



MINISTRY OF AGRICULTURE AND ANIMAL RESOURCES

## NATIONAL RICE DEVELOPMENT STRATEGY (2021 – 2030)



**JULY 2021**

## Executive Summary

Rice has been identified and promoted as one of the ‘priority food crops’ in Rwanda because it allows better use of existing land in marshlands and reduces pressure on lands located on hillsides. Rice production is considered as one of the profitable enterprises for smallholder farmers as regards the utilization of the hydro-agricultural investments laid out.

The production of rice in the country takes place mostly in marshlands in the Western, Southern and Eastern Provinces. Rwanda has tried to maximize the gains by strategically expanding marshland areas for rice production. Yet the local rice supply is not sufficient to meet local demand, which means rice import is still needed. Rwanda has 501,509 ha of irrigation potential that is divided into six (6) domains depending on water abstraction, where 123,164ha (24.6 %) is of marshland potential.<sup>1</sup> Only about 12.7% of this potential has been successfully developed to date covering a total of 63,742 ha<sup>2</sup> and rice is predominantly grown as a cash crop mostly by smallholder farmers in over 14,000 ha, with an average of 0.2 ha per household. The rice farmers are currently operating under 122 cooperatives, out of which 95 are registered officially with Rwanda Cooperative Agency (RCA).

Against an increment of 76% in consumption, the domestic rice production increased by 63% during the first phase of National Rice Development Strategy (NRDS-I; 2010-2018). The gap is presently filled through importation of rice grains mainly from Asia and Tanzania. Such importation has not only put pressure on domestic farm gate prices of paddy, but also on the market competitiveness (quality and price) of the locally produced rice. Though the marshland areas under rice cultivation have more than doubled under NRDS-I, the momentum on marshland reclamation and rehabilitation has substantially slowed down in the recent years.

The Coalition for African Rice Development (CARD) is a consultative group of 32 African governments and development partners that aims at doubling rice production in Sub-Saharan Africa. Rwanda joined the CARD initiative in 2009 and developed NRDS-I (2010-2018). To address the constraints in the rice sector, the government formed a new taskforce and requested the CARD secretariat to assist in developing NRDS-II (2020-2030). By analyzing

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<sup>1</sup> Irrigation Master Plan (2020)

<sup>2</sup> Imihigo report FY 2019,

the strengths, weaknesses, opportunities and threats, this document provides a direction for advancing the rice sector under NRDS-II.

The vision of NRDS-II is to establish a rice industry that contributes to food security, job creation and economic growth in Rwanda. NRDS-II aims to drive the rice sector towards improving self-sufficiency by increasing productivity and market competitiveness of the locally produced rice. This will be achieved by (i) enhancing rice production and productivity through research and extension; (ii) increasing total factor productivity and resilience of rice farms to climate change; (iii) facilitating sustainable and market-driven production systems, and (iv) improving policy and institutional environments for increasing the private sector investments in the rice.

These strategic axes of NRDS-II are aligned to Strategic Plan for Agriculture Transformation (PSTA4) and shall be implemented in line with the following four pillars of PSTA4:

Under Pillar-1, technologies that will increase yields, reduce the costs of production, and add value of Rwanda rice will be developed. Strategies to improve adoption of good agricultural practices and innovations by farmers and other beneficiaries along the rice value chain shall be implemented under this pillar. At least 5 new varieties will be released by 2024, and 5 additional new varieties will be released by 2030. It is envisaged that the average on-farm yield shall increase to 6.5 t/ha.

Through Pillar-2 of productivity and resilience, NRDS-II will increase total factor productivity through increased yields and sustainable management practices; and increase resilience of rice farms against market shocks that might emerge from global, regional and national emergencies such as coronavirus disease (COVID-19) and climate change. Total area under rice cultivation and rice production is expected to increase significantly. At least 9,000 ha of new marshlands will be developed and at least 3,000 ha of existing marshland will be rehabilitated for rice cultivation by 2024. An additional 4,600 ha of new marshlands will be developed for rice cultivation by 2030.

In Pillar-3 of inclusive markets & value addition, the functionalities of the marketing process will be improved through such strategies as quality-based pricing and production contract between cooperatives and millers. Grading of paddy on the parameters of moisture content, degree of purity, variety purity, and other physiological status of the grains will be introduced.

The quality of local rice will be improved to become competitive in both the local and regional markets.

Under Pillar-4 of enabling environment & responsive institutions, the rice value chain actors and supporters will be facilitated towards building their capacities, and the organizational skills of the rice farmers' cooperatives will be enhanced. This will be addressed by reorganizing the rice farmers' organizations (cooperatives and unions) and establishing a rice value chain platform for the rice stakeholders. Through the existing institutional framework, NRDS-II will mobilize the required technical and financial resources to achieve its objectives. The implementation of NRDS-II will be facilitated by the task force and coordinated by MINAGRI.

## Abbreviations & Acronyms

CARD	Coalition for African Rice Development
CIP	Crop Intensification Program
DAP	Di Ammonium Phosphate
FUCORIRWA	Federation des Unions des Cooperatives Rizicoles au Rwanda
FAO	Food and Agriculture Organization of the United Nations
IWUA	Irrigation Water Users Association <sup>[L]<sub>SEP</sub></sup>
WUO	Water Users Organizations
JICA	Japan International Cooperation Agency
MINAGRI	Ministry of Agriculture and Animal Resources
MINICOM	Ministry of Trade and Industry
NAP	National Agricultural Policy
NRDS	National Rice Development Strategy
PSTA	Plan for Agricultural Transformation in Rwanda
RAB	Rwanda Agricultural Board Rwanda
RSB	Rwanda Standards Board

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## 1. Introduction

### 1.1 Background

Agriculture remains the backbone for sustained economic growth in Rwanda, providing direct employment to 62.3% of the population.<sup>3</sup> . Rwanda's agriculture is also pivotal for food supply, exports and livelihoods that are necessary to transform the economy to a knowledge based middle-income economy (MINAGRI,2017)

Rwanda is a small country, with an estimated arable land of 26,338 km<sup>2</sup>, representing 58% of the total area.<sup>4</sup> Agricultural plots are generally small with an average plot size is 0.6 ha. About 30% of the households cultivate less than 0.2 ha (accounting for about 5% of total arable land), while about 25% cultivate more than 0.7 ha (accounting for 65% of the national farm-land). Of the total potential marshland area of 123,164 ha,<sup>5</sup> only about 63,742 ha of marshlands is currently exploited.<sup>6</sup> In general, rice is grown twice a year: firstly, during agricultural season A, which spans from July through December; secondly, during Agricultural season B, which starts in January and ends in June of the same calendar year (NISR, 2018a:1). Owing to substantial investments by the government of Rwanda in the development of marshlands and rice value chain activities, the area under rice cultivation has significantly increased in the past two decades. Rice has thus become a significant component of the agricultural sector in Rwanda is recognized by the government as a 'strategic food and cash crop' in the country.

Rice was introduced in Rwanda in the 1960s and mass cultivation only picked up recently as the Government of Rwanda sought to diversify food production, as well as provide employment in rural areas. Rwanda is endowed with extensive marshlands with a high potential for rice production due to its abundant rainfall, and warm temperate climate. Indeed, rice has been identified and promoted as one of the priority staple food crops because it allows better use of existing marshlands and reduce pressure on land located in the hillside (World bank, 2011). Rice production is considered as one of the most profitable enterprises, as regards the utilization of the hydro-agricultural investments laid out. It has also been observed that rice is capable of giving very high yields of over 7t /ha in Rwanda (Jagwe et al.,

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<sup>3</sup> Data for 2019, ILOSTAT Database, <https://ilostat ilo.org/>, accessed in April 2021

<sup>4</sup> List of Land Cover Classes Seasonal Agriculture Survey – Season A Report (NISR, 2020)

<sup>5</sup> Irrigation Master Plan (MINAGRI, 2020)

<sup>6</sup> Annual Report 2019-20 (MINAGRI, 2020)

2003),<sup>7</sup> and several researches revealed that some high yielding rice varieties has potential of producing up to 10t/ha on-farm and the maximum technical yield potential in experimental plots as 12.5t/ha,<sup>8</sup> which is above the yield from any other cereal crops that can be planted in marshlands.

Owing to support by the government in promoting rice production in the country, the area under rice cultivation in Rwanda rose from 3,549 ha in the year 2000 to currently about 14,000 ha, almost all of which are grown in the marshlands. Major areas in Rwanda where rice is grown include; Nyagatare, Gatsibo, Kayonza, Ngoma, Kirehe, Rwamagana, Bugesera, Gasabo, Kicukiro, Kamonyi, Muhanga, Ruhango, Nyanza, Huye, Nyaruguru, Nyamasheke and Rusizi.

## 1.2 Domestic production of rice

The production of rice in the country takes place mostly in marshlands. Rwanda has maximized the gains from marshlands by strategically utilizing them for rice production but the local production is not sufficient enough to meet local demand. Rwanda has 501,509 ha of irrigation potential that is divided into six (6) domains depending water abstraction, where 123,164ha (24.6 %) is of marshland potential.<sup>9</sup> Only about 12.7% of this potential has been successfully developed to date covering a total of 63,742 ha. About 12.7% of this potential has been successfully developed to date covering a total of 63,742 ha<sup>10</sup>.

Rice is grown in the Western, Southern and Eastern Provinces. In Rwanda, rice is predominantly grown as a cash crop, and is mainly cultivated by smallholder farmers who grow the crop under farmer- cooperative schemes set up by the Government. The government promotes clustering of farmers into cooperatives so that farmers can take advantage of economies of scale in rice production. The 14,000 ha is cultivated by about 62,000 farmers operating under 122 cooperatives, out of which 95 are registered officially with RCA, with an average of 0.2 ha/household.

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<sup>7</sup> However, the average rice yield in Rwanda is currently 3.47 t/ha according to Seasonal Agriculture Survey (NISR, 2019), and the yield ranges from 1.5 to 7t/ha depending on the capacity of producers, input use, farming practices as well as soil and climatic conditions.

<sup>8</sup> FAO (2000) *Bridging the Rice Yield Gap in the Asia-Pacific Region*; Anis et al (2016) "Yield potential and correlation analysis of some rice hybrids for yield and its component traits" *Journal of Animal & Plant Sciences*, Vol.30, (2)

<sup>9</sup> Irrigation Master Plan (MINAGRI, 2020)

<sup>10</sup> *Imihigo* report FY 2019/,

Recent trends in area under rice cultivation (blue line), paddy production (red line) and yield levels (green bars) are shown in Fig. 1. In 2019 Season A, rice was cultivated over 14,671 ha, which was a 13% decrease from the 2018 season A records. Paddy rice production was 59,286 tons with a slight increase change of 2% from the 2018 season A estimates.<sup>11</sup> Based on data from 2014-2017, paddy rice has been the best performing crop in terms of revenue per hectare in the marshlands.<sup>12</sup> Based on the average yield and minimum farm gate price of paddy rice for the fiscal year 2020/21, it is calculated that rice farmers in Rwanda are able to make an average revenue of 978,540 RWF/ha/season<sup>13</sup>.

