural risks** will be carried out, listing the agricultural risk management tools, schemes, and skills already implemented and/or planned in Burundi in the targeted agricultural value chains;

4) Following these risk and vulnerability analyses, a risk map will be drawn up to prioritize the most vulnerable risks. This prioritization will then be presented to, discussed, and amended in collaboration with the Burundian government. The next step will involve drawing up an action plan for implementing agricultural risk management tools and policies.

5) The fifth and final step will involve drawing up an action plan for the implementation of agricultural risk management tools and policies in Burundi, covering the three targeted value chains and the risks with the highest vulnerability rates. This action plan will be presented and validated at the workshop.

Details of how to implement this methodology are given in the appendix.

[1] Rice and maize are two commodities that have already been targeted for food and agriculture by COMPACT Burundi - alongside pigs and poultry. This document identifies production score, exportable surplus, potential revenue generation, and job creation targets. Rabbits, on the other hand, are an emerging priority for the Republic's government, and have attracted the attention of MINEAGRIE, which ranks this sector alongside poultry and pork.

1.3. General cxontext of the Burundian economy

Some economic indicators for Burundi
(2022 - World Bank)

Population: 13.2 million
Population density: 489 h/km²
GDP: 3.34 billion current USD
GDP per capita: 259 current USD
Growth 2022 :1.8%
Inflation: 18.8%
HDI rank: 187/191 (UNDP)
GINI index: 38.6
Poverty (USD 2.15 PPP): 70.4%

Burundi is a **low-income country.** According to the World Bank, in 2022 it was the country with the lowest GDP per capita in the world, at USD 259/year (current USD 2022)*[2]*.

Burundi also has second **lowest urbanization rate** on the planet at 14%, has one of the **highest contributions of agriculture to GDP** (28%), and lowest contribution of **international trade** to GDP (28%)*[1]*.

With a **food self-sufficiency rate of over 99%***[3]* in 2020-21, Burundi, and more specifically the Burundian agricultural sector, can be described as barely integrated into international trade, but also hardly dependent on it.

However, this analysis needs to be qualified for several reasons:

1. Burundi was one of the most **densely populated** countries in the pre-industrial world. Its relatively intensive traditional agriculture and dynamic rural economy have always been geared towards a large domestic market. This business model and social structure are difficult to understand using conventional macroeconomic measurement indicators, which mainly account for wealth for businesses (GDP by production), trade (GDP by trade) or household (GDP by consumption). In the context of the Burundian economy, the majority of households and businesses are actually the same business units, and their trade, although intense*[4]*, is difficult to measure because they are widely dispersed, non-official, and partly non-monetary.

2. The ability of Burundian farms to combine a **multitude of crops on a single plot** and, at the same time, to **link different crops together** over a year in a virtually continuous flow of land development makes measuring productivity on the scale of a single crop, and hence the production of agricultural statistics, a **highly complex** task. Engagements with agricultural technicians confirmed this complexity and the tendency for public statistics to only take into account the main crop*[5]* in a crop combination. The same applies to changes in crop rotation that experience an interruption (dry season, bare land), whereas many crop rotations are merged and follow one another without any actual interruption.

3. The Burundian government's capacity to gather information on production, small-scale processing (also very concentrated and intense), and non-official flows seems limited in this respect, as commercial bottlenecks (ports, central markets, border posts, and large factories) focus on a marginal trade share. As a result, public statistics systems have difficulty capturing part of the economic*[6]* activity and it is likely that agricultural, livestock, forestry, and rural crafts production are undervalued in GDP calculations.

1 https://thedocs.worldbank.org/en/doc/b3502c65235d8c72aef5f34d87ed6298-0500062021/related/data-bdi.pdf

2 https://data.worldbank.org/

3 https://www.afdb.org/fr/documents/rapport-danalyse-des-bilans-alimentaires-du-burundi-2020-2021

4 It is worth noting that studies which describe Burundian agriculture as unproductive, or "archaic" appear to be lacking in field data collection and visual and qualitative comparisons with other developing countries, and with the agricultural economy in general

5 The ENAB methodology specifies that, in the case of combinations, a maximum of one main crop and two secondary crops should be taken into account. During our field visits, we noticed up to six mixed crops on the same plot.

6 This is categorically recognized in the informal cross-border trade surveys carried out by the BRB with technical support from ISTEEBU: https://www.brb.bi/sites/default/files/Rapport_enquete_commerce_informel%202018.pdf

In this specific business environment that is built around a densely populated rural environment rather than cities, as in most of the world's economies, the **integration of technological innovations in agriculture** (selected seeds, mineral fertilizers, etc.) and **food processing** (small mills, hulling machines, electric motor presses, etc.) has, in recent years, encouraged **a major acceleration in economic growth.**

This acceleration, based on international trade development, is evident in the evolution of the GDP and marked by significant growth in agriculture and services (notably trade and credit).

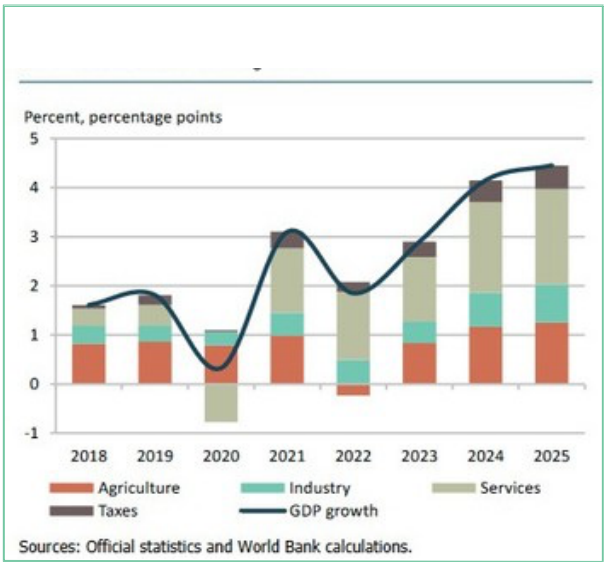


Figure 3: Structure of GDP growth by sector – World Bank Analysis

The **rate of use of mineral fertilizers and improved seeds** has risen sharply in recent years, thanks to input subsidy programs (PNSEB and PNSS) and input distribution provided by various TFPs. The use of mineral fertilizers went from 15.8%*[7]* in 2018 to 38.1%*[8]* in 2020 and will probably be over 50% of farms in 2024*[9]*; the use of improved seeds went from 2.2% in 2018 to 7% in 2020 and will probably be over 20% in 2024. **Organic fertilization**, with crop residues and animal manure is practically universal, with 60% use in 2018, 72% in 2020, and probably over 80% in 2024. The use of **plant health products** is also on the rise, increasing from 7.3% in 2018 to 12.9% in 2020 and probably over 20% in 2024.

In addition, **income diversification** is relatively high. 68.5% of farmers were also breeders (owning at least one type of animal) in 2018 (ENAB).

Moreover, in many rural households, **men sell their labor services** to wealthier farmers and breeders, and work part of the year in transport, green feeding, handling, small-scale processing, construction, livestock breeding, and trading*[10]*, while women mostly engage in unpaid work in the family **fields** *[11]*.

Finally, the **penetration of microfinance and banking in rural areas** is **accelerating rapidly** and has led to remarkable growth in the amount of credit awarded to agriculture in recent years. However, the recent acceleration in agricultural credit and investment levels has been accompanied by a sharp rise in the balance of payments deficit. The major currency crisis affecting the country is one of the main difficulties currently burdening the Burundian economy.

During our assignment, the official EUR-BIF exchange rate was EUR 1 for BIF 3,075, but the black-market exchange rate (used by the majority of

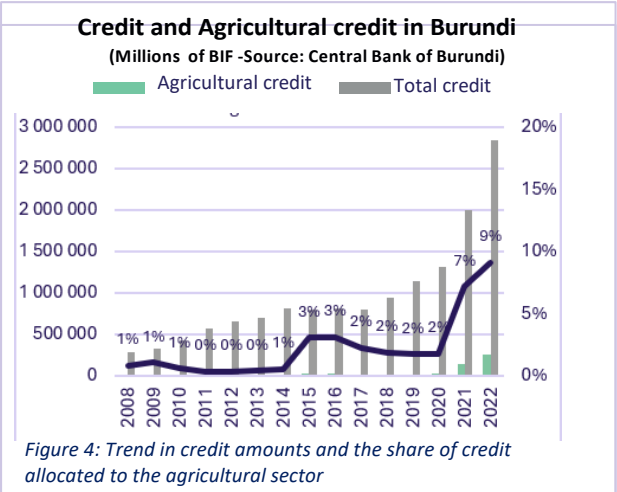


Figure 4: Trend in credit amounts and the share of credit allocated to the agricultural sector

[7] ENAB 2017-2018

[8] https://www.worldbank.org/en/country/burundi/overview

[8] ENAB 2019-2020

[9] Estimate based on our interviews and surveys.

[10] https://www.resilience-burundi.org/wp-content/uploads/2023/01/Brochure-resilience-Diversif-03.pdf et http://www.tropicultura.org/text/v14n1/17.pdf

[11] Burundi Poverty Assessment 2016, World Bank, ENAB data from 2012-2013

financial stakeholders) was EUR 1 for BIF 5,150. This represents **a difference of over 67% on the official exchange rate**. This observation is confirmed by an IFC report*[12]*, which points out that this is one of the strongest macroeconomic constraints for the country's private sector growth and trade.

1.4. Overall context of Burundian agriculture

Due to **differences in agro-climatic gradients** depending on altitude and high rainfall which are a result of its proximity to the Equator, agriculture in Burundi is extremely diversified.

Tubers, bananas (three species), protein crops*[13]*, and cereals dominate the crop rotation but are complemented by a wide variety of fruit and vegetables, trees (fertilizer, energy wood, and food), and the intense use of fodder crops to feed large ruminants herd (with green feeding dominating).

Some agricultural indicators for Burundi

National average rainfall (mm - CHRIPS 81-23):
Min: 972 (2005), **Avg: 1224**, Max: 1499 (2018)
Number of dry season months (<50 mm-CHRIPS 80-23):
Min: 3, **Avg: 4**, Max: 5
Land use (million ha- FAOSTAT 2022):
Agri: 1.6 (58% of the country)
Grassland: 0.5; Forest: 0.3; Other: 0.3
Crop rotation Useful agricultural area (million ha - FAO 2022):
Protein crops: 0.8 (53%)
Tuber crops: 0.4 (26%)
Cereals: 0.3 (20%)

Except for bananas, taro, and eleusine, all food crops have experienced significant growth in recent decades. This reflects changes in consumption habits, with an increase in cereals (maize and rice) at the expense of bananas in particular.

However, two traditional cash crops and export sectors, **coffee and cotton, are recording a structural decline in production** due to low comparative profitability for producers compared with crops destined for local and sub-regional markets. The third traditional export sector, **tea**, is **performing well** and growing steadily, probably as a result of far-reaching liberalization.

Exports of banana beer, the country's flagship product, have experienced major growth in recent years. In this fully liberalized sector, a multitude of small artisan and semi-industrial companies are developing in the national and sub-regional markets.

[12] https://www.ifc.org/content/dam/ifc/doc/mgrt/cpsd-burundi-fr.pdf

[13] In particular, the two bean species Vigna sp and Phaseolus sp.

	1961	1971	1981	1991	2001	2011	2021	1961-2021	2011-2021
Cassava	370	378	451	584	717	509	2732	2362	2223
Bananas	1000	1223	1239	1586	1549	1849	1301	301	-547
Sweet potatoes	380	390	497	681	781	955	1113	733	158
Dried beans	230	285	294	338	249	201	633	403	432
Maize	95	133	146	172	124	128	610	515	482
Other fresh vegetables	102	120	160	220	250	435	*485*	383	50
Potatoes	30	35	36	46	27	28	394	364	366
Rice	3	4	10	40	61	91	259	256	168
Sugar cane	0	5	6	132	124	204	*201*	201	-3
Other fruits	37	53	69	88	85	116	*131*	94	15
Taro	95	98	100	132	85	58	52	-43	-6
Palm kernel	6	12	12	15	10	70	*89*	83	19
Tea (leaf)	0	0	2	23	44	41	*50*	50	10
Sorghum	20	20	53	65	69	87	42	22	-45
Soybeans	1	1	1	1	1	3	18	18	16
Coffee, green	14	25	44	34	71	42	*17*	3	-25
Dry peas	29	31	30	37	33	31	*13*	-16	-19
Millet	8	9	11	13	10	10	*11*	3	1
Wheat	4	5	7	9	9	10	9	5	-1
Eleusine	0	0	0	0	11	11	6	6	-5
Pigeon pea, dry	2	2	2	3	2	6	3	1	-3
Cotton seed	9	9	7	7	3	3	*2*	-8	-1
Yams	6	6	6	8	10	10	1	-5	-9
Raw tobacco	1	1	3	4	1	1	*1*	1	0

Figure 5: Evolution of Burundi's main agricultural production (thousands of tons) from 1961 to 2021 (sources: FAOSTAT and INSBU)

The rainfall distribution over 8 to 10 months, depending on the production zone, enables most farms to link **at least two cropping cycles,** which they supplement with small-scale off-season crops in the lowlands and along watercourses during the dry season.

For simplification purposes, the Ministry of the Environment, Agriculture, and Livestock (MINEAGRIE) considers three agricultural seasons per year:

- **Season A**: from September (or exceptionally early October in the event of late rains) to late January or early February, depending on the length of the crop cycle.

- **Season B**: from the peak of the rainy season, in February or early March at the latest, to early June or even late June, depending on the length of the crop cycles.

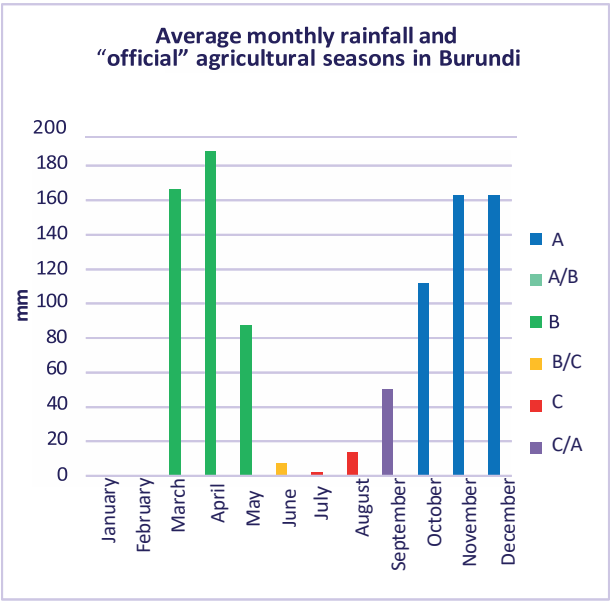


Figure 6: Average rainfall distribution, monthly average 1981-2023 (Source: CRIPS)

- **Season C**: off-season from mid-June to early July, ending in September. This season only takes place in irrigated areas (due to gravity or manual water transportation) and therefore generally accounts for smaller average areas per farm.

In practice, **many crops are combined and linked together according to much more complex calendars** and adapted to the work capacity, exposure, and slope of the farms.

Some crops, such as bananas, cassava, and palm oil, are harvested almost year-round. In irrigated rice-growing areas, many producers stagger their cropping cycles, with harvests spread over more than 4 months a year.

Overall, **food availability and the sale of agricultural surpluses are subject to moderate seasonality** and are less significant than in countries with long dry seasons and more homogeneous topography.

The "**lean season**", i.e. the period of the year during which food availability is on average more limited, while agricultural work (and therefore farmers' energy requirements) is intense, is between **November and mid-February**, before the start of season A harvests.

As can be seen below (Figure 8), Burundi's agrarian trajectory is tending towards an increase in agricultural areas, to the detriment of pasture land (and lowland wetlands). The Burundian government's decision **to ban free grazing*[14]*** in 2018 (implementation has been postponed until October 2021) is causing a sharp acceleration in this trend, with **animals virtually disappearing from the landscape**.

After declining sharply in the 1980s, 1990s, and 2000s, woodlands have increased nationwide since 2010, mainly due to the growth of artificial woodland in agroforestry*[15]*. Over the past 10 years, significant demand for wood for construction and energy has generated renewed interest in small-scale forestry (wooded areas of only a few acres), and especially in agroforestry*[16]*. This is in spite of the country having a long history of deforestation.

Agroforestry plays a strategic agronomic role in soil stabilization, vertical fertility enhancement, and fodder production (particularly in Grevillea*[17]*) in most cropping systems.

[14] https://mineagrie.gov.bi/mineagrie/uploads/decret_loi/64ab5cd6b293dtmp

[15] https://www.cbd.int/doc/world/bi/bi-nbsap-v2-p1-fr.pdf

[16] https://hal.science/hal-03425303/document

[17] https://www.agter.org/bdf/fr/corpus_chemin/fiche-chemin-235.html

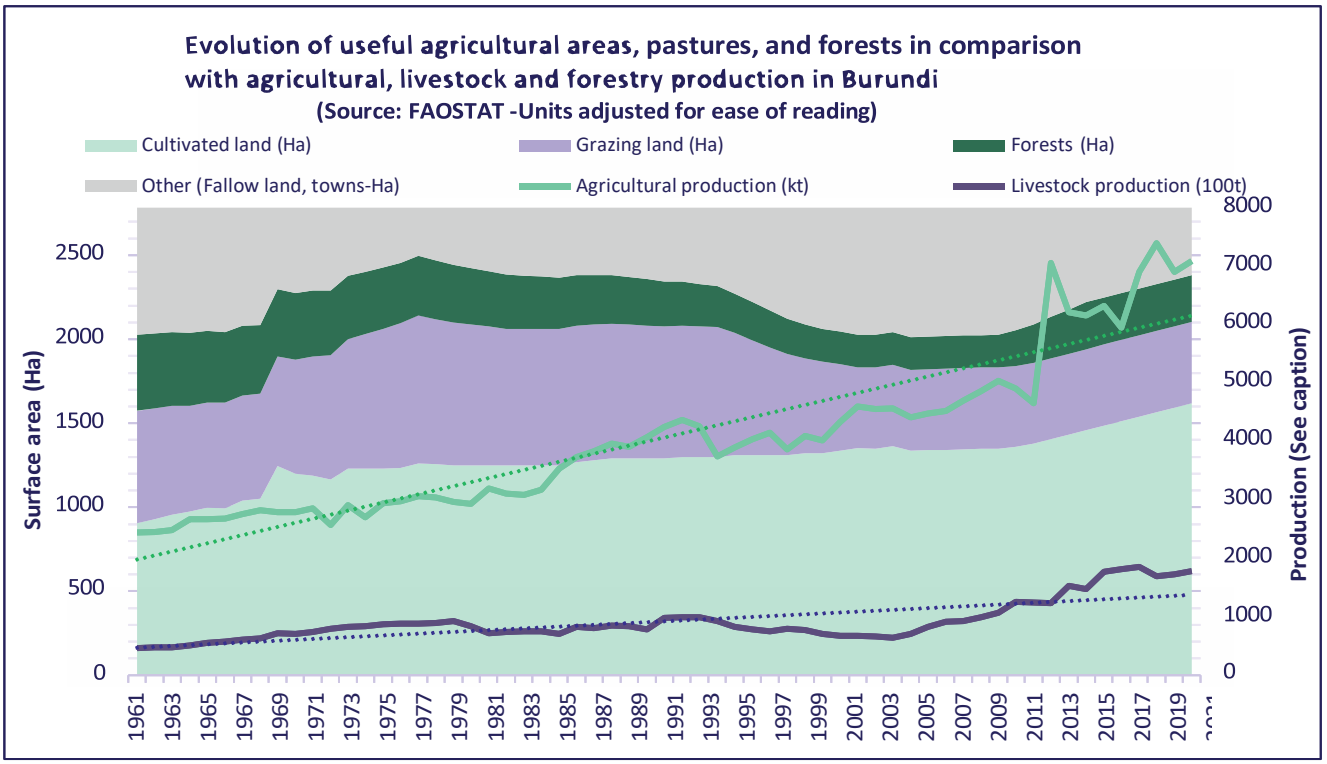


Figure 7: Evolution of the main land uses and crop and livestock production

It is evident that plant and animal production is growing faster than land area, and despite historically labor-intensive and highly fragmented agriculture, Burundi continues to experience a steady and rapid acceleration in both agricultural and zootechnical **farming**. According to FAOSTAT, the average yield per hectare for all crops combined, rose from 2.7 to 4.4 tons of agricultural production per hectare between 1961 and 2022, livestock production from 65 kg/ha/year to 368 kg/ha/year over the same period.

The three sectors targeted by the Burundian government for the study of agricultural risks symbolize this intensification of Burundian agriculture.

The maize sector is likely to record the largest yield growth in recent years (2020-2024) due to the rapid increase in the use of improved seeds (especially hybrids) and related mineral and organic fertilizers. Although recent production estimates are not available, the latest data from the Burundi National Agricultural Survey (ENAB) indicate that production has more than doubled between 2019 and 2021, from 270,000 to 610,000 tons.

The rice sector has recorded the largest growth in acreage thanks to the construction of major hydro-agricultural schemes in the "marais" (inter-collinear lowlands) and the Imbo plain. These developments are the result of several major rural development programs, in particular those financed by IFAD, which have enabled the development of 16,714 ha*[18]* of marshland in irrigated zones, out of the national potential of 123,317 ha*[19]* identified by MINEAGRIE.

The rabbit sector, identified as a strategic sector by the country's Presidency in 2023, symbolizes the spread and intensification of small-scale livestock farming in rural areas. The financial value of manure is almost as high as that of meat, and certain biomasses are being transformed into concentrated organic inputs that are better suited to the precision manual farming practiced by farms.

[18] https://www.ifad.org/documents/38714182/43045086/burundi_workshop_report.pdf/a653456e-2150-ef43-6d66-0543a527e807
[19] https://www.atlasdesmarais-bdi.org/bur/doc/marais/Atlas_v1_251017.pdf

2_ The maize value chain in Burundi

2.1. Some facts about maize

Maize, a tropical cereal native to Central America, **was the top global crop in 2023**, overtaking rice and wheat, with production estimated to be **1.15 billion tons** for the 2022-23 season, according to the USDA. The C4 photosynthesis of maize makes it particularly efficient at producing biomass per unit area, which explains its growing popularity for seed and fodder purposes worldwide.

The genetics of maize are well known*[20]*, and **varietal selection, particularly by hybridization**, has led to **exceptionally high yields**, often exceeding 10 tons per hectare in Europe and North America, and reaching up to 30 tons per hectare under optimal conditions.

Maize production cycles vary according to variety and range from 90 to 140 days after germination. Sensitive to low temperatures (below 10 °C), it tolerates heat well up to 40 °C, with an optimum temperature of around 25 °C during its growth cycle, which is close to the average temperatures experienced in most of Burundi. During its cycle, maize requires a minimum rainfall of 600 mm and high-water availability during the three weeks of flowering. Maize can tolerate heavy rainfall in excess of 1,000 mm provided the soil is well drained, as excess water can suffocate it, particularly during germination and emergence*[21]*.

Soil quality is crucial, as maize is sensitive to acidity, salinity, and nutrient deficiencies, especially nitrogen. As maize responds well to fertilizers, it is recommended to grow it in soil rich in organic matter, preferably in rotation with other crops. The differentiation between tropical and temperate varieties is significant, with Burundi prioritizing tropical varieties in the majority of the agro-climatic conditions. However, in certain high-altitude areas with temperate climates, temperate varieties may be more suitable.

2.2. Maize within the East African States

Maize production in the East African Community (EAC) is growing steadily. Between 1990 and 2010 it doubled, from 7 to 14 million tons on average, and has continued to increase in recent years, reaching **almost 20 million tons in 2021**. **Tanzania** is the biggest producer, with 6 to 7 million tons a year, followed by **Kenya** and **Uganda**, which each produce between 3 and 4 million tons annually.

[20] Maize is the first plant whose genome has been entirely sequenced by research: https://www.larecherche.fr/le-g%C3%A9nome-du-ma%C3%AFs-s%C3%A9quenc%C3%A9

[21] Symptoms of asphyxiation in young maize plants: https://fiches.arvalis-infos.fr/fiche_accident/fiches_accidents.php?mode=fa&type_cul=3&type_acc=5&id_acc=153

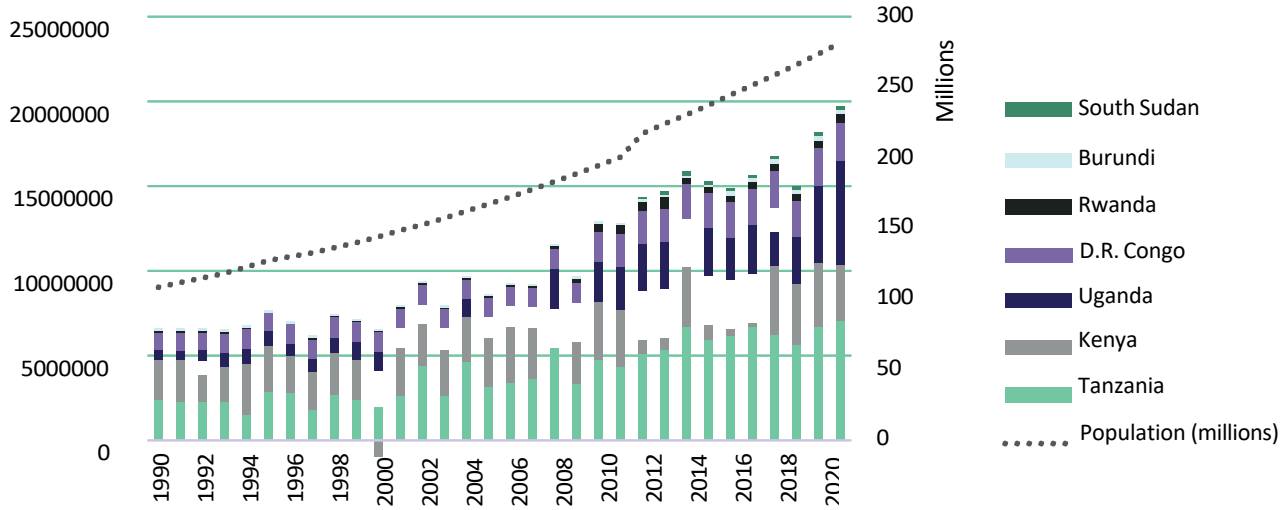


Figure 8: Maize production (tons) and population trends in the CAE sub-region (source: FAOSTAT)

The increase in production is usually aligned with population growth in these countries. Maize is part of the staple diet (103 kg/year/capita in Kenya, 90 kg in Tanzania, 34 kg in Burundi). In recent years, Tanzania has played a key role in the availability of maize in the sub-region, particularly for Kenya: its maize exports have risen from an average of around 80,000 t/year between 2012 and 2018 to 736,820 t in 2022, 90% of which is destined for Kenya - replacing Uganda, whose exports have fallen drastically over the same period (from 472,212 t in 2018 to 51,208 t in 2022)*[22]*. Therefore, **Tanzania influences prices in the sub-region** (cf. Maize prices in Burundi, p.19). It should be noted that demand in the sub-region is also supported by the growing use of maize in animal feed*[23]*.

2.3. Maize in Burundi

2.3.1. Production and imports

Annual production is rising sharply and should exceed 600,000 tons*[24]* in 2020-21. There are virtually no exports and maize imports from neighboring countries appear to be limited: an average of 18,000 tons per year, according to official statistics*[25]*, with a downward trend (2,391 tons in 2021 vs. 22,668 tons in 2019). In addition to formal imports, a 2018 study by the Central Bank of Burundi estimates that informal imports, from Tanzania, amounted to BIF 3,936 million, or around 6,000 tons based on the average price for the year. Imports of maize flour, mainly from Uganda, reached 8,000 tons in 2018, but have been declining ever since. Most of the neighboring countries produce surplus maize, and only the Democratic Republic of Congo has a potential demand for it.

Therefore, it is estimated that the increase in national production (+204,000 tons between 2020 and 2021) has enabled a reduction in imports of grain and flour maize of around 15,000 to 20,000 tons and that the remainder of the production growth has been absorbed by an increase in human and animal consumption. Between March 2021 and March 2022, the Burundian government banned all maize (grain or flour) imports, based on the presence of mycotoxins in imported foodstuffs*[26]*.

