LIBERIA NATIONAL RICE DEVELOPMENT STRATEGY II

2018 - 2030

MINISTRY OF AGRICULTURE

REPUBLIC OF LIBERIA

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Abbreviations and Acronyms

CAADP	Comprehensive Africa Agriculture Development Program
CARD	Coalition of Africa Rice Development
CARI	Central Agriculture Research Institute
CBC	Credit Bureau of Cambodia
CBL	Central Bank of Liberia
CDA	Cooperative Development Agency
CET	Common External Tariff
DP	Development Partners
ECOWAS	Economic Community of West African States
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GOL	Government of Liberia
HA	Hectare
HG	Hectogram
KG	Kilogram
LACRA	Liberian Agricultural Commodity Regulatory Authority
LASIP	Liberia Agriculture Sector Investment Plan
LEC	Liberia Electricity Corporation
LIBA	Liberian Business Association
LISGIS	Liberia Institute of Statistics and Geo Information Services
LNSC	Liberian National Seed Council
LRA	Liberian Revenue Authority
LRC	Law Reform Commission
M&E	Monitoring and Evaluation
MACs	Ministries, Agencies and Commissions
MFDP	Ministry of Finance and Development Planning
MIA	Ministry of Internal Affairs
MOA	Ministry of Agriculture
MOCI	Ministry of Commerce and Industry
MOJ	Ministry of Justice

MPW	Ministry of Public Works
MT	Metric Ton
NAOP	National Annual Operational Plan
NQP	National Quality Policy
NRDS	Liberia National Rice Development Strategy
PAPD	Pro-poor Agenda for Prosperity and Development
PMU	Project Management Unit
PPPs	Public Private Partnerships
SDCA	Seed Development and Certification Agency
USAID	United States Agency for International Development

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Executive Summary

Rice is Liberia's staple, eaten several times a day and produced by 69% of all farmers. The crop is of political and social priority and importance, providing livelihoods, an essential food source, and revenue for the country and its population. The government of Liberia, in the most recent past as well as in the current administration, have placed their focus on increasing domestic rice production through the formulation of the National Rice Development Strategy I (NRDS I, 2012 – 2018) and now through its revised version, the NRDS II (2018 – 2030). The NRDS II design is based on the lessons learned from the NRDS I and aligned with the Liberian Agriculture Sector Investment Plan II (LASIP II, 2018 – 2022) and the Pro-Poor Agenda for Prosperity and Development (PAPD, 2018 – 2023).

Liberia's rice value chain is fragmented, and most cultivated rice is used for subsistence purposes. Rice producers and rice millers face major disincentives to increasing investment and production, notably due to high transportation costs that make it hard for them to compete with imported rice. Liberia's rice production has increased only slightly from 296,090 MT to 309,144 MT in 2010 – 2016, with average yields increasing from 1.2 to 1.3 in the same time period (FAOSTAT 2019). However, due to a strong increase in demand, imports more than doubled from 161,535 MT to 398,199 in 2010 – 2017 (Ministry of Commerce and Industry (MOCI)). Given the 2.59% population growth and rising urbanization, the demand for rice is expected to grow further.

Between 50 to 70% of the rice consumed is imported, and the rice import bill rose to 218 million USD in 2016 (MOCI 2016). Rice importation is characterized by oligopolistic behavior as only four importers control around 95% of all rice imports (World Bank 2019). Following changes in trade regulations since 2011, India has replaced China as the main exporter of rice to Liberia.

In 2016, 312,314 farming households were engaged into rice production, cultivating an average area of 0.85 HA with an average yield of 1.26 MT/HA (LISGIS 2018). The main rice producing counties are Lofa, Nimba and Bong, followed by Margibi, Grand Gedeh and Grand Bassa. The grain is produced under slash and burn shifting cultivation systems mostly in the uplands and in some areas in the lowlands. Most of the rice is processed at the household level using simple technology, however, three major commercial rice processors are equipped with high-capacity mills. As rice is mainly a subsistence crop, only 7 to 21% of the domestically produced rice is sold on the market (World Bank 2019).

Women play an important role in rice production. Overall, more than 50% of the labor force in the agricultural sector are women and 79% of the national land area cultivated per household is cultivated by female-headed households (LISGIS 2018a). Rice is among the traditional crops cultivated by women; however, on average female-headed households are less productive than male-headed households of the same land size, years of schooling achieved by the head of household, and other control factors (LISGIS 2018a:28f). This could indicate that female farmers are at a disadvantage in accessing farming inputs or, for example, that the quality of land owned by female farmers is poorer, although the multiple responsibilities of women as care-givers and overseers of the domestic household may also be a factor NRDS II puts strong emphasis on increasing productivity of female farmers.

Equally important is the inclusion of Liberia's youth for a thriving agricultural sector as emphasized by continental and international bodies (Ibrahim Forum 2019, FAO 2014). More than 70% of Liberians are below the age of 35 (World Bank 2018b), providing a potentially strong labor force. However, agriculture is not viewed as an attractive source of employment given the labor demands of farmers coupled with the perceptions for limited profitability and income generation within the sector. Moreover, limited educational opportunities leading to heightened literacy challenges and restricted access to markets and networks impede the engagement of the youth in the agriculture sector. NRDS II is a youth inclusive strategy, aimed at securing the next generation of rice farmers with heightened opportunities for profitability and reliable revenue streams.

Through increased domestic rice production and processing, Liberia will benefit from expanded employment opportunities in upstream and downstream economic activities and increased incomes of rice farmers and actors along the value chain. Moreover, improved rice productivity supports food security and affordable rice enhances peace and political stability for the country. Importantly, increased domestic rice production translates into a decreased rice import bill, saving foreign exchange and reducing the trade deficit.

Liberia has a suitable natural environment for rice production and a large domestic market. Moreover, rice is of political and social importance due to the country's reliance on this staple. However, the sector faces various challenges: inadequate infrastructure, limited human and technical capacity, weak land rights and agriculture extension systems, inadequate inputs and processing systems, limited access to finance, lack of capacity for research and evidence-based analysis, a small private sector, minimal government support, ineffective donor and NGO coordination, and inadequate monitoring and evaluation (M&E) systems. The NRDS II addresses all these weaknesses and builds on the following opportunities: increasing demand for rice, access to land and water for cultivation and irrigation, a large young population, dedicated female farmers, the population's preference for domestic rice, development partners' willingness to support the rice subsector, and business opportunities from rice byproducts.

The NRDS I framework was not fully implemented. Consequently, NRDS II focuses on an improved implementation structure including clearly defined leadership roles, increased awareness on the existence and importance of NRDS II, and the need for the private sector to play a vital role in the implementation process.

Based on these lessons learned, the NRDS II has the following vision and goal:

> The vision of NRDS II is of a country self-sufficient in the production of rice, with rice farmers and a multiplicity of rice sector businesses working together to produce a vibrant and competitive rice sector -a rice sector which provides a fair balance of benefits for rice farmers, rice businesses and their employees, and rice consumers - a rice sector that supports economic growth, employment, food security and gender equity.
>
> The goal of NRDS II is achievement of a stable and functioning rice sector that is capable of increasing rice production to MT1.3million by 2030 through expansion of rice farming and robust engagement of private sector.

Main targets of NRDS II include the increase of total paddy production to 1,343,553.2 MT, the total area cultivated expanded to 424,503.87 HA with a targeted national average yield of 3.1 MT/HA. In 2030, 873,309.58 MT of rice are expected to be milled domestically.

The NRDS II aims to transform Liberia's rice subsector through a sustainable rice value chain approach via four strategic components:

- Strategic component 1: Private sector development
- Strategic component 2: Research, technology adoption and capacity building
- Strategic component 3: Seed system development
- Strategic component 4: Transportation and quality assurance
- Strategic component 5: Policy, institutional framework, and coordination mechanisms

Component 1 aims at attracting investment by creating the enabling environment for business development and improving access to finance for rice farmers and processors. Component 2 aims at improving local research on rice seed varieties as well as soil health and fertility; eradicating the high incidence of pests and diseases; disseminating agricultural mechanization and water control technology; and expanding outreach for information on soil health, pests and diseases. Moreover, it intends to improve both Liberia's extension and producer organization systems. Component 3 aims at improving the rice seed production, supply and marketing system; as well as at a functional varietal release mechanism, effective rice seed inspection, increasing capacity of seed specialists and breeders and a more active private sector in seed production. Component 4 aims at an increasing accessibility of post-harvest technologies, appropriate infrastructure (storage and warehouses, rural roads and rural electrification), an active private and public sector engaged in and supporting post-harvest activities, and a functional quality assurance and grading of rice to be introduced. Finally, component 5 aims at improving the policy, institutional and coordination framework for the rice sector.

The NRDS II will be implemented through the following structure: the high-level National Rice Platform led by the Minister of Agriculture and including the Minister of Commerce and Industry, the Minister of Finance and Development Planning, and representatives from the Ministry of State. The Liberian Agricultural Commodity Regulatory Authority and the Cooperative Development Agency have the shared responsibility to regulate rice production and imports. A Steering Committee reports to them and is comprised of representatives from the Ministries of Agriculture (MOA), Finance and Development Planning, Commerce and Industry, Public Works, the Central Agricultural Research Institute, the Environmental Protection Agency, the National Rice Federation, and the Farmers Union Network. Key roles in this Steering Committee include the Rice Desk Officer and Director of Policy of MOA to oversee the implementation of the NRDS II aligned with inputs from the Agriculture Coordination Committee and the Agriculture Donor Working Group.

The NRDS II will be financed through public resources, development partners' contributions and Public Private Partnerships (PPPs). Given the Government of Liberia's (GOL) limited fiscal space, public resources are likely to be the smallest portion of the financial contributions. Consequently, the GOL and especially the MOA are obliged to harmonize, monitor and evaluate development partners' and private sector interventions into the rice subsector. Through the use of public-private partnerships (PPPs), the GOL is responsible to ensure that Liberian rice farmers, processors and consumers benefit from these endeavors.

The implementation of NRDS II will be effectively monitored and evaluated through the Steering Committee, led by MOA's Policy Director and the Rice Desk Officer. Together they will define a National Annual Operational Plan. Prior to effective implementation, a baseline study needs to be conducted to fill existing data gaps and ensure effective monitoring. Progress reports will be formulated on a biannual and annual basis, a mid-term review will take place in 2025 and an impact assessment needs to be conducted post implementation. The M&E guiding principles include bottom up subsidiarity and complementarity; completeness; collaboration and partnership; participation and inclusiveness; flexibility; timeliness and harmonization and consistency. The results framework includes impact indicators for the overall goal and outcomes of respective subcomponents to be tracked on a regular and continuous basis.

1. Introduction

Liberia's agricultural sector is a key pillar for the country's socio-economic development and food and nutrition security. It employs around 80% of the population and contributes around 26% to Liberia's Gross Domestic Product (GDP) (Liberia Institute of Statistics and Geo Information Services (LISGIS) 2018). Developing the agriculture sector and its major value chains (rice, cassava, horticulture, cocoa, oil palm, rubber and livestock) has a tremendous potential to decrease poverty, create employment, increase revenue as well as improve national food security and nutrition and rural livelihoods. Therefore, the Government of Liberia (GOL) is reinforcing its role to support the development of the sector by giving it special emphasis in the Pro-Poor Agenda for Prosperity and Development (PAPD) under the pillar II 'Economy and Jobs', and through the formulation of Liberia's second Agricultural Sector Investment Plan (LASIP II).

Rice is Liberia's staple food. Liberians consume over 110kg of rice per person per year (United States Agency for International Development (USAID) in World Bank 2017) which translates into the fact that they spend on average 20% of their income on rice (World Bank 2019a). Rice is produced by 69% of all farmers (LISGIS 2018b). However, especially after the destruction of infrastructure and institutions during the 14-year civil war, domestic rice production has not been able to keep up with national demand, leading to a constantly increasing rice import bill. Currently, around 309,144 MT of rice are annually produced (FAOSTAT 2019), while 364,000 MT (as calculated by task force) have to be imported every year to meet national demand. The import bill rose from 76.8 million USD in 2010 to 217.5 million USD in 2017 (Ministry of Commerce and Industry (MOCI) 2017). As only 2.7 million hectares (HA) out of a total land area of 9.6 million HA is temporary or permanently cultivated and average yields of 1.26 Metric Ton (MT)/HA compared to the regional average of 2.5 MT/HA are harvested, production can be increased by both extensification and intensification (FAOSTAT 2019).

Globally, the FAO (2018) estimates that, 759.6 million MT of paddy rice were produced in 2017 while forecasts expected a slight rise to 769.9 million MT in 2018 due to cultivated land expansion. Main increases are expected to take place in India (major exporter of rice to Liberia), but also production in West Africa is expected to rise. Trade in rice was expected to decrease by 1% in 2018 relatively to the year before and stand at 47.6 million MT. Given increasing rice prices and sufficient storage, rice imports the West African region are expected to decline in this year. Both, low- and high-quality global rice prices are anticipated to increase this year by 16.8% on average.

Given increasing rice prices, population growth and the political, social and economic importance of rice in Liberia, both the PAPD and LASIP II emphasize the importance of increasing domestic production. Like the whole agriculture sector, the rice sector faces a number of challenges: restricted access to and availability of inputs (land, appropriate seeds, fertilizer, and mechanized equipment); restricted access to finance; poor infrastructure and irrigation systems; a weak extension system; limited human and technical capacity and research as well as limited government finance to support the subsector.

Like the PAPD and LASIP II, the second generation of the National Rice Development Strategy (NRDS II) for the period of 2019 – 2030 aims to address these challenges, however more detailed and focused on rice only. Besides (1) improving the overall policy, institutional framework and

coordination mechanisms for rice development, the focus of NRDS II lies on (2) research, technology dissemination and capacity building; (3) the development and management of rice production infrastructure and resources; (4) seed system development and (5) post-harvest and rice marketing. Across these components, youth and gender dimensions are incorporated.

Building on the foundations and lessons learnt of the first generation NRDS (2010 – 2018), its second generation will more actively push for the realization of decided strategic interventions and outcomes to achieve its goal of self-sufficiency in rice production until 2030.

2. Review of the National Rice Sector

2.1 Current status of rice production

The three major rice counties in terms of production and number of farming households are Lofa, Nimba and Bong, followed by Margibi, Grand Gedeh and Grand Bassa (see Table 1). The Household Income Expenditure Survey (HIES) 2016 (LISGIS 2018a) reports that the average national rice yield is 1.26MT/HA. The average area cultivated by household ranges between 0.8 HA (based on the Comprehensive Food Security and Nutrition Survey (CFSNS) 2018, LISGIS 2018b) and 0.85 HA (based on the HIES 2016, LISGIS 2018a). As table 1[1] shows, total domestic production has been slightly volatile but increasing from 296,090 MT to 309,144 MT over the period 2010 – 2016 (FAOSTAT 2019). Moreover, from the limited data available, only a small portion of domestically produced rice is milled.

County	Number of farming households	Average area per household (Ha)	Average yield/hectare (MT)	Average yield/household (MT)	Total Production (MT)
Bomi	12 498	0.85	1.26	1.07	13 413
Bong	53 885	0.85	1.26	1.07	57 830
Grand Bassa	22 294	0.85	1.26	1.07	23 926
Grand Cape Mount	23 444	0.85	1.26	1.07	25 160
Grand Gedeh	8 956	0.85	1.26	1.07	9 612
Grand Kru	7 725	0.85	1.26	1.07	8 291
Lofa	38 883	0.85	1.26	1.07	41 730
Margibi	15 668	0.85	1.26	1.07	16 815
Maryland	5 677	0.85	1.26	1.07	6 093
Montserrado	17 061	0.85	1.26	1.07	18 310
Nimba	74 658	0.85	1.26	1.07	80 124
Rivercess	8 491	0.85	1.26	1.07	9 113
Sinoe	9 874	0.85	1.26	1.07	10 597
River Gee	5 741	0.85	1.26	1.07	6 161
Gbarpolu	7 459	0.85	1.26	1.07	8 005
Total	**312 314**				**335 179**

Table 1: Domestic rice production data by county

Domestically produced rice is usually referred to as "country rice", which is largely broken, mixed, poorly milled and becomes sticky when cooked (MOA 2012). The domestic rice is usually consumed

[1] Source: LISGIS (2017)

by the smallholder farming families and only a single digit percentage of their harvested rice is sold on the market. However, demand for domestic rice is increasing, e.g., for specific varieties like red rice, especially in the urban areas. The main differences between imported and domestically produced rice relates to the milling quality including breakage and cleanliness (World Bank 2019).

Most rice produced is for subsistence purposes. The rice is consumed by the household or village after being manually pounded. Only around 7-21% of the locally produced rice is sold on the market (World Bank 2019).

Table 2 below summarizes Liberian rice production at the national level between 2010 and 2016.

	2010	2011	2012	2013	2014	2015	2016
Area harvested (HA)*	251 230	241 477	226 411	209 438	182 468	218 305	233 788
Yield (MT/HA)*	1,2	1,2	1,3	1,3	1,3	1,3	1,3
Production (MT)*	296 090	289 603	291 000	270 000	237 000	286 000	309 144
Milled rice (MT)*	1 000	1 000	2 000	2 000	N/A	N/A	N/A

Table 2: Rice Production in Liberia, 2010 – 2016

2.2 Demand and consumption

Rice is Liberia's main staple and is consumed for breakfast, lunch and dinner in most Liberian households. Consumer preferences depend on cost and quality as well as cooking characteristics of the rice on the market. Consumer preferences shift and are influenced by the availability and characteristics of imported rice and its price (World Bank 2019). On the market, three main grades of imported rice are available: 100% broken, 20-25% broken and 5% broken (ibid). Until 2011, the majority of imported rice originated from China and was called "butter rice", which was a non-parboiled 20 to 25% broken, medium to bold grain type which was relatively cheap, starchy, non-sticky and swelled when cooked (MOA 2012). This type of rice catered to the average consumer. With changing trade patterns in 2011, Chinese imports were replaced by Indian parboiled rice, which also catered to higher income households with a preference for long grain and fragrant rice from Asia or the USA (World Bank 2019).

