

# Value Chain Scanning for Rwanda and access to finance in Congo Nile Divide



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## List of abbreviations

|         |   |
|---------|---|
| CSO     | Civil Society Organizations                                     |
| CWS     | Coffee Washing Stations   |
| COMESA  | Common Market for Eastern and Southern Africa                   |
| CBOs    | Community Based Organizations                                   |
| CFSVA   | Comprehensive Food Security Vulnerability Assessment            |
| EAC     | East African Community  |
| GMNP    | Gishwati-Mukura National Park                                   |
| GVCs    | Global Value Chains   |
| GoR     | Government of Rwanda  |
| NST1    | National Strategy for Transformation                            |
| NDC     | Nationally Determined Contribution                              |
| PSDAG   | Private Sector Driven Agricultural Growth                       |
| PSAC    | Promoting Smallholder Agro-export Competitiveness Project       |
| RDB     | Rwanda Development Board  |
| PSTA    | Rwanda Strategic Plan for Agricultural Transformation in Rwanda |
| RCCF    | Rwandan Coffee Cooperatives Federation                          |
| MSD     | Market System Development                                       |
| MINAGRI | Rwandan Ministry of Agriculture and Animal Resources            |
| SACCOs  | Savings and Credit Co-Operative Societies                       |
| SIDA    | Swedish International Development Agency                        |
| STARS   | Strengthening Africa Rural Smallholders                         |
| TREPA   | Transforming Eastern Province through Adaptation                |
| VNP     | Volcanoes National Park   |
| WEAI    | Women's Empowerment in Agriculture Index                        |

## 1. Introduction

This report supports the selection of livelihood interventions under component 3 of the proposal by World Conservation Society and partners. In this rapid scan, various crop value chains are weighed, especially those of relevance to the Congo Nile Divide and with inclusive and sustainable impact. Based on a long-list, four value chains were selected (avocado, macadamia, honey and vegetables). Each of these value chains are explored in depth, with the value chain segments, opportunities, bottlenecks and basic investment case further examined. Based on this scan, recommendations and interventions are defined in the project proposal.

### 1.1. *Methodology of this Value Chain Scan*

Market systems are generally defined as systematic processes enabling many market players to offer and demand: helping buyers and sellers interact and make deals. The market system is supported by services and enabling environment. Any interventions in a market system requires a clear understanding of push and pull dynamics as well as key bottlenecks and opportunities for change, particularly for vulnerable groups. Market systems (which include many different value chains and sectors) are complex adaptive systems due to the range of interconnections and interdependencies. This makes it challenging to predict change outcomes in advance (USAID, 2014). Following the Market System Development (MSD) approach, Cordaid embraces these dynamics. This report forms an initial rapid analysis of the Rwanda Congo Nile Divide to inform strategic interventions for the GCF.

The analysis will help to strengthen the Green Climate Fund proposal and revolves around decision-making, based on details of four components at the heart of MSD:

1. Mapping the context and particularly creating a general overview of key agri-market system structures, including the core functions, supporting functions, rules and institutions;
2. Mapping the market actors and their linkages, analysing how the market system is functioning, including opportunities that affect target groups;
3. Identifying system-level trends, constraints and corresponding root causes, to find a basic understand why the system is not realizing sustainable and inclusive outcomes;
4. Prioritizing key opportunities and entry points – whether in specific value chains, business support services or enabling environment- that can influence the market and targeted regions and can be addressed during the program duration. This includes contextual experience in MSD e.g., how systems serve the poor, what incentives increase target group participation and benefits the market system.

## 2. Context situation

### 2.1. *Socio-economic context Rwanda*

Rwanda has a population of about 13 million people<sup>1</sup>, with 41% of the population under 15 in 2012. Population density per square kilometre is expected to climb from 415 inhabitants to 645 inhabitants per square kilometre in 2032, which adds to already high population density<sup>2</sup>. 80% of the population lives in rural areas, with the largest urban area being the capital of Kigali. This population also includes 85% of people living in poverty<sup>3</sup>. Rwanda has been commended for its rapid recovery from the 1994 genocide and ranks among the best-performing economies of Africa. Rwanda aspires to be a middle-income country by 2035 though its strongly public-sector investment driven strategy.

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<sup>1</sup> World Bank, 2022. Rwanda Country Overview.

<sup>2</sup> Government of Rwanda, 2021. RPHC4: Population Projections. National Institute of Statistics of Rwanda

<sup>3</sup> Bird et al., 2019. Understanding poverty trends and poverty dynamics in Rwanda: Qualitative Report. Chronic Poverty Advisory Network (CPAN).

Rwanda has seen some promising developments regarding poverty alleviation, economic development and life expectancy. The Human Development Index of Rwanda is 0.543, up compared to 0.248 in 1990. This is based on especially high gains in life expectancy, expected years of schooling and mean years of schooling<sup>4</sup>. On other indexes, Rwanda performs less well: according to the Bertelsmann Transformation Index, Rwanda scores well in terms of economic transformation and effectiveness of governance, but low on political transformation<sup>5</sup>.

Poverty fell from 77 percent in 2001 to 55.5 percent in 2017 (as measured by the international poverty line)<sup>6</sup>. Despite the challenges of Covid-19 in 2020, GDP growth in 2021 was 5.6% as the country recovered strongly. However, employment rates fell and have not recovered since the pandemic, with the situation for women particularly worsened – from 15% unemployment rate in early 2020 to 27.6% in the second quarter of 2021<sup>7</sup>. Poverty reduction has slowed in recent years and remained at the same level since 2013 (this also does not account for the effects of Covid)<sup>8</sup>. The 2018 Comprehensive Food Security Vulnerability Assessment (CFSVA 2018) found that 18.7% of the Rwandan population is food insecure, 1.7% severely food insecure and 38.6% marginally food insecure<sup>9</sup>.

## 2.2. *Rwanda's Congo-Nile Divide*

For this proposal, the focus is on Rwandan portion of the Congo-Nile Divide landscape, which runs from Volcanoes National Park (VNP) on the border with Uganda, down through Gishwati-Mukura National Park (GMNP), to Nyungwe National Park (NNP) on the border with Burundi. The region is characterized by a hilly and mountainous geography, adjacent to the Kivu Lake, and borders on Burundi, the Democratic Republic of Congo and Uganda. The climate is cool and wet with annual rainfall ranging from 1,200-2,000 millimeters<sup>10</sup>. The Congo-Nile Divide landscape in Rwanda includes the following districts: Karongi, Ngororero, Nyabihu, Nyamasheke, Rubavu, Rusizi, Rutsiro, Musanze, Nyaruguru, Nyamagabe, Kitabi.

According to the Comprehensive Food Security and Vulnerability Analysis (CFSVA) report in Rwanda, the Congo-Nile Divide area also referred administratively as the including Western Province and southern Province. These areas of Rwanda also have the highest prevalence of food insecure households in Rwanda: 35.2 percent of all households food insecure and 5.6 percent severely food insecure<sup>11</sup>. A positive note is that this has decreased since 2015 by 3.4 of severely food insecure households. However, the region has the highest stunting rates of the country at 44% stunting prevalence, well above the WHO critical threshold of 40%. Rutsiro district remains the most food insecure district in Rwanda, with 62% of households with inadequate food consumption. Ngororero district, also in Western Province, is an area of concern, as food consumption levels worsened there. Majority of people in Rwanda buy their food on the market (65%). This can be challenging at times, especially in mountainous areas during the rainy season in the Western districts.

In terms of livelihoods, the western and southern region is characterized by various agro-ecological crop zones: 1) the Lake Kivu coffee zone; 2) Western Congo Nile Tea Crest; 3) North-western volcanic Irish Potato; 4) Eastern Congo-Nile Highland Subsistence farming; and 5)

<sup>4</sup> UNDP, 2020. Human Development Report 2020. The Next Frontier: Human Development and the Anthropocene: Rwanda

<sup>5</sup> Bertelsmann Transformation Index: Rwanda. <https://bti-project.org/en/reports/country-dashboard/RWA>

<sup>6</sup> World Bank, 2019. Rwanda Systematic Country Diagnostic.

<sup>7</sup> World Bank 2022. Rwanda Economic Update Boosting Regional Integration in the Post-COVID Era

<sup>8</sup> Government of Rwanda, 2018. National Institute of Statistics of Rwanda; in Bird et al., 2019.

<sup>9</sup> MINAGRI et al., 2018. Comprehensive Food Security & Vulnerability Analysis (CFSVA)

<sup>10</sup> MINAGRI et al., 2018. Comprehensive Food Security & Vulnerability Analysis (CFSVA)

<sup>11</sup> Ibid (2018).

national parks. Most cropping zones have 2 seasons: Season A which is from September to February, and Season B from March to June.

As elaborated on in this proposal, the region is faced with various environmental and climatic challenges both now and in the future. These include climatic variables such as greater seasonal temperature variability, rainfall intensity increases, increases in drought periods; but also forest resource depletion, land and soil

erosion, increases in incidences of landslides, and biodiversity losses. Forest coverage has decreased in the past decades, and the Government of Rwanda census of 2018-2019 shows that 77% of Rwandan households use firewood as primary fuel for cooking.<sup>12</sup>

### 2.3. Important long-term dynamics and drivers

The Congo-Nile Divide region of Rwanda is likely to encounter a few important high-level trends in the middle to long term future. These relate to both social, political, economic and environmental trends, which, while not fully apparent yet, will be important to shape economic development interventions within the project.

#### 2.3.1 Climate change: localized effects of temperature shifts and rainfall patterns.

In a report by Future Climate Africa for Rwanda, it was explored how the tea and coffee sectors will be affected in the long run by climate change. Knowing about these longer-term trends is important, as the investment in new tea bushes and coffee takes many years to recoup.<sup>13</sup> According to the World Bank, agriculture and livestock sectors, particularly maize and wheat as well as coffee and tea—will be most impacted but note that expansion of crops into new areas may also arise.<sup>14</sup>

- **Temperature:** In the Congo Nile Divide temperatures could increase long term by 2 degrees Celsius. As such, research models developed by members of the proposal writing team show that an increase of temperature will shift isotherms and ecosystems uphill (by a predicted 345 meters). This has ramifications for tea production, where a shift uphill of 345 meters is challenging considering the steepness of the higher altitudes.
- **Rainfall:** rainfall intensity is set to increase during seasons with higher temperatures. On the other hand, during dry spells and higher temperatures, the land will dry out more quickly. On steep hill sides this will accelerate erosion and landslides. Tea harvesting periods may coincide with heavier rainy seasons, while planting of new tea and fertilizer application will be affected.

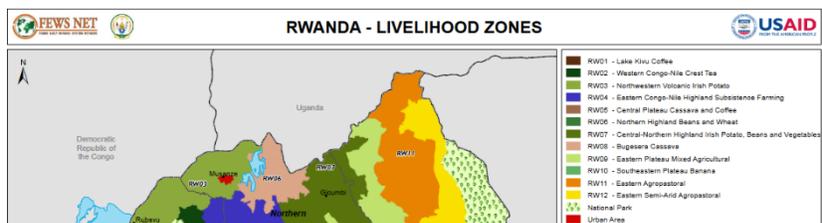
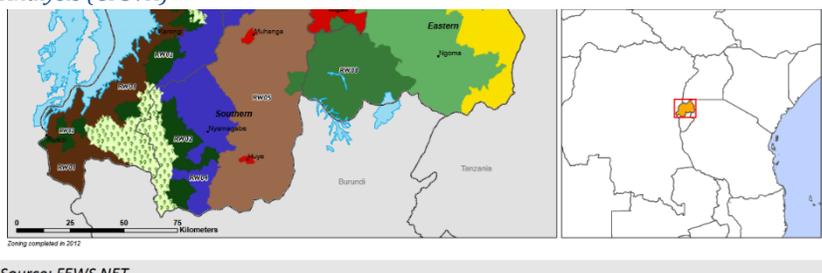


Figure 1: MINAGRI et al., 2018. *Comprehensive Food Security & Vulnerability Analysis (CFSVA)*



Source: FEWS NET

<sup>12</sup> Government of Rwanda, 2021. Rwanda Household Survey 2019/2020. National Institute of Statistics of Rwanda.

<sup>13</sup> FutureClimateAfrica, 2015. Mainstreaming climate information into sector development plans: the case of Rwanda's tea and coffee sectors. Second edition, December 2015

<sup>14</sup> World Bank, 2019. Rwanda Systematic Country Diagnostic.

- Seasonal shifts: climate change will likely impact the seasonal calendar of the Western Province, and it may not be expected that Season A and Season B will behave according to historical patterns. This will make it challenging for farmers to plan their crops. Also, diseases and viruses, such as coffee leaf rust, which is usually found in lower zones, can spread upwards.

### 2.3.2. Rural structural transformation

- Challenges to agricultural development are affected by high demographic pressure in Rwanda, Burundi, DRC and increasingly Uganda in combination with poor natural resource management. This has led to rapid and continuous soil degradation, putting pressure on the fragile ecosystems especially combined with climate change impact.
- Youth unemployment stands at 18.7 percent, while around 60 percent of youth in the labour market are underemployed<sup>15</sup>. In line with this development, youth engagement in agriculture on the long term may be a question mark, with services sectors and hospitality sectors offering promising alternatives to farming.
- The Rwanda Strategic Plan for Agricultural Transformation in Rwanda 2018-2024 (PSTA 4) and the National Strategy for Transformation (NST1) (initiated in 2017), supported by FAO and IFAD, envisions the transformation of Rwandan agriculture from subsistence to commercial agriculture. This envisions the Rwandan government as a 'market enabler' rather than 'market actor'; and supports investments and innovations such as rice intensification, crop-livestock integration, renewable energy, and mainstreaming of climate resilience<sup>1617</sup>
- The Russia war in Ukraine has highlighted how global geopolitics are affecting Rwanda. Spill overs in 2022 have included rising inflation, depressing consumption and investment, with negative terms of trade. External demand for Rwanda's goods and services might decrease and enlarge Rwanda's trade deficit. Spill overs from the war are also increasing fertilizer cost, adversely impacting food security and straining the fiscal balance.<sup>18</sup>

### 2.3.3. Regional economic integration and global connectivity

- The region, particularly the Great Lakes region and the East African Community, is set for greater economic collaboration and alignment. The East African Community (composed of Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda) initiative works toward greater harmonization of markets, offering entry points for local livelihoods and incentives for peace. DRC is preparing final steps to join the EAC in 2022<sup>19</sup>. The Common Market for Eastern and Southern Africa (COMESA) aims to implement the Simplified Trade Regime (STR)<sup>20</sup> at different borders.
- Enhanced connectivity with international markets is a key strategy of the Rwanda government: Rwanda envisions being a regional logistics and trading hub, with the development of Bugasera as a key airport for cargo a foremost development.<sup>21</sup>
- Significant investments have already been completed and further committed to trade facilitation both regionally and internationally. The World Bank and TradeMark East Africa

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<sup>15</sup> FAO, 2019. Rural youth employment and agri-food systems in Rwanda: A rapid context analysis

<sup>16</sup> Government of Rwanda, 2017. 7 Years Government Programme: National Strategy for Transformation (NST1) 2017 – 2024. [https://www.nirda.gov.rw/uploads/tx\\_dce/National\\_Strategy\\_For\\_Trsansformation\\_-NST1-min.pdf](https://www.nirda.gov.rw/uploads/tx_dce/National_Strategy_For_Trsansformation_-NST1-min.pdf)

<sup>17</sup> IFAD, 2022. Investing in rural people in Rwanda.

<sup>18</sup> IMF, 2022. IMF Country Report No. 22/200: Rwanda

<sup>19</sup> The East African. 18-01-2022. Market of 90m people beckons as DRC launches final stage talks to join EAC.

