



**THE GAMBIA NATIONAL RICE DEVELOPMENT STRATEGY
(NRDS II - 2022 – 2030)**



THE MINISTRY OF AGRICULTURE

**PREPARED UNDER THE TECHNICAL GUIDANCE OF THE COALITION
FOR AFRICAN RICE DEVELOPMENT (CARD)**

FUNDED BY THE ISLAMIC DEVELOPMENT BANK (IsDB)

APRIL 2022

ACKNOWLEDGEMENTS

A large number of institutions and individuals in different capacities contributed to the successful development of the Second National Rice Development Strategy (NRDS II).

First of all, the Ministry of Agriculture (MOA) is very grateful to the Islamic Development Bank (IsDB) for funding the process of revising the NRDS1 and updating it to NRDS II. The leadership roles played by the National Agriculture Research Institute (NARI) and the National Seed Secretariat (NSS) in the organization and development of this strategy are highly recognized and well appreciated.

Secondly, the members of the reviewing team who came from different institutions under the MOA have taken time to thoroughly review and update the strategy. Their collective effort is what yielded the insightful information contained in the document. The Ministry, therefore, acknowledges their contributions and is very grateful for their efforts. Special mention must be made of the two rapporteurs, Mr. Jerro Maane and Dr. Lamin B. Sonko, who incorporated all comments and contributions, and drafted the document.

Thirdly, a large number of individuals reviewed and provided insightful comments on the zero draft. These comments have not only improved its professional quality but also made it a truly pragmatic framework for a well calculated investment decision making to create a sustainable rice production system.

Lastly, the collective efforts of the high calibre representatives of key stakeholder institutions who meticulously reviewed the document are noteworthy. Their contributions are a big addition to the document. The Ministry is of the opinion that with the NRDS II as the guiding tool, success in the national quest for self-sufficiency in rice production in The Gambia will be achieved within the shortest possible time.

ACRONYMS

ACP	African, Carribean and Pacific Countries
ADB	African Development Bank
ADWAC	Agency for the Development of Women & Children
ARI	Africa Rice Initiative
AVCDP	Agriculture Value Chain Development Project
CAADP	Comprehensive African Agriculture Development Program
CARD	Coalition for African Rice Development
CIPRISSA	Continental Investment Plan for accelerating Rice Self-Sufficiency in Africa
CPCU	Central Projects Coordination Unit
DOA	Department of Agriculture
ECOWAS	Economic Community of West African States
ERP	Economic Recovery Program
FAO	Food and Agricultural Organization
GAFFSP	Gambia Agriculture Food Security Project
GIEPA	The Gambia Investment and Export Promotion Agency
GIRAV	Gambia Inclusive and Resilient Agricultural Value Chain Development Project
GNAIP	The Gambia National Agricultural Investment Plan
GOTG	The Government of The Gambia
GSI	Gambia Shongai Initiative
IBAS	Indigenous Business Advisory Services
IFAD	International Fund for Agricultural Development
IRRI	International Rice Research Institute
IsDB	Islamic Development Bank
LADEP	Lowland Agricultural Development Project
MDI	Management Development Institute
MOA	Ministry of Agriculture (MOA)
NARI	National Agriculture Research Institute
NASS	National Sample Survey
NDP	National Development Plan
Nema	National Agricultural Land and Water Management Development Project
NERICA	New Rice for Africa
NFSPMC	National Food Security Processing & Marketing Corporation
NGO	Non-Governmental Organization
NRDS	National Rice Development Strategy
NRDSC	National Rice Development Steering Committee
NSS	National Seed Secretariat
PAD	Project Appraisal Document
PIWAMP	Participatory Integrated Water-Shed Management Project
PVS	Participatory Varietal Selection
RAD	Regional Agricultural Directorate
RIDEP	Irrigated Rice Development Project
ROOTS	Resilience of Organizations for Transformative Smallholder Agriculture Program
RRDSC	Regional Rice Development Steering Committee
RRVCDP	Regional Rice Value Chain Development Project
RVCTP	Rice Value Chain Transformation Project
SDF	Social Development Fund
WASDA	Wuli and Sandu Development Association
WFP	World Food Program
WTO	World Trade Organization

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EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

1. The Gambia was one of the 11 Second Group (G2) countries of the Coalition for African Rice Development (CARD) initiative launched following the Fourth Tokyo International Conference on Africa Development (TICAD IV) in May, 2008.
2. Pursuant to the implementation of its commitment as a party to the initiative, The Gambia formulated its first National Rice Development Strategy (NRDS 1), which was supposed to run from 2014 to 2024.
3. Taking into consideration the comparative production capacities of the major rice growing ecologies (rain fed upland, rain fed lowland, mangrove swamp and irrigated) of the country and changes in the institutional, environmental and production dynamics, the NRDS II was formulated with a target of guiding the country to attain rice self-sufficiency by the year 2030.
4. Rice is the staple food of The Gambia with a per capita consumption of 117kg per annum, some 106% above the world average of 56.9kg. The annual requirement stands at about 275,257 tons in 2021 of which only 19% is produced locally and the deficit is met through importation.
5. Improving rice production and productivity will positively impact rural income and save the scarce foreign reserve all of which will have positive impact on overall national socioeconomic growth and the ultimate goal of the Government to shift from the existing subsistence rice production system, to a vibrant commercially- oriented production system with an enhanced value addition chain.

REVIEW OF THE NATIONAL RICE SECTOR

6. Systematic attempts to exploit the rice development potentials of the country commenced with the ill-fated Colonial Development Corporation's Rice Farm Scheme of 1951. By the end of the decade, the government adopted and pursued a policy of rice self-sufficiency through the implementation of the Taiwanese-Gambian Technical Assistance Agreement, and an International Bank for Reconstruction and Development – International Development Agency (IBRD-IDA)-supported project.
7. Between 1985 and 2005 the government commissioned five important rice development projects as part of its ERP stabilization activities and sequential consolidation of its gains. Which amounted to a total of US\$ 44.369 million excluding the then on-going rice development activities under the Taiwanese Technical Assistance program.
8. The foregoing investments in the rice sector were further extended at the dawn of the new dispensation with more projects encapsulated by the National Development Plan (2018 – 2021).
9. In view of the social and economic importance of rice as the staple food of the country, a wide range of actors are involved at every stage of the value chain as direct or secondary and/or intermediate actors.

10. Rain-fed rice in The Gambia is mainly grown by small resource-poor women farmers on small farms measuring between 0.25 and 0.5 ha on average whereas water-controlled irrigated rice production, especially pumped irrigated type, is mainly undertaken by men farmers.
11. Bottlenecks in rice processing capacities seem to be one of the major obstacles to an increased commercialization of rice. Currently the bulk of the rice produced is milled by women on the farm using traditional methods leading to low milling ratios of whole rice.
12. Since the sector is not well developed, there are very few modern processors with threshing and milling facilities. However, projects are making effort to mechanize the processing aspect of the rice value chain. The concluded NERICA, Nema, AVCDP and the on-going RVCTP, ROOTS and RRVCDP are all buying threshing and milling machines which are being given to farmers.
13. The marketing of rice is mainly carried out by private dealers although farmers also mill part of their rice for sale directly to consumers or traders. A good number of traders sell milled rice at village markets and ‘‘lumos’’. In spite of the fact that local rice commands a premium price in the urban centers, widespread selling in these areas is not common.

CHALLENGES AND OPPORTUNITIES FACING NATIONAL RICE SECTOR DEVELOPMENT

14. The development of the rice value chain in The Gambia is faced with a myriad of challenges ranging from availability of quality seeds, irrigation facilities, agrochemical inputs, pre- and post-harvest machinery and marketing amongst others.
15. Development of early generation seeds is hindered by challenges such as low research financing, dilapidated laboratories, inadequate irrigation infrastructure, inadequate supply of breeder seeds, lack of farm machinery and highly insufficient trained and motivated human resource. The provision of certified seeds on the other hand is hindered by inadequate drying floors and storage facilities, low technical capacity of the seed growers, inadequate access to credit facilities, unlevelled fields posing difficulties in water distribution, high cost of chemical fertilizers and climate change challenges such as floods, dry spells, pest and diseases out breaks amongst others.
16. In spite of the good water resource potential for rice production in The Gambia, there are challenges in irrigated rice development which include:
 - i. Inadequate developed rice fields and limited rehabilitation of existing irrigation schemes resulting in insufficient water distribution and retention;
 - ii. Salt intrusion and drainage problems;
 - iii. Limited human resource capacity specifically irrigation engineers and technicians
 - iv. Lack of strong and clear guidelines for cooperation and integration of efforts among different disciplines and institutions operating within the existing

- irrigation schemes;
- v. Low irrigation efficiencies (storage and conveyance, etc.) and the high cost of pump irrigation. Repair and maintenance and fuel are serious constraints to expansion of irrigated rice production; and,
 - vi. Social and environmental constraints: some of the negative social and environmental impacts of irrigation could cause conflict among users due to over extraction of water and inefficient use by irrigation schemes, prevalence of water borne diseases such as malaria and others and, increased salinity.
17. The inadequacy of farm machinery continues to be a big hindrance to the development of the rice sector. Pre- and post-harvest machinery such as tractors, combine harvesters and threshers are all required to enhance rice outputs.
18. A wide range of opportunities for efficient local production of rice exist in The Gambia. These stem from natural resource endowment in terms of arable land, soil type and fresh water availability right through to the geopolitical location of the country and policy environment.

APPROACHES AND PRIORITY AREAS

19. Taking into consideration the ecological diversity of the country's rice production areas, the regional differences in terms of rice ecologies, being cognizant of lessons learnt from the long history of rice development efforts, the overwhelming importance of the role of women in rice production, and the need for market-led, commercialized, efficient, competitive and dynamic rice industry, the NRDS II will adopt a multi-dimensional approach leveraging on the R-I-C-E (Resilience, Industrialization, Competitiveness and Empowerment) of CARD Phase two to tackle the challenges limiting the rice sector and ease the opportunities to improve the country's chances of attaining not only rice self-sufficiency, but exportation.
20. Substantial post-harvest losses in rice production arise mainly from inefficient field level processing and milling operations. To minimize these loss factors an integrated approach in the implementation efforts of the Strategy will follow value-chain approach to ensure that all actors along the chain will realize a fair share from the benefits of improved rice production.
21. This will be done through innovations starting from technology adaptation and generation, institutional arrangement, production, post-harvest handling up to marketing of produce. The engagement of private sector and farmers' organizations (cooperatives and associations) will be promoted along the value chain.

VISION AND SCOPE OF THE NRDS II

22. The Gambia has 216,121 ha of lowland ecologies suitable for rice production. Out of this, 81,120 ha are considered suitable for pump irrigation. Correspondingly, per capita rice consumption in The Gambia is 117kg of which only 19% is produced locally implying that a staggering 81% of the rice consumed is imported. In 2020 the total production of milled rice is 40,298 tons.

23. The NRDS II is founded on a vision of “**self-sufficiency in rice production**” by the year 2030. The strategy presupposes the creation of a market-led, commercialized, efficient, competitive and dynamic rice industry consistent with sustainable development.
24. Thus, based on equal emphasis on intensification in both upland and lowland production systems and expansion of lowland production systems the NRDS II is projected to achieve a production scope and target of 423,372.30 tons of milled rice by 2030 with sustained commitment of scientific and technical personnel and financial and human resource provision by the government.

IMPLEMENTATION STRUCTURE

25. The NRDS will be implemented by the Ministry of Agriculture (MOA) assisted by a National Rice Development Steering Committee (NRDSC) through the collaborative efforts of the National Agricultural Research Institute (NARI), National Seed Secretariat (NSS), Department of Agriculture (DOA) and the Central Projects Coordination Unit (CPCU) at the national level.
26. NARI will assume responsibility for strengthening partnership assisted by NRDSC. The CPCU will promote Project-based collaboration and effective partnership among all stakeholders assisted by RRDSCs within their jurisdictions.
27. At the regional level, the Strategy will be implemented by the Regional Rice Development Steering Committee (RRDSC) whose membership will comprise of the Regional Governor, Regional Agricultural Directorate (RAD), Regional representatives of rice related projects, other line departments on MOA, private sector actors, farmer association and NGOs.
28. The Regional Rice Development Steering Committees will promote partnership within their jurisdictions especially with NGOs active in supporting rice development activities. It will assist the regional directorates in the development of an annual rice development program and evaluate investments in rice sector development within the region.

MONITORING AND EVALUATION

29. Monitoring and reporting will be critical to assess the efficiency of the actions and the fulfillment of the targets and also to give feedback to the international donors and private investors.
30. The progress towards the accomplishment of the different targets and activities outlined in the Strategy should be evaluated each year to assess their degree of achievement. Activities undertaken under the Strategy will be part of a continuous program of monitoring by the relevant stakeholders in the rice industry.
31. The Central Project Coordination Unit under the supervision of the Ministry of Agriculture has the ultimate responsibility for monitoring and evaluating the implementation of this Strategy at two levels: national and regional levels, based on

the guidelines provided by the National Rice Development Steering Committee and Regional Rice Development Steering Committees. For this purpose, a set of indicators is proposed in order to ensure the strategy is achieved during the expected time period.

FINANCING OF THE NRDS II

32. In addition to the interventions of the Government line departments, NGOs and Development Partners in the rice sector development, project-based partnerships in funding selected research and development activities will be the main financing strategy to be promoted.
33. The agriculture ministry currently has two full-fledged rice projects i.e., RRVCDP and RVCTP. Two other projects, that is, ROOTS and GIRAV have huge rice components. The CPCU has the supervising authority of these projects will in strong collaboration with the NRDSC ensure that these projects' interventions continue to be in line with the set goals and objectives of the NRDS II.

SUB-SECTORAL STRATEGIES

34. In order to achieve its objectives, the overall strategic orientation of the NRDS will entail eight sets of strategic actions that will guide the pursuit of self-sufficiency in rice production within the next 9 years. These actions are:
 - i. Land Development (development of new schemes and rehabilitation of existing irrigation facilities)
 - ii. Seed Development and Varietal improvement;
 - iii. Enhance paddy Production;
 - iv. Post-harvest losses handling;
 - v. Processing (value addition) and Marketing;
 - vi. Rice Production Inputs Supply Distribution; and,
 - vii. Pests and disease management.
 - viii. Mitigation of climate change effects
35. In view of the suggested approaches in addressing the priority areas identified in Chapter Four and the objective framework, the NRDS II is designed to have eight sub-sectoral strategies namely:
 - i. strengthening the institutional framework and policy development
 - ii. research, technology delivery and capacity building;
 - iii. production and dissemination of rice seed;
 - iv. fertilizer marketing and distribution;
 - v. irrigation and investment in water control technologies;
 - vi. Equipment access and maintenance strategy;
 - vii. Post-harvest and marketing; and,
 - viii. Finance and credit

SUSTAINABILITY MECHANISMS

36. Since the NRDS will be serving as the guiding policy document for rice self-sufficiency, that national ownership will continue to exist. In addition, the community ownership and participatory approaches used by the strategy will be a strong sustainability element.
37. The strategy does not call for the creation of parallel entities to implement its activities, rather it depends on the existing management structures at national and local level. It will be using the existing MOA structures to work closely with the NRDSC whose memberships also composed mainly of government, local authorities and private sector players to ensure proper implementation and creation of synergy among all stakeholders.
38. The value chain approach with private sector involvement to be stimulated by the microfinance programs will create a sense of entrepreneurship which means sustainable and profitable interventions.

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The Republic of The Gambia is located in the valley of the Gambia River on the west coast of Africa stretching as a narrow band of land, approximately some 480 km long and varying in width from 48 km in the estuary of the river to 24 km inland, on both sides of the river, which bisects it. It lies between latitudes 13° 3' and 13° 49' N and longitude 16° 48' and 13° 47' W, and, except on the Atlantic coast, the country is bordered by the Republic of Senegal on all sides. It is situated in the south of the Sahel in a region which is largely semi-arid with only one rainy season of mean annual precipitation of 750 to 900mm and a long dry period of 7-9 months.