[22] Source : UN Comtrade

[23] https://www.mordorintelligence.com/fr/industry-reports/african-maize-market

[24] https://burundi.opendataforafrica.org/hekpjo/agriculture-et-utlisation-des-terres

[25] Source : UN Comtrade

[26] https://burundi-eco.com/quand-le-gouvernement-simmisce-dans-la-fixation-des-prix/

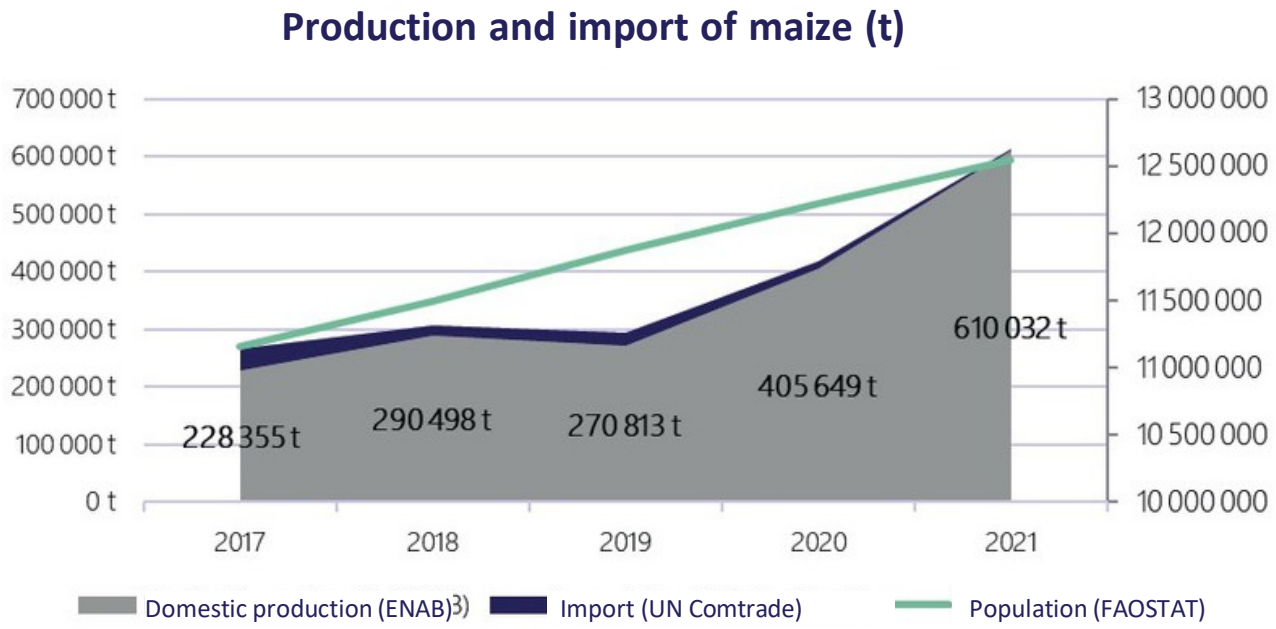


Figure 9: National maize production and imports, by volume (tons) (sources: ENAB and UN Comtrade)

Official production data, once amended to account for variations in stocks carried out by the institutions in charge of food security*[27]*, give an **available annual portion of 65 kg of cereals per capita, of which 34 kg is maize (52%)**. Maize is therefore the most widely consumed cereal, although tubers remain the population's primary energy source (39% of caloric intake). Increased production of maize (and also rice) has enabled the country to move from a **food self-sufficiency rate for cereals of 77.4% in 2020 to 114% in 2021*[28]***.

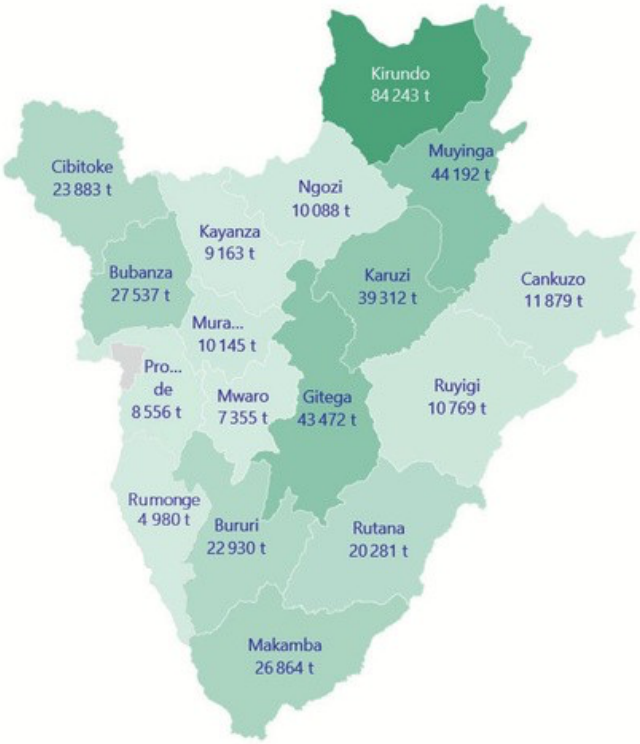


Figure 10: Annual maize production by province, 2019-20 season (source: ENAB)

[27] ANAGESSA, WFP.

[28] Source: INSBU (2023), Burundi Food Balance Analysis Report 2020-21

Maize is grown throughout Burundi, and its place in crop rotation is increasing in all provinces. However, the largest areas are concentrated in the mid-plateau hills at an average altitude of between 1,350 and 1,800 m, notably in the provinces of Kirundo, Muyinga, Karuzi, and Gitega, which are very densely populated rural areas.

2.3.2. Maize prices in Burundi

In addition to **seasonal variations in supply**, maize (grain) price trends are influenced not only by **local demand** (where the majority of flows take place) and national demand but also by **fluctuations on a sub-regional scale** (demand from neighboring countries) and **internationally** (changes in world prices and the exchange rate of the Burundian franc). Inflation impacts the price, particularly transport costs, which in turn fuels foodstuff inflation.

Monthly price trends in the Burundian retail markets reveal a regular seasonal pattern, albeit of varying amplitude. Seasonality is evident between:

- A period of low prices starting with the season A harvest (January-February) and lasting until the season B harvest (June-July);
- This is followed by a spell of rising prices, usually peaking in November and December (or even January in years of late planting).

However, this "typical" seasonality fluctuates considerably from one year to the next, mainly due to the later or later start of harvesting in season A (see Appendix 3).

Since 2014, the **shortage of Burundian currency** has led to an ever-widening decorrelation between the BIF's formal exchange rate and that within the informal economy. Since 2022, the unofficial BIF/USD exchange rate has on average been 64% higher than the official one.

From June 2022 onwards, the retail price of maize soared reaching BIF 2,000/kg on several occasions, forcing the National Food Security Stock Management Agency (ANAGESSA) to open its stocks at the end of November 2022 in an attempt to stem the surge*[29]*. This increase is linked to **the rise in international maize prices**, coupled with growth in fuel and sea freight prices, which has led to high inflation throughout the sub-region. By comparing the local price of maize in USD with the unofficial exchange rate in Figure 12 below it is evident that the latter follows the price curve of (wholesale) maize in Tanzania. Since the beginning of 2024, there has been another downward trend after season A's harvest, reaching BIF 1,581/kg in February 2024*[30]*.

[29] https://burundi-eco.com/ANAGESSA-le-prix-du-mais-grain-toujours-en-hausse/

[30] Source : FPMA

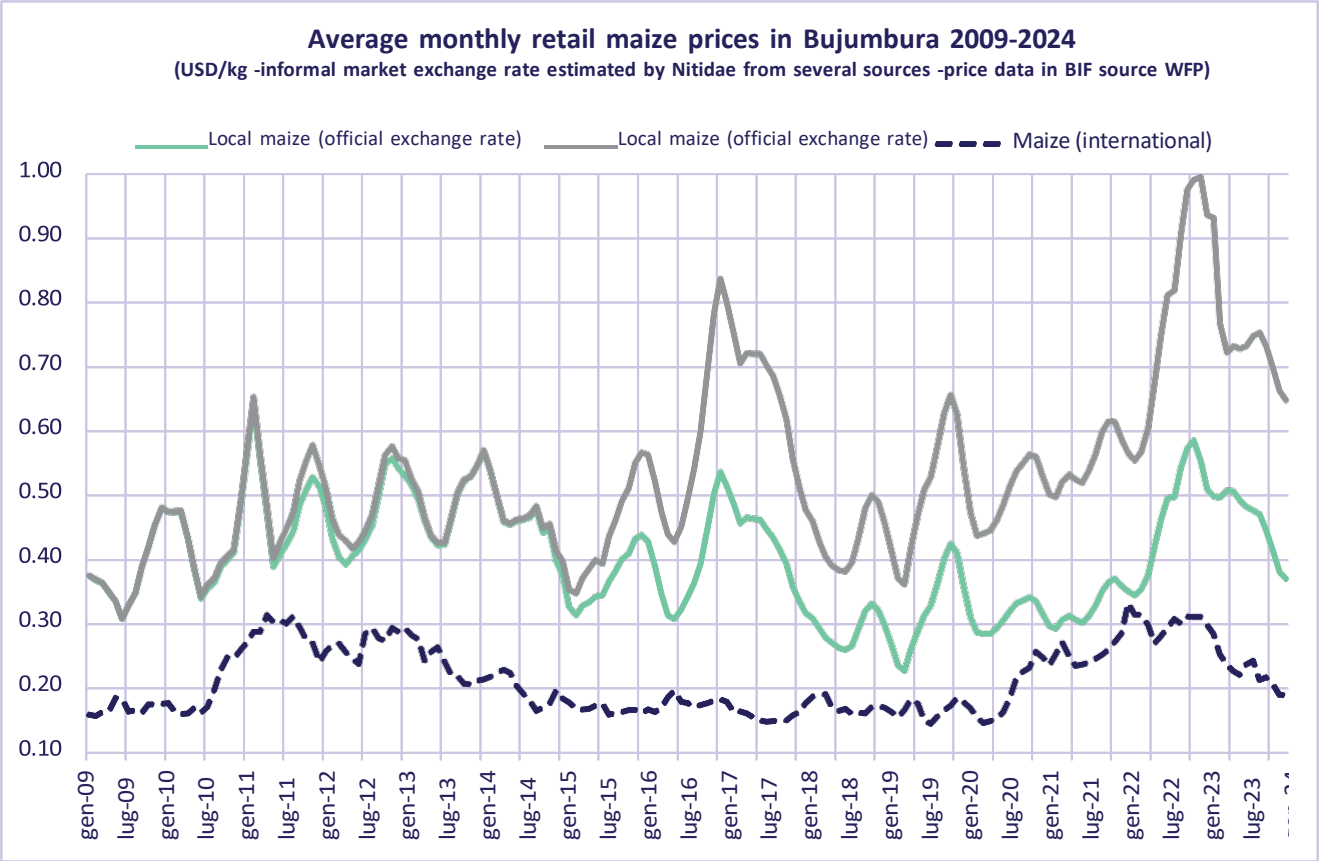


Figure 11: Evolution of maize prices (USD/kg) in Burundi (Bujumbura retail), and on the international market (FOB Argentina)

For the current 2024 harvest, **the government has set ANAGESSA's purchase price for producers at BIF 1,700/kg**, vs. BIF 680/kg in 2021, i.e. a 2.5-fold increase in three years*[31]*, based initially

- on production costs estimated at BIF 1,553/kg (vs. BIF 550/kg in 2021), with the government intending to enable producers to buy inputs such as improved seeds and fertilizers,
- and, secondly, on the expectation of a stable retail maize price of around BIF 2,000/kg*[32]*.

During this study, however, ANAGESSA had not yet started buying at this price of BIF 1,700/kg, and prices in rural areas were fluctuating between 900 and BIF 1,200/kg (0.18 and USD 0.24/kg at the unofficial exchange rate).

2.4. The links in Burundi's value chain

2.4.1. Supply of inputs

The use of conventional inputs in Burundi (hybrid seeds, mineral fertilizers, plant health treatments) has grown remarkably over the last decade. The maize sector probably accounts for the largest share of this growth and is developing rapidly, even though many maize producers complain of difficulties in accessing inputs:

- The use of hybrid seeds (21 hybrid varieties were approved by ONCCS in 2020, for a total of 29 approved varieties);

[31] https://burundi-eco.com/quand-le-gouvernement-simmisce-dans-la-fixation-des-prix/

[32] FEWS NET. Burundi Food Security Outlook February - September 2024: Average harvests in seasons A and B increase food access until September 2024, 2024.

- Use of mineral fertilizers: fertilizer imports have risen from 5,000 to 50,000 tons a year between 2012 and 2022.

Growth in the use of plant health products is much more controlled.

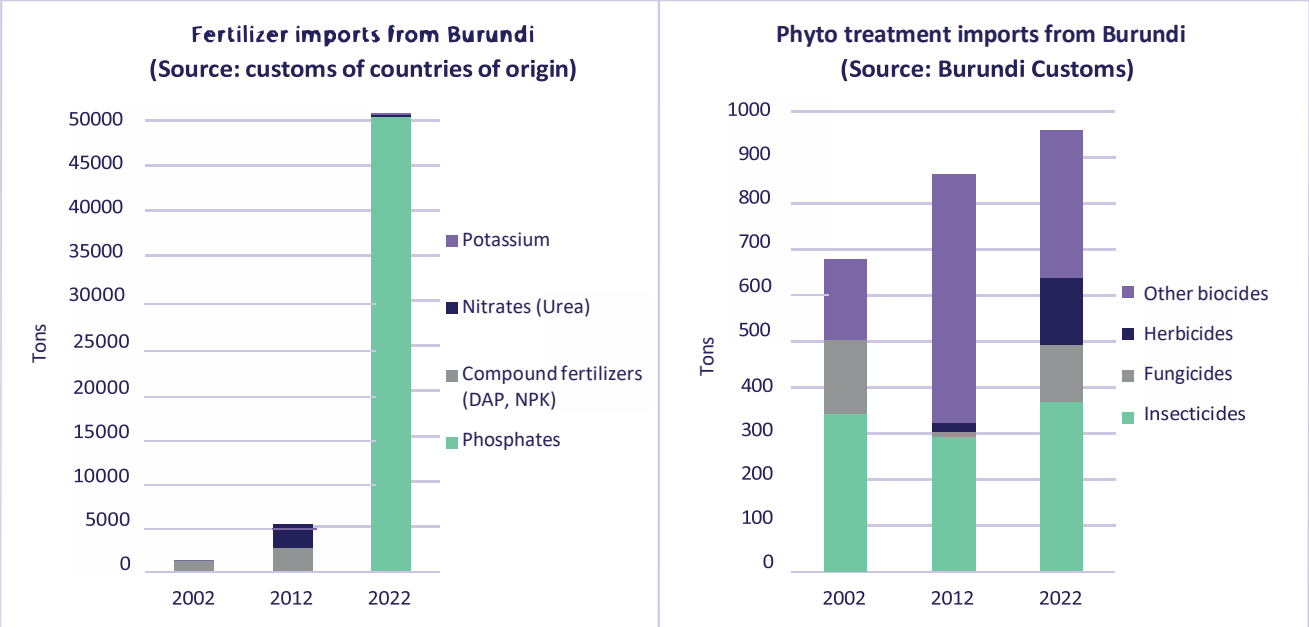


Figure 12: Burundi's fertilizer and pesticide imports

Although there have been efforts towards certification of seeds in the recent years, there are few improved seed producers in Burundi, and all hybrid seeds are imported.

The supply of inputs to producers is handled by a wide variety of small and medium-sized sellers who tour the weekly rural markets or run stores in the towns. These sellers are not specialized and rarely have the skills and knowledge to advise farmers.

In addition to the hundreds of independent retailers, the American NGO One Acre Fund, through its Burundian subsidiary Tubura opened in 2012, is developing a huge local sales network in seven provinces*[33]* that supplies inputs on credit to over 290,000 households. Last season, Tubura distributed 300 tons of improved seeds and 10,000 tons of organo-mineral fertilizers*[34]*. It is currently the largest distribution network for agricultural inputs and small equipment in Burundi. Other initiatives, such as Auxfin, are following suit.

While the distribution of inputs is relatively liberalized, the **supply of mineral fertilizers** to these sellers is highly **regulated by the State**. Through various programmes*[35]* and projects*[36]*, a pre-order system (vouchers), and a monopoly on fertilizer imports granted to the formulation and packaging company FOMI since 2019, the State oversees and subsidizes the supply of mineral fertilizers country-wide.

[33] Muramvya, Gitega, Ngozi, Kayanza, Mwaro, Muyinga and Bujumbura Rural, more than 291,000 households served in 615 hillsides during season A 2023-2024.

[34] Source: interview with FOMI.

[35] These include the National Fertilizer Subsidy Program in Burundi (PNSEB) and the National Seed Subsidy Program (PNSS).

[36] In particular Agricultural Productivity Support Project in Burundi (PAPAB) 2015-2020 and the Support project for responsible and integrated soil management (PAGRIS) 2020-2024.

With **the FOMI plant** facing numerous risks (energy supply, lack of foreign currency to import mineral elements, machine breakdowns, etc.), **it is struggling to meet the needs expressed** throughout the country. A project for a second fertilizer plant has been announced for 2023*[37]* but construction has not yet begun. Producers also complain about the lack of formulations customized for the different commodities and pedoclimatic conditions.

A description of the use of inputs in the maize industry provides more details on this - see *Appendix 5*.

2.4.2. Maize production

Burundian farms are defined by **very small cultivated areas: 0.6 hectares on average**. Most grow maize in season A, on an average of 0.2 hectares, with significant disparities from one province to another (see Appendix 6).

However, this average does not reflect **the heterogeneity of farm sizes** that can exist within the same hillside. Our surveys of 254 maize producers in Burundi's 17 provinces in March 2024 confirm this heterogeneity, with **20% of respondents harvesting less than 150 kg of maize per season, but 20% harvesting more than 700 kg/season**.

With an average of five members per household and average production in 2020-21 of 330 kg per year per household, the majority of maize production is still **for self-consumption**. However, our surveys show that even farms harvesting less than 300 kg sell surpluses of a few dozen kilograms. Within the sample, **62% of farms sold surpluses**, with an average surplus of 100 kg/season giving an average production of 300 kg/season, i.e., a **share of self-consumption of around 2/3***[38]*. These data differ markedly from those collected by the WFP, which indicate a higher share of self-consumption, with 83.5% of producers consuming their entire production*[39]*.

However, these maize farms are extremely diversified, **growing an average of six other crops** in association or rotation with maize, including beans, sweet potatoes, cassava, and bananas.

[37] https://burundi-eco.com/bientot-une-deuxieme-usine-de-fabrication-des-engrais/

[38] Surveys by BIZOZA & AI (2022) estimate the self-consumption share to be 45%.

[39] https://fscluster.org/sites/default/files/documents/cfsva_2023_burundi_rapport_final_version_francaise.pdf page 66.

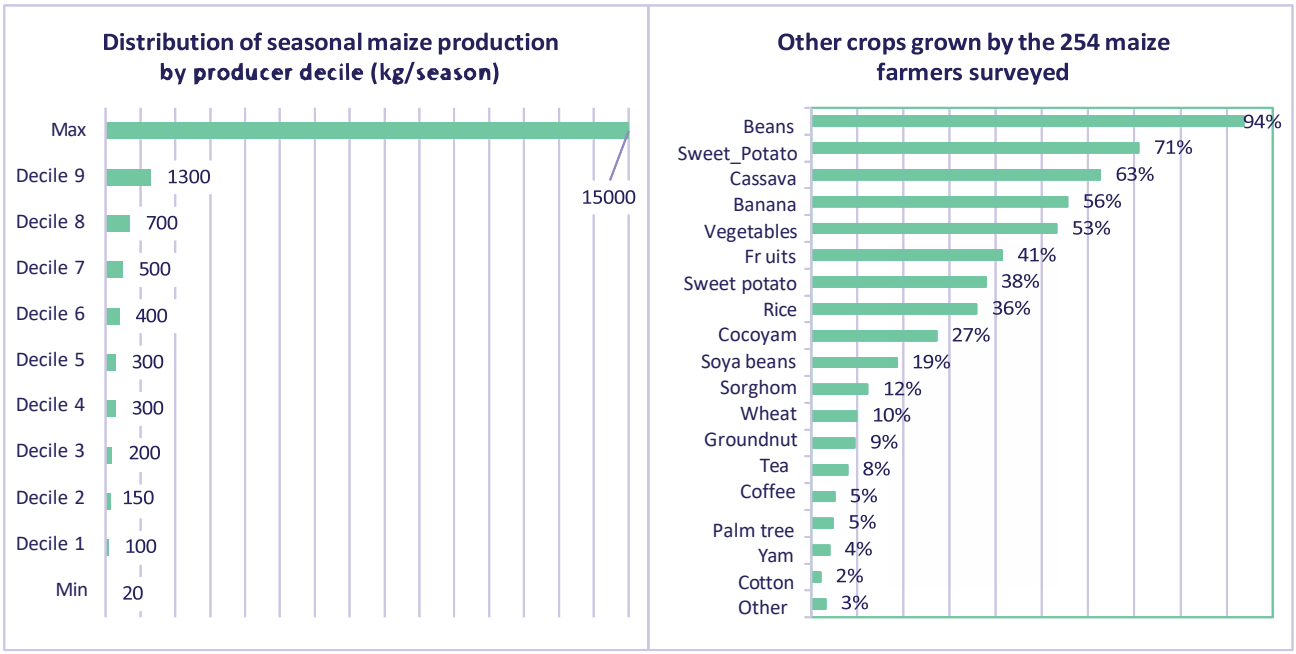


Figure 13: Maize production and other crops grown by 254 maize farmers surveyed as part of the study.

Burundian farming households are therefore predominantly producing **food crops** for **self- consumption**, with surplus sales being minor but widespread.

Current government policies tend to question this diversified, agro-ecologically intensive cropping system on very small plots of land - whether through the regionalization of crops or the promotion of "regional centers" (land pooling), monoculture (maize without an association with beans, in particular) - is promoted as a model aimed at increasing main crop yields.

It is also important to note that the traditional division of labor in rural Burundi means that the **majority of family plots are cultivated by women**. In many rural households, men are involved in other activities (transport, construction, charcoal-burning, livestock breeding, etc.), while women take on the bulk of unpaid agricultural tasks. Despite the predominance of women in agriculture, including maize cultivation, traditional Burundian land tenure law rarely gives them land rights*[40]*, and it is unusual for them to make investments or harvest income decisions. The unpaid nature of rural work performed by women on behalf of the family, and the likelihood of not having access to the income generated by this work, all run the risk of gender-based economic violence.

Finally, it should be noted that **producer organizations (cooperatives)** in Burundi, often organized by township, play a **very limited role in the maize sector**. Their highly institutional organization (they are often linked to local communal authorities) and their history of development brokerage (negotiation and obtaining subsidies from the government and/or NGOs and TFPS)*[41]* limit their involvement in a sector that is particularly fluid (many buyers available all year round) and in which their added value is very low.

2.4.3. Maize trade and distribution

Unlike other, more structured national commodity chains, where there is a marked separation between aggregators (who collect surpluses from production areas), wholesalers (who manage transport from surplus areas to factories and consumption centers), semi-wholesalers (who receive and stock loads at

[40] https://www.fao.org/3/ak159f/ak159f14.pdf and testimonials: : https://www.capad.info/spip.php?article240

[41] https://eujournal.org/index.php/esj/article/view/17027

major consumption centers) and retailers (who sell to consumers in grams or kilograms), the highly decentralized structure of Burundi's **trade patterns** limits specialization, and at township level, many traders are simultaneously aggregators, semi-wholesalers, and retailers. Some of these traders, mainly in Gitega and Bujumbura, are also importers (when local production is slow) and wholesalers (chartering trucks from other regions).

Our field surveys demonstrate that grain trading and distribution is the prerogative of both men and women.

Maize farmers sell their surpluses at the approximately **300 weekly markets** in the country's 119 townships, usually **carrying their bags of maize on foot or by bicycle**, or more rarely by public transport*[42]*. Some producers act **as aggregators** on their hillside or in their neighborhood, collecting saleable surpluses from other maize producers and taking them to market. They **sell maize either directly to urban consumers or local traders** at these markets.

Local traders sometimes travel to **neighboring hillsides**, renowned for their high maize production, to buy maize directly from producers (when a producers themselves is not a trader). They also frequently offer loans to maize producers, which can be **repaid with the maize harvest** (also known as "standing sales"). This local trade is mainly transported by small 3-5 ton trucks.

Supply to Bujumbura's urban market remains the prerogative of a few **wholesalers**, who manage several types of produce and have trucks or access to the services of a transporter. The latter are mainly supplied in production zones close to the financial capital (Gitega, Bubanza, Cibitoke) by collectors who collect maize purchased throughout the province. In this case, wholesalers provide the funds needed for this collection.

Given that harvests and sales by producers are spread over almost 8 months, and that supply is dispersed over a wide area, **retailers' storage capacity is generally limited** to a few dozen tons. The largest wholesalers in Gitega and Bujumbura have warehouses that can store several hundred tons. As with generation, **storage is therefore highly decentralized**. Insufficient maize drying, particularly during the season A harvests, storage conditions that are not always optimal, and modest use of storage treatment can lead to **storage losses** for some traders. Even if it is not systematically detected, the presence of aflatoxin, enhanced by poor storage conditions, can have consequences for consumer health, and institutional buyers such as the WFP are now requesting controls on their purchases.

2.4.4. Maize processing

The vast majority of maize processing is carried out by **"micro-mills", or "mills" scattered throughout the country** (there are usually several near each market).

Our field surveys suggest that this activity is predominantly carried out by women.

Most of these micro-processors use electric grinding mills imported from China. This equipment has a relatively low import cost (a few hundred US dollars per mill). As can be seen below, imports of this type of equipment have grown enormously in recent years.

---

[42] Source: GRET (2014), La commercialisation des produits agricoles vivriers au Burundi - Pertinence et conditions de succès de possibles initiatives s'inspirant de l'expérience tanzanienne des marchés de gros (The marketing of agricultural food products in Burundi - Relevance and conditions for success of possible initiatives inspired by the Tanzanian experience of wholesale markets.)

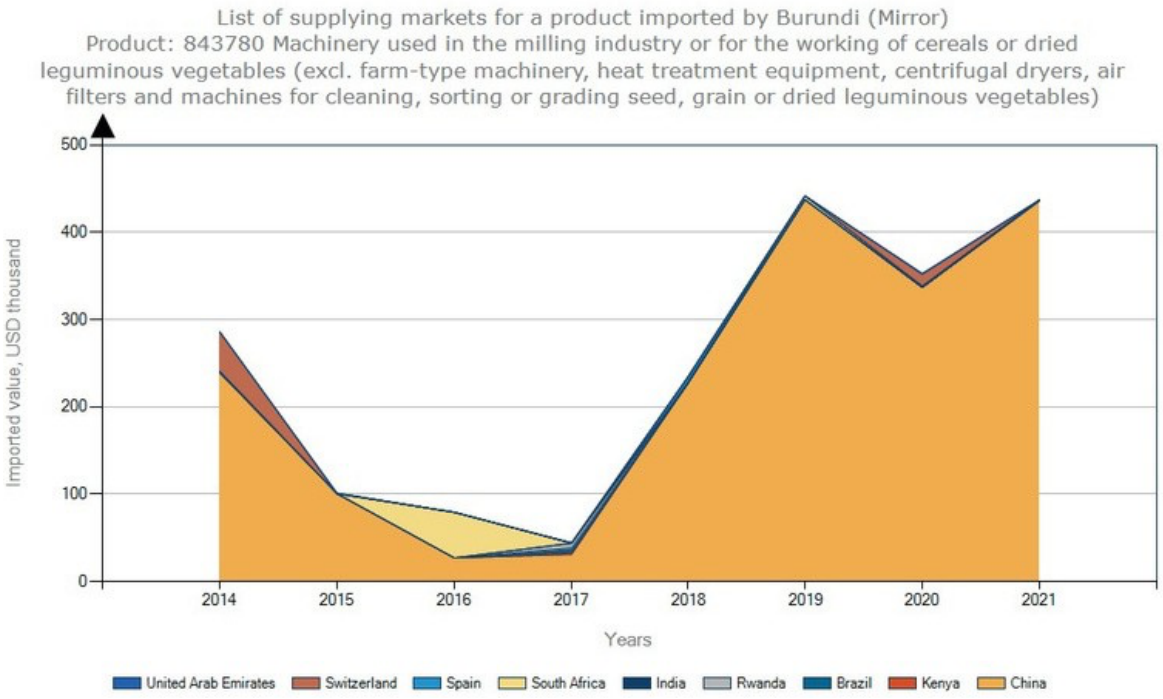


Figure 14: Imports of cereal milling equipment between 2014 and 2021 (source: Trade Map)

Since 2017, Burundi has officially imported over 3,000 of these mills, with capacities ranging from 50 to 1,000 kg/hour depending on size. This robust, low-cost technology has also been more widely adopted as it uses relatively standard motors (belt-driven motors with a power output of a few kW), which are easy to replace and local mechanics are familiar with. What's more, these mills can easily be adapted to grind cassava pods, wheat, soybeans, or even beans. Based on 3,000 mills with a capacity of 0.5 t/h working 6 hours over 250 days/year, a total milling capacity of over 2.2 million tons of dry matter per year is estimated.

Faced with these highly competitive small mills, **industrial and semi-industrial processing units are struggling to develop**. The most important flour mills, **Azam Bakhresa** (Bujumbura - in operation), **Minolacs** (Muramvya - closed), **Farisana** (Bujumbura operational only from 2013-2015), and Pembe (Bujumbura - closed), have historically focused on the use of this flour for the supply of wheat flour and cookies. The closure of most of these mills reflects both their **high exposure to processing risks**, which is discussed below, and their reduced competitiveness in the face of smaller, mechanized mills.

In addition to mills, some micro-flour mills are equipped with cleaning, blending, and bagging lines. These companies, which include Unikorn/Cerealis, Burundi Fortified Food (BFF), SOCOPA, Tumaini, Sangwe Imbura Ruyigi (SIRUY-SURL), Ikigori C'Iwacu and the cooperative maize mills set up by the PRODEFI project, focus mainly on the production of enriched/fortified flour for baby food and are trying to move upmarket to recoup their additional operating costs. Maize-based baby food has a higher added value and is largely geared towards the WFP and UNICEF urban and/or institutional markets, which are supporting local stakeholders in moving upmarket to supply their programs combating child malnutrition.

Finally, a minority share of maize production (several tens of thousands of tons according to our estimates*[43]*) is directed towards monogastric feed, and is therefore used by processors specializing in livestock feed. For the most part, these stakeholders use the same mills as the flour mills, which they complement with crushers and mixers to offer "on demand" ingredient formulations from livestock farmers, including cracked maize, maize meal, and a wide variety of other ingredients.