As shown in Table 3 below, local production is significantly lower than production. This means that demand is satisfied in part from imports (discussed in the next sub-section). Food assistance also meets some portion of local demand.

	2010	2011	2012	2013	2014	2015	2016	2017
Production (MT)	296 090	289 603	291 000	270 000	237 000	286 000	309 144	N/A
Milled rice (MT)	1 000	1 000	2 000	2 000	N/A	N/A	N/A	N/A
Consumption (MT)	457 625	581 511	493 514	650 786	360 302	546 083	482 615	N/A
Food assistance (USD, in million)	N/A	N/A	N/A	N/A	N/A	N/A	67	173

Table 3: Rice production and consumption in Liberia, 2010 – 2017

The annual demand for milled rice in Liberia is of the order of 460,000 tons equivalent to 740,000 tons of paddy. Domestic production of paddy is of the order of 260,000 tons annually, of which almost 90% is consumed either on-farm or in the immediate vicinity of production, leaving a balance of 480,000 MT of paddy rice, which is met through the importation of approximately 300,000 tons of milled rice from various sources, most recently from India.

Demand for rice shows limited elasticity and some segmentation. In rural areas, consumption is relatively constant across all income quintiles except the lowest, where it declines somewhat. In urban areas, demand tends to decrease at higher income levels where some preference for longer grain and more fragrant rice (typical of the locally produced product) has also been reported. The wholesale price of rice throughout much of Liberia is dependent upon the import parity price, moderated by considerations of quality, transport cost and the other costs of aggregation and processing. Despite limitations in physical infrastructure, the wholesale rice market is generally integrated (Tsiboe, F et. al 2016). The price of rice is lowest at the Red Light market in Monrovia and increases with distance from that point of importation. Some markets close to national borders are affected by informal imports and exports and do not follow this trend. Nevertheless, overall the cost of transport is the main factor contributing to the significant difference between wholesale prices in remote rural areas and those in Monrovia.

2.3 Value chain structure

The rice market comprises two value chains. One is based upon the importation of imported rice of standard quality from the most cost-effective global markets and the other upon the domestic production of local varieties that have the potential to be of superior quality, but for which standards are currently poorly enforced. The larger volume of imported rice, available throughout the year means that this value chain dominates market behaviors throughout most of the country. Although the volume of locally produced rice is substantial, the proportion that actually reaches commercial markets is small so that its influence on markets is limited.

The value chain for imported rice is relatively simple. Milled rice is imported on a duty and tax free basis by commercial entities who are allotted annual import quotas by the Government, subject to a condition to maintain a quota of 25% of the imported volume in storage as a *de facto* food reserve. This condition has been used to justify the allotment of quota to a very small number of businesses which might be able to maintain such reserves. The risk of oligopoly development is obvious and countered by an agreement with importers to limit the markup charged to third party sellers. Imported rice is sold through a network of wholesalers and retailers, most of whom are restricted to small margins by price sensitive consumers. That network reaches into the rural areas where many households that produce rice themselves are often obliged to augment their own production with imported rice.

In contrast, the value chain for locally produced rice is more complex. As a key staple, par-boiled rice is produced by a broad cross section of smallholders, but relatively few produce enough to generate a commercial surplus of the size that would merit aggregation. Almost all smallholders do consistently sell rice, but the majority do so in small volumes on a frequent basis so as to raise the

cash necessary to make other purchases or service debts. The majority of the rice sold in this way is circulated back into the immediate locality and does not impact the broader market at all. Larger producers are few in number but are more likely to generate a larger commercial surplus that cannot be as easily absorbed through local consumption. This rice is ultimately purchased by mills, either directly, or via a network of aggregators and traders. After processing, it may either be sold locally or may enter the wider wholesale market. Local sales allow domestically produced rice to compete with imported rice and to benefit from the cost of transport that has increased the price of the imported rice in the rural markets. In the broader wholesale market, however, the same costs work against the domestic product, which must incur increasing transport costs itself, while facing stiffer competition from imported rice which has originated close to the urban center where demand is greatest. The result is that locally produced rice is largely excluded from the urban markets where demand is consistent and strong and is instead restricted to the more local rural markets where its price remains low enough to be afforded by those who have not produced enough rice themselves.

Two key costs dominate the value chain for locally produced rice. The first is the cost of transport which restricts the market for domestic production to the rural areas where the price of imported rice is highest. The second is the cost to millers of aggregating the multiplicity of small volumes available for purchase. This cost includes not only transport again, but also the margins of intermediaries; of sorting, cleaning, bagging and weighing; and of the time and effort required to identify potential supplies. The aggregation cost represents the difference between the price paid by millers for clean grain delivered to the mill and the price paid to farmers at the farm gate, which can be substantial. A recent survey of millers and growers suggested that while millers may pay an into-mill price of US$220-300 per ton, the price paid at the farm gate may be as low as US$130 per ton. Thus, while the cost of bringing imported rice from Monrovia to a remote market in Buchanan may be of the order of $50/ton, the cost of bringing locally produced rice to the same market may be more than twice that amount.

Table 4 demonstrates the extent of the price differences reported among various markets (Tsiboe et al. ibid). The increase in price from Red-Light market where prices were largely determined on an import parity basis, to markets in the primary production areas of Bong (served by Gbarnga), Lofa (served by Voinjama), Grand Bassa (Buchanan) and Grand Gedeh (Zwedru) is quite evident. Only Saclepea in Nimba did not follow this trend and their markets were reported to have been influenced by the UNHCR refugee camps and associated food aid.

Market Series	**Local price (US$/ton)**	**Difference at Red-Light (US$/ton)**
Buchanan	624	+50
Gbarnga	607	+33
Pleebo[1]	690	+116
Red-Light	574	0
Saclepea[2]	582	+8
Tubmanburg	589	+15
Voinjama	664	+90
Zwedru	702	+128

Table 4: Farmgate – Market price differentials

That same difference between Red-Light and remote market prices for imported rice is added to the cost of any domestic rice produced in the remote areas that might be transported to the central urban markets where demand is greatest. As a result, the price of the domestic product is not competitive with that of imported rice so that neither millers nor growers are able to compete in markets beyond the production areas.

For these reasons, the value chain for locally produced rice is highly localized and restricted in its commercial extent. The majority of farmers who produce rice do so primarily to feed their families rather than for commercial purposes. A small number of larger producers are able to supply specific markets on a regular basis; but for the majority, access to markets large enough to justify investment in commercial production is severely limited. Surplus production above that required for subsistence is inconsistent in volume and is frequently sold or bartered locally before it ever reaches a commercial market. As a result, investment in commercial mills designed to produce and sell polished rice (as opposed to operating on a toll milling basis) is fraught with risk and severely limited.

The structure of the milling sector reflects the nature of the domestic value chain for rice. The high costs of transport restrict the market available to millers, whose investment has been limited to mills that can produce small volumes of rice that can be absorbed by their local markets. Indeed, a recent AfricaRice survey suggested that a substantial proportion of locally produced rice is milled on-farm for home consumption using the traditional technology of pounding in a mortar (World News (2018)). A further large proportion is milled by small mills of 1-2.5 ton/day capacity. These are often owned by larger farmers and/or cooperatives who mill their own rice and also provide a service to others (i.e., toll milling). They may also be owned by independent millers. Some of these small mills sell a proportion of the rice that they mill, and this represents the majority of the locally produced rice that finds its way onto the domestic market. Only three large capacity mills are operating in Liberia with a total capacity of 4 tons per hour (Soulier, G. et al 2020). Thus, the milling sector is dominated by small-scale production.

The process of milling is often preceded by par-boiling, which is also practiced by a substantial (but again unknown) proportion of producers. The process, undertaken almost exclusively by the women of each household, involves the steaming and drying of paddy rice. The process allows some of the nutrients in the husk to be absorbed by the grain itself and improves the nutritional value, cookability, preserving quality and ease of milling of the grain. Parboiled rice can be differentiated from rice that has not been parboiled by the yellow/brown color that it has absorbed from the husk and is widely preferred in the market, but there is little information available regarding any differences in price at either the farm-gate or retail level.

Where mills do operate to sell polished grain, paddy is reported to be purchased at US$ 220-300/ton, while the price of milled rice was reported to be approximately US$440-528 per ton (US$22-25 per 50 kg bag). Assuming an average milling outturn of 63%, the cost of the paddy required to produce each ton of milled rice would be US$350-475/ton. The cost of milling is inflated by the high cost of power, low capacity utilization and the poor quality of grain, which sometimes requires multiple

passes to be processed to a commercial standard. Milling costs are thus variable but are estimated to be in the order of US$100 per ton of rice produced, so that total costs for millers would be US$450-575/ton of milled rice. Clearly, there is no guarantee of profitability attached to milling and it is not surprising that the LEPDA survey reported that while many areas had been serviced by a number of mills in the past, only a minority of mills were currently in operation.

As shown in Table 5 below[2], the medium-term trend is that 35-59% of local demand is satisfied through imports.

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Production (MT)*	296 090	289 603	291 000	270 000	237 000	286 000	309 144	N/A
Milled rice (MT)*	1 000	1 000	2 000	2 000	N/A	N/A	N/A	N/A
Consumption (MT) ◦	457 625	581 511	493 514	650 786	360 302	546 083	482 615	N/A
Imports (MT)¤	161 535	291 908	202 514	380 786	123 302	260 083	173 471	398 199
Imports as % of consumption	35.3%	48.5%	41.0%	58.5%	34.2%	47.6%	35.9%	N/A
Imports (USD, in million)¤	77	164	119	191	63	161	93	218
Food assistance (USD, in million)ˣ	N/A	N/A	N/A	N/A	N/A	N/A	67	173

Table 5: Rice Imports, Production and Consumption in Liberia, 2010 – 2018

Even if the production and import data shown above should be rather treated as estimates, the fact is that rice imports have been consistently increasing over the last decade. Around 50 to 70% of the rice consumed is imported (MOCI 2016). From 2003 to 2009, China was the major exporter of rice to Liberia, while this role has been taken over by India since 2012 (UN Trade in World Bank 2017). The World Bank (2017) argues that based on the fact that "the markup between FOB and wholesale prices of parboiled rice from India has been close to 220% since early 2016" (p. 80) and China's and India's history of controlling exports, the share of imports is likely to rise if no counter actions are taken. Due to population growth of 2.59 percent (Worldometer 2019) and rising urbanization, the consumption of rice has been increasing and is expected to increase further.

Rice imports are regulated by MOCI. Theoretically, Liberia has an import tax on rice at 0.044$/kg, which translates into US$2.2 per 50kg bag, a tariff ad valorem equivalent value of 9.1% (MOCI 2014). In the interests of consumers, this import tax has been waived since 2008 by presidential executive orders. With the introduction of the ECOWAS CET in 2016, Liberia is supposed to implement tariffs on rice imports of 10% after the five-year adjustment period, which would mean welfare losses for consumers (USAID 2015b). MOCI issues import licenses, judged on a case-by-case basis, while assessment criteria for selection are not available to the public (MOCI 2016). Three

[2] Source: * = FAOSTAT 2019; ◦ = consumption calculated as the sum of production and imports; ¤ = MOCI, auto reports from the four major rice importers; Liberian Revenue Authority (LRA), CIF data

major rice importers (SWAT, UCI and K&K) account for 91% of rice imported (idem). MOCI has been limiting wholesale margins of one US dollar per 50 KG rice bag since 2008 (USAID 2015a). The price distorting activity of MOCI selling rice donated by the Government of Japan to the four licensed importers and MOA using this revenue to purchase domestic rice at above market prices (US$20 per 50 kg bag in 2015) since 2008 ceased in 2017 (Food Fortification Initiative & Global Alliance for Improved Nutrition (GAIN) 2016; MOCI .).

The business of rice importation is characterized by oligopolist behavior with four importers controlling around 95% of all rice imports (World Bank 2019). Table 6 provides estimates of the market shares of major importers[3], showing a highly concentrated industry:

Company	**Market share (%)**
Supplying West Africa Trader Inc. (SWAT)	31
United Commodities Inc. (UCI)	31
Fouta Corporation	20
K&K Trading Corporation	12
Small importers (7-8)	6

Table 6: Liberia's main rice importers

2.4 Policy framework for the rice sector

Liberia's economic and human development is strongly based on the agriculture sector, providing the population with livelihood opportunities, food security, and revenue for the country and its populace. Among the cultivated crops, rice is the key staple consumed. The PAPD (GOL 2018) acknowledges the importance of the agriculture sector and especially considers rice as the key food crop and puts a strong emphasis on developing the rice sector to decrease rice imports. More precisely, the production of rice shall be promoted by the use of new and appropriate technologies, access to seeds and reductions in pre-and post-harvest losses (GOL 2018). Likewise, the creation of the enabling environment for increasing public and private investment in rice shall be facilitated (idem).

Embedded in the PAPD is LASIP II, the reference document for the development of the agriculture sector. Based on the 2003 Comprehensive Africa Agriculture Development Program (CAADP) and the 2014 Malabo declaration, the second generation of LASIP was developed through a participatory and inclusive process for the period 2018 – 2022. The document was technically validated in June 2018. Rice is among the strategy's seven priority value chains, promoting its production and productivity. LASIP II is a whole sector strategy, focusing on five components: (1) Food and Nutrition Security; (2) Competitive Value Chain Development and Market Linkages; (3) Agricultural Extension, Research and Development; (4) Sustainable Production and Natural Resource Management; and (5) Governance and Institutional Strengthening. Given the importance of rice, the

[3] Source: FFI and GAIN 2016

strategy suggests for instance that within the construction and rehabilitation of farm to market roads, special emphasis will be put on rice producing counties.

From 2012 – 2018, the first NRDS of Liberia with the aim of doubling rice production by 2018 was in place. Based on the lessons learned (see section 3.5), the second generation NRDS aims towards a more successful implementation, focusing on the creation of incentives to private sector investment in a structured value chain. These incentives include appropriate legislation to promote sustainable investment, technical support in the areas of research and extension, fiscal and financial supports, as well as the fostering of representative associations within each stage of the rice value chain.

Based on Economic Community of West African States (ECOWAS) regulations aimed at regional harmonization, Liberia is in the process of nationally domesticating the Liberia Seed Development and Certification Agency Bill, the Liberia Fertilizer Regulatory Division Bill and Liberia Plant Protection Regulatory Services Bureau Bill. The bills were drafted in 2018 and currently await ratification by the Senate. The bill concerning seed development aims at establishing the Liberia Seed Development and Certification Agency (SDCA) as well as a National Seed Board that both ensures seed quality control, certification, marketing and the enforcement of seed regulations. Likewise, the fertilizer legislation will establish the Liberia Fertilizer Regulatory Division and the pesticide legislation will establish the Plant Protection Regulatory Services Bureau, both located at the Ministry of Agriculture (MOA).

2.5 Gender dimension of Liberia's rice sector

As in most African countries, women are essential actors in food production and processing as well as in ensuring food security and nutrition in Liberia. More than 50% of the labor force in the agricultural sector is composed of women and 79% of the national land area cultivated per household is cultivated by female-headed households (LISGIS 2018a).

While male farmers are usually engaged with spots, brushing, felling trees, burning, clearing and fencing, the females engage in scratching, weeding, harvesting and cooking (LISGIS 2018b). This separation of tasks allows a degree of flexibility; for instance, women taking over men's roles when men seek occupation outside the agriculture sector (idem). Crops cultivated by women are include rice, cassava, corn, sugarcane and vegetables (USAID 2015a).

However, Liberian female farmers do not enjoy equitable access to means of production and hence cannot deliver the same productivity rates as their male counterparts. Based on regression analysis, LISGIS (2018a) argues that the unconditional productivity gap in rice production between men and women is 12%, while the conditional gap (accounting for other factors affecting productivity, e.g., that women work on smaller plots) even rises to 19%. A series of challenges can explain the lower productivity of female rice farmers: Women have less access to farming inputs such as land, appropriate seeds, agrochemicals, mechanized equipment as well as extension services and finance.

Nationwide, men cultivate more land than women on average (1.66ha compared to 1.25ha) and the GINI coefficient measuring the inequality of access to land is high at 0.46 (LISGIS 2018a). On average female headed households are less productive that male headed households of the same land size, years of schooling and other control factors (LISGIS 2018a:28f). This could indicate that

female farmers are at a disadvantage in accessing farming inputs or, for example, that the quality of land owned by female farmers is of a lower standard. Women's multiple roles in domestic responsibilities as mothers and care givers is also likely to account for some of the productivity gap.

To guide the processes towards gender equality, the Ministry of Gender, Children and Social Protection (MGCSP) revised the National Gender Policy in 2017. Acknowledging the important role of women in the agriculture sector, the policy strongly argues for improved female access to land and enhanced access to inputs and extension services including trainings for female farmers. NRDS II strongly emphasizes the importance of female rice farmers for the sector's development including the reduction of constraints women are facing in not only production, but also in agro-processing and marketing. Improving access to inputs and information, as well as raising productivity of both men and women equally is at the heart of this strategy.

2.6 Youth dimension of Liberia's rice sector

Based on 2014 data, more than 70% of Liberians were below the age of 35 and 40% were below the age of 15 (World Bank 2018b). Liberia's youth, male and female, have been involved in rice production, however they have in general not been particularly interested in this as a career aspiration. Farming is not considered to be an attractive employment option given its demanding work, limited profitability and low income generation returns. It is expected that agriculture will remain a key pool of employment for the youth in Africa, however (Ibrahim Forum 2019), emphasizing the importance of raising the attractiveness of the sector to young people.

In particular, the rural youth population is poorly educated, limiting their potential to acquire specific knowledge and information to raise productivity. The overall education system and intergenerational knowledge transfer on best practice farming techniques has been ruptured during the civil war and rural literacy rates are relatively low compared to the region (World Bank 2018b).

The FAO (2014) also points out that the youth population involved in agriculture has restricted access to land which together with literacy challenges restricts access to finance agricultural activities. Moreover, market structures are often not open to the youth, who have difficulties in establishing a network such as finding appropriate buyers or simply gaining market information.