The topography consists of riverine flats and swamps intersected by tidal creeks of water courses which lead up to gently rolling slopes ending at a plateau. The upland vegetation of most of the country is savannah woodland with shrub and grass under storeys. The mangrove swamps are among the least changed features. The soils are mostly ferralitic and ferruginous weathered tropical soils characterized by low cation exchange capacity; low inherent fertility; strong consistencies and poorly developed structures; and, medium to high base saturation. They include the freely draining upland soils which occur along the plateau and its foot-slopes; the poorly drained hydromorphic lowland soils located along the banks of the river and its tributaries; and, the transitional colluvial – alluvial soils formed by colluvial and alluvial processes that occur in position between the uplands and the lowlands.

Water resources comprise of ground water and surface water. Exploitation of the water resources for agricultural production is minimal. Use of ground water for agricultural production is mainly in horticulture whereas use of surface water is in rice production principally in the Central River Region (CRR) and the Upper River Regions (URR) where the river is perennially fresh.

Evident from the foregoing analysis of the geographic, climatic and topographic circumstances of the country and its natural resource endowment, The Gambia possesses a good range of suitable ecologies for rice production. Thus, The Gambia is one of the 11 Second Group (G2) countries of the Coalition for African Rice Development (CARD) initiative launched following the Fourth Tokyo International Conference on Africa Development (TICAD IV) in May, 2008. The initiative aims at doubling the rice production in Africa by the year 2018. Pursuant to the implementation of its commitment as a party to the initiative, The Gambia started to formulate its National Rice Development Strategy (NRDS), after the Third General Meeting of CARD held in Arusha, Tanzania, in May 2010. Thus, taking into consideration the comparative production capacities of the major rice growing ecologies (rain fed upland, rain fed lowland, mangrove swamp and irrigated) of the country, this document outlines The Gambia's NRDS II which proposes to make the country self-sufficient in rice by 2030.

1.2 Background

1.2.1 The Global Rice Sector

Rice is a dietary staple for at least 62.8% of the inhabitants on the planet and accounts for 20% of the caloric intake for the world population. In Asia it accounts for 29.3% (Timmer 2010). Both paddy production and milled rice trade are carried out throughout several countries in the world. Table 1.1 presents the global paddy rice production and international trade in milled rice in terms of averages for the period 2016 to 2020.

Table 1.1: Global rice production and trade from 2016 – 2020

Commodity	Description and Unit of Measurement	Year				
		2016	2017	2018	2019	2020
Paddy rice	Production (Million Tons)	734.1	747.4	759.1	749.2	756.7
Milled Rice	Import Quantity (Million Tons)	26.5	30.9	33.2	32.9	31.7
	Imported Value (Billion \$)	14.9	18.2	20.6	20.0	19.6
	Exported quantity (Million Tons)	31.8	36.6	36.1	33.3	34.7
	Exported Value (Billion \$)	16.6	19.5	21.1	19.5	20.1

Source: FAO, 2022

Worldwide paddy rice production averaged about 734.1 million metric tons during the period 2016 and grew up to 756.7 million metric tons in 2020. Estimate of paddy rice production for 2013 is put at 744.9 million tons which predicts a 1% increase over 2012. The FAO forecast an increasing trend in rice production, though at a sluggish rate. International trade in milled rice averaged about 26.5 million metric tons during the period 2016 and grew by about 19.6% to 31.7 million metric tons in 2020. Trade in milled rice in terms of import value has risen from 14.9 billion \$ in 2016 to 19.6 billion \$ in 2020. Export values have risen from 16.6 billion \$ in 2016 to 20.1 billion \$ in 2020.

The foregoing analyses established an increasing trend in global rice production though sluggishly matched by an increasing trend in international rice trade. The sum total implication of these for net rice importers like The Gambia is an increasing international export/import price, which would have adverse effect on the deepening state of poverty in these countries.

1.2.2 The Gambia Rice Sector

Rice production is undertaken in both lowland and upland ecologies with four main ecological areas: Upland rainfed, lowland rainfed, lowland irrigated (pump and tidal) and mangrove swamps. It is the staple food with a per capita consumption of 117kg per annum, some 106% above the world average of 56.9kg.

The annual requirement which is determined by the annual population increase stands at about 275,257 tons in 2021 of which only 19% is produced locally and the deficit is met through importation. Comparing the national production against the demand, one would realize that there is a long history of rice importation into The Gambia.

With the current world market price for broken rice at \$500 per ton, around \$77 million was spent in 2021 for importation of rice into The Gambia to meet the deficit. Rice prices are bound to remain high as the market demand for rice increases, and as other crops, e.g. maize, millet and cassava compete for land with bio-fuel crops.

While The Gambia imports more than three quarters of its national rice requirements, increasing world market prices coupled with the recent decline in the value of the local currency makes it more expensive to import this foodstuff into the country, and provides an opportunity for locally produced rice to become more competitive.

Decline in national rice production has significantly increased the dependency of rural population on imported rice, thus reducing their savings and net income. Income generated from other farming and off-season farm activities are inevitably used to procure imported rice.

Renewed efforts to resuscitate rice production include the terminated Upland Rice Expansion Project by the Taiwanese Mission and the introduction of suitable rice varieties under the NERICA Project supported by the Africa Rice Initiative (ARI) of Africa Rice Centre. Though the potentials for expanded rice production to make a visible progress towards the executive pronounced 'Vision 2016' rice self-sufficiency target could not be attained, follow up efforts were made by the new dispensation through the new blue print of NDP (2018-2021) to consolidate on the previous gains achieved. In this regard, two specific rice value chain projects i.e., Rice Value Chain Transformation Project (RVCTP) and the Regional Rice Value Chain Development Project (RRVCDP), were initiated and implementation started in 2019 and 2020, respectively. This effort is being complemented by ROOTS and GIRAV projects which have land development components geared towards the enhancement of rice production.

Improved rice production and productivity will have positive rural income-effect and scarce foreign exchange saving-effect. All of these will have positive impact on overall national socioeconomic growth and the ultimate goal of the Government to utilize innovative measures to effect a shift from the existing subsistence rice production system, to a vibrant commercially- oriented production system with an enhanced value addition chain which will be difficult to attain without a concerted NRDS and an operational National Rice Policy in place.

2. REVIEW OF THE NATIONAL RICE SECTOR

2.1 The Evolutionary Perspective

In The Gambia, like many other African countries, the structural adjustment and economic recovery programs of the mid-1980s that introduced trade liberalization and removal of subsidies on farm inputs and guaranteed prices made local agro-production very expensive for the farmers and consumers alike, even before WTO agreements on agriculture were implemented.

The cumulative effect of worsening terms of trade and over-extension of government's development and recurrent budgets to stimulate accelerated growth during the 1975/85 decade led to a rapid drawing down of foreign exchange reserves and increasingly severe budgetary and balance-of-payment strains. Thus, despite the variety of public investment measures especially in irrigated rice development under-taken to promote increased production, these antecedent series of economic disruptions did not only undermine the

national strive towards a perverse policy of self-sufficiency in rice production but also triggered an unprecedented rate of import of rice into the country. This occasioned a secular trend in the substitution of rice and to a lesser extent wheat, in place of traditional food crops of millet, sorghum and maize and started to play an important role as the most preferred staple diet.

The Economic Recovery Program (ERP) achieved substantial stability of the economy by 1990. Between 1985 and 2005 the government commissioned five important rice development projects as part of its ERP stabilization activities and sequential consolidation of its gains. Those projects amounted to a total of US\$ 44.369 million excluding the then on-going rice development activities under the terminated Taiwanese-Gambian Technical Assistance Agreement of 1996. The GNAIP (2011 – 2015) implementation capped by the pronouncement of the Vision 2016, also culminated in the creation of more project portfolios with area development in rice as key components. The foregoing investments in the rice sector were extended and further induced at the dawn of the new dispensation with more projects encapsulated by the National Development Plan (2018 – 2021). Consequently, the Agriculture sector portfolio of projects that was implemented from 2011 to 2020 hit a record high both in number and budget size.

Table 2.1 below which gives a comparison of cultivated area and production further revealed that just above 1 ton and, in some cases, less than 1 ton per hectare is being realized from rice production. This suggests that any production increase came about as a result of area expansion which compensates for poor yield performance.

Table 2.1: Rice cultivated area and production data series 2014-2020

Year	Rice cultivation (Ha)	Rice production (tons)
2014	66,380	69,704
2015	66,286	46,674
2016	67,651	53309
2017	69,561	48778
2018	68,900	29,967
2019	60,414	33,759
2020	61.013	38,086

Source: NASS reports

The table is a pointer to the fact that unless the most important factors that form the bases for increasing crop yield are addressed holistically i.e., provision of high-quality seeds, early planting, soil fertility maintenance, availability of water, adoption of climate smart agriculture and robust pest and diseases control, yield per hectare for rice would remain stagnant.

Table 2.2: Imports of milled rice from 2013 - 2019 (tons)

Year	2013	2014	2015	2016	2017	2018	2019
Imported milled rice	130,226	140,411	135,984	129,811	159,853	206,484	153,943

Source: Ministry of Trade, Regional Integration and Employment

Correspondingly milled rice imports soared from 130,226tons in 2013to 206,484tons in 2018 but with a slight to 153,943 tons in 2019. Thus, the country is seriously deficient in meeting

its national requirements of rice.

2.2 Consumer preferences and demand projections

Consumer preference in the rice market is dictated by quality of the milling process and the type of dish to be prepared. Urban rice consumers generally prefer polished rice. The degree of polish is a key difference between imported and locally produced rice which in most cases is manually milled or not adequately polished. The urban consumers also prefer broken rice which is more suitable for the favorite urban dishes. These dispositions of the urban consumers favor the importers since 100% broken rice is cheaper than whole grain rice in the international market. For most of the consumers in the rural and peri-urban areas and even some urban people, the swelling capacity of the rice is of key interest.

In The Gambia, in addition to the poor milling quality of locally produced rice, its availability to consumers also remains a major challenge. Apart from the producers themselves, local rice is only mainly accessible to the middle-income class who by virtue of their work frequently visits rice production areas and during these visits purchase from farmers. With investments into improving the milling quality of locally produced rice through establishment of standard mills, easy and wider distribution networks and packaging, there is every indication that consumers both in the urban and rural areas who already recognize the excellent dietary properties and taste of locally produced rice will shift from the imported to the locally produced. In fact, this scenario has started changing since the emergence of some commercial rice actors such as Maruo Farms that produces a more improved milled rice.

Table 2.3 below presents the national rice demand in metric tons projected to 2030, the year of elapse for NRDS II. Based on a provisional population figure of 1,882,450 (2013 census), annual growth rate of 3% and per capita rice consumption of 180kgs and 117kg respectively, per annum for paddy and milled, the national demand for rice for the current year 2022 is estimated at 436,176 tons paddy and 283,514 tons milled. Projecting this estimated demand by the provisional population growth rate of 3% to 2030 gives a projected demand of 552,535 tons of paddy 359,148 tons milled rice in 2030 which is the estimated self-sufficiency requirement of the country.

Table 2.3: Projected population increments and rice requirements for the period of the strategy

Year	Projected populations	National Rice Requirement (tons)	
		Paddy Rice	Milled Rice
2020	2,352,621	423,472	275,257
2022	2,423,200	436,176	283,514
2023	2,495,896	449,261	292,020
2024	2,570,773	462,739	300,780
2025	2,647,896	476,621	309,804
2026	2,727,333	490,920	319,098
2027	2,809,153	505,648	328,671
2028	2,893,427	520,817	338,531
2029	2,980,230	536,441	348,687
2030	3,069,637	552,535	359,148

2.3 Typology and Number of Rice Farmers, Processors and Traders

In view of the social and economic importance of rice as the staple food of the country, a wide range of typology of actors are involved at every stage of the value chain as direct or secondary and/or intermediate actors. This situation is further complicated by the fact the country's demand for rice is partly met through commercial imports and partly by local production with strong gender bias in the two main rice production systems.

2.3.1 Typology and Number of Rice Farmers

Rain-fed rice in The Gambia is mainly grown by small resource-poor women farmers on small farms measuring between 0.25 and 0.5 ha on average whereas water-controlled irrigated rice production, especially pumped irrigated type, is mainly undertaken by men farmers. Thus, based on gender bias in the two rice production systems, there are two categories of rice farmers: women and men.

The rice women produce is primarily for home consumption as part of their contribution to the family food needs while small quantities are sold locally to meet their occasional cash needs. Most of the land in the irrigated rice projects are owned or controlled by men either as commercial rice farmers or head of participating family units. Tenant irrigated rice farmers of both men and women exist in this system. The greater part of the produce of commercial rice farmers is sold for cash. Both classes of farmers would normally use part of their produce, sold or in-kind, to pay off project input loans and/or rent. There is also an emerging trend of commercialization in rain-fed upland rice farming mainly in West Coast Region and Upper River Region with the introduction of upland NERICA rice varieties. Thus, on the basis of scale of operation two typologies of rice farmers exist: small-scale and large-scale rice farmers. Similarly on the basis of use of produce two typologies of rice farmers exist: subsistence and commercial.

There has been an upsurge in the number of rice growers acting singly or in groups since the introduction of NERICA rice in 2001/2002. Some of the notable rice farmer groups are "NAFA" NERICA Farmers' Association of URR Basse, Jahal Rice Farmers' Cooperative Society and Souhali Rice Growers Association. At present there is a small but increasing number of private investors in the sector, of recent the Maruo farm at Sankulay Kunda crescent. The involvement of the private sector comes with increased investment and resources for the sector, reinforcement of a commercial approach, the introduction of technologies aimed at boosting productivity, and the potential to link up with and scale up smallholder production. These opportunities already exist in the Maruo farm an enterprise involved in both production and value addition.

2.3.2 Number of Processors (Millers)

Since the sector is not well developed, there are very few modern processors with threshing and milling facilities. However, current projects are making effort to mechanize the processing aspect of the rice value chain. The NERICA project has bought some threshing and milling machines which were given to the NERICA Farmers' Associations in different agricultural regions. At least one milling machine and one thresher were given to each of six

NERICA focal villages throughout the country. This is most inadequate considering the number of rice producers. Due to inadequate mechanization 30% of paddy produced is being lost during processing (WFP, 2010).

Bottlenecks in rice processing capacities seem to be one of the major obstacles to an increased commercialization of rice. Currently the bulk of the rice produced is milled by women on the farm using traditional methods leading to low milling ratios of whole rice. The Association mills, which are largely underutilized due to high milling charges of about 0.5% in-kind, report a milling percentage of 60%. Thus, access to efficient milling services seems to be a critical factor for increasing marketable quantities and quality of local rice.

2.3.3 Number of Rice traders

The paddy and milled rice traders (wholesalers and retailers) are scattered all over the country. The marketing of rice is mainly carried out by private dealers although farmers also mill part of their rice for sale directly to consumers or traders. A good number of traders sell milled rice at village markets and/or ‘‘lumos’’. In the past, traders used to come from across the border (Senegal) to procure paddy and milled rice at lower prices to resell in their country. In spite of the fact that local rice commands a premium price in the Greater Banjul Area above that of imported rice, the general feeling among traders is that it is more profitable to sell across the border in Senegal than on the local market. Nonetheless, limited quantities of local rice in excess of household needs are also sold to traders or farmers from neighboring villages. Milled rice is sold in two forms either in 50kg bag or by cup (a tin of about 230 grams).

Homegrown school feeding - The joint initiative by the Government, FAO and WFP, with the support of the EU, to introduce homegrown school feeding, provides a ready market for rice the major menu for the feeding program. In 2014 through the linkage with rice farmers association of Niani Sukuta, GMD3 million was purchased by WFP for the said program.