2.5. Institutional stakeholders involved in the maize sector in Burundi.

2.5.1. Ministry of the Environment, Agriculture and Livestock (MINEAGRIE)

MINEAGRIE's decentralized services, led by the Direction Générale de la Mobilisation pour l'Auto-développement et la Vulgarisation Agricole (General Directorate for Mobilization for Self-Development and Agricultural Extension), carry out various activities linked to MINEAGRIE's agricultural policies and programmes. Under the leadership of the **BPEAE - Bureaux Provinciaux de l'Environnement, de l'Agriculture et de l'Elevage (Provincial Environment, Agriculture and Livestock Offices) the services are structured as follows**: one agronomist per township, some of whom are agricultural engineers, who supervise zonal agronomists (a zone comprises between 10 and 11 hillsides), having an agricultural baccalaureate-level or agricultural technician who are assisted by agricultural auditors on each hillside (one person from the local community).

The Burundian government's National Agricultural Strategy 2018-27 has identified the following **weaknesses** in this agricultural framework:

- *A lack of harmonized approaches to intervention in the field*
- *Inconsistency in published material*
- *Weak performance of the research-extension link*
- *Weak organization of producers*
- *A lack of framework for disseminating agricultural information*
- *Scarce operating resources allocated to agricultural supervision*
- *Low involvement of other technical departments in the design and distribution of technical data sheets*
- *A lack of a training plan for MINEAGRIE staff in general and agricultural supervisors in particular*

In its Environmental, agricultural and livestock policy guidance brief (July 2020), MINEAGRIE calls for the modernization of Burundian agriculture. In particular, it refers to regionalizing crop policy, but above all to the creation of "outreach centers" in each township, to pool land to achieve intensive monoculture production in areas larger than 5 hectares per plot, with the help of a "technical package" (inputs of all kinds) and irrigation techniques. These outreach centers, connected to agricultural research and extension, should be able to generate at least 50 jobs each.

2.5.2. Burundi Institute of Agronomic Sciences (ISABU)

ISABU was founded in 1962 and now has **six research stations** and **thirteen innovation centers** across the country. Under the supervision of MINEAGRIE, it publishes a quarterly agronomic research bulletin, helping to communicate knowledge.

Its maize-growing activities mainly focus on **improved seeds**. ISABU produces pre-basic seeds, which are then used by producers.

[43] Based on 70 g of maize per hen/day (60% of feed), and 2.7 million hens registered by the DGE in 2019/2020 (ENAB), an upper range of 68,500 tons of maize used by the poultry industry over one year can be estimated.

The team visited an ISABU field dedicated to hybrid production and a demonstration field for varieties authorized in the Gitega region of Burundi. The hybrid production field clearly did not meet the isolation criteria required for total control of cross-pollination. It was massively foraged by bees from a neighboring bee farm. These bees were also found in the demonstration maize field, in which more than ten different varieties were grown. The role of the demonstration field was also unclear, as it is in no way related to the conditions experienced by the producers. Cultivated on flat ground, with high-density motorized traction, with no association and with a cropping calendar staggered by one month, the demonstration field seemed more dedicated to production than to in *situ* demonstration.

Since 2011, ISABU has also been working with the NGO **CABI** on the **Plantwise** "plant clinic" programme: "Plant doctors" are trained and provided with tablets and information sheets on the various diseases affecting plant crops. They advise farmers and supply a centralized database to monitor the spatio-temporal evolution of these diseases and intervene in the event of a warning.

2.5.3. National Food Security Stock Management Agency (ANAGESSA)

The National Agency for Food Security Stock Management (ANAGESSA) was created by Royal Decree in May 2018, to ensure a physical food security reserve in the event of shortages. This instrument also enables the government to influence market prices by setting a fixed maize purchase price for producers for each harvest (BIF 680/kg in 2021, BIF 1,700/kg in 2024). Producers (or even aggregators) bring their harvest directly to one of ANAGESSA's zonal collection centers (411 across the country). ANAGESSA collected 13,000 t of maize in 2021 and 7,000 t in 2022, only to open its stocks for sale in November 2022, at a time when the price of maize was rising sharply due to both higher world prices (the war in Ukraine) and the deterioration in the exchange rate of the Burundian franc.

However, ANAGESSA's resources are very limited. The agency has no warehouse of its own (storage warehouses are owned by MINEAGRIE or local authorities) and its team is very small (3 technical staff). It sets a single quality criterion for the purchase of maize (moisture less than or equal to 13%) and provided manual sieving tools to remove some of the foreign matter but without any real control. It has no structured purchasing rules, and anyone can sell any quantity until the stock target is reached. It has no price monitoring procedure and bases its purchase prices on a calculation of production costs that seems very extreme (overestimated). The resale price only includes a margin of BIF 100/kg (added to the purchase price from maize producers), with no specific intervention procedure or mechanism for building up or managing equity.

Under these extremely rudimentary operating conditions, the effectiveness of this body has been criticized on several occasions*[44]*: poorly conserved 2022 stocks, logistical and financial inability to cope with the influx of producers wishing to sell their production to ANAGESSA from the February 2024 harvest, and even prices set too high in 2024, thus preventing post-harvest prices from decreasing. It is apparent that the retail price of maize in February 2024, at BIF 1,581/kg*[45]* (and producers' prices between BIF 900 and 1,100/kg), is significantly lower than the producer price offered by ANAGESSA for grower purchases. While the approach is commendable, **the *modus operandi and capacities of this still-young structure clearly need to be improved to make it a regulatory tool rather than a process for disrupting local markets.***

[44] https://www.iwacu-burundi.org/anagessa-une-histoire-de-pourriture-qui-risque-de-se-reediter/ https://burundi-eco.com/collecte-de-la-recolte-de-mais-par-lanagessa-cette-fois-ci-serait-elle-la-bonne/

[45] Source : FPMA

2.5.4. World Food Program (WFP)

Whereas in the past the WFP used to distribute only imported foodstuffs to food-insecure populations, in recent years it has sought to support local producers by purchasing their produce*[46]*: In 2021, 7,000 tons of live produce (including 5,000 tons purchased directly from small-scale producers) for a total amount of USD 3.3 million. The proportion of maize within these purchases is not specified.

The WFP is also involved in the **Home Grown School Feeding** (HGSF) programme, purchasing maize-based **fortified flours. Home Grown School Feeding (HGSF)** brings together the Fortified Whole Grain Alliance, the Rockfeller Foundation and WFP to provide technical support to three flour mills wishing to develop and market enriched maize-based flours: **Unikorn, BFF, and Minolacs**.

These companies submitted their product prototypes at the end of 2022. In April 2024, WFP signed up as a customer with Unikorn and BFF and will distribute these flours to 703 schools (>500,000 schoolchildren). However, millers are concerned about the absence of medium- or long-term contracts with PAM (six-month contracts), which hampers their investments and their supply chain structure.

2.5.5. International Institute of Tropical Agriculture (IITA)

IITA is one of the Consultative Group on International Agricultural Research's (CGIAR) research centers with its world headquarters in Nigeria. It aims to improve the production and productivity of food crops in Africa.

It focuses on cassava, banana, and maize in Burundi. Its approach is based on three pillars:

- Varietal improvement: 84 maize varieties have been introduced and submitted to ISABU and ONCCS for testing and approval, 11 of which have been registered but not yet marketed
- Technical production itineraries, integrated pest management & post-harvest treatments: and among other things, research into biological control of aflatoxin
- A systemic approach at farm level: promoting crop associations & rotations and small-scale livestock farming

2.5.6. Agriculture and Rural Development Sectoral Group (GSADR)

The GSADR (Groupe Sectoriel Agriculture et Développement Rural - Agriculture and Rural Development Sector Group) is a platform for consultation and coordination, bringing together ministries, technical and financial partners, and other stakeholders, at both national and provincial level, to address the challenges of sustainable and resilient agricultural development in Burundi. After several years of dormancy, GSADR's relaunched their activity in April 2021.

The GSADR has several thematic sub-groups (environment, digitization, etc.) and is particularly involved in integrating climate change and sustainable land management issues into agricultural policies and programmes. It receives support from the FAO to strengthen its position in this area. It meets regularly to assess the achievements and challenges of implementing agricultural and rural development programs.

[46] https://lejournal.africa/burundi-lonu-encourage-la-production-et-la-consommation-locales/

2.5.7. Agricultural financing programs and funds

Credit & financing are available through various programs and banking institutions:

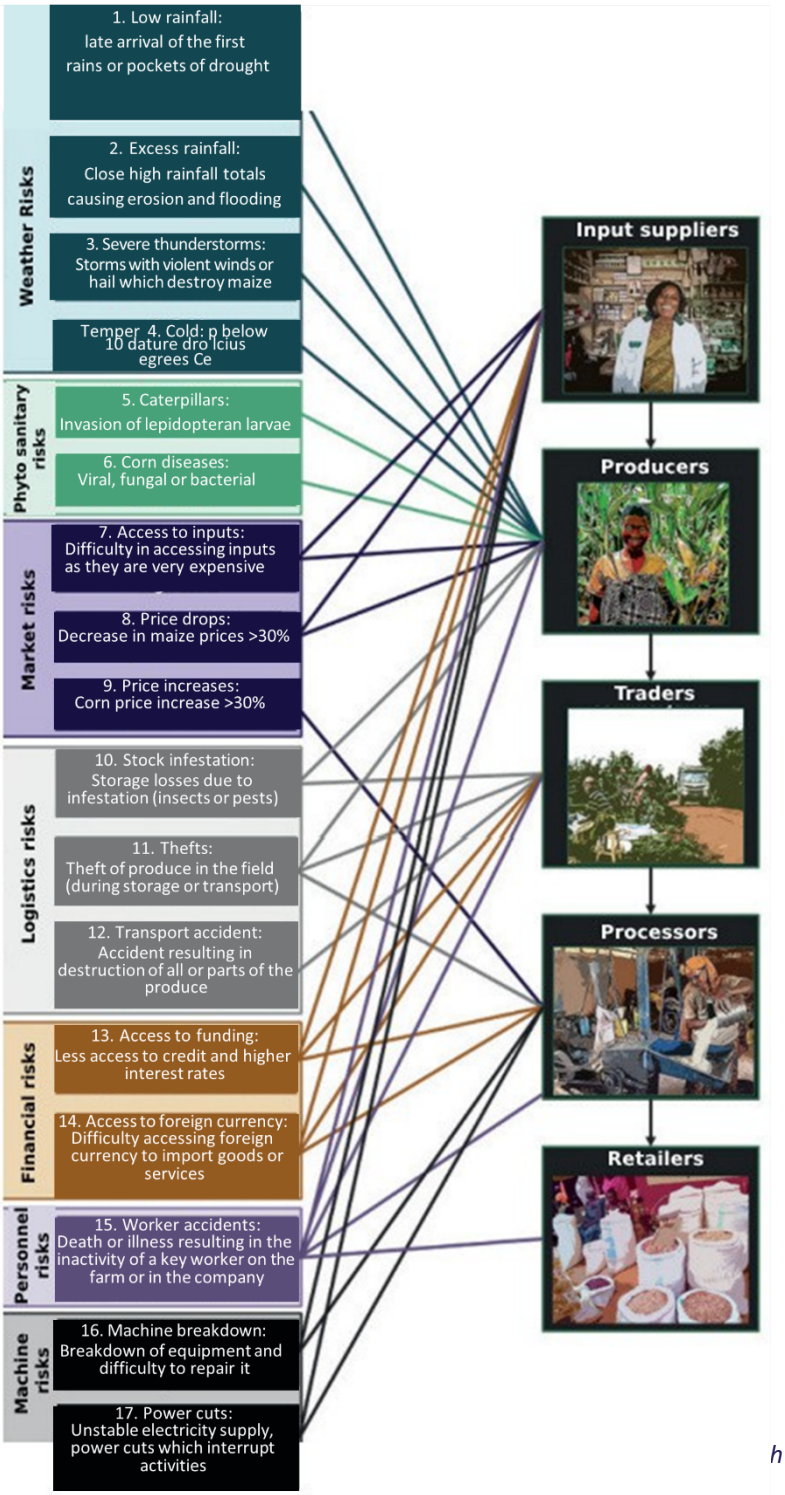
- **For young people**: through the Banque d'investissements pour les jeunes - Youth Investment Bank (BIJE) and PAEEJ
- **For women**: the Women's Investment and Development Bank (BIDF) opened in Gitega in March 2022. Its goal is to empower women financially. The shareholders are the townships (85%) and the State (15%). It grants low-interest loans to women's associations and cooperatives*[47]*.
- The **Fonds d'impulsion, de garantie et d'accompagnement (FIGA)**, under the supervision of the Ministry of Finance, offers project owners support to obtain bank loans, a guarantee fund (50% to 80%), and the granting of subordinated loans. The target groups are women, young people and farmers. Its activities include livestock breeding and the processing of livestock by-products. Suffering from a lack of cash flow, FIGA is currently undergoing reform to enable new partners to join the fund (World Bank, ADB, IFAD, and even the EU).

[47] https://burundi-eco.com/bidf-pour-stimuler-competition-dans-secteur-bancaire/ / https://www.iwacu-burundi.org/va-t-elle-reellement-financer-les-femmes/

3_Risk analysis of the maize value chain in Burundi

3.1. Risk summary

17 major risks have been identified as having an impact on the maize value chain in Burundi. The diagram opposite lists these risks and the stakeholders they directly impact.



Meteorological and plant health risks mainly impact **producers**, causing a decrease in production. Indirectly, they have an impact on all the other stakeholders in the sector, by reducing and increasing maize supply.

Market risks impact **virtually all stakeholders** but to varying degrees. Input supply difficulties and price cuts mainly affect input suppliers and producers. However, price rises have a greater impact downstream, on processors and distributors who have to increase their working capital requirements and resale prices, and potentially face a reduction in sales due to the additional cost for end consumers (households and breeders).

Logistical risks affect all stakeholders who **store or transport maize**.

Financial risks have a major impact on stakeholders whose business relies wholly or partly on bank financing and the import of inputs or machinery. To this effect, producers are probably the stakeholders least impacted by these risks, even if access to credit remains an objective to increase their investment capacity for many of them.

h

Personal risks mainly affect **small business units** (producers, aggregators, small processors), which are heavily influenced by the working capacity of their assets, and specifically the farm manager.

Lastly, **machine risks** mainly affect **processors** and, to a lesser extent, input suppliers who carry out the mechanized processing or reconditioning stage.

It should be noted that retailers, who are not particularly specialized in the maize sector, are primarily indirectly impacted by all the risks affecting the availability and cost of maize and maize-based products.

The risks identified were then analyzed according to the PARM methodology in terms of frequency (probability score), average intensity for each stakeholder affected (average impact score), and extreme impact, when their intensity reaches its maximum level (maximum impact score).

Risk frequency			Risk intensity		
Category	**Criteria**	**Score**	**Category**	**Criteria**	**Score**
High probability	Once every 7 years or more	**3**	**Catastrophic**	Decline in income> 50 Impact on more than 50% of industry stakeholders Greater impact on women and young people	**5**
Average probability	Once every 15 years or more	**2**	**Review**	Between 30% and 50% decrease in income Impact on more than 30% of industry stakeholders Greater impact on women and young people	**4**
Low probability	Less than once every 15 years	**1**	**Considerable**	15-30% decrease in income Impact on more than 20% of industry stakeholders Greater impact on some women and young people	**3**
			Moderate	5-15% income decrease Impact on more than 10% of industry stakeholders Greater impact on some women and young people	**2**
			Negligible	Less than 5% decrease in income Impact on less than 10% of stakeholders. Reduced impact on women and young people	**1**

Figure 16: PARM agricultural risk frequency and intensity scoring method

The following paragraphs analyze risks by stakeholder category and in the entire maize value chain.

3.2. Risks for input suppliers in the maize sector

According to our surveys, **the maize sector is the main outlet for input suppliers** in Burundi, ahead of the market garden sector (which uses more inputs per unit area but is less important in terms of surface area and number of producers involved) and the rice sector.

The sale of inputs is highly **dependent on producers' income and investment capacity**. Significant price decreases and the majority of risks affecting producers, therefore have a knock-on impact on input distributors' sales and revenue. Systemic risks can affect maize production, producers' incomes, and their ability to repay. This is particularly true in terms of weather risks. They therefore have a major impact on sales in the agricultural inputs sector.

Plant health risks can, on the other hand, have a **positive effect on their sales** by encouraging producers to buy more treatments and seeds selected for their resistance to certain diseases.

As the vast majority of inputs or the ingredients to produce them are imported, **import-related risks** (import logistics, fertilizer, and active ingredient prices, and access to foreign currency) also have a strong impact on input suppliers' business. This impact is more significant as the majority of input sales concentrate on the start of the two rainy seasons, and any delay in the import, preparation/packaging, or distribution process has a major effect on their business over the whole season, as **an input that is not available on time is an input that will not be sold** for several months.

Burundi's input distribution sector **has developed rapidly** in recent years, particularly in the maize sector, and has proved remarkably resilient to the series of crises post-COVID*[48]*, which drastically reduced the availability of inputs in many developing countries. This resilience has been made possible by large-scale **national programmes** such as:

- the 2012 National Fertilizer Subsidy Programme in Burundi (PNSEB), which includes the establishment of a Common Fertilizer and Amendment Fund (FCFA)*[49]* since 2013,
- and by **emergency aid from the African Development Bank** (ADB)*[50]* which has facilitated the import of inputs in recent years.
- IFDC's **PSSD** 2018-2024 program is another example*[51]*,
- and, the establishment of a subsidiary of **the NGO One Acre Fund** in 2011*[52]*, which has deployed a major fertilizer distribution network in the country, greatly improving supply in landlocked areas.

Despite these successes, the risks to inputs supply to the maize sector, and to input suppliers in general, remain significant.

The table below uses PARM methodology to rank the main industry risks to which input suppliers are exposed, with a summary justification of the indicators given for each risk.

It is worth noting that occurrences are estimated based on the last fifty years. Current extremely intense risks, such as the lack of foreign currency or difficulty accessing fertilizers, need to be considered in the context of the history of the sector and the national economy.

[48] [49] https://blogs.worldbank.org/en/opendata/fertilizer-prices-expected-remain-higher-longer https://faolex.fao.org/docs/pdf/bur143162.pdf

[50] https://www.afdb.org/fr/news-and-events/press-releases/le-burundi-recoit-le-soutien-du-groupe-de-la-banque-africaine-de-developpement-dans-des-secteurs-de-developpement-cles-60325 et https://www.agenceecofin.com/investissement/1901-115371-au-burundi-des-producteurs-se-felicitent-des-bons-rendements-agricoles-obtenus-cette-annee-grace-au-soutien-de-la-bad

[51] https://ifdc.org/projects/private-seed-sector-development-pssd/

[52] https://oneacrefund.org/what-we-do/countries-we-serve/burundi

Input suppliers		Frequency	Intensity		Risk prioritization	
	Risks	Frequency score (F)	Average impact score (Iaver.)	Maximum impact score (Imax.)	Final score: ((F*Iaver.)*.75) + (Imax.*0.25)	Comments
8	Lower maize prices	3	2	4	5.50	Price drops can lead to a reduction in purchasing power and divestiture by producers, sharply reducing sales by input suppliers.
17	Power outages	3	2	5	5.75	Input suppliers who carry out formulation, repackaging, or storage in controlled environments (mechanical aeration, air conditioning) can be severely affected by power cuts.
7	Access to inputs	2	3	5	5.75	The majority of inputs are imported, and input suppliers are therefore dependent on the availability and international market prices of inputs. In the event of logistical crises (such as the 2021 container crisis) and a sharp rise in the price of fertilizers on the international market (+100% in 2022), their ability to obtain supplies in time for their sales windows and to offer affordable prices to producers may be severely jeopardized, resulting in huge losses in business volumes.
14	Access to foreign currencies	1	4	5	4.25	Most inputs are imported either as ingredients or in ready-to-use form. Whether they import themselves or buy inputs from an importer or industry, input suppliers are heavily impacted by the shortage of foreign currency. As their business is highly seasonal, a delay in imports due to difficulties in obtaining sufficient foreign currency can result in huge losses.
16	Machine breakdown	2	2	5	4.25	Input suppliers who themselves carry out formulations (blending) such as FOMI, or repackaging (into sachets, vials, etc.) of imported active ingredients, may be affected by machine breakdowns, especially when their equipment is scarce in Burundi and spare parts and/or mechanics have to come from abroad.
15	Illness and accidents	2	2	4	4.00	Even though input sellers often work as sole traders or with a small number of employees, they can relatively easily call on a family member to run the store if someone is unavailable, which limits the impact of illness and accidents.
1	Lack of rain	3	1	4	3.25	Systemic weather risks can have a major impact on input suppliers' business volumes, by reducing producers' purchasing power, causing non-repayment of inputs supplied on credit, and shifting sales periods relative to forecasts.
	Excess rainfall	3	1	4	3.25	
2	Access to financing	1	2	3	2.25	Input suppliers generally have privileged access to bank credit. However, for small suppliers with little collateral, the tightening or increase in the cost of credit in times of economic, financial, or political crisis can lead to a reduction in cash flow and therefore a substantial decrease in business volume.

	Input suppliers	Frequency	Intensity			Risk prioritization
3	Severe storms	2	1	2	2.00	Systemic weather risks can have a major impact on input suppliers' business volumes, reducing producers' purchasing power and leading to non-repayment of inputs supplied on credit.
11	Theft	1	1	5	2.00	Product and cash theft, although infrequent, can cause huge losses for input suppliers when large amounts are involved.
12	Transport accidents	1	1	4	1.75	Transport accidents are frequent in rural areas. Even though the majority of Burundi's rolling stock has low payloads (between 3 and 10 tons per truck), this limits the volumes subject to this risk. However, losses for individual stakeholders can be significant when the entire cargo is destroyed.
4	Cold spell	1	1	2	1.25	The same applies to severe storms and disease but with less impact.
10	Stock infestation				0.00	Distributors are not affected by this risk. Fragile seed stocks are systematically treated.
5	Insects				0.00	Caterpillar attacks and diseases lead to an increased demand for plant health treatments and resistant varieties and are therefore not a risk for input suppliers.
6	Maize diseases				0.00	
9	Rising maize prices				0.00	Price rises will generally lead to increased investment in cultivation by producers, and therefore higher business volumes for input suppliers. This is not a risk for them.

3.3. Risks for maize producers

The production link is particularly sensitive, as it involves **the largest number of stakeholders** (probably more than three-quarters of Burundi's 1.8 million farms) and influences all the other links (either as an outlet or as the main source of supply). This is why this link was the subject of a much larger number of interviews than the others. In addition to the twenty or so producers the specialists met during the field assignment, a short survey was carried out among 254 maize producers (150) and producers (104), covering all of Burundi's 17 provinces, in order to rank the frequency and intensity of the main risks identified by the specialists. Average and maximum intensities are measured as a proportion of losses (on the average production of each farm) for farms that have been affected by the risk in question.

In terms of the frequency of **damage caused by excess water, farms run by women seem to be more affected**. This significant difference can be explained by less favorable access to land conditions. A higher proportion of women farmers likely to have access to plots on steeper slopes or in low-lying areas that are more easily flooded.

	Frequencies	Freq. Maize farmers	Medium intensity	Max. intensity
	Occurrences/years of experience*[53]*	Occurrences/experiences female farms	Average ((losses/production)/farms))	Max losses/production
Insects	29 %	33 %	29 %	92 %
Excess rainfall	22 %	28 %	38 %	100 %
Lack of rain	17 %	15 %	42 %	98 %
Stock pests	16 %	16 %	18 %	98 %
High winds	10 %	10 %	37 %	90 %
Decreasing prices	9 %	7 %	29 %	49 %
Hail	8 %	7 %	38 %	100 %
Maize diseases	8 %	8 %	25 %	93 %
Avail. of organic fertilizers	8 %	7 %	9 %	31 %
Avail. of mineral fertilizers	7 %	7 %	35 %	90 %
Cold spells	6 %	6 %	32 %	86 %
Drying conditions	6 %	6 %	19 %	66 %
Availability of seeds	5 %	4 %	38 %	91 %
Illness	5 %	4 %	49 %	100 %
Seed quality	3 %	2 %	39 %	79 %
Stock volume	2 %	2 %	46 %	100 %
Phyto product quality	1 %	1 %	15 %	30 %
Mineral fertilizer quality	1 %	1 %	25 %	75 %
Transport accidents	1 %	1 %	6 %	13 %
Individual accidents	0 %	0 %	46 %	100 %

In addition to the pre-identified risks, 17 producers mentioned theft, 7 producers rodent attacks in fields, and 3 producers stated pregnancy as risks that could affect their maize production. Pregnancy is not a risk in itself, but in the absence of social security, it can lead to the inability to carry out farming tasks for several months, which has a clear impact on a farm's production.

[53] Total of all occurrences for all respondents divided by the cumulative years of experience of the respondents.

For the risk analysis below, certain risks have been grouped (availability of inputs, diseases and accidents, theft, drying conditions with excess water) to make the analysis easier to understand. Qualitative elements, derived from literature reviews and qualitative interviews during the specialists' assignment have been added.

The table below classifies the main risks faced by maize-growing farms in Burundi. Analyses are based on both quantitative survey data and qualitative interviews conducted by PARM specialists during the study.

Producers		Frequency	Intensity		Risk prioritization	
No	Risks	Frequency score (F)	Average impact score (Iaver.)	Maximum impact score (Imax.)	Final score: ((F*Iav)*0.75) + (Imax*0.25)	Comments
1	**Lack of rain**	**3**	**4**	**5**	**10.25**	Fall armyworm is cited by growers as the main insect pest of corn. This observation is confirmed by the consultation statistics of the
2	**Excess rainfall**	**3**	**4**	**5**	**10.25**	Intense rainfall, which has occurred practically once every two years over the last decade and once every four years in previous decades, can damage or even destroy maize crops due to several phenomena: asphyxiation of plants due to excess water, fertilizer leaching, soil erosion and landslides, and rotting of maize cobs, particularly at the end of the season A. The greatest damage occurs in low-lying (flooded) areas and on steep slopes, where heavy rains combined with wind (violent storms) uproot plants and cause severe erosion. The frequency is almost once every 3 years, and losses exceed 35%).
5	**Insects**	**3**	**3**	**4**	**7.75**	Producers cite the armyworm as maize's main insect pest. This is confirmed by consultation statistics from the "Plantwise" project clinics. Other caterpillar borers, including two noctuid moths(Busseola fusca, Sesamia calaminis) and a codling moth(Eldana saccharina) are also causing significant damage, according to producers and research. Producers state the prevalence of these insects is higher during periods of water stress. Their damage is moderate when rainfall is abundant and regular and/or when temperatures are low, so their impact is weaker at higher altitudes. The frequency is greater than once every 5 years, and the average loss intensity is just under 30%.
15	**Illness and accidents**	**2**	**4**	**5**	**7.25**	As the labor force is mainly manual and labor intensity is particularly high in Burundian agriculture, illness, and accidents can cause many losses. Young farmers and farms run by widowed women (who generally have less diversification and a smaller family workforce) are particularly exposed to these idiosyncratic risks. In particular, several women indicated that the reduction in their work force due to pregnancy could be the cause of a significant loss of income (reduction in cultivated area or only one season out of two).

Producers		Frequency	Intensity		Risk prioritization	
3	Severe storms	2	4	5	7.25	According to our surveys, hail storms and strong winds affect maize farms every 5 to 15 years. Low-lying regions (around 1,500 m altitude) seem to be the most frequently affected. Compared with the risk of rainfall deficit or excess, this risk is less systemic and more idiosyncratic. The impact on the scale of a hillside may be very significant, but the impact on the scale of the industry is moderate.
7	Access to inputs	2	3	5	5.75	The strong growth in the use of improved seeds, mineral fertilizers, and plant health treatments on maize in recent years has led to a sharp increase in risks linked to the supply of inputs. While a limited number of producers have difficulty obtaining seeds, access to fertilizers is highly volatile in terms of availability and price, due to the monopoly of the company FOMI in supplying fertilizers to the Burundian market. In recent years, there have been several supply disruptions when producers needed to spray their crops. When mineral fertilizers are in short supply, the shift in demand to organic fertilizers also leads to supply disruptions for organics. The severity of these supply disruptions is greater in landlocked, high-altitude areas than in lowland and depression areas (closer to the FOMI plant or land borders through which fertilizer can be smuggled).
6	Maize diseases	2	3	5	5.75	Band blight (MSV), anthracnose, and maize lethal necrosis (MNL) are viral diseases that are widespread in Burundi. Maize smut, a fungal disease, is also widespread. Their frequency is high but their intensity moderate, except when crops are suffering from severe nutritional imbalances or water stress.
10	Stock infestation	3	2	5	5.75	Rodents (mice and rats) and insects (moths and weevils) cause frequent, but generally moderate, damage to maize stocks. This especially occurs when producers are not equipped with suitable containers and/or treatments.
8	Lower maize prices	2	3	4	5.50	According to producers and WFP price histories, sharp price decreases that exceed producers' expectations and normal seasonality are moderately frequent. Sustained inflation is partly limiting this situation. Marketed surpluses per farmer also remain limited, reducing the impact of these price cuts on the farm economy.
11	Theft	1	4	5	4.25	Standing crop theft and sometimes home stock theft can take place relatively frequently. This particularly affects roadside plots, houses, and farms run by single women (who are less likely to defend themselves).