<sup>20</sup> COMESA, 2021. Burundi, DR Congo set to rollout out Simplified Trade Regime

<sup>21</sup> World Bank 2022. Rwanda Economic Update Boosting Regional Integration in the Post-COVID Era

are key stakeholders that have invested efforts into supporting the construction of Rwandan harbours on Lake Kivu, improved border customs and border market infrastructure, and policy harmonisation. At the same time, the land-locked context of Rwanda without any sea connection will require sizable investments in air or train freight logistics.<sup>22</sup>

- Further integration of Global Value Chains (GVCs) in key export commodities like coffee and tea hold potential for bringing farmers closer to international consumers. However, research on internet connectivity processes in tea shows that power inequalities in access to (tailored) information flows lead to further influence of tea factories and international retailers, while smallholder farmers or cooperatives with limited access to information and dependent on 'generic' agricultural extension may withdraw from the profitable global market.<sup>23</sup> Aligned sub-trends may include a higher demand for sustainable, organic certified food products.
- Migration may figure prominently as a part of expanded possibilities for trade, especially among youth and women, with many informal trade movements already taking place between Rwanda and DRC despite incidences of insecurity. As an example, the World Bank<sup>24</sup> considers the 'Petite Barrière' between Rwanda and DRC as one of the highest daily flows of traders in Africa between 20,000 and 30,000 traders cross it every day of which majority are women.

#### 2.3.4. Cross-border conflict and political instability

- Although the trend towards increased regional collaboration is there, the effectiveness of these initiatives is still questionable. Inward looking governments and bilateral political tensions lead to significant challenges in cross-border collaboration. In practice, the enabling environment of cross-border trade is on many levels poorly organized. Intra-country, there is a lack or poor implementation of trade policies, rules and regulations.
- Political conflicts and Covid-19 have caused close borders on multiple occasions during the last years. For example, the border between Rwanda and Uganda has only been reopened since January 2022 after being closed for three years because of grievances between the governments of the two countries.
- In many countries along the Congo Nile Divide, organized Civil Society Organizations (CSOs), Community Based Organizations (CBOs), social movements, and informal activist groups play an important role in aggregating and articulating the needs and demands of the most excluded communities but are challenged in the Great Lakes region by fragility. Civil society struggles to create more accountability, trust and dialogue between formal state actors and the population at-large, due to lack of capacity, adversarial relationships, and the complexity of contexts. The disconnection of local social movements and informal activist groups from regional and global policymaking have negative implications for security, justice, governance and peace in the everyday lives of the most excluded. Civil society organizations in the Great Lakes region are structured at the national level, limiting regional interaction and influence. Patriarchal and gerontocratic social structures and norms further inhibit the influence of women's and youth advocacy organizations.<sup>25</sup>

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<sup>22</sup> World Bank 2022. Rwanda Economic Update Boosting Regional Integration in the Post-COVID Era

<sup>23</sup> Foster & Graham, 2014. Connectivity and the Tea Sector in Rwanda: Value Chains and Networks of Connectivity-Based Enterprises in Rwanda

<sup>24</sup> World Bank, 2015. [Women traders in Africa's Great Lakes](#)

<sup>25</sup> CIVICUS Monitor (2022). National Civic Space Ratings.

- Many political structures and conflicts are in some way related to land access and ownership, and while population pressure on land is projected to increase, this will lead to ongoing tensions.

#### 2.3.5. Tourism and green economy growth

- Rwanda has heavily focused on investing in tourism and its brand 'Visit Rwanda'. Though the Covid-19 pandemic has heavily impacted this, this is set for recovery in 2022. During Covid GDP contribution of tourism went from 4.6% of GDP in the first 9 months of 2019 to 1.2% in 2021.
- Investment in tourism is expected to boost other related sectors as well: especially services sub-sectors of transport, accommodation, and food services. Thus tourism, which includes a high focus on national parks in the Western part of Rwanda, could therefore affect many different sectors and employment opportunities.
- Rwanda is expected to strategically plan and implement projects around protected and conservation areas. For instance, Gishwati Forest Reserve, a secondary montane rainforest fragment located just south of Volcanoes National Park in western Rwanda. It is part of the Congo-Nile Divide Forest complex that includes Nyungwe National Park in Rwanda and the contiguous Kibira National Park in Burundi. The Park is made up of two separate forests – the larger Gishwati and small Mukura, forming a total of 34 square kilometres plus a buffer zone, according to the Rwanda Development Board (RDB)<sup>26</sup>
- Globally, increasing attention toward climate change action and the importance of preserving ecosystem habitats might support the funnelling of resources toward green economy initiatives such as agro/nature conservation tourism

### 3. Existing and planned programs

In order to position ourselves within the Congo-Nile Divide, it is important to also review and align to existing initiatives and programmes operating in this area. This to avoid duplication of efforts, and to search for synergies and cooperation. The following programmes are either planned or currently under implementation in the region.

#### 3.1. *Planned:*

- **PSAC** – The Promoting Smallholder Agro-export Competitiveness Project (PSAC) is an IFAD funded program focused on promoting agro-exports within the coffee, tea and horticulture sectors. The program is expected to cover many districts in Rwanda, including most districts in the Congo-Nile Divide Landscape.
- **ReGenerate** – in a new programme financed by SIDA, ReGenerate is aiming to strengthen market system development of Western province, with a focus on pro-poor, climate resilience and women and youth inclusion. The program was designed in 2022 and is expected to start in 2023. Cordaid is likely to have a role in the implementation.

#### 3.2. *Existing programs:*

- **FAO cross-border trade:** FAO-supported food security project in Rwanda is a regional project implemented in the cross-border districts of Rwanda, Burundi, Uganda and Democratic Republic of Congo. FAO Multipartner Programme Support Mechanism (FMM) project "Enabling women to benefit more equally from agrifood value chains" contributing to FAO's Strategic Objective Four "Enable inclusive and efficient agricultural and food systems".

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<sup>26</sup> <https://www.topafricanews.com/2022/05/09/five-ways-rwanda-is-investing-in-ecotourism-and-conservation/>

- **One Acre Fund (OAF)** - OAF has an established presence in the Congo-Nile Divide landscape, specifically around Karongi. OAF supports farmers growing a wide range of crops, notably maize, climbing beans, bush beans, potatoes, and rice, over two growing seasons per year. They also offer a range of add-on products, such as solar lights and cookstoves. Additionally, OAF runs an active agroforestry program, which is critical for improving soil, preventing erosion, and building long-term assets such as timber when the trees eventually mature.
- **TREPA** - Together with IUCN, Enabel, ICRAF and World Vision, Cordaid Rwanda is implementing a 33-million EUR Green Climate Fund project: **Transforming Eastern Province through Adaptation (TREPA)**. The project intends to restore over 60,000 ha of drought-degraded landscapes into climate resilient ecosystems through reforestation, agroforestry, restoration of pasturelands, and erosion control measures. The project will promote improved clean and efficient cooking energy technologies to more than 100,000 households. It will also develop climate resilient markets and supply chains to incentivize investments in forests, increase the capacity of communities to renew and sustainably manage forests and agroforestry resources, and support smallholder farmers to adopt climate-resilient agriculture. Cordaid will intervene in the Access to Finance component, further developing the innovations initiated in Strengthening Africa Rural Smallholders (STARS) with a focus on green finance.
- **PRISM** - a partnership programme implemented by the Rwanda Agriculture and Animal Resources Development Board and jointly funded by IFAD and ENABEL, the Belgian development agency, with Heifer International and Vétérinaires Sans Frontières Belgium as the implementing partners. Cordaid is involved with a specific contribution as sub-implementor.
- **PSD-AG** – (already phased out) Through its 5-year project titled ‘Rwanda Private Sector Driven Agricultural Growth (PSDAG)’, USAID supported the government of Rwanda to develop both the agribusiness sector and the private sector – including value chain development. A focus was on six horticultural value chains, of which 2 are for the export: sugar snaps for export; and avocados (hash type) for export.
- **TradeMark East Africa** -TradeMark East Africa is a not-for-profit company that focuses on building long-term East African capacity. TradeMark East Africa is supported by various donors, including the Netherlands. TradeMark East Africa provides a platform for scaling-up of Aid For Trade to East Africa. In areas such as: trade policy reform; trade-related infrastructure; regional investment climate harmonisation; export development; trade facilitation; and coping with the social and environmental adjustment costs of deeper integration and rapid export-led growth. The principles underlying TradeMark East Africa are to ensure that delivery is fast, flexible, responsive to partners’ needs, with technically excellent inputs.
- **HortInvest** An initiative led by SNV with the objective of contributing to the growth of the horticulture sector in Rwanda. This has been done by promoting production and productivity improvements, especially among primary producers; promoting value addition of the horticultural produce destined to domestic, regional and export markets so that the value per unit of product brought to market is markedly increased; and, raising the export earnings through increasing horticultural sales value (not necessarily volumes) at markets within DR Congo, the East African Community and international high value markets. Even though HortInvest is coming to an end in 2022, it is a key initiative to link with and to learn from whilst engaging in the horticulture sector in the Congo-Nile Divide landscape.

#### 4. Congo-Nile Divide Agri-market sector scan

The backbone of the Rwandan economy is agriculture, with its contribution to growth and poverty reduction. The diverse landscape and agro ecology offers some key advantages for certain commodities and value chains. In this section we will focus on the Congo Nile Divide, which incorporates parts of Western, Southern and Northern provinces.

Agriculture in Rwanda means mostly small holder, subsistence, rain-fed, mixed-crop farming. Increasingly, introduction of technologies and improved practices have contributed to slight productivity increases. Land is the key constraint: there is 1.78 million hectares of land available. The average number of hectares available to households is 0.6, while 50% of farmers have on average 0.35 hectares and 15% farm less than 0.1<sup>27</sup>. The majority of people living in poverty are those who depend on agriculture and the food system for their livelihood. Close to 75% of people are working in agriculture or agri-business. Nearly a 3<sup>rd</sup> of the Rwanda GDP is generated from agriculture, with more than half of export revenues from agricultural products<sup>28</sup>, and 45% of government tax revenue<sup>29</sup>. Major food crops in terms of acreage are 1) dry beans (513,137 hectares harvested); 2) bananas (322,009 ha); 3) maize (237,658 ha) and 4) cassava (205,661 ha). In terms of productivity in yield per hectare, highest ranked are cassava (17.2 tonne per hectare); bananas (9,4 t/h), potatoes (7,1 t/h) and sweet potato (6.8 t/h)<sup>30</sup>. Key international export crops from Rwanda are tea and coffee, horticulture, rice and vegetable oils. The most important trading partners in the region are Democratic Republic of Congo (82% of informal trade goes there), Uganda (12.2%), Burundi (6.1%) and Tanzania (0.1 percent). DRC is by far the largest regional trading partner both in formal and informal exports. The main exports to the DRC include livestock and crops, but cross-border trade in services, such as finance, transportation, and wholesale trading, are also important<sup>31</sup>).

The agri-market sector in Rwanda is subject to various risks. Across the board, production side challenges lead to lower productivity, high post-harvest losses and lower income generation. Generally, food crops face many of these production-related risks whereas export crops are mainly exposed to market risks, such as price volatility. Pests and diseases pose a risk to Rwanda's food crop producers in particular because food crops have fewer organized supply chains and less access to preventive inputs than export crops. Soil fertility is an issue, with a higher risk of erosion in the highland sloped areas. Key crops facing pest and disease risk are cassava, banana, followed by Irish potatoes and sweet potatoes.<sup>32</sup> In recent years, access to seed has been a challenge, though the Government of Rwanda has taken steps to develop the seed sector and reduce dependency on seed imports, focusing particularly on maize hybrid seeds.<sup>33</sup>

In terms of gender, Rwanda has placed a high emphasis on equal participation of women in society. The Women's Empowerment in Agriculture Index (WEAI) score for Rwanda is high. It is also recognized that women perform the bulk of the labour in agriculture<sup>34</sup>. The majority of these women are subsistence farmers and have a high labour burden. The Agriculture Gender Strategy

<sup>27</sup> Ibid (2018)

<sup>28</sup> World Bank, 2019: Agriculture Finance Diagnostic

<sup>29</sup> MINAGRI et al., 2018. Comprehensive Food Security & Vulnerability Analysis (CFSVA)

<sup>30</sup> Global Yield Gap Atlas, 2016.. <https://www.yieldgap.org/rwanda>

<sup>31</sup> World Bank 2022. Rwanda Economic Update Boosting Regional Integration in the Post-COVID Era.

<sup>32</sup> Giertz et al., 2015. Rwanda Agricultural Sector Risk Assessment

<sup>33</sup> <https://www.busiweek.com/rwanda-finalizes-plans-to-end-seed-imports-by-2021/>

<sup>34</sup> World Bank, 2018: cited by Senders, Mukarugwiza and Mensink, 2020. Financial services for women: case study on women's participation in the maize and bean value chains in Rwanda. p. 28

(developed by the Rwandan Ministry of Agriculture and Animal Resources; MINAGRI, 2010) indicated that, at family level, conflicts often arise due to competition between cash and food crops. This becomes a gender issue because women manage food crops, while men are heavily involved in cash crops, with the latter having the potential to earn a higher income.<sup>35</sup>

Youth (aged 16-30), depend on a range of activities to generate income and livelihoods, combining various enterprises, wage labour and agricultural work. Most youth in the Western Province (58%) are self-employed, while 20% are contributing family workers, and 18% are employed<sup>36</sup>. Access to land and water is a key challenge, as they need to inherit land from their elders. Sharecropping is mostly done for food crops, not horticulture for instance<sup>37</sup>. Under-employment is a significant challenge – two-thirds of Rwandan youth work less than 35 hours per week, which is the threshold for under-employment. In addition, their wages tend to be much lower than those of adult workers<sup>38</sup>. Young women have fewer opportunities to leave farming – as young women age, the proportion of those engaged in agriculture as their main job increases, while the reverse is true for young men<sup>39</sup>. These issues have localized effects as well: it was found that wage-farm workers (often youth and women) who live in rural areas with less access to land are a growing group with high poverty rates. The number of non-farm independent workers, which include many informal entrepreneurs has also declined, even though it is hoped that these (service) providers can drive poverty reduction.<sup>40</sup>

In the West part of Rwanda, tea and coffee are key agricultural export commodities. In the north-western side of Rwanda, Irish potato is quite promising and has received quite some attention in recent years. Key staple foods, such as beans and maize are also prominent in the region. We also explore other value chains, such as honey, horticulture (which groups many vegetables and high value fruits); nuts; spices, small livestock and fisheries.

**TABLE 6.1 CROPS WITH A COMPARATIVE ADVANTAGE IN RWANDA**

| Crops ranked from lowest to highest DRC in the best performing location | Best performing province | DRC ratio |
|---|--------------------------|-----------|
| Irish potatoes  | Northern                 | 0.19      |
| Coffee  | Western                  | 0.30      |
| Beans (runner)  | Western                  | 0.31      |
| Soybeans  | Eastern                  | 0.40      |
| Maize   | Southern                 | 0.45      |
| Cassava   | Eastern                  | 0.50      |
| Wheat   | Northern                 | 0.85      |
| Rice  | Eastern                  | 1.00      |

Source: Cambridge Resources International 2017.

Note: Domestic resource cost (DRC) is used as a tool of cost or benefit analysis in less-developed countries to both appraise hypothetical projects and to evaluate the costs of using protection to maintain existing industries. The DRC implies that crops with a low number are more competitive and profitable. It may not, however, capture the greatest income opportunities. There are many factors to consider when looking at profits, including firm efficiency, market demand, and so forth. The choice of subsectors for the deep dive differs from the rank, as other criteria were considered, including impact and markets.

In the next chapter, after a scan of the access to finance situation in Rwanda, a number of key commodities have been scanned and aligned with opportunities and challenges for development. These rapid assessments will help with further selection of key priority value chains that are aligned with the proposal.

<sup>35</sup> Senders, Mukarugwiza and Mensink, 2020. Financial services for women: case study on women's participation in the maize and bean value chains in Rwanda. p. 30

<sup>36</sup> EICV3 District Sector Profiles

<sup>37</sup> Van Keulen, Rik, Rumenera, P., Banjara, G., Colantuoni, M. and Muthamia-Mwenda, J. 2022. Horticulture value chain analysis – Opportunities for youth employment in Rwanda. Rome, FAO. <https://doi.org/10.4060/cb8266en>

<sup>38</sup> Youth Employment in Rwanda, Laterite, 2015

<sup>39</sup> EICV5, Rwanda Youth Profile

<sup>40</sup> World Bank, 2019. Rwanda Systematic Country Diagnostic.

#### 4.1. Financial sector analysis

##### 4.1.1. Situation regarding access to finance in Rwanda

Traditionally, small holder farmers in Rwanda have managed their assets, building on local knowledge and generally using their own resources to operate and manage water supply and invest in agricultural inputs and tools. However, the cumulative deterioration resulting from increasing climate-related shocks has reduced productivity and impoverished smallholder farmers. Community organisations and in particular farmers' organisations no longer have the capacity to invest adequately in innovative climate resilient land and soil management technologies. Where government investments are leveraged, the investment is not sustained due to lack of financial capacity to bear the incremental costs of addressing the severity of climate shocks on small-scale infrastructure. The upfront capital costs of these investments are outside the financial capability of farmer households or communities and, addition, communities lack the ability to effectively mobilise financing for land restoration and adopting climate resilient technologies.