2.4 Gender and Youth Dimensions in the Rice Value Chain

In the Gambia, women are almost exclusively responsible for rain-fed and tidal swamp rice and provide labor on male-controlled irrigated rice (some women also have personal irrigated rice fields). Men cultivate upland coarse grain crops (maize, sorghum and millet) as well as groundnut, cotton and irrigated rice. On-farm traditional milling of rice is exclusively done by women. Both women and men are involved in the commercial milling of rice in groups or individually. Similarly, both men and women are involved in marketing of rice but mainly individually. Within this blurred division of gender responsibility in the overall rice value chain, there is clear distinction in the gender management responsibilities in field level production.

Table 2.4 presents the relative gender management responsibilities for the rain-fed rice enterprise in terms of number of fields and hectareage under cultivation. Currently, 79% of upland rice cultivated areas are owned by women. Similarly, about 87% of total area cultivated under swamp rice are owned and managed by women. The higher percentage of both upland and swamp rice fields owned by women is reflective of the fact that cultivation of both ecologies is female dominated and a reverse in the trend of male dominance in

irrigated rice cultivation. Thus, the bulk of both the irrigated and rain-fed rice which is the main source of the country's rice production is mainly owned and managed by women despite increasing entry of commercial male farmers in upland rice production precipitated by the NERICA project and of recent the resuscitated donor interest.

2.4.1 Youth Involvement

Efforts by donors and government to engender youth involvement in rice production and their sustained participation in the rice value chain continue to yield very insignificant results. Rice production, processing, marketing and distribution continuous to be dominated by elderly women and men. The lack of youth participation continuous to cause labor shortages in rice production and processing. The NRDS II considers youth involvement and sustained participation in the rice value chain a key priority.

Table 2.4: Management responsibility of rainfed rice by gender

Local Government Area	Upland Rice			Swamp Rice		
	Area	Male	Female	Area	Male	Female
Brikama	3,557	5%	95%	85	21%	79%
Mansakonko	8,185	16%	84%	2,802	13%	87%
Kerewan	11,869	27%	73%	6,360	13%	87%
Kuntaur	5,087	11%	89%	3,206	15%	85%
Janjanbureh	6,531	2%	98%	416	11%	89%
Basse	12,812	37%	63%	102	0%	100%
National	48,042	21%	79%	12,971	13%	87%

Source: NASS, 2020 Report.

Currently, women represent over 45% of the total agricultural labor force and 95 % of the work force in rice production. In recognition of the vital role of women in the socio-economic development process, the government has taken some measures to correct the disadvantaged situation of women especially in access to agricultural land.

2.5 Comparative Advantage of Domestic Rice Production

Domestic rice in The Gambia has a number of comparative advantages. These include both technical and socioeconomic factors of which the following are key ones:

- i. the existence of research support with good linkage to international research institutes like the International Rice Research Institute (IRRI) and AfricaRice which have help adapted and released suitable rice varieties with required agronomic and food qualities;
- ii. the existence of huge production potentials both under rain-fed and irrigation conditions;
- iii. domestically produced rice is of acceptable types and fulfills quality requirements of the domestic as well as the international markets;
- iv. the existence of huge competitiveness mainly because of the existing cheap labor, which can improve the competitiveness of The Gambian rice in the international markets;
- v. the existence of considerably high domestic demand which is currently being met through imports of lower quality rice; and,
- vi. possibility of linking to other micro enterprises in the value addition and also petty trade.

3. CHALLENGES & OPPORTUNITIES FACING NATIONAL RICE SECTOR DEVELOPMENT

3.1 Challenges

The development of the rice value chain in The Gambia is faced with a myriad of challenges ranging from unavailability of quality seeds, irrigation facilities, agrochemical inputs, pre- and post-harvest machinery and marketing amongst others. The most urgent challenges that severely hinders rice sector development are discussed in detail below:

3.1.1 Input Related Challenges

There are four major input-related constraints in rice production. These constraints are presented in table 3.1 in a prioritized rank order. In a descending order of priority ranking from 1 to 4. These input related constraints are: access to and use of chemical fertilizers; access to improved rice varieties; access to and use of herbicides; and pesticides.

Table 3.1: Priority ranking of the major input related constraints

Input Related Constraints	Rank Order
Access to and use of chemical fertilizers	1
Access to improved rice varieties	2
Access to and use of herbicides	3
Pesticides	4

Challenges relating to access to improved rice varieties are wide and varied. Variety development within the domain of the research institute, NARI, whereas foundation production is handled by the NSS. These early generation seed processes are hindered by numerous challenges such as low research financing, dilapidated laboratories, inadequate irrigation infrastructure, inadequate supply of breeder seeds, lack of farm machinery and highly insufficient trained and motivated human resource.

The provision of certified seeds on the other hand is hindered by challenges such as inadequate drying floors and storage facilities, low technical capacity of the seed growers, inadequate access to credit facilities, unlevelled fields posing difficulties in water distribution, high cost of chemical fertilizers and climate change challenges such as floods, dry spells, pest and disease out breaks amongst others.

3.1.2 Agronomy Related Challenges

Table 3.2 presents major agronomic constraints. The priority ranking of these constraints in descending order of importance is poor land preparation techniques; method and date of planting; weed and weed control method; and, type, rate and date of fertilizer application.

Table 3.2: Priority ranking of the major agronomical constraints

Constraint	Rank Order
Poor land preparation technique	1
Method and time of planting	2
Weed and weed control methods	3
Type, rate and timing of fertilizer application	4
Knowledge on variety traits	5
Timing of harvest	6

3.1.3 Irrigation and Water Management Related Challenges

In spite of the good water resource potential for rice production in The Gambia, there are challenges in irrigated rice development which include:

- i. Inadequate developed rice fields and limited rehabilitation of existing irrigation schemes resulting in insufficient water distribution and retention;
- ii. Salt intrusion and drainage problems;
- iii. Limited human resource capacity specifically irrigation engineers and technicians
- iv. Lack of strong and clear guidelines for cooperation and integration of efforts among different disciplines and institutions operating within the existing irrigation schemes;
- v. Low irrigation efficiencies (storage and conveyance, etc.) and the high cost of pump irrigation. Repair and maintenance and fuel are serious constraints to expansion of irrigated rice production; and,
- vi. Social and environmental constraints: some of the negative social and environmental impacts of irrigation could cause conflict among users due to over extraction of water and inefficient use by irrigation schemes, prevalence of water borne diseases such as malaria and others and, increased salinity.

Table 3.3 presents the major constraints arising from irrigation and water management related challenges in promoting irrigated rice production in a prioritized rank order. In descending order of priority ranking, these are, limited emphasis on rehabilitation of existing irrigation schemes; limited expansion and construction of new irrigation schemes; limited human resource capacity specifically irrigation engineers and technicians; salinity and drainage problems; high cost of maintenance of pump irrigation; lack of coordinated efforts among the different stakeholders in the rice sector.

Table 3.3: Priority ranking major of constraints in irrigation and water management

Constraints	Rank Order
limited emphasis on rehabilitation of existing irrigation schemes	1
limited expansion and construction of new irrigation schemes	2
limited human resource capacity specifically irrigation engineers and	3
salinity and drainage problems	4
high cost of maintenance of pump irrigation	5
lack of coordinated efforts among the different stakeholders in the rice sector	6

3.1.4 Pre-and Post-harvest Mechanization Technology Challenges

Use of appropriate soil tillage machinery and equipment in the different rice ecologies is ideal for obtaining the right level fields that can adequately support crop growth and water distribution. Post-harvest machinery such as combine harvesters, threshers, seed cleaners and blowers are all required to enhance rice outputs. Suitable and adequate power supply for different farm operations; presence of equipment leasing and maintenance service providers; and, availability of adequate supply of spare parts are important requirements for successful farm operations to increase rice production and to remove drudgery in farm operations.

3.1.5 Land Tenure and Other Social Constraints in Rice Production

Almost all farm lands in rural Gambia are held under customary tenure system. Under this system three forms of land ownership coexist in a village community. These are community

owned land under the control of the village headman (Alkalo), family-owned land controlled by family heads and individually owned land. Inheritance and/or control of land under customary tenure system tend to be patrilineal reinforced by prevalence of a system of marriage in which the wives go to leave with their husbands.

There are three main channels through which a woman obtains land under customary tenure system: (i) through her husband; (ii) through her paternal compound as a gift on marriage; and (iii) through borrowing/renting/purchasing. Thus, under this system access to rice land by women poses no problem.

However, the rice fields in the lowland are small individual parcels of mostly less than 0.5 ha and enclosed by bunds to establish boundaries and facilitate water retention. The small size and structural configuration of the individual fields limit the degree of mechanization possible in these fields. These structural constraints are reinforced by the physical nature of the underlying soils of these ecologies. This situation is further accentuated by such social factors as gender inequalities which prevent many women from accessing adequate land and other essential production inputs such as farm machineries and agricultural credit even though studies have shown that women are more credit worthy.

3.1.6 General Constraints in Rice Production

A number of important general constraints of either socioeconomic or technological in nature exist. These include but not limited to:

- i. Yearly uncertainty in the availability of high yielding certified quality seeds and planting materials;
- ii. Limited access to available credit; inadequate use and management of financial services;
- iii. High costs of irrigation facilities which threaten to reduce margins and create disincentives to investment;
- iv. Climate change and variability risks coupled with unregulated extraction of surface and underwater resources;
- v. Limited access to land and security of tenure due to lack of land use policy and sociocultural constraints especially for women who constitute a significant percentage of producers of rice;
- vi. Limited capacities to afford improved technologies - pest control, agro-chemicals and post-harvest handling (storage and agro-processing);
- vii. Predominantly limited manual farm and mechanical power due to migration of the able-bodied population which could not be mitigated by adequate mechanical services exacerbated by small size of farm holdings;
- viii. Low level of research support specifically for rice production in reducing costs of domestic production and raising quality which would increase competitiveness against cheap imports;
- ix. Threats of unsustainable land exploitation; salt water intrusion, particularly during the dry season;

3.2 Opportunities

A wide range of opportunities for efficient local production of rice exist in The Gambia. These stem from natural resource endowment in terms of arable land, soil type and fresh water availability right through to the geopolitical location of the country and policy environment.

3.2.1 Production Potentials for Rain-fed and Irrigated Rice

Some 56% of the country's land area or 555,240 ha, is considered suitable for agricultural activities and are utilized for crop production as well as for grazing and fallow. This total arable land area comprises of 339,119 ha of upland and 216,121 ha of lowland ecologies. Of the 216,121 ha of lowland area, 81,120 is considered suitable for irrigation.

In the 2020 cropping season, out of the total arable land area, about 222, 416 ha (about 40%) was put under crop cultivation. Out of this, 61,013 ha was under rice, comprising 48,042 ha upland rice and 12,971 lowlands, including the lowland rainfed, irrigated and mangrove (NASS report, 2020).

Out of the 216,121 ha of lowland, based on the 2020 cropping season figures, there is an unexploited lowland potential of 203,150 ha for rice production. Also, of the 339, 119 ha arable upland area, 209,445 ha was put under cultivation in 2020 leaving a balance of 135,674 ha which was unexploited. Thus, even disregarding possibility of land use substitution for the various crops cultivable in the upland, the land resource potentials for rice production is huge. Therefore, the land resource potentials do exist to support the nine (9) years goal of self-sufficiency in rice production set by this strategy.

Table 3.4: Regional distribution of estimated potential rice growing ecologies in the Gambia

Region	Pump Irrigated (ha)	Tidal Swamps-fresh water & mangroves (ha)	Wulumbango (ha)	Bantafaro (ha)	Tandaco (ha)
WCR	-	21,454	4,436	1,405	6,098
NBR	-	44,203	4,078	20,179	-
LRR	-	39,637	1,602	7,895	-
CRR	2,492	33,684	2,082	4,877	-
URR	10,235	2,026	11,042	-	-
Total	12,727	141,004*	23,340	32,952	6,098

Source: LADEP Appraisal Mission Estimates – modified.

Table 3.4 presents the regional distribution of the estimated 216, 121 ha of lowland ecosystem comprising irrigated (pump and tidal) and lowland rainfed, and Mangrove ecologies. The Wulumbango, Bantafaro and Tandaco are local Mandinka names used to describe the different types of lowland fields.

Table 3.5: Summary of the main characteristics of rice production ecologies

System of Production/ Resource Base	Principal Characteristics							
	Location	Soil type	Water Source	Method of Cultivation	Crop Establish	Current Yields kg/ha	Constraint	Potential
Irrigated (pump) 12,727 ha	Swampy land adjacent to Gambia river in CRR and URR of elevated areas.	Alluvial silty clays	Controlled pumping	Power tillers/ Tractors	Transplanting	3.5-4.0 tons	Small plot size, Dilapidated irrigation structures	*2 crops
Mangrove swamp – 70,834 ha	Swamp adjacent to river subject to saline tidal flooding in dry season freshwater in the wet.	Alluvial silty clays	Freshwater tidal Manual/river flooding in wet season	Manual	Trans-Plant	800	Water control; heavy soils salinity, no access	Husb.
Freshwater tidal Swamps – 70,170 ha	Swamps adjacent to river subject to freshwater flooding in wet season. No saline tide	Alluvial clays	Freshwater flooding by tide or high river	Manual/ Tractor	Trans-plant/ Broadcast	2,000	Water control; soils	Husb.
Rainfed deep flooded swamps – 23,340 ha	Swamp depression away from river/ bolons	Alluvial silty clays high O.M.	Rainfall runoff often supplement by local flooding	Tractor /Manual	Trans-plant/ Broadcast	1,500	Water control; soils , weed, flooding	Husb. Mech
Bantafaro – upland rainfed (Hydro-morphic/freatic) 32,952 ha	Higher elevation on the borders of the rainfed swamps	colluvial silty/ clays, hydro-morphic	Rainfall min. standing water, bunding, 0-25cm	Manual/ Tractor	Broadcast	700	Heavy soils weeds	Husb. Mech
Tandaco – upland rainfed 6,098 ha	Upland depression associated with forest canopy, mainly WCR	Sandy loams high O. M. free draining	Rainfall	Manual	Broad-cast	1,000	Stumps Drought Weeds	Husb. Mech

Each of the six rice growing sub ecologies has distinct ecological characteristics. Table 3.5 summarizes these ecology-specific characteristics. Whilst some of these ecologies are regional specific in occurrence, they generally differ both in terms of regional distribution and relative importance within regions. Thus, for want of equity and rational use of arable land resources the NRDS will, of necessity, give agro-ecology specific attention to rice promotion program on rain-fed and fresh water tidally irrigable ecologies.

3.2.2 Potential of Local Rice in Rural Poverty Reduction and Economic Growth

As the staple food of the population, rice has become an increasingly important cash crop, especially for women rice farmers, in view of its insatiable demand and relatively volatile price trends in the national food market. The following are some of the existing potentials of rice production in the country:

- i. Agro-ecologically, the crop can grow in both rain-fed (upland and lowland) and

irrigated ecologies, thus, creating an opportunity for poverty reduction in all areas of the country endowed with these ecologies;

- ii. The number of rice producers, processors, and traders is increasing thus creating additional income generating activities and livelihood options for many actors. This has direct implication on rural poverty reduction;
- iii. Rice is relatively less susceptible to stored pests than other cereal grains such as maize, sorghum, and millet, which are commonly used in food security measures;
- iv. In recognition of its comparative advantages over other food crops, The Gambia has selected rice as one of the top priority crops and dubbed it as a “Millennium Crop” of prime importance for food security and income generation; and,
- v. Local rice production has a huge potential of being a foreign exchange saver as an import substitution crop as well as foreign exchange earner as an export crop.

3.2.3 Potential Supply Sources of High Yielding and Adaptable Varieties

Currently, there is a smooth exchange of rice germplasm within the region. This exchange process is effectively managed and administered in the West Africa sub-region by the Africa Rice Center – AfricaRice. Internationally it is facilitated by the International Rice Research Institute (IRRI). An ECOWAS initiative plans to establish a free movement of goods and services across countries in the West African sub-region which has the potential of improving exchange and movement of research findings and seed varieties in particular.