	Producers	Frequency	Intensity		Risk prioritization	
4	Cold spells	1	3	5	3.50	Maize suffers and can even stop growing when exposed to temperatures below 10° Celsius. Cold spells with temperatures below 10° can occasionally affect areas above 2,000 m altitude. The frequency of this risk is moderate, as producers rarely cultivate maize in areas where cold weather is frequent.
9	Rising maize prices	2	1	4	2.50	Under normal circumstances, the vast majority of Burundian farms are self-sufficient in starch (sources of slow sugar). Price increases tend to benefit those (40-60%) who sell surpluses. Even when the maize harvest is disappointing, cassava, sweet potatoes, potatoes, and bananas - all highly resilient crops - can provide for basic needs. For farms in very precarious situations, particularly those with extremely limited access to land (less than 0.25 ha) or a reduced workforce (1 single worker), the purchase of cereals and tubers during the lean season can be affected by a price rise.
13	Access to financing	2	1	3	2.25	Access to finance is very rarely a precondition for farming. It is more a question of improving farming conditions, to which few Burundian farmers have access at this point. With the development of financing directed at the agricultural sector, however, it is important to consider that access to finance could in the future become a source of risk for farms accustomed to financing part of their production factors with credit.
12	Transport accidents	1	1	4	1.75	In general, producers transport their produce from their plots to their homes, and then from home to the nearest marketplaces (urban centers). Accidents are rare on these short-distance journeys on foot or by bike, but when they do occur, they can lead to major losses.
14	Access to foreign currencies	1	1	2	1.25	To date, very few producers have been directly affected by the lack of access to foreign currency. They are indirectly affected by the impact of difficulties in accessing foreign currency for other sector stakeholders, and by the resulting inflation for input costs.
16	Machine breakdown	0	0	0	0.00	Few maize producers have processing machinery. This means they are subject to the same risks as processors.
17	Power outages	0	0	0	0.00	

3.4. In-depth weather risk analysis

These are structural risks that have been identified by all maize industry operators as **the main risks affecting the value chain**. These structural risks can affect supply on a national scale, leading to losses for all sector stakeholders (and not just producers), by reducing the **availability of maize** and encouraging **higher prices** and **supply difficulties** (particularly if, as in 2023 and 2024, the lack of foreign currency makes it difficult to import cereals). Weather risks can also promote other risks, particularly in terms of pests, sales, and even people's health (malaria, respiratory diseases) and therefore the workforce. These are systemic risks that have a huge impact on the maize value chain.

Water deficits

As detailed above, Burundi's equatorial, high-altitude climate ensures a cumulative rainfall generally over 1,000 mm per year and therefore **does not suffer from "droughts"**. The **two-season** farming system, on the other hand, can be severely disrupted when one of the two seasons experiences insufficient rainfall for good crop development.

Maize requires more cumulative rainfall than most other crops grown in Burundi. Beans, potatoes, and vegetables can withstand lower rainfall, while bananas, sweet potatoes, and cassavas establish their development cycle over a much longer period and can therefore withstand less concentrated rainfall. To reach its full potential, **maize needs to receive a minimum of 600 mm** of rainfall. Below 500 mm it suffers greatly. As can be seen below, these two thresholds are regularly exceeded, particularly during season B, which explains why the majority of farmers prefer to grow maize in season A. Moreover, over the last decade, average rainfall has shown a slight upward trend, which may explain the increasing success of maize cultivation on farms.

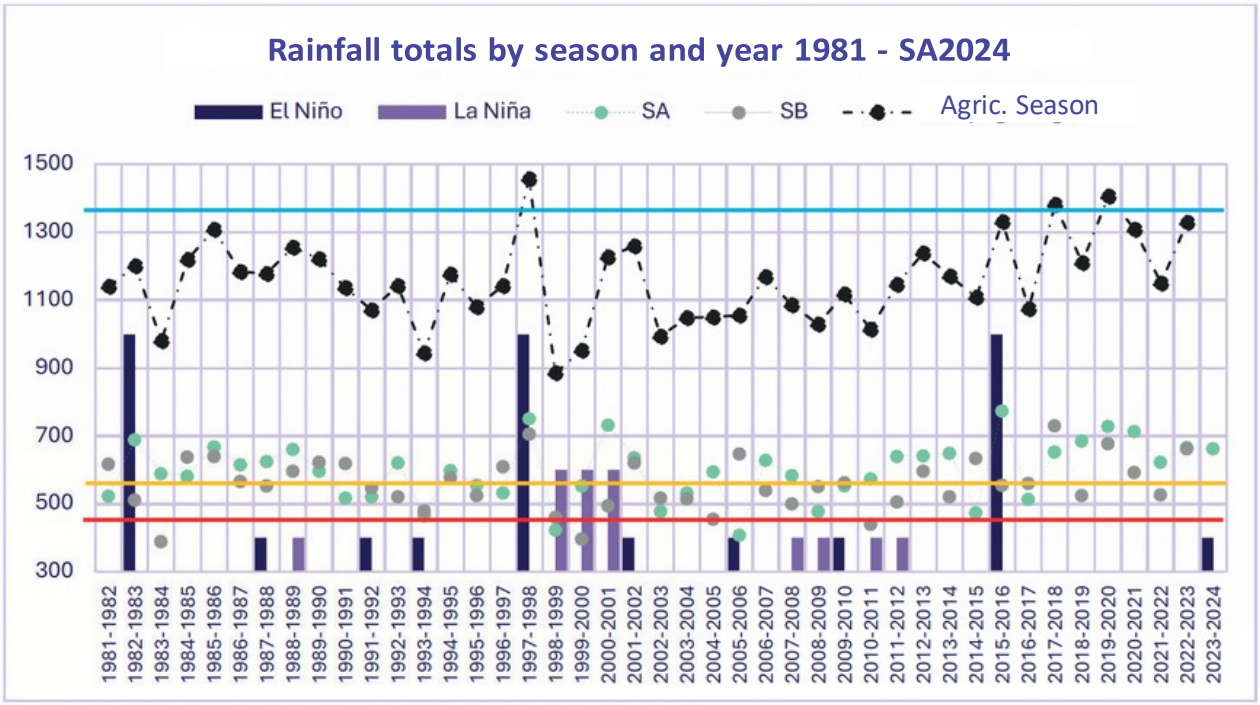


Figure 17: Historical analysis of cumulative rainfall over the two growing seasons and illustration of the impact of El Niño (normal and major) and La Niña (normal and major) climatic events on rainfall. National CHRIPS data analyzed and edited by Nitidæ + history and intensity of El Niño and La Niña events extracted from NOOA-NASA.

Surveys of 254 Burundian maize producers show that only 33 farmers (13%) have never experienced losses in their maize production due to lack of water.

Excess rainfall

Excessive rainfall can cause major damage in Burundi, on a similar scale to water deficits. **Intense rainfall**, particularly during the two peak periods of December-January and March-April, can **cause violent erosion, flooding, and landslides**. High rainfall at harvest time also makes drying and storing maize complex. Rainfall regularly causes mildew on maize and can delay the start of new production at flour mills, which need dry maize to make flour.

This risk affects not only producers but **also the entire industry**, including infrastructure, transport, and maize quality.

As is apparent in Figure 18, rainy seasons with above 1,300 mm cumulative rainfall, which can cause severe damage to both crops and the country's infrastructure, are becoming increasingly frequent, possibly as a result of climate change.

Figure 18: Photo of a maize plot on a slope in the Muhanga township, Kayenza province.

3.5. Risks for traders

Maize traders, whether they limit themselves to aggregating maize within production zones or participate in the redistribution of maize to deficit zones and the import of maize in times of national market shortage, have a **relatively moderate exposure to risk** compared to other stakeholders in the sector. During our interviews, having traders estimate their exposure to most risks was a challenge, since their role is largely to manage risk.

Highly diversified, generally stocking for periods limited to a few months, and with extensive information-gathering networks to diversify their supply from hillsides and resale townships, traders can be described as **risk management experts**.

However, they remain exposed, albeit moderately, to most of the risks affecting the sector, which create considerable variability in both business volumes and margins from one year to the next. The table below classifies the main risks faced by traders involved in the collection and resale of maize throughout Burundi.

Traders		Frequency	Intensity		Risk prioritization	
No	Risks	Frequency score (F)	Average impact score (laver.)	Maximum impact score (Imax.)	Final score: (F*laver.)*.75) + (Imax.*0.25)	Comments
15	**Illness and accidents**	**2**	**2**	**5**	**4.25**	Traders often work as sole traders or with a small number of employees. They concentrate most of their knowledge (supplier, customer, information networks, product knowledge, and logistical cost expertise) and are therefore highly exposed to personal risk. Work stoppages occur more often than once every 10 years. The average loss is moderate, but severe cases lead to extreme losses (>50% of sales).
r	**Access to foreign currencies**	**1**	**3**	**4**	**3.25**	The majority of Burundian traders sell both local maize and other dry grains (rice, beans, wheat, groundnuts, and soya), as well as a marginal share of imported products (in particular fragrant rice). The proportion of imported food varies according to national production and the time of year. Difficult access to foreign currency can complicate the import of foodstuffs and access to these, reducing margins and business volumes for traders. Over the past 50 years, the frequency of currency shortages has been relatively low. On the other hand, the losses inflicted (particularly over the last 5 years due to shortages) are significant, with many traders suffering losses of over 20%.
1	**Lack of rain**	**3**	**1**	**4**	**3.25**	Systemic weather risks, which can affect the production of an entire province or even national production, can substantially reduce maize traders' business volume, as these risks can also affect the availability of the other dry grains they sell (rice, beans, wheat, peanuts, soybeans, etc.). On the other hand, they can offset part of the decrease in business volume by increasing unit margins on inventory already built up. For these risks, the frequency is the same as for production.
2	**Excess rainfall**	**3**	**1**	**4**	**3.25**	
10	**Stock infestation**	**3**	**1**	**4**	**3.25**	The majority of traders benefit from space and storage treatments adapted to maize, which limits this risk. However, they can occasionally be affected by infestations that cause significant losses.
5	**Insects**	**3**	**1**	**3**	**3.00**	The major damage that caterpillars can cause to the maize supply can substantially affect traders' business volumes.
8	**Lower maize prices**	**3**	**1**	**3**	**3.00**	Price reductions can devalue traders' inventories and lead to losses. These losses are generally limited, as traders spread their supplies and sales, and therefore only incur losses on a small proportion of their business volume.

Traders		Frequency	Intensity		Risk prioritization	
9	Rising maize prices	3	1	2	2.75	Few traders work under contract, so they can take advantage of price rises to increase the value of their inventory. For the few traders who want to commit to contract sales (public procurement, WFP supply, catering, food processing plants, etc.), price increases after the contract has been signed can be a major risk that can reduce or even negate the commercial margin on these contracts.
16	Machine breakdown	3	1	2	2.75	Traders rarely use machines, but they may do so for weighing, quality control, cleaning, or repackaging maize.
17	Power outages	3	1	2	2.75	Traders rarely use electrical equipment, but they may do so, particularly for cleaning and repackaging maize. They can also be affected by a decrease in processor demand in the event of excessively long outages.
6	Maize diseases	2	1	2	2.00	Production-related risks have a limited impact on traders' business, although they can have a moderate impact on their traditional supply basin, forcing them to travel further to find products and increasing their sales costs.
3	Severe storms	2	1	2	2.00	
7	Access to inputs	2	1	2	2.00	
11	Theft	1	1	5	2.00	Theft of goods and money, although infrequent, can cause huge losses for retailers when large amounts are involved.
12	Transport accidents	1	1	4	1.75	Transport accidents are frequent in rural areas, even though most of Burundi's rolling stock has low payloads (between 3 and 10 tons per truck), which limits the volumes subject to this risk. However, losses can be significant for each stakeholder if the entire cargo is destroyed.
13	Access to financing	1	1	3	1.50	Traders generally have privileged access to financing. For small traders or traders with little collateral, however, the tightening of credit supply in times of economic, financial or political crisis can lead to a reduction in cash flow and therefore a substantial decrease in business volume.
r	Cold spells	1	1	2	1.25	Cold spells have the same as hail and crop disease but with less impact.

3.6. Processor risks

Maize processors are stakeholders exposed to **major risks**. Because of their **expertise** (which is stronger than that of other stakeholders), **flour mills**, which mainly produce maize flour, and **feed mills**, for which maize accounts for between 50 and 70% of their supplies, are highly sensitive to all situations affecting maize production and prices.

In addition to these supply-related risks, processors also endure significant risks in terms of access to financing, currency and electricity. These risks are linked to the challenges of financing their substantial working capital requirements (raw materials and high variable costs).

Figure 19: A mill in operation and freshly ground maize flour at a processor in Ngozi

Processors		Frequency	Intensity		Risk prioritization	
No	Risks	Frequency score (F)	Average impact score (Iaver.)	Maximum impact score (Imax.)	Final score: ((F*Iaver.)*.75) + (Imax.*0.25)	Comments
17	**Power outages**	**3**	**3**	**5**	**8.00**	The stability of the Burundian electricity network and power cuts are a major risk for processors. The majority of processing units run on electricity and have no access to back-up generators (as imported fuels are very expensive). Network instability can lead to breakdowns and on electric motors breakages, while power cuts cause frequent random interruptions in activity. All the processors we interviewed stressed that this has been the main risk they have faced since starting their business. Losses occur several times a year. Average losses are around 20%, but maximum losses for factories whose equipment or switchboards are destroyed, or which lose business due to power cuts, can become bankrupt.
9	**Rising maize prices**	**3**	**2**	**4**	**5.50**	Rising maize prices increase processors' working capital requirements and reduce their competitiveness in comparison to imported processed products. This is a major risk for domestic maize processors, which could lead to heavy losses, especially if they have not anticipated this increase and are working under contract with some of their customers.
1	**Lack of rain**	**3**	**2**	**4**	**5.50**	Systemic weather risks that can affect the production of an entire province, or even the national output, can substantially reduce maize processors' business volume, as maize is usually the main ingredient in both flour milling and livestock feed manufacturing. While processors can usually substitute the lack of local maize by buying imported maize, the latter is generally more expensive and causes a sharp rise in their production costs, severely reducing their competitiveness against imported meal and feed.
2	**Excess rainfall**	**3**	**2**	**4**	**5.50**	
15	**Illness and accidents**	**2**	**2**	**5**	**4.25**	The majority of processors are small companies with few employees. Company managers concentrate most of their knowledge (supplier, customer, information networks, product knowledge, recipes, and quality) and are therefore highly exposed to personal risk.
14	**Access to foreign currencies**	**1**	**3**	**5**	**3.50**	By reducing both the ability to import maize in times of scarcity on the domestic market, and the capacity to source other inputs (sachets, formulation ingredients, etc.) and spare parts from abroad, the lack of foreign currency can generate huge additional costs and prolonged periods of business interruption for maize processors.

Processors		Frequency	Intensity		Risk prioritization	
16	Machine breakdown	3	1	5	3.50	The majority of processors work with small-capacity Asian equipment (small mills, stone removers, hoppers, crushers, mixers, pellet compactors, etc.). Know-how and spare parts for repairing these machines are readily available. On the other hand, when processors or projects invest in more sophisticated equipment (such as the processing units equipped by the PRODEFIS project), susceptibility to breakdowns is a huge risk that can lead to the processing units failing.
10	Stock infestation	3	1	4	3.25	The majority of processors benefit from storage areas and treatments adapted to maize, which limit this kind of risk. However, they are occasionally affected by infestations that can cause very significant losses.
5	Insects	3	1	3	3.00	The significant damage that caterpillars can cause to maize supplies can substantially affect business output and the processor competitiveness. The frequency thereof is high, as seen in the production section, but average intensity is quite moderate.
13	Access to financing	1	2	4	2.50	Processors are very dependent on access to financing for their maize supplies and that of other raw materials, as well as to pay for their running costs (employees, rent, and electricity). Reduced or more expensive access to credit has a major impact on their sales.
8	Falling maize prices	2	1	3	2.25	Falling prices can devalue processors' inventories and lead to losses in profit. These losses are generally limited, as processors spread out their supplies and sales, and therefore only incur losses on a small proportion of their business volume.
11	Theft	1	1	5	2.00	Theft of products, equipment, and money, although infrequent, can cause huge losses for processors when large sums of money are involved.
6	Maize diseases	2	1	2	2.00	Production-related risks have a limited impact on processors' business, but they can have a moderate impact on the scale of their traditional supply basin, forcing them to prospect or even travel far to find product, thereby increasing their supply costs.
3	Severe storms	2	1	2	2.00	
7	Access to inputs	2	1	2	2.00	
12	Transport accidents	1	1	4	1.75	Processors rarely take charge of transporting maize and processed products. When they do, however, and an accident occurs, it can mean very heavy profit losses.
4	Cold spells	1	1	2	1.25	Cold spells have the same as hail and crop disease but with less impact.

3.7. Distributor risks

Distributors are highly diversified (in dry grains or a wider range of staple products), have limited fixed costs, and can vary their supplies between domestic production and imported maize. Like retailers, they benefit from moderate risk exposure and **good risk management strategies**.

Like other commercial traders, however, they bear the **risks associated with maize storage**. In addition, they are more affected by rises in prices, which can encourage some consumers to buy directly from producers or processors, reducing their volume of business.

Figure 20: Photo of enriched maize flour and traditional simple maize flour in a retail store (mini market) in Bujumbura

Distributors		Frequency	Intensity		Risk prioritization	
No.	Risks	Frequency score (F)	Average Impact score (Iaver.)	Maximum impact score (Imax.)	Final score: ((F*Iaver.)*.75) + (Imax.*0.25)	Comments
1	**Lack of rain**	**3**	**1**	**3**	**3.00**	Systemic weather risks can marginally reduce retailers' business volume by increasing the time spent sourcing maize and reducing daily sales. Retailers usually manage to supplement their supplies with imported maize if domestic production does not pan out, but this significantly increases the retail price of maize. What's more, in times of shortage, some low-income urban consumers try to buy directly from producers or reduce their consumption of maize in favor of tubers (which, on average, cost less per calorie). These situations can lead to a sharp drop in retailers' business activities.
2	**Excess rainfall**	**3**	**1**	**3**	**3.00**	
10	**Stock infestation**	**3**	**1**	**3**	**3.00**	The majority of retailers benefit from storage spaces and treatments adapted to maize, which limit this kind of risk. Their business may, however, occasionally be affected by infestations which cause significant losses, but only on small volumes, as more than a few tons are rarely stored.
9	**Rising maize prices**	**3**	**1**	**3**	**3.00**	Increase in prices, when they divert a proportion of consumers from their stores, can sharply reduce retailers' volumes while increasing the cost of their working capital (higher WCR [working capital requirement] for lower business volume).
5	**Insects**	**3**	**1**	**2**	**2.75**	The significant damage that caterpillars can cause to maize supplies can marginally affect retailers' business volumes.
17	**Power outages**	**3**	**1**	**2**	**2.75**	Retailers supply and/or buy from small-scale processors. A reduction in business activity at nearby processors, due to power cuts, may therefore marginally affect their business. Modern retailers (mini-markets and boutiques) are also affected by power outages for their lighting as well as operating their refrigerators - if they have any.
8	**Falling maize prices**	**3**	**1**	**2**	**2.75**	Price cuts can devalue retailers' inventories and lead to profit losses. These losses are generally limited, as retailers usually stock small volumes, especially in the run-up to harvest, when they anticipate the risk of lower prices. Note that price cuts can also be opportunities for retailers to replenish their supplies at low prices and increase sales volumes.
15	**Illness and accidents**	**2**	**1**	**3**	**2.25**	Although distributors often work as sole traders or with a small number of employees, their business activities are not very technical. They can easily call on a family member to run the store in case of unavailability.

Distributors		Frequency	Intensity		Risk prioritization	
6	Maize diseases	2	1	2	2.00	Idiosyncratic production risks have a limited impact on retailers' business activities.
3	Severe storms	2	1	2	2.00	
7	Access to inputs	2	1	2	2,00	
11	Theft	1	1	4	1.75	Theft of goods and money, although infrequent, can cause major losses for retailers when large amounts of money are involved.
13	Access to financing	1	1	4	1.75	Retailers generally have privileged access to bank-based financing. For small retailers with little collateral, however, the tightening and rising cost of credit in times of economic, financial, or political crises can lead to a drop in cash flow and therefore a substantial drop in business volume.
14	Access to foreign currencies	1	1	3	1.50	The majority of Burundian retailers do not directly import the maize or other dry grains they sell. The lack of foreign currencies, however, affecting commercial traders who might import dry grains during a period of local production shortage, can make it more difficult for them to obtain supplies, sharply increase the cost of raw materials, and marginally reduce their volume of business.
12	Transport accidents	1	1	3	1.50	Retailers very rarely organize transportation of their products. Most of the transportation is carried out by retailers or producers who supply them directly. Their exposure to this type of risk is therefore limited.
4	Cold spells	1	1	2	1.25	Cold spells have the same risks as hail and crop disease but with less impact.
16	Machine breakdown				0.00	Retailers are not affected by machines breaking down - except when they are also processors.

3.8. Industry-wide risks

At an industry level, weather, market changes, phytosanitary issues, personal, and machine-related risks clearly stand out as having the greatest impact. Producers and processors belong to the categories of stakeholders most at risk.

			Input suppliers	Producers	Traders	Processors	Distributors	Value chain	
1	WEATHER	Low rainfall	3,3	10,3	3,3	5,5	3,0	5,1	MAJOR RISKS
2	WEATHER	Excessive rainfall	3,3	10,3	3,3	5,5	3,0	5,1	
15	PERSONNEL	Illness and worker accidents	4,0	7,3	4,3	4,3	2,3	4,4	
17	MACHINES	Power cuts	5,8	0,0	2,8	8,0	2,8	3,9	SIGNIFICANT RISKS
8	MARKET	Price drop	5,5	5,5	3,0	2,3	2,8	3,8	
7	MARKET	Access to inputs	5,8	5,8	2,0	2,0	2,0	3,5	
5	PHYTO	Insects	0,0	7,8	3,0	3,0	2,8	3,3	
3	WEATHER	Severe storms	2,0	7,3	2,0	2,0	2,0	3,1	
10	LOGISTICS	Stock infestation	0,0	5,8	3,3	3,3	3,0	3,1	
9	MARKET	Price increases	0,0	2,5	2,8	5,5	3,0	2,8	AVERAGE RISKS
14	FINANCIAL	Access to foreign currency	4,3	1,3	3,3	3,5	1,5	2,8	
11	LOGISTICS	Theft	2,0	4,3	2,0	2,0	1,8	2,4	
6	PHYTO	maize diseases	0,0	5,8	2,0	2,0	2,0	2,4	
16	MACHINE	Machine breakdown	4,3	0,0	2,8	3,5	0,0	2,1	
13	FINANCIAL	Access to financing	2,3	2,3	1,5	2,5	1,8	2,1	
4	WEATHER	Cold wave	1,3	3,5	1,3	1,3	1,3	1,7	
LOGISTICS		Transport accident	1,8	1,8	1,8	1,8	1,5		
		Average per actor	2,7	4,8	2,6	3,4	2,1		

Figure 21: The hierarchy of main risks at stakeholder level and for the entire rice value chain in Burundi (source: authors, based on PARM methodology)[54]

[54] N.B.: The score appearing at value chain level is the average of the scores for the five categories of stakeholder. Ideally, this overall score should have been calculated on the basis of a weighted average according to the importance (added value) of each stakeholder category, but the lack of data on their volumes and economic performance prevented us from going into this level of detail. What's more, this average by type of risk takes into account zero values for stakeholder categories for which there is no risk.

For didactic purposes, here is an illustration of the major and important risks by stakeholder category:

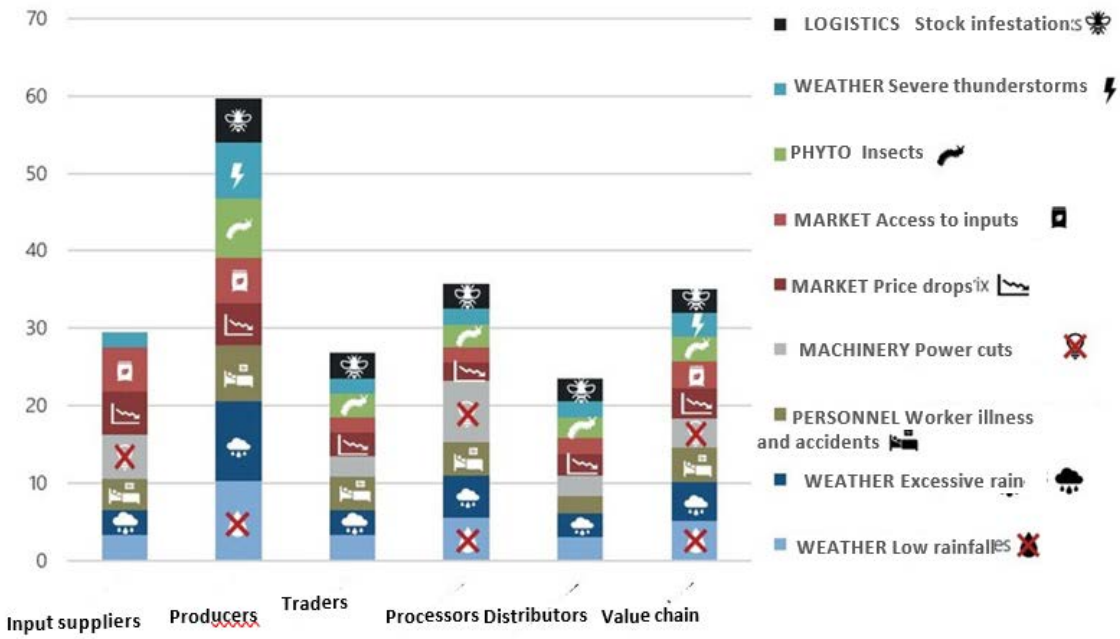


Figure 22: Graphic illustration of the main risks for each stakeholder category

4_Risk management capacity in the maize sector

4.1. Risk management capacity at stakeholder level

The main agricultural risk management strategy shared by all maize industry stakeholders is **diversification**. All players in the industry are involved in other agricultural sectors, and **only certain processors (enriched flours, feed mills) are structurally dependent on the maize industry**.

4.1.1. Risk management tools for input suppliers

Input suppliers have no real risk management tools. Their first strategy is not to specialize in the input supplies linked to a single value chain, but to **diversify their offer,** including inputs for all agricultural production, sometimes including veterinary inputs and often small pieces of equipment that can be used in agriculture, construction, or silviculture (tools, buckets, ropes, torches and electric lamps, etc.).

Faced with market changes and weather risks which, by affecting producers' incomes, can affect their sales, many suppliers like Tubura (a subsidiary of the NGO "One Acre Fund") are developing **credit sales** (partial or total) with flexible repayment schedules, enabling producers to spread input repayments over the harvests and sales of their various products. Therefore, inputs used on maize in season A can sometimes be repaid, even before the maize harvest, via selling animals, cassava pods, beans, or vegetables in the run-up to the festive season.

4.1.2. Risk management tools for producers

For all producers, diversification takes place through three channels: diversification of crops in association (at the same period), diversification of crops in rotation (over the year, sometimes with re-planting during the growing season), and diversification of activities.

As shown opposite, data from the AGVAN 2023 survey confirms that 70% of households have more than one source of income. In surveys carried out during years when they were hit by one or more hazards, 16% of respondents said they had managed to make ends meet by working for other, less-impacted producers and by engaging in non-agricultural activities (transport, construction, and trade).

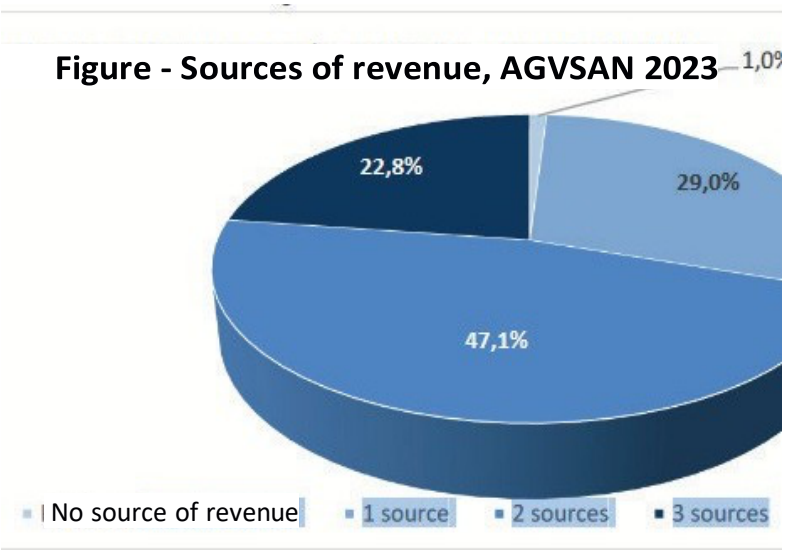


Figure 23: Number of sources of income for Burundian households (source: AGVSAN 2023)

It is important to bear in mind that beyond this 16% threshold, many households structurally practice diversifying these activities with the person working in the non-agricultural sector.

8% of respondents had recourse to debt from shopkeepers or neighbors. **3% sold animals** to compensate for their losses. However, only one producer mentioned savings in the form of grain stocks. More generally, the practice of saving seems to be very underdeveloped - or focused solely on owning or re-selling small animals.

It should also be noted that 18% of producers indicated that they had compensated for the drop in production by simply buying alimentary maize on the market. The role of local retailers is therefore an essential tool in agricultural risk management: their role as suppliers of products in the event of shortages is far more important than their role as lenders, as they are often criticized for the interest rates they charge.

It is worth noting that only 4% of producers, almost all of them in the province of Gitega, which is close to the central government, mentioned the need for support from local authorities.

How do you cope with risks during bad years?		
	% of 254 surveyed	% of 98 respondents
Maize purchased and other products sold at market.	16.5%	42.9%
Work completed for other farmers or other activities	15.7%	40.8%
Crop diversification on the same plot of land	15.4%	39.8%
Debt	8.3%	21.4%
Mechanical pest control	7.1%	18.4%
State solidarity	4.3%	11.2%
Family and village solidarity	4.3%	11.2%
Chemical pest control	3.9%	10.2%
Animal sales	3.1%	8.2%
Manual irrigation	0.8%	2.0%
Inter-annual storage	0.8%	2.0%

Figure 24: Risk management strategies implemented by the 254 producers surveyed

Index insurance pilot

The micro-insurance index based on rainfall records is still in its trial phase *[56]* in Burundi and could be scaled up once this experimental stage's evaluation has been completed *[56]*.