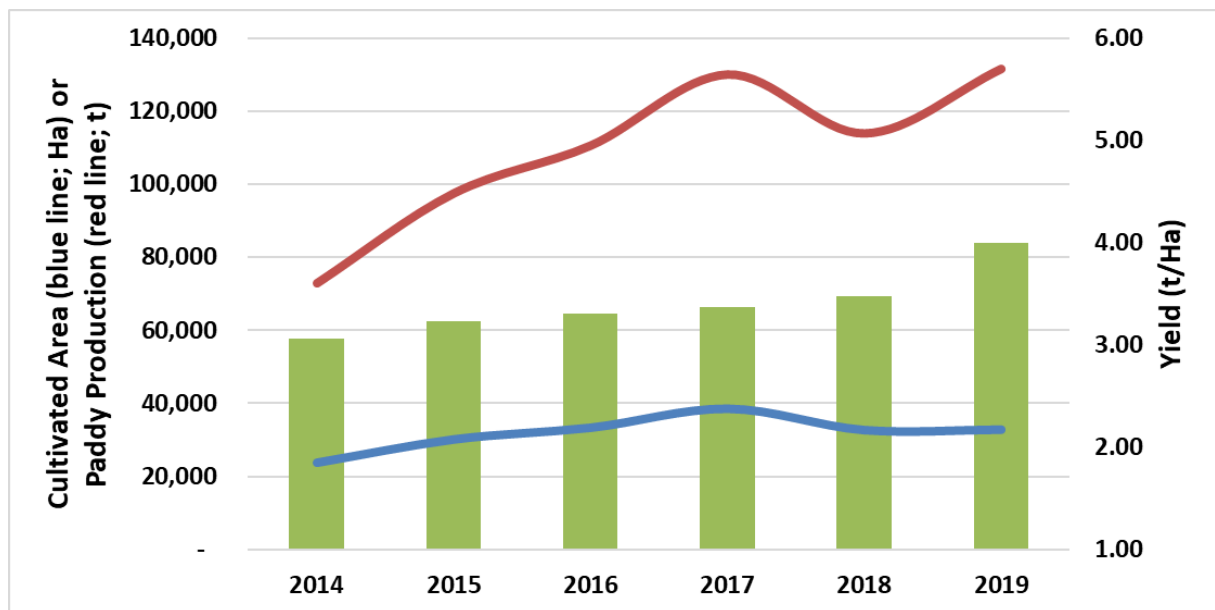


Fig. 1. Changes in area, production and yield levels of rice since 2014 in Rwanda

### 1.3 Domestic consumption of rice

Locally produced long-grain rice is mostly consumed by middle-income consumers in urban and rural areas. Surveys conducted by Rural Sector Support Project (RSSP) show that 54% of the consumers in Rwanda prefer long grains, and only 14% of the consumers prefer short and bold grains. However, short grain varieties occupy 50.2% of the total area under cultivation, whereas long grains varieties are cultivated on 49.8% (RAB, 2020).

Short-grain rice is primarily consumed by low-income urban (50%) and rural consumers,

<sup>11</sup> NISR, 2019A

<sup>12</sup> PSTA 4(2017),

<sup>13</sup> The average yield of paddy (3.47t/ha) in 2020; the minimum farm gate price of rice (270-275RWF for short grain; 290-295RWF for long grain) for FY2020/21

large scale buyers (such as boarding schools) and public programs (such as prisons). The country has 25 authorized rice mills, with a milling capacity of 40.5 tons per hour or 160,000 tons per year. The emergence of rice processing companies like ICM Rwanda — the millers and marketers of Lucki rice, Dukorehamwe Company Ltd, COTICORIZ, Nyagatare Rice Co, Alfa Supply Food Company Ltd, Gatsibo rice Co, Mayange, Makunguli, Gafunzo, Regional Trading Company, Rwabuye, Mamba, Kinazi and Kayonza among others has helped improve the marketability of Rwandan rice. However, Rwanda's rice-processing capacity is presently underutilized, due to low supplies from paddy farmers.

Consolidated datasets provided by MINAGRI, Ministry of Trade and Industry (MINICOM) and Rwanda Revenue Authority (RRA) show the domestic rice production, import and export, national rice demand and the share of domestically produced rice in the national rice demand (Fig. 2). During the period from 2015 to 2018, the average total rice consumption in Rwanda was 145,934 tons, with the lowest and highest values of 82,325 tons and 192,497 tons in 2015 and 2017 respectively, showing more or less general increasing trend. The market share of local rice in total rice consumed in Rwanda overtime averaged at 47%.

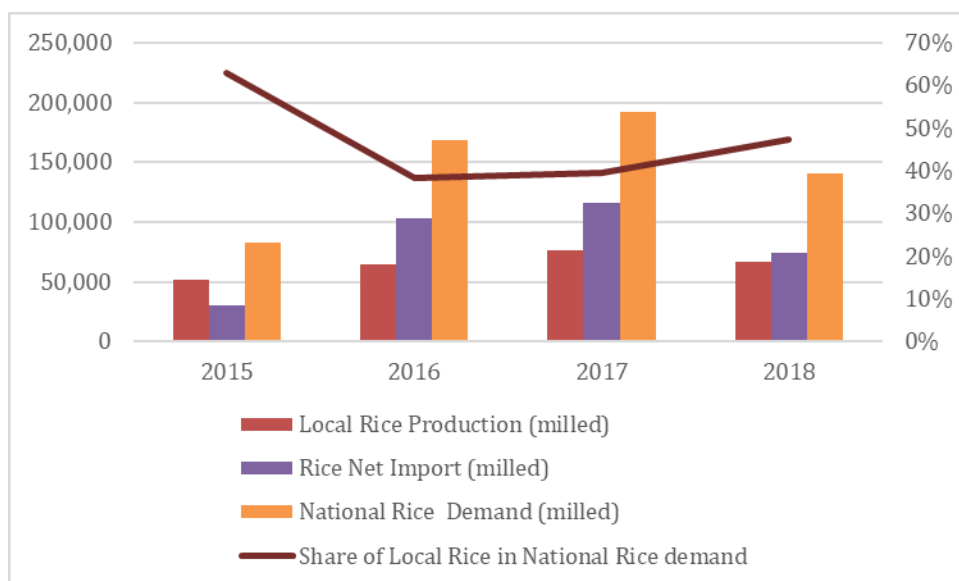


Figure 2: Share of local and imported rice in the consumption in Rwanda

Source: Prepared by MINAGRI based on data from MINAGRI, MINICOM and RRA

#### 1.4 Rice Potential Production and Trade

Rwanda currently has a weak export market of rice due to high domestic demand and insufficient local production. The annual growth rate of Rwanda's rice exports from 2006 to 2014 is 65%, with an average of 4,816 tons. Since the domestic demand for milled rice grains has also risen substantially, the country currently imports significant amount of rice from countries such as Tanzania, Pakistan, India, Vietnam and Thailand.<sup>14</sup>

Despite the increased local production, the country cannot avoid imports. Rwanda imported USD 37 million worth of rice in 2015, which had actually gone up from USD 31.1 million in 2014, with the high proportion of import being from Tanzania. According to MINICOM, imported rice from Tanzania in 2018 was 15,895 metric tons, whereas the total rice imported in 2018 is 72,767 metric tons of different varieties (Fig. 2). According to the UN COMTRADE database, the largest share of imported rice in Rwanda is taken by Pakistan for 62%, followed by Tanzania (21%), Thailand (12.5%) and India (1.2%).

## **1.5 Methodology for developing NRDS-II**

To address the constraints in the rice sector, the government formed a taskforce and requested the Secretariat of Coalition for Africa Rice Development (CARD) to assist in updating the National Rice Development Strategy (NRDS) for the second phase (2020-2030), by setting new objectives and projections. The representatives of various stakeholders of the rice value chain from public and private domains formed a taskforce, and the taskforce members analyzed the current situation of the rice sub-sector development and established a matrix of issues and suggestions under each segment of the rice value chain (on-farm production, processing, marketing and trading). Based on the current status of rice value chain support activities such as research, extension, provision of farm services and policy decisions, the taskforce prioritized the actions to be implemented.

NRDS-II consolidates the gains achieved during the implementation of NRDS-I. An increment of 76% in consumption and 63% in domestic rice production were observed under NRDS-I. Though the marshland area under rice cultivation was more than doubled under NRDS-I, the momentum of marshland reclamation and rehabilitation substantially slowed down in the latter years. Hence a major emphasis is provided for expansion and

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<sup>14</sup> As mentioned earlier, the average share of imported rice was 69% between 2015 and 2018. However, it was reduced to 52% in 2019 as the national demand and thus the import amount decreased.

rehabilitation of marshlands under NRDS-II, besides the strengthening of other segments of the rice value chain.

## 2. Review of the national rice sector

### 2.1 Status of national rice policies

Rice value chain is underpinned by government's rice-specific policies that are aimed at improving self-sufficiency, increasing competitiveness as well as public and private investments. The strategic interventions and policies governing the rice sub-sector are designed to be consistent with national and regional strategies. The EAC Vision 2050 whose pillars include Agriculture, Food Security and Rural development aims to enhance agricultural productivity for food security and a transformed rural economy; As an African Union initiative, CAADP supports member states in increasing investment and productivity in the agricultural sector. The Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods, adopted in 2014 during the 23rd Ordinary Session of the African Unions Heads of State and Government, provides further impetus to the CAADP process and gives the direction for agriculture on the continent for the next 10 years. This essentially constitutes the agricultural component of the first 10 years' implementation plan of the African Union 2063 Agenda; Agriculture has a central place in the United Nation's Sustainable Development Goals (SDGs) with focus on sustaining natural resources and overcoming hunger, malnutrition and food insecurity. The following national government policies have significant implications on the rice sub-sector:

#### (i) National Agriculture Policy (2019)

The development of the rice sub sector is included within the pillar one of the National Agriculture Policy (NAP), Productivity and Commercialization for Food Security, Nutrition, and Incomes, and under the Policy Actions to increase crop, livestock, fisheries and aquaculture productivity. The policies emphasize accessibility to and optimal use of good quality seeds,, balanced nutrition, value of the product in the market, and economic growth.