The Government of Rwanda (GoR) recognises the role played by the financial sector in facilitating economic growth through enhanced access to financial services including access to finance for investment and for building resilience for farmers. However, while the recent surveys show a gradual growth in financial inclusion since 2016 despite Covid 19 (reference to Finscope report 2020<sup>41</sup>), the use of formal financial service in agriculture remains low. Financial service providers need support to adapt financial services to the needs of farmers and Farmer organizations, including support to diversified loan packages, climate sensitive risk monitoring systems and linking lending to digital payment and information services. The Rwanda agri-sector shows a fast outreach through informal systems and Savings and Credit Co-Operative Societies (SACCOs), but the bulk of agri-credit is still provided by Microfinance banks and microfinance institutions, since these organization have a stronger finance base and deploy already digitized system (such as YAPU [42], money phone [43] etc.).

While there is a growing need for access to finance that builds climate resilience, savings and credit associations (SACCO's), microfinance and commercial banks have limited knowledge on climate change and have no experience in financing resilient agricultural production methods, including agro-forestry. In addition, the financial service providers in Rwanda do not understand the risks involved in climate change for agricultural production. This amplifies the risks for investors to support climate resilient finance for technologies and practices. The financial sector including Microfinance, SACCO's and banks, need technical and financial support to enhance climate resilient finance in agriculture.

*Table 1: Challenges and opportunities for financial service providers to offer climate smart financial products.*

| Knowledge gap |   | Technology gap |  | Funding gap |  |
|---------------|---|----------------|--|-------------|--|
| 1.            | No knowledge of climate impact on target groups     | 1.             | No tools to appraise loans for adaptation,           | 1.          | No access to long term high risk bearing capital |
| 2.            | No tailored financial products, including for women | 2.             | No systems for measuring Carbon emission (such as A- | 2.          | No access to blended finance                     |

<sup>41</sup> [https://www.bnr.rw/fileadmin/user\\_upload/2020\\_Rwanda\\_Finscope.pdf](https://www.bnr.rw/fileadmin/user_upload/2020_Rwanda_Finscope.pdf)

<sup>42</sup> YAPU: <https://www.yapu.solutions/>

<sup>43</sup> Money phone: <https://www.money-phone.com/>

|                  |   |    |  |    |   |
|------------------|---|----|--|----|---|
| 3.               | No links to CSA providers or other non-financial service providers. | 3. | Corn /FairClimateFund)<br>Tools are complicated                                |    |   |
| <b>Solutions</b> |   |    |  |    |   |
| 1.               | Capacity building on policy and product development                 | 1. | Investment in tools for measuring/ agroforestry screening and carbon reduction | 1. | Access to high risk bearing capital and long term (affordable) credit funds (at least 7-10 years) |
| 2.               | linking to non-financial service providers                          | 2. | digital investments and connection to applications                             |    |   |

#### 4.2. Existing financial services and financial inclusion stakeholders

Referring to FINSCOPE report 2020<sup>44</sup>, in total 93% (about 7 million adults) in Rwanda are financially included (including both formal and informal financial products/services). Levels of financial inclusion vary from 99% in Gasabo district to about 83% in Rusizi district. Gender gap in financial inclusion is closing with only 8% excluded women compared to 7% amongst male counterparts. As expected, when comparing seniors and youth, youth within the age group of 16 – 24 years are financially excluded at 18% points, significantly higher compared to the national average of 7% exclusion.

In financial terms, we can speak about various aspects of importance and level of access: formally served clients, banked clients but also intermediate forms of access such as digital services and informal services. About 77% (5.5 million adults) in Rwanda have/use **formal financial products/services**, including banking sector and other formal (nonbank) financial products/services from insurance firms, mobile network operators, etc. Again, levels vary from 99% in Gasabo district to only 56% in Burera district. There is clear gender gap in accessing and using formal financial services, women (74%) are lagging with 7% gap compared to male counterparts at 81%. About 36% (2.6 million individuals) of adults in Rwanda are **banked or are using banking services**. The proportion of adults that are banked ranges from 80% in Gasabo district to only 8% in Ngororero district. Women lags men in the usage of bank services, 34% of female adults in Rwanda use bank services or products versus 39% of their male counterparts. Banked population growth has increased by 1.1 million since 2016. Bank uptake and usage seems to be driven by transactional products, as more people (around 900 000) are receiving their income through banking accounts. About 25% (1.7 million) banked adults use digital payments, this is up from 6% or around 400,000 in 2016. Digital payments have a direct impact on the increased usage, 68% of bank clients use their accounts monthly, and this is up by 16 percentage points since 2016. About 87% (6.2 million adults) in Rwanda have **access to a mobile phone** with females (84%) having lower access compared to men (90%). Around 3 in 5 (61%) adults use mobile money and more males (68%) have mobile money accounts as compared to women (56%). Key barriers to the uptake of mobile money relate to lack of product knowledge and lack of interest in the product. The proportion of adults that have/use **other formal (non-bank) financial products/services** ranges from 98% in Gasabo district to 53% in Burera. Though the use of other formal non-bank services is high amongst both males and females, a lesser proportion of females (71%) have access compared to 80% males. The other formal non-bank institution usage is driven by mobile money accounts. In total, about 78% of adults in Rwanda **use informal mechanisms** (5.6 million

individuals). Around 80% women belong to a savings group or use informal mechanism to manage their financial needs and about 20% of adult women rely ONLY on informal financial devices compared to 12% of men counterparts. Levels of informal financial products usage vary from 90% in Rulindo district to 59% in Kicukiro district. The informal sector plays an important role in extending the overall levels of financial inclusion, particularly in rural areas and among women. About 16% of adults in Rwanda rely ONLY on informal mechanisms, declining from 21% in 2016.

It is important to note that despite various forms of access, quite some people still do not access financial services. 7% of adults in Rwanda (0.5 million) do not use any financial products or services (neither formal nor informal) to manage their financial lives, i.e., they are financially excluded. Levels of exclusion vary considerably across the country from zero% in Gasabo district to 17% in Gatsibo and Rusizi districts. As shown here, traditionally vulnerable groups such as the poor, those residing in remote rural areas, youth, women, and the adult (senior citizen) population are more likely to be financially excluded.

Financial access is also about more than access to financial services. Savings, borrowing from peers and networks, insurance and remittances are sources of cash for many households in Rwanda. About 86% (6 million individuals) of adults in Rwanda **save, including all forms of savings**. Saving through formal institutions, grew from 49% in 2016 to 54% in 2020. Informal savings grew significantly, reducing high number of adults saving money at home. People in Rwanda mainly save for living expenses. Women and young youth (16-24 years) are less likely to save money through formal financial service providers. Both women and young youth (49% respectively) are below national formal savings of 54%. About 76% (5.4 million) of adults in Rwanda **borrow money**, including all forms of borrowing. Slightly more females (77%) have borrowed in the past 12 months compared to their male counterparts (76%). Same as saving uptake, there has been an impressive increase in formal credit consumption, however, formal credit remains low at 22%. Formal borrowings in Rwanda are driven by borrowing from mobile money and SACCO, each with 9% penetration. In general, the uptake of **insurance** is low in Rwanda, nevertheless the uptake of insurance shows a rapid growth since 2016. About 17% of adults have insurance products, (around 1.2 million, increasing from 0.5 million since 2016). Slightly more males (19%) are insured compared to their female counterparts (15%). Insurance in Rwanda is driven by medical insurance. Life insurance is also garnering traction at 23%, up from 12% in 2016. About 45% (3.2 million individuals) of adults in Rwanda **sent and/or received money through remittances** in the past 12 months prior to FinScope Rwanda 2020 survey, including all forms of remittance channels. Slightly more people (45%) remitted money in 2020 compared to 43% in 2016. When using gender lenses, more males (49%) have remitted in the past compared to females (41%). The results show that for those that remit, the most reported means of remitting is through formal (non-bank) remittance products (93%) which is mainly driven by mobile money.

#### 4.2.1 Challenges and opportunities

The informal sector, and especially savings and credit groups, are of key importance to smallholders, especially for women in rural areas. Women use financial services primarily as a risk-management strategy to manage household cash flow constraints and food security at household level while men use financial services to invest and grow their businesses. Women are very appreciative of savings products alongside with loans. Other financial services, such as insurance and remittances, are less used, especially by women.

The use of mobile money has notably increased in Rwanda. In 2020, around 3 in 5 (61%) adults use mobile money used mobile money, but mostly for money transfers from branch to head office accounts and sometimes for savings. The recent study on client voices [1] shows that mobile phone use in rural areas is close to 50%, and almost similar for men and women. Issues of

transparency and client protection still need to be addressed in the use of these digital services, however, mobile money could help improve accessibility while reducing costs of services to the rural population, once the services are streamlined, marketed and controlled. Key recommendations from the study to improve access to finance, especially in rural areas include:

- Deepening the usage of financial services for the rural population in terms of usage of a variety of products including loans, savings, insurance, etc.
- Increasing access to finance for farmers also by linking savings groups to more formalized financial institutions.
- Developing appropriate financial products for the rural population and for SMEs, especially in the context of a value chain.
- Enhancing financial education and client protection principles, as stated in the governmental programs for leaving no one behind.
- Further digitalization into a national payment system, aiming to become a cashless economy and with 80% of the adult population using mobile and or smart card systems.
- Addressing institutional gaps and enforcing public–private partnerships (PPP).

In summary, even though Rwanda does relatively well in terms of access to finance, access to agricultural finance is still low for smallholder farmers, especially for rural women. Compounded with the lack of knowledge and understanding on climate finance of the financial sector, enhancing access to climate resilient financial services is still at its infant stage in Rwanda. The project wants to take up this challenge and alter this situation, especially for the benefit of the rural poor.

#### 4.2.2. Proposed ideas to develop financial services

The proposed financial services development addresses barriers such as limited financial products to stimulate climate resilient production in agriculture for farmers, and for the selected value chains, lack of access to finance for rural population especially women and youth. Interventions will enhance the long-term sustainability and economic viability of the project by 1) improving farmer and Farmer organizations capital base through savings stimulation 2) developing financial products and improving access to loans for progressive farmers including women, from financial service providers 3) stimulating private sector service investments for climate resilient goods and services and linking private sector service providers with farmers and Farmer organizations and downstream value chain actors engaged in climate resilient and low emissions processing and trading. Bringing in the private sector investments in the local development improves the prospects for financial risk sharing and for a gradual shift away from grant finance to private operators. Private sector and financial sector leverage offers stronger scaling potential and employment opportunities and potential for diversifying the local community's economy.

Unique to private sector stimulation, Cordaid will collaborate with financial service providers to develop savings, credit, and other financial services that will adequately consider reduced climate risks from landscape interventions and other improvements in managing climate risks and incentivising farmers and communities to take up climate interventions. To achieve this, Cordaid will deliver technical assistance to microfinance staff, help to develop new financial products, develop indicators in credit assessment, establish monitoring systems and test and evaluate financial products.[4] With provided support and capacity building, the financial service providers will be enabled to:

- Develop financial products, including savings, tailored to the needs of groups involved in targeted climate resilient activities,
- Develop financial products for Farmer organizations, farmers and other actors in value chains for agricultural and tree products.

- Assess investment opportunities while incorporating analysis of climate resilient methods of [5] agricultural production for mainstream/staple crops, and
- Adapt products for mainstreaming and replicating products at branch and national level. Through this last intervention the wider finance sector in Rwanda will be reached, including the SACCO's and lessons will be shared sector wide to stimulate a paradigm shift towards climate resilient finance.

Furthermore, Cordaid proposes international impact investors to engage in investment for SMEs in the relevant value chains and connect to insurance companies. The design and development of financial products will be based on clear understanding of the demand for such financial products and services, detailed screening and adaptation of internal procedures of financial institutions, and pilot testing and evaluation of financial products for the targeted value chains. The financial products will be consistent with climate resilience capacity building for value chain actors. Techniques will be developed to analyse and score climate resilient agricultural production modes for mainstream/staple crops. The project will support financial providers to collect learnings and share with both local actors, especially financial institutions.

The promotion of financial instruments is a long-term effort to ensure sustainability of the interventions. The design and prototype testing of financial services as part of the project, coupled with financial education activities, will stimulate access to financial services, including savings and loans, by the targeted population. Once financial services are shown to be successful, financial institutions will gradually take ownership. Similarly, financial education activities will be handed over to actors such as farmer organizations and financial institutions. Alongside this, private companies and investors that are willing to operate in the area and provide services and equipment will be stimulated and connected to financial service providers that will eventually be able to provide relevant finance.

#### 4.2.3. Financial sustainability

Strengthening responsible investments in value chains for climate resilient agricultural and tree products and associated enterprises is critical for incentivizing the establishment and management of agro-ecological systems and their continued management. Access to innovative finance products specifically designed for rainfed, agroforestry systems is crucial, as it is for climate resilient practices in mainstream agricultural production. This will ensure financial sustainability and support access to finance needed for restoration activities lessons learned will feed into dissemination efforts to ensure eventually availability at national level, so as to scale up the level of investment in climate resilient agroforestry practices and associated value chains. The project will ensure that MFIs and relevant financing mechanisms supporting the value chains (to be further expanded showing these will support all relevant value chains by targeting smallholders and relevant stakeholders).

The project should support a paradigm shift in the way future climate resilience interventions are developed, sustained and financed. Value chain actors, including individual farmers and Farmer organizations will be supported in becoming better organised and informed and in building capacities for business administration, the development of business/investment cases, attracting finance for their implementation, and ensuring economic and financial viability of resilience measures in their businesses/business. Farmers and Farmer organizations will then be linked to suitable financial products and services. Cordaid will ensure that in the long-term, farmers and Farmer organizations can both diversify livelihoods through gender inclusive agricultural value chains and have the financial resources required to add value to the agricultural and tree products derived from landscape restoration activities as a means to improve adaptive capacity to climate shocks and loss of income induced by impacts such as prolonged drought and floods. Interventions will enhance the long-term sustainability and economic viability of the project by

improving farmer and FFPOs capital base through savings stimulation and the design and prototype testing of financial services and financial education which will stimulate access to financial services in the medium term, including savings and loans, by the targeted population. A major existing market failure that the project will remedy is limited access to long-term finance by the targeted vulnerable farmers. The initial use of grants, to be replaced gradually by private sector investments, is key to ensuring sustainability and scalability of the investments. Alongside this, private companies and investors that are willing to operate in the area and provide services and equipment will be stimulated and connected to financial service providers that will eventually be able to provide relevant finance well beyond GCF financial exit. Furthermore, affordable loans for the expansion of woodlot activities led by farmers and contracting cooperatives will secure long-term biomass supply while also supporting a transition to clean cooking.