Thus, the already established AfricaRice Rice Sector Development Hubs mechanism constitutes a viable avenue for sourcing new technologies including high yielding and adaptable rice varieties through the foregoing processes and regional integration efforts. Internally, lots of highly performing climate smart rice varieties have been screened, registered and released to farmers. All kinds of varieties ranging from short duration, salt and iron toxicity tolerant, flood, drought, pests and disease tolerant rice varieties are available in the country.

3.2.4 Existence of Seed and Grain Production and Storage Facilities

The previous projects that intervened in the rice sector, such as LADEP, PIWAMP, FASDEP, Nema and AVCDP have developed or rehabilitated some hectares of rice fields. Though most of these facilities have dilapidated over the years, upcoming interventions can leverage on these to expand the production areas. Through these past interventions also, some seed and grain processing facilities and stores have been built in the rice hubs which can be easily rehabilitated or upgraded to put them into use.

3.2.5 Availability of Technology Dissemination Channels

The history of rice production is as old as settled agriculture in The Gambia. Concerted research efforts in rice varietal screening and selection for both yield and adaptability to the rain-fed ecologies and agronomic practices and, subsequent dissemination of results commenced in the early-1950s in Jenoi. Over the years, these efforts and experiences were consolidated within the national Food & Cash Crop research sector and extension program by the various rice development projects implemented since 1966 to become established research and extension programs administered by specialized units. Thus, the public

technology dissemination channels for all biological-based production especially rice production are well developed.

The NARI has the mandate to develop or source, screen and along with farmers, select promising varieties for the country. The NSS is charged with the responsibility of producing foundation seeds as well as supervise certified seed production whilst the DOA is responsible for dissemination. In addition to the public extension channels for rice technology dissemination a number of NGOs conduct rice extension education as a major element of their program or specialized rice development agency such as Action the Gambia, Wuli and Sandu Development Association (WASDA), Agency for the Development of Women & Children (ADWAC), amongst others.

3.2.6 Existence of Conducive Policy Environment

Consistent with its trade liberalization, deregulation and investment promotion policy, The Gambia has a conducive national policy environment in which rice industry development has been accorded top priority in its drive for food security and poverty reduction. This was clearly captured in the new government's development blue print, the National Development Plan (NDP) 2018-2021.

This national rice development policy stance is further consolidated by the country's membership to some sub-regional, regional and global agricultural development programs and agencies. These include:

- i. Coalition for African Rice Development (CARD);
- ii. AfricaRice sponsored Rice Sector Development Hubs Mechanism;
- iii. Comprehensive African Agriculture Development Program (CAADP) of African Union Members and;
- iv. Food and Agricultural Organization (FAO) of the United Nations.

3.2.7 Favorable Trans-boundary/Regional Trade Environment

Currently, there is a lucrative re-export trade in rice from The Gambia to Guinea Bissau and Guinea Conakry of mainly imported rice. Similarly, a fair amount of trans-boundary trade in locally produced rice through the weekly local Lumo Markets organized at various locations throughout the country which are heavily patronized by a large number of middlemen from all over the sub-region. These existing trans-boundary rice flows will be greatly consolidated and expanded by the ECOWAS free trade policy initiative which now establishes free movement of goods and services across countries in the West African sub-region.

In line with its trade liberalization, deregulation and investment promotion policy, The Gambia is a party to a number of sub-regional, regional and global trade agreements. These include:

1. The Abuja Treaty under the Economic Community of West African States (ECOWAS), May, 1975;
2. Everything But Arms (EBA) of the European Union, March, 2001;
3. Cotonou Agreement of African, Caribbean and Pacific (ACP) Countries, April, 2003;
4. African Growth Opportunities Act (AGOA) of the United States, April, 2004;

5. General Agreement on Trade and Tariffs (GATT) of United Nations Member States, February, 1965; and,
6. World Trade Organization of United Nations Member States, October, 1996 and 2001.

Thus, The Gambian rice value-chain stakeholders have ample trans-boundary/regional market opportunities to access with good quality products that meet standards and consumer needs. The Gambia Investment and Export Promotion Agency (GIEPA) provides an institutional mechanism for strengthening and exploiting such trans-boundary/regional market access opportunities through international trade fairs and ensuring adequate national representation and negotiation capacity at World Trade Organization (WTO) and major trading partners' fora.

3.2.8 Lessons Learnt from Previous Rice Interventions

Rice research and developments projects have started in the Gambia as far back as in the colonial era. The first and second republic implemented several rice related projects. From 2017 after the change of government and ascension to power by the current regime, several interventions in the rice sector have been undertaken. The key project interventions in the rice sector are described below:

- i. the 1951/56 Rice Farm Scheme (RFS) for the large-scale irrigated and mechanized rice production in the Jahally/Pacharr swamps and mangrove clearing to reclaim tidal swamps for mechanized rice production supported by the Commonwealth Development Corporation (CDC) to develop 10,636 ha but established only 1,136 ha of rice at a total cost of £1.115 million (Commonwealth Survey, 1950) equivalent to about US\$1,568/ha;
- ii. the 1956/83 Tractor Ploughing Scheme for contract mechanical cultivation services in suitable rice growing ecological areas supported by Gambia Government;
- iii. the 1966/75 Taiwanese Technical Mission (TTM) for the development of small perimeter pump irrigated rice production;
- iv. the 1973/76 World Bank (WB) supported small perimeter pump irrigated rice production;
- v. the 1975/79 People's Republic of China (PRC) supported small perimeter pump irrigated rice production;
- vi. the 1981/2002 Jahally/Pacharr Smallholder Project (JPSP) for development of 1,454 ha under large pump irrigated, tidal irrigated and combination of pump and tidal irrigated rice production supported by ADB, IFAD, KfW, Netherland and WFP at a total cost of US\$16.99 million, equal to US\$11,700/ha;
- vii. the 1990/96 Rice Development Project (RIDEP) for rehabilitation of 1,200 ha in 44 units of small perimeter pump irrigated areas of the TTM, WB and PRC initiatives supported by ADB, but only developed 352 ha at a total cost of US\$7 million, equal to about US\$19,900/ha;
- viii. the 1991/1997 Small-Scale Water Control Project (SSWCP) to establish 450 ha for purely tidal irrigation and gravity conveyance of irrigation water supported by IFAD at a total cost of US\$3.6 million, equal to about US\$8,000/ha;
- ix. the 1996/2012 Taiwanese Technical Agricultural Mission (TTAM) for the

- development of Tidal irrigated rice production;
- x. the 1998/2006 Lowland Agricultural Development Project (LADEP) supported by ADB to improve accessibility to swamps for increased rice production;
- xi. the 2003/2006 Irrigated Rice Development Project (IRRIDEP) planned to be supported by the Kuwaiti Fund to establish 1,200 ha at an estimated cost of US\$3 million equivalent to US\$2,500/ha total, aborted because the estimated cost of land development alone was some 177% more than the budgeted cost of the project; and,
- xii. the 2006/2013 Participatory Integrated Water-Shed Management Project (PIWAMP) to develop 49,751 ha supported by ADB and IFAD at a total cost of US\$17.1 million equal to about US\$344/ ha.
- xiii. 2015/2021 Agriculture Value Chain Development Project (AVCDP)

Key lessons learnt

A number of valuable lessons have been learnt from previous rice development experiences since the early-1950s. The public rice development experiences stretched across all the lowland rice ecologies/farming systems in the country. These experiences include:

The first attempt, the RFS, suffered from poor engineering works with the result that attempts to irrigate failed and production had to be dependent on rains. The TTM, WB and PRC initiatives suffered from common weaknesses of omission of internal drainage systems, poor access, lack of flood protection works and high canal seepage losses. These weaknesses are similar to those of the RFS whereas the JPSP repeated a variance of large irrigation pump type of RFS in the same fields. The RIDEP experience was an attempt to correct irrigation engineering design faults of the three earlier small perimeter pump irrigated schemes (TTM, WB and the PRC) without adequate financial provisions. The SSWCP, LADEP, PIWAMP and TTAM benefited from the lessons learnt from JPSP and RIDEP. Overall, the following valuable lessons have been accumulated from the twelve initiatives:

- i. Beneficiary involvement in the design and formulation of a rice development project/program especially in site selection and choice of components are crucial for enlisting their commitment to succeed and sustain it as their own initiative;
- ii. The scale and level of sophistication of irrigation and mechanical technologies employed and their relevance to the national economy and the socioeconomic conditions of the farmers is critical for effective beneficiary involvement and sustainability of outputs including issues of spare parts and, local maintenance and repair services skills;
- iii. A balanced division of management attention and emphasis between timely organization of production inputs and services on one hand and ensuring timely crop husbandry practices on the other by technical/institutional support services is crucial for maintaining economic yield levels; and,
- iv. The cost experiences of establishment of projects ranged from a low of US\$344/ha in PIWAMP to a high of US\$19,900/ha in RIDEP. Discounting the RFS and JPSP experiences as non-replicable options, the NRDS will focus on 4 main types of land development options: rehabilitation of existing irrigation schemes; development of rainfed swamps; establishment of new pump and tidal irrigated fields.

4. APPROACHES AND PRIORITY AREAS

4.1 Approaches

Taking into consideration the ecological diversity of the country's rice production areas, the regional differences in terms of rice ecologies, being cognizant of lessons learnt from the long history of rice development efforts, the overwhelming importance of the role of women in rice production, and the need for market-led, commercialized, efficient, competitive and dynamic rice industry, the NRDS II will adopt a multi-dimensional approach to tackle the challenges limiting the rice sector and ease the opportunities to improve the country's chances of attaining rice self-sufficiency. This approach will consist of the following elements:

4.1.1 Agro-Ecology-Based Promotion of Rice Production

There is a large diversity of agro-ecologies suitable for rice production in The Gambia. These ecologies fall within two broad groups: lowland and upland ecosystems. Out of a total land area of 555,240 ha suitable for arable agriculture, about 216,121 ha is lowland ecosystem equivalent to about 39%. Of a total cropped area of 222, 416 ha in 2020 season, 61,013 ha was under rice comprising 48,042 ha upland rice and 12,971 lowlands. Thus, the lowland potentials for expanded rice production are good although the upland potentials for rice production are negligible and faced with stiff competition from coarse grain and groundnut production.

The Lowland irrigated ecology, comprising pump and tidal production systems will be the main priority areas of investment. The potential cultivable area for this ecology amounts to 81, 120 Ha. The NRDS II is laying emphasis on this ecology because of its high production capabilities. With well-developed irrigation systems, at least two cropping season per annum is possible in these areas. The rice varieties that are also adapted to these ecologies are far more high yielding than in any other ecologies of the country. Production inputs such as fertilizers can also be well utilized in the lowland irrigated schemes than in the other rice ecologies.

4.1.2 Promoting Small- and Large-Scale Rice Production

Taking into account the gender dimension of rice production with women constituting the majority of small-scale rice producers a disproportionate attention will be paid to small producers initially. However, considering the specific socio-economic conditions of the different potential production areas, the strategy will give equal emphasis to both small-scale and commercial production of rice. This is important as the needs and requirements of small-scale and commercial production are different with different type and intensity of interventions.

4.1.3 Gender and Youth Involvement

Traditionally gender division in agricultural production has been the modus operandi. Men are generally engaged in upland mechanized cropping, usually groundnut, maize and millet while women are mainly engaged in rice cultivation using intensive labor methods. The introduction of the NERICA rice varieties which are cultivable in the upland, have since,

changed the gender dynamics of rice production with men getting involved to the extent of dominance in upland rice production.

Rice is a labor-intensive crop the cultivation of which under difficult lowland conditions requires strong man-power and or labor-saving devices. Given the government's resolve to address gender and youth issues across the board, the NRDS II will strongly consider interventions like introduction of labor-saving technologies for rice production and processing, starting from technology generation up to markets.

The following steps will be taken to enhance involvement and participation of youth in the rice value chain:

Structural Organization and Partnerships

- i. Formation of farmer organizations whose memberships will comprise of youth
- ii. Provide support to youth empowerment schemes such as the Gambia Shongai Initiative (GSI), President's Award Scheme and National Youth Service Scheme etc.
- iii. Seek partnerships with youth-based organizations e.g., youth empowerment project, Start-up Incubator Gambia, Young Female Farmers Association amongst others
- iv. Establishment of youth service centers equipped with farm machinery to provide services to farmers

Capacity Development

- i. Provide training on business and financial management
- ii. GAPs on seed and grain production
- iii. Operation and maintenance of pre- and post-harvest machinery

Financial Support

- i. Provision of start-up capital incentives and revolving loan schemes for youth-based organizations
- ii. Enhance access to credit facilities

4.1.4 Value-Chain Approach

Substantial post-harvest losses in rice production arise mainly from inefficient field level processing and milling operations. To minimize these loss factors an integrated approach in the implementation efforts of the Strategy will follow value-chain approach. This is to ensure that all actors along the chain will realize a fair share from the benefits of improved rice production. This will be ensured through innovations starting from technology adaptation and generation, institutional arrangement, production, post-harvest handling up to marketing of produce domestically and internationally. The engagement of private sector and farmers' organizations (cooperatives and associations) will be promoted along the value chain. Timely access to vital production inputs will be assured through establishment of revolving funds and access to micro- finance credit facilities such as VISACAs.

4.1.5 Environmental Sustainability

Given the history of swamp rice land development in particular, the Strategy will pay due emphasis to the sustainability of rice development activities by adopting interventions that

will safeguard social, natural resource and economic sustainability. Implementation of NRDS will entail interventions which could have negative environmental impacts if not well planned. Some of the negative impacts could include:

- i. advancement of the salt/fresh water interface of the river Gambia due to over abstraction of water and inefficient irrigation water use by farmers;
- ii. prevalence of water borne diseases such as malaria, bilharzias, diarrhea due to stagnant water in irrigation systems;
- iii. increased salinity and alkalinity of soils due to poor drainage systems and inappropriate application of fertilizers and agrochemicals;
- iv. development of acid-sulphate soils due to excessive exposure of the swamps; and,
- v. land degradation due to clearing of vegetation for establishing new areas for rice cultivation.

The NRDS implementation will anticipate and pre-empt the occurrences of such environmental hazards through continuous awareness and monitoring of fertilizer and agro-chemical usage; training of farmers on environmental issues related to irrigated agriculture including integrated pest management capacity building; training of technical staff on environmental issues in irrigation development; use of integrated water resource management approach in irrigation development to ensure equity distribution of water resources among different users; and undertaking periodic environmental impact assessment.

4.2 Priority Areas

The available arable land information contained in Sub-section 3.2.1 indicates that vast land areas are yet to be exploited both in the upland and lowland ecologies. Whereas the possibility of expansion is bigger in the upland even with competition for space for other priority upland crops such as groundnut, the priority for the NRDS II will be in the lowland ecology. Investments will be directed more towards enhancing the productive capacity of the irrigated and lowland rainfed ecologies through land development and irrigation system establishments.

The NRDS II implementation will emphasize intensification of the irrigated and lowland rainfed production systems through implementation of two season production, use of high yielding rice varieties, improved utilization of production inputs such as certified seeds and agrochemicals, utilization of appropriate machinery in post-harvest operations. The priority areas of investment in this regard are summarized as follows:

- i. Copious supply and improved timely access and use of improved seed varieties for upland rainfed, lowland rainfed and lowland irrigated; pre-harvest equipment; chemical fertilizers and pesticides;
- ii. Prioritize and promoted the WAB 105 rice variety in the upland rainfed ecology.
- iii. Investments in mechanization in the form of tillage, harvesting and post-harvest equipment and labor-saving technologies to reduce drudgery and attract youths into the rice sector;
- iv. Timely agronomy practices including proper pest management, proper land preparation technique, method and date of planting, proper seed rate along with type, rate and date of fertilizer application;

- v. Mobilize communities to be involved in the development process and train technicians in water control management. Farmers especially Water Users Association (WUA) would also be trained in the operation and maintenance of the scheme;
- vi. Rehabilitation of irrigation canals, dykes and bunds for the established fields and develop additional irrigated schemes to expand the production area and accommodate private investors;
- vii. Post-harvest handling through enhanced availability of threshing and milling equipment, safe storage facilities, harvest piling and transporting, and addressing storage pest problem and timely provision of maintenance services.
- viii. Improve quality of rice through improved milling which will be achieved through refurbishing existing rice mills across the country and provision of adequate numbers of small and medium scale mills in the short and medium term; and establishment of integrated rice mills in the long term through Public Private Partnerships.