#### (ii) PSTA4 (2018-2024)

Rwanda's Fourth Strategic Plan for Agriculture Transformation (PSTA4) is the tool for the implementation of NAP, and it outlines priority investments in agriculture and estimates required resources for the agriculture sector for the period 2018-2024. The four pillars of NRDS are aligned to the pillars of PSTA4: -

**Innovation and Extension**, which aims to improve agronomic knowledge and

technology in terms of basic research and innovation, development of good extension services, as well as knowledge and information further down the value chain

**Productivity and Resilience**, which aims to ensure that production is nutrition sensitive, sustainable, and resilient

**Inclusive markets and value addition**, which seeks to improve markets and linkages between production and processing. This includes key input markets such as fertilizers, insurance, and finance as well as upstream activities such as aggregation, promotion of value addition, market infrastructure, and export readiness. and

**Enabling Environment & Responsive Institutions**, through which the PSTA4 aims to improve evidence-based policymaking through better collection and handling of information and enhanced capacity for analysis and policy development, and to improve the planning process, particularly by addressing coordination amongst the stakeholders.

### (iii) Crop Intensification Programme (CIP)

The Crop Intensification Program (CIP) is a flagship program for improving food security and household incomes. Rice is one of the eight priority crops under CIP, along with maize, soya beans, wheat, Irish potato, cassava, fruits and vegetables. CIP promotes land use consolidation, proximity extension services and access to affordable inputs. Rice farmers benefit from CIP through the consolidation of marshlands, access to extension services through cooperatives, and subsidized inputs, thereby increasing rice productivity in the country.

## 2.2 Projection of rice demand and consumer preferences

Factors influencing the demand for rice generally include the following; population growth, rising income of the population across income groups; growing middle class population; urbanization, while factors influencing consumer preferences include; easy storage; wide range of utilization/cooking forms; low requirement of thermal energy for cooking; slow perishable nature of rice even after cooking.

Rwanda has high population pressure with growth rate of approximately 2.6%,<sup>15</sup> and this will expand the market for rice. Also, the per capita consumption of rice is increasing in the past

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<sup>15</sup> Estimate based on the population censuses of NISR



decade. Calculation based on the projected population growth and the growth rate of per capita rice consumption predicts that annual rice consumption of Rwanda will reach 202,257 tons and 280,835 tons by 2024 and 2030 respectively. This means that the rice consumption is expected to be doubled between 2018 and 2030.

In Rwanda, aroma, origin, price and the grading of rice are the important drivers of demand. With this background, domestic demand for rice is not only increasing in Rwanda, but there also appears to be a growing consumer preference for imported long grain rice varieties over the short grain domestic rice. Consumer demand evolves towards more high-quality rice, especially in urban areas. The urban consumers in Rwanda prefer aromatic and long grain rice, such as Basmati and Supa-type aromatic rice varieties from Tanzania (Kilimo Trust, 2017A).

According to RAB, Rwandan farmers cultivate a number of rice varieties. These include Buryohe (08Fan10), Fashingabo (WAB923-B-6-AL1), WAT1395-B-24-2, Gakire (Tox4331-WAT91-3-1-1-1), Basmati 370, Imbaturabukungu (WAB1025-1-8-1-1-4-2-1), Ngaruye, Yun-Yin and V30. Popular rice varieties grown by Rwandan farmers include Watt, Buryohe, Ngaruye, Yun-Yin and V30. The total number of registered varieties are 35, which includes 6 short grain varieties and 29 long grain varieties. Long grain varieties offer good marketing prospects, but the short grain varieties are widely cultivated due to their improved resistance abiotic and biotic resistance in marshlands. Over 113,000 tons of rice was produced in Rwanda in 2018, and approximately 60% of the rice is however of short grain variety types (collectively called 'Kigoli') which consumers in mainstream markets do not readily prefer due to poor cooking qualities (MINICOM, 2019). Nevertheless, the demand for short grain is higher in the rural areas than in urban areas. Due to such mixed demand for both long grain and short grains; the millers demand short and long grain varieties from the farmers depending on the season. However, the domestic rice sector is unable to efficiently meet the dynamics in consumer preferences as a result of gaps in research regarding the genetic improvement of rice and low adaptation of varieties demanded by market (e.g. aromatic varieties) to some Rwandan ecologies.

Concerning the rice quality in Rwanda, the milled rice grains are graded into three categories; Grade 1 (<5% broken), Grade 2 (up to 7% broken) and Grade 3 (up to 15% broken). Therefore, the majority of Rwandan people prefer rice of the grade 1 and 2. Another quality issue is a mixture of different rice varieties. This issue is caused by the low-quality seeds and

inappropriate postharvest handling. Furthermore, some millers and traders take advantage of this consumer preference and blend aromatic and non-aromatic rice to gain unfairly from low-quality rice (Kilimo Trust, 2017A).

## 2.3 Stakeholder analysis

### 2.3.1 Rice producers /Cooperatives

A majority of the rice producers in Rwanda are smallholder (<0.2 ha) farmers. The GoR has encouraged smallholder farmers to join cooperatives which facilitate technology transfer, capacity building and bulk purchase of inputs, as well as the aggregation of produce for the market. These cooperatives are further grouped into unions and federation for value chain coordination. In Rwanda, 95 rice cooperatives are registered and 60% of them are members of unions and federation, called FUCORIRWA. Farmers in each rice cooperative are organized into farmer groups (25 to 40 members), then into zones (5-8 zones).

### 2.3.2 Rice processors

In order to improve the competitiveness of Rwandan rice, the Government of Rwanda privatized the parastatal mills, and facilitated the private sector to establish modern mills with high milling capacity. Rice millers are regulated by MINICOM, and Rwanda Standard Board (RSB) monitors the operational standards of the processing facilities and the quality of milled rice traded in the country. Currently, several authorized rice mills are operating in Eastern, Southern and Western provinces. These companies include ICM Rwanda, the largest rice processing company, SODAR, MBI Co Ltd, Dukorerehamwe Company Ltd, COTICORIZ, MRPIC Ltd, Nyagatare Rice Co, Alfa Supply Food Company Ltd, Gafunzo Rice Mill, and Kirehe, Gatsibo & Mayange Rice mills).

### 2.3.3 Rice traders (wholesalers and retailers)

Paddy rice is aggregated by cooperatives, and sold to millers at or higher than the minimum price negotiated and agreed between millers and cooperatives each season. The milled rice is usually wholesaled by millers, although there are some individual wholesalers who purchase milled rice from millers and sell to retailers. Retailing is carried out by individual retailers, shops and super markets in a price competitive market.

### 2.3.4 Rice consumers

As mentioned in the earlier section, the domestic demand for rice is increasing in Rwanda. Per capita rice consumption is also increasing,<sup>16</sup> and a growing preference for long grain and aromatic varieties is observed. This shift in preference is equally significant in both urban and rural areas. In relative terms, however, urban households spend about three times more on long grain and aromatic varieties than short grain and non-aromatic varieties, whereas in rural areas the budget share for short grain non-aromatic varieties is still marginally higher than for long grain and aromatic varieties.<sup>17</sup>

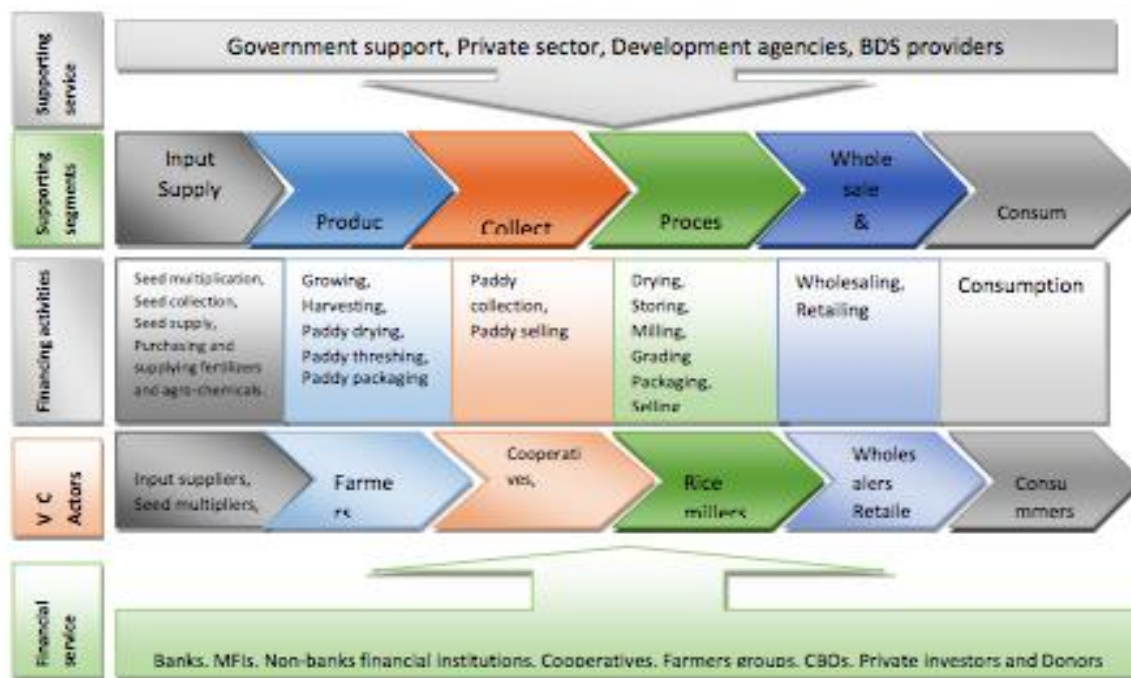


Figure 4: Rice value chain map

<sup>16</sup> According to FAO STAT, the per capita rice consumption in Rwanda was around 5 kg per annum in 2004, while it reaches to more than 11 kg per annum in 2017.

<sup>17</sup> Ghins, L. & Pauw, K. 2018. The impact of markets and policy on incentives for rice production in Rwanda. FAO Agricultural Development Economics Working Paper 18-02. Rome, FAO.