Consequently, it is key that government policies focusing on improving the enabling environment and increasing rice production put a special emphasis on the Liberian youth. Specific trainings and formalized education in vocational schools and universities are essential to build the next generation of successful rice farmers. Moreover, youth inclusive producer organizations or even youth producer organizations can support young farmers and increase market access. ICT solutions to improve information and knowledge transfers and business plan competitions to increase access for finance are further examples of how the youth involved in agriculture can be supported and agriculture can become a more attractive sector (FAO 2014). The NRDS II is a youth inclusive strategy, securing the next generation of rice farmers.

3. Strengths, Weaknesses, Opportunities and Threats

3.1 Strengths

The Liberian rice sector benefits from a range of advantages:

- Suitable natural environment:
  Liberia is endowed with the necessary environmental conditions for intensive rice production. A land area of 9.6 million HA, of which 4.1 million HA are forests, leaves a land mass of 5.4 million HA that includes fertile soils (FAOSTAT 2019). Water bodies and sufficient rainfall constitute a favorable basis for several cycles of rice production per year. Rice is produced upland and lowland, the latter showing higher yields by being either irrigated or rain fed. Especially the lowland environments have a high potential in expanding production through appropriate irrigation schemes. The MOA in collaboration with donors and NGOs have been focusing on constructing and rehabilitating irrigation schemes in these areas. The Smallholder Agriculture Productivity Enhancement and Commercialization project (SAPEC) under the MOA plans to construct 290HA of irrigation systems until March 2020.

- Political and social priority and importance:
  Rice is Liberia's primary staple crop and thus represents tremendous political and social importance. Rice is not only eaten several times a day, but 69% of Liberia's farmers are engaged in rice farming (LISGIS 2018b). Cultivating rice has been Liberia's tradition. Given its role, the GOL puts a strong focus on expanding rice production through the PAPD and LASIP II, as well as in projects with development partners. Rice is among LASIP II's priority value chains; and major factors (e.g., input and infrastructure development, research and extension services) for increasing rice production are among the strategy's five major components.

- Large domestic market:
  Due to the high preference of rice over other staples and the growing population, the demand for rice is high and is expected to grow in the future. In sum total of production and imports, Liberia consumes currently around 593,250 MT of rice (GOL 2018). Producing competitively, rice farmers should have a large market available to them locally.

3.2 Weaknesses

The following bottlenecks have to be addressed to increase rice production:

- Weak private sector:
  Liberia's private sector comprises micro, small and medium scale enterprises. Given infrastructure and other high transaction costs, private sector actors lack the incentives to increase investment and production. The legal and regulatory framework for the sector is also an obstacle. - According to the World Bank's Ease of Doing Business Report of 2019, the most difficult steps to overcome relate to the securing of construction permits, registration of property, and protection of minority investors. Liberia's performance decreased to 174th place in 2019 from 144th place in 2013**.**

- Inadequate infrastructure:
  Rice production, processing and transportation efforts are constrained by limited irrigation schemes, warehouses and storage for rice as well as road network and transportation system.

- Limited human and technical capacity:
  Among actors in the rice value chain and in cooperating government and research bodies, human and technical capacity is constrained. A limited range of specialists are available in country and researchers, agronomists, seed specialists, water and irrigation specialists, and trained extension officers from both genders are needed. Most rice farmers are not aware of high yielding best practice techniques. Likewise, there is a lack of trained M&E staff in the public sector to successfully direct and monitor donor and NGO projects.

- Weak land rights system:
  Access to land and secured titles has been a challenge, with a relatively stronger disadvantage on women. In 2018, however, the new Land Rights Act (GOL 2018b) was passed with the purpose of defining different categories of land (private, customary, public and government land) and their acquisition and access to increase the security of land rights. Within the next two years, the GOL through the Liberia Land Authority has to map out all the different types of land so that the Act can be effectively implemented.

- Weak extension system:
  Around 3.4% of all farmers have access to extension services (LISGIS 2018a). The public extension system is weak in quantity and quality and NGOs have been establishing their extension systems as well. Without adequate support to farmers in the production process, their application of appropriate techniques and responses to challenges will be limited.

- Inadequate inputs and processing system:
  Liberia lacks a certified seed system to ensure the production and availability of appropriate seeds and delivery to farmers during the planting season. Fertilizer is expensive as compared to neighboring countries and agrochemicals in general are difficult to access. The majority of mills are of low standard, breaking the rice in the process (USAID 2012). Availability and access to machinery for production and processing is limited as it has to be imported, causing delays and high prices for machinery.

- Inadequate access to finance:
  Access to finance for farmers and SMEs along the value chain is very limited. Apart from financing exports, Liberia's nine commercial banks restrict their loans to the agriculture sector, requesting high interest rates (14.5 – 25%) and short lending periods (World Bank 2019a). The GOL is currently investigating how agricultural financing can be addressed in the most appropriate way.

- Weak research capacities:
  The Central Agriculture Research Institute (CARI) became autonomous in 2015. With respect to rice, CARI is undertaking research in iron toxicity, salinity, hybridization and

breeder and foundation seed production. However, finance for research activities is limited and the Institute lacks a range of research specialists such that, for example, only lowland ecologies are considered, leaving upland aside.

- Little government support:
  Limited organizational capacity and weak coordination and communication has led to limited support for actors in the rice value chain. The first generation NRDS was neither validated nor implemented by the past government. The current government, however, prioritized the support to rice production.

- Poor donor and NGO coordination and M&E:
  Given the importance of rice in Liberia, donors and NGOs have been investing in the rice sector. These organizations have been involved in a range of activities, from providing infrastructure (constructing and rehabilitating irrigation schemes and processing facilities); inputs (facilitating access to fertilizer, appropriate seeds and machinery); and facilitating credit for the purchase of domestic rice. However, their operations could be more effective and sustainable if the MOA implemented a more robust coordination mechanism and M&E framework.

3.3 Opportunities

Liberia's potential for developing the rice sector is based on a range of opportunities:

- Increasing demand for rice:
  In general, demand for rice is high and is expected to increase further due to population growth. The PAPD (GOL 2018a), for example estimates that national requirements for rice will increase from 593,250 MT in 2018 to 670,630 MT in 2023. As illustrated in section 4.2, this strategy forecasts that 855,375.27 MT will have to be produced in 2030 to achieve self-sufficiency and meet domestic consumption. Consequently, there is potential for developing a thriving market for domestic rice in Liberia.

- Excess land and water for cultivation and irrigation:
  Of Liberia's 5.4 million HA of land mass, only 2.7 million HA are under cultivation and 3,000 HA are irrigated (FAOSTAT 2019). Therefore, there is the opportunity to increase not only intensive but also extensive production and start cultivating a larger surface of Liberia's arable land. Likewise, the 1.5 million HA of inland waters provide tremendous opportunity for expanding irrigation.

- Large young population:
  Over 70% of Liberians are under the age of 35 (World Bank 2018b), representing a potential strong workforce. With the necessary actions taken to educate young people and create the enabling environment to raise the profitability and sustainability of rice farming, enough labor can be available to increase domestic production.

- Dedicated female farmers:

It is believed that at least 50% of rice farmers are women. As outlined in section 2.7, there is a productivity gap in rice production between the two genders. Consequently, increasing women's access to land, inputs and extension services can increase their rice productivity to contribute to the overall wealth of the country.

- Preference for domestic rice:
  At the same level of processing and quality, consumers prefer domestic rice to the imported options. Currently, imported rice is often consumed due to its higher processing quality.

- Development Partner willingness to support the rice sector:
  As rice is the priority of the GOL, interventions to push small and large-scale rice farming are being planned. Moreover, donor funded MOA projects, such as the World Bank Smallholder Agriculture Transformation and Agribusiness Revitalization Project (STAR-P) will support rice FBO's with the aim of increasing their productivity and competitiveness.

- Business opportunities from rice by-products:
  By-products of rice have the potential to create new business opportunities. Rice husks, for example, can be used to generate cheap and renewable energy (charcoal) and fertilizers, as one of the major rice processors (Fabrar Rice) is currently doing (World Bank 2019a).

3.4 Threats

The following aspects may threaten the opportunities in the rice sector to translate into increased production:

- Domestic sector being 'undercut' by cheaper imports
- Increases in global fuel and farm inputs prices
- Changes in national trade policies concerning rice
- Globalization and regional competition in domestic rice markets
- Macroeconomic and political instability
- Lack of access to credit
- Change in consumer preferences
- Inadequate selection of seed rice
- Climate change and absence of mitigating response mechanisms
- Pest and disease epidemics[4]
- Weak or delayed public coordination and M&E
- Inadequate donor and NGO intervention

[4] Current pests and diseases include: Rice blast caused by pyricularia oryzae, pyricularia gresea or magnaporthe oryzae or virens; bacterial leaf blight (xanthomonas campestris pathovar oryzae); rice yellow mottle virus disease caused by rice yellow mottle virus; brown leaf spot caused by bipolaris oryzae or helminthosporium oryzae; leaf scald caused by gerlachia oryzae; sheath blight caused by rhizoctonia solani; false smut caused by ustilaginoides oryzae (information collected from Department of Agronomy, College of Agriculture & Forestry, University of Liberia)

3.5 Lessons Learned from NRDS I

The first generation of the NRDS focused on six strategic areas: (i) Land and water management, (ii) Increasing availability and accessibility of smallholder farmers to farm inputs, (iii) Enhancing post-harvest quality improvement, (iv)Increasing access to market, (v) Institutional capacity building, and (vi) Mechanization.

NRDS I was neither implemented nor thoroughly evaluated. Its targets included to expand rice production from 199,000 MT to 878,750 MT with one crop cycle per year or to 1,128,125 MT with 1.5 crop cycles per year. Likewise, total cultivation was targeted to expand from 212,000 HA to 300,000 HA, mainly through expansion in the lowlands. As outlined in section 2.2, production in 2016 stood at 300,144 MT in the total area harvested at 233,788 HA in 2016. Clearly, neither production nor area expansion targets were met.

Further priorities[5] from NRDS I have been addressed since 2012 and efforts have been realized in all the six strategic areas. Among the key success stories are the finalization of the SDCA act, the reactivation and capacitation of the Water Resource Division at MOA, the passage of a National Integrated Water Resource Management Policy and the construction of around eight rice mills across counties. Overall, however, NRDS I did not achieve its objective in developing the rice sector. No significant improvements have been achieved regarding rice farmers' access to finance, mechanization, market information and dissemination, the standardization of weights and measures or the strengthening of the extension system.

The lack of implementation of NRDS I has a range of underlying causes: lack of leadership to drive implementation, limited organizational capacity of MOA to organize the necessary working groups, lack of a functioning M&E system within MOA to monitor and evaluate activities in the agriculture sector and lack of awareness and advocacy of the existence and importance of the strategy. Another reason for the lack of implementation of the policy could be that the MOA's Project Management Unit (PMU) was planned to have implementation oversight[6]. The PMU, however, is MOA's body for implementation of projects, not of policies and strategies.

Consequently, NRDS II will learn from these past lessons to improve the implementation structure, define leadership roles, raise awareness about the importance of the strategy and especially, include the private sector to be a major driver to realize its vision and goals.

[5] See NRDS I, p. 19

[6] See NRDS I, p. 52

4. Vision and Scope

4.1 Vision, goals and objectives

Aligned with the major document of the agriculture sector, LASIP II, and the national PAPD, the NRDS II has the following vision, goal and main objective:

> The vision of NRDS II is of a country self-sufficient in the production of rice, with rice farmers and a multiplicity of rice sector businesses working together to produce a vibrant and competitive rice sector -- rice sector which provides a fair balance of benefits between rice farmers, rice businesses and their employees, and rice consumers; and a rice sector that supports economic growth, employment, food security and gender equity.
>
> The goal of NRDS II is to achieve increased rice production to MT1.3million by 2030 through expansion of rice farming and the rice private sector.

NRDS II starts 2018 and ends 2030 with a mid-term review in 2025. (Front cover says 2018)

4.2 Targets

NRDS II aims to increase productivity to deliver higher yields and expand the area cultivated to increase rice production in both low land and upland ecosystems. It also aims to increase the commercial value of rice at the farmgate; and in the market to increase value addition in the rice value chain, and the revenue of rice-sector SMEs. Table 7[7] outlines that by 2030, 636,755.82 MT of rice shall be produced from 106,125,000.97 HA of irrigated land with a yield of 6.0MT/HA while producing twice a year. In the rain fed low land ecosystem, 477,565.35 MT of rice on 191,026,000.14 HA shall be produced with the yield of 2.5 MT/HA. Likewise, 229,232 MT of rice on 127,351,000.16 HA shall be produced in the rain fed upland with the yield of 1.8 MT/HA. If Liberia produces a total of 1,343,553.2 MT of paddy rice in 2030, 873,309.58 MT is targeted to be milled to meet a rice consumption of 855,375.27 MT, which leaves 17,934.31 MT to export.

	Baseline (Av. 2012-2016)	**NRDS II target**
Total paddy rice production (MT)	278,600*	1,343,553.2
Irrigated	N/A	636,755.82
Lowland rain fed	N/A	477,565.35
Upland rain fed	N/A	229,232
Value of paddy rice production (LP)	278,600*	1,343,553.2
Total area cultivated ('000 HA)	214,082*	424,503.87
Irrigated	N/A	106,125.97
Lowland rain fed	N/A	191,026.14
Upland rain fed	N/A	127,351.16
National average yield (MT/HA)	1.3	3.1

[7] Source: *= FAOSTAT 2017; **= calculated by task force; forecasts based on 2,59% population growth

	Baseline (Av. 2012-2016)	NRDS II target
Irrigated	N/A	6.0
Lowland rain fed	N/A	2.5
Upland rain fed	N/A	1.8
Local milled rice production (MT)	181,090	873,309.58
Consumption (MT)	448,000**	855,375.27
Imports (MT)	364,000**	0
Exports (MT)	0	17,934.31

Table 7: Production, area cultivated and yield targets

Table 8 outlines the inputs needed until 2030 to meet the goal of increasing rice production by fivefold in 2030, as estimated by the Task Force.

Input	Quantity
Certified seeds	17,723 MT
Foundation seeds	253 MT
Breeder seeds	5 MT
NPK 15,15,15	63,675 MT
Urea	21,225 MT

Table 8: Input needs until 2030

Table 9 outlines the human resources needed to meet the goal of increasing rice production by fivefold in 2030, as estimated by the Task Force:

Institution	Human Resource
MOA	1 rice desk officer 660 extension officers (at least 50% female)
CARI	15 PhD holders for research (at least 50% female)
Research institutions	50 researchers and technicians in the area of pest and disease management (at least 50% female)

Table 9: Human resource needs

5. Priority Areas and Approaches

5.1 Strategic approach

The NRDS II aims to transform Liberia's rice sector through a sustainable rice value chain approach, concentrating on key strategic interventions affecting the value chain. These interventions are grouped into five strategic components:

Strategic component 1: Private sector development

Outcome 1: An efficient, structured and competitive domestic rice value chain in which all stakeholders participate on an equitable basis.

Strategic component 2: Research, technology dissemination and capacity building

Outcome 2: Innovative rice production technologies developed, piloted and adopted by rice value chain actors for sustained rice value chain development.

Strategic component 3: Seed system development

Outcome 3: Certified quality and appropriate rice seeds produced, disseminated, and adopted for increased rice productivity.

Strategic component 4: Transportation and quality assurance

Outcome 4: Higher quality and reduced post-harvest losses through increased utilization of improved post-harvest technologies and practices among rice value chain actors.

Strategic component 5: Overall policy, institutional framework, and coordination mechanisms for rice sector development

Outcome 5: Improved policies, strategies, governance, and financing mechanisms that ensure a competitive rice sector.

As demonstrated by the five components, NRDS II intervenes to address the major bottlenecks impeding the development of the rice sector. Strategic component 1 targets the business environment and investment climate for the rice-sector, recognizing that ultimately rice production, and livelihoods from rice farming, depend on the actions of the private sector. Strategic component 2 cuts across various steps of the value chain, focusing on research, capacity building and adoption of the appropriate technology from inputs to processing. Component 3 was designed to establish a functioning seed system to raise yields and productivity. Research, technology dissemination and an effective extension system (component 2) will directly support the development and management of land and irrigation (component 4), which will improve yields as well. Component 4 aims to improve

roads, electricity and other public infrastructure needed by the rice sector. Component 5 addresses the need for improved governance, coordination, policy and institutions to support other components.

With the ideal natural environment, political support and large potential market, the development of the rice value chain through the strategic approaches will lead to increasing capacity and productivity among the actors, reduce post-harvest losses, increase the availability of rice on domestic markets, and to ultimately achieve self-sufficiency.

5.2 Priorities

The five strategic components of the NRDS II apply both to the lowland and upland ecosystems; however, the priority zones for cultivation are the lowland rainfed and irrigated areas. The interventions outlined below take priority in the short, medium and long-term, respectively:

Short-term priorities:

- Launching programmatic and policy initiatives that will support private sector development
- Rehabilitating irrigation schemes in Nimba, Lofa, Bong, Margibi, Grand Gedeh, River Gee, Bomi, Maryland, and Grand Kru
- Promote the Seed Development and Certification Agency Act and establish a functioning seed system
- Increasing access to finance for rice value chain actors
- Conducting a study on the location, condition and use of current rice storage and warehouses and the need for further structures

Medium-term priorities:

- Establishing a framework for structured rice trade that allows the domestic value chain to reach all rice markets in Liberia, for example through establishment of a system of standards and better systems and infrastructure for aggregation
- Building and equipping four (4) laboratories including trained male and female operating personnel for quality assurance and grading
- Developing irrigation schemes in Nimba, Lofa, Bong, Margibi, Grand Gedeh, River Gee
- Facilitating imports of technology and inputs that are not produced in Liberia

Long-term priorities:

- Achieving the technological capability, level of infrastructure and efficiencies of scale that allow domestically produced rice to be competitive without government support.

6. Detailed Strategies for the Rice Sector

6.1 Strategic component 1: Private sector development

Outcome 1: An efficient, structured and competitive domestic rice value chain in which all stakeholders participate on an equitable basis.