## 5. Long-list VC commodity literature review

| Opportunities   | Constraints/ challenges  | Key stakeholders  |
|---|--|---|
| <p><b>Coffee</b></p> <p>The Western Province is an important part of Rwanda's coffee belt, with 126,655 coffee farmers (over 35% of all coffee producers), of whom a third are female. Almost all coffee from Rwanda is exported, mostly to Switzerland and United States (18,000 metric tonnes in 2018). Coffee represents about 7% of total export value, and 20% of the total agricultural export value from Rwanda.<sup>45</sup></p> <ul style="list-style-type: none"> <li>• Many women are hired by Coffee Washing Stations (CWS) as seasonal laborers. There are close to 300 CWS in Rwanda – up from 2 in 2002.</li> <li>• Coffee production has slightly decreased, but quality has improved, with GoR forecasting continued growth in export value by increasing sales of specialty coffee.</li> <li>• Competitive advantage is very much related to its relatively consistent good qualities, its “storytelling” capacity, its (current) pricing, its CWS infrastructure, and the ease of traveling and doing business.</li> <li>• Rwanda can produce climate positive coffee by planting shade trees.<sup>46</sup> Coffee can also be intercropped with common beans and soybean, and has been done so in Rwanda (but not on a</li> </ul> | <ul style="list-style-type: none"> <li>• Around 22% of coffee trees in the province are over 30 years old and unproductive, and highly acidic soils require application of lime</li> <li>• High average age of coffee farmers (49 years old in Western Province)</li> <li>• Strongly held cultural beliefs that farmers should not plant shade trees in the coffee farms.</li> <li>• Regenerative practices, tree rejuvenation, and attracting youth to the sector are necessary to increase yields and improve quality<sup>48</sup>. In the past, the government of Rwanda discouraged intercropping of coffee.<sup>49</sup></li> <li>• Increasing temperatures cause increases in pest and diseases</li> <li>• Rwanda's coffee industry is dominated by a few medium to large traders and exporters. Many of them are related to the larger international trading houses. Together they control 64% of the theoretical capacity, but they are thought to be responsible for at least 85% of the exported volume. This vertical integration has reduced bargaining</li> </ul> | <p>VC actors:</p> <ul style="list-style-type: none"> <li>• Coffee farmers</li> <li>• Small scale private CWS</li> <li>• Cooperative CWS</li> <li>• Coffee millers (private dry millers and cooperatives)</li> <li>• Coffee traders and exporters (88 registered) such as RTC, IMPEXCOR, Dormans and RWACOF</li> <li>• Coffee roasters</li> <li>• International coffee trading houses</li> </ul> <p>Key supporting and enabling actors</p> <ul style="list-style-type: none"> <li>• Rwandan National Agricultural Export Development Board</li> <li>• Coffee Exporters and Processors Association of Rwanda</li> <li>• Rwandan Coffee Cooperatives Federation (RCCF)</li> <li>• Rwanda Development Bank (BRD)</li> <li>• COSTCO Wholesale Corporation</li> <li>• Bloomberg Philanthropies</li> </ul> |

<sup>45</sup> CBI, 2018. Value Chain Analysis for the Coffee Sector in Rwanda Report for the CBI – 27 July 2018 Netherlands Enterprise Agency.

<sup>46</sup> FutureClimateAfrica, 2015. Mainstreaming climate information into sector development plans: the case of Rwanda's tea and coffee sectors. Second edition, December 2015

<sup>48</sup> National Coffee Census 2015; NAEB Strategy 2019-2024, Value Chain Analysis for the Coffee Sector Rwanda (2018), CBI, Centre for the Promotion of Imports

<sup>49</sup> Harelimana, Le Goff, Ntirushwa Rukazambuga, Hance, 2018. Coffee Production Systems: Evaluation of Intercropping System in Coffee Plantations in Rwanda

|   |   |  |
|---|---|--|
| <p>large scale and not necessarily for environment/soil health reasons but for food security<sup>47</sup></p> <ul style="list-style-type: none"> <li>● To respond to climate change, GoR recognizes the need to invest in irrigation for coffee.</li> <li>● Coffee husks can be used for composting as a by-product</li> </ul>  | <p>power of small-scale producers and heightened competition for coffee cherries.<sup>50</sup></p> <ul style="list-style-type: none"> <li>● Many major coffee projects ongoing and planned for the near future</li> <li>● Coffee price has been static for the past five years due to the global market pushing a few farmers to migrate from coffee to other new crops like macadamia and avocado</li> </ul>   |  |
| <b>Tea</b>  |   |  |
| <p>Rwandan tea is produced by tea estates and smallholders in labour intensive processes. This means that tea factories are located in close proximity to clusters of tea-growing plantations. Many of the tea factories tend to also have offices in Kigali, where transportation and the marketing side of production is organised</p> <ul style="list-style-type: none"> <li>● 8 out of Rwanda's 15 tea factories and approx. 21,000 tea plantation employees and 9,144 tea smallholder households located in Western Province.</li> <li>● Traditionally, women are responsible for maintaining and picking tea.</li> <li>● The government projects a strong annual tea production growth of 7.4% nationally, with 3 new factories being established by international companies, and opportunities to increase yields.</li> <li>● The specialty tea market (including organic tea) should help Rwanda capture more value.</li> </ul> | <ul style="list-style-type: none"> <li>● Sensitive to temperature variability.</li> <li>● Some current and planned low lying tea areas are no longer suitable for quality tea production<sup>52</sup></li> <li>● Low yields, low quality</li> <li>● The highland environment of tea growing limits large-scale production</li> <li>● Some Rwandan farmers have been observed to neglect tea plantations, with little use of modern inputs such as fertilisers<sup>53</sup></li> <li>● In landlocked Rwanda the high costs of fertiliser inputs and transportation particularly contribute to reducing small farmer profits due to the remote location of Rwandan tea plantations. This also puts Rwandan tea at a cost disadvantage compared to Kenyan tea, which is closer to shipping ports.</li> </ul> | <p>VC-actors</p> <ul style="list-style-type: none"> <li>● Tea estates (which employ many tea pluckers – often women)</li> <li>● Tea factories (often owners of tea estates)</li> <li>● Land sharing cooperatives</li> <li>● Smallholder farmers (majority (66%) comes from smallholders whose land area tends to be very small (&lt;0.5ha)</li> <li>● Retailers (often international)</li> </ul> <p>Key supporting and enabling actors</p> <ul style="list-style-type: none"> <li>● Rwandan National Agricultural Export Development Board</li> <li>● Mombasa Auction managed by the East African Tea Trade Association</li> </ul> |

<sup>47</sup> Harelimana, Le Goff, Ntirushwa Rukazambuga, Hance, 2018. Coffee Production Systems: Evaluation of Intercropping System in Coffee Plantations in Rwanda

<sup>50</sup> CBI, 2018. Value Chain Analysis for the Coffee Sector in Rwanda Report for the CBI – 27 July 2018 Netherlands Enterprise Agency.

<sup>52</sup> <https://www.beveragedaily.com/Article/2019/06/20/Shaping-Rwanda-s-tea-industry-to-withstand-climate-change>; <https://futureclimateafrica.org/news/adapting-rwanda-growing-rwandas-tea-coffee-sectors-changing-climate>

<sup>53</sup> Foster & Graham, 2014. Connectivity and the Tea Sector in Rwanda: Value Chains and Networks of Connectivity-Based Enterprises in Rwanda

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| <ul style="list-style-type: none"> <li>Tea firms in Rwanda are increasingly linked into global value chains of production.<sup>51</sup></li> </ul>   | <ul style="list-style-type: none"> <li>Unequal access to finance for local actors compared to global tea companies (who can access the global financial market more easily for favourable rates)</li> </ul>  |   |
| <b>Horticulture (fruit and vegetables)</b>   |  |   |
| <p>175,000 horticulture farming households in the Western province, with high involvement of women. In general, in Rwanda, among fruits, pineapple is by far the largest in volume at 12.8 percent of total horticultural production. Passion fruit (3.5%) and tamarillo (2.6%) come in a distant second and third. As a function of sales value, the big three (pineapple, passion fruit and tamarillos) contribute nearly 95% of all fruit sales<sup>54</sup>. Nation-wide, vegetable sales are dominated by tomatoes (28.4%), onions (14.2%) and cabbages (12.8%), by volume of total horticulture production. These crops are also very important in terms of sales value, but sweet pepper surfaces as one of the more important vegetable crops (11.5%) of all sales due to its high price per kg. Other crops that round out the vegetable segment of horticulture are carrot (4.5%) and eggplant (6.3%).</p> <ul style="list-style-type: none"> <li>In the zone of the Congo Nile Divide, Rubavu has high vegetable production: 49 081 tonnes in 2019<sup>55</sup></li> <li>Demand for produce such as French beans, snow peas, passion fruit, chilis, and cut flowers is growing, and high-value export crops are prioritized by the government.</li> </ul> | <ul style="list-style-type: none"> <li>Low productivity</li> <li>Most productivity increases driven by synthetic inputs, which risk further degrading soil and water quality</li> <li>Insufficient aggregation, with high current post harvest losses amount to <math>\pm 35\%</math><sup>57</sup></li> <li>Limited market infrastructure, cold chain facilities in Rwanda are scarce and underutilised, air freight and handling costs are high compared to neighbouring countries.</li> <li>Poorly organized and generally informal market channels (except for high-value export crops)</li> <li>Increasing risks of pests and diseases</li> <li>Prone to be sensitive to extreme weather</li> <li>Quality challenges stemming from lack of relevant technical know-how and limited access to quality inputs (e.g., seedlings, appropriate varieties, as well as pesticides etc. that meet export standards). Importers and wholesalers for the high-end markets in the EU have strict terms and conditions.</li> <li>Access to finance is a key issue: limited value addition, due to a lack of access to</li> </ul> | <p>VC actors:</p> <ul style="list-style-type: none"> <li>Small scale farmers, some of which are out-growers for exporting companies</li> <li>Small/medium scale commercial farmers with greenhouses</li> <li>Retail traders (52%) are the main buyers of fruit and vegetables in Rwanda</li> <li>Wholesale traders (37% of buyers of fresh produce).</li> <li>Exporters (also often provide seeds and pesticides)</li> <li>Agro-input suppliers</li> </ul> <p>Key supporting and enabling actors</p> <ul style="list-style-type: none"> <li>Ministry of Agriculture. Rwanda has the Strategic Plan for the Transformation of Agriculture in Rwanda (PSTA-4). The new policy aims to contribute to improved food and nutrition security, through increased rural incomes, access to safe and affordable horticulture products for rural and urban</li> </ul> |

<sup>51</sup> Foster & Graham, 2014. Connectivity and the Tea Sector in Rwanda: Value Chains and Networks of Connectivity-Based Enterprises in Rwanda

<sup>54</sup> Factsheet: Horticulture sector in Rwanda, 2019. Netherlands Ministry of Foreign Affairs.

<sup>55</sup> Van Keulen, Rik, Rumenera, P., Banjara, G., Colantuoni, M. and Muthamia-Mwenda, J. 2022. Horticulture value chain analysis – Opportunities for youth employment in Rwanda. Rome, FAO. <https://doi.org/10.4060/cb8266en>

<sup>57</sup> Factsheet: Horticulture sector in Rwanda, 2019. Netherlands Ministry of Foreign Affairs

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| <ul style="list-style-type: none"> <li>• Good sources for vitamins and micro-nutrients. Added to this: 72, 4% of fruit and vegetables never leave the district in which it is produced</li> <li>• DRC provides a large market for lower-value horticulture exports that are often traded informally.</li> <li>• The organic horticulture market is growing and offers opportunities. A planned large-scale organic fertilizer factory (with €20M from European investors<sup>56</sup>) is likely to make non-synthetic inputs more accessible.</li> <li>• Requires less land and is fast growing (gives cash on short term)</li> <li>• Horticulture presents more opportunities in the export market <b>for</b> European and Asia market</li> <li>• country projects to increase annual horticulture export revenues from the current \$42 million to \$130 million in 2024,</li> <li>• No government export taxes or VAT on horticulture exports;</li> </ul> | <p>working capital for agro processors. Credit to agriculture remains at a low 7% (2016). Financial constraints affect the sector particularly at the time of acquiring required inputs and at the postharvest stage. Access to finance a big challenge, especially for young agronomists willing to start a business in horticulture. Cash flow is a challenge for (regional) exporters<sup>58</sup></p> <ul style="list-style-type: none"> <li>• Tomatoes often cultivated under greenhouses by more wealthy farmers in Southern provinces<sup>59</sup></li> </ul> | <p>consumers; while also strengthening the horticulture sector to become an innovative, dynamic growth and export sector for Rwanda.</p> <ul style="list-style-type: none"> <li>• Horticultural Exporters Association of Rwanda (HEAR)</li> </ul> |
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| <p><b>Irish potato</b></p>   |   |   |
| <p>Northern agro-ecological zone has good climate and soil for growing potatoes, with 3 seasons per year. The highland areas account for 75% of land under potato production and 93% of production. <sup>60</sup> 7 Districts (Musanze, Burera, Nyabihu, Rubavu, Gicumbi, Nyamagabe and Nyaruguru). The potato seed production is concentrated mainly in Musanze District.</p> <ul style="list-style-type: none"> <li>• Potato annual consumption has increased from 34Kg/person/year in 1986 to 125kg/person/year in 2010 (FAO 2010) and is increasing</li> </ul> | <ul style="list-style-type: none"> <li>• Heavy use of pesticide</li> <li>• High dependency on chemical fertilizers</li> <li>• The intensive use of poor quality seeds and improper crop rotation leading to diseases</li> <li>• Potato seed production is facing limited private investment in the potato seed production sector and a weak seed certification system</li> <li>• War in Ukraine has caused for consideration on the need to have access to</li> </ul> | <p>VC actors:</p> <ul style="list-style-type: none"> <li>• NL companies such winnax buys from farmers and process potato into different products</li> <li>• Rwanda potato seed fund have invested heavily in facilitating seed production</li> <li>• NL embassy invested/supported potato seed heavily</li> </ul> |

<sup>56</sup> “European investors to establish €20m factory for organic fertilizers”, The New Times Rwanda, July 2021

<sup>58</sup> Factsheet: Horticulture sector in Rwanda, 2019. Netherlands Ministry of Foreign Affairs

<sup>59</sup> Dijkxhoorn, Gonzalez & Judge, 2016. Horticulture and floriculture in Rwanda Identification of focus areas for sector development

<sup>60</sup> Factsheet Potato Sector Rwanda, 2016. Netherlands Ministry of Foreign Affairs

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| <ul style="list-style-type: none"> <li>• Since 1966 up to 2010, the cultivated area has increased from 9,500 to 130,000 hectares</li> <li>• The production area increase was followed by production increase from 57,300 to 1,300,000 MT.<sup>61</sup></li> </ul> | <p>organic fertilizer, farmers are looking into developing and selling compost and fertilizer</p> <ul style="list-style-type: none"> <li>• Farmers in the northern districts shifting to wheat</li> <li>• According to climate projections in the Great Lakes region, potato will be negatively affected throughout most of the region due to rising temperatures.<sup>62</sup></li> <li>• For potato, the introduction of heat-tolerant genotypes, intercropping with legumes or the combination of both would allow compensating negative impacts of climate change on crop suitability in two SAHs representing important mid-altitude potato growing areas, from an average of -0.19 and -0.16 to an average of up to +0.25 and + 0.15 respectively.</li> </ul> | <ul style="list-style-type: none"> <li>• Urugaga imbaraga (farmer-based organization) supports farmers to increase production</li> <li>• One acre fund supports seed production and distribution of potato seeds</li> <li>• increasing private sector investing in early seed generation production (from min-tubers to basic seed production through using greenhouses)</li> <li>• Rwanda Potato Stakeholder Platform (RPSP) conducts and acts as stakeholders' consultation platform</li> </ul> |
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## Beans

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| <p>Beans have been selected among the six priorities crops under the recent PSTA4.<sup>63</sup></p> <ul style="list-style-type: none"> <li>• Bean sector is important for food security and nutrition, and at the same time is seen as a sector with the potential to empower rural women</li> <li>• Beans are produced on 485 260 ha and provide 32 percent of the total dietary calorie intake as well as 65 percent of the protein intake. They are also a major source of carbohydrates and essential micronutrients. For centuries, beans have been</li> </ul> | <ul style="list-style-type: none"> <li>• using new technologies – including inoculants, fertilizer and manure – has been shown to yield strong results, but low adoption rate is largely due to the constantly increasing cost of inputs, particularly of fertilizers, which have to be imported. Access to appropriate financing for this still represents a bottleneck that is further exacerbated by production season coinciding with other family financial</li> </ul> | <ul style="list-style-type: none"> <li>• Input providers: many women do their own mixed bean seed saving/multiplication. Agro dealers sell certified seed varieties</li> <li>• Small scale subsistence and surplus selling farmers. Most of these producers operate individually and keep their own seeds for the next cropping season. Most bean farming activities in this category are done by women</li> </ul> |
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<sup>61</sup> Factsheet Potato Sector Rwanda, 2019. Netherlands Ministry of Foreign Affairs

<sup>62</sup> Vandamme, Manners, Adewopo, Thiele, Friedmann, Thornton, 2022. Strategizing research and development investments in climate change adaptation for root, tuber and banana crops in the African Great Lakes Region: A spatial prioritisation and targeting framework. *Agricultural Systems*, Volume 202, 103464, ISSN 0308-521X, <https://doi.org/10.1016/j.agsy.2022.103464>.