### **3. Analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT Analysis) of Rwanda's rice sector**

#### **3.1 Strengths**

- Availability of marshlands, water resources, and irrigation infrastructure - The GoR has extensively invested in rice sector, focusing on marshland development and irrigation systems
- Conducive policy environment - Rice is one of the priority crops under the CIP (Crop Intensification Program) and thus, benefits from the input subsidies. Also, rice is promoted through support on land acquisition (marshlands are categorized as state lands leased out to cooperatives), adequate regulations and standards, conformity assessment, as well as price setting
- Rice value chain is better organized compared to other food commodity chains in the country. Almost all rice producers are organized into strong cooperatives and all cooperatives are linked to specific buyers for paddy rice.
- Market access for paddy by millers is well regulated - Side-selling of paddy by individual farmers and cooperatives to middlemen is limited.
- Existence of adequate research capacities for technology transfer which can increase productivity  
Active involvement of the government in developing rice value chain by availing the required infrastructures such as post-harvest handling, storage and aggregation infrastructures.
- Existence of adequate milling capacity

#### **3.2 Weaknesses**

- Limited mechanized operation in the rice value chain (from production to post harvest handling). The use of machineries is limited because of limited access to the appropriate mechanization technologies, lack of technical skills in operation and maintenance of machineries and small paddy plots of the marshlands and uneven levelling of marshlands during reclamation.
- The production cost has been recently increasing due to high cost of inputs as well as higher labor costs which reduce the price competitiveness over imported rice
- The land tenure regime is a pressing constraint to improvements in total factor

productivity, as producers who do not own the title to their land and have limited incentives to invest in it (Kayiranga, 2006; Nabahungu and Visser, 2011, 2013; Nkurunziza, 2015). Even though rice production in Rwanda should be profitable on average, only a small proportion of rice growers operate on plots that are sufficiently large to allow for attractive profit margins.

- Formal rice seed system is not well organized. Quality seeds are limited in terms of availability due to the insufficient capacity in seed quality control, genetical impurity of seeds and limited production capacity, all of which contribute to low productivity.
- Insufficient supply and low adoption and use of inorganic fertilizers. Inappropriate or blanket fertilizer recommendation for all regions (regardless of the soil types, agro-ecological zones, cropping system)
- The low use of organic fertilizers in marshlands reduces the sustainability of soil nutrients and thus declines yields
- Inadequate access to finance that limits the activities along the rice value chain
- Lack of systematic grading of milled rice
- The paddy quality is not reflected in the farmgate price
- Poor business and financial management of the cooperatives
- Insufficient supply of paddy rice to millers and several mills are working below their operation capacity
- Rwandan rice is generally less competitive in the market due to disparities in market preferences, price and quality over the imported rice
- High post-harvest losses due to inadequate labor availability during the peak season as well as insufficient awareness, and adoption of improved harvesting and postharvest handling practices amongst producers and cooperatives

### 3.3 Opportunities

- High demand for rice consumption: Currently, the demand exceeds supply. All the rice produced locally is sold without any problem. Rice becomes an important commodity for daily consumption for the majority of Rwandans, especially in urban areas. Currently, the local rice supply meets only 47.4% of the total demand therefore there is ready market. In addition, the rice demand is increasing in EAC region that offers markets for Rwanda rice.

- Rice is well adapted to the Rwanda's marshland based agro-ecological conditions
- Potential to increase productivity - There is willingness from the GoR and stakeholders to increase the on-farm productivity from the current level of 3.4t/ha to 6.5t/ha, although the potential yield of high-yielding rice varieties is 10-12.5t/ha, so there is a possibility to increase beyond 6.5t/ha
- Farmers are well organized - Farmers are organized into cooperatives The existence of cooperatives facilitates the farmers' access to information, inputs, finance and markets

### 3.4 Threats

- Growing competition with other crops in the marshlands for land and water resources
- Different needs for water resources (e.g. household use, livestock, hillside irrigation) limits the availability of water for rice cultivation in marshlands
- Imports of low-price rice from other countries.
- Increasing threats from climate change: Unpredictable and changing weather patterns, fluctuations in volumes of rainfall, thermal oscillations between day and night in the marshlands and other microclimatic fluctuations in the valleys that could negatively influence flowering and grain filling rates of rice crops, and damages from pests and diseases
- Pressure on land from growing population that leads to fragmentation.
- Lack of coherence on import tariff rates and other rice-related trade policies amongst members of regional economic communities (RECs)

Recent studies conducted on rice value chain by the Ministry of Trade and Industry revealed that the following challenges of the rice sector at various levels:

#### **At the on-farm production level**

- *Inappropriate designs and leveling of some marshlands constraining ease of irrigation;*
- *Inadequate use and inappropriate fertilizer recommendations affecting crop productivity of some farmers;*
- *Inadequate extension service provision due to insufficient number of trained*

*agronomists;*

- *Unavailability of quality seeds and poor seed handling practices at farm and during trading leads to mixed varieties of seeds, and hence low rice grain quality;*
- *Insufficient varietal options of long grain rice that are preferred by producers and millers to compete with imported rice;*
- *Poor coordination in the production and marketing of seeds;*
- *Poor maintenance of irrigation facilities by water users' organizations, affecting the performance of rice crop;*
- *Inadequate catchment management and hillside land husbandry that leads to soil erosion, flash floods, and silting especially during the extreme weather events which eventually destroy rice crop and irrigation infrastructure.*

#### **At the postharvest and processing level**

- *Insufficient availability of modern postharvest handling facilities (e.g. drying grounds, sheds, storage, equipment) leading to post harvest losses and poor quality of paddy supplied to processing units;*
- *Low adoption of modern post-harvest technologies by rice farmers, leading to low quality paddy rice, which in turn affects the quality of milled rice;*
- *High electricity costs for rice processing;*
- *Occasional breaching of contract farming arrangements between rice farmers and millers; due to such reasons as for example, delays in trader/ miller payments to farmers for paddy rice which affect the cashflow for rice cultivation activities in the following season;*
- *Existence of some sub-standard mills which produce low quality and low-price rice, and bypass tax payment, leading to unfair market competition for rice processed by modern mills;*
- *The majority of small cooperatives are not well organized and provide paddy to sub-standard mills;*
- *Lack of good storage facilities for milled rice leads to losses when the milled rice is kept for long period;*
- *Most of processors use weighing balances that are not calibrated and this may lead to*

*inaccurate measurement while purchasing paddy or selling milled rice;*

- *Poor adherence to standards and regulations: Intentional mixing of rice of different grades - In some mills, sorters are deactivated during the milling process. This practice affects the quality and credibility of Rwandan rice;*
- *Poorly maintained feeder roads that link farming marshlands and rice milling industries increase the costs of transport;*

**At the market level**

- *Limited investment capacities of millers for their business operations;*
- *Counterfeit packaging bags of rice milling industries affect the reputation of the locally processed rice;*



## 4. Current Status of Rice Value Chain

### 4.1 Seeds

Due to accelerated reclamation of marshlands in the past decade, the area under rice has gone up significantly in the country, increasing the demand for rice seeds. Rwanda Agriculture Board' (RAB) facilitates farmers' access to quality seeds of improved rice varieties. Basic seed is provided to certified seed multiplier cooperatives who multiply the seed and give it to farmers on credit that is paid at harvest.

To overcome challenges (e.g. delays, cost) farmers use rice grain as seeds, which in most cases perform poorly. In general, rice produced from these seeds is of low yield, low quality and fetches low prices. Generally, the rice seed sector is characterized by the following limitations: poor organization and coordination; insufficient quantities and untimely supply of basic and certified seeds; low quality seeds produced by seed cooperatives; limited inspection and certification capacity as well as lack of private sector participation.

### 4.2 Fertilizers

Inorganic fertilizer is an important input for increased rice productivity. It is one of the main contributors to the paddy production cost, accounting for approximately 26%.<sup>18</sup> Recognition of the declining soil fertility and the low level of fertilizer use led the GoR to setup the Crop Intensification Program (CIP) in 2007 with the objective of increasing agricultural productivity of priority crops. CIP prioritizes improving the availability and access of fertilizers for farmers, and subsidizes the cost of fertilizers for the production of maize, wheat, rice and Irish potato. In addition, rice farmers generally do not apply the adequate amount of organic fertilizers due to the lack of enterprises that could sustainably supply the organic manures in the marshlands.

Regarding inorganic fertilizer distribution, in September 2016, the Cabinet approved a new fertilizer distribution model. MINAGRI selected eight importers and one distributor — Agro-Processing Trust Corporation Ltd (APTC). Farmers buy subsidized fertilizer in their sectors from agro-dealers who work with APTC. However, the cooperatives also are authorized to act as agro-dealers to ensure farmers get fertilizers at their nearest proximity and on favorable terms. In rice value chain, all cooperatives act as agro-dealers. Generally, farmers get

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<sup>18</sup> The cost of rice production in 2019 season A shows that the fertilizer cost comes after the cost of labor and land preparation

fertilizers from the cooperative on credit, which are deducted after harvest. They pay the amount of loan, including interest, and they agree with the cooperative on terms at the beginning of the season.

#### **4.3 Pests and Diseases Control**

The most important disease in rice growing areas in Rwanda is rice blast caused by *Pyricularia oryzae*. It is common in Cyili marshland and attacks rice crop when grown for more than 3 consecutive seasons on a large scale. This disease is capable of causing 80% loss in terms of yield. Other major diseases include rice yellow mottle virus (RYMV), sheath brown rot caused by *Pseudomonas fuscovaginae* in areas above 1,500 m such as Cyili, Rwamagana and Kabuye, and by *Sarocladium oryzae* which is common in Bugarama. Most of the rice producers countrywide do complain about the stalk-eyed fly (*Diopsis thoracica*) whose larvae eat rice tillers causing them to dry out. Rwandan rice farmers rely heavily upon the use of pesticides to prevent pest-related yield losses. Commonly used agro-chemicals include herbicides (propanil, butachlor, and pendimethalin), fungicides (carbendazim and propiconazole), and insecticides [organophosphates (Chlorpyrifos), pyrethroids (cypermethrin, profenofos, and a mixture of these two [Roket]), and neonicotinoids (imidacloprid)]. However, the indiscriminate use of pesticides by local rice growers has raised concerns about potential human, animal and ecosystem health impacts, due to underground and drinking water pollution as pesticide distribution and application are not strictly regulated.

#### **4.4 Water Management**

The equitable distribution of water is a major constraint amongst rice growers, particularly during the dry season and for farmers whose fields are located at the lower end of the marshland, or at the tail end of the irrigation canal. The major causes are inadequate infrastructure, inefficient water management and use, water shortage and floods. In new marshlands, water is sufficient but often not distributed equitably due to the inappropriate design of the scheme, uneven leveling, as well as the inadequate management in water distribution.

Irrigation infrastructure is usually maintained by the Water Users Organization (WUO), and supervised by RAB. The activities of WUO are funded through water fees agreed upon and paid by members of cooperatives. Cooperatives usually oversee farmers responsibility in maintaining plots. However, WUO is responsible for operation and maintenance of irrigation

infrastructure. Water user fees are often inadequate to cover the maintenance cost, leading to the deterioration of the drainage and irrigation infrastructure.