The fundamental driver of increased domestic rice production is that growers and millers should want to produce and mill more rice. The millers' demand for paddy will not be met by growers unless the growers can receive a price that motivates them to increase their production beyond that required only to feed themselves. Additional supports to increase production and achieve economies of scale, depend for their efficacy upon growers' and millers' motivation. Such supports include research, seed multiplication, input supply and finance. None of these aspects, which are essential to continued growth, will be fully effective unless the primary issue of grower and miller motivation can be addressed.

The overarching result of the rice value chain survey implemented by MOA to develop this component stipulates that growers and millers do not want to increase production or milling because the market for milled domestic rice is too small and uncertain. Even though rice can be produced at prices that are competitive in rural markets, there is no consistent demand for any production that might be surplus to the needs of the communities in the rice-producing areas (MOA 2020). The cost of transport from rural mills to urban markets reduces the competitiveness of domestically produced rice as compared to imported rice, given world market prices. In a price-sensitive market, even a small difference in price is sufficient to outweigh the limited consumer preference for domestic rice (which is deemed to be healthier than imported "butter rice"). As a result, Liberia's large scale commercial rice milling capacity is severely limited. While small scale mills are more numerous, a recent survey by AfricaRice confirmed that very few of these are operational (World News ibid.).

Producers and processors are primarily motivated to invest in increased production capacity by two key aspects of their businesses, i.e., potential profitability and the probability of actually achieving that potential. Investors may be drawn towards a "sure thing", but even if profitability is certain, it must be large enough to be worthwhile. Indeed, the combination of profitability and probability must be more attractive for the rice value chain than the same characteristics of any other investment that producers or processors might choose to make. Accordingly, this private sector-focused policy relies upon the following factors to motivate stakeholders to increase their investment in the rice sector:

a) Reduction of millers' operating costs;

b) Stimulation of demand;

c) Measures to stabilize prices;

d) Reduction of risk in both production and marketing;

e) Facilitation of greater efficiencies in production/processing of rice (through new technologies or economies of scale) or in the domestic market (through reduced pre- and post-processing transaction costs).

NRDS2 also seeks to ensure gender equality in the development of the rice Private Sector. The overriding principles of the private sector policy component as it relates to gender are:

a) That women should have the same degree of access to support to increased rice production, trading and processing as men.

b) That women should be able to retain the benefits of their investments in whatever aspect of the value chain that they are involved.

The World Bank survey "Women, Business and the Law" for 2020 reported that the country permits women to sign contracts, register businesses, and open bank accounts in the same way as men, but there is no law prohibiting discrimination in access to credit based on gender. Similarly, In the case of assets, the law does not provide for the valuation of non-monetary contributions, which is particularly relevant to women's contribution of labor to rice crop production. In addition, social pressures can restrict women's participation in other aspects of the rice value chain ranging from training to trading.

The valuation of non-monetary contributions is of fundamental importance to women participating at the production level of the rice value chain. As producers, women undertake much of the weeding and harvesting as well as the threshing, parboiling and milling processes if these are carried out on-farm. Thus, women's investment in the form of labor in small scale rice production is substantial. If the crop is consumed at home, the benefits of that investment are enjoyed by the entire household, but if the crop becomes commercialized then there is a real risk that cash returns will be captured predominantly by men.

It is also important to recognize that the increased commercialization of rice may lead to significant gender inequity unless measures are introduced to ensure that women's input into the crop is properly valued. Such measures will almost certainly be social in nature, including messaging through such channels as cooperatives, community councils and savings and loan groups. It is impossible to be prescriptive, but it is important to be aware of the tendency to devalue women's input. To this end, the Ministry of Agriculture will sensitize its extension agents who should be tasked to monitor the situation by communicating with community groups (especially women's groups) and reporting on any gender-negative impacts of the commercialization process.

6.1.1 Increased investment by the private sector in the rice value chain

Output 1.1.1: Increased investment in the construction, rehabilitation and operation of rice mills.

Output 1.1.2: Effective supply networks to meet enhanced milling capacity established.

The fundamental driver of increased domestic rice production is that growers and millers should want to produce and mill more rice. The overarching result of the survey conducted by MOA was that there is resistance to increase production and milling because the market for milled domestic rice is too small. As a result, there is little reward for any investment in rice production beyond a subsistence level. The small surpluses that are occasionally produced are spread amongst a large number of small growers so that the costs of aggregation are substantial. Consequently, Liberia's large scale commercial rice milling capacity is severely limited. While small scale mills are more numerous, the recent survey by AfricaRice confirmed that very few of these are operational.

This component places mills at the focal point of the rice development policy with - the intention to stimulate the growth of the milling sector so as to create a sustainable demand for paddy rice. Thus, the component includes a number of interventions designed to motivate millers to renew and expand their activities.

Challenges:

- The cost of aggregating small parcels of paddy from large numbers of smallholders reduces the profitability of milling.
- The cost of transport from rural mills to urban markets reduces the competitiveness of domestically produced rice as compared with rice imported at world market prices.
- There is no consistent supply of paddy to mills from smallholders.

In a price-sensitive market, even a small difference in price is sufficient to outweigh the limited consumer preference for domestic rice. Consequently, this component focuses on the following strategic interventions:

Economic Constraint: Transportation Cost

For millers to purchase and mill more rice, it is first necessary that milled rice should be able to compete with imported rice in the marketplace. Currently, rice milled in rural areas must incur additional transport costs before it can be sold in the major urban centers and deficit areas. As a result, the price of the domestic product is not competitive with that of imported rice so that neither millers nor growers are able to compete in markets beyond their immediate production areas. It is very clear that millers face a major disincentive to investment in the form of transport costs, which inflate the costs of aggregating paddy and constrain the wholesale price of domestically milled rice. Until transport infrastructure can be upgraded, the cost of domestic transport can be expected to remain the dominant factor constraining the development of the rice subsector.

[TBD based on input from MOA].

Economic Constraint: Price Conditions

Millers and producers within Liberia will not invest in increased production if there is no expectation of a reasonable price for their product. Indeed, the central problem facing private sector development of the rice sector is that the current low levels of investment and output are more or less what is justified given prevailing prices and the operating costs borne by rice millers and other value chain actors. Market price changes, therefore, have enormous potential to either incentivize or disincentivize investment.

A major issue facing millers and producers is potential trade liberalization for the rice sector which will lower prices towards the global price and, therefore, disincentivize investment. In particular, the Ministry of Commerce's Trade Facilitation Roadmap seeks to reduce the cost of rice importation amongst 11 specific commodities (Activity no. 22). Another activity (Activity no. 5) seeks to remove the need for an import declaration for rice which would reduce the ability of the Government to monitor and control rice importation. This would further increase volumes and reduce prices and be potentially very damaging for rice private sector development. Implementation of the ECOWAS Comment External Tariff (CET) would also create issues for local rice producers, since it would

eliminate tariffs on imports of rice from other ECOWAS countries (although external tariffs on low-cost producers outside ECOWAS, notably China, would remain in place at a harmonized level).

The Ministry of Agriculture will enter into dialogue with the Ministry of Commerce and Industry (MOCI), the Liberia Revenue Authority (LRA), MFDP and other stakeholders to review Government plans for trade liberalization and tariff reform with respect to rice. It is recognized that low rice prices are of a benefit to poor Liberians, but it is proposed that the Government pursue a balanced approach whereby the need for food security is balanced against the need to provide some measure of protection for Liberia's domestic rice industry. To this end, specific trade facilitation measures could be delayed or otherwise moderated.

Further, it is proposed that this dialogue consider the possibility of setting a 'floor price' for imported rice, set around the current market price or at most slightly below. Such a floor price would be achieved through the tariff system with the majority of tariff revenue generated used to provide relief to the least food secure households. Such a floor price would provide certainty for rice millers and rice farmers, providing a significant incentive for investment and production. Again, any such mechanism would be set in such a way as to provide a balance of benefits between rice producers and rice consumers.

Incentives to Millers: Increased demand

A baseline survey conducted on the rice sub-sector discovered "thousands of imported rice mills in graveyards.... as they are abandoned and have become useless" mainly due to a lack of spare parts. Given the large number of small (1-2.5 ton/day) mills reportedly sitting idle in Liberia, MOA will work with MFDP and development partners to identify and deliver sources of finance that can be provided for the rehabilitation and upgrading of existing mills. One possibility that MOA will consider is a matching grant from a fund specifically set up for this purpose and potentially supported by donor contributions. An additional provision might be for access to such a fund being conditional upon the development of linkages with growers (such as contract farming). Such linkages are considered in more detail below.

While the rehabilitation of small mills might stimulate demand for domestically produced rice, the resultant milling capacity would nevertheless still be insufficient to achieve self-sufficiency in rice. Additional investment is required. To further stimulate private sector investment in milling, MOA will also engage with the MFDP Revenue Policy department and LRA to design fiscal measures that will promote investment. Based on initial analysis, MOA believes that the following measures could be effective:

1. All duties and taxes associated with the importation of rice milling and ancillary equipment should be waived. This measure is well aligned with the principles of the Trade Facilitation Roadmap (although not specifically addressed); and it would be expected that lobbying of the Ministry of Finance for its inclusion as a budgetary measure would be successful.
2. Similarly, the current 7% goods and service tax on rice should be waived and domestic paddy and milled rice to be zero rated for VAT if it is introduced (as opposed to exempt - a zero rating will allow registered millers and producers to claim back VAT paid on inputs).
3. Corporate tax on companies engaged solely in the domestic trading and/or processing of rice should be zero rated.

Incentives to Millers: Support for Supply Management

Next to the constraints to demand, the uncertainty of supply is the greatest risk faced by millers. To reduce this uncertainty, millers can be expected to reach out and develop linkages with growers, cooperatives and traders. At one extreme, such linkages can take the form of remote trading between wholly independent parties, while at the other, millers may set up contract farming arrangements or out-grower schemes whereby growers' operations are closely linked to the mills that they supply. Nevertheless, while millers and milling companies may be technically proficient in the processes of milling and of selling milled rice, many lack the skills required to mobilize large numbers of small rice growers and to subsequently manage their production in such a way as to ensure a consistent flow of rice to their mills. Without such skills, millers may be hesitant to invest when they cannot be confident of regular supply.

MOA will therefore work with the appropriate stakeholders on the following initiatives:

a) *Support for the organization and management of grower groups* - the management of an out-grower scheme or contract farming arrangement may lie beyond the capacity of the average miller, and the assistance of local authorities will almost certainly facilitate the setting up of farmer groups as well as the development and management of the scheme itself. It is proposed that where capacity allows, agricultural extension agents might be seconded from local government to assist millers upon request, to implement such schemes for an initial period (up to five years), after which time they might opt to be replaced and return to their original function, or to continue under the employment of the milling company. It is recognized that the capacity of the extension service to meet this requirement is limited. To this end, the Ministry of Agriculture's ongoing upgrading of the extension service will focus initially upon the main rice producing districts so that the needs described above can be met as soon as possible.

b) *Reduced cash flow for inputs* - millers seeking to supply growers with imported inputs such as rice seed, fertilizer and pesticides, must make substantial investments often as much as a year before any return is received. To reduce the initial outlay, the MOA will work with MFDP and LRA to design and implement measures in the revenue code that will reduce this cash flow burden. MOA's initial analysis suggests that an effective measure would be for millers to be licensed to defer the payment of all duties and taxes on all such imports for one fiscal year from the date of importation. This will reduce the investment, but will avoid any incentive for agrochemicals to be used for any purpose other than rice production.

c) *Input Insurance* - Millers implementing out-grower or contract farming schemes, whereby inputs are supplied in advance to growers, face the risk of losing their investment if growers do not deliver rice to the mill at least to the value of inputs originally provided. This risk is substantial. Side selling by growers to third party buyers who will not deduct any cost of inputs is a problem common to most such schemes. The problem can be mitigated through insurance whereby a premium is be paid on every contract and the cost of inputs on each contract that remain unfulfilled is reimbursed. Input insurance of this nature is available, but in view of the risks involved, it is expensive. MOA will work with the MOCI and the Central Bank of Liberia (CBL) to promote this form of insurance and if possible to provide a subsidy for it, with support from international partners. Such subsidized insurance programs are

commonly used to support production in countries such as the United States, India, China and Canada.

c) *Extension* - To obtain rice of the required quality and quantities, millers need to inform growers of their specific needs. The Extension and Advisory Service will help deliver these messages through the mechanisms of farmer field days (where the most appropriate technologies are demonstrated and discussed) and farmer field schools, or other extension methods. These events could be held exclusively by private mills, but the involvement of local government (especially EAS) will help to achieve acceptability amongst producers. It is to the mutual advantage of the mills and the EAS to work together to achieve this end.- MOA will develop a framework for EAS engagement with millers. Such a framework will include mechanisms to allow mills to finance the EAS in holding extension meetings and training sessions necessary to promote rice production to meet the mills' needs. The framework will be flexible enough to allow millers to develop such engagements individually or as part of a group.

   Care will be taken to ensure that extension support is free from gender bias. Extension officers in Liberia are predominantly men and when groups of farmers are called to agricultural demonstrations or training sessions, the attendees are also mainly men. This can inhibit the few women who are present from participating fully. Since it may well be women who will be required to actually apply the demonstrated technology, the overall value of such extension sessions can be much reduced. MOA will ensure that extension agents place greater emphasis on the communication of extension messages to women.

Business to Business (B2B) Forums

Millers seeking sources of supply, and traders seeking buyers will be assisted through the development and facilitation of B2B forums whereby traders, millers and producers are invited to meet and interact.

B2B forums generally consist of 2-part meetings. The first part should involve a presentation and discussion of a theme of common interest (such as standards, transport or new varieties), followed by a wider discussion during which participants are able to identify themselves and their buying or selling requirements with the purpose of making contact with others who might have complementary needs. Women may face particular constraints in trading rice due to social pressures that restrict women's access to the business environment. Women often claim that they know few people who they could sell to or by from and that travel to remote markets to identify potential buyers or sellers can be difficult. Overall, women face greater constraints to the process of market discovery than men. To overcome these constraints, it is recommended that B2B meetings should especially encourage the participation of women. In particular, the location, venue and duration of such forums should be amenable to women's participation.

B2B meetings may not be necessary over the long term, but in the initial stages of business linkage development, stakeholders in other countries have considered these meetings to be one of the most useful interventions provided by trade associations and other umbrella organizations. Such meetings could be organized at National and County levels by an agency such as the Chamber of Commerce, Liberia Business Association, or other associations connected to farmers. To this end the Ministry of Agriculture should liaise with MOCI to foster the development, advertisement and implementation of a schedule of B2B meetings for rice stakeholders throughout all Counties where rice is grown.

6.1.2 Increased production of domestic rice

Output 1.2.1: Increased investment by producers in intensive rice production.

Output 1.2.2: Increased volumes of paddy being produced.

The millers' demand for paddy will not be met by growers unless the growers can generate a profit that motivates them to increase their production beyond that required only to feed themselves. A series of measures to reduce the transaction costs between growers and millers and aimed at increasing the profit received by growers is described below.

Challenges:

- Even though rice can be produced at prices that are competitive in rural markets, there is no consistent demand for any production that might be surplus to the subsistence needs of the communities in the rice-producing areas.
- The additional investment required to increase production exceeds the financial capacity of most smallholders (See Section 6.1.4).
- Costs of bringing small volumes of paddy to market can exceed the additional revenue earned.

Consequently, this subcomponent focuses on the following strategic interventions:

Incentives to Growers - Increased demand

The NRDS2 rice value chain survey found that growers lack markets. The policy interventions outlined above are designed to address this constraint by stimulating millers to increase their demand for rice. This is expected to result in a proliferation of contract farming and out-grower arrangements as well as an overall increase in the farm-gate price of paddy.

Increased prices to growers can result not only from increased demand, but also from greater market efficiencies, especially with regard to aggregation and marketing. The NRDS2 rice private sector survey found a substantial difference between farm-gate and into-mill prices for paddy rice suggesting that aggregation costs represent more than 50% of the wholesale price for paddy. From this perspective, there are major savings to be made which can be at least partly benefit the grower and thereby provide an incentive for increased production.

Incentives to Growers - Promotion of aggregation

The aggregation of small volumes of rice into amounts that can be cost-effectively collected by a trader or miller is an expense which, while exaggerated by poor transport infrastructure, can be somewhat reduced through the development of appropriately sited warehouses acting as aggregation centers. The development of a network of aggregation centers, whereby smaller units at a village level act as buying points and temporary storage locations from which rice can be transported to larger warehouses, has proven to be an effective way to reduce aggregation costs in Nigeria, Kenya, Zambia and Malawi and forms the basis of the structured trading system developed by the East African Grain Council.

An aggregation network of well managed warehouses can also form the basis of a warehouse receipt system to facilitate both remote trading and the provision of finance. The use of warehousing as the basis for remote trading is a potentially substantial cost-cutting mechanism. This approach is dependent upon standards of warehouse management that are sufficient to inspire confidence in the receipts for grain issued by each participating warehouse and as such require certification on a regular basis by a third party. There is a critical role to be played by Government in overseeing and regulating the certification process. If properly expedited, this approach cannot only reduce costs but also form the basis for a credit system as outlined in Section 6.1.4 below.

The Ministry of Agriculture will coordinate with appropriate GOL entities (e.g., the Ministry of Land and Mines, and MFDP) to formulate and implement a policy to facilitate the creation of aggregation networks. The policy will promote the formation of networks of different types through:

- private buying agencies setting up their own buying points and warehouses
- buyers cooperating with NGOs or other commercial partners to develop less exclusive facilities which can also serve as input distribution points
- growers forming groups and managing the construction of their own collection center that can then act as an aggregation point to attract buyers seeking large volumes of rice

Under this policy, GOL would facilitate access to land and local grant funds where possible (likely with support from international partners). Private sector aggregators may require advice on the formation of and procedures for bringing together appropriate groups (cooperatives or companies), on warehousing and other aspects of post-harvest management. This could also be facilitated by

Government. MOA will develop materials to provide this information and disseminate it via the EAS and international partners supporting the extension process.