In principle, rainfall index micro-insurance is based on a threshold volume of cumulative rainfall recorded during an agricultural season on one or more plots of land containing several crops. "Normal rainfall" used as a threshold is the rainfall forecast for the geographical area covered, supplied by a platform of experts from the countries making up the Horn of Africa through the Institut Géographique du Burundi (IGEBU) [Geographical Institute of Burundi]. If rainfall deviates upwards (excess rainfall) or downwards (deficit rainfall) *[57]*, a payment is made to compensate the victims: 1% of the insured amount (insurance premium and insurance fund financed by the project) for each mm of rainfall deviation.

The level of intervention also depends on the level of agricultural investment declared by the insured body, and in no case does compensation exceeds 50% of the agricultural investment made by the insured body. Micro-insurance is designed around community financial groups (CFGs) to promote financial inclusion, secure payments via digital platforms, reduce the transaction costs of premium collection, and serve as channels for communicating good agricultural practices that can mitigate the

[55] Micro-insurance based on rainfall index is being implemented in 2024 A in the Province of Gitega by the NGO CORDAID through its project "Appui au Développement de la Finance Rurale Innovante" (PADFIR) [Support for the Development of Innovative Rural Finance], financed by the Kingdom of the Netherlands in Burundi.

[56] See excerpt from the social community micro-insurance approach initiated by the PADFIR project carried out by the NGO CORDAID, and the report of the day of reflection on index-based micro-insurance in Burundi co-organized by CORDAID and ARCA.

[57] The rainfall recorded in the project area is assessed by means of rainfall readings from rain gauges installed on each case over a 9-km (5.6-mile) radius.

impact of climatic shocks and thereby prevent chance/moral hazard behavior. At the end of this pilot season (2024 A), farmers had little confidence in the feasibility of the tool; so, the insurance premium was paid on a flat-rate basis instead of being correlated with the agricultural investments made on the farm.

If the government and TFPs [technical, financial propositions] contribute to the insurance fund, substantial compensation can still mobilize agricultural producers around this agricultural risk management tool, just as the insurance premium can be partly covered by this same fund. Improvements to be made when determining financial compensation would consist of basing this concept on the rainfall required at each of the critical phases in the season (emergence, bolting, flowering, etc.) according to the thresholds provided by research centers such as ISABU and UB instead of the cumulative rainfall over an entire season *[58].*

4.1.3. Risk management tools for traders

Like input suppliers and producers, retailers manage risk primarily by **diversifying** their business activities. First and foremost, this type of marketing is based on the sale of a variety of dry foodstuffs (very few retailers sell highly perishable products such as fruit and vegetables alongside dry grains).

For **larger traders**, who assume greater risks by financing, storing, and transporting large quantities of grain, risk reduction is also achieved by **diversifying into real estate**. Owning residential properties and/or hotels has an advantage of offering both complementary sources of income (with little impact on agricultural risks) and providing a guarantee to the banking sector for obtaining working capital loans.

4.1.4. Risk management tools for processors

As mentioned above, processors are generally the stakeholders with the least diversification capacity in the maize value chain. All of them generally seek to diversify their range by producing flours (enriched or not) and feeds based on starch crops other than maize (wheat, rice bran, eleusine, cassava husk flour); but for the majority of them, maize remains the main raw material for their business and their finished products, which is why their ability to manage risks affecting supply, and ultimately market risks, is extremely limited.

4.1.5. Risk management tools for retailers

As they are less exposed to the risks associated with the maize industry than other stakeholders - because they are **highly diversified** - retailers' main strategy is to form **contracts with their suppliers.** Whether these contracts are oral or written (particularly in the case of modern distribution sites such as mini-marts and supermarkets), retailers require a commitment from their suppliers regarding stability in terms of **price, quality,** containers, and volumes delivered over a specific period (month, quarter, year) and will select their suppliers on the basis of their ability to meet this commitment.

These oral or written contracts enable retailers to **transfer part of the risk** to their suppliers (traders and/or processors). This transfer strategy greatly reduces their exposure to risks within the maize industry.

[58] Some countries, such as Niger and Senegal, use rainfall indices segmented into critical phases of crop development (Maichanou, 2017).

4.1.6. Cash transfers: a cross-cutting but relatively limited risk management tool in Burundi

As Burundi is a sparsely urbanized country with a small diaspora *[59]*, stakeholders in the maize value chain do not benefit much from external income (a family working in town or expatriates). As can be seen below, less than 5% of people living in rural areas and less than 7% of those living in urban areas receive cash transfers to help them cope with agricultural risks affecting their income.

Figure - Transfers received by households over the past 12 months,

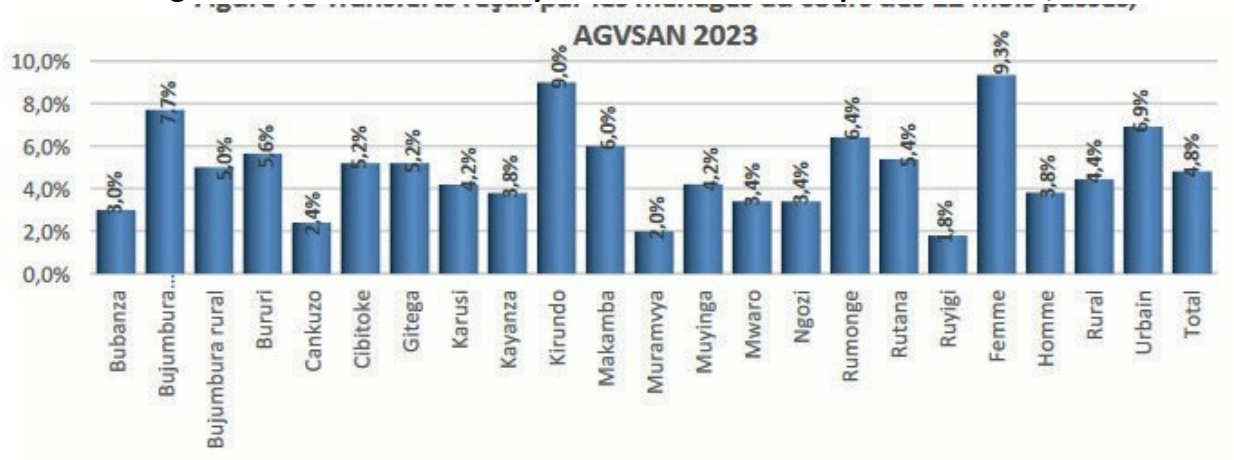


Figure 25: Access rate to cash transfers in Burundi (source: AGVSAN 2023)

[59] According to the International Organization (IOM) for Migration, by 2021 the Burundian diaspora will number just 75,530 people, mainly based in neighboring countries (DRC, Tanzania, Rwanda). https://www.migrationdataportal.org/dashboard/national-data?c=108&i=10685&t=2010

4.2. Risk management capacity at an institutional level

4.2.1. Risk tools at national level

National Platform for Risk Prevention and Disaster Management

Created in 2007 *[60]*, the National Platform for Risk Prevention and Disaster Management is affiliated with the Ministry of the Interior, Community Development and Public Safety. Its mission is to identify and prevent the risk of natural disasters and to facilitate disaster response.

This Platform works closely with UN agencies and NGOs specializing in crisis management, in particular the International Organization for Migration (IOM), which has helped it design a **multi-hazard mapping platform** *[61],* displaying provincial maps showing the risks associated with natural disasters (torrential rains, floods, violent winds, earthquakes, landslides, etc.), that quantifies average annual losses per township (on the scale of Burundi's 119 townships).

It has also drawn up **a 2013-2016 action plan** intended to strengthen national capacities for risk reduction, emergency preparedness, and emergency response in Burundi *[62]*. The plan highlights **the current absence of disaster management funds** and the limited resources of Burundi's firefighters and Civil Protection teams.

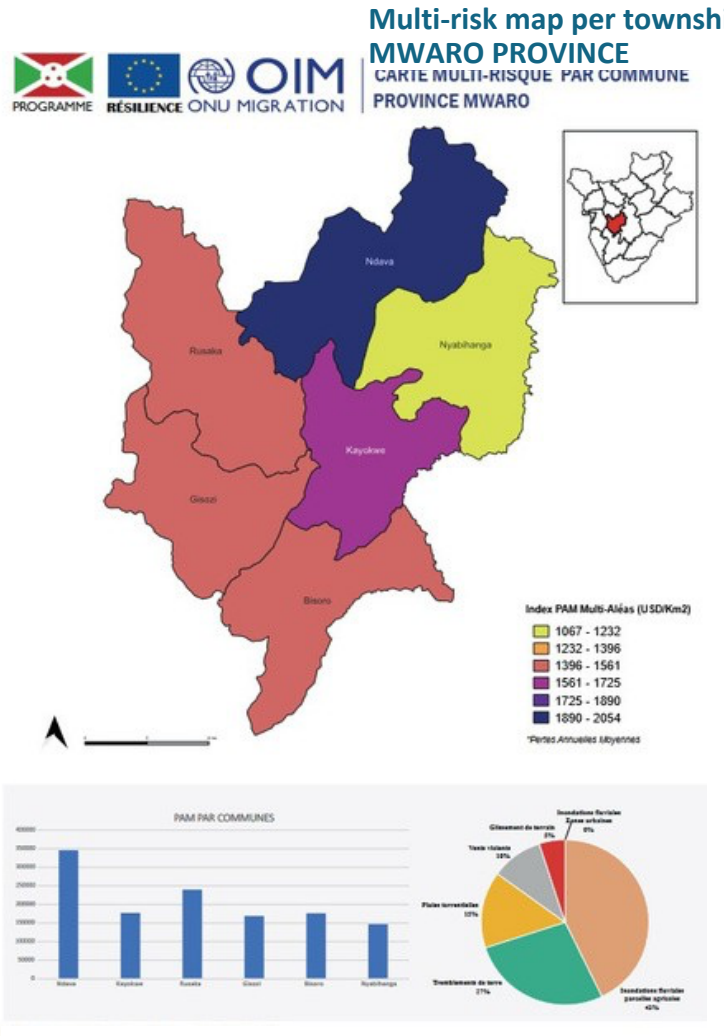


Figure 26: Example of an IOM multi-hazard map by township

With regard to agricultural risks, this action plan stresses, above all, the importance of setting up an agricultural **Early Warning System (EWS)** to anticipate crises - particularly food crises - within a multi-risk EWS.

The recent media appearance (February 2024) by the President of the Platform, Mr. Anicet Nibaruta *[63]*, indicates that, at this stage, neither the EWS nor the Fund has been set up.

Over the next few years, the National Platform for Risk Prevention and Disaster Management intends to **invest in Burundi's weather forecasting capabilities.**

60 https://bibliomines.org/wp-content/uploads/Decret_N___100-291_du_16_Octobre_2007.pdf and https://presidence.gov.bi/wp-content/uploads/2024/04/decret.pdf

61 https://fscluster.org/sites/default/files/documents/cfsva_2023_burundi_rapport_final_version_francaise.pdf

62 https://www.cadri.net/system/files/2021-05/BURUNDI-Plan-d-Action-National-en-RRC.pdf

63 https://www.iwacu-burundi.org/changement-climatique-au-burundi-vers-un-systeme-dalerte-precoce-pour-tous/

The World Food Program Mission in Burundi

Created in 1961, the World Food Program (WFP) has been present in Burundi since the 1990s, notably to provide food-based aid to displaced persons and refugees during the civil wars and crises that have marked this time period. At present, the WFP is still involved in **distributing food aid to the tens of thousands of refugees** (mainly Congolese) living in Burundi, as well as in **programmes to combat malnutrition** among young children and school children.

In terms of data production, the WFP regularly supports the Institut National de la Statistique du Burundi (INSBU) [National Institute of Statistics in Burundi] and MINEAGRIE in carrying out **surveys on rural household vulnerability and food security**. In particular, it financed a Global Analysis of Vulnerability, Food Security, and Nutrition in Burundi in August-September 2023 (AGSVAN 2023) *[64]*. The WFP and INSBU are also monitoring the retail prices of the main food products (maize, beans, cassava flour, potatoes) in the retail markets of Burundi's main towns and cities. On the other hand, they do not track the evolution of unofficial exchange rates on the parallel market, which clearly skews their price trend analyses - given the 60% gap between the official foreign exchange market and the parallel market.

National contingency plan

A national contingency plan was drawn up in 2013-2014 *[65]*. This plan establishes **human risks** (internal conflicts and external migratory flows) as the **primary risks for the country**. Among the agricultural risks identified, **price risk (soaring prices) ranks second** in terms of overall risk at national level. Risks linked to excess water (flooding, landslides, crop destruction) come fifth and droughts eighth out of a total of 14 major risks identified.

A coordination mechanism, which places the National Platform for Risk Prevention and Disaster Management at the head of operations, is established as shown below:

[64] https://fscluster.org/sites/default/files/documents/cfsva_2023_burundi_rapport_final_version_francaise.pdf

[65] http://www.presidence.gov.bi/wp-content/uploads/2017/04/plan-de-contingence-nationale-de-gestion-des-urgences.pdf

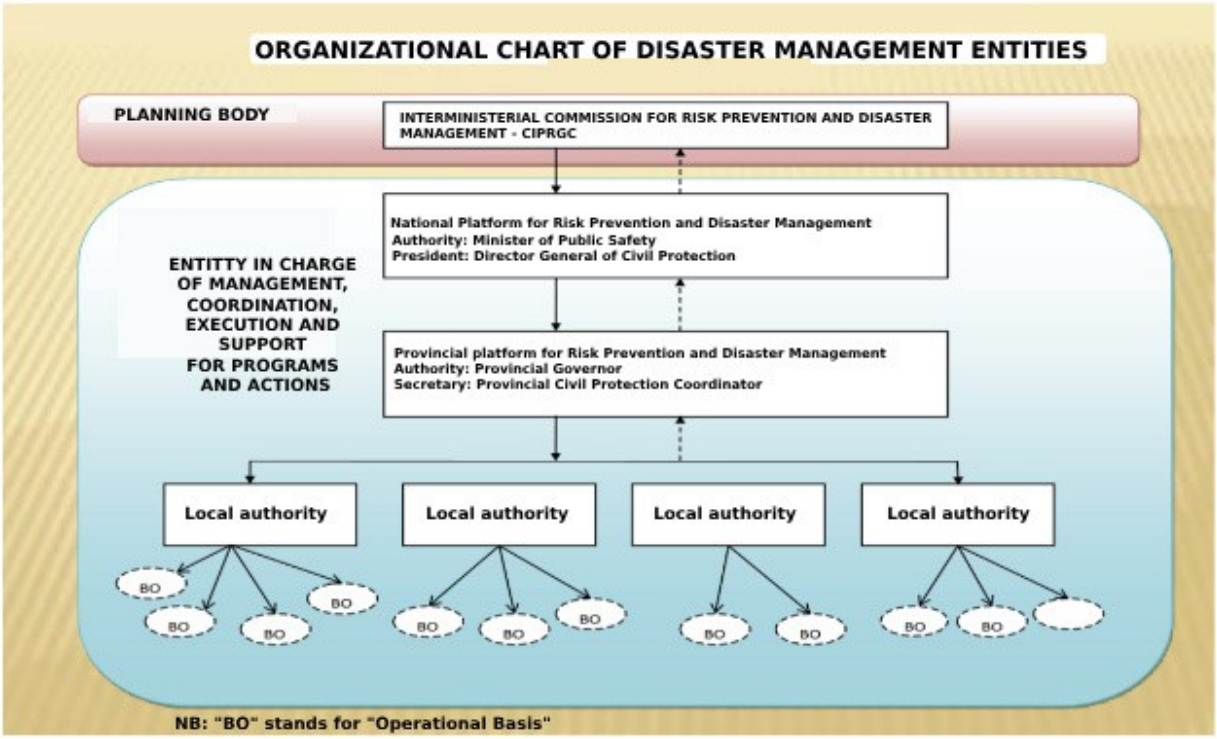


Figure 27: National institutional coordination structure (source: harmonized national contingency plan)

Disaster management in Burundi therefore seems relatively well prepared for, with dedicated institutions and continuously improving monitoring tools. The state's main **constraint is the availability of funds dedicated to disaster management**. Against a backdrop of very limited public budget capacity and a lack of foreign currency, **financing action plans is currently highly dependent on international funding**.

ANAGESSA

As written above, ANAGESSA is an agency with a dual political mandate:

- **Building up food security stocks** throughout the country to prevent the risk of food crises and soaring commodity prices;
- **Supporting producers' sales prices** by purchasing at an incentive price.

With three permanent employees, little experience and documentation in agricultural market regulation, and a highly critical approach to current market operations (cereal traders are seen by ANAGESSA staff as speculators and usurers), the agency **clearly appears to be financially and technically under-resourced when it comes to its mission.**

Its short-term priority is carrying out an inventory of state and local government storage capacities to establish its storage capacity and the improvements it needs to make.

It would also be highly strategic to provide ANAGESSA teams with **training workshops on the workings of grain markets, the self-regulating role of private storage in normal conditions, and strategies for fine-tuning market regulation**. In fact, ANAGESSA's intervention in 2023, with a maize purchase price of BIF 1,700/kg (at a time when edge-of-field prices were around BIF 1,000/kg), was perceived as disruptive or unfair by many stakeholders in the sector. The risk of discrimination between suppliers also seems significant at such a price level - if no raw material acquisition rules are put in place (quota per producer or producer organization, traceability of stocks, rigorous quality control, etc.).

In the medium term, given the fragility of Burundi's public finances, **creating and managing the grain fund and stock also requires economic modeling** to give the structure the financial leeway to regulate grain supply on the markets over the long term.

For example, a "seasonally-allocated margin" system could be set up, based on the average seasonality of prices, to build up a fund to which a storage margin could be added in good years, enabling purchases and sales at a loss in years of high pressure on the cereals market (marked over- production or under-production). Coordination with the World Food Program also seems essential for the Agency to run smoothly.

4.2.2. Risk management tools at the level of townships/municipalities

Local contingency plans

GIZ *[66]* (German Organization for International Cooperation), the United Nations Development Programme (UNDP) *[67],* and the Ministry of Public Security*[68]* have helped a number of Burundi's townships draw up communal contingency plans. According to the provincial governors, some townships already have similar plans.

Once again, decision-making frameworks and responsibilities at a municipal level seem to be clearly defined in these plans. Endowments, funds, and means of action, however, seem a lot more limited.

It should be noted that, in the communal contingency plans consulted, **food insecurity** emerges as a **major risk, along with climatic phenomena** (excess water, drought) which impact both agriculture and infrastructure.

4.3. Capacity and vulnerability

4.3.1. Risk management options and capacity assessment

For each of the risks identified in the maize sector, a targeted management option is analyzed. In addition to these targeted options, cross-cutting options such as diversification, which address several risks, are also analyzed. The options analysis is based on two estimates:

- **Effectiveness** is an analysis of the option in terms of reducing the impact of risks when implemented. It is scored from 1 to 3, according to the methodology presented below.

- **Applicability** is an analysis of the access conditions to this option. If its access is extremely limited for reasons of cost, technicality of implementation, or availability along the value chain, the score will be low. If, on the other hand, access to this option is simple and common in the industry, the score will be high. This score is established on a basis of 1 to 4, according to the methodology presented below.

66 https://adelphi.de/en/search?s=contingence+burundi

67 https://www.undp.org/fr/burundi/actualites/des-plans-de-contingence-communaux-actualises-pour-des-communautes-plus-resilientes-aux-catastrophes

68 http://mininterinfos.gov.bi/wp-content/uploads/2020/01/KQU@-MSPGC2020.pdf

Effectiveness of risk management options			**Applicability** of risk management options		
Category	**Criteria**	**Score**	**Category**	**Criteria**	**Score**
Significant effect	Reduction or compensation of at least 50% of losses	3	Applicable	General or common access to this option	4
Moderate effect	Reduction or compensation of at least 25% of losses	2	Sometimes applicable	Access to this option for more than half the stakeholder group	3
			Difficult or costly to apply	Access limited to a few stakeholders due to high cost or high technicality	2
Minor effect	Reduction or compensation of less than 25% of losses	1	Not possible or very difficult to apply	Option is unavailable within the industry or prohibitive cost exists	1

Figure 28: Methodology for quantifying PARM's risk management capacity

It should be noted that risk management capacity is **analyzed at all sectors' levels**. Within each stakeholder category, more at-risk demographics such as women, young people, internally displaced persons (IDPs) or refugees, or newly created businesses, may have a much lower risk management capacity than the majority of stakeholders in each link of the value chain. We'll be coming back to the need for **specific approaches for these more vulnerable demographics** within each sector in the action plan.

In the next table, we have analyzed the effectiveness and applicability of 36 risk management options (tools, strategies, public policies) in Burundi's maize value chain. Each option reduces or offsets one or more risks. Some options do not apply to all stakeholders. If this is the case, no score is associated with the stakeholder category.

The table shows that input suppliers, retailers, and commercial traders have the best risk management capabilities.

Although **producers and processors** are the stakeholders **most exposed to risk**, as mentioned in the previous section, they are also the links in the value chain with the **most limited average risk management capacity**.

N°	Options		Risks	Input suppliers			Maize farmers			Traders			Processors			Distributors		
				Effectiveness (1-3)	Applicability (1-4)	Capacity (1-12)	Effectiveness (1-3	Applicability (1-4)	Capacity (1-12)	Effectiveness (1-3)	Applicability (1-4)	Capacity (1-12)	Effectiveness (1-3)	Applicability (1-4)	Capacity (1-12)	Effectiveness (1-3)	Applicability (1-4)	Capacity (1-12)
1	Variety diversity	124	Water deficit, excess rainfall, cold spells	2	4	8	2	3	6									
2	Supplementary irrigation	1	Water deficit				3	1	3									
3	Hydro-agricultural micro dev. mgt. plan	12	Water deficit, excess rainfall				2	2	4									
4	Watershed management plan	12	Water deficit, excess rainfall				2	2	4									
5	Natural disaster management fund	1234	Water deficit, excess rainfall, cold spells	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2
6	Agroforestry	126	Water deficit, excess rainfall, maize diseases				1	3	3									
7	Agrometeorological info & advice	1234	Water deficit, excess rainfall, maize diseases	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2
8	Weather index insurance	1234	Water deficit, excess rainfall, maize diseases				1	2	2									
9	Info & advice on pests & diseases	56	Caterpillars, maize diseases				2	2	4									
10	Mechanical control techniques	56	Caterpillars, maize diseases				2	4	8									
11	Chemical control techniques	56	Caterpillars, maize diseases				2	3	6									
12	Biological control techniques	56	Caterpillars, maize diseases				2	1	2									
13	Health monitoring system	56	Caterpillars, maize diseases				1	2	2	1	2	2	1	2	2	1	2	2
14	Self-produced fertilizers	67	Maize diseases, access to inputs	2	3	6	2	2	4									
15	Self-prod. phytosanitary treatment	567	Maize diseases, access to inputs				2	1	2									
16	Self-produced fertilizers	7	Access to inputs	2	4	8	2	3	6									
17	Market information and advice	789	Access to inputs, price drops, price increase	2	2	4	2	1	2	2	3	6	2	2	4	2	2	4
18	Reference market network	789	Access to inputs, price drops, price increase	2	3	6	2	3	6	2	4	8	2	3	6	2	3	6
19	Warrantage & third-party holding	8913	Price drops, price increase, access to funding	2	3	6	2	2	4	2	2	4	2	2	4	2	2	4
20	Packaging adapted to maize storage	10	Stock infestation	3	4	12	3	2	6	3	3	9	3	3	9	3	3	9
21	Maize storage treatment	10	Stock infestation	3	4	12	3	2	6	3	4	12	3	4	12	3	4	12
22	Maize storage treatment	710	Access to inputs, stock infestation				2	2	4									
23	Suitable storage warehouses	8910	Access to inputs, stock infestation	2	4	8	2	2	4	2	3	6	2	3	6	2	3	6
24	Grain banks	8910	Price drops, price increase, stock infestation				2	2	4									
25	Public price smoothing mechanism	89	Price drops, price increase	2	2	4	2	2	4	2	2	4	2	2	4	2	2	4
26	Storage insurance (theft, dest.)	1011	Stock infestation, thefts	3	2	6	3	2	6	3	2	6	3	2	6	3	3	9
27	Transport ins. (theft & destruction)	1112	Diseases and transport accidents	3	2	6	3	2	6	3	2	6	3	2	6	3	2	6
28	Storage insurance (theft, dest.)	15	Diseases and worker accidents	3	2	6	3	1	3	3	1	3	3	1	3	3	2	6
29	Social security	15	Diseases and worker accidents	3	3	9	3	1	3	3	1	3	3	1	3	3	2	6
30	Repair and spare parts network	16	Machine breakdown	3	3	9							3	3	9			
31	Supplier warranties	16	Machine breakdown	3	2	6							3	2	6			
32	Autonomous solar kit	17	Power cuts	3	2	6				3	2	6	3	2	6	3	2	6
33	Micro-credit and credit	All		3	4	12	2	3	6	2	4	8	2	4	8	2	4	8
34	Secure, liquid, interest-bearing savings	All		3	4	12	2	2	4	2	4	8	2	4	8	2	4	8
35	Value chain diversification	All		2	4	8	2	4	8	3	4	12	2	2	4	3	4	12
36	Diversification of activities	All		2	2	4	2	4	8	3	3	9	2	2	4	3	4	12
37	Safety net for the most vulnerable	All		2	1	2	2	1	2	2	1	2	2	1	2	2	1	2
	Average capacity by actor					7.0			4.3			5.9			5.3			6.3

Once the risk management capacity has been defined for each risk management option, the risk management capacity per risk is calculated on the basis of the average of the scores of all the options concerning the same risk. The result is a risk management capacity score rated out of 12, as shown below. Risks that do not concern a stakeholder are left empty. For this indicator, the lower the score, the more limited the ability to manage the identified risk. Once again, producers and processors have the most limited risk management capabilities.

Risk management capability scores

			Input suppliers	Producers	Traders	Processors	Distributors
1	WEATHER	Lack of rainfall	6.3	4.2	6.1	4.3	6.6
2	WEATHER	Excess rainfall	6.3	4.3	6.1	4.3	6.6
3	WEATHER	Severe thunderstorms	6.0	4.3	6.1	4.3	6.6
4	WEATHER	Cold spell	6.3	4.4	6.1	4.3	6.6
5.	PHYTO	Insects		4.7	6.8	4.7	7.3
6.	PHYTO	maize diseases		4.5	6.8	4.7	7.3
7.	MARKET	Access to inputs	6.7	4.8	7.0	5.1	6.9
8.	MARKET	Price drop	6.6	4.7	6.7	5.0	6.6
9.	MARKET	Price rise		4.7	6.7	5.0	6.6
10	LOGISTICS	Stock infestation		5.3	8.0	6.6	8.7
11	LOGISTICS	Theft	7.1	5.7	7.3	5.4	8.1
12	LOGISTICS	Transport accident	7.3	5.7	7.5	5.3	8.0
13	FINANCE	Access to finances	7.3	5.3	7.2	5.0	7.7
14	FINANCE	Access to foreign currency	7.6	5.6	7.8	5.2	8.4
15	PERSONNEL	Personnel illness and accidents	7.6	4.9	6.4	4.6	7.7
16	MACHINES	Machine breakdown	7.6		7.8	5.9	
17	MACHINES	Power failure	7.3		7.5	5.3	8,0

Figure 29: Risk management capacity at each stakeholders' level in the rice value chain (source: authors, based on PARM methodology)

On the basis of these risk management capacity scores, we can, in the next section, calculate the vulnerability score to each risk affecting the stakeholders and the value chain as a whole.

4.3.2. Vulnerability score

The vulnerability score is calculated on the basis of the **60%-weighted risk score** and the **40%- weighted management capacity score**. A moderate risk for which one category of stakeholder has no management capacity may therefore result in greater vulnerability than a high risk for which the stakeholders have significant management capacity.

In the context of Burundi's maize value chain, the two rainfall-related risks remain those that make the sector most vulnerable. Vulnerability to personal risks (illness, accidents) remains high, particularly in the absence of social security coverage mechanisms. However, the sector's vulnerability to caterpillar or lepidopteran infestations is greater than its vulnerability to power outages.

Maize Sector
Vulnerability scores

			Input suppliers	Producers	Traders	Processors	Distributors	Value chain	
1	WEATHER	Low rainfall	4.3	9.3	4.3	6.4	4.0	5.6	
2	WEATHER	Excessive rainfall	4.3	9.3	4.3	6.4	4.0	5.6	
15	PEOPLE	Illness and personal injury	4.2	7.2	4.8	5.5	3.1	4.9	
5	PHYTO	Insects		7.6	3.9	4.7	3.5	4.9	
17	MACHINES	Power cuts	5.3		3.5	7.5	3.3	4.9	
8	MARKET	Price drops	5.5	6.2	3.9	4.2	3.8	4.7	HIGH VULNERABILITY
9	MARKET	Price increases		4.4	3.8	6.1	4.0	4.6	
7	MARKET	Access to inputs	5.6	6.3	3.2	4.0	3.2	4.5	
3	WEATHER	Severe storms	3.6	7.5	3.5	4.3	3.4	4.5	
10	LOGISTICS	Stock infestation		6.1	3.6	4.1	3.1	4.2	
6	PHYTO	Maize diseases		6.4	3.3	4.1	3.1	4.2	
16	MACHINES	Machine breakdown	4.3		3.3	4.6		4.1	
14	FINANCIAL	Access to foreign currency	4.3	3.3	3.6	4.8	2.3	3.7	
4	WEATHER	Cold wave	3.1	5.1	3.1	3.8	2.9	3.6	SIGNIFICANT VULNERABILITY
11	LOGISTICS	Theft	3.1	5.1	3.1	3.8	2.6	3.5	
13	FINANCIAL	Access to finance	3.2	4.0	2.8	4.3	2.8	3.4	
12	LOGISTICS	Transport accident	2.9	3.6	2.9	3.7	2.5	3.1	AVERAGE VULNERABILITY
		Average by stakeholder	**4.1**	**6.1**	**3.6**	**4.8**	**3.2**		

Figure 30: Vulnerability of stakeholder and the entire rice value chain in Burundi to the main risks (source: authors, based on PARM methodology).[69]

In conclusion, it can be said that the categories of risk to which the sector is most vulnerable are those linked to water, the market, insects, and electricity supply.