Government has clearly outlined responsibilities of farmers and WUOs. However, inadequate involvement and limited finances of smallholder farmers as well as limited technical capacities of WUO remain a serious challenge to management, operation and maintenance of irrigation infrastructure in some marshlands.

#### **4.5 Marketing**

Cooperatives aggregate paddy rice from member farmers and supply to registered rice millers, often under the contract farming arrangement. It is expected that the millers would in turn provide inputs (fertilizers mainly) under the contract farming arrangement.

Prior to the harvesting period, the cost of production is calculated by each cooperative based on costs incurred in cultivation and the expected production by a technical team of MINICOM, MINAGRI, rice federation (FUCORIRWA) and Rwanda Forum of Rice Millers (RFRM). This information is consolidated at national level and used during the seasonal stakeholders' meeting involving MINAGRI, MINICOM, FUCORIRWA, cooperatives, and RFRM to negotiate and agree on the minimum farmgate price of paddy. Negotiations take into consideration the calculated costs of production and prevailing market prices of white rice.

High import duties and common external tariff rate on imported rice aims to protect markets for locally produced rice. Prior to formally joining the EAC Customs Union in 2009, Rwanda applied a tariff of 35% on rice imports originating from non-COMESA members. EAC recommended its Customs Union members apply a Common External Tariff (CET) of 75 % on rice imports from outside EAC. However, member countries were given some autonomy to set their own tariff rate; therefore, upon joining the Customs Union, Rwanda set its tariff rate at 30%. For a brief period during 2011–2012, it did apply the recommended 75% tariff rate, but for the most part the tariff rate remained between 30% and 45%. Presently, Rwanda applies 0% tariff for rice imported from within the EAC region, and 75% for all non-EAC importations.

#### **4.6 Access to Finance**

The financing services and products provided by financial institutions to rice cooperatives are insufficient to cover all the needs expressed by farmers during the whole process of rice

production cycle. Formal financial institutions are only financing inputs (mostly inorganic fertilizers) and farm operations. The agricultural sector is mainly financed by BRD as this bank is mandated by the GoR to finance agriculture, although commercial banks such as KCB, BPR and UOB also provide some agricultural loans. However, only 5.2% of the total credit is allocated to the agricultural sector.

Generally, rice farmers, like other smallholder farmers have difficulties to access formal financial services due to the following: - limited accessibility to collaterals, high interest rates, lack of guarantors, limited availability of financial products targeting agriculture, high costs of loan transaction, and lack of skills in developing bankable business plans. Existing agricultural financial products have short tenure, not sensitive to the cropping cycle, and the repayment terms and schedules are not favorable for agriculture (e.g. repayment is required to begin before harvesting seasons). Furthermore, high interest rates associated with agriculture loans are the direct result of the perceived risks of the sector (e.g. climate risks, price fluctuations). Small size of loan by smallholder farmers also contributes to the high interest rates and transaction costs. In addition, most of the commercial banks lack knowledge and trained analysts in agriculture to assess the business plans in the agriculture sector.

#### **4.7. Access to Extension Services**

Farmers in Rwanda access extension services through *Twigire Muhinzi*, the home-grown proximity extension model. *Twigire Muhinzi* is decentralized and farmer-oriented extension services delivery model of the GoR, and it ensures the access of all farmers in Rwanda to agriculture extension and advisory services. Co-implemented by RAB under MINAGRI and the MINALOC at the district level; the model is based on two complementary approaches to farmer-to-farmer extension: (1) Farmer promoters approach (FP): Quickly reach all farmers with basic extension messages through mobilization and demonstration plots in each village; and (2) Farmer Field Schools approach: Gradually reaching all farmers with in-depth knowledge by offering an experiential learning experience in the Farmer Field School (FFS) plot, at the cell level.

*Twigire Muhinzi* enhances farmer-to-farmer knowledge transfer, which is a basis to form farmer cooperatives and makes farmers actively involved in the learning process. Further, through learning-by-doing at the FFS plot, farmers truly develop their decision-making skills which help them handle current and future challenges effectively and thus farmers become progressively managers of their own economic activities. Rice farmers are organized into

FFS groups within the marshlands, and trained on good agricultural practices in the rice production.

As far as rice is concerned, cooperatives play critical roles in dissemination of extension messages to cooperative members. Extension workers specialized in rice are hired by rice cooperatives, and provide extension and advisory services. These extension workers receive technical backstopping from RAB and work in partnership with projects by development partners and NGOs to benefit rice farmers to the maximum extent. For instance, an extension model for market-oriented crop production was established in the Smallholder Market-oriented Agriculture Project (*SMAP*) that was implemented by RAB in collaboration with JICA. The *SMAP* approach bridges the production and marketing, through strengthening the capacity of farmers in decision making on agriculture planning and farming activities based on the information collected by farmers themselves on demand, prices and seasonality, among other market information. The *SMAP* approach causes the change of farmers' mindset from "Grow and Sell" to "Grow to Sell" in which they regard farming as business.

## 5. Vision and Scope of NRDS-II

### 5.1 Goal

NRDS-II envisions a rice industry that contributes to food security, job creation and economic growth in Rwanda. The goal of NRDS-II is: To drive the rice sub-sector towards achieving self-sufficiency by increasing productivity and market competitiveness of the locally produced rice

*Table 1: NRDS-II Targets (2020-2030)*

	2018	2024	2030
Required Production (paddy rice; t) for self-sufficiency	180,499	311,164	434,553
Observed/Projected Production (paddy rice; t)	113,880	254,440	390,000
Observed/Projected local production (milled rice; t)	66,620	165,386	253,500
Observed/Projected Area Harvested <sup>1</sup> (ha for 2 seasons)	33,677	50,888	60,000
Required yield for Self Sufficiency		6.11	7.24
Observed/Projected Yield (t/ha)	3.4	5.0	6.5
Observed/Projected Net Imports (t)	(74,022)	(36,871)	(27,335)
Consumption requirement (milled rice; estimated) (t)	140,642	202,257	280,835
Self-sufficiency ratio	47.4%	82%	90%
Population Figure <sup>19</sup>	12,301,970	14,030,371	16,141,036
Per capita rice consumption (kg/year; estimated)	11.43	14.42	17.40

### 5.2 Objectives

- I. Enhance rice production and productivity through research and extension
- II. Increase total factor productivity and resilience of rice farms to climate change and market shocks arising out of global, regional and national emergencies
- III. Facilitate sustainable and market-driven production systems
- IV. Improve policy and institutional environments for increasing the private sector investments in the rice

### 5.3 Strategic Axes

The strategic axes of NRDS-II are aligned to PSTA4 and shall be implemented in line with the following four pillars of PSTA4.

<sup>19</sup> National Institute of Statistics of Rwanda (2012) Fourth Population and Housing Census

### **Pillar 1: Innovation & Extension**

Under pillar 1, Technologies that will increase yields, reduce the costs of production and add value of Rwanda rice will be developed. Strategies to improve adoption of good agricultural practices and innovations by farmers and other beneficiaries along the rice value chain shall be implemented. New technologies will be communicated to farmers through various extension channels. NRDS-II emphasizes the *Twigire-Muhinzi* for proximity extension through FFS especially on good on-farm practices as well as the SMAP approach to support farmers practice market-oriented rice production as business.

### **Pillar-2: Productivity & Resilience**

This pillar aims at increasing total factor productivity through increased yields and on-farm productivity. It also aims to increase resilience of rice farms to climate change through sustainable land and husbandry management. Market resilience against global, regional and national rice supply and price shocks will also be improved by increasing self-reliance and domestic market share of locally produced rice.

### **Pillar-3: Inclusive markets & Value addition**

The functionality of the marketing process will be improved through such strategies as quality-based pricing, as opposed to the current flat pricing, which is based on supply parameters such as quantity, variety and production contract between cooperatives and millers. Grading of paddy on the basis of moisture content, degree of purity, homogeneity, presence of immature grains and foreign materials will be introduced. The quality of local rice will be improved to become competitive in both the local and regional markets, and branding of the rice produced locally will be enabled by introducing the concept of “Rwanda Rice”.

### **Pillar -4: Enabling environment & responsive institutions**

Rice value chain actors and supporters will be facilitated to build their capacities. The organizational skills of the rice farmers’ cooperatives will be enhanced. This will be addressed by reorganizing the rice farmers’ organizations (Cooperatives and unions) and establishing a rice value chain platform for the rice stakeholders.

## 6. Strategies for the Sector

### 6.1 Innovation and Extension

Research, technology dissemination, and capacity building will play key roles in realization of the NRDS-II strategic objectives.

#### 6.1.1 Technology generation

Majority of domestic rice consumers prefer long grain and fragrant rice varieties, which are mostly imported. However, availability of long grain varieties, which are adapted to the country's climatic conditions, is limited. Therefore, research on identifying long grain and fragrant rice varieties that can adapt to the Rwandan agro-ecologies shall be conducted. Frequent droughts and flooding impose a high risk on production. Continuous research and dissemination of the results are required to address climate resilience related issues. Technology generation will be spearheaded by RAB, which will collaborate with the private sector, and regional and international rice research institutions. Participatory research will be encouraged where farmers and extension personnel will be involved. The research and innovation will focus on developing technologies that will increase yields, minimize postharvest losses, reduce costs of production, and add value of Rwanda rice under the Pillar 1 of PSTA 4; Innovation & Extension. The expected outputs and the activities towards achieving this objective are listed below: -

**Output-1:** At least 5 new varieties released by 2024 and 5 additional new varieties are released by 2030.

#### *Proposed activities*

- 1) Conduct market research on the dynamics of consumer preferences in national and regional markets
- 2) Breeding and introduction of higher yielding, climate-resilient and market-preferred varieties that are adapted to marshlands

#### *Estimated Budget*

USD 1,000,000 (USD 250,000 – USD 300,000 every 3 years)

**Output-2:** 10% reduction in production costs by 2024 and additional 10% reduction in production costs by 2030.

#### *Proposed activities*



- 1) Innovations for improving the input use efficiency and other cost-cutting farm practices
- 2) Carry out research on appropriation and optimization of the usage of inputs (water, seeds, machineries, fertilizers and other agro-chemicals).
- 3) Conduct research and develop appropriate equipment to use along the rice value chain
- 4) Disseminate technical and market information on the identified equipment to the stakeholders

Development of the following equipment by the Agriculture Technology Development Centers (RAB, universities, colleges, ATVET schools; Small scale harvesters, small motorized threshers, small scale motorized winnowers, small scale driers for paddy rice in the rice growing areas, improved rice mills (Milled rice grading machines), Seed and paddy rice grain grading equipment, Branded milled rice appropriate materials packaging materials.