Incentives to Growers - Improved Market Information

Policymakers often focus on physical transaction costs, such as the cost of transportation. However, planning production and making sales also requires information (for instance, information about sale prices and the identity of buyers). Acquiring this information has a cost which can be difficult for smallholders to bear. As a result, smallholders often lack good market information and are thus susceptible to an increased market risk whereby, having transported their rice to the market they are offered a lower price than anticipated. They are then faced with the choice of selling or incurring the additional cost of transporting the product home again. Enhanced market information can empower growers and act as an incentive to increased production.

With the spread of mobile phone and computer technology, it has become possible to design and implement market information systems that can operate on a sustainable commercial basis at little or no cost to the grower. Such systems include the E-Soko platform, developed in Ghana and now operational in Malawi, Tanzania and Guinea Bissau, as well as the G-Soko platform developed by the East African Grain Council and operational in Kenya, Rwanda and Uganda. The E-Soko system allows farmers to receive bids from traders and millers in real time by SMS to their mobile phones. This provides growers with an accurate real-time assessment of demand and allows them to determine the best time, place and price at which to sell their rice. The G-Soko system is more complex and is based upon a network of certified warehouses that generate and sell grain receipts on an electronic exchange.

It is critical that growers, traders and millers are able to access up-to-date access market information. The Ministry of Agriculture will seek the assistance of international partners to design and pilot a system similar to E-Soko at the earliest opportunity. This will be done in coordination with the Ministry of Post and Telecommunications, and private sector Telecommunication Companies.

6.1.3 Support for the development of structured trade in rice

Output 1.3.1: Reduced transaction costs within the domestic value chain.

Output 1.3.2: Proliferation of out grower and contract farming arrangements.

Output 1.3.2: Regular participation of private sector stakeholders in the development of rice sector policy.

While it may be possible to motivate millers to purchase and mill more rice and to motivate farmers to increase their investment into rice production, additional supports must be developed if the value chain is to function competitively. These include the development and implementation of standards for the effective functioning of the rice value chain, the development of a supply chain for inputs, an effective contract arbitration system, and a system to facilitate ongoing dialogue between private sector stakeholders and government. These aspects are considered below:

Challenges:

- Implementation of standards in the rice trade is limited.
- Inputs are not readily available to growers.

- Enforcement of contracts can be difficult and slow.
- Commercialization may diminish women's benefits from their non-monetary contributions to the rice value chain.
- Few representative associations exist to facilitate dialogue between government and private sector.

Consequently, this sub-component focuses on the following strategic interventions:

Standards

This aspect includes the establishment of a system to develop grain quality standards, standard weights and measures and packaging, as well as standards for payment. Standardization in each of these areas allows stakeholders to communicate up and down the value chain using a common language.

Ideally, the development of standards should reflect the realities of the market. Although it is often influenced by Regional norms, or even the ideologies of international agencies, the formulation of meaningful standards for a domestic market should be informed by the stakeholders that comprise that market. Private sector participation (including representation of consumers) in the development of rice standards is critical, although the role of Government in formalizing and adopting standards is essential.

Standards themselves are of limited value to transactions unless they can be independently verified. This is especially true of remote transactions; and hence, certification capacity must be available so that all parties can be confident of the nature of the rice that is being transacted. That certification capacity may initially reside within Government; but in a mature sub-sector, the responsibility for certification can reasonably be delegated to private sector agencies. It is recommended that this should be the ultimate goal. Private sector certification capacity requires accreditation by the ultimate authority of Government; and hence, accreditation capacity is also required.

All of these concepts are embedded within Liberia's National Quality Policy (NQP), but at the present time the various agencies envisaged within that document do not have the resources and capacity to fulfill their necessary responsibilities. Moreover, the NQP does not appear to espouse any particular development goals. In particular, it does not provide support for the achievement of national self-security in rice and development of the rice private sector. As discussed in section 6.1.1 ('Incentives to Millers- Price Conditions') above, the danger exists that standards developed to achieve maximum benefit for consumers and optimal trade harmonization could be detrimental to private sector development of rice.

The Ministry of Agriculture will support the development and implementation of the NQP by working with the MOCI, using rice as a test case. In particular, it will:

a) Support the National Standards Body in selecting appropriate private sector stakeholders in the rice value chain who can participate in the development of quality standards for rice that are appropriate for the domestic market.

b) Liaise with private sector stakeholders in the rice value chain to support the National Accreditation Focal Point in its selection of appropriate criteria required for the accreditation of certification agencies.

c) Disseminate standards for rice once these have been defined.

d) Set up certification units within the Ministry of Agriculture as may be required to meet the immediate demand for certification of rice.

e) Support the transition of certification capacity to the private sector by working with the Accreditation Focal Point to publicize amongst rice stakeholders, both the need for private sector participation and the requirements to be met by private certification agencies.

These activities might initially focus on the certification of volumes and standards of rice in all its forms (parboiled, raw paddy, and milled rice). The scope of support to the NQP should be expanded as rapidly as possible to include standards, together with certification and accreditation capacity for storage, including the packaging and warehousing of rice. As noted below, such standards are essential to the efficient remote trading of rice. With input from the Ministry of Agriculture, they can be developed in a manner that responds to local circumstances so as to facilitate increased production, rather than acting as hurdles to it.

Arbitration

A key concern underpinning any contractual arrangement is that it should be enforceable. Currently, despite the creation of a Commercial Court System in 2011, the capacity of the formal justice system to provide the rapid arbitration and resolution of disputes at a local level is severely limited. Levels of non-performing debt exceed 13% and enforcing a non-secured loan in Liberian courts can take over three and a half years. Growers' trust in the formal justice system is also limited. Such conditions cannot foster any confidence amongst millers or others wishing to lend growers inputs to produce rice under out-grower or contract farming arrangements.

To support out-grower and contract farming of rice it will be necessary to strengthen local arbitration capacity as it relates to contracts between millers and growers. Unless this can be done, the validity of contractual arrangements as a widespread means to include rice growers within more intensive production systems remains uncertain.

MOA will conduct dialogue to identify which agencies should have oversight of local arbitration (e.g. whether this is done by the judiciary or MACs). Upon resolution of this issue MOA will work with the appropriate stakeholders to solicit the input of growers and millers before preparing appropriate guidelines to permit and inform the settlement of contractual defaults by agreed arbitrators in such a way as to promote contract farming and out-grower arrangements. The details of such guidelines will require further research but unless this critical element can be addressed, millers in particular may be unwilling to enter into contract or out-grower farming arrangements with smallholders.

Representation

Private sector input is needed for the development and implementation of any policy or strategy, including NRDS2. To that end, it is important that growers, millers and traders in the rice value chains come together through producer associations, unions or chambers to develop consensus positions on preferred policies and to advocate for them . When properly structured, such private sector associations promote the efficient flow of information to government without excessive distortion by individual interests.

Currently stakeholders in the rice sector are not adequately represented in this regard (with the possible exception of the small number of rice importers). Some farmers are organized into farmer-based organizations, grouped within producer associations under the umbrella of the Liberia Farmer Unions Network. Although the network has 54,000 farmer members, it has limited capacity for representation and does not specific cater to rice. Rice traders and millers might be represented by the Chamber of Commerce, but again there is no specific representative association for rice. Strong representation that could inform government of concerns within the rice sector is not as yet well developed.

To address the issue of adequate representation, MOA can promote the formation of representative associations through various means, including:

a) Working with the MIA to ensure the support of local authorities in providing meeting facilities,
b) Coordinating with MFDP and LRA to develop favorable tax regimes (e.g., exemption from VAT of membership subscriptions in the case that it is implemented) for associations

c)In addition, MOA will promote inclusion by government of private sector associations in meetings related to the development of policy, legislation or regulations associated with the rice sector and will also serve as a *de facto* endorsement of their representative status and help to enhance their membership and capacity to perform their essential functions of representation and advocacy.

6.1.4 Access to finance

Output 1.4.1: Appropriate and functional financing schemes available for rice farmers and value chain actors

Limited access to finance for growers is widely considered to be a key constraint to increased production. While the commercial banks have sufficient liquidity (at 42%), providing long-term loans to the agriculture sector is difficult given mainly short-term deposits with only 6% of private sector lending going to agriculture (World Bank 2019a). Moreover, when viewed from the lenders' perspective, it is evident that commercial rice production in Liberia is currently a poor investment and that if resources are limited there are many other more lucrative opportunities in which to invest. Therefore, the first and most essential step to facilitate the flow of investment into the rice sub-sector is to increase the profitability of rice production and milling to the point where banks consider it to be at least as attractive an investment as any other sub-sector.

Apart from microfinance institutions, alternative financial instruments such as financial leasing, warehouse receipts or factoring are not established (see discussion above). LASIP II puts a strong focus on agriculture financing and the activities below are closely aligned to the Plan.

Challenges in improving access to finance for rice farmers and processors are:

- Commercial banks' perception of agricultural risk as compared with risk in other sectors.
- Limited collateral of farmers and other value chain actors.
- Costs of administering many small loans.
- Poor historical performance of agricultural borrowers (non-payment of 10-15%)
- Limited institutional capacity to arbitrate disputes and enforce judgments.

Consequently, this subcomponent focuses on the following strategic interventions:

- Facilitating the provision of credit throughout grower schemes.
- Revising the credit registry to meet smallholder needs.
- Promoting inventory credit and factoring
- Strengthen existing community-based financing schemes for smallholder rice farmers

Credit Legislation

Contract farming and out-grower arrangements can be complex and are often subject to non-performance. In particular, contractors accuse producers of side selling (whereby a producer who having received inputs on credit from one contracting agency (such as a miller), avoids repayment of that credit by selling their rice to another miller). Conversely, growers often complain of exploitation by contracting agencies who insist on buying all that the growers have produced at a low price, irrespective of the cost of the inputs, or any changes in the value of the end product over the course of the growing season.

The design of equitable contract farming and out-grower arrangements and their subsequent implementation in an equitable manner will be enhanced by a legal and regulatory framework that would both minimize exploitation, (e.g., by proscribing volume-based repayment of loans) and maximizing repayment (including through the use of credit registries as indicated below). Such legislation could also extend the outreach of commercial banks by facilitating and regulating the flow of credit and repayment through a tripartite arrangement of banks, growers, and millers. Under such an arrangement, contracts with millers could be used by growers to underpin loans; and payments by millers to growers could be garnished by banks. Such arrangements would use the administrative frameworks of millers' contract farming or out-grower schemes both to reduce the administrative costs incurred by banks and to enhance loan performance.

The arrangements that underpin out-grower and contract farming require legislation to ensure that they are developed in a way that is equitable to all parties. Currently such legislation does not exist in Liberia. The Ministry of Agriculture will canvass representative stakeholders (including banks, suppliers and growers) and work with appropriate GOL stakeholders (e.g. MoCI, CBL and legal entities such as the Law Reform Commission (LRC)) to develop appropriate guidelines for contractual arrangements for rice production by smallholders. Once these have been developed, further inter-agency cooperation and coordination will be required to develop and draft credit legislation and/or regulations that are appropriate to these special circumstances.

Credit Registry

The viability of any business loan is assessed on three factors, namely the viability of the business proposition, the availability of collateral. and past credit history of the applicant. From this perspective, a credible and accessible credit registry can facilitate the flow of finance to rice growers who may have limited collateral. Currently a credit registry does exist in Liberia and is managed by the Central Bank; however, it is of limited functionality and not accessible via the internet. This restricts its usefulness significantly and can, in particular, prevent smallholders from accessing finance.

Around the world, credit registry systems do exist that can be implemented and accessed electronically. In Cambodia, such a registry is maintained by the Credit Bureau of Cambodia (CBC), a private institution that began operations in 2011. The registry generates a Personal Credit Report

for each borrower, i.e., a record of the individual borrower's credit payment history, compiled from bank, micro-finance and major financial institutions. This can be accessed by any financial institution via the CBC interface on the internet and has facilitated and accelerated the lending process. By 2019, the system had expanded to include 52.2% of all adults.

Such a system could be developed in Liberia at relatively low cost, by a consortium of banks, the government, or a private sector agency. However, it is unlikely to be implemented unless government and/or donors initiate the appropriate research and undertake the required sensitization of stakeholders. Pilot activities may also require coordination and assistance by donors so that a critical mass of borrowers can be registered to ensure sustainability.

The Ministry of Agriculture will liaise with CBL, MFDP and private sector stakeholders (banks, MFIs and other lending agencies) to undertake the research necessary to specify and cost a credit registry system that can provide the same degree of functionality as that used by the CBC and which will cover SMEs including those from the rice sector. Once the system has been specified and costed, stakeholders will be appraised of the results.

Inventory Credit and Factoring

While the milling sub-sector requires investment capital for the purchase and rehabilitation of new plant, it also requires significant working capital to finance the continual purchase of paddy, e.g., a mill of 10 ton/day capacity may cost in the order of US$300,000, while purchase of the paddy required to sustain operations for 90 days can cost an additional US$225,000. Two policy interventions can help to facilitate the flow of working capital.

In the first instance, access to finance by millers, traders, and growers can be facilitated through the development of a warehouse receipt system that would allow certified third-party warehouses to issue receipts for lots of grain held by them. Such receipts can be traded (as mentioned above), or used as collateral to obtain finance. Conventionally, banks have been prepared to advance up to 60% of the value of a warehouse receipt, allowing traders who use the system repeatedly to effectively double their working capital. In all cases, however, warehouse receipt systems depend upon the confidence that each receipt is an accurate representation of the quality and volume of the grain it describes. As such, the establishment and enforcement of uniform grain standards, and the certification of procedures and premises, is critical. Government has a critical role to play in establishing such a system. MOA will engage with other sectoral stakeholders (e.g., MOCI) and legal stakeholders (e.g. MOJ and LRC) to begin the process of designing such a framework.

Banks may also be encouraged to commit finance to the agribusiness sub-sector if the inherent risk can be reduced through the process of factoring. Factoring involves the purchase of accounts receivable at a discounted price by an agency (the factor). The factor must conduct the necessary research to determine the reasonable value (i.e., likelihood of payment) of the accounts receivable and will determine the discount rate accordingly. The factor will also insure against catastrophic loss. A commercial bank is able to take comfort in the due diligence and insurance of the factor and will lend the factor the finance required to purchase the discounted accounts receivable which the factor will then collect at their full value. The process of factoring thus reduces the risk to the commercial bank to an acceptable level.

To be effective in promoting rice production, factoring requires agencies with sound knowledge of the domestic rice value chain and commercial banks with an interest to increase the proportion of agricultural lending in their portfolios. In Rwanda, where both these conditions exist, factoring has allowed companies selling agro-inputs to farmers to sell their accounts receivable to obtain the funds needed to maximize turnover. In Liberia, agro-dealers might benefit in a similar way as also might millers if they were able to sell accounts receivable from wholesalers for milled rice.

Currently, no factor houses exist in Liberia and there is no specific legislation to enable factoring. The Ministry of Agriculture will engage with relevant GOL entities (e.g., MFDP, CBL, MOCI) and interested private sector actors to create dialogue around the possibility of establishing factor houses.

6.2 Strategic component 2: Research, technology adoption and capacity building

Outcome 2: Innovative rice production technologies developed, piloted and adopted by rice value chain actors for sustained rice value chain development

The accessibility and adoption of quality seeds of high yielding rice varieties, agrochemicals for pest control, agricultural mechanized equipment, irrigation and soil health techniques to farmers is key for developing the rice sector. Research, technology adoption and available capacity to support this agenda are however limited. The main agricultural research body, CARI became autonomous in 2016 and donors have been continuously supporting its capacity and infrastructure. Hybrid rice research sponsored by the Chinese government is underway (World Bank 2019). As mentioned in section 3.2., At least 15 PhD holders are needed for research at CARI. An important concern regards irrigation, which is a necessity for cultivating several crop cycles per year. Developing and managing appropriately Liberia's rice production resources, namely land and water, through improved technology has the potential to additionally increase productivity.

Major entities responsible for improving research, technology dissemination and capacity building are MOA, CARI, Liberian National Seed Council (LNSC), MFDP, MOCI, LRA and Commercial Banks.

6.2.1 Genetic resource conservation, development of new varieties and production of existing varieties

Output 2.1.1: Functioning and capacitated Seed Development and Certification Agency established

Output 2.1.2: Human resources to develop, conserve and produce rice varieties enhanced

MOA and partners have drafted the Seed Development and Certification Agency Act which awaits enactment from the national Legislature, and which will establish the Seed Development and Certification Agency. The Agency's functions are "research on issues relating to seed testing, registration, release, production, marketing, distribution, certification, quality control, supply and use of seeds in Liberia" (MOA 2016b:8), advising the national research system and support for the establishment of seed companies that contribute to research. CARI is Liberia's entity for conserving genetic resources, developing new and producing existing rice varieties. Liberia has two trained seed specialists and five trained seed breeders. CARI and Africa Rice conducted a training of trainers by of local lead farmers' representatives from all fifteen counties in seed production in 2013.

Seed research for production and conservation face the following challenges:

- Lack of infrastructure and logistics for research on seed development and production
- Inadequate breeder and foundation seeds for production and development
- Delay in passage of the Seed Development and Certification Agency Act into law by National Legislature
- Low public budgetary allocation for research and development of new varieties
- Limited number and capacity of researchers for developing new rice varieties

This subcomponent proposes the following strategic interventions:

- Passage of the Seed Development and Certification Agency Act and establishment of its related agency

- Institutional support to the development of the seed supply chain, marketing and promotion of improved seed and human resource development.
- Gender sensitive youth inclusive training of an additional batch of scientists at CARI (PhD and MSc in Seed technology, statistics and laboratory engineering) and out-growers of seed companies for the promotion of elite varieties such as NERICA L19, Arica 2, IR 841, NERICA 8,9,12,14

6.2.2 Adoption of agricultural mechanization and water control technology

Output 2.2.1: Increased accessibility to appropriate agricultural mechanization and water control technologies for rice production

Output 2.2.2: Increased capacity to use agricultural mechanization and water control technologies for rice production

At present, mechanical equipment is mainly used in land preparation for both up and low land rice production. Spare parts of equipment are largely imported with few being obtained from local stores. Agricultural mechanization is practiced on an ad-hoc basis, not as a result of specific policy or program of the GOL. No analysis of cost efficiency of land preparation to determine alternative systems of land preparation has been conducted.