<sup>63</sup> Senders, Mukarugwiza and Mensink, 2020. Financial services for women: case study on women's participation in the maize and bean value chains in Rwanda

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| <p>produced in the country, mainly for food security at household level. They are grown by an estimated 95 percent of Rwandan farmers.</p> <ul style="list-style-type: none"> <li>• Most bean producers in Rwanda are small-scale subsistence farmers, tilling less than 0.50 ha of land. The subsistence character of the chain implies smallholder farmers become the main consumers of their own product.</li> </ul>   | <p>obligations that take priority, such as school fees.</p> <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>• Some medium and larger scale farmers selling for commercial purposes</li> <li>• Cooperatives</li> <li>• Aggregators and traders</li> <li>• A remarkable absence of a bean processing node in Rwanda</li> </ul>  |
| <p><b>Maize</b></p>   |  |  |
| <p>Maize is an important food crop and increasingly important as cash crop in Rwanda. It is still partially and informally organized based on a spot market, but it is increasingly structured for commercial buyers<sup>64</sup>.</p> <ul style="list-style-type: none"> <li>• Around 85 percent of the total maize production is accounted for by smallholder farmers.</li> <li>• In 2017 the maize value chain offered a net profit of RWF 40 000/acre for smallholder farmers, about RWF 80/kg for the farmers in 2016 (ICCO, 2016).</li> <li>• Interesting opportunities, especially in maize seed production and serving niche markets provided by commercial buyers and with WFP facilitating linkages.</li> <li>• Maize is one of the priority crops promoted by the MINAGRI</li> </ul> | <ul style="list-style-type: none"> <li>• These producers and rural-based traders suffer from low margins, poor access to credit and inadequate storage facilities</li> <li>• Quality input supply and lack of mechanization is a challenge for growing production and reducing post-harvest losses.</li> <li>• The chain currently offers opportunities for participation of women, especially through the informal and cooperative structures. The cooperatives provide a gateway to markets and services for women</li> <li>• Increased income can also be generated because the harvest is bulked by the cooperative.</li> <li>• women play a vital role in post-harvest handling: shelling, grading, winnowing and quality control to meet the requirements specified by the buyer.</li> </ul> | <ul style="list-style-type: none"> <li>• The maize marketing system of in Rwanda is complex, consisting of thousands of small assemblers, brokers, medium-scale wholesalers, large wholesalers, transporters and retailers.</li> <li>• Currently, 89 percent of maize producers are in organized cooperatives, mostly for access to inputs and other services</li> <li>• About 65 percent of smallholder farmers use improved seeds from registered seed suppliers, mostly small scale agri-dealers</li> <li>• biofortification companies, supported by World Food Programme such as Africa Improved Food</li> </ul> <p>Supporting and enabling actors:</p> <ul style="list-style-type: none"> <li>• Rwanda Agricultural Board (RAB)</li> <li>• MINAGRI</li> </ul> |

<sup>64</sup> Senders, Mukarugwiza and Mensink, 2020. Financial services for women: case study on women's participation in the maize and bean value chains in Rwanda

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|  |  | <ul style="list-style-type: none"> <li>● RGCC</li> <li>● WFP</li> </ul>   |
| <b>Honey</b>   |  |   |
| <ul style="list-style-type: none"> <li>● Beekeeping in Rwanda has been practiced for many years through successive generations and along inherited patterns<sup>65</sup>. It is estimated that there are more than 45,000 active beekeepers managing more than 90,000 hives, mainly traditional, across Rwanda.<sup>66</sup></li> <li>● According to a small study in Nyamagabe, the districts Rusizi, Nyamasheke, Karongi, Nyamagabe, and Nyaruguru, near national parks, have a honey productivity ranging from 21MT to 30MT<sup>67</sup></li> <li>● Beekeeping has basically been of a subsistence nature, where honey was used as a food product for home, medicine and for brewing traditional liquor. Nowadays beekeeping has become an important component with the growing export and local market.</li> <li>● Rwanda produces mostly honey, beeswax and propolis. Rwanda has wild bees, that are resistant to diseases and the natural forests, with wild plant resources, provide a honey made of special pesticide-free, vegetation and the vast amount of</li> </ul> | <ul style="list-style-type: none"> <li>● At the moment, current levels of honey collecting, processing and marketing activities are not large enough to have significant impact on the income of VC actors. This is due to poor access to the market, low producer prices, lack of access for traders to products of sufficient quality and quantity, weak linkages between producers and traders.</li> <li>● Honey marketed as a generic product is an indication of the market's inefficiency, which only proved the assertions that sellers are in the honey business only to survive and not as a commercial venture<sup>71</sup></li> <li>● Most beekeepers in the Nyamagabe study were male (70%) and 30% were females. It is an indication that women inclusion in bee keeping at Nyamagabe district is low due to heavy workload assigned to women to take care of family and children. However, another study notes that women and youth are increasingly interested.<sup>72</sup></li> </ul> | <p>VC actors</p> <ul style="list-style-type: none"> <li>● Beekeepers. Many beekeepers are organised in cooperatives</li> <li>● Collectors / processing entrepreneurs</li> <li>● Local retail outlets (shops and supermarkets)</li> <li>● Urban retailers in Kigali</li> </ul> <p>Supporting and Enabling:</p> <ul style="list-style-type: none"> <li>● Hive builders (artisanal) and modern hive distributors. Many distributors are NGOs and donors, as modern hives are relatively expensive</li> <li>● Government of Rwanda: The new Strategic Plan for the Transformation of Agriculture in Rwanda Phase (PSTA IV 2018 – 2024) recognized the beekeeping among the priority in animal resources production systems due to multiple contributions to food</li> </ul> |

<sup>65</sup> Dijkxhoorn, Gonzalez & Judge, 2016. Horticulture and floriculture in Rwanda Identification of focus areas for sector development

<sup>66</sup> Fiom, 2018. Participatory Action Research On The Beekeeping Value Chain In The Districts Of Kayonza, Gatsibo And Nyagatare

<sup>67</sup> Samson & Nepo, 2019. Analysis of the profitability of honey production in Nyamagabe District in Rwanda

<sup>71</sup> Fiom, 2018. Participatory Action Research On The Beekeeping Value Chain In The Districts Of Kayonza, Gatsibo And Nyagatare

<sup>72</sup> Fiom, 2018. Participatory Action Research On The Beekeeping Value Chain In The Districts Of Kayonza, Gatsibo And Nyagatare

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| <p>eucalyptus trees also produces a special and popular type of honey.</p> <ul style="list-style-type: none"> <li>• The national and regional demand for honey is high and Rwandan honey producers have been challenged to increase the capacity.<sup>68</sup></li> <li>• Three main business outlets for beekeepers: traditional brewery, consumers from urban areas, and tourists visiting national parks.<sup>69</sup></li> <li>• Cost Benefit Ratio (CBR) for beekeeping was found to be 4.49 suggesting that the income of 449 Frws is expected once the farmer has investment 100Frws in honeybee production.<sup>70</sup></li> <li>• National Park buffer zones are under increasing pressure for harvesting fuel wood and encroachment to plant crops allowing beekeepers to utilize the buffer zone has a two-fold benefit of providing additional income to beekeepers that may not have sufficient land to use, and in turn they ensure the protection of the parks boundary and reduce poaching</li> <li>• Cardamom plants can be intercropped with trees that provide shade and, ideally, have flowers to attract bees; the main pollinators for cardamom.</li> </ul> | <ul style="list-style-type: none"> <li>• adoption rate of modern beehives at small scale beekeeper's (subsistence level) and trader's levels in are still very low.<sup>73</sup></li> <li>• Beekeepers lack a business mindset as well as access to appropriate financial services<sup>74</sup></li> <li>• Social issues: women do not prefer to be out late in remote places in the forest to visit apiaries; beekeeping is overlooked as a serious livelihood area; non-beekeepers are afraid of bees/bee stings and do not allow for beehives to be kept near their households/fields.</li> <li>• Environmental challenges: high absconding rates of bees due to search for nectar; agro-chemicals; and occasional drought seasons.</li> </ul> | <p>security, nutrition, employment, rural incomes and biodiversity conservation</p> <ul style="list-style-type: none"> <li>• National Agricultural Export Board (NAEB)</li> <li>• Federation Rwandaise des Cooperatives d'Apiculteurs (FERWACAPI)</li> </ul> |
| <p><b>Macadamia</b></p>  |   |  |
| <ul style="list-style-type: none"> <li>• Karongi is home to Rwanda's largest macadamia nut producer. Norelga Macadamia was the first</li> </ul>  | <ul style="list-style-type: none"> <li>• Kenya seems to be a heavy competitor, with established productions and export streams</li> </ul>   | <p>VC actors</p>   |

<sup>68</sup> Dijkxhoorn, Gonzalez & Judge, 2016. Horticulture and floriculture in Rwanda Identification of focus areas for sector development

<sup>69</sup> Fiom, 2018. Participatory Action Research On The Beekeeping Value Chain In The Districts Of Kayonza, Gatsibo And Nyagatare

<sup>70</sup> Samson & Nepo, 2019. Analysis of the profitability of honey production in Nyamagabe District in Rwanda

<sup>73</sup> Fiom, 2018. Participatory Action Research On The Beekeeping Value Chain In The Districts Of Kayonza, Gatsibo And Nyagatare

<sup>74</sup> Ibid., 2018

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| <p>business to introduce the highly profitable nutritious macadamia nut, which grows on trees, to Rwanda. It has grown to engage 500 farmers and grow 4,000 seedlings per year in 2019<sup>75</sup></p> <ul style="list-style-type: none"> <li>• The role of macadamia as a cash crop for foreign exchange earnings has steadily increased in recent years<sup>76</sup> The global macadamia nut market size was valued at \$1.17 billion in 2019 and is expected to more than double to \$2.36 billion by 2027<sup>77</sup></li> <li>• Macadamia exports from Rwanda amounted to over 390,000 kilogrammes which fetched over \$1.61 million (about Rwf1.6 billion</li> <li>• Kenya is already investing heavily in macadamia, and it is turning out to be one of the most lucrative crops</li> <li>• Rwanda managed to penetrate major markets such as USA for the kernel macadamia nuts while in-shell macadamia nuts are exported to India and Vietnam.<sup>78</sup> Other key export destinations are the U.S., the EU, Japan, China, and Canada. Direct imports of Kenyan macadamia enter the EU mainly through the Netherlands and Germany, accounting for a combined share of around 98 percent of the imports in 2018.</li> <li>• The growing EU demand for macadamia, and especially organic macadamia, is rooted in a</li> </ul> | <ul style="list-style-type: none"> <li>• Long term investment needed: macadamia take at least 5 years to become productive, and has peak production in the 12th-15th year with a tree producing 40 to 60 kilogrammes of fresh in-shell macadamia nuts<sup>79</sup></li> <li>• access to seedlings has been a limiting factor for farmers</li> <li>• Financial constraints for smallholder farmers</li> <li>• takes a lot of patience and discipline in the farmer</li> <li>• no international grading system for macadamia<sup>80</sup></li> </ul> <p>Though we could not find a VC study for macadamia in Rwanda, we can learn from experiences in Kenya. Here, challenges include:</p> <ul style="list-style-type: none"> <li>• Low productivity</li> <li>• Low-quality nuts</li> <li>• Traceability</li> <li>• insufficient stakeholder collaboration</li> <li>• Poor EU market access</li> </ul> | <ul style="list-style-type: none"> <li>• Producers (smallholders and macadamia</li> <li>• processors' plantations)</li> <li>• aggregators (traders and associations)</li> <li>• processors (who also export, such as Rwanda Nut Company (1,200 farmers with farms as big as a hectare to those that have a single tree in their backyard</li> <li>• Retailers such as local supermarket chains, hotels, and Rwanda's national Rwandair airline</li> </ul> <p>Supporting and Enabling:</p> <ul style="list-style-type: none"> <li>• Ministry of Agriculture</li> <li>• Ministry of Environment</li> <li>• Rwanda Environment Management Authority (REMA).</li> </ul> |
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<sup>75</sup> <https://afr100.org/content/building-sustainable-macadamia-nut-market-rwanda>

<sup>76</sup> CBI, 2019. Value Chain Analysis of Macadamia Nuts in Kenya. Commissioned by The Centre for the Promotion of Imports from developing countries (CBI)

<sup>77</sup> <https://allafrica.com/stories/202105110481.html>

<sup>78</sup> ibid

<sup>79</sup> <https://allafrica.com/stories/202105110481.html>

<sup>80</sup> <https://www.forbesafrica.com/economy/2022/05/09/seed-capital-turning-macadamia-into-currency-in-rwanda%ef%bf%bc/>

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| <p>greater interest among EU consumers in food products with superior health benefits as well as natural cosmetics.</p> <ul style="list-style-type: none"> <li>• Products can be macadamia nuts but also processed for oil and butter. It can be used as bakery ingredient, or to create retail snack packs. Its oil has one of the highest levels of monounsaturated fats and contains no cholesterol</li> <li>• Macadamia producer Norelga is also focused on conservation. The company has conserved 41 hectares of land and planted over 13,000 trees since its founding. The company's use of intercropping practices helps preserve biodiversity, and reforestation plays a key role in preventing devastating landslides and flooding.</li> <li>• Suitable as an out-grower model.</li> </ul> |  |   |
| <p><b>Avocado</b></p> <ul style="list-style-type: none"> <li>• Imports of fresh avocados into the EU market have grown 30% in volume over the last years. The market size surpasses €1,000m.</li> <li>• The scarce of supply during the period from October to April offers an opportunity for Rwanda to start serving the EU market. Also, the supply of avocados coming from Kenya is known as inconsistent and too small in size. Thus, Rwanda can also make a difference by becoming a reliable partner in terms of product quality and quantity. However, for export-oriented production the Hash variety is required, and this is not commonly produced in Rwanda (Bijl and Baker, 2015).</li> <li>• Rwanda has targets to increase avocado production and export</li> </ul>                   | <ul style="list-style-type: none"> <li>• Challenges for exporters: exporters have a maximum capacity that do not exceed 3 to 5 tonnes of horticultural products a year</li> <li>• Limited access to financial schemes</li> <li>• costly and less competitive inputs</li> </ul> | <ul style="list-style-type: none"> <li>• Small scale farmers, with overall landholding ranges from 0.5 and 1.5ha.</li> <li>• Exporters (small number)</li> <li>• Importers (based in Europe for instance) are often serving diaspora retailers in Europe.</li> <li>• Supermarkets</li> </ul> <p>Supporters and enablers:</p> <ul style="list-style-type: none"> <li>• Rwanda Development Board (RDB)</li> <li>• National Agricultural Export Board (NAEB)</li> <li>• Ministry of Trade and Industry (MINICOM)</li> <li>• Private Sector Federation</li> </ul> |

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| <ul style="list-style-type: none"> <li>• The good ecological condition in the Congo Nile divide favours avocado production</li> <li>• In 2018/2019, Rwanda exported 605,986Kg of avocados worth <u>442,252USD</u>. In 2019/2020 exports increased to 840,672Kg and generated 840,570USD.</li> <li>• Avocado farming offers small producers a steady production year around and opportunity for intercropping (agroforestry).</li> <li>• Avocado farming requires/promotes beekeeping for its extensive pollinators' needs.</li> <li>• Opportunity for job creation among the youth and women with avocado oil processing</li> </ul>   |  | <ul style="list-style-type: none"> <li>• Avocado Society of Rwanda</li> <li>• ITC/ MARKUP Programme</li> </ul>  |
| <p><b>Spices</b></p>  | <ul style="list-style-type: none"> <li>•</li> </ul>  | <ul style="list-style-type: none"> <li>•</li> </ul>   |
| <p>The main spices and herbs produced and consumed in Rwanda are chilli, ginger and garlic. 52.5 percent of these specialty horticulture crops (nuts and spices) comes from the Western province. Rubavu is a frontrunner in herbs and spices.</p> <ul style="list-style-type: none"> <li>• The global spices and seasonings market are expected to grow with approximately five percent between 2018 and 2024.<sup>81</sup> The demand size is growing at a fast pace and consumers are becoming aware of the benefits of using spices and seasonings</li> <li>• chili production for export is rapidly expanding and more recently, ginger production for export has also started</li> <li>• Cardamom, Ginger, Paprika (sweet) show most potential in Rwanda's existing climate. Chilli is</li> </ul> | <ul style="list-style-type: none"> <li>• Cultivation expertise, processing capacity and financial resources are still limited.</li> <li>• As most spices and herbs require handpicking and careful handling, labour costs are an important factor determining production costs</li> <li>• Chillies are subjected to stringent quality checks in Europe, which Rwandan exporters are currently struggling to pass; they face high rejection rates</li> <li>• There is a lack of facilities to dry, store and process chillies making the quality of products dependent on weather conditions</li> <li>• To date, professional drying facilities are not present in Rwanda and farmers depend on sun drying</li> </ul> | <p>VC actors:</p> <ul style="list-style-type: none"> <li>• Independent smallholders – small number of individual farmers serving the local and regional markets</li> <li>• Out-growers and cooperatives – large groups of smallholder farmers working together with larger exporters/buyers</li> <li>• Medium-size farms – agripreneurs producing large quantities of chilli for export.</li> <li>• Large company: GET IT</li> <li>• 20 chilli exporting companies</li> </ul> |

<sup>81</sup> TRADE Rwanda, 2020. Investment Opportunities in the Rwandan Herbs and Spices Sector.