#### *Estimated Budget*

USD 1,800,000 for 10 years

**Output-3:** At least 2 new value-added products/by-products developed by 2024 and additional 2 new value-added products/by-products developed by 2030.

#### *Proposed activities*

- 1) Research on fortification and other modes of value addition of rice grains and by-products

#### *Estimated Budget*

USD 522,500 for 10 years

### 6.1.2 Technology Dissemination/Extension and advisory services

The specific objective under this strategic axis will be to improve adoption of good agricultural practices and innovations by farmers and other beneficiaries along the rice value chain. Towards achieving this objective, the following activities and outputs are envisaged:

**Output-1:** Adoption rate for rice-related technologies (e.g improved varieties, appropriate use of fertilizer and IPM) increased to 60% by 2024 and to 80% by 2030. (Baseline: 44% for varieties in 2018).

#### *Proposed activities*

- 1) Strengthen the proximity extension and advisory services in rice growing areas through public and private sector, including institutions of higher learning,
- 2) Promote commodity-based extension services through rice cooperatives

- 3) Organized training of all rice stakeholders on the entire rice value chain
- 4) Train FFS facilitators on rice farming
- 5) Organize farmers into FFS
- 6) Train Farmer promoters on rice production

#### *Estimated Budget*

USD 10,000,000

#### **Output-2:** Private extension services on rice are piloted

- 1) Promote commodity-based extension services through private stakeholders (e.g. trained youth individuals/ groups, input supplying companies)
- 2) Promote contract farming between cooperatives and private sector (e.g. millers, investors) where the private sector will sponsor the extension services.
- 3) Cooperatives to get into contracts with the extension services organizations like youth professionals in agriculture and FFS Facilitators cooperatives
- 4) Pilot test the private extension mentioned-above

#### *Estimated Budget*

USD 5,000,000

## **6.2 Productivity and Resilience**

Under NRDS-II, the on-farm rice productivity and resilience will be increased by (1) expanding area under rice cultivation, (2) improving supply and quality of seeds of improved varieties, (3) promoting appropriate usage of fertilizers, (4) more systematic and equitable distribution of water for rice farming in the marshlands. (5) minimizing yield losses due to pests through integrated management practices, (6) increasing the accessibility and durability of the irrigation infrastructures, (7) increasing the availability and accessibility of machineries and services to rice farmers, (8) enhancing competitiveness of the locally produced rice, and (9) improving access to finance for all the stakeholders along the rice value chain.

### **6.2.1 Expand area under rice cultivation**

Domestic production of paddy continues to lag behind national consumption. Of the potential marshland area 123,164 ha, around 14,507 ha has been developed for rice cultivation. However, if the potential marshland area suitable for rice cultivation are developed, elevating rice production to the level of meeting domestic demand will become

possible. Rwanda annually spends significant resources on rice imports. If the gap between national production and consumption is reduced, the country will save foreign exchange and enhance food security. However, the development, operation and maintenance of irrigation schemes can put significant fiscal burden to the Government of Rwanda, thus should leverage the investments by the private sector and development partners through strategic partnerships. Under the PPP arrangements; the roles and responsibilities of public, private, and rice farming communities are to be determined through negotiations among all concerned parties. Nonetheless, the Government of Rwanda should ensure, at least, to make land and water resources available for private investors according to the agreed terms, provide necessary information such as inventory of potential marshlands as well as feasibility study, involve all the concerned parties (e.g. local residents, private sector, local government) in the entire process of PPP (e.g. target setting, negotiations on cost-sharing and buying down the risks consensus on rewards/returns, planning, implementation, and scaling), and ensure enforcement and conformity of agreed terms and contract by all parties through monitoring and mediation for dispute settlement.

**Output-1:** At least 9,000 ha of marshlands are newly developed and deployed for rice cultivation by 2024 and additional 4,600 ha by 2030.

*Proposed activities*

- 1) Prepare and update an inventory for potential area for marshland development
- 2) Expand area under rice cultivation in marshlands through new reclamation of hitherto unexploited marshlands

*Estimated Budget*

USD 180,000,000

**Output-2:** At least 3,000 ha of existing marshlands are rehabilitated

*Proposed activities*

- 1) Assessment of the non-functional marshlands
- 2) Rehabilitate existing, non-functional, developed marshlands

*Estimated Budget*

Approximately USD 4,500,000 and exact cost will be determined by the assessment report. But at an estimated cost of rehabilitation cost per hectare is USD 1,500.

**Output-3:** Public-Private -Partnership for development and rehabilitation of marshland piloted

*Proposed activities*

- 1) Share with private sector the list up potential areas for marshland development and marshland that requires rehabilitation with cost estimates
- 2) Build strategic partnerships with private sector and development partners for marshland development/rehabilitation
- 3) Reach negotiations on terms and conditions on the pilot project
- 4) Development/ Rehabilitation of marshlands through PPP arrangement
- 5) Carefully monitor the investment and make necessary interventions to settle the disputes

*Estimated Budget*

The Government Budget is to be determined through the negotiation on terms and conditions.

### 6.2.2 Enhance the supply and usage of quality seeds of improved rice varieties

The government plays a key role in the rice seed supply chain, and RAB is the major source of breeder and pre-basic seeds for various rice cultivars, from which are multiplied to produce pre-basic seeds that are adopted to local conditions, at selected RAB research stations. Two main types of rice grains that are cultivated in Rwanda namely the short and bold (*japonica*) and the long and medium/slender (*indica*) types. Rwanda Standard Board (RSB), in alignment with that of EAC standards, regulates the quality of rice seeds (MINAGRI 2013). Cooperatives, as well as appointed agro-dealers are the main sources of seeds for rice farmers.

The strategy aims at addressing challenges that the rice seed sector faces through the activities outlined below.

**Output-1:** Adoption rate for quality seeds increased to 80% by 2024 and to 100% by 2030 (Baseline: 60%)<sup>20</sup>

*Proposed activities*

- 1) Review the seed law and make suggestions for amendments, as required
- 2) Involve the private sector in the production of pre-basic, basic and certified seeds.
- 3) Improve the tracking, reporting and enforcement mechanisms in case of malpractice by any of the stakeholders

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<sup>20</sup> NISR 2018

- 4) Improve the planning for the production of seeds (by determining effective demand)
- 5) Ensure timely supply of seeds (through better planning, and streamlining the supply chain linkages)

#### *Estimated Budget*

USD 600,000 for 10 years

**Output-2:** Seed supply through contract farming with rice millers is piloted with 2 millers by 2024 and adopted by 60% of millers by 2030

#### *Proposed activities*

- 1) Identification of partner millers
- 2) Identification of other partner stakeholders such as seed suppliers and financial institution
- 3) Negotiations on modalities, terms and conditions among millers, cooperatives, seed suppliers, financial institutions and other stakeholders
- 4) Pilot a contract farming between cooperatives and millers where the millers provide seeds

#### *Estimated Budget*

USD 300,000

### 6.2.3 Enhance the supply and usage of appropriate fertilizers

Inorganic fertilizer is a key input used by farmers for improving rice productivity,

**Output-1:** Percentage of farmers applying the appropriate fertilizers according to the soil analysis and the right amount is increased to 80% by 2024 and to 100% by 2030

#### *Proposed activities*

- 1) Support favorable policy environment to entice private sector investments in blending fertilizers according to the needs of the respective rice growing regions.
- 2) Support the improvement of access to appropriate fertilizers by farmers
- 3) Facilitation of timely procurement of the fertilizers
- 4) Capacity building of farmers on efficient use of fertilizers

#### *Estimated Budget*

USD 120,000

**Output-2:** Inorganic fertilizer supply through contract farming with rice millers is piloted

*Proposed activities*

- 1) Identification of partner millers
- 2) Identification of other partner stakeholders such as fertilizer wholesaler and financial institutions
- 3) Negotiation on modalities, terms and conditions among millers, cooperatives, inorganic fertilizer suppliers, financial institutions and other stakeholders
- 4) Pilot a contract farming between cooperatives and millers where the millers provide fertilizer.
- 5) Review results and examine the possibility of scale-up and/or out

*Estimated Budget*

USD 300,000

#### 6.2.4 Promote Integrated Pest Management (IPM) practices

The main biotic stresses for rice include blast and rice yellow mottle virus diseases, and Diopsis insect pest and other emerging diseases, caused by bacteria. The agro chemicals that are used to control these diseases are imported from other countries, and at times they are not in store when required. The expensive nature of pesticides results in high cost of rice production in Rwanda and this contributes to higher production costs of locally produced rice compared to imported rice. The strategy therefore aims to promote adoption of integrated Pest Management (IPM) practices by rice farmers, which include use of pesticide, variety rotation, synchronization of planting, and usage of disease resistant varieties.

**Output-1:** Adoption of IPM practices by rice farmers increased to 50% by 2024 and to 100% by 2030.

*Proposed activities*

- 1) Increase pest and disease surveillance
- 2) Research on efficacy of new pesticides (Government to provide)
- 3) Attract investors in the pesticide industry
- 4) Create awareness to the farmers of the available pesticides for the various pests and diseases
- 5) Create awareness to the farmers of the existing pests and diseases and the IPM for their control

- 6) Capacity building of the extension agents on integrated pests and diseases management

*Estimated Budget*

USD 450,000

6.2.5 Improved irrigation management

**Output-1:** Catchment protection in the hillsides surrounding the marshlands in 50% of the marshlands by 2024 and in 80% by 2030.

**Output-2:** Revamping of 40% of water reservoirs and water distribution structures by 2024 and 60% by 2030.

*Proposed activities*

- 1) Proper implementation of the water distribution calendar
- 2) Increase the number of water dams
- 3) Protection of the drainage canals against silting
- 4) Implementation of the water policy
- 5) Soil and water conservation on the hillsides to protect the marshlands

*Estimated Budget*

USD 40,000,000 (allocated through Irrigation and Land Husbandry Initiatives)

**Output-3:** Durability of the irrigation infrastructure increased

The focus of activities under this output will aim to strengthen the organizational capacities of WUA (Water Users Associations) on operations, management and maintenance of irrigation infrastructures in rice growing marshlands. Irrigation canals are usually maintained by the Water Users Associations (WUA), which is partly funded by cooperatives. RAB supports continuous improvements in service delivery by WUA, it also underlines the importance of plot maintenance by farmers for irrigation schemes to be effective. In particular, it is crucial for rice fields to be appropriately leveled, in order to let all rice plants, receive the same amount of water. Therefore, WUAs need more capacity to undertake these mandates.