5. VISION AND SCOPE OF NRDS II

5.1 The Vision

The NRDS II is founded on a vision of “**self-sufficiency in rice production**” by the year 2030.

5.2 The Goal

The overall goal of the NRDS II is to create a market-led, commercialized, efficient, competitive and dynamic rice industry consistent with sustainable development.

5.3 The Objectives

The over-arching objective of the NRDS (2022/2030) is the creation of a market-led, commercialized, efficient, competitive and dynamic rice industry which maximizes enhancement of food security and poverty reduction. This objective strand will be accomplished through the achievement of the following specifics:

- i. increase domestic production by around 25% annually over the next 9-year period through enhancement of the productive capacity of the smallholder farmers and commercial local rice producers and entrepreneurs along the value chain;
- ii. promote consumption and marketing of locally produced rice through quality improvement and value addition;
- iii. increase availability of and access to safe and nutritious rice as food for the nation;
- iv. promote public-private sector collaboration in rice production; and,
- v. promote stakeholder innovation capacity for the utilization of rice by-products while ensuring sound environmental management practice

5.4 Strategic Scope and Targets

From the analysis of rice production potentials as presented in Chapter three, sub-section 3.2.1, it is established that the possibility of expanding rice production both in the upland and lowland exist. The unexploited areas are bigger in the upland even with the possibility of shift

in the choice of crop as the same areas are used for the several upland crops. However, because of the possibility of two cropping seasons and the higher yield potentials in the irrigated lowlands, the NRDS II will place more emphasis on intensification in lowland production systems during the 9-year Strategy 2022 – 2030.

The scope and targets of the Strategy in terms of production, scientific and technical personnel and financial and human resource commitment by all stakeholders including the government, development partners and private sector are summarized as follows:

5.4.1 Projected Area, Production and Yield

Table 5.1: Base and projected areas, yield and production of paddy and milled rice in the four ecologies for the period of the strategy

Year	Rainfed upland				Rainfed Lowland				Irrigated				Mangrove				Total				
	New Area to be developed	Area harvested	Yield	Production	New Area to be	Area harvested	Yield	Production	New Area to be	Area harvested	Yield	Production	New Area to be developed	Area harvested	Yield	Production	New Area to be developed	Area harvested	AV. Yield	Production (Paddy)	Production (Milled)
2020		48,042	1	31,493		8,546	2	17,092	0	3,250	3	9,750	0	259	1	259		60,097	1.0	58,594	38,086.10
2022	3,000	51,042	1	51,042	1,500	10,046	2	20,092	2,000	5,250	3	15,750	200	200	2	400	6,700	66,538	1.3	87,284	56,734.60
2023	4,500	55,542	2	111,084	2,500	12,546	3	37,638	3,000	8,250	4	33,000	500	700	2	1,400	10,500	77,038	3.1	183,122	119,029.30
2024	7,000	62,542	2	125,084	3,000	15,546	3	46,638	5,000	13,250	4	53,000	800	1,500	2	3,000	15,800	92,838	3.1	227,722	148,019.30
2025	10,000	72,542	2	145,084	9,000	24,546	3	73,638	8,000	21,250	4	85,000	1,200	2,700	2	5,400	28,200	121,038	3.2	309,122	200,929.30
2026	20,000	92,542	2	185,084	15,000	39,546	3	118,638	12,000	33,250	4	133,000	1,000	3,700	2	7,400	48,000	169,038	3.2	444,122	288,679.30
2027	22,000	114,542	2	229,084	12,000	51,546	3	154,638	7,000	40,250	4	161,000	600	4,300	2	8,600	41,600	210,638	3.2	553,322	359,659.30
2028	8,000	122,542	2	245,084	6,000	57,546	3	172,638	3,000	43,250	4	173,000	500	4,800	2	9,600	17,500	228,138	3.2	600,322	390,209.30
2029	5,000	127,542	2	255,084	4,000	61,546	3	184,638	2,512	45,762	4	183,048	400	5,200	2	10,400	11,912	240,050	3.2	633,170	411,560.50
2030	3,380	130,922	2	261,844	2,254	63,800	3	191,400	1,000	46,762	4	187,048	325	5,525	2	11,050	6,959	247,009	3.2	651,342	423,372.30

The assumptions underlying Table 5.1 are that:

- i. The upland ecology will keep on being relevant in the rice self-sufficiency drive of the country, therefore, research and dissemination of varieties suitable for this ecology needs to be strengthened;
- ii. The bulk of the targeted rice will be produced from the irrigated lowland as two season production is being targeted. Therefore, efforts geared towards enhancing timely operations and productivity within this ecology needs to be strengthened.

Based on the foregoing assumptions, the total production of rice by 2030 is projected to be 187,171 Ha under improved rice production systems yielding about 651,342 tons of paddy. At 65% improved milling output, this represents an annual milled rice production of 423,372.30 tons which is in excess of the 2030 rice demand projection of 359, 147.75 tons by 61, 206.25 tons. The excess produce could be stockpiled in the country's grain reserve or exported to earn an additional foreign revenue.

5.4.2 Projected Increase in Human Resource Development

Table 5.2: Number of researchers, seed scientist, extension workers and engineers projected to be trained during the period to support the rice sector development

Year	Agricultural Researchers			Seed Scientists			Extension workers	Engineers
	PhD (rice breeding & agronomy)	MSc. (Rice agronomy)	Research technicians (BSc & HND)	MSc. (Seed science)	Seed Technicians (BSc&HND)	Laboratory technicians	Rice specialists (MSc, BSs & HND)	Irrigation engineers (MSc.)
2022	1	2	4	2	3	2	25	3
2023	1	2	4	2	3	2	25	4
2024	1	2	4	2	3	3	30	6
2025	1	2	4	2	3	3	35	8
2026	1	2	4	2	4	3	35	8
2027	2	1	3	1	4	2	40	6
2028	2	1	3	1	4	2	40	5
2029	1	1	3	1	4	2	45	5
2030	1	1	3	1	4	2	50	5
Total	11	14	32	14	32	21	325	50

5.4.3 Financial Commitment of the Government

During the past six decades government has been committing huge financial resources to the development of the country's rice sector. Close to 5% of the national budget is allocated to the agriculture sector in the past 10 years and this is complimented with millions of dollars of donor funds in grants and loans in the form of projects that support rice production, processing and marketing.

Currently the government is implementing four major projects that are entire rice based or having a huge rice component which will ensure continuous financial commitment to rice production. These are the Regional Rice Value Chain Development Project (RRVCDP), Rice Value Chain Transformation Project (RVCTP), Resilience of Organizations for Transformative Smallholder Agriculture Program (ROOTS), and Gambia Inclusive and Resilient Agricultural Value Chain Development Project (GIRAV).

6. IMPLEMENTATION STRUCTURE

6.1 Governance of the NRDS II and Implementation Arrangements

The NRDS will be implemented by the Ministry of Agriculture (MOA) assisted by a National Rice Development Steering Committee (NRDSC) through the collaborative efforts of the National Agricultural Research Institute (NARI), National Seed Secretariat (NSS), Department of Agriculture (DOA) and the Central Projects Coordination Unit (CPCU) at the national level. At the regional level, the Strategy will be implemented by the Regional Agricultural Directorate (RAD) assisted by Regional Rice Development Steering Committee (RRDSC) in each region.

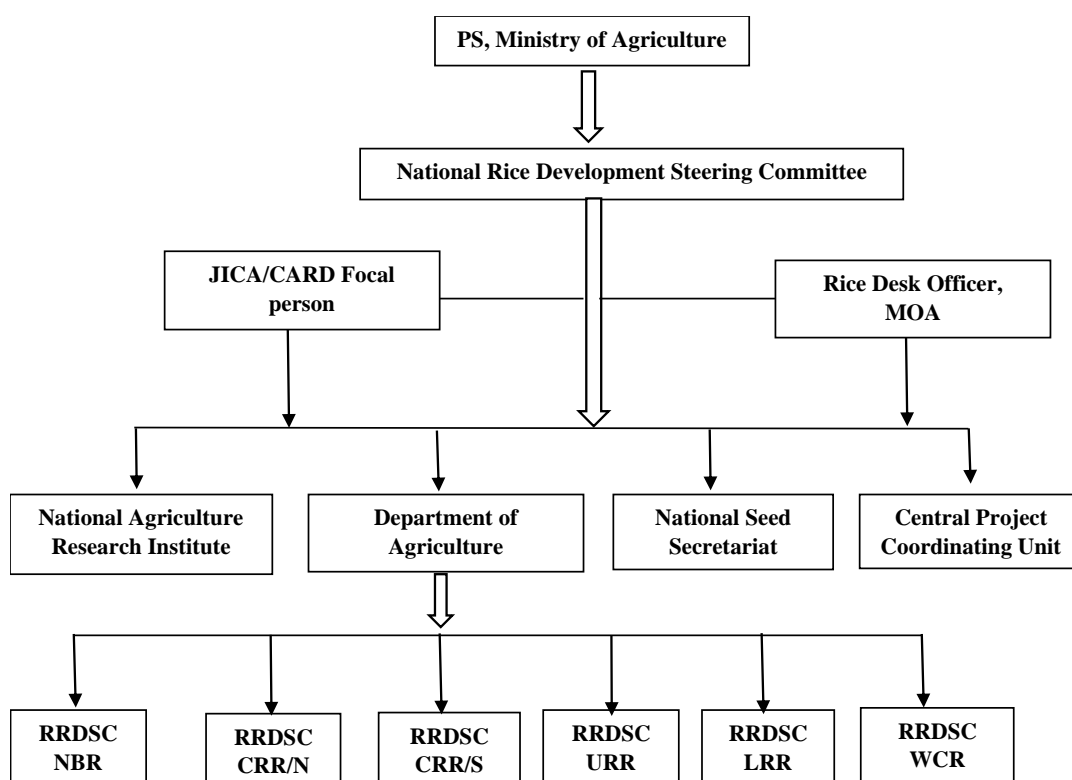


Figure 6.1: Governance Structure of the Implementation of the NRDS2

6.1.1 Governance of NRDS

Figure 6.1 presents the governance structure for the implementation of the NRDS II. In line with the regional orientation of the field administration of agricultural development and differences in the relative regional importance of rice ecologies, the field implementation of the NRDS will be on regional basis under the national agricultural policy and program leadership of the Ministry of agriculture.

The national level structures of the governance will include:

1. The Ministry of Agriculture (MOA) and its technical arms of:
 - i. National Agricultural Research Institute;
 - ii. Department of Agriculture;
 - iii. National Seed Secretariat; and
 - iv. Central Projects Coordination Unit

2. The Social Development Fund (SDF) as the governments designated credit and micro-finance outlet, it will be used as the institution to handle credit facilities and micro-finance matters of the NDRS2.

3. The National Rice Development Steering Committee will assist the MOA in its program planning, evaluation and review functions and will comprise of the following key stakeholders:

- i. Permanent Secretary, MOA-Chairperson
- ii. Permanent Secretary, Local Governments and Lands
- iii. Permanent Secretary, Parks and Wild Life
- iv. Deputy Permanent Secretary, Projects and Programs, MOA – Rice Desk Officer;
- v. Director General NARI - National Focal Point of NRDS and Secretary to the Committee;
- vi. Coordinator, Central Projects Coordination Unit – Co-Secretary;
- vii. Director General, Department of Agriculture;
- viii. Director General, National Seed Secretariat
- ix. Director, Department of Planning Services, MOA;
- x. Director, SDF;
- xi. Rice Related Project Directors
- xii. Women’s Bureau; and,
- xiii. President of the Farmers’ Platform

The regional level structures of the governance will include:

A Regional Rice Development Committee (RRDC) in each of the six regional agricultural directorates. The RRDC will assist the regional directorates in the development of an annual rice development program and evaluate investments in rice sector development within the region. The Committee will comprise the following:

- i. Regional Governor, Chairperson;
- ii. The Regional Agricultural Director, Secretary;
- iii. The Regional Agriculture Research Officer;
- iv. Regional Seeds Officer;
- v. Regional representatives of rice related projects;
- vi. SDF regional representative
- vii. Department of Planning Services lead regional officer;
- viii. National Farmers’ Platform regional representative;
- ix. Private sector leaders (rice processors, aggregators, marketers)
- x. NGOs with rice as a core program.
- xi. Parks and Wild Life Regional Representative

6.1.2 Partnership Arrangements

The NRDS II will be promoting effective partnership with all stakeholders within the country and regionally such as AfricaRice, IRRI, JICA, and CARD. The National Agricultural Research Institute (NARI) will take the responsibility in strengthening this partnership. In addition, the National Rice Development Steering Committee will promote partnership at the sub-regional and national levels.

The CPCU will promote Project-based collaboration and effective partnership among all stakeholders as an approach in implementing the different aspects of the NRDS. The Regional Rice Development Steering Committees will promote partnership within their jurisdictions especially with NGOs active in supporting rice development activities.

6.2 Monitoring and Evaluation

Monitoring and reporting will be critical to assess the efficiency of the actions and the fulfillment of the targets and also to give feedback to the international donors and private investors. The progress towards the accomplishment of the different targets and activities outlined in the Strategy should be evaluated each year to assess their degree of achievement. At the same time, the Strategy will be reviewed periodically based on worldwide technological developments in this sector and the emergence of variations in the climatic pattern of The Gambia.

In addition to the current (and ongoing) reporting and monitoring requirements of annual agricultural production under the NASS, activities undertaken under the Strategy should be part of a continuous program of monitoring, involving the relevant stakeholders in the rice industry as part of the successful implementation process of the strategy.

The Strategy will be evaluated at end of every cropping season to assess the degree of achievement and the progress of the different activities and measures included in the framework, and to ensure that the overall direction of the Strategy remains the best (least cost and lowest risk) option for the generality of small farmers especially the women rice farmers. The Strategy emphasis will be updated if amendments are required.

The Central Project Coordination Unit and Planning Service Unit under the supervision of the Ministry of Agriculture have the ultimate responsibility for monitoring and evaluating the implementation of this Strategy at two levels: National and Local Government Area (LGA) levels, based on the guidelines provided by the National Rice Development Steering Committee and Regional Rice Development Steering Committees. For this purpose, a set of indicators is proposed in order to ensure the strategy is achieved during the expected time period.

The assessment's results regarding these indicators, as well as the recommendations obtained from this analysis, will be published in an annual report which will be submitted to Cabinet by the Hon. Minister of Agriculture.

The tentative indicators for the annual assessment of the performance of this strategy over the period 2022-2030 might be:

Section A: Impact Level Indicators

1. Percentage reduction in rice imports.
2. Percentage of households living above poverty line.
3. Change in the annual budget allocation to agriculture geared to rice value chain development.
4. Percentage share of rice in the National Food Balance Sheet.