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|--|---|--|
| <p>slightly less naturally fitting but has very high market potential.</p> <ul style="list-style-type: none"> <li>• The cultivation of most spices does not require large land sites as most spices can be intercropped, cultivated by means of out grower schemes and/or have a higher value per ton in comparison to most other horticulture products</li> <li>• Black pepper vines can be grown under the same conditions as coffee and tea, which are Rwanda's major export crops. Moreover, black pepper can be intercropped with the coffee trees (at lower altitudes) or integrated in other agroforestry projects</li> <li>• Alternatively, it can be grown as an inter-row crop between legumes and macadamia nuts. It is recommended to rotate ginger with leguminous plants in order to increase N and organic matter levels</li> <li>• Ginger's root is widely utilized as a spice, either fresh, dried (in pieces or grinded) or pickled. Essential oil and extract can be derived from the roots. In Rwanda, ginger is mostly used for tea (ginger or African) and meat preparation</li> </ul> | <ul style="list-style-type: none"> <li>• In Rwanda, storage facilities are of variable quality while the climate is hot and humid resulting in high post-harvest losses. Aflatoxin can flourish when crops are subjected to insufficient drying followed by poor storage conditions.</li> <li>• Obtained yields at small-scale farms remain low. The main reasons are a lack of training, irrigation and access to agricultural inputs.</li> <li>• Smallholder farmers hardly use farming tools or inputs such as pesticides, fertilizers and improved seeds.</li> <li>• Moreover, often farmers do not have access to irrigation and electricity.</li> </ul> |  |
| <b>Small Livestock</b>   |   |  |
| <ul style="list-style-type: none"> <li>• Accounts for 14% of agricultural GDP<sup>82</sup>.</li> <li>• Livestock is important to Rwandan households, both in terms of income and food security and for the organic manure produced, which is applied in the fields. Half of all households own a goat, cow,</li> </ul>   | <ul style="list-style-type: none"> <li>• High cost of feed, with imported inputs (e.g., minerals and vitamins)</li> <li>• Inconsistent quality of nutritional feeds</li> <li>• Lack of modern poultry and pig slaughterhouses and processing facilities</li> </ul>  |  |

<sup>82</sup> PRISM Project Design Report, July 2019

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|--|---|--|
| <p>and/or chicken, and of livestock units, 68 percent are cattle<sup>83</sup></p> <ul style="list-style-type: none"> <li>• Small livestock is an opportunity for smallholders who have small plots (36.5% of households in the Western Province already raise chickens).</li> <li>• Market demand for meat and eggs has been growing dramatically (between 2000 and 2017, domestic per capital consumption grew by 688% for poultry, 79% for pork, and 111% for small ruminants).</li> <li>• Western Province's proximity to the large urban markets of Goma and Bukavu in the DRC presents an additional market opportunity.</li> </ul> | <p>that meet quality and safety standards required by markets</p> <ul style="list-style-type: none"> <li>• Limited veterinary services and high susceptibility of indigenous breeds to disease</li> <li>• Limited availability of commercial day-old chicks (most are imported)</li> <li>• Low productivity</li> <li>• Insufficient aggregation</li> <li>• Limited access to improved breeds</li> <li>• Limited access to financial services for livestock dealers/ distributors and for investment in modern facilities</li> </ul>   |  |
| <b>Fisheries</b>   |   |  |
| <ul style="list-style-type: none"> <li>• Lake Kivu accounted for 45% of total national fish production in 2020</li> <li>• Fish farming being trialled, cages set up in Rusizi and Nyamasheke</li> <li>• Rwanda imports significant quantities of fish (15,000 MT/year)<sup>84</sup></li> </ul>   | <ul style="list-style-type: none"> <li>• Limited government involvement in production, aggregation, or export</li> <li>• Overfishing – seasonal bans already apply</li> <li>• Water temperatures are not ideal for fish farming, resulting in significantly slower growth rates of Nile tilapia compared to Uganda</li> <li>• Limited access to inputs (fish feed and fingerling production)</li> <li>• Nascent industry</li> <li>• Limited access to finance for investment in modern fish farming technologies</li> <li>• Lack of skills to adopt modern fish farming technologies</li> </ul> |  |
| <b>Eco-tourism</b>   |   |  |

<sup>83</sup> Giertz et al., 2015. Rwanda Agricultural Sector Risk Assessment

<sup>84</sup> Source: <https://dc.sourceafrica.net/documents/120811-MASTER-PLAN-FOR-FISHERIES-AND-FISH-FARMING-IN.html>  
<https://www.newtimes.co.rw/news/rwanda-fish-production>

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|--|--|--|
| <p>Rwanda is located in the Alcobertine Rift, a region considered especially rich in biodiversity, making it ideal for conservation and ecotourism. The commitment to conservation and tourism is highlighted in Rwanda's Green Growth and Climate Resilience Strategy, which includes 'Ecotourism, Conservation and Payment of Ecosystem Services' as one of 14 programmes of action. Specifically, the Congo-Nile Divide offers opportunities on ecotourism:</p> <ul style="list-style-type: none"> <li>● Recent establishment of Gishwati-Mukura National Park (2016) and designation as UNESCO Biosphere Reserve (2020) offers opportunities to deploy new ecotourism initiatives</li> <li>● As one of Rwanda's most important tourism attractions, the gorillas in the Virunga National Park offer opportunities to further strengthen existing ecotourism initiatives and where relevant deploy new activities</li> <li>● Examples of projects in which conservation efforts and tourism products are combined (e.g. growing and crafting of bamboo products)</li> </ul> | <ul style="list-style-type: none"> <li>● High-level of regulation and centralisation of the tourism industry especially around the national parks</li> <li>● Focus on high-end tourism within Rwandan</li> <li>● Weak business models of ecotourism initiatives / not always market driven</li> </ul>  | <p>Management of national parks:</p> <ul style="list-style-type: none"> <li>● Rwanda Development Board (RDB)</li> <li>● Ministry of Environment (MoE)</li> <li>● Rwanda Forestry Authority (RFA)</li> <li>● African Parks</li> </ul> <p>National / International Organisations:</p> <ul style="list-style-type: none"> <li>● Greater Virunga Transboundary Collaboration (GVTC)</li> <li>● Areco Rwanda Nziza</li> <li>● TroCaire (climate change adaptation project in Nyaruguru, some ecotourism)</li> <li>● Arcos (Agroforestry for livelihoods project)</li> </ul> |
| <b>Small scale Trade</b>   |  |  |
| <ul style="list-style-type: none"> <li>● Most significant non-farm sector of the economy in the target geography, in particular informal cross-border trade with the DRC.</li> <li>● 45,000 informal cross-border traders in the Western Province. The majority are women and trade are their main income source.</li> </ul>   | <ul style="list-style-type: none"> <li>● Trade limited to micro-volumes with no economies of scale</li> <li>● Majority of trade is in unprocessed agricultural products with little value addition</li> <li>● Low margins</li> <li>● Security risks</li> <li>● Insufficient business skills</li> <li>● Lack of access to financial services</li> <li>● Lack of access to market information</li> </ul> |  |

- In 2018, Rwanda's informal cross-border trade registered a trade surplus of USD 27.2 million, primarily from agricultural commodities<sup>85</sup>.

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<sup>85</sup> Dynamic Analysis. "Analytical Study and Portfolio Mapping for Swedish Embassy's Development Cooperation in Rwanda Within Inclusive Economic Growth, Private Sector Development and Employment; Output 3A- Deep dive into the key areas of intervention; <https://www.international-alert.org/wp-content/uploads/2021/09/Great-Lakes-Cross-Border-Trade-EN-2012.pdf>

## 6. Value chain quick scans

In the following sections we will dive into the short-listed value chains and explore what are the potential bottlenecks and opportunities to tap into. Note that this scanning is still somewhat limited in terms of quantitative detail, as more information gathering is needed in the inception phase of the project, also depending on the areas selected for intervention.

### 6.1. Value chain 1: Avocado mapping, bottlenecks, and opportunities

The avocado value chain of is of interest to support regenerative agriculture through agroforestry, soil protection with avocado tree canopy, long term carbon sequestration and other socio-economic benefits such as nutritional value and export opportunity. The avocado value chain could potentially also showcase considerable opportunities of off-farm business opportunities in local value addition, such as through nutritious edible avocado oil that can be supported to expand job creation potential to youth and women. Avocado in Rwanda has been established for many years and is a common sight among Rwandan households as it is a long-time-shown culture of owning one or two trees around the home for consumption and fruit sales. It is in a very recent time that new commercial varieties were introduced in the country with aim to boost the Rwandan export mainly to EU and Middle East.

Avocado cultivation is very suited to the current Rwandan climate. A global study modelling the current and future cultivation of coffee, cashew, and avocado found that all agro-ecological zones where these three crops are currently growing will be affected (negatively as well as positively) by climate change. Coffee was most often negatively affected. Cashew and avocado growing areas have both effects. Avocado growing areas are expected to expand, while some growing areas in key producing countries such as Peru, Dominican Republic, and Indonesia are expected to decrease. According to a map created for Africa, Rwanda has various areas still classified as suitable in the future (2050), while other regions of DRC are decreasing in suitability.<sup>86</sup>

Rwanda's good agri-climatic conditions, favourable cost basis and the attractive investment environment enables Rwanda to meet some of the EU's unfulfilled demand (reports the Monitor Group under MINAGRI and USAID). In the Congo-Nile Divide region, the rainfall is year-round, and averages exceed 1,000 millimetres per annum. The average humidity is 75%, and the average temperature is 22 degrees Celsius, with very little variation. These good growing conditions have become comparatively even more advantageous in recent years as neighbouring countries have experienced strong climatic changes that have dramatically reduced their periods of long rains. (Monitor Group, Minagri & USAID).

Historically, avocado exports out of Rwanda have been low because smallholder farmers do not tend to grow the Hass or Fuerte variety avocados demanded by international markets. With the adoption of export-grade seedlings, Rwanda's competitive advantage vis-à-vis neighbouring countries such as Kenya will increase both in terms of yields and cost structure. Moreover, there is growing trend in local business and crafts to processing Rwandan avocados into avocado oil, and other key organisations like One Acre Fund are teaming up with local enterprises (such as SANIT WING) to produce crafted avocado soap with up to USD500,000 in investment. The biggest market is expected to come from EU, Middle East and recently the Chinese market that has opened for African Hass avocado.

The avocado farming might offer a positive impact to the environment where is an opportunity for smallholder farmers to integrate agroforestry in their day-to-day farming activities especially at the Congo-Nile Divide region that is prone to landslides and erosion due to sharp slopes. It can also

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<sup>86</sup> Grüter, R., Trachsel, T., Laube, P., & Jaisli, I. (2022). Expected global suitability of coffee, cashew and avocado due to climate change. *PLoS ONE*, 17(1), e0261976. <https://doi.org/10.1371/journal.pone.0261976>

be used to support local beekeeping activities through pollination. One constraint would be that this value chain is strictly to landowners as it is not practiced by small scale producers on a land leasing model. The trees stay productive up to 50 years and it would be a challenge for a leaser to keep that contract going for that long.

Figure 2: Avocado mapping, bottlenecks, and opportunities



The avocado value chain map above covers the key segments of the avocado trading process. As such, key stakeholders in the Value chain, as well as supporters (mostly from business and NGOs) and enablers are mentioned. Key bottlenecks we see are thus the element of access to finance, particularly financial opportunities for agroforestry. Additionally, the export potential is high, but is hampered by capacities of value chain stakeholders as well as the need for more reliable quality products. Another is that inputs for growing avocados are still relatively costly. Value chain coordination can also improve. As such, as for interventions proposed under this programme, a strong link will be to improve growing capacities of farmers, improving access to seedlings. Input market access needs to improve through strengthening farmer groups and organisations. Finally, development of inclusive business linkages especially for conservation-friendly avocado production should be explored.

## 6.2. Value Chain 2: Macadamia mapping, bottlenecks and opportunities

Macadamia, an evergreen tree crop, is currently being grown in Rwanda, Kenya, Malawi, and Zimbabwe. While a study specific to Rwanda is unavailable, experiences from neighbouring countries have seen the following: the tree proliferates and is relatively resilient to drought. The tree requires warm temperatures and high annual rainfall to generate a good crop. However, certain varieties may be vulnerable to climate change, the most significant threats being high temperatures, drought, and frost – this requires further assessment. The tree can contribute to surrounding ecosystems and crops through soil and moisture conservation. This makes the macadamia a valuable and strategic addition to the cropping of maize, groundnuts, soybeans, and sunflower.

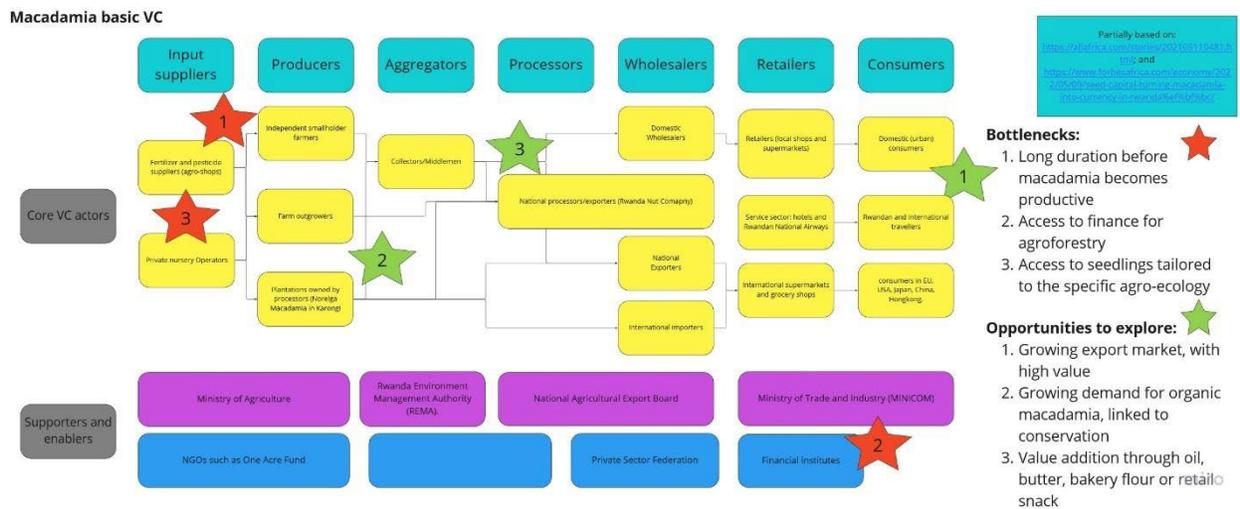
The fact that investments have already been taking place in macadamia increase the interest in this value chain. The long duration of fruition of the trees means that it is essential to look at businesses and business models that are already operational and succeeding. The case of the macadamia production and processing facility in Karongi will be a very interesting case to explore and perhaps partner with. This processor, Norelga, is also focused on conservation. The company has conserved 41 hectares of land and planted over 13,000 trees since its founding. The

company's use of intercropping practices helps preserve biodiversity, and reforestation plays a key role in preventing devastating landslides and flooding. This could be a valuable example business case.

As with avocado, the potential for agro forestry, intercropping and the link with biodiversity conservation is particularly interesting. The southwestern region in Rwanda turns out to be promising in terms of climate. Also, a growing export market in a diverse range of markets, both domestically and internationally offer opportunities. The global macadamia nut market size was valued at \$1.17 billion in 2019 and is expected to more than double to \$2.36 billion by 2027. Generally, the macadamia nut is sold either as in kernel nuts or as in-shell nuts. One of the key challenges related to the investment in macadamia involve the long-term investment that is needed: macadamia take at least 5 years to become productive and has peak production in the 12th-15th year with a tree producing 40 to 60 kilograms of fresh in-shell macadamia nuts.