*Proposed activities*

- 1) Capacity building of WUA

- 2) Enforcement of the guidelines on rehabilitation and maintenance of the infrastructure upon handover

*Estimated Budget*

USD 475,000

**Output-4:** Financing capacity of the Water User Associations (WUAs) and rice farmer cooperatives on management of irrigation infrastructure improved

*Proposed activities*

- 1) In-depth evaluation of the cooperatives' financing and responsibility as far as infrastructure or field maintenance is concerned.

*Estimated Budget*

USD 375,000

#### 6.2.6 Promote rice farm mechanization

**Output-1:** Improved adoption of farm machineries in rice growing marshlands

*Proposed Activities*

- 1) Assess and based on evidences, advocate policy reforms on consolidation of fields by rice farmers into large parcels that will ease the adoption of mechanization
- 2) Promote synchronization of seasonal land preparation
- 3) Suggest appropriate redesigning of the marshlands to allow service roads, which can be used for mechanization
- 4) Facilitate private mechanization service provisions to tackle issues around social-distancing & labor crunch during peak seasons

*Estimated Budget*

USD 2,150,000

**Output-2:** Availability and accessibility of machineries and services to rice farmers increased

Access to machinery is a challenge, and this is compounded by the labor constraints; high cost of manual labor, labor shortage, inefficient laborers and low productivity. Farm equipment is used by some farmers for weeding operations, but they are not very efficient as they require a lot of energy and take away jobs for women. To address this challenge, there is an increasing participation of women in supplying the simple farm machinery and equipment.



Currently there are two women supplying farm implements in Muvumba marshland. Moreover, some cooperatives have introduced threshers and winnowers which can reduce the burden of women while maximizing their utility.<sup>21</sup> NRDS-II will enhance the accessibility to such agricultural machineries and equipment through manufacturing and assembling of simple implement and machineries as appropriate and promote private mechanization service provision. In order for agricultural mechanization to be sustainable, mechanization should bring economic profit for all the players in the mechanization chain. Therefore, the efforts will be made based on their profitability as well as technical feasibility.

### *Proposed activities*

- 1) Research on adaptive mechanisation – machines and accessories that are adapted to the local soil texture (like ploughs, threshers, weeders, transplanters, harvesters)
- 2) Promote acquisition of machines and hiring of mechanization service by farmers
- 3) Promote participation of private sector and individual entrepreneurs to establish and manage service centres for the machines at the village/ cell/ sector/ district level.
- 4) Promote participation of private sector and individual entrepreneurs in manufacturing/ assembly and/or sales of agricultural machineries, spare parts, accessories and implements for farmers in marshlands
- 5) Identification of partners such as research institutions, DPs, financial institutions and others that can technically and/or financially support the pilot
- 6) Advertise for proposals/business plans on mechanization service provision from private sector
- 7) Provide advice and technical backstopping on potential proposals/ business plans
- 8) Negotiate on terms and contracts on the pilot of private mechanization service with private sector, financial institutions and other stakeholders.
- 9) Facilitate the selection and procurement of machinery and spare parts by selected private sector
- 10) Conduct/ facilitate the training on operation and management of machineries as well as mechanization service business
- 11) Create awareness on private mechanization service

### *Estimated Budget*

USD 14,205,000

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<sup>21</sup> ICCO (2017), Rice value chain Finance analysis- STARS Program

**Output-4:** Appropriate harvesting and postharvest equipment and machineries adopted

*Proposed activities*

- 1) Capacity building of farmers on the importance of the use of machinery and equipment in harvesting and postharvest handling
- 2) Capacity building of the farmers on proper practices in post-harvest handling

*Estimated Budget*

USD 615,000

### **6.3 Market Competitiveness**

Facilities for drying, cleaning, sorting and milling shall be enhanced so as to improve the quality of locally produced rice. While challenges such as availability of adapted varieties to the Rwanda climatic conditions, do not necessarily permit large-scale adoption of long grain rice varieties, improvements in milling and grading practices can greatly improve the quality of local rice varieties, thus allowing more effective competition with imports and the expansion of exports to emerging markets such as the Democratic Republic of Congo.

#### **6.3.1 Enhance competitiveness of the locally produced rice over the imported rice**

**Output-1:** Quality of locally produced paddy is improved by strengthening the implementation and enforcement of regulations and standards

*Proposed activities*

- 1) Enforce observation of quality standards and norms throughout the value chain by the respective actors and supporters (RSB, RAB) by providing guidelines and carrying out supervision and monitoring to ensure they are adhered to.
- 2) Promote incentives and financial windows for improving internal capacity of millers (e.g. through introducing equipment for grading, kits for testing moisture content).
- 3) Adapt the existing EAC's standards in Rwanda and disseminate the standards of both paddy and milled rice by RSB
- 4) Strengthen the capacity of cooperatives to produce quality rice
- 5) Establish pricing mechanism according to the quality of paddy rice

*Estimated Budget*

USD 650,000

**Output-2:** Market shares of local rice increased at national and regional markets

*Proposed activities*

- 1) Encourage millers to invest in machines that will allow further grading of the three categories of rice (short, long and aromatic)
- 2) Identify varieties that could be labeled and marketed as ‘Rwandan Rice’ (or ‘Produce of Rwanda’ (for example Buryohe)
- 3) Improve preparedness of markets to supply and price shocks of COVID-19

#### *Estimated Budget*

USD 550,000

### **6.4 Enabling Environment**

#### 6.4.1 Improving rice farmers’ organizational efficiency

*Output-1:* Rice stakeholders become well-coordinated and organized

There are so many layers of farmers representatives, and there is need to streamline and consolidate them. Since the more the layers, the more the farmers have to contribute for their operations; the farmers need to be effectively organized and linked with other stakeholders of the rice value chain at cooperative level. In addition, there are many actors along the rice value chain, but there is no national platform through which they can share experiences and exchange information, which could lead to improvement of competitiveness of rice in Rwanda.

#### *Proposed activities*

- 1) Support the rice farmers organizations (cooperatives and unions) in developing their skills
- 2) Establish a rice value chain platform for the rice stakeholders

#### *Estimated budget*

USD 250,000

#### 6.4.2 Improve access to finance by all stakeholders along the rice value chain

The strategy will seek to have an assessment of the production processes, milling, value addition and marketing processes so as to determine the financial needs of the actors in the chain and means of facilitating financial support. Based on the findings, innovative financial products shall be developed and applied or adapted to meet those specific financial needs identified along the chain. Such financial products can be categorized as product financing (e.g input- supplier finance, marketing and wholesale company finance); receivables financing (e.g Trade-receivable finance); physical-asset collateralization (e.g Warehouse

receipts finance); risk mitigation products (e.g crop insurance) and financial enhancements (e.g Loan guarantees).

**Output-1:** Promote affordable finance and insurance products for farmers

*Proposed activities*

- 1) Identify gaps in value chain financing, and recommend affordable financial products that could resolve the needs
- 2) Facilitate linkages amongst farmers, private finance companies/institutions for increasing the access to financial and insurance products.

*Estimated Budget*

USD 250,000

## 7. Combatting rice market crisis due to COVID-19 pandemic and other emerging issues

Global rice markets had in the recent past gone through several adversaries that affected the supply of rice in Rwanda. Through a spin-off effect, such crises often tend to leave a lasting impact on the local rice markets in Rwanda. For instance, during the accelerating phase of rice price crisis in 2008-09; market prices for both the local rice and imported rice increased sharply in line with international prices. However, during the deceleration phase of the crisis, the local market prices did not decline to the pre-crisis levels in Rwanda due to continued and robust demand for consumption, but has instead left trails of higher farm gate price and hindered price-competitiveness of the local rice.<sup>22</sup> Since some of the member countries within EAC exempted or reduced their common external tariff (CET) rates from 75% to various levels for Asian rice, the crisis also contributed to expansion of unscrupulous rice flow within the EAC region.<sup>23</sup> In addition, some of the non-EAC member countries such as Ethiopia imported Asian rice at a lower tariff rate (5%) and were in a position to re-export to EAC member countries such as Kenya and Burundi through bilateral trading modes at a lower tariff rate.

The recent outbreak of Coronavirus disease 2019 (COVID-19) poses serious threats to the network of both local and imported rice production and supply chains. Restricted movement, border closures, lockdown measures such as social distancing imposed across the globe, exacerbated by concerns of food security and other lockdown measures imposed across the globe have not only prompted several Asian rice-exporting countries such as Thailand, Cambodia, India and Myanmar to curtail their exportation volumes but also have set an upward trend for global rice prices. FAO's rice price index has risen 14% above its value last year.<sup>24</sup> Volatility of rice futures prices in international markets have started adding risks and uncertainties to global rice trading in the recent months.<sup>25</sup> Since transmission of price volatility is higher in Africa for rice when the trade volumes are larger than the domestic production (Ceballos et al. 2016), the current spikes in price and volatility in international

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<sup>22</sup> Kathiresan A (2013) Rwanda's rice commodity chain – Facing globalization. Ministry of Agriculture and Animal Resources, Kigali

<sup>23</sup> Ghins L, Pauw K (2018) The impact of markets and policy on incentives for rice production in Rwanda. FAO Agricultural Development Economics Working Paper 18-02

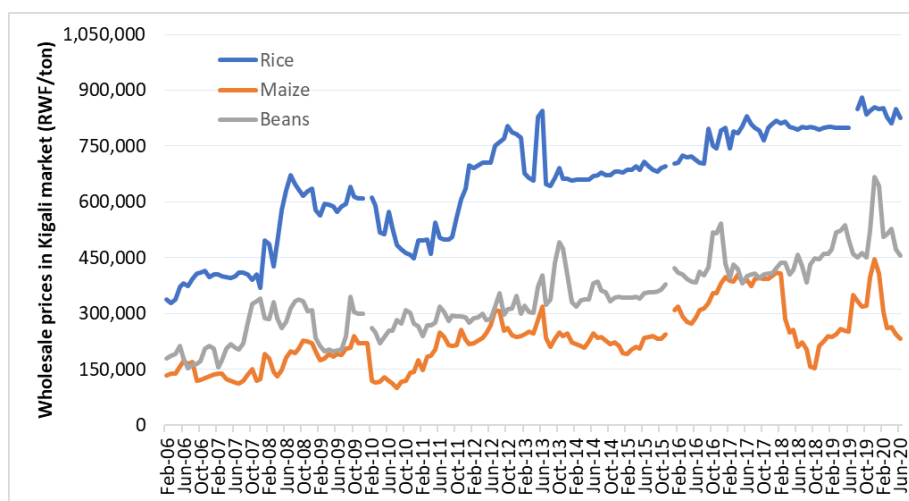
<sup>24</sup> Kathiresan A et al (2020) Policy options for galvanizing Africa's rice sector against impacts of COVID-19. World Development 136: 105126

<sup>25</sup> FAO Rice price update (July 2020)

markets might escalate the vulnerability of Rwanda’s markets and lower food security causing poor people to reduce rice consumption. With a current import dependence ratio of 52.6% and an expected importation requirement of about 100,000 tons of milled rice in 2020, Rwanda is vulnerable to the looming crisis.