Quantitative surveys have highlighted women's vulnerability to meteorological hazards, probably linked to the fact that land is less well located to cope with bad weather or water shortages. Moreover, they have fewer resources at their disposal to cope with these hazards.

Worker risk is also very important for the most vulnerable parties affected and for the entire value chain but is harder to influence in the context of an agricultural risk management program, since this kind of risk goes beyond the agricultural context and concerns the entire health and social security system.

[69] N.B.: the score appearing at value chain level is the average of the scores for the five categories of stakeholder. Ideally, this overall score should have been calculated on the basis of a weighted average according to the importance (added value) of each stakeholder category, but the lack of data on their volumes and economic performance prevented us from going into this level of detail. What's more, this average per means of vulnerability does not take into account stakeholders considered not to be vulnerable to this risk.

In the following section, we will attempt to propose courses of action to design an agricultural risk management program capable of reducing the long-term vulnerability of stakeholders and the sector when it comes to these priority risks.

For didactic purposes, here is an illustration of the risks to which the various stakeholders are most vulnerable:

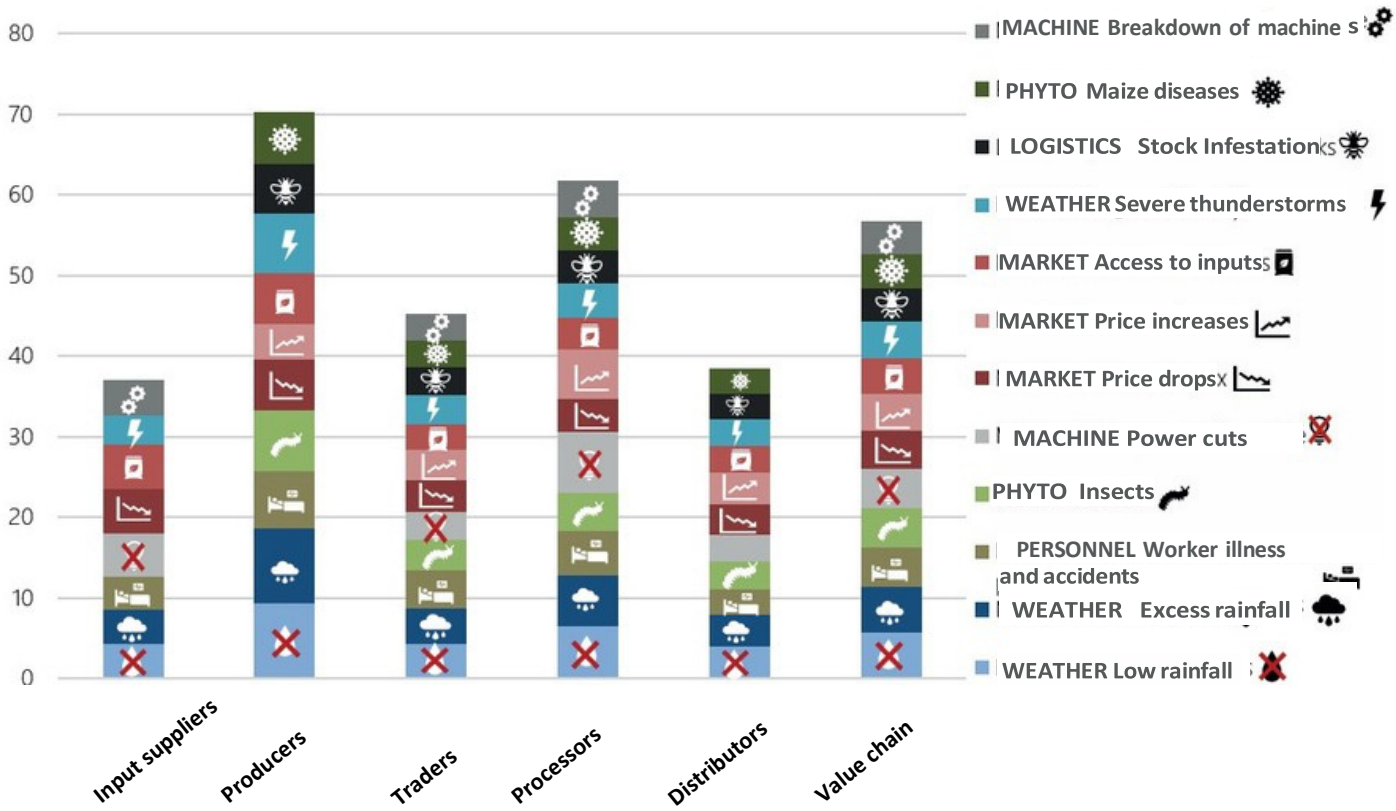


Figure 31: Graphic illustration of the risks to which maize value chain stakeholders are most vulnerable

5_ Strategies and action plan for agricultural risk management in the maize value chain in Burundi

The maize industry is highly exposed to risk. **An essential sector for Burundi's food security, production risks are essentially environmental** (weather and phytosanitary pressure).

Existing mitigation strategies are mainly and intrinsically linked to Burundi's particular production methods: **crop diversity and associations, and use of topography to desynchronize production**.

The main risk categories identified by the study are as follows:

1) **Production risks:** these relate both to extreme climatic events (linked in particular to water management) and to upsets from phytosanitary pressure.

2) **Market risks**: these relate both to price volatility in production zones and on the national market, and to the impact of international markets via fertilizer imports.

3) **Machine-related risks**: linked to the automation of input preparation and packaging stages, but above all to maize processing stages (shelling, crushing, grinding, blending, packaging). These risks, and in particular the stability of the electricity supply - and to a lesser extent the availability of equipment, agro-industrial mechanical skills and spare parts - both handicap the income and performance of upstream and downstream maize production and hinder the creation of added value in the sector.

In addition to the risks associated with the maize value chain in Burundi, there are also structural **constraints on the country's agricultural economy:** densely populated and landlocked, Burundi has few comparative advantages, and any specialization in one sector would be insufficient to achieve any kind of competitiveness on world markets (and would also be highly detrimental to the production system's resilience). On one hand, the State's limited capacity to invest in its infrastructure and institutions (education, police, justice, rule of law, social security) and, on the other, the low level of diversification in the Burundian economy, severely limit the diversification options available to stakeholders in the sector (sectoral or non-agricultural diversification). It is difficult to act on this third category of risk on the scale of an Agricultural Risk Management (ARM) programme, which is why most of the proposals that follow will focus on the categories of risk that specifically concern the maize value chain.

It should be noted, however, that a number of actions, notably concerning market function and improving the production and dissemination of independent information useful to stakeholders, contribute indirectly to strengthening the Burundian economy's structure and, therefore, marginally to reducing these structural risks. Also, thanks to an Agricultural Risk Management programme, developing the maize, rice, and rabbit sectors will contribute to diversifying the agricultural economy and, more generally, Burundi's economy.

The image below summarizes the main action strategies proposed as part of an agricultural risk management programme for the maize sector. Some of the proposed actions are shared with those of the rice sector, as they are also highly relevant to the latter.

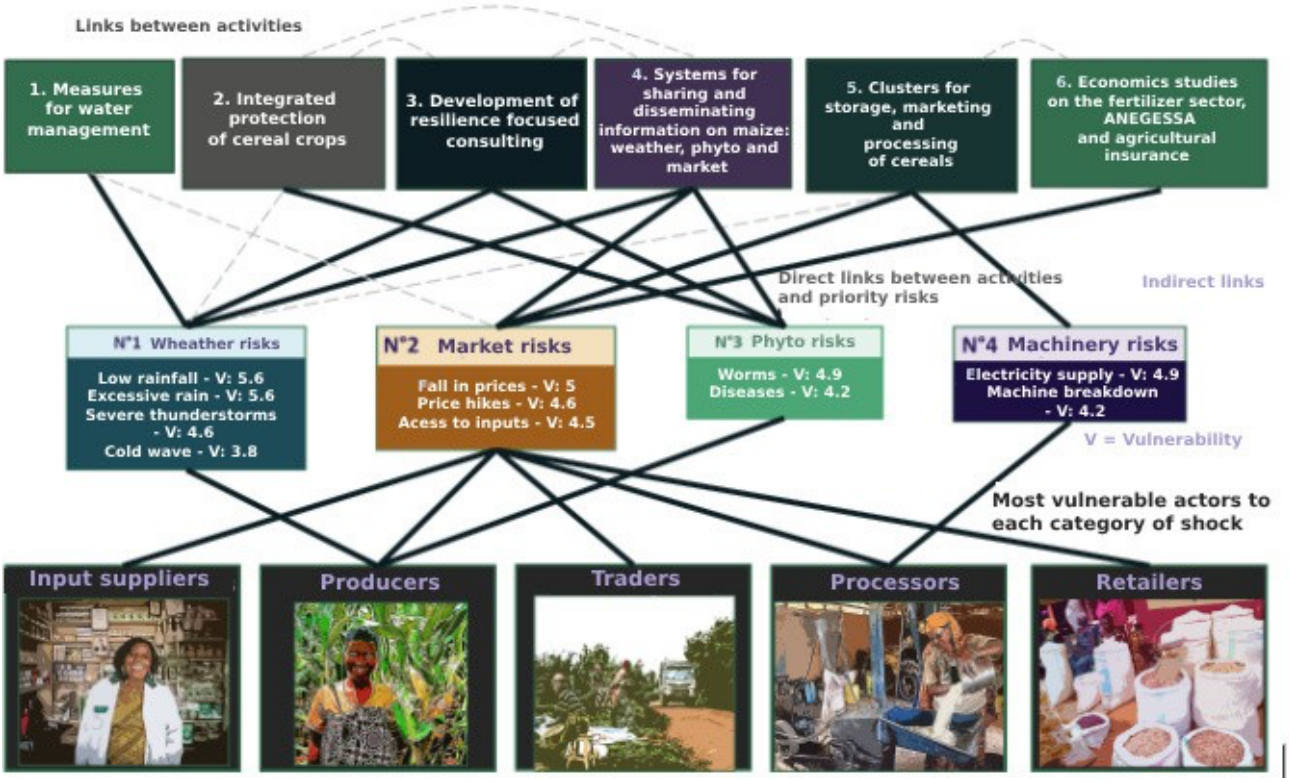


Figure 32: Proposed actions meant to manage priority agricultural risks in Burundi's maize sector

5.1. Improving adaptation to climate risk through better water management

According to the surveys carried out during this study, the main climatic risks are a lack of water and, conversely, damage caused by excess water (flooding and erosion that damage or even destroy agricultural, logistical, and hydro-agricultural development).

In this respect, a comprehensive approach to improving landscape resilience to rainfall is required. This approach is being carried out globally, designed to increase water storage capacity in watersheds (including in the "living" compartments of landscapes: forests, hedges, fodder), reinforce soil retention capacities and preserve their resistance to erosion, improve the capacity to drain and/or evacuate excess water without damaging hydraulic systems and, last but not least, to strengthen the capacity of households to better manage the soil/water resource pair (and promote beneficial practices).

Burundi's topography, rainfall patterns, and high rural population densities make **erosion control** a long-standing national concern. Numerous reports highlight the harmful farming practices that encourage erosion (ploughing descending slopes, for example). As early as the 1940s*[70]*, ambitious "development projects for the modernization of agriculture" sought to combat "soil and land losses", in particular through installing blind isohypsis ditches (i.e., with no outlets) and fountain grass plantations on contour lines.

However, some authors have pointed out the constraints associated with these developments and the exposure of producers to high risks of flooding or excess water harmful to certain particularly sensitive crops, which is why producers build drainage gutters (in the direction of the slopes or obliquely, depending on the case) [71].

[70] Voir par exemple: https://www.persee.fr/doc/payen_0989-6007_1990_act_3_1_854#

In this regard, it is essential to integrate endogenous knowledge and to approach watershed management from a practical perspective and from the point of view of users (who are ultimately responsible for maintaining the structures). From this perspective, however, we can imagine several levers for dealing with the risks associated with water management.


Figure 33: Comparing exogenous and endogenous erosion control measures

Recent projects in Rwanda: This type of large-scale development is generally very popular with funders, but has a number of limitations: the need for extensive re-parceling, the durability of the schemes if the outlets are not adapted, the difficulty of adapting to different soil depths, and the fact that little account is taken of farmers' "knowledge." These limitations generate major risks: physical risks linked to the facilities being destroyed by rain, social risks linked to failing to take into account the constraints (land tenure in particular) of certain farms affected by the facilities, and risks of losing production resilience through the homogenization of technical itineraries.

Conversely, the above-right image illustrates the diversity of management practices in Burundi, which enable a separate form of risk management (particularly visible through the diversity of crops grown). The plots are contiguous, but generally "framed" by gullies to ensure effective drainage. Some plots have drains set at an angle that matches the slope's, making it possible to adapt to a wide range of topographical configurations. There are also different strategies for maintaining a permanent plant cover: the maize-cassava association, for example, allows plant cycles to be staggered, or the use of perennial plants: bananas and sylviculture. *Fountain grasses* are also used to stabilize plot edges, both on slopes and on contour lines. The topographical sequence is also carefully considered as a whole: the upper slopes accumulate woody biomass, the foothills grow annual crops in rotations and associations, and the lower slopes are devoted to rice growing and off-season crops. Transferring fine elements to the sidelines can be part of the strategy. It is not a question of "over-valuing" farming practices a priori, but of integrating them into an overall approach to optimizing water management.

Promoting pragmatic agro-ecology enables us to approach the question of water management in a systemic way, by integrating endogenous knowledge. This means capitalizing on existing agroecological practices in Burundi and intensifying them where necessary and possible, in co-construction with producers (see recommendation 5.5). This stance is even more important in a country where agricultural services are trending towards a type of "modernism" at odds with the principles of agroecology (monoculture, specialization).

[71]See https://www.persee.fr/doc/tiers_1293-8882_2002_num_43_172_1670_t1_0950_0000_1

As far as erosion control is concerned, we can distinguish two phenomena linked to the aggressiveness of rainfall. Initially, rainfall disintegrates soil structures, making fine, soluble elements more available (the effect is more or less significant depending on soil characteristics). In a later phase, the elements disintegrated in this fashion are drained off by means of runoff, which is more or less intense depending on the length and gradient of the slopes. It is therefore advisable to act on these two phenomena: first, to protect the soil (and make it less sensitive to the mechanical force of rain), and second, to encourage draining excess water.

Protecting the soil

The most effective way to protect the soil is to **maintain a permanent vegetation cover.** Many farming practices are conducive to maintaining a permanent cover: associated crops with complementary root systems (e.g., cassava and maize), associated crops with a ground-cover effect (e.g., maize and sweet potato). Some agroecological options could be tested to enrich the levers available: cover crops associated with maize (peanuts) and ecosystemic plants (e.g., Mucuna or Crotalaria). As part of a co-constructed support approach, it would be useful to establish technical itineraries that are conducive to permanently maintaining plant cover. It may be useful to promote positive practices: for example, during our mission, we observed high-performance bean sowing systems using maize stalks as stakes (the leaves of which were harvested as fodder).

In addition, **biomass needs to be returned to the soil** to reinforce the soil's structural stability. Significant biomass is restored by bananas, for example, but options are sometimes limited. Available biomass could be better used by identifying biomass deposits by hillside and grinding them and returning them to the soil (post- harvest coffee waste, palm oil, wood, urban waste, banana trunks). By incorporating biomass into the soil, biological activity increases its porosity (and therefore its capacity to store water). Different types of manure are also widely used with precise results (fractional contributions per seed pocket). These practices should be encouraged. Targeted and fractioned inputs are more effective in protecting the soil than massive inputs or herd stabling.

In this respect, **creating a link with the rabbit industry would be beneficial** to ensure permanent cover crop recycling (for example, alfalfa, clovers in maize inter-rows). These labor-intensive technical systems (sowing cover crops, green harvesting, feeding, and restituting manure in stacks) need to be adjusted according to producers' limitations.

Promoting storage and evacuating excess water

Once the soil's capacity for infiltration and storage has been maximized, it is possible to consider **its potential storage on one hand, and its "controlled" evacuation capability on the other**. Storage can be considered on a watershed scale - either on a small scale (domestic storage via small types of infrastructure [notably PVC water tanks, the production of which has developed in the sub-region], admittedly limited but allowing a home garden to be maintained, for example), or on a larger scale where possible and sensible (hillside reservoirs). Storage in "living" compartments should also be considered: scattered trees over the landscape, hedges where sensible, and silvicultural groves are all means to be promoted (for example, by making available forest or shrub species requested by producers, including Grevillea, Callendra, Moringa, etc.).

Forestry can play a very important role in the long-term stabilization of the landscape. To achieve this goal, we need to encourage positive practices such as maintaining a permanent cover or planting crops that cover the soil. In fact, when plowing a plot of land, clear-cutting can severely degrade the soil, depending on the time period under consideration. The involvement of women's groups in silviculture, with possible support from REFACOF (African Women's Network for Community Forest Management), is also an interesting avenue to consider.

Last but not least, it is essential to think about water drainage; to do so, we need to draw inspiration from farming practices, for example: stony gutters laid out according to the length and gradient of the slopes, with banks stabilized by Pennisetum or sugar cane. An entire drainage network needs to be built in consultation with users, to ensure maximum circulation of nutrient-free water. To achieve this goal, HIMO (High Intensity Labor Activities) approaches could be used (from cutting stone blocks to installing them, to building up the network).

Leveraging social and landscape engineering

As written above, there are a number of "agro-ecological techniques" for reducing climate-related risks. But these techniques only make sense if they are part of an individual and collective approach of those who use an agricultural area. To achieve this goal, **it is necessary for watershed users to work together to build a shared vision of the landscape.** It is a laborious and painstaking task, but one that could be piloted by sites on hills that have already undergone their risk analysis and land use plans.

At the end of these kinds of consultations, a three-scale action plan could be co-constructed, answering the following questions:

- At plot level: what practices can be implemented to promote soil protection? (Sowing under plant cover, maintaining plant cover, ecosystemic plants, associations, mulching, long plant growing rotations including silviculture);
- At farm system level: how do we optimize biomass production and recycling organic matter produced on the farm? (Agro-silvo-pastoral integration, improved fallows)
- On a watershed scale: what infrastructure is needed to store and evacuate water? What kind of social organization is needed to keep different types of infrastructure in working order?

5.2. Promoting integrated protection to limit phytosanitary risks

The second risk mentioned by producers and growers during the survey was insect attacks. During field visits, this risk was also a recurring concern, which seems to be accentuated by the effects of climate change. In fact, certain "new" types of insect pests (particularly concerning to producers) such as the fall army worm are clearly associated with rising temperatures *[72]*. In this respect, risk management needs to be both preventive and curative.

5.2.1. Supporting producers in implementing preventive pest management

To achieve this goal, we will act on the following:

- Maize and rice *growing conditions*. Agroecological techniques are designed to promote good growing conditions for plants, making them more resistant to attack. This involves a range of techniques such as varietal adaptation, temporal and spatial rotations, and associated crops and adapted mineral nutrition (for example, in maize, the state of nitrogen nutrition is associated with greater or lesser palatability for caterpillars).

[72] Other examples include whiteflies in the rice sector, which have been observed in the Imbo Plain (where temperatures are rising significantly), and cricket beetles, a polyphagous insect which is generally not a problem, but which can get worse in drier periods (populations are generally kept at low levels by flooding rice fields).

Once again, many techniques have already been implemented by producers, and the aim of this technical support is to enrich these methods and widen the range of risk-avoidance methods available (for example, by increasing varietal availability or access to eco-systemic plants).

- *Maintaining ecosystem regulation capacities*. The aim of this goal is to limit pest populations by maintaining a good level of regulators (natural predators like birds, bats, arachnids, insects, and parasitoids). Some maize production techniques, such as push-pull, are particularly effective, but require a certain amount of technical expertise. The conditions for adopting these methods need to be understood on a case-by-case basis (and imply appropriate training for technical advisors, both in terms of their support stance and the agronomic bases mobilized). Regulatory capacities can be enhanced by setting up agroecological types of infrastructure: grass/flower strips, hedges, and integrating trees into the landscape with the aim of increasing plant diversity (intraspecific and interspecific).

5.2.2. Supporting producers in curative control measures

In order to implement solutions to mitigate phytosanitary risks, it is sometimes necessary to resort to **curative control** measures. To achieve this goal, two main types of action can be implemented:

- Setting up *a crop health monitoring network*. Given the diversity of crops grown in general, it can be complex and costly to set up an active monitoring network. It would therefore be necessary to assess the current information-gathering systems active in Burundi, as well as the technical and financial partners available, to see what synergies could be envisaged. Depending on the networks available, a simple, lightweight survey system (including WhatsApp photo exchange groups to improve identification) could be set up.
- *Technical support for producers in implementing curative solutions.* In this regard, training courses in good pesticide use practices would be very useful. There are a number of guides that could serve as a basis for such training courses (FAO guidelines among others), and a module on good pesticide use practices could be developed through PARM's network of academic experts. A pilot test could be set up in collaboration with farmers' organizations and rural training centers.

5.2.3. Promoting a "landscape approach" to health risk management

As in the case of climate risk management, **a countryside approach to health risk management** would reinforce the effectiveness of measures taken at producer level.
Such an approach would act on all three of the above-written levels:

- Sanitary risk management at plot level: varietal mixtures, push-pull techniques, adapted planting rotations
- Managing health risks at farm level: enriching the farming system (diversity) and using agro-silvo-pastoral integration. One of these challenges may also be maintaining the attractiveness of crops that have agroecological benefits and are more resilient to climate change. For example, the biomass production enabled by bananas and their protective effect on soils is essential. Similarly, sorghum is more resilient to heat deficits. These two crops seem to be declining in Burundi's overall

crop rotation, and maintaining their attractiveness is one strategy for mitigating risk. To achieve this goal, it may be necessary to think "outside the agricultural sector," through agri-food development, to help maintain these crops in the countryside *[73]*.

- Managing health risks at watershed level: agroecological infrastructure (hedges, forestry plots), grass strips, and maintaining semi-natural environments.

5.3. Strengthening technical advice and support services in the maize and rice value chains, focusing on the resilience of cropping systems.

In order to respond to the climatic and phytosanitary risks affecting maize and rice production, it is also essential to work on **strengthening technical advice and support systems** in both sectors. The Ministry of Agriculture's technicians need to be supported and reinforced to:

- Understand the stakes involved in holistic agricultural risk management at farm level and helping farmers evolve from a position that has historically focused on popularizing agricultural intensification practices (monoculture), which can sometimes increase risks for producers, to a position of technical support and co-construction with producers in the search for more resilient, high-performance cropping systems.
- Understand the limitations, risks, and opportunities specific to maize and rice cultivation.
- Increase knowledge of agroecological fertilization, tillage, association, rotation, and crop protection techniques, as well as the global approach to agroecology as a cropping system geared towards crop and farm resilience.

As the Ministry of Agriculture's technical teams are limited in size and have numerous missions to work on, we will also need to **identify other advisory structures** (producers' organizations, women's associations, youth associations, local NGOs, local authorities, etc.) to participate in the dissemination of new advisory and technical support practices focused on Agricultural Risk Management and on improving the resilience and productivity of these two crops. This initiative will have to pay particular attention to the roles of women (who are too often excluded from farm advisory services) and young people (particularly sensitive to innovations and changes in practices) in implementing all of its phases.

5.4. Strengthening the supply of agricultural, agro-meteorological, and commercial information using ICTs

Information is one of the keys to managing both production and market risks. Thanks to **new information and communication technology** (ICT), gathering information is faster and less costly. Monitoring changes in rainfall, phytosanitary pressure (as mentioned in 5.2), and prices no longer requires sending dozens of surveyors out into the countryside; this can now be done at a lower cost by building networks of village informers and discussion and information-sharing groups between producers.

[73] Traditional transformations into wine or beer is one way of looking at this concept. By its very nature, it is difficult for Burundi to specialize in order to achieve economies of scale that would enable it to compete on world commodity markets. Targeting higher value-added markets is necessary. In this respect, alcoholic beverages - not including the question of public health policies - represent a potential market, including on a sub-regional scale. Burundi has a wealth of know-how, and upgrading this sector could be one way to move forward.

The example of the n'kalô Service in West Africa*[74]* shows that a single market analyst can easily monitor price and demand trends across a country's main production basins.

Similar to prices, with a small pool of specialized technicians and a good network of players in the production basins, it is possible to **monitor production constraints and disseminate technical solutions** when risk levels are moderate and **plan public intervention** when risk levels become too extreme.

This proposal involves setting up **a unit within MINEAGRIE to monitor and disseminate information on the two cereals sectors**.

Initially, this unit will be able to build up its information-sharing network in the areas targeted by the program and on the maize and rice cereal commodities; but eventually, it will be able to extend its scope of information collection and exchange to all production areas and stakeholders in these two commodities - and then beyond to other agricultural commodities.

As always, the networks for collecting, sharing, and disseminating information will need to be built up by integrating stakeholder diversity within each link of the value chain (women, young people, migrants, small businesses, large commercial traders, and industrialists). The network's coordinators will need to be trained in Agricultural Risk Management approaches to encourage the rapid circulation of information on all subjects relating to climatic, phytosanitary, and market risks.

This information unit focusing on the maize and rice value chains could also be used as a source of information for structural risk management bodies such as the National Platform for Risk Prevention and Disaster Management and, possibly, a national Early Warning System (EWS).

5.5. Promoting Burundi's unique model internationally, while innovating constantly

As mentioned in the introduction, Burundi's overall production system is remarkable in several respects. Its evolution towards a "labor-intensive **garden system**" makes it one of the most densely populated rural areas in the world, with a**dvanced agroecological practices** (intra- and inter-specific associations, temporal and spatial plant rotations, multi-story agroforestry systems, etc.).

We could therefore imagine the creation of an **International Training and Research Center for Agroecology** in Burundi.

Given the predominant role played by women in rural work, this center would also enable them to make the most of their knowledge. This center would have several functions:

- *Active monitoring: tracking farmer innovations.* Burundi's agrarian history illustrates the capacity of rural societies to innovate against a "Malthusian" vision of development. These innovations could be documented, measured, and disseminated.
- *Co-construction research*: as written above, certain agroecological practices could be optimized, enriched, or combined (at different levels). The co-construction of new methods would be at the heart of the center's research approach.
- *Training*: the center would offer practical training courses, including courses intended for a Western audience, thereby overturning prejudices associated with African agriculture.

[74] www.nkalo.com

Some transition farms in Europe (e.g., *La ferme du Bec Hellouin*), based on labor-intensive agroecological methods, have become successful training centers. Similar training courses could be offered in Burundi. Gender issues and inclusion in agriculture could also be addressed.

5.6. Strengthening cluster effects within the maize and rice value chains

As explained in the report, **a multitude of small-scale operators** are active in trading, processing, and distributing cereals. The main risks, apart from commercial risks, relate to unpredictable interruptions to processing activities due to intermittent access to energy.

Operator fragmentation has its advantages (strong resilience of sectors, economic dynamism, and job creation in rural and urban areas) as well as its disadvantages (limited economies of scale, no synergies on support functions, limited and poor-quality infrastructures, and irregular access to energy). Gradual support for these stakeholders could eventually lead to **structuring cereal chains**. This progressive aspect of support is important, and we have also seen how difficult it is to amortize poorly sized processing facilities such as the flour mills and small rice mills built by the PRODEFI project.

The cluster effect can enable commercial information to be exchanged (on prices, stock availability, etc.), technological innovations to be disseminated (for example, small-scale pelletizers*[75]* in the custom animal feed sector enable pellets to be made from local ingredients), or support functions to be created (mechanics to maintain equipment, for example).

To encourage this effect, public intervention could be used to **build modular infrastructure** (accessible to stakeholders of different scales) providing a range of attractive services (storage, drying areas, loading/unloading areas, secure access to energy, waste management and recovery, and feed production - particularly for the rabbit industry). However, **a feasibility study** is needed to assess the size, business model, and requirements of the various operators.

In the long term, these "clusters" could become reference markets along the lines of the Tanzanian "wholesale market," whose adaptation to the Burundian context has been envisaged in a related study*[76]*. They could also house buffer stocks managed by ANAGESSA to regulate markets.

A gradual approach would involve an initial planning phase with a few pilot projects based on two types thereof:

- **Pilot projects** near or in key **urban centers** (Ngozi, Gitega, Cibitoke, Kirundo, etc.).
- **Pilot projects in rural areas**. These types of approaches should be based on the 5.1 and 5.2 recommendations, with the "watershed" as a relevant entry point. Storage and processing equipment needs could be identified, as well as service providers currently active in rural areas. Intervention would then be aimed at supporting active service providers to increase their range of services (e.g., maize shucking) or enhance their technical and economic performance (e.g., through access to energy).