A land and water resource division was established at the MOA in 2018 and a national water resource strategy was developed. Total potential land for irrigation is estimated at 600,000 HA while potential irrigated rice yield estimate is 4 MT/HA. As previously stated, 4% of the nationally planted area is irrigated (LISGIS 2018a). Ad-hoc development of irrigation and drainage infrastructure for swamps is being established in the major rice producing counties. Few irrigation schemes and infrastructure regarding water conservation is available, while part of it is dilapidated as it was abandoned after the war and there is limited finance for maintenance. Most of the low land rice cultivation is purely rain fed. Currently, to construct irrigation schemes farmers design the layout of irrigation schemes and construct inner bounds, floodways, peripheral canals and spillways. Then, after tilling, PVC or bamboo pipes are laid out and the field is levelled. In the upland, tillage and levelling follows directly after clearing. In sum, agricultural machinery and water control technology is sporadically used with little guidance from public institutions

Adoption of agricultural mechanization and water control technology faces the following challenges:

- Limited number of appropriate machinery available in country
- High tariffs on importation of agricultural equipment
- Limited supply of spare parts for agricultural machinery
- Unavailability of skilled mechanics for repairs and maintenance
- Little information available on machine use
- Limited access to finance for agricultural equipment and water control technology
- Limited funds to realize national water resource strategy
- Lack of updated information on irrigated areas
- Lack of mechanization policy for guidance
- Farmers financial constraints to rent or purchase machinery
- Limited access of farmers to irrigation and water control technology
- Limited access of farmers to irrigation specialists or trained extension officers

- Poor community organizational structure (e.g. to initiate rehabilitation/maintenance of irrigation schemes)
- Limited knowledge on the use of chemicals in the irrigation system

Consequently, this subcomponent proposes the following strategic interventions:

- Conduct a needs assessment to prioritize the farm machinery for land development and of appropriate irrigation infrastructure
- Conduct gender sensitive and youth inclusive capacity building programs for repair and maintenance mechanics of agricultural machinery and irrigation technology
- Waive import tariffs, VAT and other hidden taxes/duties on importation of farm machineries
- Establish Public Private Partnerships (PPPs) for expanding availability of land development machinery
- Create awareness on the advantages of using irrigated rice fields to rain-fed upland and lowland fields
- Develop appropriate financial schemes for purchase or lease of agricultural machinery and water control technologies
- Demonstrate agricultural machinery and water control technologies to farmers through appropriate demonstration sites
- Establish a public registry on all existing irrigated areas
- Develop and implement a mechanization policy
- Rehabilitate irrigation schemes
- Conduct gender sensitive and youth inclusive training of lead farmers, extension officers, cooperatives and local trainers in the construction and use of irrigation schemes and drainage facilities as well as chemicals used with it
- Promote private sector participation in capacity building of farmers and in designing and investing in an irrigation plan
- Develop and implement a medium-term irrigation strategy
- Support the establishment of a national water and ecological information center

6.2.3 Research and adoption of soil health and fertility management techniques

Output 2.3.1: Functional and capacitated soil testing laboratories for rice production established

Output 2.3.2: Farmers knowledge on soil health and fertility management increased

As stated in previous parts of the document, Liberia has a land mass of 5.4 million HA that includes fertile soils (FAOSTAT 2019). To develop sustainable and fertile farmland for increasing rice yields, good soil management practice is required. Farmers are not familiar with proper soil management practices, machines or mechanical technology that can help improve agricultural production, and so, farmers are engaged in haphazard farmland development and shifting cultivation which threatens the environment and land resources. To develop land for rice production, fields have to be brushed, destemmed and cleared. Along these activities, rice farmers heavily rely on manual labor while mechanized land preparation would increase productivity. The need for understanding soil fertility, appropriate fertilization (using organic and inorganic fertilizer), strengthening institutions, building human resource capacity, creating awareness among lead farmers along with mechanized land preparation and crop rotation are techniques and action steps that can improve agricultural land development productivity. Guidelines on optimal rates of inorganic fertilizer used for lowland and

upland rice production have been established by MOA and CARI, however their dissemination is limited. In addition, the MOA has drafted the Fertilizer and Pesticide Acts and is awaiting passage into law by the National Legislature.

Research and adoption of soil health and fertility management techniques faces the following challenges:

- Limited knowledge on application and usage of fertilizer
- Inadequate usage of fertilizers by smallholder farmers
- Lack of funding for soil research
- High cost of fertilizer
- Parent material and mineral imbalances lead to iron and aluminum toxicity
- Limited knowledge and fertility management
- Lack of soil testing
- Limited knowledge on soil health
- Limited knowledge of farmers on soil and use of use technologies
- CARI's and University of Liberia's soil labs are not functioning

Consequently, this subcomponent proposes the following strategic interventions:

- Increase funding for soil research
- Train and employ soil researchers
- Gender sensitive youth inclusive training of lead farmers, extension officers, cooperatives and local trainers in sustainable land development and management including soil testing
- Gender sensitive youth inclusive training of soil scientists and lab technicians
- Support CARI's and University of Liberia's soil lab
- Promote the establishment of regional soil testing laboratories
- Increase sensitization/awareness on the usage of inorganic fertilizer
- Subsidize fertilizer and agro-chemicals
- Remove high tariffs on fertilizer imports

6.2.4 Research and adoption of pest control and disease management

Output 2.4.1: Increased accessibility to appropriate agrochemicals for rice pest control and disease management

Output 2.4.2: Increased capacity of rice farmers in pest control and disease management

Currently, agrochemicals for the control of pests and diseases are sold at few input dealerships in Liberia. Pest and disease control by smallholder farmers are usually carried out using traditional practices (e.g., weeding in time, hand picking insects or burning biomass). A few MOA and CARI technicians were trained in control and management of pests and diseases. Liberia does not have any regulation to control the use of insecticides and pesticides but rather depend on the existing ECOWAS regulations governing the use of pesticides. The Liberia Plant Protection Regulatory Services Bureau Act however was drafted and awaits ratification by the Legislature.

Research and information dissemination of pest and disease faces the following challenges:

- Farmers lack knowledge of efficient practices for pest and disease prevention or control
- There are no regulations governing the handling and use of pesticides, fungicides or insecticides

- Inadequate number of technicians specialized in pest and disease management
- Limited number of agro-input dealers involved in the sale of agrochemicals for pest and disease control
- Lack of early warning systems to improve response to pest and disease incidences
- Few resistant varieties for the major pests and diseases
- High costs of agrochemicals

Consequently, this subcomponent proposes the following strategic interventions:

- Conduct gender sensitive and youth inclusive training for farmers on best practices for pest and disease management including appropriate use of agrochemicals
- Conduct gender sensitive and youth inclusive training for fifty researchers and technicians in the area of pest and disease management
- Support agro-input dealers to expand their businesses to all counties
- Establish an early warning system to provide information about potential threats of pest and disease outbreaks
- Improve research into the development/breeding of resistant varieties for the major pests and diseases of Liberia.
- Reduce cost of agrochemicals for use in pest and disease control

6.2.5 Resourcing and management of extension service

Output 2.5.1: Adequate extension workers and advisory personnel recruited, trained and deployed

Currently, there is limited trained extension staff in Liberia including in rice producing counties. Overall, there is one extension staff to 26,000 farmers (LISGIS 2018). The MOA Extension Division is yet to develop fact sheets for harmonized data collection by extension officers in Liberia and develop training manuals for farmers. New technology is not disseminated to all counties of Liberia. A national Policy for Agricultural Extension and Advisory Services (MOA 2012) has been developed, however its adoption and implementation are still outstanding.

Liberia's extension model faces the following challenges to adequately support rice production:

- Limited number of extension workers in the field
- Limited technical capacity of extension workers
- Poor road infrastructure and difficulty to reach farmers
- Limited logistical and financial support to extension officer

This component hence proposes the following strategic interventions:

- Increase number of extension staff
- Gender sensitive youth inclusive training of extension workers to promote new technologies to farmers
- Public support for extension services is all rice growing counties
- Establish an annual farmer field day
- Develop fact sheets for harmonized data collection per county for extension workers
- Develop and use of training manuals to train farmers and FBO's
- Establish technology-demonstration centers for farmers around the major rice hubs
- Adopt and implement the Agricultural Extension and Advisory Services Policy

6.2.6 Producer organizations and rural learning communities

Output 2.6.1: Organizational capacity of rice cooperatives, farmer groups and producer organizations improved

Several farmer-based organizations (FBOs) are established in all counties. CDA has certified six rice cooperatives in Bong county, eleven in Lofa and fourteen in Nimba. Formal registration of rice cooperatives in other counties is still outstanding due to financial constraints. Most of the FBOs aim to improve livelihood conditions through farming, higher production and sales of produce.

Producer organizations and rural learning communities face the following challenges:

- Limited organizational capacity
- Limited access to financing
- Limited support from CDA due to its limited financial, human and organizational capacity

Consequently, this subcomponent proposes the following strategic interventions:

- Support the establishment of more producer organizations and cooperatives involved in production, aggregation and processing of rice
- Provide management training to cooperatives, producer groups and processing associations
- Provide subsidies and financing schemes to producer organizations
- Register rice cooperatives in the remaining counties

6.3 Strategic component 3: Seed system development

Outcome 3: Certified quality and appropriate rice seeds produced, disseminated and adopted for increased rice productivity

As stated in section 2.2., Liberia lacks a functioning seed system. The distribution network of seeds is very limited in rural areas. Certified seeds are hardly used, and farmers store a selection of their harvested grains until the next production cycle. Over this one-year period, the viability of the seeds is reduced. Among the range of inputs, appropriate breeder, pre-basic, basic and certified seed as well as improved informal seeds such as quality declared seeds are vital for increasing yields and production. As stated in section 1.1., Liberia is awaiting the ratification of the Liberia Seed Development and Certification Agency Act, which would establish the SDCA as well as a National Seed Board that both ensure seed quality control, certification, marketing and the enforcement of seed regulations. The national responsible agencies to improve seed system development are MOA, MFDP, CARI, LACRA, LNSC and universities.

6.3.1 Rice seed production, supply and marketing system

Output 3.1.1.: Increased capacity of public institutions to regulate rice seed production, supply and marketing system

Liberia is lacking a proper system for planning and coordination of production and supply and marketing of all classes of seeds. The Seed Development and Certification Agency (SDCA) Act is key as it would establish the SDCA that has the power to coordinate, regulate, administer and realize seed development and certification activities in Liberia. Meanwhile, CARI is providing foundation and certified seeds to farmers in a limited amount and breeder seeds are obtained from Africa Rice and IFPRI. 1 kg of breeder seeds produces 50 kg a foundation seeds and further 1 kg a foundation seeds produces 70 kg of certified seeds. Local seed businesses are available and await accreditation in order to engage into the production and marketing of improved certified seeds.

The rice seed production, supply and marketing system is currently constrained by the following aspects:

- Outstanding legislation of the SDCA Act
- Limited irrigation systems and infrastructure for producing certified seeds
- Limited funding and access to credit
- Untimely provision of inputs (fertilizer and agro-chemicals)

Consequently, this subcomponent proposes the following strategic interventions:

- Political action to enact the SDCA Act into law and establish the SDCA which by its mandate (MOA 2016b) has to:
  - Analyze and formulate programs, policies and actions regarding seed development and the seed industry in general
  - Design an improved management system and procedures relating to the administration of the national seed board
  - Analyze the market and prices of seeds
  - Advise the national research system on the changing pattern of seed demand and farmers' needs

- Monitor and evaluate the achievement of the national seed system and recommend improvements thereof
- Encourage the formation or establishment of seed companies in Liberia for the purpose of carrying out research, production, processing and marketing of seeds
- Undertake advocacy for the seed sector and assist in mobilizing resources for the development of the national seed industry

- Increase access to credit for out-growers and seed companies to invest in seed production, supply and marketing
- Strengthen CARI's capacity in breeder and foundation seed provision
- Conduct youth inclusive gender sensitive capacity building in seed producing technology
- Promote elite varieties (NERICA L19, ARICA 2, IR841) and upland varieties (NERICA 8, 9, 12, 14) for adaptation of farmers

6.3.2 Varietal release mechanism for strategic genetic resource development

Output 3.2.1: Functional varietal release mechanism established

With the approval of the Liberia Seed Development and Certification Agency Act the National Seed Board will be established. Within this Board, a Variety Registration and Release Committee will be created. This Committee will be responsible amongst others to review and maintain the national variety list and to approve new varieties of seed; approve variety release and entry of seeds into the seed multiplication program; determine the varieties of seeds to be released, rejected and referred or outclassed; establish standards of varieties of seeds eligible for seed certification and to formulate the policy on allocation of seeds to growers for multiplication of seeds. In awaiting the passage into law, the MOA established the Committee and members are expected to be approved after ratification of the Act.

Seed system development is facing the following challenges:

- Future funding to support both the National Seed Council and the Varietal Release Committee
- Low level of public awareness on the benefit of high quality and certified seeds
- Lack of laboratories and green houses for seed development

Consequently, this subcomponent proposes the following strategic interventions:

- Financial and political support for the National Seed Council and the Varietal Release Committee
- Gender sensitive youth inclusive trainings on the advantages and use of certified seeds

6.3.3 Seed inspection and certification for quality control and assurance

Output 3.3.1: Adequate rice seed inspectors recruited, trained and deployed

Liberia's MOA has 40 trained seed inspectors; however, they have not been employed and do not work as seed inspectors. With the enactment of the Seed Development and Certification Agency Act, a National Seed Board has to be created with the function to contribute to the implementation regulations on seed quality control. Moreover, the SDCA shall have the sole authority to over seed control within Liberia. According the draft Act (2018:16), "Seed quality and control shall apply to all stages and venues of production from the farm to the producer's or distributor's storage facility,

which shall have previously been admitted for control. And all locally produced seeds or imported seeds shall be processed and tested through an established and commissioned seed laboratory to ascertain that they meet the standards set".

Seed inspection and certification faces the following challenges:

- Limited number of seed inspectors
- Limited capacity of seed inspectors
- Limited funding for training and hiring further seed inspectors

Consequently, this subcomponent proposes the following strategic interventions:

- Political action to translate the Seed Development and Certification Agency Act into law and establish the SDCA
- Employ trained seed inspectors
- Conduct gender sensitive youth inclusive training in seed inspection

6.3.4 Engaging the private sector in seed production

Output 3.4.1: Effective registration system for private sector rice seed production established

Output 3.4.2: Private sector capacity for rice seed development increased

Currently, Liberia has approximately five organized seed companies and a range of out-grower groups. MOA's SAPEC project trained 500 rice out growers in paddy or seed production.

The private seed sector development faces the following challenges:

- The SDCA Act has not been passed into law to regulate the private seed sector and create the enabling environment
- The existing seed companies are unregistered
- Limited number of trained seed scientists and technicians

Consequently, this subcomponent proposes the following strategic interventions:

- Political action for passage of Seed Development and Certification Agency Act into law and consequent establishment of guidelines for private sector participation in certified seed production
- Incentivize private sector participation in seed production
- Youth inclusive gender sensitive training of seed scientists, technicians and inspectors to assist and monitor private sector
- Support for private seed companies (access to finance, purchasing tools and agro-chemicals)

6.4 Strategic component 4: Transportation and quality assurance

Outcome 4: Higher quality and reduced post-harvest losses through increased utilization of improved post-harvest technologies and practices among rice value chain actors

This component focuses post-harvest technology, infrastructure as well as the role of the public and private sector in improving post-harvest handling. Moreover, grading and quality assurance, the strengthening of price competitiveness and the streamlining of the rice value chain are addressed in detail. As already stated in section 3.2, the agricultural sector and so also the rice sector face the

challenge of weak infrastructure, especially the poor road network and limited rural electrification. This constrains transportation of harvest from the farm to the market or to processing facilities.

The following institutions are responsible for the realization of this component: MOA, MFDP, MOCI, MPW, Environmental Protection Agency (EPA), Liberia Electricity Corporation (LEC)/Rural Renewal Energy Agency (RREA) and LACRA.

6.4.1 Rural road development and management

Output 4.1.1: Increased conductivity and quality of farm to market roads in rice producing counties

Liberia has a road network of 11,423 km, which is quite substantial; however, the quality of the roads is a problem (World Bank 2018a). Currently, the major road corridors are from Monrovia to Ganta/Gompa City and from Monrovia to Buchanan. 60% of the unpaved roads are in a bad condition and 2.3 million people in Liberia are not connected to the good road network, with the rice producing county Lofa being among the least connected (idem). Non-existent or poor roads creates challenges for adequate transportation of inputs and farm produce to processing facilities. Consequently, the GOL through the MPW strongly focuses on road development, with support of DP. Agriculture projects in the past have been incorporating road construction and rehabilitation, such as the World Bank's SAPEC project.

Rural road development and management is currently constrained by the following aspects:

- Limited public financial resources and capacity to invest in road development and management including maintenance and monitoring
- Limited availability of equipment for road construction and management
- Limited organizational capacity of the public sector

Consequently, this subcomponent proposes the following strategic interventions:

- Conduct a needs assessment to prioritize the construction and rehabilitation of farm to market roads in rice producing counties
- Construct, rehabilitate and maintain farm to market roads in rice producing counties
- Facilitate importation of road equipment
- Conduct gender sensitive youth inclusive training for operators of road equipment

6.4.2 Rural electrification development and management

Output 4.2.1.: Quality rural electricity infrastructure increased in rice producing counties

Around 4.9-12% of the population have access to electricity (World Bank 2018b, USAID 2018) apart from Monrovia, mostly in Nimba, Grand-Gedeh and Maryland. Rural electrical infrastructure is dilapidated in some counties and rural electrification programs are partially unfunctional. In the past years, however, LEC's capacity has been enhanced and the GOL aims to connect 70% of the population until 2030 (USAID 2018). Electrification is key in post-harvest handling, especially processing.