5. Number of job opportunities created through NRDS value chain activities disaggregated by rice value chain segment, sub sector and job category (short term and long term)

Section B: Outcome Level Indicators

1. Percentage of households with improved levels of food security (measured as a reduction in periods (months) of food deficit during lean season period), disaggregated by gender, age and by region of household head.
2. Proportion of households with change in income generated from rice value chain disaggregated by source of income and gender age and region.
3. Change in areas under rice production disaggregated by ecology type, rice production type and by age, gender and region of farmer.
4. Proportion of farmers that are realizing a change in yield (T/Ha), disaggregated by ecology type and by gender, age and region of farmer.
5. Proportion of farmers that are realizing a change in rice production disaggregated by ecology type and by gender, age and region of farmer.
6. Proportion of farmers that adopted the new rice production technology that realise a sustained increase in disaggregated by technology type and by gender, age and region of farmer.
7. Percentage of rice value chain actors that are satisfied by the services they received disaggregated by disaggregated by type of service type, service provider institution, and by rice value chain segment.
8. Proportion of people utilizing the provided infrastructure disaggregated by category of infrastructure (production, processing, marketing) sub sector by gender, age and region.
9. Percentage of rice value chain actors achieving reduced post-harvest losses disaggregated by gender, age and region of rice value chain actors.
10. Proportion of rice value chain actors realizing a change in the volume of value added products disaggregated by product type and region.
11. Proportion of rice value chain actors timely accessing market information, disaggregated by market information type (prices, product availability, producer location, market days, etc.) and by means of communication (radio, television, mobile Short Message Service (SMS), newspaper, etc.)
12. Proportion of rice value chain actors accessing financial services, disaggregated by financial service type (bank, VISACA, etc.), gender, age and region of rice value chain actor.
13. Proportion of disbursed loans that is invested in rice value chain disaggregated by financial service provider and rice value chain type by region.
14. Change (%) in the volume of local rice available on the local market disaggregated by region.
15. Area under irrigation disaggregated by irrigation type.
16. Number of people employed in the rice value chain disaggregated by sub sector, age and region.
17. Number of people employed in the rice VC disaggregated by VC segment, by gender, age and region.

Section 3: Out Put Level Indicators

1. Number of rice value chain actors that applied new technologies disaggregated by type of technology, gender, age and region.
2. Number of demonstration sites (not on farm trials) established disaggregated by technology type and region.
3. Number of rice value chain actors that received Capacity Development Support (CDS) disaggregated by value chain segment (production, processing, marketing, etc.), type of support, gender, age and region of person.
4. Number of staff that received capacity development support disaggregated by type of support, institution and gender of staff.
5. Number of staff who received training materials disaggregated by category of person (staff, farmer, trader, etc.) material type and by gender, age and region of recipient.
6. Number of farmers who received production inputs (seeds, fertilizer, etc.) disaggregated by input type, gender, age and region.
7. Number of infrastructures developed disaggregated by infrastructure type and by region.
8. Number of financial services institutions established (including the ones that were revived) for supporting rice value chain activities disaggregated by region and type of financial institution.
9. Number of rice value chain actors (people) who received loans disaggregated by VC category of the recipient, gender, age and region.
10. The value of loans disbursed disaggregated by type of financing institution (micro finance or commercial bank, etc.) and region.
11. Number of people (rice VC actors) that are practicing some form of value addition (either as individuals or members of newly established value addition group initiatives) disaggregated by gender, age, region.
12. Number of people (rice VC actors/beneficiaries) reached disaggregated by category of support, age and region of farmer.
13. Number of conservation structures developed/constructed disaggregated by type (contour bunds, gully plugs, Irish crossing, etc.) and by region.
14. Number of trials established disaggregated by variety, location (on farm or on station) and region.
15. Number of projects formulated to implement NRDS II disaggregated by funding source.
16. Annual NRDS II budget portfolios disaggregated by funding source.

Logical Result Framework

Hierarchy of objectives	Performance Indicators	Baseline	Target	Means of Verification	Assumptions and Risks
Impact					
1. Self-sufficient and creation of a market-led, commercialized, efficient, competitive, and dynamic rice industry	By 2035 1. Increase domestic rice production 2. Increase in rice farmers' income 3. National poverty level reduced	20%	40% 30% 5%	--MOTRI Rice imports data -GBOS Poverty Assessment Reports, - -MICS V Reports, - PSU CILSS food and nutrition security Surveys. - NRDS Impact & Closure Reports -- NBPDP Impact Report.	i. Government commitment to food and nutritional security sector is there ii. Favorable climatic conditions exist iii. Poor gender awareness and mainstreaming and limited youth involvement iv. Inadequate capacity of service providers v. Increase private sector investment and favorable market access
Outcomes					
1. Increased rice production and productivity 2. Increased private sector partnership in Rice Value Chain 3. Job creation Increased within the rice value chain. 4. Agriculture credit facilities increased	By 2033 1.1 Rice yield increased 1.2 Number of value chain actors with increased income 2.1 Number of private sector partnerships created 3.1 Number of Jobs created 4.1 Financial institutions providing agric. credit facilities created/established	3tons irrigated 1ton Upland 0 2 0 6	6tons/ha 2tons 200,000 100 250,000 20	- MOA APR, - CPCU M&E and DSM Reports. - Evaluation reports. - Consultants reports. - Annual NASS Surveys and Statistics Reports	vi. Acceptance/ownership vii. Limited financial resources viii. Climate conditions remain favourable ix. Stable global input and equipment prices
Outputs					
	By 2027				i. A positive Farmer

1. Increasing total area in rice production and productivity	1.1 Develop new irrigation schemes (pump & tidal)	0	43,512ha	- RAD PR -CPCU M&E and DSM Reports. - Consultant progress reports. - Partner reports. - Field visit report. - CPCU coordination reports - Project reports	ii. Attitude Adequate financial resources iii. Climate conditions remain favourable iv. Stable global input and equipment prices
	1.2 Rehabilitate tidal & pump irrigation schemes	0	5000		
	1.3 Improve areas in the rain fed upland	xx	82,800ha 500%		
	1.4 Increase in % of domestic rice production in the tidal & pump area (Double cropping - plus- increased productivity).		500%		
	1.5 Increase in % of domestic rice production in the uplands	0	63 tractors		
	1.6 Number of production machinery introduced	0	5 units		
2. Strengthening processing, marketing systems	2.1 Number of new warehouses constructed		25 units		
	2.2 Number of stores constructed		4units medium		
	2.2 Number of new small-medium rice mills built	-	20unit small		
	2.3 Number of rice mills rehabilitated	0	15 units		
	2.4 Quantity of rice paddy produced	69,000 tons	552,535 tons		
	2.5 Number of post-harvest equipment (harvesting & threshing machinery) provided	0	300units threshers 34units harvesters		
3. Strengthening national rice seed systems	2.6 Access roads developed in (KM)	0	2,000km		
	3.1 Number of labs improved	0			
	3.2 NSS seed production area rehabilitated & expanded	0	6 labs 15Ha		
	3.3 Number of technical staff trained	0			
		10	105		

4. Policy and Monitoring strengthening	3. 4 Quantity of certified produced	0	11,832 tons		
	3.5 Number of certified seed companies registered		5		
	3.6 Number of climate-smart high yielding rice varieties introduced		15		
	3.6 Number of rice breeding structures established		6		
	4.1 Number policy instrument developed/updated		5		
Activities	Resource/ inputs				
	Thematic areas		Total (GMD)	Total (USD)	
1. Development of tidal and pump irrigation schemes	Tidal and pump irrigation schemes development (43,512 hectares)			181,300,000	
2. Rehabilitation tidal and pump irrigation schemes					
Upland improvement					
3. Provision of production machinery	Tidal and pump irrigation scheme rehabilitation (5,000 hectares)			15,000,000	
	Improvement of 82,800ha of uplands			82,800	
	63 Tractors and accessories			3,150,000	
4. Provision of production inputs (seeds, agro-chemicals)	200 Super eco seeders			100,000	
	150 trans planters			3,000,000	
5. Provision agric. machineries	Seeds (all categories)			226,554	
6. Construction of new warehouses	Fertilizer (NPK 15:15:15 and Urea)			74,872,143	
7. Establishment of new small-medium rice mill units	Herbicides			38,461.54	
8. Rehabilitation of existing					
	warehouse (4), Village grain stores, drying floors			5,000,000	

rice mills	Rice mills (3 medium, 15 small, 15 rehabilitated)		2,800,000	
9.Post-harvest equipment (harvesters, threshers, etc.)	34 combine harvesters		9,550,000	
	300 motorized threshers			
10.Development of access roads to enhance field and market access	1,000 km of access roads		30,000,000	
11.Improvement and or establishment of NSS seed laboratory	Improvement of 6 laboratories		300,000	
12.Develop new irrigation areas for seed production	New irrigation areas for seed production (15ha)		3,750,000	
13.Training of Researchers, seed scientists, extension specialist, and irrigation engineers	105 staff of researchers, seed scientists, extension specialists and irrigation engineers		2,500,000	
14.Development new policy document to promote idea of RICE	Consultancy and one day validation		50,000	
15.Management and monitoring of the progress and performance of the strategy	Procurement of office furniture, other equipment and vehicle for the office of NRDS Desk Officer at MOA		250,000	
	NRDS steering committee meetings/annual reviews		270,000	
	Co funding of PSU annual NASS data collection activities		180,000	
	PSU MIS data collection		90,000	
	NRDSII Evaluation (Mid-term and completion)		100,000	
	CPCU & DOA regular monthly data collection		60,000	

7. FINANCING STRATEGY OF THE NRDS II

In addition to the Government line departments, NGOs and Development partners interventions in the rice sector development, project-based partnerships in funding selected research and development activities will be the main financing strategy to be promoted. The agriculture ministry currently has two full-fledged rice projects i.e., RRVCDP and RVCTP. Two other projects i.e., ROOTS, GIRAV and GAFSP have huge rice components. The CPCU supervises these projects and in collaboration with NRDC will ensure that these projects' interventions continue to be in line with the set goals and objectives of the NRDS II.

In promoting financing of intensive activities like irrigation schemes, it is suggested to (i) promote cost sharing mechanisms with beneficiaries in terms of installation and maintenance, (ii) donor assisted irrigation schemes; and (iii) public funded irrigation schemes.

Based on the lessons learnt from previous rice interventions in sub-section 3.2.8, strategy scope and targets in sub-section 5.4 and the proposed irrigation and water control investment strategy for the NRDS in sub-section 8.2.5, a plausible indicative planning figure is estimated at about US\$764,271,959 over the 9-year period. The cost breakdowns are presented in table 7.1 below.

Table 7.1: The quantities and costs of land development, inputs and machinery required for the NRDS II

No.	Item	Quantity	Total Cost (\$)
1	Tidal and pump irrigation schemes development & rehabilitation	43,512 Ha	522,144,000
2	Development of lowland rainfed fields	55,254 Ha	110,508,000
3	Improvement of uplands	82,800 Ha	82,800
4	Development of access roads	1000 km	30,000,000
5	Seeds (All 3 classes)	1.76; 141.16; and 11,292.41 tons of breeder, foundation & certified seeds, respectively)	226,554
6	Fertilizer	748,684 bags of NPK 374,342 bags of Urea	74,872,143
7	Tractors and accessories	63	3,150,000
8	Super eco seeders	200	100,000
9	Rice transplanters	150	3,000,000
10	combined harvesters	34	9,550,000
11	Rice mills	3 medium, 15 small, 15 rehabilitated	2,800,000
12	Herbicides	400 tons (granular)	38,461.54
13	Storage facilities	warehouse (4), Village grain stores (150), drying floors (300)	5,000,000
14	Improvement of research and seed laboratories	6	300,000
15	Human resource development (Researchers, seed scientists, extension specialist, and irrigation engineers)		2,500,000

7.1 Access to Finance: Assessment and Strategy

This is to assess demand and supply constraints that block a more sustained access to finance for SMEs in the rice value chain. Investment in such will require the level of the SMEs capital requirement. Agricultural financing remains a major challenge, with less than 5% of loans going to agriculture (GIRAV appraisal report, 2022). Financial Institutions especially commercial banks in the Gambia offer little loans facilities to agriculture due to the high risk associated to it. The following are some of the strategies to improve access to finance:

- i. Link processors to financial institutions
- ii. Government to establish Agriculture Development Bank
- iii. Establish matching grant facilities in development projects
- iv. Concessionary loans and Public Private Partnership

8. SUB-SECTORAL STRATEGIES

8.1 Key Strategic Interventions

In order to achieve its objectives as set out in Chapter 5.2, the overall strategic orientation of the NRDSII will entail eight sets of strategic actions that will guide the pursuit of self-sufficiency in rice production within the next 9 years. These actions are:

- i. Land development (development of new schemes and rehabilitation of existing irrigation facilities)
- ii. Seed development and varietal improvement;
- iii. Enhanced paddy production;
- iv. Post-harvest losses handling;
- v. Processing (value addition) and marketing;
- vi. Rice production inputs supply and distribution;
- vii. Pests and disease management.
- viii. Mitigation of climate change effects

8.2 Sub-Sectoral Strategies

In view of the suggested approaches in addressing the priority areas identified in Chapter Four and the objective framework, the NRDSII is designed to have eight sub-sectoral strategies namely:

1. strengthening the institutional framework and policy development
2. research, technology delivery and capacity building;
3. production and dissemination of rice seed;
4. fertilizer marketing and distribution;
5. irrigation and investment in water control technologies;
6. Equipment access and maintenance strategy;
7. Post-harvest and marketing; and,
8. Finance and credit

8.2.1 Strengthening the Institutional Framework and Policy Development

Operational management (coordination, monitoring and evaluation) is a major part of the

implementation and it cuts across all the strategy elements. The government policy has emphasized the need for closer collaboration between various stakeholders in the innovation systems. NARI has now adopted a new strategy called Agricultural Research for Development (AR4D) in which all the stakeholders within the system are involved in the planning and implementation of research findings. However, stakeholder sensitization and training need to be carried out on this new innovation system for proper institutionalization. Similarly, the area of public-private partnership, capacity building, sound environmental management, micro-finance for agricultural production, development of the rice information system through ICT, collaboration with stakeholders both internally and externally among others need to be strengthened.

For effective implementation of the strategy, Sapu station of NARI will serve as the Centre of Excellence for Rice Research and Training. However, there is a need to strengthen the Station in terms of human and physical facilities. Specifically, there is a need to establish well-flagged site(s) for rice germplasm maintenance and seed multiplication, and establishment of required facilities for training.

In addition to the formal interventions that will be designed through the annual program planning processes of the NRDSC and the RRDSCs and other partners, specific projects on the NRDS different aspects of the rice R&D will be designed and implemented in the short-, medium-, and long-term.

8.2.2 Research and Technology Dissemination Strategy

Studies have shown that linkages between research, extension and users of the technologies have not been very strong, thus most of the technologies developed are not successfully transferred to farmers. The linkage between research and extension is very weak. Thus, the following strategy elements will be deployed:

- i. Introduce new research paradigm (Integrated Agricultural Research for Development IAR4D) which will facilitate participation in the generation and dissemination of agricultural technologies through more proactive partnering with research and extension systems;
- ii. Provide training for stakeholders on the principles of IAR4D;
- iii. Organize bi-monthly meetings, Annual Research Review meetings (ARREV) and workshops to sensitize stakeholders on different technologies developed by research;
- iv. Carry out joint research and extension demonstration plots to showcase technologies and best practices to farmers;
- v. Make use of the participatory varietal selection (PVS) approach in technology development and dissemination;
- vi. Use video, film shows, drama, ICT etc. to help inform target groups about the technology one intends to disseminate;
- vii. Increase number of extension agents to reduce farmer –extension agent ratio;
- viii. Improve mobility to have regular visit of the extension agents to farmers; and,
- ix. Train farmers and extension agents on recommended agronomic practices.

8.2.3 Production and Dissemination of Rice Seed

Table 8.1 presents the projected early generation and certified seed requirement of the Strategy from the base year of 2022 through 2030. The cumulative total certified seed requirement as at the mid strategy year of 2026 is estimated at 6,485tons. Cost-effective and good quality rice seeds are essential factors in the attainment of increased rice production in the Gambia. The National Seed policy has been enacted by the House of Parliament in 2011 and subsequently in the 2015, the National Seed Secretariat was established.