Although the impacts of COVID-19 on local rice production and supply are still unfolding, the lockdown measures in Rwanda have not so far directly affected the on-farm rice production. However, the pandemic has hindered rehabilitation measures by communities in marshlands that are affected by flash floods and thus might lower the on-farm productivity levels. Despite some restrictions on transportation, farmers’ access to key inputs such as seeds, fertilizers, water and extension services remain unaffected. However, the restrictions have subdued the institutional demand (schools, public programs and restaurants) for rice consumption. The low turnovers of sales volumes have affected the cash flow amongst rice commodity chain actors, thus threatening offtake of paddy grains and maintenance of machinery operations by millers.

Average wholesale prices<sup>26</sup> of local rice in Kigali markets have shown an increase of 5.9% and 3.1% in the months of May and June in 2020 over the previous year; during which time, the wholesale prices of maize (-4.5% and -7.6% respectively) and beans (-13.5% and -9.9% respectively) showed a decrease (Fig. 5).

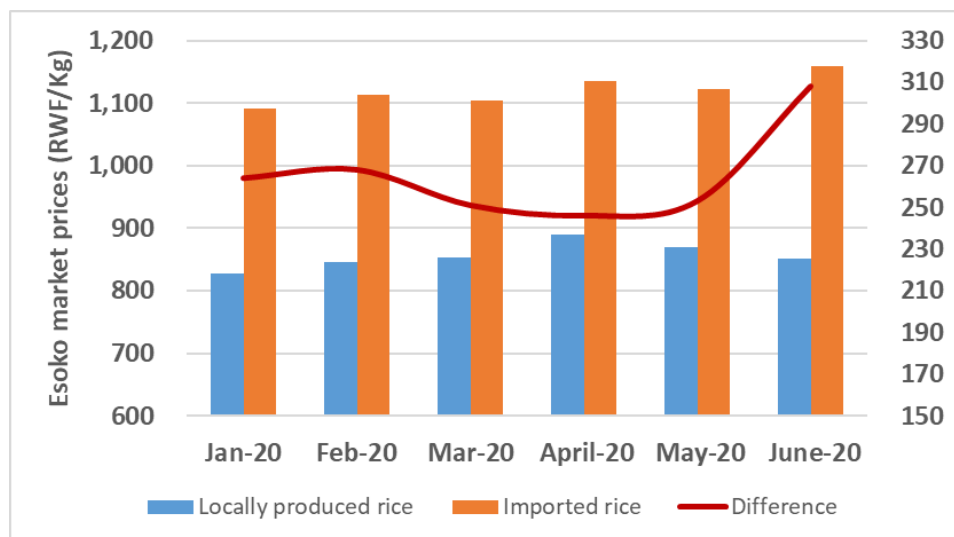


*Fig. 5: Movements of prices of rice, maize and beans in wholesale market in Kigali (RWF/ton) since 2006. Gaps in curve lines indicate non-availability of data.*

Monthly average retail market (eSoko) prices for rice revealed that differential pricing for local and imported rice has become wider since the onset of COVID-19 pandemic (Fig. 6). It is possible that the continued increase in prices of imported rice through the pandemic period

<sup>26</sup> Data Source: FAO (fpma.apps.fao.org) accessed on 27-July-20

is due to reduced supplies of imported rice in the market. Recent trends indicate that exportation volumes have reduced by about 38% over the previous year due to lockdown measures in countries such as Thailand and Vietnam.<sup>27</sup>



*Fig. 6: Changes in average monthly eSoko prices for local and imported rice between January and June 2020.*

Besides the COVID-19 pandemic, other regional/global emergencies in the future might also affect the external rice supply chain and regional rice trading, and thereby put the national markets and the food security under pressure. It is however conceivable that such crises nevertheless could also open up new opportunities for the Rwanda rice to expand its local market share and improve the self-reliance. Hence, NRDS-II shall deem acceleration of efforts on import substitution by improving the market resilience as a guiding principle during such crisis times. This chapter provides such guidance on rice sector development in the emerging crises contexts, COVID-19 in particular, while detailed approaches and concrete interventions will be further elaborated, separately from the NRDS-II document, as the nature of COVID-19 and its impacts are unveiled in the future. One of the key lessons learnt from the food price crisis include the need for coherent calibration of national and regional rice-related trade policies that will tweak the supply of imported rice in a manner that will reinforce growth in the local rice industry. Hence the specific objectives of interventions during the COVID-19 & other similar crises shall include:

- (i) Strengthening of the resilience of production systems;
- (ii) Expansion of the market share of locally produced rice during external supply crisis;

<sup>27</sup> United States Department of Agriculture Global Agriculture Information Network (2020) Rice price – Weekly Report No: TH2020-0073

(iii) Evolving evidence-based policy responses that will ensure adequate rice supply (domestic and imported as appropriate) and safeguard markets from unsustainable volatility in prices.

Table 2: Possible actions that may help attain the above-mentioned objectives are listed in the table below under each of the four strategic pillars of PSTA 4

Pillar-1: Innovation & Extension	Pillar-2: Productivity & Resilience	Pillar-3: Inclusive markets & Value Addition	Pillar-4: Enabling environment & Responsible Institutions
<ul style="list-style-type: none"> <li>- “Enhanced” mechanization services during crisis period – to ease labor constraints;</li> <li>- Use of Drones for application of fertilizers and pesticides</li> <li>- Enhanced extension services through digital modes (e-extension)</li> </ul>	<ul style="list-style-type: none"> <li>- Exemption of restrictions on cultivation, movement of farm inputs, marketing</li> <li>- Establish contingency seed reserve/store for seeds &amp; fertilizers</li> <li>- Emergency rehabilitation, operational and maintenance measures during periods of crisis (climatic, pandemic)</li> <li>- Temporary provision of subsidies on productivity enhancing farm inputs (seeds, fertilizers)</li> <li>- Strengthening the storage capacity along the value chain</li> </ul>	<ul style="list-style-type: none"> <li>- Facilitation of finance and linkages for value chain actors during the crisis period</li> <li>- Deployment of remote sensing for early detection of calamities</li> <li>- Increase competitiveness of local rice by for example, incentivizing the supply of local rice (reduction in VAT and other taxes)</li> <li>- Establish strategic reserve for rice and release stocks to compromise shortage in external supply of rice and buffer sharp price increments;</li> <li>- Expand affordable crop insurance on rice</li> </ul>	<ul style="list-style-type: none"> <li>- Establish monitoring mechanisms for assessing supply/flow (volumes, prices and effective demand) of domestic and imported rice in local markets during crisis period</li> <li>- Enable local communities to respond to emergencies through contingency plans</li> <li>- Waive/postpone interest payment on loans</li> <li>- Reduce tariffs on rice imports with conditions on volumes and quality</li> </ul>



## **8. Governance of NRDS-II**

NRDS-II aims at providing adequate institutional framework to mobilize sufficient resources to achieve its objectives. At present, various stakeholders actively involved in rice production are not well coordinated. NRDS-II shall harness stakeholders together through a National Rice Stakeholders Forum (NRSF) for more interaction and collaboration to enhance implementation of NRDS-II.

The implementation of NRDS-II will be facilitated by the task force and coordinated by MINAGRI through the Department of crops and agriculture development, which is headed by the Director General. To enhance the proper functioning of NRDS-II, there is a need to have an organizational structure headed by the Director General of Agriculture Development of MINAGRI.

### **8.1 Task Force**

The NRDS taskforce members (present and future) will facilitate the implementation of NRDS recommendations by;

- Providing technical and administration guidance
- Resource mobilization for the implementation of NRDS-II by developing project concept notes and lobbying for funds from government, development partners and other public and private stakeholders
- Provide technical back stopping and feedback
- Undertake monitoring and evaluation of NRDS-II activities

### **8.2 National Rice Stakeholders' Forum (NRSF)**

A national rice stakeholders' forum will be established. The forum will be instrumental in priority setting and implementation of interventions identified in NRDS-II. The stakeholders' forum will be composed of:

- MINAGRI (to provide and house Secretariat)
- RAB
- Private sector Organizations dealing with rice
- Relevant sector ministries like Local Government, Trade
- Farmer organizations (Representatives of farmers cooperatives)
- Regulatory bodies (RSB)

- Rice millers
- Agro-dealers
- Rice traders
- NGOs and CBOs
- Credit providers (Banks and MFIs)

### **8.3 Terms of reference for the National Rice Stakeholders' Forum**

- Periodical review the rice sector within the framework of Government policies.
- Set and periodically review extension, research and capacity building agenda.
- Prioritize programs and activities under NRDS-II.
- Monitor and evaluate implementation of NRDS-II.
- Assess and respond to any emerging challenges in production and marketing of rice in Rwanda

## 9.NRDS Budget

<b>NO.</b>	<b>STRATEGIC OBJECTIVES FOR THE SECTOR</b>	<b>ESTIMATED BUDGET in USD</b>
1	Develop technologies that will increase yields, reduce the costs of production and add value of Rwanda rice	3,322,500
2	To Improve adoption of good agricultural practices and innovations by farmers and other beneficiaries along the rice value chain.	15,000,000
3	To expand area under rice cultivation in marshlands through reclamation	184,500,000
4	Enhance the supply and usage of quality seeds of improved rice varieties	900,000
5	Enhance the supply and usage of recommended fertilizers	420,000
6	To minimize yield loss due to pests and diseases	450,000
7	To Improve climate resilience and equitability of water distribution	40,000,000
8	To strengthen the organizational capacities of WUA on operations, management and maintenance of irrigation infrastructures in rice growing marshlands.	475,000
9	Improve capacities of farmers and their cooperatives on water management	375,000
10	To Improve efficiency in land use	2,150,000
11	To Improve access and availability of farm machinery	14,205,000
12	To Strengthen postharvest handling of rice to minimize losses and enhance quality and safety of rice grain	615,000
13	Improve the competitiveness of Rwanda rice in national and regional markets	1,200,000
14	NRDS task force and stakeholders' forum activities	250,000
15	Improve access to finance by all stakeholders along the rice value chain	250,000
	<b>TOTAL</b>	<b><u>264,112,500</u></b>