Rural electrification is currently constrained by the following aspects:

- Limited public financial resources to develop and manage rural electrification

- Limited private sector participation in the development and management of rural electrification
- Limited organizational capacity of electricity providers

Consequently, this subcomponent proposes the following strategic interventions:

- Conduct needs assessment to prioritize the development and management of electrification in rice producing counties
- Support the public electrification strategy and create the enabling environment for private sector participation
- Increase political support to enhance organizational capacity of electricity providers
- Promote PPPs for expanding rural electrification
- Promote the utilization of locally produced materials for the development and management of rural electrification infrastructure
- Promote the introduction of renewable energy and solar panels in rice processing communities

6.4.3 Post-harvest storage and warehouse development and management

Output 4.3.1: Appropriate and accessible warehousing and storage in rice producing counties in place

Currently, storage and warehousing facilities are available in almost all of the 15 counties, ranging from one to four per county. However not all of them are functional. WFP has been funding 23 warehouses equipped with mills that work as community grain reserves since 2010 (WFP n.d.). In the lean season, they lend out cleaned rice while farmers pay back in paddy rice after harvest. Otherwise, rice is often stored in the household itself.

The challenges regarding the post-harvest storage and warehouse development and management are the following:

- Limited availability of storage and warehouses
- Limited community involvement when constructing warehouses and storage facilities and consequent low interest in maintenance and management
- Limited public organizational capacity and involvement to adequately support construction and maintenance of warehouses and storage facilities

Consequently, this subcomponent entails the following strategic interventions:

- Identify active and inactive warehouses, reasons for inactiveness and measures for reactivation
- Identify rice producing communities without access to storage facilities
- Support the construction of large centrally located warehouses and smaller storage in rice producing communities
- Increase community involvement when constructing and planning maintenance and management
- Increase private sector involvement in high quality maintenance and management of all warehouses and storage facilities

6.4.4 Post-harvest process

Output 4.4.1: Accessibility to appropriate improved rice post-harvest technologies increased

Output 4.4.2: Rice value chain actors' capacity to use appropriate quality post-harvest technologies increased

Output 4.4.3: Private sector capacity to engage in post-harvest activities along the rice value chain increased

Output 4.4.4: Organizational capacity of public sector to promote post-harvest management along the rice value chain increased

Post-harvest rice handling includes harvesting, winnowing, drying facilities, threshing, de-stoning, scaling, milling and bagging. Only few machineries for these processes are currently available in Liberia, and the few that are available function on low capacity. In the villages, drying takes place in the open, exposing the rice to contamination and waste, before the grains are mechanically or manually husked (World Bank 2019a). Among the farmers, there is an advanced knowledge in the use of relatively simple machinery, while there is less knowledge on the usage of advanced post-harvest technology. Among the simple machinery, mills lead to a high level of breakage, reducing its value on the market (idem). A few knowledgeable operators and maintenance specialists are available in country.

Currently, the number of private sector actors engaged in post-harvest management is relatively small. As mentioned in section 2.4., there are three major established commercial rice processors (Fabrar Rice, AIIC, SEDC) besides small groups processing on a limited scale. As a total of output for processed rice, these main rice processors may only account for less than 2% of the yearly milled rice in Liberia (World Bank 2019a). Moreover, the distribution network of domestic rice is separate from the one of imported rice, smaller and with less access to credit, resulting in relatively lower competitiveness (idem).

Currently, challenges regarding the use of post-harvest technologies are as follow:

<u>Overall availability of technology</u>

- Limited availability of appropriate technologies in country
- Limited accessibility of farmers and cooperatives to appropriate technologies
- Limited knowledge to adequately use and maintain post-harvest machinery and manual handling

<u>Public sector capacity to promote and support</u>

- Little technical guidance and support for the private sector in post-harvest management
- Limited access to finance to establish and expand post-harvest actions
- Limited knowledge and motivation of private actors to engage in post-harvest management
- Poor infrastructure limiting appropriate post-harvest management

<u>Private sector uptake capacity</u>

- Limited organizational, technical, and financial capacity of the public institutions to formulate, realize and implement appropriate policies and strategies

- Vested interests in direct engagement of the government in post-harvest management
- Financial constraints to train extension officers and specialists in post-harvest management

Consequently, this subcomponent entails the following strategic interventions:

Overall availability of technology

- Duty free importation of post-harvest technology
- Establish rice hubs for aggregating post-harvest activities
- Encourage PPPs to import post-harvest machinery and sell it at affordable prices
- Encourage PPPs to develop and produce local post-harvest machinery

Public sector capacity to promote and support

- Conduct gender sensitive trainings for public extension officers and organize knowledge transfers to users of post-harvest technology
- Political support and action to appropriately organize public structures to effectively and efficiently enact policies, strategies and coordination frameworks including M&E
- Establish a support mechanism (division or mandate) in the MOA to establish a public lending mechanism in post-harvest technology
- Increase communication and collaboration among MACs

Private sector uptake capacity

- Conduct gender sensitive trainings for private sector users of post-harvest technology
- Enhance public support through policy guidance and the creation of enabling environment for post-harvest management
- Increase capacity of private sector through gender sensitive youth inclusive trainings in post-harvest management
- Enhance collaboration and coordination among DP, public and private sector for post-harvest management
- Organize processors and aggregators to increase sector coordination and knowledge spill overs
- Support domestic rice distribution network to increase competitiveness
- Train male and female rice farmers in business skills

6.4.5 Quality assurance and grading

Output 4.5.1: Functioning laboratories and capacitated scientists and technicians for quality assurance and grading in place

Currently, there is no quality assurance and grading system in place. There is currently one laboratory with technicians for quality testing and grading in Liberia, however their capacity is limited.

Post-harvest quality assurance and grading has been facing the following challenges:

- Limited organizational, technical and financial capacity of the government to establish a quality assurance and grading system
- Limited information about quality assurance and grading among rice value chain actors

Consequently, this subcomponent proposes the following strategic interventions:

- Political support and action to appropriately organize public structures to effectively and efficiently establish a grading system
- Build and equip four laboratories including trained male and female operating personnel for quality assurance and grading
- Improve the information framework to educate the end user on rice quality assurance and grading

6.5 Strategic component 5: Policy, institutional framework and coordination

Outcome 1: Improved policies, strategies, governance and financing mechanisms that ensure a competitive rice sector

The policy and institutional framework to effectively support rice development has not been developed. Governance and policy for the sector is fragmented, and important reforms such as the Land Rights act have not been fully implemented. Previous rice policies and strategies, such as NRDS1 were not implemented. The voice of all rice stakeholders is not always fully reflected in policy processes. This is also reflected in the fact that some other policy efforts undertaken by the Government, such as trade and tariff reform, are not always undertaken in a way that accommodates the interest of the domestic rice industry.

This component deals with the establishment of the institutional and policy environment conducive to the rice sector. Agencies responsible for this component are MOA, MOCI, MFDP, the Rice Federation, LACRA, CDA and the National Rice Platform as a whole as mentioned in section 7 (implementation structure).

6.5.1 Land rights

Output 5.1.1: Land reform implemented

A major barrier to growth of the rice-based economy is implementation of land rights legislation. As previously noted, the Land Rights Act was passed in 2018 and implementation is currently ongoing although at a very slow pace. The Land Authority started educating the population about the new Act and identifying and registering land (**private, customary, public and government land**) through their county offices.

Challenges of strengthening the enabling business environment:

- Limited financial and technical capacity to implement the Land Rights Act

Consequently, this subcomponent focuses on the following strategic interventions:

- Promote the land authority's work in identifying and registering land related instruments
- Enforce the Land Rights Act

6.5.2 Institutional framework for the rice sector

Output 5.2.1: Functional and capacitated rice sector coordination mechanisms in place

The institutional framework of the Liberian rice sector is weak, facing a series of challenges. LASIP II emphasizes the importance of value chain working groups and monthly sector coordination meetings with the relevant stakeholders. The structure of the rice sector working group is in place; however, since the government transition period of 2017/18, the group has not been active. The main rice association is the non-governmental National Rice Federation, which was established in 2017 under the umbrella of the Regional Rice Federation, an ECOWAS framework. The National Rice Federation is currently in the process of establishing a national rice producers' association (including the cooperatives), a national rice processors' association, and a national rice aggregators' association as well as linking these associations with the existing Agro-dealers' Association.

The institutional framework for the rice sector faces the following challenges:

- Little effective communication and flow of information between public institutions and the rice sector
- Weak coordination between public institutions and the rice sector
- Limited organizational, technical and financial capacity of the government to streamline rice value chain
- Limited funding of the National Rice Federation to establish subgroups and support rice value chain actors

Consequently, this subcomponent proposes the following strategic interventions:

- MOA establishes and leads an effective National Rice Platform (see section 7) including MOCI, MFDP, Ministry of State, LACRA and CDA with the responsibility of overseeing the implementation of this strategy, actively promoting the interests of the rice sector, and ensuring that the interests of the sector are represented in other policy processes
- Establish and fill the post of a rice desk officer at the MOA who in collaboration with the Director of Sector Coordination:
    - reactivates a proactive rice sector working group
    - communicates and collaborates with the rice sector working group and the National Rice Federation
    - coordinates the rice sector working group and the National Rice Federation
- Support the National Rice Federation in the process of establishing the Federation's subgroups

7. Implementation Structure

The implementation structure of NRDS II is the following: As graph 1 demonstrates, on top level is the high level National Rice Platform led by the Minister of Agriculture and including the Minister of Commerce and Industry, the Minister of Finance and Development Planning, Ministry of State, Liberian Agricultural Commodity Regulatory Authority (LACRA) and Cooperative Development Agency (CDA) with the responsibility of actively regulating rice production and imports. They meet quarterly. Reporting to the National Rice Platform, the Steering Committee is comprised of main technicians from the MOA, Ministry of Finance and Development Planning (MFDP), Ministry of Internal Affairs (MIA), MOCI, MPW, CARI, EPA, Liberia Land Authority (LLA), the National Rice Federation and the Farmer Union Network. This Committee meets quarterly. A key role within this Steering Committee plays the Rice Desk Officer[8], located in the Crop Resource Division, and the Director for Policy from the Department of Planning and Development. In close collaboration with the National Rice Federation, they are to organize meetings of the Steering Committee and take all necessary steps to implement projects: set up a project formulation and design committee, organize resource mobilization and financing, M&E and the mid-term review. They equally communicate with and receive input from the Agriculture Coordination Committee, the Agriculture Donor Working Group and especially the Rice Sector Technical Working Group, which is facilitated by the Director for Sector Coordination in times that no Rice Desk Officer is employed. Major outputs are a National Annual Operational Plan (NAOP), from which concept notes will be developed for resource mobilization and implementation.

[8] see the Rice Desk Officer Terms of Reference in Appendix 1

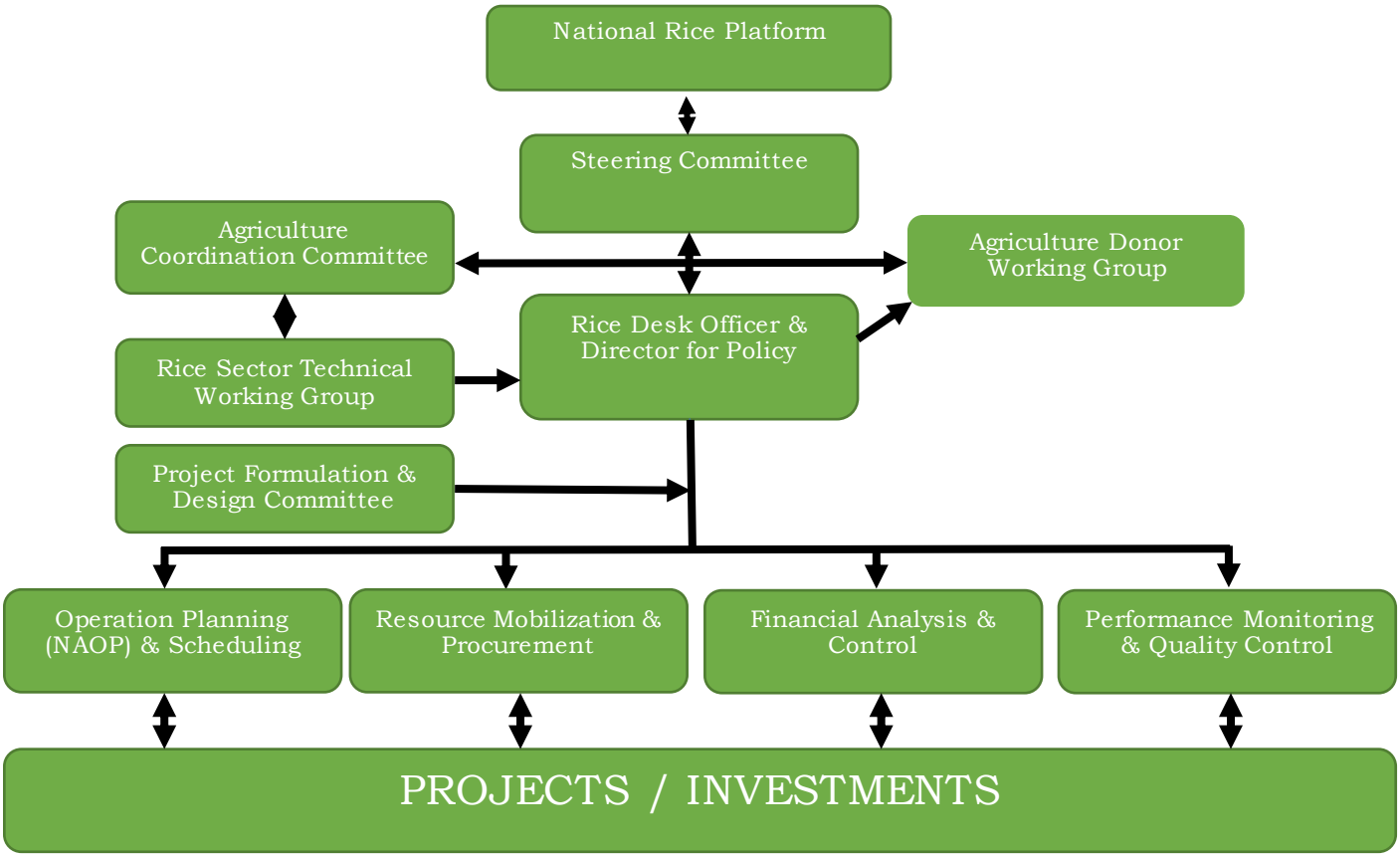

Figure 1: Implementation Structure

8. Monitoring & Evaluation (M&E) Framework

8.1 NRDS M&E and Institutional Arrangements

The successful implementation of the NRDS II requires a multi-stakeholder approach to both implementation and monitoring of progress. Effective monitoring of the Strategy demands the active involvement of the key actors– private and public and other relevant DP– in the rice sub-sector in Liberia. However, the public sector institutions must take the lead role of coordinating and partnering with relevant stakeholders to effectively monitor and evaluate progress. This is the duty of the MOA in collaboration with other institutions.

M&E of the NRDS will be undertaken at both the national and local levels i.e. counties to districts, collaboratively. Organized by the Rice Desk Officer and Policy Director of MOA, led by the M&E Director of MOA and supported by the National Rice Federation, the NRDS will be collaboratively monitored by institutions represented in the steering committee (MOA, MOCI, MIA, MPW, CARI, EPA, LACRA, LLA, the National Rice Federation and the Farmer Union Network) as well as rice cooperatives, DP, civil society in the agricultural sector, the media and financial institutions including the decentralized agencies of these institutions.

Led by MOA's M&E Director, the Steering Committee will define a National Annual Operational Plan (NAOP) for the NRDS. This plan will form the guiding operational framework for all the relevant stakeholders involved in the NRDS implementation. The NAOP should be linked to the NRDS and the associated action plan. The NAOP will outline the concept notes to be developed for implementing the NRDS.

M&E at the national level will focus on progress tracking underpinned by realistic indicators that are informed by verification means and relevant assumptions. At the start of the implementation of NRDS, baseline studies are undertaken to ascertain the present status of indicators against which progress will be monitored. Given the inadequacy of baseline data for the defined indicators, a baseline study is a ***sine qua non*** for effective monitoring of the NRDS (Table 7 Results Framework). At the counties and district levels, monitoring will focus on operations and implementation i.e. inputs, activities and outputs, and results i.e. outcomes and impact.

8.2 M&E Reporting

The reporting system for the NRDS will be guided by the principles of bottom up, subsidiarity and complementarity where the lowest administrative unit reports to the next higher unit up to the national level. At the national and local levels, M&E reporting of progress of the NRDS will be done as follow:

- Biannual Progress Report: This will be completed in December, the middle of each financial year over the plan period.
- Annual Progress Report: This will be completed in July, the end of each financial year over the plan period.

- Mid-Term Progress Review: This will be completed in half-way through the plan period. That is in 2025;
- Impact Assessment: This is the ex post evaluation of the implementation (i.e. assessing the implementation process to see whether the strategy worked as planned and the lessons learned) and impact evaluation of the strategy to ascertain whether the goal is achieved.

The M&E Division of the MOA is responsible for these Reports, working closely with the Rice Desk officer, the National Rice Federation, agricultural district and county staff and DP.

8.3 M&E Guiding Principles

M&E of the NRDS will be undergirded by the following principles:

- Bottom-up, Subsidiarity and Complementarity: Monitoring and reporting is from the local level to the national level based on the organizational capacity administrative units while local and national level support each other where the need be.
- Completeness: this involves content and geographical completeness. All programmes, projects and activities under the NRDS are comprehensively monitored and reported, and the administrative units and locations within the country are monitored and reported effectively.
- Collaboration and Partnership: all relevant MACs work collaboratively and in partnership with DP and private, non-state actors.
- Participation and Inclusiveness: all relevant actors participate in the planning and implementation of the NRDS. Efforts be made to achieve gender parity and youth inclusiveness.
- Flexibility: throughout the plan period, structures are adaptable and relevant to the changing times and environment while maintaining high level of performance.
- Timeliness: implementation and reporting be timeous and consistent
- Harmonization and Consistency: strategies, indicators, baselines, targets and outcomes across local and national levels are consistently set and harmonized.

8.4 Results Framework

Monitoring and evaluation of the NRDS will be informed by the following results framework (table 7).