Table 8.1: Seed requirement for the different classes of seeds for the period of the strategy

Year	Seed Classes		
	Breeder (tons)	Foundation (tons)	Certified (tons)
2022	0.064	5.125	410.000
2023	0.099	7.938	635.000
2024	0.152	12.125	970.000
2025	0.253	20.250	1620.000
2026	0.445	35.625	2850.000
2027	0.409	32.750	2620.000
2028	0.165	13.188	1055.000
2029	0.110	8.820	705.600
2030	0.067	5.335	426.810
Total	1.764	141.155	11,292.410

Table 8.2: Projections of seed requirement of the four ecologies for the period of the strategy

Seed Requirements (tons)						
No.	Year	Rainfed upland	Rainfed lowland	Irrigated	Mangrove	Total
1	2022	240	60	100	10	410
2	2023	360	100	150	25	635
3	2024	560	120	250	40	970
4	2025	800	360	400	60	1,620
5	2026	1,600	600	600	50	2,850
6	2027	1,760	480	350	30	2,620
7	2028	640	240	150	25	1,055
8	2029	400	160	126	20	706
9	2030	270	90	50	16	427
TOTAL		6,630	2,210	2,176	276	11,292

Table 8.3: Projected cost of the three classes of seeds required for the period of the strategy

Year	Seed Classes								
	Breeder			Foundation			Certified		
	Quantity (tons)	Unit cost / tons (\$)	Total Cost (\$)	Quantity (tons)	Unit cost /ton (\$)	Total Cost (\$)	Quantity (tons)	Unit cost /ton (\$)	Total Cost (\$)
2022	0.064	2,000	128.13	5.125	1,500	7,687.50	410.000	1,000	410,000.00
2023	0.099	2,000	198.44	7.938	1,500	11,906.25	635.000	1,000	635,000.00
2024	0.152	2,000	303.13	12.125	1,500	18,187.50	970.000	1,000	970,000.00
2025	0.253	2,000	506.25	20.250	1,500	30,375.00	1620.000	1,000	1,620,000.00
2026	0.445	2,000	890.63	35.625	1,500	53,437.50	2850.000	1,000	2,850,000.00
2027	0.409	2,000	818.75	32.750	1,500	49,125.00	2620.000	1,000	2,620,000.00
2028	0.165	2,000	329.69	13.188	1,500	19,781.25	1055.000	1,000	1,055,000.00
2029	0.110	2,000	220.50	8.820	1,500	13,230.00	705.600	1,000	705,600.00
2030	0.067	2,000	133.38	5.335	1,500	8,002.69	426.810	1,000	426,810.00
Total	1.764	2,000	3,528.88	141.155	1,500	211,732.69	11,292.41	1,000	11,292,410.00

The capacity of NARI and NSS in terms of infrastructural and human resource development should be strengthened to help produce breeder and foundation seeds for onward transfer into the farming system. The seed system needs to be well organized to produce good quality certified seed. In doing this, certified seed producers have to be identified on commodity specific basis at different location in the country. The Community Based Seed System will be strengthened to encourage the provision of large quantities of quality seed within easy reach of farmers. The introduction of hybrid rice varieties and biotechnology would be used to increase rice production. Also, the collaboration between the National Agricultural Research and Extension systems (NARES) should be strengthened.

8.2.4 Fertilizer marketing and distribution strategy

The government through the National Food Security Processing & Marketing Corporation (NFSPMC), is responsible for importation, marketing and distribution of fertilizer in The Gambia. For the recent past years, fertilizer has been coming on time and at a subsidized price that is affordable by most farmers. However, the procurement and distribution of fertilizer, access and affordability still remains a major challenge as the bulk of the fertilizer is fraudulently bought by commercial entities against laid down regulation and sold at prices above the subsidized, hoarded and resold through black marketeering or slip away in to neighboring Senegal. This makes government effort of subsidizing for cheaper affordability to farmers to some extent futile.

Table 8.4: Projections for fertilizer type and requirement for the strategy

Fertilizer Requirements (50Kgbag)											
No.	YEAR	Rainfed upland		Rainfed lowland		Irrigated		Mangrove		Total	
		NPK 15:15:15	Urea	NPK 15:15:15	Urea	NPK 15:15:15	Urea	NPK 15:15:15	Urea	NPK 15:15:15	Urea
1	2022	12,000	6,000	6,000	3,000	8,000	4,000	800	16,000	26,800	13,400
2	2023	18,000	9,000	10,000	5,000	12,000	6,000	2,000	24,000	42,000	21,000
3	2024	28,000	14,000	12,000	6,000	20,000	10,000	3,200	40,000	63,200	31,600
4	2025	40,000	20,000	36,000	18,000	32,000	16,000	4,800	64,000	112,800	56,400
5	2026	80,000	40,000	60,000	30,000	48,000	24,000	4,000	96,000	192,000	96,000
6	2027	88,000	44,000	48,000	24,000	28,000	14,000	2,400	56,000	166,400	83,200
7	2028	32,000	16,000	24,000	12,000	12,000	6,000	2,000	24,000	70,000	35,000
8	2029	20,000	10,000	16,000	8,000	10,048	5,024	1,600	20,096	47,648	23,824
9	2030	13,520	6,760	9,016	4,508	4,000	2,000	1,300	8,000	27,836	13,918
Total		331,520	165,760	221,016	110,508	174,048	87,024	22,100	348,096	748,684	374,342

Table 8.4 presents the projected fertilizer requirement of the Strategy. The projected total fertilizer requirement at 2030 is estimated at 748,684 (50kg bags) of NPK (15:15:15) and 374,342 (50 kg bags) of urea. To meet its annual fertilizer requirements on a timely basis, the NRDS II will propose to involve private sector in the blending of fertilizers based on ecology, soil, variety to be adopted by farmers and where possible, organic fertilizer will be part of the specific rice ecology blend.

Improvement of transportation and storage facilities nationwide is a need. Packing of fertilizer into appropriate small quantities will ensure easy access and affordability by smallholder farmers. In order to remedy the existing red tape of the industry, the following strategy elements should be put in place:

- i. Continue providing fertilizer to farmers on time and at affordable price;
- ii. Support the private sector to import fertilizers in to the country;
- iii. Set standards for effective quality control for fertilizers and other chemical inputs;
- iv. Create the enabling environment for private sector investment in the importation and manufacturing of fertilizers into the country;
- v. Encourage use of organic-based fertilizers to ensure good maintenance of the soil fertility and soil biodiversity; and,
- vi. Establishment of new and refurbishment of old seed stores in the country to facilitate access for farmers.

8.2.5 Irrigation and Water Control Investment Strategy`

Irrigation and water control investment will be the responsibility of the Ministry of Agriculture. Beneficiary participation when it comes to making decisions on the systems of irrigation must be highly encouraged. Investments in irrigation will be effected in phases of short (1-3 years), medium (3-6 years), and long-term (> 6 years) taking into consideration the country's regional dispersal of rice ecologies, regional agricultural administrative structures and climatic variations.

Short-term (1-3 years) strategy actions would be:

- i. carryout minor maintenance on existing irrigation schemes such as desilting, canal cleaning, land leveling, fixing of damage gates etc.;

- ii. construction of rainwater harvesting and storage structures for small-scale irrigation and improving soil moisture through promotion of in-situ soil moisture conservation technologies;
- iii. rehabilitation of water control structures and facilitation of access for the expansion of rain-fed deep-flooded swamps;
- iv. rehabilitation and/or expansion of swamp rice fields of both fresh water and brackish water zones; and,
- v. promotion of appropriate rice varieties suitable for brackish water and saline conditions and construction of irrigation infrastructures for water management to prevent salinity problems;

Medium-term (3-6 years) strategy actions would be:

- i. increase irrigation extension and management systems through staff and beneficiaries' capacity building;
- ii. rehabilitation of existing perimeter irrigation schemes (adopting renewable energy resources and/or hybrid pumping systems with well-designed back-up training modules in repair and maintenance); and,
- iii. strengthening the collaboration and linkages between national, regional and international institutions involved in rice research and development program.

Long-term (6 years onwards) strategy actions would be:

- i. expansion of areas in lowland irrigation through construction of new irrigation and drainage schemes and consolidating rehabilitated perimeters;
- ii. increase access to improved water saving irrigation technologies; and
- iii. encouraging private sector investment in medium and large-scale irrigation schemes using underground water resource.

8.2.6 Equipment Access and Maintenance Strategy

In order to ensure easy and timely access to farm equipment, the government in the short-term plan will facilitate the supply of power tillers and accessories, water pumps, tractors and accessories, rice seeders, transplanters and rotary weeder. The government will encourage private sector to play a key role in public-private partnership ventures. Empowerment of the communities in accessing and use of equipment for maintenance of irrigation systems (clearing of irrigation and drainage canals) will be encouraged. This strategy can only be implemented by building the capacity of communities, farmers, and entrepreneurs to efficiently operate and maintain the farm equipment and accessories. The following strategy elements are recommended to be in place:

- i. Develop and introduce appropriate machinery for efficient land preparation (ploughs and harrows), planting (seeder) harvesting (harvesters);
- ii. Strengthen the capacity of engineering program of NARI and Agriculture Engineering Services Unit (AESU) of DOA to develop appropriate equipment for producers;
- iii. Train farmers and extension agents on the operation and maintenance of the equipment; and,
- iv. Train artisans as trainers on the development and assemblage of farm equipment.

Table 8.5 below gives a breakdown of the most appropriate equipment that are required for

the effective implementation of NRDS II. A total of 63 tractors and accessories are required of which 22 each are for rainfed upland and irrigated, 19 tractors for lowland rainfed ecologies.

Table 8.5: Land preparation machinery requirement for the strategy

Ecology	Tractor type		Planting machines	
	Type	Quantity	Type	Quantity
Upland Rainfed	4WD 65-80HP	22	Super Eco seeder	200
Lowland Rainfed	4WD 80-90HP	19	Transplanters	50
Irrigated	4WD 80-90HP	22	Transplanters	100
Total		63		400

Other machines required as indicated in Table above ranges from super eco seeders for which 200 units is allocated to rainfed upland and 200 trans planters with 100 for irrigated and 50 each for the rainfed lowland and mangrove swamps.

8.2.7 Post-Harvest Processing

Substantial post-harvest losses in rice production arise mainly from inefficient field level processing and milling operations. Currently, most farmers are using drums and barrels for rice threshing which leads to substantial post-harvest losses. There is also a proliferation of inefficient small milling machines which farmers are relying on to mill their rice. In order to promote and sustain profitable rice production, it is essential to minimize post-harvest losses and also improve the quality of rice to meet the market demand. The use of harvesting and threshing equipment will be encouraged. To enhance efficiency, there is the need to introduce motorized threshers and efficient milling machines which will help to curb post-harvest losses. Reduction of post-harvest losses will be pursued through the following strategy elements:

- i. Promote small (1t/h) to medium (5-10 t/ha) scale milling machines;
- ii. Improve capacity and skills of service providers (extension agents, private operators, and farmers);
- iii. Promoting the adoption of appropriate post-harvest technologies;
- iv. Mapping of service providers, dealers and facilitate linkages between these actors and farmers;
- v. Renovate old and establish new storage and paddy drying facilities for rice at different parts of the country;
- vi. Encourage parboiling through training and introduction of necessary equipment;
- vii. Establish warehouses for milled rice at central locations of major producing and consumption areas;
- viii. Establish marketing credit lines and build capacity of marketers and processors at various market centers.

8.2.8 Rice Marketing

The rice marketing strategy will be focused on development of market infrastructure, and tools that can easily facilitate the buying and selling of locally produced rice. The following options will be exploited:

1) Strengthening Market Information and E-commerce Systems

Rice producers are highly fragmented which poses a challenge in meeting quality and quantity requirements for development of an efficient market information system. There is the need to strengthen market information and E-commerce systems to enable many smaller holder farmers not to sell their produce at giveaway prices. The market information system established at the department of planning does not provide market information on all the major market within the country. The information that is gathered is conducted on periodic basis which prevent market vendors from accessing relevant information during crucial periods of the marketing chain. To ensure market vendors acquire relevant market information at all time, there is the need to strengthen existing market information systems by incorporating e-commerce for easy information access. The following action points will help to operationalize this strategy:

- Ensure there are regular market data collection in all the major markets across the country;
- Promote ICT oriented technologies for speedy and timely market information;
- Support and strengthen market information systems through the use of national media, rural community radios and mobile phones;
- Sourcing of regular funding for the sustainability of the marketing information system;
- Ensure access to real time information on price in national and regional markets to reduce the risk of middlemen from over profiting along the rice value chain.

2) Linking Producers to Markets

The rice markets sector of The Gambia is dominated by imported rice. To promote commercialization of locally produced, there is need to ensure that a fair share of the rice market is accessed by local vendors. Currently, most of the locally produced rice stops at the farm gate. This happens because there is a vast difference in quality between domestic and imported rice. This reduces the competitiveness of locally produced rice. The following points will ensure vendors have access to a fair share of the local market:

- Improve the quality of local rice
- Promote the development of agribusiness and agro-processing enterprises
- Formation of marketing cooperatives
- Promote public private sector partnership through contract farming
- Establish producer groups and platforms to strengthen their bargaining power

3) Establishing frameworks for infrastructure development, management and maintenance

Good infrastructure is needed to enhance processing and marketing of locally produce rice. Once rice is harvested, it has to be dried to a desired moisture level for milling. This cannot be attained without the establishment of functional drying floors and seed stores. Currently, the seed stores and drying floors available are far below the required number needed to support local rice production. Most of the current facilities are in a deplorable condition requiring immediate renovation. Besides renovation, the facilities in place need to be properly managed for sustainability purpose. These facilities will improve product quality, reduce

marketing costs, reduce post-harvest losses, increase farm gate prices, create better linkages between producers and buyers and improve competitiveness of domestic production in supplying food products to major regional consumers. This strategy will be implemented by developing new facilities, renovate and manage old ones through the following action points:

- Construction of new drying floors and seed stores
- Rehabilitation of existing seed stores and drying floors
- Establishment of facility management committee

4) Promoting Market-Oriented Rice Varieties

Considering the water resource endowment of the country, there is a huge potential to attain self-sufficient in local rice production if the right production practices and policies are put in place and implemented. To attend this, there is need to identify, select and promote the most promising rice varieties with desirable consumer preferred traits available within the country. Currently, there are few rice varieties that are being promoted in the country. These are NERICA L19-sub1, Orylux 6, Sahel 177 and Sahel 134. Efforts will be made to promote these varieties through the following means:

- Encourage rice farmers to produce the selected varieties
- Establish markets for the farmers through contract farming
- Extension service to promote the varieties through farmer field school/farmer business school
- Support research and the seed sector to produce breeder, foundation and certified seeds of the selected varieties

Table 8.6: Harvesting and post-harvest machinery requirement of the NRDS II

Ecologies	Harvesters		Threshers	
	Machine type	Quantity	Machine type	Quantity
Rainfed upland	Combine harvester (Medium)	10	Motorized thresher	100
Rainfed Lowland	Combine harvester (Medium)	8	Motorized thresher	80
Irrigated	Combine harvester (Medium)	10	Motorized thresher	80
Mangrove	Combine harvester (Medium)	6	Motorized thresher	40
Total		34		300

8.2.9 Finance and Credit

Credit is an integral part of sustainable rice production because it helps balance seasonal savings in household cash-flows between incurring costs of production and outputs, thus, reduce and cushion the impact of shocks. Credit also provides the funds for investment in new technology and enterprises, thereby removing a critical barrier to innovation and entrepreneurship. In this vein, many developments experts regard credit as the motto of development.

In view of the foregoing, The Government of The Gambia (GOTG) through its line Ministries of Agriculture, Trade, and Finance provide adequate, easily accessible and repayable credit facilities in rural Gambia to boost rice production, processing, marketing and distribution.