Various business models have been seen so far with regard to the macadamia tree. There are independent growers (largely small and medium-size farmers), out grower farmers contracted by processors, and plantations run/owned by processors. These models offer interesting, different opportunities for income generation and job creation. Another interesting element is the potential for value addition: macadamia can be processed into oil, bakery flour, butter and retail packages.

Figure 3: Macadamia mapping, bottlenecks and opportunities



The value chain map above shows the initial sketch of the macadamia trading process. Bottlenecks point to the issue with the long-term investment needed in the trees before they receive a revenue. This challenge will be essential to tackle in exploring the interest of smallholder farmers in this business. One solution can be the introduction or linkages to more short-term intercropping methods, while another can be the linkage to financial credit opportunities that favour a long-term investment. Another bottleneck is the importance to find and improve access to quality seedlings for farmers depending on their specific agro-ecological zone. Key interventions in this domain will be to work with nurseries for macadamia seedlings to make these more accessible, training farmers on agroforestry and erosion-prevention farm planning (such as alley cropping), explore market linkages for farmers interested in macadamia production, link with financial service providers and businesses interested to set up out-grower models or Public Private Partnerships. This exploration of output markets should include an explicit invitation to businesses and farmer groups with innovative and inclusive ideas for value creation and processing.

### 6.3. *Value Chain 3: Honey mapping, bottlenecks and opportunities*

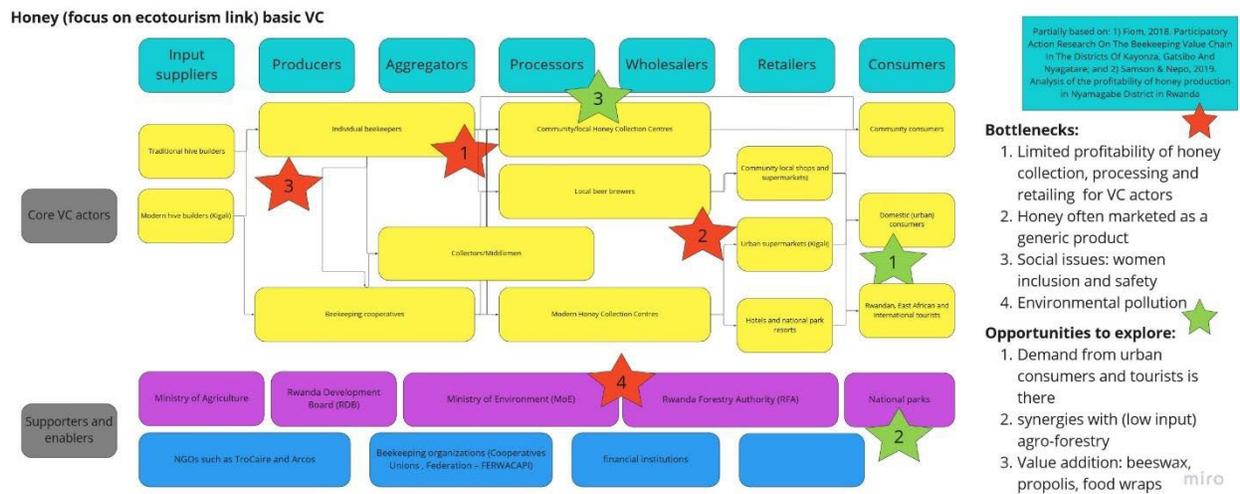
The third value chain being honey can be a good extension to tree farming that is already a trend in the Congo-Nile Divide areas. It can also be complementary to existing initiatives in avocado and macadamia farming under different projects like one with One Acre Fund. Natural forests of the CND represent the best habitat for honey production in Rwanda. More than 1,000 flowering indigenous plant species found in three national parks are relatively well protected and provide nectar and pollen for bees. In recent years there have been several endeavours and new interventions around protected areas towards encouraging development of the honey sector and trade within the country. The main objective of beekeeping development in the CND's natural forests has been to reduce human pressure, especially fire risks, on the national parks while simultaneously improving livelihoods of surrounding communities. Nevertheless, well packaged, imported honey still predominates on the shelves of supermarkets in Kigali, and beekeepers still report that they have no reliable market for their honey.

The beekeeping business has already been well established in Rwanda for many years. It is estimated that more than 45,000 beekeepers are active in Rwanda. They mostly manage more traditional hives. The productivity, according to research in the districts Rusizi, Nyamasheke, Karongi, Nyamagabe and Nyaruguru, show that productivity ranges from 21MT to 30MT. The beekeeping and honey production has traditionally been mostly a subsistence business, but more and more the national market and to a lesser extent the international market have grown. The value chain is mostly composed of beekeepers who either work alone or in cooperatives, who sell to middlemen and processors but can also process honey themselves. Other products made from honey include honey beer, beeswax and propolis.

The productivity of bees goes hand in hand with the availability of flowers and vegetation. This has come under stress in recent years with more pesticides being used in the surrounding areas, harvesting of wood from forests and decrease of land availability due to crop expansion. The proximity to national parks therefore is important for the honey value chain. The link with agroforestry and ecotourism is most interesting. Agroforestry, including trees such as macadamia can offer nectar to bees. Ecotourism is a sector that offers a promising 'product-place combination': national parks may have an interest to offer their clients and guests a specific type of honey linked to the national park.

The honey value chain shows a wide range of different consumer target groups. This is interesting, as at the same time, it is said that honey is too often marketed as a generic product. This is likely an important bottleneck: while the value chain actors engage in the business, there is, as yet limited incentive to invest financial resources to improve production or quality improvement such as through modern hive building. However, in recent years export agreements, such as with Singapore, and through support of various NGOs, leading to investments in training or modernisation of hives. If we work on this value chain, it will be key to focus on a specific linkage between ecotourist destinations, agro tourism to enhance the potential for an improved business case and helping beekeeping cooperatives to enhance their processing, quality management and marketing processes. This will likely include attention to social issues: women can feel unsafe collecting honey far afield, while environmental awareness raising will be important toward wider community members and farmer groups.

Figure 4: Honey mapping, bottlenecks and opportunities



#### 6.4. Value Chain 4: Horticulture mapping, bottlenecks and opportunities

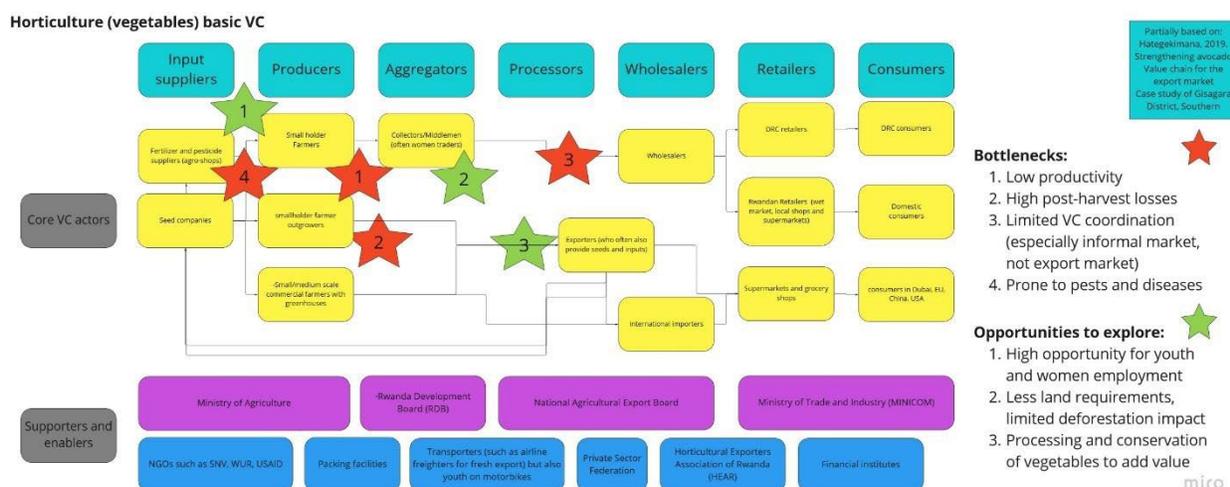
The horticulture value chain is a bit of an outsider for our value chain focus. However, especially in the north-west of Rwanda, it is a booming business, with much trade taking place in Rwanda and across the border with Democratic Republic of Congo. The highland climate in the west of Rwanda is well suited for the growing of fruits and vegetables. Yet, Rwanda still imports much of its fruit and vegetables from other countries, mostly coinciding with growing seasons. We decided to zoom in on this value chain as it may offer alternatives to women and youth living in areas where the risk of engaging in poaching, wood collection and other ecologically destructive activities may be present. Having a profitable source of income that does not require much land and can be intercropped with tree crops can offer a promising route for farmers as well.

Horticulture crops are typically short value chain crops: after harvesting they need to be picked up, repacked and transported the same day to a wholesaler or directly to wet markets for sales to consumers. There are limited storage or conservation facilities, which mean that the product has to be sold quickly. Post-harvest losses are relatively high, therefore. Often key intermediaries or collectors play a key role to meet supply and demand within the short time period, often women taking this role.

The horticulture value chain below shows that there is quite a difference between smallholder farmers with a vegetable or fruit patch and larger farmers who have the means to invest in greenhouses. These larger farmers typically grow crops like tomato and have a stronger link with exporters and cold chain service providers. These different groups also typically provide to a specific clientele, with the larger wholesale markets and low-income retailers with the largest market share in Rwanda, while a select group of producers has a more direct link with hotels, restaurants and high end supermarkets. These latter supply chains demand much higher reliability of supply and stronger quality control. The final consumer of these high-end vegetables and fruits are typically urban expatriates, though a growing Rwandan middle class is increasingly purchasing these as well.

The following bottlenecks have been found in this value chain analysis: low productivity, high post-harvest losses, limited value chain coordination. Finally, the vegetable sector is also prone to pests and diseases, for instance tomato being susceptible to various types. In terms of coordination, it is unclear whether cooperatives play a role with regard to output market linkages, while they do facilitate access to inputs for farmers.

Figure 5: Horticulture mapping, bottlenecks, and opportunities



Vegetables (such as green beans and chilis) can be vulnerable to climate change, especially in the case of extreme weather events such as heavy rainfall or prolonged drought. Additionally, the challenge related to the perishability of vegetables may be exacerbated by more extended periods of drought or moisture. Weather-related events may lead to a loss of harvest. However, due to the availability of different seed varieties and short-term growing season, vegetables and chilis may be more adaptable than perennials or annual crops – giving more opportunities for farmers to choose types more suitable to changing weather patterns and adapt growing techniques. This requires a solid knowledge base among growers and applied climate-resilient practices and technologies. This also requires adequate access to finance, enabling farmers to be able to face potential crop losses. Note that financing for vegetable production will automatically imply an in-depth analysis of the profitability of the crop for the farmer and household. In addition, we suggest linking the analysis to weather and crop monitoring services through geo-special and digitized systems. This early warning systems will assist to avoid big disasters such as flooding of the crop. We agree that net profitability for the farmer should be monitored regularly throughout the project.

It will be important to further zoom in on this sector once specific communities and regions are selected for the project interventions. Crops such as tomato, onions, cabbage and other types of brassicas, pumpkin and carrot hold potential. It will be important to identify key cooperative groups focusing on these crops and identify their specific needs, particularly with regard to market linkages, bargaining and securing long term commitments from buyers. Explicit attention should be paid on women and youth: these entrepreneurs are heavily involved in this market, so identifying ways to add value through quality selection, decreasing post-harvest losses and processing may lead to increased benefits.

Sub-analysis of potential VCs (traffic light: green = high, orange = medium, red = low)<sup>87</sup>

| VC | Relevance (impact-focus) | Opportunity in the market | Systemic change feasibility | Overall score |
|----|--------------------------|---------------------------|-----------------------------|---------------|
|----|--------------------------|---------------------------|-----------------------------|---------------|

<sup>87</sup> Based on: The Springfield Centre (2015) The Operational Guide for the Making Markets Work for the Poor (M4P) Approach, 2nd edition funded by SDC & DFID

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|---|--|--|--|--|
| Avocado   |  |  |  | <p><b>Positive.</b> Can be aligned to a number of existing export-focused programmes. Also, need to explore intercropping options. Systemic change is a question as avocado production is very much already highly competitive with mostly an export focus.</p> <p>Focus regions – southwest Rwanda</p>  |
| Macadamia   |  |  |  | <p><b>Positive,</b> but need to keep in mind the long-term perspective (5-15 years perspective) only if building on specific private sector developments and business models. However, macadamia lends itself well for intercropping on the short run and promotion of agro-forestry and mixed cropping. Organic macadamia is also in demand.</p> <p>Focus region: south-west, western Rwanda</p>  |
| Honey and eco-tourism                                     |  |  |  | <p><b>Positive:</b> There is a basis of beekeepers and existing honey production in Rwanda. Market for quality honey may be existing and expanding. There is a strong link with eco-tourism as well, including biodiversity benefits. However, it is not yet fully clear whether there is a big scope for either strong productivity enhancement or scalability of honey production business.</p> <p>Focus regions: close to national parks: Nyungwe, Makura, Volcanoes National Park and Gishwati Forest Reserve, and therefore an interesting product-place combination with hotels and resorts.</p> |
| Horticulture (tomato, chili, onion, cabbage, green beans) |  |  |  | <p><b>Positive:</b> Horticulture is a huge market, especially in the northwest close to the DRC border. However, horticulture crops, especially vegetables are interesting as they can be marketed close by, grown with limited land, and often offer</p>  |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  | <p>opportunities for women and youth. Relevance is more indirect, as this crop might not directly encourage environmental conservation. However, it can offer income alternatives for rural households and support farmers who are investing in agroforestry.</p> <p>Locations: north-west, but also in the southwest.</p> |
|--|--|--|--|--|

Each market system you consider should be assessed for its relative potential to: (a) affect large numbers of poor people, (b) increase the poor's performance in markets that are growing or their access to basic services, and (c) stimulate system-level changes. As noted above, these basic considerations are of equal importance. It is essential to explore opportunities and feasibility at the same time as defining your target group. Relevance therefore should consider number and scope of poor people to engage as well as opportunities to address poverty and inequalities. Opportunity: economic and social value, growth potential, attraction of investment, services potential to be pro-poor, robustness of the system. Feasibility: available market drivers for change, ability to attract new actors, conducive political economy, willingness of market players to change business models, likelihood of inability/distortion in applying market systems development principles.

#### 6.5. Benefits and investment case

All selected crops have the benefit of:

- Being well suited to current Rwandan climatic conditions, and for most areas as well a positive outlook into the future climatic conditions of CND.
- Offering good entry points to be integrated toward resilient agroforestry, intercropping farming system, which provides farmers the opportunity to diversify as well as manage risks in case of failure of single crops
- Having business potential, whether on local or regional markets

Vegetables such as green beans have a high-profit margin, while others such as chilis can also be dried and processed to conserve them with potential of job creation for youth and women in the off-farm value chain. Other crops, such as onions, tomatoes, carrots, and cabbage, are in high demand in Rwanda and DRC.

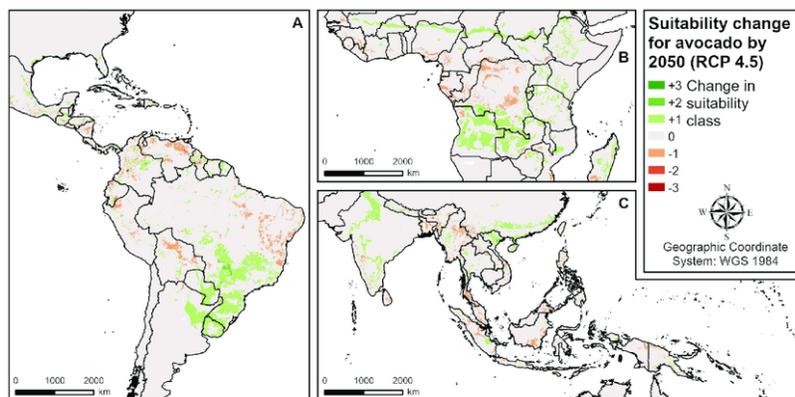
Much will depend on the inclusive business case that is introduced. This requires more in-depth analysis, stakeholder consultations, market linkages, and facilitation of financial models. It is important that regular monitoring takes place of the market dynamics, prices and product trends and assessment of the impact of market linkage, value chain development and financial services. The search for synergies is a priority, such as how vegetable crop investment can support the wait for trees to mature or the introduction of cook-stoves to minimize deforestation and enhance the importance of ecosystem preservation.