Promoting solar kits adapted to the needs of small-scale cereal processing units will also be a strategic focus on these sites and on existing cereal processing hubs.

[75] Machines for making granules from local ingredients

[76] https://gret.org/wp-content/uploads/2021/12/Rapport-etude-commercialisation-Burundi-26-Fevrier-2014.pdf

This component could consist of a cost-sharing subsidy mechanism (50%) to access solar electricity kits (panels, alternators and batteries) adapted to consumption within small mills, seeders, grinders, huskers, compactors, and baggers used in the sector. In the context of Burundi's landlocked and highly decentralized economy, this type of solar kit seems particularly useful. It should help strengthen the resilience and competitiveness of some of the industry's downstream players, without seeking to bring about a major technological breakthrough that could destabilize the sector.

In this particular field, it will be essential not to resort to distribution or centralized order processing, so as not to compete with solar kit distributors already active in the country, nor to supply equipment that will not benefit from local after-sales service. It will therefore be essential to use a subsidy mechanism for decentralized purchasing, as well as to include warranties, availability of spare parts, and after-sales services when drafting procurement terms.

5.7. Conducting a technical and economic study of the fertilizer sector

The **use of fertilizers** is an important factor in **mitigating production-related risks.** The sector is one of the government's priorities and a major concern for many TFPs (see, for example, the soil map produced by the International Fertilizer Development Center). And above all, it is a priority for producers whose strategies for accessing manure are extremely diverse and innovative. Similarly, meticulous, micro-localized manure spreading strategies highlight the inestimable value of fertilizers (especially organic types) for producers.

The creation of the company FOMI and the associated monopoly is a government response to strengthen Burundi's capacity to meet its own needs. However, a monopoly has long-term disadvantages. It would therefore be advisable to carry out a technical and economic study, the aim of which would be to support the government in controlling imports of essential fertilizing elements in order to avoid shortages (and therefore benefit from the efficiency of the market economy in supplying goods), while at the same time establishing adequate levels of taxation to enable FOMI's development.

Diversifying the supply of organo-mineral fertilizers, to better adaptation to different commodities and/or soil and climate conditions, also seems to be necessary.

In addition, the rabbit industry's risk assessment indicates that manure and urine from rabbit farms are not being recycled, even though they could be a major source of organic raw material for fertilizer production.

5.8. Better defining ANAGESSA's intervention methods and drawing up a program to strengthen it technically and financially, to achieve a sustainable policy to regulate market volatility for grains and cereals.

As described in the report, ANAGESSA's current operation is highly disruptive to markets, and therefore, to date, constitutes a risk for the maize and rice value chains, as opposed to a risk reduction.

While the overall strategy makes sense (creating food security stocks to offset crises while stimulating local production), the methods and capacity for intervention are ill-suited to the context of cereal markets and the need to regulate these strategic sectors.

Carrying out a technical and strategic study should make it possible to refine ANAGESSA's intervention methods to consolidate its regulatory role.

To do so, we need to define a clear strategy and precise intervention methods, as well as establish the right sources of information on which to base operational decisions.

5.9. Analyzing the priorities and economic potential of insurance schemes in rural areas

In addition to the pilot initiative by the NGO CORDAID described above, many Burundian institutional stakeholders are keen to develop agricultural insurance in Burundi.

Developing index insurance (or parametric insurance) to manage weather risks, and even weather and plant health risks (yield risk), faces numerous economic constraints (producers' ability and interest in paying, transaction costs for collecting premiums and paying claims) and technical constraints (index reliability, yield construction model reliability, adaptation to diverse varieties and production systems).

Generally speaking, index insurance mainly works through partnerships between manufacturers or large commercial traders, who supply inputs to producers on credit and deduct the premium from the payment when buying from producers (reducing transaction costs). As this type of partnership model is very rare in Burundi (except in the sorghum sector with the Brarudi brewery), the economic success of this kind of insurance seems difficult to ensure.

Furthermore, experience*[77]* shows that in many rural contexts, yield insurance may not be a priority insurance product for farmers, and accident, critical illness, pregnancy, or life insurance may be in greater demand than agricultural insurance.

It would therefore be interesting to carry out an in-depth economic analysis of the supply and demand for insurance products in rural Burundi, and to assess the conditions for the success of insurance products in the country, drawing inspiration from contexts similar to that of Burundi (Rwanda, Uganda, Kenya, Tanzania).

[77] https://www.inter-reseaux.org/wp-content/uploads/revue_spd_25_fr.pdf

6_ Appendices

Appendix 1. Action plan for a risk management programme across the rabbit, rice, and maize value chains

The proposed action plan aims to design a 5-year program for agricultural risk management in the maize, rice, and rabbit sectors in Burundi.

The general objective of the agricultural risk management programme could be carried out as follows:

Supporting sustainable growth of the maize, rice, and rabbit value chains in Burundi by developing the supply of agricultural risk management and upstream-downstream partnerships involving all stakeholders.

The program has three specific objectives:

- SO1: Strengthening the resilience of these three value chains through strategic infrastructure and inclusive governance at a territorial level
- SO2: Strengthening advisory and support services for production through a risk prevention approach
- SO3: Improving production and sharing information within sectors to strengthen the ability to anticipate, mitigate, and regulate risks

The logical framework below offers suggestions on how to reorganize the initiatives proposed in the agricultural risk analysis for each of the three sectors, structuring them around three specific objectives and proposing courses of action (in chronological order of implementation) and results indicators for each of the initiatives under consideration.

This action plan will be specified, budgeted, and detailed during the design phase following validation of the three agricultural risk analysis reports.

Specific objective(s)	Strategic priorities	Initiatives	Expected results
SO1: Strengthening the resilience of these three value chains through strategic infrastructure and inclusive governance at a territorial level	**Developing facilities and infrastructure for collective water management on a landscape and watershed scale**	- Identifying two strategic watersheds for collectively improving water management. - Territorial and participatory diagnostics of the watershed. The diagnosis reached will be based on technical analyses of the relevant physical environment and its characteristics (topography, soils, hydrographic network, natural resources, degraded areas, exposure to risks, land use and its history), on socio-economic analyses, and on inclusive consultation with watershed users. It will also be necessary to map out the stakeholders and their roles (local authorities, water user associations, producer organizations, self-help groups). - Drawing up a watershed development plan (or an equivalent, depending on the tools available within the targeted local authorities) which will incorporate elements of the diagnosis and devote a section to the issue of water management (drinking and produced water) to identify the issues and developments to be carried out. - Carrying out a feasibility study of the developments under the watershed development plan: including technical works (dams, irrigation canals, access tracks, distribution networks) and landscape works (bank protection, spreading plains, forestry massifs) in consultation with agricultural users to integrate their constraints and methods of managing water-related risks. - Implementing development projects and training users, including a substantial social engineering component - Monitoring development plan implementation and training various stakeholders - Seeking additional funding for other components of the development plan (education, health care)	- Two pilot watersheds are being developed using a systemic approach (including all uses of the watershed, not just as "marshes") and incorporating farmers' know-how. - 50,000 watershed users (farmers and residents) are positively impacted by these pilot projects and benefit from improved water management.
	Supporting cereal trade and processing through constructing dedicated clusters	- Identifying strategic commercial hubs around which 10 cereal clusters could be set up, - Identifying operators (traders, processors, cooperatives, input suppliers, SFDs, banks, equipment suppliers) located in the vicinity (township) of the hub and their interest/investment capacity in accessing better-quality, grouped marketing, and processing infrastructure - Carrying out economic and technical feasibility studies for each of the 10 clusters, including location choices, building layout, and other relevant infrastructure (parking, traffic lanes, drying areas, retail sales areas, waste disposal areas) and autonomous energy supply (solar panels), as well as any additional services (warranty/third-party holding, machine repair/maintenance/sales) and space for agri-food activities other than cereals (other dry grains in particular). - Identifying cluster governance structures (users' associations/cooperatives, local authorities) and financing structures for maintaining and developing clusters (rent, charges proportional to electricity consumption); - Cluster construction and promotion	- 10 cereals clusters of 5,000 m2 should be built in strategic locations, are energy self-sufficient, and concentrate a minimum of 200 operators specialized in the cereals industry.
	Subsidizing investment in rabbit farming infrastructure	- Identifying a list of priority infrastructure and equipment for risk reduction in the rabbit industry (hutches, transport crates, manure collection systems, insemination tools, etc.) - Defining procedures for selecting applications, awarding subsidies, and justifying expenditure - Implementing a subsidy fund for rabbit farming infrastructure and equipment	- 1,000 operators in the rabbit farming sector will benefit from a shared-cost subsidy to acquire equipment dedicated to their activity in the sector
	Promoting the value of rabbit products	- Identifying the skills and host organization for the rabbit farming product promotion center - Recruiting and/or training the center's staff - Providing support for market studies in Burundi and its sub-region - Supporting communication on the uses of rabbit farming products - Offering nurseries for rabbit farming start-ups - Organizing innovation competitions and awards (with different categories: gastronomy, offal valorization, waste valorization, hide and weight valorization, etc.).	- 1 promotion center is operational - 10 market studies on rabbit products have been produced and published. - 50 companies specializing in rabbit products have been supported by the center and have seen their sales increase by over 30% as a result.

SO2: Strengthening advisory and support services for production through a risk prevention approach	Supporting initiative research on integrated crop protection for cereals	- Setting up a national public-private working group (e.g., ISABU [Institute of Agronomical Sciences in Burundi]-type research institute, Ministry of Agriculture, decentralized government departments, input suppliers, NGOs working with farmers). This working group will draw up a national strategy for initiative research in the farming industry. This national strategy will identify priority issues and possible levers for addressing these issues, in particular through integrated protection of cereal crops, which could incorporate the recommendations from the risk analysis report (preventive control, curative control, multi-dimensional approaches to plots and countryside land) - Implementing pilot projects consistent with the national strategy. Depending on the stakeholders' capacities in the working group, pilot projects will be implemented in the farming environment to test agro-ecological innovations for integrated crop protection - Evaluating, capitalizing and disseminating the results from the pilot projects to agricultural research and advisory organizations in Burundi.	- A national strategy document on integrated crop protection - At least 10 pilot projects should promote integrated pest management approaches implemented by the public and private sectors
	Strengthening the technical skills of advisory services through an approach focused on crop resilience	- Diagnosing the skills of local advisory services operating in Burundi - Designing a theoretical and practical training program to upgrade local advisory services - Practical implementation of advisory services to 4,000 farms (linked to the watershed if possible), with advisors supported by local advisory services' in-house technical assistance in order to integrate an approach focused on the resilience of farming systems - Evaluating the system	- A training curriculum should be established - 200 advisors should be trained - 4,000 family farms should be supported
	Building national expertise to support rabbit farms	- Identifying 6 international rabbit farming experts and organizing a mission to enable them to investigate Burundi's rabbit farming industry and the main pathologies present - Identifying 18 future national experts (including a minimum of 6 breeders and a minimum of 6 private veterinary service providers) - A training program developed for the 18 national experts by the 6 international experts - Designing protocols for diagnosing rabbit pathologies and formulating rabbit feed - Publishing the list of national experts, their contacts, and their specialties in every Burundi township	- 6 international experts and 18 national experts have been trained and regularly exchange information on risk management and development of the rabbit industry; - 20 technical fact sheets on rabbit pathology diagnosis and rabbit farming in Burundi have been produced and are available online.
	Preventing the import and spread of rabbit pathogens	- Confirming the interest of importing breeding animals to develop the sector by international experts - If interest is confirmed: identifying competent and certified foreign laboratories to detect any contamination in breeding rabbits prior to import, drafting a decree to set out the rules for controls and quarantine (in particular to identify healthy carrier animals) prior to any import of lagomorphs into Burundi - Disseminating the decree and implementing it at all the country's border posts	- A report on the suitability and requirements for importing lagomorphs into Burundi has been published and is available online - Myxomatosis, hepatitis D, and their variants are not present in Burundi.

SO3: Improving production and sharing technical information within sectors to strengthen the ability to anticipate, mitigate, and regulate risks.	Building an offer and a network for sharing information on meteorological, phytosanitary, sanitary, and market risks in the rice, maize, and rabbit sectors.	- Identifying reliable, up-to-date, regular, and responsive sources of information on weather, phytosanitary, health, and market risks in these 3 sectors - Identifying the organization(s) hosting methods and gathering information and its/their sharing unit - Recruiting and training the teams in charge of gathering and sharing information by international experts - Identifying the most effective and sustainable (in terms of recurring costs) communication channels for sharing information with and between stakeholders (community radio, text messages, WhatsApp and Facebook communities, etc.) - Disseminating regular, up-to-date, and reliable information to stakeholders and considering their questions and information sharing approaches at a unit level.	- A unit for producing and distributing regular pieces of (minimum monthly) information on risks affecting these 3 sectors should be operational - 300 sources of information media on risks have been distributed to stakeholders in these three sectors. - 60,000 stakeholders in these 3 sectors have received at least two sources of information on agricultural risks distributed by the unit.
	Supporting for creating a network of national rabbit breeders	- The expertise unit should create an evaluation grid for breeders' selection skills - Mission to identify the most experienced breeders - Training 40 breeders in population monitoring and in breeding risk mitigation - Organizing biannual meetings between these breeders - Creating a WhatsApp group for breeders - Creating and annually updating a catalog of rabbit characteristics including breeders' availability and contacts - Organizing 4 annual rabbit fairs to bring together breeders and fatteners from the different provinces.	- At least 40 breeders have been identified and trained - At least 16 fairs have been organized, enabling breeders to present their breeding stock and characteristics, as well as to exchange ideas. - 4 successive versions of the rabbit breeding catalog have been published and are available online.
	Carrying out economic studies on development within the fertilizer sector, development of insurance products for farmers, and strengthening ANAGESSA's mandate and technical capabilities.	- Carrying out an economic study on development in the national fertilizer supply in a competitive environment - Carrying out an economic study on demand for insurance products from agricultural stakeholders, conditions for insurance product profitability, and the technical feasibility of supporting supply development adapted to rural insurance, by drawing on international examples - Carrying out an economic and technical study on regulating the cereals market through public intervention by ANAGESSA when it comes to purchasing and selling cereals at critical times, including modalities for triggering this kind of intervention, on infrastructure and equipment requirements (CAPEX), and on long-term financing (OPEX) for ANAGESSA.	- 3 studies have been published and are available online - 3 workshops meant to operationalize the results gleaned from the studies have been shared with all the institutions and private stakeholders concerned; this has resulted in a roadmap for implementing necessary reforms and investments.

Appendix 2. Methodology

The study of agricultural risks in the maize, rice, and rabbit sectors in Burundi was based on the PARM methodology, which is defined in a practical manner:

"*Assessing value chain risks to design agricultural risk management strategies*."

1. An initial **inception** report produced in January 2024 and validated in February 2024 **targeted the main risks found in the three value chains** designated by the Burundi government, namely: rice, maize, and rabbits.*[78]*
2. Following this report, a phase set aside to **study agricultural risks** was organized in January and February 2024 in all three targeted value chains, leading to the establishment of a risk (scoring) grid;
3. At the same time, **a study targeting vulnerability to agricultural risks** was carried out, listing the tools, mechanisms, and skills necessary for agricultural risk management that have already been implemented and/or planned in Burundi within these pre-targeted agricultural value chains;
4. Following these risk and vulnerability analyses, a risk map was drawn up in March-April 2024, prioritizing the risks with the highest level of vulnerability. This prioritization was then presented, discussed, and adapted with the Burundian government and institutions involved in the sector at different workshops held on May 23 and 24, 2024, leading to the final stage of the process: developing an action plan to implement agricultural risk management tools and policies*[79]*.
5. The fifth and final stage, which will follow over the next few months, will involve drawing up an action plan to implement agricultural risk management tools and policies in Burundi for these three targeted value chains and the risks therein that have the highest vulnerability rates. It will be presented and validated at the workshop.

To gather information on risks (frequency, intensity) and risk management capabilities, the consultants produced interview guides via links, which are available below.

In addition to focus groups with maize/rice producers and rabbit breeders, PARM experts held discussions with 3 feed millers, 3 rice hulling units, 3 flour mills, 3 cereals traders, 3 input suppliers, agricultural managers from 3 banks, 3 veterinary input stores, 2 communal SGs, 6 communal monitors and agronomists, ANAGESSA, BESD, and the MINEAGRIE technical committee.

Following these discussions, it was decided to carry out a short quantitative survey with rice and maize producers to determine risk frequency and intensity indicators.

A total of 254 maize producers and 213 rice producers were interviewed using a digital form on ODK Collect software in all provinces where these products are produced. You can find a breakdown of these interviews in the table below. There is also a map that shows the interviews' geographical distribution. The qualitative interview guides and interview questionnaires can be found shortly after.

[78]Rice and maize are two commodities that have already been targeted for food and agriculture by COMPACT Burundi - alongside pigs and poultry. This document identifies production score, exportable surplus, potential revenue generation, and job creation targets. Rabbits, on the other hand, are an emerging priority for the Republic's government, and have attracted the attention of MINEAGRIE, which ranks this sector alongside poultry and pork.

[79] The first workshop based on this study was attended by 34 participants, the second by 72.

The selection process for producers that were interviewed underwent the following methodology:

- Carrying out interviews on a minimum of 2 different hill sites, at least 1 of which not being located on a paved road;
- Priority given to talking to small farmers cultivating areas of less than 5 acres;
- Interviewing a minimum of 5 female rice producers and 5 female maize producers (no maximum).
- Interviewing "in the field", i.e., on or near plots of land cultivated by the producer.
- Activating GPS on cell phones before the interview starts and throughout the interview.
- Using the ODK form provided by Nitidae when discussing all issues with farmers;
- If an interview does not run smoothly, indicate this fact at the end of the questionnaire (interview self-assessment Q56) and provide explanations in the free comment section (Q58).
- When interviews are carried out offline via the ODK application, the results must be transferred upon return to the place of residence or as soon as a connection is available;
- In the comment section at the end of the questionnaire, make note of any information relevant to understanding agricultural risks and risk management strategies that could not be transcribed via the questions;
- Finalize and validate the questionnaire immediately after the interview.

Figure 34: Producers and breeders interviewed by region and gender.

Provinces	Maize prod. (F)	Maize prod. (M)	Rice prod. (F)	Rice prod. (M)	Rabbit prod. (M)
Bubanza	5	8	9	4	
Bujumbura	12	3	8	10	8
Bururi	15	10			
Cankuzo	10	2	8	4	
Cibitoke	7	10	10	6	
Gitega	11	8	12	12	8
Karuzi	5	7	7	5	3
Kayanza	8	5	10	3	5
Kirundo	6	7	8	6	
Makamba	12	4	9	6	
Muramvya	10	2	8	4	
Muyinga	6	6	10	2	
Mwaro	18	6			3
Ngozi	5	8	12	2	
Rumonge	6	6	8	5	
Rutana	7	7	4	9	
Ruyigi	7	5	6	6	
Total	**150**	**104**	**129**	**84**	**27**

Figure 35: Map of interviews with producers and breeders.

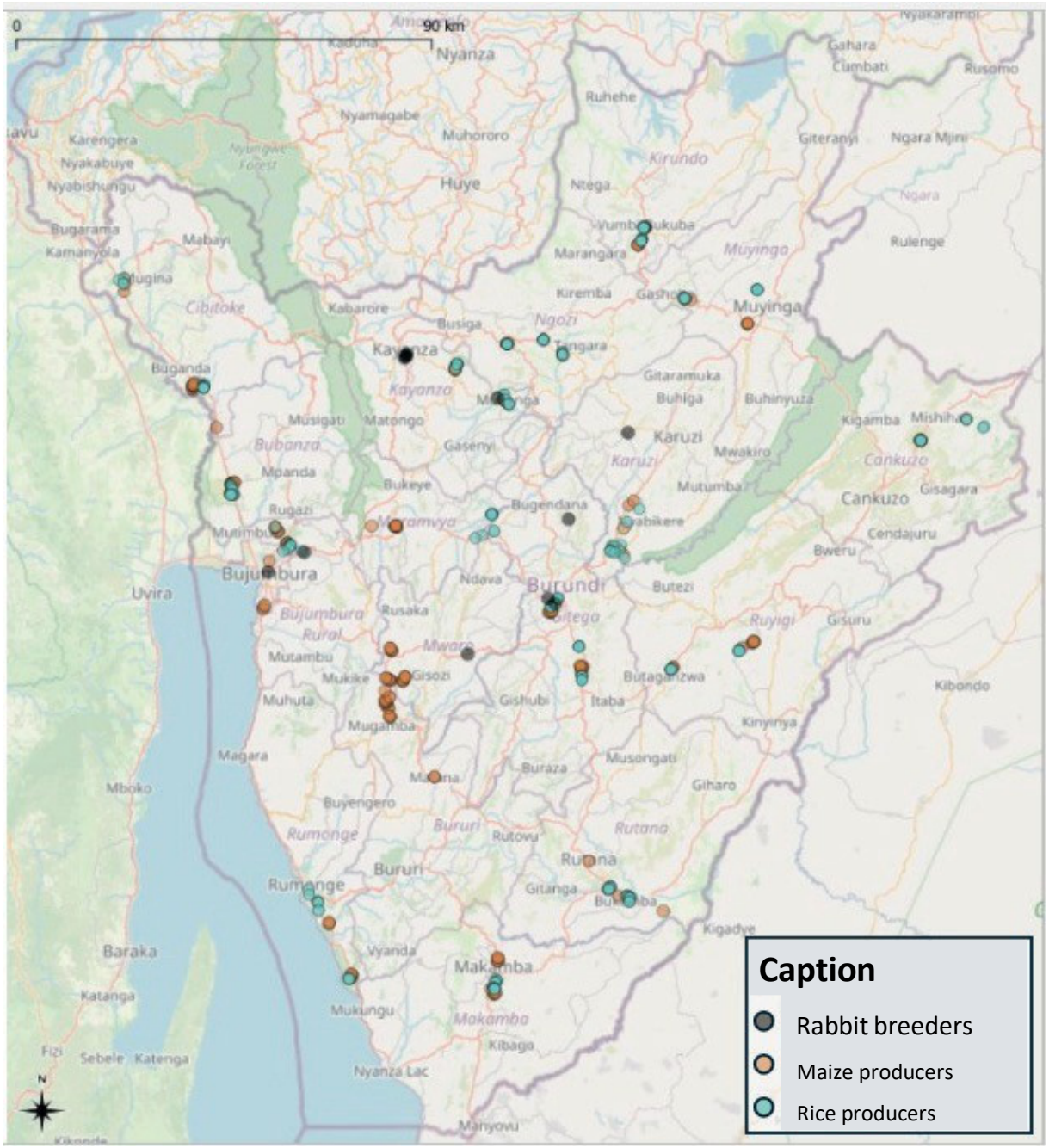


Figure 36: Interview guides for maize and rice producers

Interview guide farmers: maize and/or rice

Presentation of the farm: status, location, share of maize and rice in the crop rotation and in activities, type of crops grown (associated, pure, lowland, hillside, water management)

Production practices: history of the farm, changes in crop rotation, introduction of new practices, new crops, discontinuation of certain practices, etc. Reasons for these changes? Main crop rotations involving rice or maize.

Main costs and constraints of maize and/or rice production?

Cereals marketing: marketing locations, marketing periods/peaks (depending on market or cash flow needs), sales planning, selling prices according to time periods, sales locations and quality criteria. Year (and possibly month) in which sales prices were the best in the operator's entire experience. Why was this a good year? Year (and possibly month) with the lowest sales prices in the producer's entire experience. Why was it a bad year? Other reasons for price variations? Perception of institutional purchasing/institutional purchases as part of the Alliance Nationale de Gestion des Stacks de Sécurité Alimentaire (ANAGESSA) [National Alliance for Food Security Stack Management]. Impact of food donations and sales at social prices?

Risks, "very challenging experiences": worst experiences in agriculture? Let the producer tell their story, then explore the reasons (as a reminder: disease/pest, theft, drought, flooding, storage losses, soaring input prices, inability to access inputs, to sell, drastic drop in selling price). Try to prioritize. If possible, give a frequency indicator (1 event every 7 years, 15 years or 30 years). Volume of lost income.

Adaptation strategy: How did you cope with this situation?

Mitigation strategy: What are you doing to prevent this situation from happening again?

Support: Have you ever received technical support for maize/rice? From whom (supplier, customer, other farmers, NGOs, government services, other)?

Prospects: would you like to grow more cereals? Less? Would you prefer to invest in other activities? If so, which ones? Do you feel that demand is growing or stagnating? Why do you think this is? How can we support the industry?

Figure 37: Interview guide for other value chain parties

Interview guide for private players up and down the value chain

Presentation of role and actions carried out, type of relationship with other parties (opportunistic, contractual, etc.)?

Activity costs: main objectives for the 3 commodity chains (maize, rice, rabbit)?

Main constraints of the commodity chain: let the person answer freely, encourage him/her to prioritize and explain the constraints.

Risks

Very challenging experiences: worst years for the sector? Why these worst years?

Adaptation strategy: How did the sector deal with this problem?

Mitigation strategy: What are you doing to prevent this situation from recurring?

Documentation: Do you have any documents describing the sector, its constraints, or risks?

Databases: Do you have databases that can help us quantify the intensity (impact) and frequency of risks in one or more or several of the 3 sectors?

Outlook: How do you see the future of the sector? What are the priorities for the coming years?