The Gambia as at now, does not have an agricultural bank; government credit for farming

operations is provided through the Social Development Fund (SDF), which is supported by the Central Bank. The SDF disburse credits to beneficiaries by itself through its various regional outlets or through other micro-finance institutions (MFIs) for onward disbursement to beneficiaries. The repayment rate under SDF is considered satisfactory under the micro-finance best practices. Credit will be provided both for short- and medium-terms.

Almost all of the on-going rice projects or projects with rice components under the MOA have some credit facilities for rice value chain actors. The RRVCDP has a line of finance of around one million US dollars (USD\$1,000,000.00) that through SDF, will be disbursed to actors in the rice sector following Shariah compliant modalities. The ROOTS and GIRAV projects also have matching grant facilities that rice farmers can tap from to boost their production activities.

To improve business skills of the private sector to better service the farmers, individual entrepreneurs will be trained in business planning, book keeping and marketing. Institutions selected through short-listing will conduct the training. The service providers will include the Indigenous Business Advisory Services (IBAS), Social Development Fund (SDF), Management Development Institute (MDI), VISACA Promotion Centre (VPC) and the West African Insurance Institute. These trainings will enable the private entrepreneur to develop basic business plans that will be used as a basis for applying for loans. The promotion of the private sector will ensure the continuous provision of agricultural inputs. The SDF, being the government's micro-finance parastatal will carry out the following functions:

- i. Develop training modules on access and management of credits;
- ii. Provide training to farmers and link them to credit institutions for easy access to credit, inputs and equipment;
- iii. Organize farmers into community-based organizations; and,
- iv. Monitor and mentoring successful entrepreneurs to ensure that they appropriately apply the acquired skills.

8.3 Sustainability Mechanisms

Rice is the staple of the Gambia and since local production is still very low, the country imports close to 80% of its rice requirement per annum. This high importation bill continue to place high burdens on the country's foreign reserves. Since the NRDS will be serving as the guiding policy document for rice self-sufficiency, that national ownership will continue to exist. In addition, the community ownership and participatory approaches used by the strategy will be a strong sustainability element.

The strategy does not call for the creation of parallel entities to implement its activities, rather it depends on the existing management structures (governmental) at national and local level. The strategy is using the existing MOA structures to work closely with the NRDSC whose memberships also composed mainly of government, local authorities and private sector players to ensure proper implementation and creation of synergy among all stakeholders.

The value chain approach with private sector involvement to be stimulated by the microfinance programs will create a sense of entrepreneurship which means sustainable and profitable interventions.

The established partnership between the country and partners such as the Coalition for Africa Rice Development (CARD) and the networks established between national institutions with international institutions associated with rice development (AfricaRice, IRRI etc.) is expected to ensure regular supply of new technologies that will boost the capacity of our rice value chain actors. With these and other options to be utilized by the NRDS II, the gains that will be realized can be sustained for a very long time.

ANNEXES

ANNEX 1: NRDS II Indicator Reference Table:

Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
<p>6. Percentage reduction in rice imports.</p> <p>The unit of measurement is a percentage. All NRDS capacity development support efforts ultimately target to achieve improved food security in the Gambia of which rice is the major factor. The current level of rice imports into the country is not sustainable although it tries to meet a genuine deficit on the market. The aim is to eradicate rice imports by increasing the level of local rice production</p>						
Rice	Rice product name; region;	Quantity of rice imports as at 2020 or baseline minus Quantity of rice imports as at end of NRDS (2030) + Quantity of rice imports as at 2020.	Import records from Ministry of Trade database, producer/farmer records	Review of Government database on imports; sample survey at baseline and annually using structured questionnaire	At baseline and at end of the strategy.	MoFEA, GBOS, Ministry of Trade, GRA, all NRDS Implementing Partners (IP)
<p>7. Number of job opportunities created through NRDS activities disaggregated by rice-VC segment and job category (short or long term)</p> <p>This indicator is a crucial indicator to measure for the new NDP information needs. This is a simple count of job vacancies (not in the conventional sense but any opportunity that is created by NRDS that would require a person to be employed and paid) and the unit is just a number. It records all and the people that were employed in the rice-VC due to activities arising from NRDS support ONLY. The list of job categories will be provided as a guide to the data collectors but broadly they should be grouped under short and long term.</p>						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Rice VC segments; sub sector; job category	Name, ID, gender, region, number of days of employment; type of job to be done, number of people needed/engaged	Count and record all the job openings created, count all the number of people employed under each age group and gender and	IP databases and reports including admin and finance records	Administer Monthly data collection forms in all NRDS intervention areas and record the job opportunities and also people employed; collate these into quarterly reports; aggregate the	Quarterly and annually	ROOTS, ARVCP, GIRAV, future rice value chain oriented projects, MOA Departments, CPCU

		VC segment separately, aggregate in the database		values in database		
<p>8. Percent households living above the poverty line</p> <p>The unit for this indicator is a percent. The indicator measures the number of HH that has a HH income of less than USD1.25 per day per person, converted into local currency at 2005 Purchasing Power Parity (PPP) exchange rates. The use of PPP exchange rates ensures that the poverty line applied in each country has the same real value. Measurement is based on the value of average daily consumption expenditure per person, where food and other items that a household consumes out of its own production are counted as if the household purchased those items at market prices in the intervention areas as compared to the total number of HH that were assisted under the NRDS. A number of variables will be calculated as well and these include: The household income that will be determined through a number of actions shown below.</p>						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Gender, age and region	Number of people reached with the NRDS; HH income levels; gender and age, region, names of HH had or NRDS participant	Divide the number of HH with less than US\$1.25 per day per person by the total number of HH reached. Compare with baseline values and compute change due to NRDS interventions	IP database and reports. NRDS database; survey data	Baseline survey at start, annual and end of NRDS surveys in the sampled intervention areas. Data from NASS will be used as well.	At strategy start as baseline values, annual and at project end	ROOTS, ARVCP, GIRAV, future rice value chain oriented projects, MOA Departments, CPCU
<p>9. Change in annual budget allocation to the Agriculture disaggregated by crop sub sector specific separately (rice, horticulture, livestock etc.)</p> <p>The unit of measurement is percent. The indicator measures how much money is being allocated to the development of agriculture at national level with special emphases on the rice related investment. The Maputo Declaration on Agriculture and Food Security requires that governments allocate at least 10 percent of the national budget to agriculture development. Financial resources mobilization under NRDS tries to contribute to this target in the Gambia hence measuring how much budget contribution has the NRDS made on an annual basis will be a crucial data for the Ministry of Finance and Economic Affairs (MoFEA). Disaggregating the data by VC segment enable policy makers to identify any skewed allocation/distribution of resources across the Agriculture sector. Record the actual budget figures that are allocated to a specific VC and subsector separately</p>						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Sub sector, Agro VC; source of funding (treasury, private sector, bilateral or	Sub sector, Agro VC; source of funding (treasury, private sector, bilateral or otherwise)	Sub sector, Agro VC; source of funding (treasury, private sector,	Sub sector, Agro VC; source of funding (treasury, private sector, bilateral or otherwise)	Sub sector, Agro VC; source of funding (treasury, private sector, bilateral or otherwise)	Sub sector, Agro VC; source of funding (treasury, private sector,	ROOTS, ARVCP, GIRAV, MOA Departments, CPCU

otherwise)		bilateral or otherwise)			bilateral or otherwise)	
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SECTION B: Outcome level indicators

1. Percent of households with improved levels of food security (measured as a reduction in period (months) of food deficit during lean season period), disaggregated by gender, age and by region of HH head

The unit of measurement is a percentage. This indicator measures the total number of households whose food security status has been changed as a result of NRDS intervention. The measure checks how much the NRDS assistance has changed the food security situation by determining the HH that have realized a change in the number of hungry months (the desired direction of change is a reduction). A decrease in household hunger is also a reflection of improved household resilience. Hungry period is a count of the months that a HH had problems of accessing adequate food. In the Gambia this is commonly referred to as the lean period which may cover the period June to November. In this case measure will target only those HH that benefited from NRSD interventions. The lean period will be based on an agreed set of food classes and **NOT** only rice. A reduction in the number of HH they have less hungry months is a measure of food security attainment. This can be attained through the following: all capacity development support activities at farm level under NRDS; enabling policy environment that favors smallholder rural development, the need to tackle soil fertility depletion as the fundamental biophysical constraint to rice production and productivity, and the need for more intensive and diverse land use to produce high value products while increasing agro ecosystem resilience will contribute greatly to food security and environmental conservation, in a win-win situation

Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
HH, gender, age and region	Names of HH supported under NRDS; gender and age of HH heads; region; common food classes per region	Number of HH heads that had food deficit divide by the sample size (n) and X 100. The various categories of months of food deficit can be computed through various statistical analyses software like SPSS to calculate % HH in a specific food deficit category	IP database and reports; baseline survey reports	A HH questionnaire administration for baseline; annual outcome and end of strategy sample surveys	Annually and end of project	ROOTS, ARVCP, GIRAV, MOA Departments, CPCU

2. Proportion of households with change in income generated from the rice VC disaggregated by source of income and gender, age and region

The unit of measurement is a percent. There is a high probability that investing in the rice VC will result improve the quality of life for the various sub segment VC actors. Naturally, if the investment/support is right, the income of the HH of the VC actors is expected to increase. This indicator measures how many of the assisted rice VC actors will realize an increase in HH income. HH income for calculating this indicator should be limited to the income raised from the rice-VC only and other sources like remittances. A careful follow

up of the link between the income sources to the rice-VC activities is required and should be established in the survey questionnaire. Data on the sources of HH income will be useful in providing the contextual explanation of trends. Such data can be determined through the NASS.						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Income source, gender, age, region	Name and ID of farmers; region; gender and age; source of income; VC activities list; income	Divide the number of HH whose income has changed (separate those with reduced from those with increased income by the total number of HH assisted in the sample	IP database and reports; NRDS database; survey data; NASS reports	Data collection forms used to record income realized from rice-VC activities and collated into quarterly and annual reports; survey questionnaire administered as scheduled (baseline and end of NRDS)	Baseline, annual and end of NRDS	ROOTS, ARVCP, GIRAV, future rice VC oriented projects, MOA Departments, CPCU
<p>3. Change (%) in area (ha) under rice disaggregated by variety, ecology type and by gender, age and region of farmer</p> <p>Improved capacity in terms of skills and resources support will increase the production capacity of participating farmers and this increased capacity can be known by measuring the change in agricultural land that is put under rice production. This indicator just records a number in hectares. It measures the size of land that is being used to produce rice. This is recorded annually at the end of every cropping season. It helps to calculate an outcome indicator on change in area under rice since it will be compared to the baseline value. All the area on which rice crop varieties was grown is measured and recorded. It tries to establish whether there are any variations in the area between varieties and ecologies, i.e. which variety and ecology are preferred most and in which regions.</p>						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Rice ecology, variety; region; production	Name; gender; age; ID or voter number of person; region; variety name; number of hectare; type of ecology; dates of key management practices like planting, harvesting, record production data like quantity harvested for the crop; names and quantity of inputs used	Count the individual farmer level area and sum all those for similar ecology and similar production type at baseline. Use this value as an enumerator to compute the % change on an annual and project basis. Area at	IP collects this data through census or survey of strategy participants, direct observation of land, and report into strategy documents; IP database and NRDS database	Administer monthly data collection forms for participating farmers; outcome annual sample surveys; NASS	At baseline and annually	ROOTS, ARVCP, GIRAV, MOA Departments, CPCU

		baseline divided by area at year/end of NRDSX100 for each crop and production type				
<p>4. Proportion of farmers that are realizing a change in yield (T/Ha) disaggregated by ecology, rice variety and crop production type and by gender, age and region of farmer</p> <p>The unit of measurement is tons per hectare (t/ha). Capacity development assistance under NRDS aims at improving land utilization and return per dollar used. This indicator is limited to rice only so data should clearly indicate this. The more quantity one gets from a piece of land the higher the chances that overall production will be high and food security will improve. Yield is quantity produced per unit area. Yields of selected rice varieties will be estimated by randomly selecting fields for yield measurement using the Gambia NASS method in addition to the physical yield measurement that will be done by farmers and field staff during the harvesting stage of selected rice variety, in the intervention sites. Disaggregating the data by region is crucial since different region have different productive potential and capacity by nature of the physical factors like temperature, rainfall amount and distribution and soil type. Type of production for example refers to how the crop is being produced and managed e.g. irrigated rice versus rain fed rice.</p>						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Crop name, gender, age, region, rice ecology and variety	Name of HH; ID #; field GPS coordinates/region; crop name; production type; area cropped (ha); quantity harvested; name and type of inputs used; quantity of inputs used	The NASS crop yield calculation will be used for calculating yields; physical measurement of produce during harvest time; measurement of sample fields; ultimate calculation is done: yield figure at strategy end – baseline yield figure divided by baseline figure yield X 100	Farmers records; extension staff records; IP database; survey data during the NASS	Baseline and annual surveys, including NASS	At baseline and annually	ROOTS, ARVCP, GIRAV, MOA Departments, CPCU
<p>5. Change (%) in the volume of local rice products available on the local market, disaggregated by rice VC segment type and by region</p> <p>The unit of measurement is a percentage. All NRDS capacity development support efforts ultimately target to achieve improved rice self-sufficiency in the Gambia among other things. The current level of rice imports into the country is not sustainable although it tries to meet a genuine deficit on the market. The aim is to reduce rice imports by increasing</p>						

the level of local rice production. This indicator measures the amount of locally produced rice that is available on the local market. Indirectly, it measures the extent to which NRDS support will have reduced the imports of rice, i.e. level of import substitution. This data can be collected from either producers or retailers. From producers' record quantity of rice sold for each brand and to the market to which it was sold. Record the amount of rice that was reserved for home consumption.						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
Rice VC-actors (processors); gender and age; product type and region	Name and ID #, age of VC-actor; region; product type/name; estimated metric units produced; quantity sold; destination market; number of assisted processors	New metric values of products (quantity) for sample processor – baseline value of product type divided by baseline value x 100	IP database and reports; processors records; NRDS database	Capture all figures through a form that is completed by processors regularly; annual sample outcome surveys	At baseline; annually and at strategy end in 2030	ROOTS, ARVCP, GIRAV, MOA Departments, CPCU
<p>6. Proportion of rice VC actors achieving reduced post-harvest losses disaggregated by value chain segment, product type and by gender, age and region of value chain actor</p> <p>The unit is a percentage. Rice VC actors lost a lot of food and income due to huge post-harvest losses every year (about 30%?). There is very high interest to reduce post-harvest losses under NRDS. Strengthening skills, investing in processing technology to add value to primary products are key means that can be used to reduce post-harvest losses. PH losses refers to any loss of any crop that is incurred during and after harvesting to as far as any stage before consumption.</p>						
Disaggregation	Required data sets	Calculation	Data sources	Data collection methods	Frequency of reporting	IP contributing progress
VC segment; product type; gender; age and region	Name, age, gender, ID # and region of VC actor; VC segment to which actor belongs/operates, product type; quantity of primary products received; quantity of lost product	VC actor under each VC segment and for each product type who consistently achieved a reduced PH loss divided by total # of VC actors under each VC segment and for each product type	Rice VC actors records; IP database and reports; NRDS database and reports	Capture all figures through a form that is completed by processors regularly; field staff to collect figures on a monthly basis and for capturing into quarterly reports; annual sample outcome surveys using structured questionnaire	At baseline; annually and at strategy end in 2030	ROOTS, ARVCP, GIRAV, MOA Departments, CPCU

ANNEX 2: NRDS II Formulation Taskforce Members:

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Mr. Morro Bah - Principal Seed Officer & Team Leader for Seed Projections
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Mr. Mustapha Minteh - Director, Agriculture Engineering Services
Mr. Lamin Fadera - Secretary, Farmers Platform
Mr. Ebrima Ceesay - NACOFAG
Dr. Mike Nasamu- CARD Regional Consultant and facilitator of the working week

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