High in mono-saturates, the oil content of avocados is second only to olives among fruit, and sometimes greater. Clinical feeding studies in humans have shown that avocado oil can reduce blood cholesterol<sup>88</sup>. Hence the CND community benefit will also be seen on the diet impact where

<sup>88</sup>[https://www.nda.agric.za/docs/Brochures/Avocado\\_prod.pdf](https://www.nda.agric.za/docs/Brochures/Avocado_prod.pdf)

producers' household will also have a steady access to a range of vitamins available in avocado fruits for a balance diet.

With optimum growing conditions for avocado farming at 1,200 –2,200 meters above sea level and temperature 25 –30°C, this flowering tree is well suited for much of the Congo-Nile Divide that is located at 1,500 to 1,800 meters and with average temperature between. Compared to coffee, cashew and avocado were more resilient to climate change. For avocados, the suitable rooms are expected to expand globally, while the most convenient locations in some major producing countries (e.g., the Dominican Republic, Peru, Indonesia) might decrease<sup>89</sup>.



In sub-Saharan and East Africa (e.g., Burkina Faso, Nigeria, Chad, Ethiopia, Uganda, Kenya) and parts of India, positive changes in suitability are caused by increasing precipitation<sup>90</sup> and temperature that now allows the avocado trees to proliferate in almost all parts of these regions.

On average, 81% of farmers interviewed tend to run

intercropped avocado orchards, while the rest possessed either mono-cropped or both mono-cropped and intercropped orchards<sup>91</sup>. The crops used in intercropping with avocado varied with the climate and altitude of the areas, and involved fruit crops, vegetables, starchy food crops, and other cash crops.

#### 6.5.1. Avocado Investment Unit Economics on 0.4Ha

- 150 Hass variety avocado seedlings at a spacing of 5m by 6m spacing.
- A farmer will be able to harvest 50 fruits per tree by year 3 totalling to 60,000 fruits worth 3 million Rwandan francs
- The following year increases between 200 to 250 fruits meaning approximately 240,000 fruits worth 12 million Rwandan francs.

#### 6.5.2. Expected Benefits of Macadamia Value Chain for Smallholder Farmers

Macadamia cultivation can be inclusive for women and young people, as it doesn't require access to large areas of land. Certain macadamia varieties are unlikely to thrive in long-term climate shifts; however, a lack of research and investment leaves the farmers who grow it ill-equipped to adapt at pace. The Macadamia tree is an evergreen fruit crop. They are three species of commercial importance: *Macadamia integrifolia*, *M. ternifolia*, and *M. Beaumont* (Huett, 2004: 610)<sup>92</sup>. The tree originates from Australia but is now grown in many countries, including South Africa, Kenya, China, Guatemala, Malawi, Zimbabwe, and Brazil<sup>93</sup>.

<sup>89</sup> Grüter, R., Trachsel, T., Laube, P., & Jaisli, I. (2022). Expected global suitability of coffee, cashew and avocado due to climate change. *PLOS ONE*, 17(1), e0261976. <https://doi.org/10.1371/journal.pone.0261976>

<sup>90</sup> Grüter, R., Trachsel, T., Laube, P., & Jaisli, I. (2022). Expected global suitability of coffee, cashew and avocado due to climate change. *PLOS ONE*, 17(1), e0261976. <https://doi.org/10.1371/journal.pone.0261976>

<sup>91</sup> Juma, I.; Fors, H.; Hovmalm, H.P.; Nyomora, A.; Fatih, M.; Geleta, M.; Carlsson, A.S.; Ortiz, R.O. Avocado Production and Local Trade in the Southern Highlands of Tanzania: A Case of an Emerging Trade Commodity from Horticulture. *Agronomy* 2019, 9, 749. <https://doi.org/10.3390/agronomy9110749>

<sup>92</sup> S. Afr. J. Agric. Ext. Bandason, Parwada, Musara, Vol. 49 No. 3, 2021: Unlocking the potential of value chains as climate change resilience strategies: can macadamia nuts (*macadamia integrifolia*) offer the gateway? <https://sajae.co.za/article/download/12852/17825/76901>

<sup>93</sup> Mitchell & Maddox, 2010:105

Once established, the trees take about five years before the first fruit set and ten years to reach full maturity. Macadamia requires warm temperatures and high (>850 mm) annual rainfall to yield a good crop. Thus, the biggest threats to production are droughts, extremely high temperatures, and heavy frost. The production of macadamia is, therefore, directly affected by the climatic conditions of the growing area. Nevertheless, integrating macadamia and other annual crops can improve the livelihoods of smallholders because the tree can withstand drought conditions better than the yearly crops due to its deep rooting system. In addition, the tree can provide various ecosystem services, such as soil and moisture conservation under its crown. Based on the fact that macadamia has the potential to yield better than most of the annual crops under relatively unfavourable climatic conditions, the tree can be a strategic cash crop in the wake of climate change. However, this requires a well-organized value-addition chain if farmers are to benefit more from the harvest.

From a case in Malawi, the Macadamia Nuts project<sup>94</sup> can give an example. In its 5th year of implementation, the project worked with 3000 farmers in Thyolo and Mzimba districts. The smallholder farmers are given to grow 100 tree seedlings each and sell Macadamia Nuts in the future. This activity was also coupled with capacity building in intercropping system to maximize profits for producers and benefit from micro-climatic conditions created by the macadamia trees like soil protection, and moisture retention favourable for vegetables, peppers and chilis. The nuts are turning out to be a lucrative commodity and are used for household consumption, income generation among farming families and as a foreign exchange earning crop at country-level<sup>95</sup>.

### 6.5.3. Macadamia Investment Unit Economics on 0.4Ha

Based on our understanding of the macadamia growing process, we can estimate a brief investment case. Note: this case needs further research and analysis to be tailored to the proposed project, and more analysis on the costs is needed.

- An acre (4046.86m<sup>2</sup> or even 0.40Ha) of land will hold to 70 Macadamia trees.
- A mature tree will produce between 80kg and 300kg of nuts.
- At the primary harvest, that comes 2 years after transplantation of seedlings, a farmer will fetch between 30kg and 50kg.
- At a minimum price of 1500Rwf per kilogram of nuts, up to 5,250,000Rwf per 0.4Ha will be made if a farmer harvest minimum 50Kg per tree in year3 of the project.

For a short-term project like in the 5years of GCF-CND project, one farmer will have the ability to make 13,650,000Rwf assuming he was able to harvest on average 80Kg of macadamia nuts per tree from year 4 of the project.

Therefore, we suggest promoting macadamia agroforestry and intercropping with other crops such as maize, groundnuts, soybeans, and sunflower in the agricultural fields as an adaptation strategy to climate change farm intensification due to limited land, particularly among smallholders. Large mono-cropped orchards are at high risk for pests and disease. However, these risks would be minimal if macadamia is planted in small-scale agroforestry plots, which we recommend.

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<sup>94</sup> <https://www.dapp-malawi.org/our-blog/agriculture/odetta-chimwaza-macadamia-nuts-project>

<sup>95</sup> Review of Macadamia Production in Malawi: Focusing on What, Where, How Much Is Produced and Major Constraints: [Emmanuel Junior Zuza](#), [Kadmiel Maseyk](#), [Shonil Bhagwat](#), [Yoseph Negusse Araya](#), [Will Rawes](#), and [Andrew Emmott](#).

#### 6.5.4. Expected Benefits of Horticulture Value Chain for Smallholder Farmers

The horticulture value chain is for crops with 30 to 45 days of production cycle. This short-term production is a key value to small producers who need a timely source of income to support their day-to-day activities. Increasing demand for horticultural products due to an increasing population provides opportunities for local production but also enables the development of added value products and services in areas such as processing, cold chain logistics and infrastructure (e.g., cold stores, packaging)<sup>96</sup>.

The Rwanda Government prepared a horticulture policy in 2014, the Development of a National Horticulture Policy and Strategy for pro-poor growth in Rwanda. The policy intends to radically transform the structure and function of the horticulture sector, with a particular focus on export earnings.<sup>97</sup>

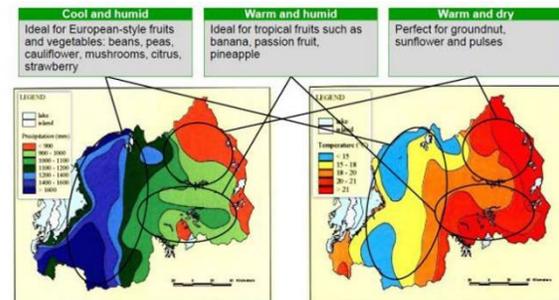


Figure 1 Climatic zones of Rwanda  
Source: Kerkhoven et al. (2013).

Kubwimana (2020) conducted analysis on the risks related to the growing of carrots and cabbages in Rubavu, and showed that the earnings of commercial vegetable farmers (this was focused on large acreage farmers in his sample) can be very high, but also variable due to weather patterns<sup>98</sup>. FAO and SNV<sup>99</sup> did more in-depth analysis of various business cases for youth. Chili, French beans and tomatoes were assessed. For chili, based on the Koabiga and Jyamberemuhinzi cooperatives, it was found that “the cost of production is calculated per are, as this is how farmers think about their production: smallholders produce between 5 and 20 ares of chilli for the market. These two cooperatives have export linkages, but if produced for the domestic market, farm gate prices are similar, between RWF 400/kg and RWF 900/kg. There is also considerable demand for dried chilli, with farm gate prices between RWF 1 200/kg and RWF 2 000/kg.” Furthermore, among the vegetables assessed, it was found that while tomato and chili require more upfront investment (which can be challenging for youth), they are also more profitable. Another crop analysed, French beans, showed that profitability is reasonable, but production is low while cost of production can be lowered as well. Overall, the following gross margins and return on labour was found:

- For French bean: a gross margin of 22,040Rwf and return on labour of 2,755Rwf per day.
- For chili: a gross margin of 46 384Rwf and return on labour of 7 731Rwf per day.
- For tomato: a gross margin of 48 876Rwf and return on labour of 1 947Rwf per day.

Van Keulen et al note that for the example of French bean, the investment case is relatively straightforward<sup>100</sup>. The crop requires relatively low investment costs, while the first harvests start 1.5 months after sowing. This is particularly interesting for youth with limited working capital. In

<sup>96</sup> Horticulture and floriculture in Rwanda Identification of focus areas for sector development Youri Dijkhoorn1, Yeray Saavedra Gonzalez2 and Lucas Judge1; LEI Wageningen UR

<sup>97</sup> Rwanda private sector driven agricultural growth horticulture value chain analysis International Resources Group (IRG), a wholly-owned subsidiary of Engility Corporation 1320 Braddock Place Alexandria, VA 22314

<sup>98</sup> Kubwimana, J. J. 2020. Risk Analysis of Vegetable Production in Rwanda: a Case of Carrots and Cabbages produced in Rubavu District.

<https://www.slideshare.net/nathson/risk-analysis-of-vegetables-production-in-rwanda-a-case-of-carrots-and-cabbages-produced-in-rubavu-district>

<sup>99</sup> Van Keulen, Rik, Rumenera, P., Banjara, G., Colantuoni, M. and Muthamia-Mwenda, J. 2022. Horticulture value chain analysis – Opportunities for youth employment in Rwanda. Rome, FAO. <https://doi.org/10.4060/cb8266en>

<sup>100</sup> Van Keulen, Rik, Rumenera, P., Banjara, G., Colantuoni, M. and Muthamia-Mwenda, J. 2022: p. 175. Horticulture value chain analysis – Opportunities for youth employment in Rwanda. Rome, FAO. <https://doi.org/10.4060/cb8266en>

the example of a farmer with 0.1 hectare, costs are estimated for production (land rent and labour are about 330,000Rwf, cooperative membership around 15,000Rwf and cost of living around 37,500Rwf (25,000Rwf per month). This means in total 384,000Rwf. This can be off set with the expected earnings of 550,000Rwf per 0.1 hectare.

## **7. Conclusions and recommendations**

Agriculture is a critical sector that employs the majority of Rwandan people. Although GDP from agriculture is becoming smaller, more than 1/3 of poverty reduction is related to it. Around 60% of youth still work in agriculture. The investment in strategic crops, while informed by a market-oriented approach such as MSD, can enhance the productivity and profitability of farming while creating new opportunities for income and job creation along the value chain. Combined with a particular focus on inclusiveness and climate resilience, we seek to develop synergies with land management, water, soil retention, and natural ecosystem preservation that will also offer long-term value. It has become clear that if economic promotion of agriculture needs to be combined with climate resilience efforts in order to maintain long term sustainability and market linkage efforts as well as access to appropriate financial services will need to take this into consideration.

The market scan and the selected value chains offer ample potential for supporting the achievement of the goals of the proposed project. Based on the traffic-light scoring of the selected value chains, assessing relevance to the GCF goals, market potential, and systemic change feasibility, we found that majority of short-listed value chains have a good contribution. Avocado scores well in terms of market potential and relevance, while slightly lower in terms of change feasibility. Macadamia scores highly in terms of relevance, and reasonably well in terms of market potential and change feasibility. Lower market potential is due to longer maturation time needed. Avocado and macadamia are flowering fruits and nuts trees with an expanding local and international market. These trees also offer the added advantage of moisture retention and erosion control, which is particularly important in the CDN. These traits benefit other crops, such as vegetables, and income-generating activities, such as honey, due to pollination and flowering. As with avocado, the potential for agro forestry, intercropping and the link with biodiversity conservation is particularly interesting. The southwestern region in Rwanda turns out to be promising in terms of climate. Also, a growing export market in a diverse range of markets, both domestically and internationally offer opportunities. Honey scores very well in terms of relevance – particularly due to proximity to the CND national parks and the opportunity to link with eco-tourism. However, interventions in this value chain have to focus less on enhancing production and provision of tools but rather focus on enhancing the business case, market linkages and product-place combinations to enhance sales and quality – thus enhancing profitability so value chain stakeholders will invest. Finally, vegetable crops such as green beans, French beans and chili are very interesting in terms of market opportunity. These crops are in-directly relevant to the topic of ecosystem restoration, but they are essential in terms of creating business cases for youth, women, farmers as intercropping and high value for money products. Similarly, investment in high-value and regionally high-demand vegetables and chilis will support farmers with nutritious and cash-generating products in the short term.

Paradigm shift is needed. A comprehensive transformation of natural resource management is required to ensure a future in which resilient ecosystems support adaptive livelihoods. The GCF project will lead to a paradigm shift in natural resource management away from reliance on degraded ecosystems that are highly sensitive to climate risks and affect production systems of smallholder farmers. The approach to developing value chains for climate resilient agricultural and tree products, developing innovative finance products and services, and leveraging

responsible public and private investments, combined with comprehensive management and implementation shifts across the project's three components, will result in restoration of healthy landscapes and agro-ecological systems, which support climate resilient production, food security and employment and income opportunities for smallholder farmers, and benefits of climate resilience for all primary beneficiaries and society at large. The targeted GCF funding will reinforce landscape transformation in the most vulnerable province of Rwanda (Eastern Province) to achieve climate resilience of agro-ecosystems and farmers affected by prolonged drought periods, other effects induced by climate change, and overall land degradation. In support of transformative change, the project creates enabling environment conditions for achievement and replication of the adaptation and climate resiliency targets set out in Rwanda's Nationally Determined Contribution (NDC), National Strategy for Climate Change and Low-Carbon Development - Green Growth and Climate Resilience.

The interventions proposed should build on a more in-depth analysis of targeted regions, business case, and stakeholder analysis. Intervention areas should follow a market systems development perspective, where the linkages between private sector (buyers and input providers), financial institutes and enabling environment is enhanced. This should be married to an approach that focuses on improving farmer capacities for climate resilient and environmentally sound agricultural practices; cooperation in farmer groups, savings groups and cooperatives; and promotion of innovations that encourage synergies such as clean cook stoves, digital tools and nature conservation.