Table 3: Results Framework

Indicator	Baseline	Target (2030)	Monitoring Method	Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
GOAL: To increase current level of rice production by five-fold by 2030								
Quantity (mt) of national paddy rice produced	278,600 MT	1,343,553.2 MT	Studies/survey, secondary data	FAOSTAT, HIES, agriculture surveys	Biennially	MOA	C4	P2
Quantity (mt) of national paddy rice produced on irrigated fields	N/A	636,755.82 MT	Studies/survey	HIES, agriculture surveys	Biennially	MOA		
Quantity	N/A	477,565.35	Studies/survey	HIES,	Biennially	MOA		

Indicator	Baseline	Target (2030)	Monitoring Method	Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
(mt) of national paddy rice produced on rain fed lowland fields		MT		agriculture surveys				
Quantity (mt) of national paddy rice produced on upland rain fed fields	N/A	229,232 MT	Studies/survey,	HIES, agriculture surveys	Biennially	MOA		
Total area (ha) cultivated	214,082,000 HA	424,503,870 HA	Studies/survey, secondary data	FAOSTAT, HIES, agriculture surveys	Biennially	MOA		
Irrigated area (ha)	N/A	106,125,970	Studies/survey,	HIES, agriculture	Biennially	MOA		

Indicator	Baseline	Target (2030)	Monitoring Method	Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
cultivated		HA		surveys				
Rainfed lowland area (ha) cultivated	N/A	191,026,140 HA	Studies/survey,	HIES, agriculture surveys	Biennially	MOA		
Rainfed lowland area (ha) cultivated	N/A	127,351,160 HA	Studies/survey,	HIES, agriculture surveys	Biennially	MOA		
National average yield (mt/ha) of rice	1.3 MT/HA	3.1 MT/HA	Studies/survey, secondary data	HIES, agriculture surveys	Biennially	MOA		
Average yield of rice cultivated on	N/A	6.0 MT/HA	Studies/survey, secondary data	HIES, agriculture surveys	Biennially	MOA		

Indicator	Baseline	Target (2030)	Monitoring Method	Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
irrigated fields								
Average yield of rainfed low land rice	N/A	2.5 MT/HA	Studies/survey, secondary data	HIES, agriculture surveys	Biennially	MOA		
Average yield of rice produced on rainfed upland fields	N/A	1.8 MT/HA	Studies/survey, secondary data	HIES, agriculture surveys	Biennially	MOA		

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
Strategic Component 1 **Outcome 1: An efficient, structured and competitive domestic rice value chain in which all stakeholders participate on an equitable basis**								
Output 1.1.1: Increased investment by the private sector in the rice value chain	% of millers reporting increased investment in previous period	n/a	**50%**	MOA biannual rice sector survey	Biannual	MOA		
Output 1.2.1: Increased investment by producers in intensive rice production	% of rice farmers reporting investment in agricultural intensification in previous period	n/a	**50%**	MOA biannual rice sector survey	Biannual	MOA		
Output 1.2.2: Increased volumes of paddy being	Annual national paddy production (MT)	278,600 MT	1,343,553.2 MT	FAOSTAT, HIES, agriculture surveys	Biennially	MOA	C4	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar				
produced												
Output 1.3.1: Transaction costs within the domestic value chain are reduced	Average % difference between farmgate price and Monrovia market price	8.2%	4%	MOA price surveys	Biennially	MOA						
Output 1.3.2: Proliferation of out grower and contract farming arrangements	Average % of millers/wholesalers reporting intention to enter into purchase contracts with rice farmers			-		25%		MOA biannual rice sector survey	Biannual	MOA		
Output 1.3.3: Private sector stakeholders regularly participate in the development of rice sector policy	No. of workshops, meetings or other events in which rice private sector entities input into development of policy, strategy, regulations or law related to rice			1		4		MOA reports	Biannual	MOA		

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar	
Output 1.4.1: Appropriate and functional financing schemes available for rice farmers and value chain actors	Percentage of rice value chain operators accessing loans (farmers, aggregators and processors), disaggregated by gender	N/A	25% of male operators; 25% of female operators	Surveys, administrative records	Biennially	MOA in collaboration with CBL, MFDP		C2	P2
	Numbers of innovative rice sector financing schemes designed, piloted and implemented	N/A	5	Surveys, administrative records	Biennially	MOA in collaboration with CBL, MFDP			

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Indicator	Corresponding PAPD Pillar
Strategic Component 2: **Outcome 2: Innovative rice production technologies developed, piloted and adopted by rice value chain actors for sustained rice value chain development**								
Output 2.1.1: Functioning and capacitated Seed Development and Certification Agency established	Existence of Seed Development and Certification Agency	Not existing	Existing	Reports, administrative and research records	Biennially	MOA	C5	P2
	Quantity and varieties of rice seeds developed, piloted, certified and disseminated	3	5		Biennially	MOA in collaboration with CARI	C4	
Output 2.1.2: Human resources to develop, conserve and produce rice varieties enhanced	Number of researchers and technicians trained on developing, conserving and producing rice varieties, disaggregated by gender	20	100 (60 male and 40 female)	Reports, administrative and research records	Biennially	MOA in collaboration with CARI	C3	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Indicator	Corresponding PAPD Pillar
Output 2.2.1: Increased accessibility to appropriate agricultural mechanization and water control technologies for rice production	Number of mechanization outlets in country	N/A	33	Reports, administrative records, field visits	Biennially	MOA in collaboration with MOCI, Liberian Business Association (LIBA)	C2, C4	P2
	Number of water control technology outlets in country	N/A	33	Reports, administrative records, field visits				
	Percentage of rice farmers with access to water technology, disaggregated by gender	N/A	50% of male farmers, 40% of female farmers	Surveys, Reports, administrative records		MOA		
Output 2.2.2: Increased capacity to use agricultural mechanization and water control	Percentage of farmers with access to agricultural machinery for rice production, disaggregated by gender	N/A	50% of male farmers, 40% of female farmers	Surveys, Reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation	C2, C4	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Indicator	Corresponding PAPD Pillar
technologies for rice production	Percentage of farmers effectively using water control technologies for rice production, disaggregated by gender	N/A	45% of male farmers, 40% of female farmers	Surveys, Reports, administrative records				
Output 2.3.1: Functional and capacitated soil testing laboratories for rice production established	Existence of functioning soil testing laboratories	0	7	Reports, administrative records	Biennially	MOA in collaboration with CARI		P2
	Number of qualified technicians working in soil testing laboratories, disaggregated by gender	N/A	20 male, 15 female	Reports, administrative records			C3	
Output 2.3.2: Farmers knowledge on soil health and fertility management	Percentage of farmers trained on soil health and fertility management, disaggregated by gender	N/A	45% of male farmers, 40% of female farmers	Reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation	C3, C4	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Indicator	Corresponding PAPD Pillar
increased								
Output 2.4.1: Increased accessibility to appropriate agrochemicals for rice pest control and disease management	Number of agrochemical outlets with agrochemicals for rice pest control and disease management in country	N/A	75	Reports, administrative records, field visits	Biennially	MOA in collaboration with MOCI, LIBA	N/A	P2
Output 2.4.2: Increased capacity of rice farmers in pest control and disease management	Percentage of farmers trained on pest control and disease management, disaggregated by gender	N/A	45% of male farmers, 40% of female farmers	Reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation	C3	P2
Output 2.5.1: Adequate extension workers and advisory personnel	Number of extension workers recruited, trained and deployed, disaggregated by gender	Male: 77; Female: 13	Male: 300; Female:200	Reports, administrative records	Biennially	MOA	C3	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Indicator	Corresponding PAPD Pillar
recruited, trained and deployed								
Output 2.6.1: Organizational capacity of rice cooperatives, farmer groups and producer organizations improved	Number of rice cooperatives, farmer groups and producer organizations which have received capacity enhancement training	31	60	Reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation	C5	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
Strategic Component 3 **Outcome 3: Certified quality and appropriate rice seeds produced, disseminated and adopted for increased production**								
Output 3.1.1: Increased capacity of public institutions to regulate rice seed production, supply and marketing system	Number of Seed Development and Certification Agency's personnel trained on seeds regulation, disaggregated by gender	0	15	Reports, administrative records	Biennially	MOA in collaboration with SDCA	C5	P2
	Number of seed rice regulatory mechanisms developed and implemented	0	2	Reports, administrative records				
Output 3.2.1: Functional varietal release mechanism established	Functional varietal release mechanism in place	Not in place	In place and functioning	Reports, administrative records	Biennially	MOA in collaboration with SDCA	C5	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
Output 3.3.1: Adequate rice seed inspectors recruited, trained and deployed	Number of rice seed inspectors recruited, trained and deployed	0	80	Reports, administrative records	Biennially	MOA	N/A	P2
Output 3.4.1: Effective registration system for private sector rice seed production established	Existence of registration system for private sector seed rice production	Not existing	Existing and functioning	Reports, administrative records	Biennially	MOA in collaboration with MOCI and LIBA	C2	P2
	Number of rice seed companies registered	N/A	15	Liberian Business registry				
Output 3.4.2: Private sector capacity for rice seed development increased	Number of private sector actors supported to effectively develop seed rice, disaggregated by gender	N/A	15	Reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation	C3	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
Strategic Component 4 **Outcome 4: Reduced post-harvest losses through increased utilization of improved post-harvest technologies and practices among rice value chain actors**								
Output 4.1.1: Increased connectivity and quality of farm to market roads in rice producing counties	Km of farm to market road constructed in rice producing counties	N/A	1000	Surveys, field visits, reports, administrative records	Biennially	MOA in collaboration with MPW	C2	P2
	Km of farm to market road rehabilitated in rice producing counties	N/A	500	Surveys, field visits, reports, administrative records				
Output 4.2.1: Quality of rural electricity infrastructure increased in rice producing counties	Percentage of households with access to electricity in rice producing counties	N/A	25	Surveys, field visits, reports, administrative records	Biennially	MOA in collaboration with MPW	C2	P2
Output 4.3.1: Appropriate and accessible	Number of appropriate warehouses available	N/A	50	Surveys, field visits, reports, administrative	Biennially	MOA in collaboration	C2	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
warehousing and storage in rice producing counties in place	in rice producing counties			records		with MPW		
Output 4.4.1: Accessibility to appropriate improved rice post-harvest technologies increased	Number of rice post-harvest technologies developed and disseminated	N/A	10	Surveys, reports, administrative records	Biennially	MOA in collaboration with research institutions	C4	P2
	Percentage of farmers using improved rice post-harvest technologies, disaggregated by gender	N/A	70% of male farmers, 60% of female farmers	Surveys, reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation		
Output 4.4.2: Rice value chain actors' capacity to use appropriate quality post-harvest technologies	Percentage of rice value chain actors trained on post-harvest technologies, disaggregated by gender	N/A	45% of male farmers, 40% of female farmers	Reports, administrative records	Biennially	MOA in collaboration with the National Rice Federation	C4	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
increased								
Output 4.4.3: Private sector capacity to engage in post-harvest activities along the rice value chain increased	Number of private sector actors supported to undertake post-harvest activities, disaggregated by gender	N/A	50	Surveys, field visits, reports, administrative records	Biennially	MOA in collaboration with MOCI and the National Rice Federation	C2, C4	P2
Output 4.4.4: Organizational capacity of public sector to promote post-harvest management along the rice value chain increased	Number of extension and advisory service personnel trained on rice post-harvest management, disaggregated by gender	Male: 3; Female: 1	Male: 150; Female: 100	Reports, administrative records	Biennially	MOA	C3	P2
Output 4.5.1: Functioning laboratories and	Number of laboratories for quality assurance and	1	5	Surveys, field visits, reports, administrative	Biennially	MOA in collaboration	C3	P2

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
capacitated scientists and technicians for quality assurance and grading in place	grading			records		with CARI		
	Number of scientists and technicians with capacity for quality assurance and grading, disaggregated by gender	N/A	25	Surveys, reports, administrative records				

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
Strategic Component 5 **Outcome 5: Improved policies, strategies, governance and financing mechanisms that ensure a competitive rice sector**								
Output 5.1.1: Land rights act effectively implemented and enforced	Percentage of landowners who have registered their lands	N/A	70	Reports, administrative records	Biennially	MOA in collaboration with LLA, MIA, MOJ, Center for National Documents Records and Archives (CNDRA)	C1, C4	P3
	Number of land-related conflicts	288	30					
Output 5.2.1: Functional and capacitated rice sector coordination mechanisms in place	Functioning of rice sector coordination mechanisms that adopt a multi-stakeholder approach to organizing and coordinating sector issues	1	3	Reports, administrative records	Biennially	MOA	C2, C5	P2
	Number of meetings	0	4					

Output	Indicator	Baseline	Target (2030)	Monitoring Method & Data Sources	Frequency of Monitoring	Responsible Agency	Corresponding LASIP II Component	Corresponding PAPD Pillar
	of National Rice Platform held per year							
	Number of meetings of Rice Sector Technical Working Group held per year	0	4					
	Number of subgroups of National Rice Federation established	3	6			MOA in collaboration with the National Rice Federation		

Table 10: NRDS2 results framework

7. Financing Strategy

The GOL and especially the MOA drive the implementation of NRDS II together with the private sector lead by the National Rice Federation. Consequently, available public resources will be directed to the realization of the different components. Adhering to the CAADP guidelines reinforced by the Malabo declaration 2014, 10% of the government budget should be allocated to the agricultural sector. As, however, sectoral allocation to agriculture has not passed 2% within the last five years (MOA Budget Division) and overall public finances are limited, the NRDS II will need support from the private sector and DP. The MOA and especially the steering committee play a central role in seeking this financial support through the formulation and dissemination of concept notes and in harmonizing investments into the rice sector.

PPPs have the advantage that the private company not only brings the necessary funds, but also business know-how and experience, skills as well as technology. Such that the Liberian rice sector and its value chain actors however genuinely profit from PPPs, contracts have to be well-designed and enforced. The following issues should be well considered: thorough entry regulations for international companies; the creation of employment opportunities; transfer of technology and R&D; welfare of local farmers and communities; production and possibly output sharing; distribution of revenues; local procurement of inputs; requirements of target markets; development of agriculture - related infrastructure and environmental protection (UNCTAD 2009). The GOL is responsible to ensure that PPPs benefit Liberian rice farmers, processors and consumers.

Likewise, the MOA is responsible for harmonizing, monitoring and evaluating investments into the rice sector conducted by DP and NGOs. The steering committee is responsible to ensure DP and NGO finances are effectively and sustainably spent and budget is allocated to M&E.

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Appendix 1

Terms of Reference – Rice Desk Officer (m/f) at Ministry of Agriculture, Republic of Liberia

Organizational Setting

The Ministry of Agriculture (MOA) of the Republic of Liberia has the mandate to develop the agriculture sector. It has to establish and maintain an effective organizational structure and hire staff capable of planning, coordinating, implementing, monitoring and evaluating agricultural development policies, strategies and programs. The Organization must ensure that its staff and the farmers are trained to address the challenges of developing the agriculture sector.

In addition, MOA has to ensure that agricultural challenges impeding production are investigated and lasting solutions found, and the farmers and private sector actors are provided with the supportive services and the enabling environment to produce, process and market their products.

No staff specialized on rice in currently employed in the MOA and hence the position of a Rice Desk Officer is key to support the development of the rice sector.

Background

Through an inclusive stakeholder process, the MOA developed the second generation of the National Rice Development Strategy (NRDS II) in 2019. The strategy builds on the lessons learned of NRDS I (2012 – 2018) with an improved implementation structure. The Rice Desk Officer will be the key person to drive the implementation from the MOA side, strongly collaborating with the National Rice Federation, as the private sector is the key actor to implement the strategy.

The NRDS II has the following four components: (i) Overall policy, institutional framework, and coordination mechanisms for rice development; (ii) Research, technology adoption and capacity building; (iii) Seed system development and (vi) Post-harvest and rice marketing.

Based on the NRDS II implementation structure, the Rice Desk Officer is the main organizer of the NRDS II steering committee and has oversight of the implementation of NRDS II and other developmental activities in the rice sector.

Reporting Lines

The Rice Desk Officer works under the overall guidance and reports to the Director of the Crops Resource Division. The Officer works in close collaboration with the Policy Director and the Director for Sector Coordination of the Department of Planning and Development.

Task and Scope of Work

The Rice Desk Officer is assigned the following tasks and responsibilities:

- Communicate and raise awareness on the existence and implementation of NRDS II within the public sector and the general public, especially the private sector and among development partners
- Implement NRDS II in collaboration with the Policy Director and the Director for Sector Coordination:
    - Constitute and chair the NRDS II Steering Committee with a co-chair from the National Rice Federation

- Reactivate and chair the Rice Sector Technical Working Group
- Constitute a project formulation and design committee
- Organize resource mobilization and financing
- Organize regular M&E and mid-term review in collaboration with the Director for M&E of the Department of Planning and Development
- Lead the formulation and execution of a National Annual Operational Plan
- perform further tasks for the implementation of NRDS II and the strengthening of the rice sector

- Once implementation is completed, organize and conduct an impact assessment in collaboration with the Director for M&E
- Based on NRDS II impact assessment, initiate NRDS III/ further steps necessary to develop and support the rice sector

Required qualifications

- Minimum Requirements
  - Masters education in agricultural sciences, economics, business, international development, international relations or related field
  - Relevant experience in working on the rice sector and on the rice value chain
  - Relevant experience in value chain development, agribusiness, business, agricultural economics, economics, food systems, and/or digital technologies for value chain development
  - Working knowledge of English
- Technical/Functional Skills
  - Extent and relevance of experience in agricultural economics, agribusiness, food systems, value chain development, development economics and rice value chain development in particular
  - Ability to plan and organize own work, deliver results and meet deadlines
  - Ability to write clear and concise technical documents
  - Excellent oral and written communication and presentation skills
  - Ability to perform well in cross-disciplinary teams
  - Work experience with projects funded by international donors
  - Excellent interpersonal and cross-cultural communication skills
  - Ability to identify issues, analyze and participate in the resolution of issues/problems
  - Knowledge and experience in results-based management, development and implementation of budgets, preparation of technical and financial reports, and monitoring and evaluation