Figure 38: Maize producer questionnaire

		English
Maize Production Risk Questionnaire		
Q1		Province?
R1	*Drop-down list*	see list
Q2		Municipality?
R2	*Drop-down list*	see list
Intro		We're going to talk about the risks and problems of growing maize. I'm going to present you with some risks and for each of them I'm going to ask you how many times this problem has occurred and how much you think you lost the last time it happened.
Q3		How many years have you been growing maize?
R3	*figure*	
Q4		Comments
R4	*Text*	
Weather		
Q5		How many times has lack of rain caused losses since you started growing maize?
R5	*figure*	
Q6		The last time the lack of rain caused losses, how much do you think you lost?
Q6.1		Expected quantity (kg)
R6.1	*figure*	
Q6.2		Quantity harvested (kg)
R6.2	*Figure*	
R6.3	*Text (comments)*	
Q7		How many times have excess rains caused losses since you started growing maize?
R7	*figure*	
Q8		The last time excess rain caused losses, how much do you think you lost?
Q8.1		Expected quantity (kg)
R8.1	*figure*	
Q8.2		Quantity harvested (kg)
R8.2	*Figure*	
R8.3	*Text (comments)*	
Q9		How many times have excess winds caused losses since you started growing maize?
R9	*figure*	
Q10		The last time excess wind caused losses, how much do you think you lost?
Q10.1		Expected quantity (kg)
R10. 1	*figure*	
Q10.2		Quantity harvested (kg)
R10. 2. 1	*Figure*	
R10. 3	*Text (comments)*	
Q11		How many times has hail caused losses since you started growing maize?
R11	*figure*	
Q12.1		The last time hail caused losses, how much do you think you lost?
R12. 1		Expected quantity (kg)
Q12.2	*figure*	
R12. 2		Quantity harvested (kg)
R12. 3	*Figure*	
Q13	*Text (comments)*	
R13		How many times has cold weather caused losses since you started growing maize?
Q14	*figure*	
Q14.1		How many times has cold weather caused losses since you started growing maize?
R14. 1		
Q14.2	*figure*	
R14. 2		Quantity harvested (kg)
R14. 3	*Figure*	
Q15	*Text (comments)*	
R15		How many times has an insect caused losses since you started growing maize?
Q16	*figure*	
R16		What type of insect causes the most damage?
Q17	*Text*	
Q17.1		The last time an insect caused losses, how much do you think you lost?
R17. 1		Expected quantity (kg)
Q17.2	*figure*	
R17. 2		Quantity harvested (kg)
R17. 3	*Figure*	
Q18	*Text (comments)*	
R18		How many times has a disease caused losses since you started growing maize?
Q19	*figure*	
R19		Which types of disease cause the most damage?
Q20	*Text*	
Q20.1		The last time a disease caused losses, how much do you think you lost?
R20. 1		Expected quantity (kg)
Q20.2	*figure*	
R20. 2		Quantity harvested (kg)
R20. 3	*Figure*	
	Text (comments)	

Inputs		
Q21		How many times have you had trouble finding maize seed at planting time?
R21	*Figure*	
Q22		What was the loss or delay the last time this happened?
R22	*T ext e*	
Q23 R23		How many times have you bought seeds that turned out to be bad or unsuitable for your zone?
Q24	*Figure*	
R24		What was the loss the last time this happened?
Q25	*T ext e*	
R25		How many times have you had trouble finding mineral fertilizers at the right time?
Q26	*Figure*	
R26		What was the loss or delay the last time this happened?
Q27	*Text*	How many times have you bought mineral fertilizers that turned out to be wrong or unsuitable for your
R27		specific application?
Q28	*Figure*	
R28		The last time this happened, what was the loss?
Q29	*Text*	
R29		How many times have you had trouble finding organic fertilizer at the right time?
Q30	*Figure*	
R30		What was the loss or delay the last time this happened?
Q31	*Text*	
R31		How many times have you bought a chemical treatment that didn't work on the disease or insect?
Q32	*Figure*	
R32		The last time this happened, what was the loss?
	T ext e	
Post harvest		
Q33		How many times have you had trouble drying your maize because of heavy rains?
R33	*Figure*	
Q34		What was the loss the last time this happened?
Q34.1		Quantity dried (kg)
R34. 1	*Figure*	
Q34.2		Quantity lost (kg)
R34. 2	*Figure*	
R34. 3	*Text (comments)*	
Q35		How often have you had insects or rodents attack your stock?
R35	*Figure*	
Q36		What was the loss the last time this happened?
Q36.1		Quantity stored (kg)
R36. 1	*Figure*	
Q36.2		Quantity lost (kg)
R36. 2	*Figure*	
R36. 3	*Text (comments)*	
Q37		How many times have you been forced to sell your maize at a very low price compared to your expectations?
R37	*Figure*	
Q38		The last time this happened, what was the loss?
Q38.1		Expected price (BIF/kg)
R38. 1	*Figure*	
Q38.2		Lowest selling price finally obtained (BIF/kg)
R38. 2	*Figure*	
Q38.3		Quantity sold (affected by loss in kg)
R38. 3		
R38. 4	*Text (comments)*	
Q39		How many times have you lost part of your crop in transit?
R39	*Figure*	
Q40		The last time this happened, what was the loss?
Q40.1		Quantity transported (kg)
R40. 1	*Figure*	
Q40.2		Quantity lost (kg)
R40. 2	*Figure*	
R40. 3	*Text (comments)*	
Q41		How many times have you had part of your harvest stolen?
R41	*Figure*	
Q42		What was the loss the last time this happened?
Q42.1		Quantity stored
R42. 1	*Figure*	
Q42.2		Stolen quantity
R42. 2	*Figure*	
R42. 3	*Text (comments)*	

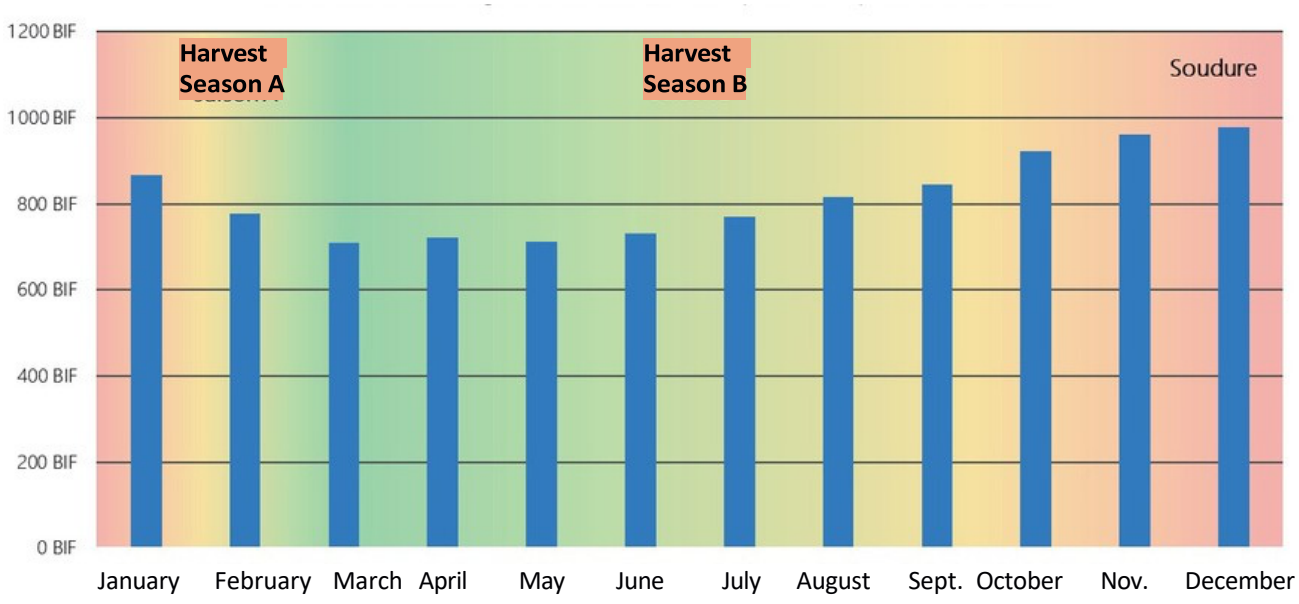
Other		
Q43		How many times has illness prevented you from carrying out farming activities at the right time?
R43	*Figure*	
Q44		What was the loss the last time this happened?
R44	*Text*	
Q45		How many times has an accident or injury prevented you from farming at the right time?
R45	*Figure*	
Q46		What was the loss the last time this happened?
R46	*Text*	
Q47		Do you want to describe another problem we haven't mentioned?
R47	*Text*	
Q48		What were the consequences of this problem?
R48	*Text*	
Risk management		
Q49		Faced with these many risks, what can help you get through the bad seasons?
R49		
Information on the farmers		
Q50.1		Apart from maize, what other crops do you grow?
R50. 1	*Multiple choice (several choices)*	Beans
Q50.2		Other (please specify):
R50.2	*Text*	
Q51.1		Which animals do you own?
R51. 1	*Multiple choice (several choices)*	Cows
Q51.2		Other (please specify):
R51.2	*Text*	
Q52		Do you own a bicycle?
R52	*Yes/No*	Yes/No
Q53		Do you own a cell phone?
R53	*Yes/No*	Yes/No
Q54	*Figure*	If it's okay, please share your cell phone number (optional)
R54		
Libérer la personne		The rest of the questions are to be completed by the interviewer once the person has been released.
Q55		Sex
R55	*H/F*	Male / Umugabo
Q56		Estimated age range
R56	*Multiple choice (several choices)*	Under 25 (munsi y'imyaka 25)
Q57		Self-evaluation of interview
R57	*Multiple choice (several choices)*	Perfectly passed (ikiganiro cagenze neza cane)
Q58		Take GPS coordinates of survey site
R58	*GPS*	Button
Q59		Any other comments
R59	*Text*	
End		Survey finalization (on site)

Appendix.3. Retail maize prices: seasonality?

BIF/kg	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Average 2009-23
Jan.	463	603	566	612	780	784	524	838	1221	874	766	1127	1027	1065	1 763	867
Feb.	394	601	573	566	721	739	425	742	1149	693	687	781	829	1018	1 728	776
Mar.	382	519	556	550	675	700	391	580	1018	620	574	704	754	871	1 741	709
Apr.	408	457	479	625	681	724	407	522	1013	564	771	999	732	923	1 522	722
May	366	383	446	599	586	730	442	552	1058	574	548	1070	750	1004	1 560	711
June	400	385	550	615	576	736	476	586	1089	557	584	887	787	1103	1 625	730
July	350	397	553	610	589	747	505	684	1076	576	785	1014	743	1224	1 704	771
Aug.	463	458	540	606	642	739	555	771	1131	584	761	1051	824	1330	1 799	817
Sep.	475	463	538	634	691	561	594	840	1125	613	970	843	927	1496	1 898	844
Oct.	500	524	588	670	703	631	704	1038	1229	630	962	911	1041	1680	2 029	923
Nov.	575	500	592	759	701	609	828	1125	1120	706	1057	895	1100	1937	1 909	961
Dec.	600	500	622	775	742	580	871	1231	991	773	1152	939	1154	1911	1 837	978

Although 77% of maize production takes place in season A (ENAB 2019-20), the prospect of a small harvest in season B seems to have had a stabilizing effect on prices, ultimately inducing an average variation limited to +30% in gap prices compared with post-harvest prices (and at most: +55-60% in 2015, 2016, and 2022).

Maize price (BIF/kg): less seasonal variation



Average 2009 - 23

Appendix 4. Diseases and pests in maize crops

Diseases or pests	Recommended control methods
Streak virus (viral disease transmitted by Cicadulina insects)	Using resistant crop varieties
Stem-boring caterpillars	Inter-campaign without host crop Destroyed thatch after harvesting Early sowing Pesticides used for heavy infestations: Dursban 4E, Deltamethrin 2.5 EC
Fall army worms (an invasive species that appeared in Burundi in 2016, attacking late-growing maize in March)	Early sowing/using early-growing crop varieties Para-pheromone trapping Spraying with synthetic pyrethroids: Dursban 5G, Imidacloprid, Decis, Orthene
Helminthosporiosis (caused by a fungus)	Using less sensitive crop varieties
Storage insects (grain moths and weevils)	Insecticides (actellic super, actalm super, and as a last resort phostoxin, whose use is highly regulated because it is dangerous)

Appendix 5. Input trading in Burundi

According to Biboza et al., putting all types of maize inputs together, 50% come directly from the farm, 29% from government or NGOs, and 6% from producer associations. Only 15% come from traditional economic channels ("agrodealers," markets).

It should be noted that government subsidies for mineral fertilizers and improved seeds take the form of purchase vouchers that producers can redeem with local input traders.

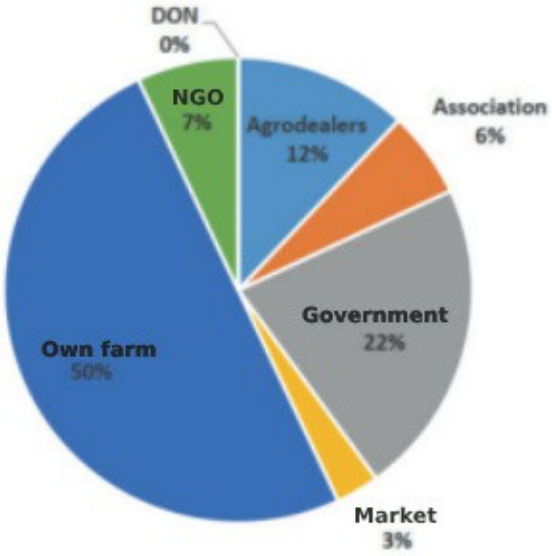


Figure 39: Sources of maize supply inputs by producers. Source: BIZOZA et Al (2022).

Seeds: the hybrid maize seed craze and the challenge of domestic production

The 2019-2020 national agricultural survey showed that using improved maize seed was still carried out by a minority of relevant parties (23.5% of farming households, mainly in the provinces around Bujumbura and Gitega). However, the situation seems to be changing rapidly, and demand from maize producers is increasing: in 2023, insufficient supply led to a surge in the price of hybrid seed*[80]*. Seed imports often exceed 800 t/year, with annual variations potentially linked to purchases by the government*[81]*, NGO development programs, and major seed innovation distributors. According to our field surveys, the NGO One Acre Fund seems to play a decisive role in their seed distribution initiatives in rural areas: in 2023, it reached nearly 300,000 farming households and distributed 300 t of hybrid maize seed and over 10,000 t of FOMI (mineral-organic) fertilizer.

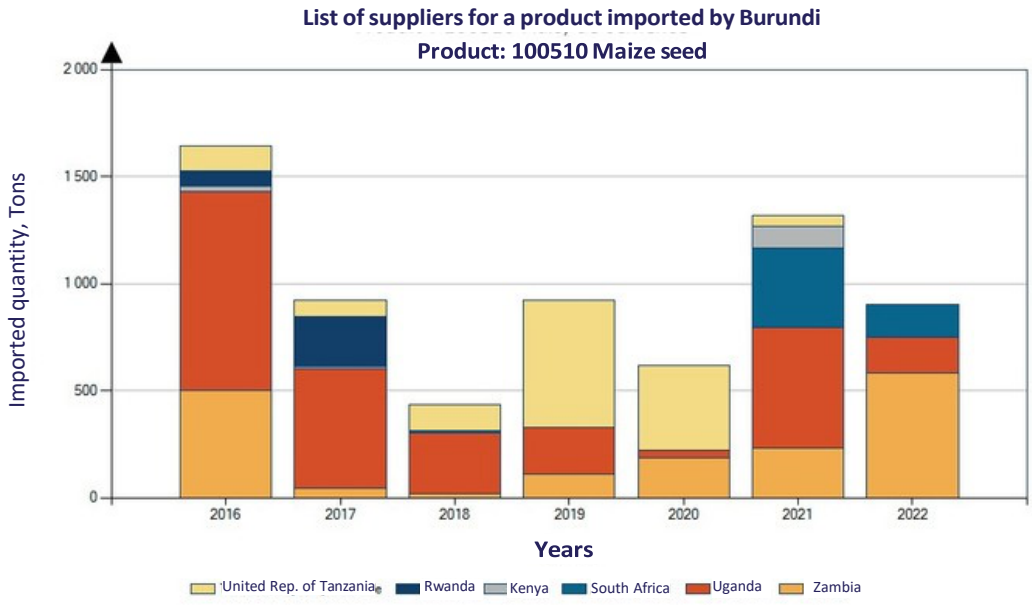


Figure 40: Maize seed imports into Burundi, 2016-22 (source: ITC Trade Map)

[80] https://www.sosmediasburundi.org/2023/10/08/bubanza-les-semences-de-mais-hybrides-sujettes-a-speculation/

[81] October 2022: "690 tons of selected maize seed from Zambia will arrive in Burundi" https://www.youtube.com/watch?v=x-_6FfW9bQ4

As part of the **National Seed Plan** (first plan 2009-2022, second plan launched in 2022*[82]*), national production of hybrid maize seed is one of its key orientations. Isabu has increased its pre-basic seed production from 35.8 t in 2017 to 46.5 t in 2021 (+30%) and has provided technical support for creating a hybrid maize seed production company, **Seed Trade Company (Setraco)**. Since 2019-20, this company has been organizing seed production through a network of multiplier farmers under contract, with the aim of responding to farmers' craze for hybrid seeds without continuing to increase Burundi's dependence on imports thereof. Setraco produced 66 t of hybrid seeds in 2020 and plans to reach a goal of 3,000 t by 2024. At multiplier level, ONCCS estimates that 1,000 t of maize seed were produced in 2021. This boom, and the exponential forecasts linked to it, raises the question of how available knowledge and skills in this field really are.

Fertilizers: insufficient FOMI supply to meet growing demand

Organo-mineral Fertilizer Industries (FOMI)*[83]* has enjoyed a national monopoly since the conclusion of a public-private partnership with MINEAGRIE in 2019. It offers a range of three organo- mineral fertilizers, two of which are recommended for maize crops (FOMI Imbura as a base fertilizer and FOMI Totahaza as a cover fertilizer), and agricultural lime. However, urea is imported from abroad.

FOMI buys organic raw materials from Burundi (some producers even regret that they can no longer obtain manure from their neighbors, as FOMI buys it from them at a good price). Mineral elements, purchased by FOMI or other companies, are imported from Tanzania (93% of the total FOB value of imports), which itself imports them largely from Morocco*[84]*. In 2022, (phosphate) fertilizers were Burundi's fourth-largest import category by value, behind fuel, vehicles, and metals*[85]*.

From 2015 to 2019, the Agricultural Productivity Support Project in Burundi (PAPAB) has contributed, among other things, to increasing the number of farming facilities with access to fertilizers, estimated at 48% in 2019 in their end-of-year report. ENAB 2019-20 shows that 54% of households use organic manure and 38% use mineral fertilizers. For the 2022-23 season, total fertilizer requirements were estimated at 145,000 t. Despite an increase in FOMI production from 8,000 t (2021-22)*[86]* to 17,000 t (2022-23), the company was unable to meet the demand that was then estimated at 50,000 t*[87]*. The Burundian government took out a $4 million loan from the Agricultural Development Bank to urgently import 3,000 t of fertilizer*[88]*. Unsurprisingly, this shortage fuels speculation on fertilizer prices*[89]*, ultimately spurring on general inflation on agricultural commodities. In addition to the need to increase FOMI's production capacity, importing mineral fertilizers has sometimes been hampered by a lack of foreign currency. Faced with these difficulties, the government has reopened the possibility of importing fertilizers in 2023.

Maize producers benefit from a government subsidy of around 30% of the cost of fertilizer. The national budget for this product was BIF 15 million in 2021-22.

[82] See Burundi National Seed Plan, Second Edition (May 2022), available online: https://ifdc.org/wp-content/uploads/2023/10/Plan-National-Semencier-du-Burundi.pdf

[83] https://fomi.bi/

[84] Source: UN Comtrade

[85] Idem

[86] https://www.jimberemag.org/mauvaise-recolte-2021-2022-agriculteurs-epinglent-fomi-burundi/

[87] https://burundi-eco.com/les-larges-subventions-des-engrais-destabilisent-la-situation-budgetaire-du-pays/

[88] https://www.afdb.org/fr/news-and-events/press-releases/le-burundi-recoit-le-soutien-du-groupe-de-la-banque-africaine-de-developpement-dans-des-secteurs-de-developpement-cles-60325

[89] https://www.rpa.bi/index.php/actualites/bonne-gouvernance/la-speculation-dans-la-vente-de-l-engrais-de-l-usine-fomi

In 2021-22, 62% of orders to FOMI came from provinces close to Bujumbura (Kayanza, Cibitoke, Bubanza and rural Bujumbura), which raises the question of accessibility to more remote provinces.

Phytosanitary products: due to their cost, these products are not used much for food crop s-such as maize.

The Plant Protection Department (DPV) has a National Committee for the Homologation and Control of Pesticides (CNHCP) which has registered 131 pesticides (69 insecticides, 3 nematicides, 16 fungicides, 23 herbicides, 16 rodenticides, 3 chemical mediators, 1 insecticide-nematicide) - and has banned 24 of them. In the absence of a local industry, all authorized pesticides are imported, mainly from Uganda (75% by 2021), which itself imports mass import quantities from China and India.

These imports, which are exempt from customs duties and taxes, have been rising sharply since 2019, reaching 1,252 t in 2021, almost half of which are fungicides - mainly for potato crops (mildew) and rice (blast). In the maize growing industry, fall army worms are the main threat, attacking maize that grows in late March, and can be controlled with an insecticide.

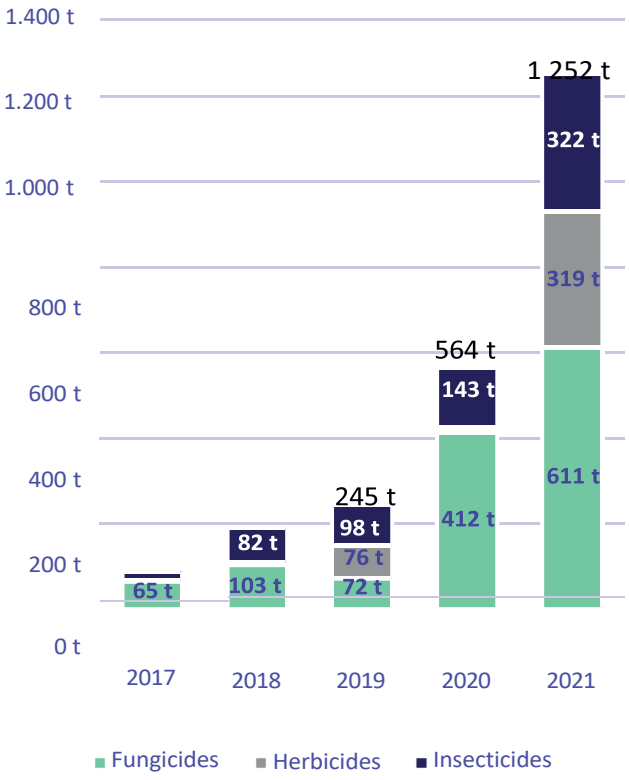


Figure 41: Pesticide imports by Burundi (source: UN Comtrade)

These imports are carried out either by public and para-public bodies or by private companies (Alchem Burundi, Bolena, Cooper Burundi, etc.), and then inspected by a phytosanitary inspector. Small quantities of illegal imports from neighboring countries also occur.

Pesticides are then distributed to user areas by wholesalers and retailers, who are rarely specialized/qualified in this field. In theory, only structures approved by the DPV are authorized to market registered pesticides to farmers or community groups.

With the exception of potatoes, the use of pesticides is much more common for cash crops (cotton, coffee, tobacco, etc.) than for food crops, probably due to their onerous nature. ENAB 2019-20 shows that phytosanitary product use by farming facilities remains in the minority, if not anecdotal: 12.9% use insecticides, 3.4% fungicides, 2.4% rat poison, 0.5% herbicides and 1.4% other types of product.

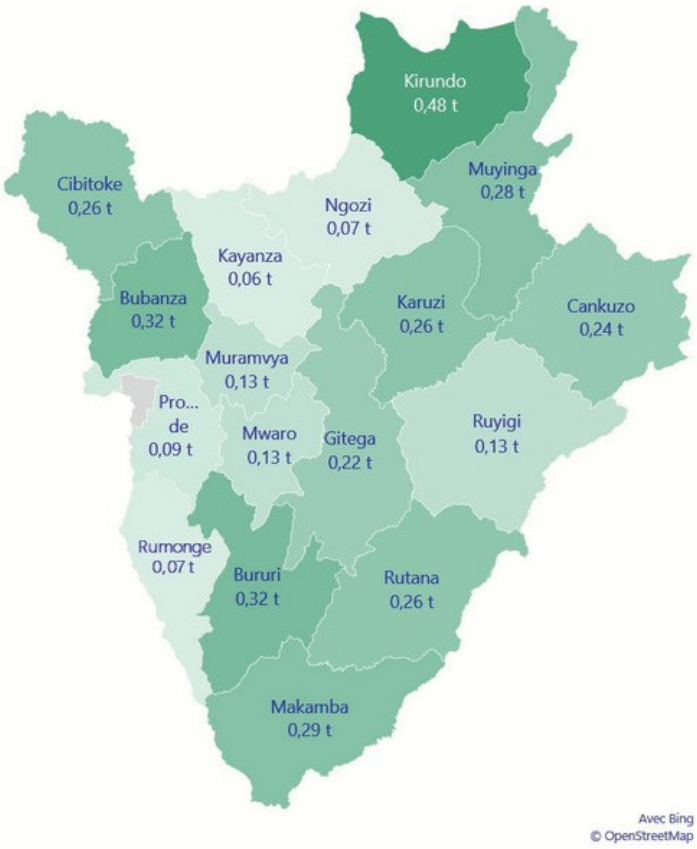
Note the recent effort to promote biological control and biopesticides (neem-based in particular).

[90] Source: NGO for Property, Environment, and Health (PES), 02/2021, National Report on Highly Hazardous Pesticides in Burundi

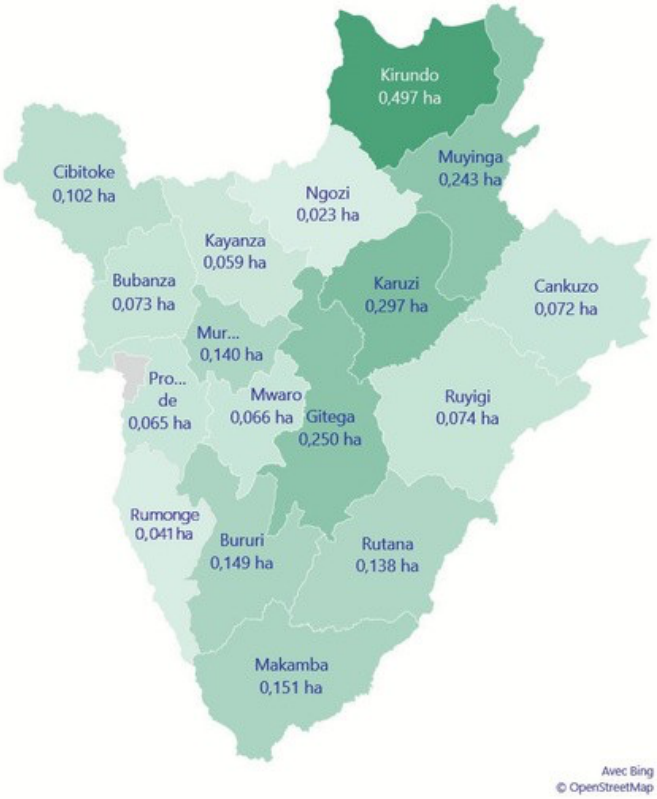
[91] Source: Mineagrie (2018), Pesticide Management Plan

[92] https://www.inadesformation.net/burundi-promotion-des-biopesticides-contre-les-ravageurs-sur-les-cultures-de-mais-de-haricot-et-de-chou/

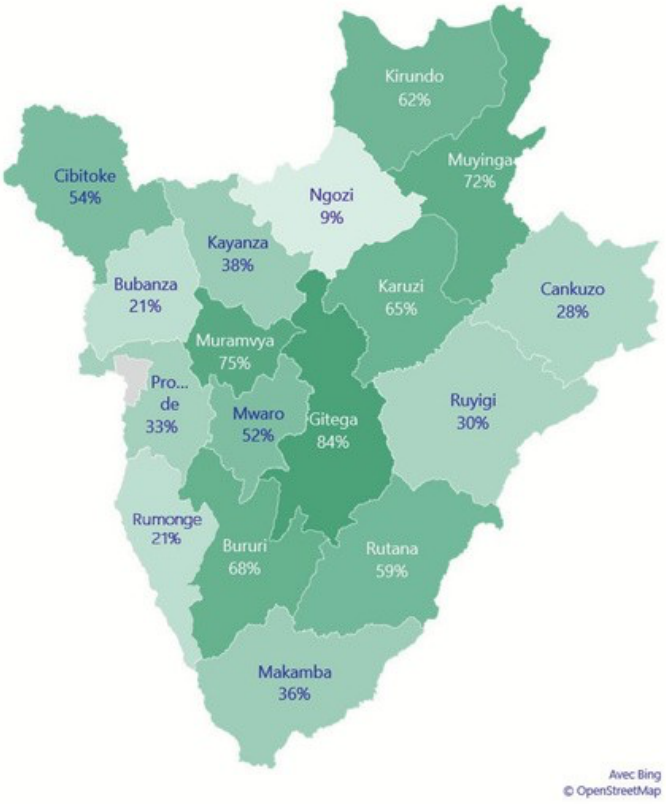
Appendix 6. Maize production: breakdown by province



Average annual maize production per farm household (source: ENAB 2019-20)

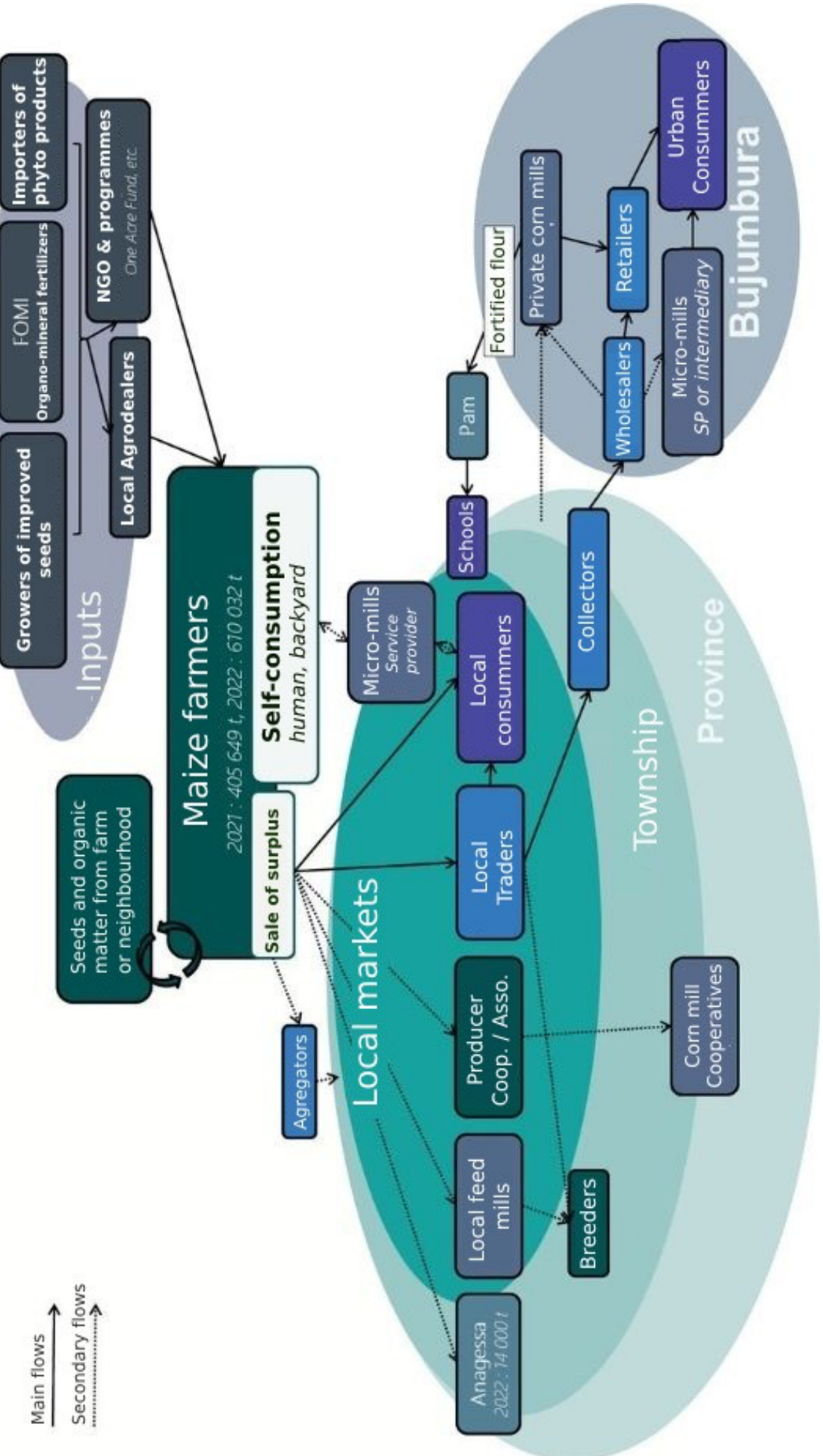


Average maize-covered area per farming facility in season A (source: ENAB 2019-20)



Share of cultivated area dedicated to maize in season A (source: ENAB 2019-20)

Appendix 7. Map of the maize value chain in Burundi



Notes

Notes

Managing risks to improve the livelihoods of producers

Platform for Agricultural Risk Management

PARM Secretariat
International Fund for Agricultural Development (IFAD)
Via Paolo di Dono 44 - 00142 Rome (Italy)

parm@ifad.org
www.parm.org